

J300
J300 ABS

Motorcycle
Service Manual



Kawasaki

Quick Reference Guide

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

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



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Motorcycle Service Manual

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

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

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

LIST OF ABBREVIATIONS

A	ampere(s)	kg	(mass)
ABDC	after bottom dead center	kgf	(force)
AC	alternating current	km/h	kilometers per hour
Ah	ampere hour	L	liter(s)
ATDC	after top dead center	lb	pound(s)
BBDC	before bottom dead center	m	meter(s)
BDC	bottom dead center	min	minute(s)
BTDC	before top dead center	N	newton(s)
°C	degree(s) Celsius	oz	ounce(s)
CDI	capacitive discharge ignition	Pa	pascal(s)
cmHg	centimeters of mercury	PS	horsepower
cu in.	cubic inch(es)	psi	pound(s) per square inch
DC	direct current	qt	quart(s)
EMI	Electro-Magnetic Interference	r	revolution
F	farad(s)	r/min, rpm	revolution(s) per minute
°F	degree(s) Fahrenheit	s	second(s)
ft	foot, feet	SOHC	single overhead camshaft
g	gram(s) (mass)	TDC	top dead center
gal	gallon(s)	TIR	total indicator reading
h	hour(s)	V	volt(s)
HP	horsepower(s)	W	watt(s)
in.	inch(es)	Ω	ohm(s)
ISC	Idle Speed Control		

Foreword

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

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

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

To get the longest life out of your vehicle.

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

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference

Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

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

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

DANGER

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

WARNING

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

NOTICE

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

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

NOTE

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

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

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

General Information

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1-2 GENERAL INFORMATION

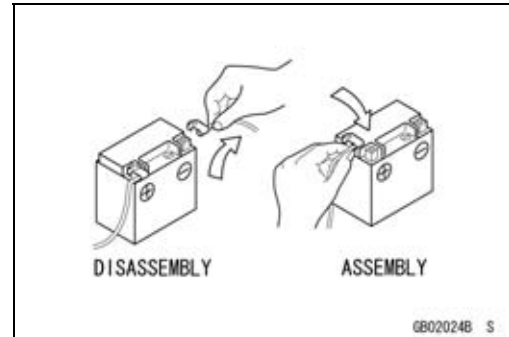
Before Servicing

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

Especially note the following.

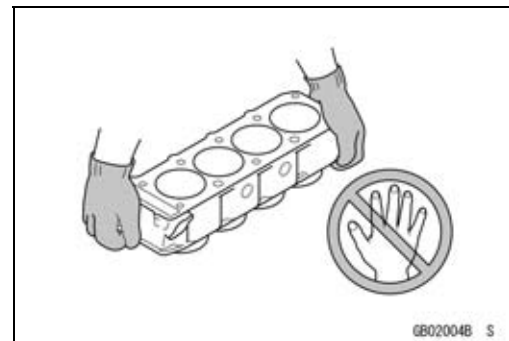
Battery Ground

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



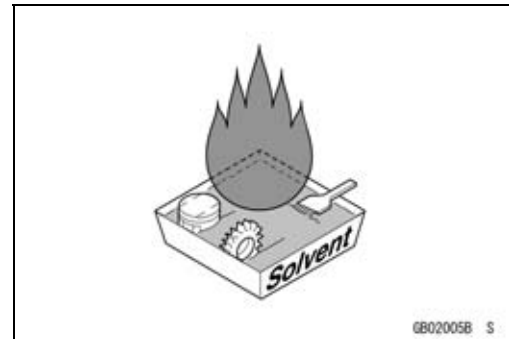
Edges of Parts

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



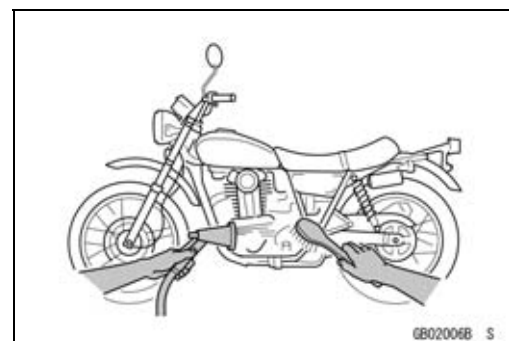
Solvent

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



Cleaning Vehicle before Disassembly

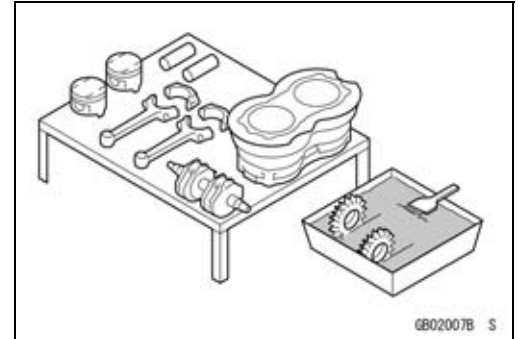
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

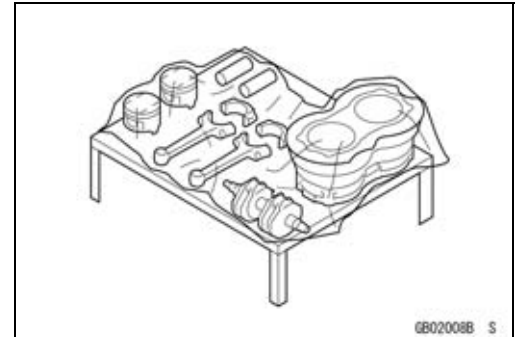
Arrangement and Cleaning of Removed Parts

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



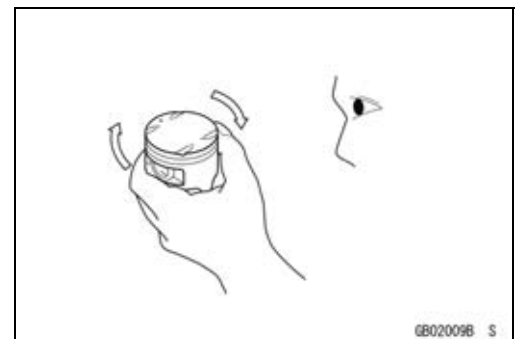
Storage of Removed Parts

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



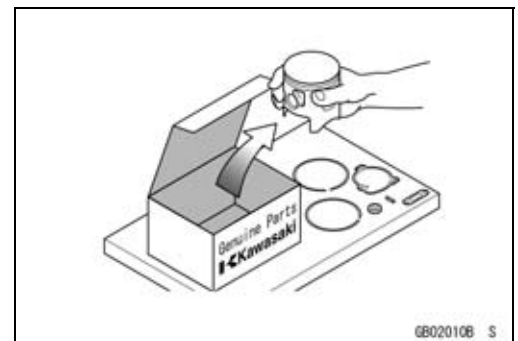
Inspection

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



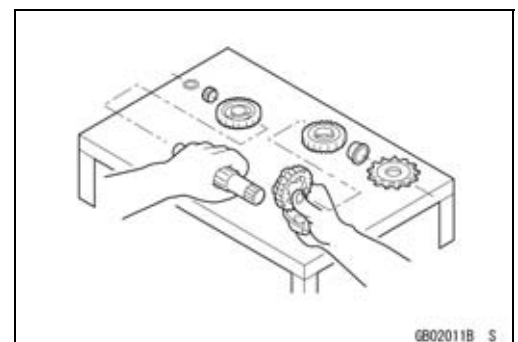
Replacement Parts

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



Assembly Order

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

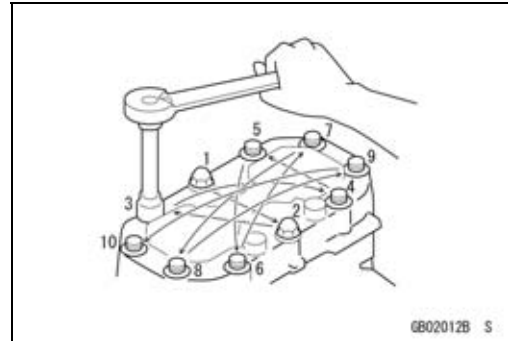


1-4 GENERAL INFORMATION

Before Servicing

Tightening Sequence

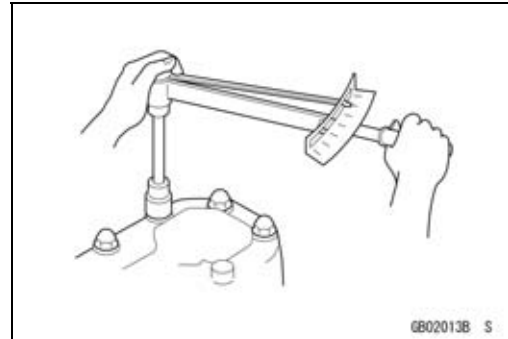
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or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



Tightening Torque

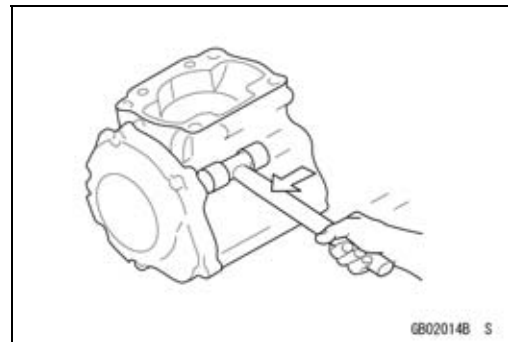
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench. Often, the tightening sequence is followed twice-initial tightening and final tightening with torque wrench.

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



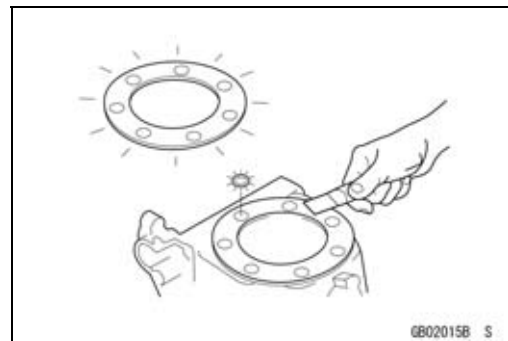
Force

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



Gasket, O-ring

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



Liquid Gasket, Non-permanent Locking Agent

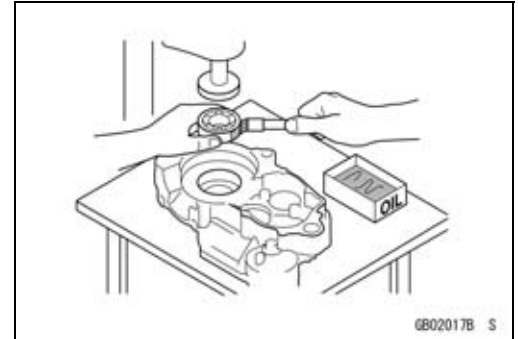
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

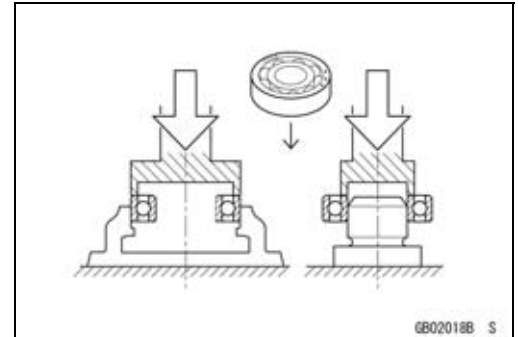
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

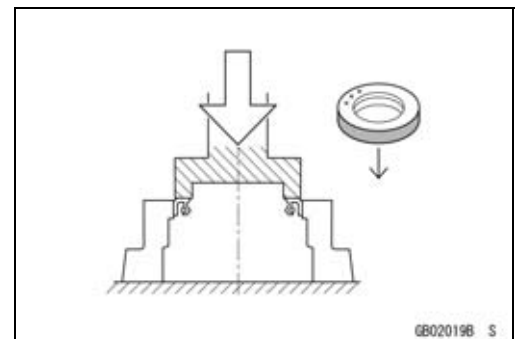
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

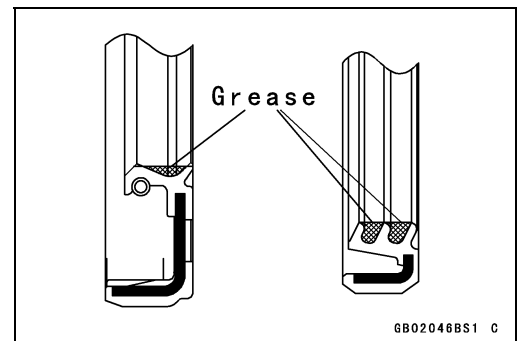


Oil Seal, Grease Seal

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

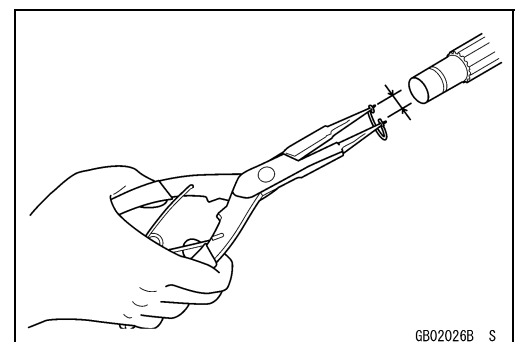


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

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



1-6 GENERAL INFORMATION

Before Servicing

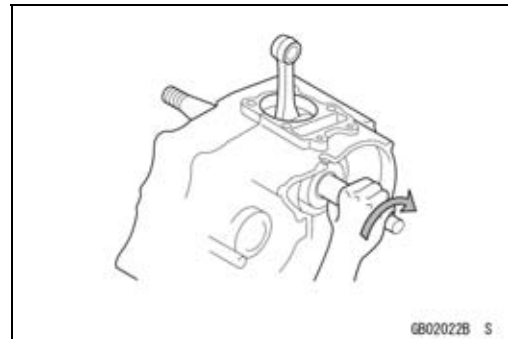
Lubrication

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



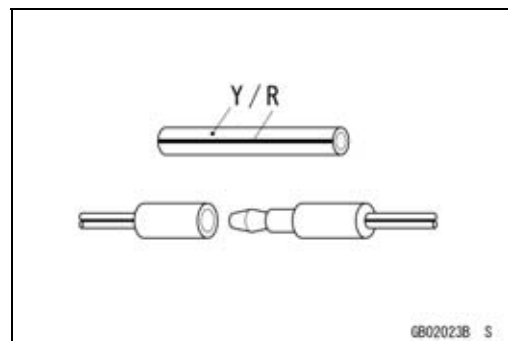
Direction of Engine Rotation

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



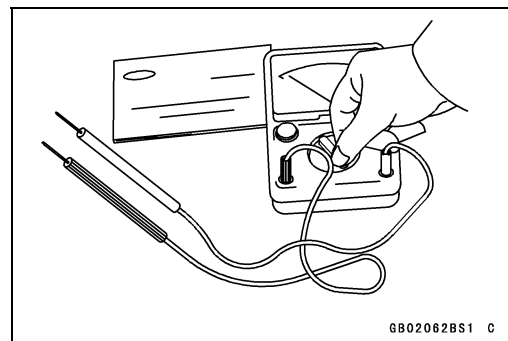
Electrical Leads

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



Instrument

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



Model Identification

SC300AE Left Side View



SC300AE Right Side View



1-8 GENERAL INFORMATION

Model Identification

SC300BE Left Side View



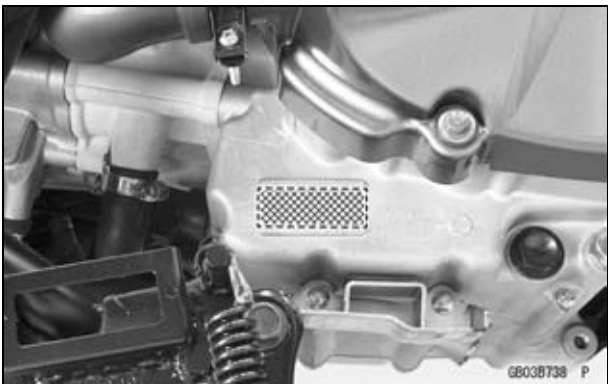
SC300BE Right Side View



Frame Number



Engine Number



General Specifications

Items	SC300AE ~ AF/BE ~ BF
Dimensions	
Overall Length	2 235 mm (87.99 in.)
Overall Width	775 mm (30.51 in.)
Overall Height	1 260 mm (49.61 in.)
Wheelbase	1 555 mm (61.22 in.)
Road Clearance	145 mm (5.71 in.)
Seat Height	775 mm (30.5 in.)
Curb Mass:	191 kg (421 lb)
Front	78 kg (172 lb)
Rear	113 kg (249 lb)
Fuel Tank Capacity	13 L (3.4 US gal)
Performance	
Minimum Turning Radius	2.6 m (8.5 ft)
Engine	
Type	4-stroke, SOHC, single cylinder
Cooling System	Liquid-cooled
Bore and Stroke	72.7 × 72.0 mm (2.86 × 2.83 in.)
Displacement	299 cm ³ (18.2 cu in.)
Compression Ratio	10.8:1
Maximum Horsepower	20.3 kW (28 PS) @7 750 r/min (rpm)
Maximum Torque	28.7 N·m (2.9 kgf·m, 21 ft·lb) @6 250 r/min (rpm)
Fuel System:	FI (Fuel Injection) KEIHIN 34 × 1
Minimum Octane Rating:	
Research Octane Number (RON)	91
Starting System	Electric starter
Ignition System	ECU control (full transistor)
Timing Advance	Electronically advanced
Ignition Timing	10.0° BTDC @1 600 r/min (rpm) to 30.0° BTDC @7 750 r/min (rpm)
Spark Plug	NGK CR7E
Valve Timing:	
Intake:	
Open	9° (BTDC)
Close	37° (ABDC)
Duration	226°
Exhaust:	
Open	39° (BTDC)
Close	10° (ATDC)
Duration	229°
Lubrication System	Forced lubrication (wet sump)

1-10 GENERAL INFORMATION

General Specifications

Items	SC300AE ~ AF/BE ~ BF
Engine Oil: Type Viscosity Capacity	API SJ, SL or SM with JASO MA, MA1 or MA2 SAE 5W-50 1.5 L (1.6 US qt)
Drive Train Driving System Primary Reduction Ratio Final Reduction Ratio Over Drive Ratio Clutch Type	V-Matic continuously variable 2.220 ~ 0.790 7.222 16.030 ~ 5.700 Automatic, centrifugal
Frame Type Caster (Rake Angle) Trail Front Tire: Type Size Rear Tire: Type Size Rim Size: Front Rear Front Suspension: Type Wheel Travel Rear Suspension: Type Wheel Travel Brake Type: Front Rear	Tubular diamond 28° 113 mm (4.45 in.) MAXXIS, i PRO, Tubeless 120/80-14 M/C 58S MAXXIS, PRO, Tubeless 150/70-13 M/C 64S J 14 × 3.0 J 13 × 4.0 Telescopic fork 110 mm (4.33 in.) Swingarm 100 mm (3.94 in.) Single disc Single disc
Electrical Equipment Battery Headlight: Type Bulb: High Low Tail/Brake Light Alternator: Type Maximum Output	12 V 10 Ah (10 HR) Semi-sealed beam 12 V 35 W × 2 12 V 35 W × 2 LED Three-phase AC 25.0 A/14 V @10 000 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/cm ²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg
kgf/cm ²	×	98.07	=	kPa
kgf/cm ²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

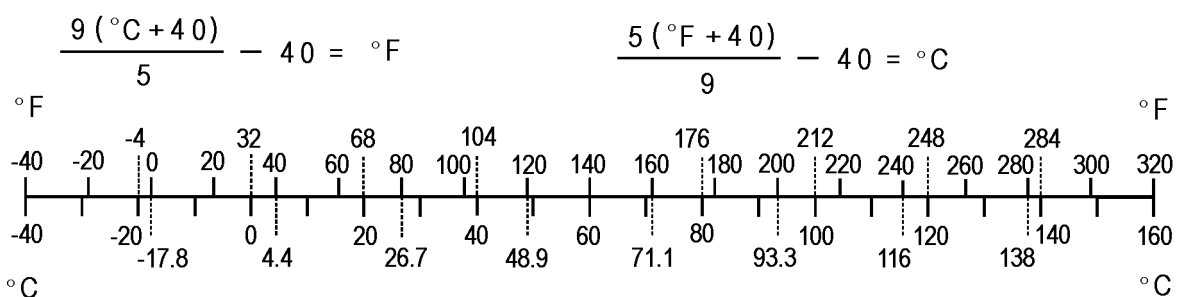
Units of Speed:

km/h	×	0.6214	=	mph

Units of Power:

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

Units of Temperature:



Periodic Maintenance

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2-2 PERIODIC MAINTENANCE

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.

I: Inspection and Clean, Adjust, Lubricate or Replace if necessary

C: Clean

A: Adjust

R: Replace

L: Lubricate

*: Should be serviced by your Kawasaki dealer, unless you have the proper tools, service data and are technically qualified.

** : In the interest of safety, we recommend these items be serviced only by your Kawasaki dealer. Kawasaki recommends that your Kawasaki dealer road test your scooter after each periodic maintenance service is completed.

ITEM	FREQUENCY	Whichever comes first ↓	*Odometer Reading × 1 000 km (× 1 000 mile)						See Page	
			1 (0.6)	5 (3)	10 (6)	15 (9)	20 (12)	25 (15)		30 (18)
		MONTH	1	6	12	18	24	30		36
* Air cleaner element				R	R	R	R	R	R	2-11
* Idle speed					I		I		I	2-12
* Throttle control system (play, smooth return, no drag)				I	I	I	I	I	I	2-12
* Fuel system					I		I		I	2-13
** Fuel hose			Replace at every 5 years						2-14	
** Coolant				I	R	I	R	I	R	2-16
* Valve clearance				I	A	I	A	I	A	2-19
** Clutch shoe wear					I		I		I	2-20
Engine oil and oil filter			R	R	R	R	R	R	R	2-20
* Engine oil screens (both right and left)				C	R	C	R	C	R	2-23
Crankcase breather			C	C	C	C	C	C	C	2-23
** Wheels/tires				I	I	I	I	I	I	2-23
* Drive belt				I	I	I	R	I	I	2-25
* Transmission oil			R	R	R	R	R	R	R	2-27
Brake system				I	I	I	I	I	I	2-28
Brake fluid				I	R	I	R	I	R	2-29
Brake hose				Replace at every 4 years						2-31
Brake rubber parts				Replace at every 48 000 km (30 000 mile) or 4 years (whichever occurs earlier)						2-32
Brake pad wear				I	I	I	I	I	I	2-35
Brake light switch				I	I	I	I	I	I	2-36
Suspension system					I		I		I	2-36
Steering stem bearings				I	I	I	I	I	I	2-38
* Electrical system				I	I	I	I	I	I	2-39
Spark plug				I	R	I	R	I	R	2-42

PERIODIC MAINTENANCE 2-3

Periodic Maintenance Chart

ITEM	FREQUENCY	Whichever comes first	*Odometer Reading × 1 000 km (× 1 000 mile)							See Page
		↓	1 (0.6)	5 (3)	10 (6)	15 (9)	20 (12)	25 (15)	30 (18)	
		MONTH	1	6	12	18	24	30	36	
	Chassis parts				L		L		L	2-43
*	Condition of bolts, nuts and fasteners									2-44

2-4 PERIODIC MAINTENANCE

Torque and Locking Agent

Tighten all bolts and nuts to the proper torque using an accurate torque wrench. If insufficiently tightened, a bolt or nut may become damaged, strip an internal thread, or break and then fall out. The following table lists the tightening torque for the major bolts and nuts, and the parts requiring use of a non-permanent locking agent or silicone grease etc. All of the values are for use with dry solvent - cleaned threads unless otherwise indicated.

When checking the tightening torque of the bolts and nuts, first loosen the bolt or nut by half a turn and then tighten to specified torque.

Letters used in the "Remarks" column mean:

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

Lh: Left-hand Threads

R: Replacement Parts

S: Follow the specified tightening sequence.

Si: Apply silicone grease.

SS: Apply silicone sealant.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Water Temperature Sensor (ECU)	12	1.2	106 in·lb	
Fuel Injector Mounting Bolt	9.8	1.0	87 in·lb	
Oxygen Sensor	25	2.5	18	
Fuel Pump Mounting Screws	3.4	0.35	30 in·lb	
Cooling System				
Water Hose Clamp Screws	4.4	0.45	39 in·lb	
Thermostat Housing Cover Bolts	7.4	0.75	65 in·lb	
Water Pump Cover Bolts	9.8	1.0	87 in·lb	
Water Pump Impeller	12	1.2	106 in·lb	Lh
Water Temperature Sensor (ECU)	12	1.2	106 in·lb	
Water Temperature Sensor (Meter)	7.4	0.75	65 in·lb	SS
Engine Top End				
Upper Camshaft Chain Guide Bolt	9.8	1.0	87 in·lb	
Rocker Shaft Stopper Bolt	8.8	0.90	78 in·lb	L
Intake Manifold Stud Bolts	8.8	0.90	78 in·lb	
Cylinder Head Stud Bolts	8.8	0.90	78 in·lb	
Exhaust Pipe Manifold Stud Bolts	8.8	0.90	78 in·lb	
Camshaft Sprocket Bolts	12	1.2	106 in·lb	L
Cylinder Head Nuts (M10) (First)	20	2.0	15	S
Cylinder Head Nuts (M10) (Final)	37	3.8	27	S
Cylinder Head Nuts (M6)	9.8	1.0	87 in·lb	S
Cylinder Head Bolts	9.8	1.0	87 in·lb	S
Cylinder Bolts	9.8	1.0	87 in·lb	S
Camshaft Chain Tensioner Mounting Bolts	12	1.2	106 in·lb	
Camshaft Chain Tensioner Cap Bolt	4.4	0.45	39 in·lb	
Spark Plug	12	1.2	106 in·lb	
Fuel Hose Bracket Bolt	9.8	1.0	87 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
Intake Manifold Mounting Nuts	9.8	1.0	87 in·lb	
Valve Adjusting Screw Locknuts	8.8	0.90	78 in·lb	
Muffler Body Mounting Bolts	34	3.5	25	
Exhaust Pipe Manifold Holder Nuts	20	2.0	15	
Converter System				
Left Crankcase Cover Bolts	9.8	1.0	87 in·lb	
Drive Face Nut	93	9.5	69	
Clutch Outer Nut	54	5.5	40	
Clutch Drive Plate Nut	54	5.5	40	
Engine Lubrication System				
Oil Screen Plug	9.3	0.95	82 in·lb	R L
Oil Pump Screws	9.8	1.0	87 in·lb	
Oil Separator Cover Bolts	9.8	1.0	87 in·lb	
Oil Pressure Switch	23	2.3	17	
Engine Oil Drain Bolt	25	2.5	18	
Oil Filter Cap	9.3	0.95	82 in·lb	
Engine Removal/Installation				
Engine Hanger Nuts	64	6.5	47	R
Engine Mounting Nut	49	5.0	36	R
Crankcase/Crankshaft				
Crankcase Bolts	9.8	1.0	87 in·lb	EO L
Engine Stud Bolts	12	1.2	106 in·lb	
Starter Motor Clutch Bolts	20	2.0	15	
Wheels/Tires				
Front Axle	20	2.0	15	R
Rear Axle Nut	118	12.0	87.0	
Sub Frame Bolts	34	3.5	25	
Final Drive				
Final Gear Case Cover Bolts	20	2.0	15	
Oil Filler Bolt	9.8	1.0	87 in·lb	
Final Gear Case Oil Drain Bolt	9.8	1.0	87 in·lb	
Brakes				
Front Caliper Mounting Bolts	34	3.5	25	L
Front Wheel Rotation Sensor Bolt	12	1.2	106 in·lb	
Brake Hose Banjo Bolts	34	3.5	25	
Brake Disc Mounting Bolts	34	3.5	25	L
Brake Reservoir Cap Screws	1.6	0.16	14 in·lb	
Master Cylinder Clamp Bolts	12	1.2	106 in·lb	
Brake Lever Pivot Bolt	2.0	0.20	18 in·lb	Si
Brake Lever Pivot Bolt Locknut	9.8	1.0	87 in·lb	
Brake Light Switch Screw	1.0	0.10	8.9 in·lb	
Bleed Valves	5.4	0.55	48 in·lb	

2-6 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Brake Pad Pin	18	1.8	13	L
Rear Caliper Mounting Bolts	34	3.5	25	L
ABS Hydraulic Unit Mounting Nuts	7.8	0.80	69 in·lb	
Suspension				
Front Fork Clamp Bolts	26	2.7	19	AL
Front Fork Bottom Allen Bolts	29	3.0	21	L
Upper Rear Shock Absorber Nuts	39	4.0	29	R
Lower Rear Shock Absorber Bolts	39	4.0	29	
Sub Frame Bolts	34	3.5	25	
Steering				
Steering Stem Nut	20	2.0	15	
Steering Stem Lock Nut	62	6.3	46	
Handlebar Mounting Nut	44	4.5	32	R
Frame				
Grab Rail Mounting Bolts	24	2.4	18	
Electrical System				
Ignition Coil Mounting Nuts	12	1.2	106 in·lb	SS
Starter Relay Terminal Nuts	29	3.0	21	
Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
Water Temperature Sensor (Meter)	7.4	0.75	65 in·lb	
Water Temperature Sensor (ECU)	12	1.2	106 in·lb	
Alternator Rotor Nut	59	6.0	44	
Alternator Cover Bolts	9.8	1.0	87 in·lb	
Timing Inspection Cap	4.4	0.45	39 in·lb	
Alternator Cover Center Cap (SC300AE/BE)	4.4	0.45	39 in·lb	
Alternator Cover Center Cap (SC300AF ~/BF ~)	9.8	1.0	87 in·lb	
Stator Coil Bolts	9.8	1.0	87 in·lb	L
Crankshaft Sensor Bolts	4.4	0.45	39 in·lb	
Starter Motor Clutch Bolts	20	2.0	15	
Oxygen Sensor	25	2.5	18	

Torque and Locking Agent

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

Basic Torque for General Fasteners

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

2-8 PERIODIC MAINTENANCE

Specifications

Item	Standard	Service Limit
Fuel System (DFI)		
Throttle Grip Free Play	2 ~ 6 mm (0.08 ~ 0.24 in.)	— — —
Idle Speed	1 600 ±100 r/min (rpm)	— — —
Air Cleaner Element	Wet paper element	— — —
Cooling System		
Coolant:		
Type (Recommended)	Permanent type of antifreeze	— — —
Color	Green	— — —
Mixed Ratio	Soft water 50%, coolant 50%	— — —
Freezing Point	−35°C (−31°F)	— — —
Total Amount	1.5 L (1.6 US qt)	— — —
Engine Top End		
Valve Clearance:		
Exhaust	0.10 mm (0.0039 in.)	— — —
Intake	0.10 mm (0.0039 in.)	— — —
Converter		
Drive Belt Width	25.2 mm (0.992 in.)	23.7 mm (0.933 in.)
Engine Lubrication System		
Engine Oil:		
Type	API SJ, SL or SM with JASO MA, MA1 or MA2	— — —
Viscosity	SAE 5W-50	— — —
Capacity	1.3 L (1.4 US qt)	— — —
	1.5 L (1.6 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	— — —	1 mm (0.04 in.)
Rear	— — —	1 mm (0.04 in.)
Air Pressure (when Cold):		
Front	200 kPa (2.0 kgf/cm ² , 29 psi)	— — —
Rear	225 kPa (2.25 kgf/cm ² , 33 psi)	— — —
Final Drive		
Final Gear Case Oil:		
Viscosity	SAE 90	— — —
Capacity	0.23 L (0.24 US qt) at disassembly	— — —
	0.21 L (0.22 US qt) at change	— — —
Brakes		
Brake Fluid:		
Grade	DOT4	— — —
Brake Pad Lining Thickness:		
Front	5 mm (0.20 in.)	1 mm (0.04 in.)
Rear	5.8 mm (0.23 in.)	1 mm (0.04 in.)

Specifications

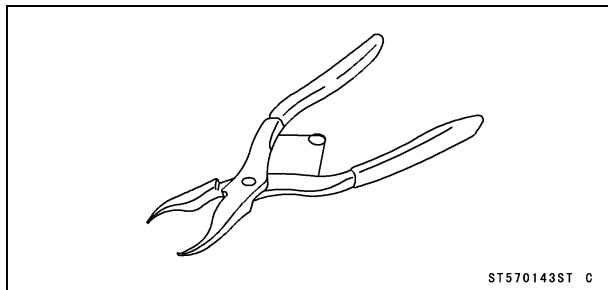
Item	Standard	Service Limit
Brake Light Timing:		
Front	Pulled ON	— — —
Rear	Pulled ON	— — —
Electrical System		
Spark Plug:		
Type	NGK CR7E	— — —
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	— — —

2-10 PERIODIC MAINTENANCE

Special Tools

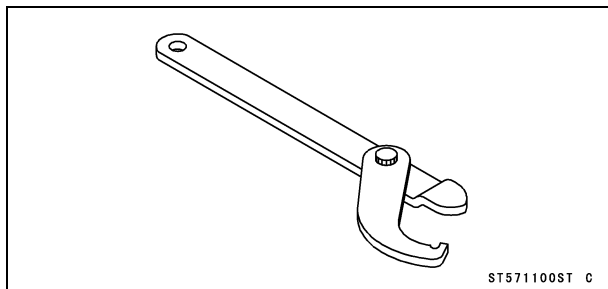
Inside Circlip Pliers:

57001-143



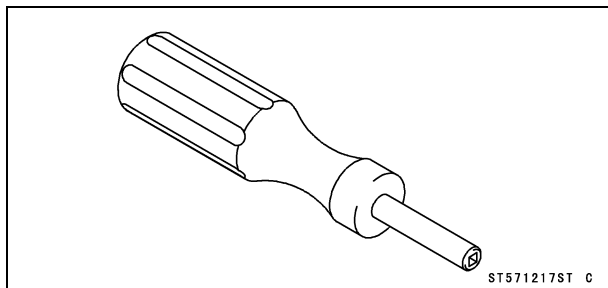
Steering Stem Nut Wrench:

57001-1100



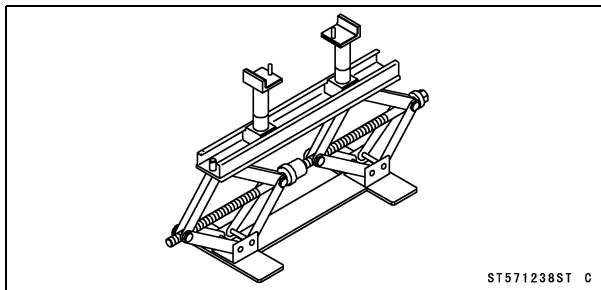
Valve Adjusting Screw Holder:

57001-1217



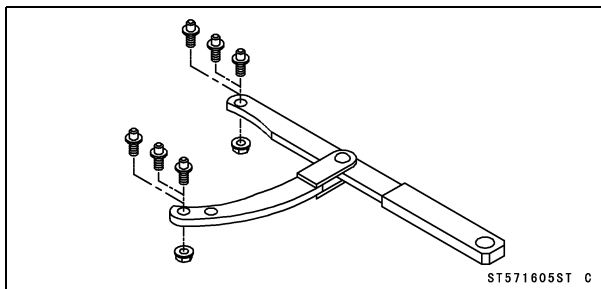
Jack:

57001-1238



Flywheel & Pulley Holder:

57001-1605



Periodic Maintenance Procedures

Fuel System (DFI)

Air Cleaner Element Replacement

NOTE

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

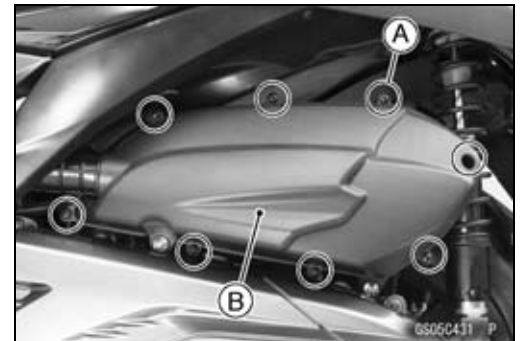
⚠ WARNING

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

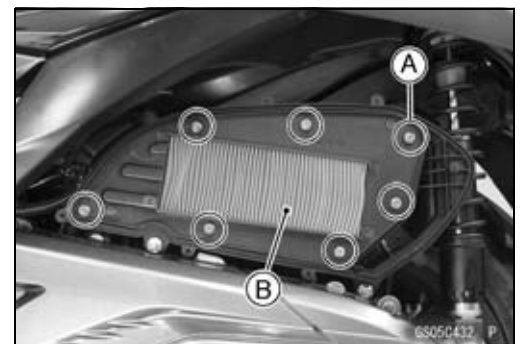
NOTICE

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

- Remove:
Screws [A]
Air Cleaner Cover [B]



- Remove:
Bolts [A]
Air Cleaner Element [B]



- Install a new element and tighten its bolts.

NOTICE

Use only the recommended air cleaner element. Using another air cleaner element will wear the engine prematurely or lower the engine performance.

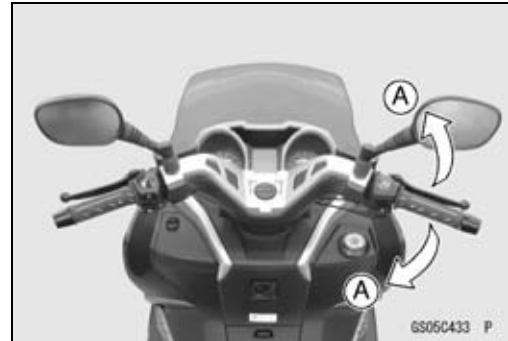
- Install the air cleaner cover and tighten its screws.

2-12 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebars to both sides [A].
- ★ If handlebars movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed, or damaged. Be sure to correct any of these conditions before riding (see Throttle Control System Inspection and Cable, Wire, and Hose Routing section in the Appendix chapter).



⚠ WARNING

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

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

Idle Speed

Standard: 1 600 ±100 r/min (rpm)

Idle Speed Adjustment

NOTE

- *This motorcycle is equipped with the idle speed control valve. The idle speed is adjusted automatically at the specified value (1 600 r/min (rpm)) by the idle speed control valve system. Therefore, it is not necessary to adjust the idle speed normally.*

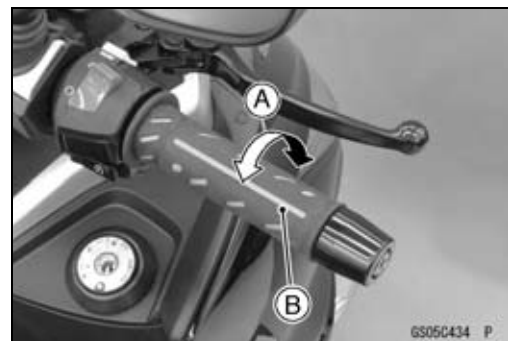
Throttle Control System Inspection

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

Throttle Grip Free Play

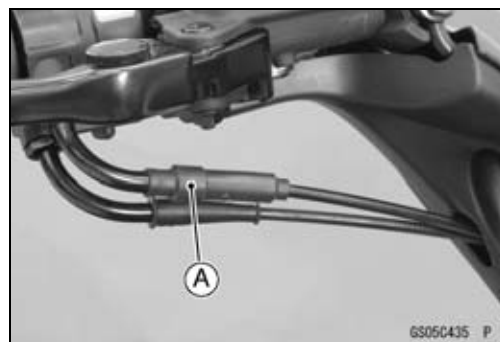
Standard: 2 ~ 6 mm (0.08 ~ 0.24 in.)

- Check that the throttle grip [B] moves smoothly from full open to close, and the throttle closes quickly and completely by the return spring in all steering positions.
- ★ If the throttle grip does not return properly, check the throttle cables routing, grip free play, and cable damage. Then lubricate the throttle cable.
- Run the engine at the idle speed, and turn the handlebars all the way to the right and left to ensure that the idle speed does not change.
- ★ If the idle speed increases, check the throttle cable free play and the cable routing.

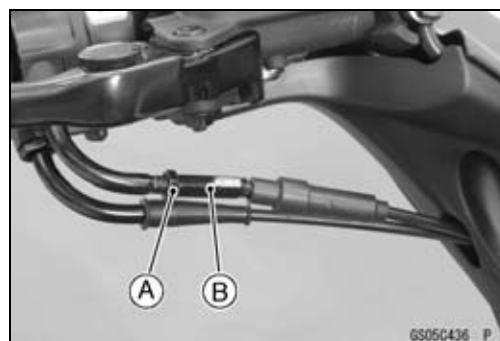


Periodic Maintenance Procedures

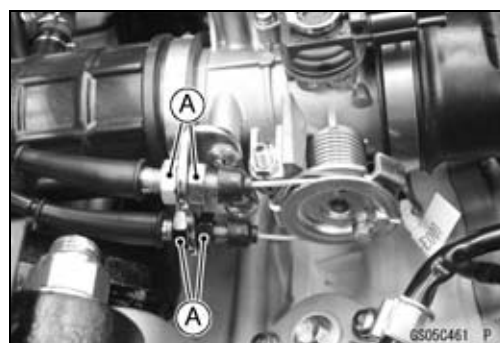
- ★ If necessary, adjust the throttle cable as follows.
- Slide the dust cover [A].



- Loosen the locknut [A].
- Turn the adjuster [B] until the proper amount of throttle grip play is obtained.
- Tighten the locknut.



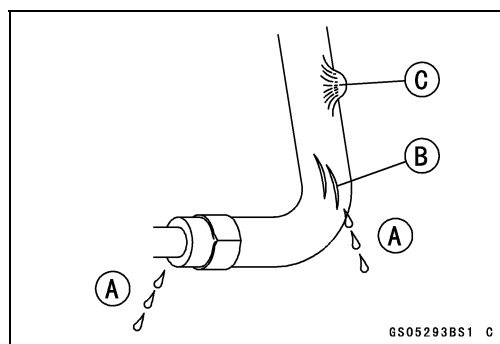
- ★ If the throttle grip free play cannot be adjusted with the adjuster of the throttle cable upper end, adjust the free play with the adjuster of the throttle cable lower end.
- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Loosen the locknuts [A] and adjust the throttle cable so that the throttle grip free play is until the proper amount.
- Tighten the locknuts.
- ★ If the free play can not be adjusted with the adjuster, replace the cable.



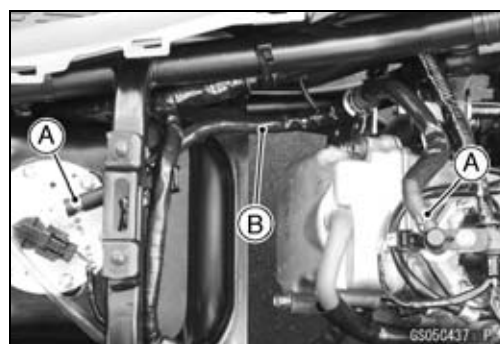
Fuel System

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

- If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak [A] or the hose to burst. Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter) and check the fuel hoses.
- ★ Replace the fuel hose if any fraying, cracks [B] or bulges [C] are noticed.



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



2-14 PERIODIC MAINTENANCE

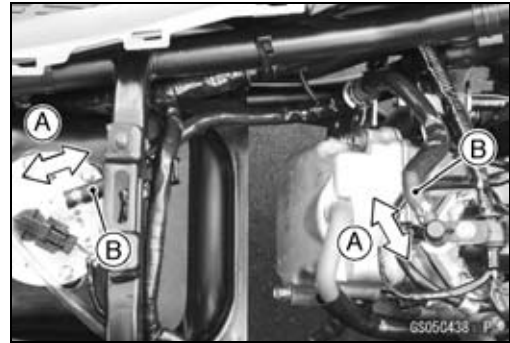
Periodic Maintenance Procedures

- Check that the fuel hose clamps are securely installed.
- Push and pull [A] the fuel hose [B] back and forth, and make sure it is locked.

⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose clamp is installed correctly.

- ★ If it does not locked, reinstall the new hose clamp.



Fuel Hose Replacement

- Remove the fuel tank cap cover (see Fuel Tank Cap Cover Removal in the Frame chapter).

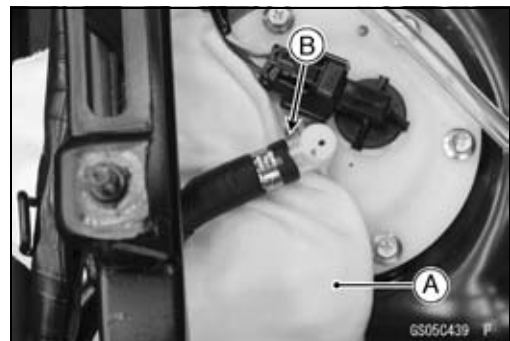
NOTE

- Ensure the fuel hose without any pressure, and then remove the fuel pump.

STEP 1: Disconnect the fuel pump connector.

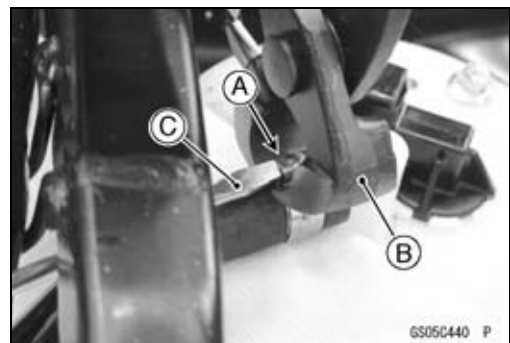
STEP 2: Turn the ignition switch on. Starting the engine until the engine stop working.

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



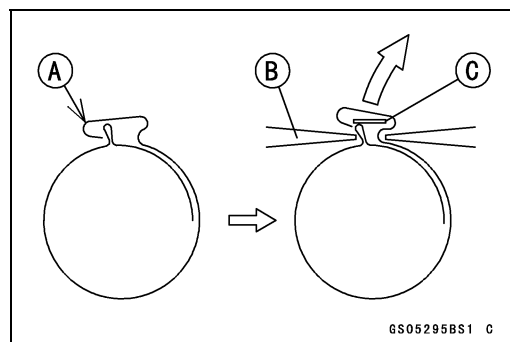
- Clear the hook [A] of the hose clamp with a suitable tool [B] and flat tip screwdriver [C], and remove the hose clamp.
- Insert the flat tip screwdriver under the hook while clamping the hose clamp with the suitable tool.

Recommend Tool: OETIKER 1098



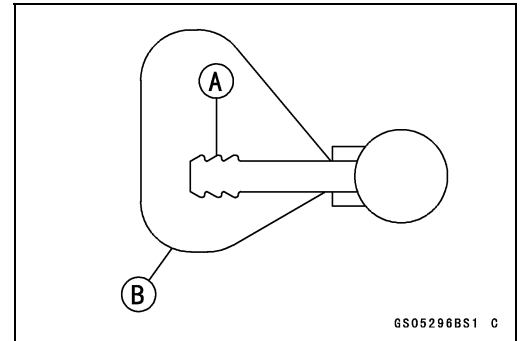
⚠ WARNING

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

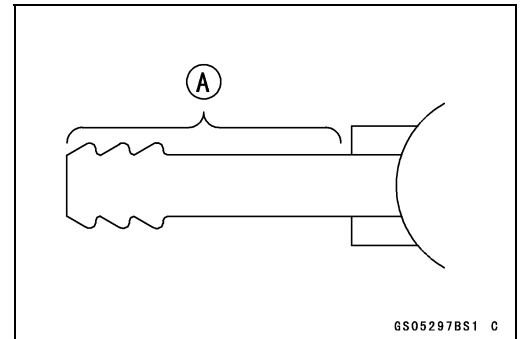


Periodic Maintenance Procedures

- Clean the fuel pipe [A].
- If the new hose is not installed soon, cover the fuel pipe with the vinyl bag [B] to keep it clean.

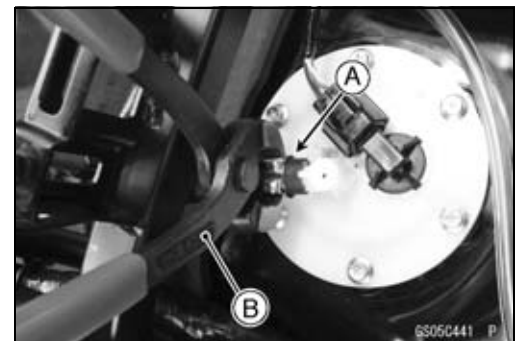


- Remove the vinyl bag on the pipe.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the fuel pipe [A].



- Replace the fuel hose and hose clamps with new ones, and install them.
- Run the fuel outlet hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Pinch the new hose clamp [A] with a suitable tool [B] to install it.

Recommend Tool: OETIKER 1098

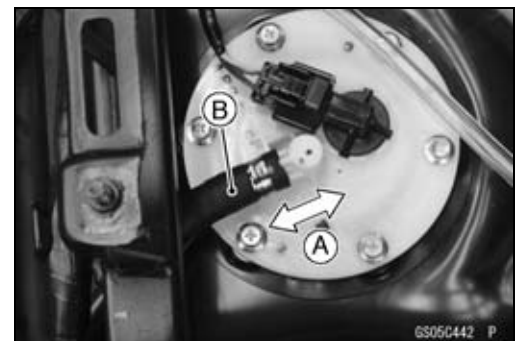


- Push and pull [A] the fuel hose [B] back and forth, and make sure it is locked and does not come off.

⚠ WARNING

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

- ★ If it comes off, reinstall the hose together with the new hose clamp.
- Start the engine and check the fuel hose for leaks.



2-16 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

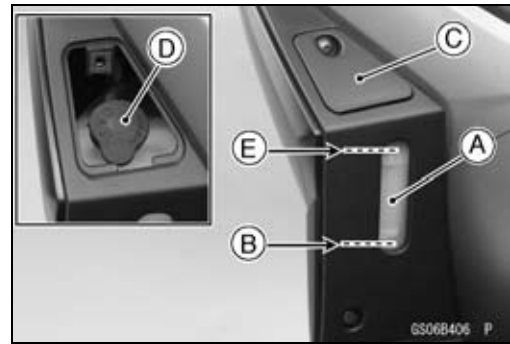
Cooling System

Coolant Level Inspection

NOTE

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

- Check the coolant level in the reserve tank [A] with the motorcycle held perpendicular (Do not use the side stand).
- ★ If the coolant level is lower than the “LOW” level line [B], remove the reserve tank cap cover [C] by removing screw, and then remove the reserve tank cap [D] and add coolant to the “FULL” level line [E].



NOTICE

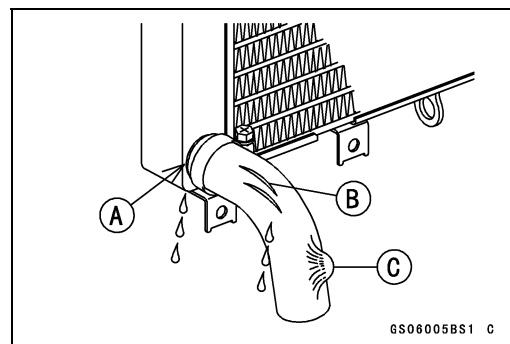
For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days. If coolant must be added often or the reservoir tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks. Coolant ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.

Cooling System

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

- The high pressure inside the radiator hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained.
- Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.
- ★ Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.
- Check that the hoses are securely connected and clamps are tightened correctly.

Torque - Water Hose Clamp Screws: 4.4 N·m (0.45 kgf·m, 39 in·lb)



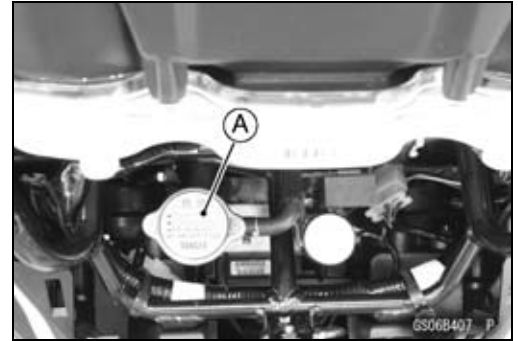
Coolant Change

⚠ WARNING

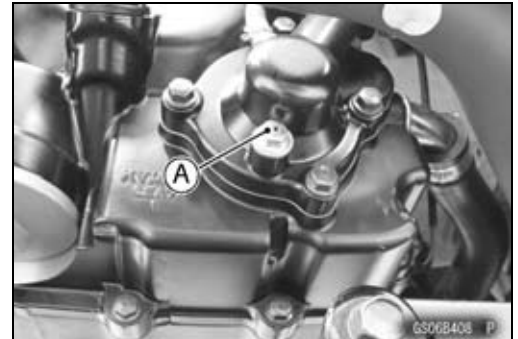
Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.

Periodic Maintenance Procedures

- Remove:
  - Front Center Cover (see Front Center Cover Removal in the Frame chapter)
  - Storage Box (see Storage Box Removal in the Frame chapter)
  - Radiator Cap [A]
- Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.



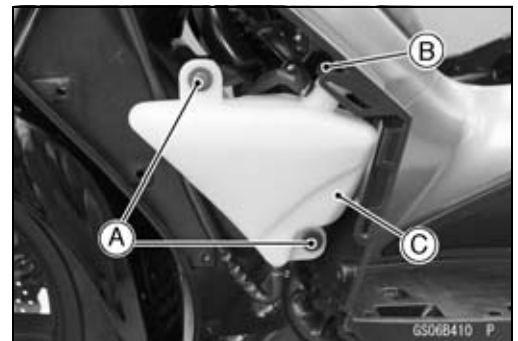
- Place a container under the drain bolt [A] of the water pump cover.
- Drain the coolant from the radiator by removing the drain bolt.



- Remove the bolt [A] on the thermostat housing cover to drain the coolant completely.



- Remove:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Bolts [A]
  - Cap [B]
- Pour the coolant into a container.
- Install the coolant reserve tank [C] and tighten the bolts.
- Tighten the drain bolt with new gasket.



2-18 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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

NOTICE

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

Water and Coolant Mixture Ratio (Recommended)

Soft Water:	50%
Coolant:	50%
Freezing Point:	-35°C (-31°F)
Total Amount:	1.5 L (1.6 US qt)

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

NOTE

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

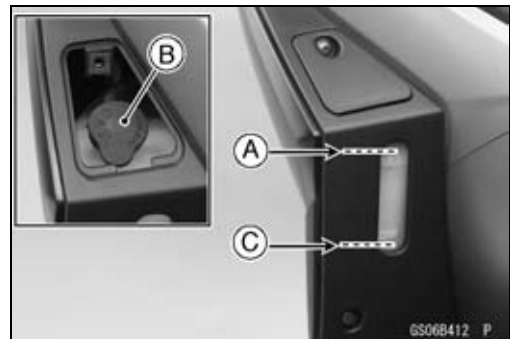
- Check the cooling system for leaks.



- Remove the bolt [A] on the thermostat housing cover to bleed the air.
- Tap the radiator hoses to force any air bubbles caught inside.
- Tighten the bolt with a new gasket after bleeding the air.
- Fill the radiator up to the filler neck with coolant.



- Fill the reserve tank up to the "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 "LOW" level line [C], add coolant to the "FULL" level line.



NOTICE

Do not add more coolant above the "FULL" level line.

Periodic Maintenance Procedures

Engine Top End

Valve Clearance Inspection

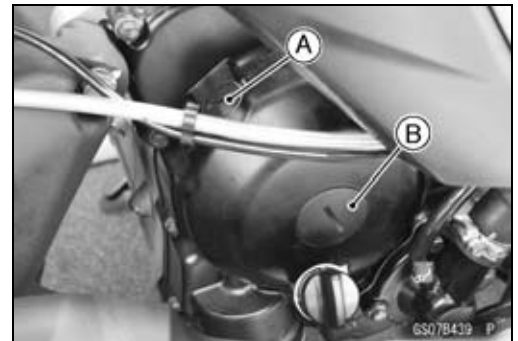
NOTICE

If valve clearance is left unadjusted, the wear will eventually cause the valves to remain partly open, which lowers performance, burns the valves and the valve seats, and may cause serious engine damage.

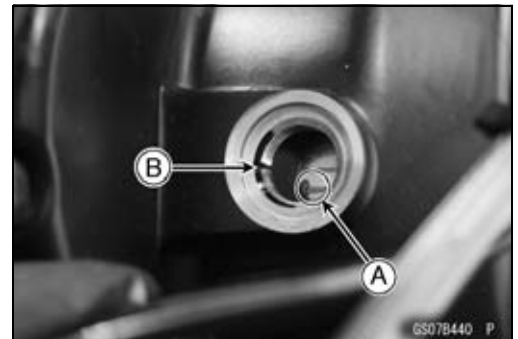
NOTE

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

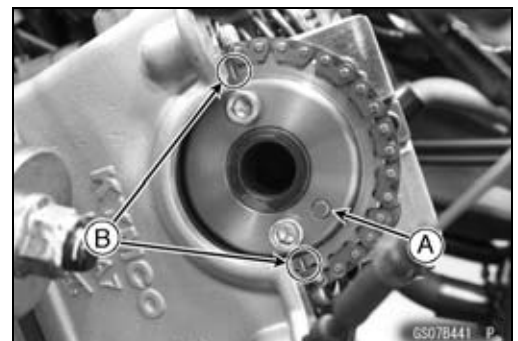
- Remove:
Cylinder Head Cover (see Cylinder Head Cover Removal in the Engine Top End chapter)
Timing Inspection Cap [A]
Alternator Cover Center Cap [B]



- Turn the crankshaft clockwise, and align the “T” mark [A] on the alternator rotor with the groove [B] on the alternator cover.



- Check that the projection [A] and lines [B] on the camshaft sprocket is in position. This shows that the piston TDC is at the end of the compression stroke.



2-20 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Using a thickness gauge [A], measure the valve clearance between the adjusting screw and valve stem.
- Measure the both valves at a time.

Valve Clearance

Standard:

Exhaust   0.10 mm (0.0039 in.)

Intake   0.10 mm (0.0039 in.)

- ★ If the valve clearance is not within the specified range, adjust it.

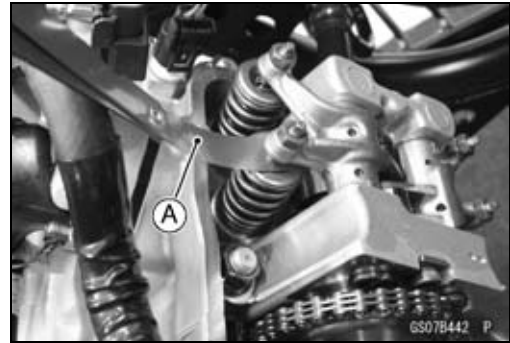
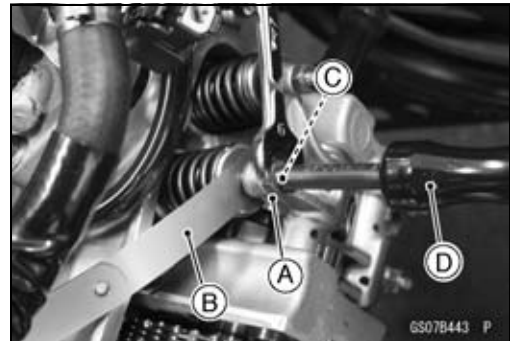
Valve Clearance Adjustment

- Loosen the valve adjusting screw locknut [A] and insert the thickness gauge [B] between the valve and adjusting screw [C], and turn the screw until the adjusting screw stops.
- Tighten the valve adjusting screw locknut.

Special Tool - Valve Adjusting Screw Holder [D]:
57001-1217

Torque - Valve Adjusting Screw Locknut: 8.8 N·m (0.90 kgf·m, 79 in·lb)

- Install the removed parts (see appropriate chapters).



Clutch

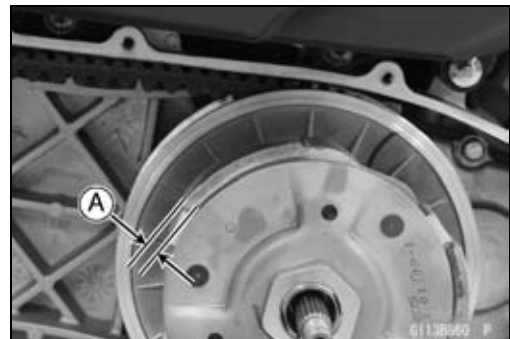
Clutch Shoe Wear Inspection

- Remove the clutch outer (see Clutch/Driven Pulley Removal in the Converter System chapter).
- Check the clutch shoes for damage.
- ★ If there is any damaged part, replace it.
- Measure the clutch lining thickness [A].
- ★ If the lining thickness is worn over the service limit, replace the clutch shoe.

Clutch Lining Thickness

Standard: 4.0 mm (0.16 in.)

Service Limit: 2.0 mm (0.08 in.)



Engine Lubrication System

Engine Oil Change

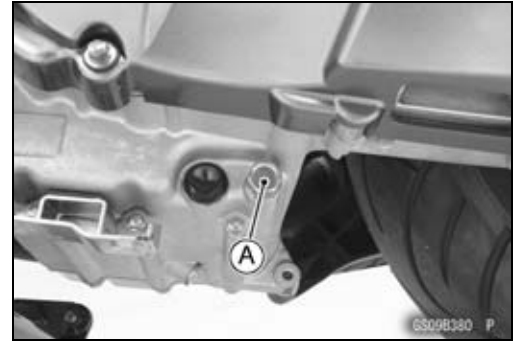
- Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily. Then stop the engine.
- Place an oil pan beneath the engine.
- Remove the oil filler cap/dipstick [A].



Periodic Maintenance Procedures

- Remove the engine oil drain bolt [A] from the bottom of the engine, and let the oil drain completely.
- Replace the drain bolt assy with a new one.
- Install the new drain bolt.
- Tighten:

Torque - Engine Oil Drain Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)



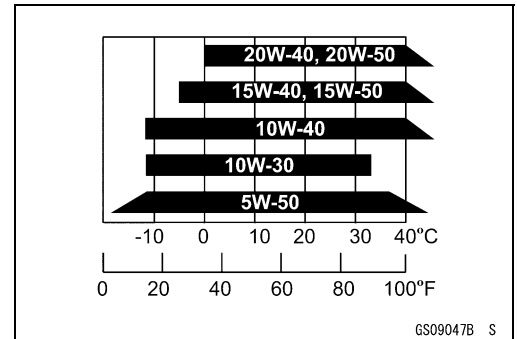
- Pour in the specified type and amount of oil.

Recommended Engine Oil

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

Viscosity: SAE 5W-50

Capacity: 1.3 L (1.4 US qt)
1.5 L (1.6 US qt) (when engine is completely dry)



NOTE

- Do not add any chemical additive to the oil. Oils fulfilling the above requirements are fully formulated and provide adequate lubrication for both the engine and the clutch.
- Although 5W-50 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).
- Replace the oil filler cap/dipstick O-ring with a new one.
- Apply grease to the O-ring.
- Tighten the oil filler cap/dipstick securely.

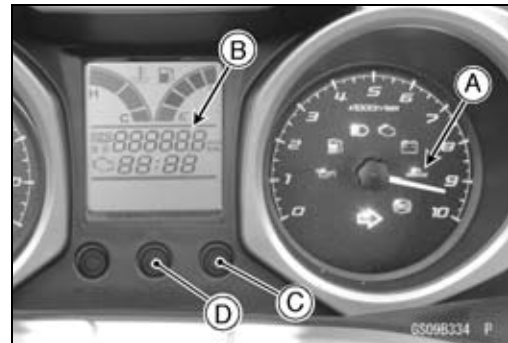
2-22 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Oil Service Indicator Light Reset

NOTE

- The yellow oil service indicator light (LED) [A] goes on for changing the engine oil when the distance of the service mode [B] reaches 5 000 km (3 107 mile). The yellow oil service indicator light (LED) goes off when the oil service mode is reset. Reset the oil service mode after changing the engine oil.
- It is not necessary to reset the oil service mode at the 1000 km initial maintenance of the oil change.
- Push the ADJ button [C] for 2 seconds to display the service mode.
- Push the Reset button [D] and hold it in. After 2 seconds, the yellow oil service indicator light (LED) goes off and the service mode display turns to 0.0.



Oil Filter Replacement

- Drain the engine oil (see Engine Oil Change).
  - Remove:
    - Oil Filter Cap [A]
    - Oil Filter
  - Replace the oil filter with a new one.
  - Apply engine oil to the grommet [A].
  - Install the oil filter so that the grommet faces to the engine side.
  - Replace the oil filter cap O-ring [A] with a new one.
  - Apply grease to the O-ring and install it.
  - Install the spring [B].
  - Install the oil filler cap and tighten it securely.
- Torque - Oil Filter Cap: 9.3 N·m (0.95 kgf·m, 82 in·lb)**
- Pour in the specified type and amount of oil (see Engine Oil Change).



Periodic Maintenance Procedures

Oil Screen Inspection

- Remove the both right and left oil screens (see Oil Screen Removal in the Engine Lubrication System chapter).
- Check the oil screens [A] carefully for any damage, holes, and broken wires.
- ★ If the screen is damaged, replace it.
- Clean the screen of the oil strainers with a high flash-point solvent and remove any particles stuck to them.

NOTE

○ While cleaning the screens, check for any metal particles that might indicate internal engine damage.

WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the screen in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the screen.

Breather Hose Inspection

- Check the breather hose [A].
- ★ Replace the breather hose if any fraying, cracks or bulges are noticed.



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 200 kPa (2.0 kgf/cm², 29 psi)

Rear 225 kPa (2.25 kgf/cm², 33 psi)



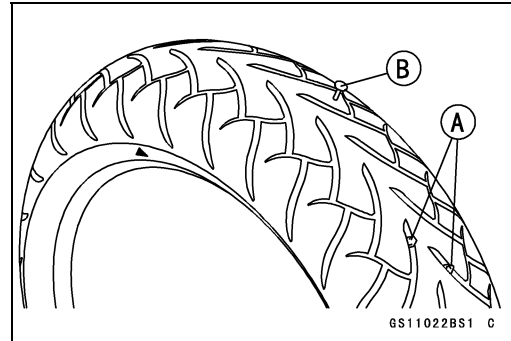
2-24 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Wheels and Tires

Wheel/Tire Damage Inspection

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



Tire Tread Wear Inspection

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

- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.
- ★ If any measurement is less than the service limit, replace the tire (see Tire Removal/Installation in the Wheels/Tires chapter).



Tread Depth

Service Limit:

Front 1 mm (0.04 in.)

Rear 1 mm (0.04 in.)

⚠ WARNING

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

NOTE

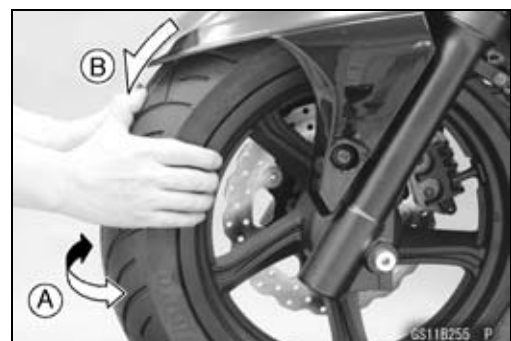
- Most countries may have their own regulations a minimum tire tread depth: be sure to follow them.
- Check and balance the wheel when a tire is replaced with a new one.

Wheel Bearing Damage Inspection

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

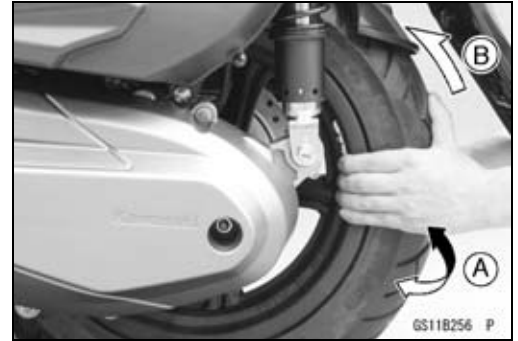
Special Tool - Jack: 57001-1238

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



Periodic Maintenance Procedures

- Raise the rear wheel off the ground with the center stand.
- Inspect the roughness of the rear wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the rear wheel lightly, and check for smoothly turn, roughness, binding or noise.
- ★ If roughness, binding or noise is found, remove the rear wheel and inspect the wheel bearing (see Rear Wheel Removal, Hub Bearing/Sub Frame Bearing Inspection in the Wheels/Tires chapter).



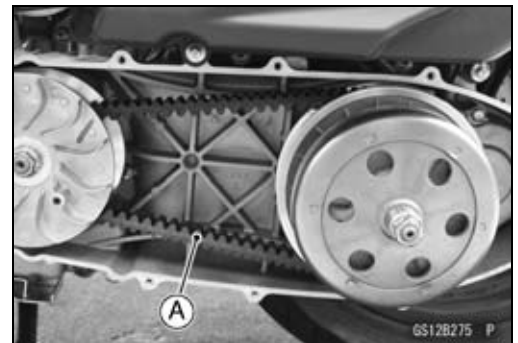
Converter

Drive Belt Wear Inspection

- Remove the left crankcase cover (see Left Crankcase Cover Removal in the Converter System chapter).
- Clean the drive belt [A] and pulley faces.
- Inspect the drive belt for cracks or wear.
- ★ If there is any damage, replace the drive belt.

NOTE

○ Do not get oil or grease on drive belt and pulley faces.



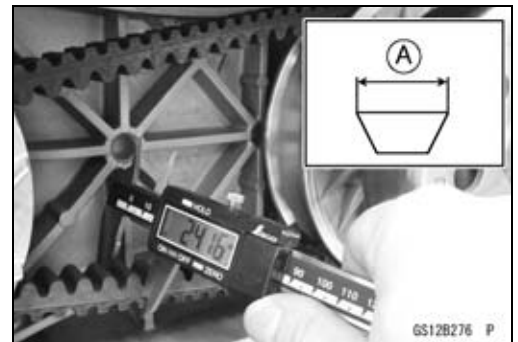
- Measure the drive belt width [A].

Drive Belt Width

Standard: 25.2 mm (0.992 in.)

Service Limit: 23.7 mm (0.933 in.)

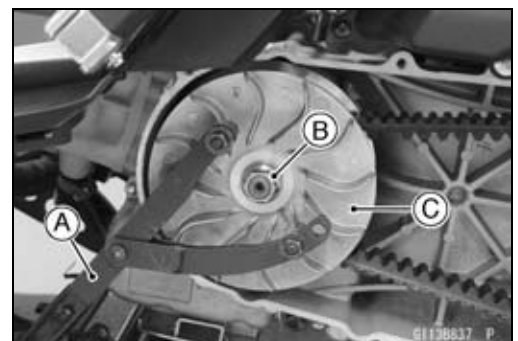
- ★ If the drive belt width is out of service limit, replace the drive belt.



Drive Belt Replacement

- Remove the left crankcase cover (see Left Crankcase Cover Removal in the Converter System chapter).
- Hold the drive pulley using the flywheel & pulley holder [A], and remove the drive face nut [B] and washer.
- Remove the drive pulley face [C].

Special Tool - Flywheel & Pulley Holder: 57001-1605



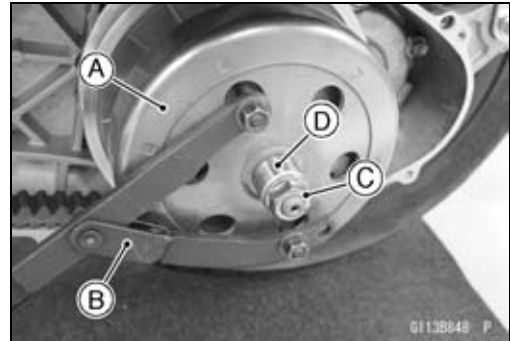
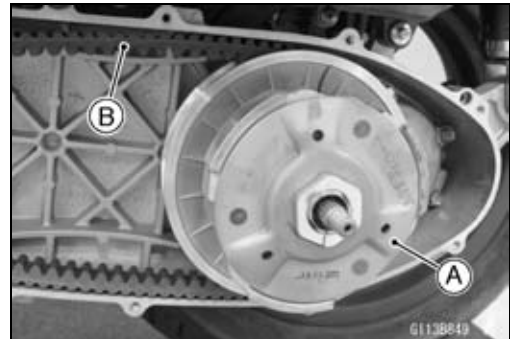
2-26 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Hold the clutch outer [A] with the flywheel & pulley holder [B], and remove the clutch outer nut [C].

Special Tool - Flywheel & Pulley Holder: 57001-1605

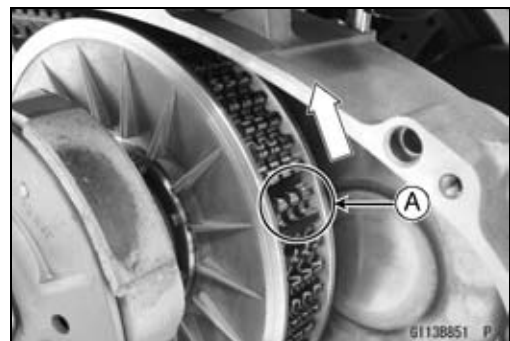
- Remove:
  - Collar [D]
  - Clutch Outer
- Remove the clutch/driven pulley assembly [A] and drive belt [B] as a set.



- Replace the drive belt with a new one.
- Lay the new drive belt on the driven pulley and install the clutch/driven pulley onto the drive shaft.

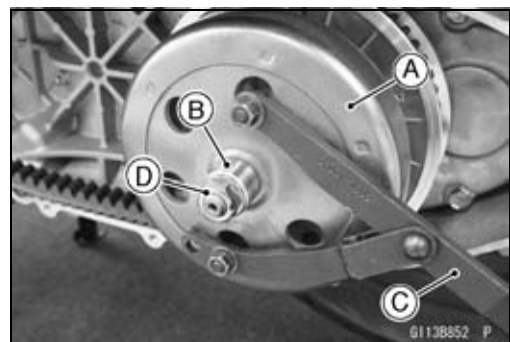
NOTE

- Lay the drive belt so that its arrow marks [A] face forward.
- Do not get oil or grease on drive belt and pulley faces.

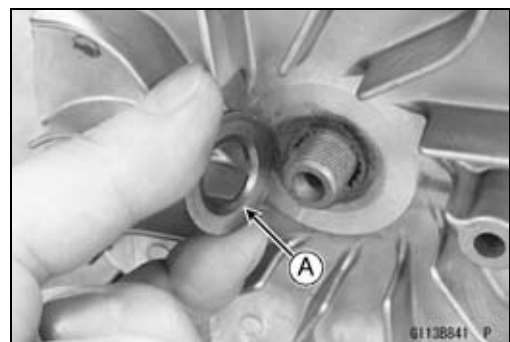


- Install:
  - Clutch Outer [A]
  - Collar [B]
- Hold the clutch outer with the flywheel & pulley holder [C].
- Tighten the clutch outer nut [D].

Torque - Clutch Outer Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)

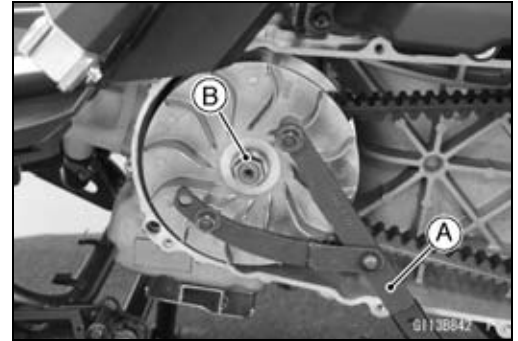


- Install the drive pulley face.
- Install the washer so that the chamfer side [A] faces to the crankcase side.



Periodic Maintenance Procedures

- Hold the drive pulley using the flywheel & pulley holder [A].
Special Tool - Flywheel & Pulley Holder: 57001-1605
- Tighten the drive face nut [B].
Torque - Drive Face Nut: 93 N·m (9.5 kgf·m, 69 ft·lb)



Final Drive

⚠ WARNING

Motorcycle operation with insufficient, deteriorated, or contaminated oil causes accelerated wear of the final and countershaft gears, and may result in seizure. Seizure can lock the rear wheel and skid the rear tire, with consequent loss of control. Change the final gear case oil according to the periodic maintenance chart.

Final Gear Case Oil Change

- Warm up the oil by running the motorcycle so that the oil will pick up any sediment and drain easily. Stop the motorcycle and turn the ignition switch off.
- Place an oil pan beneath the final gear case, and remove the oil filler bolt [A] and drain bolt [B].

⚠ WARNING

Oil on tires can cause loss of traction and an accident resulting in serious injury or death. When draining or filling the final gear case, do not spill oil the tire or rim. Clean any oil that may spill with a high flash-point solvent.

- After the oil has completely drained out, install the drain bolt with a new gasket.

Torque - Final Gear Case Oil Drain Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Fill the final gear case with the specified oil and quantity.

Final Gear Case Oil

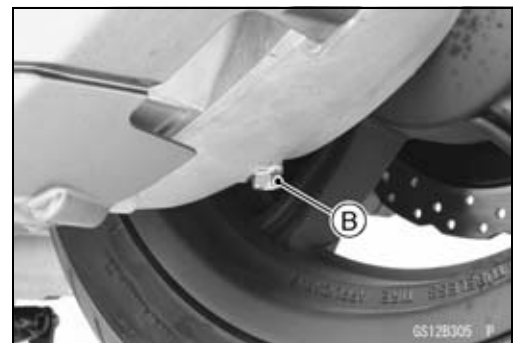
Viscosity: SAE 90

Capacity: 0.23 L (0.24 US qt) at disassembly

0.21 L (0.22 US qt) at change

- Install the oil filler bolt.

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



2-28 PERIODIC MAINTENANCE

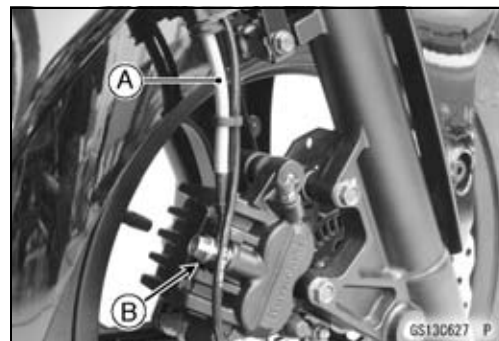
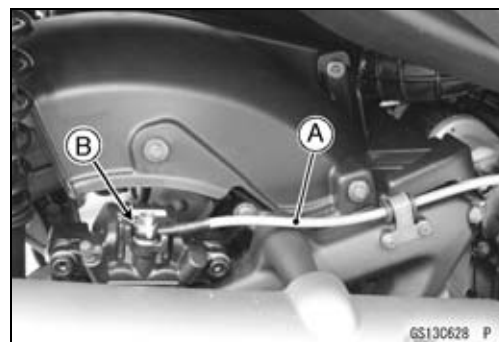
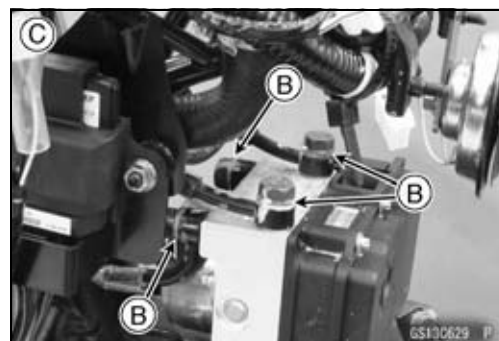
Periodic Maintenance Procedures

Brakes

Brake System

Brake Fluid Leak Inspection

- For ABS equipped model, remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Apply the brake lever 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.
ABS equipped model [C]



Periodic Maintenance Procedures

Brake Hose Installation Condition Inspection

- For ABS equipped model, remove the front fairing (see Front Fairing Removal in the Frame chapter).
- 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: 34 N·m (3.5 kgf·m, 25 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 Operation Inspection

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

WARNING

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

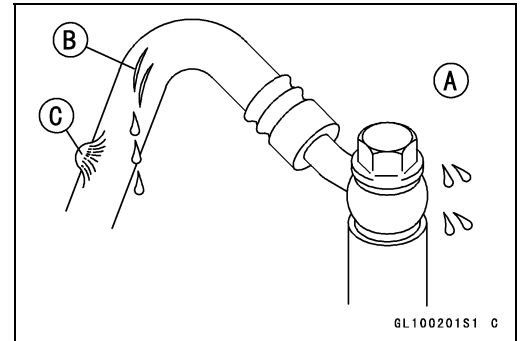
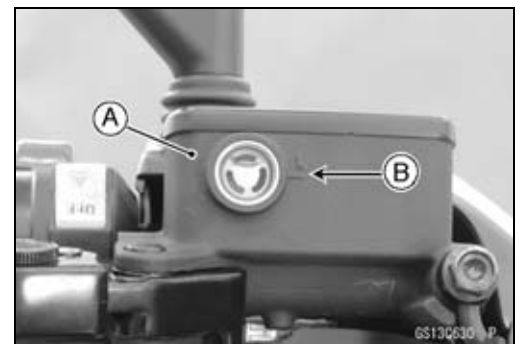
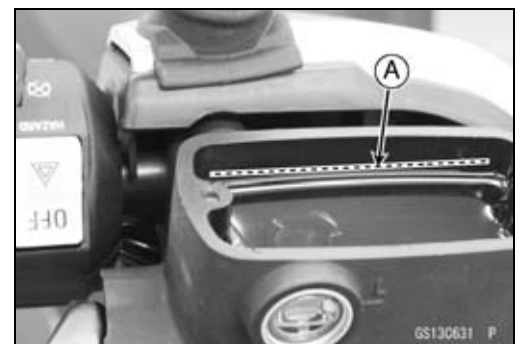
Brake Fluid Level Inspection

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

NOTE

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

- ★ If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [A].
- Remove the reservoir cap and diaphragm.



2-30 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

WARNING

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

Recommended Disc Brake Fluid

Grade: DOT4

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.
- 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.

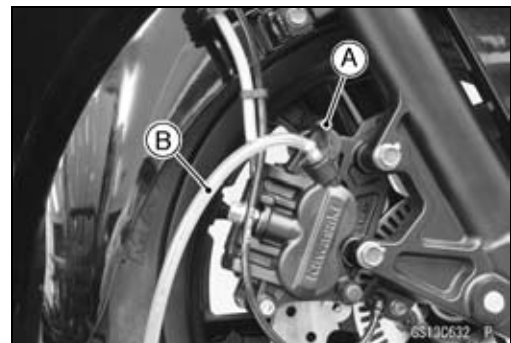
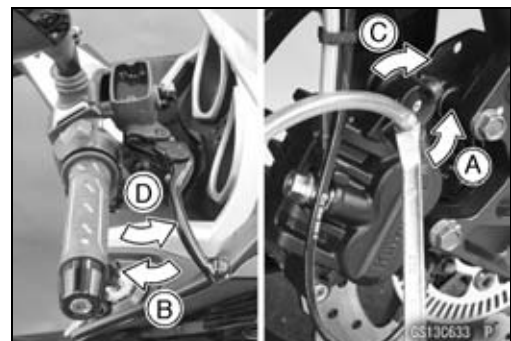
Torque - Brake Reservoir Cap Screws: 1.6 N·m (0.16 kgf·m, 14 in·lb)

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

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

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

★If necessary, bleed the air from the lines.



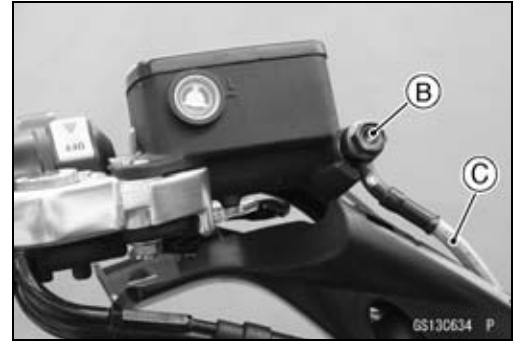
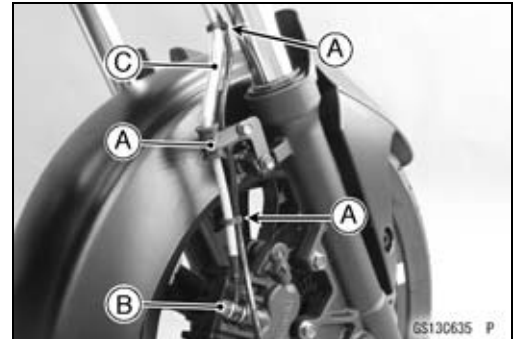
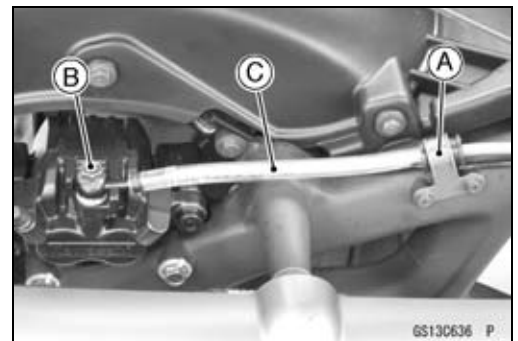
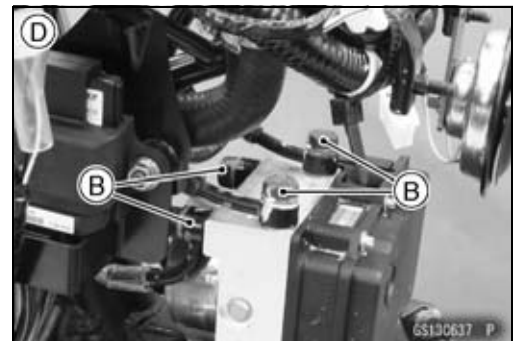
Periodic Maintenance Procedures

Brake Hose Replacement

NOTICE

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

- Remove:
  - Upper Handlebar Cover (see Handlebar Cover Removal in the Frame chapter)
  - Leg Shield (see Leg Shield Removal in the Frame chapter)
  - Brake Hose Clamps [A]
  - Brake Hose Banjo Bolts [B]
  - Bands (see Cable, Wire, and Hose Routing section in the Appendix chapter)
- When removing the brake hoses [C], note the following.
  - Take care not to spill the brake fluid on the painted or plastic parts.
  - Temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
  - Immediately wash away any brake fluid that spills.
- When installing the brake hoses, note the following.
  - Avoid sharp bending, kinking, flattening or twisting, and run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
  - There are washers on each side of the brake hose fitting. Replace them with new ones.
  - Tighten:
    - Torque - Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**
- Fill the brake line after installing the brake hose (see Brake Fluid Change).
  - ABS equipped model [D]



2-32 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Master Cylinder Rubber Parts Replacement

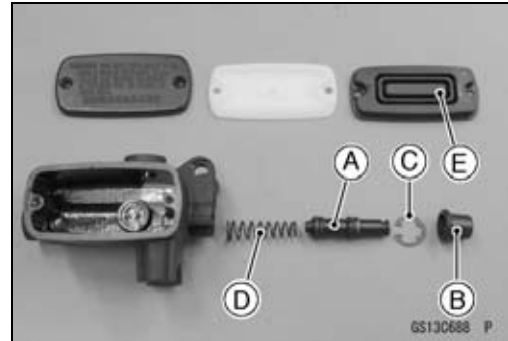
Master Cylinder Disassembly

- Remove the master cylinder (see Master Cylinder Removal in the Brakes chapter).
- Unscrew the locknut and pivot bolt, and remove the brake lever.
- Remove the piston assembly [A] as follows.
  - Remove the dust cover [B] and circlip [C].

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the piston assembly.
- Remove the return spring [D].

- Replace:
  - Dust Cover
  - Circlip
  - Piston Assembly
  - Diaphragm [E]



Master Cylinder Assembly

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

NOTICE

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

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease to the brake lever pivot bolt.
- Tighten the brake lever pivot bolt and the locknut.

Torque - Brake Lever Pivot Bolt: 2.0 N·m (0.20 kgf·m, 18 in·lb)

Brake Lever Pivot Bolt Locknut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Caliper Rubber Parts Replacement

Front Caliper Disassembly

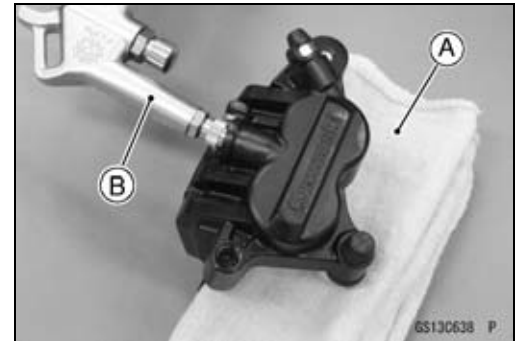
- Remove:
  - Front Caliper (see Front Caliper Removal in the Brakes chapter)
  - Brake Pads (see Front Brake Pad Removal in the Brakes chapter)
  - Pad Spring

Periodic Maintenance Procedures

- Using compressed air, remove the pistons.
- Cover the caliper opening with a clean heavy cloth [A].
- Blow compressed air [B] into the hole for the banjo bolt to remove the piston.

⚠ WARNING

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



- Pull out the pistons by hand.

- Remove:
  - Caliper Holder
  - Dust Seals
  - Fluid Seals
  - Bleed Valve
  - Rubber Cap

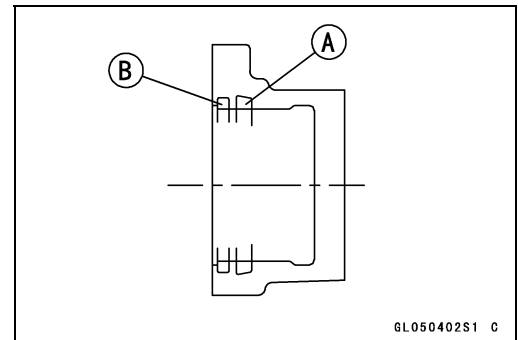
Front Caliper Assembly

- Clean the caliper parts except for the pads.

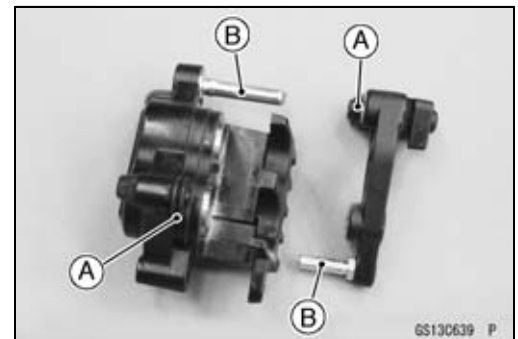
NOTICE

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

- Install the bleed valve and rubber cap.
- Replace the fluid seals [A] and the dust seals [B] with new ones.
- Apply brake fluid to the seals, and install them into the cylinders by hand.



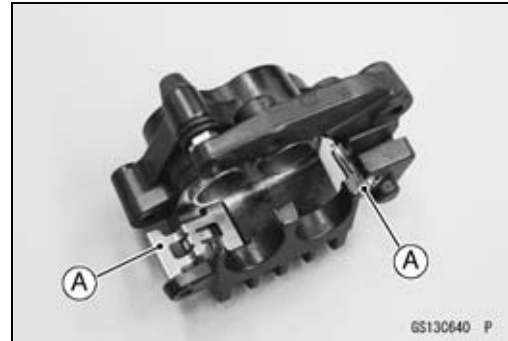
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the friction boots [A] and replace them with new ones if they are damaged.
- Apply silicone grease to the caliper holder shafts [B].



2-34 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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

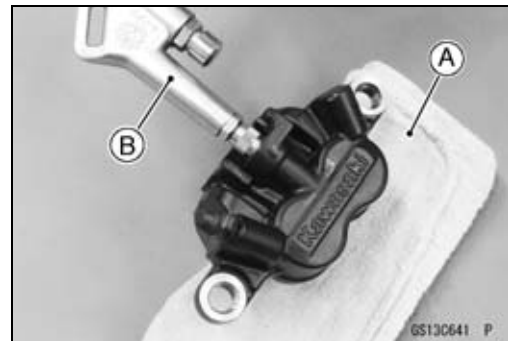


Rear Caliper Disassembly

- Remove:
  - Rear Caliper (see Rear Caliper Removal in the Brakes chapter)
  - Brake Pads (see Rear Brake Pad Removal in the Brakes chapter)
  - Pad Spring
- Using compressed air, remove the piston.
  - Cover the caliper opening with a clean heavy cloth [A].
  - Blow compressed air [B] into the hole for the banjo bolt to remove the piston.

⚠ WARNING

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



- Pull out the pistons by hand.

- Remove:
  - Caliper Holder
  - Dust Seals
  - Fluid Seals
  - Bleed Valve
  - Rubber Cap

Rear Caliper Assembly

- Clean the caliper parts except for the pads.

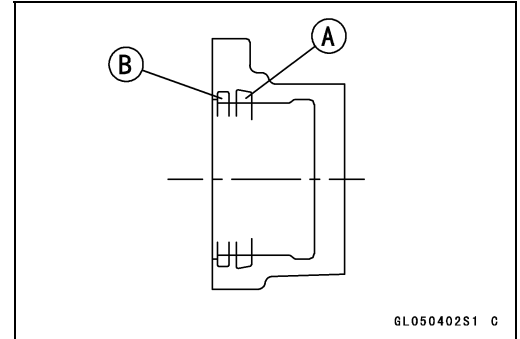
NOTICE

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

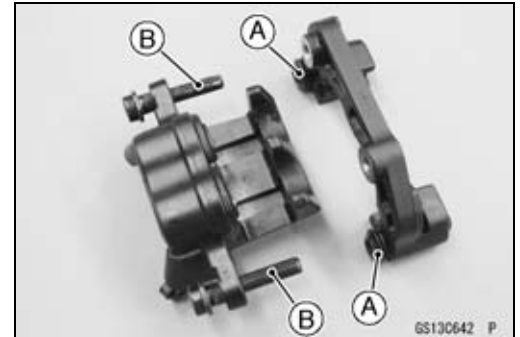
- Install the bleed valve and rubber cap.

Periodic Maintenance Procedures

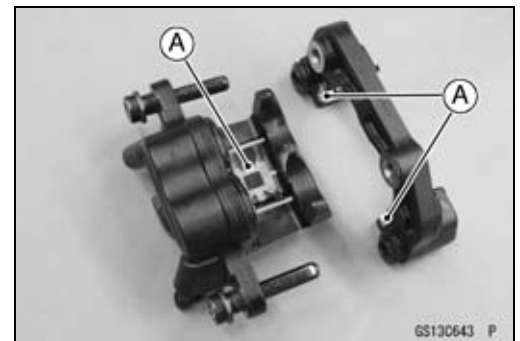
- Replace the fluid seals [A] and the dust seals [B] with new ones.
- Apply brake fluid to the seals, and install them into the cylinders by hand.



- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the friction boots [A] and replace them with new ones if they are damaged.
- Apply silicone grease to the caliper holder shafts [B].



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



Brake Pad Wear Inspection

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

Front Brake Pad [C]

Rear Brake Pad [D]

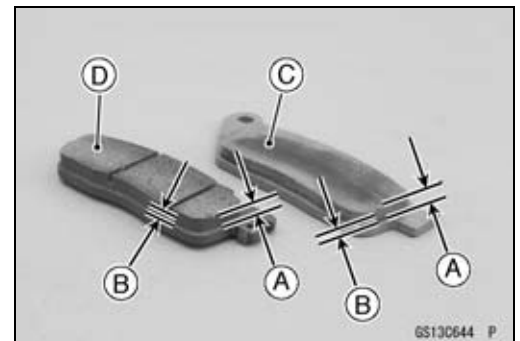
Pad Lining Thickness

Standard:

Front	5 mm (0.20 in.)
Rear	5.8 mm (0.23 in.)

Service Limit:

Front	1 mm (0.04 in.)
Rear	1 mm (0.04 in.)



2-36 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Brake Light Switch Operation Inspection

- Turn the ignition switch on.
- The brake light (LED) [A] should go on when the brake lever is applied.



- ★ If it does not go on, inspect or replace the following parts.
  - Battery (see Charging Condition Inspection in the Electrical System chapter)
  - Brake Light (LED) (see Tail/Brake Light (LED) Removal Installation in the Electrical System chapter)
  - Main Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
  - Charging/ECU Fuse 30 A (see Fuse Inspection in the Electrical System chapter)
  - Headlight Relay Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
  - Front Brake Light Switch [A] (see Switch Inspection in the Electrical System chapter)
  - Harness (see Wiring Inspection in the Electrical System chapter)

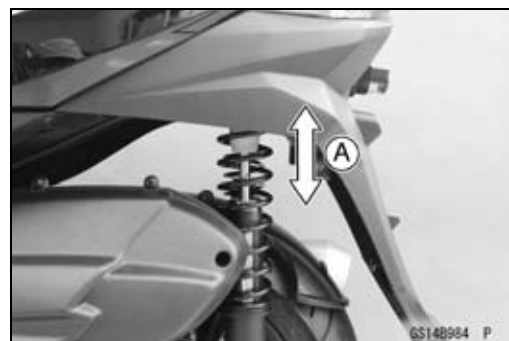


Suspension

Suspension System

Front Forks/Rear Shock Absorber Operation Inspection

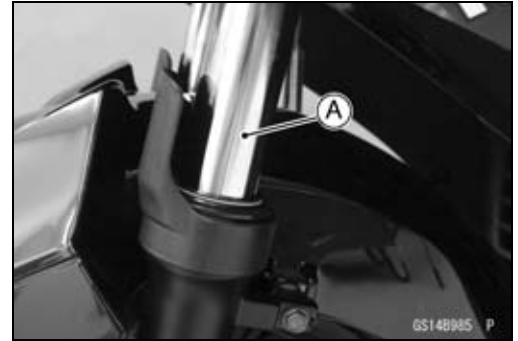
- Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.
- ★ If the forks do not move smoothly or noise is found, inspect the fork oil level or fork clamps (see Front Fork Oil Change in the Suspension chapter).
- Pump the shock absorbers down and up [A] 4 or 5 times, and inspect the smooth stroke.
- ★ If the shock absorbers do not move smoothly or noise is found, inspect the oil leak (see Rear Shock Absorber Oil Leak Inspection).



Periodic Maintenance Procedures

Front Fork Oil Leak Inspection

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



Rear Shock Absorber Oil Leak Inspection

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



Steering

Steering Play Inspection

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

Special Tool - Jack: 57001-1238

- With the front wheel pointing straight ahead, alternately tap each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.
- ★ If the wheel binds or catches before the stop, the steering is too tight.
- Feel for steering looseness by pushing and pulling [A] the forks.
- ★ If you feel looseness, the steering is too loose.



NOTE

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

Steering Play Adjustment

- Remove:
  - Handlebars (see Stem, Stem Bearing Removal in the Steering chapter)
  - Steering Stem Locknut (see Stem, Stem Bearing Removal in the Steering chapter)

2-38 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

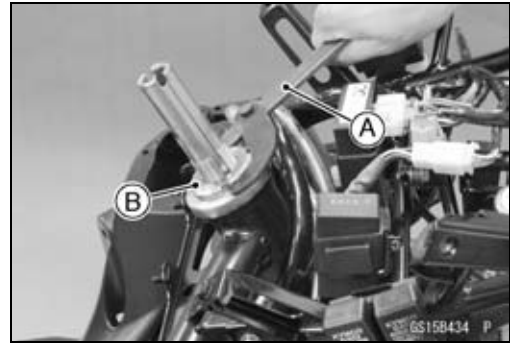
- Adjust the steering using the steering stem nut wrench [A].

Special Tool - Steering Stem Nut Wrench: 57001-1100

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

NOTE

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



- Install:
  - Steering Stem Locknut (see Stem, Stem Bearing Installation in the Steering chapter)
  - Handlebars (see Stem, Stem Bearing Installation in the Steering chapter)

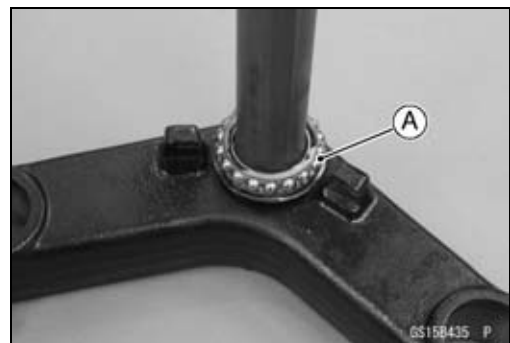
⚠ WARNING

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

- Check the steering again.
- ★ If the steering is still too tight or too loose, repeat the adjustment.
- Install the removed parts (see appropriate chapters).

Steering Stem Bearing Lubrication

- Remove the steering stem (see Stem, Stem Bearing Removal in the Steering chapter).
- Using a high flash-point solvent, wash the upper and lower ball bearings [A] in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and the ball bearings.
- ★ Replace the bearing assemblies if they show wear or damage.
- Pack the upper and lower ball bearings in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem (see Stem, Stem Bearing Installation in the Steering chapter).
- Adjust the steering (see Steering Play Adjustment).



Periodic Maintenance Procedures

Electrical System

Lights and Switches Operation Inspection

First Step

- Set the motorcycle with the center stand.
- Put the side stand up.
- Turn the ignition switch on.
- The following lights should go on according to below table.

City Lights (LED) [A]	Go on
Headlights [B]	Go on
Taillight (LED) [C]	Goes on
License Plate Light [D]	Goes on
Meter Panel Illumination Lights (LED) [E]	Go on
Meter Panel LCD [F]	Goes on
Red Oil Pressure Warning Indicator Light (LED) [G]	Goes on
Yellow Fuel Level Warning Indicator Light (LED) [H]	Goes on (about 3 seconds)
Yellow Engine Warning Indicator Light (LED) [I]	Goes on (about 2 seconds)
Red Battery Voltage Warning Indicator Light (LED) [J]	Goes on (about 3 seconds)
Yellow Oil Service Indicator Light (LED) [K]	Goes on (about 3 seconds)
Yellow ABS Indicator Light (LED) [L] (ABS Equipped Model)	Goes on

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

Battery (see Charging Condition Inspection in the Electrical System chapter)

Indicator Lights (LED) (see Meter Unit Inspection in the Electrical System chapter)

Meter Panel Illumination Light (LED) (see Meter Unit Inspection in the Electrical System chapter)

Headlight Bulbs (see Headlight Bulb Replacement in the Electrical System chapter)

Low Beam Headlight Relay (see Relay Inspection in the Electrical System chapter)

License Plate Light Bulb (see License Plate Light Bulb Replacement in the Electrical System chapter)

ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

Oil Pressure Switch (see Switch Inspection in the Electrical System chapter)

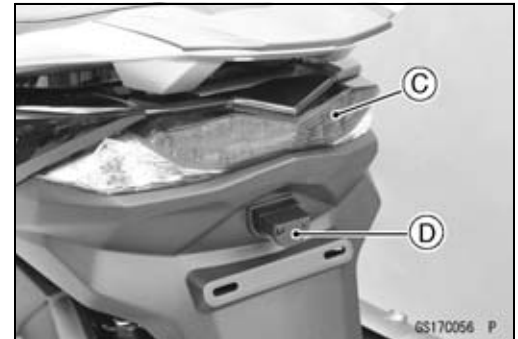
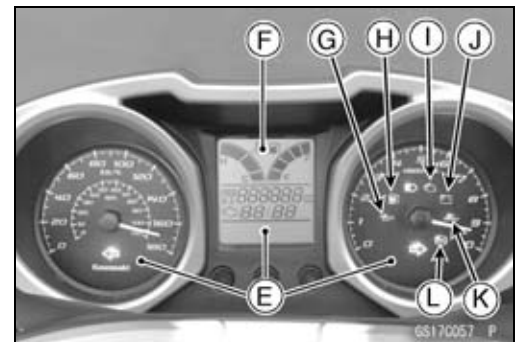
Main Fuse 15 A, Headlight Relay Fuse 15 A (see Fuse Inspection in the Electrical System chapter)

Charging/ECU Fuse 30 A (see Fuse Inspection in the Electrical System chapter)

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

Ignition Switch (see Switch Inspection in the Electrical System chapter)

Harness (see Wiring Inspection in the Electrical System chapter)



2-40 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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

Second Step

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

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

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

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

Charging/ECU Fuse 30 A (see Fuse Inspection in the Electrical System chapter)

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

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

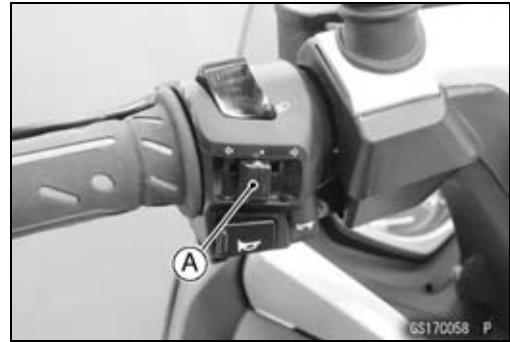
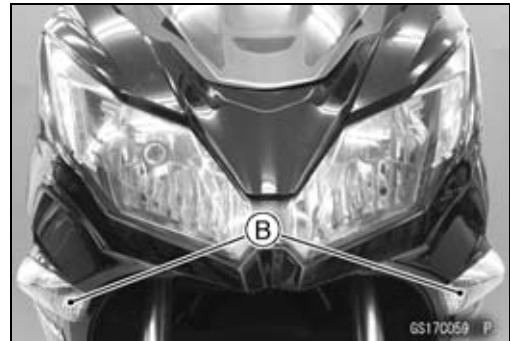
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)

Harness (see Wiring Inspection in the Electrical System chapter)

- Push the turn signal switch.
- The turn signal lights and green turn signal indicator light (LED) should go off.
- ★ If the light does not go off, inspect or replace the following parts.

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

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



Periodic Maintenance Procedures

Third Step

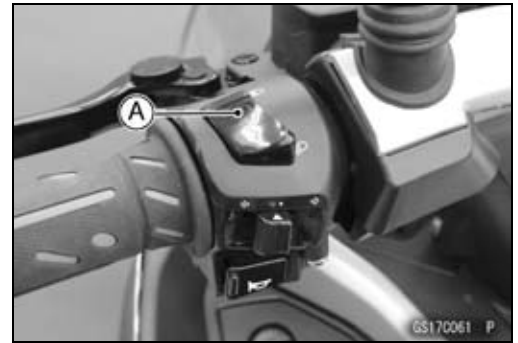
- Set the dimmer switch [A] to high beam position.
- The high beam headlights [B] should go on.
- The blue high beam indicator light (LED) [C] should go on.
- ★ If the high beam headlight and/or blue high beam indicator light (LED) does not go on, inspect or replace the following parts.

Headlight Bulbs (see Headlight Bulb Replacement in the Electrical System chapter)

High Beam Headlight Relay (see Relay Inspection in the Electrical System chapter)

Dimmer Switch (see Switch Inspection in the Electrical System chapter)

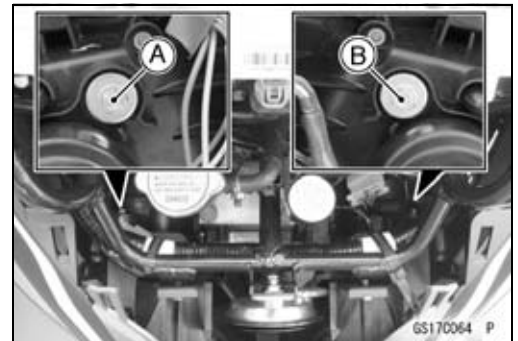
- Turn the ignition switch off.
- The headlights and blue high beam indicator light (LED) should go off.



Headlight Aiming Inspection

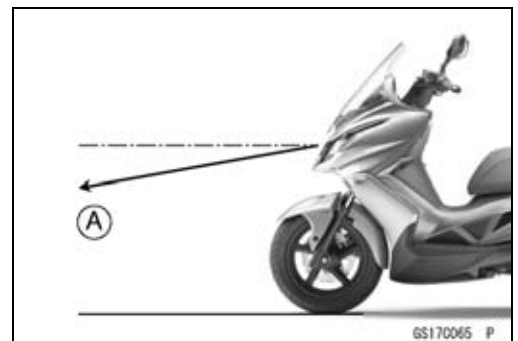
The headlight beam is adjustable vertically.

- Inspect the headlight beam for aiming.
- ★ If necessary, adjust the headlight beam.
- Remove the front center cover (see Front Center Cover Removal in the Frame chapter).
- Adjust the headlight up or down by turning the adjuster.
Right Headlight Adjuster [A]
Left Headlight Adjuster [B]



NOTE

- On high beam, the brightest point [A] 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.



2-42 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Engine Stop Switch Operation Inspection

First Step

- Turn the ignition switch on.
- Set the motorcycle with the center stand.
- Put the side stand up.
- Turn the engine stop switch to stop position [A].
- Push the starter button.
- The engine does not start.
- ★ If the engine starts, inspect or replace the engine stop switch (see Switch Inspection in the Electrical System chapter).



Second Step

- Turn the ignition switch on.
- Set the motorcycle with the center stand.
- Put the side stand up.
- Turn the engine stop switch to run position [A].
- Push the starter button and start the engine.
- Turn the engine stop switch to stop position.
- Immediately the engine should be stop.
- ★ If the engine does not stop, inspect or replace the engine stop switch (see Switch Inspection in the Electrical System chapter).
- ★ If the engine stop switch is good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



Spark Plug Replacement

- Disconnect the spark plug cap.
- Remove the spark plugs using the 16 mm (0.63 in.) plug wrench [A] vertically.
- Replace the spark plugs with new ones.

Standard Spark Plug

Type: **NGK CR7E**



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



NOTICE

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

- Tighten:
Torque - Spark Plug: 12 N·m (1.2 kgf·m, 106 in·lb)
- Install the spark plug cap.
- After installation, be sure the spark plug cap is installed securely by pulling up it lightly.

Periodic Maintenance Procedures

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

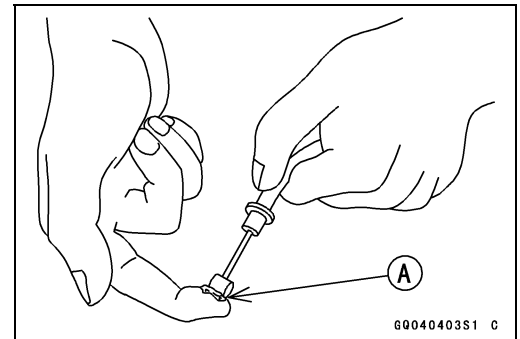
○Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.

Pivots: Lubricate with Grease.

Brake Levers
Rear Footpegs
Side Stand
Center Stand

Points: Lubricate with Grease.

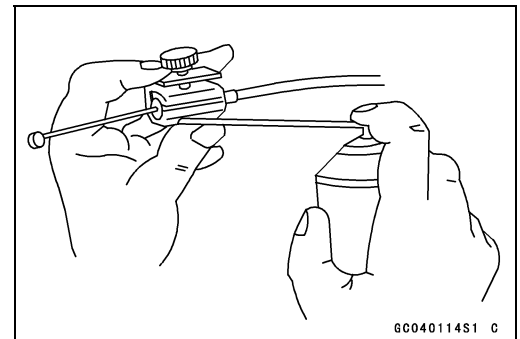
Throttle Inner Cable Upper and Lower Ends [A]



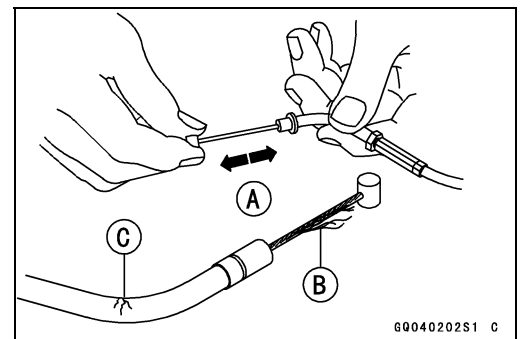
Cables: Lubricate with Rust Inhibitor.

Throttle Cables

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



- With the cable disconnected at both ends, the inner cable should move freely [A] within the cable housing.
- ★ If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



2-44 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Condition of Bolts, Nuts and Fasteners Tightness Inspection

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

NOTE

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

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

Bolt, Nut and Fastener to be checked

Engine:

- Engine Holder Nuts
- Engine Mounting Nut
- Exhaust Pipe Holder Nuts
- Muffler Body Clamp Bolt
- Muffler Body Mounting Bolts
- Radiator Bolts

Wheels:

- Front Axle Clamp Bolt
- Front Axle
- Rear Axle Nut

Brakes:

- Brake Lever Pivot Bolt Locknut
- Caliper Mounting Bolts
- Master Cylinder Clamp Bolts

Suspension:

- Front Fork Clamp Bolts
- Rear Shock Absorber Bolts and Nuts

Steering:

- Handlebar Mounting Nut
- Steering Stem Lock Nut

Others:

- Front Fender Mounting Bolts
- Sub Frame Bolts
- Side Stand Bolt
- Center Stand Bolts and Nuts

Fuel System (DFI)

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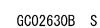
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3-2 FUEL SYSTEM (DFI)

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Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oxygen Sensor	25	2.5	18	
2	Fuel Injector Mounting Bolt	9.8	1.0	87 in·lb	
3	Water Temperature Sensor (ECU)	12	1.2	106 in·lb	
4	Fuel Pump Mounting Screws	3.4	0.35	30 in·lb	

5. ECU

6. ECU Relay

7. Vehicle-down Sensor

8. Crankshaft Sensor

9. Ignition Coil

CL: Apply cable lubricant.

EO: Apply engine oil.

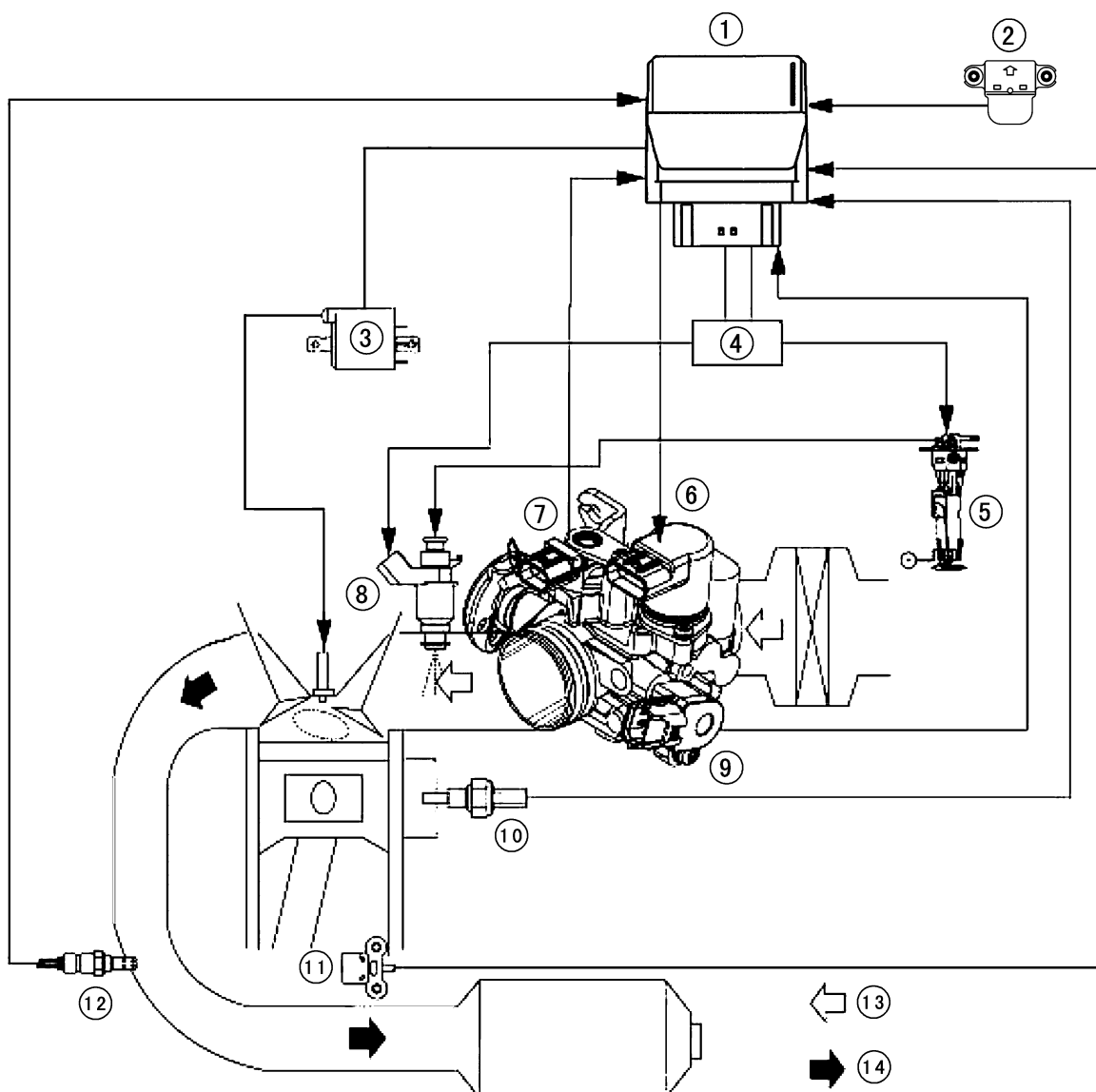
G: Apply grease.

R: Replacement Parts

3-6 FUEL SYSTEM (DFI)

DFI System

DFI System



DFI System

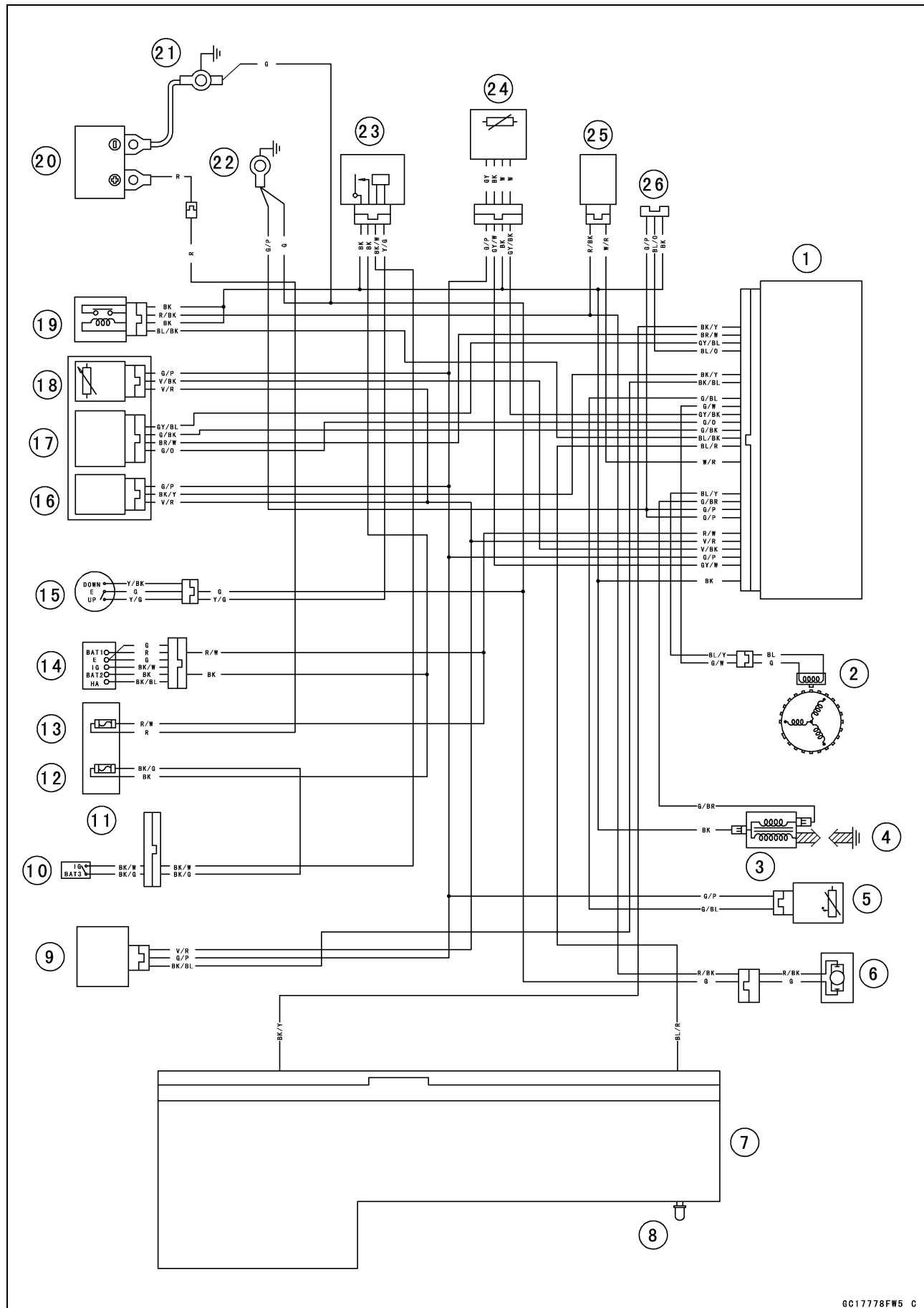
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1. ECU
2. Vehicle-down Sensor
3. Ignition Coil
4. Fuel Pump Relay
5. Fuel Pump
6. Idle Speed Control Valve Actuator
7. Intake Air Pressure Sensor
8. Fuel Injector
9. Throttle Sensor
10. Water Temperature Sensor (ECU)
11. Crankshaft Sensor
12. Oxygen Sensor
13. Fresh Air
14. Exhaust Gas

3-8 FUEL SYSTEM (DFI)

DFI System

DFI System Wiring Diagram



DFI System

Part Names

1. ECU
2. Crankshaft Sensor
3. Ignition Coil
4. Spark Plug
5. Water Temperature Sensor (ECU)
6. Fuel Pump
7. Meter Unit
8. Yellow Engine Warning Indicator Light (LED)
9. Vehicle-down Sensor
10. Engine Stop Switch
11. Fuse Box
12. Ignition Fuse 10 A
13. Charging/ECU Fuse 30 A
14. Ignition Switch
15. Side Stand Switch
16. Intake Air Pressure Sensor
17. Idle Speed Control Valve Actuator
18. Throttle Sensor
19. Fuel Pump Relay
20. Battery
21. Engine Ground
22. Frame Ground 1
23. ECU Relay
24. Oxygen Sensor
25. Fuel Injector
26. Self-Diagnostic System Connector

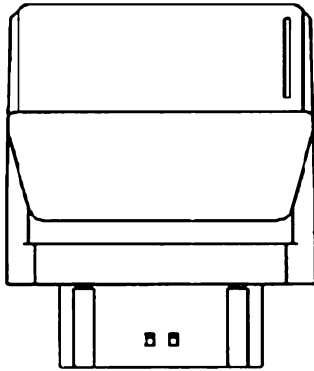
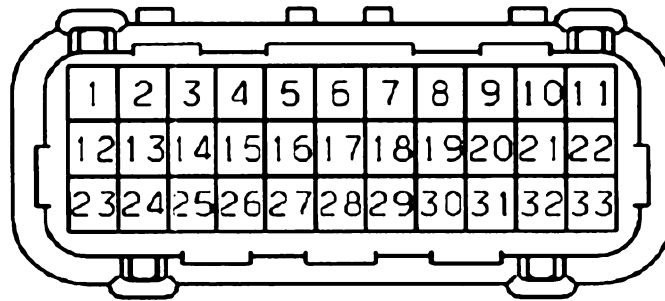
○Color Codes:

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		

3-10 FUEL SYSTEM (DFI)

DFI System

Terminal Numbers of ECU Connectors



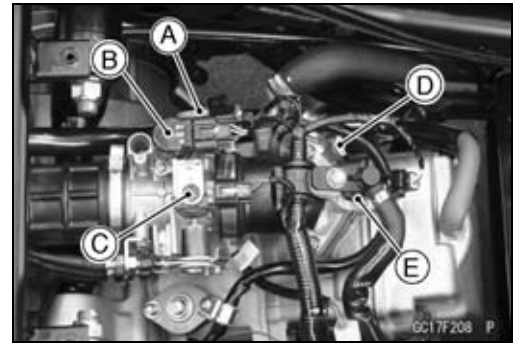
GT03096B S

Terminal Names

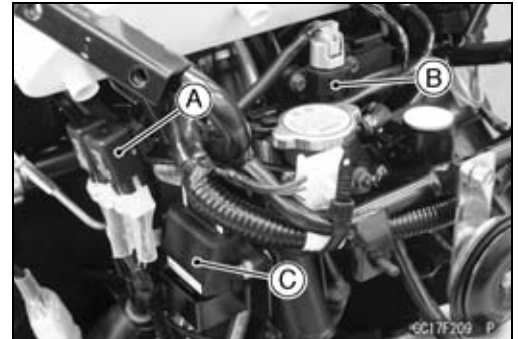
1. Ignition Power: BK
2. Ground: G/P
3. Oxygen Sensor: GY/W
4. Ground for Sensors: G/P
5. Throttle Sensor: V/BK
6. Power Supply to Sensors: V/R
7. Battery: R/W
8. Radiator Fan Relay: G/BK
9. Ground: G/P
10. Ground: G/P
11. Ignition Coil: G/BR
12. Crankshaft Sensor (+): BL/Y
13. Unused
14. Unused
15. Unused
16. Fuel Injector: W/R
17. Unused
18. Yellow Engine Warning Indicator Light (LED): BL/R
19. Fuel Pump Relay: BL/BK
20. Idle Speed Control Valve B (-): G/BK
21. Idle Speed Control Valve A (-): G/O
22. Oxygen Sensor Heater: GY/BK
23. Crankshaft Sensor (-): G/W
24. Water Temperature Sensor: G/BL
25. Unused
26. Vehicle-down Sensor: BK/BL
27. Intake Air Pressure Sensor: BK/Y
28. Unused
29. Unused
30. Self-Diagnostic System: BL/O
31. Idle Speed Control Valve B (+): GY/BL
32. Idle Speed Control Valve A (+): BR/W
33. Meter: BK/Y

DFI Parts Location

Throttle Sensor [A]
 Idle Speed Control Valve Actuator [B]
 Intake Air Pressure Sensor [C]
 Water Temperature Sensor (ECU) [D]
 Fuel Injector [E]



ECU Relay [A]
 Vehicle-down Sensor [B]
 ECU [C]



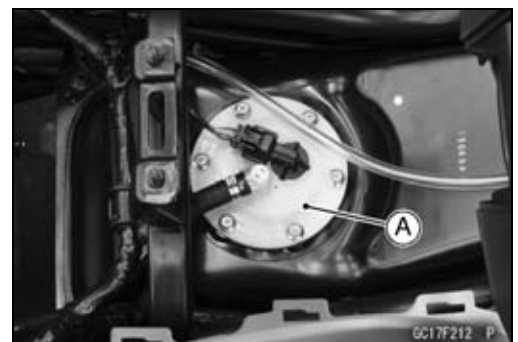
Crankshaft Sensor [A]



Oxygen Sensor [A]



Fuel Pump [A]



3-12 FUEL SYSTEM (DFI)

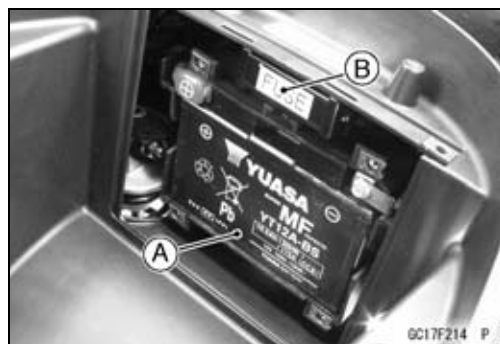
DFI Parts Location

Speed Sensor (Front Wheel Rotation Sensor) [A]



Battery [A]

Fuse Box (Charging/ECU Fuse 30 A) [B]



Ignition Coil [A]



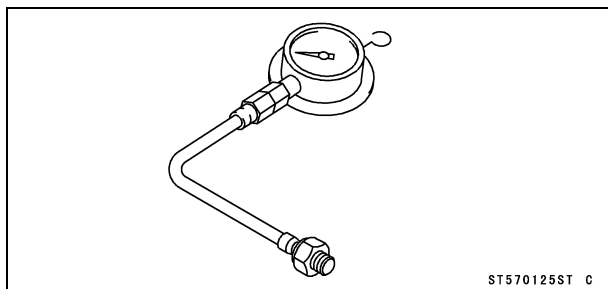
Specifications

Item	Standard
Digital Fuel Injection System	
Idle Speed	1 600 ±100 r/min (rpm)
Throttle Body Assy:	
Throttle Valve	Single throttle valve
Bore	φ34 mm (1.34 in.)
ECU:	
Make	KEIHIN
Type	Digital memory type, with built in IC igniter, sealed with resin
Fuel Pressure (High Pressure Line)	294 ±6 kPa (3.0 ±0.06 kgf/cm ² , 43 ±0.87 psi) with engine idling
Fuel Pump:	
Discharge	50 mL (1.7 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	30NA-FN40-0100
Nozzle Type	Fine atomizing type with 10 holes
Resistance	10.5 ±0.53 Ω @20°C (68°F)
Throttle Sensor:	
Input Voltage	DC 5 V
Output Voltage	DC 0.5 ~ 0.7 V at idle throttle opening DC 3.5 ~ 3.8 V at full throttle opening (for reference)
Resistance	3.5 ~ 6.5 kΩ @20°C (68°F)
Intake Air Pressure Sensor	
Input Voltage	DC 5 V
Output Voltage	DC 1.0 ~ 4.2 V (13.3 kPa (9.98 cmHg) ~ 120 kPa (90.0 cmHg))
Vehicle-down Sensor:	
Input Voltage	DC 5 V
Output Voltage	With sensor tilted 65° or more right or left: 3.7 ~ 4.4 V With sensor arrow mark pointed up: 0.4 ~ 1.4 V
Oxygen Sensor:	
Output Voltage (Rich)	DC 0.7 V or more
Output Voltage (Lean)	DC 0.18 V or less
Heater Resistance	6.7 ~ 9.5 Ω @20°C (68°F)
ISC Actuator:	
Input Voltage	About DC 8 V ~14.2 V and then 0.2 V or About DC 8 ~ 14.2 V
Resistance	About 80 Ω
Throttle Grip and Cables	
Throttle Grip Free Play	2 ~ 6 mm (0.08 ~ 0.24 in.)
Air Cleaner	
Air Cleaner Element	Wet Paper Element

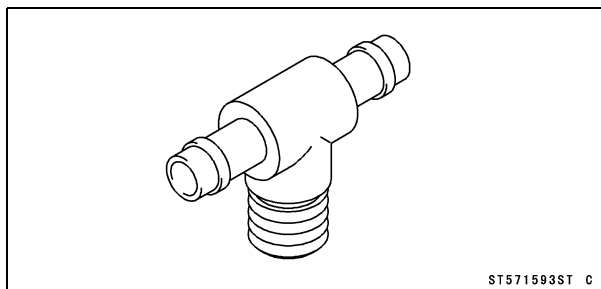
3-14 FUEL SYSTEM (DFI)

Special Tools and Sealant

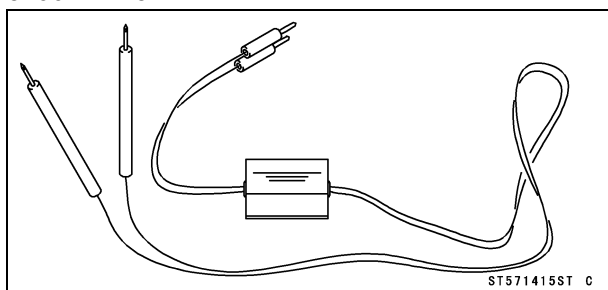
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



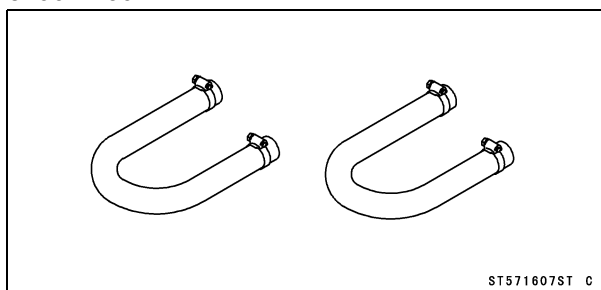
Fuel Pressure Gauge Adapter:
57001-1593



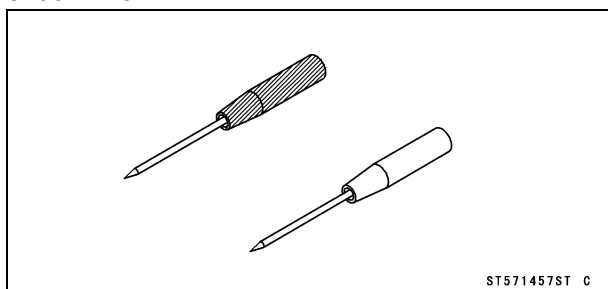
Peak Voltage Adapter:
57001-1415



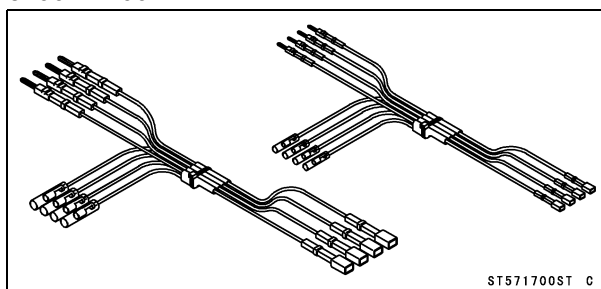
Fuel Hose:
57001-1607



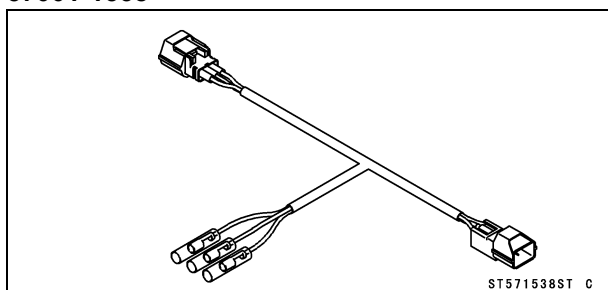
Needle Adapter Set:
57001-1457



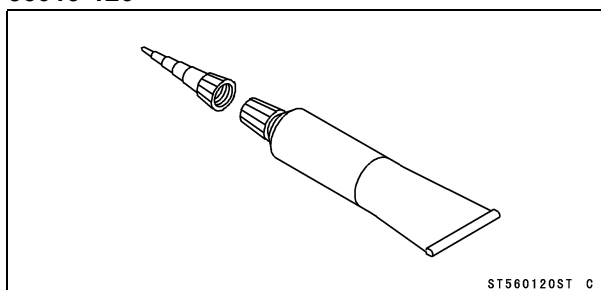
Measuring Adapter:
57001-1700



Throttle Sensor Setting Adapter:
57001-1538



Liquid Gasket, TB1211:
56019-120

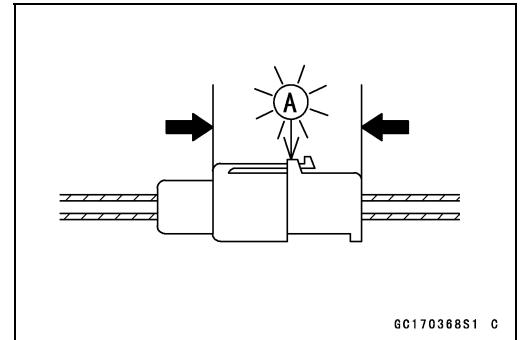


DFI Servicing Precautions

DFI Servicing Precautions

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

- This DFI system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the DFI parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.
- Whenever the DFI electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (–) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].



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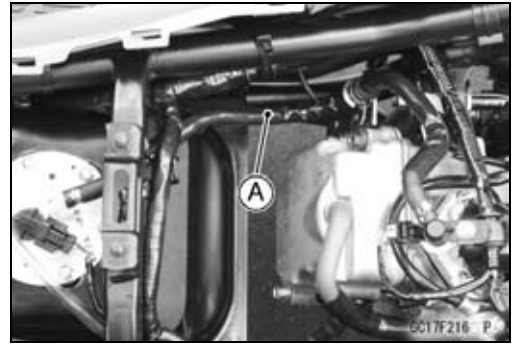
- Do not turn the ignition switch on while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, DFI parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of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

3-16 FUEL SYSTEM (DFI)

DFI Servicing Precautions

○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak or the hose to burst. Check the fuel hose [A] (see Fuel Hose Inspection (fuel leak, damage, installation condition) in the Periodic Maintenance chapter).

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



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



Troubleshooting the DFI System

Outline

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



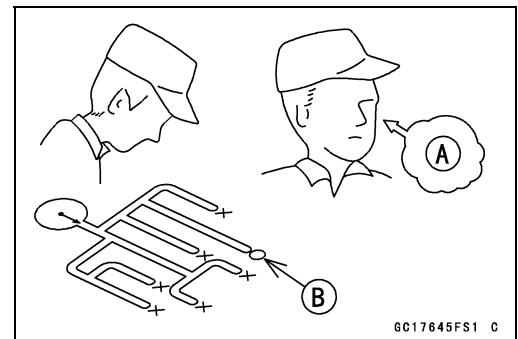
And the engine warning symbol [A] and the service code (error code) [B] are displayed on the LCD by the number of two digits.



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

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

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



Even if the repair has been done, the service codes stored in memory of the ECU are not erased to preserve the problem history. But, the service code can be erased with the specified procedures.

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

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

3-18 FUEL SYSTEM (DFI)

Troubleshooting the DFI System

- When checking the DFI parts, use a tester which can be read two decimal place voltage or resistance.
- The DFI part connectors [A] have seals [B], including the ECU. When measuring the input or output voltage with the connector joined, use the needle adapter set [C]. Insert the needle adapter inside the seal until the needle adapter reaches the terminal.

Special Tool - Needle Adapter Set: 57001-1457

NOTICE

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

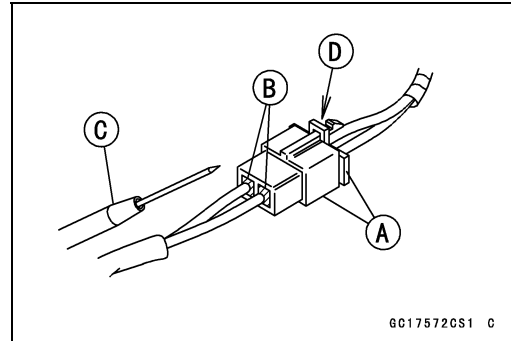
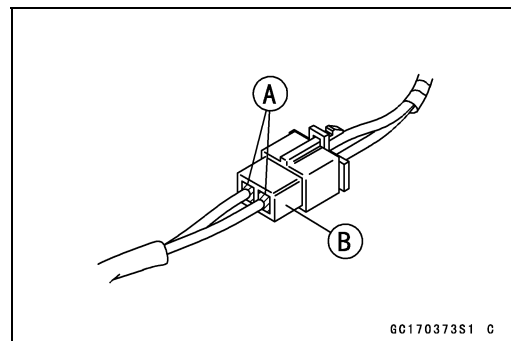
- Make sure that measuring points are correct in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of a tester.
- Be careful not to short-circuit the leads of the DFI or electrical system parts by contact between adapters.
- Turn the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

NOTICE

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

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

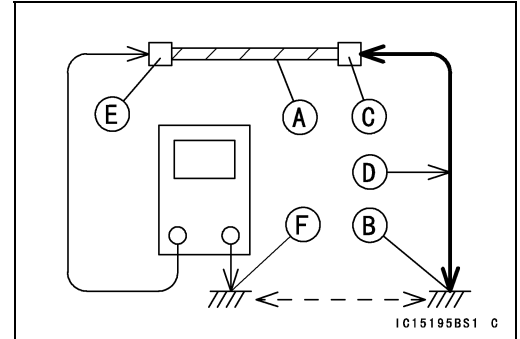
Sealant - Liquid Gasket, TB1211: 56019-120



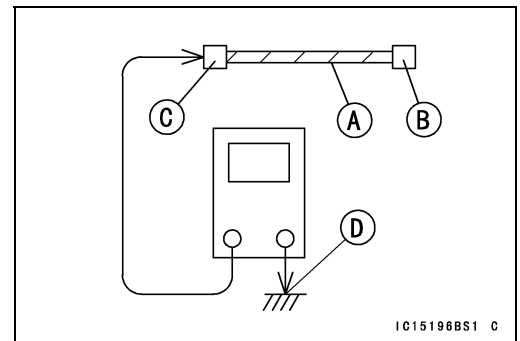
- Always check battery condition before replacing the DFI parts. A fully charged battery is a must for conducting accurate tests of the DFI system.
- Trouble may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.
- Measure the coil winding resistance when the DFI part is cold (at room temperature).
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, short, etc. Deteriorated wires and bad connections can cause reappearance of problems and unstable operation of the DFI system.
- ★ If any wiring is deteriorated, replace the wiring.

Troubleshooting the DFI System

- Pull each connector apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect a tester between the ends of the leads.
- ★ If the tester does not read about 0 Ω , the lead is defective. Replace the lead or the main harness.
- If both ends of a harness [A] are far apart, ground [B] the one end [C], using a jumper lead [D] and check the continuity between the end [E] and the ground [F]. This enables to check a long harness for continuity. If the harness is open, repair or replace the harness.



- 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.

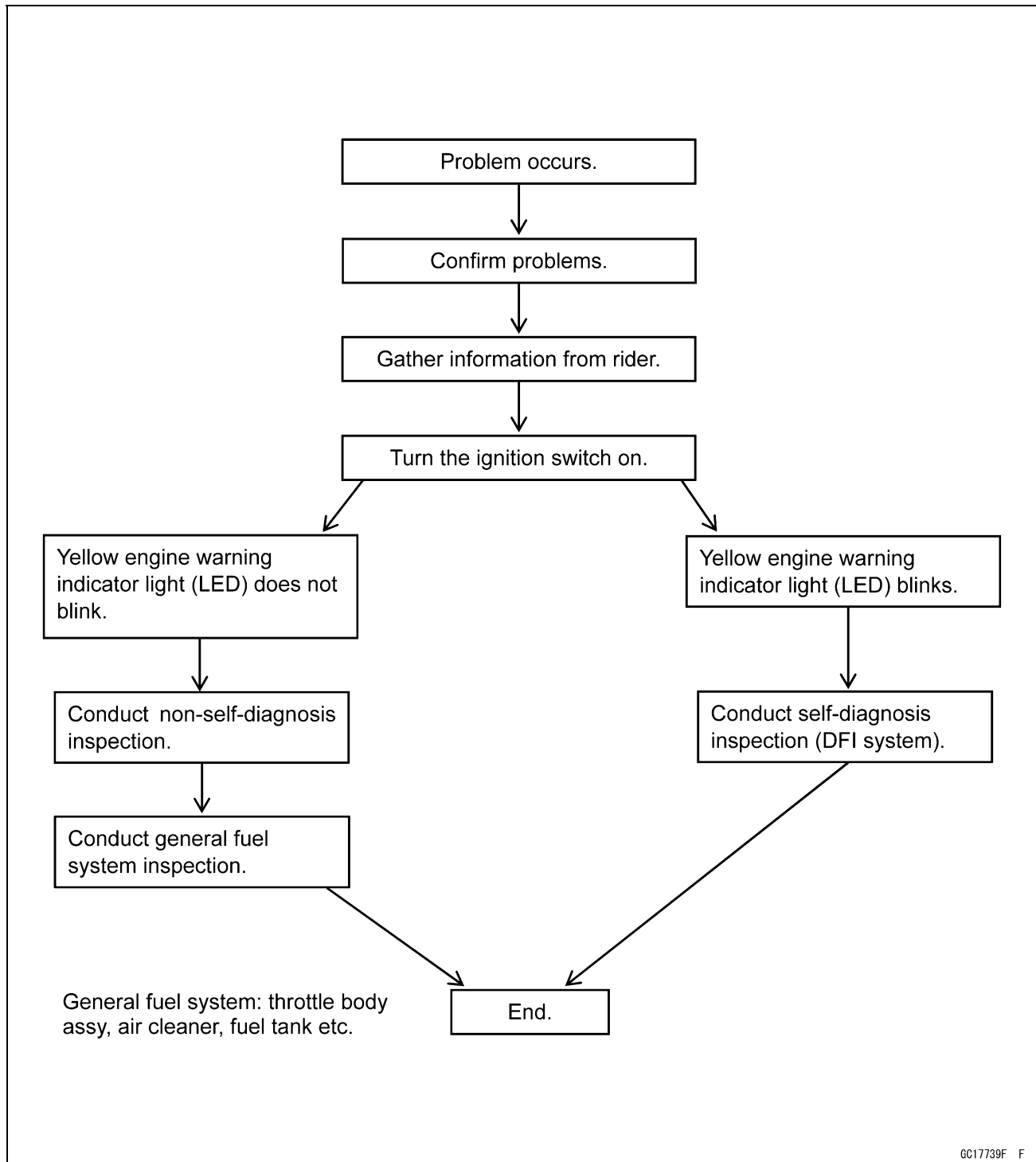


- Narrow down suspicious locations by repeating the continuity tests from the ECU connectors.
- ★ If no abnormality is found in the wiring or connectors, the DFI parts are the next likely suspects. Check the part, starting with input and output voltages. However, there is no way to check the ECU itself.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

3-20 FUEL SYSTEM (DFI)

Troubleshooting the DFI System

DFI Diagnosis Flow Chart



Inquiries to Rider

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

Troubleshooting the DFI System

Sample Diagnosis Sheet

Rider name:	Registration No. (license plate No.):	Year of initial registration:
Model:	Engine No.:	Frame No.:
Date problem occurred:		Mileage:
Environment when problem occurred.		
Weather	☐ fine, ☐ cloudy, ☐ rain, ☐ snow, ☐ always, ☐ other:	
Temperature	☐ hot, ☐ warm, ☐ cold, ☐ very cold, ☐ always, ☐ other:	
Problem frequency	☐ chronic, ☐ often, ☐ once	
Road	☐ street, ☐ highway, ☐ mountain road (☐ uphill, ☐ downhill), ☐ bumpy, ☐ pebble	
Altitude	☐ normal, ☐ high (about 1 000 m or more)	
Motorcycle conditions when problem occurred.		
Yellow engine warning indicator light (LED)	☐ goes on immediately after turning the ignition switch on, and goes off after about a few seconds (normal).	
	☐ goes on immediately after turning the ignition switch on, and then it blinks (DFI problem).	
	☐ does not go on after turning the ignition switch on [light (LED), meter unit fault].	
Starting difficulty	☐ starter motor not rotating.	
	☐ starter motor rotating but engine doesn't turn over.	
	☐ starter motor and engine don't turn over.	
	☐ no fuel flow (☐ no fuel in tank, ☐ no fuel pump sound).	
	☐ engine flooded (do not crank engine with throttle opened, which promotes engine flooding).	
	☐ 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:	

3-22 FUEL SYSTEM (DFI)

Troubleshooting the DFI System

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

DFI System Troubleshooting Guide

NOTE

- *This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties in DFI system.*
- *The ECU may be involved in the DFI electrical and ignition system troubles. If these parts and circuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.*

Engine Won't Turn Over

Symptoms or possible Causes	Actions (chapter)
Side stand 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).
Ignition coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Ignition coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU ground and power supply trouble	Inspect (see chapter 3).
ECU trouble	Inspect (see chapter 3).
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel pump not operating	Inspect (see chapter 3).
Fuel pump relay trouble	Inspect and replace (see chapter 16).
Fuel filter clogged	Inspect and replace fuel filter (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Idle speed control valve trouble	Inspect (see chapter 3).
Throttle sensor position and idle speed control valve actuator position are not reset	Reset throttle sensor position and idle speed control valve actuator position (see chapter 3)

Poor Running at Low Speed

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

3-24 FUEL SYSTEM (DFI)

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Unstable (rough) idling:	
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Idle speed control valve trouble	Inspect (see chapter 3).
Throttle sensor position and idle speed control valve actuator position are not reset	Reset throttle sensor position and idle speed control valve actuator position (see chapter 3)
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Ignition coil trouble	Inspect (see chapter 16).
Throttle sensor trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water 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).
Idle speed control valve trouble	Inspect (see chapter 3).
Throttle sensor position and idle speed control valve actuator position are not reset	Reset throttle sensor position and idle speed control valve actuator position (see chapter 3)
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter clogged	Inspect and replace fuel filter (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Ignition coil trouble	Inspect (see chapter 16).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel Injector trouble	Inspect (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Throttle sensor trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water 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 17).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
After fire:	
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Fuel injector trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Other:	
Intermittent any DFI fault and its recovery	Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 3).

Poor Running or No Power at High Speed:

Symptoms or Possible Causes	Actions (chapter)
Firing incorrect:	
Ignition coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Ignition coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Intake manifold loose	Reinstall (see chapter 3).
Fuel Injector 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	Visually inspect and replace (see chapter 3).
Fuel injector clogged	Repair (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently.	Fuel pump bearings may wear. Replace the fuel pump (see chapter 3).

3-26 FUEL SYSTEM (DFI)

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Fuel pump trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Cracked or obstructed intake air pressure sensor vacuum hose	Inspect and repair or replace (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Knocking:	
Fuel poor quality or incorrect	Fuel change (Use the gasoline recommended in the Owner's Manual).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
Ignition coil trouble	Inspect (see chapter 16).
ECU trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Miscellaneous:	
Throttle valves will not fully open	Inspect throttle cables and lever linkage (see chapter 3).
Engine overheating - Water temperature sensor or crankshaft sensor trouble	(see Overheating of Troubleshooting Guide in chapter 17).
Exhaust Smokes Excessively:	
(Black smokes)	
Air cleaner clogged	Clean element (see chapter 3).
Fuel pressure too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water 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).

Self-Diagnosis

Self-Diagnosis Outline

The self-diagnosis system is monitoring the DFI system and ignition system.

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



The LCD (Liquid Crystal Display) displays the engine warning symbol [A] and service code(s) [B] to show the problem(s) which the above system has at the moment of diagnosis.

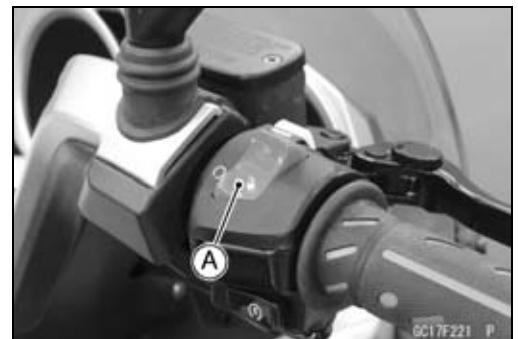


Self-Diagnosis Procedures

NOTE

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

- Place the motorcycle on its center stand.
- Put the side stand [A] up.
- Turn the engine stop switch to run position [A].



3-28 FUEL SYSTEM (DFI)

Self-Diagnosis

- Turn the ignition switch on.
- When a problem occurs with DFI system and ignition system, the yellow engine warning indicator light (LED) [A] blinks to alert the rider.

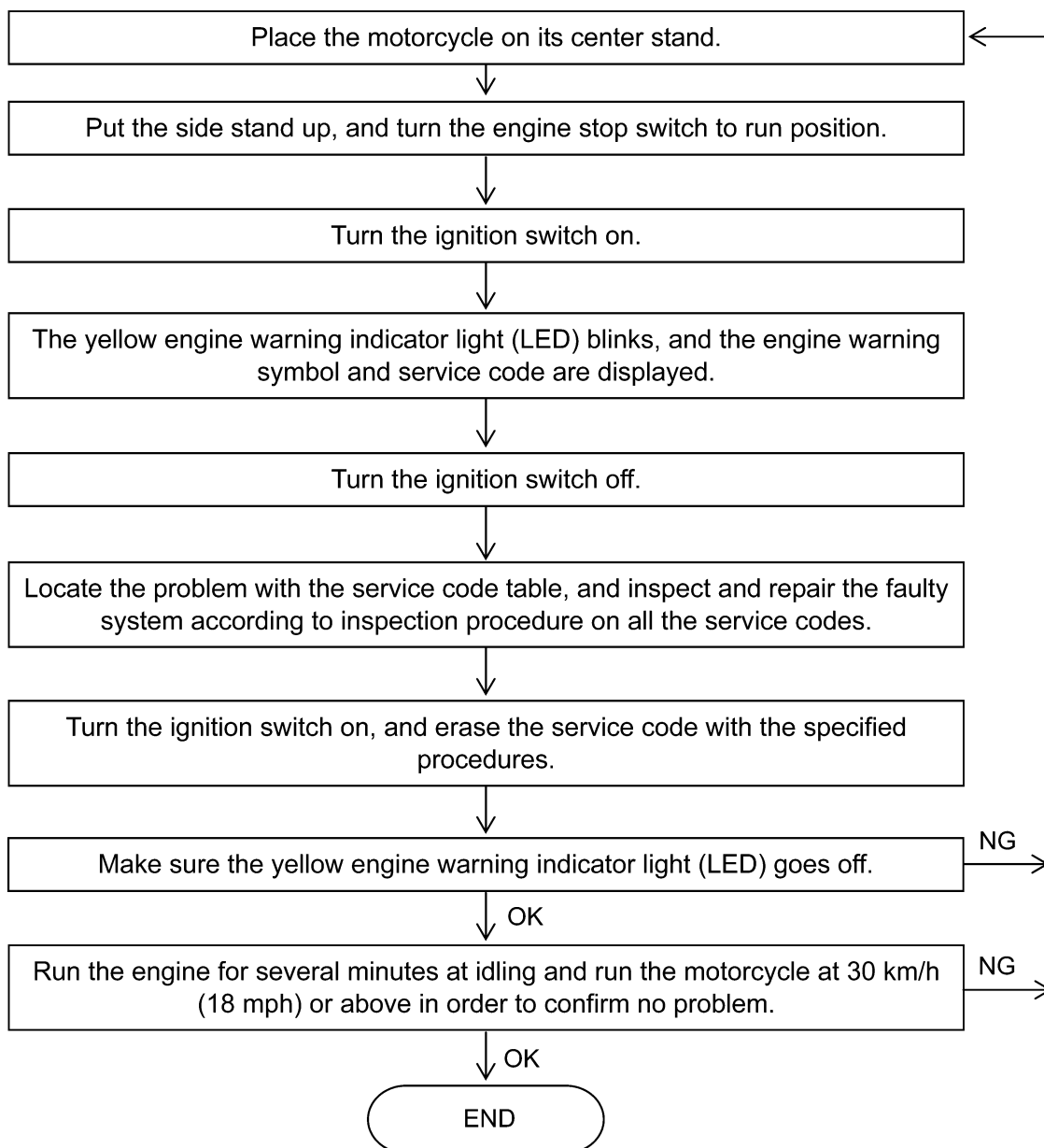


- And the engine warning symbol [A] and service code [B] are displayed at the end of the blinking of the yellow engine warning indicator light (LED).



Self-Diagnosis

Self-Diagnosis Flow Chart

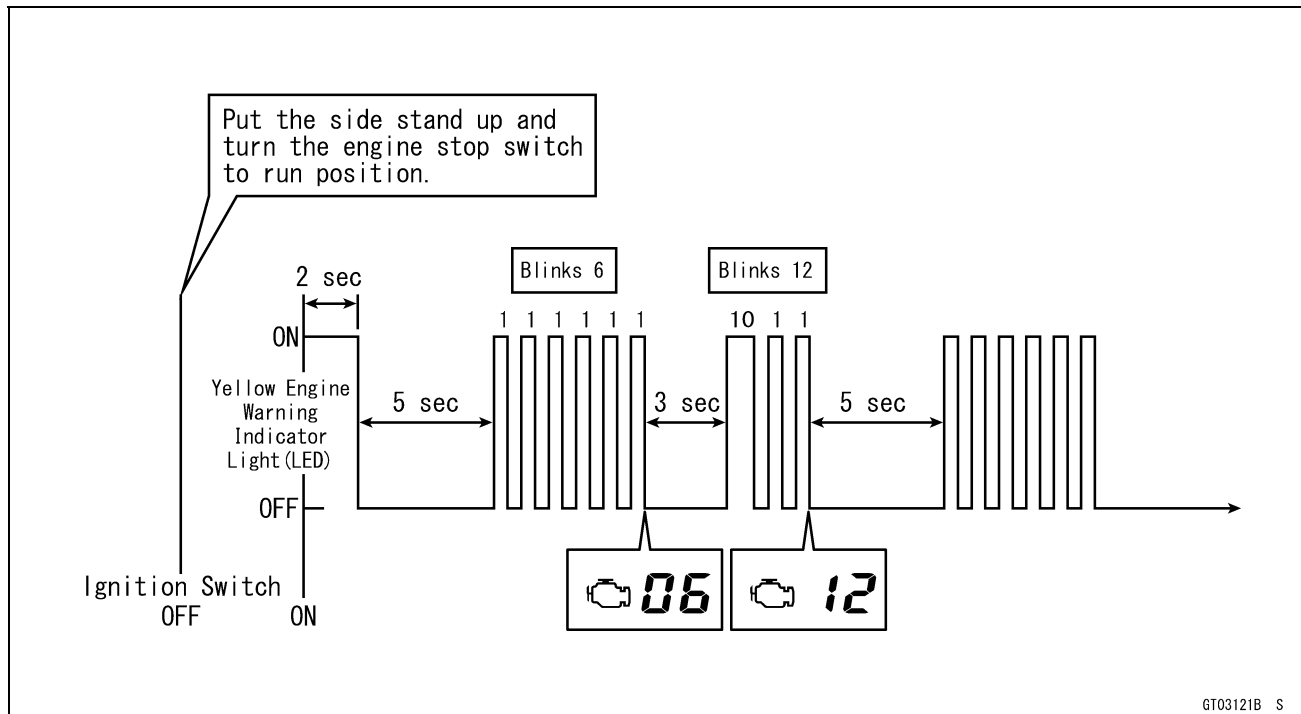


3-30 FUEL SYSTEM (DFI)

Self-Diagnosis

How to Read Service Codes

- Service codes are shown by a series of long and short blinks of the yellow engine warning indicator light (LED), and the number of two digits on the display, as shown below.
- 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 ignition switch is turned off.
- The warning symbol and the number of two digits are displayed at the end of the blinking of the yellow engine warning indicator light (LED).
- For example, if two problems occurred in the order of 12, 06, the service codes are displayed from the lowest number in the order listed.
(06 → 12) → (06 → 12) → . . . (repeated)



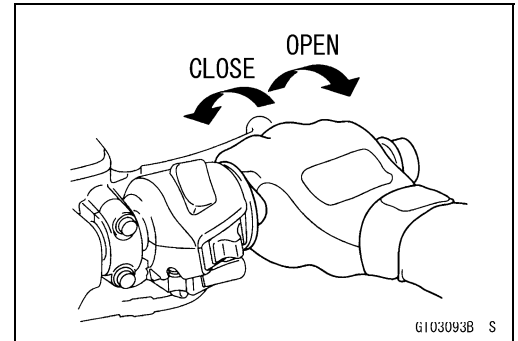
Self-Diagnosis

How to Erase Service Code

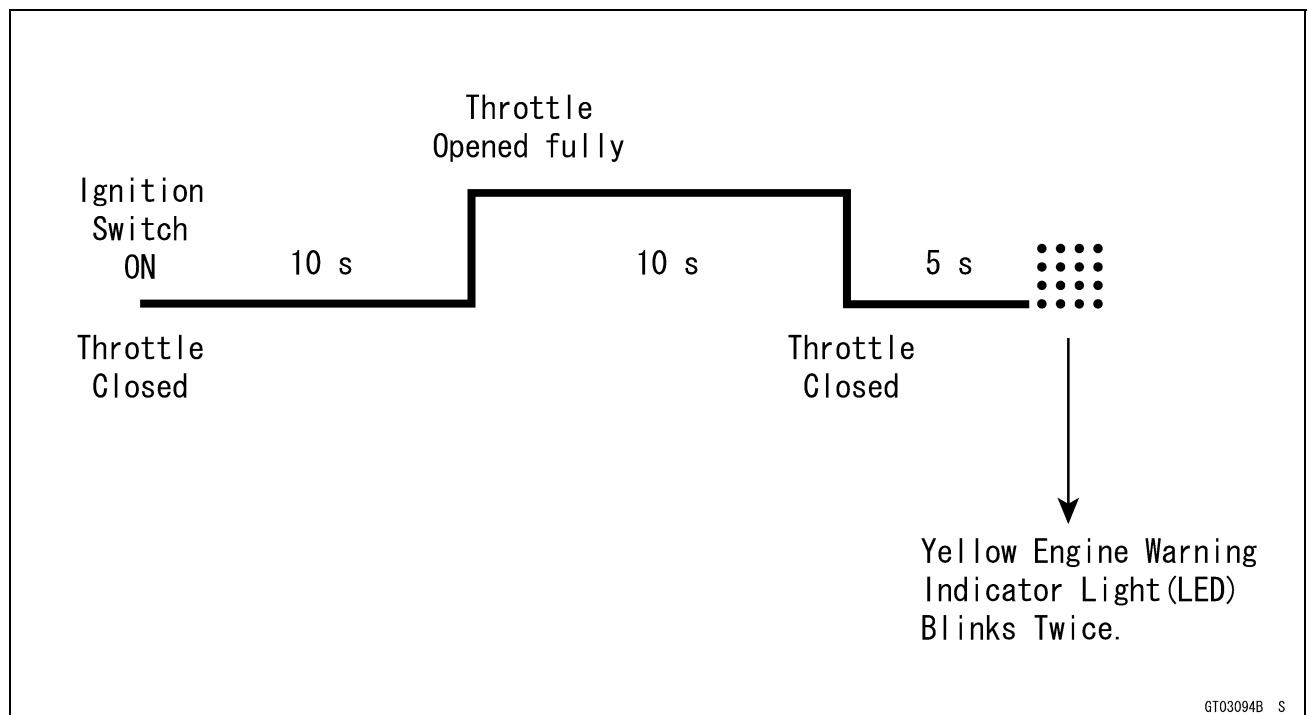
The service code stored in memory of the ECU continues to be display on the meter unit until it is erased. Erase the service code after the repair has done.

Service Code Erasing Procedure

1. Place the motorcycle on its center stand.
2. Put the side stand up, and turn the engine stop switch to run position.
3. Turn the ignition switch on and wait for ten seconds.
4. Fully open the throttle grip and wait for ten seconds.
5. Release the throttle grip.
6. The yellow engine warning indicator light (LED) will blink twice (0.5 second) after five seconds.
7. The service code data is erased after the yellow engine warning indicator light (LED) goes off.



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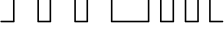
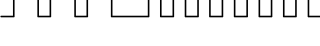
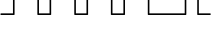
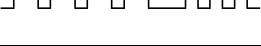
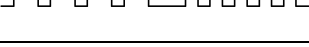
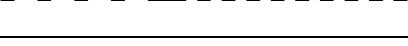
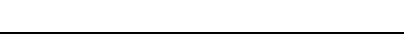


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3-32 FUEL SYSTEM (DFI)

Self-Diagnosis

Service Code Table

Service Code	Yellow Engine Warning Indicator Light (LED)	Problems
06		Throttle sensor malfunction, wiring open or short
09		Intake air pressure sensor malfunction, wiring open or short
12		Water temperature sensor malfunction, wiring open or short
15		Vehicle-down sensor malfunction, wiring open or short
17		Oxygen sensor inactivation, wiring open or short
33		Fuel injector malfunction, wiring open or short
37		Ignition coil malfunction, wiring open or short
41		Fuel pump relay malfunction, cling
43		Radiator fan relay malfunction, wiring open or short
45		Oxygen sensor heater malfunction, wiring open or short
49		Idle Speed Control Valve Actuator malfunction, wiring open or short
66		Crankshaft 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
Symptoms

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Symptoms
06	Throttle Sensor	Output Voltage 0.3 ~ 4.5 V	Engine operates normally
09	Intake Air Pressure Sensor	Output Voltage 1.0 ~ 4.2 V	Engine operates normally
12	Water Temperature Sensor	-20°C: 18.8 kΩ 40°C: 1.136 kΩ 100°C: 0.1553 kΩ	Engine operates normally
15	Vehicle-down Sensor	Output Voltage 0.4 ~ 4.4 V	Engine operates normally
17	Oxygen Sensor	A/F below 14.7: 0.7 V or more A/F over 14.7: 0.18 V or less	Engine operates normally
33	Fuel Injector	Resistance 9.97 ~ 11.03 Ω	Engine fail to be operated
37	Ignition Coil	The ignition coil primary winding must send signals (output voltage) continuously to the ECU.	Engine fail to be operated
41	Fuel Pump Relay	When relay power supply is off, fuel pump relay is off.	Engine fail to be operated
43	Radiator Fan Relay	When the relay OFF condition, the fan relay is open.	Engine operates normally
45	Oxygen Sensor Heater	Resistance 6.7 ~ 9.5 Ω	Engine starts normally but not smooth
49	Idle Speed Control Valve Actuator	The actuator operates open and close of the bypass passage by the pulse signal from the ECU.	Engine operates normally
66	Crankshaft Sensor	Crankshaft sensor must send 17 signals to the ECU at the 1 cranking.	Engine starts normally but not smooth

3-34 FUEL SYSTEM (DFI)

Throttle Sensor Position and Idle Speed Control Valve Actuator Position Reset

How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position

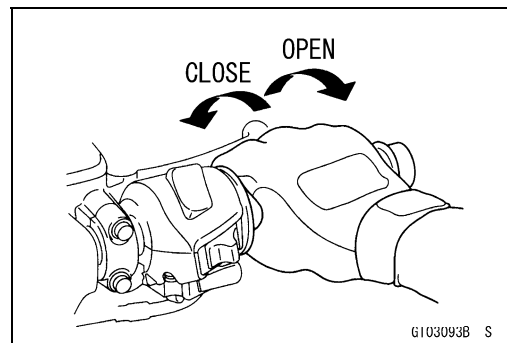
The ECU records the throttle sensor position and idle speed control valve actuator position. Therefore, the throttle sensor position and idle speed control valve actuator position have to be reset when throttle body, intake air pressure sensor, idle speed control valve actuator or ECU has been reinstalled.

NOTE

- If close or open the throttle grip randomly, the ECU may record the incorrect the throttle sensor position when the ECU or the throttle body has been reinstalled. It can cause hard to start the engine or idling speed is not smooth when engine installation.
- The idle speed control valve actuator has a motor inside, which controls idle speed control valve actuator to obtain smooth idling speed. The ECU may record the incorrect idle speed control valve actuator position during the engine speed is not working when the ECU or the throttle body has been reinstalled. It can cause engine stop, hard to start the engine or rough idling speed.

Throttle Sensor Position and Idle Speed Control Valve Actuator Position Reset Procedure

1. Place the motorcycle on its center stand.
  2. Put the side stand up, and turn the engine stop switch to run position.
  3. Turn the ignition switch off.
  4. Fully open the throttle grip.
  5. Turn the ignition switch on.
  6. Release the throttle grip after waiting for eight seconds.
  7. Turn the ignition switch off.
  8. Turn the ignition switch on.
  9. The throttle sensor position and idle speed control valve actuator position have been reset successfully.
- ★If the trouble occurs after resetting, repeat the steps from 1 to 8 again.



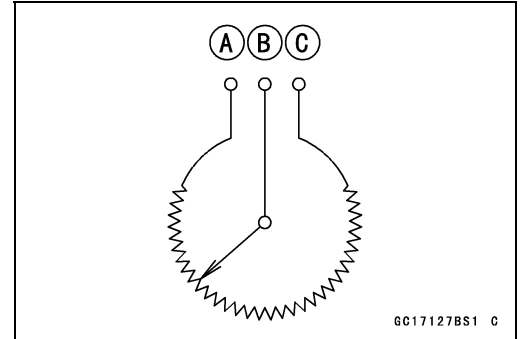
Throttle Sensor (Service Code 06)

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

Input Terminal [A]: V/R

Output Terminal [B]: V/BK

Ground Terminal [C]: G/P

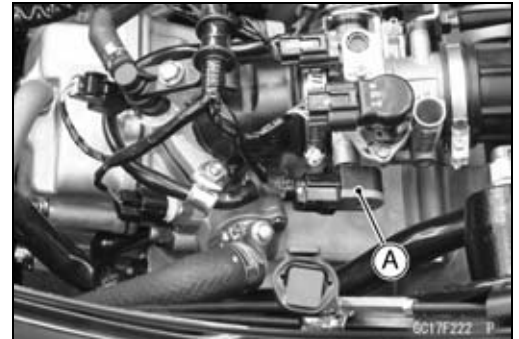


Throttle Sensor Removal/Adjustment

NOTICE

Do not remove or adjust the throttle sensor [A] since it has been adjusted and set with precision at the factory.

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



Throttle Sensor Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the throttle sensor connector [A].



- Connect the setting adapter [A] between the harness connector and throttle sensor connector.

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

- Connect a digital meter to the setting adapter leads.

Main Throttle Sensor Input Voltage

Connections to Adapter:

Digital Meter (+) → BK (sensor V/R) lead

Digital Meter (–) → W (sensor G/P) lead

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

Input Voltage

Standard: DC 5 V

- Turn the ignition switch off.
- ★ If the reading is within the standard, check the throttle sensor resistance (see Main Throttle Sensor Resistance Inspection).



3-36 FUEL SYSTEM (DFI)

Throttle Sensor (Service Code 06)

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

○ Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

ECU Connector [A] ↔

Main Throttle Sensor Connector [B]

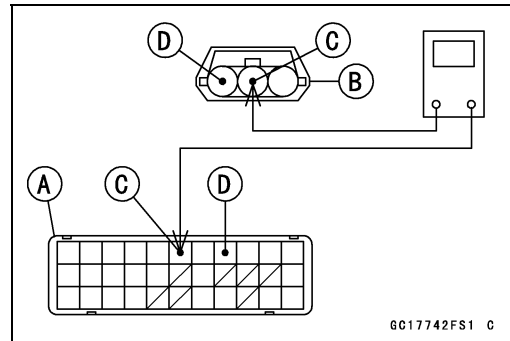
V/R lead (ECU terminal 6) [C]

G/P lead (ECU terminal 4) [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).

● Reset the throttle sensor position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).



Throttle Sensor Resistance Inspection

● Turn the ignition switch off.

● Measure the throttle sensor resistance in the same way as input voltage inspection, note the following.

○ Disconnect the throttle sensor setting adapter [A] from the connector of the main harness side.

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

○ Connect the setting adapter to the sensor connector only.



○ Connect a digital meter [A] to the setting adapter [B].

Main Throttle Sensor [C]

Main Throttle Sensor Resistance

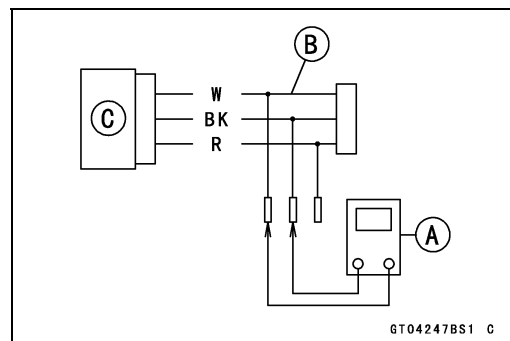
Connections to Adapter:

BK (sensor V/R) lead ↔ W (sensor G/P) lead

Standard: 3.5 ~ 6.5 kΩ @20°C (68°F)

★ If the reading is out of the standard, replace the throttle body assy.

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



Throttle Sensor Output Voltage Inspection

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

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

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

Throttle Sensor Output Voltage

Connections to Adapter:

Digital Meter (+) → R (sensor V/BK) lead

Digital Meter (-) → W (sensor G/P) lead



Throttle Sensor (Service Code 06)

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

Idle Speed

Standard: 1 600 ±100 r/min (rpm)

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

Output Voltage

Standard: DC 0.5 ~ 0.7 V at idle throttle opening

DC 3.5 ~ 3.8 V at full throttle opening (for reference)

NOTE

- Open the throttle, confirm the output voltage will be raise.
- The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.
- When the input voltage reading shows other than 5 V, derive a voltage range as follows.

Example:

In the case of a input voltage of 4.75 V.

$$0.5 \times 4.75 \div 5.00 = 0.48 \text{ V}$$

$$0.7 \times 4.75 \div 5.00 = 0.67 \text{ V}$$

Thus, the valid range is 0.60 ~ 0.62 V

- Turn the ignition switch off.
- ★ If the reading is out of the standard, replace the throttle body assy.
- ★ If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.
- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

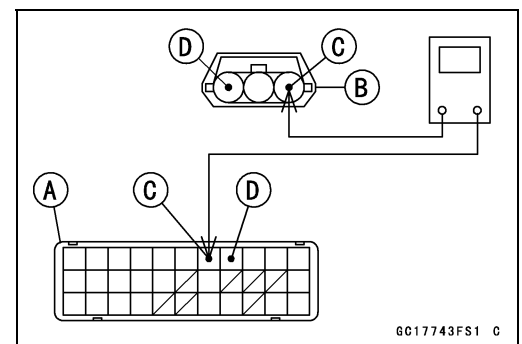
ECU Connector [A] ↔

Main Throttle Sensor Connector [B]

V/BK lead (ECU terminal 5) [C]

G/P lead (ECU terminal 4) [D]

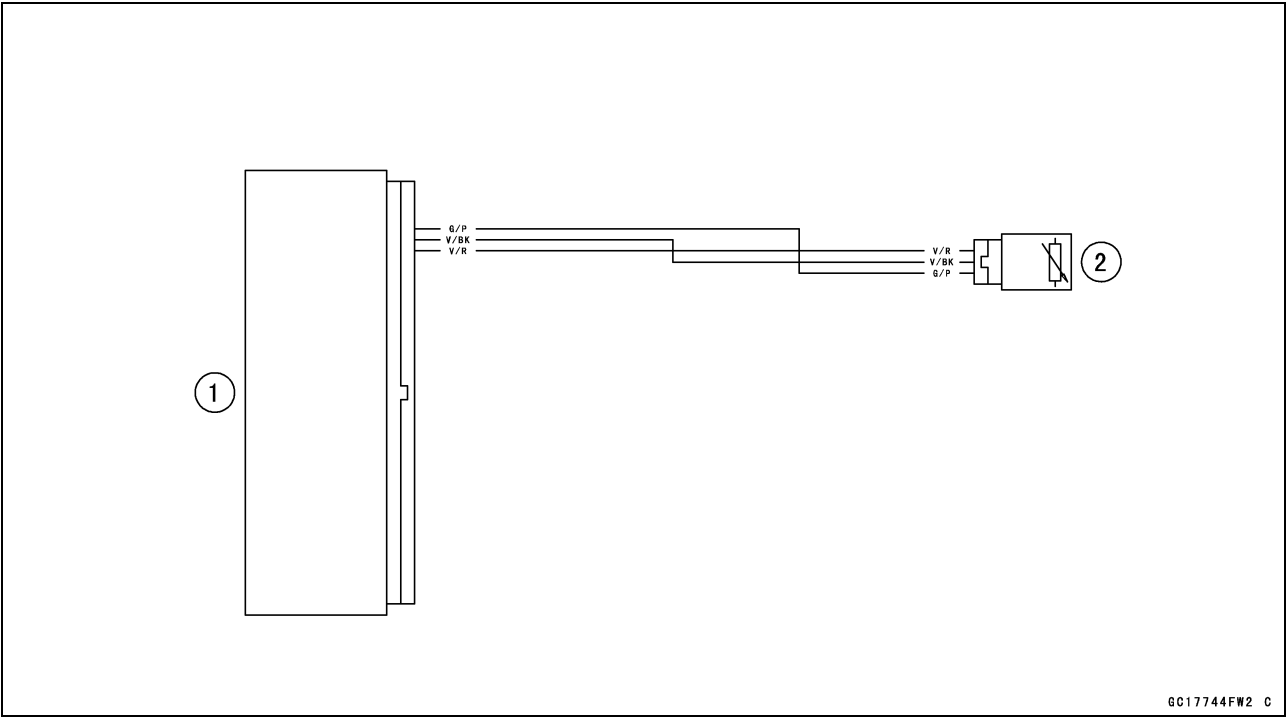
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- Reset the throttle sensor position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).



3-38 FUEL SYSTEM (DFI)

Throttle Sensor (Service Code 06)

Throttle Sensor Circuit



- 1. ECU
- 2. Throttle Sensor

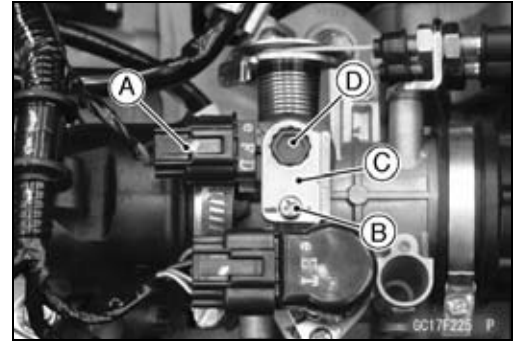
Intake Air Pressure Sensor (Service Code 09)

Intake Air Pressure Sensor Removal

NOTICE

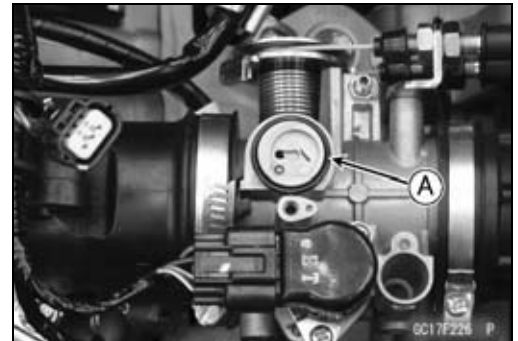
Never drop the intake air pressure sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the intake air pressure sensor connector [A].
- Remove:
  - Screw [B]
  - Plate [C]
  - Intake Air Pressure Sensor [D]

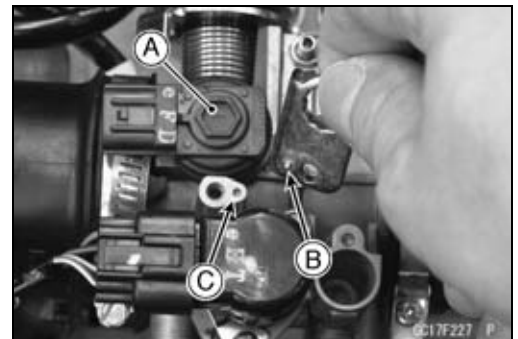


Intake Air Pressure Sensor Installation

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



- Install the intake air pressure sensor [A] to the throttle body assy.
- Install the plate so that the projection [B] on the plate fits to the hollow [C] on the throttle body assy.
- Tighten the screw.
- Connect the intake air pressure sensor connector.
- Reset the throttle sensor position and idle speed control valve actuator position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).



3-40 FUEL SYSTEM (DFI)

Intake Air Pressure Sensor (Service Code 09)

Intake Air Pressure Sensor Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the intake air pressure sensor connector and connect the measuring adapter [A] between these connectors.

[B] Main Harness

[C] Intake Air Pressure Sensor

Special Tool - Measuring Adapter: 57001-1700

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

Intake Air Pressure Sensor Input Voltage

Connections to Adapter:

Digital Meter (+) → R (sensor V/R) lead

Digital Meter (-) → BK (sensor G/P) lead

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

Input Voltage

Standard: DC 5 V

- Turn the ignition switch off.
  - ★ If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor Output Voltage Inspection).
  - ★ If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.
- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

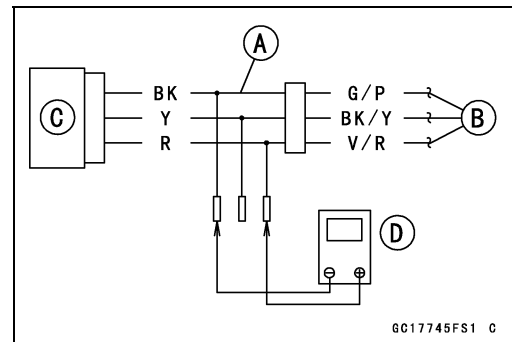
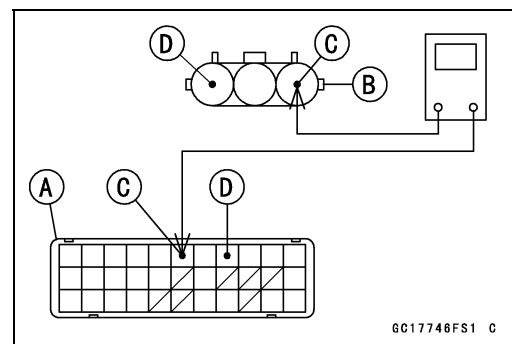
ECU Connector [A] ↔

Intake Air Pressure Sensor Connector [B]

V/R lead (ECU terminal 6) [C]

G/P lead (ECU terminal 4) [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).
- Reset the throttle sensor position and idle speed control valve actuator position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).



Intake Air Pressure Sensor (Service Code 09)

Intake Air Pressure Sensor Output Voltage Inspection

- Measure the output voltage at the intake air pressure sensor in the same way as input voltage inspection, note the following.
- Disconnect the intake air pressure sensor connector and connect the measuring adapter [A] between these connectors.
  - [B] Main Harness
  - [C] Intake Air Pressure Sensor
  - [D] Digital Meter

Special Tool - Measuring Adapter: 57001-1700

Intake Air Pressure Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → Y (sensor BK/Y) lead

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

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

Output Voltage

Usable Range: **DC 1.0 ~ 4.2 V [13.3 kPa (9.98 cmHg) ~ 120 kPa (90.0 cmHg)]**

NOTE

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

- Turn the ignition switch off.
- ★ If the reading is out of the usable range, replace the sensor.
- ★ If the reading is within the usable range, remove the ECU and check the wiring for continuity between harness connectors.
- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

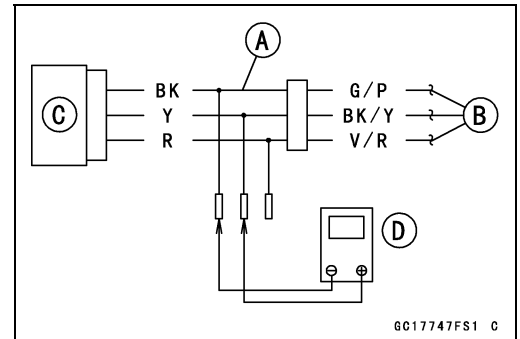
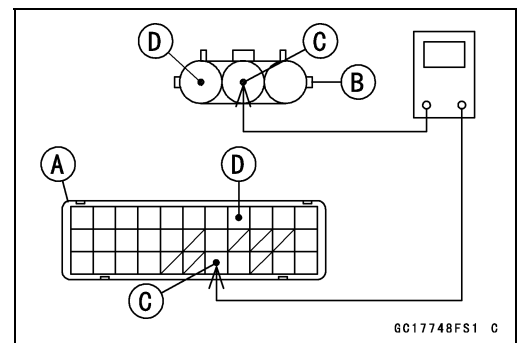
ECU Connector [A] ↔

Intake Air Pressure Sensor Connector [B]

BK/Y lead (ECU terminal 27) [C]

G/P lead (ECU terminal 4) [D]

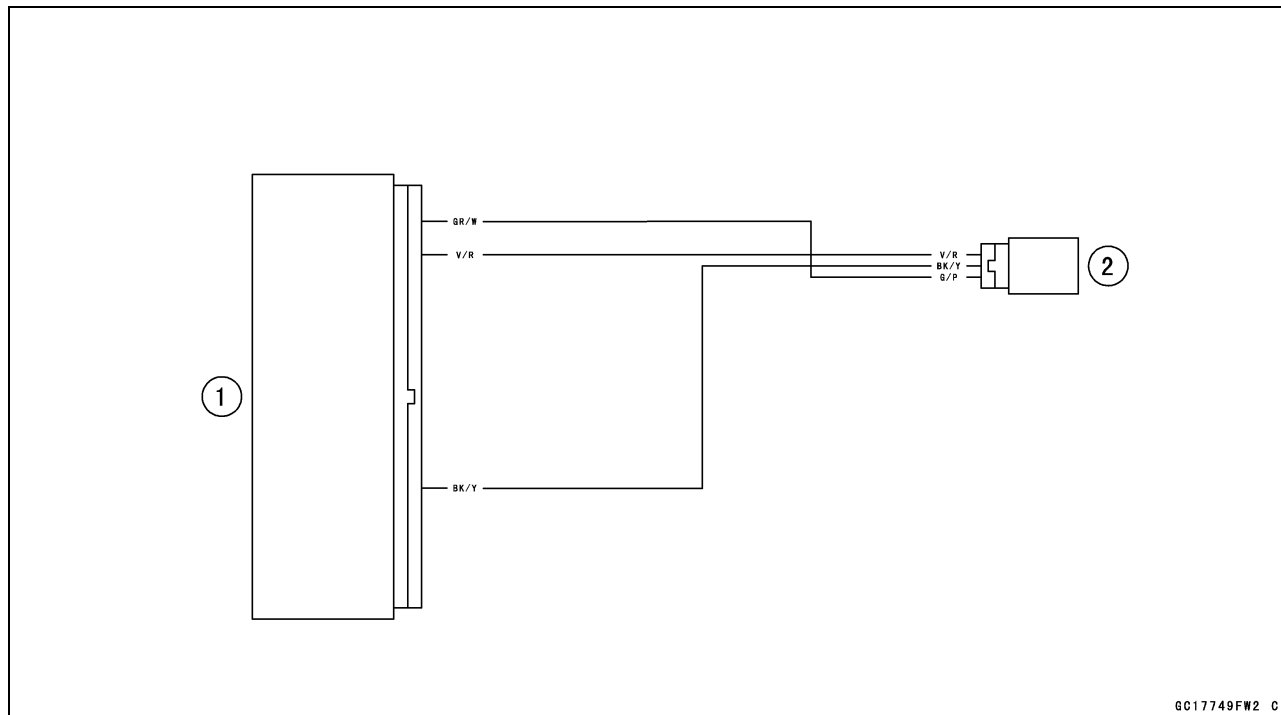
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- Reset the throttle sensor position and idle speed control valve actuator position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).



3-42 FUEL SYSTEM (DFI)

Intake Air Pressure Sensor (Service Code 09)

Intake Air Pressure Sensor Circuit



1. ECU

2. Intake Air Pressure Sensor

Water Temperature Sensor (Service Code 12)

Water Temperature Sensor (ECU) Removal/Installation

NOTICE

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

- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Disconnect the water temperature sensor connector [A].
- Remove the water temperature sensor [B].
- Replace the O-ring with a new one.
- Tighten:

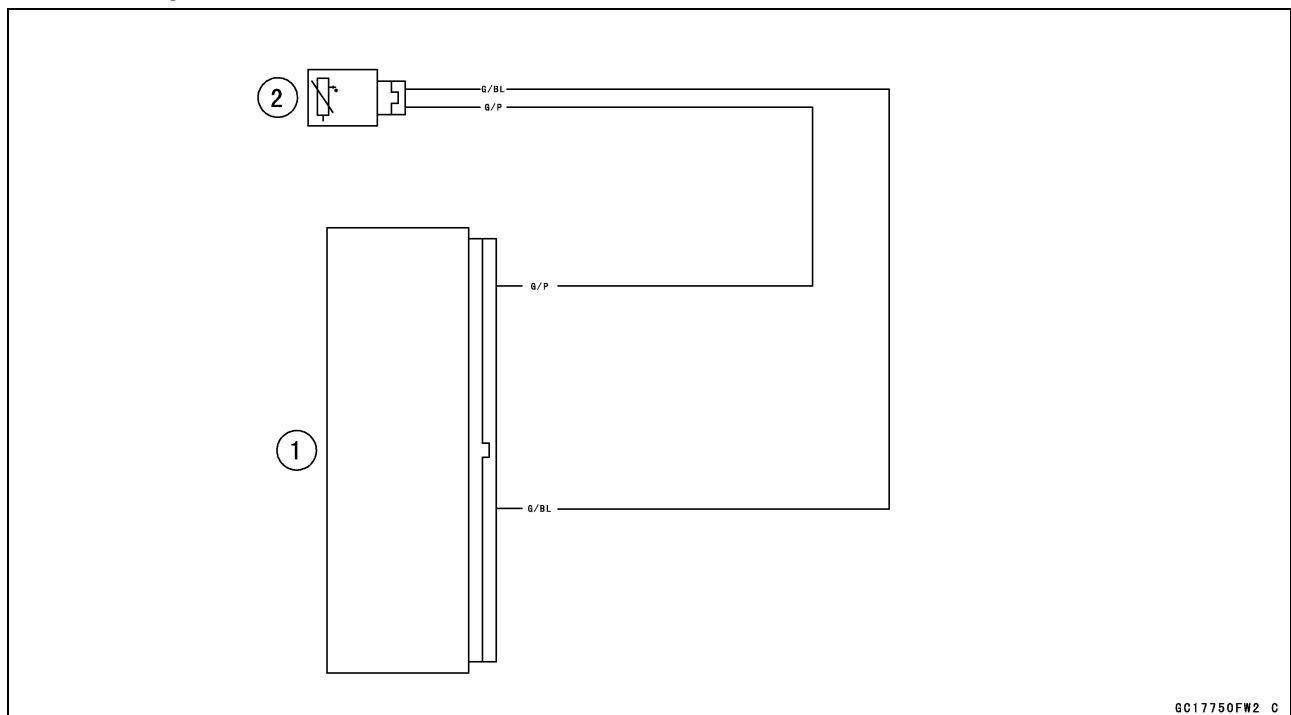
Torque - Water Temperature Sensor (ECU): 12 N·m (1.2 kgf-m, 106 in-lb)

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

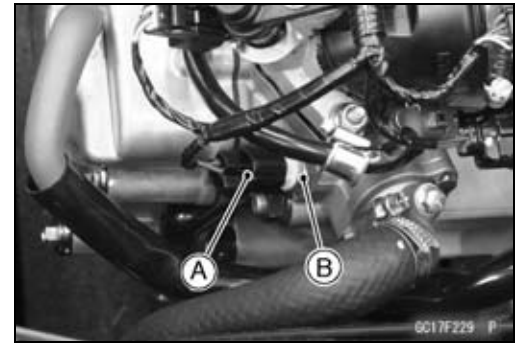
Water Temperature Sensor Resistance Inspection

- 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 Temperature Sensor (ECU)



3-44 FUEL SYSTEM (DFI)

Vehicle-down Sensor (Service Code 15)

This sensor has a weight [A] with two magnets inside, and sends a signal to the ECU. But when the motorcycle banks 65° or more to either side (in fact falls down), the weight turns and the signal changes. The ECU senses this change, and stops the fuel pump relay, the fuel injector and the ignition system.

Hall IC [B]

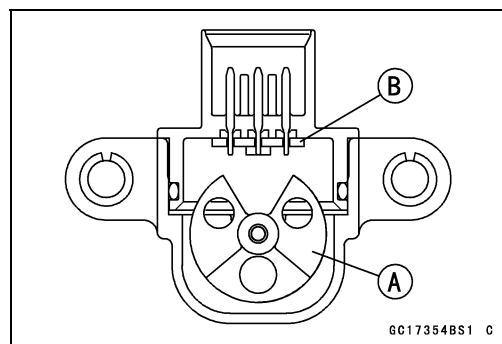
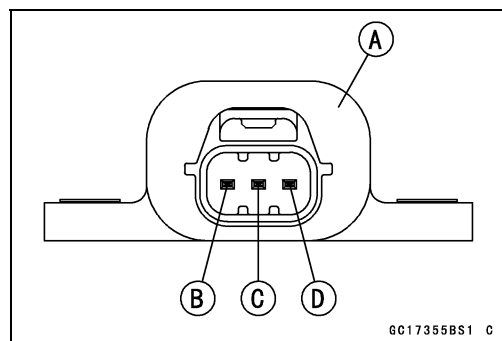
When the motorcycle is down, the ignition switch is left ON. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch to OFF, and then turn it to ON.

Vehicle-down Sensor [A]

Ground Terminal [B]: G/P

Output Terminal [C]: BK/BL

Input Terminal [D]: V/R

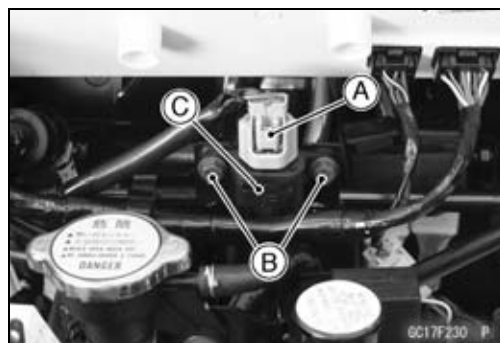


Vehicle-down Sensor Removal

NOTICE

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

- Remove the front center cover (see Front Center Cover Removal in the Frame chapter).
- Disconnect the vehicle-down sensor connector [A].
- Remove:
  - Bolts [B]
  - Vehicle-down Sensor [C]



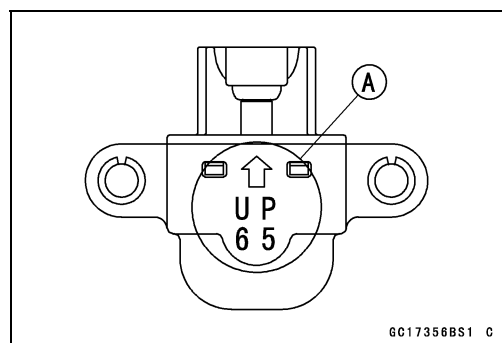
Vehicle-down Sensor Installation

- The UP mark [A] of the sensor should face upward.

⚠ WARNING

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

- Tighten the vehicle-down sensor bolts.



Vehicle-down Sensor (Service Code 15)

Vehicle-down Sensor Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the front center cover (see Front Center Cover Removal in the Frame chapter).
- Disconnect the vehicle-down sensor connector and connect the measuring adapter [A] between these connectors.

Main Harness [B]

Vehicle-down Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

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

Vehicle-down Sensor Input Voltage

Connections to Adapter:

Digital Meter (+) → R (sensor V/R) lead

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

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

Input Voltage

Standard: DC 5 V

- Turn the ignition switch off.
- ★ If the reading is within the standard, check the output voltage (see Vehicle-down Sensor Output Voltage Inspection).
- ★ If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

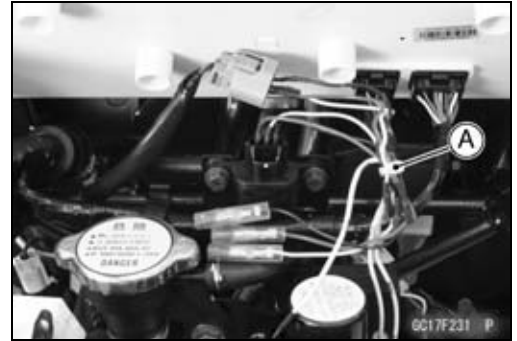
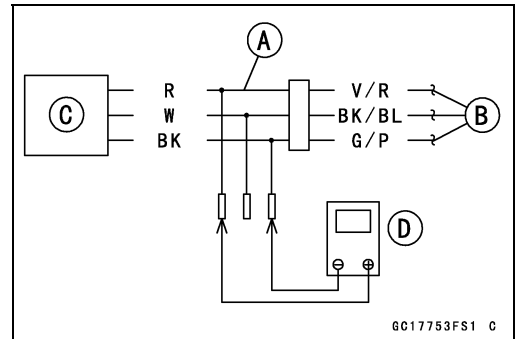
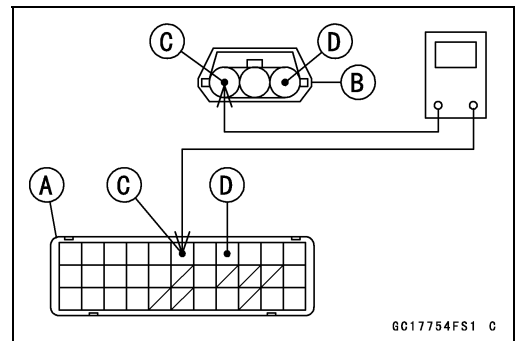
ECU Connector [A] ↔

Vehicle-down Sensor Connector [B]

V/R lead (ECU terminal 6) [C]

G/P lead (ECU terminal 4) [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).



3-46 FUEL SYSTEM (DFI)

Vehicle-down Sensor (Service Code 15)

Vehicle-down Sensor Output Voltage Inspection

- Remove the vehicle-down sensor.
- Connect the measuring adapter [A] to the vehicle-down sensor connectors.

Special Tool - Measuring Adapter: 57001-1700

Main Harness [B]

Vehicle-down Sensor [C]

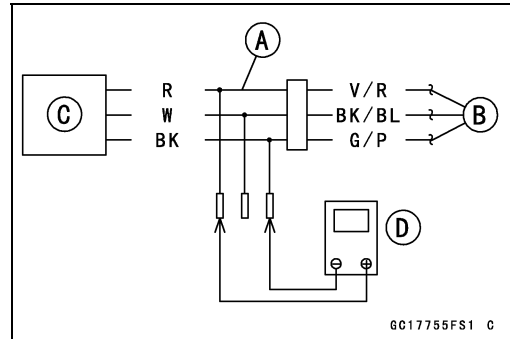
- Connect a digital meter [D] to the measuring adapter leads.

Vehicle-down Sensor Output Voltage

Connections to Adapter:

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

Digital Meter (-) → BK (sensor G/P) lead



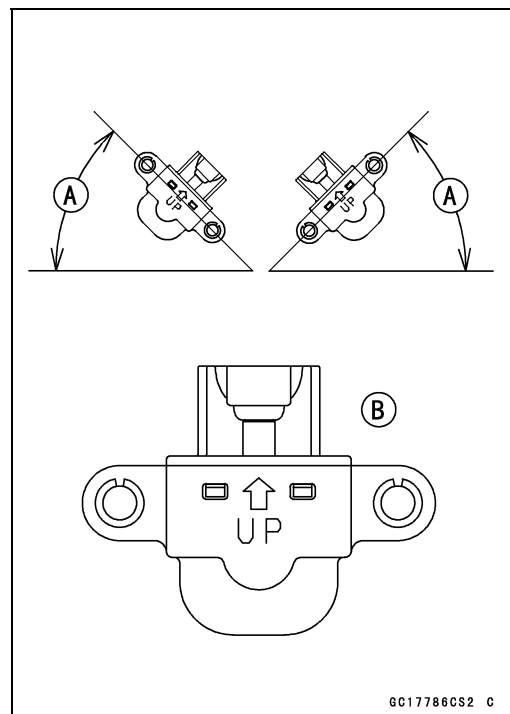
- Hold the sensor vertically.
- Measure the output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch on.
- Tilt the sensor 65° or more [A] right or left, then hold the sensor almost vertical with the arrow mark pointed up [B], and measure the output voltage.

Output Voltage

Standard: With sensor tilted 65° or more right or left:
DC 3.7 ~ 4.4 V

With sensor arrow mark pointed up: DC
0.4 ~ 1.4 V

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



Vehicle-down Sensor (Service Code 15)

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

○ Disconnect the ECU and sensor connectors.

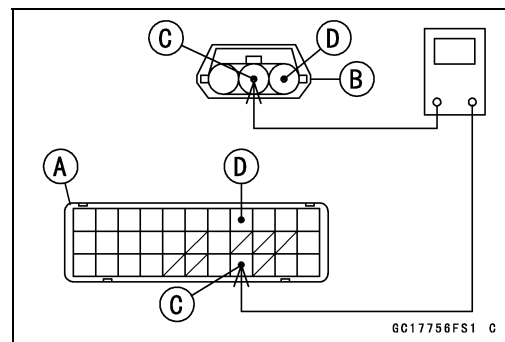
Wiring Continuity Inspection

ECU Connector [A] ↔

Vehicle-down Sensor Connector [B]

BK/BL lead (ECU terminal 26) [C]

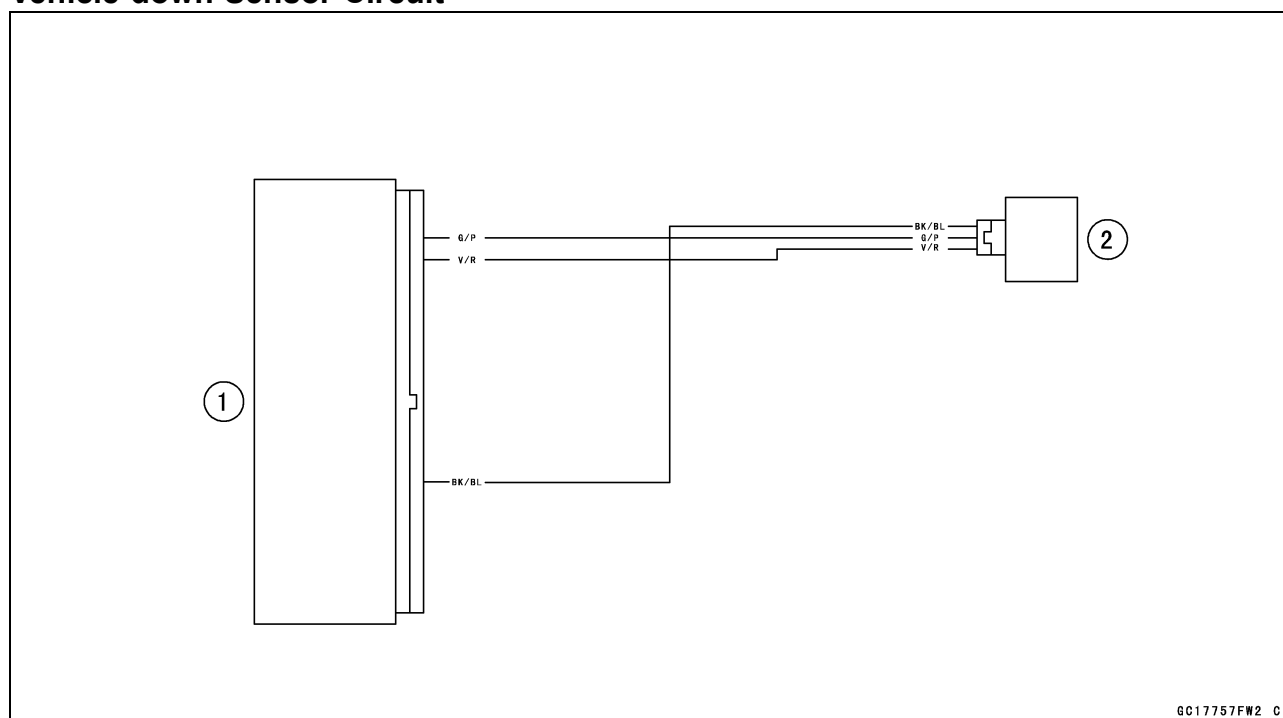
G/P lead (ECU terminal 4) [D]



★ 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 Circuit



1. ECU

2. Vehicle-down Sensor

3-48 FUEL SYSTEM (DFI)

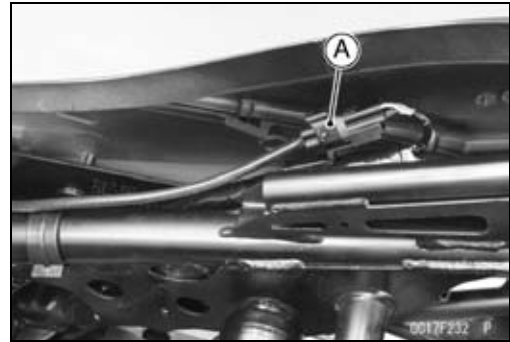
Oxygen Sensor - not activated (Service Code 17, Equipped Models)

Oxygen Sensor Removal/Installation

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

Oxygen Sensor Inspection

- Remove:
  - Storage Box (see Storage Box Removal in the Frame chapter)
  - Oxygen Sensor Lead Connector [A]



- Connect the measuring adapter [A] between the harness connector and oxygen sensor lead connector.
  - Main Harness [B]
  - Oxygen Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

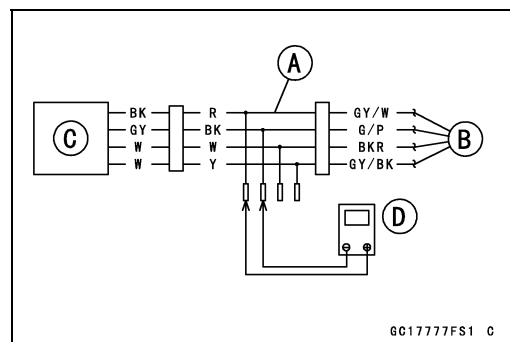
- Connect a digital meter [D] to the measuring adapter leads.

Oxygen Sensor Output Voltage

Connections to Adapter:

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

Digital Meter (-) → BK (sensor GY) lead



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

Output Voltage

Standard: DC 0.7 V or more (Rich: AF below 14.7)

DC 0.18 V or less (Lean: AF over 14.7)

- Turn the ignition switch off.

Oxygen Sensor - not activated (Service Code 17, Equipped Models)

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

○ Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

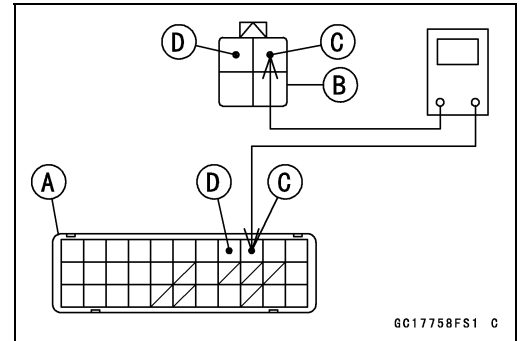
ECU Connector [A] ←→

Oxygen Sensor Connector [B]

GY/W lead (ECU terminal 3) [C]

G/P lead (ECU terminal 4) [D]

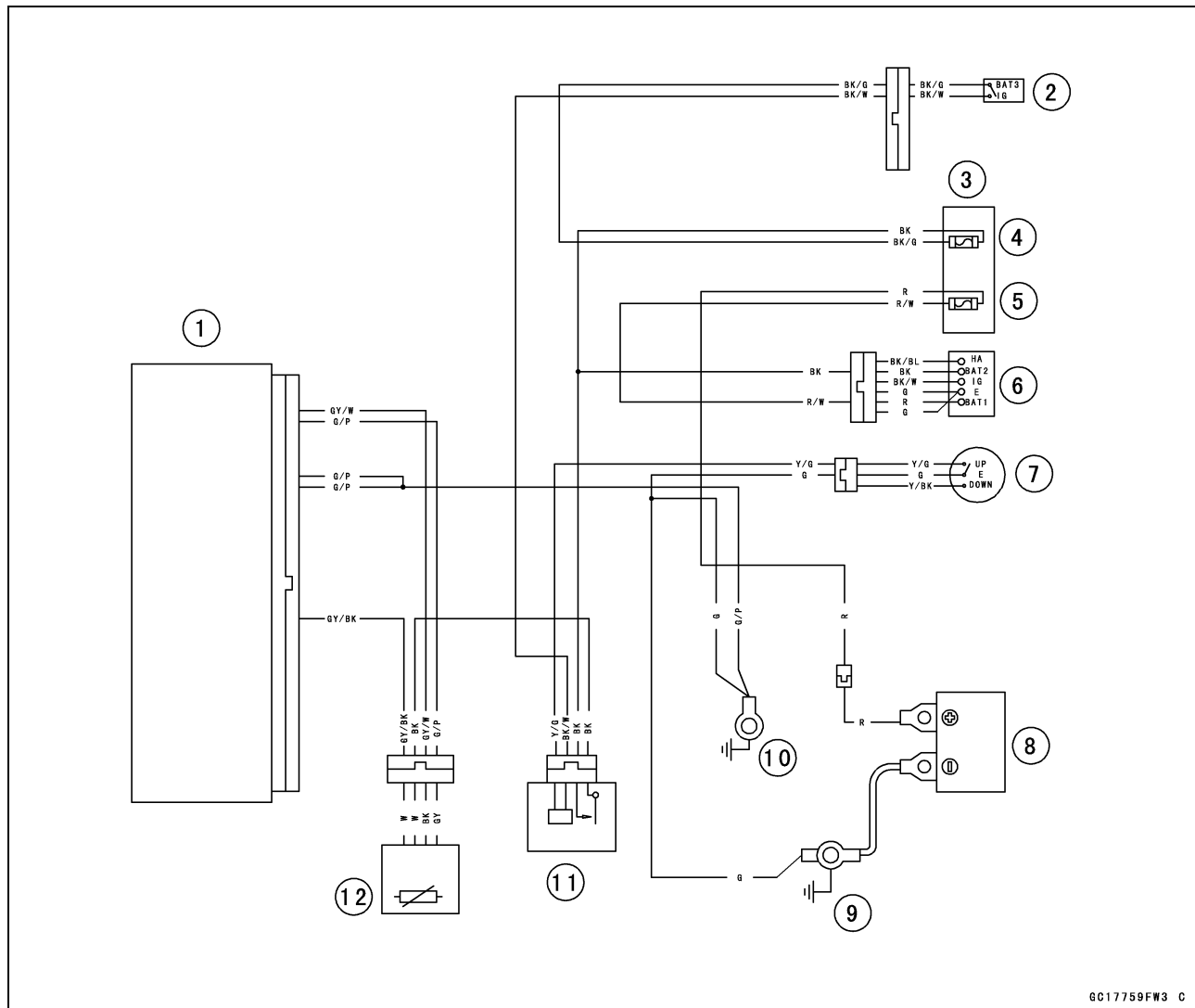
- ★ If the wiring is good, replace the sensor.
- ★ If the reading is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



3-50 FUEL SYSTEM (DFI)

Oxygen Sensor - not activated (Service Code 17, Equipped Models)

Oxygen Sensor Circuit



6C17759FW3 C

1. ECU
2. Engine Stop Switch
3. Fuse Box
4. Ignition Fuse 15 A
5. Charging/ECU Fuse 30 A
6. Ignition Switch
7. Side Stand Switch
8. Battery
9. Engine Ground
10. Frame Ground 1
11. ECU Relay
12. Oxygen Sensor

Fuel Injector (Service Code 33)

Fuel Injector Removal

⚠ WARNING

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

NOTICE

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

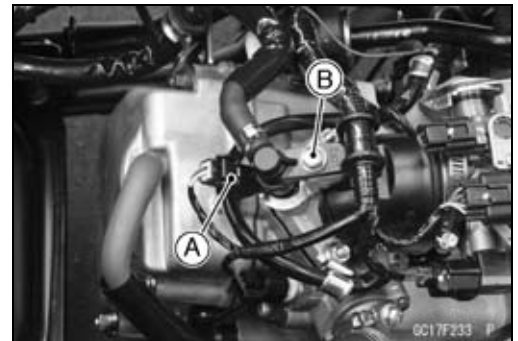
NOTE

○Ensure the fuel hose without any pressure, and then remove the fuel injector.

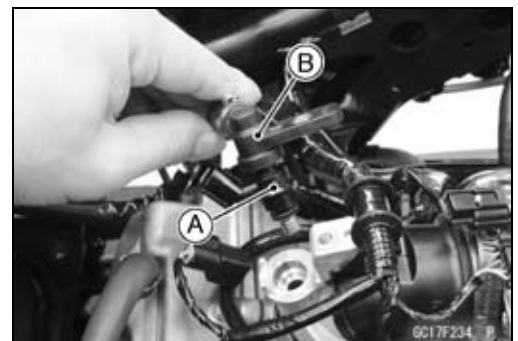
STEP 1: Disconnect the fuel pump connector.

STEP 2: Turn the ignition switch on. Starting the engine until the engine stop working.

- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the fuel injector connector [A].
- Remove the fuel injector mounting bolt [B].



- Remove the fuel injector [A] from the fuel pipe [B].

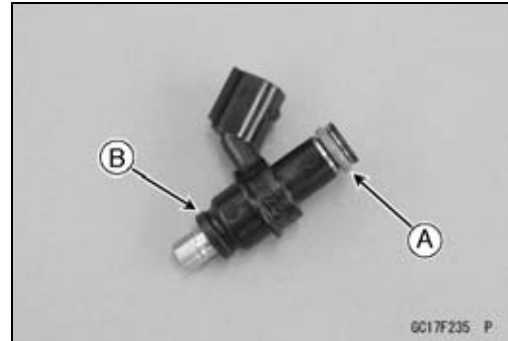


3-52 FUEL SYSTEM (DFI)

Fuel Injector (Service Code 33)

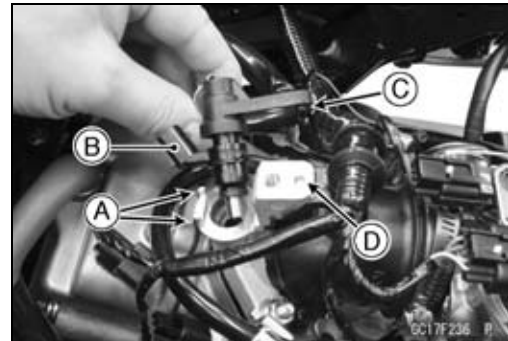
Fuel Injector Installation

- Replace the O-ring [A] and dust seal [B] with new ones.



- Apply engine oil to the O-ring and dust seal.
- Install the fuel injector to the fuel pipe.
- Install the fuel injector to the intake manifold so that the tabs [A] fit the fuel injector [B] and the projection [C] inserts into the hole [D].
- Tighten:

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



Fuel Injector Audible Inspection

NOTE

○Be sure the battery is fully charged.

- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Start the engine, and let it idle.
- Apply the tip of a screwdriver [A] to the fuel injector. Put the grip end into 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.
- ★If the injector click at a regular intervals, the injector is normal.
- Turn the ignition switch off.
- ★If fuel injector dose not click, check the fuel injector resistance (see Fuel Injector Resistance Inspection).



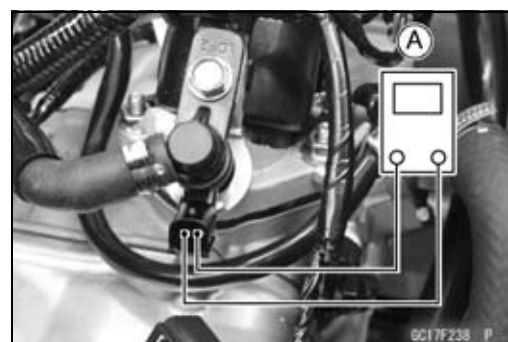
Fuel Injector Resistance Inspection

- Turn the ignition switch off.
- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the injector connector.
- Connect a digital meter [A] to the injector terminal.
- Measure the fuel injector resistance.

Fuel Injector Resistance

Standard: About 10.5 $\pm$ 0.53 Ω @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 supply voltage (see Fuel Injector Output Voltage Inspection).



Fuel Injector (Service Code 33)

Fuel Injector Power Supply Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the injector connector and connect the measuring adapter [A] between these connector.
Main Harness [B]
Fuel Injector [C]

Special Tool - Measuring Adapter: 57001-1700

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

Fuel Injector Power Supply Voltage

Connect the Adapter:

Digital Meter (+) → R (main harness R/BK) lead

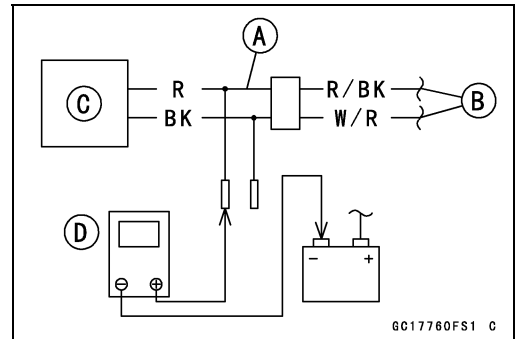
Digital Meter (–) → Battery (–) Terminal

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

Power Supply Voltage

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

- Turn the ignition switch off.
- ★ If the voltage is out of the standard, check the power supply wiring (see Fuel Injector Circuit).
- ★ If the reading is within the standard, check the output voltage (see Fuel Injector Output Voltage Inspection).



3-54 FUEL SYSTEM (DFI)

Fuel Injector (Service Code 33)

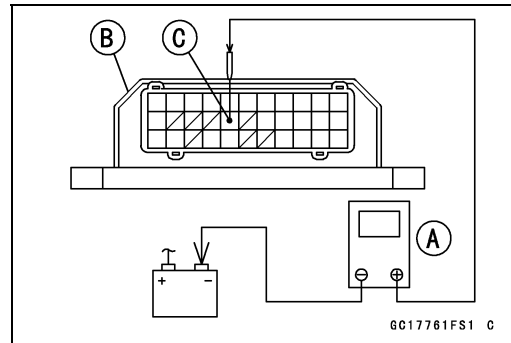
Fuel Injector Output Voltage Inspection

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.
- Using the needle adapter set and connect a digital meter [A] to the connector [B].

Special Tool - Needle Adapter Set: 57001-1457



Fuel Injector Output Voltage

Connect the ECU Connector:

Digital Meter (+) → W/R lead (ECU Terminal 16) [C]

Digital Meter (-) → Battery (-) Terminal

- Measure the power supply voltage with the engine stopped with the connector jointed.
- Turn the engine stop switch to running position.
- Turn the ignition switch on.

Output Voltage

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

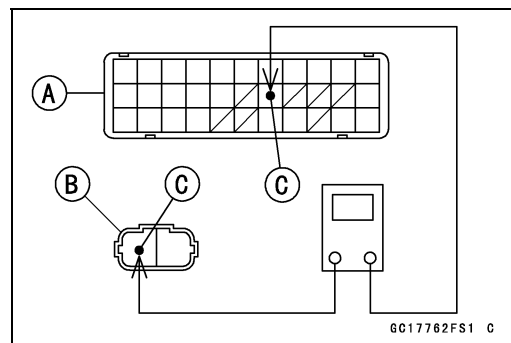
- Turn the ignition switch off.
- ★ If the reading is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★ If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- Disconnect the ECU and injector connectors.

Wiring Continuity Inspection

ECU Connector [A] ← → Fuel Injector Connector [B]

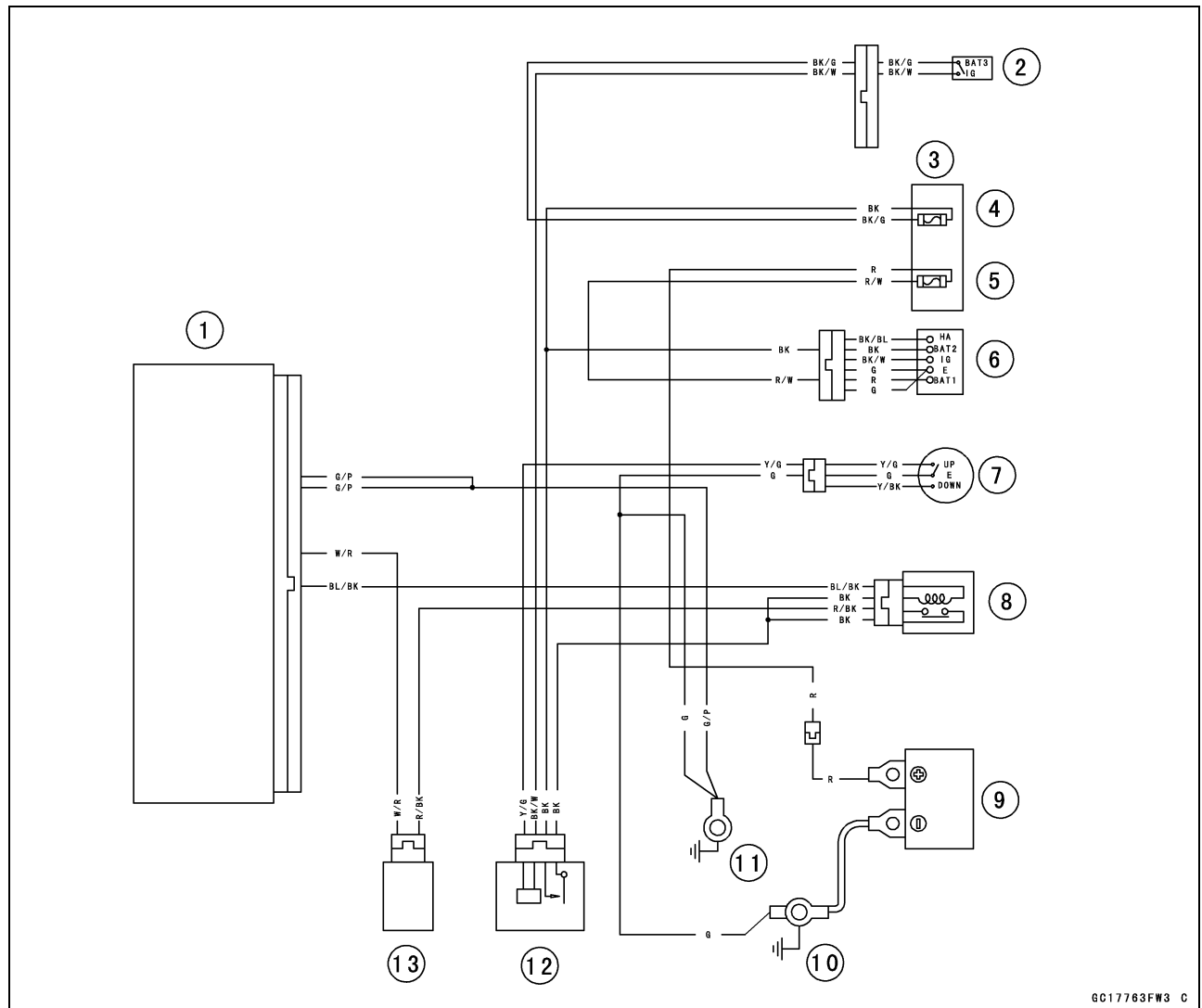
W/R lead (ECU terminal 16) [C]

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



Fuel Injector (Service Code 33)

Fuel Injector Circuit



1. ECU
2. Engine Stop Switch
3. Fuse Box
4. Ignition Fuse 15 A
5. Charging/ECU Fuse 30 A
6. Ignition Switch
7. Side Stand Switch
8. Fuel Pump Relay
9. Battery
10. Engine Ground
11. Frame Ground 1
12. ECU Relay
13. Fuel Injector

3-56 FUEL SYSTEM (DFI)

Ignition Coil (Service Code 37)

Ignition Coil Removal/Installation

- Refer to the Ignition Coil Removal/Installation in the Electrical System chapter.

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

Special Tool - Needle Adapter Set: 57001-1457

Ignition Coil Input Voltage

Connections to ECU Connector:

Digital Meter (+) → G/BR lead (terminal 11) [C]

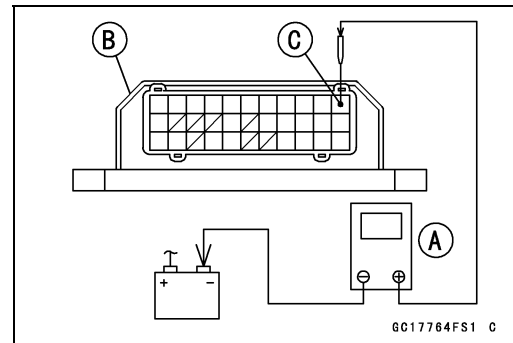
Digital Meter (–) → Battery (–) Terminal

- Measure the input voltage to the primary winding of the ignition coil with the engine stopped, and with the connector joined.
- Turn the ignition switch on.

Input Voltage

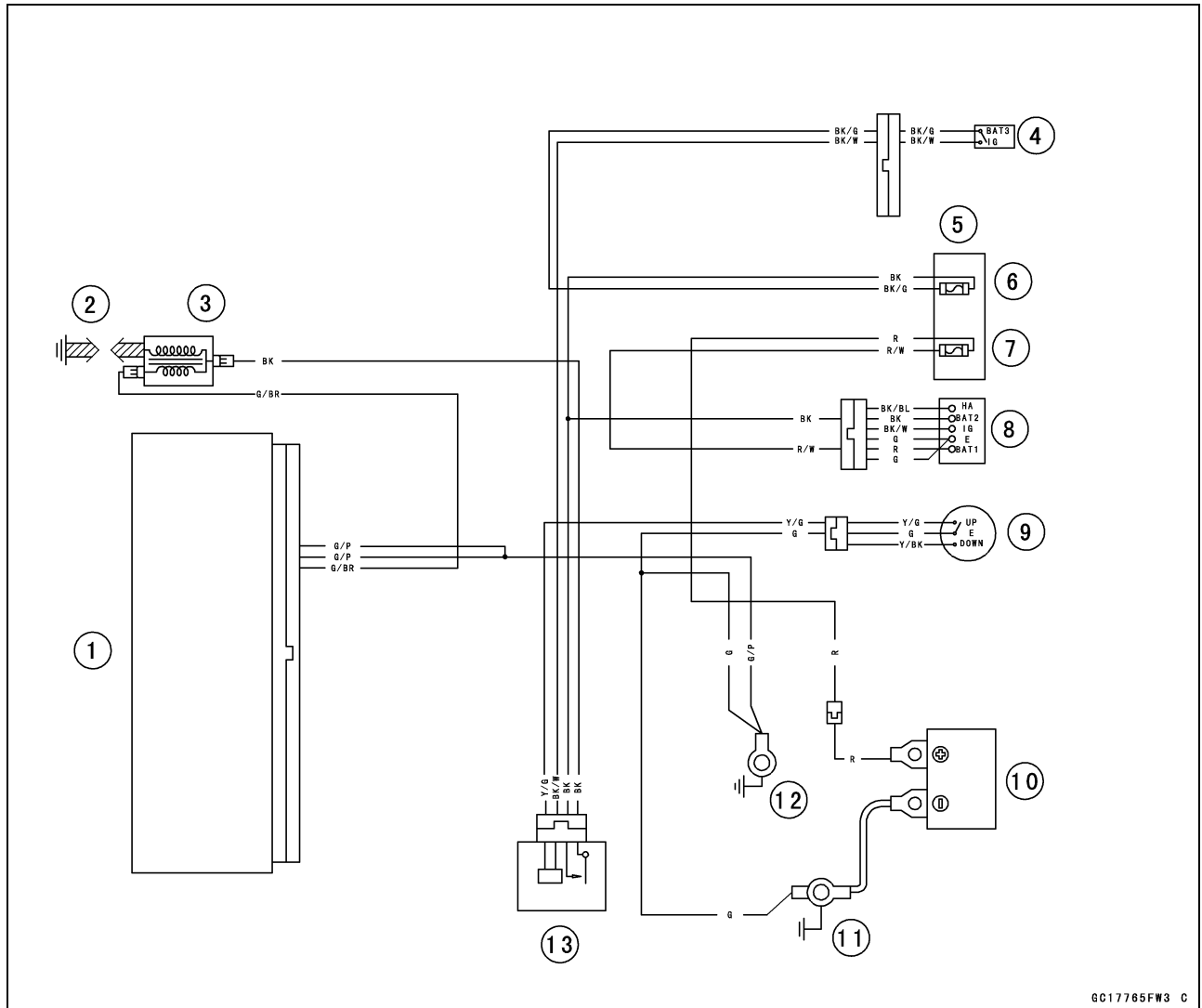
Standard: Battery Voltage

- Turn the ignition switch off.
- ★ If the input voltage is out of the standard, check the ignition coil winding resistance (see Ignition Coil Inspection in the Electrical System chapter).
- ★ If the ignition coil winding resistance is within the standard, check the wiring for continuity (see Ignition Coil Circuit).
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★ If the input voltage is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



Ignition Coil (Service Code 37)

Ignition Coil Circuit



GC17765FW3 C

1. ECU
2. Spark Plug
3. Ignition Coil
4. Engine Stop Switch
5. Fuse Box
6. Ignition Fuse 15 A
7. Charging/ECU Fuse 30 A
8. Ignition Switch
9. Side Stand Switch
10. Battery
11. Engine Ground
12. Frame Ground 1
13. ECU Relay

3-58 FUEL SYSTEM (DFI)

Fuel Pump Relay (Service Code 41)

Fuel Pump Relay Removal

<i>NOTICE</i>

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

- Remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Remove the fuel pump relay [A] and disconnect the connector.

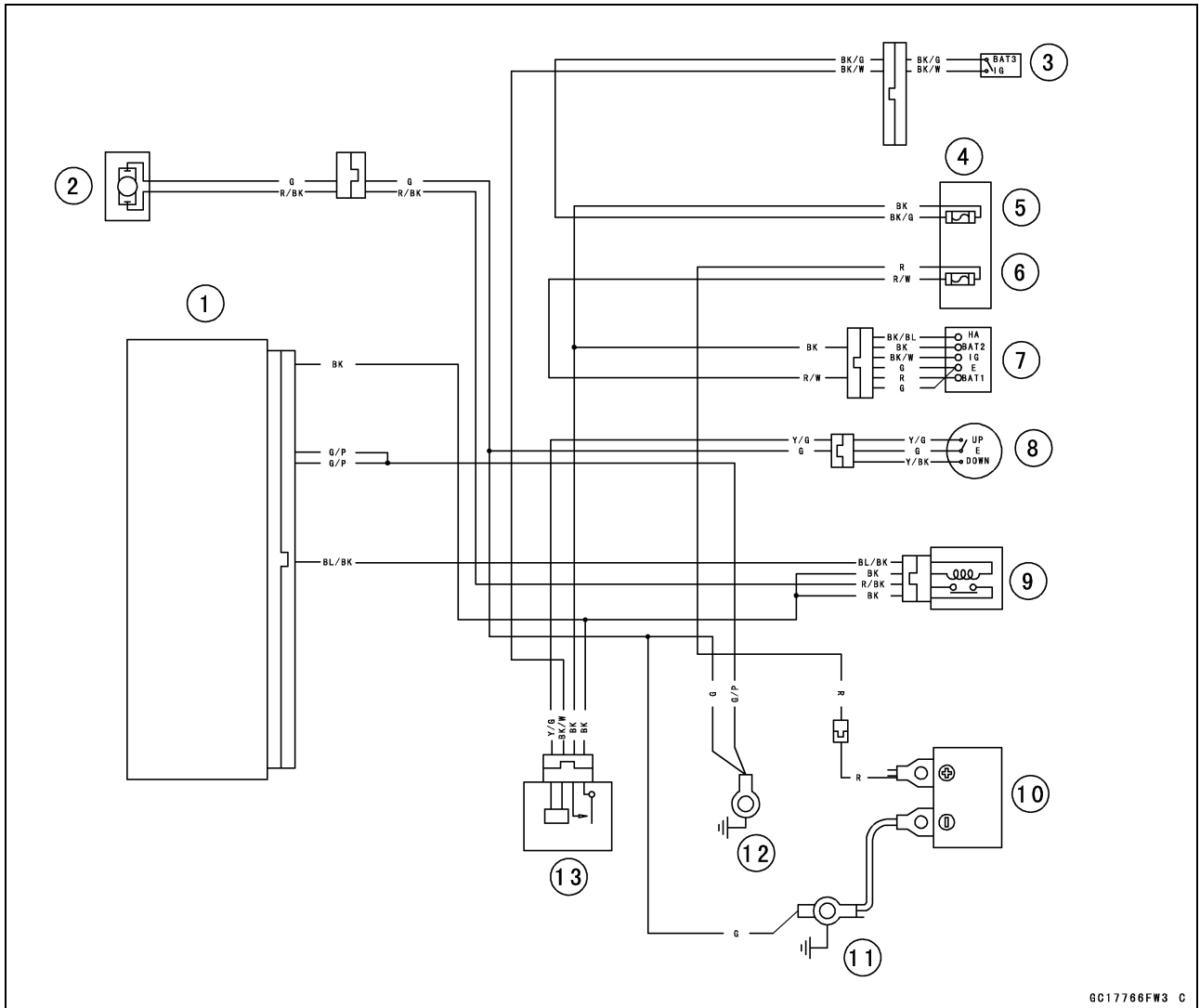
Fuel Pump Relay Inspection

- Refer to the Relay Inspection in the Electrical System chapter.
- ★ If the tester does not read as specified, replace the fuel pump relay.



Fuel Pump Relay (Service Code 41)

Fuel Pump Relay Circuit



1. ECU
2. Fuel Pump
3. Engine Stop Switch
4. Fuse Box
5. Ignition Fuse 15 A
6. Charging/ECU Fuse 30 A
7. Ignition Switch
8. Side Stand Switch
9. Fuel Pump Relay
10. Battery
11. Engine Ground
12. Frame Ground 1
13. ECU Relay

3-60 FUEL SYSTEM (DFI)

Radiator Fan Relay (Service Code 43)

Radiator Fan Relay Removal

NOTICE

Never drop the radiator fan relay especially on a hard surface. Such a shock to the relay can damage it.

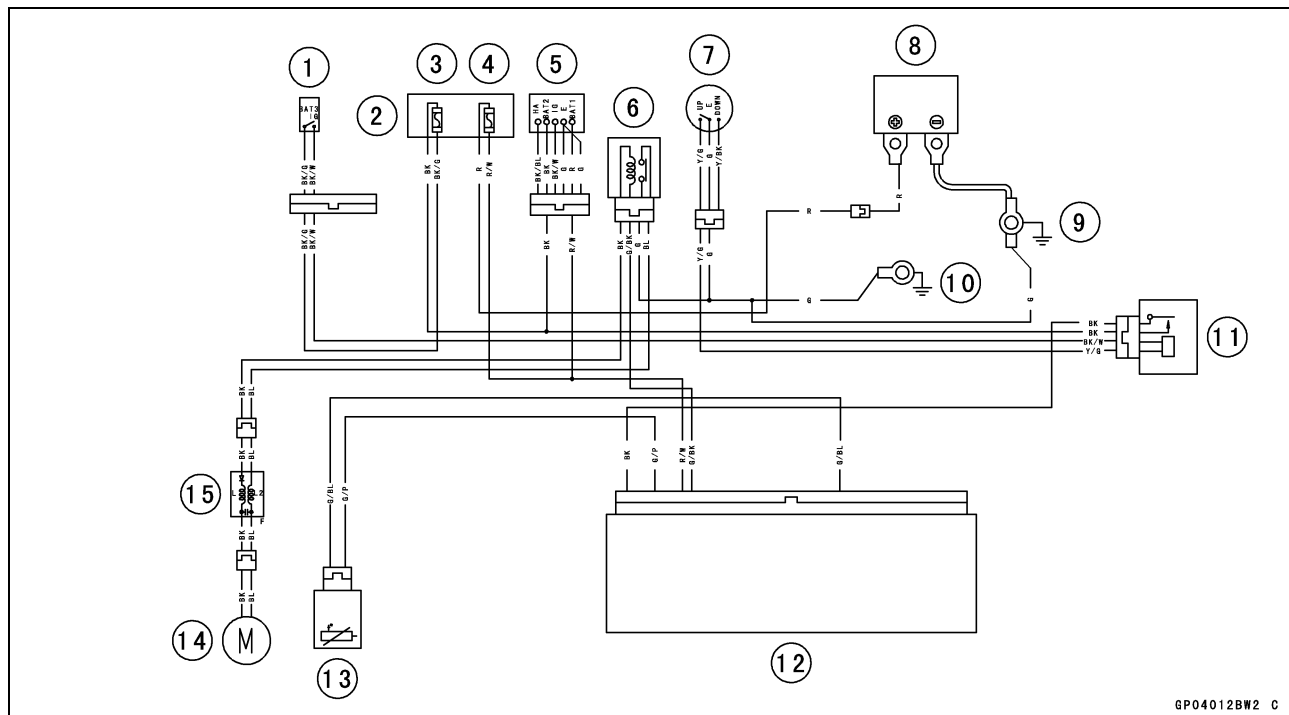
- Remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Remove the radiator fan relay [A] and disconnect the connector.



Radiator Fan Relay Inspection

- Refer to the Relay Inspection in the Electrical System chapter.
- ★ If the tester does not read as specified, replace the radiator fan relay.

Radiator Fan Relay Circuit



1. Engine Stop Switch
2. Fuse Box
3. Ignition Fuse 10 A
4. Charging/ECU Fuse 30 A
5. Ignition Switch
6. Radiator Fan Relay
7. Side Stand Switch
8. Battery 12 V 10 Ah
9. Engine Ground
10. Frame Ground 1
11. ECU Relay
12. ECU
13. Water Temperature Sensor (ECU)
14. Fan Motor
15. EMI Filter

GP04012BW2 C

Oxygen Sensor Heater (Service Code 45)

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 storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector [A].



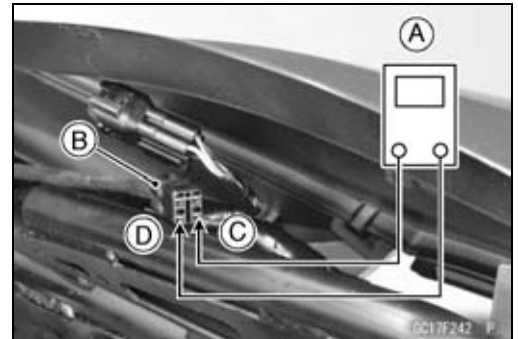
- Connect a digital meter [A] to the terminals in the oxygen sensor lead connector [B].
- Measure the oxygen sensor heater resistance.

Oxygen Sensor Heater Resistance

Connections: W lead [C] ↔ W lead [D]

Standard: 6.7 ~ 9.5 Ω @20° (68°F)

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



3-62 FUEL SYSTEM (DFI)

Oxygen Sensor Heater (Service Code 45)

Oxygen Sensor Heater Power Source Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector and connect the measuring adapter [A] between these connectors.

Main Harness [B]

Oxygen Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

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

Oxygen Sensor Heater Power Source Voltage

Connections to Adapter:

Digital Meter (+) → R (main harness GY/BK) lead

Digital Meter (–) → Frame Ground terminal

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

Power Source Voltage

Standard: Battery Voltage

- Turn the ignition switch off.
- ★ If the reading is in specification, but the problem still exists, replace the ECU (see ECU Removal/Installation).
- ★ If the reading is out of the standard, check the power source wiring (see Oxygen Sensor Circuit).
- ★ If the wiring is good, remove the ECU and check the wiring for continuity between harness connectors.
- Disconnect the ECU and sensor connectors.

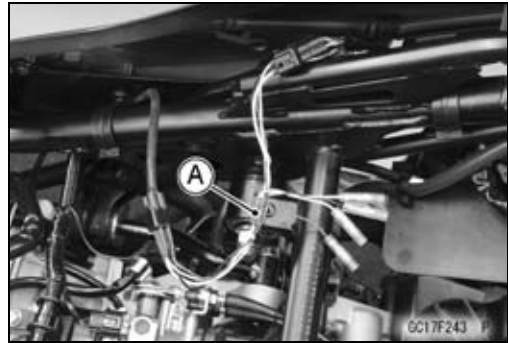
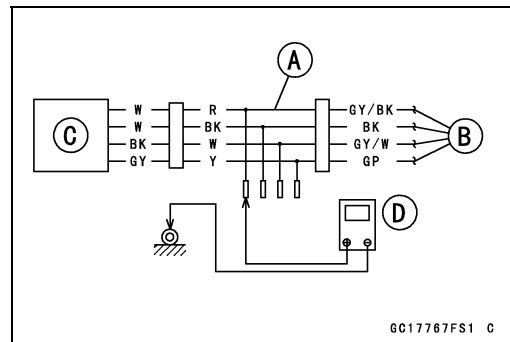
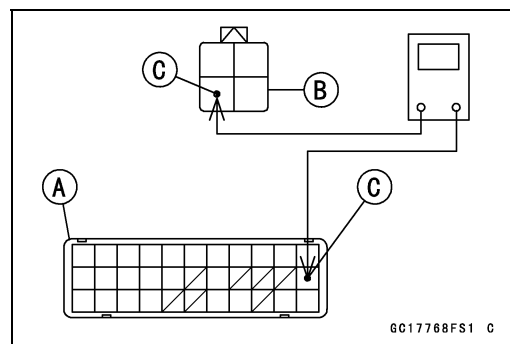
Wiring Continuity Inspection

ECU Connector [A] ↔

Oxygen Sensor Connectors [B]

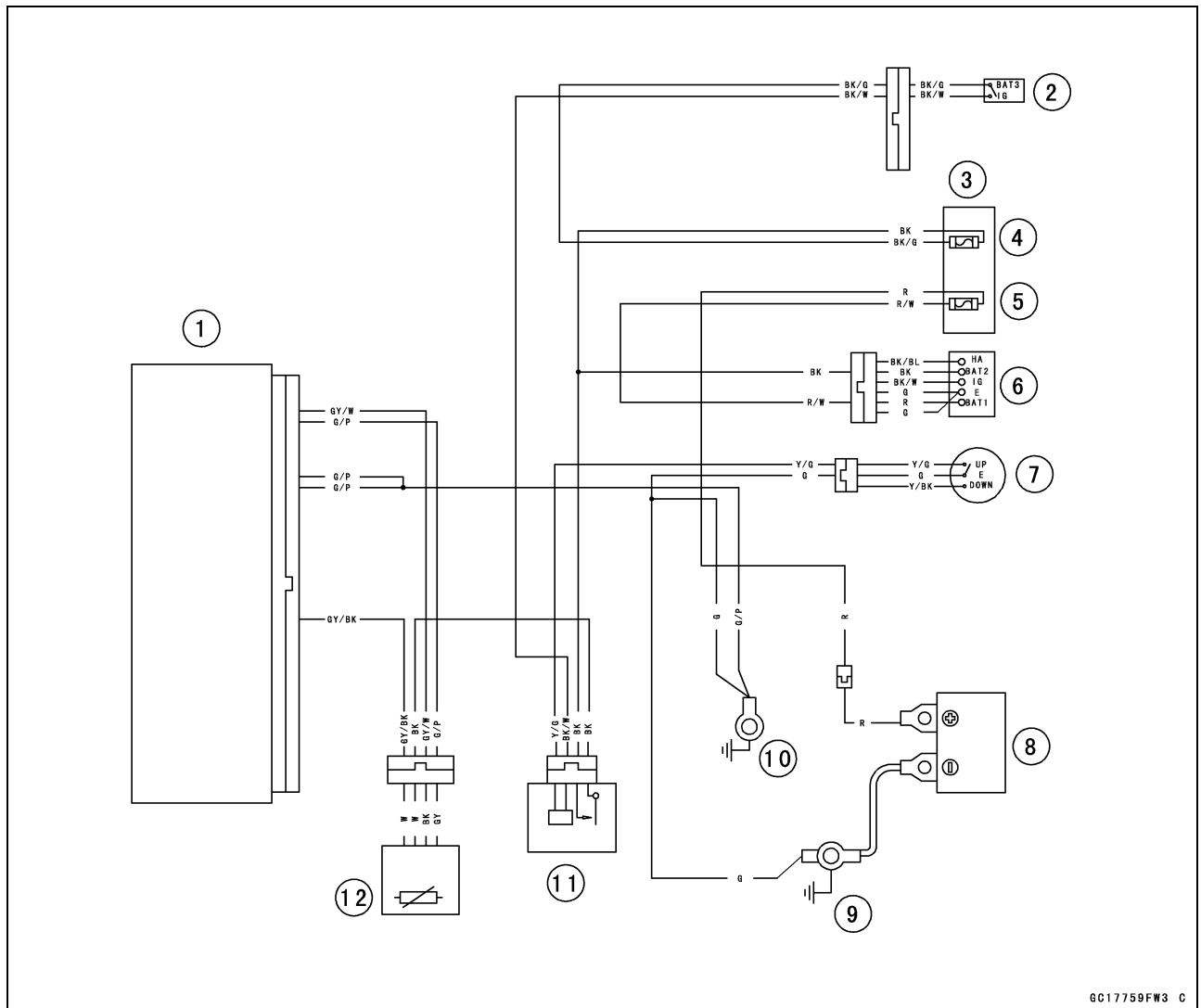
GY/BK lead (ECU terminal 22) [C]

- ★ 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 Heater (Service Code 45)

Oxygen Sensor Circuit



GC17759FW3 C

1. ECU
2. Engine Stop Switch
3. Fuse Box
4. Ignition Fuse 15 A
5. Charging/ECU Fuse 30 A
6. Ignition Switch
7. Side Stand Switch
8. Battery
9. Engine Ground
10. Frame Ground 1
11. ECU Relay
12. Oxygen Sensor

3-64 FUEL SYSTEM (DFI)

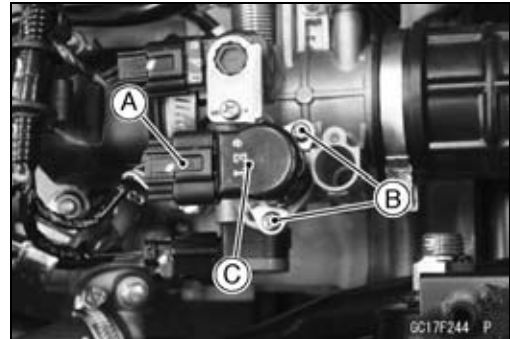
Idle Speed Control Valve Actuator (Service Code 49)

Idle Speed Control Valve Actuator Removal

NOTICE

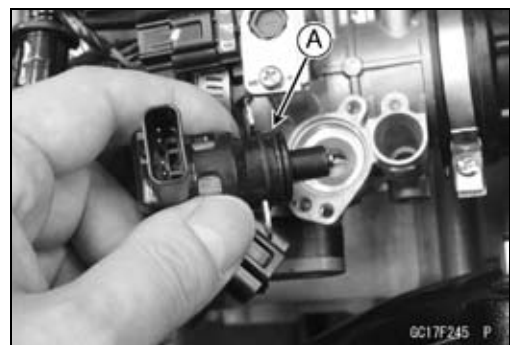
Never drop the idle speed control valve actuator especially on a hard surface. Such a shock to the actuator can damage it.

- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the idle speed control valve actuator connector [A].
- Remove:
  - Retainer Mounting Screws [B]
  - Idle Speed Control Valve Actuator [C] with Retainer



Idle Speed Control Valve Actuator Installation

- Replace the O-ring [A] with a new one.
- Install the idle speed control valve actuator together with the retainer, and tighten the retainer mounting screws.
- ★ If the idle speed control valve actuator is replaced, be sure to do the following procedures.
  - Turn the ignition switch on.
  - Turn the ignition switch off, and wait for 2 or 3 seconds.
  - Inspect the idle speed (see Idle Speed Inspection in the Periodic Maintenance chapter).
- Reset the idle speed control valve actuator position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).



Idle Speed Control Valve Actuator Resistance Inspection

- Turn the ignition switch off.
- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the idle speed control valve actuator connector.
- Connect a digital meter to the idle speed control valve actuator.
- Measure the idle speed control valve actuator resistance.

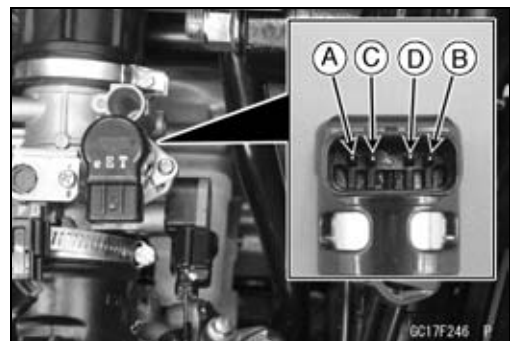
Idle Speed Control Valve Actuator Resistance

Connections: G/O lead [A] ↔ BR/W lead [B]

G/BK lead [C] ↔ GY/BL lead [D]

Standard: About 80 Ω

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



Idle Speed Control Valve Actuator (Service Code 49)

Idle Speed Control Valve Actuator Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Disconnect the idle speed control valve actuator connector and connect the measuring adapter [A] between these connectors.
Main Harness [B]
Idle Speed Control Valve Actuator [C]
- Connect the peak voltage adapter [D] and a digital meter [E] to the measuring adapter leads.

Special Tools - Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

Measuring Adapter: 57001-1700

Idle Speed Control Valve Actuator Input Voltage Connections to Adapter:

- (I) Digital Meter (+) → R (actuator G/O) lead
Digital Meter (−) → Frame Ground terminal
- (II) Digital Meter (+) → W (actuator G/BK) lead
Digital Meter (−) → Frame Ground terminal
- (III) Digital Meter (+) → Y (actuator GY/BL) lead
Digital Meter (−) → Frame Ground terminal
- (IV) Digital Meter (+) → BK (actuator BR/W) lead
Digital Meter (−) → Frame Ground terminal

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

Input Voltage

Standard: About DC 8 ~ 14.2 V and then 0.2 V or About DC 8 ~ 14.2 V

- Turn the ignition switch off.

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

○ Disconnect the ECU and actuator connectors.

Wiring Continuity Inspection

ECU Connector [A] ←→

Idle Speed Control Valve Actuator Connector [B]

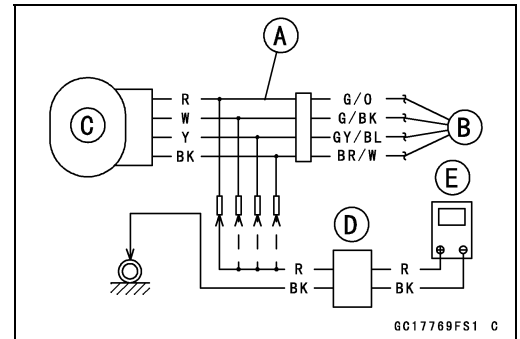
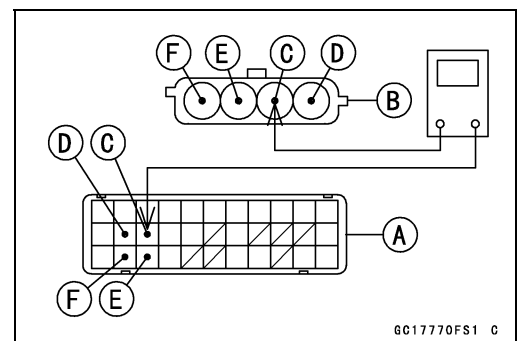
G/BK lead (ECU terminal 20) [C]

G/O lead (ECU terminal 21) [D]

GY/BL lead (ECU terminal 31) [E]

BR/W lead (ECU terminal 32) [F]

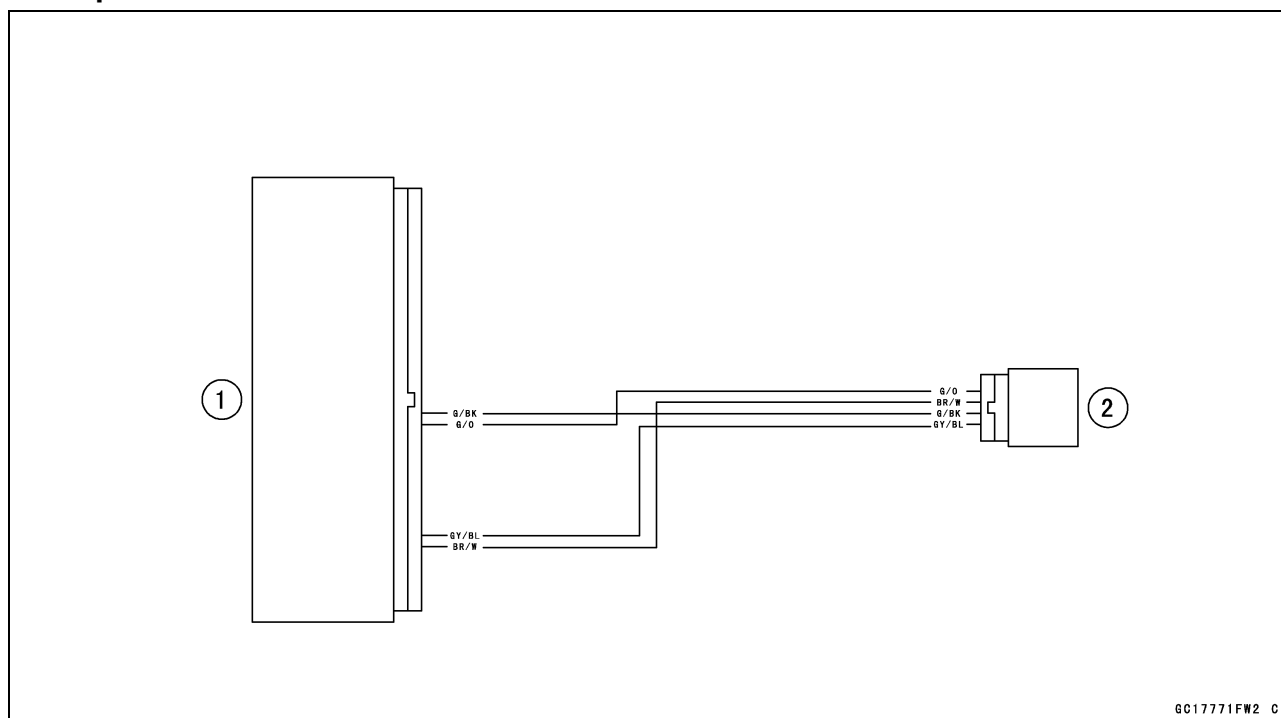
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- Reset the idle speed control valve actuator position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).



3-66 FUEL SYSTEM (DFI)

Idle Speed Control Valve Actuator (Service Code 49)

Idle Speed Control Valve Actuator Circuit



1. ECU

2. Idle Speed Control Valve Actuator

Crankshaft Sensor (Service Code 66)

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

Crankshaft Sensor Removal/Installation

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

Crankshaft Sensor Resistance Inspection

- Refer to the Crankshaft Sensor Inspection in the Electrical System chapter.
- ★ If the reading is within the standard, check the peak voltage (see Crankshaft Sensor Peak Voltage Inspection).

Crankshaft Sensor Peak Voltage Inspection

- Refer to the Crankshaft Sensor Peak Voltage Inspection in the Electrical System chapter.
- ★ If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.
- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

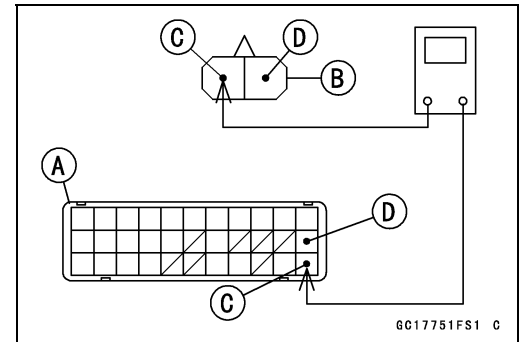
ECU Connector [A] ↔

Crankshaft Sensor Connector [B]

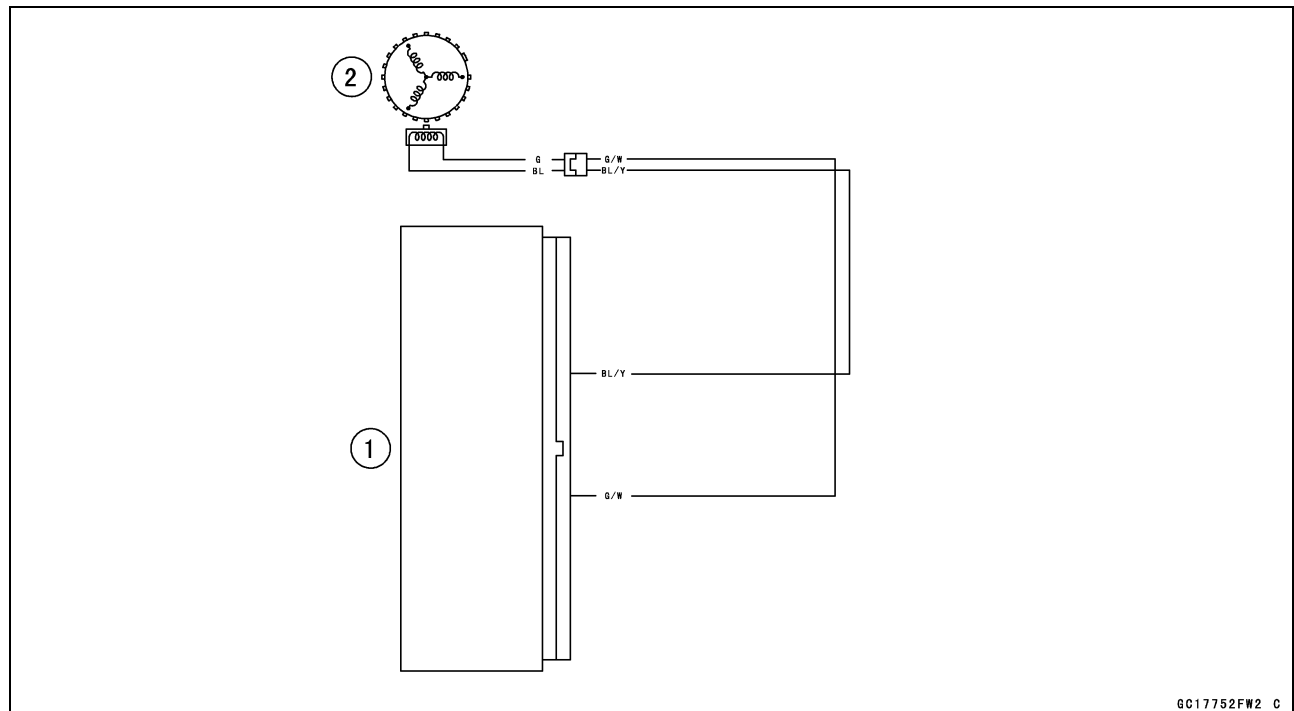
BL/Y lead (ECU terminal 23) [C]

G/W lead (ECU terminal 12) [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

3-68 FUEL SYSTEM (DFI)

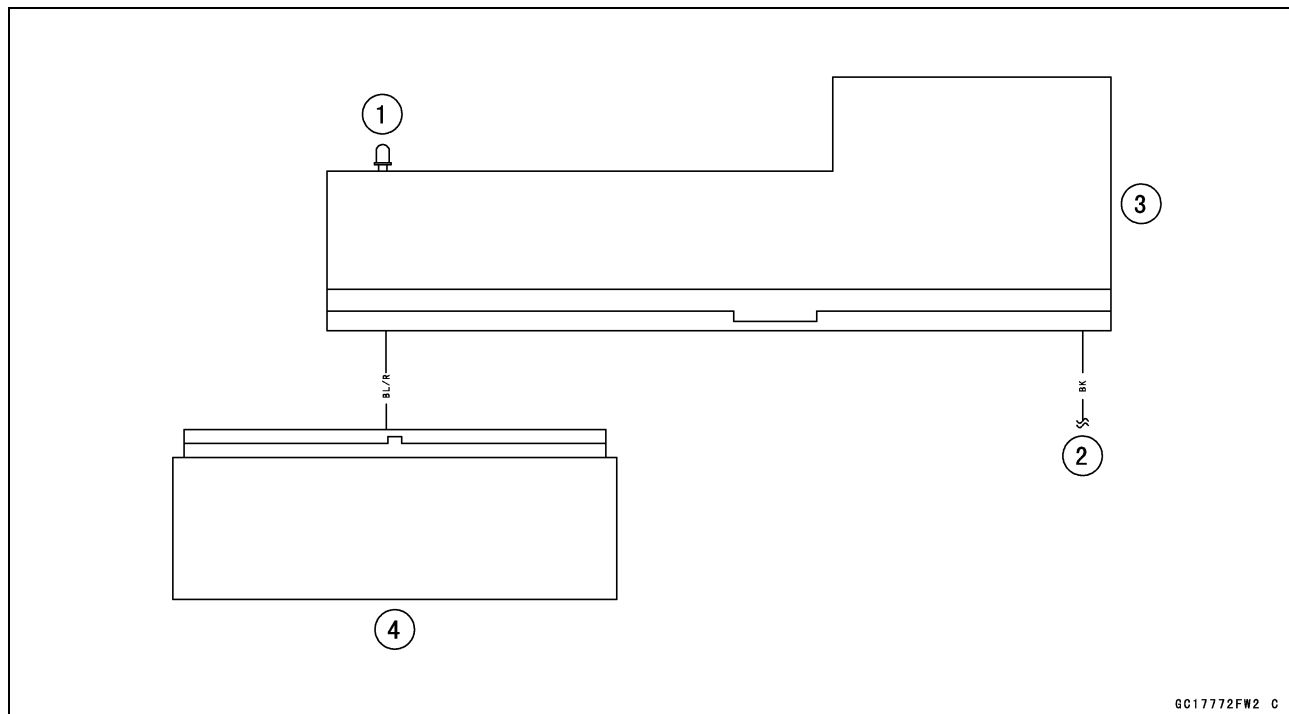
Yellow Engine Warning Indicator Light (LED)

Yellow Engine Warning Indicator Light (LED) Inspection

- In this model, the yellow engine warning indicator light (LED) [A] goes on or blinks by the data sent from the ECU.
- Refer to the Meter Unit Inspection in the Electrical System chapter for the yellow engine warning indicator light (LED) inspection.



Yellow Engine Warning Indicator Light (LED) Circuit



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

GC17772FW2 C

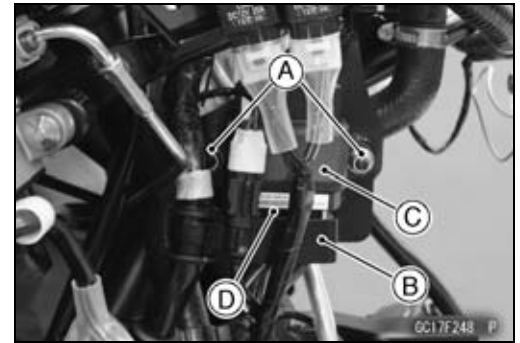
ECU

ECU Removal

NOTICE

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

- Remove:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Nuts [A]
  - Bracket [B]
  - ECU [C]
- Disconnect the ECU connector [D].



ECU Installation

- Installation is the reverse of removal.
- Reset the throttle sensor position and idle speed control valve actuator position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).

ECU Power Supply Inspection

- Remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Visually inspect the ECU connectors.
- ★ If the connector is clogged with mud or dust, blow it off with compressed air.
- Remove the ECU (see ECU Removal).
- Visually inspect the terminals [A] of the ECU and main harness connector.
- ★ If the terminals of the ECU connector are damaged, replace the ECU.
- ★ If the terminals of the main harness connectors are damaged, replace the main harness.
- Turn the ignition switch off.
- Disconnect the ECU connector [A].
- Set a tester [B] and check the following wiring for continuity.



ECU Grounding Continuity Inspection

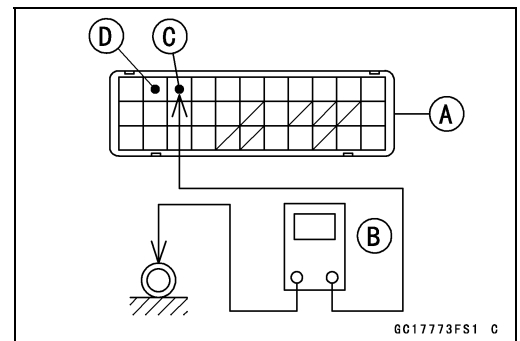
Connections:

(I) G/P leads (ECU terminal 9 [C] or 10 [D])	↔	Battery (–) Terminal
(II) Engine Ground	↔	Battery (–) Terminal

Criteria:

Both: about 0 Ω

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



3-70 FUEL SYSTEM (DFI)

ECU

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

NOTE

○ Be sure the battery is fully charged.

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

Special Tool - Needle Adapter Set: 57001-1457

ECU Power Supply Inspection

Connections:

- (I) Digital Meter (+) → Terminal 1 (BK) [C]
Digital Meter (–) → Battery (–) Terminal
- (II) Digital Meter (+) → Terminal 7 (R/W) [D]
Digital Meter (–) → Battery (–) Terminal

Ignition Switch OFF:

Terminal 1 (BK): 0 V

Terminal 7 (R/W): Battery Voltage

Ignition Switch ON:

All: Battery Voltage

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

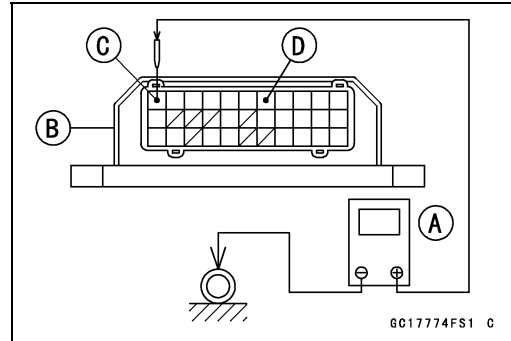
Ignition Fuse 15 A (see Fuse Inspection in the Electrical System chapter)

Charging/ECU Fuse 30 A (see Fuse Inspection in the Electrical System chapter)

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

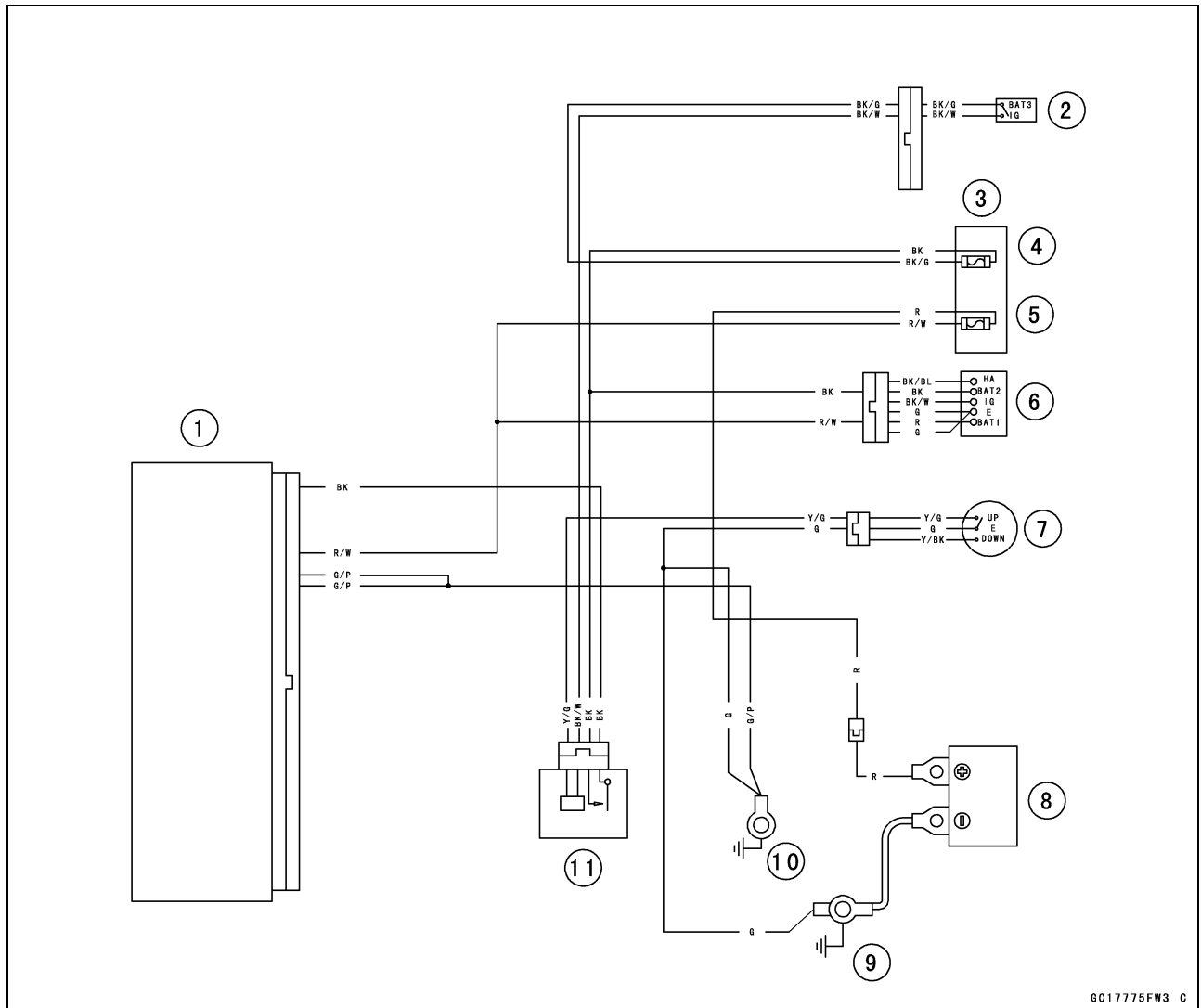
Power Source Wiring (see wiring diagram in this section)

- Reset the throttle sensor position and idle speed control valve actuator position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).



ECU

ECU Power Source Circuit



GC17775FW3 C

1. ECU
2. Engine Stop Switch
3. Fuse Box
4. Ignition Fuse 15 A
5. Charging/ECU Fuse 30 A
6. Ignition Switch
7. Side Stand Switch
8. Battery
9. Engine Ground
10. Frame Ground 1
11. ECU Relay

3-72 FUEL SYSTEM (DFI)

DFI Power Source

ECU Fuse Removal

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

ECU Fuse Installation

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

ECU Fuse Inspection

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

ECU Relay Removal/Installation

- Remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Remove the ECU relay [A] and disconnect the connector.



ECU Relay Inspection

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

Fuel Line

Fuel Pressure Inspection

NOTE

○Be sure the battery is fully charged.

- Remove the fuel hose (see Fuel Hose Replacement in the Periodic Maintenance chapter).
- Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the fuel pipe of the intake manifold.

⚠ WARNING

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

- Install the fuel pressure gauge adapter [A] and fuel hoses (Special Tool: 57001-1607) [B] between the fuel outlet pipe and delivery pipe.
- Secure the fuel hoses with the clamps.
- Connect the pressure gauge [C] to the fuel pressure gauge adapter.

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

⚠ WARNING

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

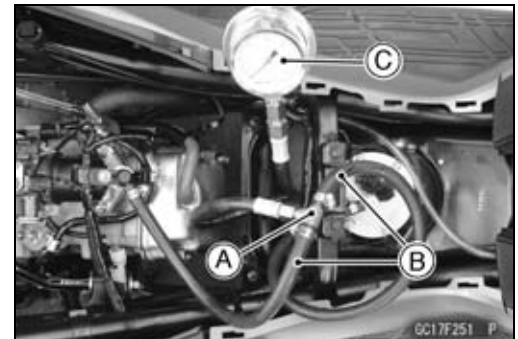
- Turn the engine stop switch to run position.
- Turn the ignition switch on.
- The fuel pump should operate for 3 seconds, and then should stop.

NOTE

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

NOTICE

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



3-74 FUEL SYSTEM (DFI)

Fuel Line

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

Fuel Pressure (with Engine Idling)

Standard: 294 ±6 kPa (3.0 ±0.06 kgf/cm², 43 ±0.87 psi)

NOTE

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

- Turn the ignition switch off.
- ★ If the fuel pressure is much higher than specified, replace the fuel pump because the fuel pressure regulator in the fuel pump have been clogged or stuck.
- ★ If the fuel pressure is much lower than specified, check the following.
  - Fuel Line Leakage (see Fuel Injector Fuel Line Inspection)
  - Amount of Fuel Flow (see Fuel Flow Rate Inspection)
- After above checks, measure the fuel pressure again.
- Remove the fuel pressure gauge, hoses and adapter.
- Install the fuel hose (see Fuel Hose Replacement in the Periodic Maintenance chapter).
- Start the engine and check for fuel leakage.

Fuel Flow Rate Inspection

WARNING

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

NOTE

○Be sure the battery is fully charged.

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

Special Tool - Fuel Hose: 57001-1607

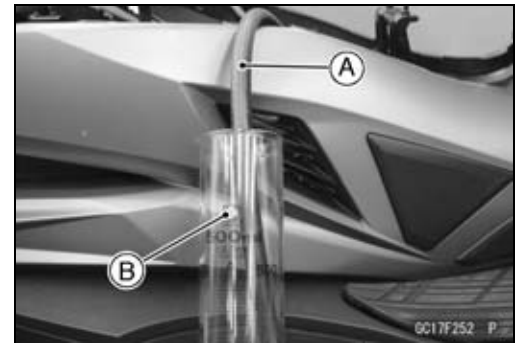
Fuel Line

- Disconnect the fuel hose from the fuel pump (see Fuel Hose Replacement in the Periodic Maintenance chapter).
- Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump.

⚠ WARNING

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

- Connect the prepared fuel hose [A] to the fuel outlet pipe 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.**

- Turn the engine stop switch to run position.
- Turn the ignition switch on.
- The fuel pump should operate for 3 seconds, and then should stop.

NOTICE

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

- Measure the discharge for 3 seconds.
- Repeat this operation several times.

Amount of Fuel Flow

Standard: 50 mL (1.7 US oz.) or more for 3 seconds

- Turn the ignition switch off.
- ★ If the fuel flow is much less than the specified, replace the fuel pump (see Fuel Pump Removal/Installation).
- Install the removed parts (see appropriate chapters).
- Start the engine and check for fuel leakage.

3-76 FUEL SYSTEM (DFI)

Fuel Pump

Fuel Pump Removal

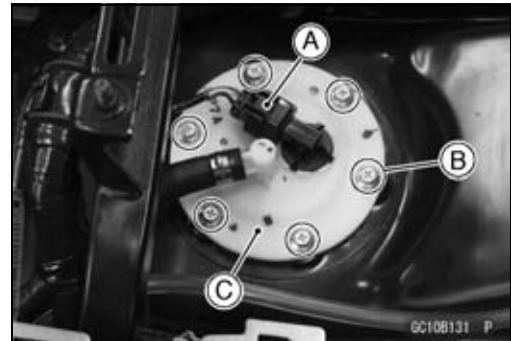
WARNING

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

NOTICE

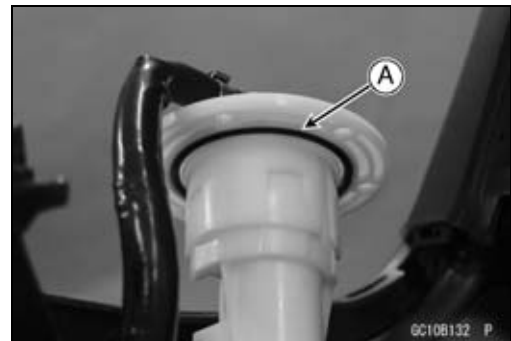
Never drop the fuel pump especially on a hard surface. Such a shock to the injector can damage it.

- Remove:
  - Fuel Tank Cap Cover (see Fuel Tank Cap Cover Removal in the Frame chapter)
  - Fuel Injector (see Fuel Injector Removal)
- Disconnect the fuel pump connector [A]
- Remove:
  - Fuel Pump Mounting Screws [B]
  - Fuel Pump [C] with Fuel Hose



Fuel Pump Installation

- Remove dirt or dust from the fuel pump by lightly applying compressed air.
- Replace the O-ring [A] with a new one.
- Install the fuel pump and tighten its screws.
  - Torque - Fuel Pump Mounting Screws: 3.4 N·m (0.35 kgf·m, 30 in·lb)**
- Tighten the screws again to check the tightness.
- Install the removed parts (see appropriate chapters).



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, inspect 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 cap cover (see Fuel Tank Cap Cover Removal in the Frame chapter).
- Disconnect the fuel pump connector and connect the measuring adapter [A] between these connectors.
Main Harness [B]
Fuel Pump [C]

Special Tool - Measuring Adapter: 57001-1700

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

Fuel Pump Operating Voltage

Connections to Adapter:

Digital Meter (+) → R (main harness R/BK) lead

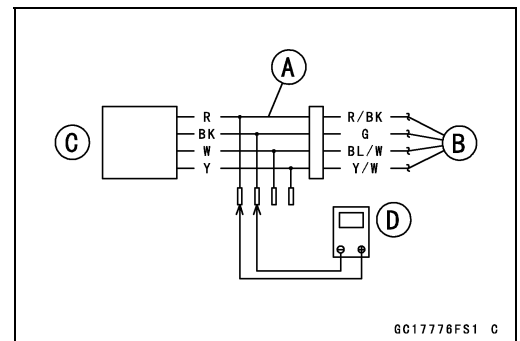
Digital Meter (–) → BK (main harness G) lead

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

Operating Voltage

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

- Turn the ignition switch off.
- ★ If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
- ★ If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★ If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
- ★ If the fuel pump relay is normal, check the wiring for continuity (see 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).

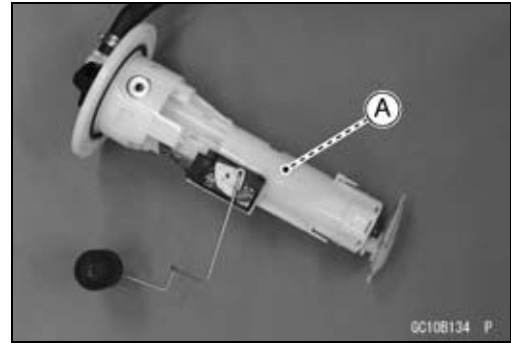


3-78 FUEL SYSTEM (DFI)

Fuel Pump

Pressure Regulator Removal

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



Fuel Filter Cleaning

- Remove the fuel pump (see Fuel Pump Removal).
- Wash the fuel filter [A] in non-flammable or high flash-point solvent. Use a brush to remove any contaminants trapped in the screens.

⚠ WARNING

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



★If the fuel filter is damaged, replace it.

3-80 FUEL SYSTEM (DFI)

Throttle Grip and Cables

Throttle Grip Free Play Inspection

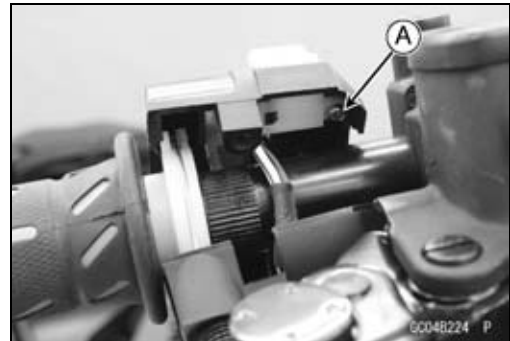
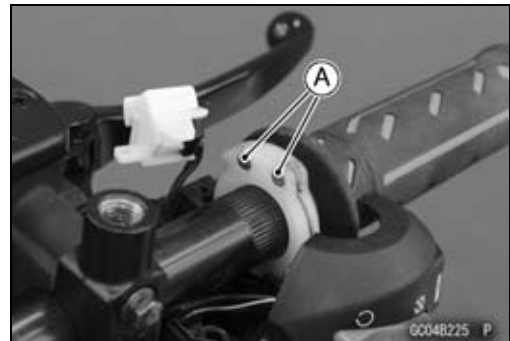
- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter.

Throttle Grip Free Play Adjustment

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

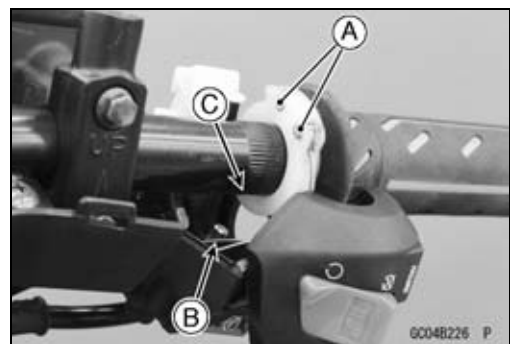
Throttle Cable Removal

- Remove:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Left Side Fairing (see Side Fairing Removal in the Frame chapter)
  - Upper Handlebar Cover (see Handlebar Cover Removal in the Frame chapter)
- Loosen the throttle cable by the adjuster (see Throttle Control System Inspection in the Periodic Maintenance chapter).
- Remove the throttle cable lower ends from the throttle pulley (see Throttle Body Assy Removal).
- Remove:
  - Right Switch Housing Screws
  - Hazard Switch Screw [A] and Hazard Switch
  - Right Switch Housing
- Remove the throttle cable upper ends [A] from the throttle grip.



Throttle Cable Installation

- Apply grease to the upper and lower ends of the throttle cable.
- Install the upper ends [A] of the throttle cable to the throttle grip, and install the right switch housing.
- When installing the right handlebar switch housing, fit the projection [B] to the hole [C].
- Install the hazard switch and tighten its screw.
- Install the throttle cable in accordance with the Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the lower ends of the throttle cable to the throttle pulley (see Throttle Body Assy Installation).
- Install the removed parts (see appropriate chapters).



⚠ WARNING

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

Throttle Grip and Cables

Cable Lubrication

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

3-82 FUEL SYSTEM (DFI)

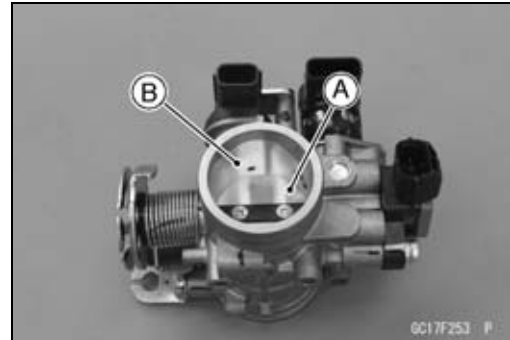
Throttle Body Assy

Idle Speed Inspection

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

Throttle Bore Cleaning

- Check the throttle bore for cleanliness as follows.
  - Remove the throttle body assy (see Throttle Body Assy Removal).
  - Check the throttle valve [A] and throttle bore [B] for carbon deposit by opening the throttle valve.
- ★ If any carbon accumulates, wipe the carbon off the throttle bore around the throttle bore and the throttle valve, using a cotton pad penetrated with a high flash-point solvent.

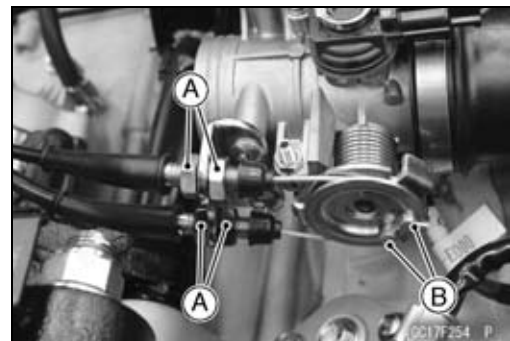
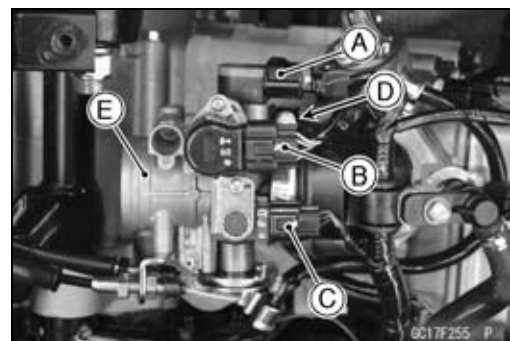


Throttle Body Assy Removal

WARNING

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

- Remove:
  - Storage Box (see Storage Box Removal in the Frame chapter)
  - Air Cleaner Box (see Air Cleaner Box Removal)
- Loosen the throttle cable by the adjuster on the throttle grip side (see Throttle Control System Inspection in the Periodic Maintenance chapter).
- Loosen the locknuts [A].
- Remove the throttle cable lower ends [B] from the throttle pulley.
- Disconnect:
  - Throttle Sensor Connector [A]
  - Idle Speed Control Valve Actuator Connector [B]
  - Intake Air Pressure Sensor Connector [C]
- Loosen the clamp screw [D].
- Remove the throttle body assy [E].
- After removing the throttle body assy, stuff pieces of lint-free, clean cloths into the throttle body assy holders.



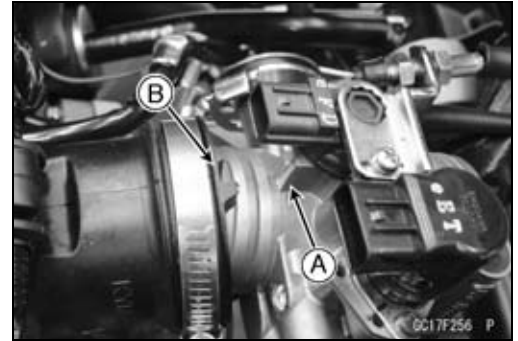
NOTICE

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

Throttle Body Assy

Throttle Body Assy Installation

- Installation is the reverse of the removal.
- Install the throttle body assy so that the rib [A] of the throttle body assy fits the groove [B] of the intake manifold.
- Reset the throttle sensor position and idle speed control valve actuator position (see How to Reset Throttle Sensor Position and Idle Speed Control Valve Actuator Position).

***Throttle Body Assy Disassembly***

- Remove the throttle body assy (see Throttle Body Assy Removal).
- Remove:
  - Idle Speed Control Valve Actuator (see Idle Speed Control Valve Actuator Removal)
  - Intake Air Pressure Sensor (see Intake Air Pressure Sensor Removal)

3-84 FUEL SYSTEM (DFI)

Air Cleaner

Air Cleaner Element Removal

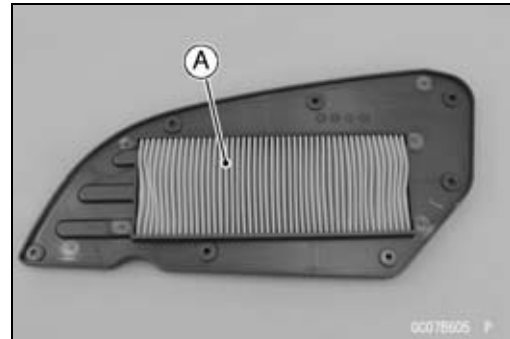
- Refer to the Air Cleaner Element Replacement in the Periodic Maintenance chapter.

Air Cleaner Element Installation

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

Air Cleaner Element Inspection

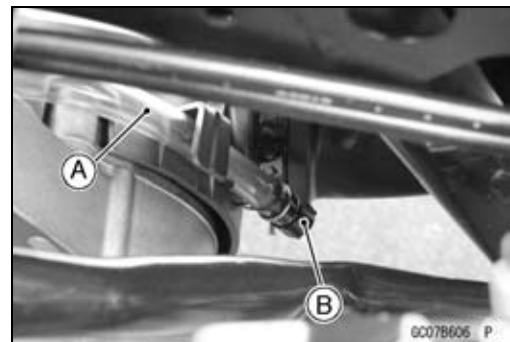
- Remove the air cleaner element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
- Visually check the element [A] for tears or breaks.
- ★ If the element has any tears or breaks, replace the element.



Engine Breather Box Oil Draining

A drain hose is connected to the bottom of the engine breather box on the air cleaner box to drain the oil accumulated.

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

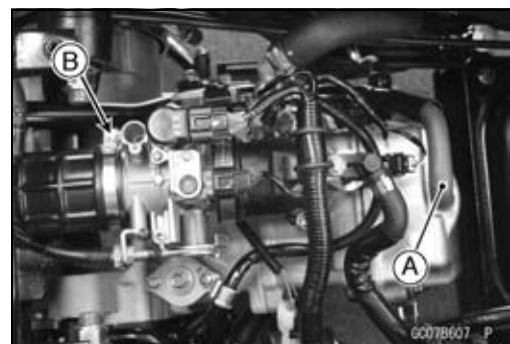


⚠ WARNING

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

Air Cleaner Box Removal

- Remove:
Storage Box (see Storage Box Removal in the Frame chapter)
- Open the clamp and disconnect the breather hose [A].
- Loosen the clamp screw [B].



- Remove the bolts [A].

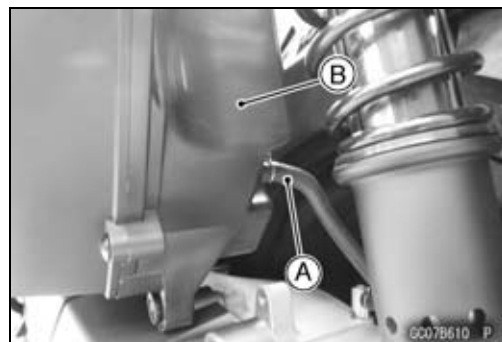


Air Cleaner

- Remove the bolts [A].



- Open the clamp and disconnect the breather hose [A].
- Remove the air cleaner box [B].



Air Cleaner Box Installation

- Installation is the reverse of removal.

3-86 FUEL SYSTEM (DFI)

Fuel Tank

Fuel Tank Removal

WARNING

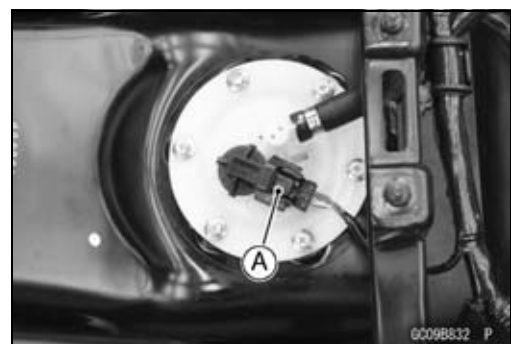
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect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

- Open the fuel tank cap.
- Draw the fuel out from the fuel tank with a commercially available pump.
- Use a soft plastic hose [A] as a pump intake hose in order to insert the hose smoothly.
- Put the hose through the fill opening [B] into the tank and draw the fuel out.

WARNING

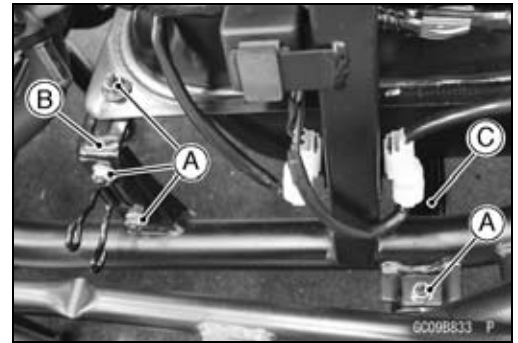
Spilled fuel is flammable and can be explosive under certain conditions. The fuel can not be removed completely from the fuel tank. Be careful for remained fuel spillage.

- Remove:
  - Fuel Injector (see Fuel Injector Removal)
  - Leg Shield (see Leg Shield Removal in the Frame chapter)
  - Lower Cover (see Lower Cover Removal in the Frame chapter)
- Disconnect the fuel pump connector [A].

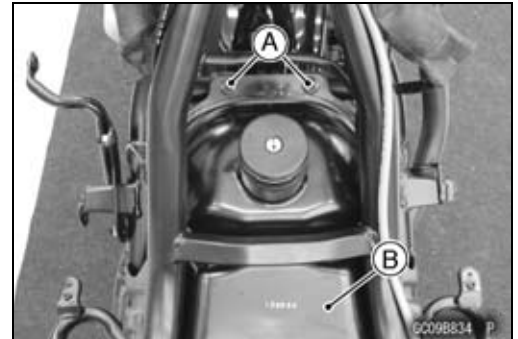


Fuel Tank

- Remove:
  - Nuts [A] (Both Sides)
  - Bracket [B] (Both Sides)
  - Guard [C]

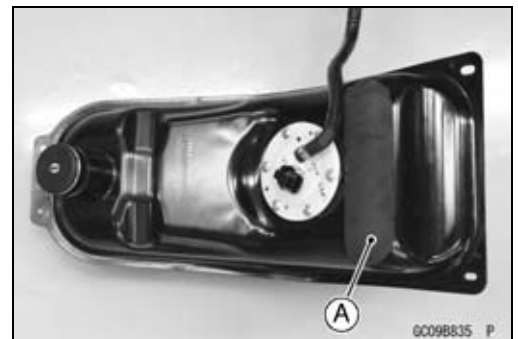


- Remove:
  - Nuts [A]
  - Fuel Tank [B]



Fuel Tank Installation

- Installation is the reverse of removal.
- Be sure that the pad [A] is in position.



Fuel Tank Cleaning

WARNING

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

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

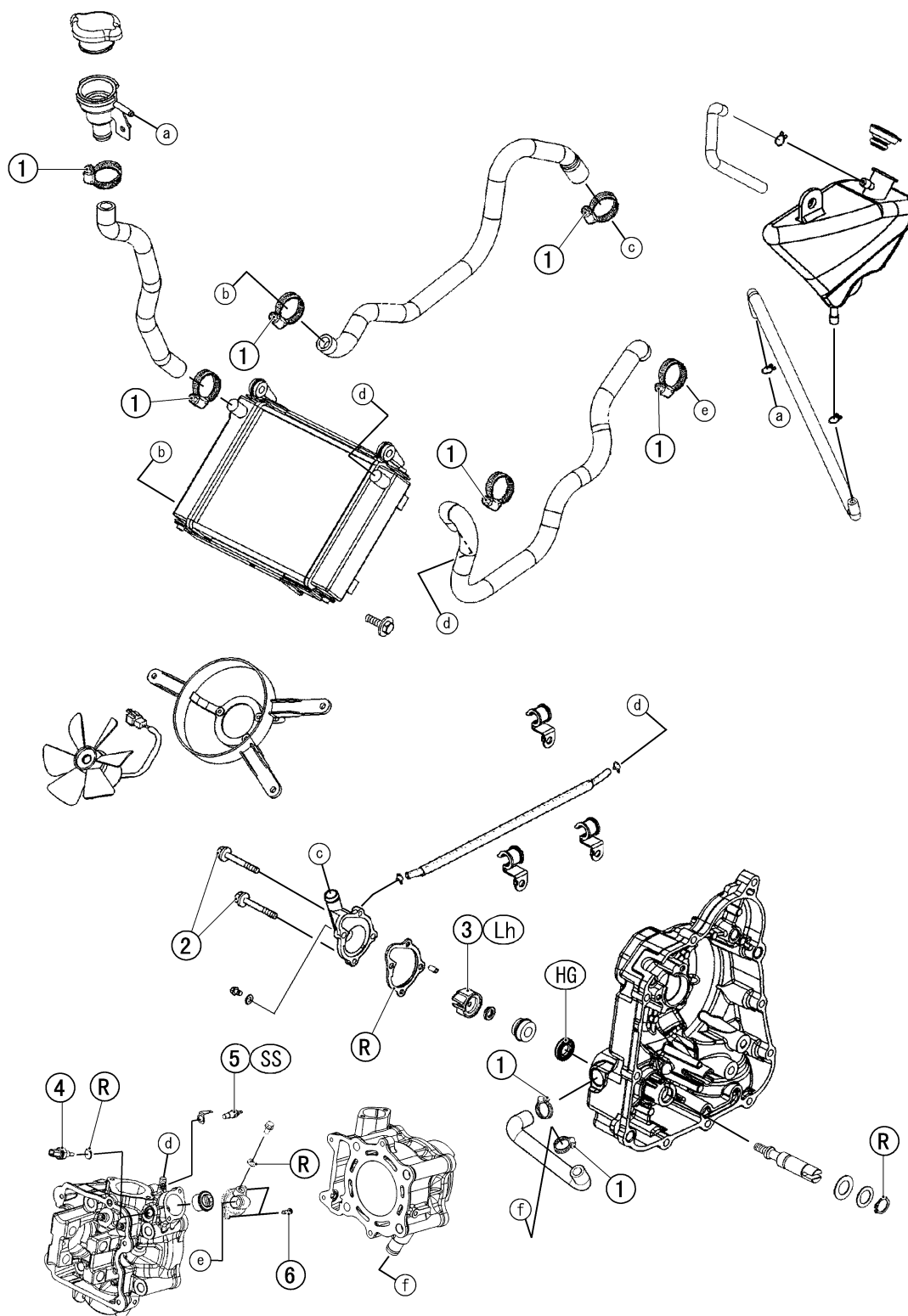
Cooling System

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4-2 COOLING SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Hose Clamp Screws	4.4	0.45	39 in·lb	
2	Water Pump Cover Bolts	9.8	1.0	87 in·lb	
3	Water Pump Impeller	12	1.2	106 in·lb	Lh
4	Water Temperature Sensor (ECU)	12	1.2	106 in·lb	
5	Water Temperature Sensor (Meter)	7.4	0.75	65 in·lb	SS
6	Thermostat Housing Cover Bolts	7.4	0.75	65 in·lb	

HG: Apply high-temperature grease.

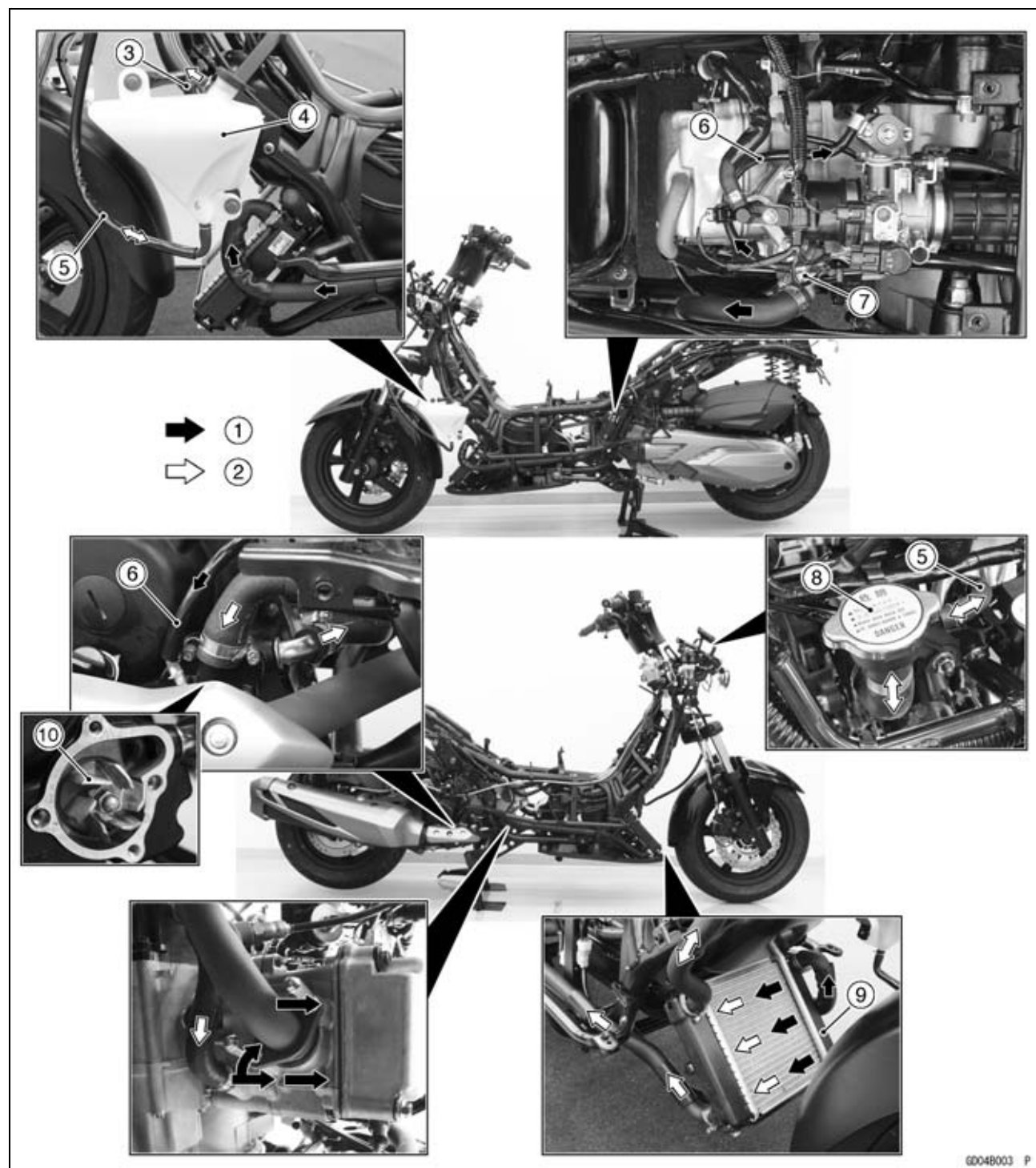
Lh: Left-hand Threads

R: Replacement Parts

SS: Apply silicone sealant.

4-4 COOLING SYSTEM

Coolant Flow Chart



1. Hot Coolant
2. Cold Coolant
3. Reserve Tank Overflow Hose
4. Reserve Tank
5. Radiator Overflow Hose
6. Water Bypass Hose
7. Thermostat
8. Radiator Cap
9. Radiator
10. Water Pump

Specifications

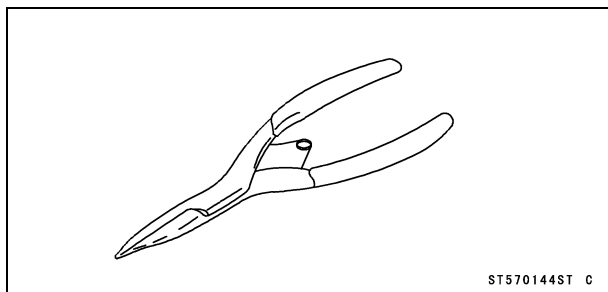
Item	Standard
Coolant Provided when Shipping	
Type (Recommended)	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mixed Ratio	Soft water 50%, coolant 50%
Freezing Point	-35°C (-31°F)
Total Amount	1.5 L (1.6 US qt) (Reserve tank full level, including radiator and engine)
Radiator Cap	
Relief Pressure	88 ±14 kPa (0.9 ±0.15 kgf/cm ² , 13 ±2 psi)
Thermostat	
Valve Opening Temperature	71°C (160°F)
Valve Full Opening Lift	3.5 ~ 4.5 mm (0.14 ~ 0.18 in.) or more @80°C (176°F)

4-6 COOLING SYSTEM

Special Tools and Sealant

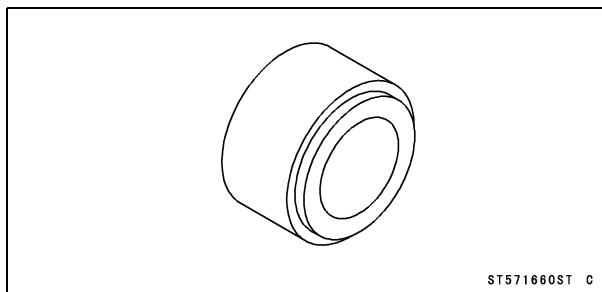
Outside Circlip Pliers:

57001-144



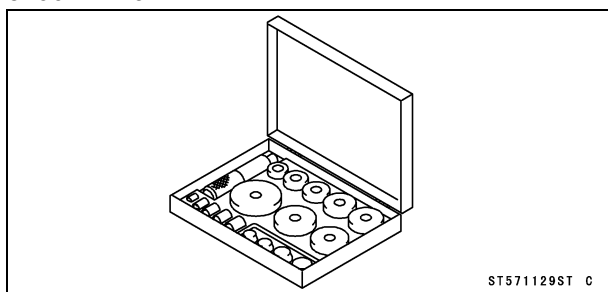
Oil Seal Driver $\phi 37.5$:

57001-1660



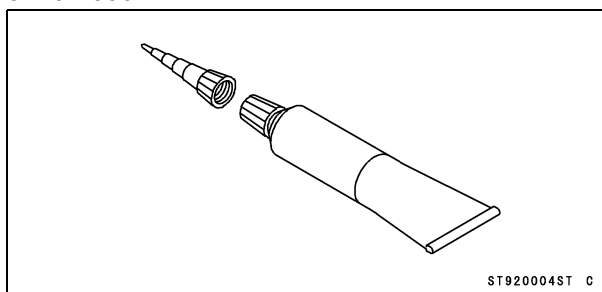
Bearing Driver Set:

57001-1129



Liquid Gasket, TB1211F:

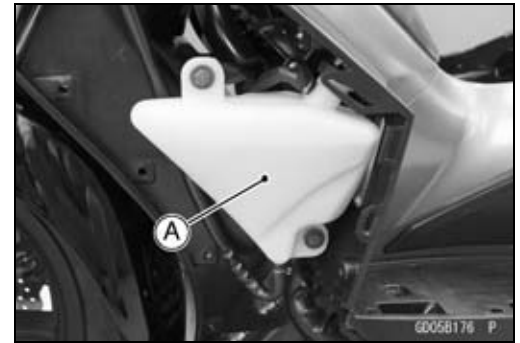
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Coolant

Coolant Deterioration Inspection

- Remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Visually inspect the coolant in the reserve tank [A].
- ★ If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.
- ★ If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.



Coolant Level Inspection

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

Coolant Draining

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

Coolant Filling

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

Pressure Testing

- Remove:
  - Front Center Cover (see Front Center Cover Removal in the Frame chapter)
  - Radiator Cap [A]
- Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.

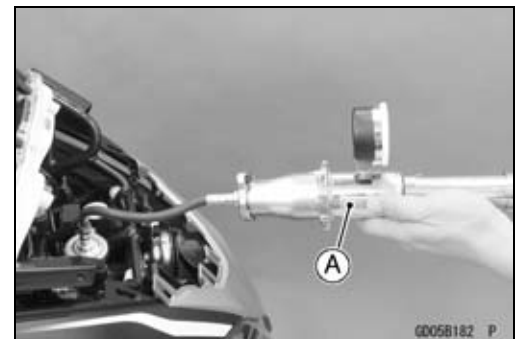


- Install the cooling system pressure tester [A] on the filler neck.

NOTE

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

- Build up pressure in the system carefully until the pressure reaches 102 kPa (1.05 kgf/cm², 15 psi).



NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 102 kPa (1.05 kgf/cm², 15 psi).

- Watch the gauge for at least 6 seconds.
- ★ If the pressure holds steady, the system is all right.
- ★ If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.
- Remove the pressure tester, replenish the coolant, and install the radiator cap.
- Install the front center cover (see Front Center Cover Installation in the Frame chapter).

4-8 COOLING SYSTEM

Coolant

Cooling System Flushing

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

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

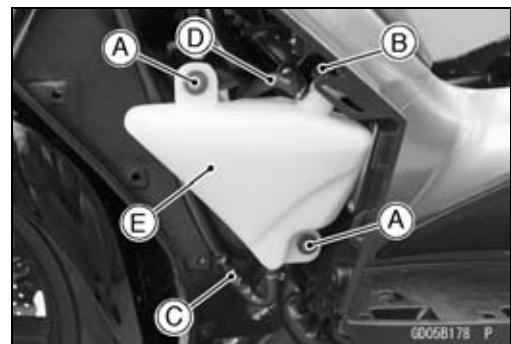
NOTICE

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

- Warm up the engine, and run it at normal operating temperature for about 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:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Bolts [A]
- Remove the cap [B] and pour the coolant into a container.
- Remove:
  - Radiator Overflow Hose [C]
  - Reserve Tank Overflow Hose [D]
  - Coolant Reserve Tank [E]



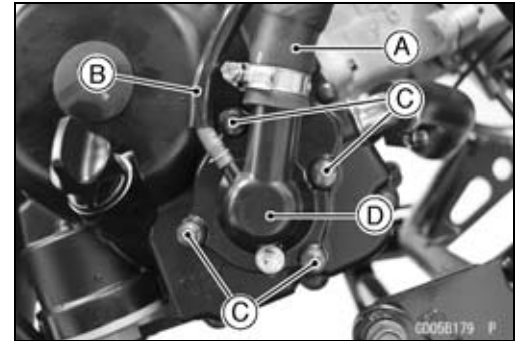
Coolant Reserve Tank Installation

- Installation is the reverse of removal.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Fill the coolant reserve tank with coolant (see Coolant Change in the Periodic Maintenance chapter).

Water Pump

Water Pump Cover Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  - Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top chapter)
- Loosen the water hose clamp screw and disconnect the water hose [A].
- Open the water hose clamp and disconnect the water bypass hose [B].
- Remove:
  - Water Pump Cover Bolts [C]
  - Water Pump Cover [D] and Gasket



Water Pump Cover Installation

- Replace the water pump cover gasket with a new one.
- Install the dowel pins [A] and new gasket are in place.
- Install the water pump cover and tighten its bolts.
- Install the water hoses.
- Tighten:
  - Torque - Water Hose Clamp Screw: 4.4 N·m (0.45 kgf·m, 39 in·lb)**
- Install the removed parts (see appropriate chapters).
- Fill the cooling system with the coolant (see Coolant Change in the Periodic Maintenance chapter).



Impeller Removal/Installation

- Remove:
  - Water Pump Cover (see Water Pump Cover Removal)
  - Water Pump Impeller [A] and Washer

NOTE

○Water Pump Impeller is left-hand threads.



- If necessary, hold the alternator rotor bolt [A] to remove the water pump impeller.
- When the alternator cover center cap is removed, replace the O-ring of the cap with a new one.
- Installation is the reverse of removal.

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



4-10 COOLING SYSTEM

Water Pump

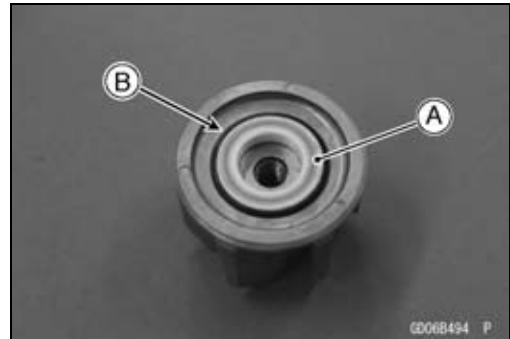
Water Pump Inspection

- Check the drainage outlet passage [A] at the bottom of the water pump housing for coolant leaks.
- If a coolant leak or ooze is found, start the engine and check if the coolant leaks continuously.
- When coolant does not continuously leak, it is normal.
- ★ If the mechanical seal is damaged, the coolant continuously leaks through the drainage outlet passage. Replace the mechanical seal unit.
- ★ If the oil seal is damaged, engine oil leaks through the drainage outlet passage. Replace the oil seal.



Water Pump Impeller Disassembly/Assembly

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



Water Pump Impeller Inspection

- Remove the water pump cover (see Water Pump Cover Removal).
- Visually inspect the impeller [A].
- ★ If the surface is corroded or if the blades are damaged, replace the impeller.



Mechanical Seal Inspection

- Remove the water pump impeller (see Water Pump Impeller Removal/Installation).
- Visually inspect the mechanical seal.
- ★ If any of the parts is damaged, replace the mechanical seal as a set.

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



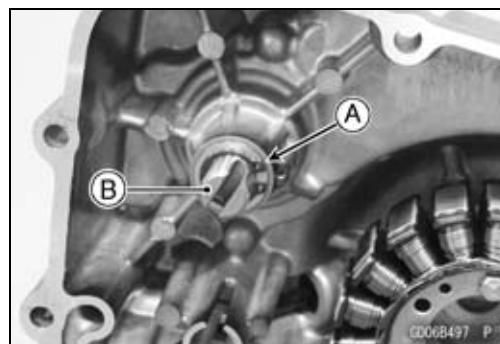
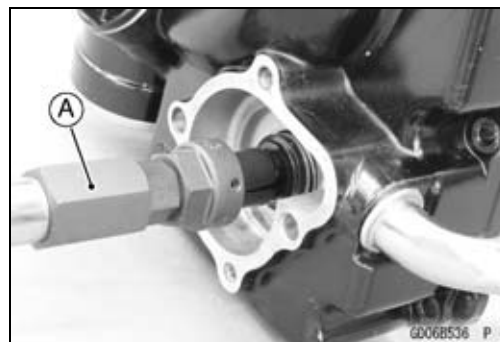
Water Pump

Mechanical Seal Removal

- Remove:
  - Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
  - Water Pump Impeller (see Water Pump Impeller Removal/Installation)
  - Circlip [A] and Washer
  - Water Pump Shaft [B]

Special Tool - Outside Circlip Pliers: 57001-144

- Remove the mechanical seal and oil seal using a suitable tool [A].



Mechanical Seal Installation

- Press the new oil seal until it is bottomed.
- Apply a high-temperature grease to the oil seal lips.

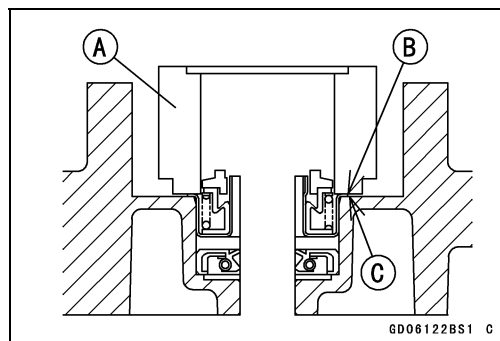
Special Tool - Bearing Driver Set: 57001-1129

NOTICE

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

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

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

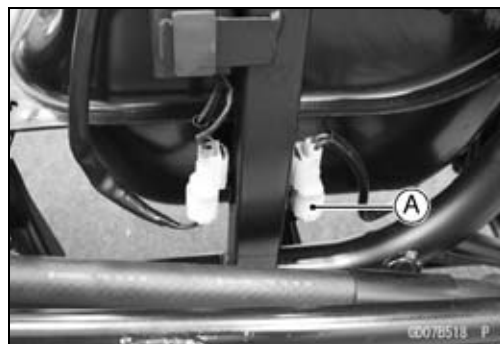
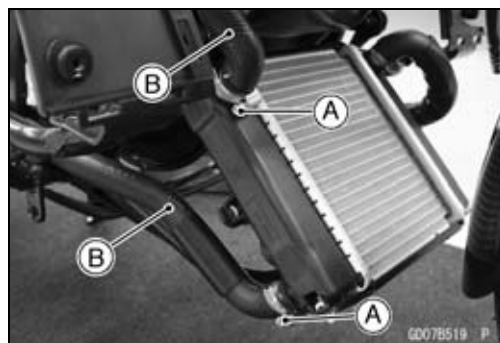


4-12 COOLING SYSTEM

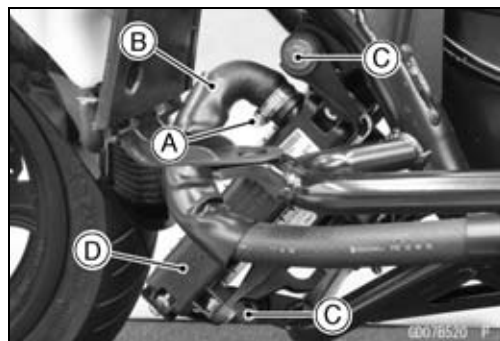
Radiator

Radiator and Radiator Fan Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Side Fairing (see Side Fairing Removal in the Frame chapter)
  - Radiator Cover (see Radiator Cover Removal in the Frame chapter)
  - Lower Cover (see Lower Cover Removal in the Frame chapter)
- Disconnect the radiator fan motor lead connector [A].
- Loosen the water hose clamp screws [A].
- Disconnect the water hoses [B].



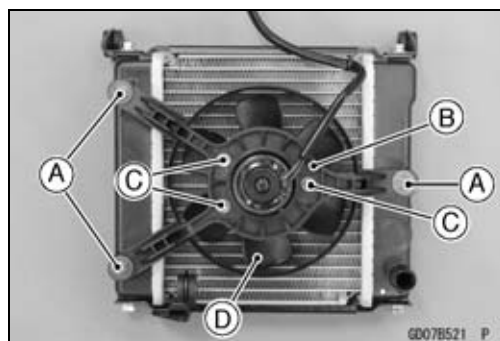
- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove:
  - Radiator Bolts [C]
  - Radiator [D]



NOTICE

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

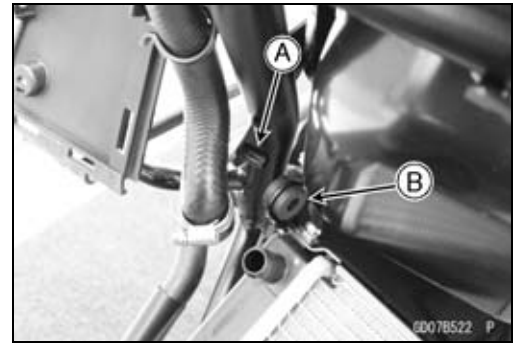
- Remove:
  - Radiator Fan Bracket Bolts [A]
  - Radiator Fan Bracket [B]
  - Radiator Fan Screws [C]
  - Radiator Fan [D]



Radiator

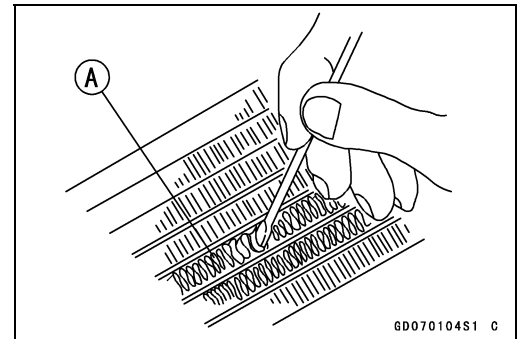
Radiator and Radiator Fan Installation

- Installation is the reverse of removal.
- Insert the projection [A] of the frame into the grommet [B] of the radiator.
- Tighten:
Torque - Water Hose Clamp Screws: 4.4 N·m (0.45 kgf/cm, 39 in·lb)
- Install the removed parts (see appropriate chapters).



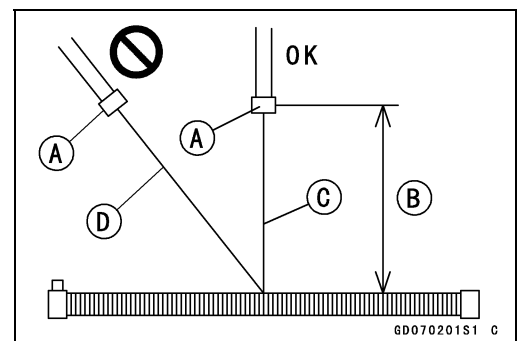
Radiator Inspection

- Remove the radiator (see Radiator and Radiator Fan Removal).
- Check the radiator core.
- ★ If there are obstructions to air flow, remove them.
- ★ If the corrugated fins [A] are deformed, carefully straighten them.
- ★ If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.



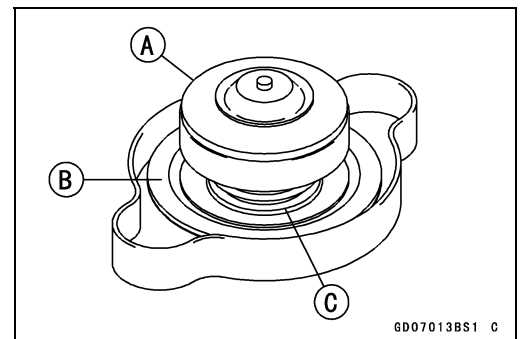
NOTICE

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



Radiator Cap Inspection

- Remove:
Front Center Cover (see Front Center Cover 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.



4-14 COOLING SYSTEM

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 for at least 6 seconds.

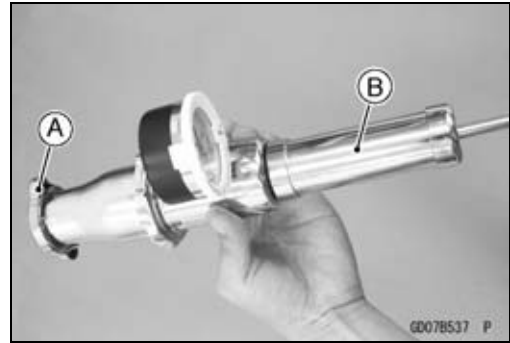
Radiator Cap Relief Pressure

Standard: 88 ± 14 kPa (0.9 ± 0.15 kgf/cm², 13 ± 2 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

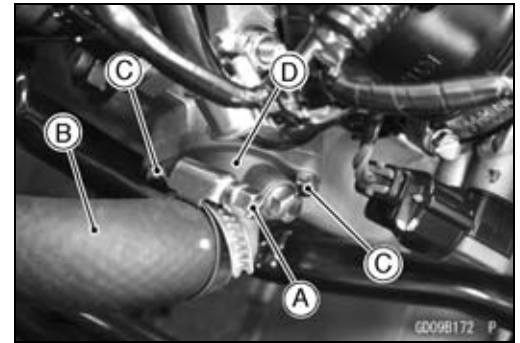
- Remove:
  - Front Center Cover (see Front Center Cover Removal in the Frame chapter)
  - Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function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



Thermostat

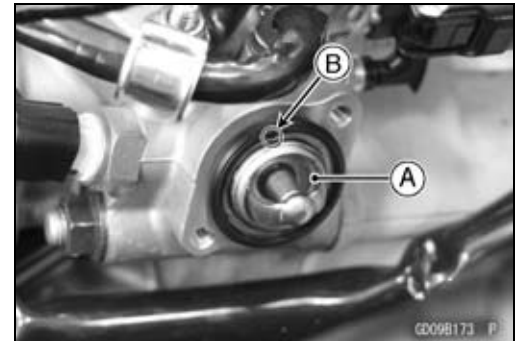
Thermostat Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the storage box (see Storage Box Removal in the Frame chapter)
- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove:
  - Thermostat Housing Cover Bolts [C]
  - Thermostat Housing Cover [D]
  - Thermostat



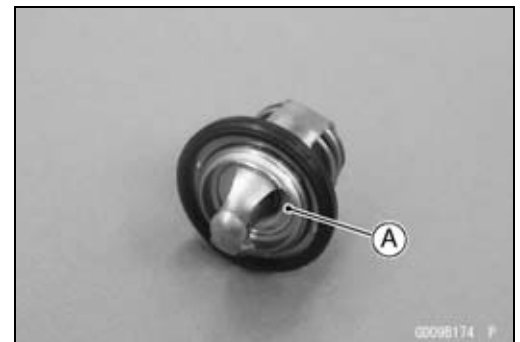
Thermostat Installation

- Install the thermostat [A] in the housing so that the air bleeder hole [B] is on top.
- Install the thermostat cover, and tighten its bolts.
  - Torque - Thermostat Housing Cover Bolts: 7.4 N·m (0.75 kgf·m, 65 in·lb)**
- Install the water hose and tighten the clamp screw.
  - Torque - Water Hose Clamp Screw: 4.4 N·m (0.45 kgf/cm, 39 in·lb)**
- Install the removed parts (see appropriate chapters).



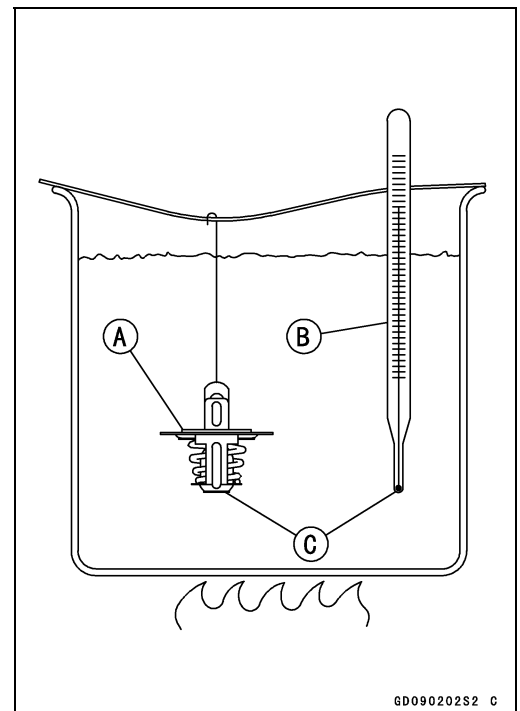
Thermostat Inspection

- Remove the thermostat (see Thermostat Removal).
- Inspect the thermostat valve [A] at room temperature.
- ★ If the valve is open, replace the thermostat with a new one.



- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.
- The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.
- ★ If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature
71°C (160°F)

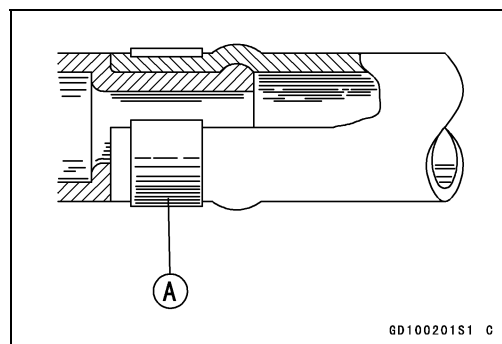


4-16 COOLING SYSTEM

Hoses and Pipes

Hose Installation

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



Hose Inspection

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

Water Temperature Sensor

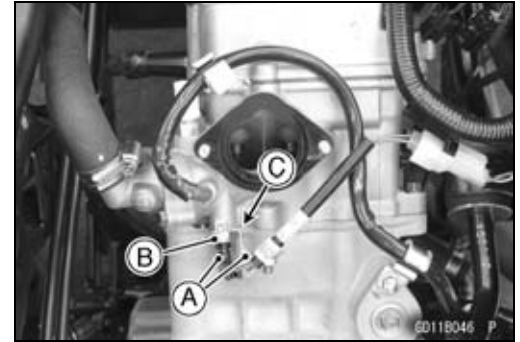
Water Temperature Sensor (ECU)

Removal/Installation

- Refer to the Water Temperature Sensor (ECU) Removal/Installation in the Fuel System (DFI) chapter.

Water Temperature Sensor (Meter) Removal

- Remove the intake manifold (see Intake Manifold Removal in the Engine Top End chapter).
- Disconnect the water temperature sensor connectors [A].
- Remove:
  - Water Temperature Sensor [B]
  - Terminal Plate [C]



Water Temperature Sensor (Meter) Installation

- Installation is the reverse of removal.
- Apply liquid gasket to the threads of the water temperature sensor, and tighten it together with the terminal plate.

Sealant - Liquid Gasket, TB1211F: 92104-0004

Torque - Water Temperature Sensor (Meter): 7.4 N·m (0.75 kgf·m, 65 in·lb)

- Connect the connectors.
- Install the intake manifold (see Intake Manifold Installation in the Engine Top End chapter).

Water Temperature Sensor Inspection

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

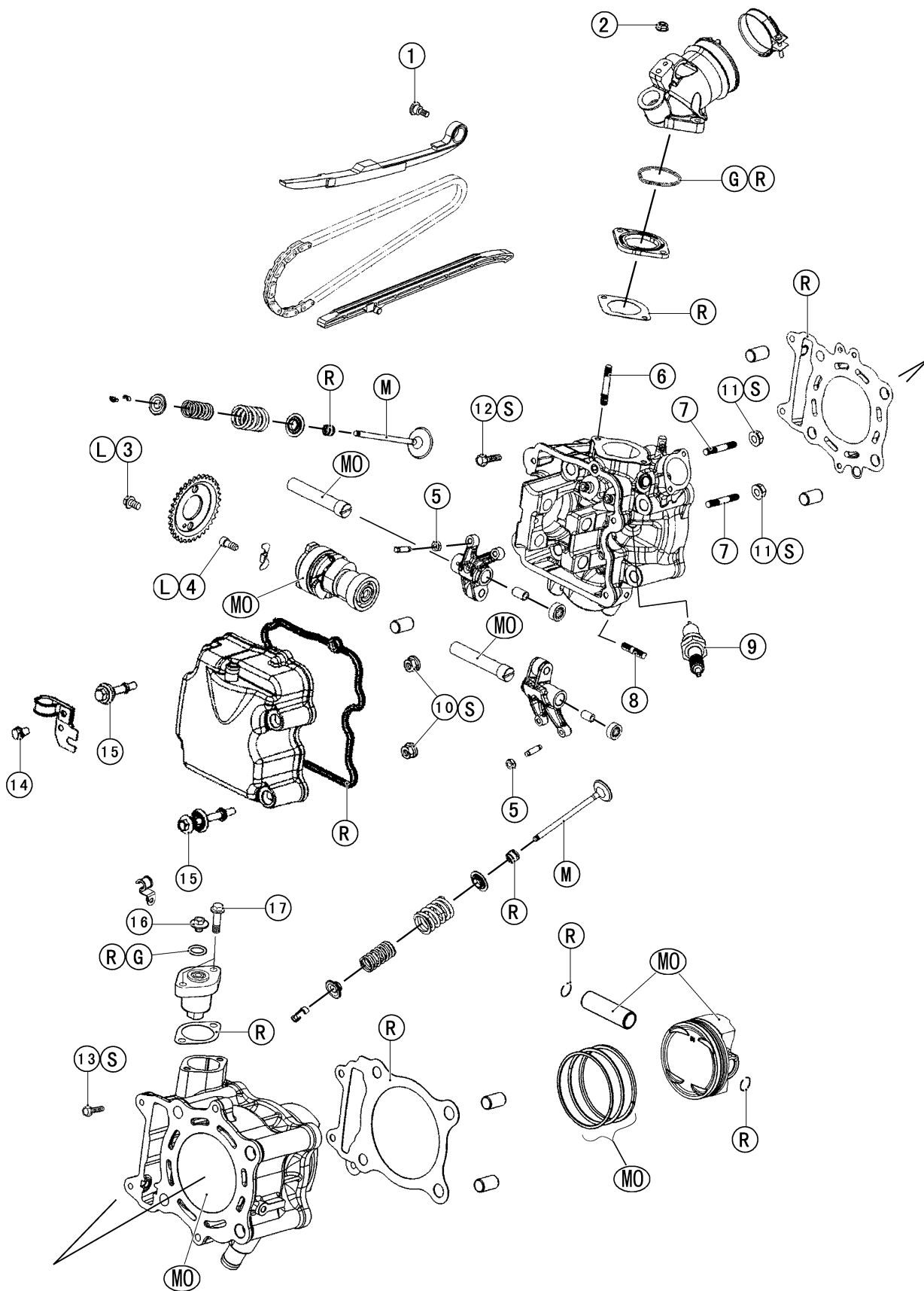
Engine Top End

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5-2 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Camshaft Chain Guide Bolt	9.8	1.0	87 in·lb	
2	Intake Manifold Mounting Nuts	9.8	1.0	87 in·lb	
3	Camshaft Sprocket Bolts	12	1.2	106 in·lb	L
4	Rocker Shaft Stopper Bolt	8.8	0.90	78 in·lb	L
5	Valve Adjusting Screw Locknuts	8.8	0.90	78 in·lb	
6	Intake Manifold Stud Bolts	8.8	0.90	78 in·lb	
7	Cylinder Head Stud Bolts	8.8	0.90	78 in·lb	
8	Exhaust Pipe Manifold Stud Bolts	8.8	0.90	78 in·lb	
9	Spark Plug	12	1.2	106 in·lb	
10	Cylinder Head Nuts (M10) (First)	20	2.0	15	S
	Cylinder Head Nuts (M10) (Final)	37	3.8	27	S
11	Cylinder Head Nuts (M6)	9.8	1.0	87 in·lb	S
12	Cylinder Head Bolts	9.8	1.0	87 in·lb	S
13	Cylinder Bolts	9.8	1.0	87 in·lb	S
14	Fuel Hose Bracket Bolt	9.8	1.0	87 in·lb	
15	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
16	Camshaft Chain Tensioner Cap Bolt	4.4	0.45	39 in·lb	
17	Camshaft Chain Tensioner Mounting Bolts	12	1.2	106 in·lb	

G: Apply grease.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

MO: Apply molybdenum disulfide oil solution.

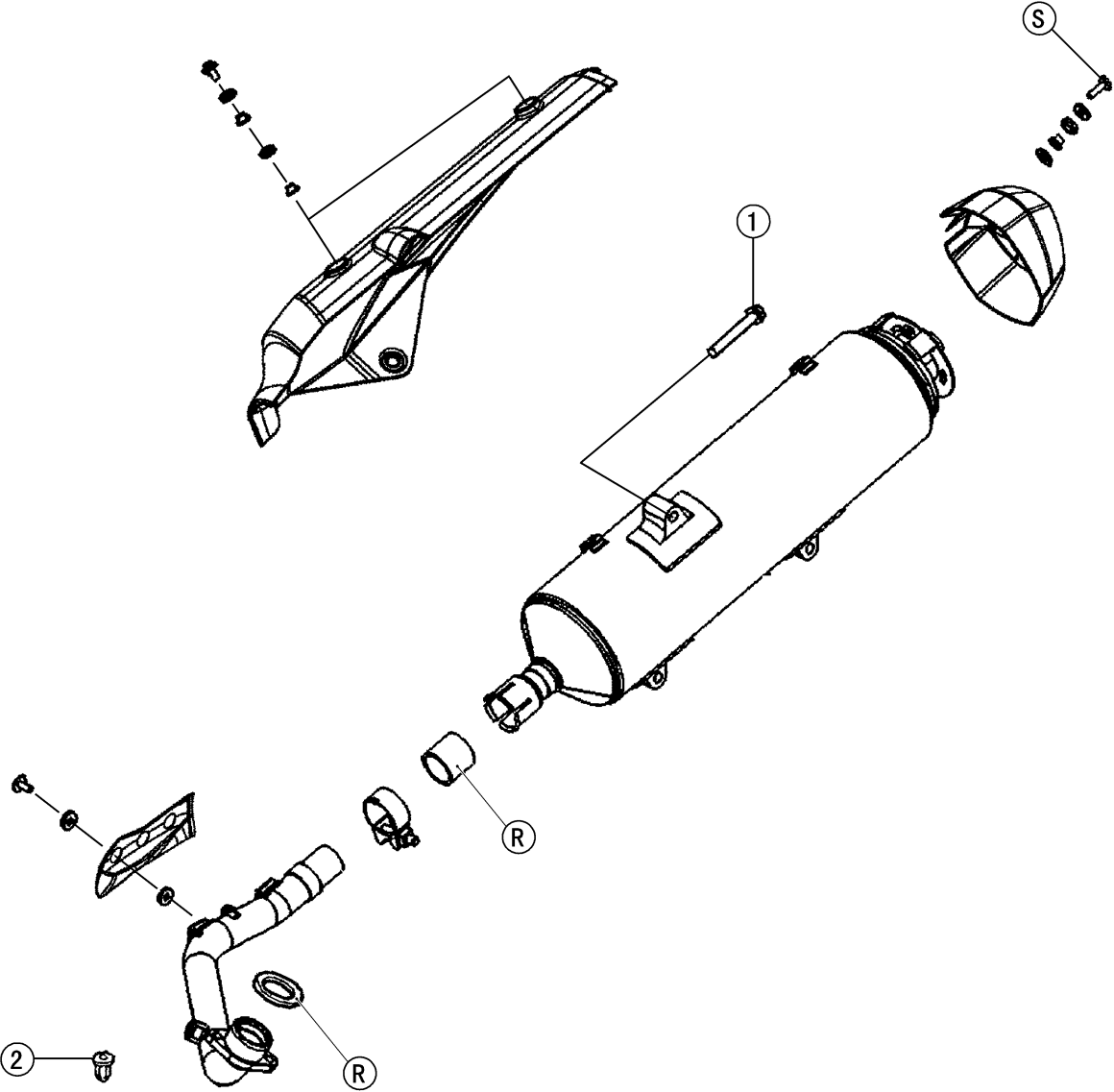
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

R: Replacement Parts

S: Follow the specified tightening sequence.

5-4 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Muffler Body Mounting Bolts	34	3.5	25	
2	Exhaust Pipe Manifold Holder Nuts	20	2.0	15	

R: Replacement Parts
S: Follow the specified tightening sequence.

5-6 ENGINE TOP END

Specifications

Item	Standard	Service Limit
Camshaft		
Cam Height:		
Exhaust	34.1721 mm (1.34535 in.)	— — —
Intake	34.2987 mm (1.35033 in.)	— — —
Rocker Arm Inside Diameter	10.000 ~ 10.015 mm (0.3937 ~ 0.3943 in.)	— — —
Rocker Shaft Diameter	9.972 ~ 9.987 mm (0.3926 ~ 0.3932 in.)	— — —
Cylinder Head		
Cylinder Compression	(Usable Range) 1370 ~ 1770 kPa (14 ~ 18 kgf/cm ² , 199 ~ 256 psi) @570 r/min (rpm)	— — —
Cylinder Head Warp	— — —	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.10 mm (0.0039 in.)	— — —
Intake	0.10 mm (0.0039 in.)	— — —
Valve Head Thickness:		
Exhaust	1.10 mm (0.0043 in.)	0.6 mm (0.0236 in.)
Intake	1.10 mm (0.0043 in.)	0.6 mm (0.0236 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	4.970 ~ 4.955 mm (0.1957 ~ 0.1951 in.)	— — —
Intake	4.990 ~ 4.975 mm (0.1965 ~ 0.1959 in.)	— — —
Valve Guide Inside Diameter:		
Exhaust	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in.)	— — —
Intake	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in.)	— — —
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.030 ~ 0.057 mm (0.0012 ~ 0.0022 in.)	0.08 mm (0.0031 in.)
Intake	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in.)	0.06 mm (0.0024 in.)
Valve Seat Cutting Angle	32°, 45°, 60°	— — —
Valve Seating Surface:		
Width:		
Exhaust	1.2 mm (0.047 in.)	— — —
Intake	1.2 mm (0.047 in.)	— — —
Outside Diameter:		
Exhaust	23.5 ~ 23.7 mm (0.925 ~ 0.933 in.)	— — —
Intake	29.3 ~ 29.5 mm (1.15 ~ 1.16 in.)	— — —
Valve Spring Free Length:		
Outer	38.82 mm (1.5283 in.)	37.3 mm (1.4685 in.)
Inner	37.5 mm (1.4764 in.)	36.5 mm (1.437 in.)

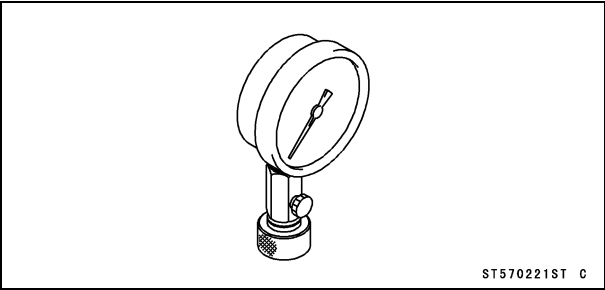
Specifications

Item	Standard	Service Limit
Cylinder, Piston		
Cylinder Inside Diameter	72.705 ~ 72.715 mm (2.8624 ~ 2.8628 in.)	72.80 mm (2.866 in.)
Piston Diameter	72.67 ~ 72.69 mm (2.8610 ~ 2.8618 in.)	72.70 mm (2.862 in.)
Piston/Cylinder Clearance	0.010 ~ 0.040 mm (0.0004 ~ 0.0016 in.)	0.1 mm (0.0039 in.)
Piston Ring/Groove Clearance:		
Top	0.015 ~ 0.055 mm (0.0006 ~ 0.0022 in.)	0.13 mm (0.0051 in.)
Second	0.015 ~ 0.055 mm (0.0006 ~ 0.0022 in.)	0.13 mm (0.0051 in.)
Piston Ring Groove Width:		
Top	1.00 ~ 1.02 mm (0.039 ~ 0.040 in.)	1.1 mm (0.043 in.)
Second	1.00 ~ 1.02 mm (0.039 ~ 0.040 in.)	1.1 mm (0.043 in.)
Piston Ring Thickness:		
Top	0.97 ~ 0.99 mm (0.038 ~ 0.039 in.)	0.92 mm (0.036 in.)
Second	0.97 ~ 0.99 mm (0.038 ~ 0.039 in.)	0.92 mm (0.036 in.)
Piston Ring End Gap:		
Top	0.10 ~ 0.25 mm (0.004 ~ 0.010 in.)	0.50 mm (0.020 in.)
Second	0.10 ~ 0.25 mm (0.004 ~ 0.010 in.)	0.50 mm (0.020 in.)
Oil (Oil Side Rail)	0.2 ~ 0.7 mm (0.008 ~ 0.028 in.)	1.0 mm (0.04 in.)
Piston Pin Diameter	14.994 ~ 15.000 mm (0.59031 ~ 0.59055 in.)	14.96 mm (0.5890 in.)
Piston Pin Hole Diameter	15.002 ~ 15.008 mm (0.59062 ~ 0.59086 in.)	15.04 mm (0.5921 in.)
Piston/Piston Pin Clearance	0.002 ~ 0.014 mm (0.0001 ~ 0.0006 in.)	0.02 mm (0.0008 in.)
Connecting Rod Small End Inside Diameter	15.016 ~ 15.034 mm (0.59118 ~ 0.59189 in.)	15.06 mm (0.5929 in.)

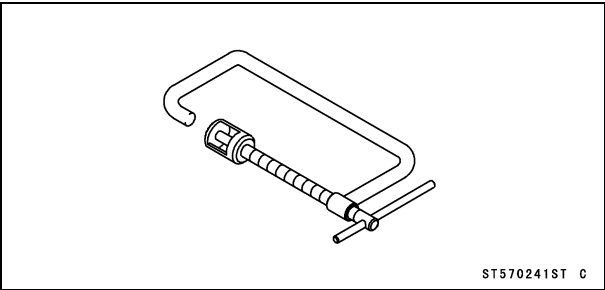
5-8 ENGINE TOP END

Special Tools and Sealant

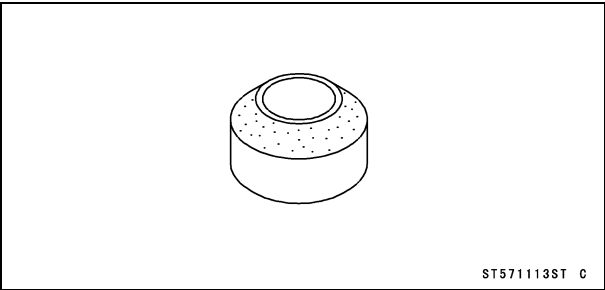
Compression Gauge, 20 kgf/cm²:
57001-221



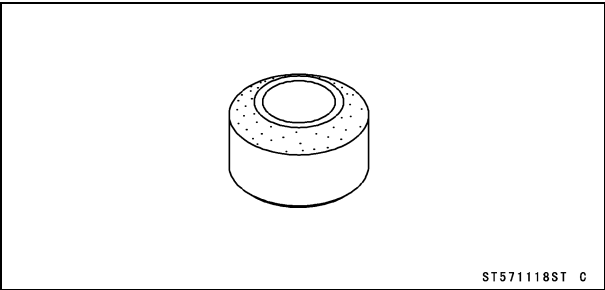
Valve Spring Compressor Assembly:
57001-241



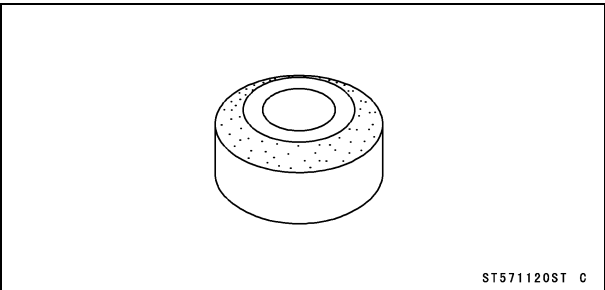
Valve Seat Cutter, 45° - $\phi 24.5$:
57001-1113



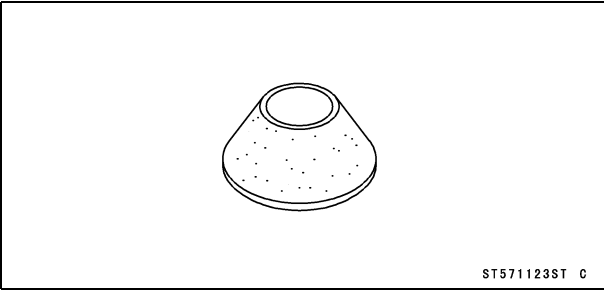
Valve Seat Cutter, 32° - $\phi 25$:
57001-1118



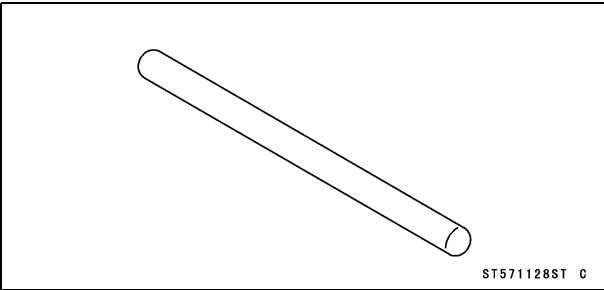
Valve Seat Cutter, 32° - $\phi 30$:
57001-1120



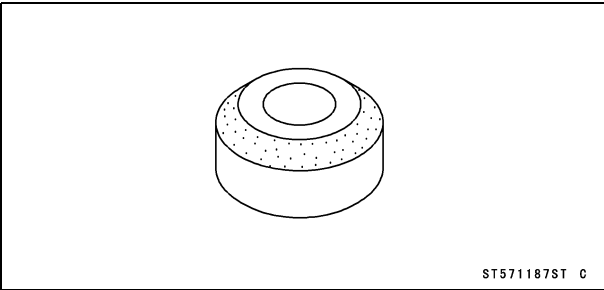
Valve Seat Cutter, 60° - $\phi 30$:
57001-1123



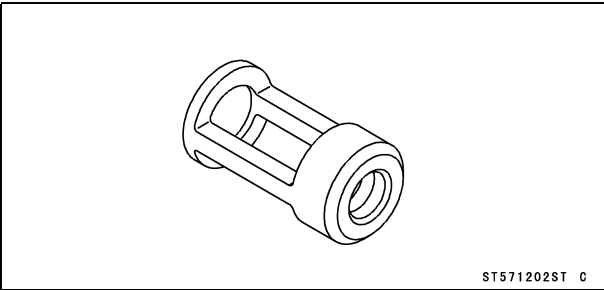
Valve Seat Cutter Holder Bar:
57001-1128



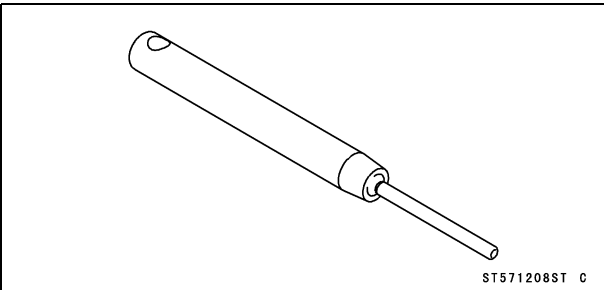
Valve Seat Cutter, 45° - $\phi 30$:
57001-1187



Valve Spring Compressor Adapter, $\phi 22$:
57001-1202

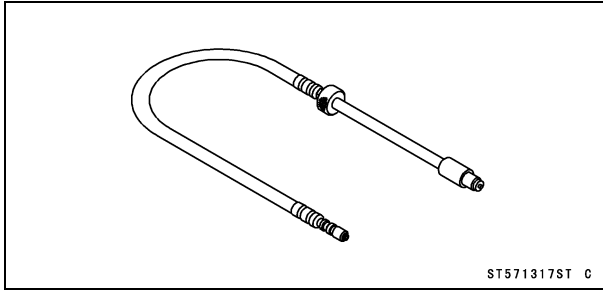


Valve Seat Cutter Holder, $\phi 5$:
57001-1208

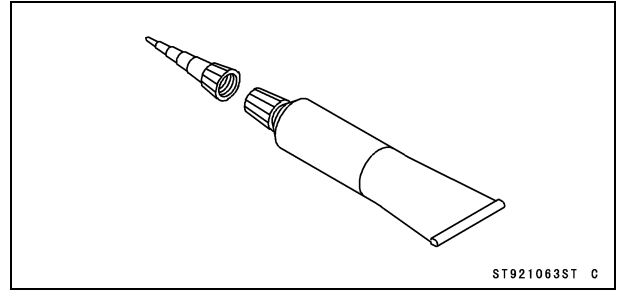


Special Tools and Sealant

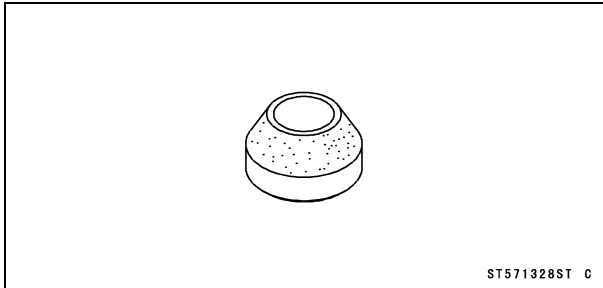
Compression Gauge Adapter, M10 × 1.0:
57001-1317



Liquid Gasket, TB1216:
92104-1063



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

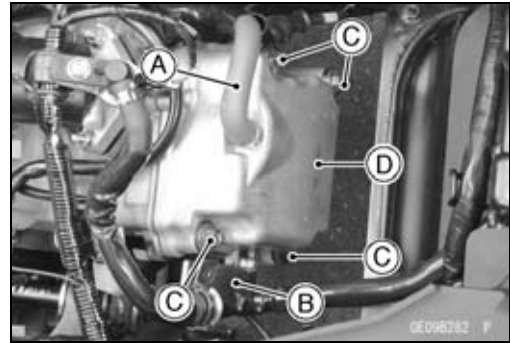


5-10 ENGINE TOP END

Cylinder Head Cover

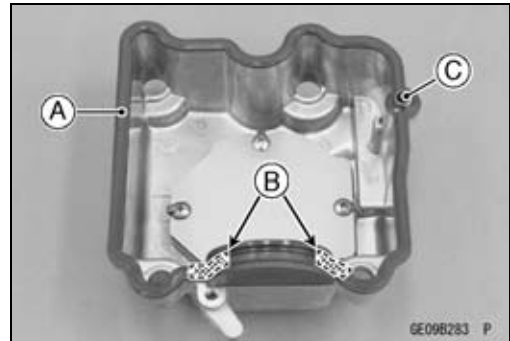
Cylinder Head Cover Removal

- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Open the clamp and disconnect the breather hose [A].
- Loosen the bolt and remove the fuel hose bracket [B].
- Remove:
  - Cylinder Head Cover Bolts [C]
  - Cylinder Head Cover [D]
  - Cylinder Head Cover Gasket



Cylinder Head Cover Installation

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



Sealant - Liquid Gasket, TB1216: 92104-1063

- Install the dowel pin [C].
- Install the cylinder head cover to the cylinder head.
- Install the cylinder head cover 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

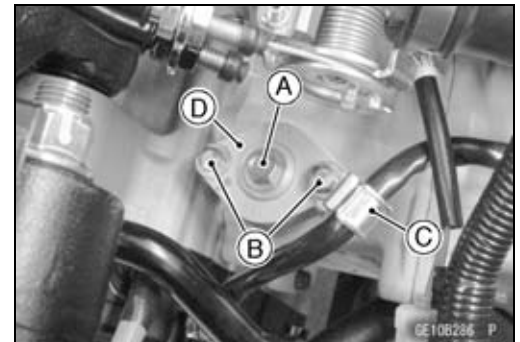
Camshaft Chain Tensioner Removal

NOTICE

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up cam 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:
  - Storage Box (see Storage Box Removal in the Frame chapter)
  - Camshaft Chain Tensioner Cap Bolt [A]
  - Camshaft Chain Tensioner Mounting Bolts [B]
  - Clamp [C]
  - Camshaft Chain Tensioner [D] and Gasket



Camshaft Chain Tensioner Installation

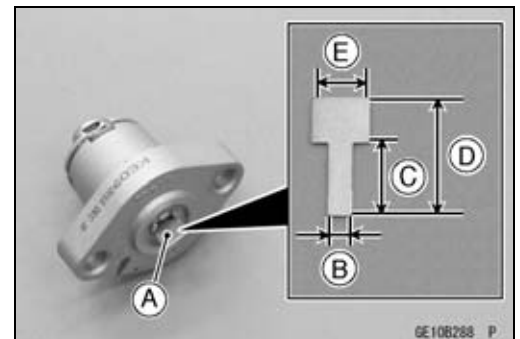
- While compressing the push rod [A], turn it clockwise with a suitable screwdriver until the rod stopped.

NOTICE

Do not turn the rod counterclockwise before installing the tensioner. This could detach the rod and the tensioner cannot be reinstalled.



- 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]
  - 11 mm (0.43 in.) [C]
  - 18 mm (0.71 in.) [D]
  - 8.5 mm (0.33 in.) [E]



5-12 ENGINE TOP END

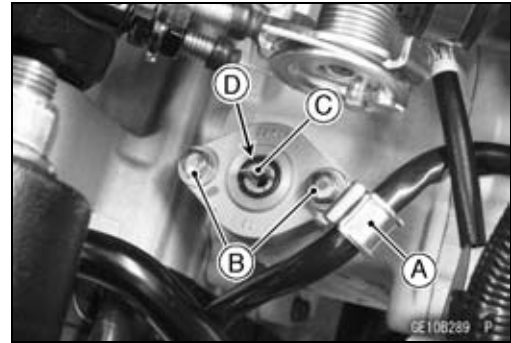
Camshaft Chain Tensioner

- Replace the chain tensioner gasket with a new one.
- Install:
  - Camshaft Chain Tensioner
  - Clamp [A]
  - Camshaft Chain Tensioner Mounting Bolts [B]

Torque - Camshaft Chain Tensioner Mounting Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Take out the holder plate [C].
- Replace the tensioner cap bolt O-ring [D] with a new one.
- Apply grease to the O-ring.
- Tighten:

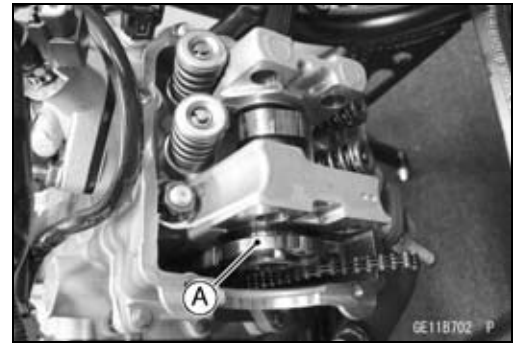
Torque - Camshaft Chain Tensioner Cap Bolt: 4.4 N·m (0.45 kgf·m, 39 in·lb)



Camshaft

Camshaft Removal

- Remove:
  - Camshaft Sprocket (see Camshaft Sprocket Removal)
  - Rocker Arms (see Rocker Arm Removal)
  - Camshaft [A]



Camshaft Installation

- Clean the camshaft with the high flash-point solvent.
  - Apply molybdenum disulfide oil solution to all cam parts, journal and bearing.
  - Install the camshaft into the cylinder head.
  - Install the removed parts (see appropriate chapters).
- Check and adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).

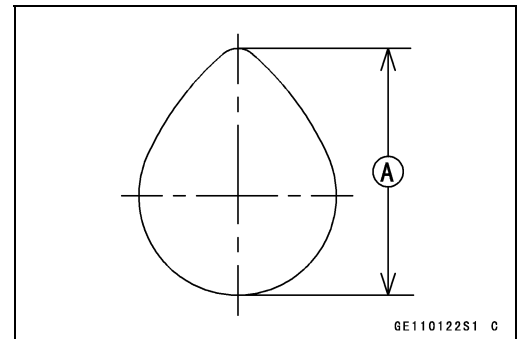
Cam Wear Inspection

- Remove the camshaft (see Camshaft Removal).
  - Measure the height [A] of each cam with a micrometer.
- ★ If the cams are worn down past the standard, replace the camshaft.

Cam Height

Standard:

Exhaust	34.1721 mm (1.34535 in.)
Intake	34.2987 mm (1.35033 in.)



Camshaft Bearing Inspection

- Visually inspect each camshaft bearing [A].
- ★ If there is any damage, replace the camshaft.
- Turn the bearing back and forth while checking for roughness or binding.
- ★ If roughness or binding is found, replace the camshaft.
- ★ If it is noisy, does not spin smoothly, or has any rough spots, replace the camshaft.

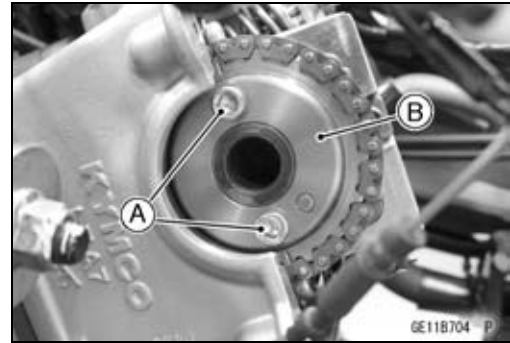


5-14 ENGINE TOP END

Camshaft

Camshaft Sprocket Removal

- Bring the piston to the TDC of the compression stroke (see Valve Clearance Inspection in the Periodic Maintenance chapter).
- Remove:
  - Right Side Fairing (see Side Fairing Removal in the Frame chapter)
  - Cylinder Head Cover (see Cylinder Head Cover Removal)
  - Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  - Camshaft Sprocket Bolts [A]
  - Camshaft Sprocket [B]



NOTICE

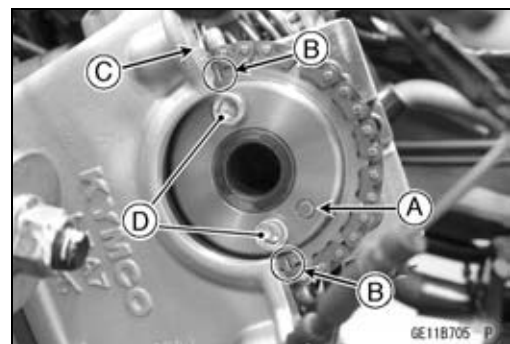
Always strain the camshaft chain while turning the crankshaft when the camshaft chain is loose. This avoids kinking the chain on the camshaft chain drive sprocket. A kinked chain could damage both the chain and the sprocket.

Camshaft Sprocket Installation

- Bring the piston to the TDC of the compression stroke (see Valve Clearance Inspection in the Periodic Maintenance chapter).
- Engage the camshaft chain with the camshaft sprocket.
- Set the projection [A] of the camshaft facing front.
- Align the timing marks [B] on the camshaft sprocket with the cylinder head upper surface [C].
- Apply a non-permanent locking agent to the threads of the camshaft sprocket bolts [D] and tighten them.

Torque - Camshaft Sprocket Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).
- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.



NOTICE

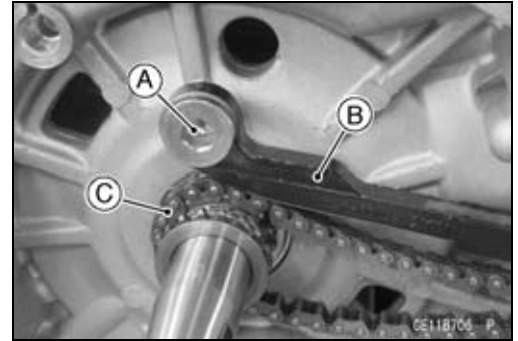
Rotation of the crankshaft with improper camshaft timing could cause the valve to contact each other or the piston, and bend. If any resistance is felt when turning the crankshaft, stop immediately, and check the camshaft chain timing.

- Install the removed parts (see appropriate chapters).

Camshaft

Camshaft Chain Removal

- Remove:
  - Camshaft Sprocket (see Camshaft Sprocket Removal)
  - Oil Pump Drive Chain (see Oil Pump Removal in the Engine Lubrication System chapter)
  - Upper Camshaft Chain Guide Bolt [A]
  - Upper Camshaft Chain Guide [B]
  - Camshaft Chain [C]



Camshaft Chain Installation

- Installation is the reverse of removal.
  - Torque - Upper Camshaft Chain Guide Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)**

Camshaft Chain Guide Wear Inspection

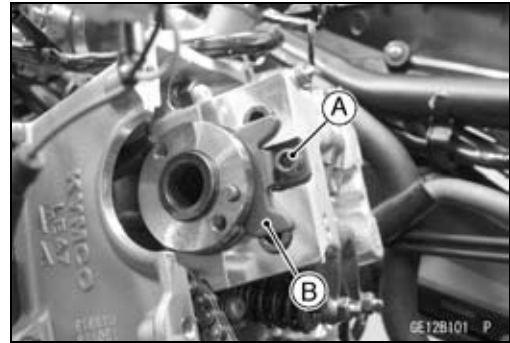
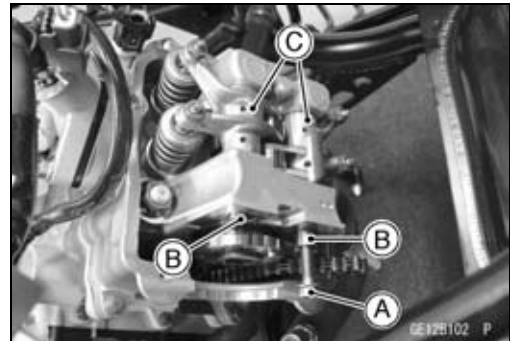
- Visually inspect the guides.
- ★ If the guide is damaged, replace the guide.

5-16 ENGINE TOP END

Rocker Arm, Rocker Shaft

Rocker Arm Removal

- Remove:
  - Camshaft Sprocket (see Camshaft Sprocket Removal)
  - Rocker Shaft Stopper Bolt [A]
  - Rocker Shaft Stopper [B]
- Using the 5 mm (0.20 in.) bolt [A], remove the rocker shafts [B] and rocker arms [C].

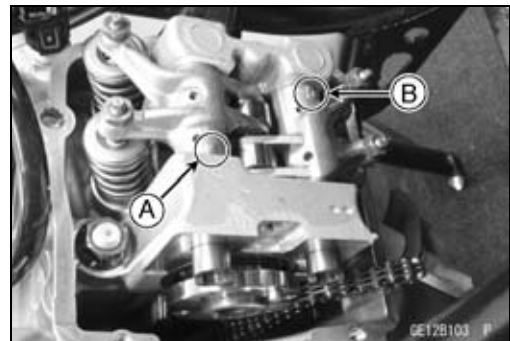
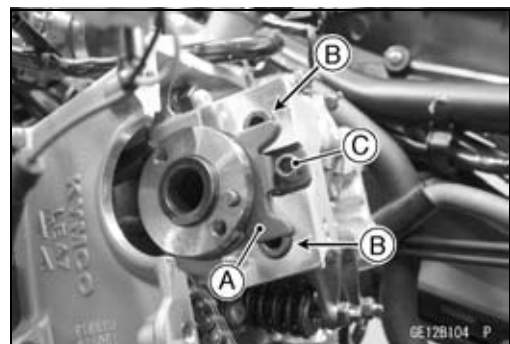


Rocker Arm Installation

- Clean the rocker arms and rocker shafts with high flash-point solvent.
- Apply molybdenum disulfide oil solution to the rocker shaft outside and rocker arm cam parts.
- Turn the camshaft so that the cam lobes point downward.
- Install each rocker shaft to the cylinder head, inserting it into each rocker arm.
- The rocker arms have the "IN" [A] or "EX" [B] mark.
- Install the rocker shaft so that the screw thread faces outside.
- Install the rocker shaft stopper [A] so that the cut sides [B] of the rocker shafts fit the stopper.
- Apply a non-permanent locking agent to the threads of the rocker shaft stopper bolt [C] and tighten it.

Torque - Rocker Shaft Stopper Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Install the removed parts (see appropriate chapters).
- Check and adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).



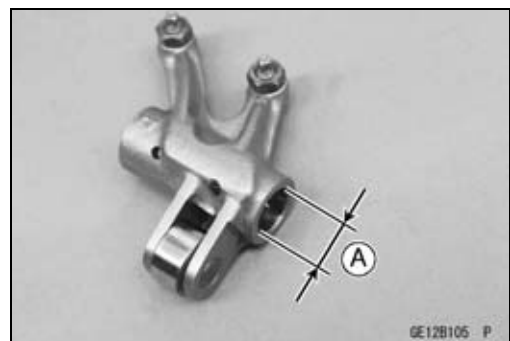
Rocker Arm and Rocker Shaft Wear Inspection

- Visually inspect the area on the rocker arm where the cam rubs.
- ★ If there is any damage or uneven wear, replace the arm.
- Measure the inside diameter [A] of each rocker arm.

Rocker Arm Inside Diameter

Standard: 10.000 ~ 10.015 mm (0.3937 ~ 0.3943 in.)

- ★ If it exceeds the standard, replace the rocker arm.



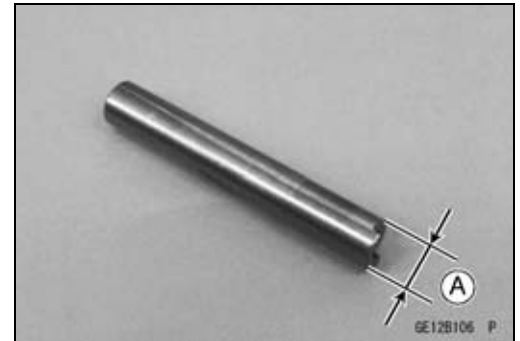
Rocker Arm, Rocker Shaft

- Measure the outside diameter [A] of each rocker shaft where the rocker fits.

Rocker Shaft Diameter

Standard: 9.972 ~ 9.987 mm (0.3926 ~ 0.3932 in.)

- ★ If the diameter is less than the standard, replace the rocker shaft.



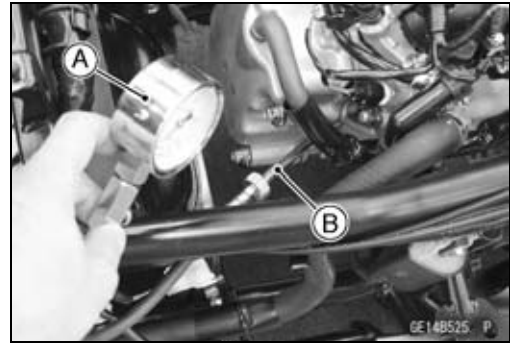
5-18 ENGINE TOP END

Cylinder Head

Cylinder Compression Measurement

- Remove the left side fairing (see Side Fairing Removal in the Frame chapter).
- Warm up the engine thoroughly.
- Stop the engine.
- Remove the spark plug (see Spark Plug Replacement in the Periodic Maintenance chapter).
- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.

Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1317



- 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.

NOTE

○ Use the battery which is fully charged.

Cylinder Compression

Usable Range: 1 370 ~ 1 770 kPa (14 ~ 18 kgf/cm², 199 ~ 256 psi) at 570 r/min (rpm)

- Install the spark plug (see Spark Plug Replacement in the Periodic Maintenance chapter).

○ The following table should be consulted if the obtainable compression reading is not within the usable range.

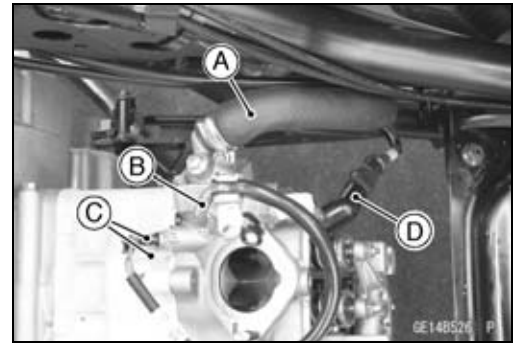
Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range.	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace the gasket with a standard part.
Cylinder compression is lower than usable range.	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.

Cylinder Head Removal

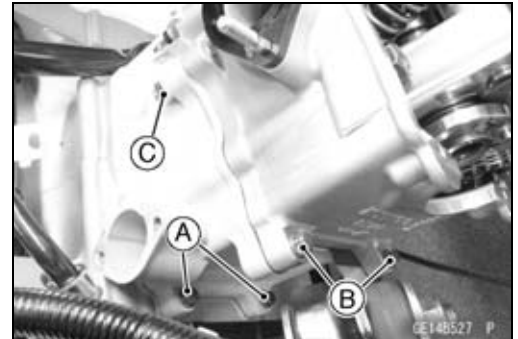
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  - Cylinder Head Cover (see Cylinder Head Cover Removal)
  - Camshaft Sprocket (see Camshaft Sprocket Removal)
  - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  - Intake Manifold (see Intake Manifold Removal)
  - Exhaust Pipe (see Exhaust Pipe Removal)

Cylinder Head

- Loosen the clamp screw and disconnect the water hose [A].
- Open the clamp and disconnect the water bypass hose [B].
- Disconnect:
  - Water Temperature Sensor (Meter) Connectors [C]
  - Spark Plug Cap [D]



- Loosen the Cylinder Bolts [A].
- Remove:
  - Cylinder Head Bolts [B]
  - Cylinder Head Nuts (M6) [C]

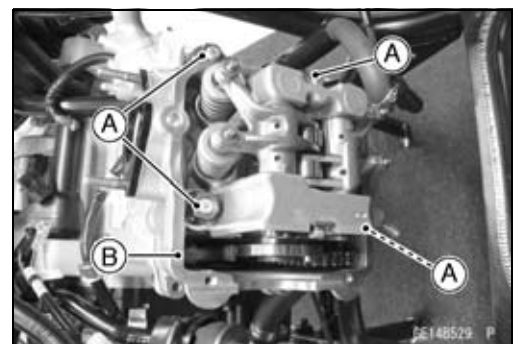
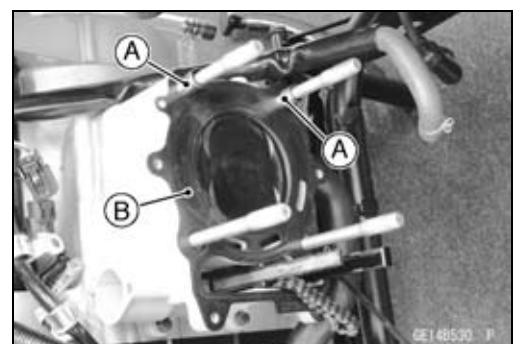


- Remove:
  - Cylinder Head Nuts (M10) [A]
  - Cylinder Head [B] and Gasket



Cylinder Head Installation

- Be sure that the two dowel pins [A] are in place on the cylinder.
- Replace the cylinder head gasket [B] with a new one.
- Install the new cylinder head gasket.



5-20 ENGINE TOP END

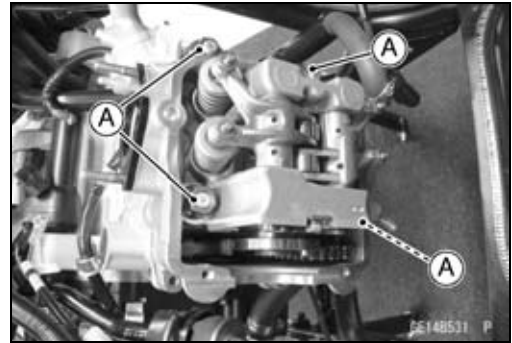
Cylinder Head

- Install the cylinder head.
- First, tighten the cylinder head nuts (M10) [A].

Torque - Cylinder Head Nuts (M10):

First 20 N·m (2.0 kgf·m, 15 ft·lb)

Final 37 N·m (3.8 kgf·m, 27 ft·lb)



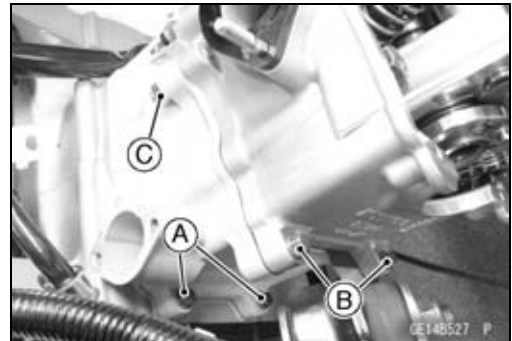
- After that, tighten the cylinder bolts [A], cylinder head bolts [B] and cylinder head nuts (M6) [C].

Torque - Cylinder Bolts: 9.8 N·m (10 kgf·m, 87 in·lb)

Cylinder Head Bolts: 9.8 N·m (10 kgf·m, 87 in·lb)

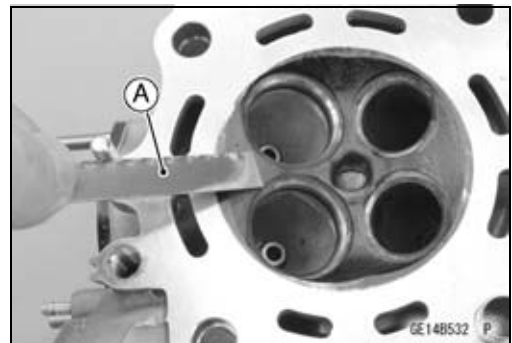
Cylinder Head Nuts (M6): 9.8 N·m (10 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).



Cylinder Head Cleaning

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valves (see Valve Removal).
- Wash the head with a high flash-point solvent.
- Scrape the carbon out of the combustion chamber and exhaust port with a suitable tool [A].
- Clean the cylinder head in a bath of high flash-point solvent.
- Using compressed air, blow out any particles which may obstruct the oil passage in the cylinder head.
- Install the valves (see Valve Installation).



Cylinder Head

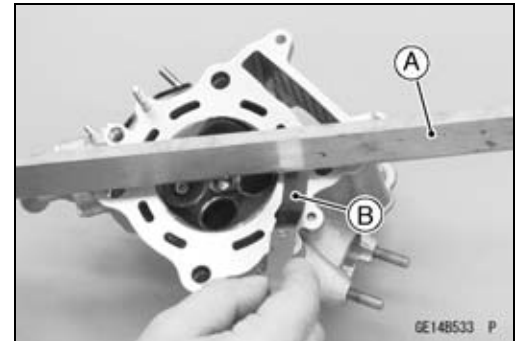
Cylinder Head Warp Inspection

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

Cylinder Head Warp

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).



5-22 ENGINE TOP END

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)
  - Rocker Arms and Rocker Shafts (see Rocker Arm Removal)
  - Camshaft (see Camshaft Removal)
- Using the valve spring compressor assembly [A] and adapter [B], remove the valve.

Special Tools - Valve Spring Compressor Assembly: 57001-241

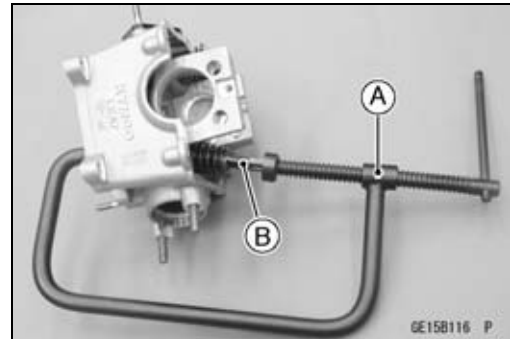
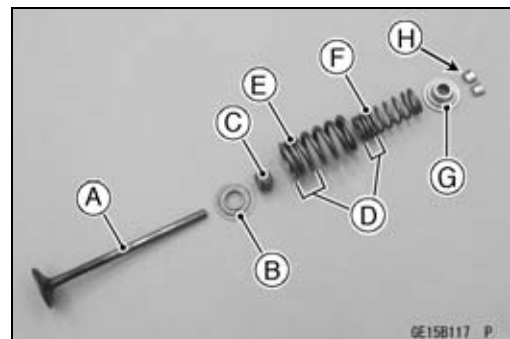
Valve Spring Compressor Adapter, $\phi 22$: 57001-1202

NOTE

- Mark and record the valve locations so that they can be installed in their original positions to keep the valve clearance unchanged.

Valve Installation

- Replace the oil seal with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the spring so that the closed coil end faces downwards.
  - Valve Stem [A]
  - Spring Seat [B]
  - Oil Seal [C]
  - Closed Coil Ends [D]
  - Valve Spring (Outer) [E]
  - Valve Spring (Inner) [F]
  - Retainer [G]
  - Split Keepers [H]



Valves

Valve Seat Inspection

- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].
- Measure the outside diameter [D] of the seating pattern on the valve seat.
- ★ If the outside diameter is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter

Standard:

Exhaust 23.5 ~ 23.7 mm (0.925 ~ 0.933 in.)

Intake 29.3 ~ 29.5 mm (1.15 ~ 1.16 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]

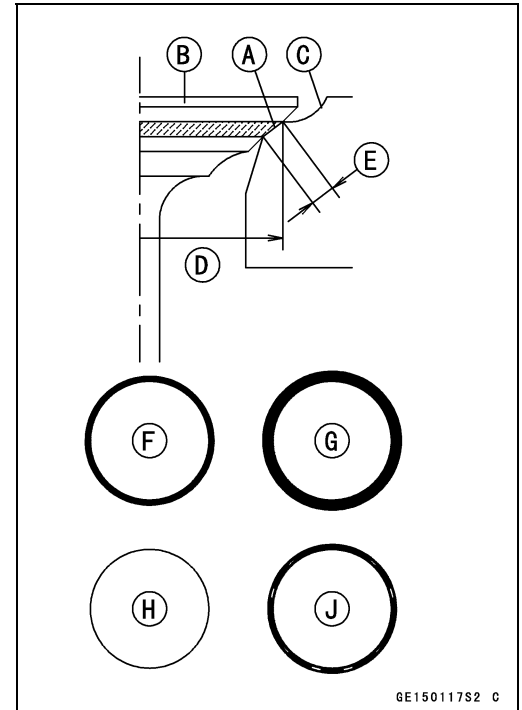
- ★ If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

Valve Seating Surface Width

Standard:

Exhaust 1.2 mm (0.047 in.)

Intake 1.2 mm (0.047 in.)



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Valve Seat Repair

- Repair the valve seat with the valve seat cutters [A].

Special Tools - Valve Seat Cutter Holder Bar [B]: 57001-1128

Valve Seat Cutter Holder, $\phi 5$ [C]: 57001-1208

[For Exhaust Valve Seat]

Valve Seat Cutter, 45° - $\phi 24.5$: 57001-1113

Valve Seat Cutter, 32° - $\phi 25$: 57001-1118

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

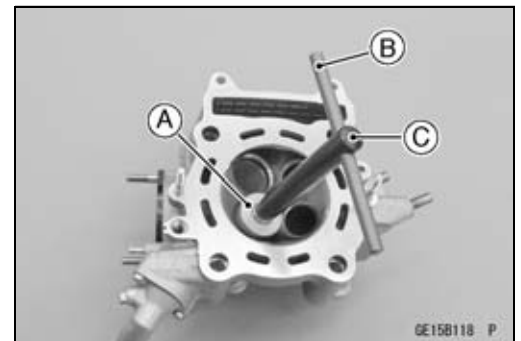
[For Intake Valve Seat]

Valve Seat Cutter, 45° - $\phi 30$: 57001-1187

Valve Seat Cutter, 32° - $\phi 30$: 57001-1120

Valve Seat Cutter, 60° - $\phi 30$: 57001-1123

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



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5-24 ENGINE TOP END

Valves

Seat Cutter Operation Care

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

NOTE

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

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

NOTE

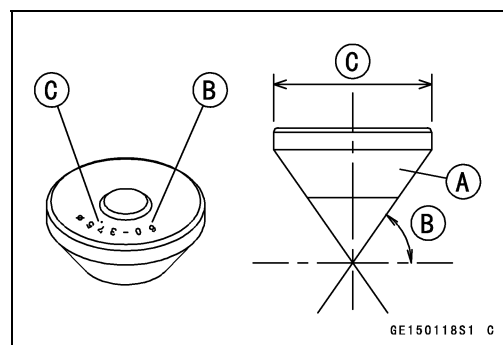
○Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.

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

Marks Stamped on the Cutter

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

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



Operating Procedures

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

NOTICE

Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

Valves

- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

Widened Width [A] of engagement by machining with 45° cutter

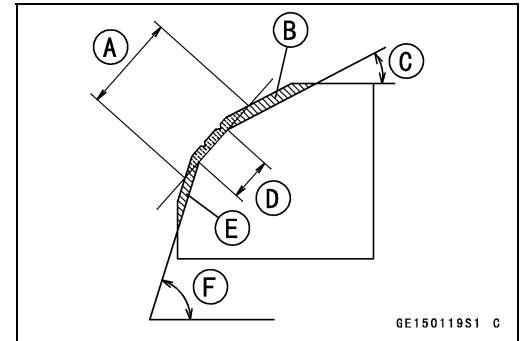
Ground Volume [B] by 32° cutter

32° [C]

Correct Width [D]

Ground Volume [E] by 60° cutter

60° [F]

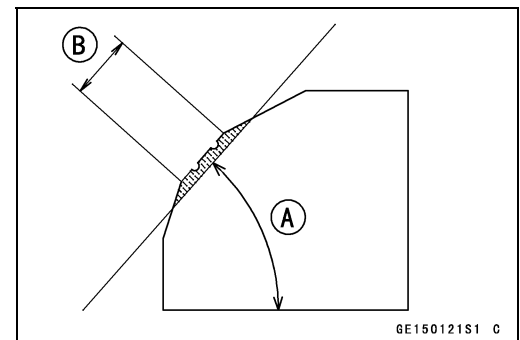


- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.

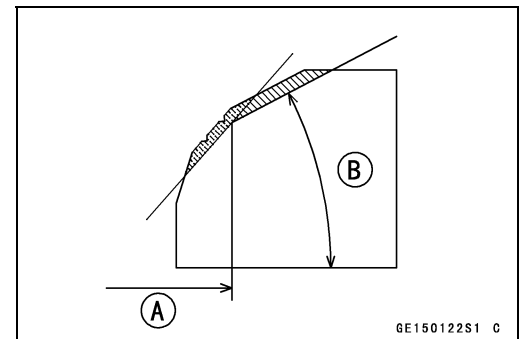
Original Seating Surface [B]

NOTE

- Remove all pittings of flaws from 45° ground surface.
- After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 60° grinding operation easier.



- ★ If the outside diameter [A] of the seating surface is too large, make the 32° grind described below.
- ★ If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.
- Grind the seat at a 32° angle [B] until the seat outside diameter is within the specified range.
- To make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.
- Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.



NOTICE

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

- After making the 32° grind, return to the seat outside diameter measurement step above.
- To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
- ★ If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat outside diameter measurement step above.

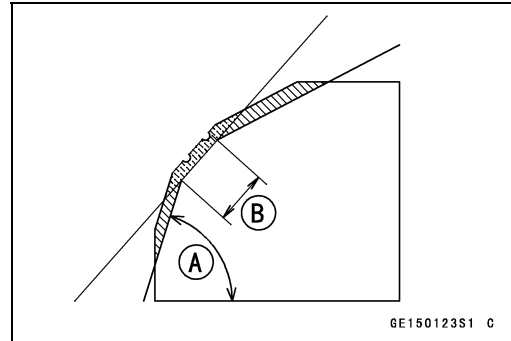
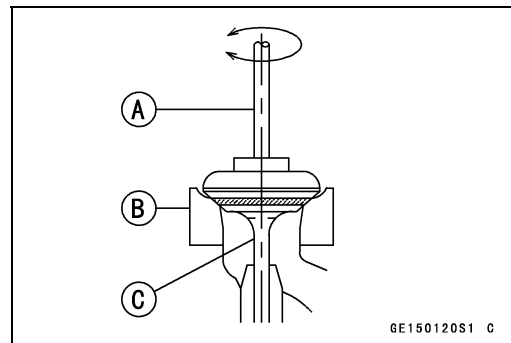
5-26 ENGINE TOP END

Valves

- ★ If the seat width is too wide, make the 60° [A] grind described below.
- ★ If the seat width is within the specified range, lap the valve to the seat as described below.
- Grind the seat at a 60° angle until the seat width is within the specified range.
- To make the 60° grind, fit 60° cutter into the holder, and slide it into the valve guide.
- Turn the holder, while pressing down lightly.
- After making the 60° grind, return to the seat width measurement step above.

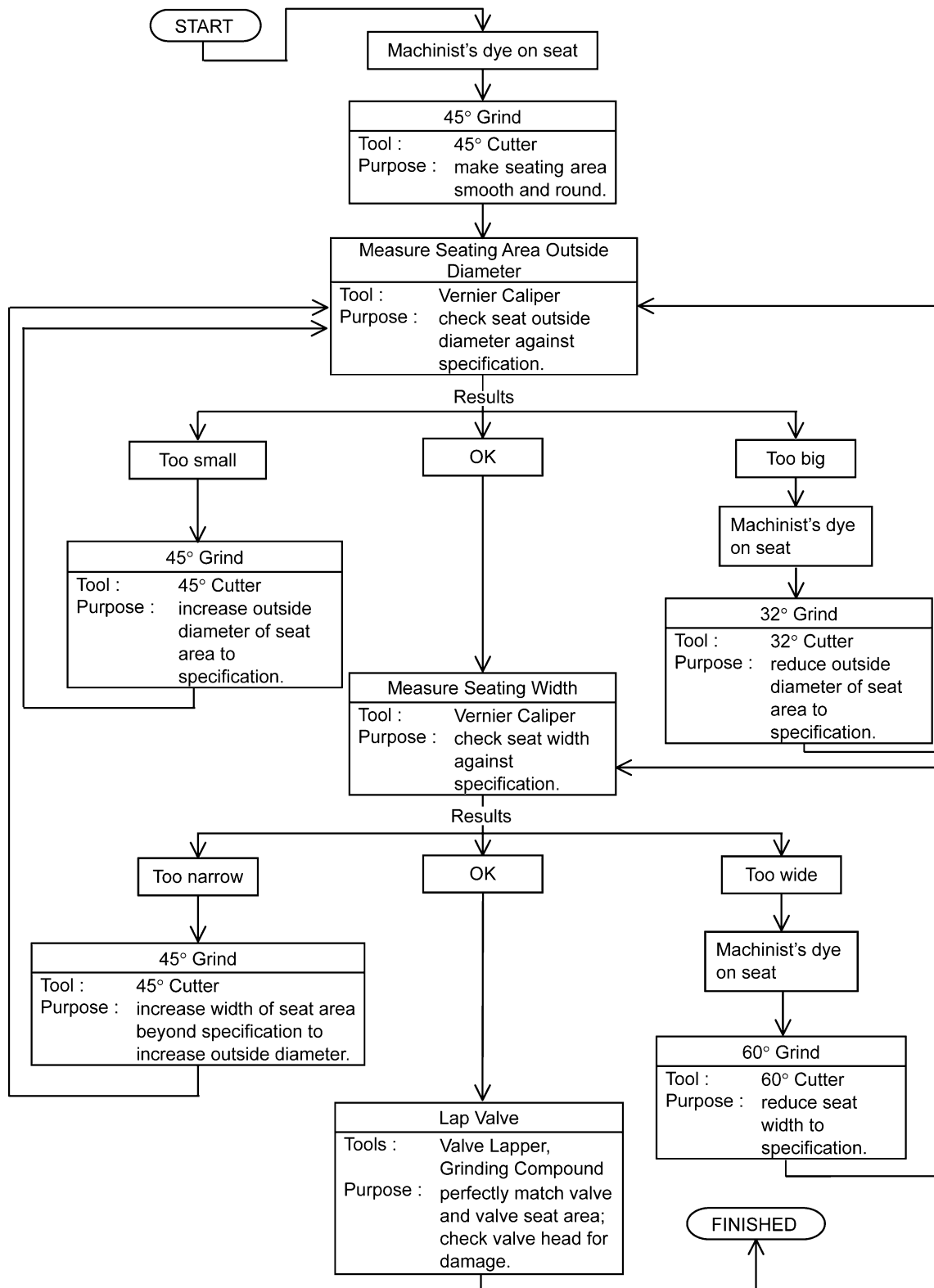
Correct Width [B]

- Lap the valve to the valve seat, once the seat width and outside diameter are within the ranges specified above.
- Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
- Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
- Repeat the process with a fine grinding compound.
- Lapper [A]
Valve Seat [B]
Valve [C]
- The seating area should be marked about in the middle of the valve face.
- ★ If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).



Valves

Valve Seat Repair



5-28 ENGINE TOP END

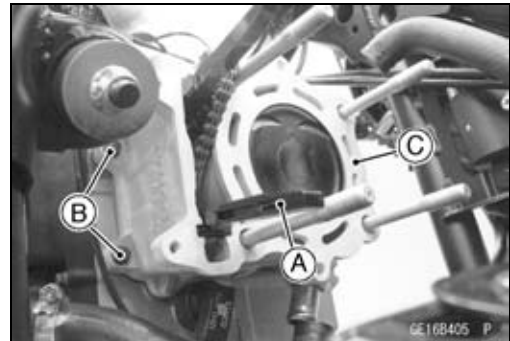
Cylinder, Piston

Cylinder Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Loosen the water hose clamp screw and disconnect the water hose [A].



- Remove:
  - Lower Camshaft Chain Guide [A]
  - Cylinder Bolts [B]
  - Cylinder [C] and Gasket

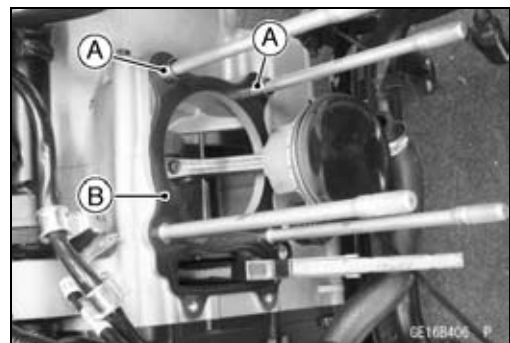


Cylinder Installation

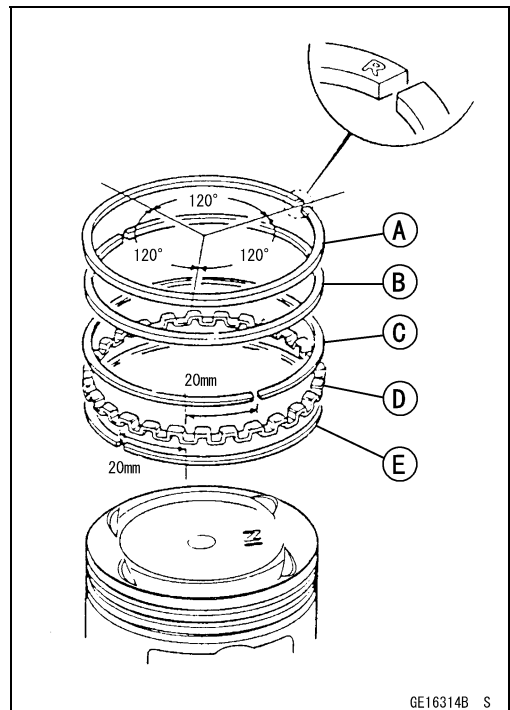
NOTE

○ If a new cylinder is used, use a new piston ring.

- Be sure that two dowel pins [A] are properly fitted in the crankcase.
- Replace the cylinder base gasket [B] with a new one.
- Install the new cylinder base gasket.

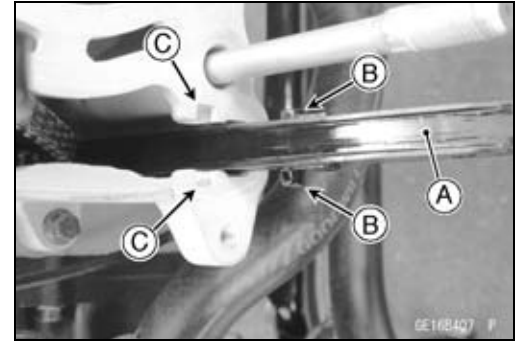


- Position the piston ring opening as follows.
  - Top Ring [A]
  - Second Ring [B]
  - Upper Steel Rail [C]
  - Expander [D]
  - Lower Steel Rail [E]



Cylinder, Piston

- Apply molybdenum disulfide oil solution to the piston and cylinder bore.
- Apply molybdenum disulfide oil solution to the piston rings (see Piston Installation).
- Install the cylinder while compressing the piston rings with your fingers.
- Install the lower camshaft chain guide [A] securely.
- Fit the projections [B] to the grooves [C].
- Tighten the cylinder bolts temporary.
- Install the removed parts (see appropriate chapters).

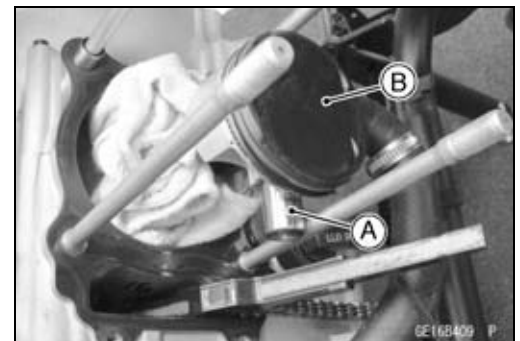


Piston Removal

- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the piston.
- Remove the snap ring [A].



- Remove:
  - Piston pin [A]
  - Piston [B]

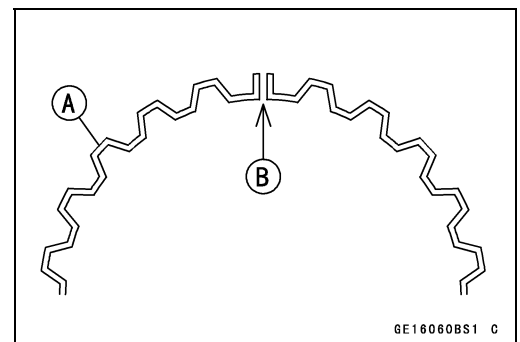


- Carefully spread the piston ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



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] 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.



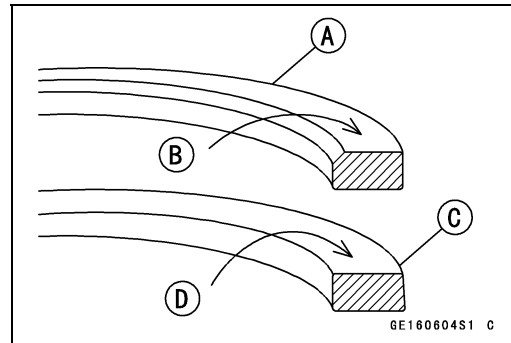
NOTE

- The oil ring rails have no "top" or "bottom".

5-30 ENGINE TOP END

Cylinder, Piston

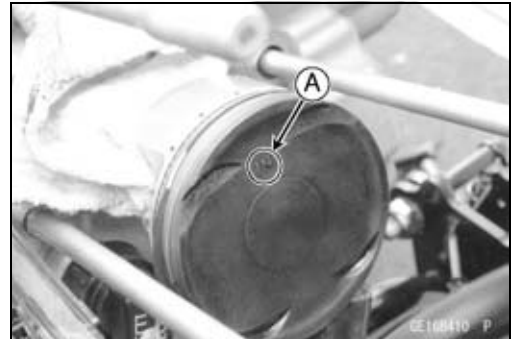
- Apply molybdenum disulfide oil solution to the piston rings.
- Do not mix up the top and second ring.
- Install the top ring [A] so that the “R” mark [B] faces up.
- Install the second ring [C] so that the “RN” mark [D] faces up.



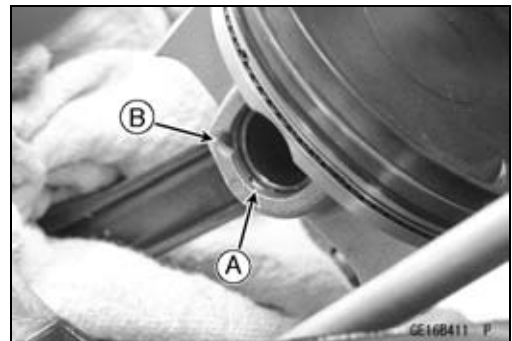
NOTE

○ If a new piston is used, use new piston ring.

- Install the piston with its “IN” mark [A] facing the intake side.



- 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 pin and piston journals.
- When installing the piston pin snap ring, compress it only enough to install it and no more.



NOTICE

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

- Install the cylinder (see Cylinder Installation).

Cylinder Wear Inspection

- Since there is a difference in cylinder wear in different directions, take a side to side and a front to back measurement at each of the 3 locations (total of 6 measurements) shown.
- ★ If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

Cylinder Inside Diameter

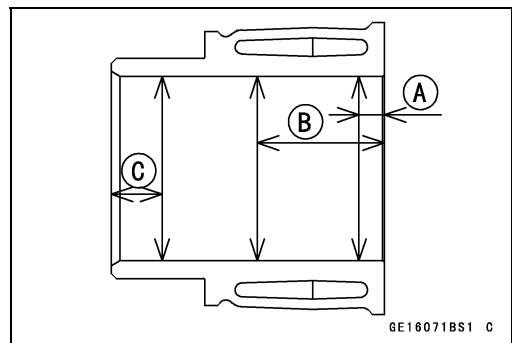
Standard: 72.705 ~ 72.715 mm (2.8624 ~ 2.8628 in.)

Service Limit: 72.80 mm (2.866 in.)

10 mm (0.4 in.) [A]

50 mm (2.0 in.) [B]

20 mm (0.8 in.) [C]



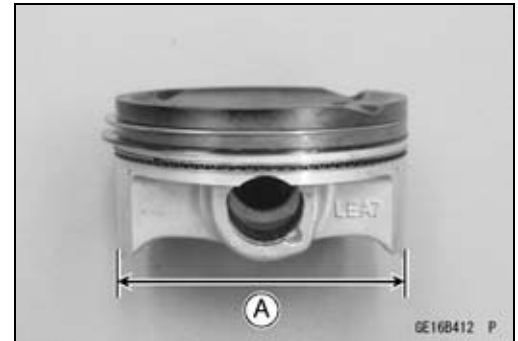
Cylinder, Piston

Piston Wear Inspection

- Measure the outside diameter [A] at a right angle to the direction of the piston pin.
- ★ If the measurement is less than the service limit, replace the piston.

Piston Diameter

Standard:	72.67 ~ 72.69 mm (2.8610 ~ 2.8618 in.)
Service Limit:	72.70 mm (2.862 in.)



Piston/Cylinder Clearance Inspection

The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values. Measure the piston diameter as just described, and measure the cylinder diameter at the very bottom of the cylinder.

Piston/Cylinder Clearance

Standard:	0.010 ~ 0.040 mm (0.0004 ~ 0.0016 in.)
Service Limit:	0.1 mm (0.0039 in.)

NOTE

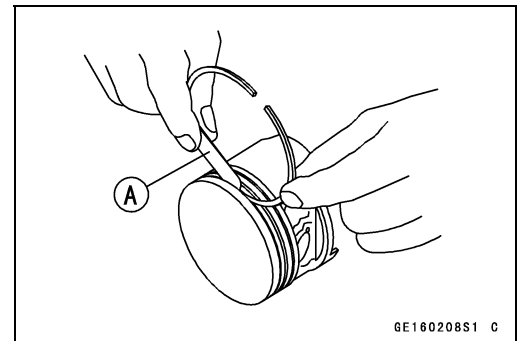
- Whenever the piston or cylinder has been replaced with a new one, the motorcycle must be broken in the same as with a new machine.

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	0.015 ~ 0.055 mm (0.0006 ~ 0.0022 in.)
Second	0.015 ~ 0.055 mm (0.0006 ~ 0.0022 in.)
Service Limit:	
Top	0.13 mm (0.0051 in.)
Second	0.13 mm (0.0051 in.)



5-32 ENGINE TOP END

Cylinder, Piston

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] 1.00 ~ 1.02 mm (0.039 ~ 0.040 in.)

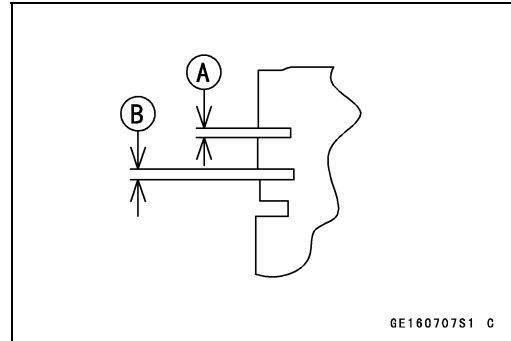
Second [B] 1.00 ~ 1.02 mm (0.039 ~ 0.040 in.)

Service Limit:

Top 1.1 mm (0.043 in.)

Second 1.1 mm (0.043 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] 0.97 ~ 0.99 mm (0.038 ~ 0.039 in.)

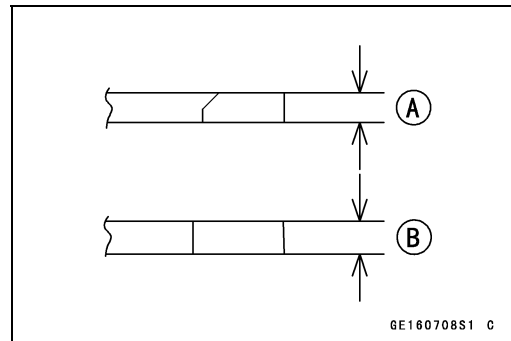
Second [B] 0.97 ~ 0.99 mm (0.038 ~ 0.039 in.)

Service Limit:

Top 0.92 mm (0.036 in.)

Second 0.92 mm (0.036 in.)

- ★ If any of the measurements is less than the service limit on either of the rings, replace all the rings.



NOTE

- When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.

Piston Ring End Gap Inspection

- Place the piston ring [A] inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap [B] between the ends of the ring with a thickness gauge.

Piston Ring End Gap

Standard:

Top 0.10 ~ 0.25 mm (0.004 ~ 0.010 in.)

Second 0.10 ~ 0.25 mm (0.004 ~ 0.010 in.)

Oil 0.20 ~ 0.70 mm (0.008 ~ 0.028 in.)

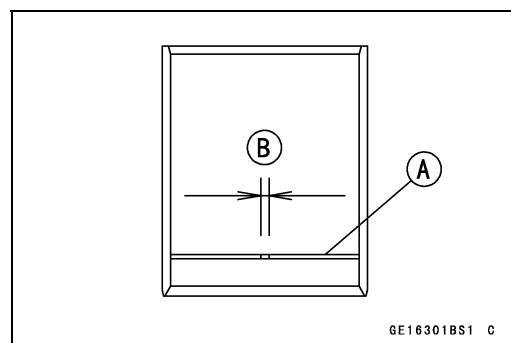
Service Limit:

Top 0.50 mm (0.020 in.)

Second 0.50 mm (0.020 in.)

Oil 1.0 mm (0.04 in.)

- ★ If the end gap of either ring is greater than the service limit, replace all the rings.



Cylinder, Piston

Piston, Piston Pin, Connecting Rod Wear Inspection

- Measure the diameter [A] of the piston pin with a micrometer.

Piston Pin Diameter

Standard: 14.994 ~ 15.000 mm (0.59031 ~ 0.59055 in.)

Service Limit: 14.96 mm (0.5890 in.)

- ★ If the piston pin diameter is less than the service limit at any point, replace the piston pin.

- Using a cylinder gauge, measure the diameter [A] of both piston pin holes in the piston and the inside diameter [B] of the connecting rod small end.

Piston Pin Hole Diameter

Standard: 15.002 ~ 15.008 mm (0.59062 ~ 0.59086 in.)

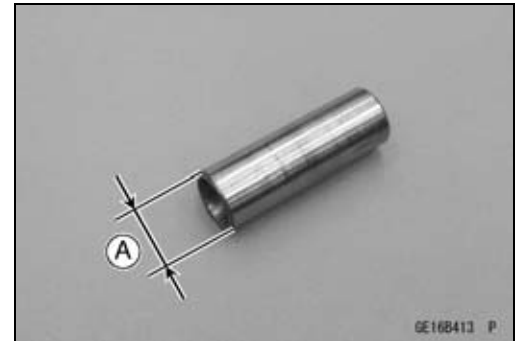
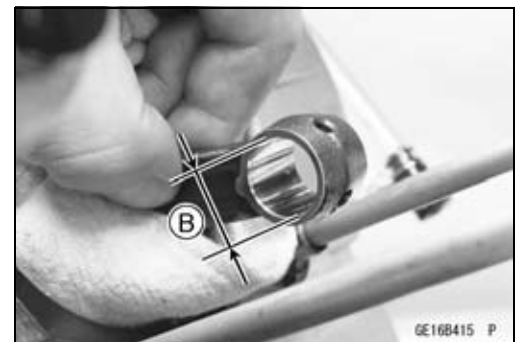
Service Limit: 15.04 mm (0.5921 in.)

Connecting Rod Small End Inside Diameter

Standard: 15.016 ~ 15.034 mm (0.59118 ~ 0.59189 in.)

Service Limit: 15.06 mm (0.5929 in.)

- ★ If either piston pin hole diameter exceeds the service limit, replace the piston.
- ★ If the pin hole groove shows excessive wear, replace the piston.
- ★ If the connecting rod small end inside diameter exceeds the service limit, replace the connecting rod.

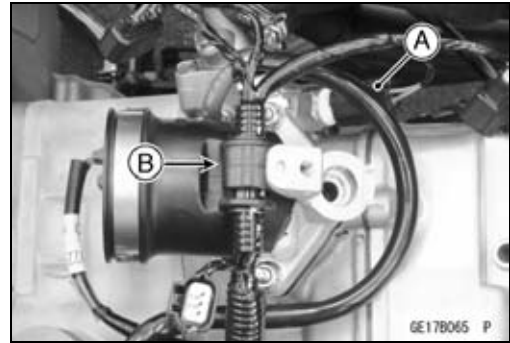


5-34 ENGINE TOP END

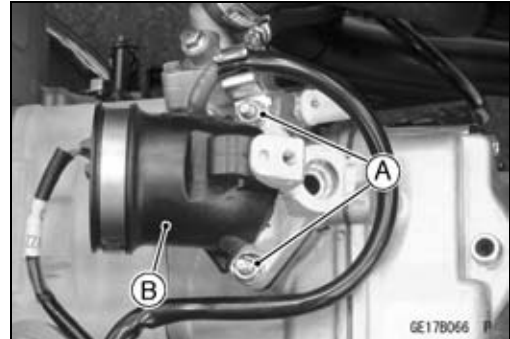
Intake Manifold

Intake Manifold Removal

- Remove:
  - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  - Fuel Injector (see Fuel Injector Removal in the Fuel System (DFI) chapter)
- Disconnect the water temperature sensor connector [A].
- Clear the main harness from the clamp [B].



- Remove:
  - Intake Manifold Nuts [A]
  - Intake Manifold [B]



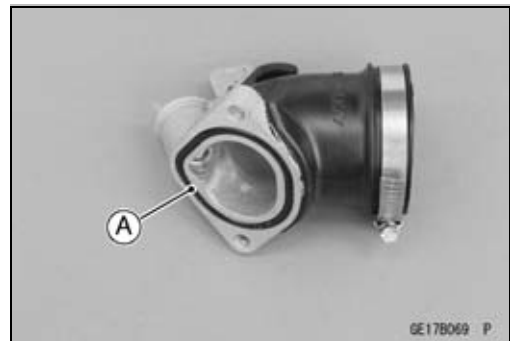
- If necessary, remove the insulator [A].



Intake Manifold Installation

- Installation is the reverse of removal.
- When the insulator is removed, replace the gasket with a new one.
- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.

Torque - Intake Manifold Mounting Nuts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Muffler

WARNING

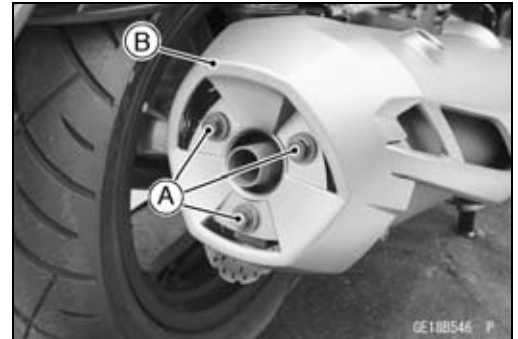
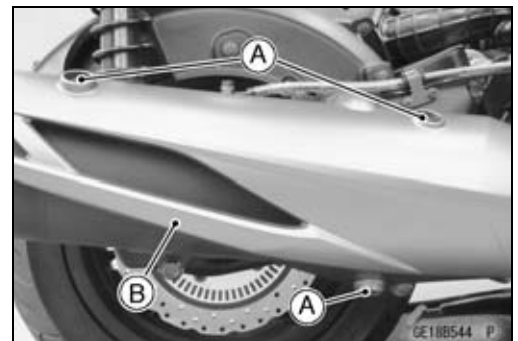
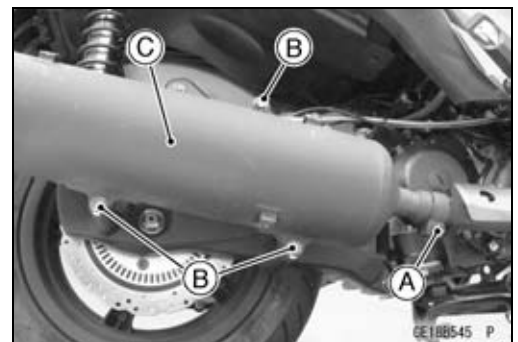
The muffler can become extremely hot during normal operation and cause severe burns. Do not remove the muffler while it is hot.

Muffler Body Removal

- Remove
  - Bolts [A] and Washer
  - Muffler End Cover [B]

- Remove:
  - Bolts [A] and Washers
  - Muffler Side Cover [B]

- Loosen the muffler body clamp bolt [A].
- Remove:
  - Muffler Body Mounting Bolts [B]
  - Muffler Body [C]



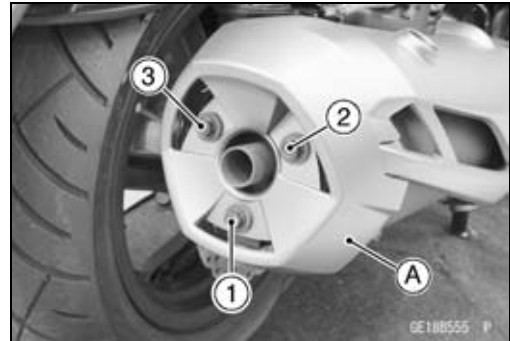
Muffler Body Installation

- Replace the muffler body gasket with a new one.
  - Install the muffler body and tighten the muffler body mounting bolts and clamp bolt.
- Torque - Muffler Body Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**

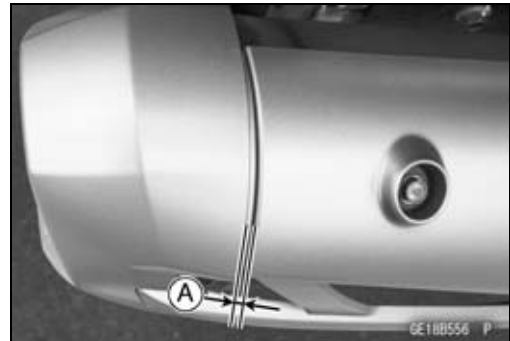
5-36 ENGINE TOP END

Muffler

- Install the muffler body side cover and tighten the bolts together with the washers.
- Install the muffler end cover [A] and tighten its bolt together with the washers as shown specified sequence [1 ~ 3].



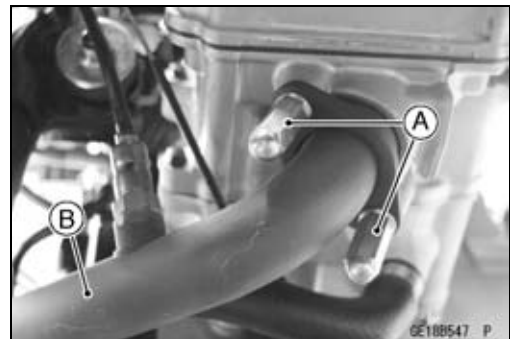
- Be sure that the gap [A] of the muffler end cover and the muffler side cover is parallel.
- ★ If the gap is not parallel, reinstall the muffler end cover.



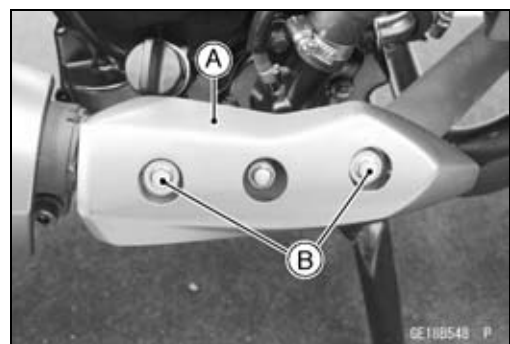
- Thoroughly warm up the engine, wait until the engine cools down, and then retighten all bolts.

Exhaust Pipe Removal

- Remove muffler body (see Muffler Body Removal).
- Disconnect the oxygen sensor lead connector (see Oxygen Sensor Removal in the Electrical System chapter).
- Remove:
  - Exhaust Pipe Manifold Holder Nuts [A]
  - Exhaust Pipe [B]



- If necessary, remove the exhaust pipe cover [A] by removing the bolts [B] and washers.



Exhaust Pipe Installation

- Replace the exhaust pipe gasket with a new one.
- Install the exhaust pipe.
- Tighten:
  - Torque - Exhaust Pipe Manifold Holder Nuts: 20 N·m (2.0 kgf·m, 15 ft·lb)**
- Install the removed parts (see appropriate chapters).

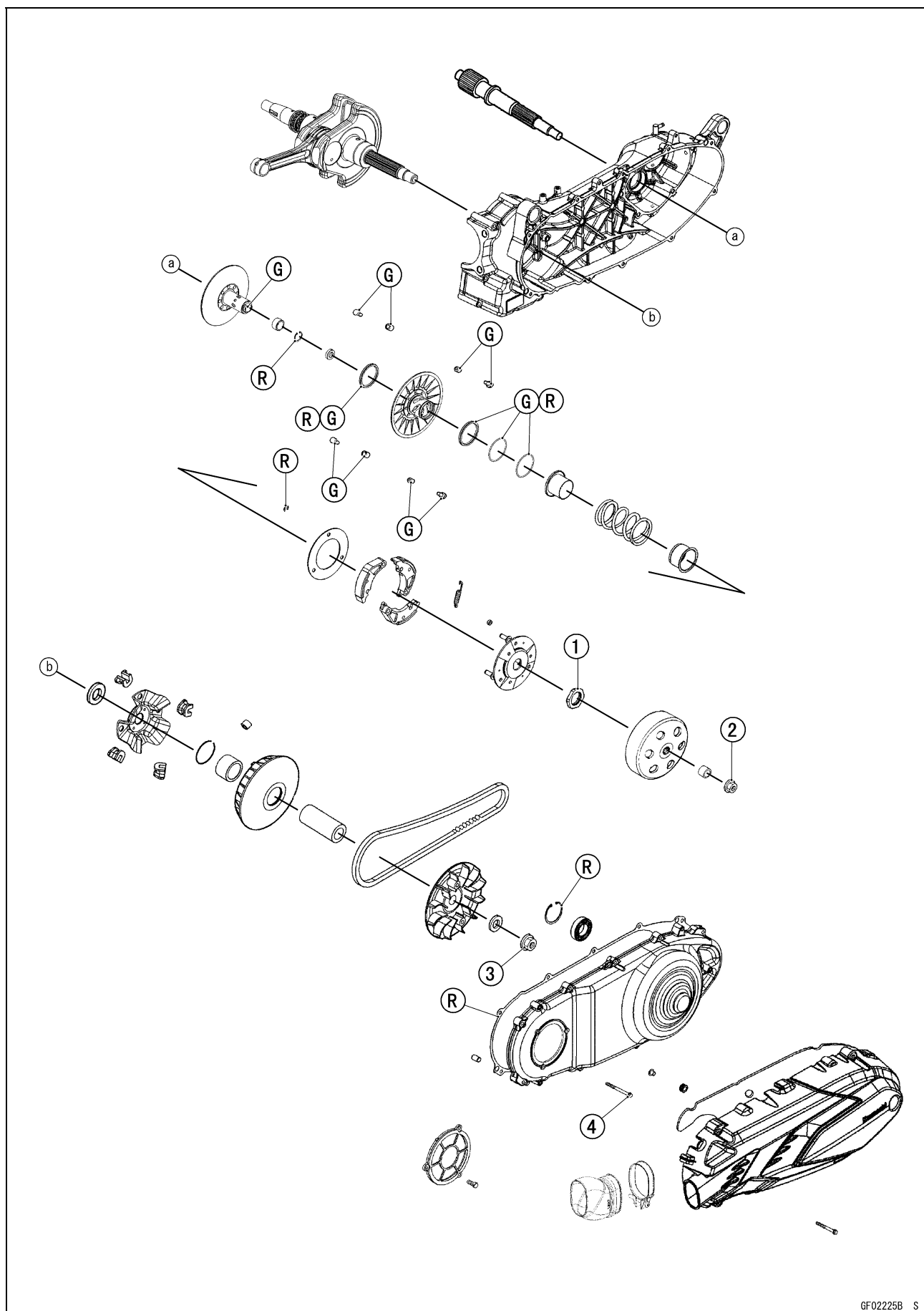
Converter System

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6-2 CONVERTER SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Drive Plate Nut	54	5.5	40	
2	Clutch Outer Nut	54	5.5	40	
3	Drive Face Nut	93	9.5	69	
4	Left Crankcase Cover Bolts	9.8	1.0	87 in·lb	

G: Apply grease.
R: Replacement Parts

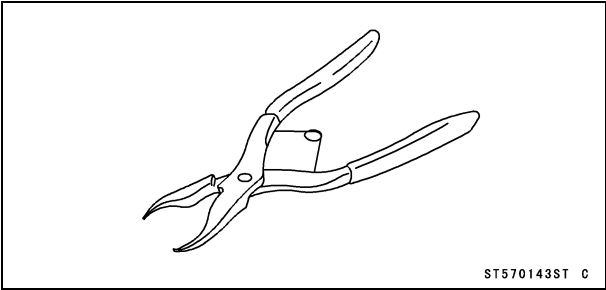
6-4 CONVERTER SYSTEM

Specifications

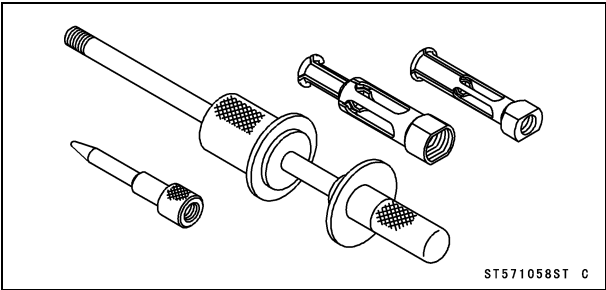
Item	Standard	Service Limit
Drive Belt Drive Belt Width	25.2 mm (0.992 in.)	23.7 mm (0.933 in.)
Drive Pulley Movable Drive Face Bushing Inside Diameter Drive Pulley Collar Outside Diameter Weight Roller Outside Diameter	27.01 ~ 27.04 mm (1.063 ~ 1.065 in.) 26.985 ~ 26.995 mm (1.0624 ~ 1.0628 in.) 19.92 ~ 20.08 mm (0.7843 ~ 0.7905 in.)	27.07 mm (1.091 in.) 26.97 mm (1.062 in.) 19.4 mm (0.764 in.)
Driven Pulley Clutch Lining Thickness Clutch Outer Inside Diameter Driven Face Spring Free Length Driven Face Outside Diameter Movable Driven Face Inside Diameter	4.0 mm (0.16 in.) 152.1 ~ 152.2 mm (5.988 ~ 5.992 in.) — 39.965 ~ 39.985 mm (1.5734 ~ 1.5742 in.) 40.000 ~ 40.025 mm (1.5748 ~ 1.5757 in.)	2.0 mm (0.08 in.) 152.2 mm (5.992 in.) 136 mm (5.35 in.) 39.94 mm (1.572 in.) 40.06 mm (1.577 in.)

Special Tools

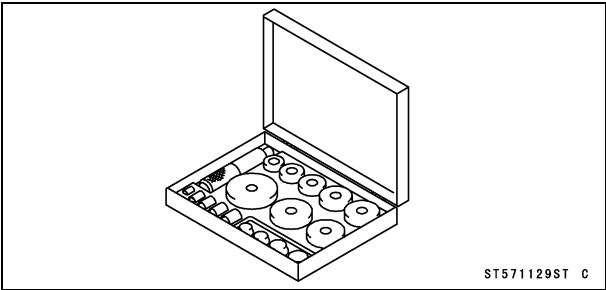
Inside Circlip Pliers:
57001-143



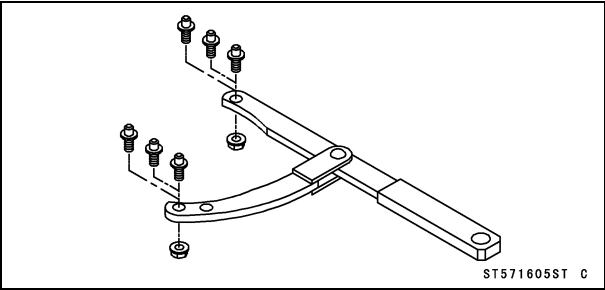
Oil Seal & Bearing Remover:
57001-1058



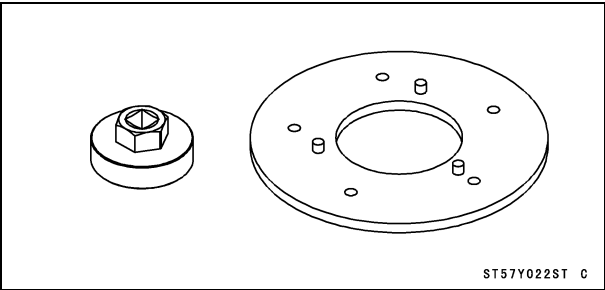
Bearing Driver Set:
57001-1129



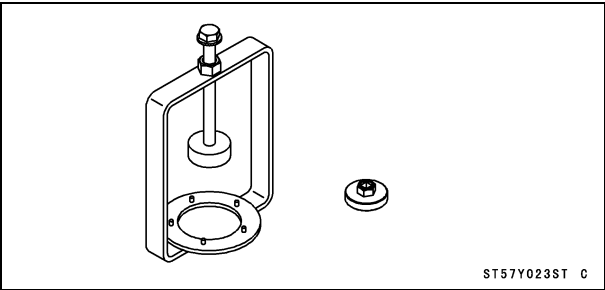
Flywheel & Pulley Holder:
57001-1605



Clutch Drive Nut Fitting:
57001-Y022



Clutch Spring Compressor:
57001-Y023

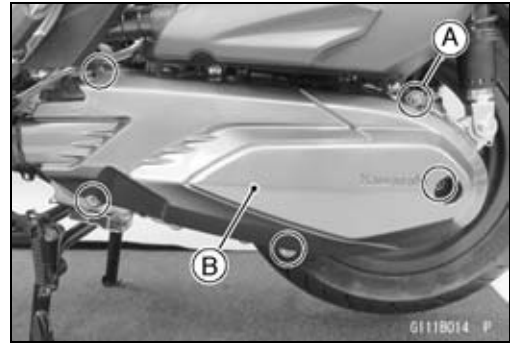
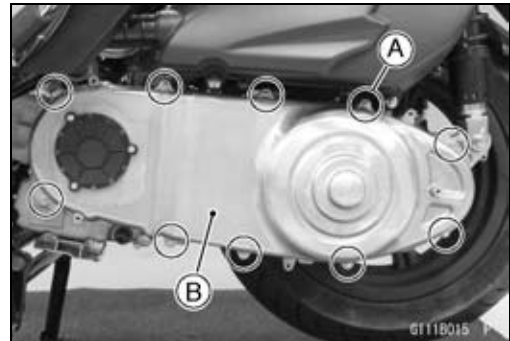


6-6 CONVERTER SYSTEM

Left Crankcase Cover

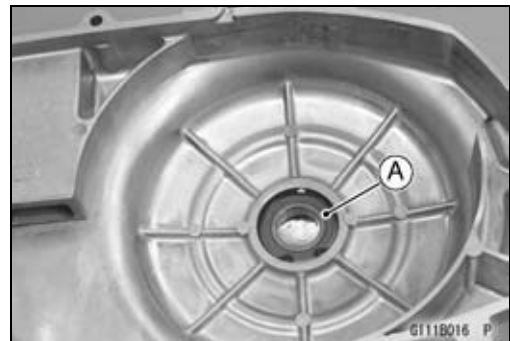
Left Crankcase Cover Removal

- Remove:
  - Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  - Left Crankcase Outer Cover Bolts [A]
  - Left Crankcase Outer Cover [B]
- Remove:
  - Left Crankcase Cover Bolts [A]
  - Left Crankcase Cover [B] and Gasket



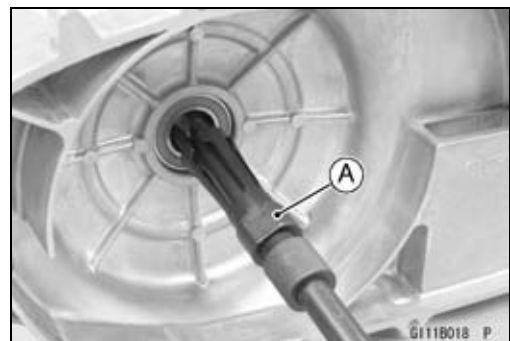
Left Crankcase Cover Installation

- Check the left crankcase cover bearing [A] for wear or damage.
  - ★ If the bearing is noisy or have excessive play, replace it with a new one (see Crankcase Cover Bearing Replacement).
  - Replace the left crankcase cover gasket with a new one.
  - Install the dowel pins [A] and new gasket in place on the left crankcase.
  - Install the left crankcase cover and tighten them bolts.
- Torque - Left Crankcase Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install the left crankcase outer cover and tighten them bolts.
  - Install the left lower fairing (see Lower Faring Installation in the Frame chapter).



Left Crankcase Cover Bearing Replacement

- Remove:
    - Left Crankcase Cover (see Left Crankcase Cover Removal)
    - Circlip
- Special Tool - Inside Circlip Pliers: 57001-143**
- Remove the left crankcase cover bearing.
- Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058**



Left Crankcase Cover

- Replace the left crankcase cover bearing with a new one.
- Press the crankcase cover bearing until it is bottomed.

Special Tool - Bearing Driver Set [A]: 57001-1129

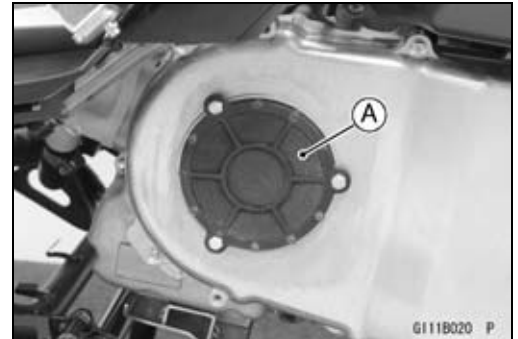
- Replace the circlip with a new one.
- Install the new circlip.

Special Tool - Inside Circlip Pliers: 57001-143



Converter Air Filter Inspection

- Remove the left crankcase outer cover (see Left Crankcase Cover Removal).
- Visually inspect the converter air filter [A].
- ★ If the filter is clogged with mud or dust, clean the filter.
- ★ If the filter has any tears or breaks, replace the filter.



6-8 CONVERTER SYSTEM

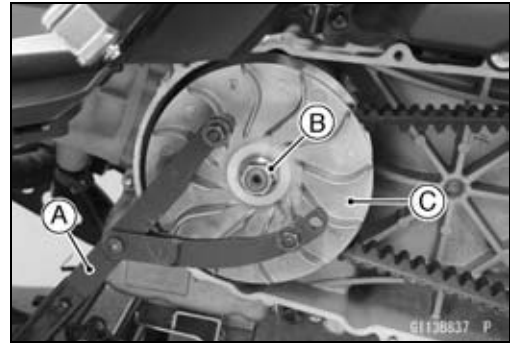
Drive Pulley

Drive Pulley Removal

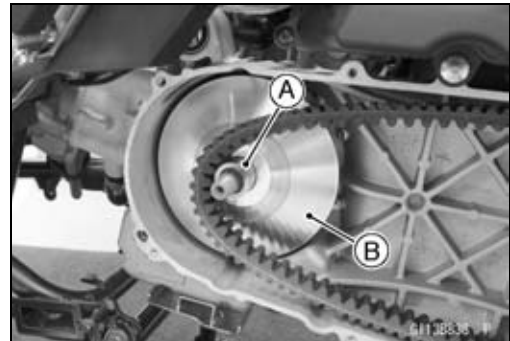
- Remove the left crankcase cover (see Left Crankcase Cover Removal).
- Hold the drive pulley using the flywheel & pulley holder [A], and remove the drive face nut [B] and washer.

Special Tool - Flywheel & Pulley Holder: 57001-1605

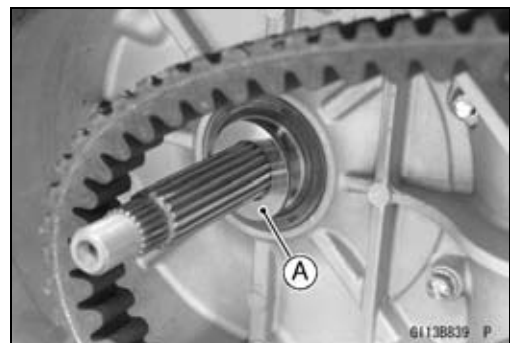
- Remove the drive pulley face [C].



- Remove:
Drive Pulley Collar [A]
Movable Drive Face [B]

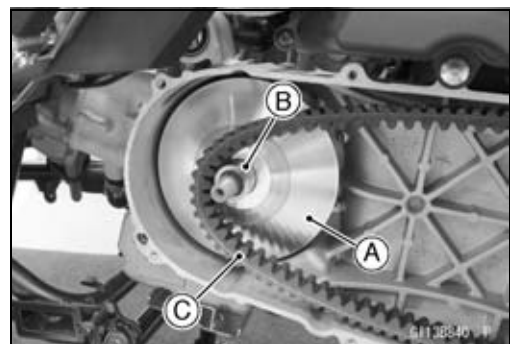


- Remove the washer [A]

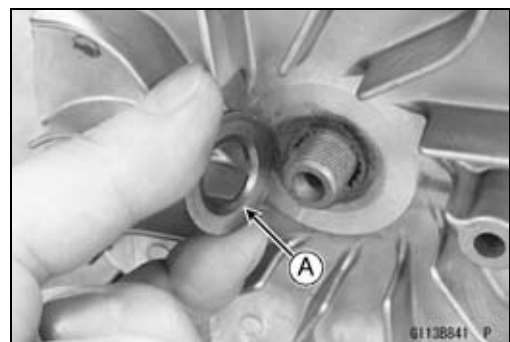


Drive Pulley Installation

- Clean the drive pulley faces and remove any grease from them.
- Install:
Washer
Movable Drive Face [A]
Drive Pulley Collar [B]
- Set the drive belt [C] on the drive pulley collar.



- Install the drive pulley face.
- Install the washer so that the chamfer side [A] faces to the crankcase side.



Drive Pulley

- Hold the drive pulley using the flywheel & pulley holder [A], and tighten the drive face nut [B].

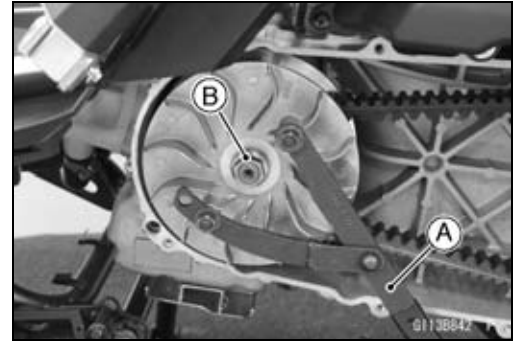
Special Tool - Flywheel & Pulley Holder: 57001-1605

Torque - Drive Face Nut: 93 N·m (9.5 kgf·m, 69 ft·lb)

NOTE

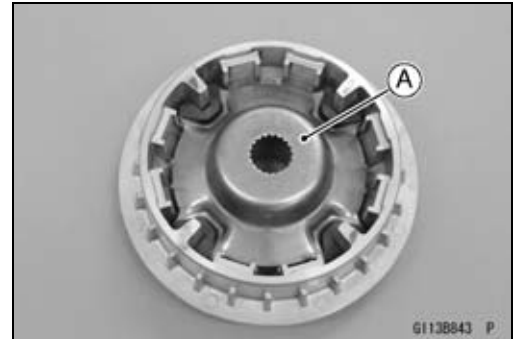
○Be sure to clean the drive face off any grease.

- Install the removed parts (see appropriate chapters).



Drive Pulley Disassembly

- Remove the ramp plate [A].

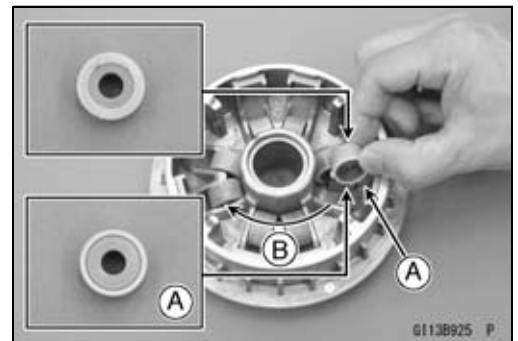


- Remove the weight roller [A].



Drive Pulley Assembly

- Install the weight rollers to the drive pulley so that the collar side [A] of the weight rollers are faced to clockwise side [B].
- Install the weight rollers and the ramp plate into the movable drive face.



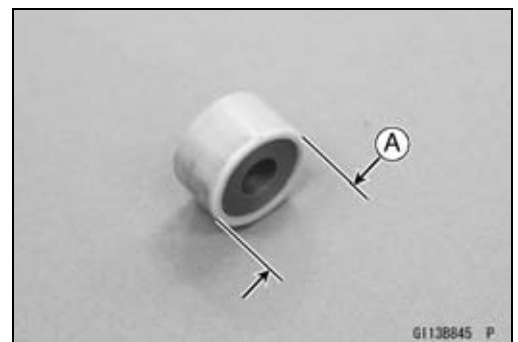
Drive Pulley Inspection

- Check each weight roller for damage.
- ★If there is any damaged part, replace it.
- Measure each weight roller outside diameter [A].
- ★If the weight roller is worn over the service limit, replace it.

Weight Roller Outside Diameter

Standard: 19.92 ~ 20.08 mm (0.7843 ~ 0.7905 in.)

Service Limit: 19.4 mm (0.764 in.)



6-10 CONVERTER SYSTEM

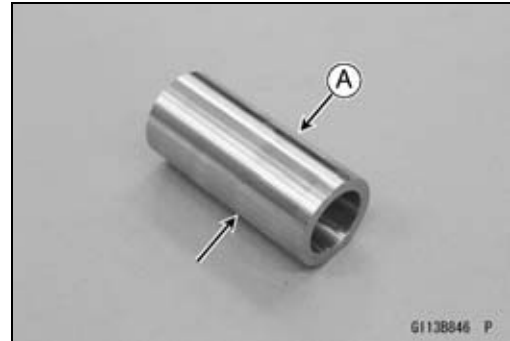
Drive Pulley

- Check the drive pulley collar for damage.
- ★ If there is any damaged part, replace it.
- Measure the outside diameter [A] of the drive pulley collar sliding surface.
- ★ If the collar is worn over the service limit, replace it.

Drive Pulley Collar Outside Diameter

Standard: 26.985 ~ 26.995 mm (1.0624 ~ 1.0628 in.)

Service Limit: 26.97 mm (1.062 in.)

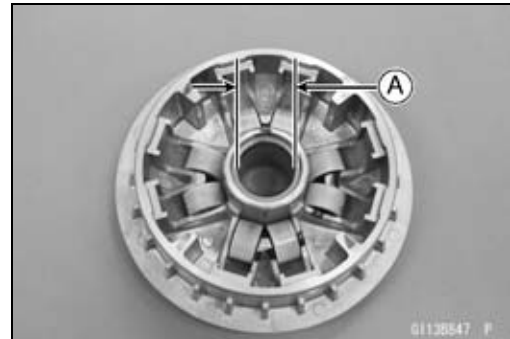


- Measure the movable drive face bushing inside diameter [A].
- ★ If the bushing is worn over the service limit, replace it.

Movable Drive Face Bushing Inside Diameter

Standard: 27.01 ~ 27.04 mm (1.063 ~ 1.065 in.)

Service Limit: 27.07 mm (1.091 in.)



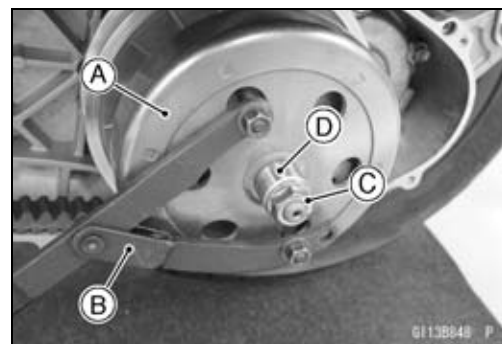
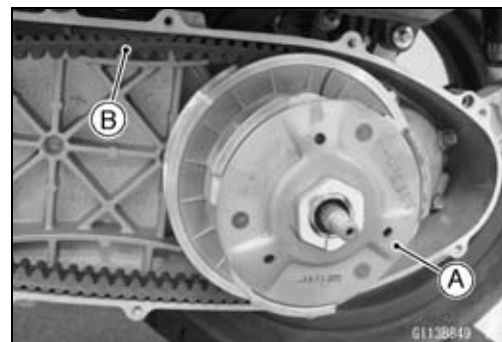
Clutch/Driven Pulley

Clutch/Driven Pulley Removal

- Remove the drive pulley (see Drive Pulley Removal).
- Hold the clutch outer [A] with the flywheel & pulley holder [B], and remove the clutch outer nut [C].

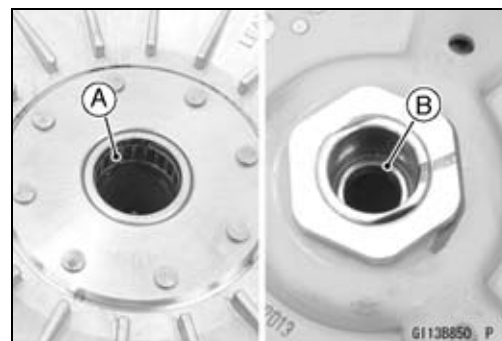
Special Tool - Flywheel & Pulley Holder: 57001-1605

- Remove:
  - Collar [D]
  - Clutch Outer
- Remove the clutch/driven pulley assembly [A] together with the drive belt [B].



Clutch/Driven Pulley Installation

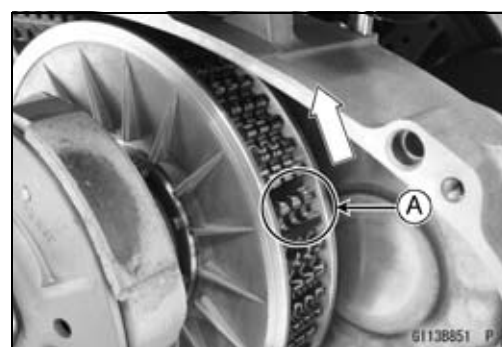
- Check the needle bearing [A] and outer bearing [B] for wear or damage.
- ★ If the bearing is noisy or have excessive play, replace it with a new one (see Driven Pulley Face Bearing Replacement).



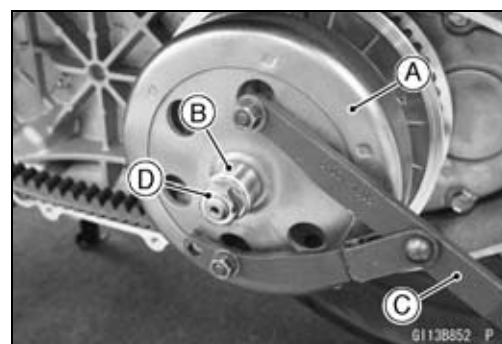
- Clean the driven pulley faces and remove any grease from them.
- Lay the drive belt on the driven pulley and install the clutch/driven pulley onto the drive shaft.

NOTE

○ Lay the drive belt so that its arrow marks [A] face forward.



- Install:
  - Clutch Outer [A]
  - Collar [B]
- Hold the clutch outer with the flywheel & pulley holder [C].
- Special Tool - Flywheel & Pulley Holder: 57001-1605**
- Tighten the clutch outer nut [D].
- Torque - Clutch Outer Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)**
- Install the removed parts (see the appropriate chapters).



6-12 CONVERTER SYSTEM

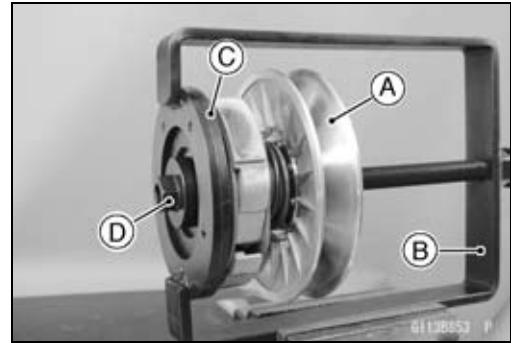
Clutch/Driven Pulley

Clutch/Driven Pulley Disassembly

- Hold the clutch/driven pulley assembly [A] with the clutch spring compressor [B].

Special Tools - Clutch Drive Nut Fitting [C], [D]: 57001-Y022
Clutch Spring Compressor: 57001-Y023

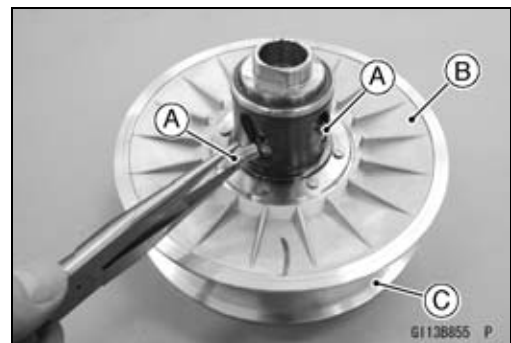
- Set the clutch spring compressor in a vise and remove the clutch drive plate nut.
- Loosen the clutch spring compressor and disassemble the drive pulley assembly.



- Remove the seal collar [A].

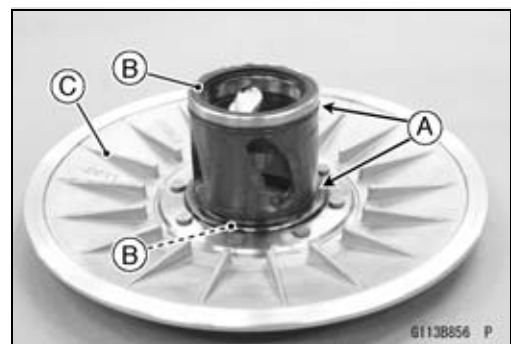


- Pull out the guide roller pins [A] and guide rollers.
- Remove the movable driven face [B] from the driven face [C].



Clutch/Driven Pulley Assembly

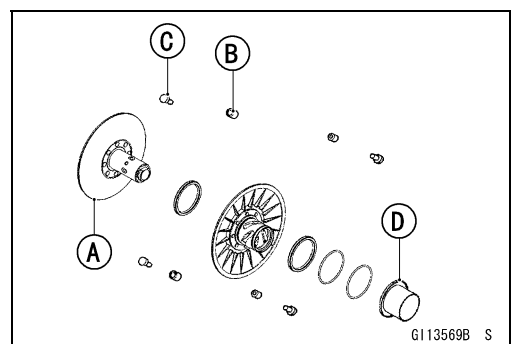
- Replace the O-rings [A] and oil seals [B] with new ones.
- Apply grease to the O-rings and oil seals lips, and install them onto the movable driven face [C].



- Clean the driven pulley faces and remove any grease from them.
- Install the movable driven face onto the driven face [A].
- Apply grease to the guide rollers [B] and guide roller pins [C] and then install them into the holes of the driven face.
- Install the seal collar [D].
- Remove any excessive grease.

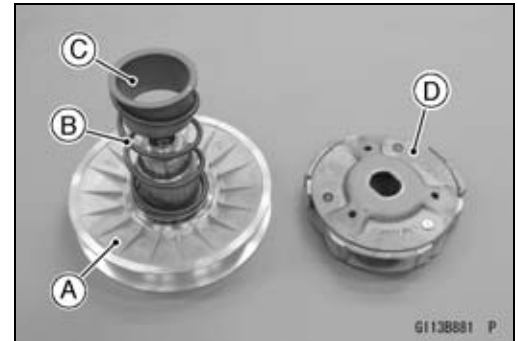
NOTE

○Be sure to clean the driven face off any grease.



Clutch/Driven Pulley

- Set the driven pulley assembly [A], driven face spring [B], collar [C] and clutch assembly [D] onto the clutch spring compressor.

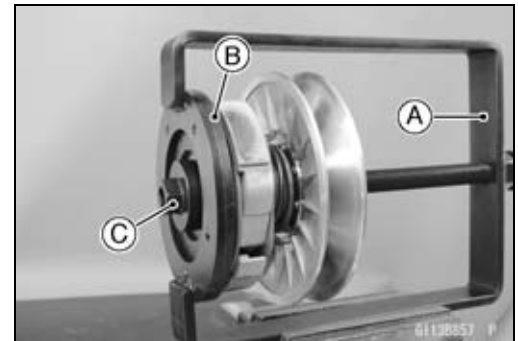


- Compress the clutch spring compressor [A] and install the clutch drive plate nut.

Special Tools - Clutch Drive Nut Fitting [B], [C]: 57001-Y022
Clutch Spring Compressor: 57001-Y023

- Set the clutch spring compressor in a vise and tighten the clutch drive plate nut to the specified torque.

Torque - Clutch Drive Plate Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)



Clutch Disassembly

- Remove the circlips [A] to disassembly the clutch.

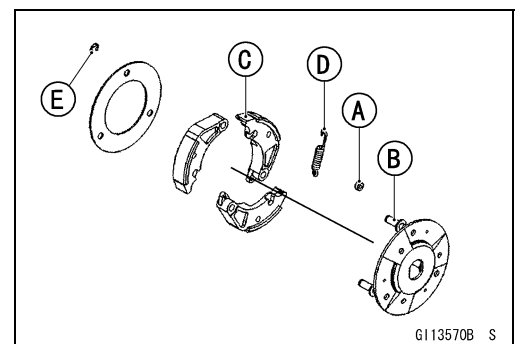
NOTE

○Keep grease off the clutch linings [B].



Clutch Assembly

- Install the damper rubbers [A] on the drive plate pins [B].
- Install the clutch weights/shoes [C] and clutch springs [D].
- Replace the circlips [E] with new ones.
- Set the new circlips in the groove.



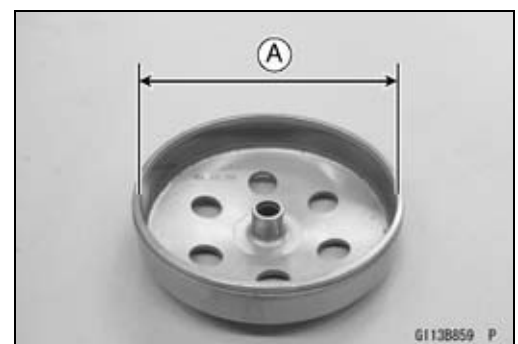
Clutch/Driven Pulley Inspection

- Inspect the clutch outer for damage.
- ★If there is any damaged part, replace it.
- Measure the clutch outer inside diameter [A].
- ★If the clutch outer is worn over the service limit, replace it.

Clutch Outer Inside Diameter

Standard: 152.1 ~ 152.2 mm (5.988 ~ 5.992 in.)

Service Limit: 152.2 mm (5.992 in.)



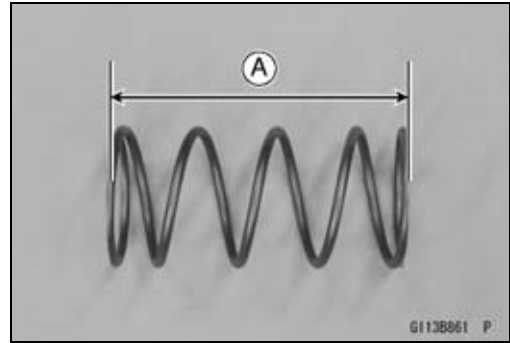
6-14 CONVERTER SYSTEM

Clutch/Driven Pulley

- Measure the driven face spring free length [A].

Driven Face Spring Free Length

Service Limit: 136 mm (5.35 in.)

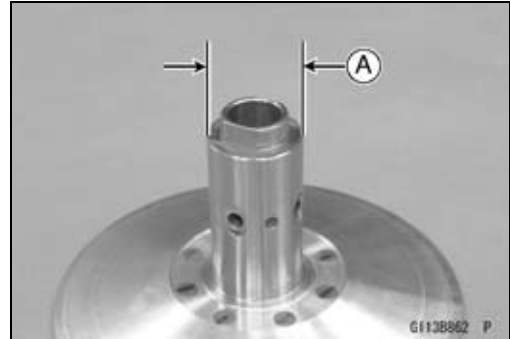


- Check the driven face for damage.
- ★ If there is any damaged part, replace it.
- Measure the driven face outside diameter [A].
- ★ If the driven face is worn over the service limit, replace it.

Driven Face Outside Diameter

Standard: 39.965 ~ 39.985 mm (1.5734 ~ 1.5742 in.)

Service Limit: 39.94 mm (1.572 in.)

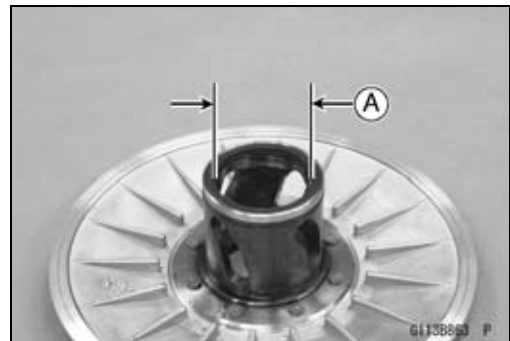


- Check the movable driven face for damage.
- ★ If there is any damaged part, replace it.
- Measure the movable driven face inside diameter [A].
- ★ If the movable driven face is worn over the service limit, replace it.

Movable Driven Face Inside Diameter

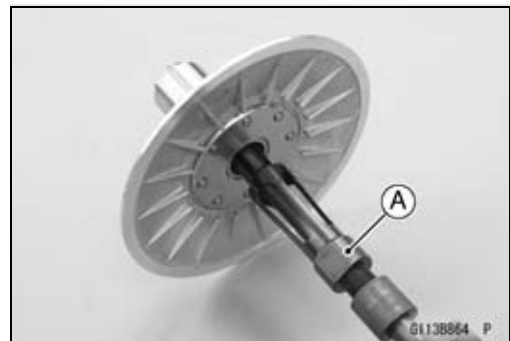
Standard: 40.000 ~ 40.025 mm (1.5748 ~ 1.5757 in.)

Service Limit: 40.06 mm (1.577 in.)

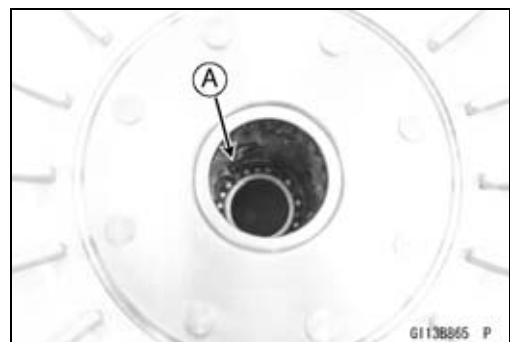


Driven Pulley Face Bearing Replacement

- Remove:
    - Driven Pulley Face (see Clutch/Driven Pulley Disassembly)
    - Needle Bearing
- Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058

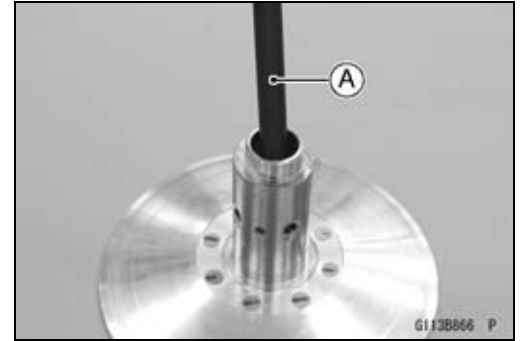


- Remove the circlip [A].
- Special Tool - Inside Circlip Pliers: 57001-143



Clutch/Driven Pulley

- Remove the outer bearing by tapping with a suitable bar [A].



- Replace the bearings with new ones.
- Press the outer bearing until it is bottomed.

Special Tool - Bearing Driver Set [A]: 57001-1129

- Install the outer bearing so that the sealed end faces outward. Install the new circlip.

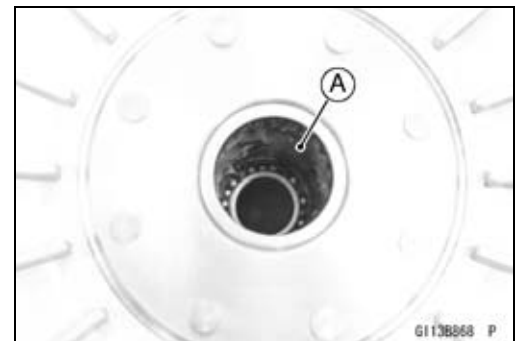
Special Tool - Inside Circlip Pliers: 57001-143

- Press the needle bearing until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129



- Apply grease to the drive face bore areas [A].



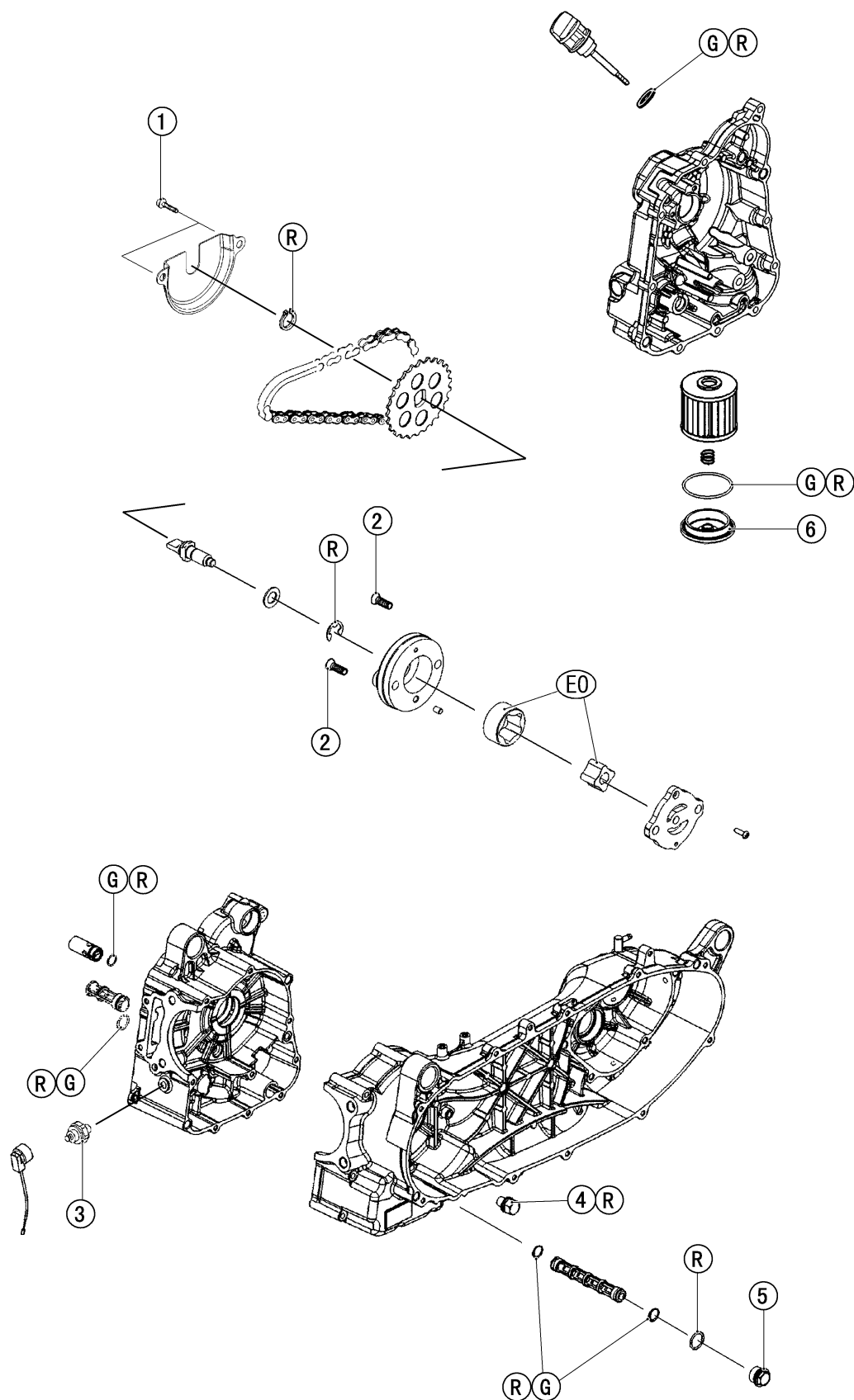
Engine Lubrication System

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7-2 ENGINE LUBRICATION SYSTEM

Exploded View



ENGINE LUBRICATION SYSTEM 7-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Separator Cover Bolts	9.8	1.0	87 in·lb	
2	Oil Pump Screws	9.8	1.0	87 in·lb	
3	Oil Pressure Switch	23	2.3	17	
4	Engine Oil Drain Bolt	25	2.5	18	R
5	Oil Screen Plug	9.3	0.95	82 in·lb	
6	Oil Filter Cap	9.3	0.95	82 in·lb	

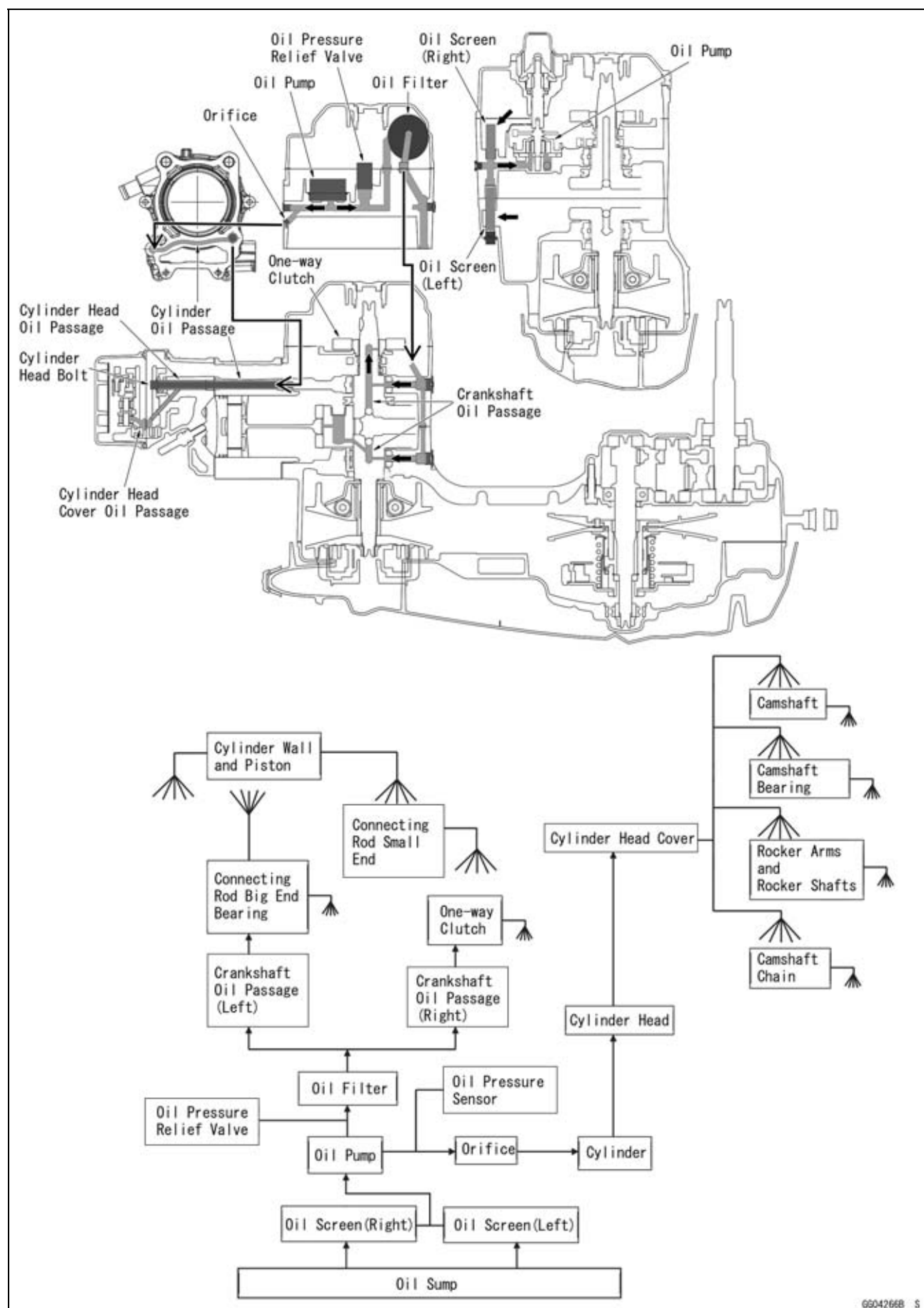
EO: Apply engine oil.

G: Apply grease.

R: Replacement Parts

7-4 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



ENGINE LUBRICATION SYSTEM 7-5

Specifications

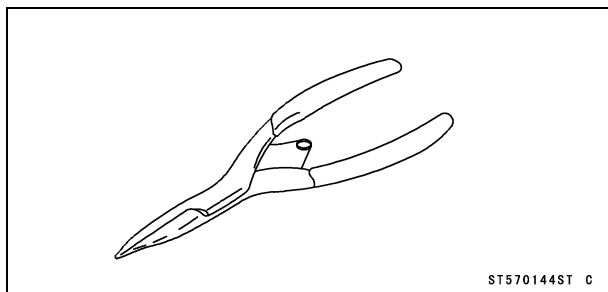
Item	Standard
Engine Oil	
Type	API SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 5W-50
Capacity	1.3 L (1.4 US qt) 1.5 L (1.6 US qt) (when engine is completely dry)
Level	Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)

7-6 ENGINE LUBRICATION SYSTEM

Special Tool

Outside Circlip Pliers:

57001-144



Engine Oil and Oil Filter

⚠ WARNING

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

Oil Level Inspection

- Use the center stand to support the motorcycle upright.
- Remove the oil filler cap/dipstick [A], wipe it dry and insert it back.

NOTE

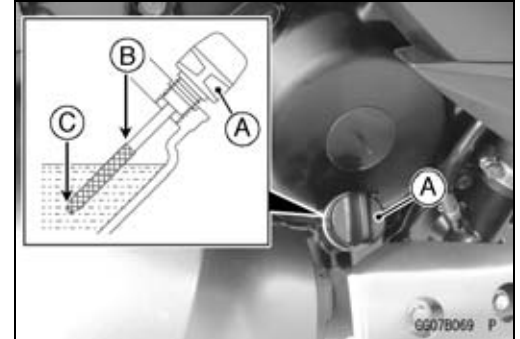
○ Check the oil level with the oil filler cap/dipstick unscrewed.

- Check that the engine oil level is between the upper [B] and lower [C] levels on the dipstick.

NOTE

○ If the motorcycle has just been used, wait several minutes for all the oil to drain down.

○ If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.



NOTICE

Racing the engine before the oil reaches every part can cause engine seizure.

- ★ If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- ★ If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

○ If the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.

Engine Oil Change

- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

Oil Filter Replacement

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

7-8 ENGINE LUBRICATION SYSTEM

Engine Oil and Oil Filter

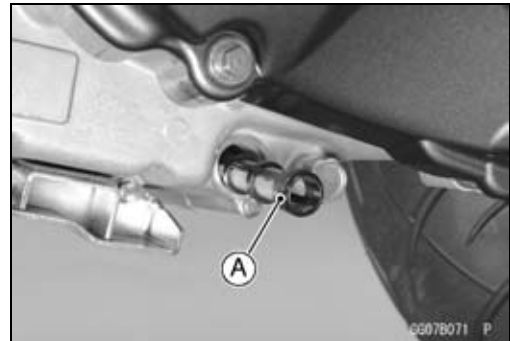
Oil Screen Removal

Oil Screen (Left)

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the oil screen plug [A].

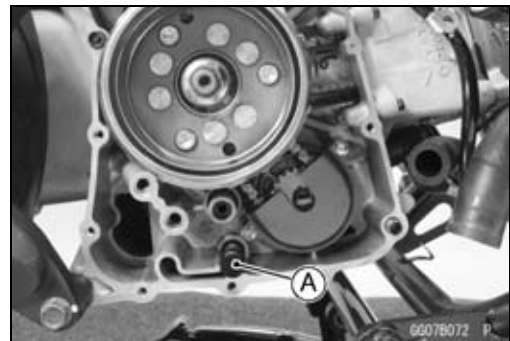


- Remove the oil screen [A].



Oil Screen (Right)

- Remove:
  - Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
  - Oil Screen [A]



Oil Screen Installation

- Installation is the reverse of removal.

NOTE

○ *Clean the oil screen thoroughly whenever it is removed for any reason.*

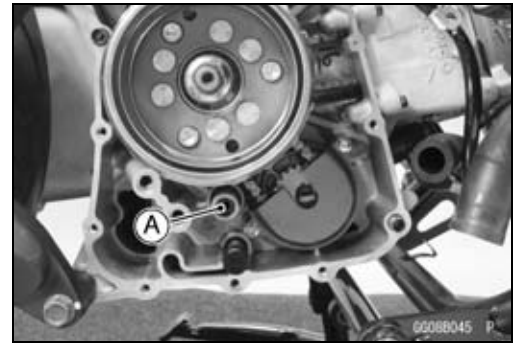
- Clean the oil screen (see Oil Screen Cleaning in the Periodic Maintenance chapter).
- Replace the O-rings of the oil screens and oil screen plug with new ones.
- Tighten:

Torque - Oil Screen Plug: 9.3 N·m (0.95 kgf·m, 82 in·lb)

Oil Pressure Relief Valve

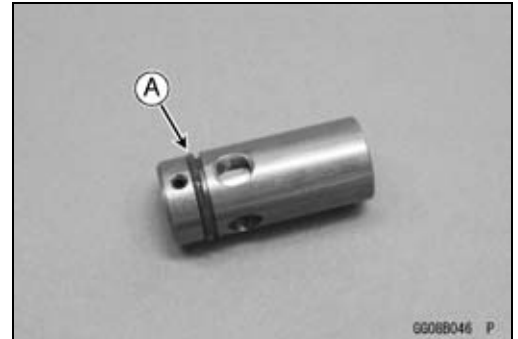
Oil Pressure Relief Valve Removal

- Remove:
  - Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
  - Oil Pressure Relief Valve [A]



Oil Pressure Relief Valve Installation

- Replace the O-ring [A] with a new one.
- Install the oil pressure relief valve.
- Install the alternator cover (see Alternator Cover Installation in the Electrical System chapter).



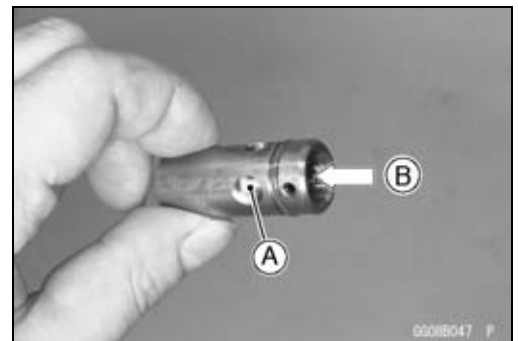
Oil Pressure Relief Valve Inspection

- Remove the oil pressure relief valve (see Oil Pressure Relief Valve Removal).
- Check to see if the valve [A] slides smoothly when pushing [B] it in with a wooden or other soft rod, and see if it comes back to its seat by spring pressure.

NOTE

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

- ★If any rough spots are found during above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.



⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the oil pressure relief valve.

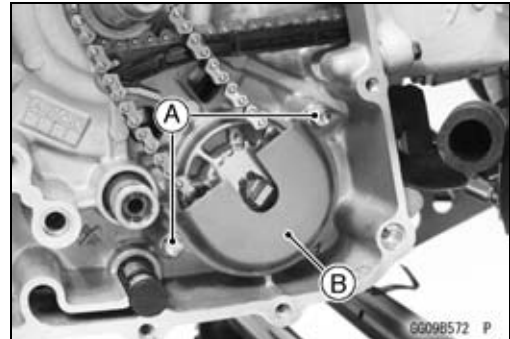
- ★If cleaning does not solve the problem, replace the oil pressure relief valve as an assembly. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

7-10 ENGINE LUBRICATION SYSTEM

Oil Pump

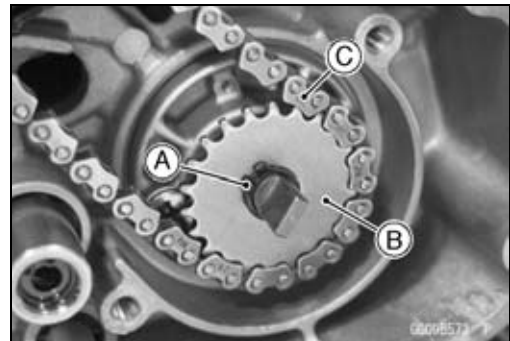
Oil Pump Removal

- Remove:
  - Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  - Starter Motor Clutch Gear (see Starter Motor Clutch Gear and Starter Idle Gear Removal in the Crankcase/Crankshaft chapter)
- Remove:
  - Oil Separator Cover Bolts [A]
  - Oil Separator Cover [B]

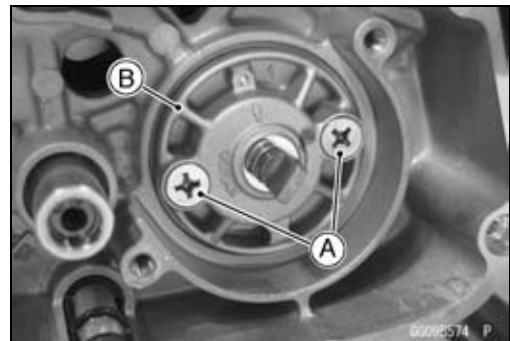


- Remove:
  - Circlip [A]
  - Oil Pump Driven Gear [B]
  - Drive Chain [C]

Special Tool - Outside Circlip Pliers: 57001-144



- Remove:
  - Oil Pump Screws [A]
  - Oil Pump Assembly [B]



Oil Pump Installation

- Install the oil pump assembly so that the arrow [A] faces up, and tighten its screws.

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

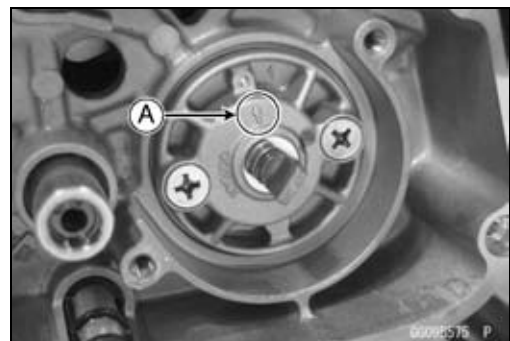
NOTE

○Fill the oil pump with the engine oil before installation.

- Install the pump driven gear and drive chain by aligning the pump driven gear with the cutout in the pump shaft.
- Replace the circlip with a new one.
- Install the new circlip.

Special Tool - Outside Circlip Pliers: 57001-144

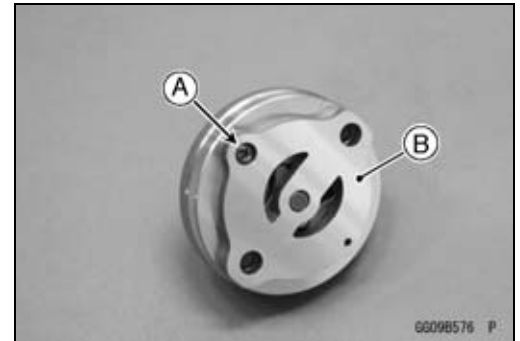
- Install the oil separator cover, and tighten its bolts.
  - Torque - Oil Separator Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install the removed parts (see appropriate chapters).



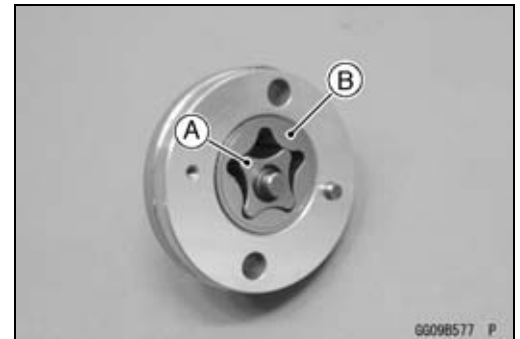
Oil Pump

Oil Pump Disassembly

- Remove:
  - Oil Pump Assembly (see Oil Pump Removal)
  - Screw [A]
  - Oil Pump Cover [B]



- Remove:
  - Inner Rotor [A]
  - Outer Rotor [B]

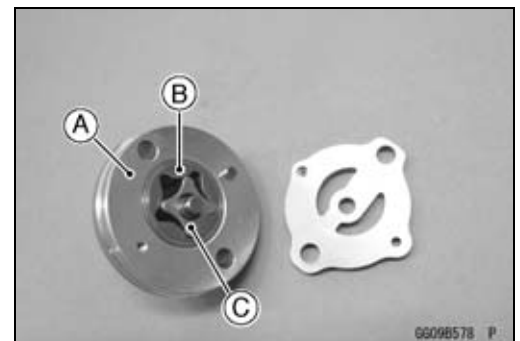


Oil Pump Assembly

- Assembly is the reverse of disassembly.

Oil Pump Inspection

- Disassemble the oil pump assembly (see Oil Pump Disassembly).
- Visually inspect the oil pump body [A], outer rotor [B] and inner rotor [C].
- If there is any damage or uneven wear, replace the oil pump body, rotors or the oil pump assembly.

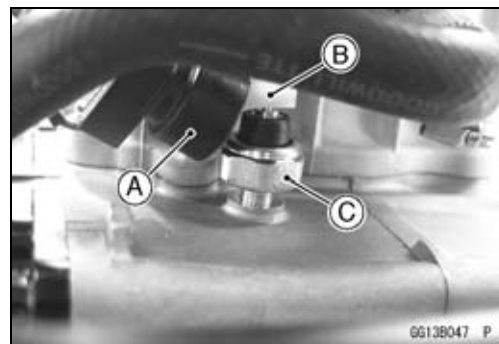


7-12 ENGINE LUBRICATION SYSTEM

Oil Pipe

Oil Pressure Switch Removal

- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Slide the switch cover [A], and disconnect the oil pressure switch connector [B].
- Remove the oil pressure switch [C].



Oil Pressure Switch Installation

- Install the oil pressure switch.
Torque - Oil Pressure Switch: 23 N·m (2.3 kgf·m, 17 ft·lb)
- Connect the oil pressure switch connector together with the switch cover.
- Install the removed parts (see appropriate chapters).

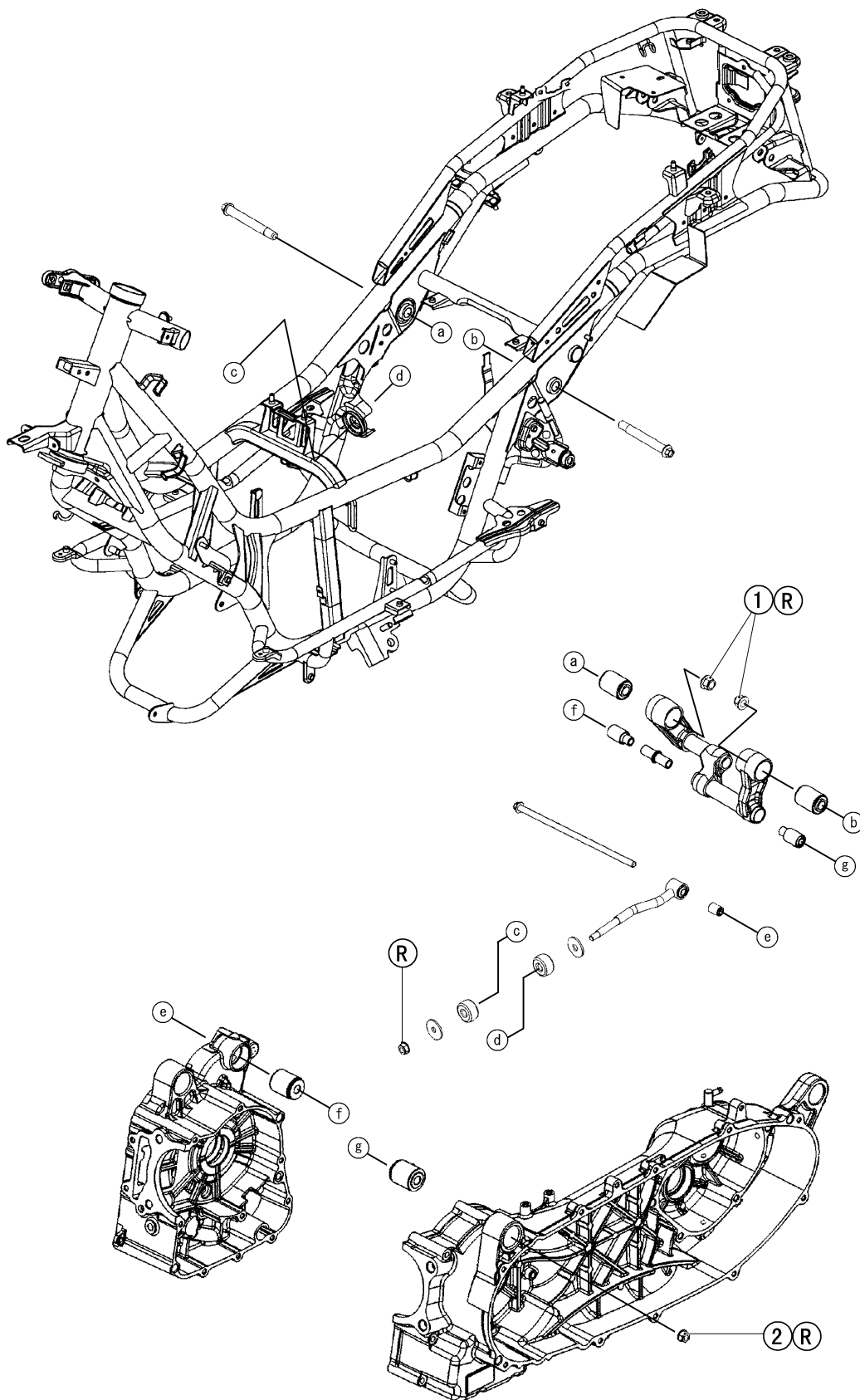
Engine Removal/Installation

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8-2 ENGINE REMOVAL/INSTALLATION

Exploded View



ENGINE REMOVAL/INSTALLATION 8-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Hanger Nuts	64	6.5	47	R
2	Engine Mounting Nut	49	5.0	36	R

R: Replacement Parts

8-4 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

Engine Removal

- Use the center stand to support the motorcycle upright.
- Squeeze the front brake lever slowly and hold it with a band [A].

⚠ WARNING

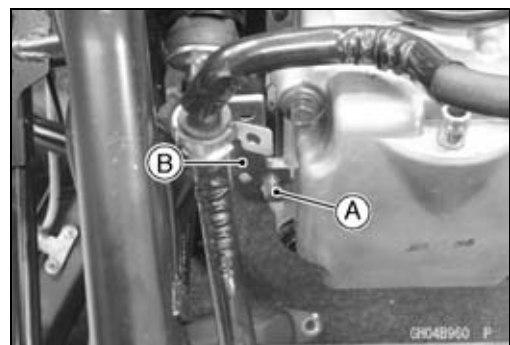
Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the engine.

NOTICE

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

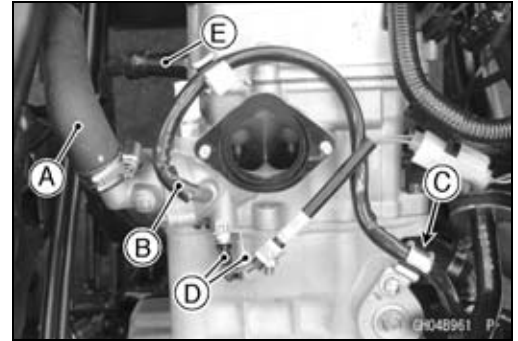


- Drain:
  - Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  - Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  - Side Fairings (see Side Fairing Removal in the Frame chapter)
  - Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  - Air Cleaner Box (see Air Cleaner Box Removal in the Fuel System (DFI) chapter)
  - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  - Intake Manifold (see Intake Manifold Removal in the Engine Top End chapter)
  - Starter Motor (see Starter Motor Removal in the Electrical System chapter)
- Loosen the bolt [A], and remove the fuel hose bracket [B].

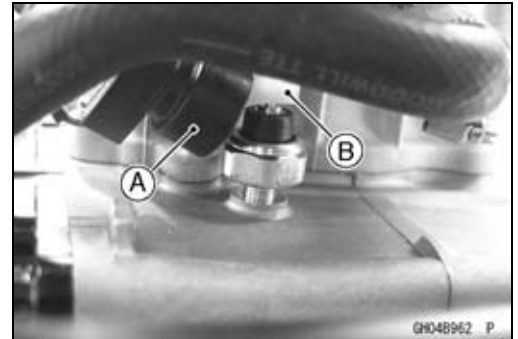


Engine Removal/Installation

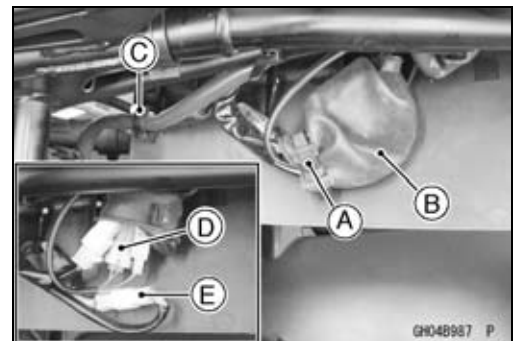
- Loosen the clamp screw and disconnect the water hose [A].
- Open the clamp and disconnect the water bypass hose [B].
- Clear the water bypass hose from the clamp [C].
- Disconnect the water temperature sensor connectors [D].
- Disconnect the spark plug cap [E].



- Slide the switch cover [A] and disconnect the oil pressure switch connector [B].



- Remove the band [A] and slide the dust cover [B].
- Open the clamp [C].
- Disconnect:
  - Crankshaft Sensor Lead Connector [D]
  - Alternator Lead Connector [E]



- Loosen the water hose clamp screw and disconnect the water hose [A].



- Support the engine with a suitable stand [A].



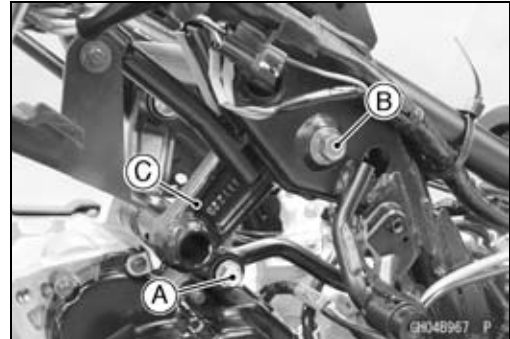
8-6 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

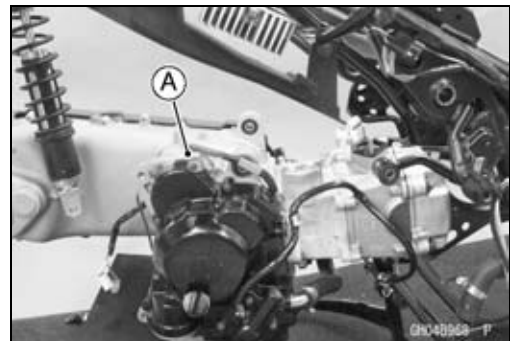
- Remove the left lower rear shock absorber bolt [A].



- Remove:
  - Engine Mounting Bolt [A] and Nut
  - Engine Hanger Bolt [B] and Nut (Both Sides)
  - Engine Hanger [C]



- Remove the engine [A] backward.



Engine Installation

- Installation is the reverse of removal.
- Replace the engine mounting nut and engine hanger nuts with new ones.
- Install the engine with engine hanger, and tighten the bolts and nuts.

Torque - Engine Mounting Nut: 49 N·m (5.0 kgf·m, 36 ft·lb)

Engine Hanger Nuts: 64 N·m (6.5 kgf·m, 47 ft·lb)

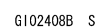
- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust the throttle cables (see Throttle Control System Inspection in the Periodic Maintenance chapter).
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).

Crankcase/Crankshaft

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Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Starter Motor Clutch Bolts	20	2.0	15	L
2	Engine Stud Bolts	12	1.2	106 in·lb	EO
3	Crankcase Bolts	9.8	1.0	87 in·lb	

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket.

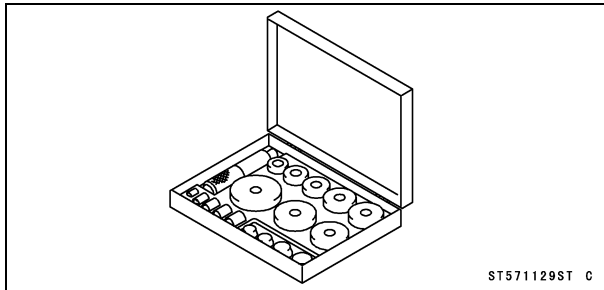
9-4 CRANKCASE/CRANKSHAFT

Specifications

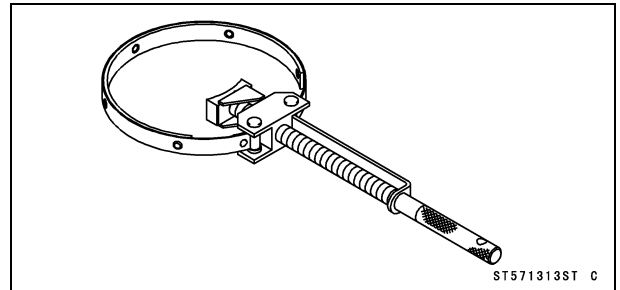
Item	Standard	Service Limit
Crankshaft, Connecting Rod		
Connecting Rod:		
Big End Radial Clearance	0 ~ 0.008 mm (0 ~ 0.0003 in.)	0.05 mm (0.002 in.)
Big End Side Clearance	0.15 ~ 0.35 mm (0.0059 ~ 0.0138 in.)	0.6 mm (0.024 in.)
Crankshaft Runout	TIR 0.03 mm (0.0012 in.) or less	TIR 0.1 mm (0.004 in.)

Special Tools and Sealant

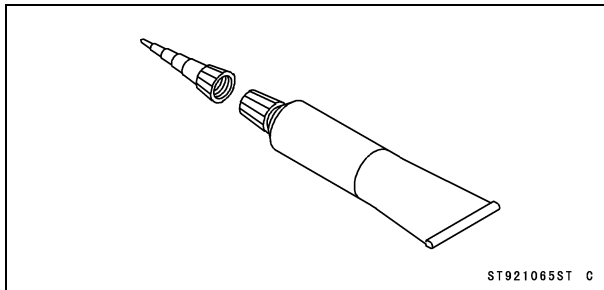
Bearing Driver Set:
57001-1129



Flywheel Holder:
57001-1313



Liquid Gasket, TB1215:
92104-1065

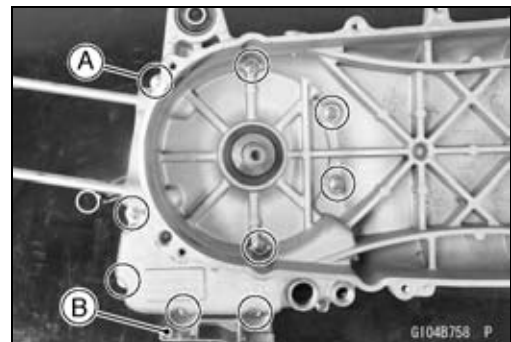


9-6 CRANKCASE/CRANKSHAFT

Crankcase

Crankcase Splitting

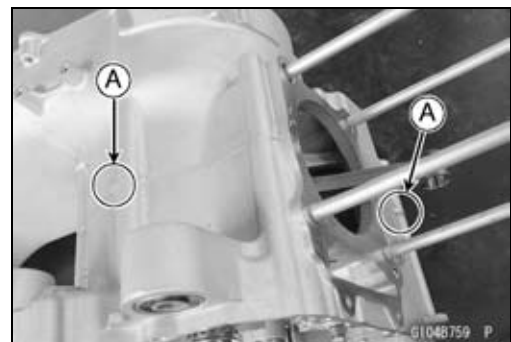
- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
  - Cylinder (see Cylinder Removal in the Engine Top End chapter)
  - Piston (see Piston Removal in the Engine Top End chapter)
  - Clutch/Driven Pulley (see Clutch/Driven Pulley Removal in the Converter System chapter)
  - Starter Motor Clutch Gear and Starter Idle Gear (see Starter Motor Clutch Gear and Starter Idle Gear Removal)
  - Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
  - Camshaft Chain (see Camshaft Chain Removal in the Engine Top End chapter)
  - Oil Screens (see Oil Screen Removal in the Engine Lubrication System chapter)
  - Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal in the Engine Lubrication System chapter)
  - Oil Pressure Switch (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
- Remove:
  - Crankcase Bolts [A]
  - Guide [B]



- ★ If the crankcase does not split easily, tap the crankcase ribs [A] lightly with a plastic mallet.
- Take care not to damage the crankcase.
- Remove the right crankcase.

NOTE

- *Never use a driver to knock the crankcase mating surfaces apart.*

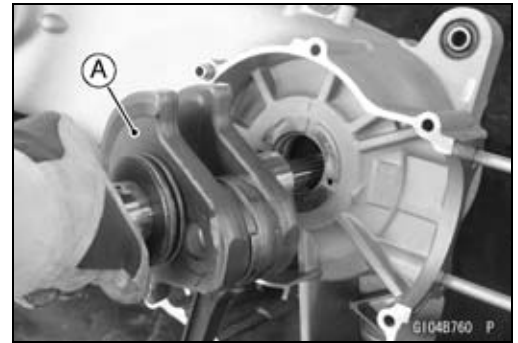


Crankcase

- Remove the crankshaft [A] from the left crankcase.

NOTE

- Avoid damaging the bearing.
- Avoid damaging the crankcase mating surfaces.



Crankcase Assembly

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the crankcase in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the crankcase.

- ★ If the crankshaft bearing is damaged, replace it (see Crankshaft Bearing Replacement).
- Chip off the old gasket from the mating surfaces of the crankcase halves, and clean off the crankcase and crankshaft with a high flash-point solvent. After cleaning, apply engine oil to the bearings.
- Replace the oil seal of the left crankcase with a new one.
- Install the oil seal with the bearing driver set.

Special Tool - Bearing Driver Set: 57001-1129

- Apply grease to the oil seal lips.
- Be sure to replace any bearings removed with new ones (see Crankshaft Bearing Replacement).
- Install the crankshaft [A] to the left crankcase.

NOTE

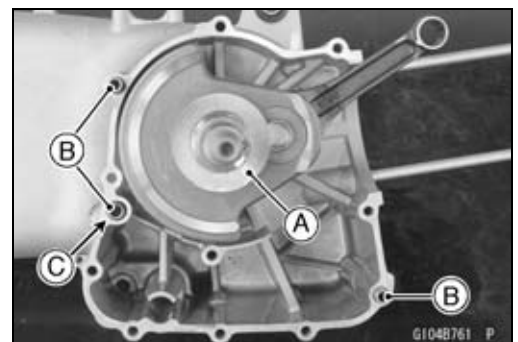
- Avoid damaging the oil seal and bearing.
- Avoid damaging the crankcase mating surfaces.

- Check to see that the crankcase dowel pins [B] are in place.
- Replace the O-ring [C] with a new one.
- With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
- Apply liquid gasket to the mating surface of the left crankcase.

Sealant - Liquid Gasket, TB1215: 92104-1065

- Install the left crankcase.
- Tighten the crankcase bolts together with the guide.

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

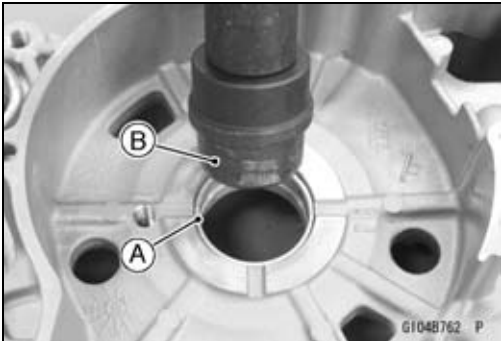


9-8 CRANKCASE/CRANKSHAFT

Crankcase

Crankshaft Bearing Replacement

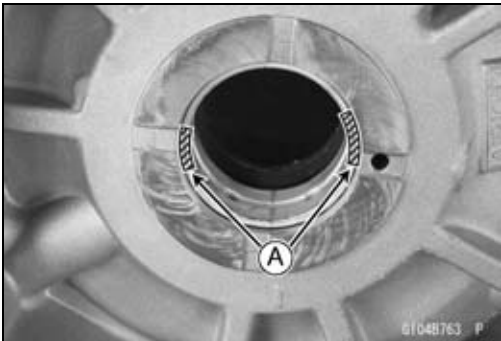
- Remove the crankshaft bearing [A].
- Special Tool - Bearing Driver Set [B]: 57001-1129



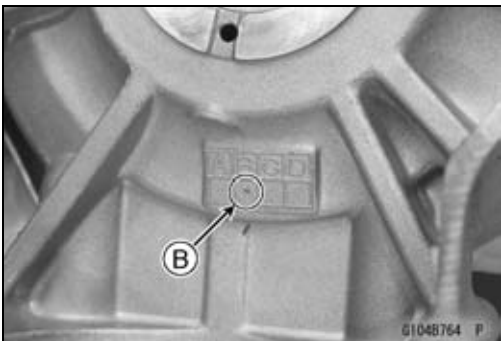
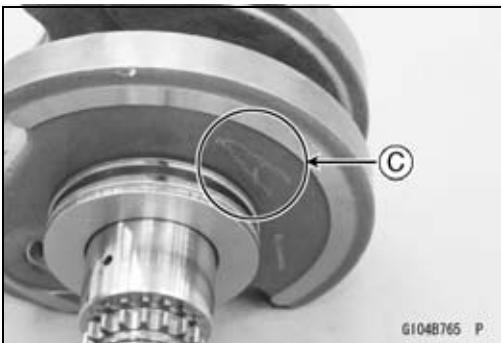
- Replace the crankshaft bearings with new ones.
- Select the new bearing, refer to the following.

Crankshaft Bearing Color [A]

Crankshaft Mark [C]	Crankcase Mark [B]			
	A	B	C	D
A	Black	Green	Green	Red
B	Green	Green	Red	—



- Install the crankshaft bearing.
- Special Tool - Bearing Driver Set: 57001-1129



Crankshaft, Connecting Rod

Crankshaft Removal

- Refer to the Crankcase Splitting.

Crankshaft Installation

- Refer to the Crankcase Assembly.

Crankshaft Disassembly

If the crankshaft is damaged, replace it as a set. Not for sale to each part of the crankshaft.

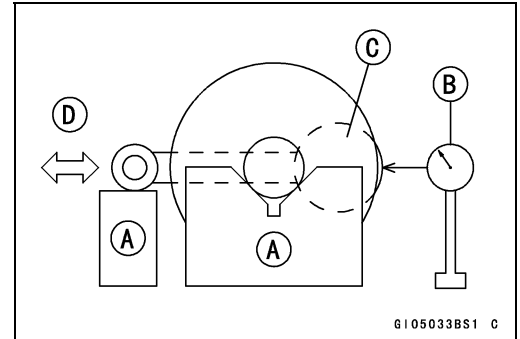
Connecting Rod Big End Radial Clearance Inspection

- Set the crankshaft on V blocks [A] and place a dial gauge [B] against the connecting rod big end [C].
- Push [D] the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.
- ★ If the radial clearance exceeds the service limit, replace the crankshaft assembly.

Connecting Rod Big End Radial Clearance

Standard: 0 ~ 0.008 mm (0 ~ 0.0003 in.)

Service Limit: 0.05 mm (0.002 in.)



Connecting Rod Big End Seizure Inspection

- In case of seizure, replace the crankshaft assembly.

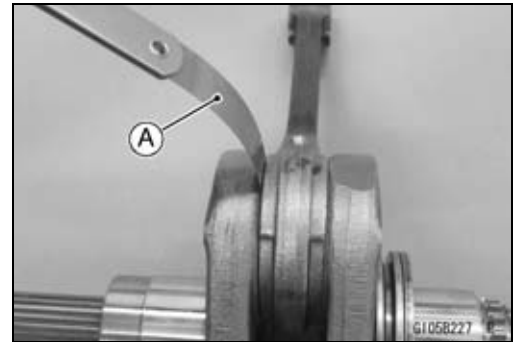
Connecting Rod Big End Side Clearance Inspection

- Measure the side clearance of the connecting rod with a thickness gauge [A].
- ★ If the clearance exceeds the service limit, replace the crankshaft assembly.

Connecting Rod Big End Side Clearance

Standard: 0.15 ~ 0.35 mm (0.0059 ~ 0.0138 in.)

Service Limit: 0.6 mm (0.024 in.)



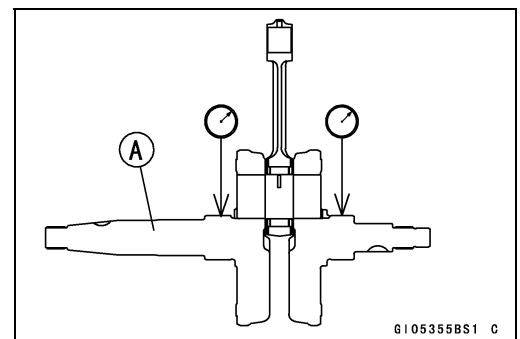
Crankshaft Runout Inspection

- Set the crankshaft [A] on V blocks, and place a dial gauge against the points indicated.
- Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.
- ★ If the runout at either point exceeds the service limit, replace the crankshaft assembly.

Crankshaft Runout

Standard: TIR 0.03 mm (0.0012 in.) or less

Service Limit: TIR 0.1 mm (0.004 in.)



9-10 CRANKCASE/CRANKSHAFT

Starter Motor Clutch

Starter Motor Clutch Removal

- Refer to the Starter Motor Clutch Disassembly.

Starter Motor Clutch Installation

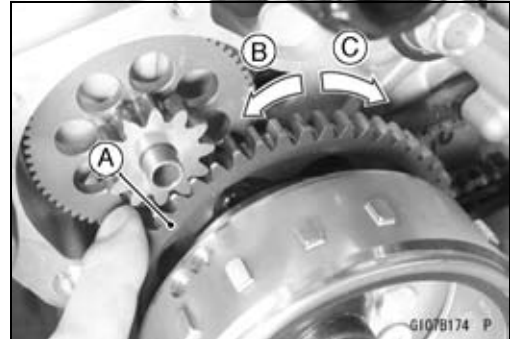
- Refer to the Starter Motor Clutch Assembly.

Starter Motor Clutch Inspection

- Remove:
  - Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
  - Starter Motor (see Starter Motor Removal in the Electrical System chapter)
- Turn the starter motor clutch gear [A] by hand. The starter clutch gear should turn counterclockwise [B] freely, but should not turn clockwise [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 is worn or damaged.



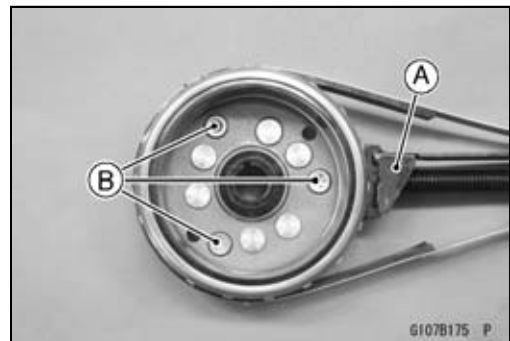
Starter Motor Clutch Disassembly

- Remove the alternator rotor (see Alternator Rotor Removal in the Electrical System chapter).
- Holding the alternator rotor by flywheel holder [A], remove the starter motor clutch bolts [B].

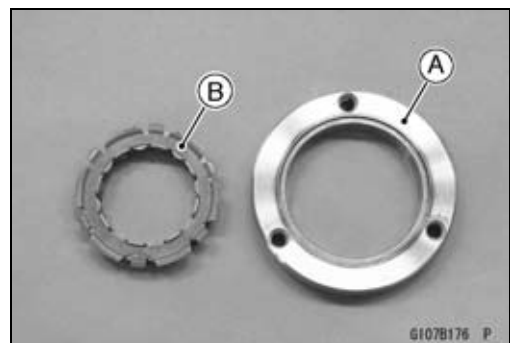
Special Tool - Flywheel Holder: 57001-1313

NOTICE

Do not hold the rotor at pick-up portion with the flywheel holder.



- Remove:
  - Starter Motor Clutch Housing [A]
  - Starter Motor Clutch [B]



Starter Motor Clutch Assembly

- Install the starter clutch and the starter clutch housing to the alternator rotor.
- Holding the alternator rotor by flywheel holder.

Special Tool - Flywheel Holder: 57001-1313

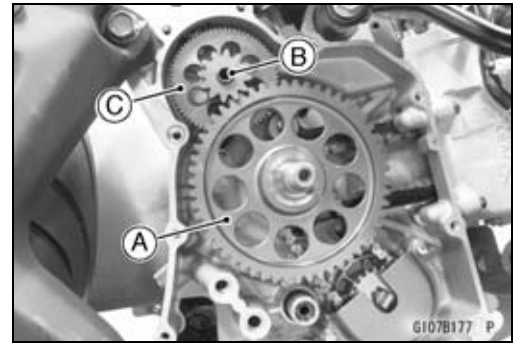
- Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

Torque - Starter Motor Clutch Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

Starter Motor Clutch

Starter Motor Clutch Gear and Starter Idle Gear Removal

- Remove:
  - Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  - Starter Motor Clutch Gear [A]
  - Shaft [B]
  - Starter Idle Gear [C]

***Starter Motor Clutch Gear and Starter Idle Gear Installation***

- Installation is the reverse of removal.

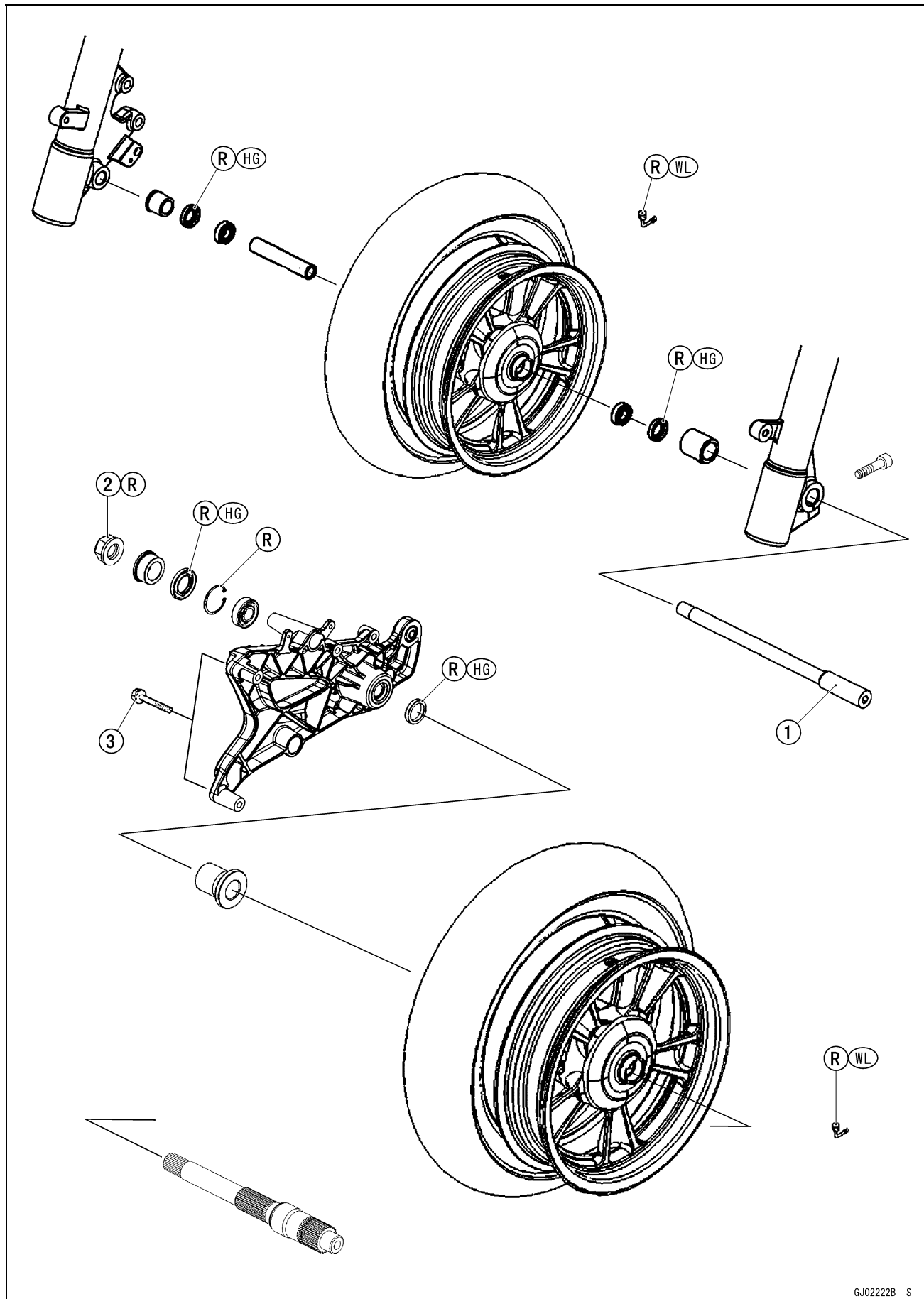
Wheels/Tires

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10-2 WHEELS/TIRES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle	20	2.0	15	
2	Rear Axle Nut	118	12.0	87.0	R
3	Sub Frame Bolts	34	3.5	25	

HG: Apply high-temperature grease.

R: Replacement Parts

WL: Apply soap and water solution or rubber lubricant.

10-4 WHEELS/TIRES

Specifications

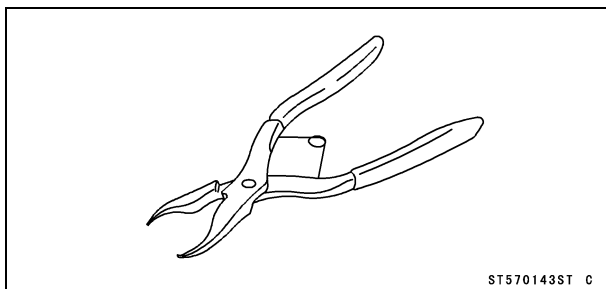
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	— — —	TIR 2.0 mm (0.08 in.)
Radial	— — —	TIR 2.0 mm (0.08 in.)
Axle Runout/100 mm (3.94 in.)	— — —	TIR 0.2 mm (0.008 in.)
Rim Size:		
Front	J 14 × 3.0	— — —
Rear	J 13 × 4.0	— — —
Tires		
Air Pressure (when Cold):		
Front	200 kPa (2.00 kgf/cm ² , 29 psi)	— — —
Rear	225 kPa (2.25 kgf/cm ² , 33 psi)	— — —
Tread Depth:		
Front	— — —	1 mm (0.04 in.)
Rear	— — —	1 mm (0.04 in.)
Standard Tires:	Make, Type	Size
Front	MAXXIS, i PRO	120/80-14 M/C 58S
Rear	MAXXIS, PRO	150/70-13 M/C 64S

WARNING

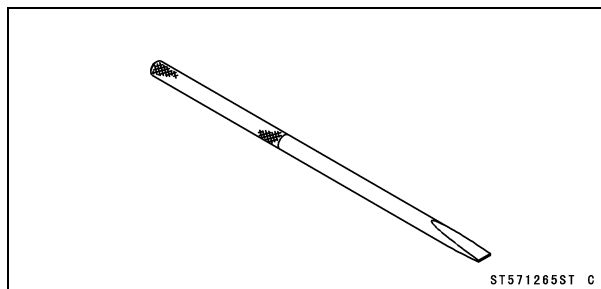
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

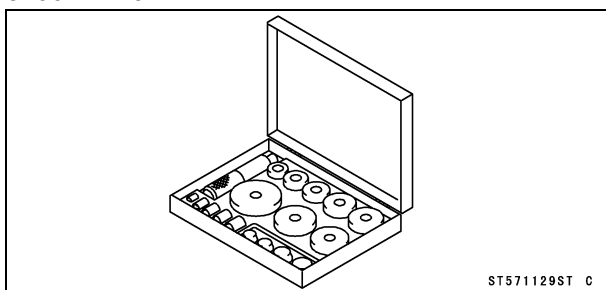
Inside Circlip Pliers:
57001-143



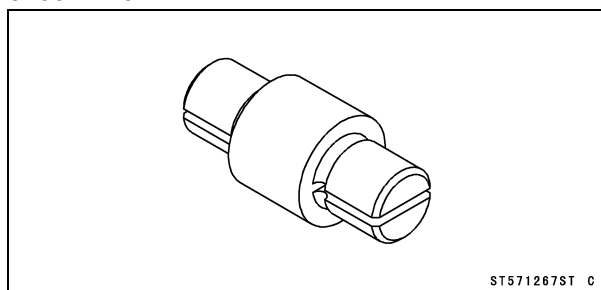
Bearing Remover Shaft, $\phi 9$:
57001-1265



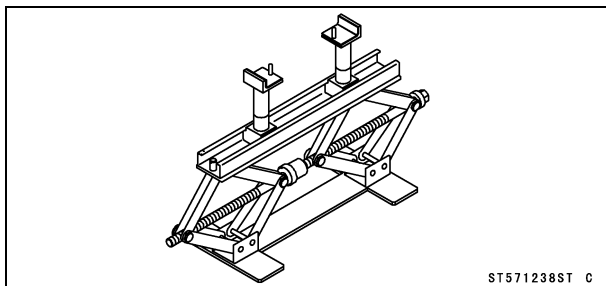
Bearing Driver Set:
57001-1129



Bearing Remover Head, $\phi 15 \times \phi 17$:
57001-1267



Jack:
57001-1238

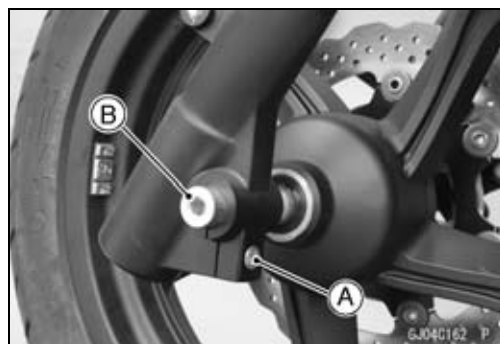


10-6 WHEELS/TIRES

Wheels (Rims)

Front Wheel Removal

- Remove:
  - Front Fender (see Front Fender Removal in the Frame chapter)
  - Bolt [A]
  - Front Wheel Rotation Sensor (Speed Sensor) [B]
- Loosen:
  - Front Axle Clamp Bolt [A]
  - Front Axle [B]



- Remove the lower cover (see Lower Cover Removal in the Frame chapter).
- Raise the front wheel off the ground.
  - Special Tool - Jack: 57001-1238**
- Pull out the front axle to the left side and drop the front wheel out of the front forks.

NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation

- Apply high-temperature grease to the grease seal lips.
- Fit the collars [A] on both sides of the hub.
- Install the stepped collar to the right side.
- Insert the front axle from the left side.
- Tighten:
  - Torque - Front Axle: 20 N·m (2.0 kgf·m, 15 ft·lb)**



- Before tightening the front axle clamp bolt on the left front fork leg, pump the front fork up and down 4 or 5 times to allow the right front fork leg to seat on the front axle.

NOTE

○ Put a block in front of the front wheel to stop moving.

- Tighten the front axle clamp bolt.

Wheels (Rims)

- Install the removed parts (see appropriate chapters).
- Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

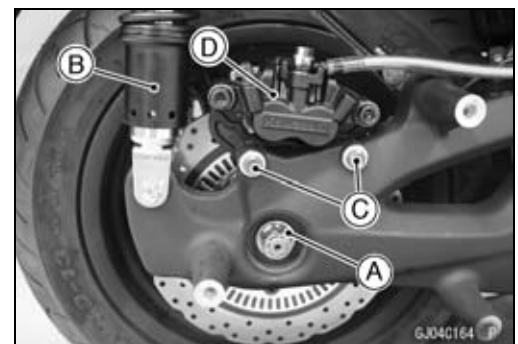
Rear Wheel Removal

- Use the center stand to support the motorcycle upright.
- Remove:
  - Muffler Body (see Muffler Body Removal in the Engine Top End chapter)
  - Mud Guard (see Mud Guard Removal in the Frame chapter)
- Remove the rear axle nut [A].

NOTE

○When loosening the rear axle nut, hold the rear brake on.

- Remove:
  - Right Rear Shock Absorber [B] (see Rear Shock Absorber Removal in the Suspension chapter)
  - Rear Caliper Mounting Bolts [C]
  - Rear Caliper [D]
- Remove:
  - Sub Frame Bolts [A]
  - Sub Frame [B]
- Remove:
  - Collar [A]
  - Rear Wheel [B]



10-8 WHEELS/TIRES

Wheels (Rims)

Rear Wheel Installation

- Installation is the reverse of removal.
- Replace the rear axle nut with a new one.
- Tighten:
  - Torque - Sub Frame Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)
  - Rear Axle Nut: 118 N·m (12.0 kgf·m, 87.0 ft·lb)
- Install the removed parts (see appropriate chapters).
- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Wheel Inspection

- Remove the lower cover (see Lower Cover Removal in the Frame chapter).
- Raise the front/rear wheel off the ground.
  - Special Tool - Jack: 57001-1238**
- Spin the wheel lightly, and check for roughness or binding.
- ★ If roughness or binding is found, replace the following parts.
  - Hub Bearings (see Hub Bearing Removal/Installation)
  - Sub Frame Bearing (see Sub Frame Bearing Removal/Installation)
  - Final Shaft Bearing (see Final Reduction Bearing Replacement in the Final Drive chapter)
- 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 or final shaft.

Wheels (Rims)

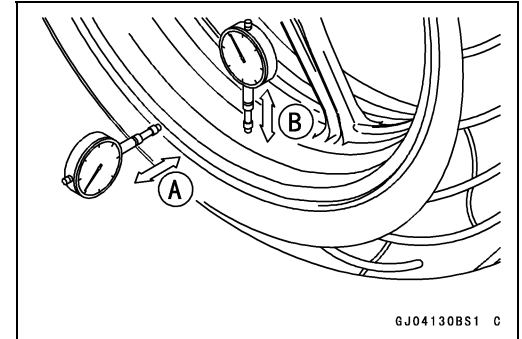
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.
- ★ If rim runout exceeds the service limit, check the following.
  - Hub Bearings/Sub Frame Bearing (see Hub Bearing/Sub Frame Bearing Inspection)
  - Bearings of Final Shaft (see Final Gear Case Inspection in the Final Drive chapter)
- ★ If the problem is not due to the bearings, replace the wheel.

Rim Runout (with tire installed)

Service Limit:

Axial TIR 2.0 mm (0.08 in.)

Radial TIR 2.0 mm (0.08 in.)

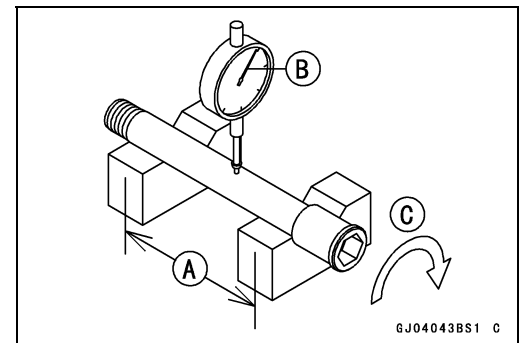


⚠ WARNING

Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

Front Axle Inspection

- Remove the front axle (see Front Wheel Removal).
- Visually inspect the front 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.

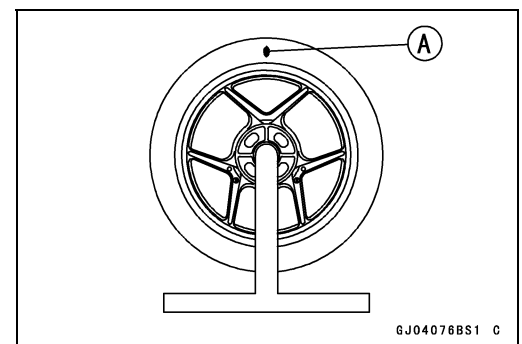


Axle Runout/100 mm (3.94 in.)

Service Limit: TIR 0.2 mm (0.008 in.)

Balance Inspection (Front Wheel Only)

- Remove the front wheel (see Front 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).

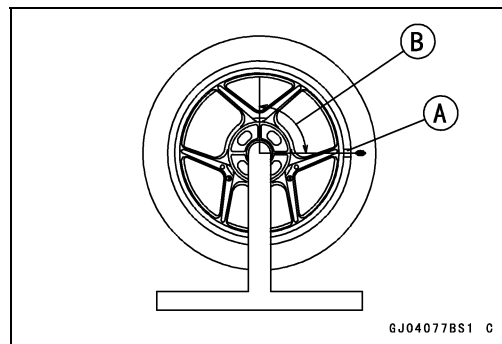


10-10 WHEELS/TIRES

Wheels (Rims)

Balance Adjustment (Front Wheel Only)

- 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 (Front Wheel Only)

- Remove the balance weights [A].
- Discard the used balance weight.



Balance Weight Installation (Front Wheel Only)

- Using a high flash-point solvent, clean off any oil or dirt that may be balance weight installing area.
- Install the balance weight(s).

⚠ WARNING

Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, it means it is not installed securely on the rim and it could fly off during riding. Replace the loose balance weight. Do not reuse the used balance weight.

NOTE

○ Use the commercially available balance weights. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.

Tires

Air Pressure Inspection/Adjustment

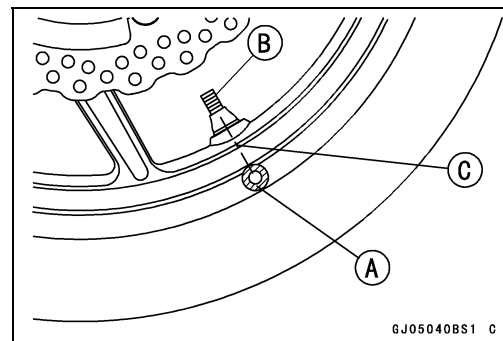
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

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 Painted Mark [A]
  - Valve Stem [B]
  - Align [C]



- Remove the tire from the rim using a suitable commercially available tire changer. For this model, do not apply any lubricant or solution on tire beads and rim flanges while assembling or removing tire.

NOTE

○The tires cannot be removed with hand tools because they fit the rims too tightly.

Tire Installation

⚠ WARNING

Mixing tire brands and types can adversely affect handling and cause an accident resulting in injury or death. Always use the same manufacturer's tires on both front and rear wheels.

- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

NOTICE

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

10-12 WHEELS/TIRES

Tires

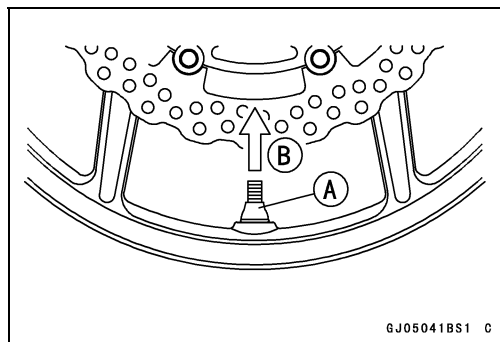
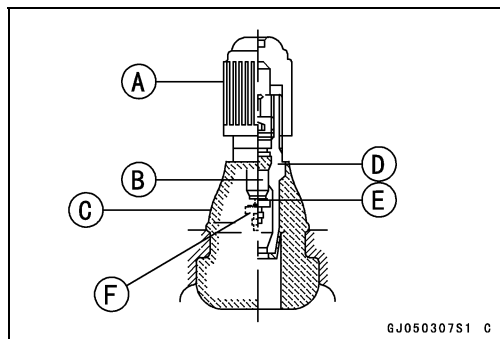
- Install a new valve in the rim.
- Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.

NOTICE

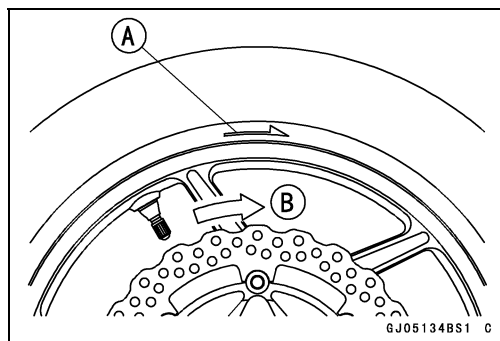
Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

- The air valve is as shown.

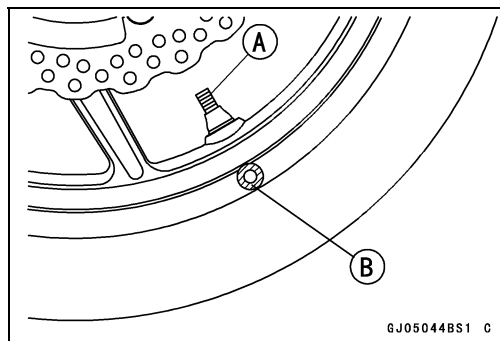
Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]



- Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.
Tire Rotation Mark [A]
Rotating Direction [B]



- Position the tire on the rim so that the valve [A] aligns with the tire balance mark [B] (the chalk mark made during removal, or the painted mark on a new tire).
- Install the tire bead over the rim flange using a suitable commercially available tire changer. For this model, do not apply any lubricant or solution on tire beads and rim flanges while assembling or removing tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.

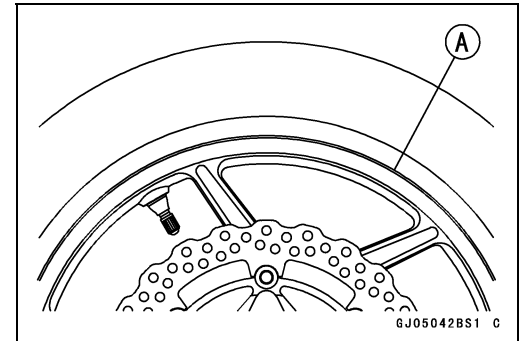


WARNING

Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi).

Tires

- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.
- ★ If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.
- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.
- Inflate the tire slightly above standard inflation.
- Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.
- Adjust the air pressure to the specified pressure (see Air Pressure Inspection in the Periodic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).



Tire Repair

Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

10-14 WHEELS/TIRES

Hub Bearing

Hub Bearing Removal

- Remove the front wheel (see Front Wheel Removal), and take out the following.

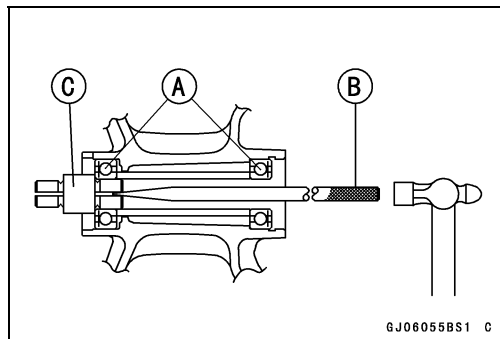
Collars
Grease Seals

- Use the bearing remover to remove the hub bearings [A].

NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

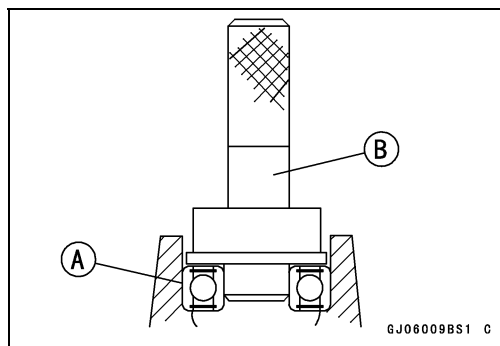
Special Tools - Bearing Remover Shaft, $\phi 9$ [B]: 57001-1265
Bearing Remover Head, $\phi 15 \times \phi 17$ [C]: 57001-1267



Hub Bearing Installation

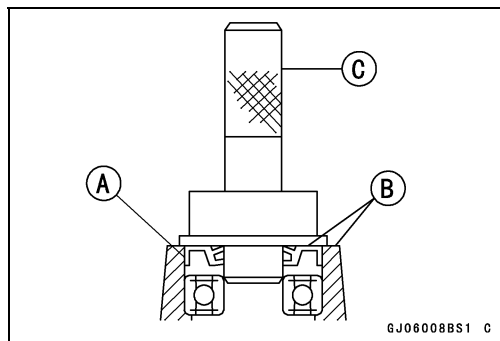
- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.
- Press in each right the bearing [A] until they are bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129



- Replace the grease seals with new ones.
  - Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.
- Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set [C]: 57001-1129

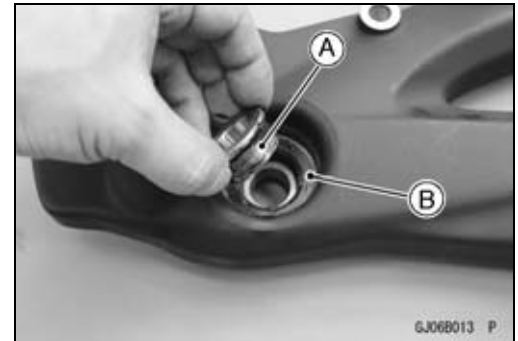


Sub Frame Bearing Removal

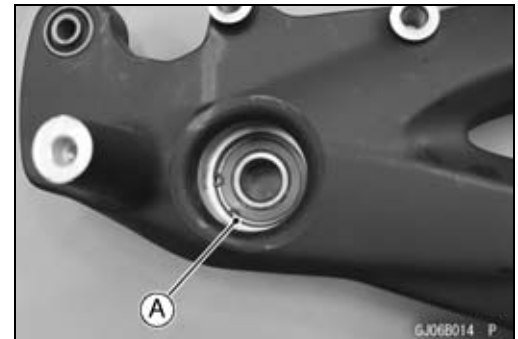
- Remove the sub frame (see Rear Wheel Removal).
- Remove the following parts from the sub frame.
  - Rear Brake Hose Clamp
  - Rear Wheel Rotation Sensor (ABS equipped model, see Rear Wheel Rotation Sensor Removal in the Brakes chapter)

Hub Bearing

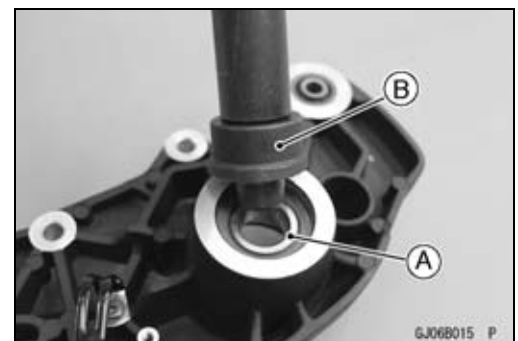
- Remove:
Collar [A]
Grease Seal [B] (Both Sides)



- Remove the circlip [A].
Special Tool - Inside Circlip Pliers: 57001-143



- Remove the bearing [A] by tapping from the wheel side.
Special Tool - Bearing Driver Set [B]: 57001-1129



Sub Frame Bearing Installation

- Before installing the sub frame bearing, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearing.
- Replace the bearing with a new one.
- Install the bearing by using the bearing driver set which does not contact the bearing inner race.
- Press in the bearing [A] until it is bottomed.

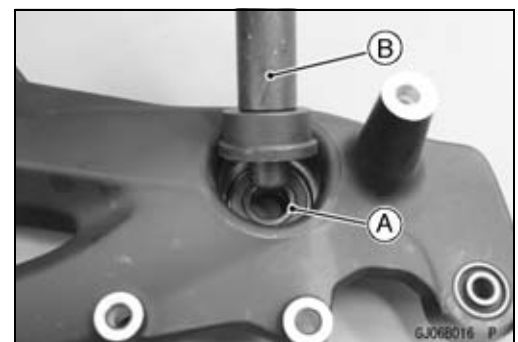
Special Tool - Bearing Driver Set [B]: 57001-1129

- Replace the circlip with a new one.

Special Tool - Inside Circlip Pliers: 57001-143

- Replace the grease seals with new ones.
- Press in the grease seals until they are bottomed.
- Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001-1129



10-16 WHEELS/TIRES

Hub Bearing

Hub Bearing/Sub Frame Bearing Inspection

Since the bearings are made to extremely close tolerances, the clearance can not normally be measured.

NOTE

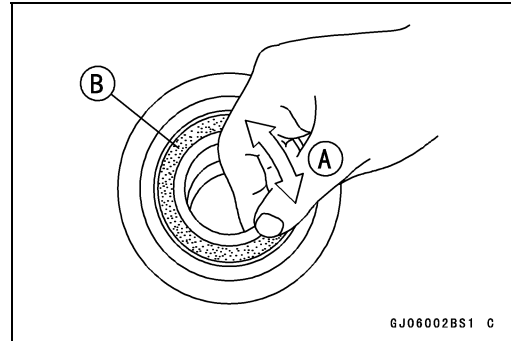
○Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.

- 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/Sub Frame Bearing Lubrication

NOTE

○Since the hub bearings are packed with grease and sealed, lubrication is not required.



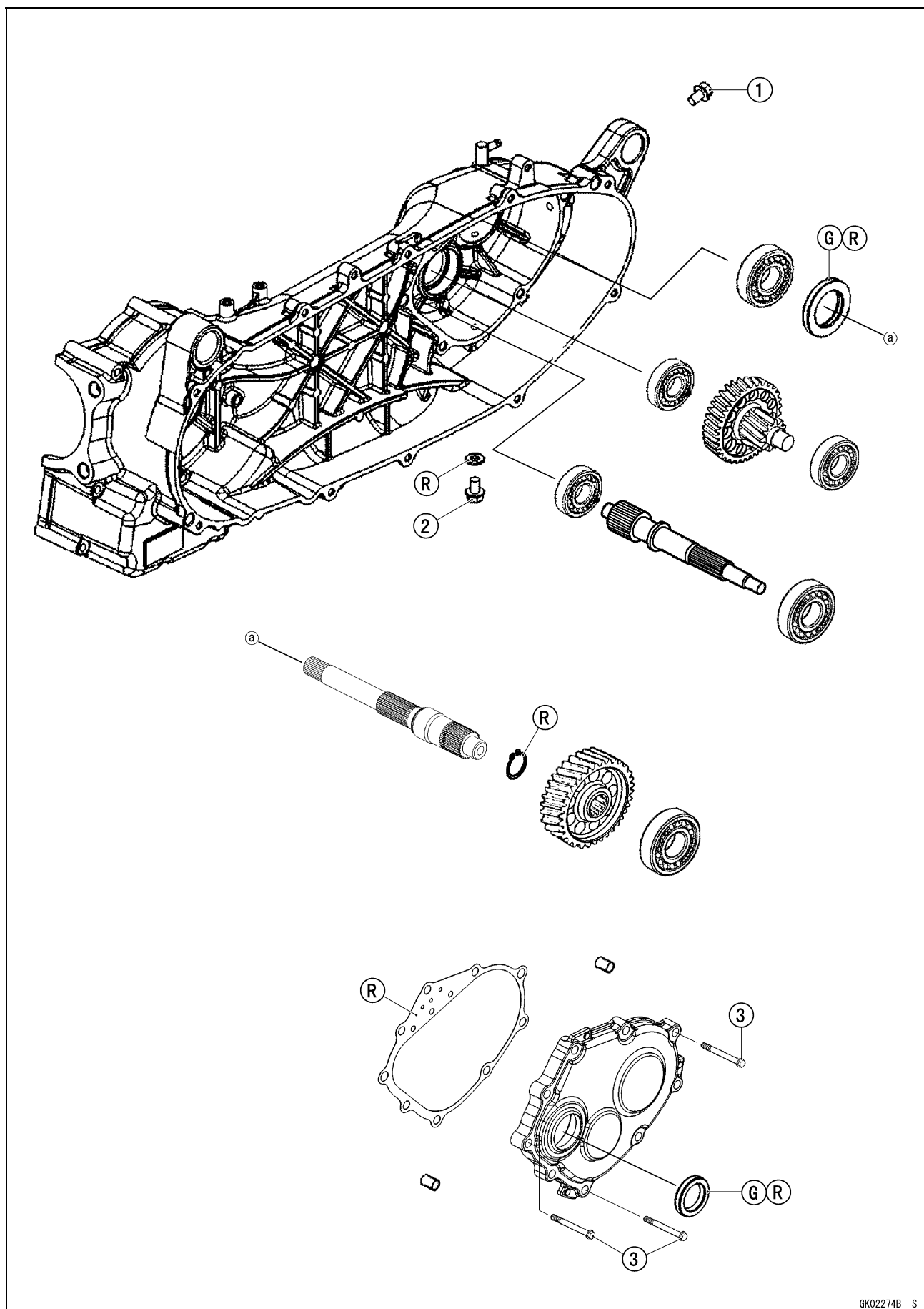
Final Drive

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11-2 FINAL DRIVE

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Filler Bolt	9.8	1.0	87 in·lb	
2	Final Gear Case Oil Drain Bolt	9.8	1.0	87 in·lb	
3	Final Gear Case Cover Bolts	20	2.0	15	

G: Apply grease.
R: Replacement Parts

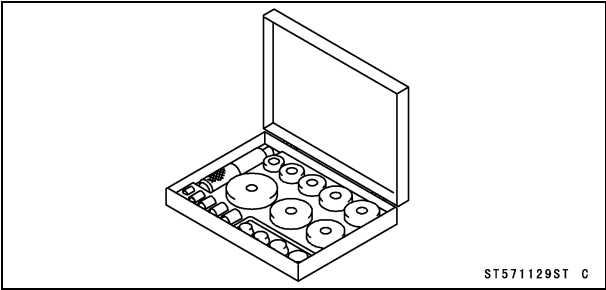
11-4 FINAL DRIVE

Specifications

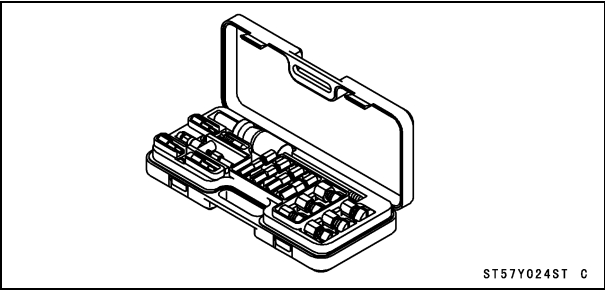
Item	Standard	Service Limit
Final Drive		
Final Gear Case Oil:		
Viscosity	SAE 90	— — —
Capacity	0.23 L (0.24 US qt) at disassembly	— — —
	0.21 L (0.22 US qt) at change	— — —

Special Tools

Bearing Driver Set:
57001-1129



Oil Seal & Bearing Remover:
57001-Y024



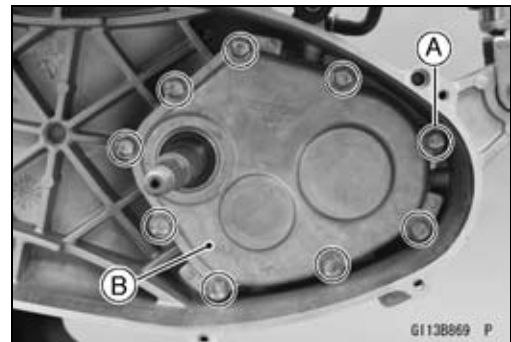
11-6 FINAL DRIVE

Final Gear Case

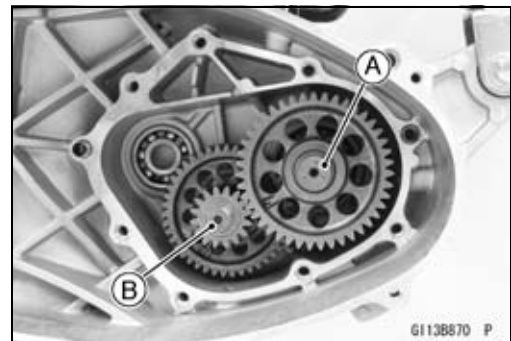
Final Gear Case Disassembly

NOTE

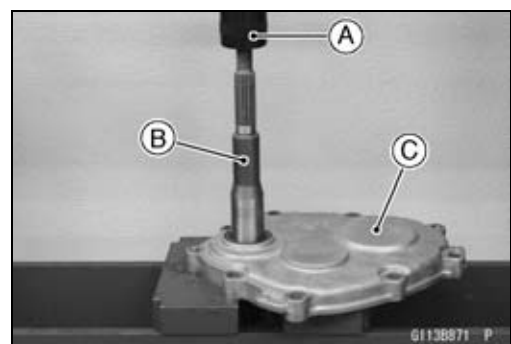
- Do not remove the final gear case cover except for necessary part replacement.
- When replacing the drive shaft, also replace the bearing and oil seal.
- Remove:
  - Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  - Clutch/Driven Pulley Assembly (see Clutch/Driven Pulley Removal in the Converter System chapter)
- Drain the final gear case oil (see Final Gear Case Oil Change in the Periodic Maintenance chapter).
- Remove:
  - Final Gear Case Cover Bolts [A]
  - Final Gear Case Cover [B] and Gasket



- Remove:
  - Final Shaft [A]
  - Countershaft [B]



- Using a press [A], remove the drive shaft [B] from the final gear case cover [C] if necessary.

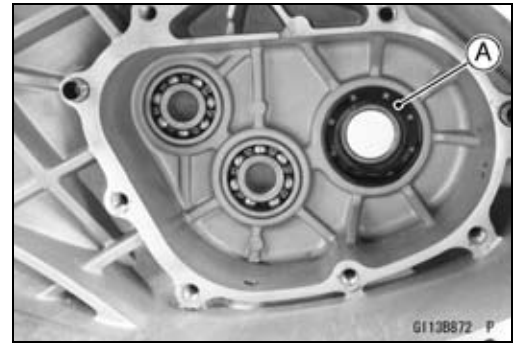


Final Gear Case Assembly

- When the drive shaft is removed, replace the drive shaft bearing and oil seal (see Final Reduction Bearing Replacement).
- Using a press, install the drive shaft to the final gear case cover.

Final Gear Case

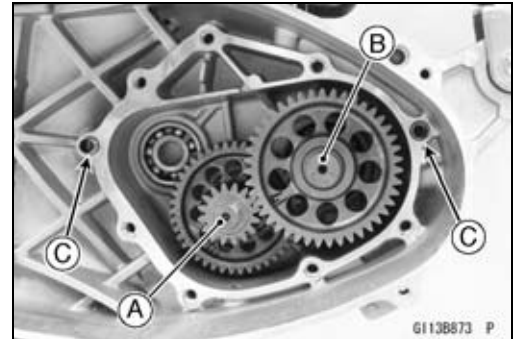
- Replace the oil seal [A] on the left crankcase with a new one.
- Apply grease to the oil seal lips, and install the oil seal to the left crankcase.



- Install:
  - Countershaft [A]
  - Final Shaft [B]
- Replace the final gear case cover gasket with a new one.
- Install the dowel pins [C] and new gasket are in place on the left crankcase.
- Install the final gear case cover and tighten them bolt.

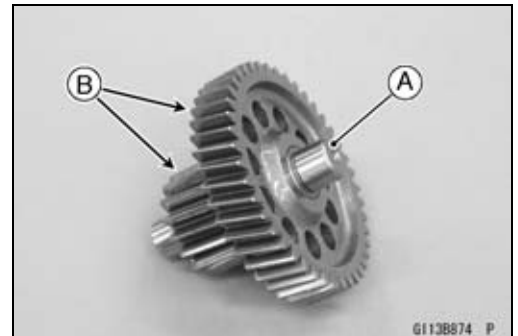
Torque - Final Gear Case Cover Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Fill the final gear case with final gear case oil (see Final Gear Case Oil Change in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).



Final Gear Case Inspection

- Disassembly the final gear case (see Final Gear Case Disassembly).
- Inspect the countershaft [A] and gears [B] for wear or damage.
- ★ If there is any damage, replace it.



- Inspect the final shaft [A] and gear [B] for wear or damage.
- ★ If there is any damage, replace it.



11-8 FINAL DRIVE

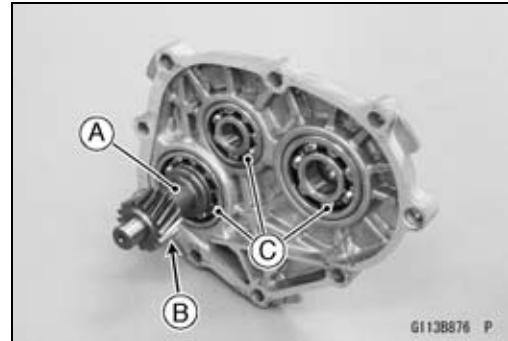
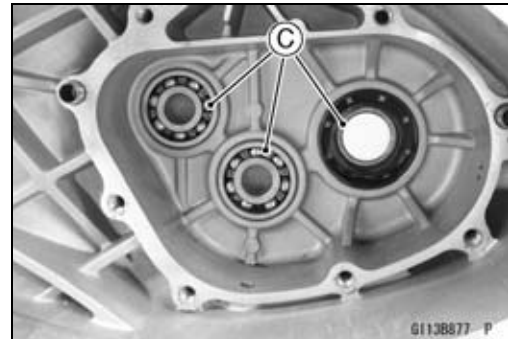
Final Gear Case

- Inspect the drive shaft [A] and gear [B] for wear or damage.
- ★ If there is any damage, replace it.

NOTE

○ When replacing the drive shaft, also replace the bearing and oil seal.

- Inspect the bearings [C] for excessive play or noise.
- ★ If there is any damage, replace it (see Final Gear Bearing Replacement).



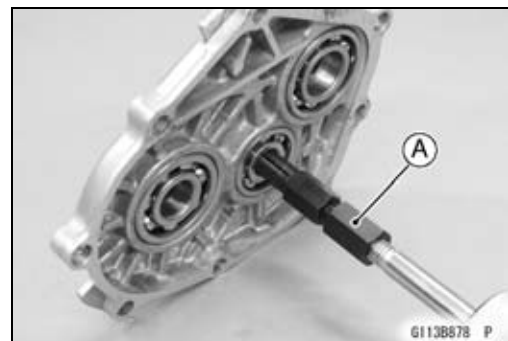
Final Gear Bearing Replacement

- Disassemble the final gear case (see Final Gear Case Disassembly).
- Remove the bearings.

Special Tool - Oil Seal & Bearing Remover [A]: 57001-Y024

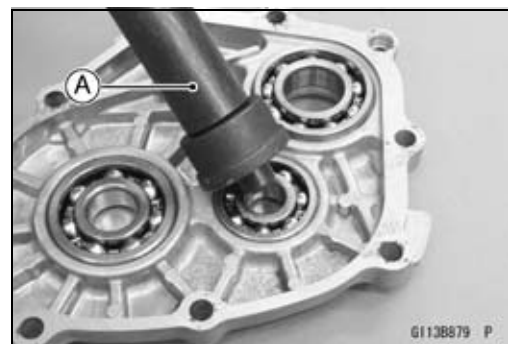
- For removing the final shaft bearing and the drive shaft bearing, use the bearing driver set.

Special Tool - Bearing Driver Set: 57001-1129



- Replace the bearings with new ones.
- Press the bearings until they are bottomed.

Special Tool - Bearing Driver Set [A]: 57001-1129



Brakes

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12-2 BRAKES

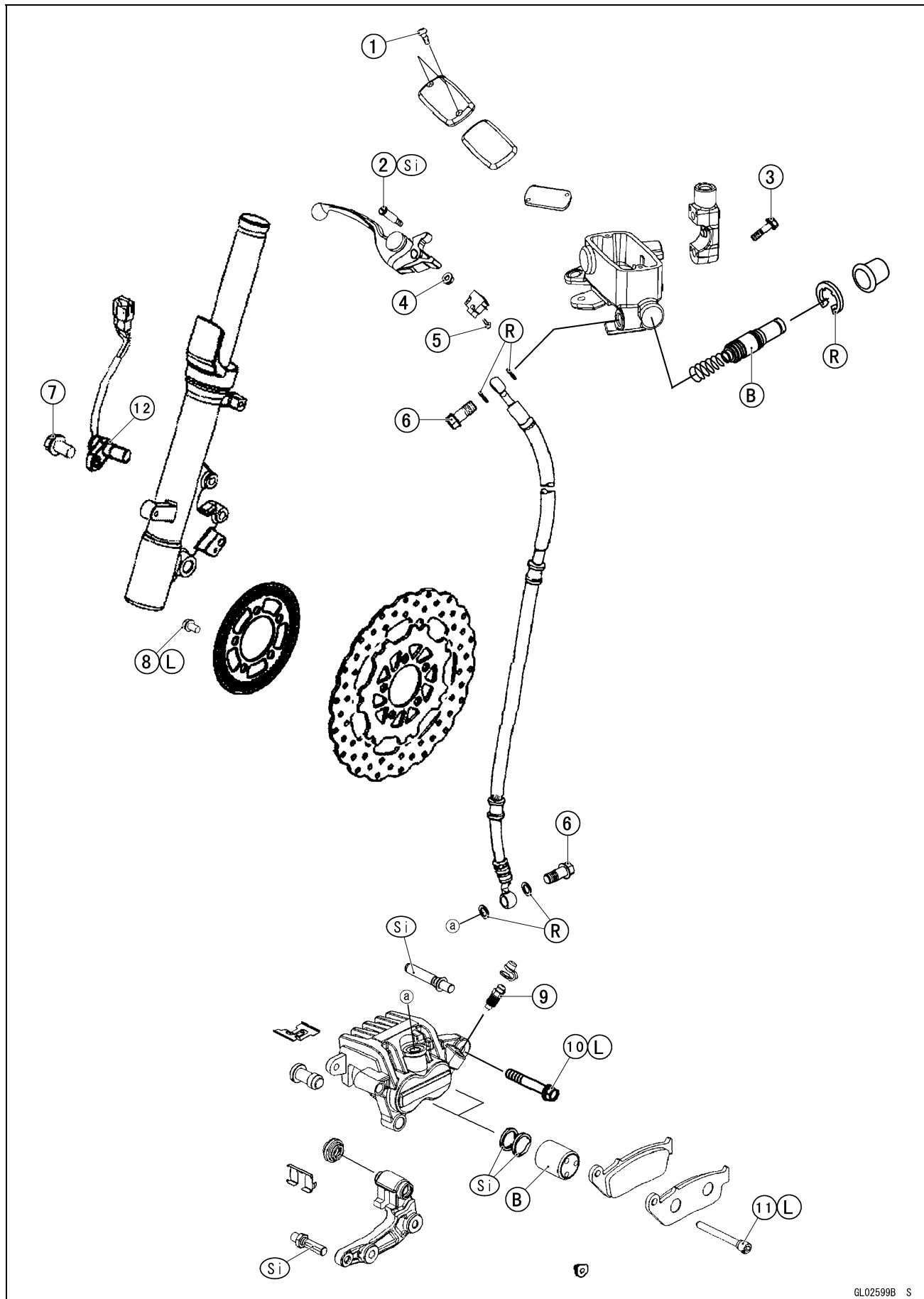
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Exploded View

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Exploded View

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Reservoir Cap Screws	1.6	0.16	14 in·lb	
2	Brake Lever Pivot Bolt	2.0	0.20	18 in·lb	Si
3	Master Cylinder Clamp Bolts	12	1.2	106 in·lb	
4	Brake Lever Pivot Bolt Locknut	9.8	1.0	87 in·lb	
5	Brake Light Switch Screw	1.0	0.10	8.9 in·lb	
6	Brake Hose Banjo Bolts	34	3.5	25	
7	Front Wheel Rotation Sensor Bolt	12	1.2	106 in·lb	
8	Brake Disc Mounting Bolts	34	3.5	25	L
9	Bleed Valves	5.4	0.55	48 in·lb	
10	Front Caliper Mounting Bolts	34	3.5	25	L
11	Brake Pad Pin	18	1.8	13	L

12. Speed Sensor (Front Wheel Rotation Sensor)

B: Apply brake fluid.

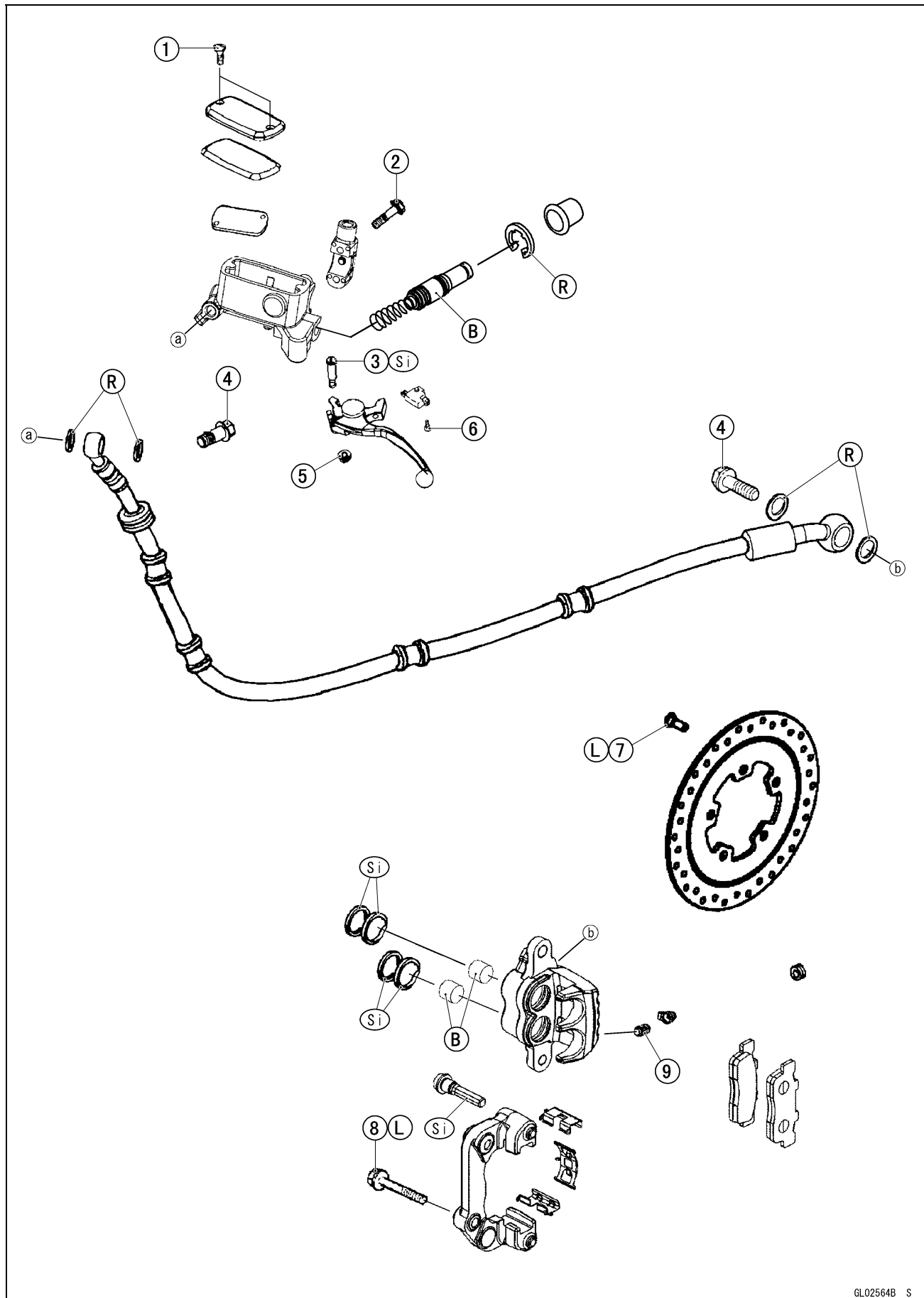
L: Apply a non-permanent locking agent.

R: Replacement Parts

Si: Apply silicone grease.

12-6 BRAKES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Reservoir Cap Screws	1.6	0.16	14 in·lb	
2	Master Cylinder Clamp Bolts	12	1.2	106 in·lb	
3	Brake Lever Pivot Bolt	2.0	0.20	18 in·lb	Si
4	Brake Hose Banjo Bolts	34	3.5	25	
5	Brake Lever Pivot Bolt Locknut	9.8	1.0	87 in·lb	
6	Brake Light Switch Screw	1.0	0.10	8.9 in·lb	
7	Brake Disc Mounting Bolts	34	3.5	25	L
8	Rear Caliper Mounting Bolts	34	3.5	25	L
9	Bleed Valves	5.4	0.55	48 in·lb	

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

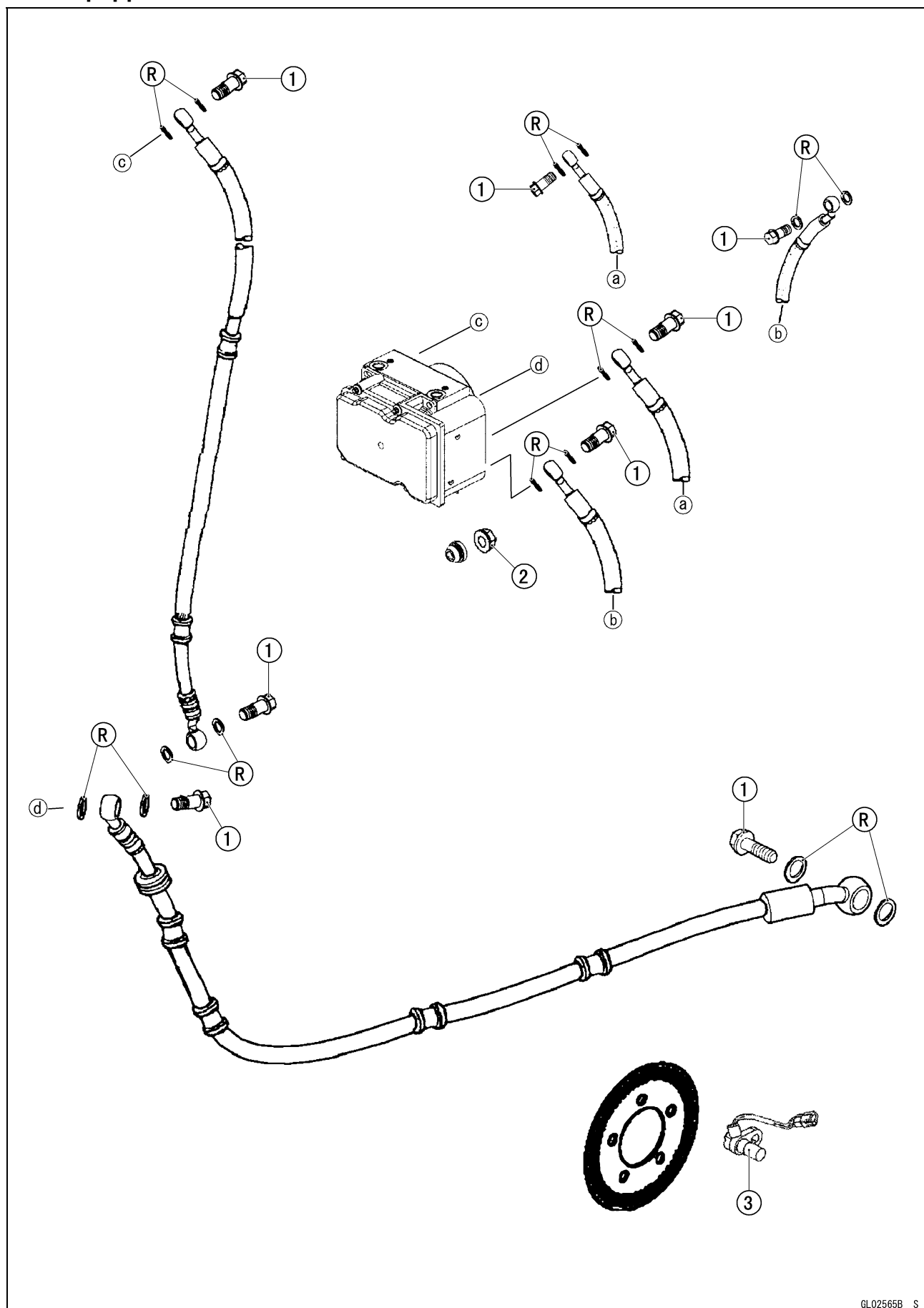
R: Replacement Parts

Si: Apply silicone grease.

12-8 BRAKES

Exploded View

ABS Equipped Model



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	34	3.5	25	
2	ABS Hydraulic Unit Mounting Nuts	7.8	0.80	69 in·lb	

3. Rear Wheel Rotation Sensor

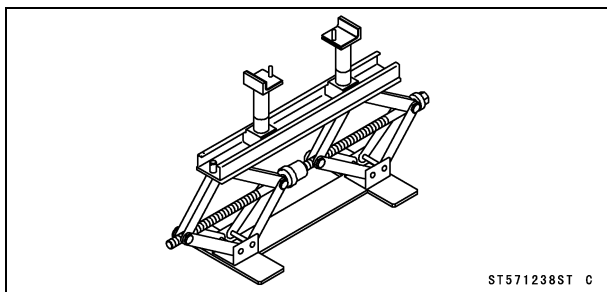
R: Replacement Parts

12-10 BRAKES

Specifications

Item	Standard	Service Limit
Brake Lever		
Brake Lever Position	4-way adjustable (to suit rider)	— — —
Brake Lever Free Play	Non-adjustable	— — —
Brake Pads		
Lining Thickness:		
Front	5 mm (0.20 in.)	1 mm (0.04 in.)
Rear	5.8 mm (0.23 in.)	1 mm (0.04 in.)
Brake Discs		
Thickness:		
Front	3.8 ~ 4.2 mm (0.15 ~ 0.17 in.)	3.0 mm (0.12 in.)
Rear	5.0 mm (0.20 in.)	4.0 mm (0.16 in.)
Runout	— — —	TIR 0.4 mm (0.016 in.)
Brake Fluid		
Grade	DOT4	— — —
ABS (Equipped Model)		
ABS Hydraulic Unit:		
Make	BOSCH	— — —
Wheel Rotation Sensor Air Gap:		
Front	0.4 ~ 1.2 mm (0.02 ~ 0.05 in.)	— — —
Rear	0.4 ~ 1.2 mm (0.02 ~ 0.05 in.)	— — —

Special Tool

Jack:**57001-1238**

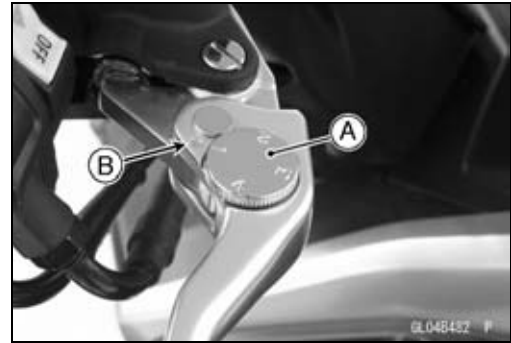
12-12 BRAKES

Brake Lever, Brake Pedal

Brake Lever Position Adjustment

The brake lever adjuster has 4 positions so that the brake lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the mark [B] on the lever.
- The distance from the grip to the lever is minimum at number 1 and maximum at number 4.



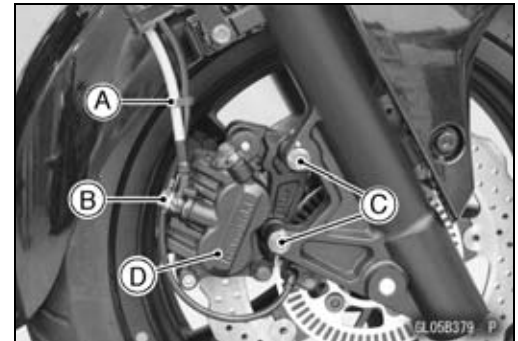
Calipers

Front Caliper Removal

- Remove the clamp [A].
- Loosen the banjo bolt [B] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [C], and remove the caliper [D] from the disc.
- Unscrew the banjo bolt and remove the brake hose from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

NOTICE

Immediately wash away any brake fluid that spills.

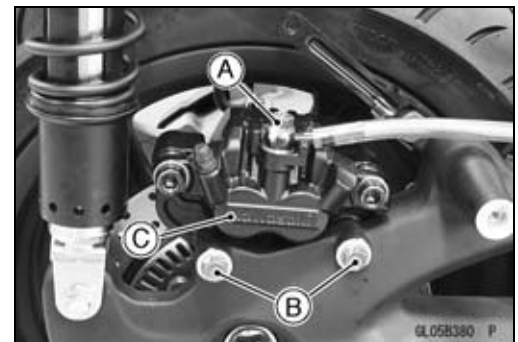


Rear Caliper Removal

- Remove:
  - Muffler Body (see Muffler Body Removal in the Engine Top chapter)
  - Mud Guard (see Mud Guard Removal in the Frame chapter)
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [B], and remove the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hoses from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

NOTICE

Immediately wash away any brake fluid that spills.



12-14 BRAKES

Calipers

Caliper Installation

- Install the caliper and brake hose lower end.
- Replace the washers on each side of hose fitting with new ones.
- Apply a non-permanent locking agent to the caliper mounting bolts.
- Tighten:
  - Torque - Front Caliper Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**
  - Rear Caliper Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**
  - Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**
- Install the removed parts (see appropriate chapters).
- Check the fluid level in the brake reservoirs.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Front Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Front Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Assembly

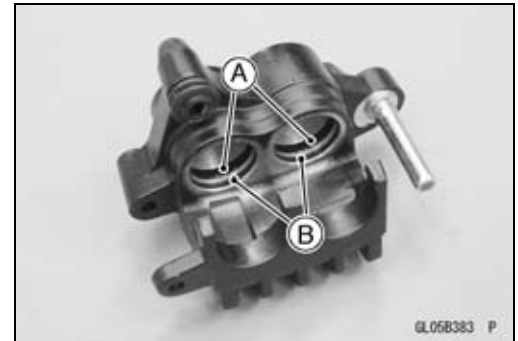
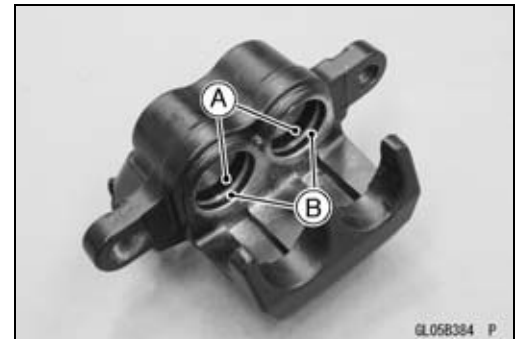
- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Calipers

Caliper Fluid Seal Damage Inspection

The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

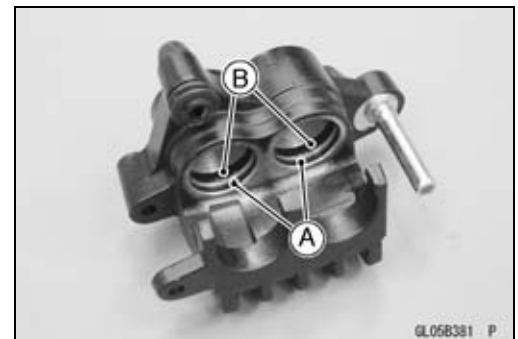
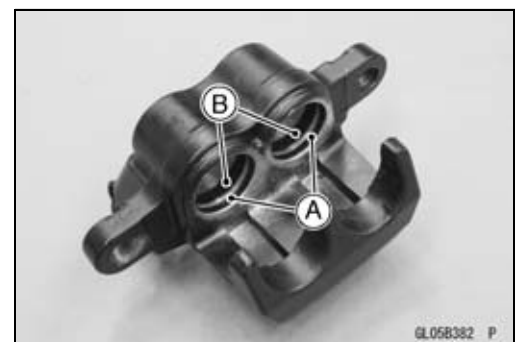
- Replace the fluid seal if it exhibits any of the conditions listed below.
  - Brake fluid leakage around the pad.
  - Brakes overheat.
  - Considerable difference in inner and outer pad wear.
  - Seal and piston are stuck together.
- ★ If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.



Caliper Dust Seal Damage Inspection

- Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.
- ★ If they show any damage, replace the dust seals with new ones.

Fluid Seals [B]

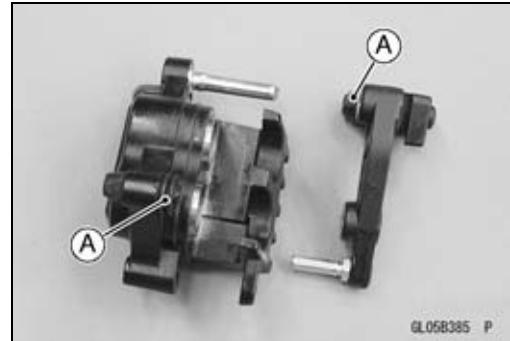
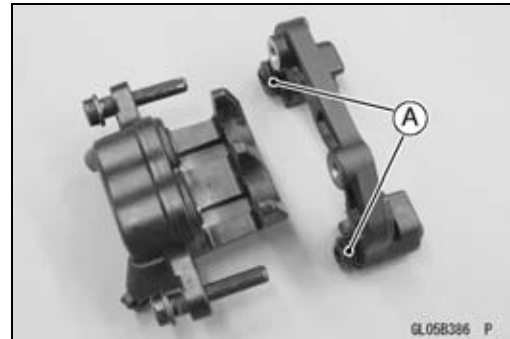


12-16 BRAKES

Calipers

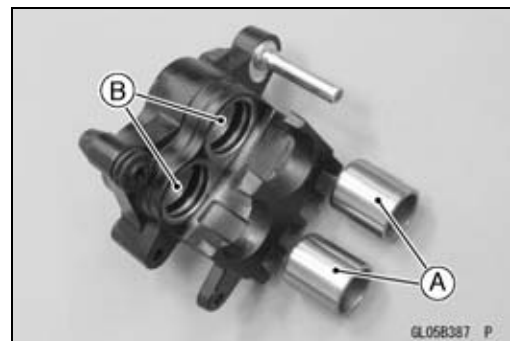
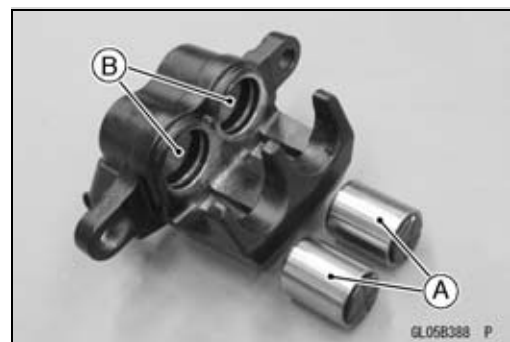
Caliper Friction Boot Damage Inspection

- Check that the friction boots [A] are not cracked, worn, swollen, or otherwise damaged.
- ★ If they show any damage, replace them.



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 scored or rusty.

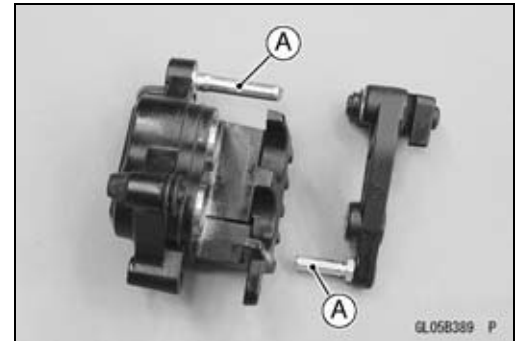
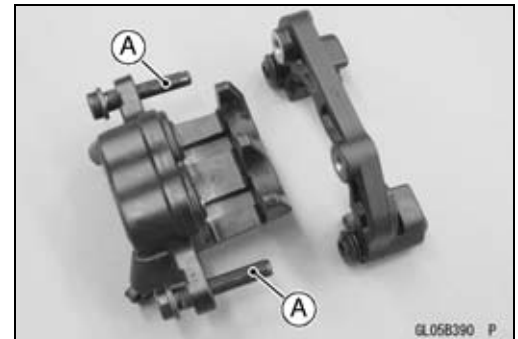


Calipers

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 are not damaged.
- ★ If the caliper holder pin is damaged, inspect the caliper holder for warp or deformation. If the caliper holder is in good condition, replace the caliper holder pins.

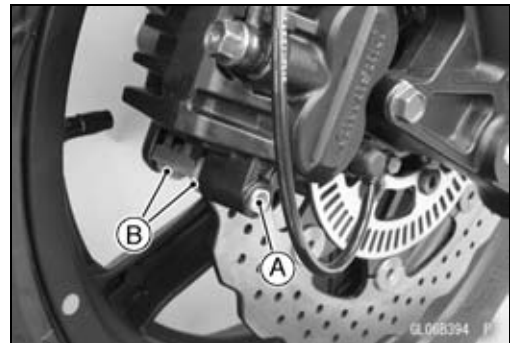


12-18 BRAKES

Brake Pads

Front Brake Pad Removal

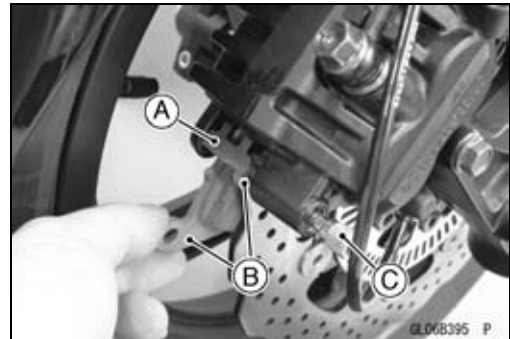
- Remove:
  - Pad Pin [A]
  - Brake Pads [B]



Front Brake Pad Installation

- Push the caliper pistons in by hand as far as they will go.
- Check that the pad spring [A] is in place on the caliper.
- Install the brake pads [B] and insert the pad pin.
- Apply a non-permanent locking agent to the threads of the brake pad pin [C].
- Tighten:

Torque - Brake Pad Pin: 18 N·m (1.8 kgf·m, 13 ft·lb)

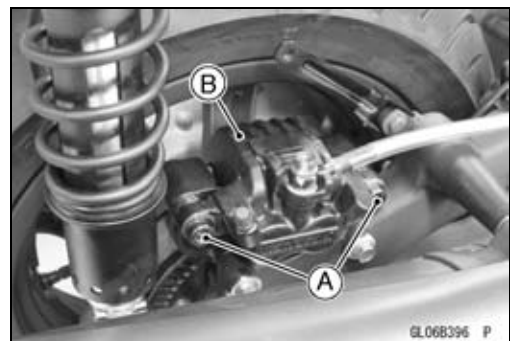


⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Rear Brake Pad Removal

- Remove:
  - Mud Guard (see Mud Guard Removal in the Frame chapter)
  - Rear Caliper Holder Pins [A]
  - Rear Caliper [B]



- Remove the brake pads [A].



Brake Pads

Rear Brake Pad Installation

- Push the caliper pistons in as far as they will go.
- Check that the pad springs are in place on the caliper.
- Install:
  - Brake Pads
  - Rear Brake Caliper
- Apply silicone grease to the shaft [A] of the caliper holder pins.
- Apply a non-permanent locking agent to the threads of the caliper holder pins.
- Install the caliper holder pins.



⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Brake Pad Wear Inspection

- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

12-20 BRAKES

Master Cylinder

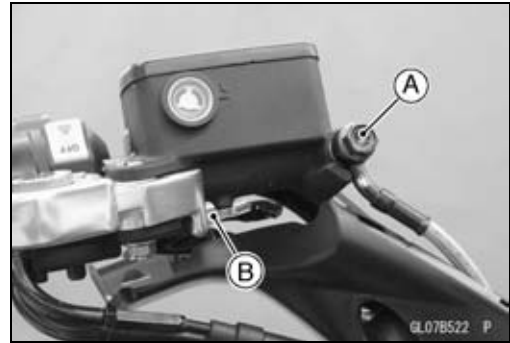
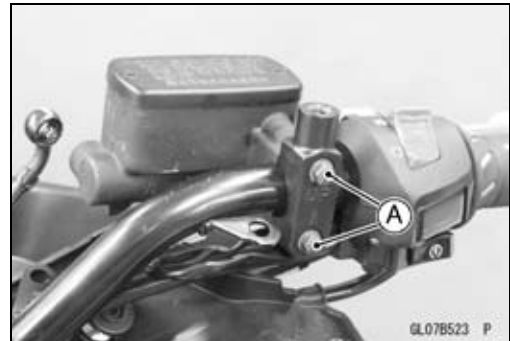
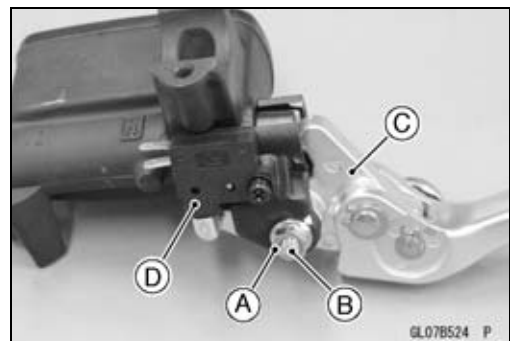
Master Cylinder Removal

- Remove:
    - Rear View Mirror (see Rear View Mirror Removal in the Frame chapter)
    - Upper Handlebar Cover (see Handlebar Cover Removal in the Frame chapter)
  - Remove the brake hose banjo bolt [A] and remove the brake hose from the master cylinder.
  - Disconnect the front brake light switch connectors [B].
-
- Remove the clamp bolts [A], and take off the master cylinder as an assembly with the reservoir, brake lever and front brake light switch installed.

NOTICE

Immediately wash away any brake fluid that spills.

- Remove:
  - Locknut [A] and Brake Lever Pivot Bolt [B]
  - Brake Lever [C]
  - Front Brake Light Switch [D]



Master Cylinder Installation

- Apply silicone grease to the sliding surface of the brake lever pivot bolt.
- Install the brake lever, and tighten the brake lever pivot bolt and locknut.
  - Torque - Brake Lever Pivot Bolt: 2.0 N·m (0.20 kgf·m, 18 in·lb)**
  - Brake Lever Pivot Bolt Locknut: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install the front brake light switch.
  - Torque - Brake Light Switch Screw: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)**

Master Cylinder

- Install the master cylinder to the handlebars.
- Fit the projection [A] into a hole [B] in the handlebars.
- Tighten the upper clamp bolt first, and then lower clamp bolt.

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

- Replace the washers that are on each side of the hose fitting with new ones.
- Tighten the brake hose banjo bolt.

Torque - Brake Hose Banjo Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.
- Install the removed parts (see appropriate chapters).

Master Cylinder Disassembly

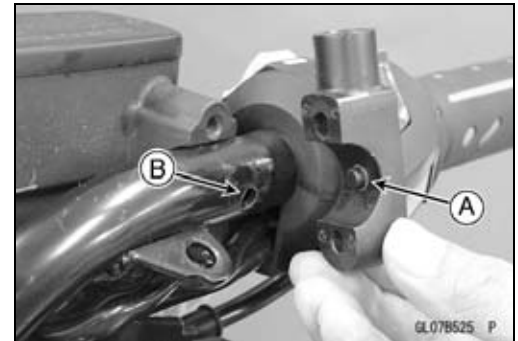
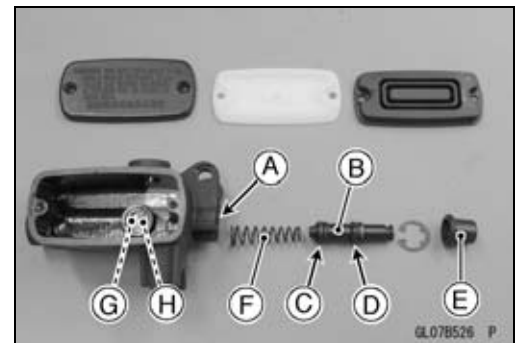
- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Inspection (Visual Inspection)

- Remove the master cylinder (see Master Cylinder Removal).
- Disassemble the master cylinder (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 the master cylinder and on the outside of the piston [B].
- ★ If a master cylinder or piston shows any damage, replace it.
- 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 cover [E] for damage.
- ★ If it is damaged, replace it.
- Check the piston return spring [F] for any damage.
- ★ If it is damaged, replace it.
- 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.

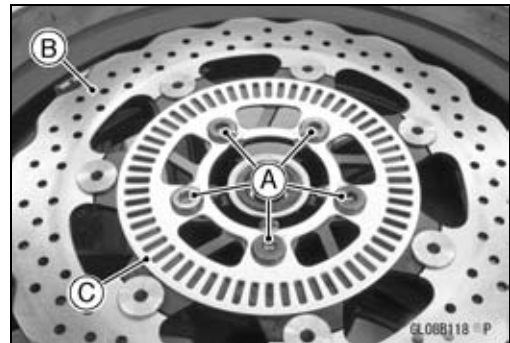


12-22 BRAKES

Brake Disc

Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
  - Remove the brake disc mounting bolts [A], and take off the disc [B].
  - Remove the wheel rotation sensor (speed sensor) rotor [C].
- For rear wheel, the rear brake disc has the wheel rotation sensor only on ABS model.



Brake Disc Installation

- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the threads of the brake disc mounting bolts.
- Tighten:
Torque - Brake Disc Mounting Bolts: 34 N·m (3.5 kgf·m, 25 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	3.8 ~ 4.2 mm (0.15 ~ 0.17 in.)
Rear	5.0 mm (0.20 in.)

Service Limit:

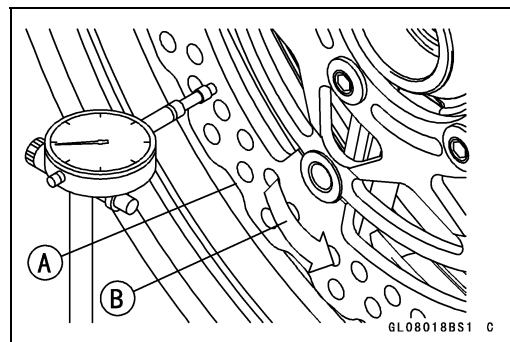
Front	3.0 mm (0.12 in.)
Rear	4.0 mm (0.16 in.)

Brake Disc Warp Inspection

- Raise the wheel off the ground with jack.
- Special Tool - Jack: 57001-1238**
- For front disc inspection, turn the handlebar fully to one side.
- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.
- ★ If runout exceeds the service limit, replace the disc.

Disc Runout

Service Limit: TIR 0.4 mm (0.016 in.)



Brake Fluid

Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Brake Fluid Change

- Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

Brake Line Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever has a soft or “spongy” feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTE

- *The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

- Remove:
  - Screw [A]
  - Brake Reservoir Cap [B]
  - Diaphragm Plate
  - Diaphragm

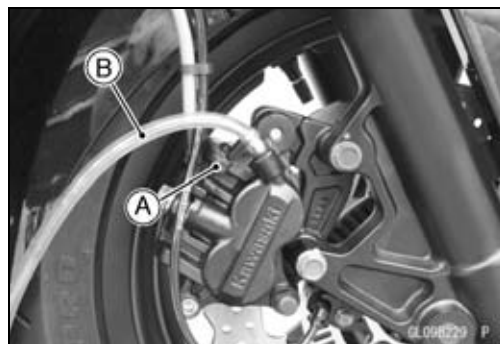


- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

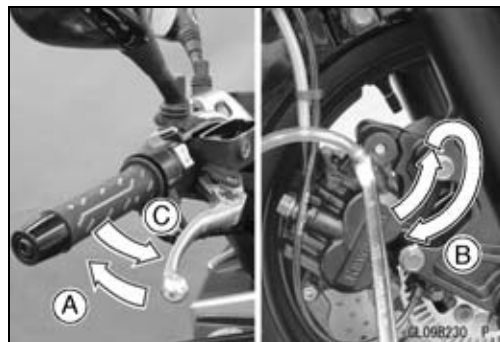
12-24 BRAKES

Brake Fluid

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



- Bleed the brake line and the caliper.
- Repeat this operation until no more air can be seen coming out into the plastic hose.
  1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
  2. Quickly open and close [B] the bleed valve while holding the brake applied.
  3. Release the brake [C].



NOTICE

After pumping the brake lever several times, releasing it without opening and closing of the bleed valve may cause brake fluid to be blown back from the master cylinder reservoir. Brake fluid spilt on painted surfaces and plastic parts will quickly damage them. Be sure to open and close the bleed valve.

NOTE

- *The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*
  - *Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*
  - Remove the clear plastic hose.
  - Install:
    - Diaphragm
    - Diaphragm Plate
    - Brake Reservoir Cap
- Torque - Brake Reservoir Cap Screws: 1.6 N·m (0.16 kgf·m, 14 in·lb)**
- Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)
  - Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
  - After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

Brake Fluid

** WARNING**

When working with the disc brake, observe the precautions listed below.

- Never reuse old brake fluid.
- Do not use fluid from a container that has been left unsealed or that has been open for a long time.
- Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
- Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
- Don't change the fluid in the rain or when a strong wind is blowing.
- Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning of the brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
- When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
- Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.
- If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE LINE.**

12-26 BRAKES

Brake Hose

Brake Hose Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

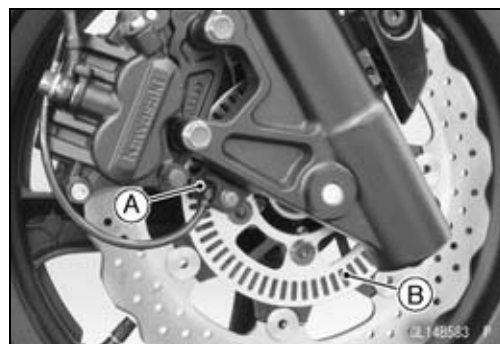
Brake Hose Inspection

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

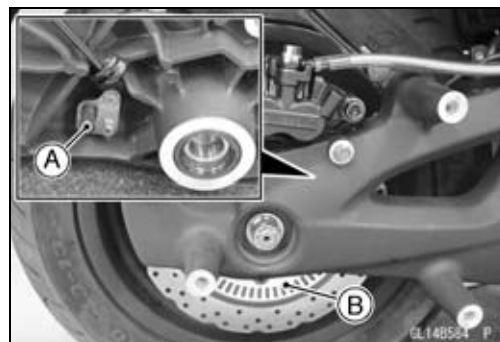
Anti-Lock Brake System (Equipped Model)

Parts Location

Front Wheel Rotation Sensor [A]
Front Wheel Rotation Sensor Rotor [B]



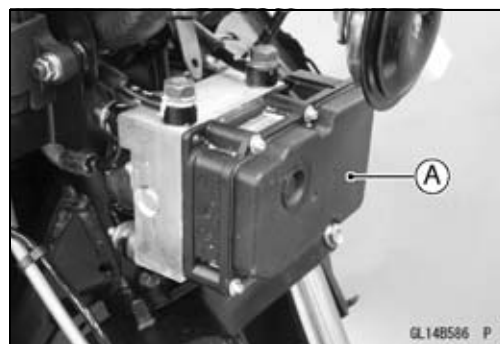
Rear Wheel Rotation Sensor [A]
Rear Wheel Rotation Sensor Rotor [B]



Yellow ABS Indicator Light [A]



ABS Hydraulic Unit [A]



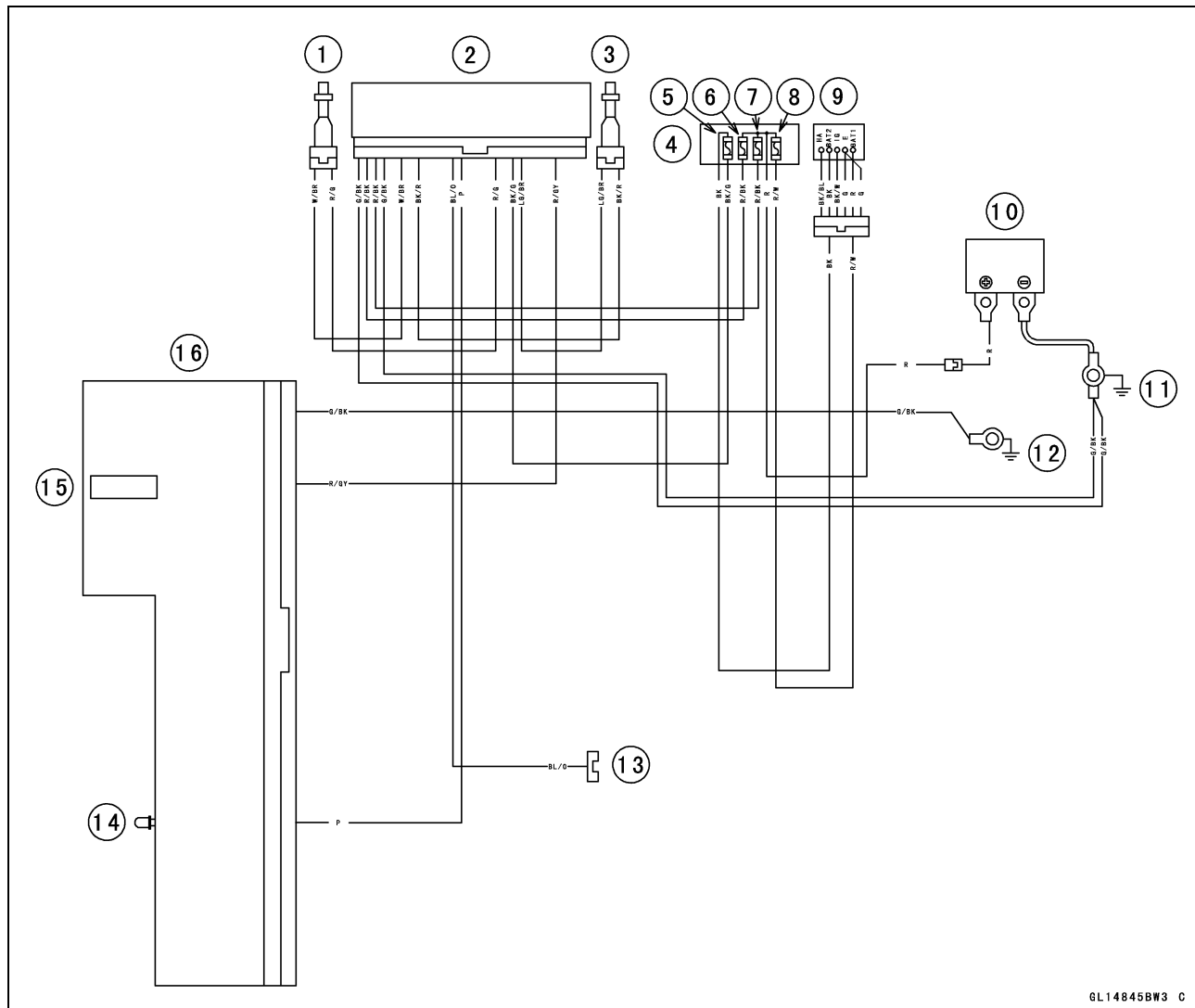
Fuse Box [A] (ABS Motor Relay Fuse 40 A, ABS Solenoid Valve Relay Fuse 25 A)



12-28 BRAKES

Anti-Lock Brake System (Equipped Model)

ABS System Wiring Diagram



GL14845BW3 C

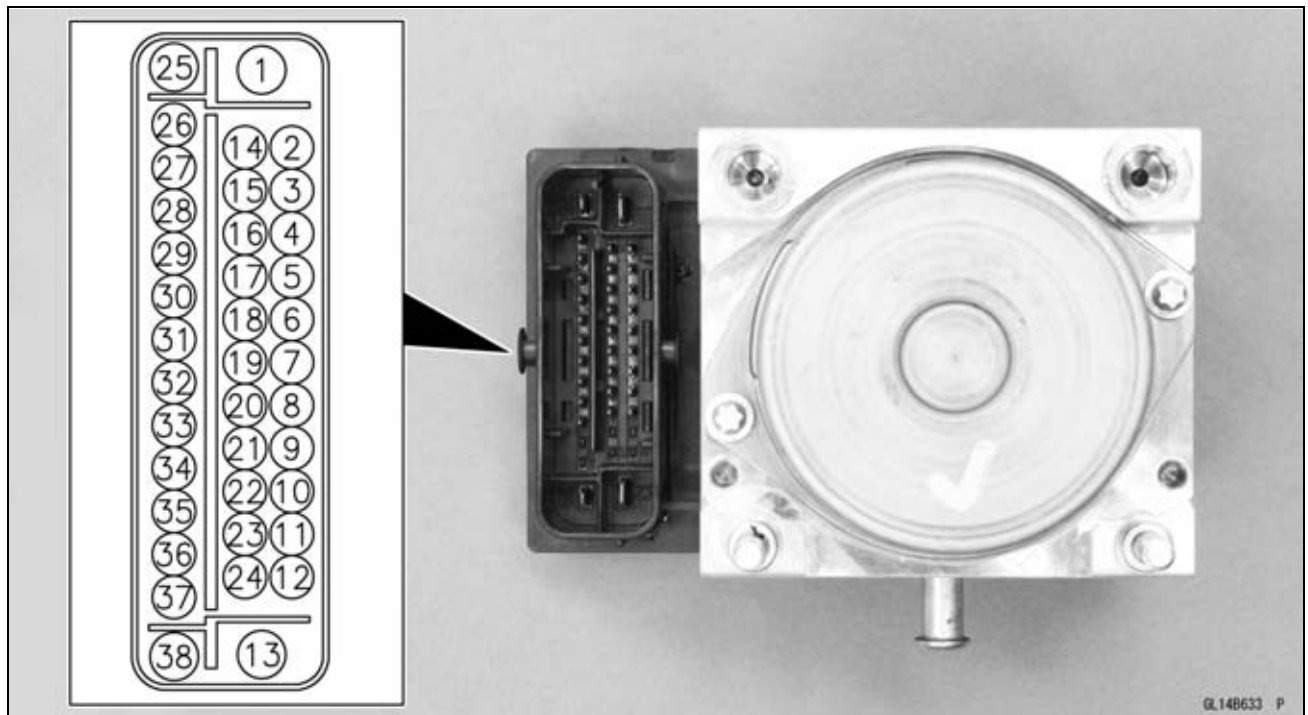
1. Front Wheel Rotation Sensor	9. Ignition Switch
2. ABS Hydraulic Unit	10. Battery 12 V 10 Ah
3. Rear Wheel Rotation Sensor	11. Engine Ground
4. Fuse Box	12. Frame Ground 1
5. Ignition Fuse 10 A	13. Self-Diagnosis System Connector
6. ABS Motor Relay Fuse 40 A	14. Yellow ABS Indicator Light (LED)
7. ABS Solenoid Valve Relay Fuse 25 A	15. Speedometer
8. Charging/ECU Fuse 30 A	16. Meter Unit

○Color Codes:

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

Anti-Lock Brake System (Equipped Model)

ABS Hydraulic Unit Terminal Names



1. Power Supply to ABS Motor Relay: R/BK	21. Power Supply to Front Wheel Rotation Sensor: R/G
2. Unused	22. Front Wheel Rotation Sensor Signal Output: W/BR
3. Unused	23. Unused
4. Yellow ABS Indicator Light (LED): P	24. Unused
5. Unused	25. Power Supply to ABS Solenoid Valve Relay: R/BK
6. Unused	26. Unused
7. Unused	27. Unused
8. Unused	28. Unused
9. Unused	29. Unused
10. Unused	30. Unused
11. Unused	31. Rear Wheel Rotation Sensor Signal Output: BK/R
12. Unused	32. Power Supply: BK/G
13. Ground to Motor: G/BK	33. Unused
14. Unused	34. Unused
15. Unused	35. Unused
16. Signal to Speedometer: R/GY	36. Unused
17. Self-Diagnosis System Terminal: BL/O	37. Unused
18. Unused	38. Ground: G/BK
19. Unused	
20. Power Supply to Rear Wheel Rotation Sensor: LG/BR	

12-30 BRAKES

Anti-Lock Brake System (Equipped Model)

ABS Servicing Precautions

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

- This ABS system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ABS hydraulic unit.
- To prevent damage to the ABS parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Do not turn the ignition switch on while any of the ABS electrical connectors are disconnected.
- Do not spray water on the electrical parts, ABS parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the ABS system is not influenced by electric wave radiated from the antenna. Locate the antenna as far as possible away from the ABS hydraulic unit.
- Whenever the ABS electrical connections are to be disconnected, first turn off the ignition switch.
- The ABS parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- The ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the ABS parts, replace it.
- The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever has a soft or “spongy” feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTICE

Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.

Anti-Lock Brake System (Equipped Model)

- The Yellow ABS indicator light (LED) [A] may light if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light lights, remedy the problem.

⚠ WARNING

Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.



- The yellow ABS indicator light (LED) may come on if the engine is run with the motorcycle on the center stand, and the rear wheel turns.
- When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever.
- Before delivering the motorcycle to the customer, test run the motorcycle at a speed of more than 20 km/h (12 mph) to see that the yellow ABS indicator light (LED) does not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (20 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (The reaction force generated is felt in the brake lever and pedal.). This completes the final inspection.

ABS Troubleshooting Outline

Even when the ABS is operating normally, the yellow ABS indicator light (LED) may light up under the conditions listed below. Turn the ignition switch off to stop the indicator light. If the motorcycle runs without remedying the problem, the light may light up again.

- After continuous riding on a rough road.
- When the engine is started with the center stand raised, and the rear wheel turns.
- When accelerating so abruptly that the front wheel leaves the ground.
- When the ABS has been subjected to strong electrical interference.
- When tire pressure is abnormal. Adjust tire pressure.
- When a tire different in size from the standard size is being used. Replace with standard size.
- When the wheel is deformed. Replace the wheel.

Much of the ABS troubleshooting work consists of confirming continuity of the wiring. The ABS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the ABS hydraulic unit.

The basic troubleshooting procedures are listed below.

- Carry out the preliminary inspection.
- Carry out the general inspection.
- Check the wiring and connections from the ABS hydraulic unit connector to the suspected faulty ABS part, using a tester.

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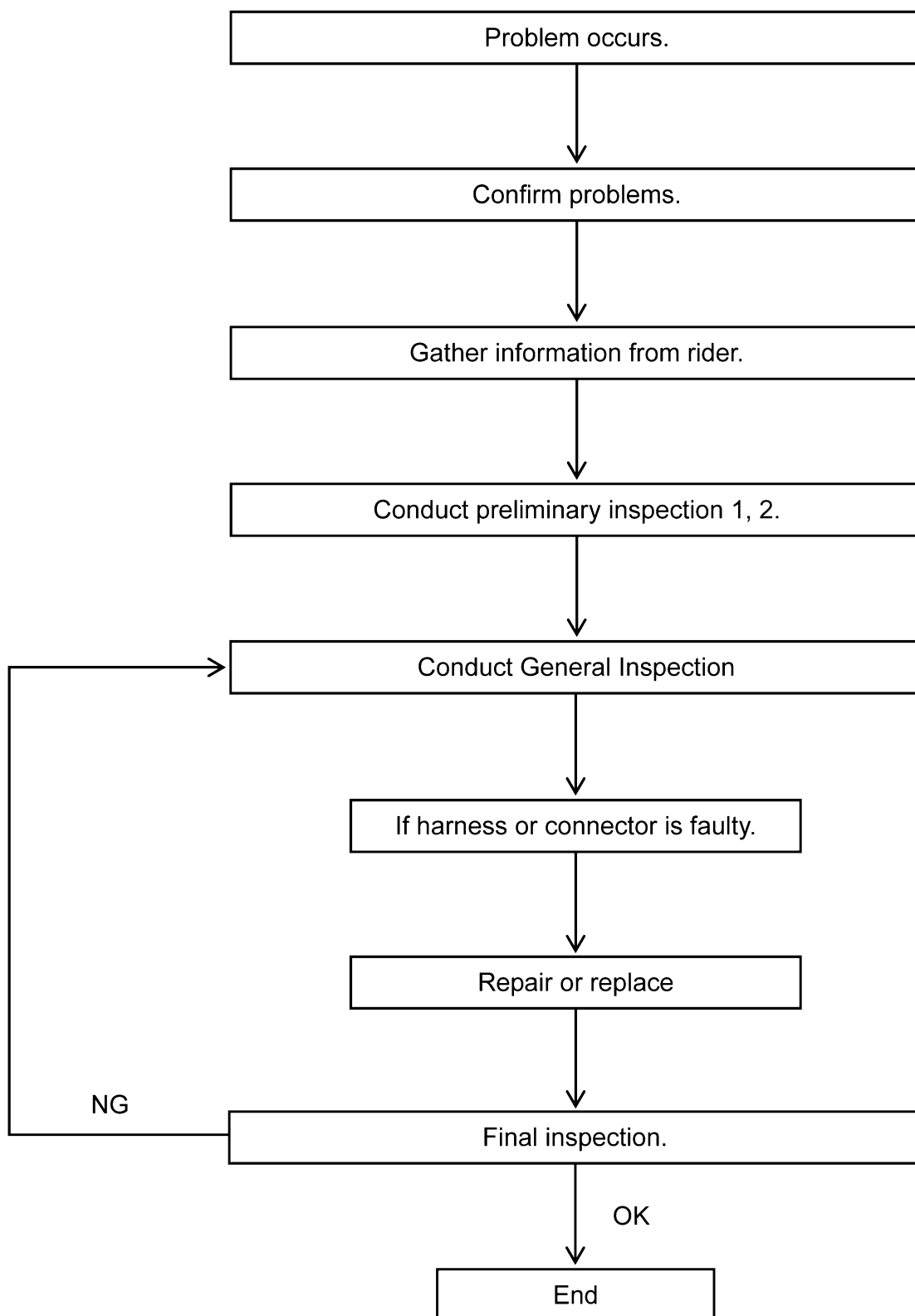
Anti-Lock Brake System (Equipped Model)

- Visually inspect the wiring for signs of burning or fraying.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector apart and inspect it for corrosion, dirt and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect the tester between the ends of the leads.
- ★ If the tester does not read about 0 Ω , the lead is defective. Replace the main harness if necessary.

- Narrow down suspicious parts and close in on the faulty ABS part by repeating the continuity tests.
- ★ If no abnormality is found in the wiring or connectors, the ABS parts are the next likely suspects. Check each part one by one.
- ★ If an abnormality is found, replace the affected ABS part.

Anti-Lock Brake System (Equipped Model)

ABS Diagnosis Flow Chart



12-34 BRAKES

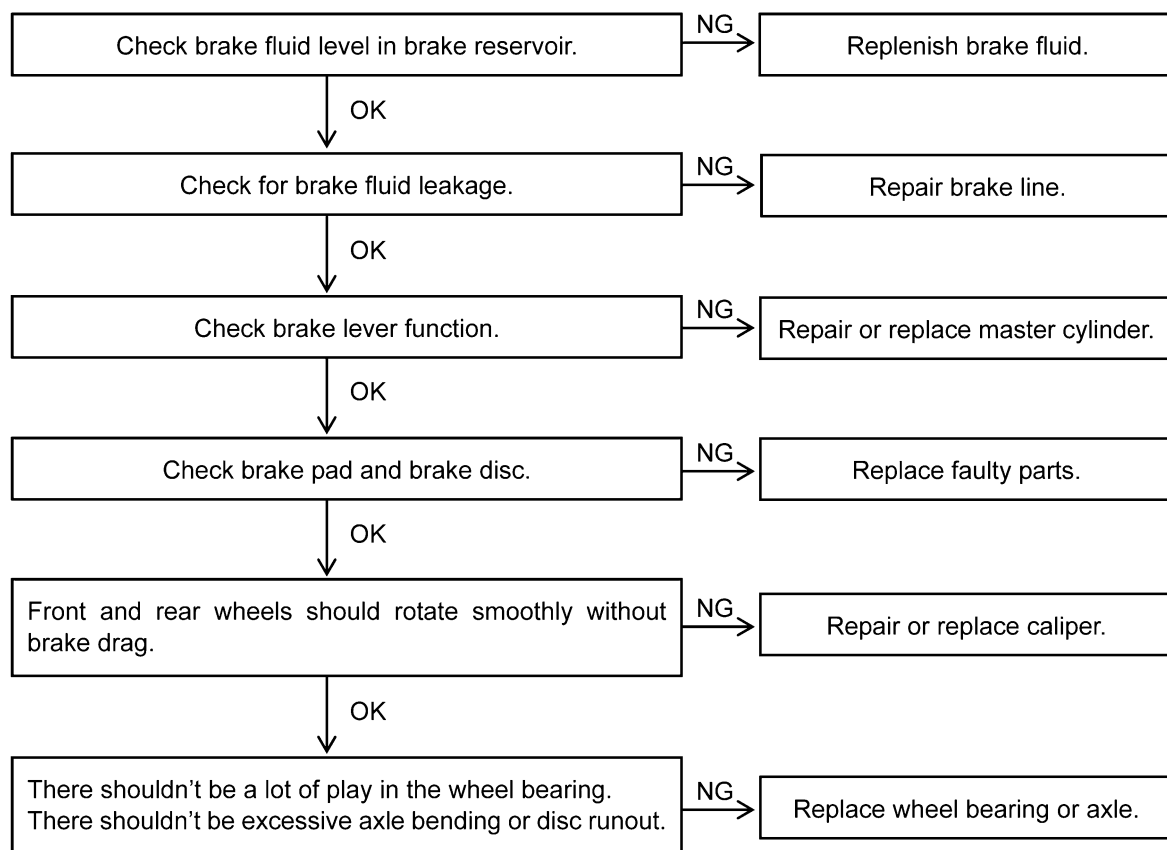
Anti-Lock Brake System (Equipped Model)

Inquiries to Rider

- Each rider reacts to problems in different ways, so it is important to confirm what kind of condition the rider is dissatisfied with.
- Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the shop.
- The diagnosis sheet will help prevent you from overlooking any keys, so always use it.

Sample Diagnosis Sheet

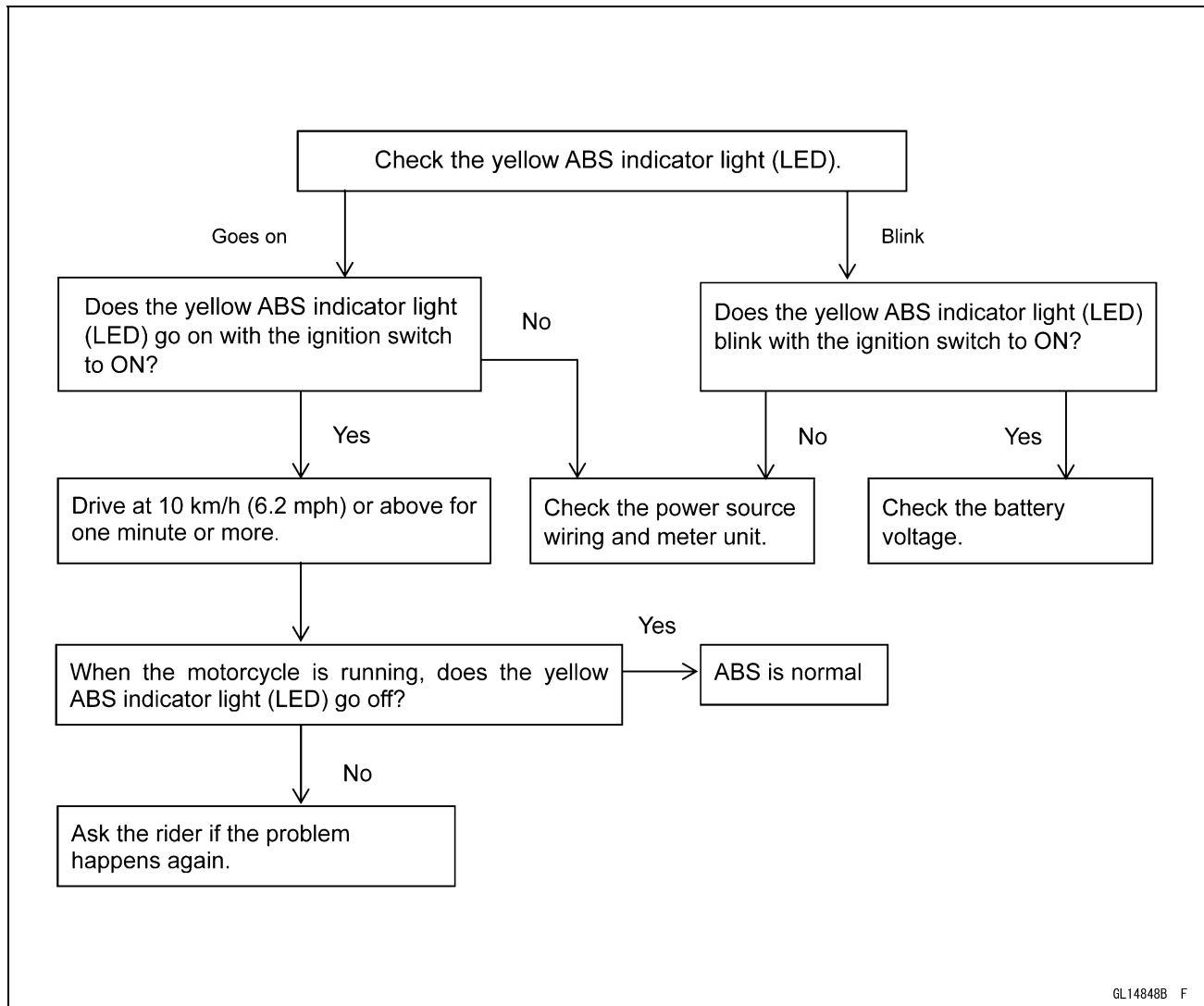
Rider name:		Registration No. (license plate No.):	
Year of initial registration:		Model:	
Engine No.:		Frame No.:	
Date problem occurred:		Frequency:	
Weather:		Mileage:	
Phenomenon	☐ Brake lever vibration or noise		
	☐ Yellow ABS indicator light (LED) blinks		
	☐ Yellow ABS indicator light (LED) remains lit up		
	☐ Braking distance too long		
	☐ Abnormal brake lever movement		
	☐ ABS not working		
	☐ ABS works but yellow ABS indicator light (LED) doesn't light up		
	☐ ABS operating too frequently		
Engine conditions at problem	☐ At start-up ☐ After starting ☐ At 5 000 r/min (rpm) or more		
Road conditions	☐ Slippery road (☐ snow, ☐ gravel, ☐ other) ☐ Rough surface ☐ Other		
Driving conditions	☐ High-speed cornering ☐ Driving 30 km/h (19 mph) or above ☐ Driving below 30 km/h (19 mph) ☐ When stopping ☐ When turning		
Brake application	☐ Gradual ☐ Abrupt		
Other conditions	☐ Large brake lever stroke		

Anti-Lock Brake System (Equipped Model)**Preliminary Inspection 1**

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Anti-Lock Brake System (Equipped Model)

Preliminary Inspection 2



Yellow ABS Indicator Light (LED) Inspection

- In this model, the yellow ABS indicator light (LED) [A] goes on by the control of the ABS hydraulic unit.
- Refer to the meter operation Inspection in the Electrical System chapter.



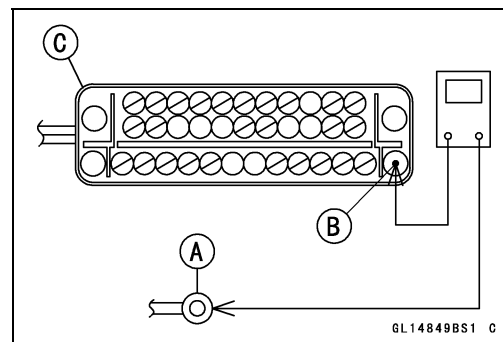
ABS Solenoid Valve and Relay Inspection

- Check the ABS solenoid valve relay fuse (25 A) [A] (see Fuse Inspection in the Electrical System chapter).



Anti-Lock Brake System (Equipped Model)

- ★ If the fuse is good, check the wiring continuity between the positive (+) terminal [A] of the battery and R/BK lead terminal [B] in the ABS Hydraulic Unit Connector [C].
- Disconnect the ABS hydraulic unit connector.
- ★ If the wiring is open, replace or repair the harness (see ABS System Wiring Diagram).
- ★ If the wiring is good, replace the ABS hydraulic unit.



Front, Rear Wheel Rotation Difference Abnormal (Deviation between Wheel Speeds)

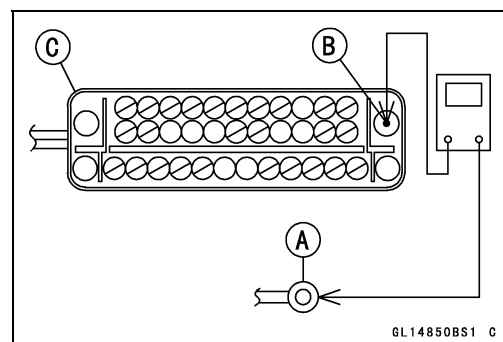
- Check the following and correct the faulty part.
  - Incorrect Tire Pressure
    - Tires not recommended for the motorcycle were installed (incorrect tire size).
  - Deformation of Wheel or Tire
  - Missing Teeth and Clogging with Foreign Matter of Sensor Rotor (see Wheel Rotation Sensor Inspection)

ABS Motor Relay Inspection

- Check the ABS motor relay fuse (40 A) [A] (see Fuse Inspection in the Electrical System chapter).

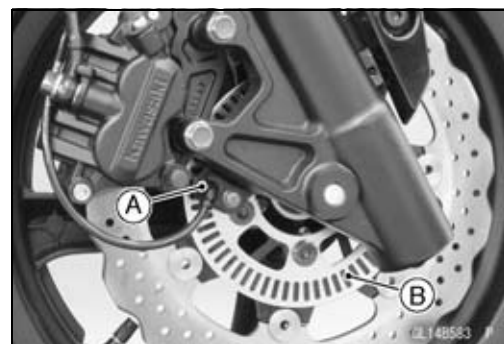


- ★ If the fuse is good, check the wiring continuity between the positive (+) terminal [A] of the battery and R/BK lead terminal [B] in the ABS hydraulic unit connector [C].
- Disconnect the ABS hydraulic unit connector.
- ★ If the wiring is open, replace or repair the harness (see ABS System Wiring Diagram).
- ★ If the wiring is good, replace the ABS hydraulic unit.



Wheel Rotation Sensor Signal Abnormal

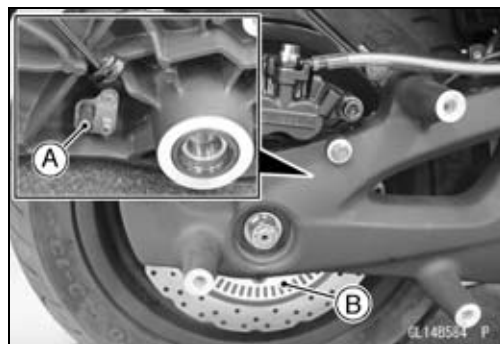
- Measure the air gap between the wheel rotation sensor [A] and sensor rotor [B] (see Wheel Rotation Sensor Air Gap Inspection).
- Check the wheel rotation sensor (see Wheel Rotation Sensor Inspection).
- ★ If both inspections are good, go to the next step.



12-38 BRAKES

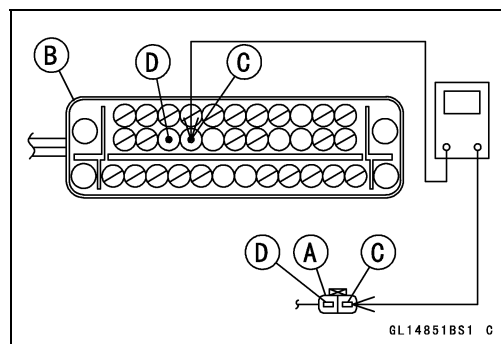
Anti-Lock Brake System (Equipped Model)

- Check that there is iron or other magnetic deposits between the sensor [A] and sensor rotor [B], and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).
- ★ If the sensor rotor is in bad condition, remove the any deposits. Install the proper part or replace faulty part.



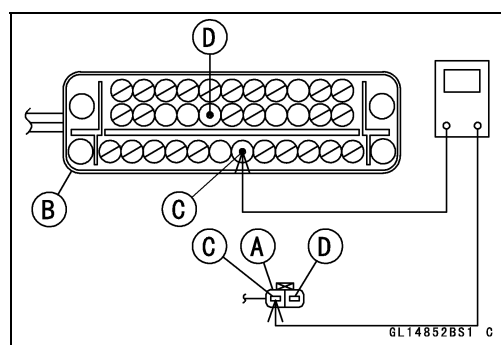
Front Wheel Rotation Sensor Wiring Inspection

- Disconnect:
  - ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal)
  - Front Wheel Rotation Sensor Connector (see Front Wheel Rotation Sensor Removal)
- Check the wiring continuity of the R/G lead and W/BR lead.
  - Front Wheel Rotation Sensor Lead Connector [A]
  - ABS Hydraulic Unit Lead Connector [B]
  - R/G Lead Terminal [C]
  - W/BR Lead terminal [D]
- ★ If the wiring is open, replace or repair the harness (see ABS System Wiring Diagram).



Rear Wheel Rotation Sensor Wiring Inspection

- Disconnect:
  - ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal)
  - Rear Wheel Rotation Sensor Connector (see Rear Wheel Rotation Sensor Removal)
- Check the wiring continuity of the BK/R lead and LG/BR lead.
  - Rear Wheel Rotation Sensor Lead Connector [A]
  - ABS Hydraulic Unit Lead Connector [B]
  - BK/R Lead Terminal [C]
  - LG/BR Lead terminal [D]
- ★ If the wiring is open, replace or repair the harness (see ABS System Wiring Diagram).



Anti-Lock Brake System (Equipped Model)

ABS Hydraulic Unit Removal

NOTICE

The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface.

Be careful not to get water or mud on the ABS hydraulic unit.

- Drain the brake fluid from the front and rear brake lines.
- Drain the brake fluid through the bleed valve by pumping the brake lever and pedal.
- Clean the ABS hydraulic unit.

NOTICE

Clean all fittings on the ABS hydraulic unit and the rear master cylinder because dirt around the banjo bolts could contaminate the brake fluid in the line during removal/installation.

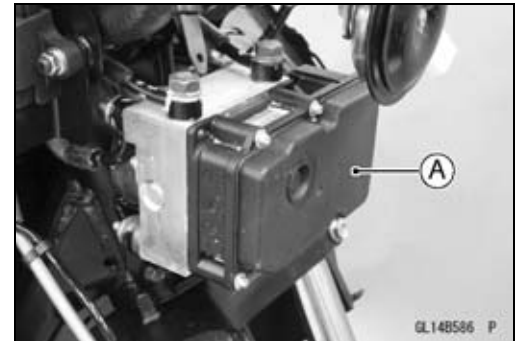
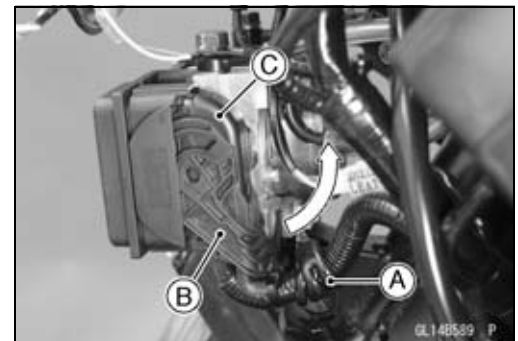
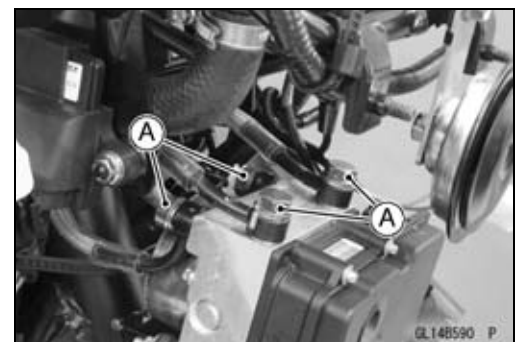
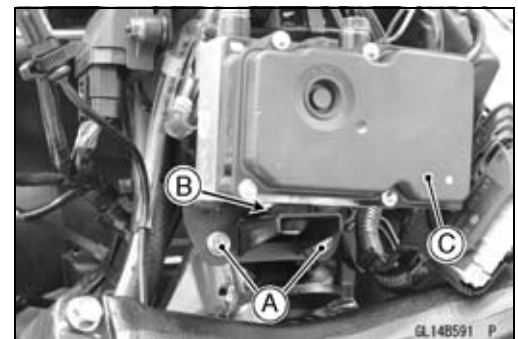
Spread over a shop towel around the ABS hydraulic unit before removing the brake line so that brake fluid does not leak on the parts.

- Open the clamp [A].
- Pull the lever [B] upward to disconnect the ABS hydraulic unit connector [C].
- Remove:
Brake Pipe Banjo Bolts [A]

NOTICE

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

- Remove the bolts [A].
- Clear the projection [B], and remove the ABS hydraulic unit [C] together with the bracket.



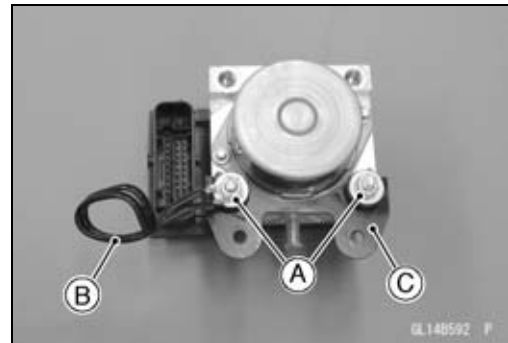
12-40 BRAKES

Anti-Lock Brake System (Equipped Model)

- Remove:
  - ABS Hydraulic Unit Mounting Nuts [A]
  - Clamp [B]
  - Bracket [C]

NOTICE

The ABS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the ABS hydraulic unit.

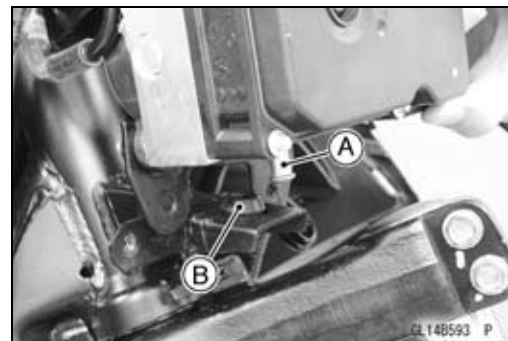


ABS Hydraulic Unit Installation

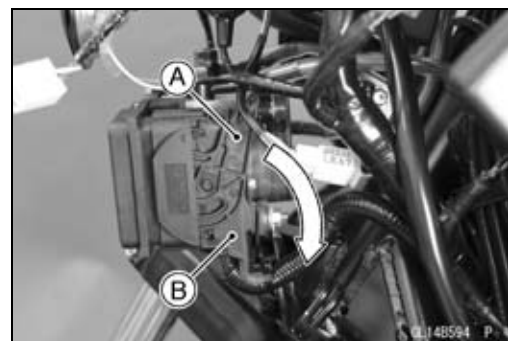
NOTICE

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

- Install the bracket and clamp to the ABS hydraulic unit, and tighten the ABS hydraulic unit mounting nuts.
Torque - ABS Hydraulic Unit Mounting Nuts: 7.8 N·m (0.80 kgf·m, 69 in·lb)
- Insert the projection [A] into the grommet [B], and tighten the bolts.
- Replace the washers that are on each side of hose fitting with new ones.
- Install the brake hoses (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:
Torque - Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)



- Pull the lever [A] downward to connect the ABS hydraulic unit connector [B].
- Hold the ABS hydraulic unit lead with the clamp.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.
- Install the removed parts (see appropriate chapters).



ABS Hydraulic Unit Inspection

- Disconnect the ABS hydraulic unit connector (see ABS Hydraulic Unit Removal).
- Visually inspect the connector terminals [A].
- ★ Replace the ABS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.
- ★ If the ABS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.
- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal).
- Visually inspect the ABS hydraulic unit.
- ★ Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.



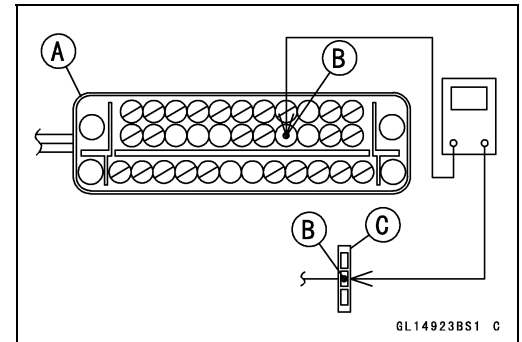
Anti-Lock Brake System (Equipped Model)

Power Supply Inspection

- When the supply voltage is too low voltage or too high voltage, check the ABS hydraulic unit connector (see ABS Hydraulic Unit Inspection).
- ★ If the connector is good, check the battery condition (see Charging Condition Inspection in the Electrical System chapter).
- ★ If the battery condition is good, check the charging voltage condition (see Charging Voltage Inspection in the Electrical System chapter).

ABS ECU Inspection

- Check the power supply voltage (see Power Supply Inspection).
- ★ If the power supply voltage is good, check the wiring continuity BL/O lead.
  - ABS Hydraulic Unit Lead Connector [A]
  - BL/O Lead Terminal [B]
  - Self-Diagnosis System Connector [C]
- ★ If the wiring is open, replace or repair the harness (see ABS System Wiring Diagram).
- ★ If the wiring is good, replace the ABS hydraulic unit.



ABS Motor Inspection

- ★ If the ABS motor has a problem, refer to the ABS Motor Relay Inspection.

Intake Valve and Outlet Valve Inspection

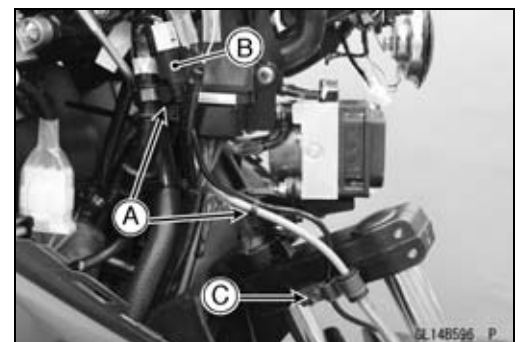
- ★ If the intake and outlet valves have a problem, refer to the ABS Solenoid Valve and Relay Inspection.

Front Wheel Rotation Sensor Removal

NOTICE

The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. Do not try to disassemble or repair the wheel rotation sensor.

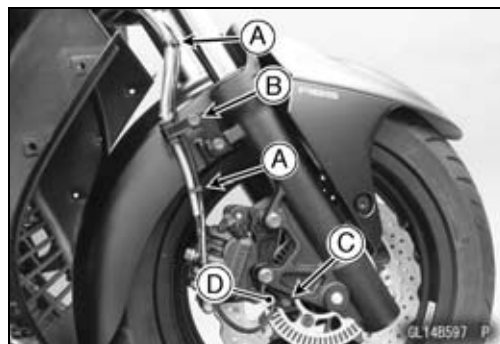
- Remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Clear the sensor lead and connector from the clamps [A].
- Disconnect the front wheel rotation sensor lead connector [B].
- Remove the clamp bolt [C], and open the clamp.



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Anti-Lock Brake System (Equipped Model)

- Clear the sensor lead from the clamps [A].
- Remove the clamp bolt [B], and open the clamp.
- Remove:
  - Bolt [C]
  - Front Wheel Rotation Sensor [D]



Front Wheel Rotation Sensor Installation

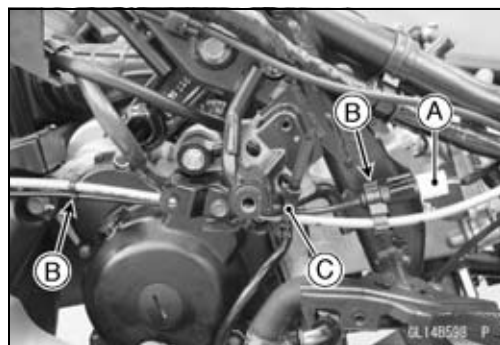
- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Rear Wheel Rotation Sensor Removal

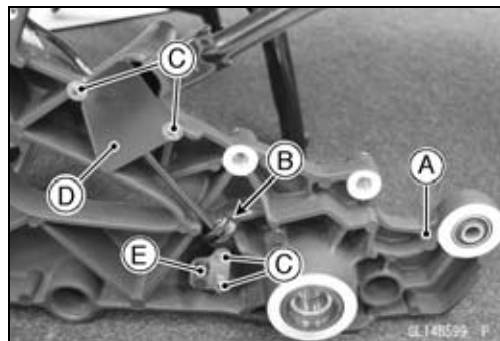
NOTICE

The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. Do not try to disassemble or repair the wheel rotation sensor.

- Remove the right side fairing (see Side Fairing Removal in the Frame chapter).
- Disconnect the rear wheel rotation sensor lead connector [A].
- Clear the sensor lead and connector from the clamps [B].
- Remove the bands [C].



- Remove the sub frame [A] (see Rear Wheel Removal in the Wheels/Tires chapter).
- Open the clamp [B].
- Remove:
  - Bolts [C]
  - Cover [D]
  - Rear Wheel Rotation Sensor [E]



Rear Wheel Rotation Sensor Installation

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

Anti-Lock Brake System (Equipped Model)

Wheel Rotation Sensor Inspection

- Remove the front wheel rotation sensor [A] from the front fork (see Front Wheel Rotation Sensor Removal).
- Remove the sub frame to inspect the rear wheel rotation sensor [B] (see Rear Wheel Removal in the Wheels/Tires chapter).
- Visually inspect the wheel rotation sensors.
- ★ Replace the wheel rotation sensor if it is cracked, bent, or otherwise damaged.



Wheel Rotation Sensor Air Gap Inspection

- Raise the front/rear wheel off the ground (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Measure the air gap between the sensor and sensor rotor at several points by turning the wheel slowly.
Thickness Gauge [A]

Air Gap

Standard:

Front	0.4 ~ 1.2 mm (0.02 ~ 0.05 in.)
Rear	0.4 ~ 1.2 mm (0.02 ~ 0.05 in.)

NOTE

○ The sensor air gap cannot be adjusted.

- ★ If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection in the Wheels/Tires chapter), sensor installation condition and sensor (see Wheel Rotation Sensor Inspection).

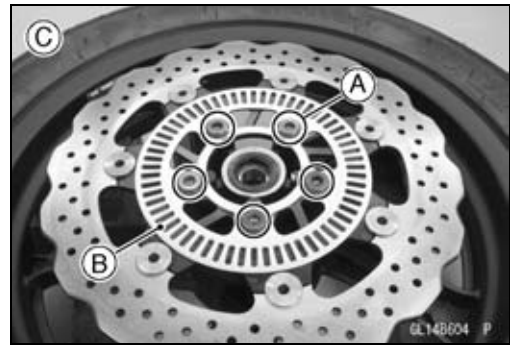
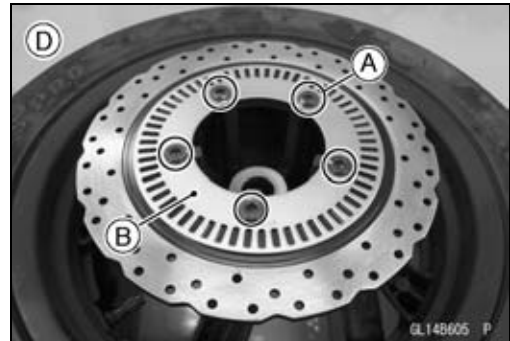


12-44 BRAKES

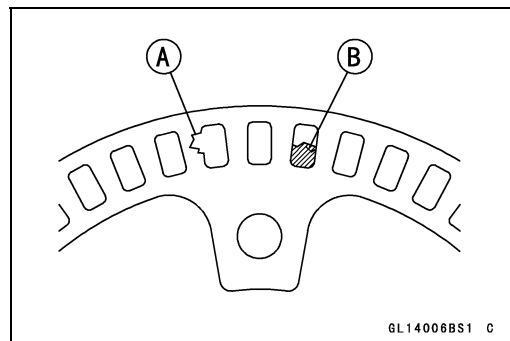
Anti-Lock Brake System (Equipped Model)

Wheel Rotation Sensor Rotor Inspection

- Remove:
  - Wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter)
  - Brake Disc Mounting Bolts [A]
  - Sensor Rotor [B]
  - Front Wheel [C]
  - Rear Wheel [D]



- Visually inspect the wheel rotation sensor rotor.
- ★ If the rotor is deformed or damaged (chipped teeth [A]), replace the sensor rotor with a new one.
- ★ If there is iron or other magnetic deposits [B], remove the deposits.



ABS Solenoid Valve Relay Fuse (25 A) Removal

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

ABS Motor Relay Fuse (40 A) Removal

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

Fuse Installation

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

Fuse Inspection

- Remove the fuses (see ABS Solenoid Valve Relay Fuse (25 A)/ABS Motor Relay Fuse (40 A) Removal).
- Refer to the Fuse Inspection in the Electrical System chapter.

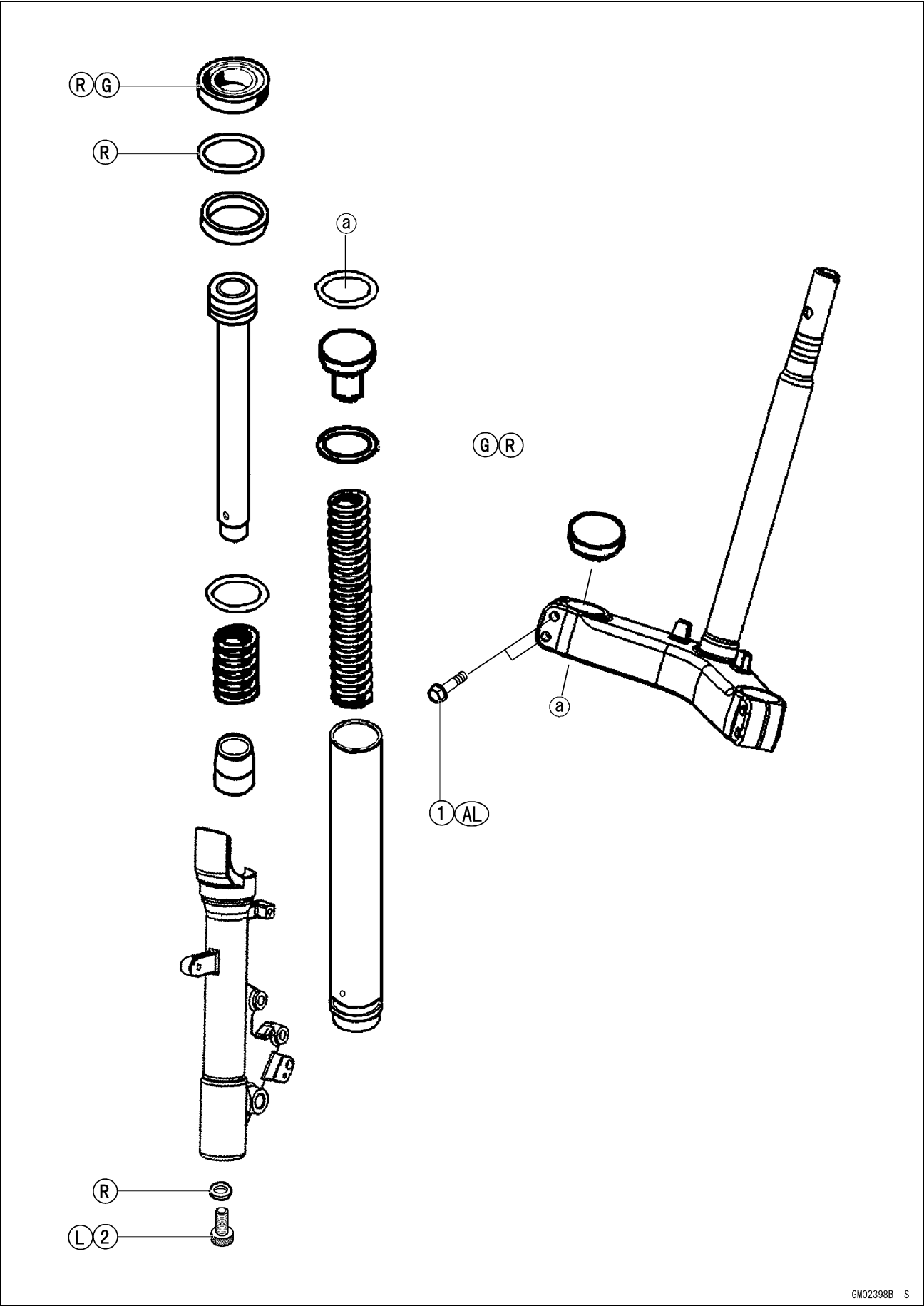
Suspension

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13-2 SUSPENSION

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Clamp Bolts	26	2.7	19	AL
2	Front Fork Bottom Allen Bolts	29	3.0	21	L

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.

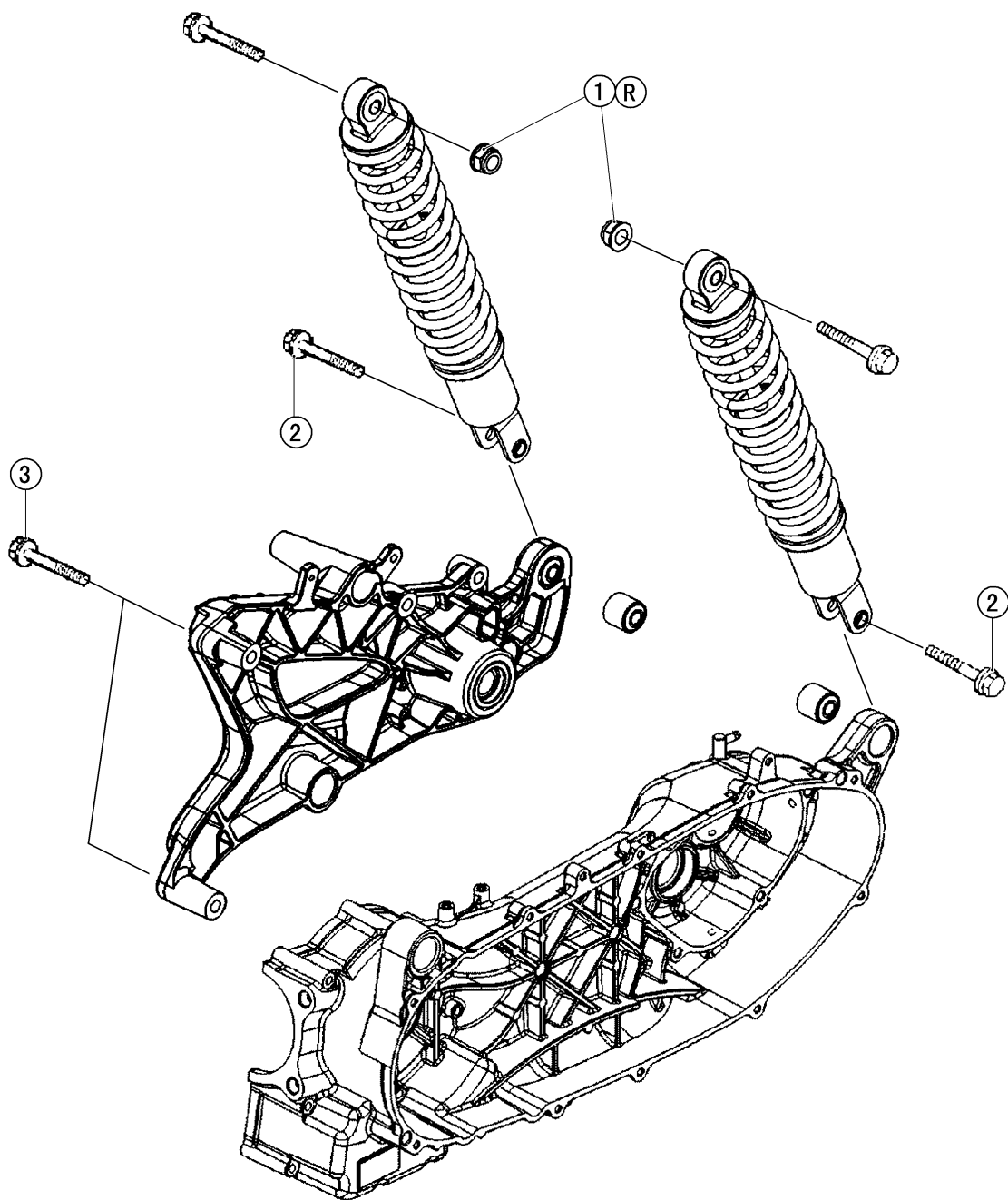
G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

13-4 SUSPENSION

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Rear Shock Absorber Nuts	39	4.0	29	R
2	Lower Rear Shock Absorber Bolts	39	4.0	29	
3	Sub Frame Bolts	34	3.5	25	

R: Replacement Parts

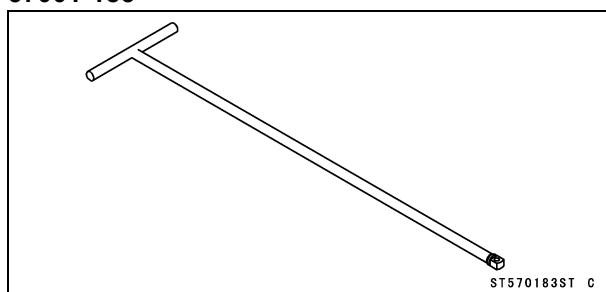
13-6 SUSPENSION

Specifications

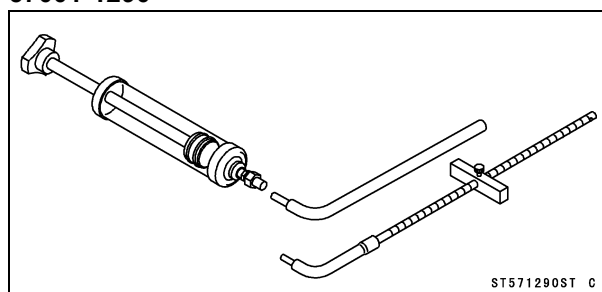
Item	Standard
Front Fork (Per One Unit)	
Fork Inner Tube Diameter	φ31 mm (1.2 in.)
Air Pressure	Atmospheric pressure (Non-adjustable)
Damper Setting	Non-adjustable
Fork Spring Setting	Non-adjustable
Suspension Oil:	
Recommended Oil	Kawasaki SS-8 or equivalent
Amount	Approx. 157 mL (5.31 US oz.) (when changing oil) 185 ±1 mL (6.25 ±0.03 US oz.) (after disassembly and completely dry)
Fork Oil Level	82 ±2 mm (3.2 ±0.08 in.) (below from inner tube top with fully compressed, without fork spring)
Fork Spring Free Length	307 mm (12.1 in.) (Service Limit: 301 mm (11.9 in.))
Rear Shock Absorber	
Damper Setting	Non-adjustable
Spring Preload Setting Position	3rd position (Adjustable Range: 1st ~ 5th position)
Gas Pressure	Bellow 392 kPa (4.0 kgf/cm ² , 57 psi, Non-adjustable) at full stretch

Special Tools

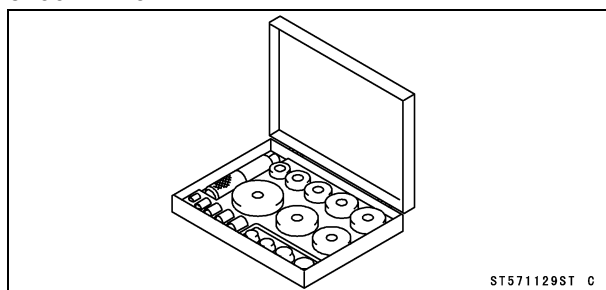
Fork Cylinder Holder Handle:
57001-183



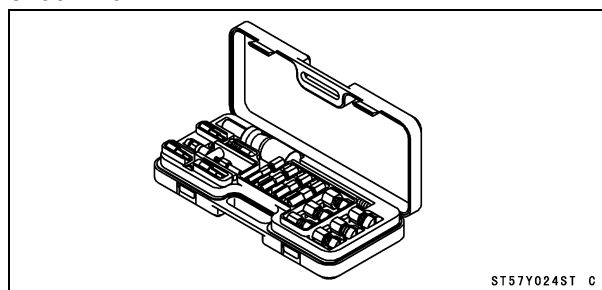
Fork Oil Level Gauge:
57001-1290



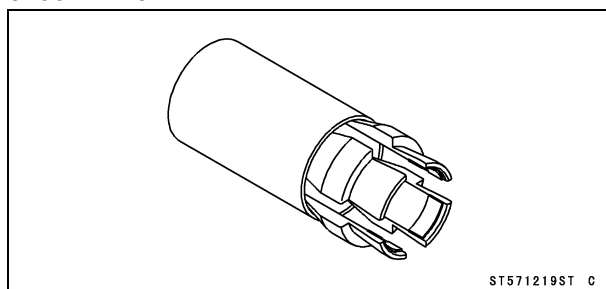
Bearing Driver Set:
57001-1129



Oil Seal & Bearing Remover:
57001-Y024



Front Fork Oil Seal Driver:
57001-1219

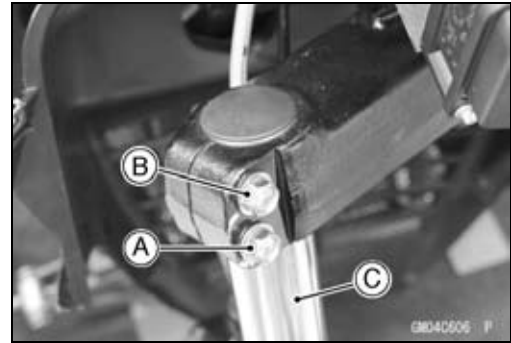


13-8 SUSPENSION

Front Fork

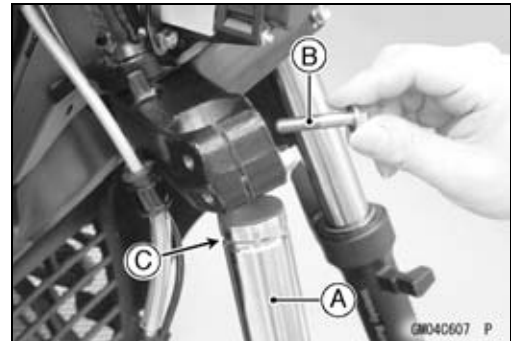
Front Fork Removal (Each Fork Leg)

- Remove:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Front Wheel (see Front Wheel Removal in the Wheel/Tires chapter)
- Loosen the front fork clamp bolt [A].
- Remove the front fork clamp bolt [B] retaining the front fork.
- Remove the front fork [C].



Front Fork Installation (Each Fork Leg)

- Install the front fork [A].
- Install the front fork clamp bolt [B] through the dent [C] of the front fork.
- Tighten:
  - Torque - Front Fork Clamp Bolts: 26 N·m (2.7 kgf·m, 19 ft·lb)



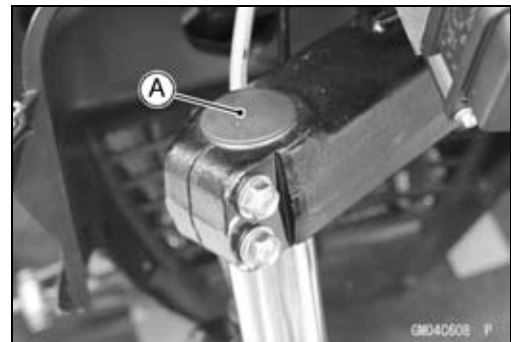
NOTE

○ Tighten the two clamp bolts alternately two times to ensure even tightening torque.

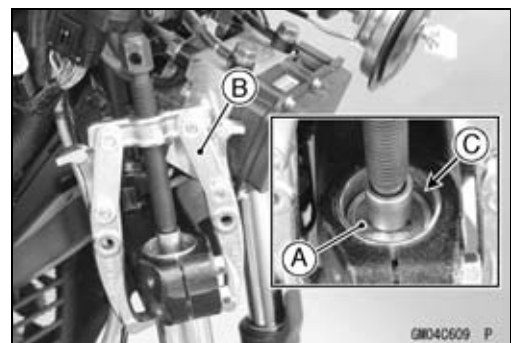
- Install the removed parts (see appropriate chapters).

Front Fork Oil Change

- Remove:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Front Wheel (see Front Wheel Removal in the Wheel/Tires chapter)
  - Cap [A]

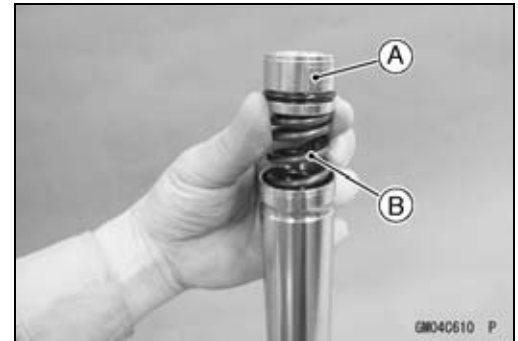


- Push the top plug [A] down with a suitable tool [B].
- Remove the retaining ring [C].



Front Fork

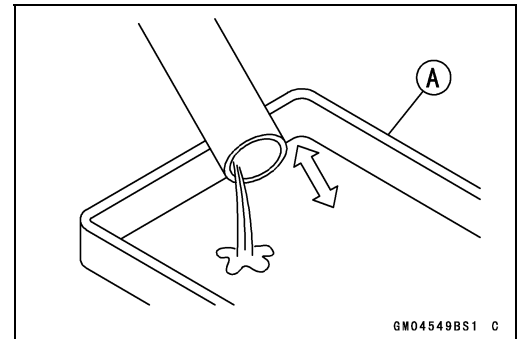
- Remove:
  - Front Fork (see Front Fork Removal (Each Fork Leg))
  - Top Plug [A]
  - Fork Spring [B]



- Drain the fork oil into a suitable container [A].
- Pump the outer tube up and down at least ten times to expel the oil from the fork.

NOTE

- *Pump the outer tube slowly. If the outer tube is pumped quickly, the fork oil may be spattered outward.*



- Hold the fork tube upright, press the inner tube.
- Pour in the type and amount of fork oil specified.

Suspension Oil

Recommended Oil:

Kawasaki SS-8 or equivalent

Amount (Per Side):

When changing oil:

Approx. 157 mL (5.31 US oz.)

After disassembly and completely dry:

185 ±1 mL (6.25 ±0.03 US oz.)

- Measure the oil level as follows.
- Hold the outer tube vertically in a vise.
- Pump the inner tube several times to expel air bubbles.

NOTE

- *Pump the outer tube slowly. If the outer tube is pumped quickly, the fork oil may be spattered outward.*

- Wait until the oil level settles.
- With the fork fully compressed, insert a tape measure or rod into the inner tube, and measure the distance from the top of the inner tube to the oil.

Oil Level (fully compressed without spring)

Standard: 82 ±0.2 mm (3.2 ±0.08 in.)

13-10 SUSPENSION

Front Fork

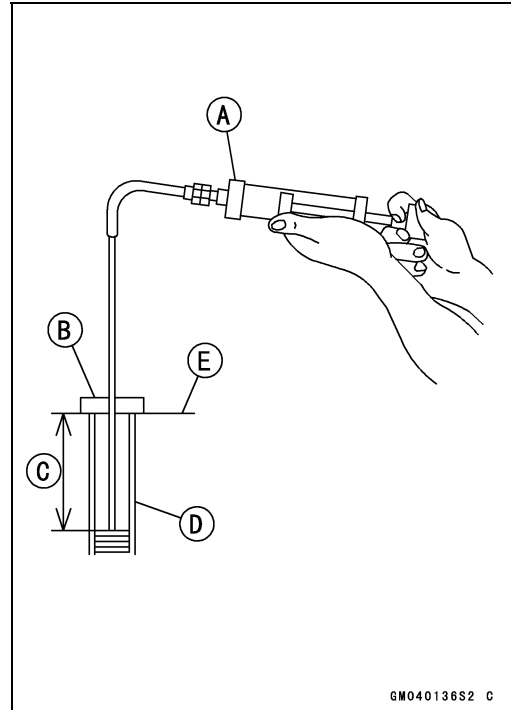
- ★ If the oil is above or below the specified level, remove or add oil and recheck the oil level.

NOTE

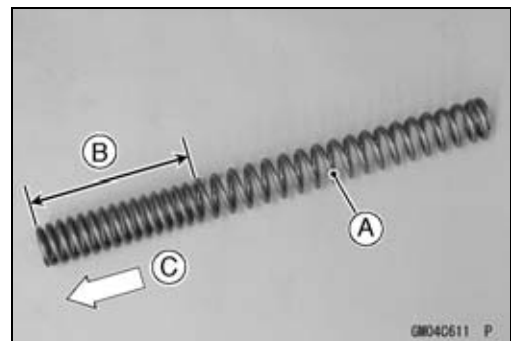
○ Fork oil level may also be measured using the fork oil level gauge [A] as follows.

Special Tool - Fork Oil Level Gauge: 57001-1290

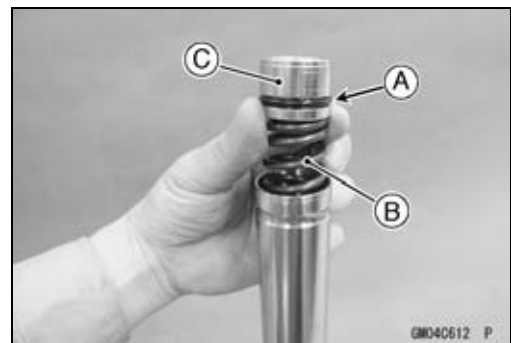
- Set the oil gauge stopper [B] so that its lower side shows the oil level distance specified [C].
- Insert the gauge tube into the inner tube [D] and position the stopper across the inner tube top end [E].
- Pull the handle slowly to draw out the excess oil until no more oil comes up the tube.
- ★ If no oil is drawn out, there is not enough oil in the inner tube. Pour in some more oil, then draw out the excess.



- Install the fork spring [A] so that the closed coil end [B] faces downward [C].



- Replace the O-ring [A] with a new one.
- Install:
  - Fork Spring [B]
  - Top Plug [C] with new O-ring
  - Front Fork (see Front Fork Installation (Each Fork Leg))



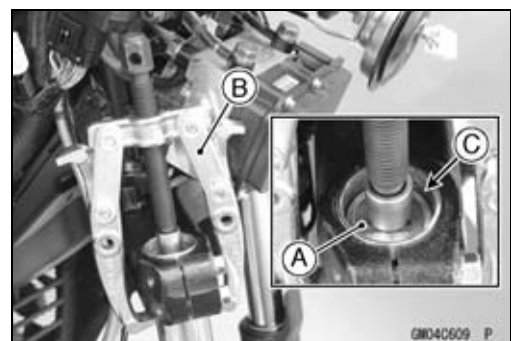
- Install the front fork to the stem base temporary (see Front Fork Installation (Each Fork Leg)).
- Push the top plug [A] down with a suitable tool [B].
- Install the new retaining ring [C].
- Tighten:

Torque - Front Fork Clamp Bolts: 26 N·m (2.7 kgf·m, 19 ft·lb)

NOTE

○ Tighten the two clamp bolts alternately two times to ensure even tightening torque.

- Install the removed parts (see appropriate chapters).



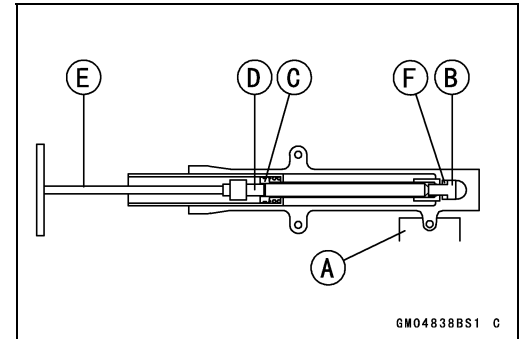
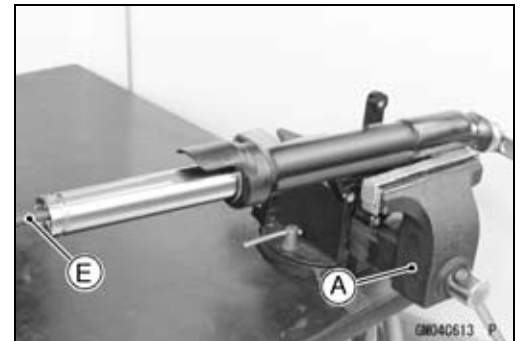
Front Fork

Front Fork Disassembly

- Remove the front fork and drain the fork oil (see Front Fork Oil Change).
- Hold the fork leg horizontally in a vise [A].
- Loosen the front fork bottom Allen bolt [B] while holding the cylinder unit [C] with a commercially available 19 mm Allen socket [D] and fork cylinder holder handle [E].

Special Tool - Fork Cylinder Holder Handle: 57001-183

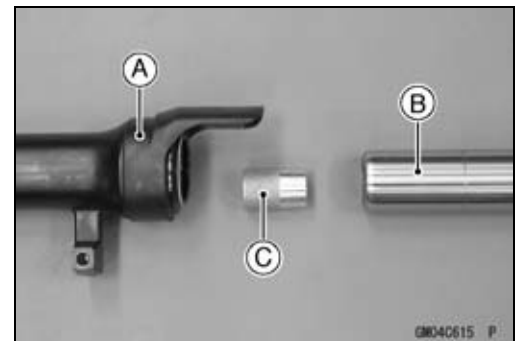
- Remove the front fork bottom Allen bolt and gasket [F].



- Remove the cylinder unit [A].



- Separate the outer tube [A] and the inner tube [B].
- Remove the cylinder base [C].



- Remove the retaining ring [A] from the outer tube.

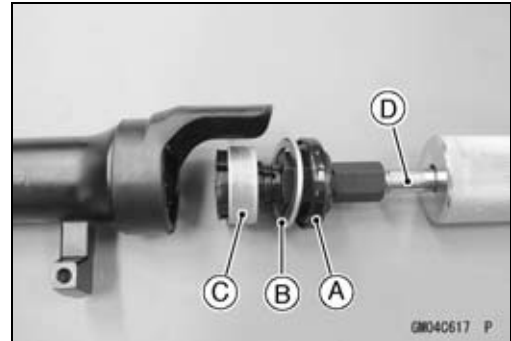


13-12 SUSPENSION

Front Fork

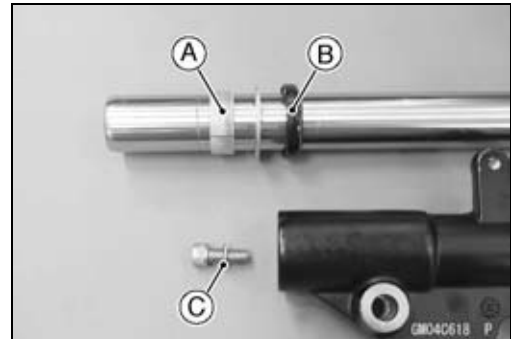
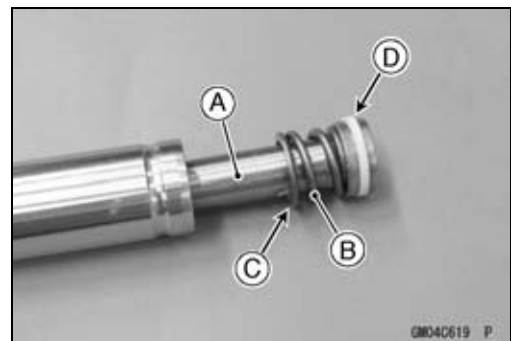
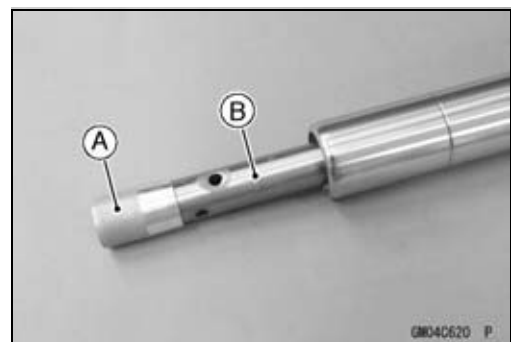
- Remove the oil seal [A], washer [B] and bushing [C] as a set.

Special Tool - Oil Seal & Bearing Remover [D]: 57001-Y024



Front Fork Assembly

- Replace the following parts with new ones.
  - Bushing [A]
  - Oil Seal [B]
  - Bottom Allen Bolt Gasket [C]
- Install the cylinder unit [A] to the inner tube.
  - When the spring [B] is removed, install it so that the large diameter [C] of the spring faces downward.
  - ★ If the collar [D] is damaged, replace it with a new one.
- Install the cylinder base [A] to the cylinder unit [B].
- Install the inner tube to the outer tube.

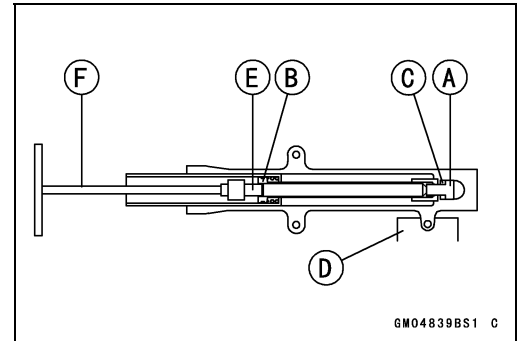
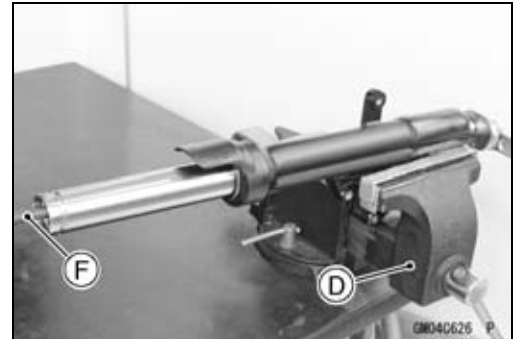


Front Fork

- Apply a non-permanent locking agent to the threads of the front fork bottom Allen bolt [A] and screw it to the cylinder unit [B] with the new gasket [C].
- Hold the front fork horizontally in a vise [D].
- Tighten the front fork bottom Allen bolt while holding the cylinder unit with a commercially available 19 mm. Allen socket [E] and fork cylinder holder handle [F].

Special Tool - Fork Cylinder Holder Handle: 57001-183

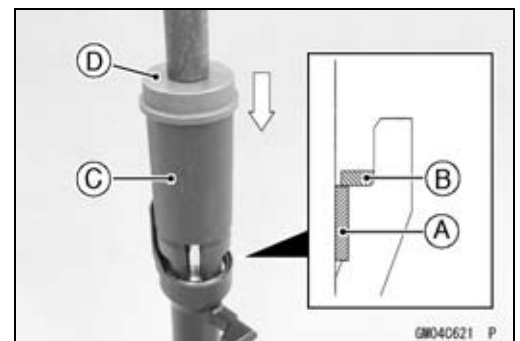
Torque - Front Fork Bottom Allen Bolt: 29 N·m (3.0 kgf·m, 21 ft·lb)



- Install the new bushing [A] and washer [B] into the outer tube using the special tools, until the washer is bottomed.
- Hold the front fork oil seal driver [C], and press it with bearing driver [D] to prevent damage to the outer tube.

Special Tools - Bearing Driver Set: 57001-1129

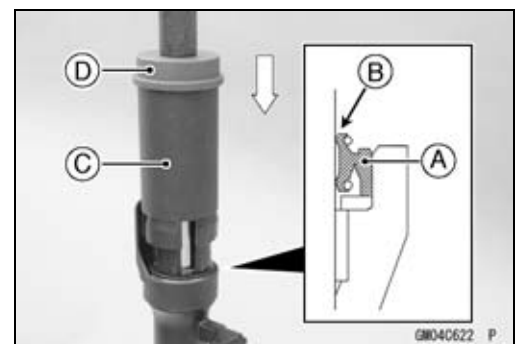
Front Fork Oil Seal Driver: 57001-1219



- Apply grease to the oil seal lips, and install the oil seal [A] to the inner tube from the top.
- Install the oil seal into the outer tube using the special tools until the oil seal is bottomed.
- Install the oil seal with its lip side [B] facing up.
- Hold the front fork oil seal driver [C], and press it with bearing driver [D] to prevent damage to the outer tube and the oil seal.

Special Tools - Bearing Driver Set: 57001-1129

Front Fork Oil Seal Driver: 57001-1219



- Install the retaining ring.
- Pour in the specified type of oil (see Front Fork Oil Change).

13-14 SUSPENSION

Front Fork

Inner Tube, Outer Tube Inspection

- Visually inspect the inner tube [A].
- ★ If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.

NOTICE

If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

- Temporarily assemble the inner [A] and outer [B] tubes, and pump [C] them back and forth manually to check for smooth operation.
- ★ If you feel binding or catching, the inner and outer tubes must be replaced.

⚠ WARNING

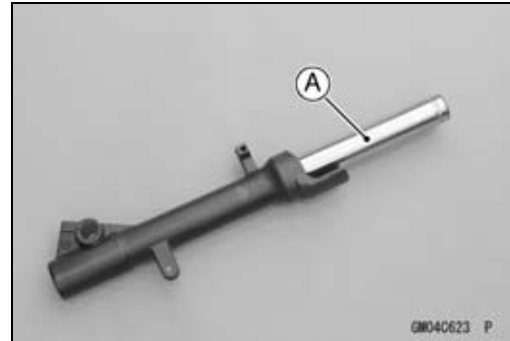
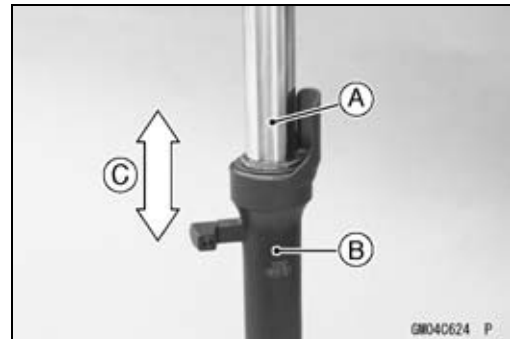
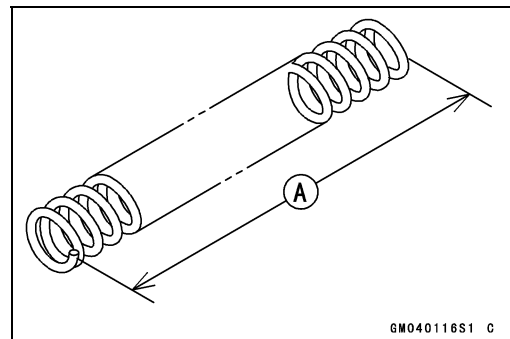
A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Spring Tension Inspection

- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.
- ★ If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Fork Spring Free Length

- Standard:** 307 mm (12.1 in.)
Service Limit: 301 mm (11.9 in.)



Rear Shock Absorber

Spring Preload Adjustment

- Set the motorcycle up on its center stand.
- Using the hook wrench [A], turn the adjuster [B] to adjust the spring preload.

Spring Preload Setting

Standard Position: 3rd position

Adjustable Range: 1st ~ 5th position

NOTICE

Always adjust the spring preload adjuster in sequence (1 → 2 → 3 → 4 → 5 or 5 → 4 → 3 → 2 → 1). Attempting to adjust directly from 1 to 5 or 5 to 1 may damage the shock absorber.

- ★ 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.

Mark [A]

“3” (3rd position) [B]

Spring Preload Adjustment

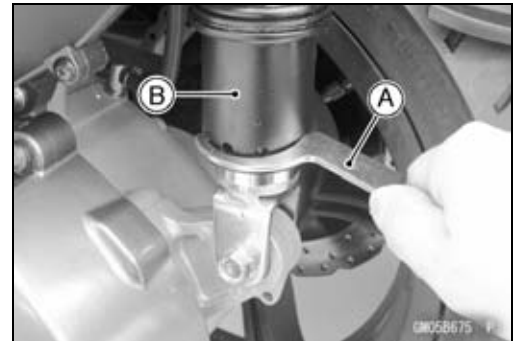
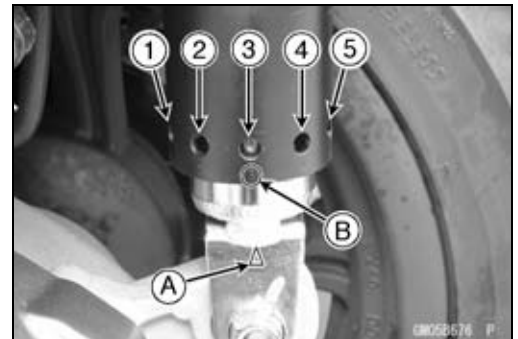
Adjuster Position	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
5th	Strong	Hard	Heavy	Bad	Highway

⚠ WARNING

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result. Be sure the adjusters are set equally.

Rear Shock Absorber Removal

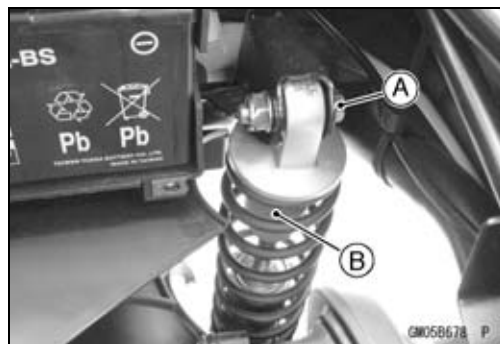
- Set the motorcycle up on its center stand.
- Remove:
  - Storage Box (see Storage Box Removal in the Frame chapter)
  - Lower Rear Shock Absorber Bolt [A]



13-16 SUSPENSION

Rear Shock Absorber

- Remove:
  - Upper Rear Shock Absorber Bolt [A] and Nut
  - Rear Shock Absorber [B]
- Remove the right rear shock absorber in the same way.



Rear Shock Absorber Installation

- Replace the upper rear shock absorber nut with a new one.
- Install the rear shock absorber.
- Tighten:
  - Torque - Upper Rear Shock Absorber Nut: 39 N·m (4.0 kgf·m, 29 ft·lb)
  - Lower Rear Shock Absorber Bolt: 39 N·m (4.0 kgf·m, 29 ft·lb)
- Install the storage box (see Storage Box Installation in the Frame chapter).

Rear Shock Absorber Inspection

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
  - Oil Leakage
  - Crack or Dent
  - Bushing [A]
- ★ If there is any damage to the rear shock absorber replace it.



NOTE

- When replacing one shock absorber of a pair, the performance of shock absorber on the other side may be different compared to the new one due to normal wear and tear.
- After replacing the shock absorber on one side with a new one, if there is any difference in performance or feeling between the shock absorbers during riding, also replace the shock absorber on the other side.

Rear Shock Absorber Scrapping

⚠ WARNING

Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen.

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Drill the hole [A] of the reservoir tank using about 2 mm (0.08 in.) drillbit.

⚠ WARNING

Pressurized gas can cause injury. Do not point the drill toward your face or body.



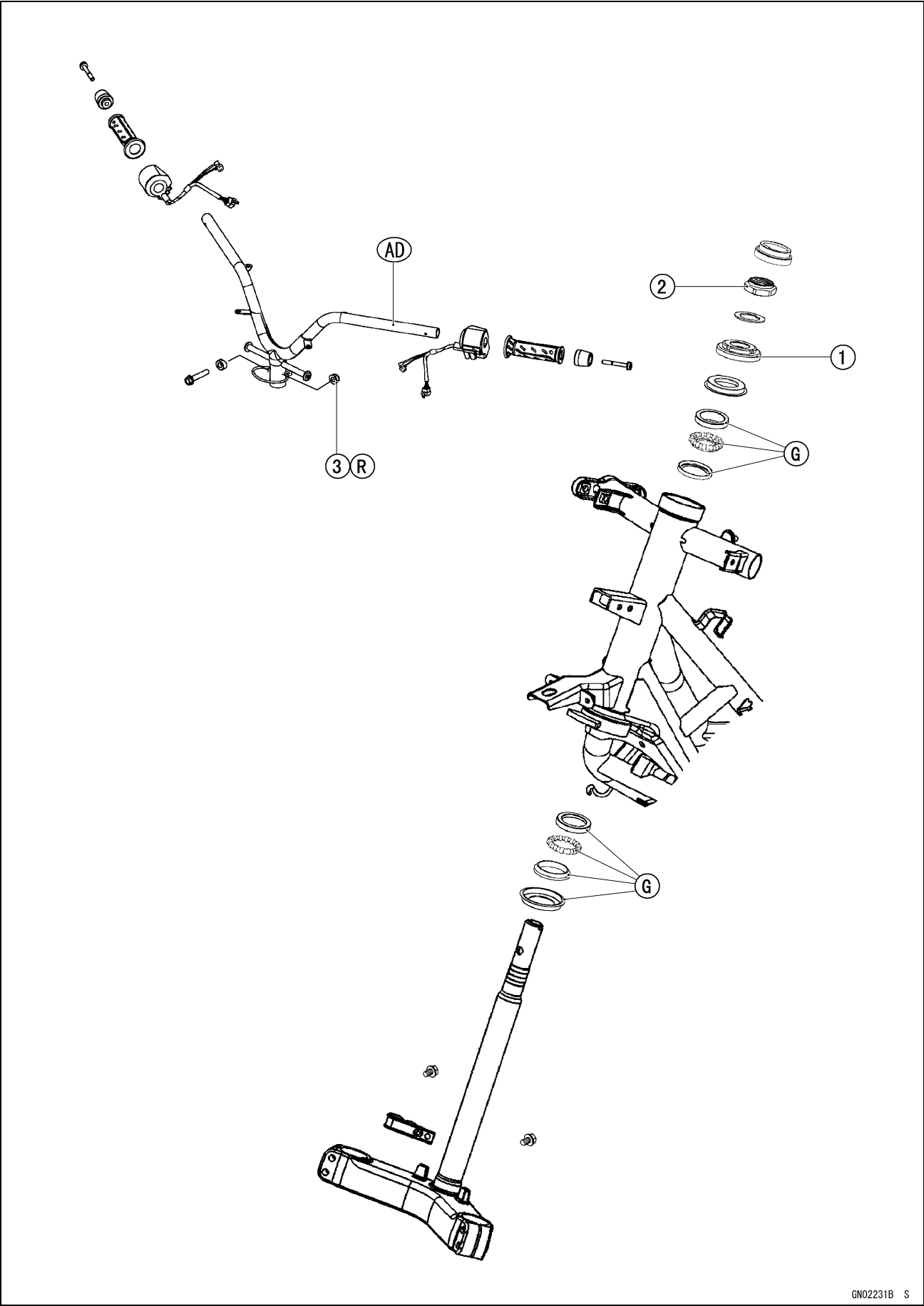
Steering

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Handlebar Installation	14-11

14-2 STEERING

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Steering Stem Nut	20	2.0	15	
2	Steering Stem Lock Nut	62	6.3	46	
3	Handlebar Mounting Nut	44	4.5	32	R

AD: Apply adhesive.

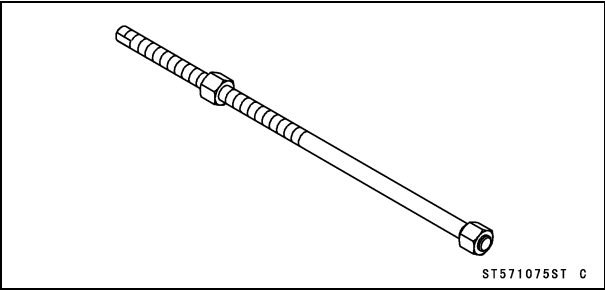
G: Apply grease.

R: Replacement Parts

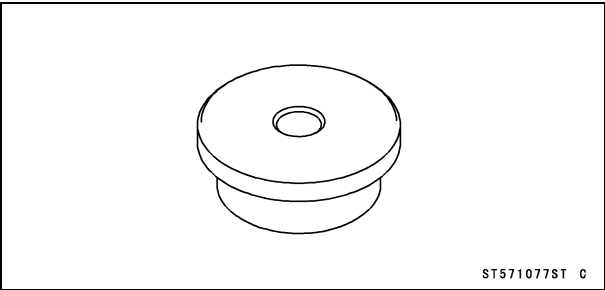
14-4 STEERING

Special Tools

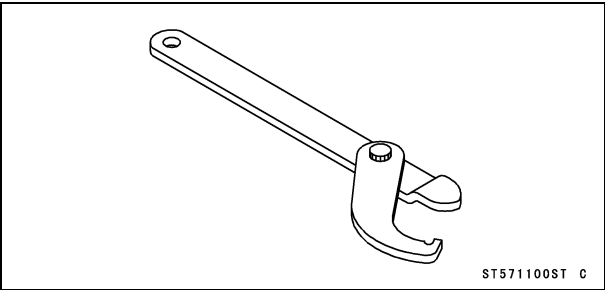
Head Pipe Outer Race Press Shaft:
57001-1075



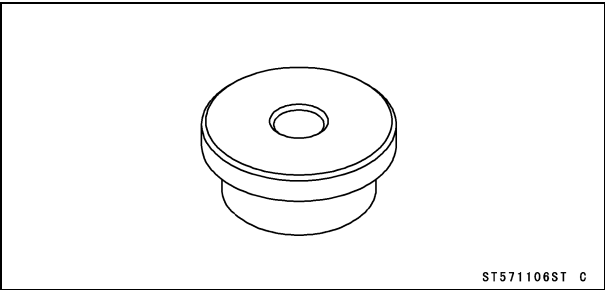
Head Pipe Outer Race Driver, $\phi 54.5$:
57001-1077



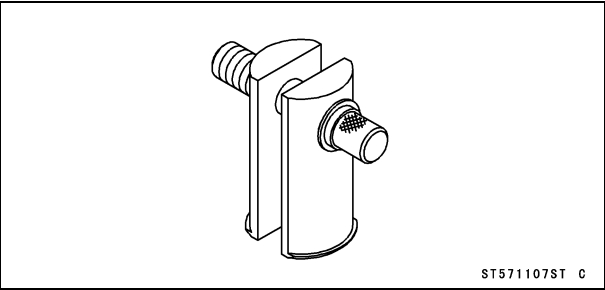
Steering Stem Nut Wrench:
57001-1100



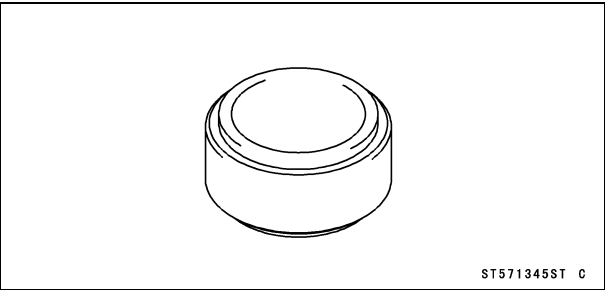
Head Pipe Outer Race Driver, $\phi 46.5$:
57001-1106



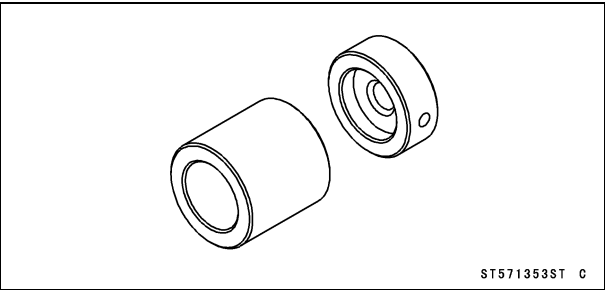
Head Pipe Outer Race Remover ID > 37 mm:
57001-1107



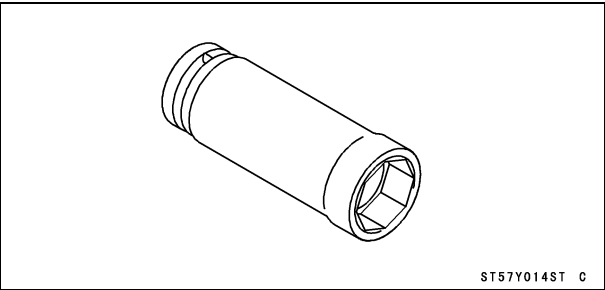
Steering Stem Bearing Driver Adapter, $\phi 41.5$:
57001-1345



Case Assembly Tool, $\phi 50.8$:
57001-1353



Steering Stem Lock Nut Wrench, 32 mm:
57001-Y014



Steering

Steering Inspection

- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

Steering Adjustment

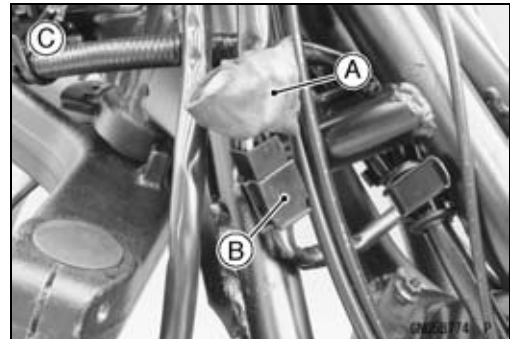
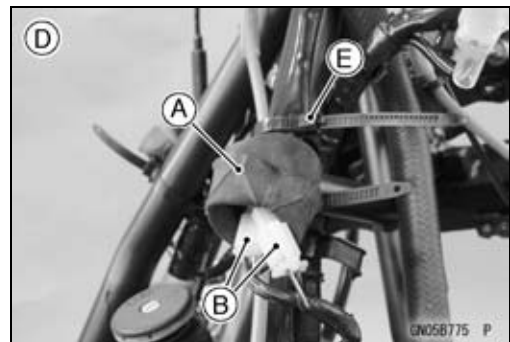
- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

14-6 STEERING

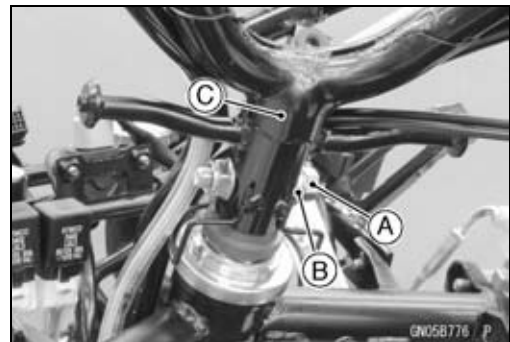
Steering Stem

Stem, Stem Bearing Removal

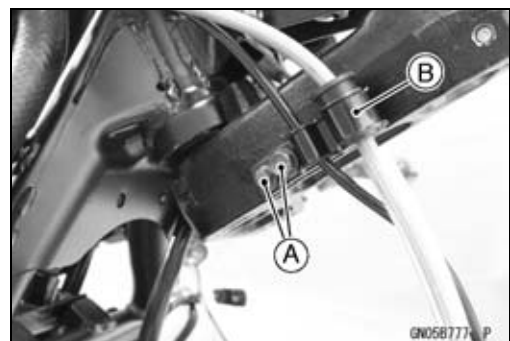
- Remove:
  - Front Forks (see Front Fork Removal in the Suspension chapter)
  - Upper Handlebar Cover (see Handlebar Cover Removal in the Frame chapter)
  - Leg Shield Cover (see Leg Shield Removal in the Frame chapter)
- Remove the brake master cylinders with the brake hose installed (see Master Cylinder Removal in the Brake chapter).
- Slide the dust covers [A] and disconnect the connectors [B] to remove the handlebars.
  - Left Side [C]
  - Right Side [D]
- Remove the band [E].



- Remove:
  - Handlebar Mounting Bolt [A] and Nut Collar [B]
- Remove the handlebars [C] from the steering stem with the switch housings installed.

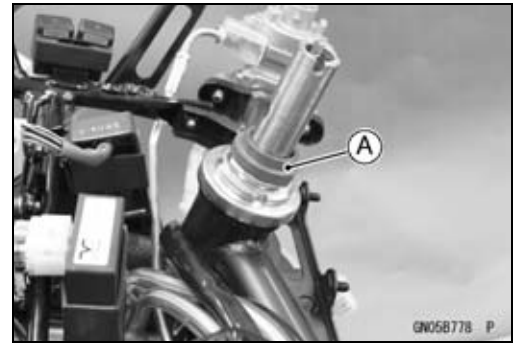


- Remove:
  - Bolts [A]
  - Clamp [B]



Steering Stem

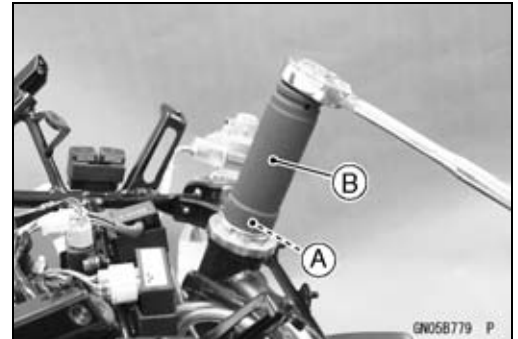
- Remove the cap [A].



- Remove the steering stem locknut [A] with the steering stem locknut wrench [B].

**Special Tool - Steering Stem Locknut Wrench, 32 mm:
57001-Y014**

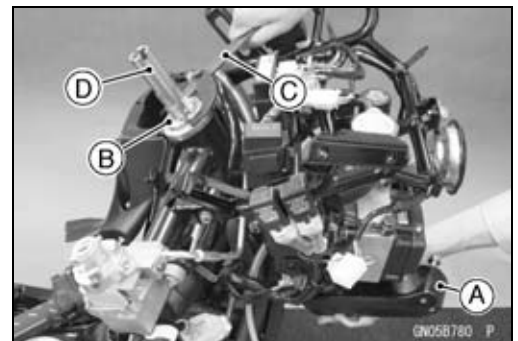
- Remove the washer.



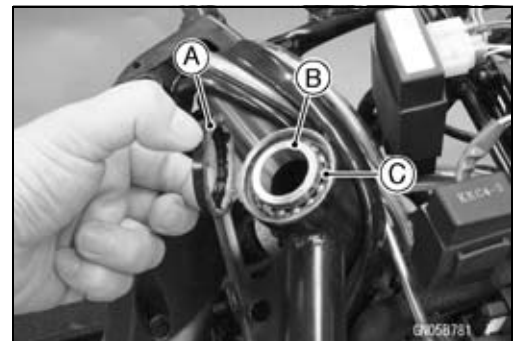
- Pushing up the stem base [A], and remove the steering stem nut [B].

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

- Remove the steering stem [D].

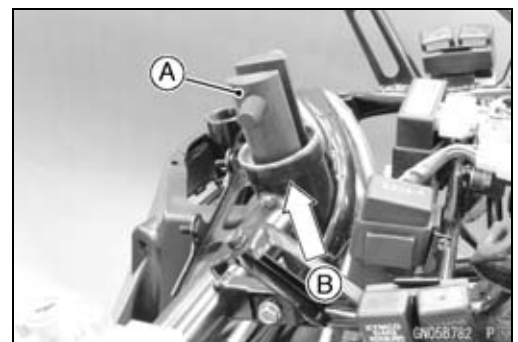


- Remove:
Stem Cap [A]
Upper Ball Bearing Inner Race [B]
Upper Ball Bearing [C]



- Remove the bearing outer races from the head pipe.
○ Using the head pipe outer race remover [A], and hammer [B] the head pipe outer race remover to drive it out.

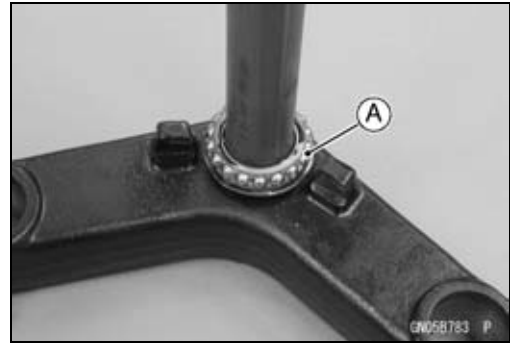
**Special Tool - Head Pipe Outer Race Remover ID > 37 mm:
57001-1107**



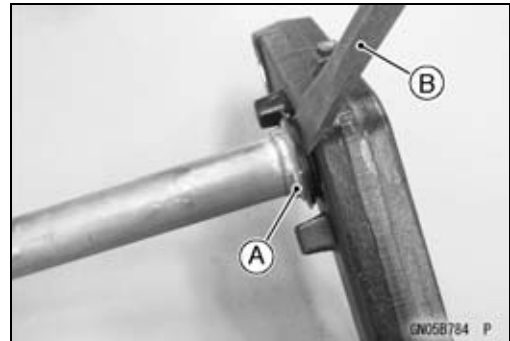
14-8 STEERING

Steering Stem

- Remove the lower ball bearing [A] from the steering stem.



- Remove the lower bearing inner race [A] (with its grease seal) which is pressed onto the steering stem with a suitable commercially available chisel [B].



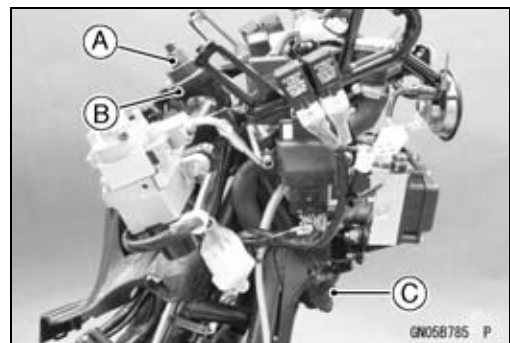
Stem, Stem Bearing Installation

- Replace the bearing outer races with new ones.
- Drive them into the head pipe at the same time.

Special Tools - Head Pipe Outer Race Press Shaft [A]:
57001-1075

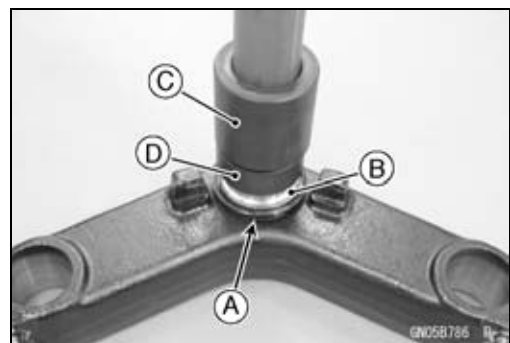
Head Pipe Outer Race Driver, $\phi 46.5$ [B]:
57001-1106

Head Pipe Outer Race Driver, $\phi 54.5$ [C]:
57001-1077

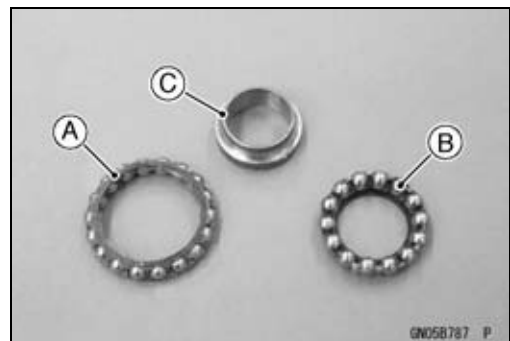


- Apply grease to the outer races.
- Replace the bearing inner races and grease seal with new ones.
- Apply grease to the grease seal.
- Install the grease seal [A] on the steering stem, and drive the lower ball bearing inner race [B] applied the grease onto the stem.

Special Tools - Case Assembly Tool, $\phi 50.8$ [C]: 57001-1353
Steering Stem Bearing Driver Adapter, $\phi 41.5$ [D]: 57001-1345

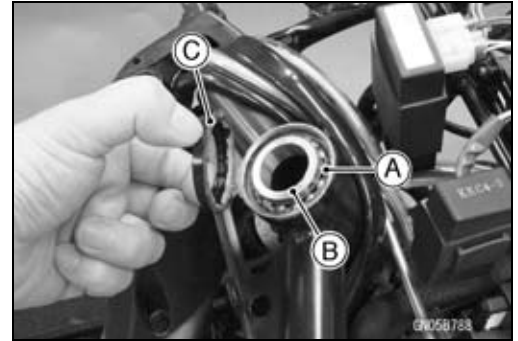


- Apply grease to the lower ball bearing [A], and install it onto the steering stem.
- Apply grease to the upper ball bearing [B] and inner race [C].

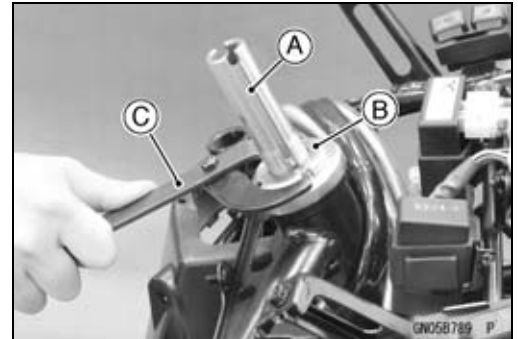


Steering Stem

- Install:
  - Upper Ball Bearing [A]
  - Upper Ball Bearing Inner Race [B]
  - Stem Cap [C]



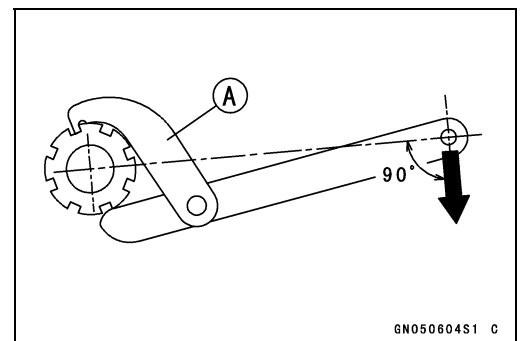
- Install:
  - Steering Stem [A]
  - Steering Stem Nut [B]
- Special Tool - Steering Stem Nut Wrench [C]: 57001-1100



- Settle the bearings in place as follows.
  - Tighten the steering stem nut with **51 N·m (5.2 kgf·m, 38 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a steering stem nut wrench [A].
  - Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.

Special Tool - Steering Stem Nut Wrench: 57001-1100

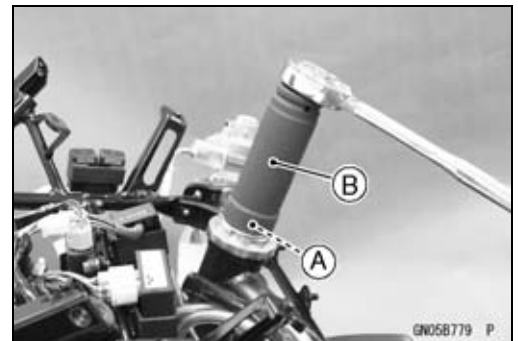
Torque - Steering Stem Nut: 20 N·m (2.0 kgf·m, 15 ft·lb)



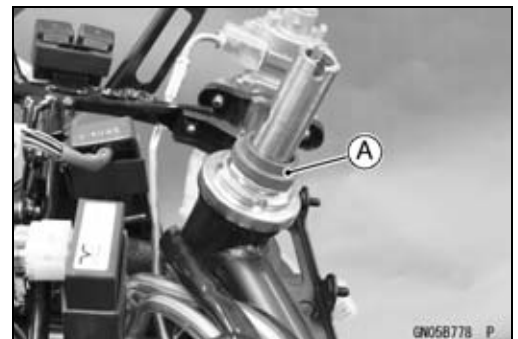
- Install the washer.
- Install the steering stem locknut [A] with the steering stem locknut wrench [B].

Special Tool - Steering Stem Locknut Wrench, 32 mm: 57001-Y014

Torque - Steering Stem Locknut: 62 N·m (6.3 kgf·m, 46 ft·lb)



- Install the cap [A].



14-10 STEERING

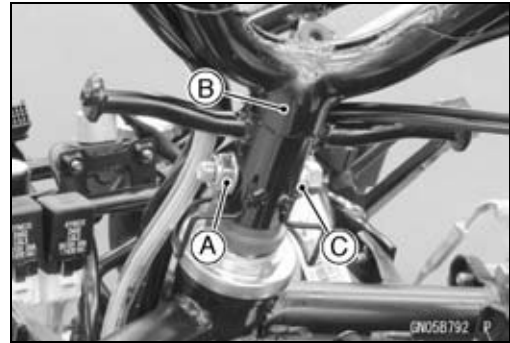
Steering Stem

- Replace the handlebar mounting nut [A] with a new one.
- Install:
  - Handlebars [B]
  - Collar [C]
  - Handlebar Mounting Bolt and Nut

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

WARNING

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



- Install the removed parts (see appropriate chapters).

Steering Stem Bearing Lubrication

- Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem Warp Inspection

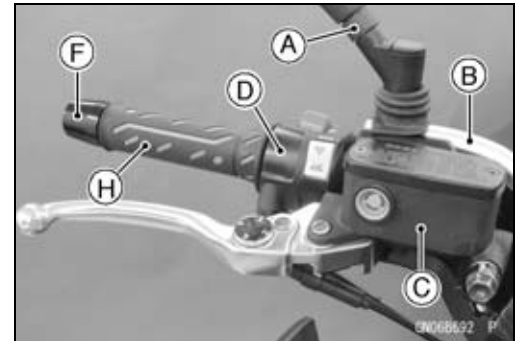
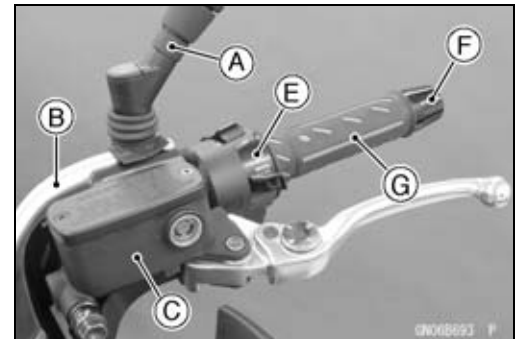
- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.
- ★ If the steering stem [A] is bent, replace the steering stem.



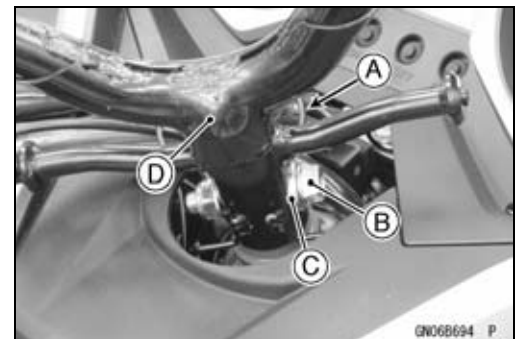
Handlebar

Handlebar Removal

- Remove:
  - Rear View Mirrors [A] (see Rear View Mirror Removal in the Frame chapter)
  - Handlebar Cover [B] (see Handlebar Cover Removal in the Frame chapter)
  - Master Cylinders [C] (see Master Cylinder Removal in the Brakes chapter)
  - Right Switch Housing [D] (see Throttle Cable Removal in the Fuel System (DFI) chapter)
  - Left Switch Housing [E]
  - Handlebar Weights [F]
  - Left Handlebar Grip [G]
  - Throttle Grip [H]



- Clear the cables, harnesses and hoses from the guide [A].
- Remove:
  - Handlebar Mounting Bolt [B] and Nut
  - Collar [C]
  - Handlebars [D]



Handlebar Installation

⚠ WARNING

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

- Replace the handlebar mounting nut with a new one.
- Install the handlebars and collar, and tighten the handlebar mounting bolt and nut.

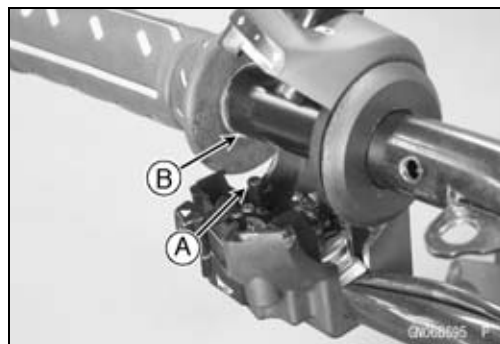
Torque - Handlebar Mounting Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)

- With a high flash-point solvent, clean off the installation surfaces of the handlebar grip and wipe dry.
- Apply adhesive cement to the inside of the left handlebar grip.
- Install the left handlebar grip, throttle grip and handlebar weights.

14-12 STEERING

Handlebar

- Install the left switch housing.
- Fit the projection [A] of the left switch housing into a hole [B] of the handlebars.
- Install the removed parts (see appropriate chapters).

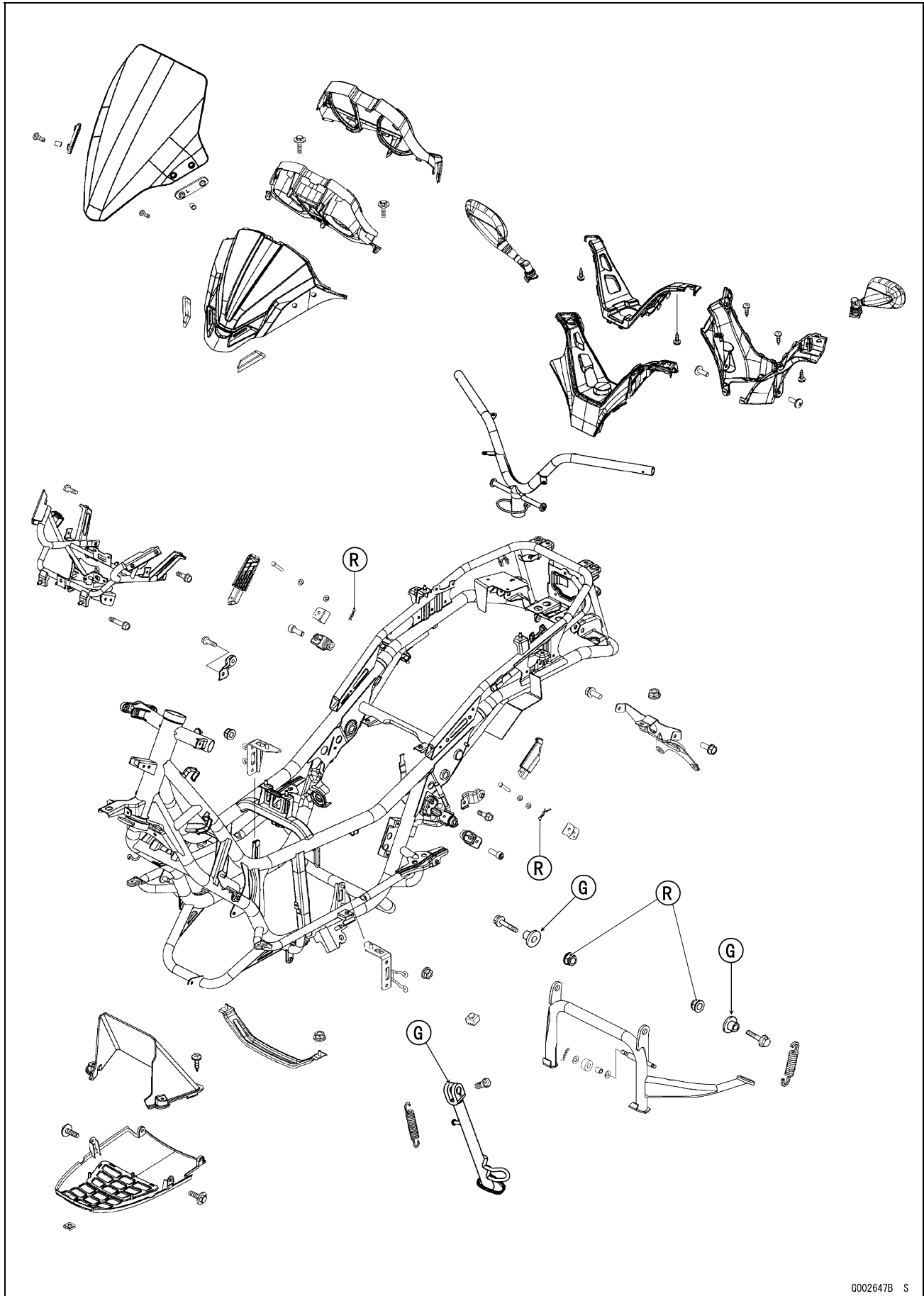


Frame

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Exploded View



G002647B S

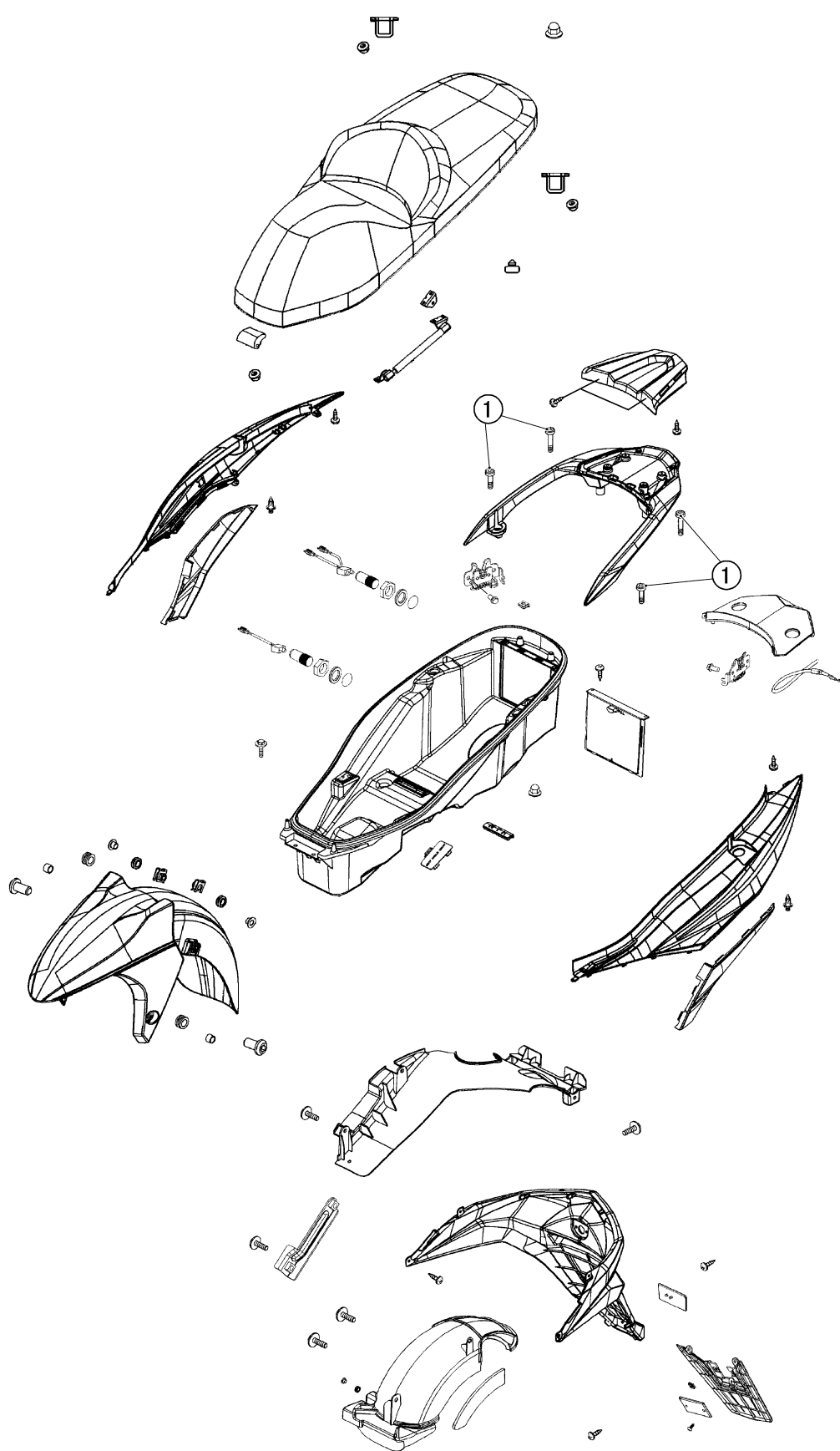
R: Replacement Parts
G: Apply grease.

Exploded View



15-4 FRAME

Exploded View



Exploded View

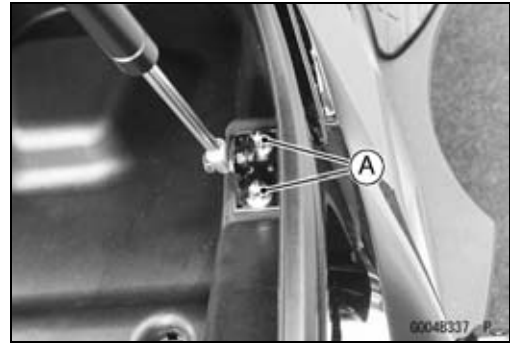
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Grab Rail Mounting Bolts	24	2.4	18	

15-6 FRAME

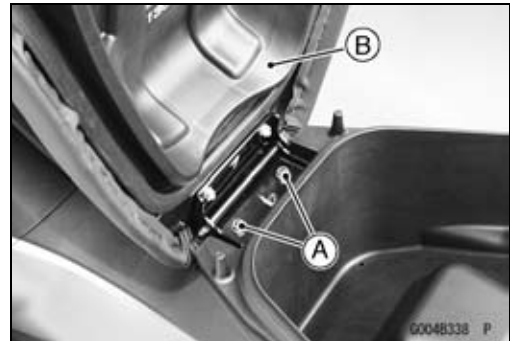
Seat

Seat Removal

- Open the seat.
- Remove the nuts [A].



- Remove:
  - Nuts [A]
  - Seat Assy [B]

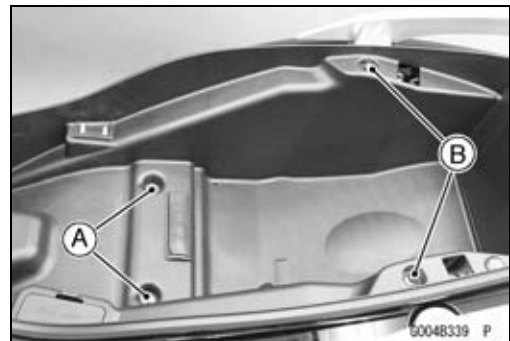


Seat Installation

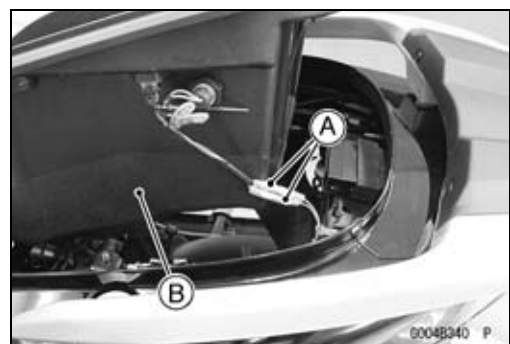
- Installation is the reverse of removal.

Storage Box Removal

- Remove:
  - Seat (see Seat Removal)
  - Bolts [A]
  - Nuts [B]



- Disconnect the storage box light switch lead connectors [A].
- Remove the storage box [B].



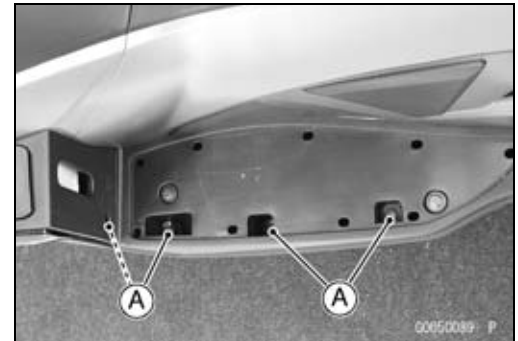
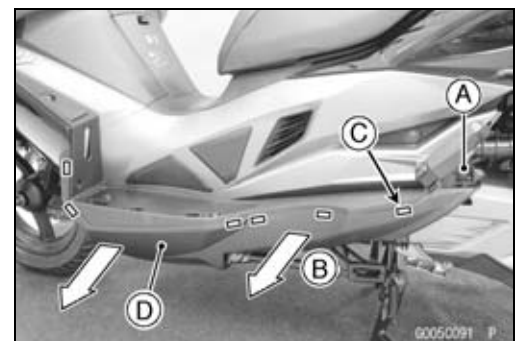
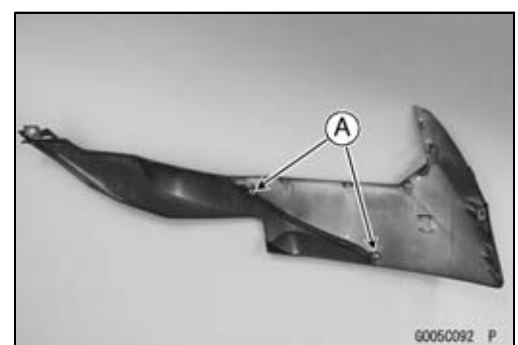
Storage Box Installation

- Installation is the reverse of removal.

Fairings

Lower Fairing Removal

- Remove:
  - Floor Mat
  - Rear Fairing Cover (see Rear Faring Cover Removal)
  - Screws [A]
- Remove the quick rivets [A].
- Remove the bolt [A].
- Pull the rear side of the lower fairing outward [B] to clear the hooks [C], and then pull the front side of the lower fairing.
- Pull the fairing outward while flipping the lower portion of the fairing.
- Remove the lower faring [D].
- If necessary, separate the lower fairings by removing the screws [A].

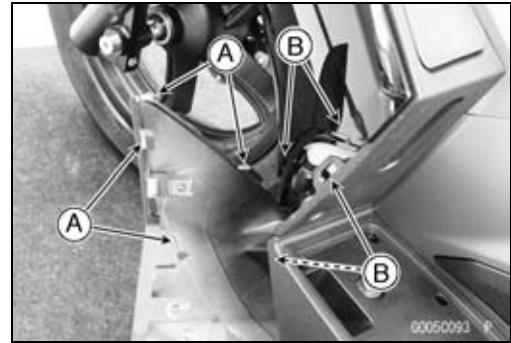
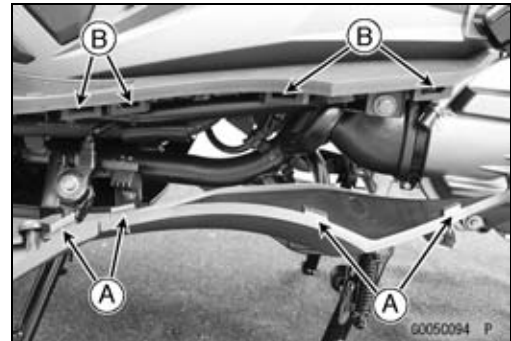


15-8 FRAME

Fairings

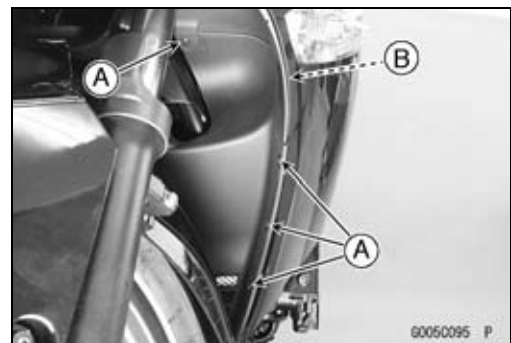
Lower Fairing Installation

- Insert the hooks [A] into the slots [B].
- Install:
  - Screws and Bolt
  - Quick Rivets
  - Rear Fairing Cover (see Rear Fairing Cover Installation)
  - Floor Mat



Front Fairing Removal

- Remove:
  - Front Center Cover (see Front Center Cover Removal)
  - Lower Fairing (see Lower Fairing Removal)
  - Quick Rivets [A] (Both Sides)
  - Screw [B] (Both Sides)

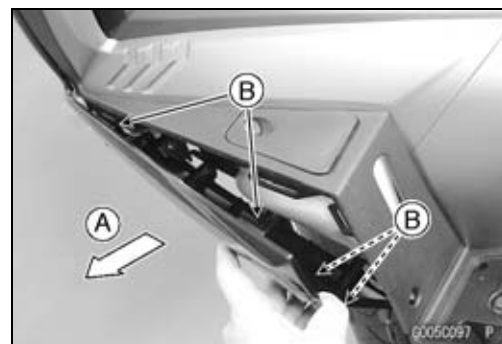
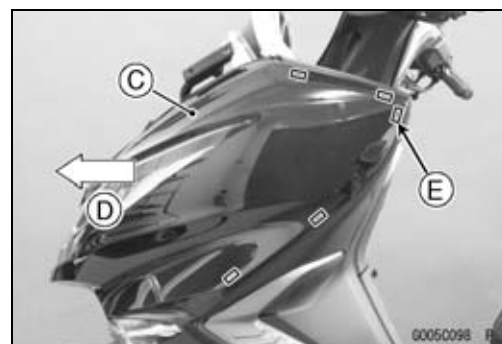


- Remove the nuts [A].



Fairings

- Pull the lower side of the front fairing outward [A] to clear the hooks [B], and then pull the front fairing [C] forward [D] to clear the hooks [E].

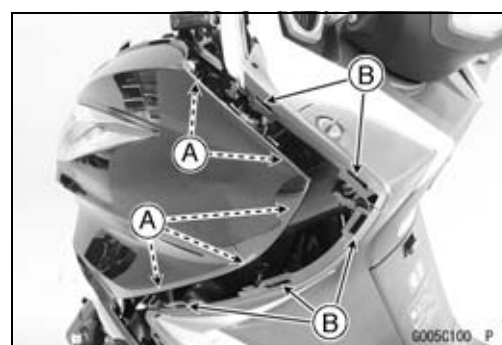
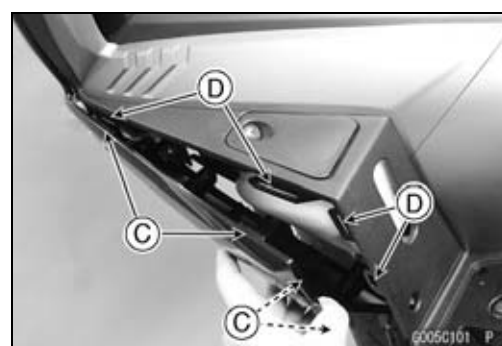


- Disconnect the headlight lead connectors [A] and remove the front fairing.



Front Fairing Installation

- Connect the headlight lead connectors.
- Insert the hooks [A] of the upper side into the slots [B], and then insert the hooks [C] of the lower side into the slots [D].
- Install:
  - Quick Rivets
  - Screws and Nuts
- Install the removed parts (see appropriate chapters).

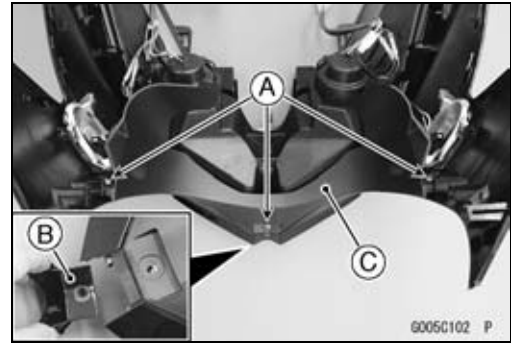
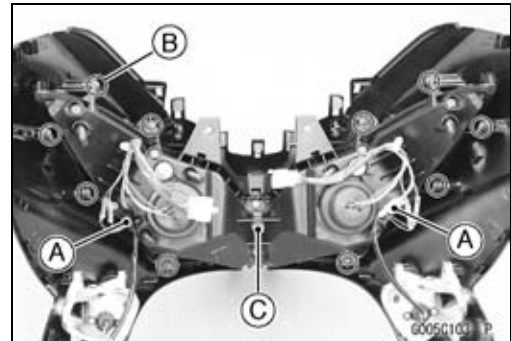
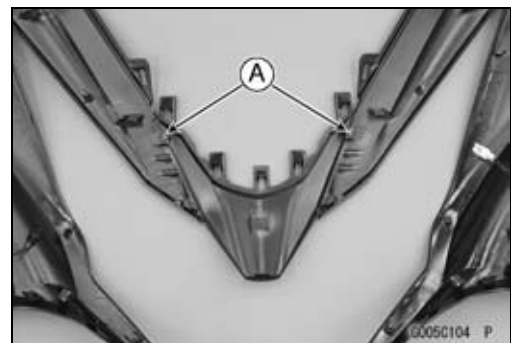


15-10 FRAME

Fairings

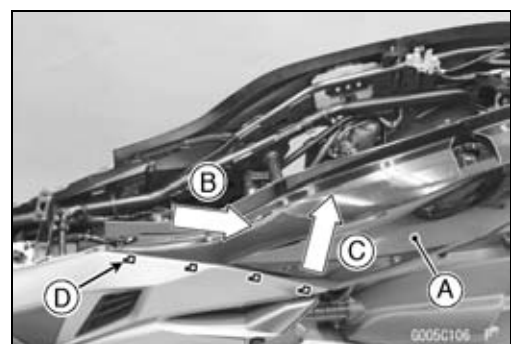
Front Fairing Disassembly

- Remove:
  - Screws [A]
  - Fitting [B]
  - Inner Cover [C]
- Disconnect the front turn signal light lead connectors [A].
- Remove:
  - Screws [B]
  - Headlight Assy [C]
- Remove the screws [A] and separate the front fairings.



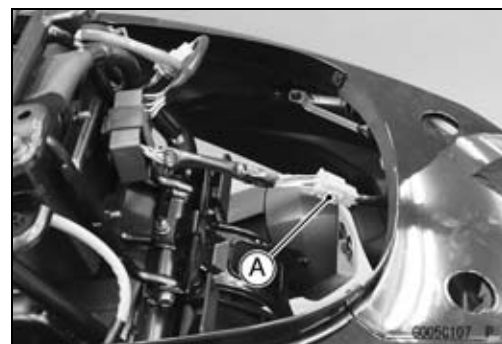
Rear Fairing Removal

- Remove:
  - Storage Box (see Storage Box Removal)
  - Fuel Tank Cap Cover (see Fuel Tank Cap Cover Removal)
  - Rear Fairing Cover (see Rear Fairing Cover Removal)
  - Grab Rail (see Grab Rail Removal)
  - Bolts [A]
- Slide the rear fairing [A] backward [B], and then pull the rear fairing upward [C] to clear the hooks [D].



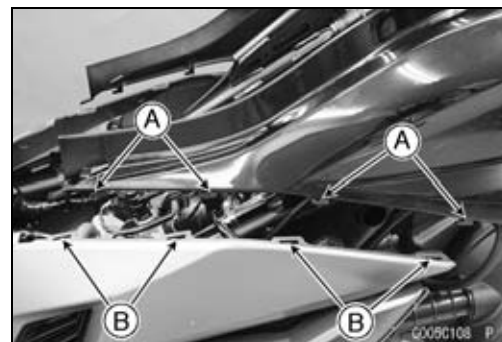
Fairings

- Disconnect the tail/brake light lead connector [A] and remove the rear fairing.



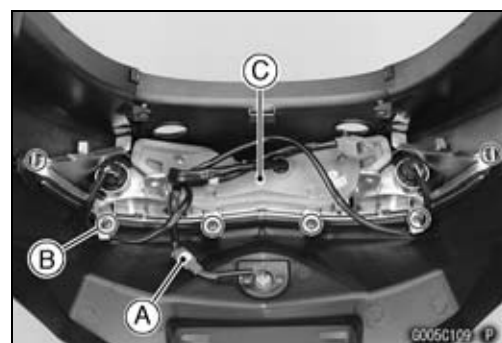
Rear Fairing Installation

- Connect the tail/brake light lead connector.
- Insert the hooks [A] into the slots [B].
- Install the removed parts (see appropriate chapters).

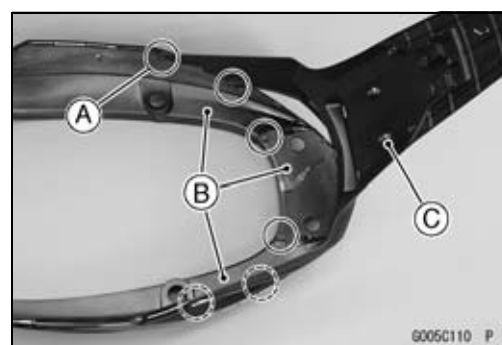


Rear Fairing Disassembly

- Disconnect the license plate light lead connector [A].
- Remove:
  - Screws [B]
  - Tail/Brake Light Assy [C]



- Remove the screws [A] and separate the rear fairings [B] and flap/rear fender [C].



Side Fairing Removal

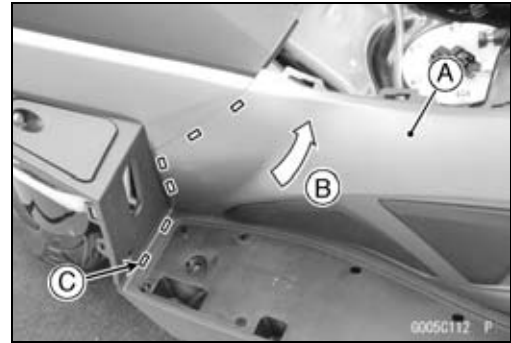
- Remove:
  - Front Fairing (see Front Fairing Removal)
  - Rear Fairing (see Rear Fairing Removal)
  - Footpeg (see Footpeg Removal)
  - Bolts [A]



15-12 FRAME

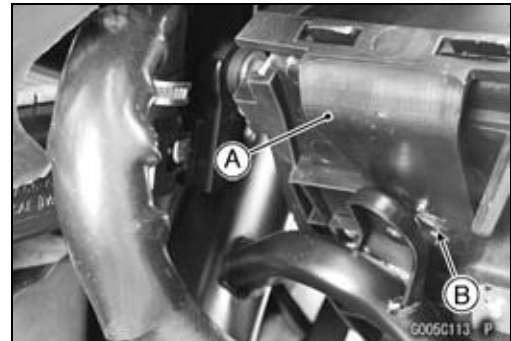
Fairings

- Pull the side fairing [A] upward [B] to clear the hooks [C].

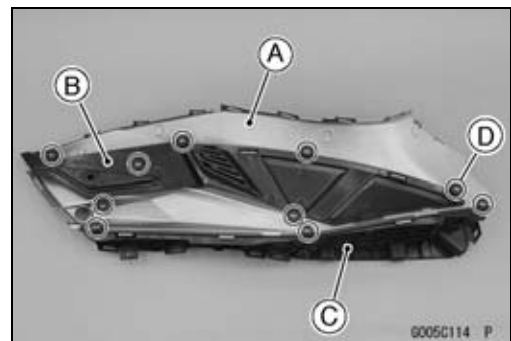


- Clear the plate [A] of the leg shield from bolt hole [B] of the side fairing.

- Remove the side fairing.

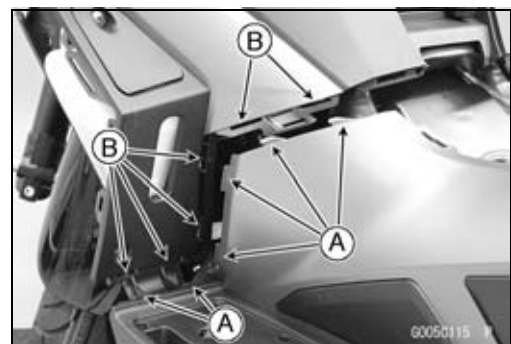


- If necessary, separate the side fairing [A], inner cover [B] and floor board [C] by removing the screws [D].



Side Fairing Installation

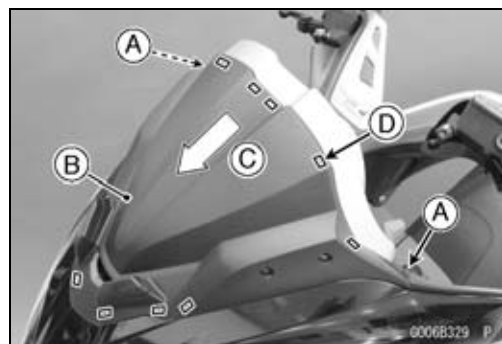
- Insert the hooks [A] into the slots [B].
- Tighten the bolts.
- Install the removed parts (see appropriate chapters).



Covers

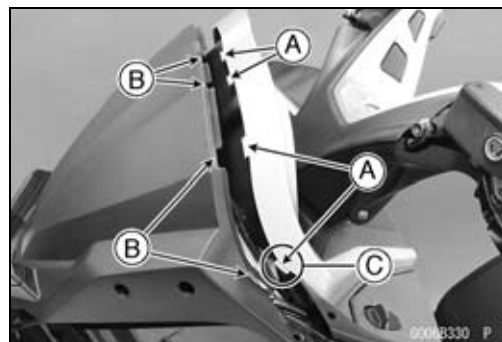
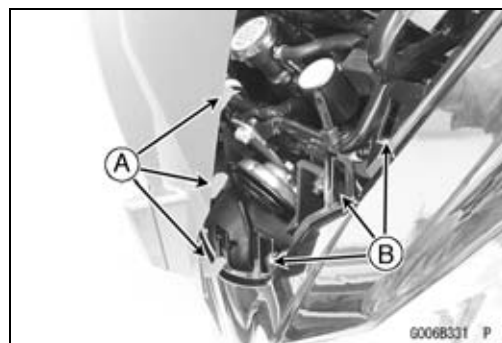
Front Center Cover Removal

- Remove:
  - Windshield (see Windshield Removal)
  - Quick Rivets [A]
- Pull the front center cover [B] forward [C] to clear the hooks [D] and remove the front center cover.



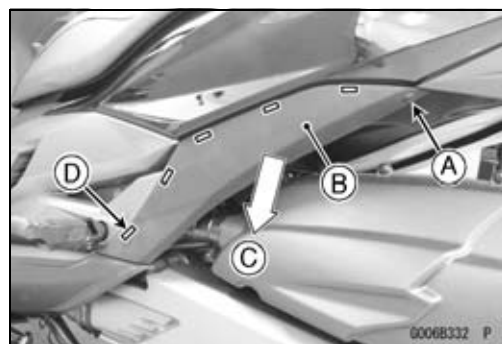
Front Center Cover Installation

- Insert the hooks [A] into the slots [B].
- Install:
  - Quick Rivet
  - Windshield (see Windshield Installation)
- Be careful when installing the hook [C] on the end. It is fragile.



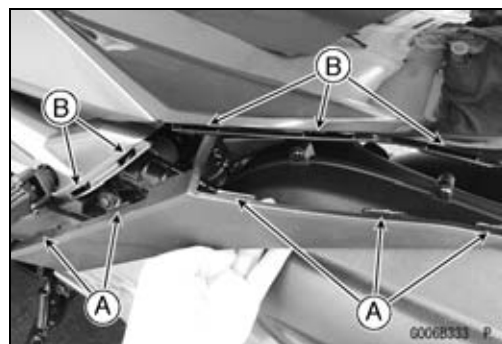
Rear Fairing Cover Removal

- Remove the quick rivet [A].
- Pull the rear fairing cover [B] outward [C] to clear the hooks [D] and remove the front center cover.



Rear Fairing Cover Installation

- Insert the hooks [A] into the slots [B].
- Install the quick rivet.

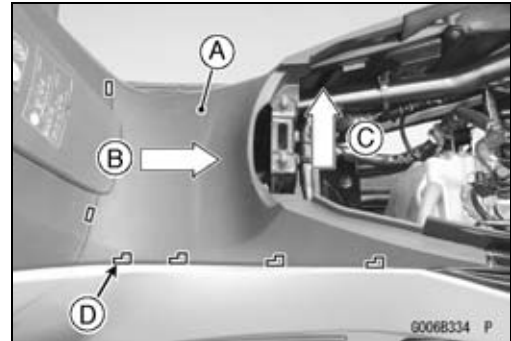


15-14 FRAME

Covers

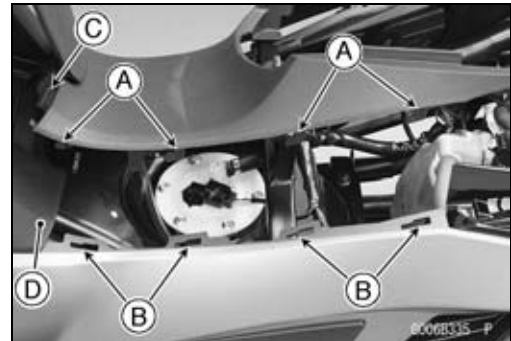
Fuel Tank Cap Cover Removal

- Remove the storage box (see Storage Box Removal).
- Slide the fuel tank cap cover [A] backward [B], and then pull the fuel tank cap cover upward [C] to clear the hooks [D].
- Remove the fuel tank cap cover.



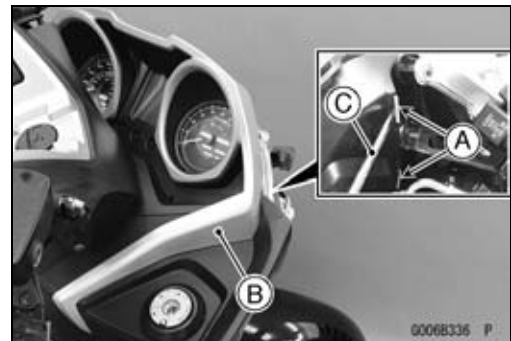
Fuel Tank Cap Cover Installation

- Insert the hooks [A] into the slots [B] and fit the hook [C] to the leg shield [D].
- Install the removed parts (see appropriate chapters).



Meter Cover Removal

- Remove the front fairing (see Front Fairing Removal).
- Clear the hooks [A] of the outer meter cover [B] with the flat tip screwdriver [C].
- Remove the outer meter cover.



- Remove the bolts [A].



- Remove the security shutter assy mounting screw [A].

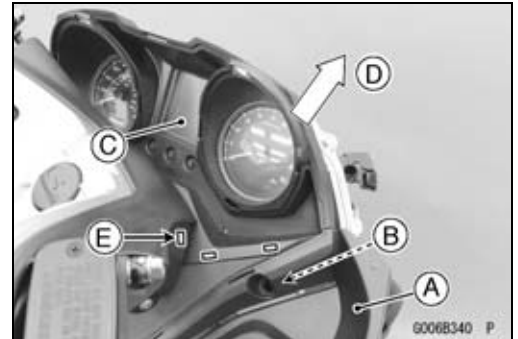


Covers

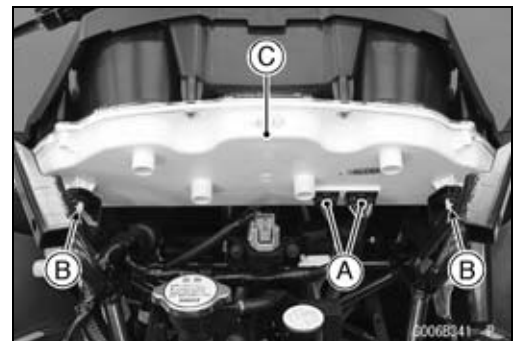
- Remove the security shutter assy [A].



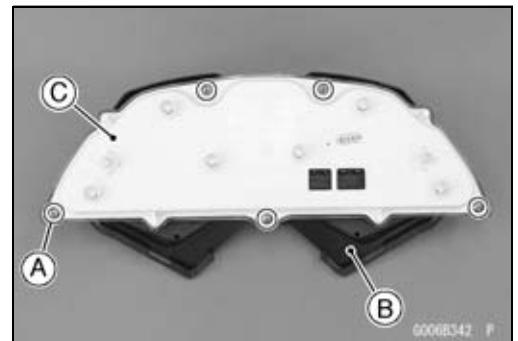
- Clear the leg shield [A] from the bolt hole rib [B] of the frame to free the leg shield.
- Pull the meter assy [C] forward [D] to clear the hooks [E].



- Disconnect the meter connectors [A].
- Clear the projections [B] and remove the meter assy [C].

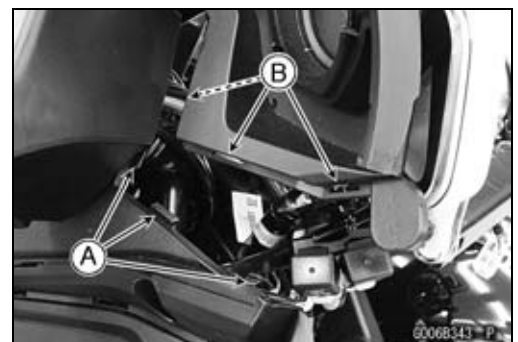


- Remove the screws [A] and separate the meter cover [B] and meter unit [C].



Meter Cover Installation

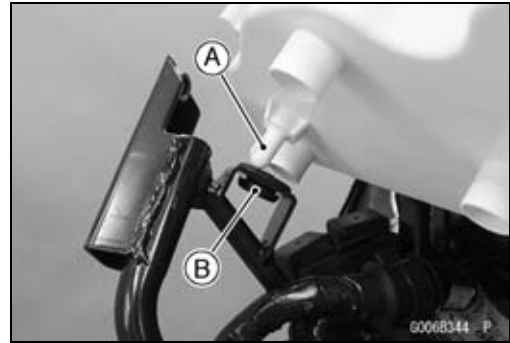
- Installation is the reverse of removal.
- Insert the hooks [A] into the slots [B].



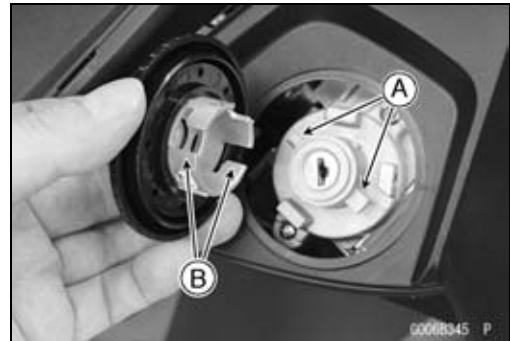
15-16 FRAME

Covers

- Insert the projection [A] of the meter unit into the grommet [B].

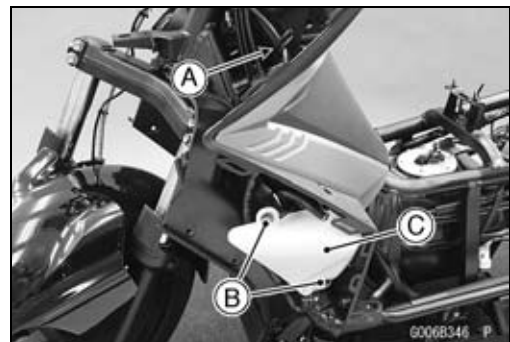


- Fit the projections [A] of the ignition switch to the slits [B] of the security shutter assy and tighten the security shutter assy mounting screw.



Leg Shield Removal

- Remove:
  - Meter Assy (see Meter Cover Removal)
  - Side Fairings (see Side Fairing Removal)
  - Radiator Cover (see Radiator Cover Removal)
- Open the clamp [A].
- Remove:
  - Bolts [B]
  - Coolant Reserve Tank [C]



- Remove the cover [A] and its hose.



Covers

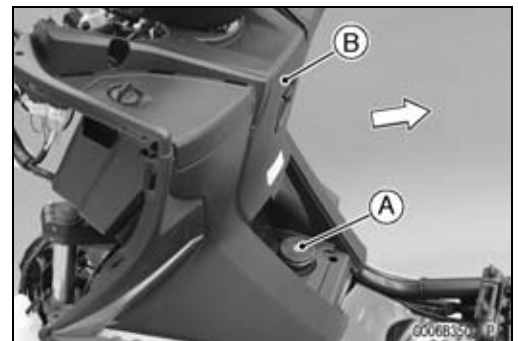
- Disconnect the accessory socket lead connector [A].



- Remove the bolts [A] (both sides).



- Open the fuel tank cap [A].
- Remove the leg shield [B] backward.
- Install the fuel tank cap.

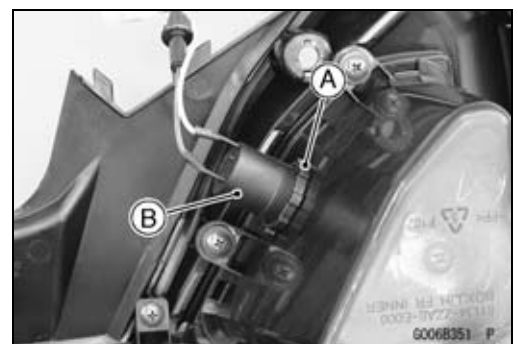


Leg Shield Installation

- Installation is the reverse of removal.

Leg Shield Disassembly

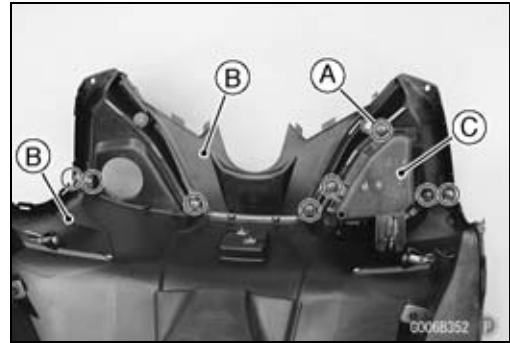
- Remove:
  - Locknut [A]
  - Accessory Socket [B]



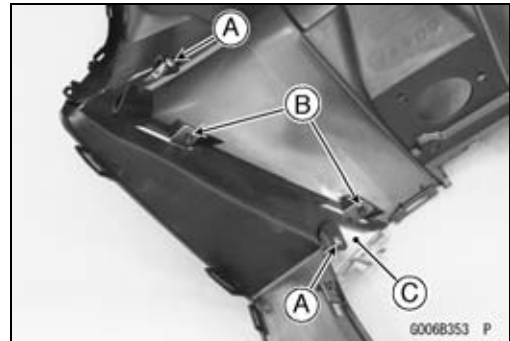
15-18 FRAME

Covers

- Remove the screws [A] and separate the leg shields [B] and glove box [C].



- Remove:
Screws [A]
Quick Rivets [B]
Leg Shield Cover [C]



Radiator Cover Removal

- Remove:
Front Fairing (see Front Fairing Removal)
Screws [A]



- Remove the radiator cover [A].



Radiator Cover Installation

- Installation is the reverse of removal.

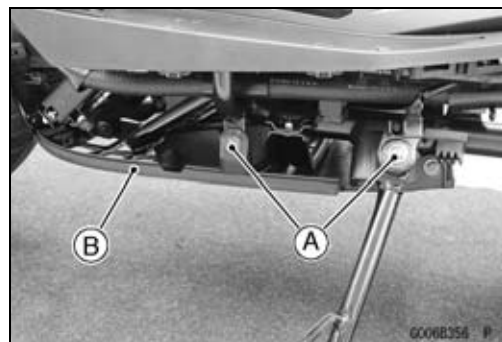
Covers

Lower Cover Removal

- Remove:
Lower Fairing (see Lower Fairing Removal)
Screws [A]



- Remove:
Bolts [A] (Both Sides)
Lower Cover [B]

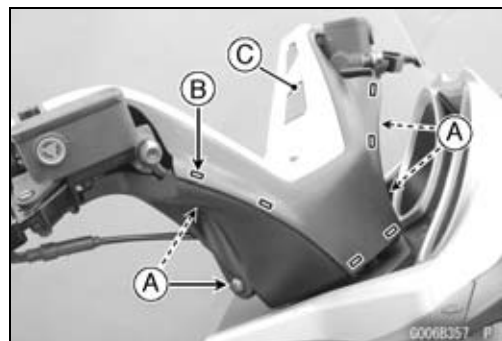


Lower Cover Installation

- Installation is the reverse of removal.

Handlebar Cover Removal

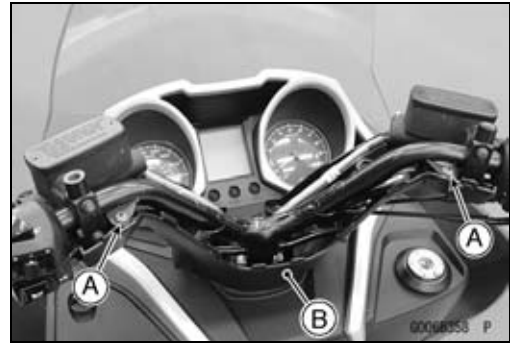
- Remove:
Rear View Mirrors (see Rear View Mirror Removal)
Screws [A]
- Clear the hooks [B] and remove the upper handlebar cover [C].
- If necessary, using the flat tip screwdriver [D] to clean the hook. Be careful not to damage the handlebar cover.



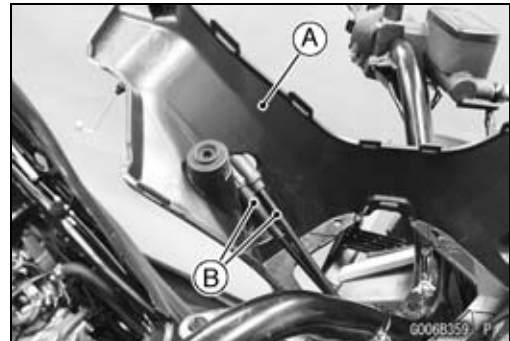
15-20 FRAME

Covers

- Remove the screws [A].
- Remove the lower handlebar cover [B].

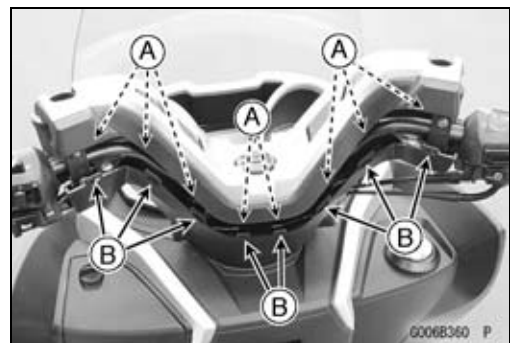


- When removing the lower handlebar cover [A] from the handlebar completely, remove the throttle cables [B] from the right switch housing (see Throttle Cable Removal in the Fuel System (DFI) chapter).



Handlebar Cover Installation

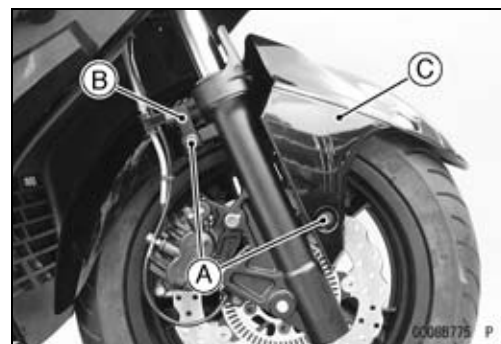
- Installation is the reverse of removal.
- Insert the hooks [A] of the upper handlebar cover into the slots [B] of the lower handlebar cover.



Fenders

Front Fender Removal

- Remove:
  - Bolts [A] (Both Sides)
  - Bracket [B]
  - Front Fender [C]



Front Fender Installation

- Installation is the reverse of removal.

Flap/Rear Fender Removal/Installation

- Refer to the Rear Fairing Disassembly.

15-22 FRAME

Frame

Sub Frame Removal

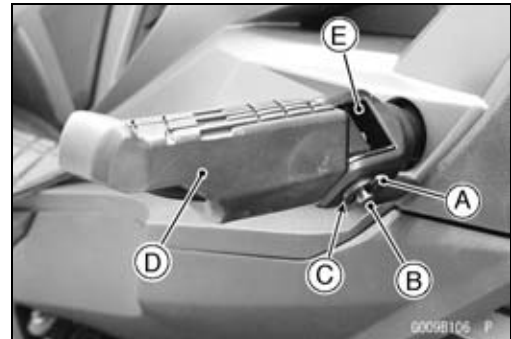
- Refer to the Rear Wheel Removal in the Wheels/Tires chapter.

Sub Frame Installation

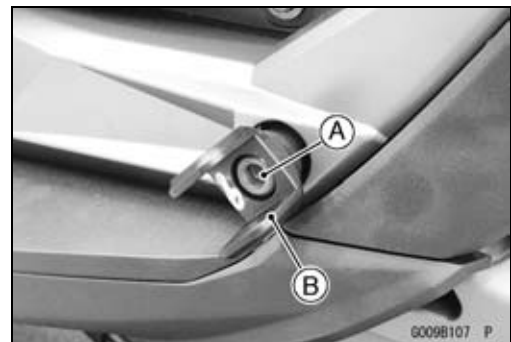
- Refer to the Rear Wheel Installation in the Wheels/Tires chapter.

Footpeg Removal

- Remove:
  - Clip [A]
  - Pin [B]
  - Washers [C]
  - Footpeg [D]
  - Guide [E]

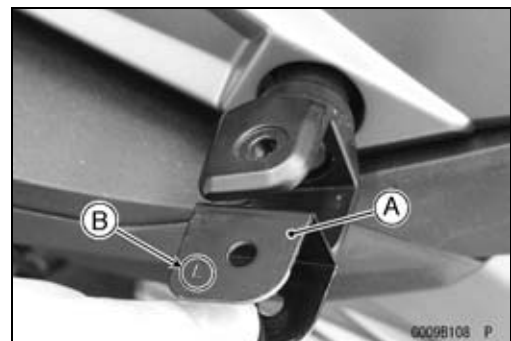


- Remove:
  - Bolt [A]
  - Holder [B]



Footpeg Installation

- Installation is the reverse of removal.
- Install the guide [A] as shown.
  - Left Side: Mark "L" [B]
  - Right Side: Mark "R"
- Replace the clip with a new one.



Frame Inspection

- Visually inspect the frame for cracks, dents, bending, or warp.
- ★ If there is any damage to the frame, replace it.

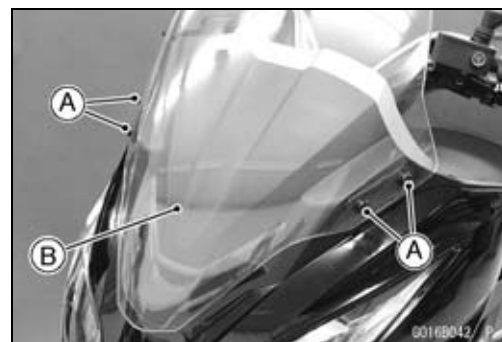
⚠ WARNING

A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

Windshield

Windshield Removal

- Remove:
  - Bolts [A]
  - Windshield [B]



Windshield Installation

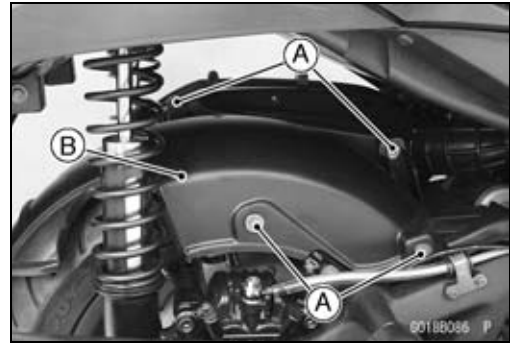
- Installation is the reverse of removal.

15-24 FRAME

Guard

Mud Guard Removal

- Remove:
  - Bolts [A]
  - Mud Guard [B]

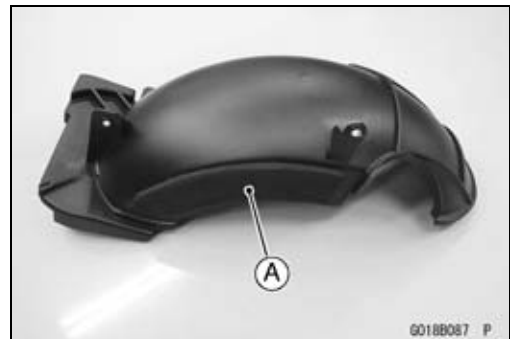


○ Remove the bolts [A], and free the air cleaner box to remove the mud guard.



Mud Guard Installation

- Installation is the reverse of removal.
- Be sure that pad [A] is in position on the mud guard.

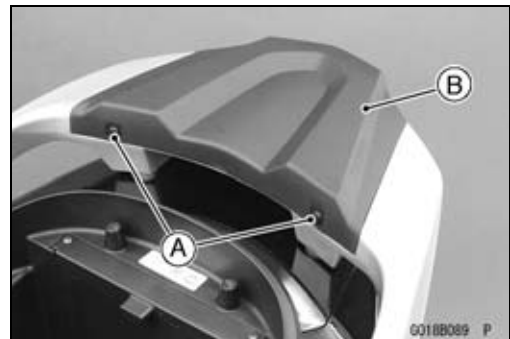


Grab Rail Removal

- Open the seat.
- Remove the screws [A].

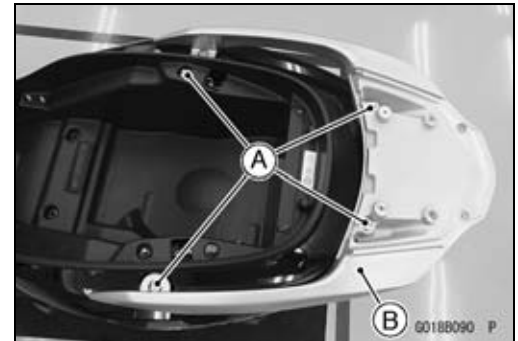


- Remove:
  - Quick Rivets [A]
  - Cover [B]



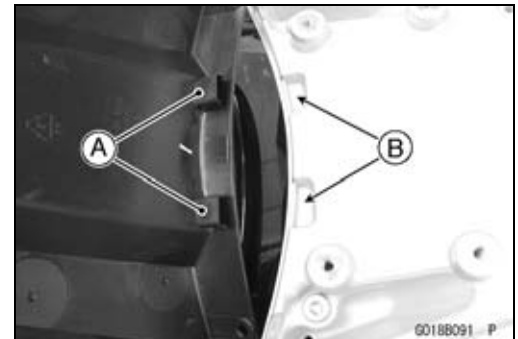
Guard

- Remove:
  - Grab Rail Mounting Bolts [A]
  - Grab Rail [B]



Grab Rail Installation

- Install the grab rail and tighten its bolts.
    - Torque - Grab Rail Mounting Bolts: 24 N·m (2.4 kgf·m, 18 ft·lb)**
  - Install:
    - Cover
    - Quick Rivets
    - Screws
- Fit the tabs [A] of the cover to the ribs [B] of the grab rail.

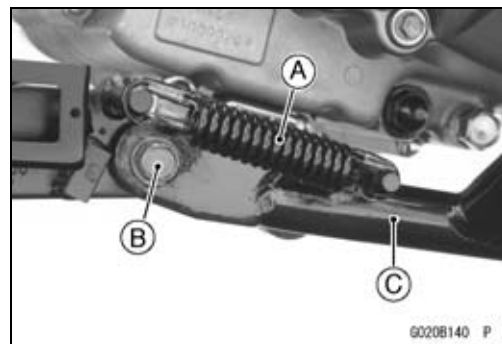


15-26 FRAME

Center Stand, Side Stand

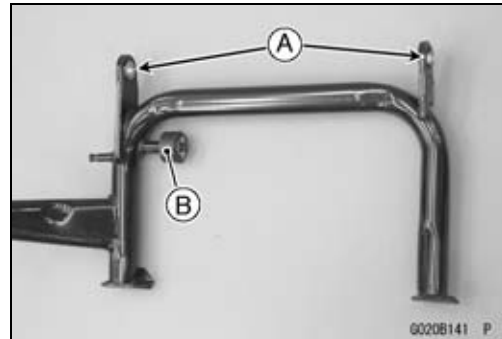
Center Stand Removal

- Remove:
  - Spring [A]
  - Center Stand Bolts [B] and Nut (Both Sides)
  - Center Stand [C]

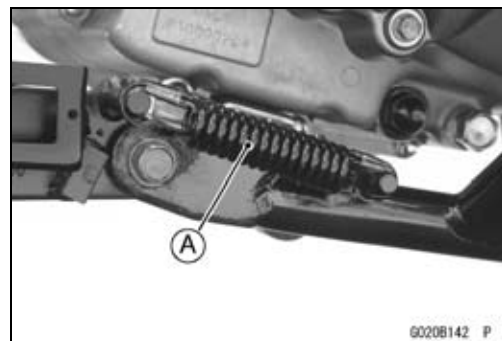


Center Stand Installation

- Be sure that the collars [A] are in position.
- Apply grease to the inside of the collars.
- ★ If the damper [B] is damaged, replace it.

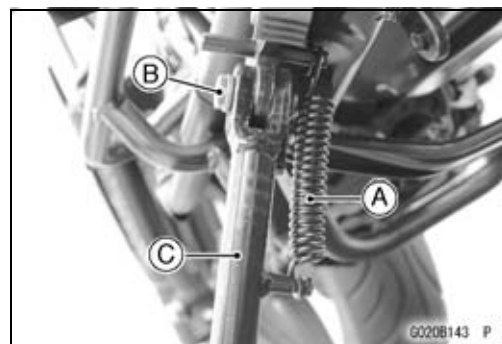


- Replace the center stand nuts with new ones.
- Install:
  - Center Stand
  - Center Stand Bolts and New Nuts
- Hook the spring [A] as shown.



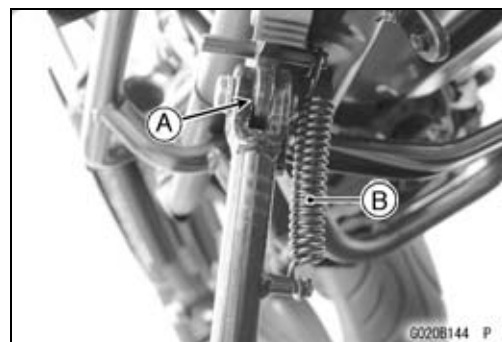
Side Stand Removal

- Use the center stand to support the motorcycle upright.
- Remove:
  - Side Stand Switch (see Side Stand Switch Removal in the Electrical System chapter)
  - Spring [A]
  - Side Stand Bolt [B]
  - Side Stand [C]



Side Stand Installation

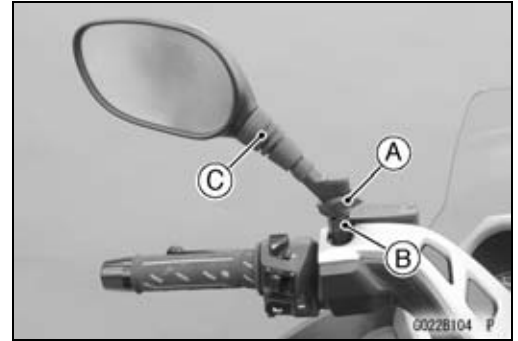
- Apply grease to the sliding area [A] of the side stand.
- Install:
  - Side Stand
  - Side Stand Bolt
- Hook the spring [B] as shown.



Rear View Mirror

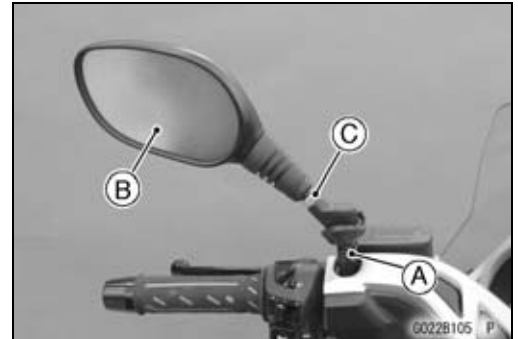
Rear View Mirror Removal

- Slide the rubber cover [A].
- Loosen the locknut [B] and remove the rear view mirror [C].



Rear View Mirror Installation

- Install the rear view mirror and tighten the locknut [A].
- Adjust the rear view mirror slightly with its mirror [B].
- If necessary, loosen the locknut [C] and adjust the mirror.
- Install the rubber covers.
- Installation and adjustment of the right side are common with those of the left side. Follow the procedure specified at the left side.



Electrical System

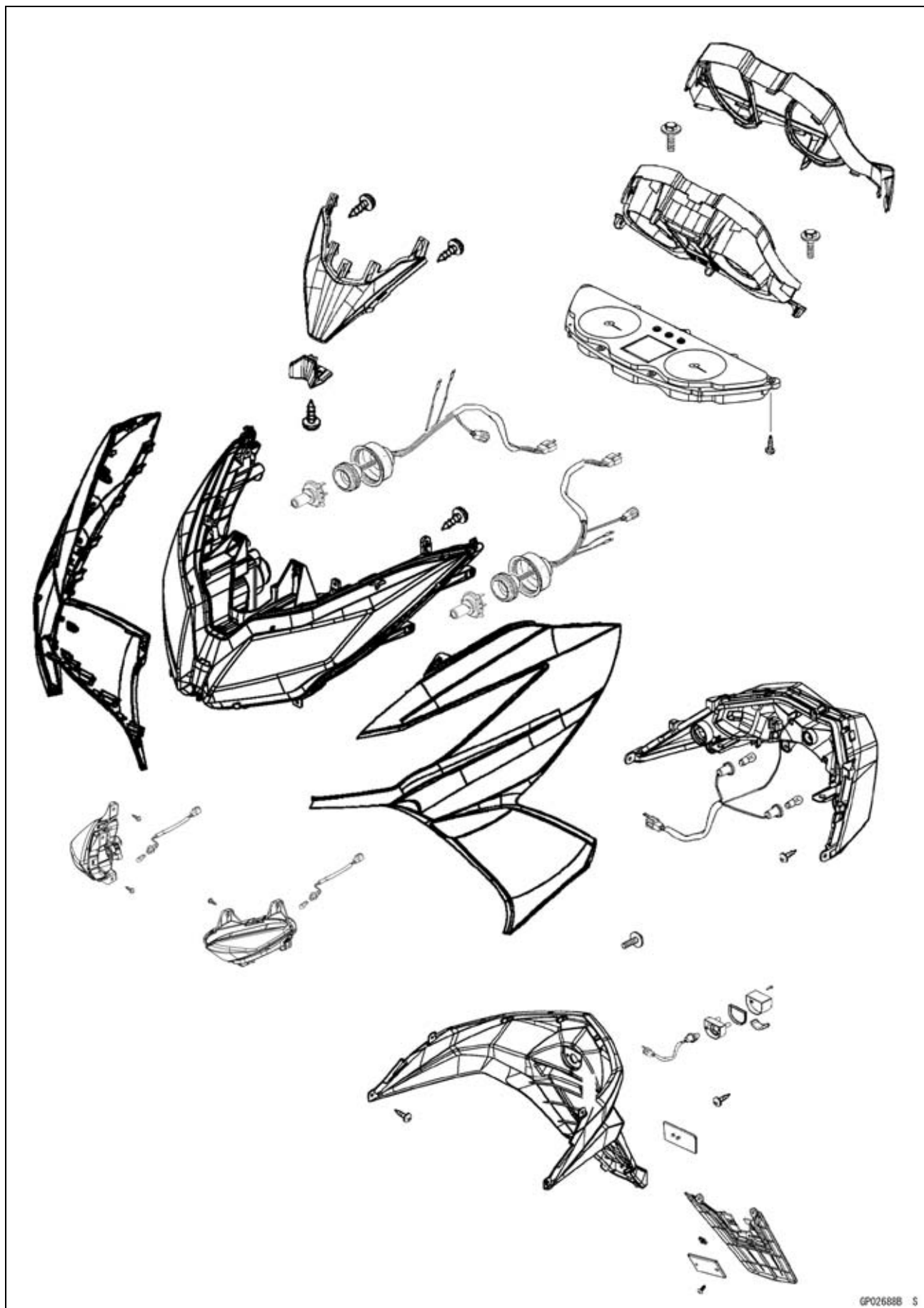
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16-2 ELECTRICAL SYSTEM

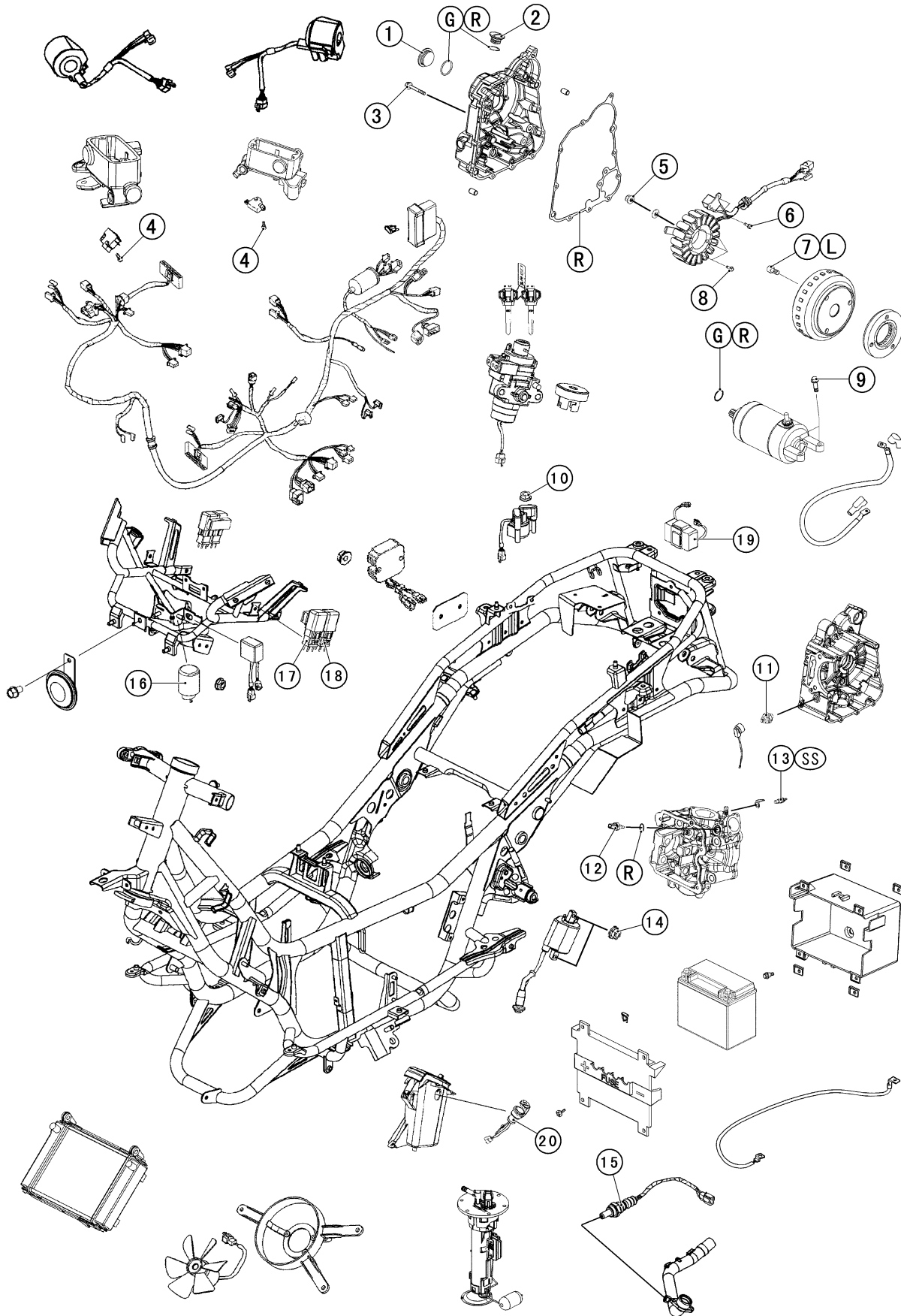
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Exploded View



16-4 ELECTRICAL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Alternator Cover Center Cap (SC300AE/BE)	4.4	0.45	39 in·lb	
	Alternator Cover Center Cap (SC300AF ~/BF ~)	9.8	1.0	87 in·lb	
2	Timing Inspection Cap	4.4	0.45	39 in·lb	
3	Alternator Cover Bolts	9.8	1.0	87 in·lb	
4	Brake Light Switch Screws	1.0	0.10	8.9 in·lb	
5	Alternator Rotor Nut	59	6.0	44	
6	Crankshaft Sensor Bolts	4.4	0.45	39 in·lb	
7	Starter Motor Clutch Bolts	20	2.0	15	L
8	Stator Coil Bolts	9.8	1.0	87 in·lb	
9	Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
10	Starter Relay Terminal Nuts	29	3.0	21	
11	Oil Pressure Switch	23	2.3	17	
12	Water Temperature Sensor (ECU)	12	1.2	106 in·lb	
13	Water Temperature Sensor (Meter)	7.4	0.75	65 in·lb	SS
14	Ignition Coil Mounting Nuts	12	1.2	106 in·lb	
15	Oxygen Sensor	25	2.5	18	

16. Turn Signal Relay

17. High Beam Headlight Relay

18. Low Beam Headlight Relay

19. Hazard Control Unit

20. Accessory Socket

L: Apply a non-permanent locking agent.

G: Apply grease.

R: Replacement Parts

SS: Apply silicone sealant.

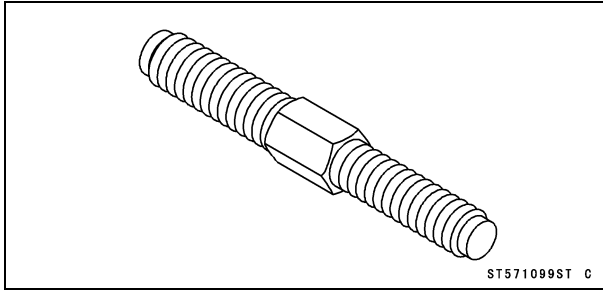
16-6 ELECTRICAL SYSTEM

Specifications

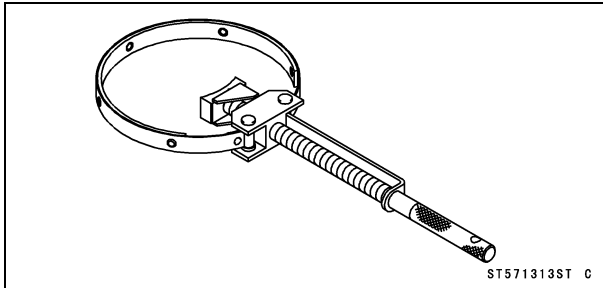
Item	Standard
Battery Type Model Name Capacity Voltage Gross Weight Electrolyte Volume	Sealed Battery YT12A-BS 12 V 10 Ah (10 HR) 12.8 V or more 3.5 kg (7.7 lb) 0.47 L (29 cu in.)
Charging System Type Alternator Output Voltage Stator Coil Resistance Charging Voltage (Regulator/Rectifier Output Voltage)	Three-phase AC AC 70 ~ 75 V @4 800 ~ 5 200 r/min (rpm) 0.32 ~ 0.48 Ω @20°C (68°F) 14 $\pm$ 0.5 V
Ignition System Crankshaft Sensor: Resistance Peak Voltage Ignition Coil: Primary Winding Resistance Secondary Winding Resistance Primary Peak Voltage Spark Plug: Type Gap	 96 ~ 144 Ω @20°C (68°F) 0.9 V or more 2.38 ~ 3.22 Ω 7.2 ~ 10.8 k Ω 120 V or more NGK CR7E 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Switches and Sensors Fuel Level Sensor Resistance: Full Position Empty Position Water Temperature Sensor (ECU) Resistance Water Temperature Sensor (Meter) Resistance	 1100 $\pm$ 33 Ω @20°C (68°F) 100 $\pm$ 3 Ω @20°C (68°F) in the text in the text

Special Tools and Sealant

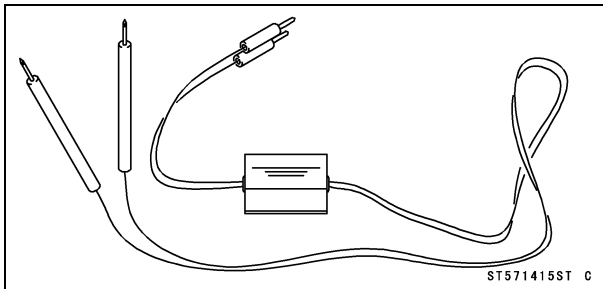
Rotor Puller M18 × 1.5, M16 × 1.5:
57001-1099



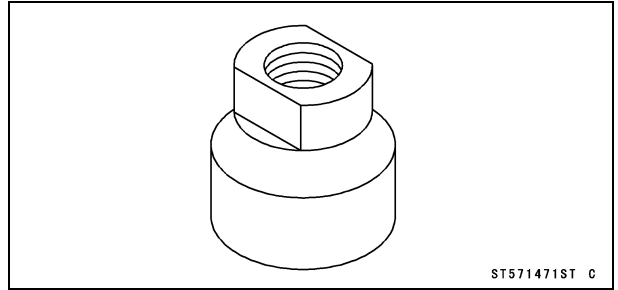
Flywheel Holder:
57001-1313



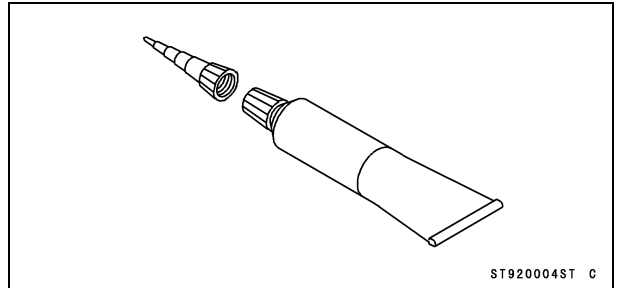
Peak Voltage Adapter:
57001-1415



Flywheel Puller, M28 × 1.0:
57001-1471



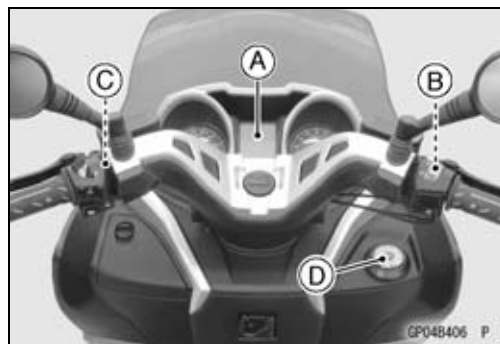
Liquid Gasket, TB1211F:
92104-0004



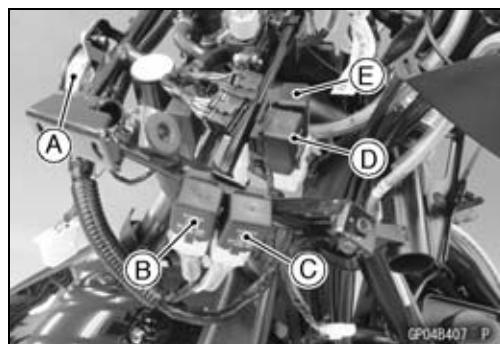
16-8 ELECTRICAL SYSTEM

Parts Location

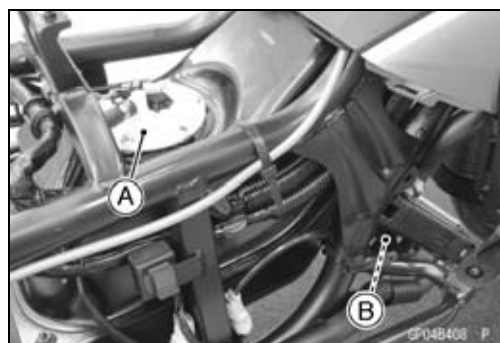
Meter Unit [A]
Front Brake Light Switch [B]
Rear Brake Light Switch [C]
Ignition Switch [D]



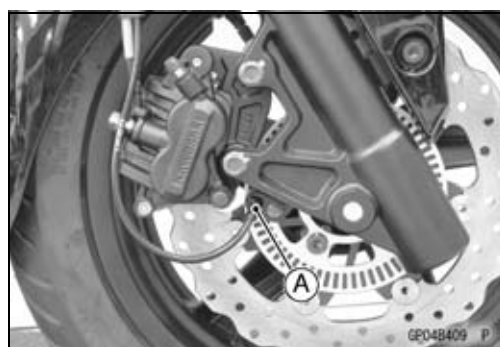
Horn [A]
High Beam Headlight Relay [B]
Low Beam Headlight Relay [C]
Starter Relay 1 [D]
Fan Relay [E]



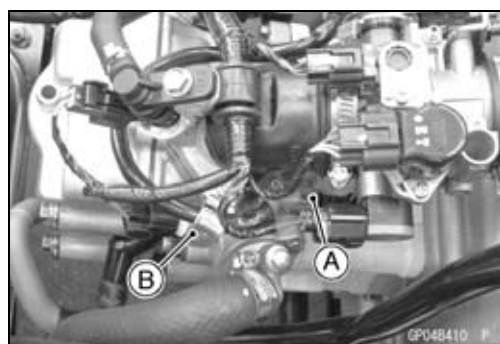
Fuel Pump/Fuel Level Sensor [A]
Fan Motor [B]



Speed Sensor (Front Wheel Rotation Sensor) [A]

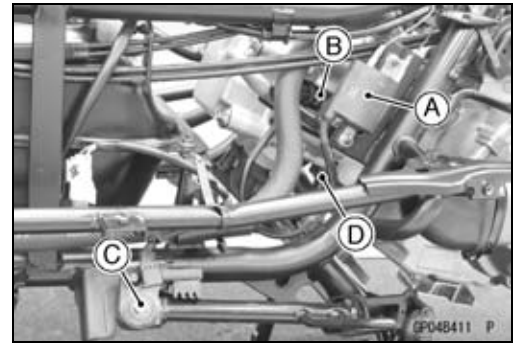


Water Temperature Sensor (Meter) [A]
Water Temperature Sensor (ECU) [B]

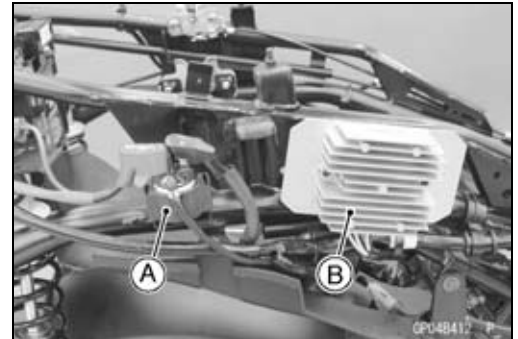


Parts Location

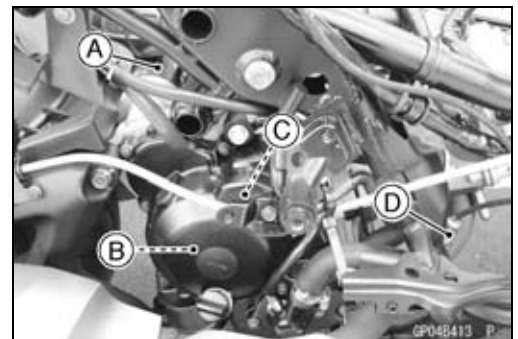
Ignition Coil [A]
 Spark Plug [B]
 Side Stand Switch [C]
 Oil Pressure Switch [D]



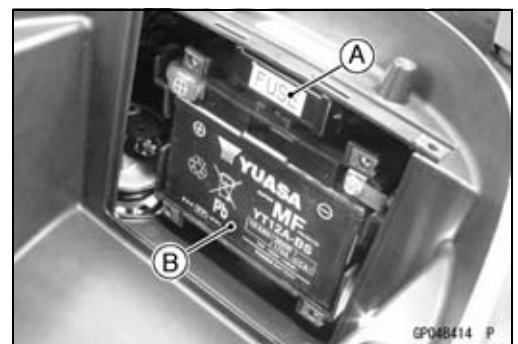
Starter Relay 2 [A]
 Regulator/Rectifier [B]



Starter Motor [A]
 Alternator [B]
 Crankshaft Sensor [C]
 Oxygen Sensor [D]

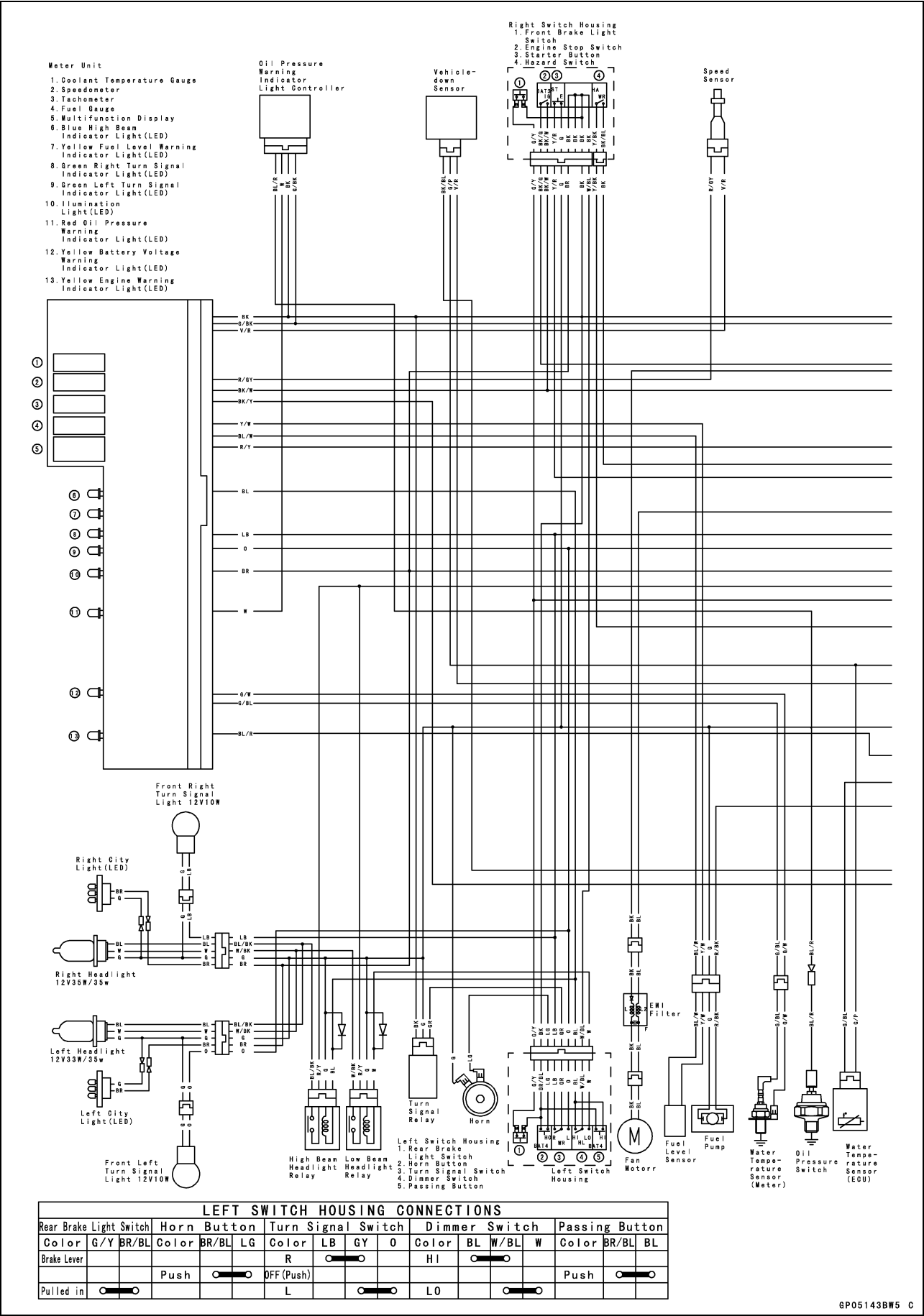


Fuse Box [A]
 Battery [B]

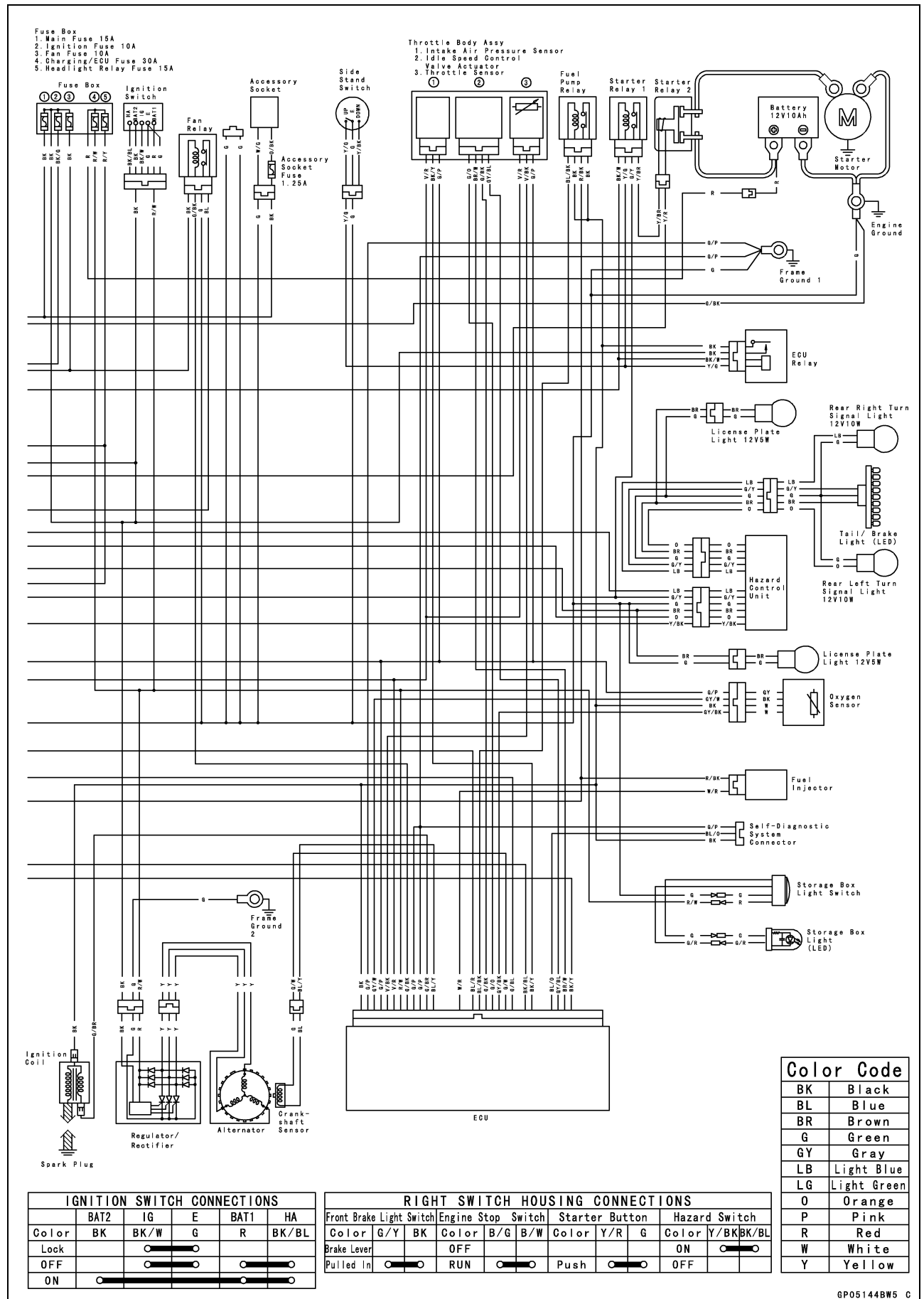


16-10 ELECTRICAL SYSTEM

Wiring Diagram

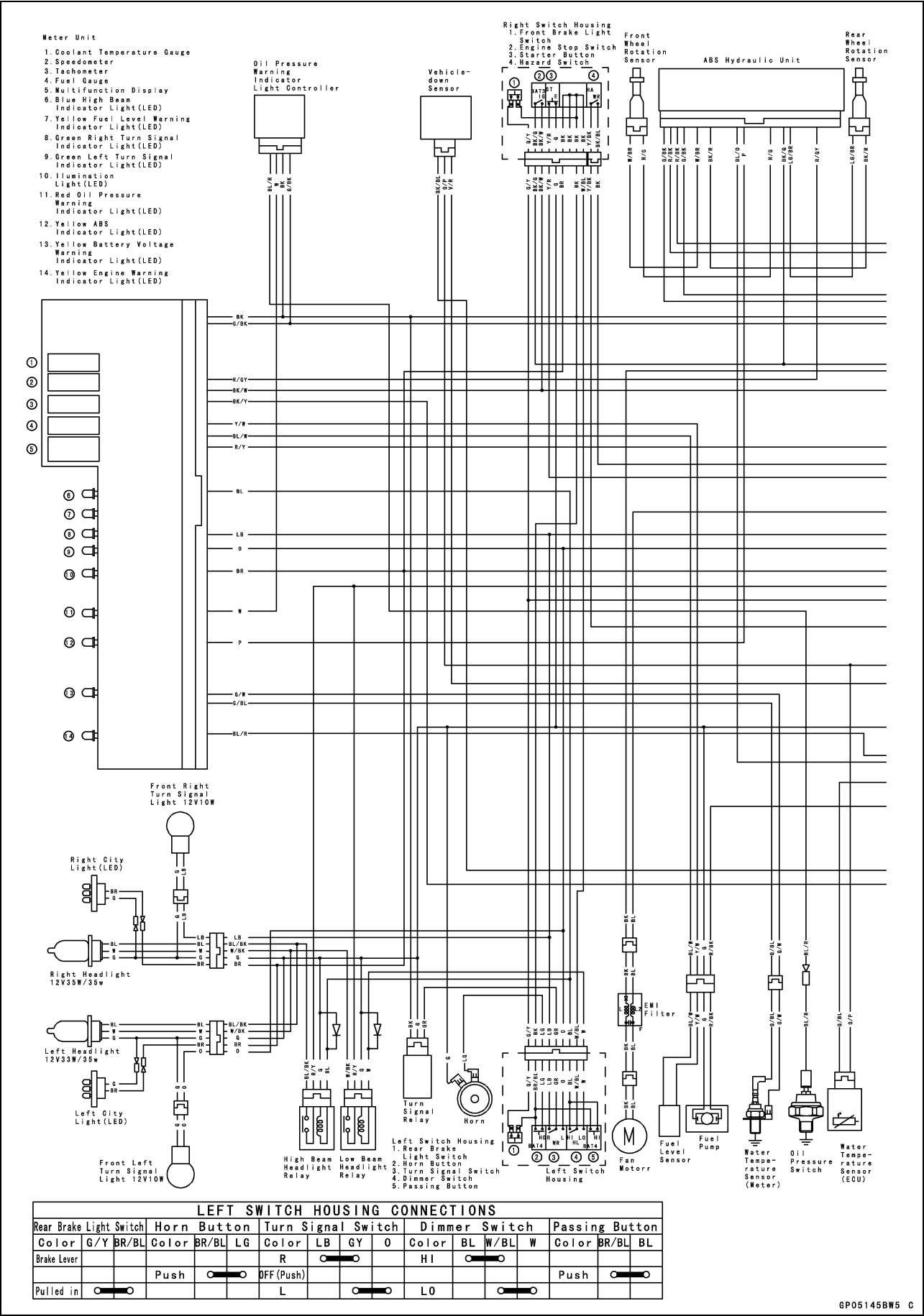


Wiring Diagram

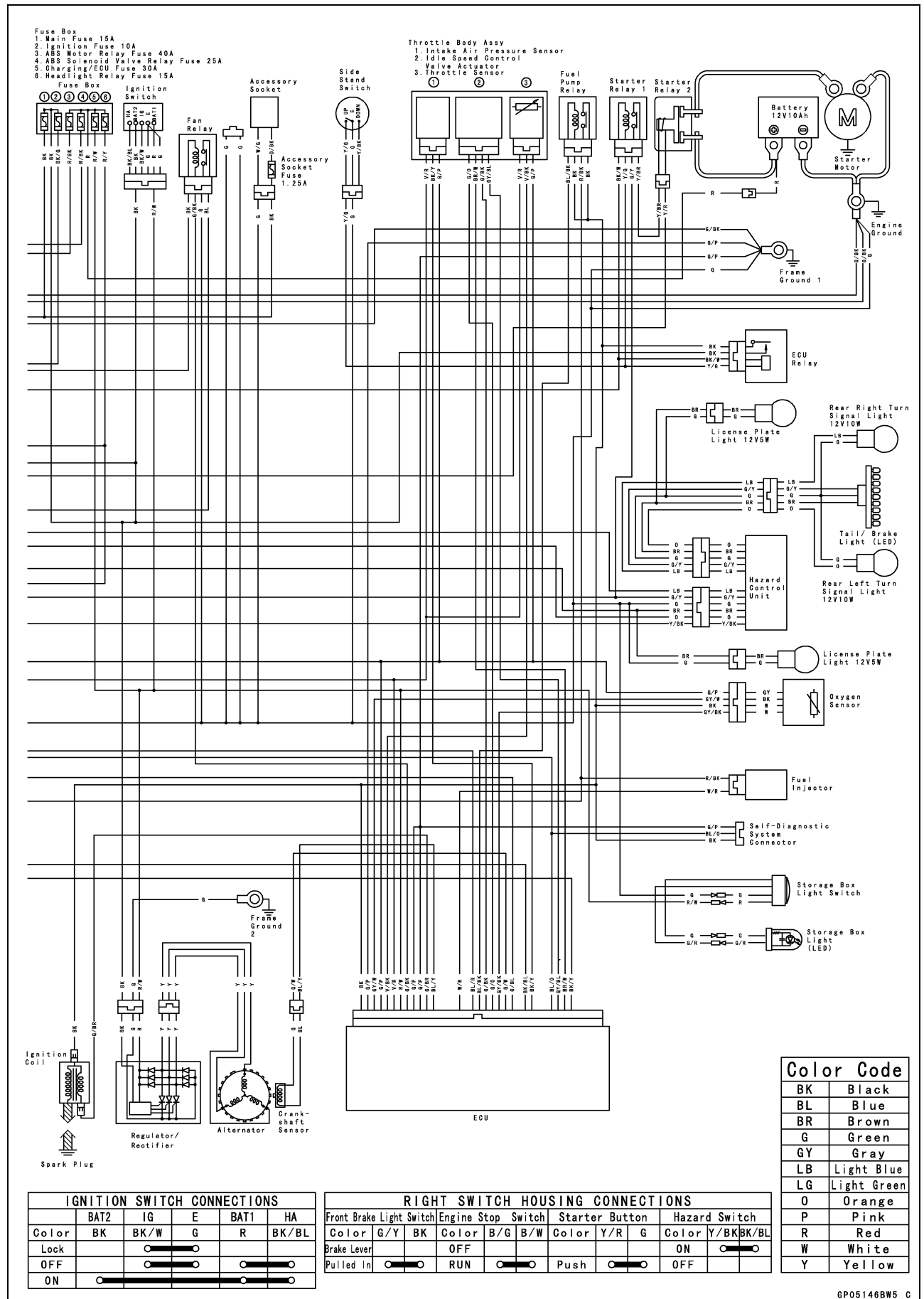


16-12 ELECTRICAL SYSTEM

Wiring Diagram (ABS Equipped Model)



Wiring Diagram (ABS Equipped Model)



16-14 ELECTRICAL SYSTEM

Precautions

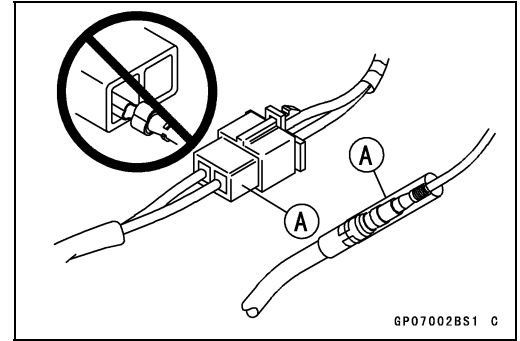
There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items.
Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning, fraying, etc. Poor leads and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
  - ★ If any wiring is poor, replace the damaged wiring.
  - Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
  - ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
-
- Check the wiring for continuity.
  - Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
  - Connect a tester between the ends of the leads.
  - ★ If the tester does not read about 0 Ω , the lead is defective. Replace the lead or the wiring harness if necessary.

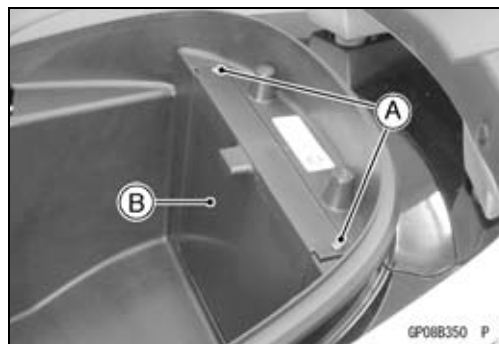


16-16 ELECTRICAL SYSTEM

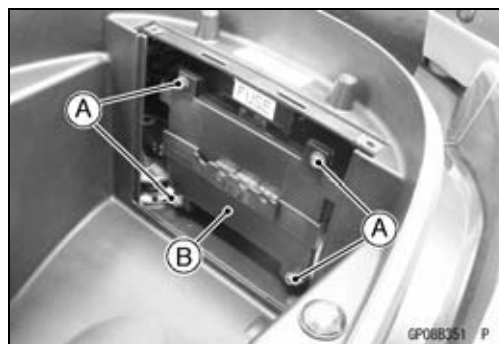
Battery

Battery Removal

- Turn the ignition switch off.
- Open the seat.
- Remove:
  - Screws [A]
  - Battery Cover [B]



- Remove:
  - Bolts [A]
  - Battery Case Cover [B]

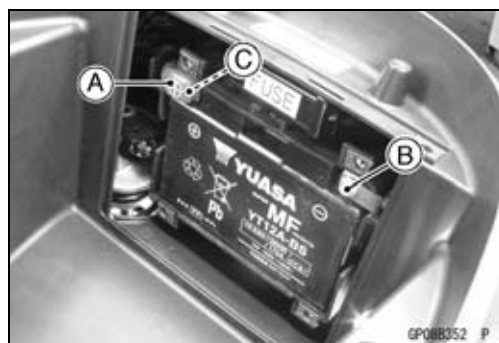


- Slide the red cap [A].
- Disconnect the negative (-) cable [B] and then positive (+) cable [C].

NOTICE

Be sure to disconnect the negative (-) cable first.

- Remove the battery.



Battery Installation

- Visually inspect the surface of the battery container.
- Put the battery into the battery case so that the positive (+) terminal faces right side of the motorcycle.
- Connect the positive (+) cable [A] (red cap) to the positive (+) terminal first, and then the negative (-) cable [B] to the negative (-) terminal.
- Apply a light coat of grease on the terminals to prevent corrosion.
- Cover the positive (+) terminal with the red cap [C].
- Install the battery case cover and tighten its bolts.
- Install the battery cover and tighten its screws.



NOTICE

If each battery cable is not correctly disconnected or connected, sparks can arise at electrical connections, causing damage to electrical and DFI parts.

Battery

Battery Activation

Electrolyte Filling

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name

SC300A/B: YT12A-BS

NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.

NOTICE

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.

⚠ DANGER

Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

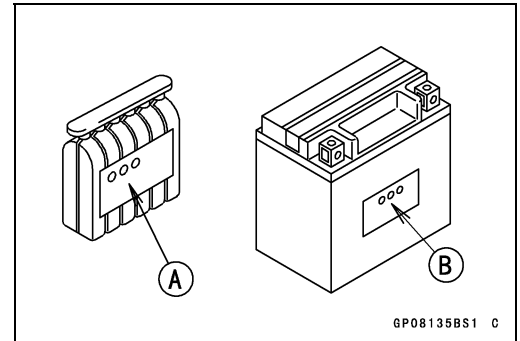
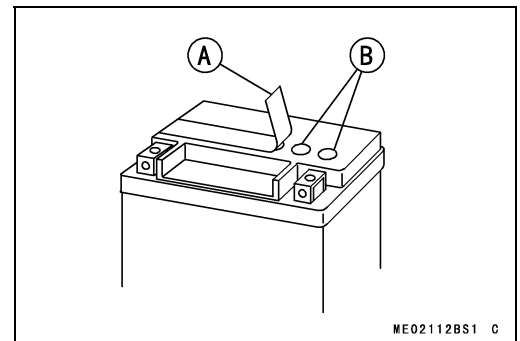
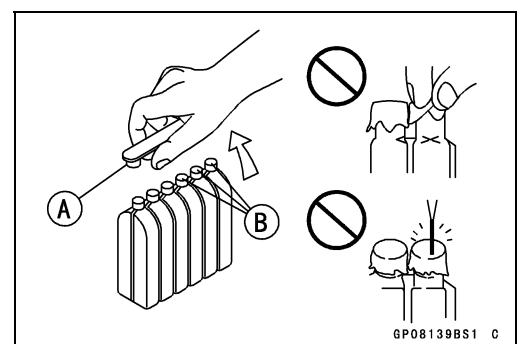
NOTE

○The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.

- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

NOTE

○Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.



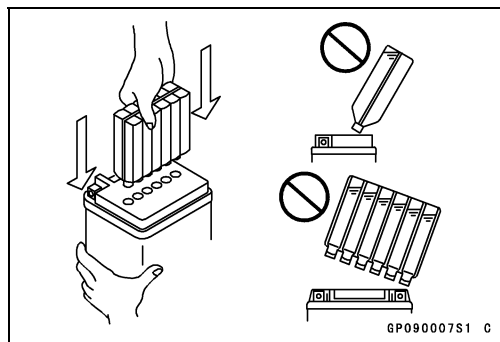
16-18 ELECTRICAL SYSTEM

Battery

- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

NOTE

○Do not tilt the electrolyte container.

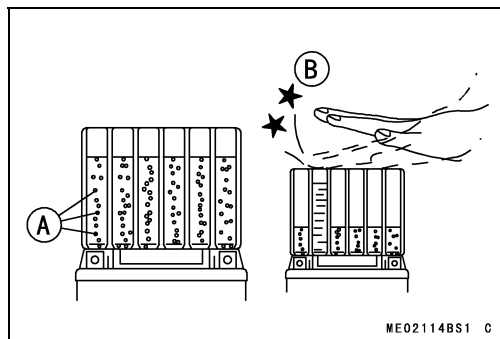


- Check the electrolyte flow.
- ★ If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.

NOTE

○Be careful not to have the battery fall down.

- Keep the container in place. Don't remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.



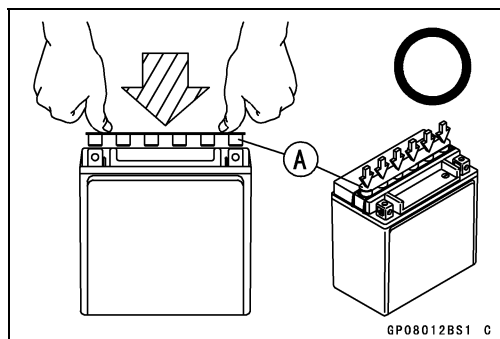
NOTICE

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.

- After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.
- Make sure that the container cells have emptied completely, and remove the container from the battery.
- Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.

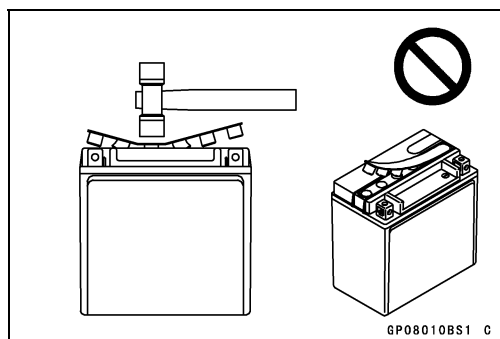
NOTICE

Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.



NOTE

○Charging the battery immediately after filling can shorten service life.



Battery

Initial Charge

- Newly activated sealed batteries require an initial charge.

Standard Charge: 1.2 A × 5 ~ 10 hours

- ★ If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:

Battery Mate 150-9

OptiMate PRO 4-S/PRO S/PRO2

Yuasa MB-2040/2060

Christie C10122S

- ★ If the above chargers are not available, use equivalent one.
- Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.).

NOTE

- *Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.8 V, repeat charging cycle.*
- *To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds. Re-check voltage and if less than 12.8 V repeat the charging cycle and load test. If still below 12.8 V the battery is defective.*

Precautions

- 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.
- Refreshing charge
If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).
When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.

If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

- 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.
- 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).

16-20 ELECTRICAL SYSTEM

Battery

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medical attention for more severe burns.

Interchange

A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

Charging Condition Inspection

- Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].
- Remove the battery (see Battery Removal).
- Measure the battery terminal voltage.

NOTE

- Measure with a digital voltmeter which can be read one decimal place voltage.

- ★ If the reading is 12.8 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

Battery Terminal Voltage

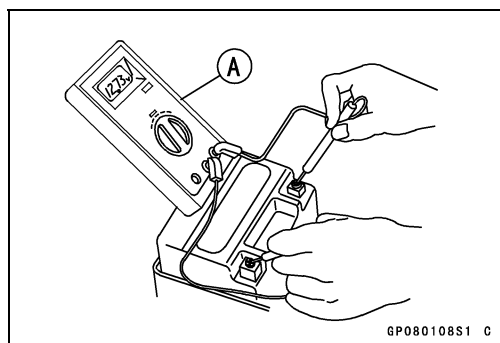
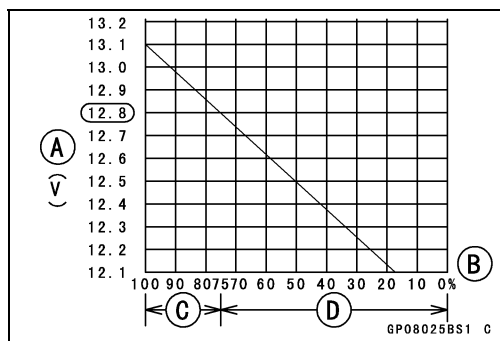
Standard: 12.8 V or more

Terminal Voltage (V) [A]

Battery Charge Rate (%) [B]

Good [C]

Refresh charge is required [D]

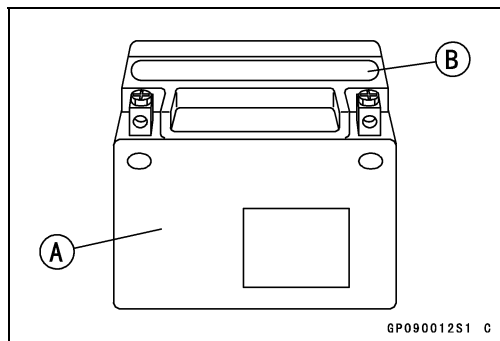


Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



Battery

Terminal Voltage: 11.5 ~ less than 12.8 V

Standard Charge 1.2 A × 5 ~ 10 h (see following chart)

Quick Charge 5 A × 1 h

NOTICE

If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

Terminal Voltage: less than 11.5 V

Charging Method: 1.2 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]

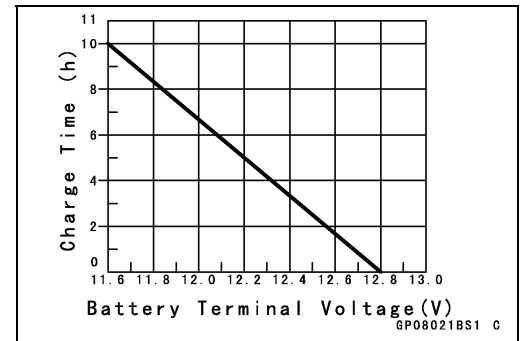
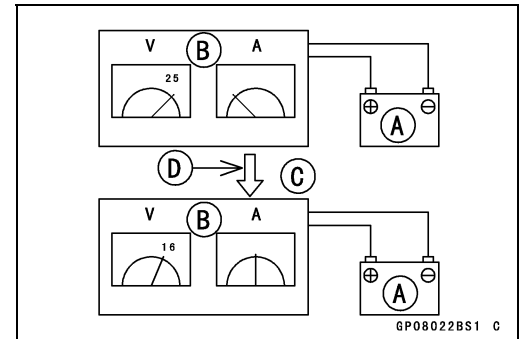
Battery Charger [B]

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

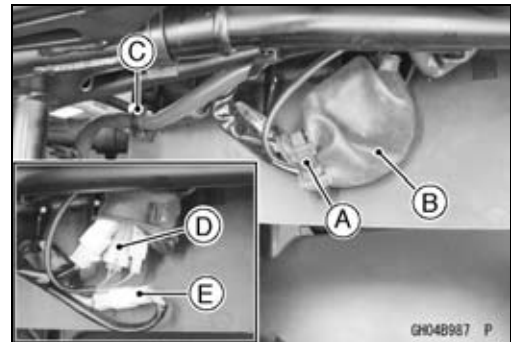


16-22 ELECTRICAL SYSTEM

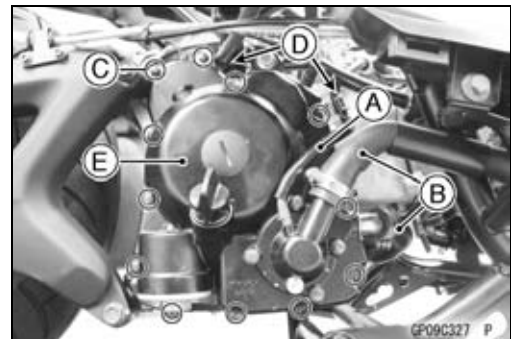
Charging System

Alternator Cover Removal

- Drain:
  - Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  - Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  - Storage Box (see Storage Box Removal in the Frame chapter)
  - Lower Fairing (see Lower Fairing Removal In the Frame chapter)
  - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
- Remove the band [A] and slide the dust cover [B].
- Open the clamp [C].
- Disconnect:
  - Crankshaft Sensor Lead Connector [D]
  - Alternator Lead Connector [E]

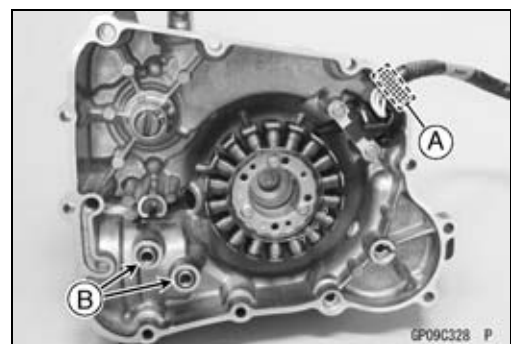


- Open the water hose clamp and disconnect the water bypass hose [A].
- Loosen the water hose clamp screws and disconnect the water hoses [B].
- Remove:
  - Alternator Cover Bolts [C]
  - Clamps [D]
  - Alternator Cover [E]



Alternator Cover Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
  - Apply liquid gasket to the alternator lead grommet [A] on the alternator cover.
- Sealant - Liquid Gasket, TB1211F: 92104-0004**
- Replace the O-rings [B] with new ones.
  - Apply grease to the new O-rings.



Charging System

- Check that the dowel pins [A] are in place on the crankcase.
- Replace the alternator cover gasket with a new one.
- Tighten the alternator cover bolts together with the clamps.

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

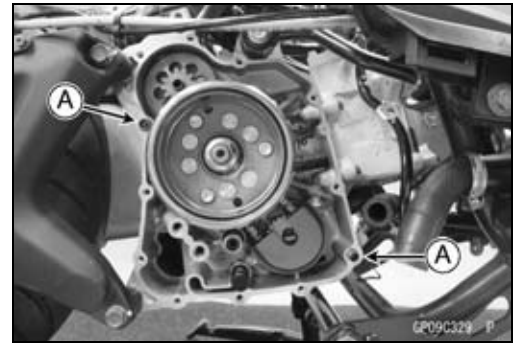
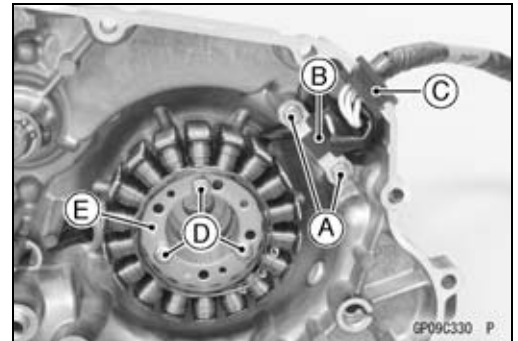
- Run the lead and water hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Water Hose Clamp Screws: 4.4 N·m (0.45 kgf·m, 39 in·lb)

- Install the removed parts (see appropriate chapters).

Stator Coil Removal

- Remove:
  - Alternator Cover (see Alternator Cover Removal)
  - Crankshaft Sensor Bolts [A]
  - Crankshaft Sensor [B]
  - Alternator Lead Grommet [C]
  - Stator Coil Bolts [D]
- Remove the stator coil [E] from the alternator cover.



Stator Coil Installation

- Install the stator coil and crankshaft sensor, and tighten them bolts.

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

Crankshaft Sensor Bolts: 4.4 N·m (0.45 kgf·m, 39 in·lb)

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the alternator lead grommet, and fit the grommet into the notch of the cover securely.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Install the alternator cover (see Alternator Cover Installation).

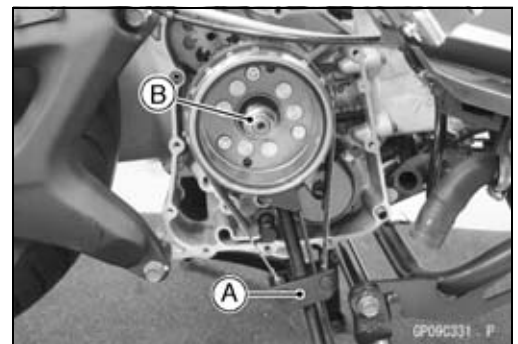
Alternator Rotor Removal

- Remove the alternator cover (see Alternator Cover Removal).
- Hold the alternator rotor steady with the flywheel holder [A], and remove the rotor nut [B] and washer.

Special Tool - Flywheel Holder: 57001-1313

NOTICE

Do not hold the rotor at pick-up portion with the flywheel holder.



16-24 ELECTRICAL SYSTEM

Charging System

- Using the flywheel puller [A] and rotor puller [B], remove the alternator rotor from the crankshaft.

Special Tools - Rotor Puller M18 × 1.5, M16 × 1.5: 57001-1099

Flywheel Puller, M28 × 1.0: 57001-1471

NOTICE

Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Alternator Rotor Installation

- Remove the starter motor [A] temporary (see Starter Motor Removal).

- 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]

- Fit the woodruff key [C] securely in the slot of the crankshaft.
- Align the woodruff key on the crankshaft with groove [D] on the alternator rotor.

- Push the alternator rotor while turning the starter motor clutch gear [A] counterclockwise until it engaged into the starter clutch case.
- Install the starter motor (see Starter Motor Installation).

- Install the washer and rotor nut [A].
- Tighten the alternator rotor bolt while holding the alternator rotor steadily with the flywheel holder [B].

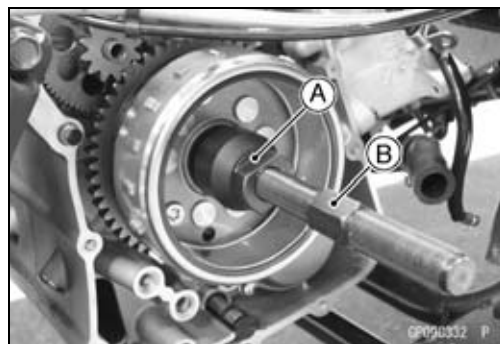
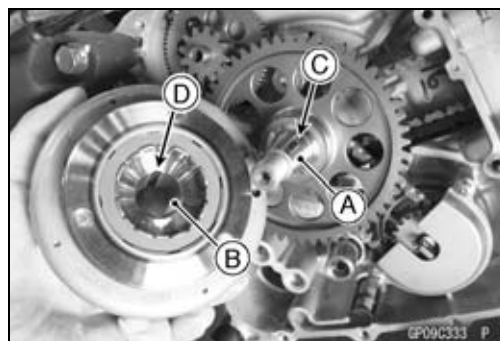
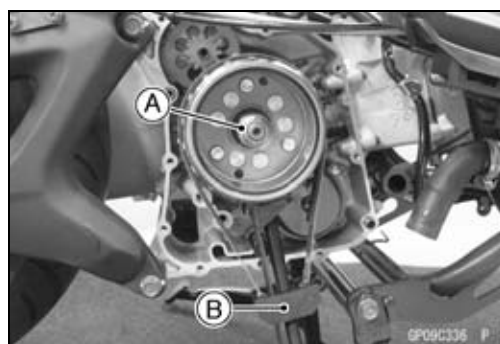
Special Tool - Flywheel Holder: 57001-1313

Torque - Alternator Rotor Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)

NOTICE

Do not hold the rotor at pick-up portion with the flywheel holder.

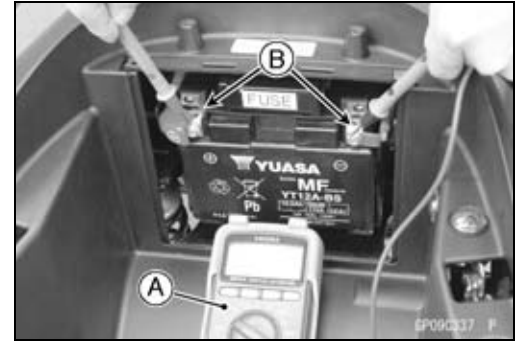
- Install the alternator cover (see Alternator Cover Installation).



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 case cover (see Battery Removal).
- Check that the ignition switch is turned off, and connect a digital meter [A] to the battery terminals [B].
- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.



Charging Voltage

Connections		Reading
Tester (+) to	Tester (-) to	
Battery (+)	Battery (-)	14 $\pm$ 0.5 V

- Turn off the ignition switch to stop the engine, and disconnect the digital meter.
- ★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★ If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

16-26 ELECTRICAL SYSTEM

Charging System

- To check the alternator output voltage, do the following procedures.
- Turn the ignition switch off.
- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Remove the band [A] and slide the dust cover [B].
- Disconnect the alternator lead connector [C].
- Connect a tester as shown in the table 1.
- Start the engine.
- Run it at the rpm given in the table 1.
- Note the voltage readings (total 3 measurements).

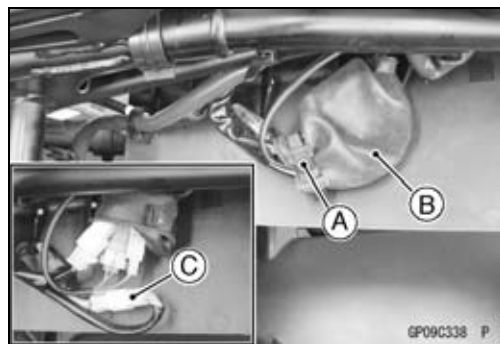


Table 1 Alternator Output Voltage @4 800 ~ 5 200 r/min (rpm)

Connections		Reading
Tester (+) to	Tester (-) to	
One Y lead	Another Y lead	AC 70 ~ 75 V

- ★ If the output voltage shows the value in the table, the alternator operates properly. The regulator/rectifier is damaged.
- ★ If the output voltage shows a much lower reading than that given in the table, stop the engine and inspect the stator coil resistance.
- Check the stator coil resistance as follows.
- Stop the engine.
- Connect the tester as shown in the table 2.
- Note the readings (total 3 measurements).

Table 2 Stator Coil Resistance @20°C (68°F)

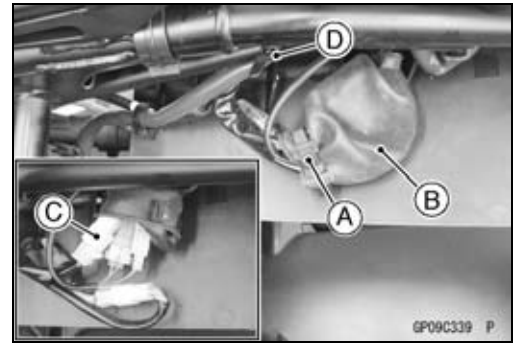
Connections		Reading
Tester (+) to	Tester (-) to	
One Y lead	Another Y lead	0.32 ~ 0.48 Ω

- ★ If there is more resistance than shown in the table, or no tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
- Measure the resistance between each of the Y leads and chassis ground.
- ★ Any hand tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
- ★ If the stator coil has normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

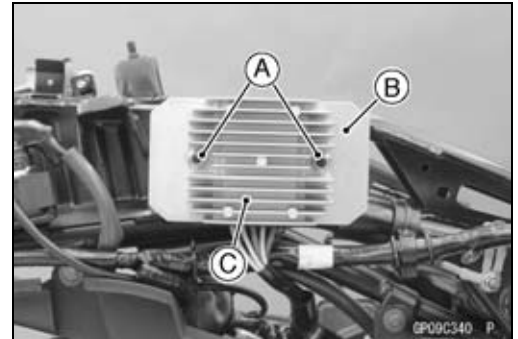
Charging System

Regulator/Rectifier Removal

- Remove the rear fairing (see Rear Fairing Removal in the Frame chapter).
- Remove the band [A] and slide the dust cover [B].
- Disconnect the regulator/rectifier lead connector [C].
- Remove the band [D].



- Remove:
Regulator/Rectifier Nuts [A]
Aluminum Plate [B]
Regulator/Rectifier [C]



Regulator/Rectifier Installation

- Installation is the reverse of removal.

Charging System Troubleshooting

- Before inspection, remove all accessories that consume electrical power.

NOTE

○Even when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.

- Pay attention to riding conditions and the customer's riding habits which could affect the charging system such as:

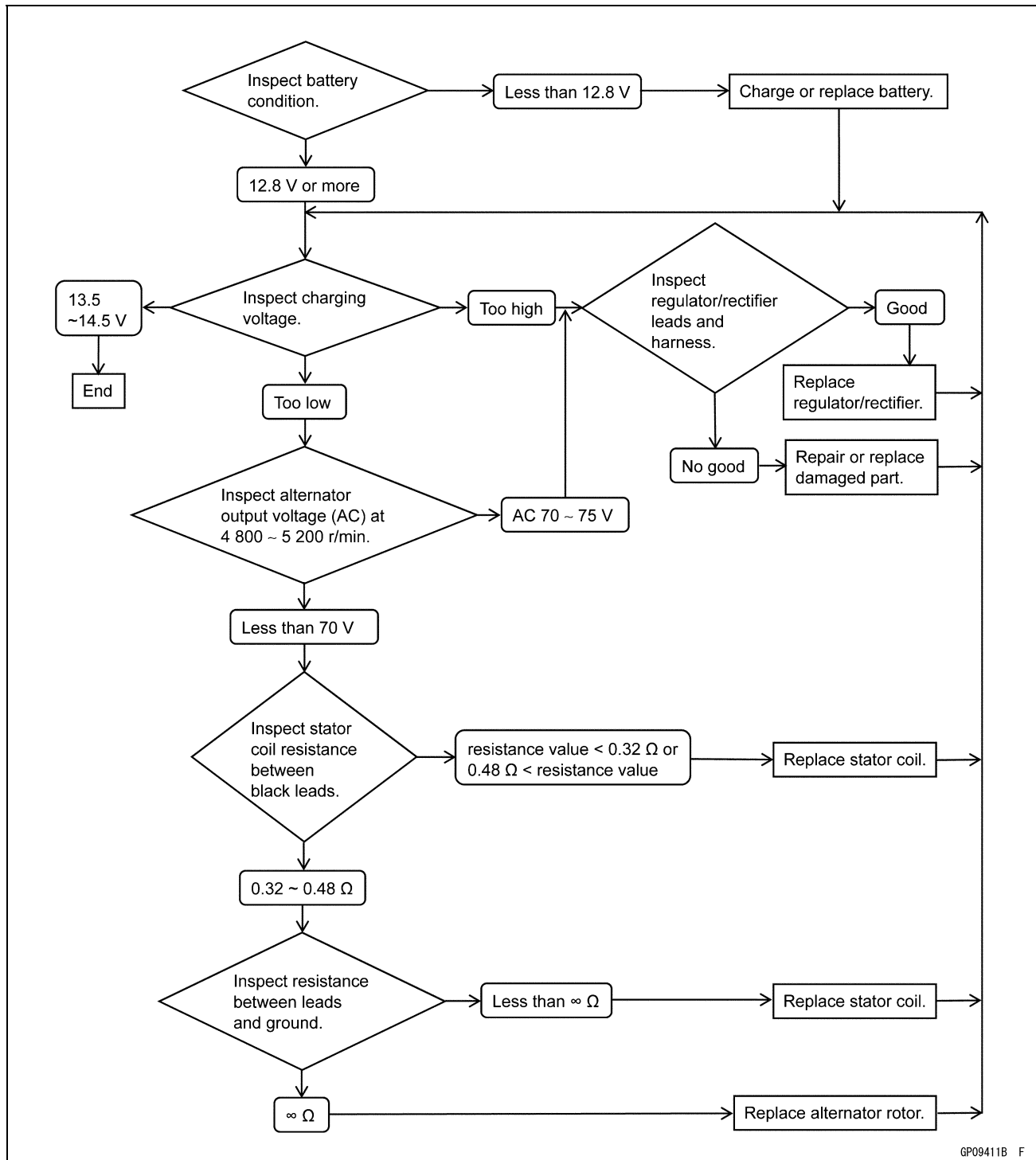
Frequent use at low engine speed → Battery discharged

Frequent and unnecessary brake pedal dragging → Battery discharged

- Recharge the battery if it is discharged.

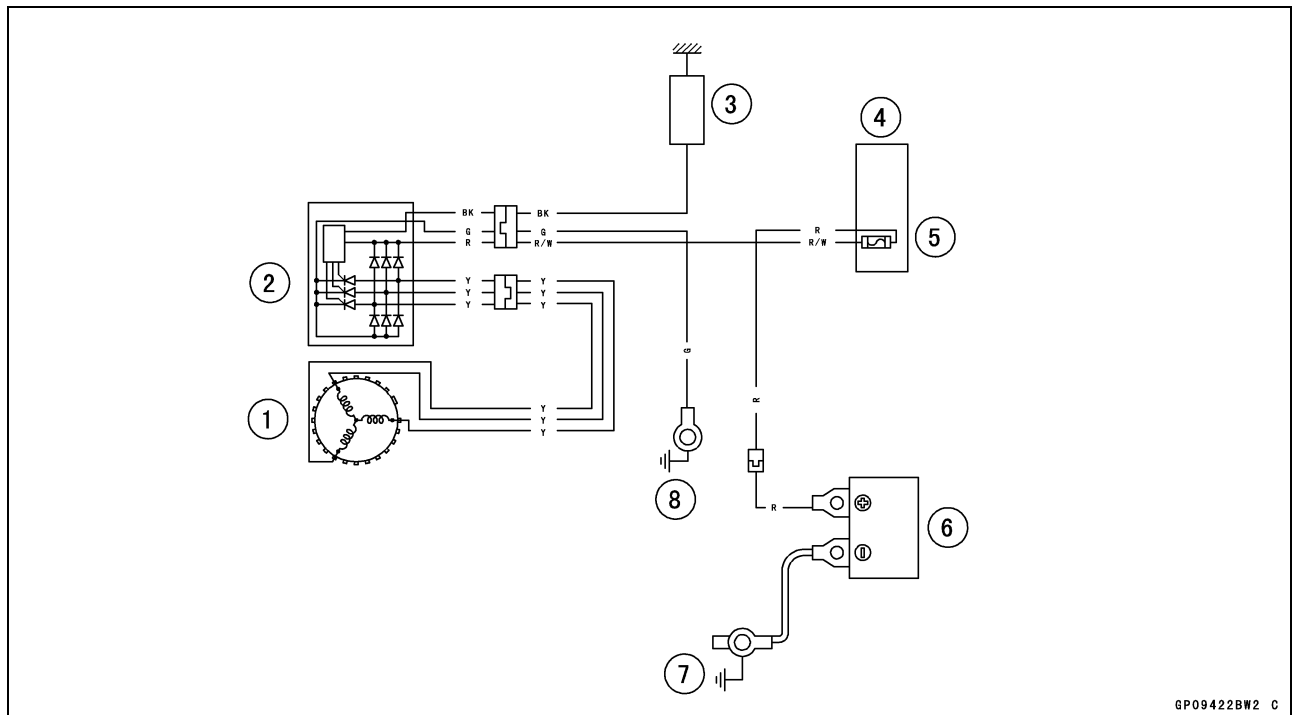
16-28 ELECTRICAL SYSTEM

Charging System



Charging System

Charging System Circuit



GP09422BW2 C

1. Alternator
2. Regulator/Rectifier
3. Load
4. Fuse Box
5. Charging/ECU Fuse 30 A
6. Battery 12 V 10 Ah
7. Engine Ground
8. Frame Ground 1

16-30 ELECTRICAL SYSTEM

Ignition System

WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or ignition coil lead while the engine is running, or you could receive a severe electrical shock.

NOTICE

Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent ECU damage.

Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.

Crankshaft Sensor Removal

- Refer to the Stator Coil Removal.

Crankshaft Sensor Installation

- Refer to the Stator Coil Installation.

Crankshaft Sensor Inspection

- Disconnect the crankshaft sensor lead connector (see Alternator Cover Removal).
- Connect a digital meter [A] to the crankshaft sensor lead connector [B].

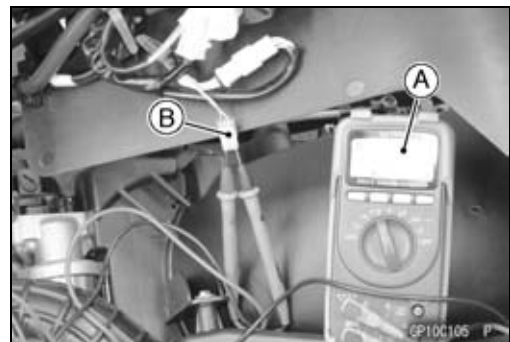
Crankshaft Sensor Resistance

Connections:

BL lead → G lead

Standard: 96 ~ 144 Ω @20°C (68°F)

- ★ If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.
- Measure the resistance between the crankshaft sensor leads and chassis ground.
- ★ Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor.



Ignition System

Crankshaft Sensor Peak Voltage Inspection

NOTE

- Be sure the battery is fully charged.
- Using the peak voltage adapter [A] is more reliable way to determine the condition of the crankshaft sensor than crankshaft sensor internal resistance measurements.

- Disconnect the crankshaft sensor lead connector (see Alternator Cover Removal).
- Connect a digital meter [B] to the peak voltage adapter.

Special Tool - Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

- Connect the adapter to the terminals of the crankshaft sensor lead connector [C].

Connections:

Crankshaft Sensor Lead Connector		Peak Voltage Adapter		Tester Probe
BL lead	←	R lead	→	(+)
G lead	←	BK lead	→	(-)

- Turn the engine stop switch to run position.
- Turn the ignition switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds to measure the crankshaft sensor peak voltage.
- Repeat the measurements 5 or more times.

Crankshaft Sensor Peak Voltage

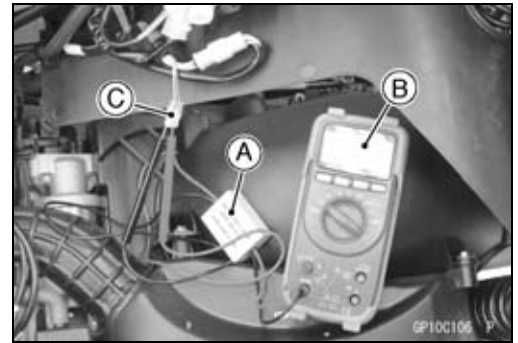
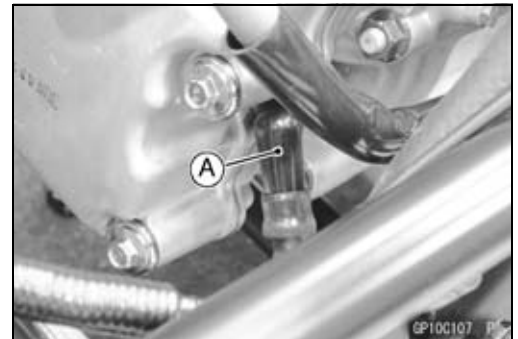
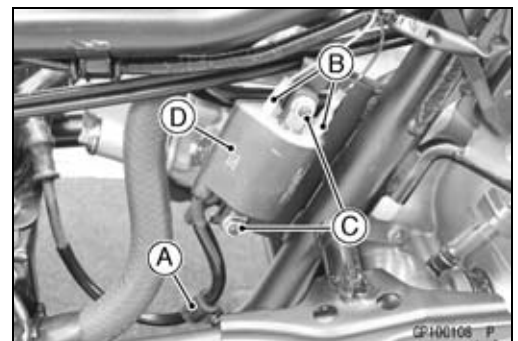
Standard: 0.9 V or more

- ★ If the reading is less than the standard, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

Ignition Coil Removal

- Remove the left side fairing (see Side Fairing Removal in the Frame chapter).
- Disconnect the spark plug cap [A].

- Remove the spark plug lead from the clamp [A].
- Disconnect the ignition coil lead connectors [B].
- Remove:
  - Ignition Coil Mounting Nuts [C]
  - Ignition Coil [D]

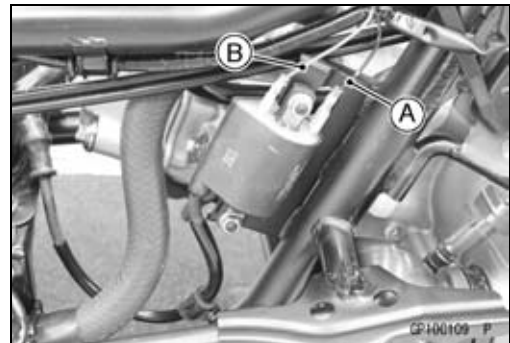


16-32 ELECTRICAL SYSTEM

Ignition System

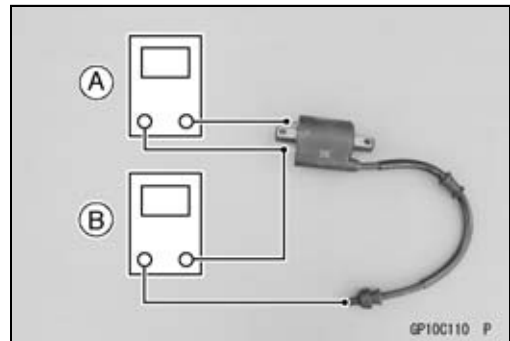
Ignition Coil Installation

- Install the ignition coil and tighten its nuts.
Torque - Ignition Coil Mounting Nuts: 12 N·m (1.2 kgf·m, 106 in·lb)
- Connect the ignition coil lead connectors.
BK Lead [A]
G/BR Lead [B]
- Fit the plug cap securely.
- Pull up the spark plug cap lightly to make sure of the installation of the spark plug cap.



Ignition Coil Inspection

- Remove the ignition coil (see Ignition Coil Removal).
- Measure the primary winding resistance [A] as follows.
○ Connect a tester between the ignition coil terminals.
- Measure the secondary winding resistance [B] as follows.
○ Remove the spark plug cap from the spark plug lead.
○ Connect a tester between the high tension lead and the ground terminal.



Ignition Coil Winding Resistance

Primary Windings: 2.38 ~ 3.22 Ω

Secondary Windings: 7.2 ~ 10.8 k Ω

- ★ If the tester does not read as specified, replace the ignition coil.
- ★ If the tester reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, replace the coil with one known to be good.
- Check the spark plug lead for visible damage.
- ★ If the spark plug lead is damaged, replace the ignition coil.
- Install the spark plug cap to the spark plug lead securely.

Ignition Coil Primary Peak Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

- Disconnect the spark plug cap (see Ignition Coil Removal).
- Do not remove the spark plug.
- Measure the primary peak voltage as follows.
○ Install the new spark plug [A] into the spark plug cap [B], and ground it onto the frame.
- Connect the peak voltage adapter [C] into a digital meter [D].
Ignition Coil [E]
ECU [F]

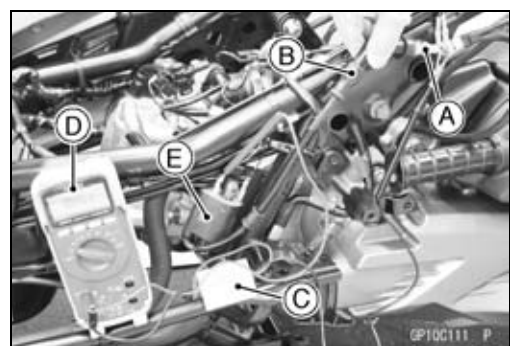
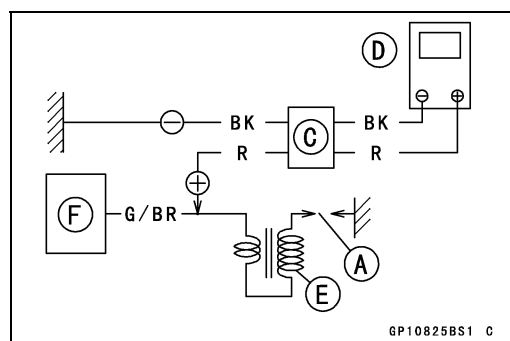
Special Tool - Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

Connections:

Adapter (R, +) → Ignition Coil Primary Lead Terminal

Adapter (G/BR, -) → Ignition Coil Ground Terminal



Ignition System

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds to measure the primary peak voltage.
- Repeat the measurements 5 or more times.

Ignition Coil Primary Peak Voltage

Standard: 120 V or more

- ★ If the reading is less than the specified value, check the following.

Ignition Coil (see Ignition 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.

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 oily or has carbon built up on it, clean it. The plug may also be cleaned using high flash-point solvent and nonmetal brush (nylon etc.).
- Measure the gap [D] with a wire-type thickness gauge.
- ★ If the gap is incorrect, replace the spark plug.

Spark Plug Gap: 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)

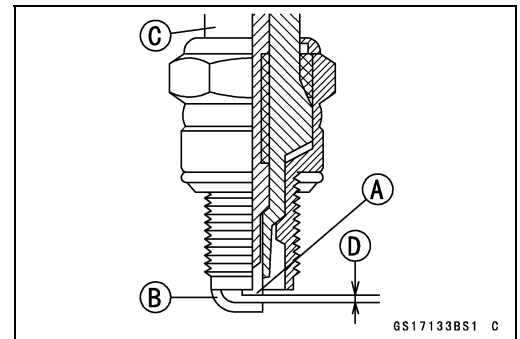
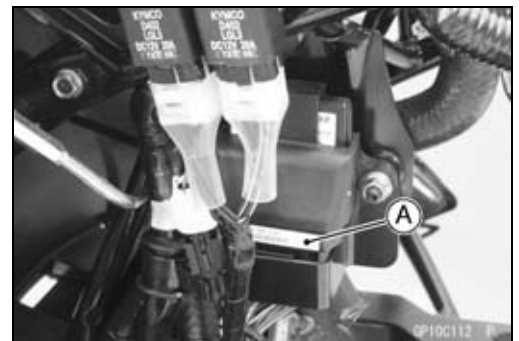
- Use the standard spark plug or its equivalent.

Standard Spark Plug

Type: NGK CR7E

IC Igniter Inspection

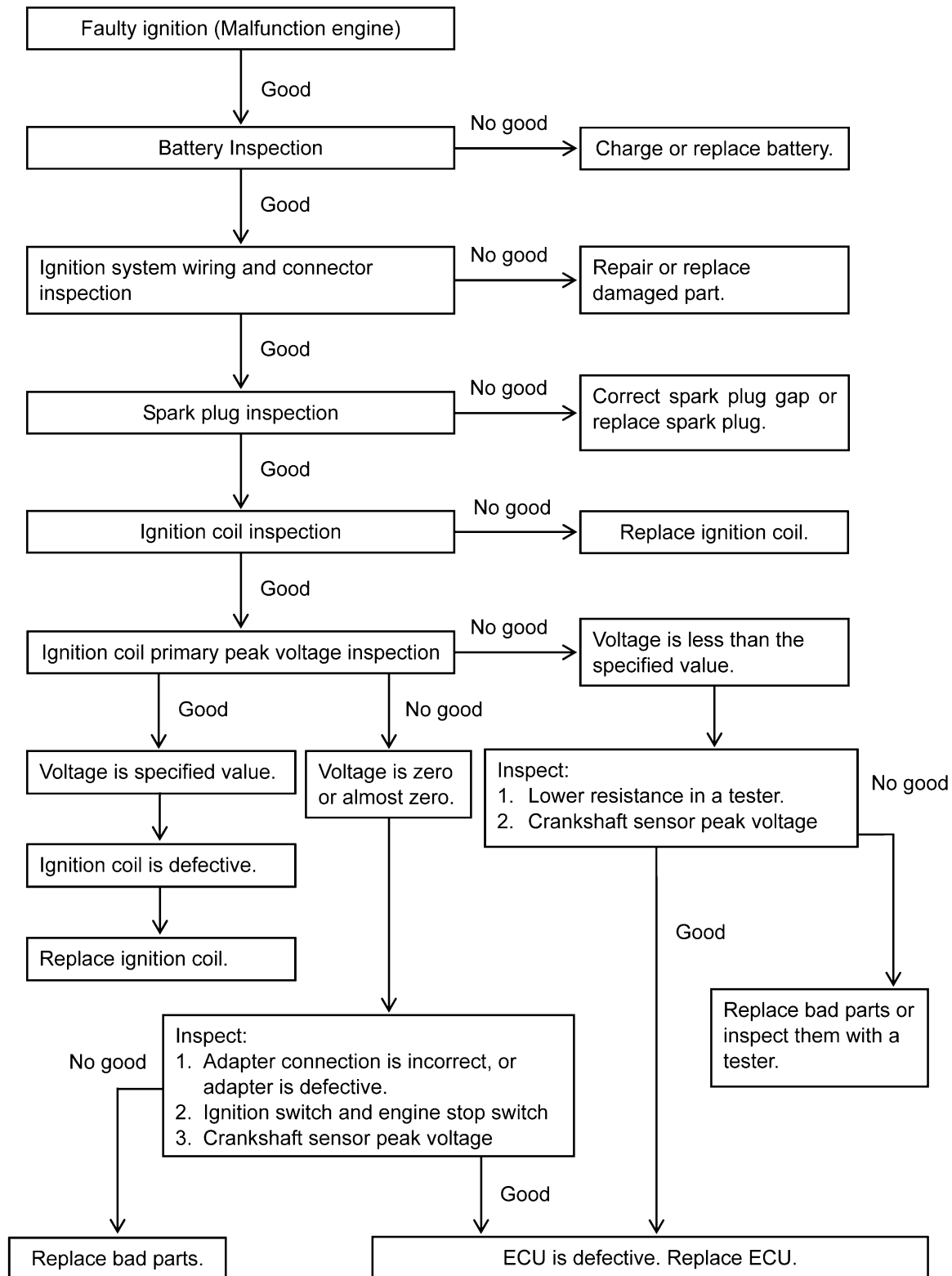
- The IC igniter is built in the ECU [A].
- Refer to the following items.
  - Ignition System Troubleshooting (see Ignition System section)
  - ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)



16-34 ELECTRICAL SYSTEM

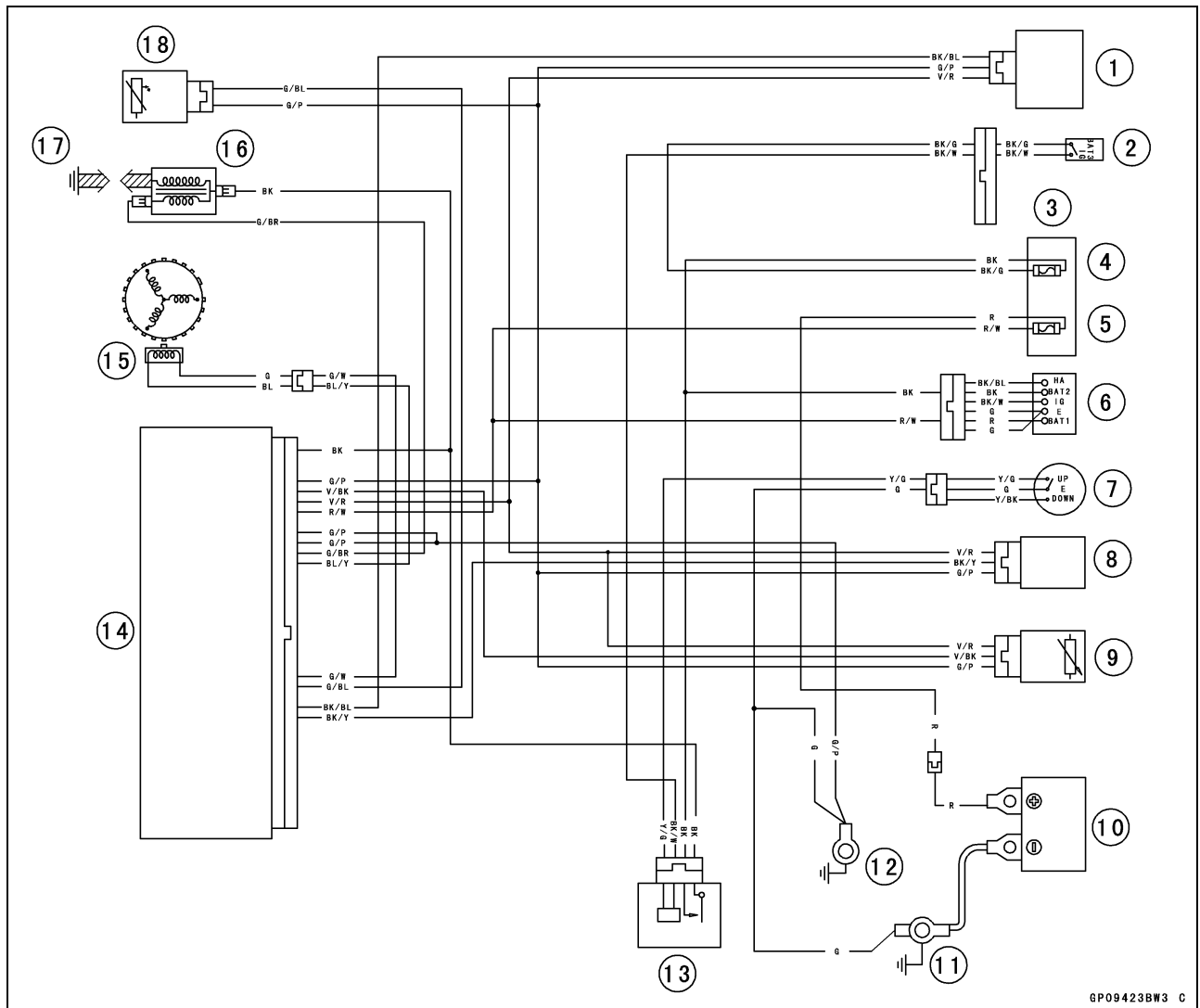
Ignition System

Ignition System Troubleshooting



Ignition System

Ignition System Circuit



GP09423BW3 C

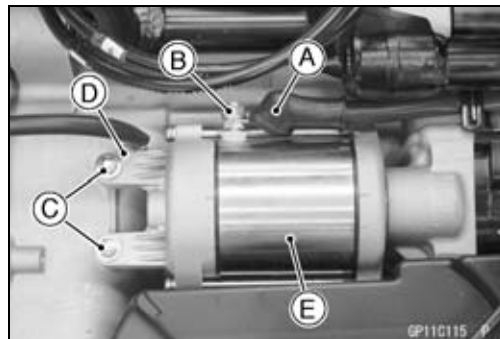
1. Vehicle-down Sensor
2. Engine Stop Switch
3. Fuse Box
4. Ignition Fuse 10 A
5. Charging/ECU Fuse 30 A
6. Ignition Switch
7. Side Stand Switch
8. Intake Air Pressure Sensor
9. Throttle Sensor
10. Battery 12 V 10 Ah
11. Engine Ground
12. Frame Ground 1
13. ECU Relay
14. ECU
15. Crankshaft Sensor
16. Ignition Coil
17. Spark Plug
18. Water Temperature Sensor (ECU)

16-36 ELECTRICAL SYSTEM

Electric Starter System

Starter Motor Removal

- Remove:
  - Storage Box (see Storage Box Removal in the Frame chapter)
  - Air Cleaner Box (see Air Cleaner Box Removal in the Fuel System (DFI) chapter)
- Slide the rubber cap [A].
- Remove the starter motor cable terminal nut [B].
- Remove the starter motor mounting bolts [C] and engine ground terminal [D].
- Remove the starter motor [E].

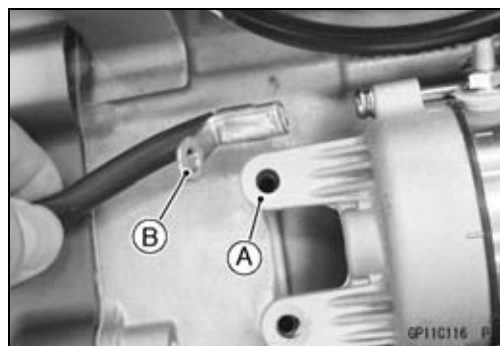


Starter Motor Installation

NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Clean the starter motor leg [A] and engine ground terminal [B].

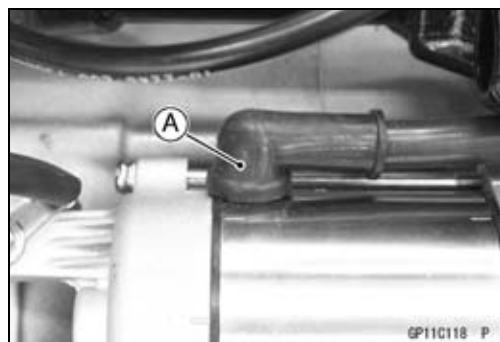


- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Install the starter motor.
- Tighten the starter motor mounting bolts together with the engine ground terminal.

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



- Install the starter motor cable and tighten the starter motor cable terminal nut.
- Slide back the rubber cap to the original position [A].
- Install the removed parts (see appropriate chapters).



Electric Starter System

Starter Motor Inspection

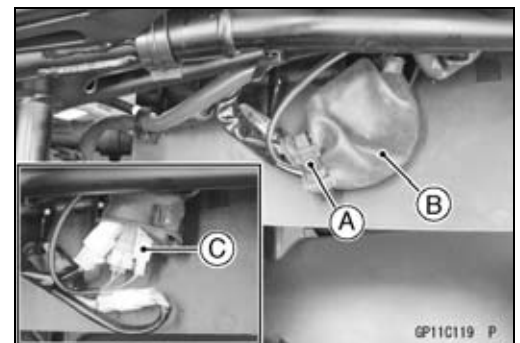
- Turn the engine stop switch to run position.
- Turn the ignition switch on and push the starter button.
- ★ If the starter motor does not turn, check the following.
  - Charging/ECU Fuse 30 A (see Fuse Inspection)
  - Ignition Fuse 10 A (see Fuse Inspection)
  - Battery Condition (see Charging Condition Inspection)
  - Starter Relays (see Starter Relay Inspection)
  - Side Stand Switch (see Side Stand Switch Inspection)
  - Ignition Switch (see Wiring Diagram)
  - Right Switch Housing (see Wiring Diagram)
- ★ If no abnormality is found in these checks, replace the starter motor.

NOTE

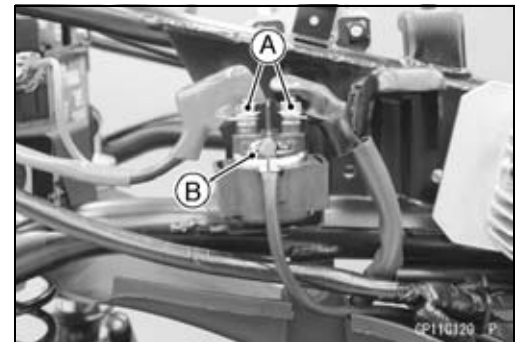
○ The starter motor cannot be disassembled. If necessary, replace the starter motor as an assembly.

Starter Relay Inspection

- Remove the rear fairing (see Rear Fairing Removal in the Frame chapter).
- Remove the band [A], and slide the dust cover [B].
- Disconnect the connector [C].



- Remove:
  - Starter Relay Terminal Nuts [A]
  - Starter Relay 2 [B]



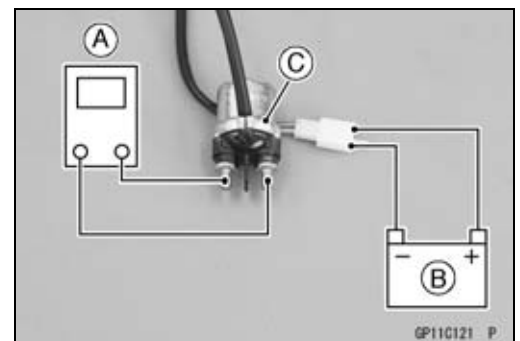
- Connect a tester [A] and 12 V battery [B] to the starter relay [C] as shown.
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

Criteria: When battery is connected → about 0 Ω
 When battery is disconnected → $\infty \Omega$

NOTE

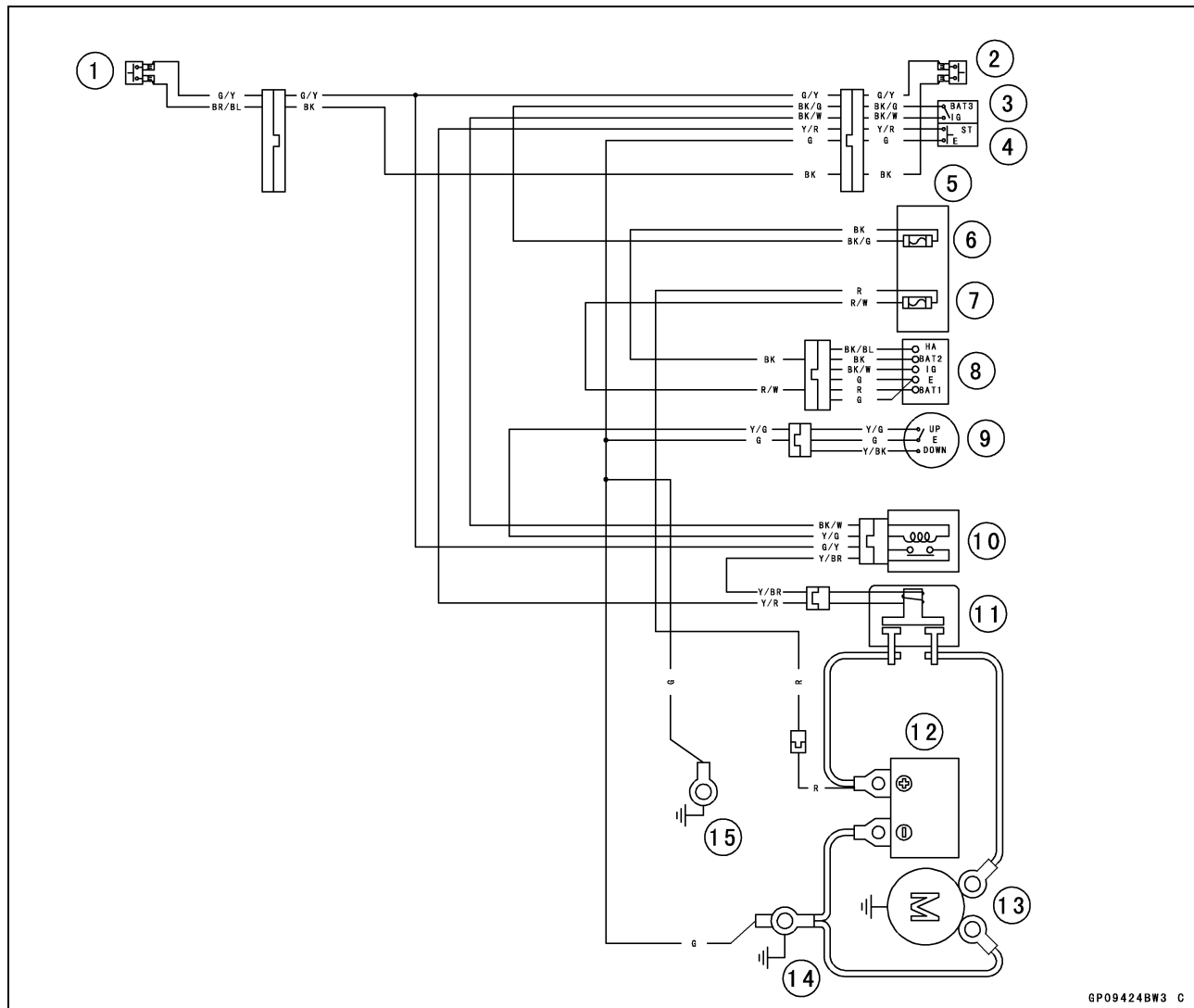
○ For inspection of the starter relay 1, refer to the Relay Inspection.



16-38 ELECTRICAL SYSTEM

Electric Starter System

Electric Starter Circuit



GP09424BW3 C

1. Rear Brake Light Switch
2. Front Brake Light Switch
3. Engine Stop Switch
4. Starter Button
5. Fuse Box
6. Ignition Fuse 10 A
7. Charging/ECU Fuse 30 A
8. Ignition Switch
9. Side Stand Switch
10. Starter Relay 1
11. Starter Relay 2
12. Battery 12 V 10 Ah
13. Starter Motor
14. Engine Ground
15. Frame Ground 1

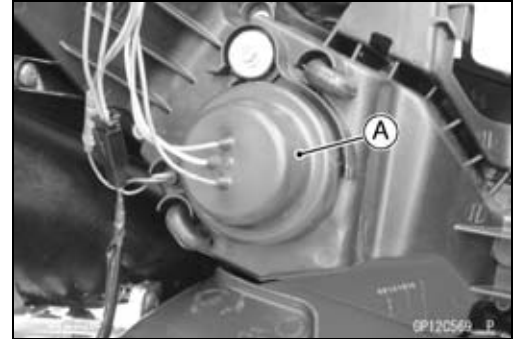
Lighting System

Headlight Aiming Inspection

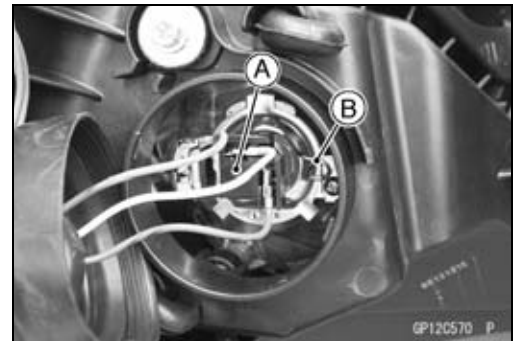
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Bulb Replacement

- Remove:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Dust Cover [A]



- Disconnect the headlight connector [A].
- Release the hook [B].
- Remove the headlight bulb.



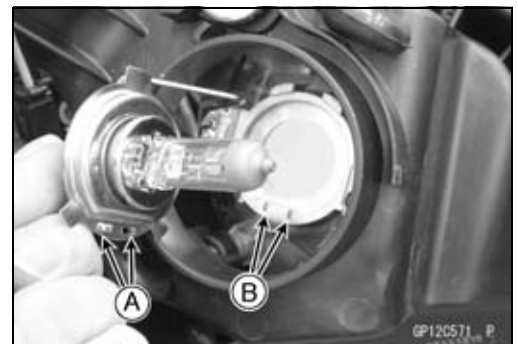
NOTICE

When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

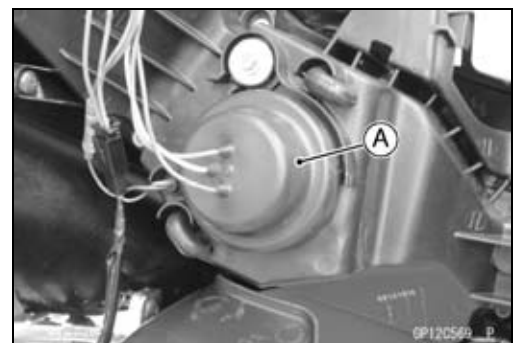
NOTE

○ Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.

- Replace the headlight bulb with a new one.
- Fit the projections [A] of the bulb in the hollows [B] of the headlight.
- Install the hook.



- Connect the headlight connector.
  - Install the dust cover [A].
  - After installation, adjust the headlight aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter).
- Other Bulb: Repeat the above steps.



Headlight Removal/Installation

- Refer to the Front Fairing Disassembly/Assembly in the Frame chapter.

Tail/Brake Light (LED) Removal/Installation

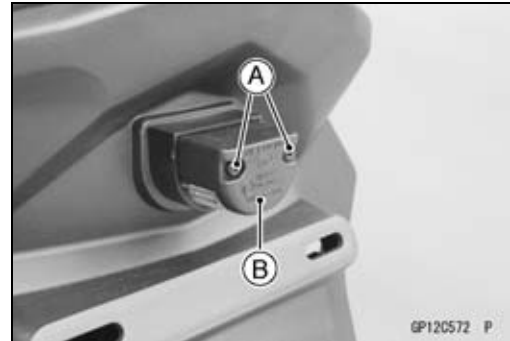
- Refer to the Rear Fairing Disassembly/Assembly in the Frame chapter.

16-40 ELECTRICAL SYSTEM

Lighting System

License Plate Light Bulb Replacement

- Remove:
  - License Plate Light Cover Screws [A]
  - License Plate Light Cover [B]

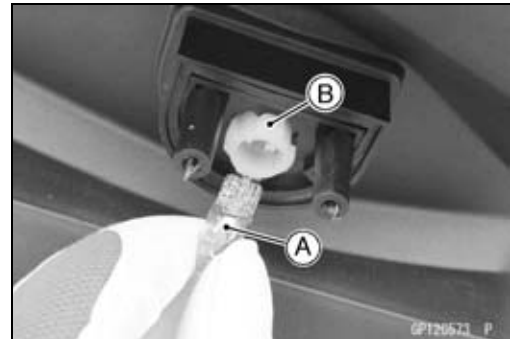


- Pull the bulb [A] out of the socket [B].

NOTICE

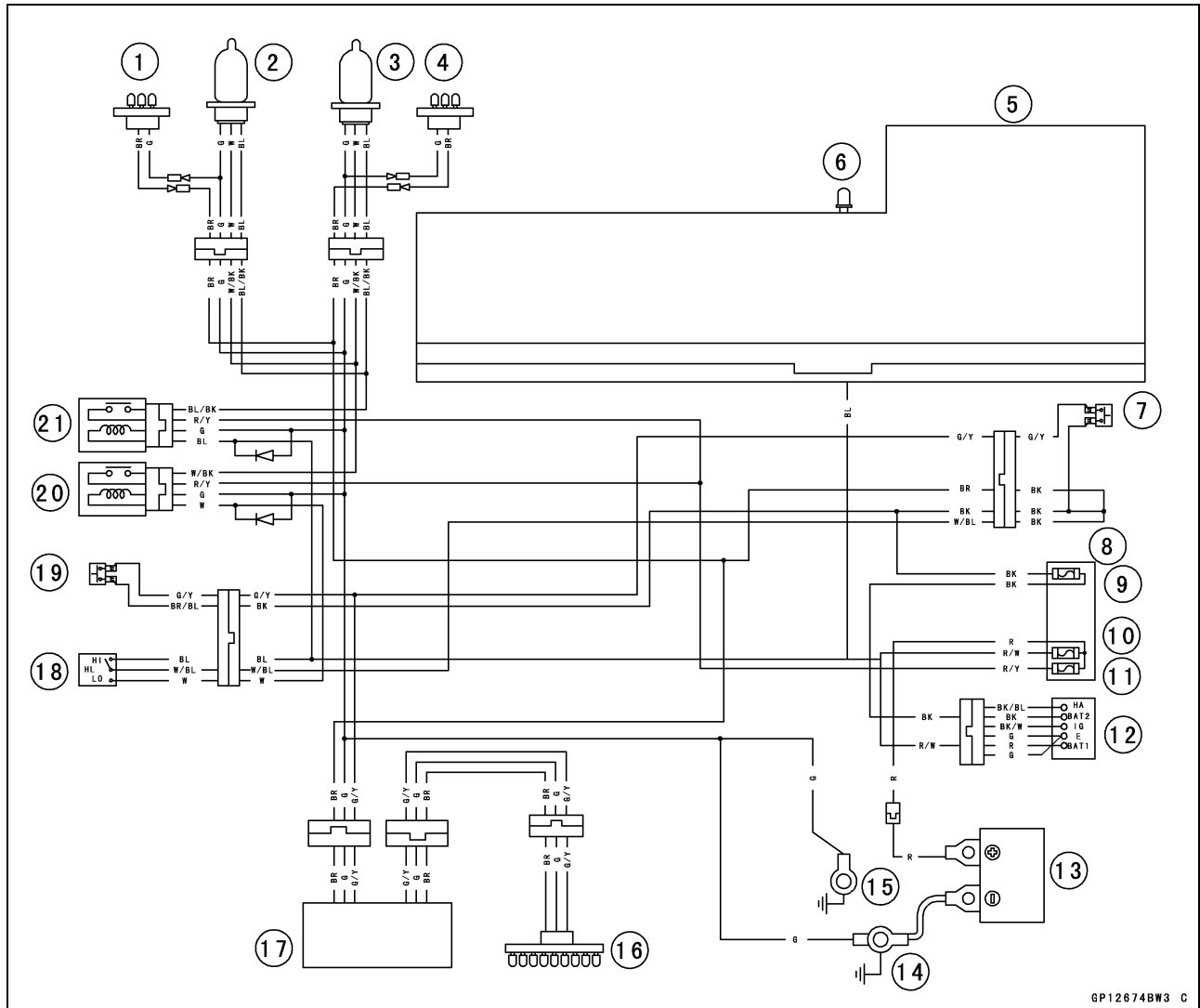
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.

- Replace the bulb with a new one.
- Install the license plate light cover, and tighten its screws.



Lighting System

Headlight/Tail Light Circuit



GP12674BW3 C

1. Left City Light (LED)	12. Ignition Switch
2. Left Headlight 12 V 33 W/35 W	13. Battery 12 V 10 Ah
3. Right Headlight 12 V 33 W/35 W	14. Engine Ground
4. Right City Light (LED)	15. Frame Ground 1
5. Meter Unit	16. Tail/Brake Light (LED)
6. Blue High Beam Indicator Light (LED)	17. Hazard Control Unit
7. Front Brake Light Switch	18. Dimmer Switch
8. Fuse Box	19. Rear Brake Light Switch
9. Main Fuse 15 A	20. Low Beam Headlight Relay
10. Charging/ECU Fuse 30 A	21. High Beam Headlight Relay
11. Headlight Relay Fuse 15 A	

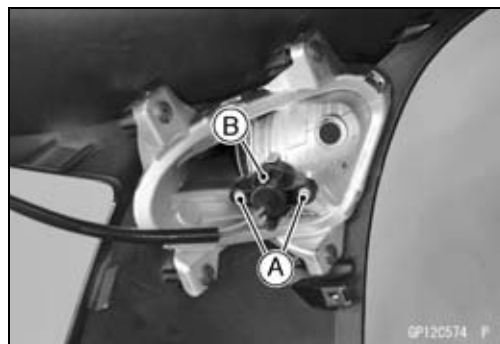
16-42 ELECTRICAL SYSTEM

Lighting System

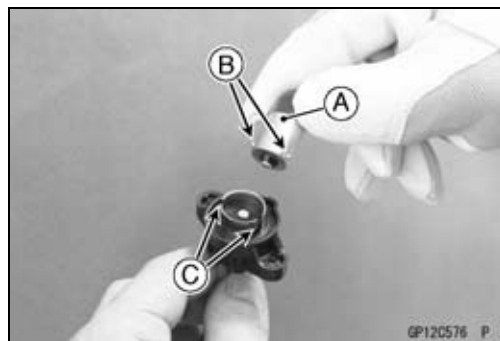
Turn Signal Light Bulb Replacement

Front Turn Signal Light

- Remove:
  - Front Fairing (see Front Fairing Removal in the Frame chapter)
  - Front Turn Signal Light Socket Screws [A]
  - Front Turn Signal Light Socket [B]
- Push and turn the front turn signal light bulb [A] counterclockwise and remove it.
- Replace the bulb with a new one.



- Insert the new bulb [A] by aligning the pins [B] with the grooves [C] in the socket, and turn the bulb clockwise.
  - Install the front turn signal light socket, and tighten its screws.
- Other Bulb: Repeat the above steps.



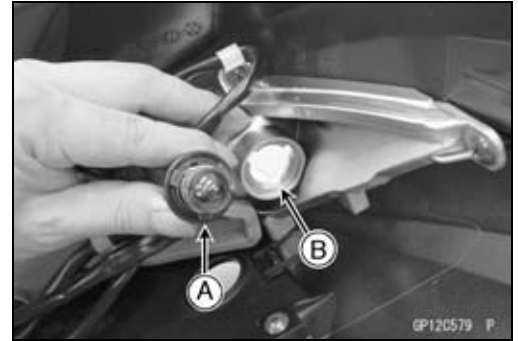
Rear Turn Signal Light

- Remove the rear fairing (see Rear Fairing Removal in the Frame chapter).
  - Turn the socket [A] counterclockwise and pull out the socket together with the bulb.
- Push and turn the rear turn signal light bulb [A] counterclockwise and remove it.
  - Replace the rear turn signal light bulb with a new one.
- Replacement procedure of the rear turn signal light bulb is common with it of the front turn signal light bulb.



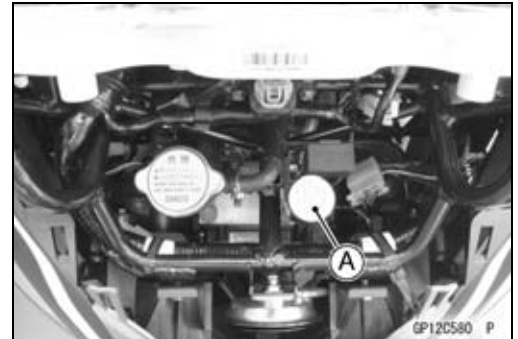
Lighting System

- Fit the large projection [A] of the socket into the large groove [B] of the turn signal light.
- Turn the rear turn signal light bulb clockwise.



Turn Signal Relay Inspection

- Remove the front center cover (see Front Center Cover Removal in the Frame chapter).
- Pull out the turn signal relay [A] backward, and remove it from the rear fender.
- Disconnect the connector.



- Connect one 12 V battery and turn signal lights as indicated, and count how many times the lights blink for one minute.

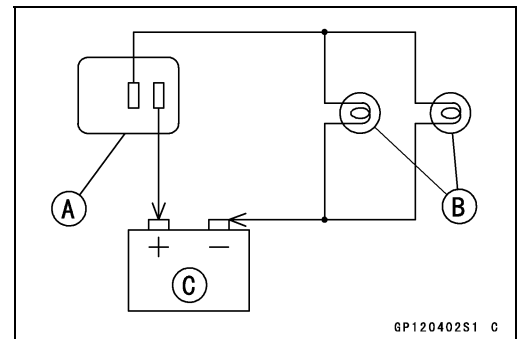
Turn Signal Relay [A]
Turn Signal Lights [B]
12 V Battery [C]

Connections:

Battery (+) → BK lead terminal

Turn Signal Lights → GY lead terminal

- ★ If the lights do not blink as specified, replace the turn signal relay.



Testing Turn Signal Relay

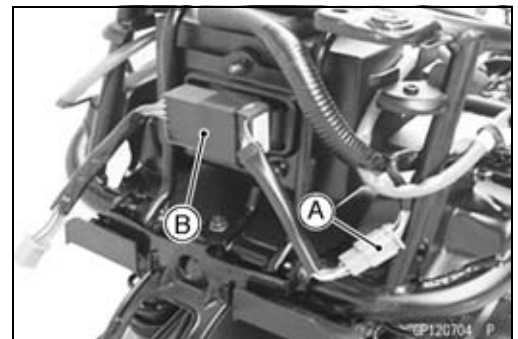
Load		Blinking Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	150 ~ 250
2	20	70 ~ 100

(*): Cycle(s) per minute

(**): Corrected to "one light burned out".

Hazard Control Unit Removal

- Remove the rear fairing (see Rear Fairing Removal in the Frame chapter).
- Disconnect the connector [A].
- Remove the hazard control unit [B].



Hazard Control Unit Installation

- Installation is the reverse of removal.

16-44 ELECTRICAL SYSTEM

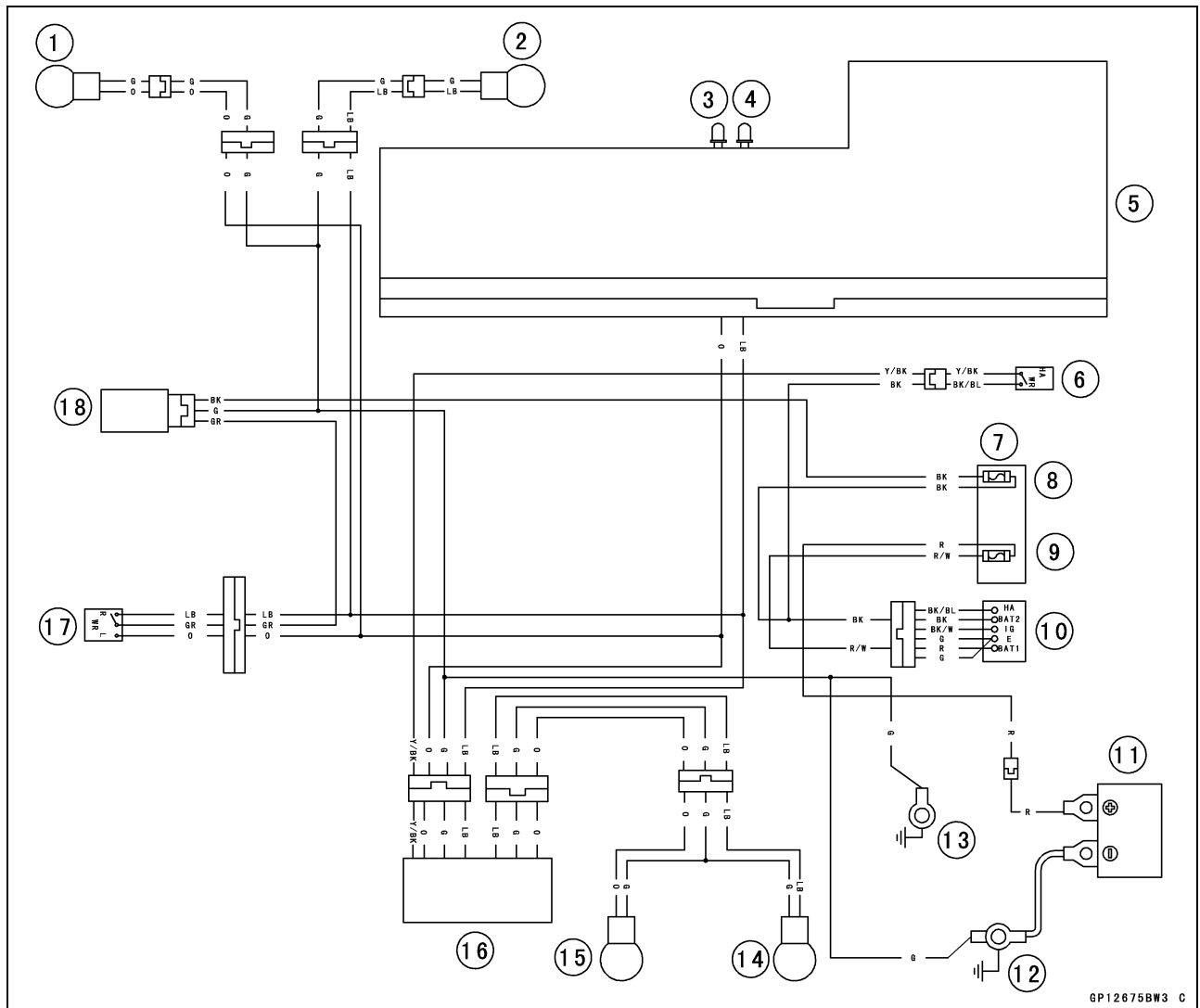
Lighting System

Hazard Control Unit Inspection

- Turn the ignition switch on.
- Turn the hazard switch on.
- The left and right turn signal lights (front and rear) should blink.
- ★ If turn signal light does not blink, inspect or replace the following parts.
  - Turn Signal Light Bulbs (see Lights and Witches Operation Inspection Periodic Maintenance chapter)
  - Harness (see Wiring Inspection)
  - Ignition Switch (see Wiring Diagram)
  - Hazard Switch (see Wiring Diagram)
  - Main Fuse 15 A (see Fuse Inspection)
  - Charging/ECU Fuse 30 A (see Fuse Inspection)
- ★ If all items are good condition, replace the hazard control unit (see Hazard Control Unit Removal/Installation).

Lighting System

Turn Signal Light Circuit



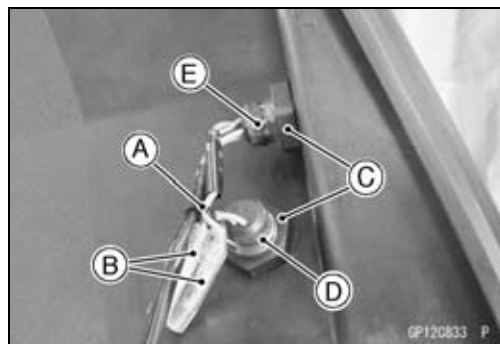
1. Front Left Turn Signal Light 12 V 10 W
2. Front Right Turn Signal Light 12 V 10 W
3. Green Left Turn Signal Indicator Light (LED)
4. Green Right Turn Signal Indicator Light (LED)
5. Meter Unit
6. Hazard Switch
7. Fuse Box
8. Main Fuse 15 A
9. Charging/ECU Fuse 30 A
10. Ignition Switch
11. Battery 12 V 10 Ah
12. Engine Ground
13. Frame Ground 1
14. Rear Right Turn Signal Light 12 V 10 W
15. Rear Left Turn Signal Light 12 V 10 W
16. Hazard Control Unit
17. Turn Signal Switch
18. Turn Signal Relay

16-46 ELECTRICAL SYSTEM

Lighting System

Storage Box Light/Storage Box Light Switch Removal

- Remove:
  - Storage Box (see Storage Box Removal in the Frame chapter)
- Cut the band [A]
- Disconnect:
  - Storage Box Light Lead Connectors [B]
- Remove:
  - Lock Nuts [C]
  - Storage Box Light [D]
  - Storage Box Light Switch [E]



Storage Box Light/Storage Box Light Switch Installation

- Installation is basically the reverse of removal.
- Run the storage box light and storage box light switch leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Storage Box Light System Inspection

NOTE

○Be sure the battery is fully charged.

- Open the seat.
  - ★ If the storage box light [A] does not go on, check the storage box light (see Storage Box Light Inspection).
  - ★ If the storage box light goes on, continue the next procedure.
-
- It will light off 2 minutes later while opening the rider seat.
  - It will light off 3 seconds later while masking the sensor below 4 cm.
  - ★ If the above storage box light system does not work, replace the storage box light switch [A].



Storage Box Light Inspection

- Check the charging/ECU fuse [A] 30 A (see Fuse section).
- ★ If the fuse is good, remove storage box (see Storage Box Removal in the Frame chapter).

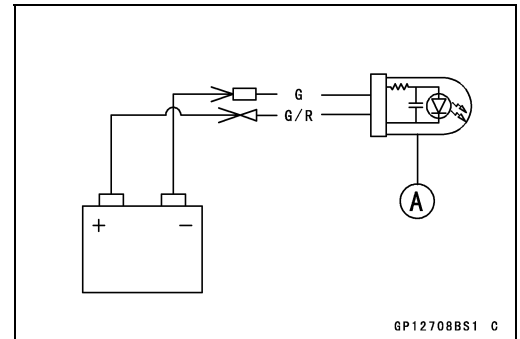


Lighting System

- Disconnect the storage box light lead connectors [A] and using the auxiliary leads, connect the 12 V battery to the storage box light lead connectors as follows.

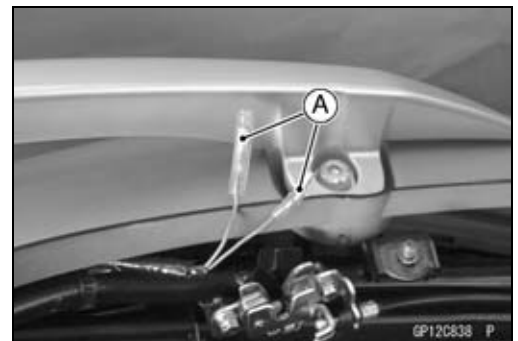


- Connect the battery positive (+) terminal to the green/red lead.
- Connect the battery negative (–) terminal to the green lead.
- ★ If the storage box light [A] does not go on, replace the storage box light.
- ★ If the storage box light goes on, check the storage box light switch (see Storage Box Light Switch Inspection).
- Connect the storage box light lead connectors.

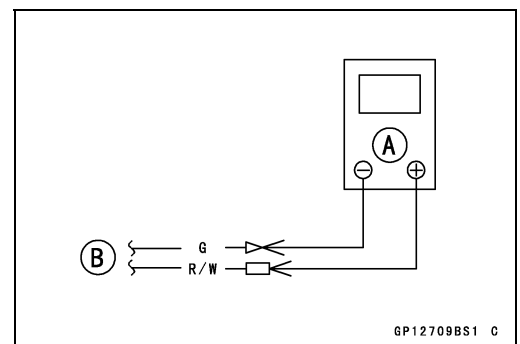


Storage Box Light Switch Inspection

- Check the input voltage of the storage box light switch at the lead connectors [A] of main harness side.



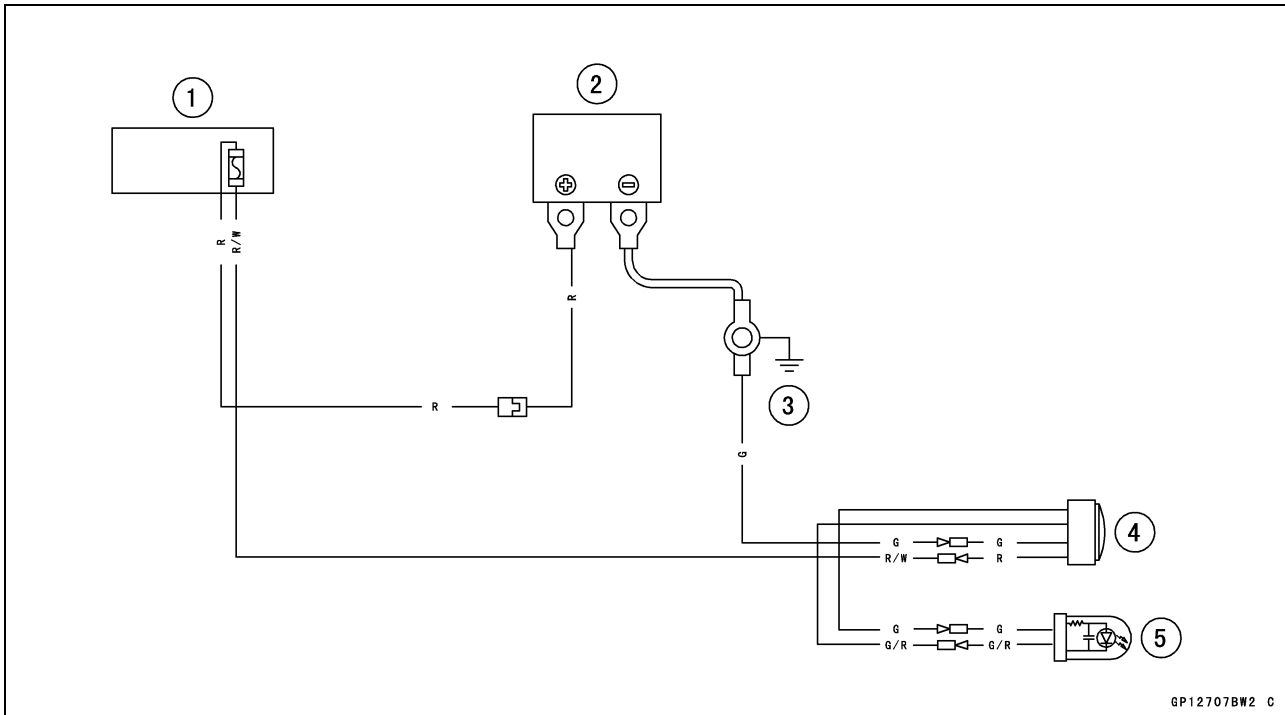
- Connect the voltmeter [A] to the storage box light switch lead connectors as follows.
Main Harness Side [B]
- Connect the voltmeter positive (+) terminal to the red/white lead.
- Connect the voltmeter negative (–) terminal to the green lead.
- ★ If the reading is not the battery voltage, check the wiring for continuity according to the Storage Box Light System Circuit.
- ★ If the reading is the battery voltage, replace the storage box light switch.



16-48 ELECTRICAL SYSTEM

Lighting System

Storage Box Light Circuit

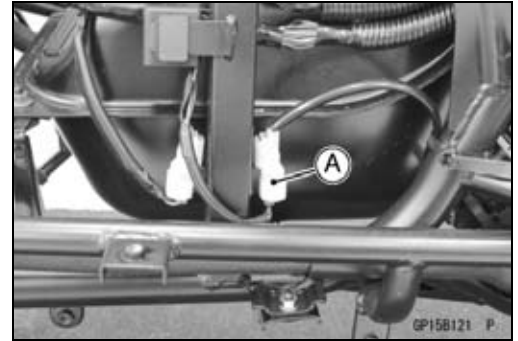


1. Charging/ECU Fuse 30 A
2. Battery
3. Engine Ground
4. Storage Box Light Switch
5. Storage Box Light

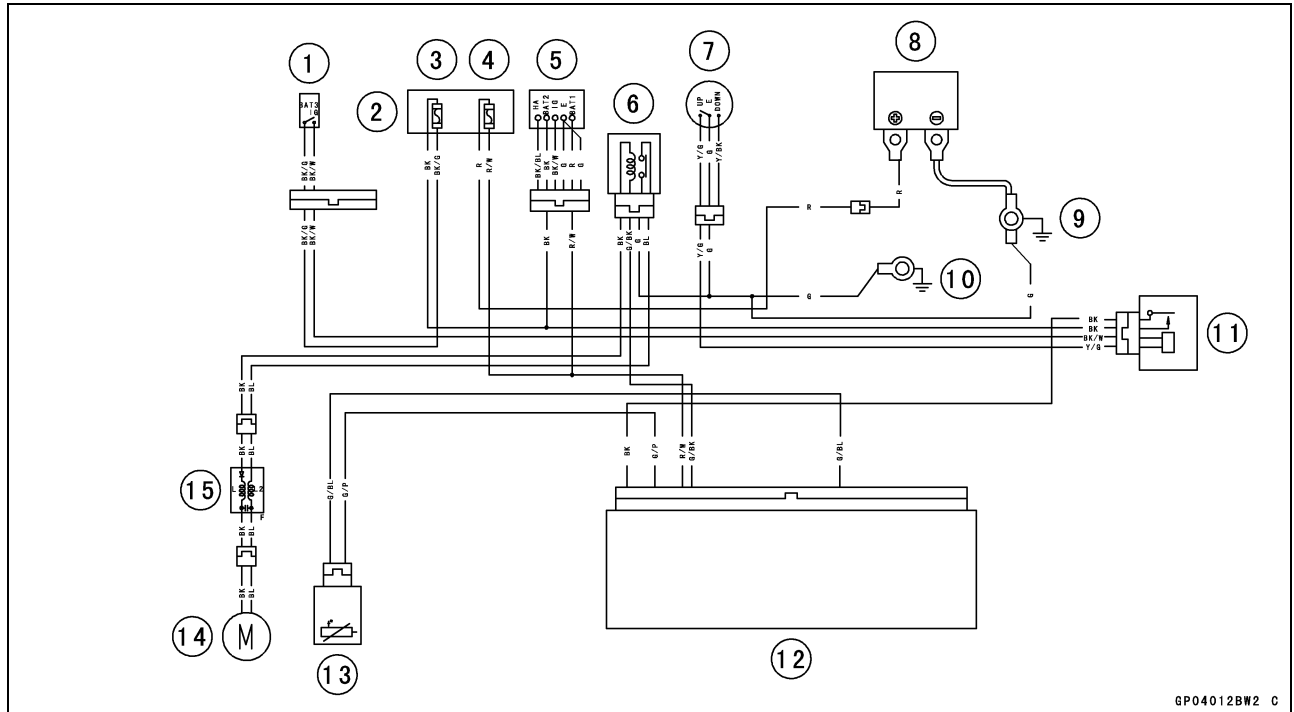
Radiator Fan System

Fan Motor Inspection

- Remove the right side fairing (see Side Fairing Removal in the Frame chapter).
  - Disconnect the radiator fan lead connector [A].
  - Using an auxiliary leads, supply battery power to the fan motor.
- ★ If the fan does not rotate, the fan motor is defective and must be replaced.



Radiator Fan Circuit



GP04012BW2 C

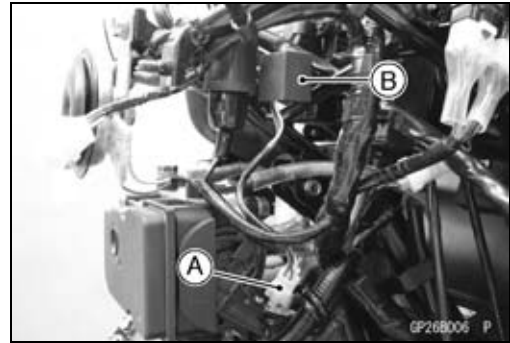
1. Engine Stop Switch
2. Fuse Box
3. Ignition Fuse 10 A
4. Charging/ECU Fuse 30 A
5. Ignition Switch
6. Fan Relay
7. Side Stand Switch
8. Battery 12 V 10 Ah
9. Engine Ground
10. Frame Ground 1
11. ECU Relay
12. ECU
13. Water Temperature Sensor (ECU)
14. Fan Motor
15. EMI Filter

16-50 ELECTRICAL SYSTEM

Oil Pressure Warning System

Oil Pressure Warning Indicator Light Controller Removal

- Remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Disconnect the connector [A].
- Remove the oil pressure warning indicator light controller [B].



Oil Pressure Warning Indicator Light Controller Installation

- Installation is the reverse of removal.

Red Oil Pressure Warning Indicator Light (LED) Lighting Condition

	Oil Pressure Switch	Red Oil Pressure Warning Indicator Light (LED)
Ignition Switch ON	ON (oil pressure not applied)	Goes on
	OFF (oil pressure applied)	Goes on*
Engine is running	ON (oil pressure not applied)	Goes on**
	OFF (oil pressure applied)	Goes off

(*): When the oil pressure switch turns on within ten seconds after the red oil pressure warning indicator light (LED) went off, the indicator light goes on immediately.

(**): When the oil pressure switch stays on for 60 seconds, the red oil pressure warning indicator light (LED) goes on.

Oil Pressure Warning System Inspection

First Step

- Turn the ignition switch on.
- ★ If the red oil pressure warning indicator light (LED) [A] goes on, go to the second step.
- ★ If the red oil pressure warning indicator light (LED) does not go on, go to the third step.



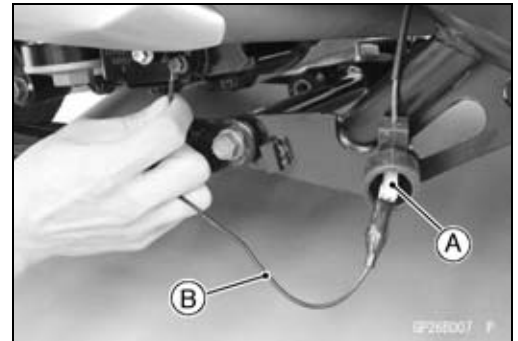
Second Step

- Check the oil pressure switch connections (see Switch Inspection).
- ★ If the oil pressure switch connections are good, go to the fourth step.

Oil Pressure Warning System

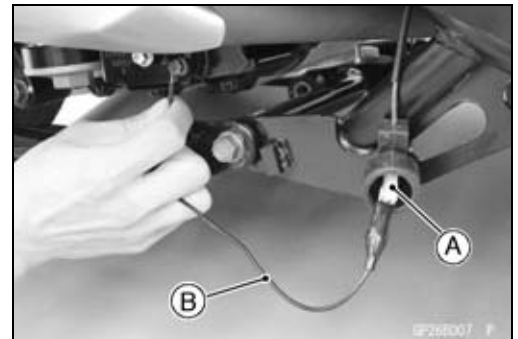
Third Step

- Disconnect the oil pressure switch connector [A] (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
- Ground the oil pressure switch connector to the engine, using an auxiliary lead [B].
- Turn the ignition switch on.
- ★ If the red oil pressure warning indicator light (LED) goes on, check the oil pressure switch connections (see Switch Inspection).
- ★ If the red oil pressure warning indicator light (LED) does not go on, inspect or replace the following parts.
  - Red Oil Pressure Warning Indicator Light (LED) (see Electronic Combination Meter Unit Inspection)
  - Harness (see Wiring Inspection)
- ★ If all items are good condition, replace the oil pressure warning indicator light controller (see Oil Pressure Warning Indicator Light Controller Removal/Installation).



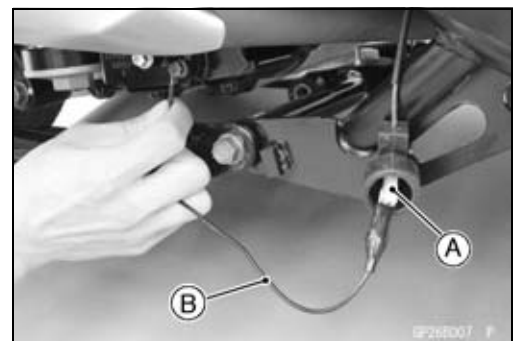
Fourth Step

- Disconnect the oil pressure switch connector [A] (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
- Ground the oil pressure switch connector to the engine, using an auxiliary lead [B].
- Turn the ignition switch on.
- The red oil pressure warning indicator light (LED) should go on.
- Disconnect the auxiliary lead.
- ★ If the red oil pressure warning indicator light (LED) goes off, go to the fifth step.
- ★ If the red oil pressure warning indicator light (LED) does not go off, replace the oil pressure warning indicator light controller (see Oil Pressure Warning Indicator Light Controller Removal/Installation).



Fifth Step

- Disconnect the oil pressure switch connector [A] (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
- Turn the ignition switch on and wait for ten seconds.
- The red oil pressure warning indicator light (LED) does not go on.
- Ground the oil pressure switch connector to the engine, using an auxiliary lead [B].
- The red oil pressure warning indicator light (LED) should go on with a delay.
- Measure the delay time.



Lighting Delay Time

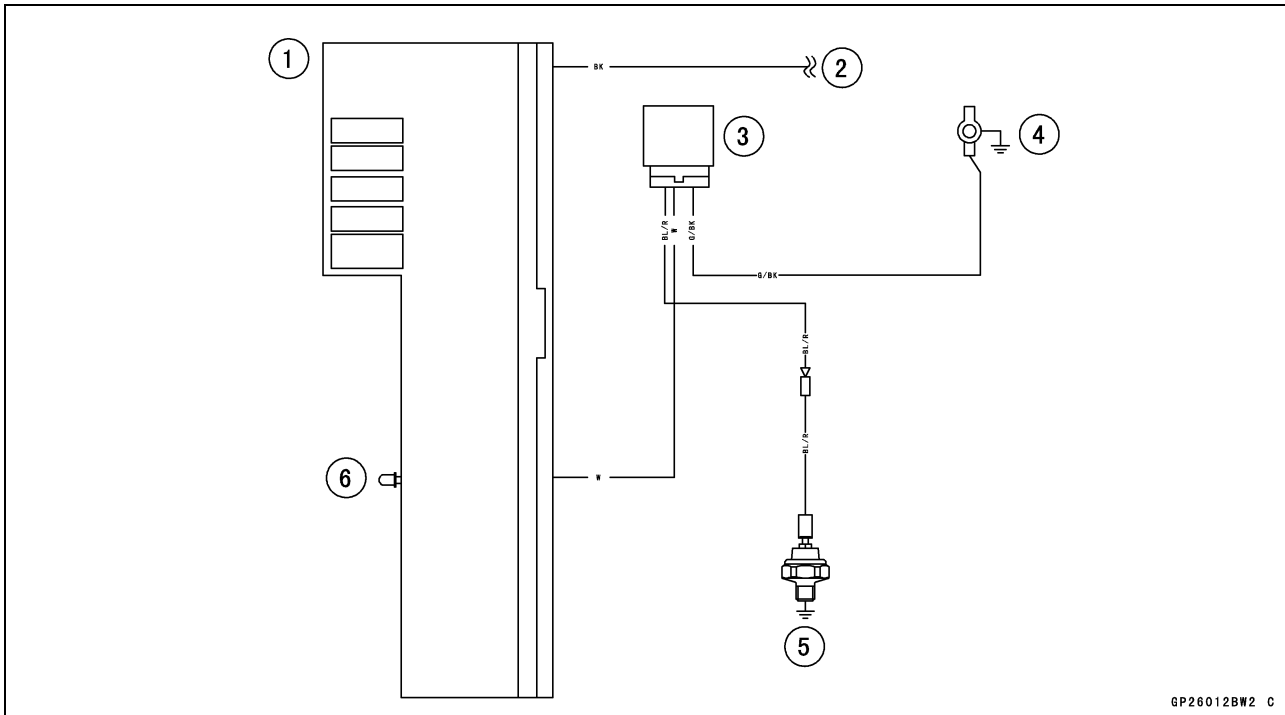
Standard: 60 seconds

- ★ If the lighting delay time is out of the standard, replace the oil pressure warning indicator light controller (see Oil Pressure Warning Indicator Light Controller Removal/Installation).

16-52 ELECTRICAL SYSTEM

Oil Pressure Warning System

Oil Pressure Warning System Circuit



1. Meter Unit
2. to Ignition Switch
3. Oil Pressure Warning Indicator Light Controller
4. Engine Ground
5. Oil Pressure Switch
6. Red Oil Pressure Warning Indicator Light (LED)

Meter, Gauge, Indicator Unit

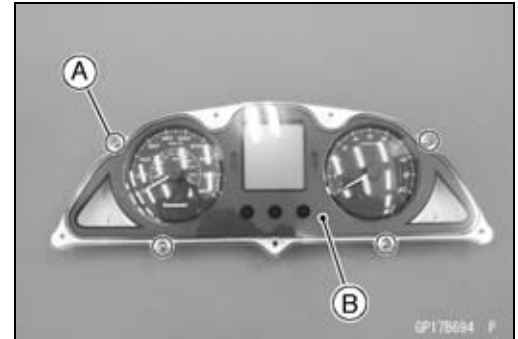
Meter Unit Removal/Installation

- Refer to the Meter Cover Removal/Installation in the Frame chapter.

<i>NOTICE</i>
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.

Meter Unit Disassembly

- Remove the meter unit (see Meter Unit Removal/Installation).
- Remove the screws [A] and separate the meter lens [B] and meter unit.



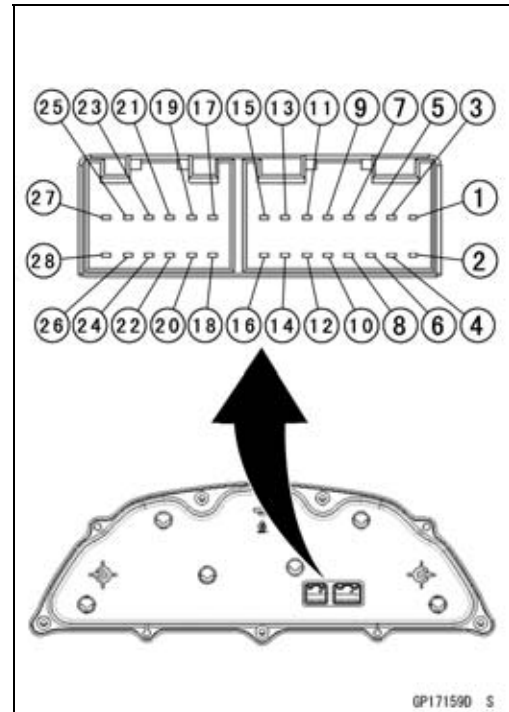
16-54 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

Electronic Combination Meter Unit Inspection

- Remove the meter unit with the meter cover installed (see Meter Unit Removal/Installation).

- [1] Red Oil Pressure Switch (–)
- [2] Meter Illumination Light (LED) (+)
- [3] Water Temperature Sensor (+)
- [4] Battery (+)
- [5] Blue High Beam Indicator Light (LED) (+)
- [6] Unused
- [7] Green Right Turn Signal Indicator Light (LED) (+)
- [8] Ignition (+)
- [9] Green Left Turn Signal Indicator Light (LED) (+)
- [10] Fuel Level Sensor (+)
- [11] Unused
- [12] Unused
- [13] Tachometer Pulse
- [14] Yellow ABS Indicator Light (LED) (–) (ABS Equipped Model)
- [15] Unused
- [16] Fuel Level Sensor (–)
- [17] Unused
- [18] Unused
- [19] Yellow Engine Warning Indicator Light (LED) (–)
- [20] Speed Sensor Pulse
- [21] Ground (–)
- [22] Speed Sensor Power Supply (+) (ABS Unequipped Model)
- [23] Unused
- [24] Unused
- [25] Engine Stop Switch
- [26] Water Temperature Sensor (–)
- [27] Unused
- [28] Unused

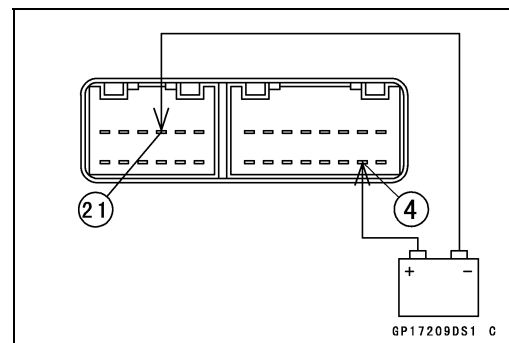


NOTICE

Do not drop the meter unit. Place the meter unit so that it faces upward. If the meter unit is left upside down or sideways for a long time or dropped, it will malfunction. Do not short each terminals.

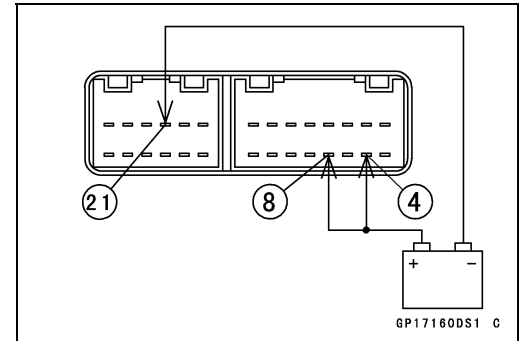
Check 1: Meter Unit Primary Operation Check

- Using the auxiliary leads, the 12 V battery to the meter unit connector as follows.
- Connect the battery positive (+) terminal to the terminal [4].
- Connect the battery negative (–) terminal to the terminals [21].

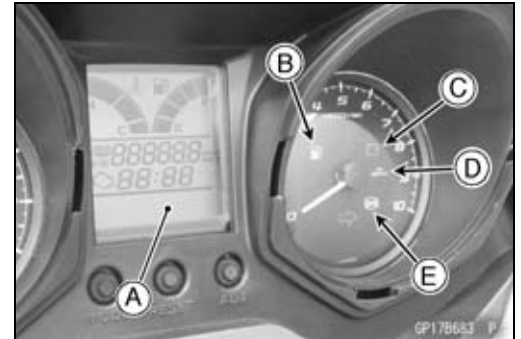


Meter, Gauge, Indicator Unit

- Connect the terminal [8] to the battery (+) terminal.

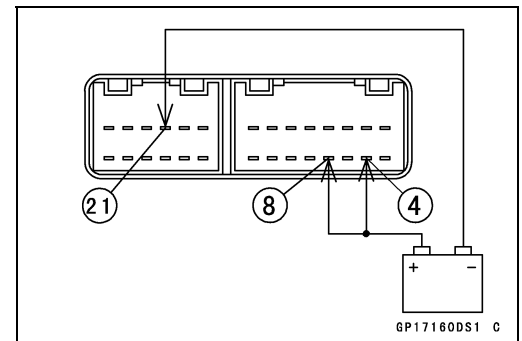


- Check the following items.
  - The speedometer and tachometer needles momentarily point their last readings and back to the minimum position.
  - All the LCD (Liquid Crystal Display) segments [A] go on for a few seconds.
  - The yellow fuel level warning indicator light (LED) [B], red battery voltage warning indicator light (LED) [C] and yellow oil service indicator light (LED) [D] go on for a few seconds.
  - For ABS equipped model, the yellow ABS indicator light (LED) [E] goes on.
- ★ If the meter unit does not work, replace the meter unit.

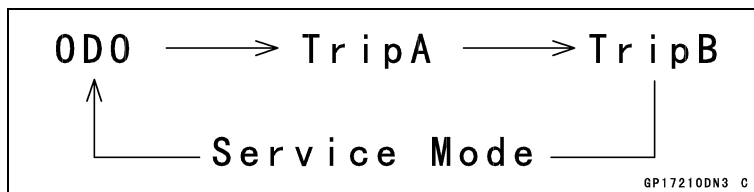


Check 2: ADJ Button Operation Check

- Connect the leads in the same circuit as Check 1.



- By pushing the ADJ button [A] for 2 seconds, check that the display [B] changes as follows.



- ★ If the display function does not work, replace the meter unit.

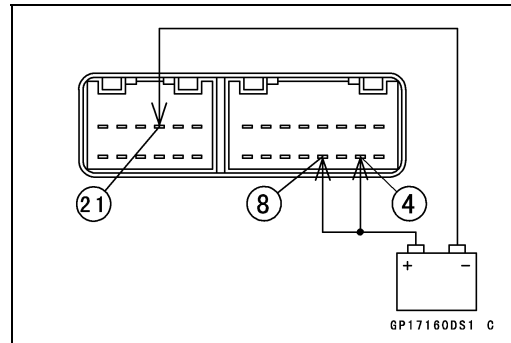


16-56 ELECTRICAL SYSTEM

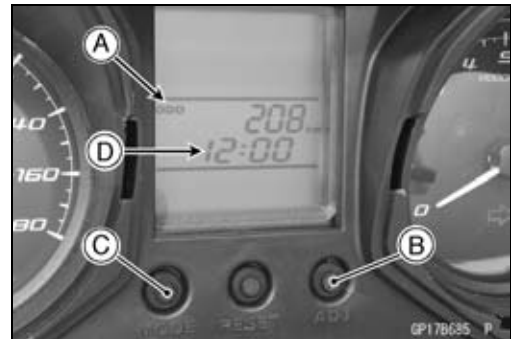
Meter, Gauge, Indicator Unit

Check 3: Clock Setting Check

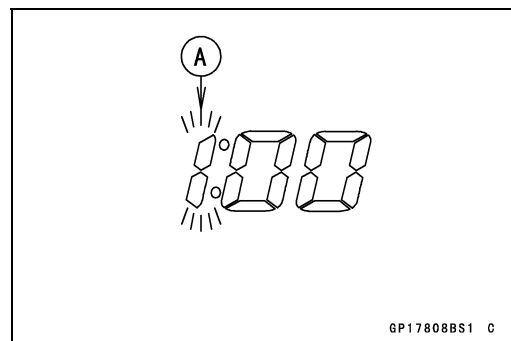
- Connect the leads in the same circuit as Check 1.



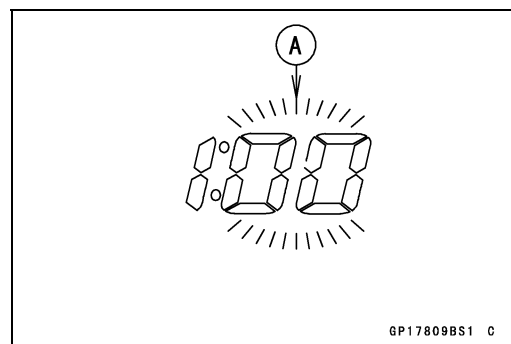
- Set the ODO mode [A] by pushing the ADJ button [B] for 2 seconds.
- Push the MODE button [C] and ADJ button simultaneously for more than 2 seconds to adjust the clock [D].
- The hour display only blinks.



- By pushing the ADJ button each time, check that the hour display [A] changes.

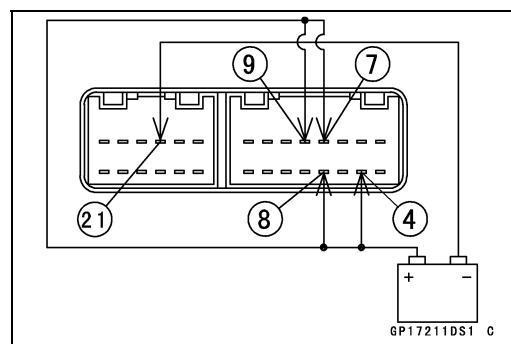


- By pushing the MODE button, check that the hour display decides and minute display [A] starts blinking.
- By pushing the ADJ button each time, check that the minute display changes.
- Push the MODE button and ADJ button simultaneously for more than 2 seconds. The displays stop blinking and the clock starts working.
- ★ If the display function does not work, replace the meter unit.



Check 4: Green Turn Signal Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [7] (right) or [9] (left) to the battery (+) terminal.



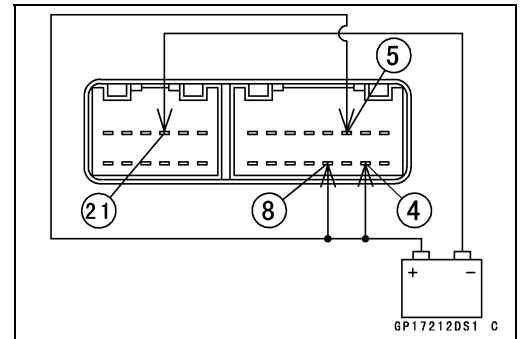
Meter, Gauge, Indicator Unit

- Check that the green turn signal indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter unit.

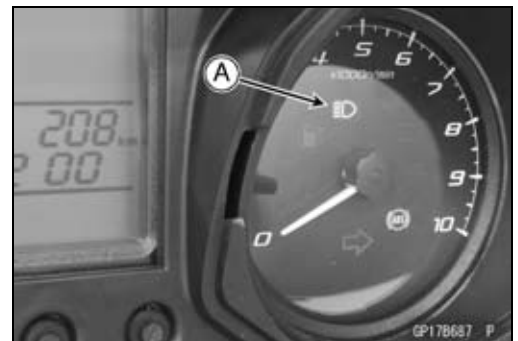


Check 5: Blue High Beam Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [5] to the battery (+) terminal.

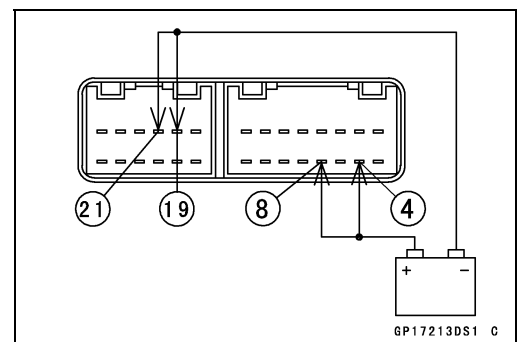


- Check that the blue high beam indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter unit.



Check 6: Yellow Engine Warning Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [19] to the battery (-) terminal.



- Check that the yellow engine warning indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter unit.

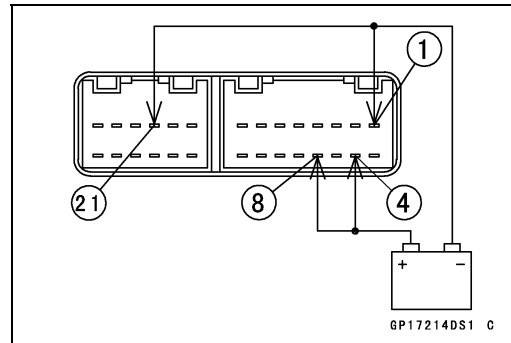


16-58 ELECTRICAL SYSTEM

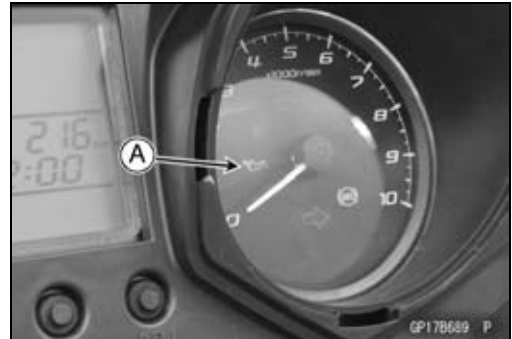
Meter, Gauge, Indicator Unit

Check 7: Red Oil Pressure Warning Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [1] to the battery (–) terminal.



- Check that the red oil pressure warning indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter unit.

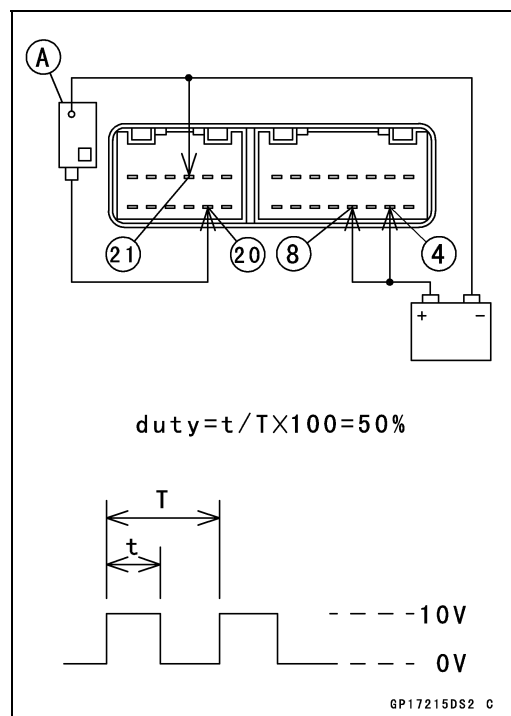


Check 8: Speedometer Inspection

- Connect the leads in the same circuit as Check 1.
- The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [20].
- Indicates approximately 60 km/h if the input frequency is approximately 550 Hz.
- ★ If the meter function does not work, replace the meter unit.

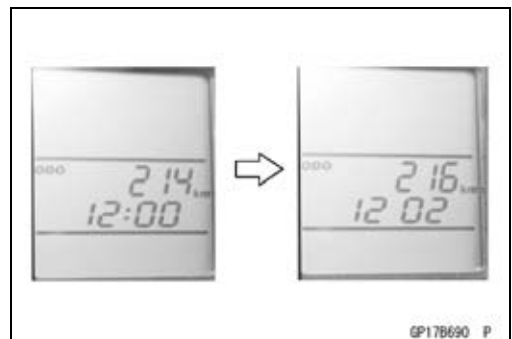
NOTE

- The input frequency of the oscillator adds the integrated value of the odometer.



Check 9: Odometer Check

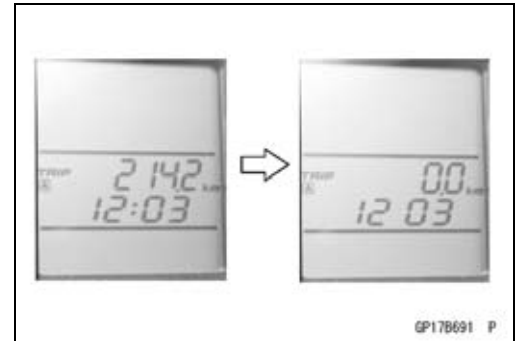
- Check the odometer with the speedometer check in the same way.
- ★ If value indicated in the odometer is not added, replace the meter unit.



Meter, Gauge, Indicator Unit

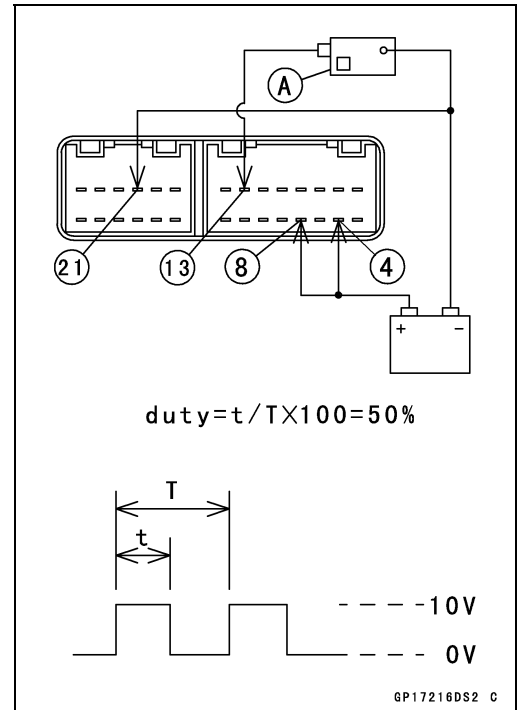
Check 10: Trip A/Trip B Meter Check

- Check the trip meter with the speedometer in the same way.
- ★ If value indicated in the trip meter is not added, replace the meter unit.
- Check that when the RESET button is pushed for more than 2 seconds, the figure display turns to 0.0.
- ★ If the figure display does not indicate 0.0, replace the meter unit.



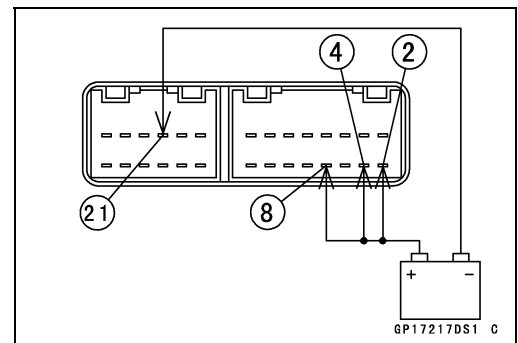
Check 11: Tachometer Inspection

- Connect the leads in the same circuit as Check 1.
- The engine speed (rpm) equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [13].
- Indicates approximately 4 000 rpm if the input frequency is approximately 67 Hz.
- ★ If the meter function does not work, replace the meter unit.



Check 12: Meter Illumination Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [2] to the battery (+) terminal.



- Check that the meter illumination light (LED) [A] goes on.
- ★ If the light (LED) does not go on, replace the meter unit.

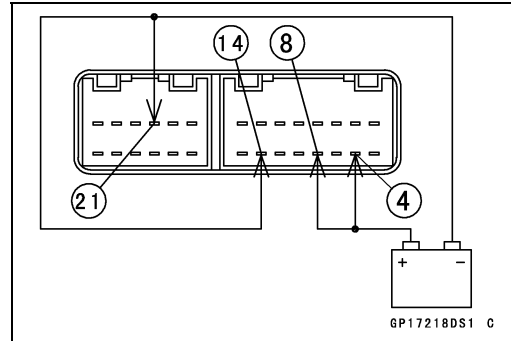


16-60 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

Check 13: Yellow ABS Indicator Light (LED) Inspection (ABS Equipped Model)

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [14] to the battery (–) terminal.



- Check that the yellow ABS indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter unit.



Meter, Gauge, Indicator Unit

This wiring diagram illustrates the electrical system for the 2007 Honda CBR600F4i motorcycle. The main fuse block (1) is the central hub for all electrical components. The battery (15) provides power to the system. The diagram shows the following components and their connections:

- 1**: Main fuse block with terminals for BK, G/BK, G/Y, BK/W, BK/Y, Y/W, BL/W, R/Y, BL, LB, G, BR, W, P, G/W, G/BL, and BL/R.
- 2**: Headlight switch connector with terminals BL/R, W, and G/BK.
- 3**: Horn relay connector with terminals BL/G, BK/W, BK, and BK.
- 4**: Horn relay connector with terminals W/BK, G/BK, G/W, P, and G/Y.
- 5**: Headlight assembly with terminals BL/W, G/W, G/BL, and BL/R.
- 6**: Headlight relay connector with terminals BK, BK, BL/G, R, and G/Y.
- 7**: Headlight relay connector with terminals BK, BK, BL/G, R, and G/Y.
- 8**: Headlight relay connector with terminals BK, BK, BL/G, R, and G/Y.
- 9**: Headlight relay connector with terminals BK, BK, BL/G, R, and G/Y.
- 10**: Headlight relay connector with terminals BK, BK, BL/G, R, and G/Y.
- 11**: Headlight relay connector with terminals BK, BK, BL/G, R, and G/Y.
- 12**: Headlight relay connector with terminals BK, BK, BL/G, R, and G/Y.
- 13**: Headlight relay connector with terminals BK, BK, BL/G, R, and G/Y.
- 14**: Ground connection point for the headlight relay.
- 15**: Battery with terminals BL/W, G/W, G/BL, and BL/R.
- 16**: Battery terminal connector with terminals BL/W, G/W, G/BL, and BL/R.
- 17**: Battery terminal connector with terminals BL/W, G/W, G/BL, and BL/R.
- 18**: Battery terminal connector with terminals BL/W, G/W, G/BL, and BL/R.
- 19**: Battery terminal connector with terminals BL/W, G/W, G/BL, and BL/R.
- 20**: Battery terminal connector with terminals BL/W, G/W, G/BL, and BL/R.
- 21**: Battery terminal connector with terminals BL/W, G/W, G/BL, and BL/R.
- 22**: Battery terminal connector with terminals BL/W, G/W, G/BL, and BL/R.

1. Meter Unit
2. Oil Pressure Warning Indicator Light Controller
3. Engine Stop Switch
4. Front Wheel Rotation Sensor
5. ABS Hydraulic Unit
6. Fuse Box
7. Main Fuse 15 A
8. Ignition Fuse 10 A
9. Charging/ECU Fuse 30 A
10. Headlight Relay Fuse 15 A
11. Ignition Switch
12. Battery 12 V 10 Ah
13. Engine Ground
14. Frame Ground 1
15. ECU
16. Crankshaft Sensor
17. Oil Pressure Switch
18. Water Temperature Sensor (Meter)
19. Turn Signal Relay
20. to Dimmer Switch and Passing Button
21. to Turn Signal Light Switch (Right)
22. to Turn Signal Light Switch (Left)

Switches and Sensors

Brake Light Timing Inspection

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

- Using a tester, check to see that only the connections shown in the table have continuity.
- 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.

Side Stand Switch Connections

Side Stand Switch Connections		
Color	Y/G	G
When side stand is up	○ —	○ —
When side stand is down		

GP18679B S

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.

16-64 ELECTRICAL SYSTEM

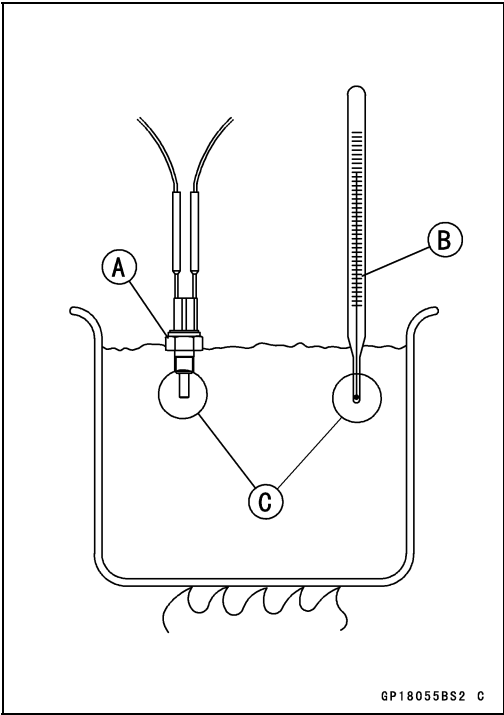
Switches and Sensors

Water Temperature Sensor Inspection

- Remove:
  - Water Temperature Sensor (ECU) (see Water Temperature Sensor (ECU) Removal in the Fuel System (DFI) chapter)
  - Water Temperature Sensor (Meter) (see Water Temperature Sensor (Meter) Removal in the Cooling System chapter)
- Suspend the sensor [A] in a container of coolant so that the temperature-sensing portion [C] is submerged.
- Suspend an accurate thermometer [B] with temperature-sensing portion located in almost the same depth with the sensor.

NOTE

- *The sensor and thermometer must not touch the container side or bottom.*
- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the digital meter, measure the internal resistance of the sensor.
- ★ If the digital meter does not show the specified values, replace the sensor.



Water Temperature Sensor (ECU) Resistance

Temperature	Resistance (kΩ)
-20°C (-4°F)	18.8
40°C (104°F)	1.136
100°C (212°F)	0.1553

Water Temperature Sensor (Meter) Resistance

Temperature	Resistance (Ω)
50°C (122°F)	154
80°C (176°F)	52
100°C (212°F)	27

Switches and Sensors

Fuel Level Sensor Inspection

- Remove the fuel pump (see Fuel Pump Removal in the Fuel System (DFI) chapter).
- Connect a digital meter to the fuel pump connector.
- Measure the fuel level sensor resistance.

Fuel Level Sensor Resistance

Connections:

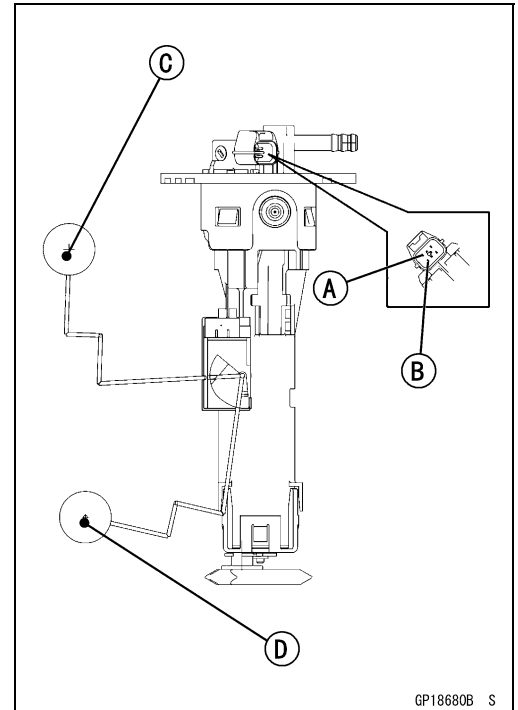
Y/W lead terminal [A] $\leftrightarrow$ BL/W lead terminal [B]

Standard:

Full Position [C] $1100 \pm 33 \Omega$ @20°C (68°F)

Empty Position [D] $100 \pm 3 \Omega$ @20°C (68°F)

- ★ If the tester does not read as specified, replace the fuel pump.



Speed Sensor Removal/Installation

- Refer to the Front Rotation Sensor Removal/Installation in the Brakes chapter.

Speed Sensor Inspection

- Refer to the Wheel Rotation Sensor Inspection in the Brakes chapter.

Oxygen Sensor Removal

- Remove the storage box (see Storage Box Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector [A].

NOTICE

Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.

- Remove the oxygen sensor [A].



16-66 ELECTRICAL SYSTEM

Switches and Sensors

Oxygen Sensor Installation

NOTICE

Never drop the oxygen sensor [A] especially on a hard surface. Such a shock to the unit can damage it. Do not touch the sensing part [B] to prevent oil contact. Oil contamination from hands can reduce sensor performance.

- Tighten:
Torque - Oxygen Sensor: 25 N·m (2.5 kgf·m, 18 ft·lb)
- Run the oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Oxygen Sensor Inspection

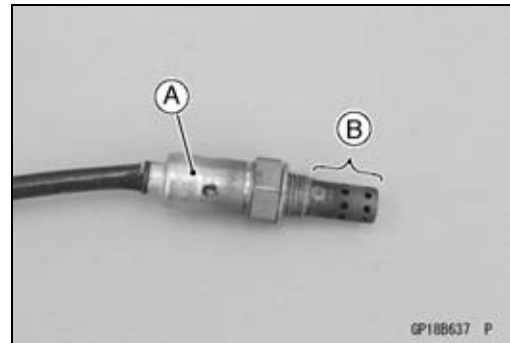
- Refer to the Oxygen Sensor Inspection in the Fuel System (DFI) chapter.

Oxygen Sensor Heater Inspection

- Refer to the Oxygen Sensor Heater Resistance Inspection in the Fuel System (DFI) chapter.

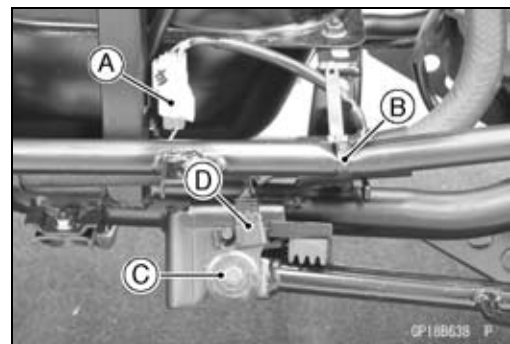
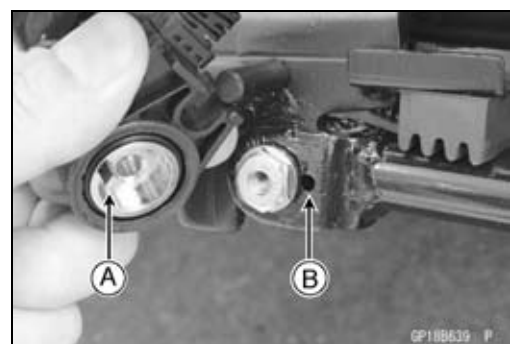
Side Stand Switch Removal

- Remove the left side fairing (see Side Fairing Removal in the Frame chapter).
- Disconnect the side stand switch lead connector [A].
- Remove:
  - Band [B]
  - Bolt [C]
  - Side Stand Switch [D]



Side Stand Switch Installation

- Installation is the reverse of removal.
- Insert the projection [A] of the side stand switch into the hole [B] of the side stand.



Side Stand Switch Inspection

- Refer to the Switch Inspection.

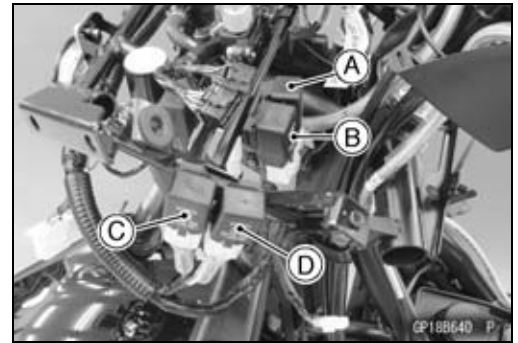
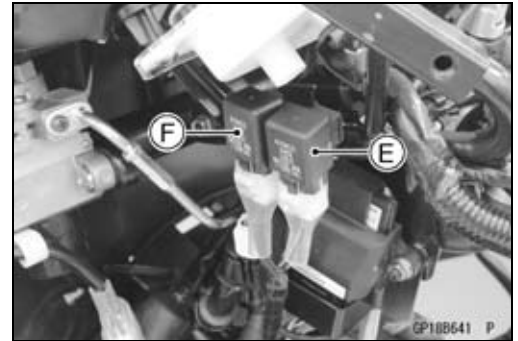
Switches and Sensors

Relay Inspection

- Remove the front fairing (see Front Fairing Removal in the Frame chapter).
- Disconnect the relay connectors, and remove the relays.
  - Fan Relay [A]
  - Starter Relay 1 [B]
  - High Beam Headlight Relay [C]
  - Low Beam Headlight Relay [D]
  - ECU Relay [E]
  - Fuel Pump Relay [F]

NOTE

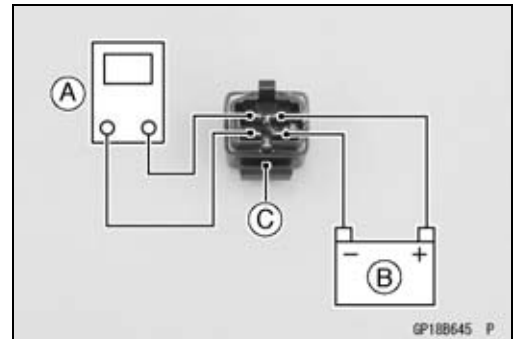
○The fan relay, starter relay 1, high beam headlight relay, low beam headlight relay, ECU relay and fuel pump relay are the same.



- Connect a tester [A] and 12 V battery [B] to the relay [C] as shown.
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

Criteria: When battery is connected → about 0 Ω
 When battery is disconnected → $\infty \Omega$

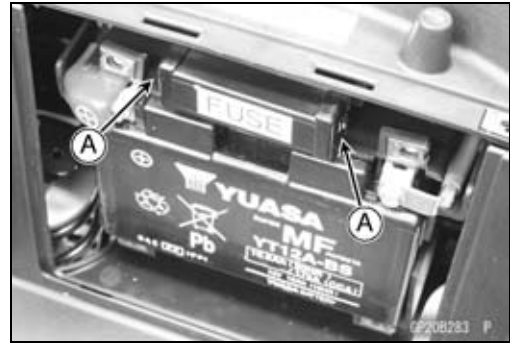


16-68 ELECTRICAL SYSTEM

Fuse

Fuse Box Fuse Removal

- Remove the battery cover (see Battery Removal).
- Unlock the hooks [A] to remove the lid.



- Pull the fuses [A] straight out of the fuse box with needle nose pliers.



Fuse Installation

- ★ If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.
- Install the fuse box fuses on the original position as specified on the lid.

Fuse Inspection

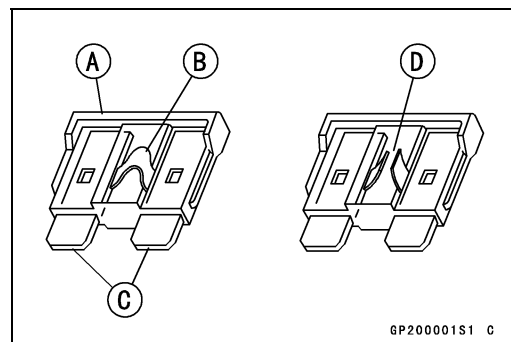
- Remove the fuse (see Fuse Box Fuse Removal).
- Inspect the fuse element.
- ★ If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]

Fuse Element [B]

Terminals [C]

Blown Element [D]



NOTICE

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

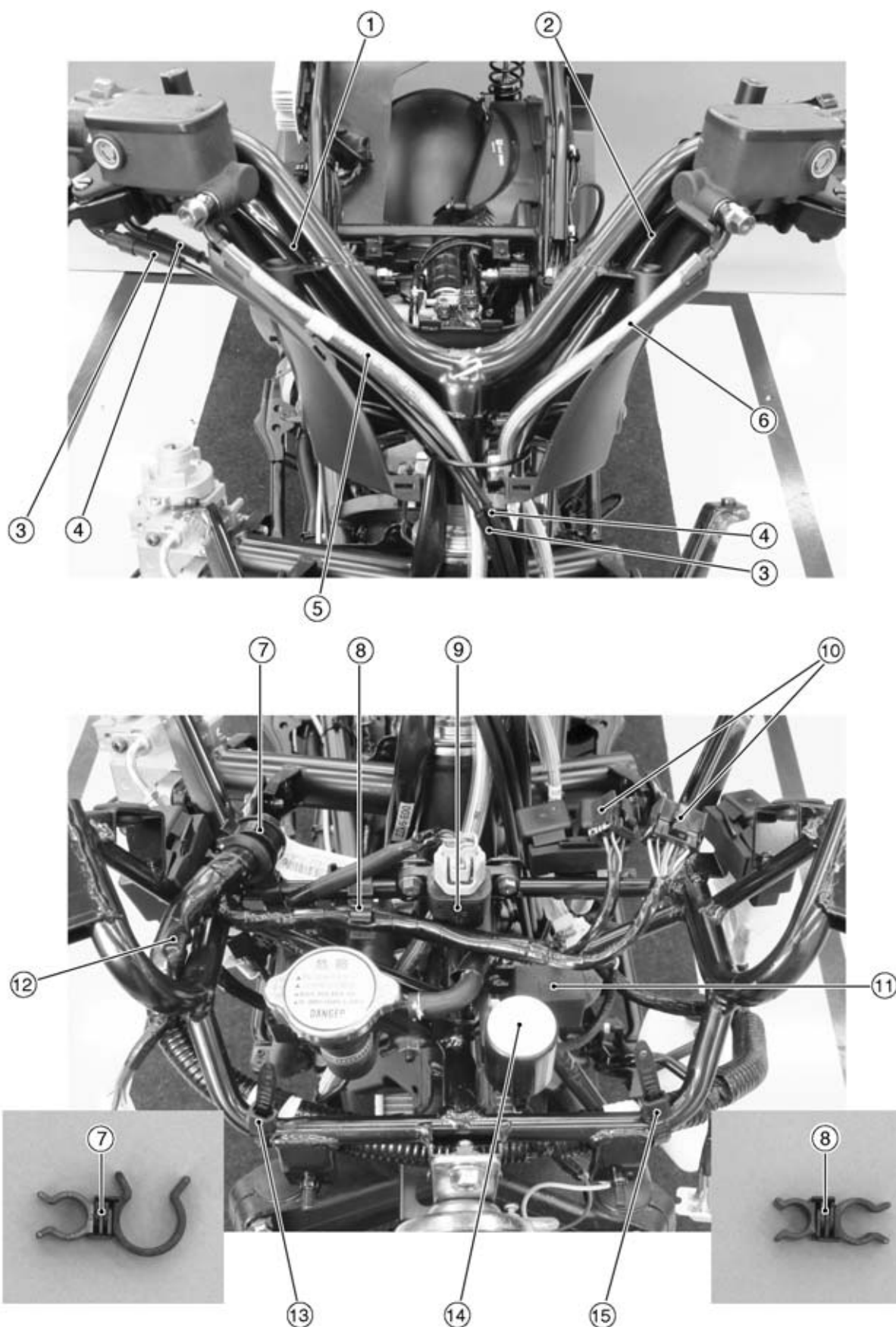
Appendix

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Troubleshooting Guide	17-26

17-2 APPENDIX

Cable, Wire, and Hose Routing



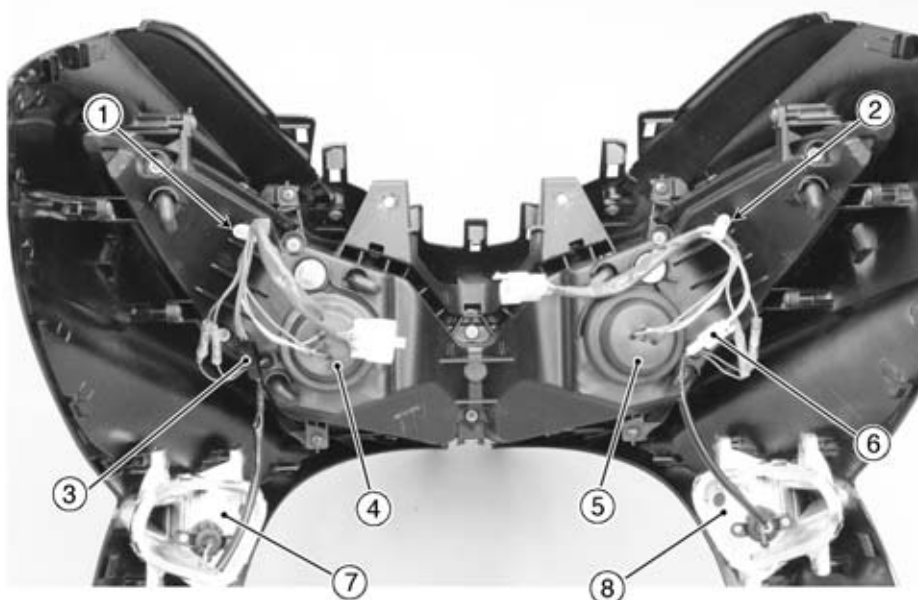
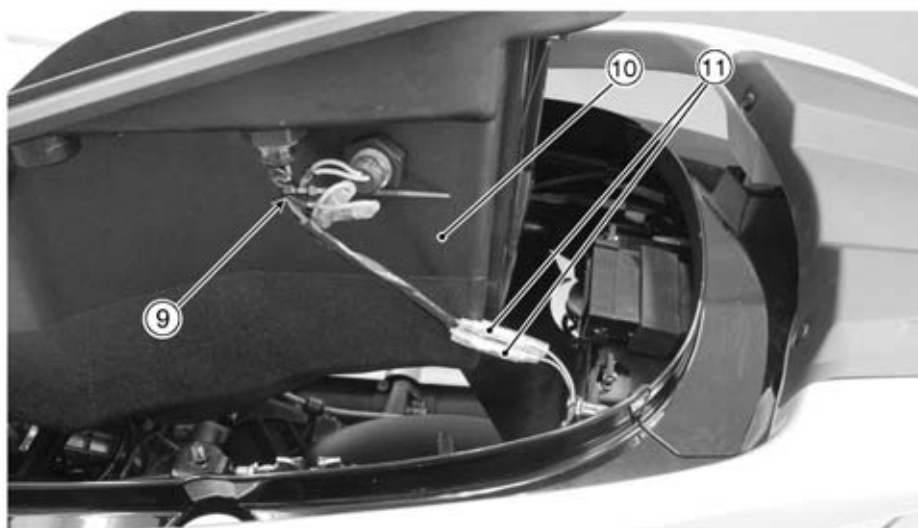
Cable, Wire, and Hose Routing

---

1. Right Switch Housing Lead
2. Left Switch Housing Lead
3. Throttle Cable (Accelerator)
4. Throttle Cable (Decelerator)
5. Front Brake Hose
6. Rear Brake Hose
7. Clamp (Hold the main harness and fairing bracket.)
8. Clamp (Hold the meter lead and fairing bracket.)
9. Vehicle-down Sensor
10. Meter Lead Connectors
11. Red Oil Pressure Warning Indicator Light Controller
12. Main Harness
13. Band (Hold the main harness.)
14. Turn Signal Relay
15. Band (Hold the main harness.)

17-4 APPENDIX

Cable, Wire, and Hose Routing



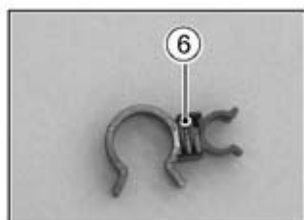
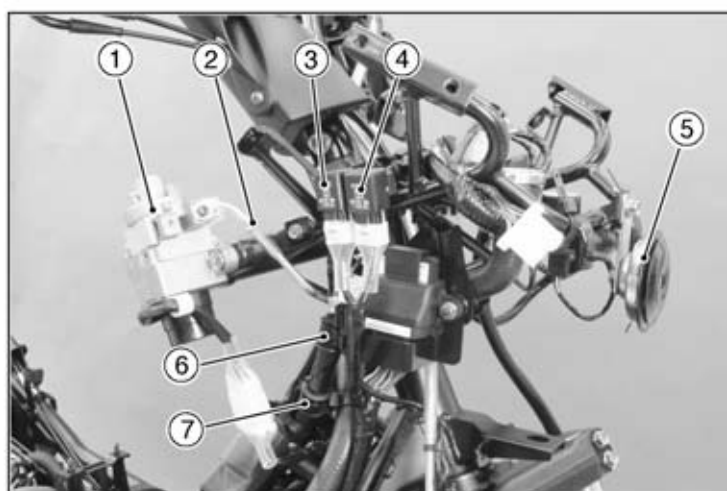
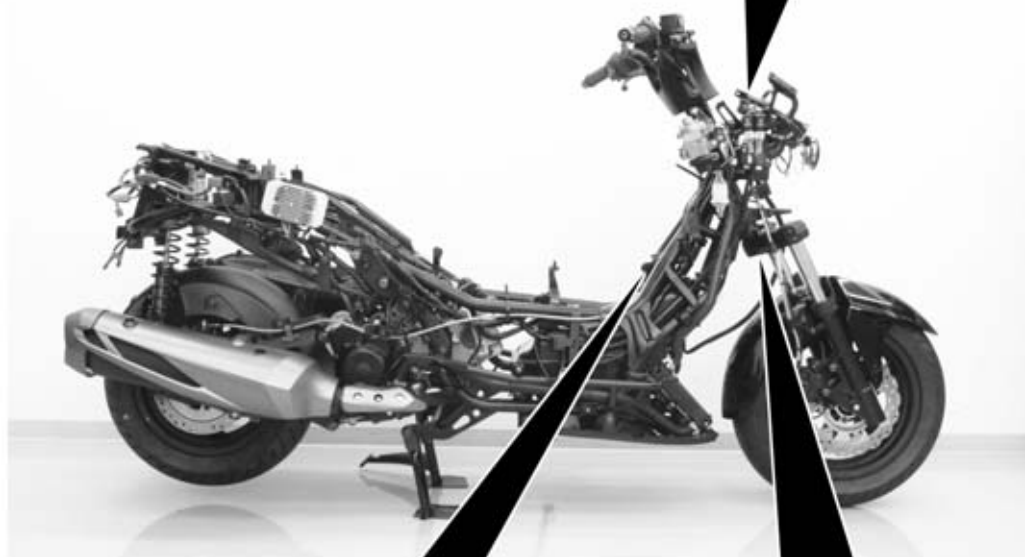
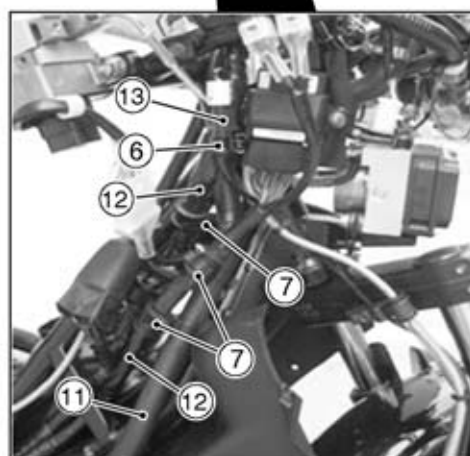
Cable, Wire, and Hose Routing

---

1. Clamp (Hold the left headlight leads and left city light leads.)
2. Clamp (Hold the right headlight leads and right city light leads.)
3. Front Left Turn Signal Light Lead Connector
4. Left Headlight
5. Right Headlight
6. Front Right Turn Signal Light Lead Connector
7. Front Left Turn Signal Light
8. Front Right Turn Signal Light
9. Band (Hold the storage box light lead and storage box right switch lead.)
10. Storage Box
11. Storage Box Light Switch Lead Connectors
12. Rear Right Turn Signal Light
13. Rear Left Turn Signal Light
14. Clamp (Hold the rear right turn signal light lead.)
15. Clamp (Hold the tail/brake light lead.)
16. Tail/Brake Light
17. Clamp (Hold the rear left turn signal light lead.)

17-6 APPENDIX

Cable, Wire, and Hose Routing



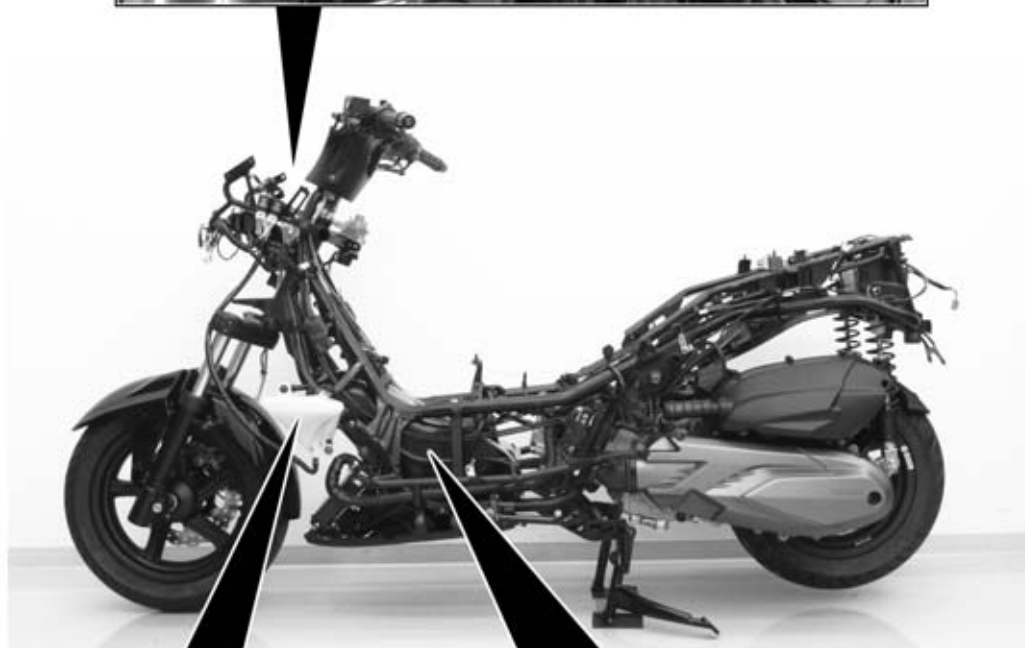
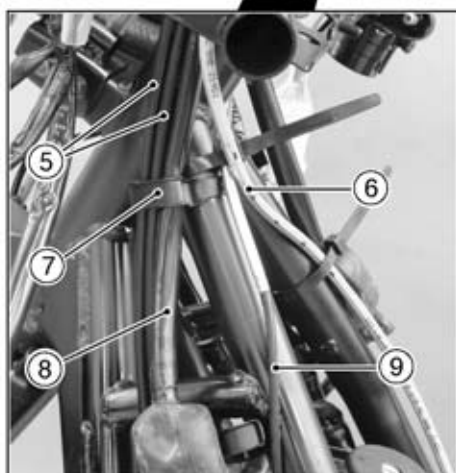
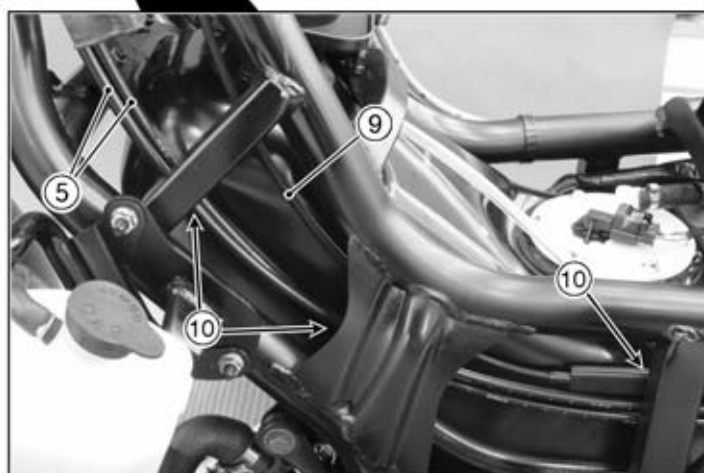
Cable, Wire, and Hose Routing

---

1. Ignition Switch
2. Seat Lock Cable
3. Fuel Pump Relay
4. ECU Relay
5. Horn
6. Clamp (Hold the speed sensor (front wheel rotation sensor) lead connector and main harness.)
7. Clamps (Hold the water hose and main harness.)
8. Right Switch Housing Lead
9. Band (Hold the right switch housing lead and rear brake hose.)
10. Rear Brake Hose
11. Water Hose
12. Main Harnesses
13. Speed Sensor (Front Wheel Rotation Sensor) Lead Connector

17-8 APPENDIX

Cable, Wire, and Hose Routing



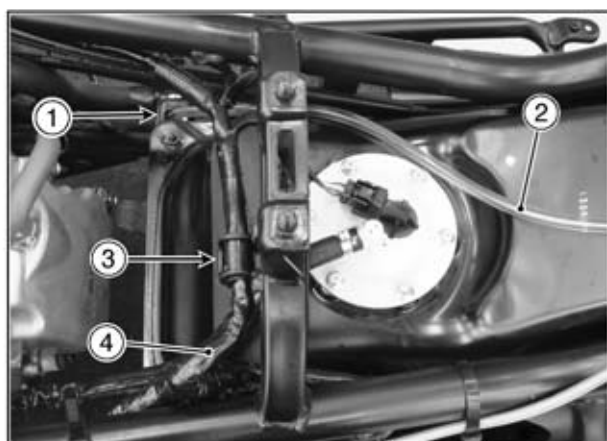
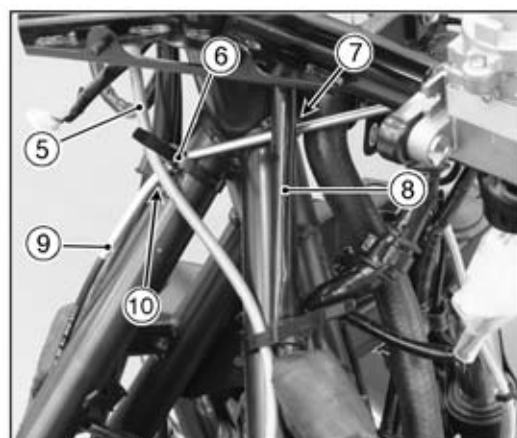
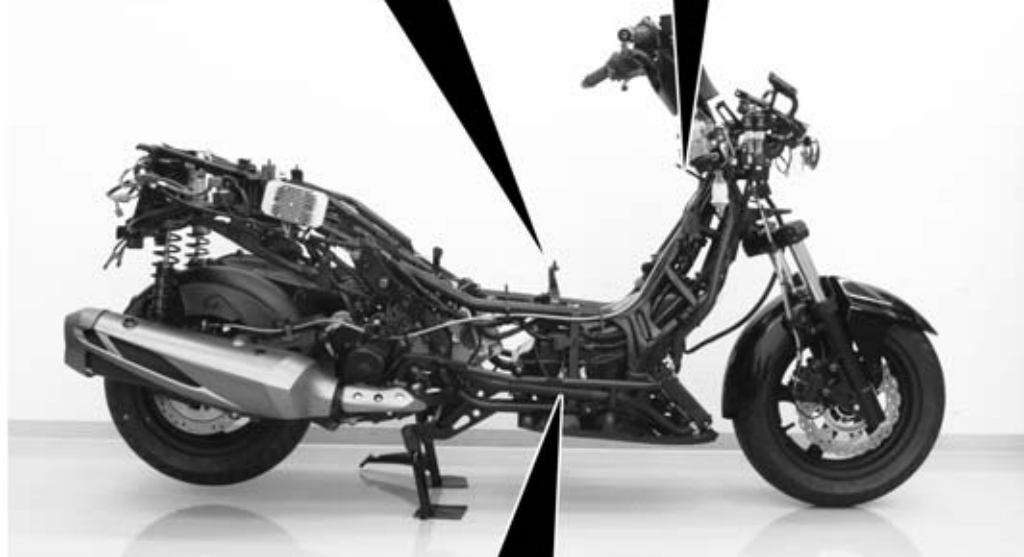
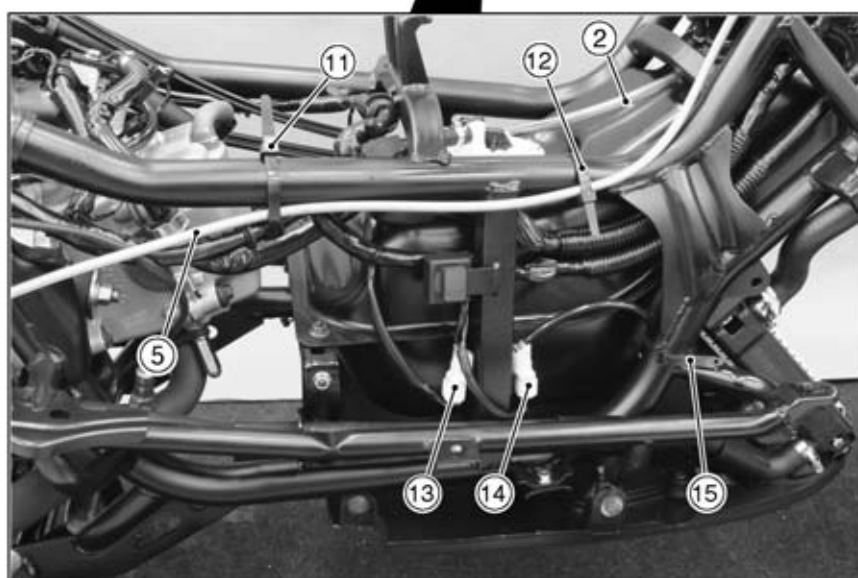
Cable, Wire, and Hose Routing

---

1. Fan Relay
2. Starter Relay 1
3. High Beam Headlight Relay
4. Low Beam Headlight Relay
5. Throttle Cables
6. Rear Brake Hose
7. Run the throttle cables and left switch housing lead to the inside of the guide.
8. Left Switch Housing Lead
9. Seat Lock Cable
10. Run the throttle cables and seat lock cable to the inside of the frame.

17-10 APPENDIX

Cable, Wire, and Hose Routing



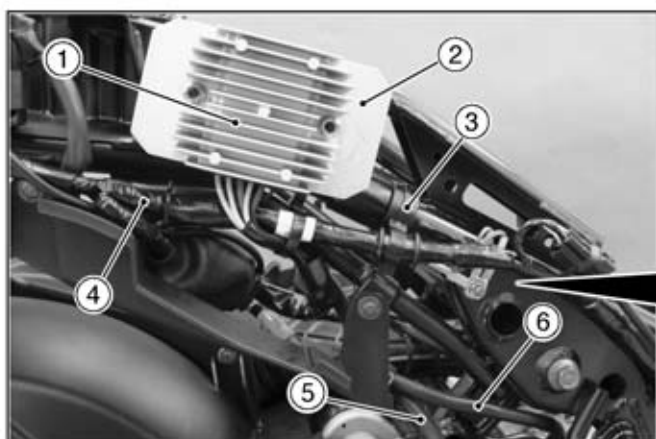
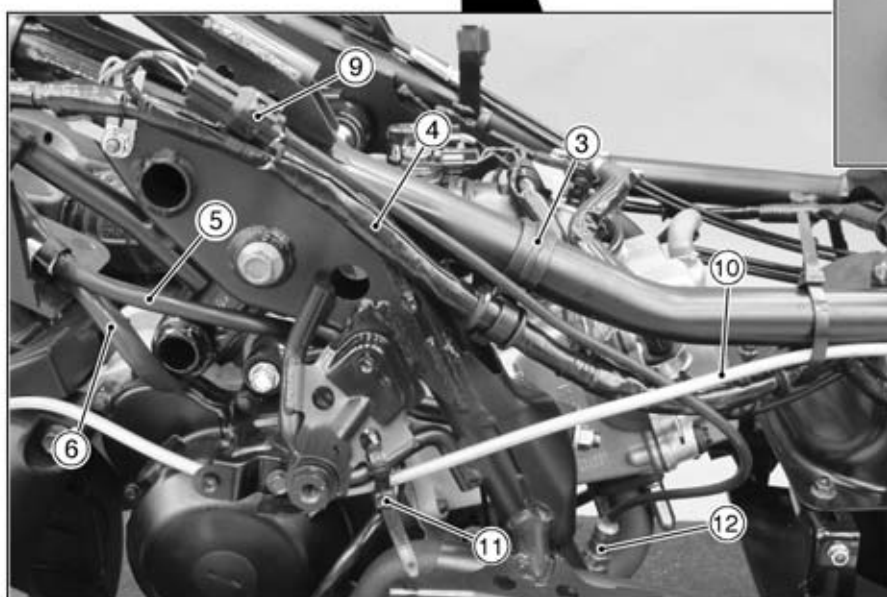
Cable, Wire, and Hose Routing

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1. Run the fuel overflow hose into the hole of bracket.
2. Fuel Overflow Hose
3. Hold the main harness with the hook of the frame.
4. Main Harness
5. Rear Brake Hose
6. Band (Hold the seat lock cable.)
7. Run the seat lock cable under the right switch housing lead.
8. Right Switch Housing Lead
9. Seat Lock Cable
10. Run the seat lock cable under the rear brake hose.
11. Band (Hold the rear brake hose and main harness.)
12. Band (Hold the rear brake hose.)
13. EMI Filter Lead Connector (fixed on the stay)
14. Radiator Fan Lead Connector (fixed on the stay)
15. Band (Hold the radiator fan lead.)

17-12 APPENDIX

Cable, Wire, and Hose Routing



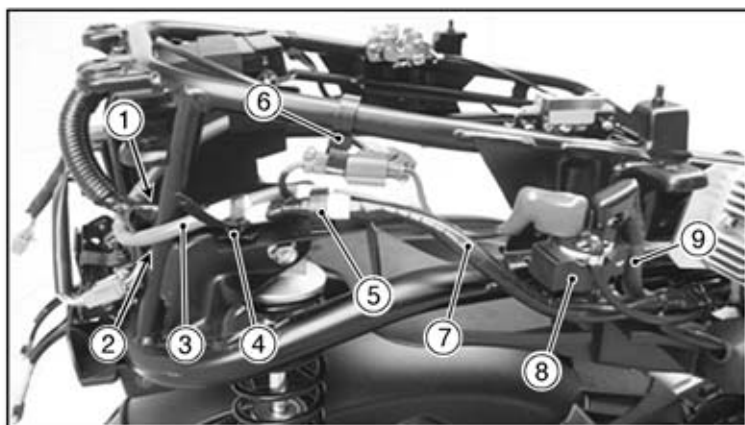
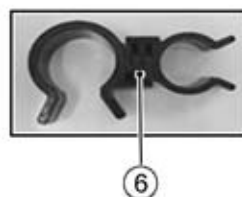
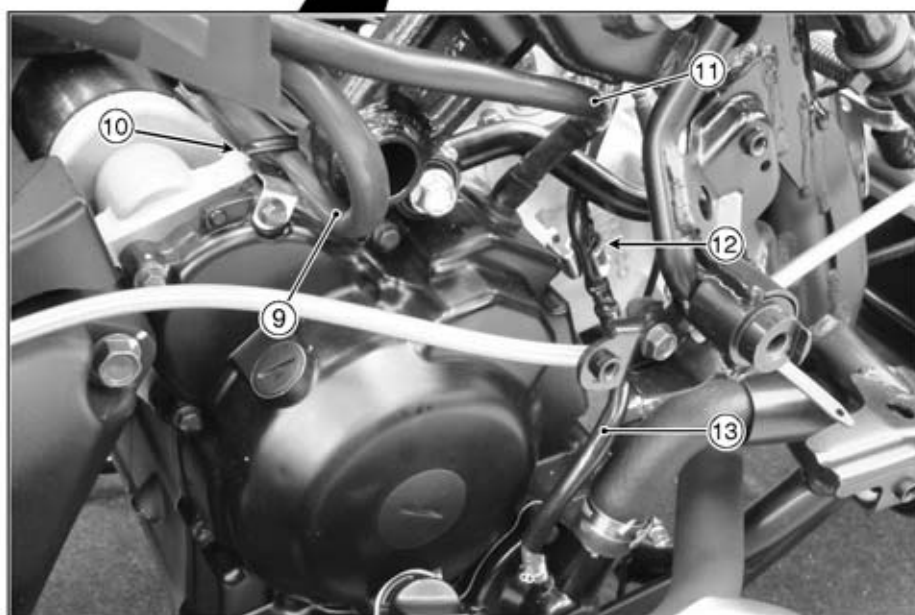
Cable, Wire, and Hose Routing

---

1. Regulator/Rectifier
2. Aluminum Plate
3. Clamps (Hold the main harness and frame.)
4. Main Harness
5. Alternator Lead
6. Starter Motor Cable
7. Frame Ground Terminal (on the upper)
8. Frame Ground Terminal (on the lower)
9. Oxygen Sensor Lead Connector
10. Rear Brake Hose
11. Band (Hold the rear brake hose.)
12. Oxygen Sensor

17-14 APPENDIX

Cable, Wire, and Hose Routing



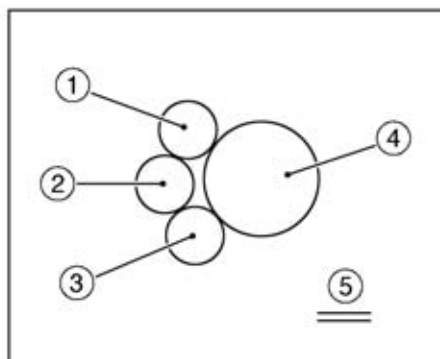
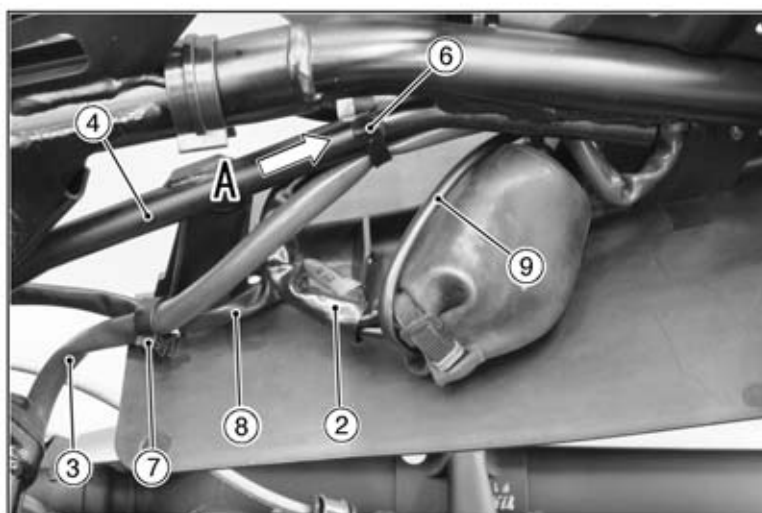
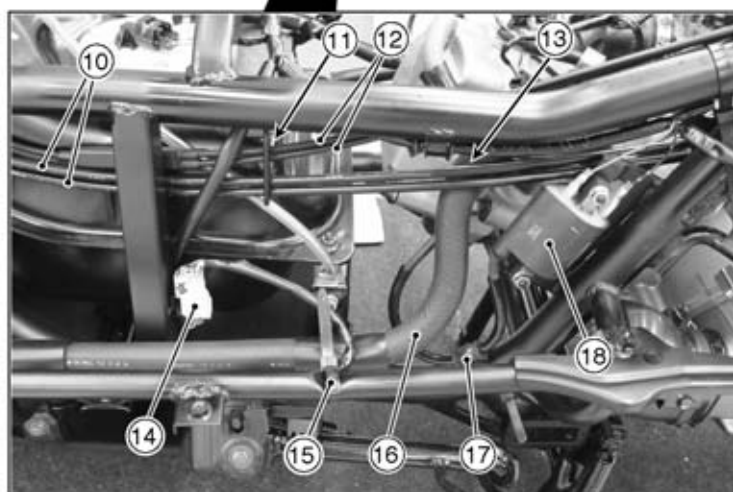
Cable, Wire, and Hose Routing

---

1. Run the main harness to the inside of the frame.
2. Run the battery (+) cable to the outside of the frame.
3. Battery (+) Cable
4. Band (Hold the battery (+) cable and main harness.)
5. Clamp (Hold the main harness.)
6. Clamp (Hold the battery (+) cable connector.)
7. Main Harness
8. Starter Relay 2
9. Starter Motor Cable
10. Clamp (Hold the starter motor cable.)
11. Alternator Lead
12. Clamp (Hold the water bypass hose.)
13. Water Bypass Hose

17-16 APPENDIX

Cable, Wire, and Hose Routing



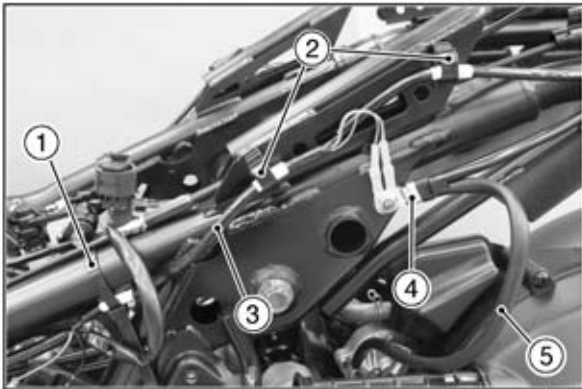
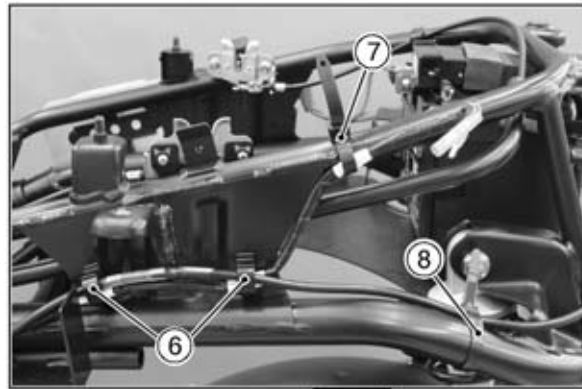
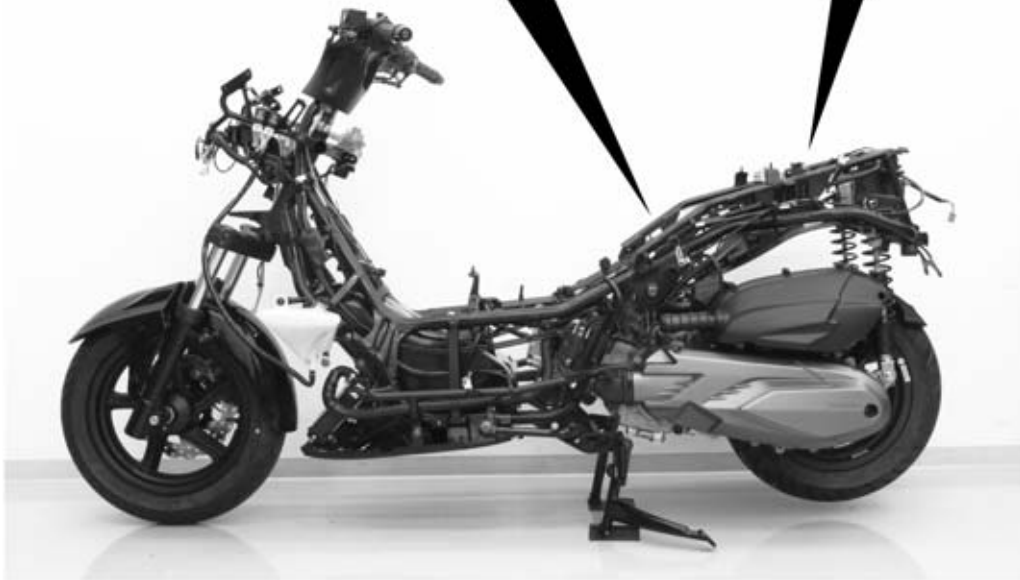
Cable, Wire, and Hose Routing

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1. Main Harness
2. Regulator/Rectifier Lead
3. Starter Motor Cable
4. Frame
5. View from A
6. Band (Hold the main harness, regulator/rectifier lead and starter motor cable.)
7. Clamp (Hold the alternator lead and starter motor cable.)
8. Alternator Lead
9. Starter Relay 2 Lead
10. Throttle Cables
11. Run the throttle cables and seat lock cables into the guide.
12. Seat Lock Cables
13. Run the throttle cables to the outside of the water hose.
14. Side Stand Switch Lead Connector (fixed on the stay)
15. Band (Hold the side stand switch lead.)
16. Water Hose
17. Clamp (Hold the spark plug cable.)
18. Ignition Coil

17-18 APPENDIX

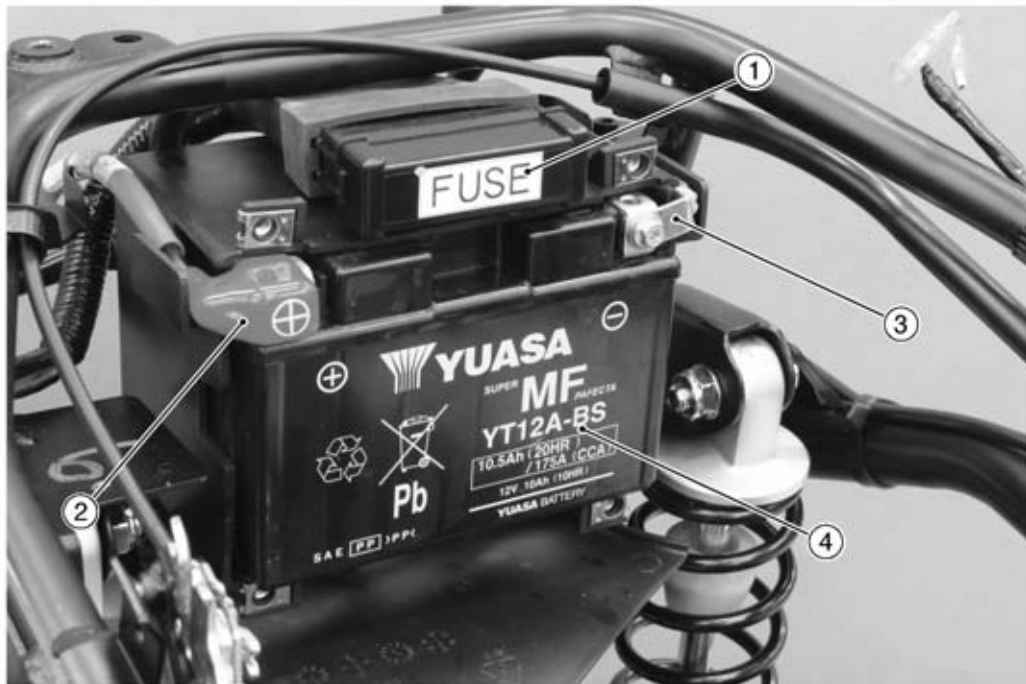
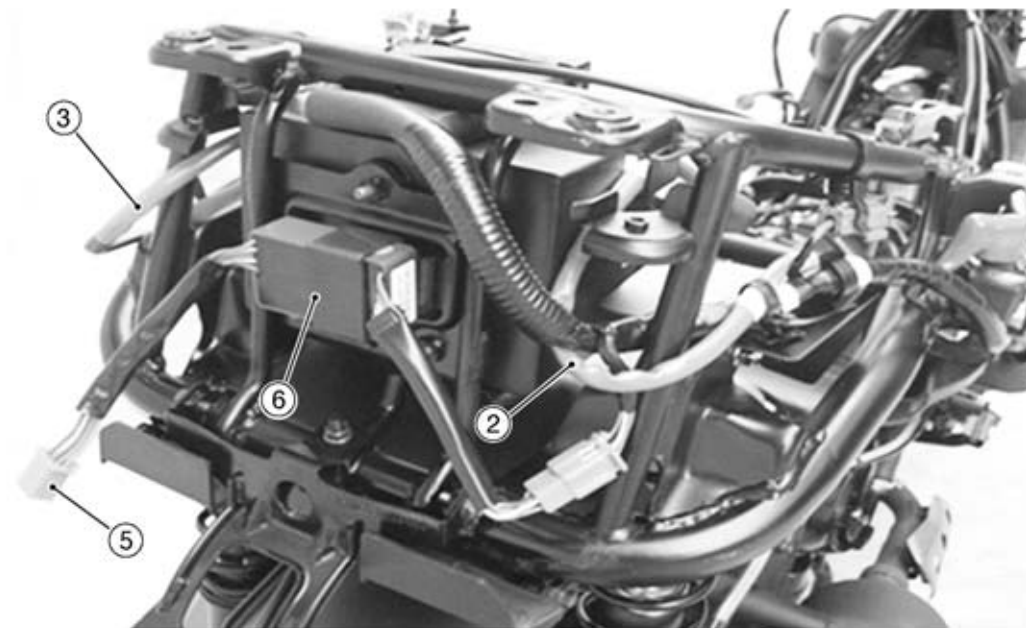
Cable, Wire, and Hose Routing



GB09B066 P

1. Band (Hold the main harness.)
2. Clamps (Hold the main harness.)
3. Main Harness
4. Frame Ground Terminal (on the upper)
5. Battery (-) Cable
6. Clamps (Hold the main harness and battery (-) cable.)
7. Band (Hold the main harness.)
8. Band (Hold the battery (-) cable.)

Cable, Wire, and Hose Routing

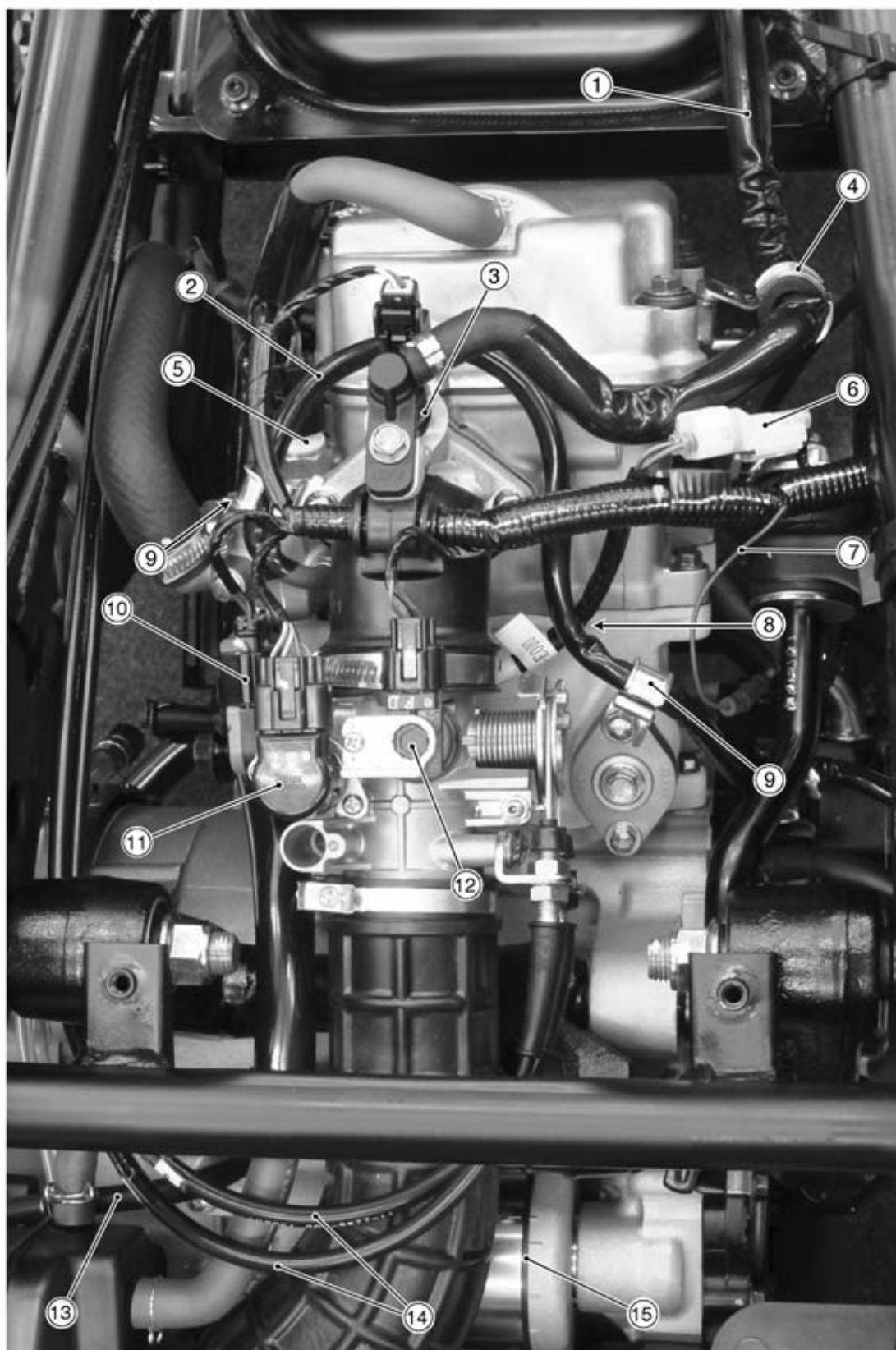


GB09B067 P

1. Fuse Box
2. Battery (+) Cable
3. Battery (-) Cable
4. Battery
5. Tail/Brake Light Lead Connector
6. Hazard Control Unit

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Cable, Wire, and Hose Routing



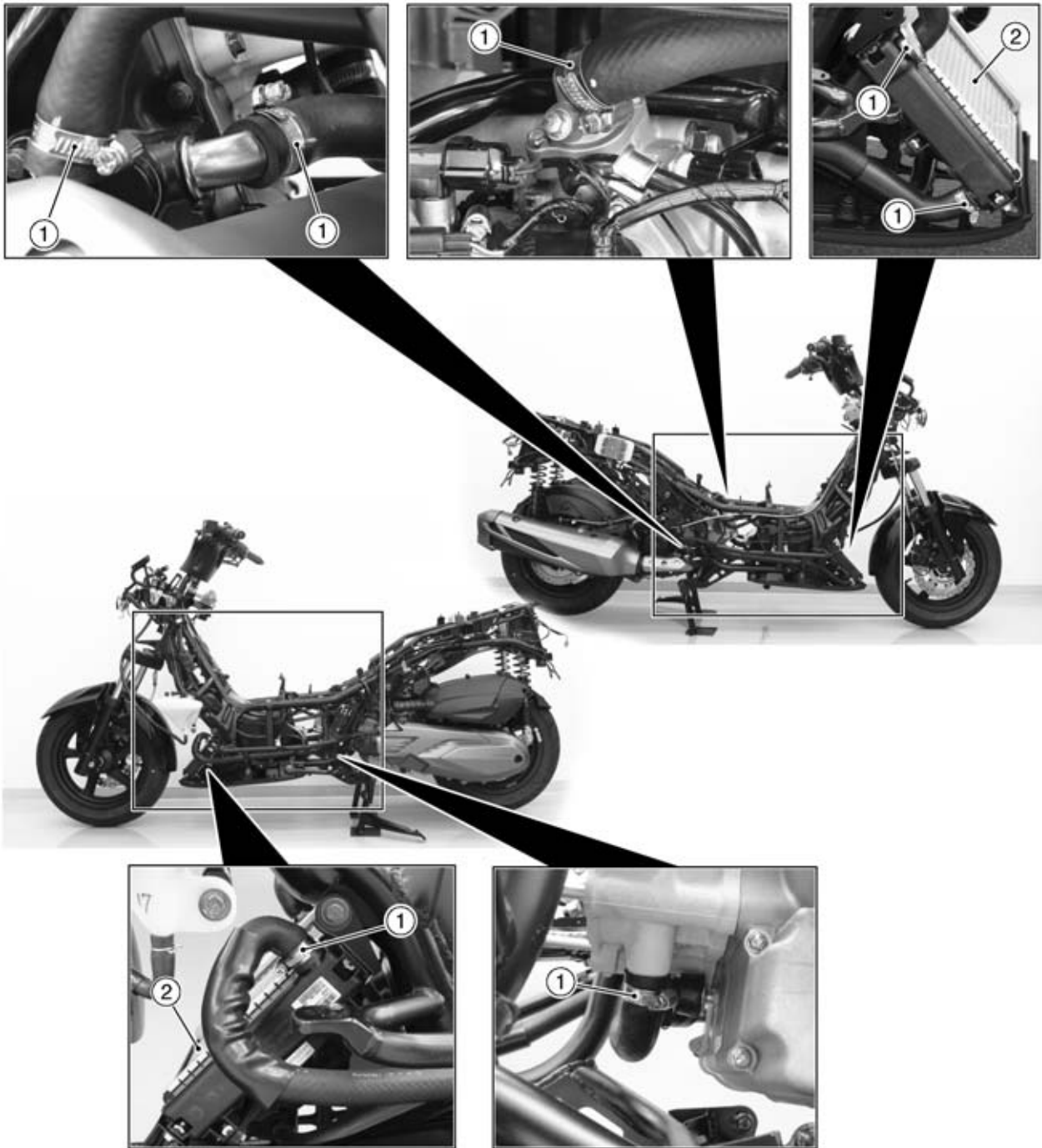
Cable, Wire, and Hose Routing

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1. Fuel Hose
2. Water Bypass Hose
3. Fuel Injector
4. Clamp (Hold the fuel hose.)
5. Water Temperature Sensor (ECU)
6. Water Temperature Sensor (Meter) Lead
7. Oil Pressure Switch Lead
8. Run the water temperature sensor (meter) lead under the water bypass hose.
9. Clamps (Hold the water bypass hose.)
10. Throttle Sensor
11. Idle Speed Control Valve Actuator
12. Intake Air Pressure Sensor
13. Battery (–) Cable
14. Throttle Cables
15. Starter Motor

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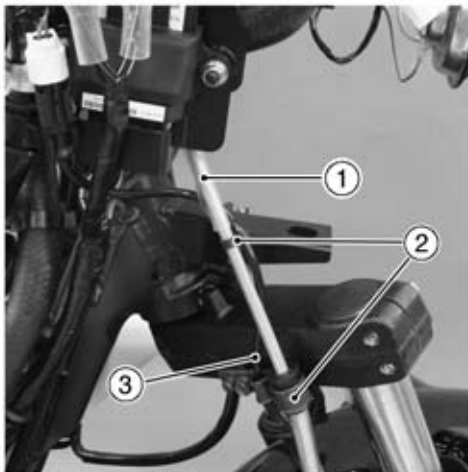
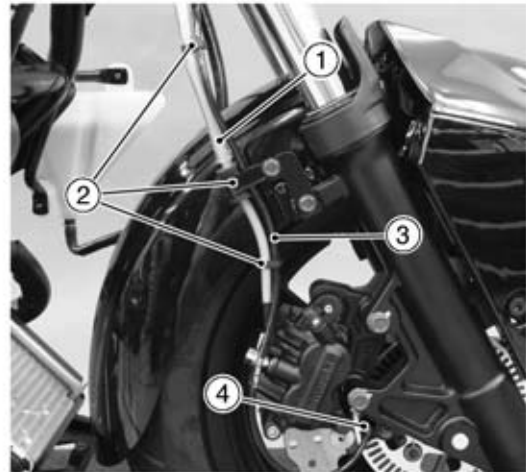
Cable, Wire, and Hose Routing



GB09B069 P

- 1. Water Hose Clamps
- 2. Radiator

Cable, Wire, and Hose Routing



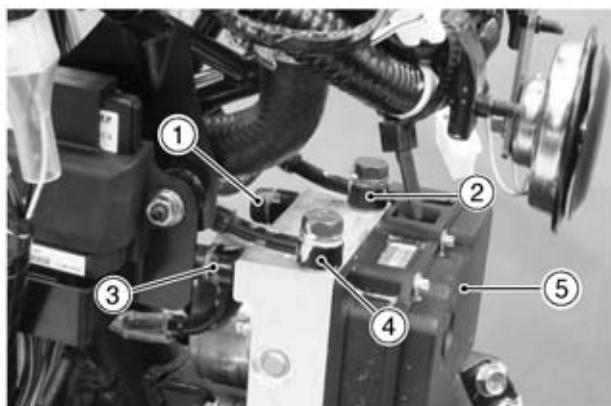
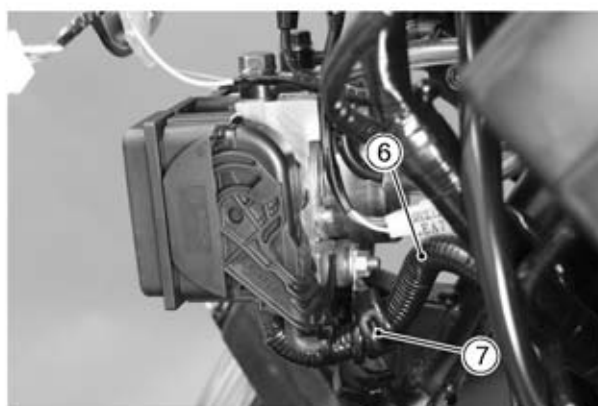
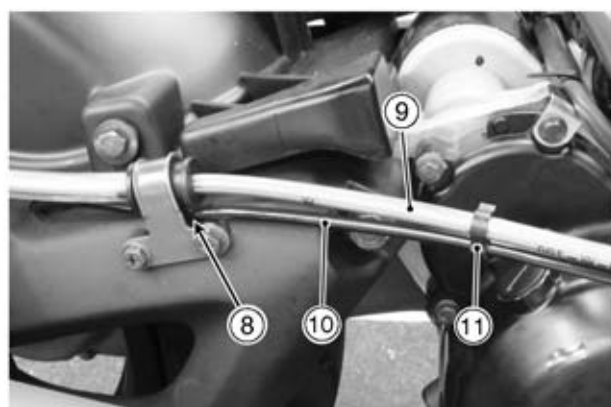
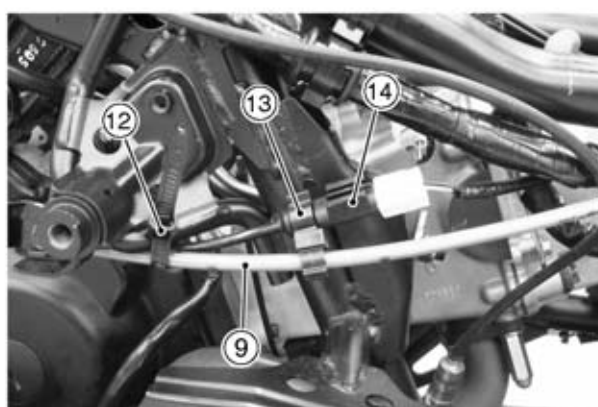
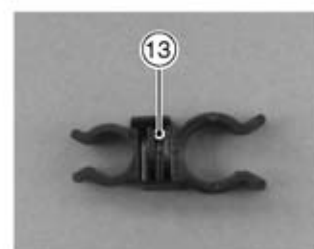
GB09B070 P

1. Front Brake Hose
2. Clamps (Hold the speed sensor (front wheel rotation sensor) lead and front brake hose.)
3. Speed Sensor (Front Wheel Rotation Sensor) Lead
4. Speed Sensor (Front Wheel Rotation Sensor)
5. Rear Brake Hose
6. Clamp (Hold the rear brake hose.)

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Cable, Wire, and Hose Routing

ABS Equipped Model



Cable, Wire, and Hose Routing

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1. To Rear Master Cylinder
2. To Rear Caliper
3. To Front Master Cylinder
4. To Front Caliper
5. ABS Hydraulic Unit
6. ABS Hydraulic Unit Lead
7. Clamp (Hold the ABS hydraulic unit lead.)
8. Run the rear wheel rotation sensor lead under the brake hose held with the clamp.
9. Rear Brake Hose
10. Rear Wheel Rotation Sensor Lead
11. Clamp (Hold the rear wheel rotation sensor lead and rear brake hose.)
12. Band (Hold the rear wheel rotation sensor lead and rear brake hose.)
13. Clamp (Hold the rear wheel rotation sensor lead connector and rear brake hose.)
14. Rear Wheel Rotation Sensor Lead Connector

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
- Side stand switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:

- Starter clutch trouble
- Starter idle gear trouble
- Vehicle-down sensor (DFI) coming off

Engine won't turn over:

- Valve seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Final gear or bearing seizure
- Camshaft seizure

No fuel flow:

- No fuel in tank
- Fuel pump trouble
- Fuel tank air vent obstructed
- Fuel filter clogged
- Fuel line clogged

Engine flooded:

- Clean spark plug and adjust plug gap
- Starting technique faulty
(When flooded, do not crank the engine with the throttle fully opened. This promotes engine flood because more fuel is supplied automatically by DFI.)

No spark; spark weak:

- Vehicle-down sensor (DFI) coming off
- Ignition and engine stop switch not on
- Battery voltage low
- Spark plug dirty, broken, or gap maladjusted
- Spark plug cap or ignition coil cable trouble
- Spark plug cap shorted or not in good contact

- Spark plug incorrect
- ECU trouble
- Side stand switch trouble
- Crankshaft sensor trouble
- Ignition coil trouble
- Ignition switch or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

Fuel/air mixture incorrect:

- Air cleaner clogged, poorly sealed, or missing

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)

Poor Running at Low Speed:

Spark weak:

- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or ignition coil cable trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- ECU trouble
- Crankshaft sensor trouble
- Ignition coil trouble

Fuel/air mixture incorrect:

- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Intake manifold 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 warped
- Cylinder head gasket damaged

Troubleshooting Guide

Valve spring broken or weak
 Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
 Camshaft cam worn

Run-on (dieseling):

Ignition switch trouble
 Engine stop switch trouble
 Fuel injector trouble
 Carbon accumulating on valve seating surface
 Engine overheating

Other:

ECU trouble
 Engine oil viscosity too high
 Drive train (CVT) trouble
 Brake dragging
 Engine overheating
 Clutch slipping

Poor Running or No Power at High Speed:

Firing incorrect:

Spark plug dirty, broken, or maladjusted
 Spark plug cap or ignition coil cable trouble
 Spark plug cap shorted or not in good contact
 Spark plug incorrect
 Camshaft position trouble
 ECU trouble
 Crankshaft sensor trouble
 Ignition coil trouble

Fuel/air mixture incorrect:

Air cleaner clogged, poorly sealed, or missing
 Air cleaner duct loose
 Water or foreign matter in fuel
 Intake manifold loose
 Fuel to injector insufficient (DFI)
 Fuel tank air vent obstructed
 Fuel line clogged
 Fuel pump trouble

Compression low:

Spark plug loose
 Cylinder head not sufficiently tightened down
 No valve clearance
 Cylinder, piston worn
 Piston ring bad (worn, weak, broken, or sticking)
 Piston ring/groove clearance excessive
 Cylinder head gasket damaged
 Cylinder head warped
 Valve spring broken or weak
 Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Knocking:

Carbon built up in combustion chamber
 Fuel poor quality or incorrect
 Spark plug incorrect
 ECU trouble
 Crankshaft sensor trouble

Miscellaneous:

Throttle valve won't fully open
 Brake dragging
 Clutch slipping
 Engine overheating
 Engine oil level too high
 Engine oil viscosity too high
 Drive train (CVT) trouble
 Camshaft cam worn
 Catalytic converter melt down due to muffler overheating

Overheating:

Firing incorrect:

Spark plug dirty, broken, or maladjusted
 Spark plug incorrect
 ECU trouble

Muffler overheating:

For catalytic converter, do not start the engine under misfire due to spark plug fouling or poor connection of the spark plug
 ECU trouble

Fuel/air mixture incorrect:

Intake manifold loose
 Air cleaner duct loose
 Air cleaner poorly sealed, or missing
 Air cleaner clogged

Compression high:

Carbon built up in combustion chamber

Engine load faulty:

Clutch slipping
 Engine oil level too high
 Engine oil viscosity too high
 Drive train (CVT) trouble
 Brake dragging

Lubrication inadequate:

Engine oil level too low
 Engine oil poor quality or incorrect

Water temperature gauge incorrect:

Meter unit 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

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Troubleshooting Guide

- Fan motor broken
- Fan blade damaged
- Water pump not turning
- Water pump impeller damaged

CVT Faulty:

Engine starts but motorcycle won't move:

- Drive belt worn
- Ramp plate broken
- Clutch lining worn or damaged
- Driven face spring broken

Engine stalls or motorcycle creeps:

- Clutch weight spring broken

Lack of Power:

- Drive belt worn
- Drive face spring weak
- Weight roller worn
- Drive face fouled

Abnormal Engine Noise:

Knocking:

- ECU trouble
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- Overheating

Piston slap:

- Cylinder/piston clearance excessive
- Cylinder, piston worn
- Connecting rod bent
- Piston pin, piston pin hole worn

Valve noise:

- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearing worn
- Valve lifter worn

Other noise:

- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring/groove clearance excessive
- Piston ring worn, broken, or stuck
- Piston ring groove worn
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive
- Engine mount loose
- Crankshaft bearing worn
- Primary gear worn or chipped
- Camshaft chain tensioner trouble
- Camshaft chain, sprocket, guide worn
- Alternator rotor loose
- Catalytic converter melt down due to muffler overheating

Abnormal Drive Train Noise:

Final gear case noise:

- Bearing worn
- Metal chip jammed in gear teeth
- Gears worn or chipped
- Gear oil insufficient or too thin

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

Red Oil Pressure Warning Indicator Light Doesn't Go Off:

- Engine oil pump damaged
- Engine oil screen clogged
- Engine oil filter clogged
- Engine oil level too low
- Engine oil viscosity too low
- Camshaft bearing worn
- Crankshaft bearing worn
- Oil pressure switch damaged
- Wiring faulty
- Relief valve stuck open
- O-ring at the oil passage in the crankcase damaged

Exhaust Smokes Excessively:

White smoke:

- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

Black smoke:

- Air cleaner clogged

Brown smoke:

- Air cleaner 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

Troubleshooting Guide

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
 Rim warped, or not balanced
 Wheel bearing worn
 Handlebar bolt loose
 Steering stem nut loose
 Front axle runout excessive
 Engine mounting bolt loose

Handlebar pulls to one side:

Frame bent
 Wheel misalignment
 Sub frame bent or twisted
 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

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 lead 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.
2014	SC300AE	RGSC40000E1000001
2014	SC300BE	RGSC40000E1100001
2015	SC300AF	RGSC40000F1000101
2015	SC300BF	RGSC40000F1100101