

Kawasaki

Z800
Z800 ABS



Motorcycle Service Manual

Quick Reference Guide

General Information	1
Periodic Maintenance	2
Fuel System (DFI)	3
Cooling System	4
Engine Top End	5
Clutch	6
Engine Lubrication System	7
Engine Removal/Installation	8
Crankshaft/Transmission	9
Wheels/Tires	10
Final Drive	11
Brakes	12
Suspension	13
Steering	14
Frame	15
Electrical System	16
Appendix	17

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.



Z800
Z800 ABS

Motorcycle Service Manual

All rights reserved. No parts of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic mechanical photocopying, recording or otherwise, without the prior written permission of Quality Assurance Division/Motorcycle & Engine Company/Kawasaki Heavy Industries, Ltd., Japan.

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

COUNTRY AND AREA CODES

AU	Australia	WVTA (FULL)	WVTA Model (Full Power)
BR	Brazil	UK WVTA (FULL)	WVTA Model (Left Side Traffic, Full Power)
SEA-B2	Southeast Asia B2	WVTA (78.2)	WVTA Model (78.2 kW Power)

Foreword

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

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

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

To get the longest life out of your vehicle.

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

How to Use This Manual

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

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

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

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

DANGER

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

WARNING

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

NOTICE

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

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

NOTE

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

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

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

General Information

Table of Contents

Before Servicing	1-2
Model Identification.....	1-7
General Specifications.....	1-11
Unit Conversion Table	1-14

1-2 GENERAL INFORMATION

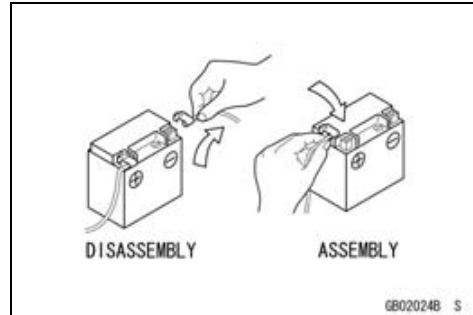
Before Servicing

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

Especially note the following.

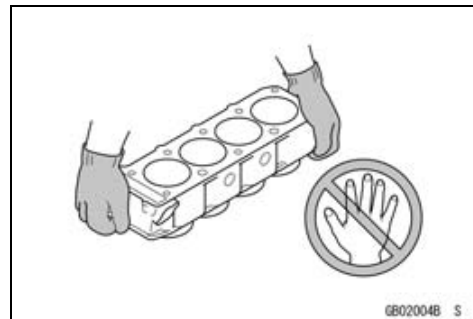
Battery Ground

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



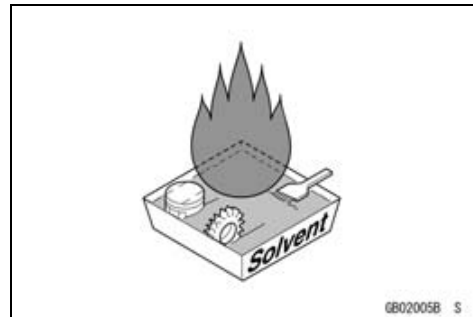
Edges of Parts

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



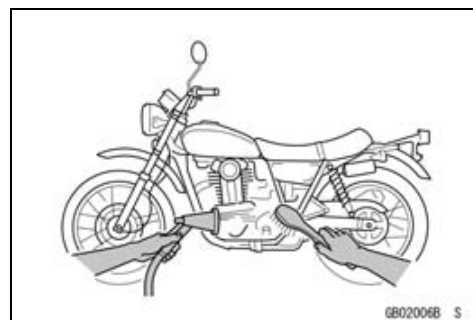
Solvent

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



Cleaning Vehicle before Disassembly

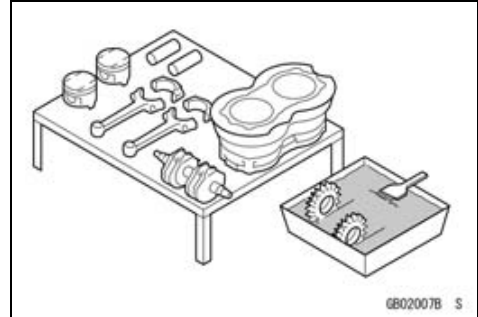
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

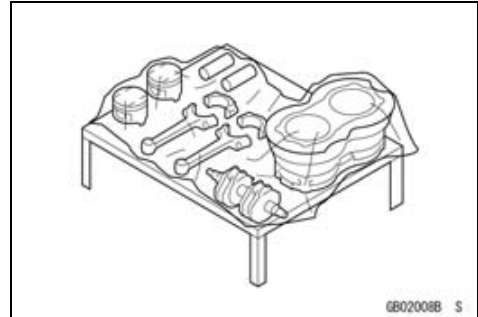
Arrangement and Cleaning of Removed Parts

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



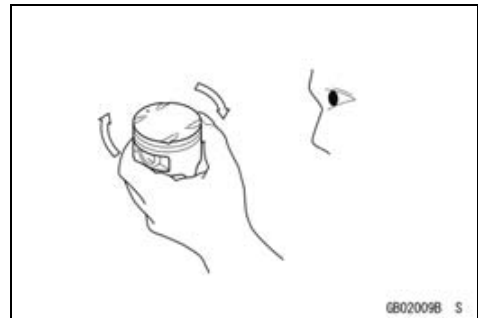
Storage of Removed Parts

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



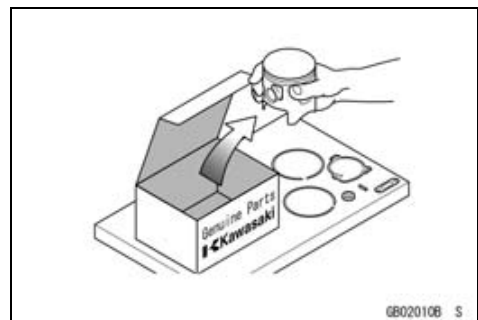
Inspection

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



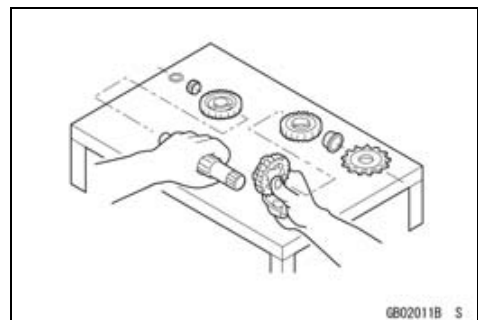
Replacement Parts

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



Assembly Order

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

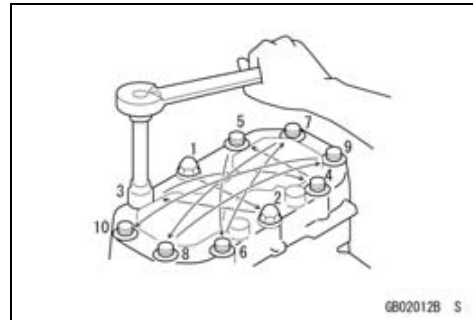


1-4 GENERAL INFORMATION

Before Servicing

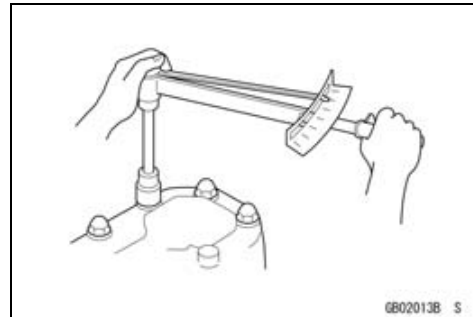
Tightening Sequence

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



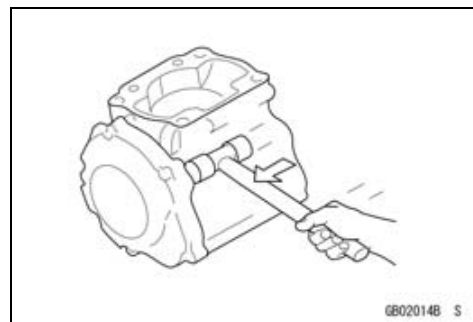
Tightening Torque

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



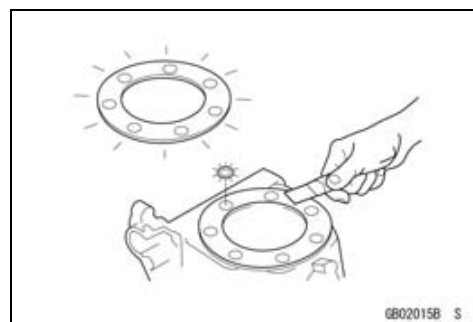
Force

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



Gasket, O-ring

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



Liquid Gasket, Non-permanent Locking Agent

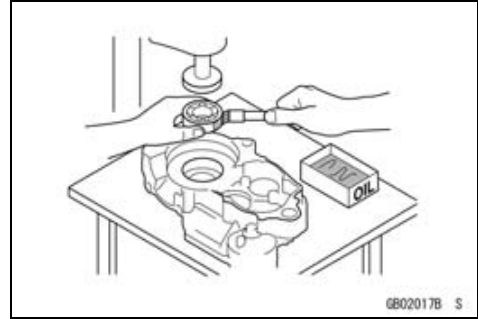
For applications that require Liquid Gasket or a Non-Permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

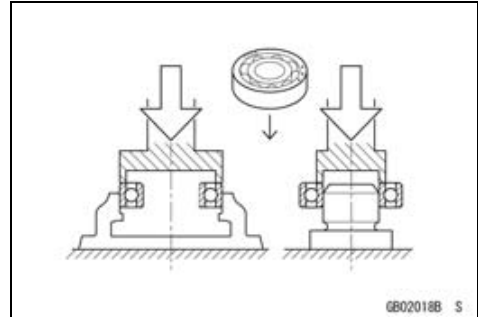
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

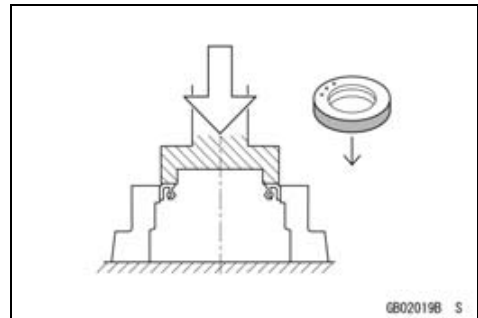
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

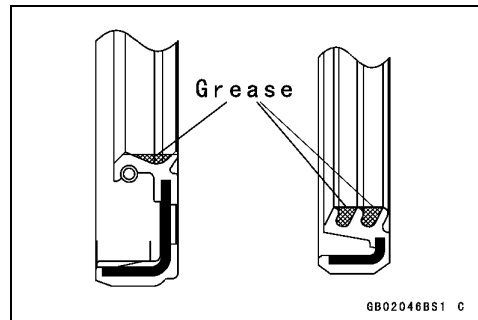


Oil Seal, Grease Seal

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

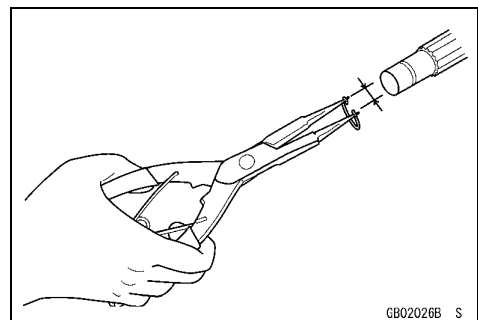


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

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

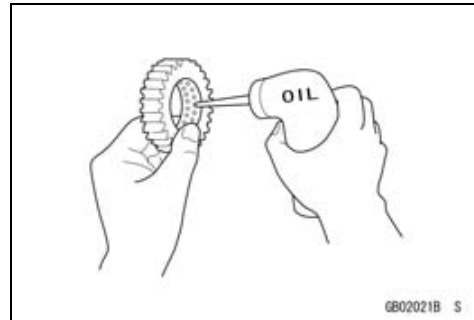


1-6 GENERAL INFORMATION

Before Servicing

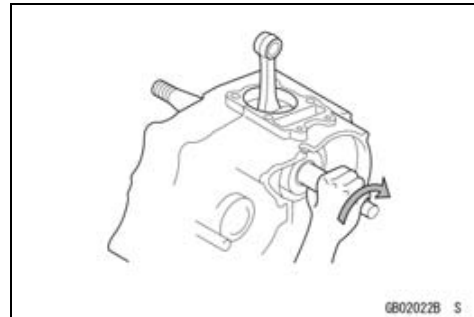
Lubrication

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



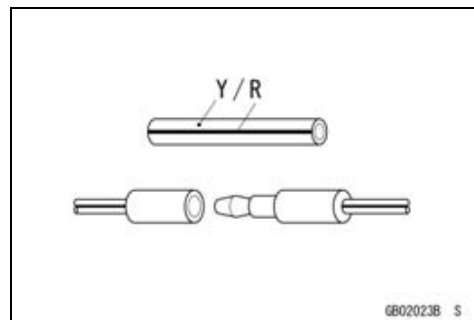
Direction of Engine Rotation

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



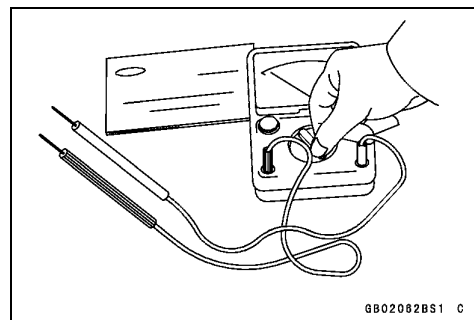
Electrical Wires

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



Instrument

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



Model Identification

ZR800AD (Europe) Left Side View



ZR800AD (Europe) Right Side View



1-8 GENERAL INFORMATION

Model Identification

ZR800BD (Europe) Left Side View



ZR800BD (Europe) Right Side View



Model Identification

ZR800CD Left Side View



ZR800CD Right Side View



1-10 GENERAL INFORMATION

Model Identification

ZR800DD Left Side View



ZR800DD Right Side View



Frame Number



Engine Number



General Specifications

Items	ZR800AD/BD/CD/DD
Dimensions	
Overall Length	2 100 mm (82.68 in.)
Overall Width	800 mm (31.50 in.)
Overall Height	1 050 mm (41.34 in.)
Wheelbase	1 445 mm (56.89 in.)
Road Clearance	150 mm (5.91 in.)
Seat Height	834 mm (32.83 in.)
Curb Mass:	
ZR800A	229 kg (504.9 lb)
ZR800B	231 kg (509.4 lb)
ZR800C	226 kg (498.3 lb)
ZR800D	228 kg (502.7 lb)
Front:	
ZR800A	116 kg (255.8 lb)
ZR800B	117 kg (258.0 lb)
ZR800C	114 kg (251.4 lb)
ZR800D	115 kg (253.6 lb)
Rear:	
ZR800A	113 kg (249.2 lb)
ZR800B	114 kg (251.4 lb)
ZR800C	112 kg (247.0 lb)
ZR800D	113 kg (249.2 lb)
Fuel Tank Capacity	17 L (4.5 US gal.)
Performance	
Minimum Turning Radius	3.0 m (9.8 ft)
Engine	
Type	4-stroke, DOHC, 4-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	71.0 × 50.9 mm (2.80 × 2.00 in.)
Displacement	806 cm ³ (49.18 cu in.)
Compression Ratio	11.9 : 1
Maximum Horsepower:	
ZR800A/B	83.0 kW (113 PS) at 10 200 r/min (rpm) WVTA (78.2) 78.2 kW (106 PS) at 10 000 r/min (rpm)
ZR800C/D	70.0 kW (95.2 PS) at 9 500 r/min (rpm)
Maximum Torque:	
ZR800A/B	83.0 N·m (8.5 kgf·m, 61 ft·lb) at 8 000 r/min (rpm) WVTA (78.2) 80.5 N·m (8.2 kgf·m, 59 ft·lb) at 8 000 r/min (rpm)
ZR800C/D	76.0 N·m (7.7 kgf·m, 56 ft·lb) at 8 000 r/min (rpm)
Fuel System	FI (Fuel Injection) MIKUNI 34 EHDW × 4
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (digital igniter)
Ignition Timing	From 10° BTDC at 1 100 r/min (rpm) to 37° BTDC at 5 000 r/min (rpm)

1-12 GENERAL INFORMATION

General Specifications

Items	ZR800AD/BD/CD/DD
Spark Plug Cylinder Numbering Method Firing Order Valve Timing: Intake: Open Close Duration Exhaust: Open Close Duration Lubrication System Engine Oil: Type Viscosity Capacity	NGK CR9EK, ND U27ETR Left to right, 1-2-3-4 1-2-4-3 38° BTDC 66° ABDC 284° 51° BBDC 25° ATDC 256° Forced lubrication (wet sump) API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 SAE 10W-40 3.8 L (4.0 US qt)
Drive Train Primary Reduction System: Type Reduction Ratio Clutch Type Transmission: Type Gear Ratios: 1st 2nd 3rd 4th 5th 6th Final Drive System: Type Reduction Ratio Overall Drive Ratio	Gear 1.714 (84/49) Wet multi disc 6-speed, constant mesh, return shift 2.571 (36/14) 1.941 (33/17) 1.556 (28/18) 1.333 (28/21) 1.200 (24/20) 1.095 (23/21) Chain drive 3.000 (45/15) 5.633 at Top gear
Frame Type Caster (Rake Angle) Trail Front Tire: Type Size Rim Size	Tubular, diamond 24° 98 mm (3.86 in.) Tubeless 120/70ZR17 M/C (58W) J17M/C × MT3.50

General Specifications

Items	ZR800AD/BD/CD/DD
Rear Tire: Type Size Rim Size Front Suspension: Type Wheel Travel Rear Suspension: Type Wheel Travel Brake Type: Front Rear	Tubeless 180/55ZR17 M/C (73W) J17M/C × MT5.50 Telescopic fork 120 mm (4.72 in.) Swingarm (uni-trak) 137 mm (5.39 in.) Dual discs Single disc
Electrical Equipment Battery Headlight: Type Bulb: High Beam Low Beam Tail/Brake Light Alternator: Type Rated Output	12 V 8 Ah Semi-sealed beam 12 V 55 W × 2 12 V 55 W LED Three-phase AC 30.1 A/14.0 V at 5 000 r/min (rpm)

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

1-14 GENERAL INFORMATION

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

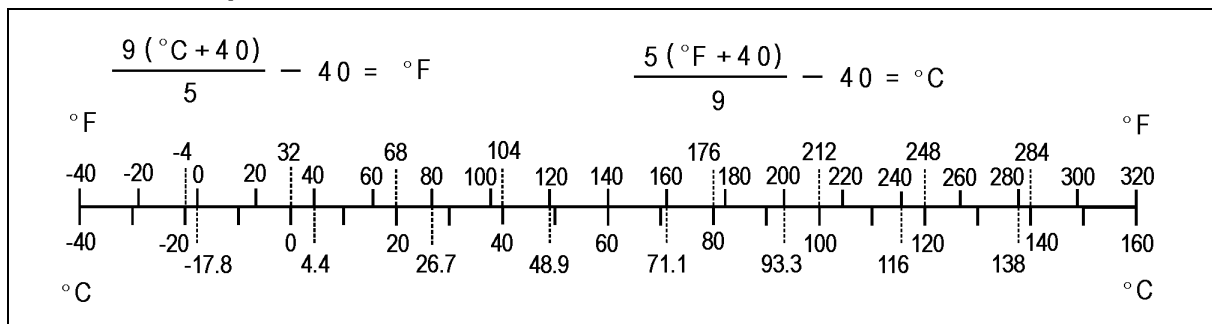
Units of Speed:

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

Table of Contents

Periodic Maintenance Chart	2-3
Torque and Locking Agent.....	2-5
Specifications	2-11
Special Tools	2-13
Periodic Maintenance Procedures.....	2-14
Fuel System (DFI).....	2-14
Air Cleaner Element Cleaning.....	2-14
Air Cleaner Element Replacement.....	2-14
Idle Speed Inspection	2-16
Idle Speed Adjustment.....	2-16
Throttle Control System Inspection.....	2-16
Engine Vacuum Synchronization Inspection.....	2-17
Fuel System.....	2-20
Fuel Hose Replacement	2-22
Cooling System.....	2-25
Coolant Level Inspection.....	2-25
Cooling System.....	2-25
Coolant Change	2-25
Water Hose and O-ring Replacement.....	2-28
Engine Top End	2-28
Valve Clearance Inspection	2-28
Valve Clearance Adjustment.....	2-30
Air Suction System Damage Inspection.....	2-33
Clutch.....	2-33
Clutch Operation Inspection.....	2-33
Engine Lubrication System	2-34
Engine Oil Change.....	2-34
Oil Filter Replacement	2-35
Wheels/Tires.....	2-36
Air Pressure Inspection.....	2-36
Wheels and Tires	2-36
Wheel Bearing Damage Inspection	2-37
Final Drive.....	2-38
Drive Chain Lubrication Condition Inspection.....	2-38
Drive Chain Slack Inspection	2-38
Drive Chain Slack Adjustment	2-39
Wheel Alignment Inspection	2-40
Drive Chain Wear Inspection	2-40
Chain Guide Wear Inspection	2-41
Brakes.....	2-42
Brake System.....	2-42
Brake Fluid Level Inspection.....	2-43
Brake Fluid Change	2-44
Brake Hose and Pipe Replacement.....	2-46
Master Cylinder Rubber Parts Replacement	2-47
Caliper Rubber Parts Replacement	2-48
Brake Pad Wear Inspection	2-52
Brake Light Switch Operation Inspection	2-52
Suspension.....	2-53
Suspension System	2-53

2-2 PERIODIC MAINTENANCE

Steering System	2-55
Steering Play Inspection	2-55
Steering Play Adjustment.....	2-55
Steering Stem Bearing Lubrication	2-56
Electrical System	2-57
Lights and Switches Operation Inspection.....	2-57
Headlight Aiming Inspection	2-59
Side Stand Switch Operation Inspection.....	2-60
Engine Stop Switch Operation Inspection.....	2-61
Spark Plug Condition Inspection.....	2-61
Spark Plug Replacement	2-61
Others.....	2-62
Chassis Parts Lubrication	2-62
Condition of Bolts, Nuts and Fasteners Tightness Inspection	2-64

Periodic Maintenance Chart

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

Periodic Inspection

*A: Service at number of years shown or indicated odometer reading intervals, whichever comes first.

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

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

○: Emission Related Item

Q: Inspection

🔧: Change or Replace

🛢️: Lubrication

Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile)					See Page
		1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	
Fuel System							
○ Air cleaner element (*C)					Q		2-14
		🔧: every 36 000 km (22 500 mile)					
○ Idle speed		Q		Q		Q	2-16
○ Throttle control system (play, smooth return, no drag)	Q:1	Q		Q		Q	2-16
○ Engine vacuum synchronization				Q		Q	2-17
Fuel system	Q:1	Q		Q		Q	2-20
Fuel hoses	🔧:5						2-22
Cooling System							
Coolant level		Q		Q		Q	2-25
Cooling system	Q:1	Q		Q		Q	2-25
Coolant, water hose and O-ring	🔧:3	🔧: every 36 000 km (22 500 mile)					2-25, 2-28
Engine Top End							
○ Valve clearance		Q: every 42 000 km (26 250 mile)					2-28
○ Air suction system				Q		Q	2-33
Clutch							
Clutch operation (play, engagement, disengagement)		Q		Q		Q	2-33
Engine Lubrication System							
Engine oil and oil filter (*C)	🔧:1	🔧		🔧		🔧	2-34, 2-35
Wheels and Tires							
Tire air pressure	Q:1			Q		Q	2-36
Wheels and tires	Q:1			Q		Q	2-36
Wheel bearing damage	Q:1			Q		Q	2-37

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile)					See Page
		1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	
Final Drive							
Drive chain lubrication condition (*C)		Q: every 600 km (400 mile)					2-38
Drive chain slack (*C)		Q: every 1 000 km (600 mile)					2-38
Drive chain wear (*C)				Q		Q	2-40
Drive chain guide wear				Q		Q	2-41
Brakes							
Brake system	Q:1	Q	Q	Q	Q	Q	2-42
Brake fluid level	Q:0.5	Q	Q	Q	Q	Q	2-43
Brake fluid (front and rear)	↻:2					↻	2-44
Brake hose/rubber parts of brake master cylinder and caliper	↻:4	↻: every 48 000 km (30 000 mile)					2-46, 2-47, 2-48
Brake pad wear (*C)			Q	Q	Q	Q	2-52
Brake light switch operation		Q	Q	Q	Q	Q	2-52
Suspension							
Suspension system	Q:1			Q		Q	2-53
Steering							
Steering play	Q:1	Q		Q		Q	2-55
Steering stem bearings	↘:2					↘	2-56
Electrical System							
Electrical system	Q:1			Q		Q	2-57
○ Spark plugs				↻		↻	2-61
Others							
Chassis parts	↘:1			↘		↘	2-62
Condition of bolts, nuts and fasteners		Q		Q		Q	2-64

Torque and Locking Agent

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

Letters used in the "Remarks" column mean:

- AD: Apply adhesive (see the text).
- AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
- HG: Apply high-temperature grease.
- L: Apply a non-permanent locking agent.
- Lh: Left-hand Threads
- LG: Apply liquid gasket.
- MO: Apply molybdenum disulfide grease oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)
- R: Replacement Parts
- S: Follow the specified tightening sequence.
- Si: Apply silicone grease.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Throttle Cable Plate Bolt	5.9	0.60	52 in·lb	
Throttle Body Cover Mounting Bolts	4.0	0.41	35 in·lb	
Delivery Pipe Assy Mounting Screws	3.5	0.36	31 in·lb	
Throttle Body Assy Holder Clamp Bolts	1.1	0.11	10 in·lb	
Air Cleaner Duct Screws	3.8	0.39	34 in·lb	
Air Duct Clamp Bolts	1.1	0.11	10 in·lb	
Air Cleaner Housing Tapping Screws	1.2	0.12	11 in·lb	
Air Cleaner Housing Mounting Bolts	9.8	1.0	87 in·lb	
Vehicle-down Sensor Bolts	5.9	0.60	52 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Oxygen Sensor	44	4.5	32	
Speed Sensor Bolt	12	1.2	106 in·lb	
Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	
Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
Fuel Level Sensor Bolts	6.9	0.70	61 in·lb	L
Exhaust Butterfly Valve Actuator Mounting Bolts	6.9	0.70	61 in·lb	
Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	
Cooling System				
Thermostat Bracket Bolt	6.9	0.70	61 in·lb	
Reserve Tank Bolts	9.8	1.0	87 in·lb	
Thermostat Housing Screws	2.6	0.27	23 in·lb	
Thermostat Housing Clamp Bolt	6.9	0.70	61 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Radiator Bolts	6.9	0.70	61 in·lb	
Water Hose Clamp Screws	3.0	0.31	27 in·lb	
Radiator Bracket Mounting Bolt	6.9	0.70	61 in·lb	
Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
Water Pipe Bolts	11	1.1	97 in·lb	L
Cylinder Fitting Mounting Bolts	11	1.1	97 in·lb	

2-6 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Water Pump Impeller Bolt	9.8	1.0	87 in·lb	
Water Pump Cover Bolts	11	1.1	97 in·lb	
Coolant Drain Bolt (Water Pump)	11	1.1	97 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
Camshaft Cap Bolts (L = 45 mm)	12	1.2	106 in·lb	S
Camshaft Cap Bolts (L = 40 mm)	12	1.2	106 in·lb	S
Spark Plugs	13	1.3	115 in·lb	
Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
Cylinder Head Bolts (M10)	See the text	←	←	MO, S
Cylinder Head Jacket Plugs	21.6	2.20	15.9	L
Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in·lb	
Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
Rear Camshaft Chain Guide Bolt	25	2.5	18	
Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
Throttle Body Assy Holder Bolts	13	1.3	115 in·lb	
Throttle Body Assy Holder Clamp Bolts	1.1	0.11	10 in·lb	
Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
Exhaust Butterfly Valve Actuator Mounting Bolts	6.9	0.70	61 in·lb	
Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	
Exhaust Butterfly Valve Cable Adjuster Locknuts	6.9	0.70	61 in·lb	
Exhaust Butterfly Valve Cover Bolt	11	1.1	97 in·lb	
Muffler Body Mounting Bolts	34	3.5	25	
Muffler Body End Cover Bolts	11	1.1	97 in·lb	
Muffler Body Cover Bolts	6.9	0.70	61 in·lb	
Exhaust Pipe Manifold Holder Nuts	17	1.7	13	S
Muffler Body Clamp Bolt	17	1.7	13	
Clutch				
Clutch Lever Clamp Bolts	11	1.1	97 in·lb	S
Oil Filler Plug	2.0	0.20	18 in·lb	
Clutch Cover Mounting Bolts	11	1.1	97 in·lb	
Clutch Spring Bolts	8.8	0.90	78 in·lb	
Clutch Hub Nut	135	13.8	100	R
Engine Lubrication System				
Oil Jet Nozzle Bolts	6.9	0.70	61 in·lb	L
Oil Filler Plug	2.0	0.20	18 in·lb	
Oil Filter	17	1.7	13	
Oil Filter Holder	78	8.0	58	L
Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	HG
Oil Pressure Switch	15	1.5	11	LG

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Passage Plugs	20	2.0	15	L
Oil Pipe Holder Bolts	13	1.3	115 in·lb	L
Water Pump Cover Bolts	11	1.1	97 in·lb	
Coolant Drain Bolt (Water Pump)	11	1.1	97 in·lb	
Water Pump Impeller Bolt	9.8	1.0	87 in·lb	
Oil Pressure Relief Valve	15	1.5	11	L
Oil Pan Bolts	15	1.5	11	
Engine Oil Drain Bolt	30	3.1	22	
Engine Removal/Installation				
Front Engine Bracket Bolts	11	1.1	97 in·lb	
Upper Engine Bracket Bolts	44	4.5	32	S
Subframe Bolts	25	2.5	18	S
Adjusting Collar Locknuts	49	5.0	36	S
Front Engine Mounting Bolts	44	4.5	32	S
Upper Adjusting Collar	9.8	1.0	87 in·lb	S
Middle Engine Mounting Nut	44	4.5	32	S
Rear Engine Bracket Bolts	25	2.5	18	S
Lower Engine Mounting Nut	44	4.5	32	S
Lower Adjusting Collar	4.9	0.50	43 in·lb	S
Engine Ground Cable Terminal Bolt	9.8	1.0	87 in·lb	
Crankshaft/Transmission				
Oil Jet Nozzle Bolts	6.9	0.70	61 in·lb	L
Crankcase Bolts (M6)	12	1.2	106 in·lb	S
Crankcase Bolts (M7)	20	2.0	15	S
Side Breather Plate Bolts	5.9	0.60	52 in·lb	L
Connecting Rod Big End Nuts	See the text	←	←	MO
Upper Breather Plate Bolts	9.8	1.0	87 in·lb	L
Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
Oil Passage Plugs	20	2.0	15	L
Oil Pipe Holder Bolts	13	1.3	115 in·lb	L
Crankcase Bolts (M8)	27	2.8	20	S
Crankcase Bolts (M9, L = 95 mm)	See the text	←	←	MO, S
Crankcase Bolts (M9, L = 81 mm)	See the text	←	←	MO, S
Shift Drum Bearing Holder Screw	5.9	0.60	52 in·lb	L
Shift Drum Bearing Holder Bolt	12	1.2	106 in·lb	L
Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	L
Neutral Switch	15	1.5	11	
Shift Lever Bolt	6.9	0.70	61 in·lb	
Gear Positioning Lever Bolt	12	1.2	106 in·lb	
Shift Shaft Return Spring Pin	29	3.0	21	L
Tie-Rod Locknuts	6.9	0.70	61 in·lb	

2-8 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Shift Pedal Mounting Bolt	25	2.5	18	
Wheels/Tires				
Front Axle Clamp Bolt	20	2.0	15	
Front Axle	108	11.0	79.7	
Rear Axle Nut	108	11.0	79.7	
Final Drive				
Engine Sprocket Cover Bolts	6.9	0.70	61 in·lb	
Engine Sprocket Nut	167	17.0	123	MO
Chain Adjuster Locknuts	16.5	1.68	12.2	
Rear Axle Nut	108	11.0	79.7	
Rear Sprocket Nuts	59	6.0	44	R
Brakes				
Brake Hose Banjo Bolts	25	2.5	18	
Front Master Cylinder Reservoir Cap Screws	1.5	0.15	13 in·lb	
Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
Front Brake Disc Mounting Bolts	27	2.8	20	L
Front Caliper Assembly Bolts	22	2.2	16	L
Front Caliper Mounting Bolts	25	2.5	18	
Front Brake Pad Pins	17.2	1.75	12.7	
Front Brake Pad Pin Plugs	2.5	0.25	22 in·lb	
Front Caliper Holder Pin Bolts	22	2.2	16	L, Si
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Brake Pedal Bolt	8.8	0.90	78 in·lb	
Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
Rear Caliper Pin Bolt	27	2.8	20	Si
Rear Brake Disc Mounting Bolts	27	2.8	20	L
Rear Brake Pad Pin	17.2	1.75	12.7	
Rear Brake Pad Pin Plug	2.5	0.25	22 in·lb	
Rear Caliper Mounting Bolt	22	2.2	16	
Brake Hose Banjo Bolts (ABS Hydraulic Unit)	33	3.4	24	
Bleed Valves	7.8	0.80	69 in·lb	
Suspension				
Upper Front Fork Clamp Bolts	20	2.0	15	
Front Fork Top Plugs	22.5	2.29	16.6	
Piston Rod Nuts	15	1.5	11	
Lower Front Fork Clamp Bolts	20.5	2.09	15.1	AL
Cylinder Units	70	7.1	52	AD
Front Axle Clamp Bolt	20	2.0	15	
Piston Rod Nut	15	1.5	11	
Piston Rod Rubber Nut	15	1.5	11	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Piston Rod Assy Stopper	17.5	1.78	12.9	AD
Cylinder Unit	70	7.1	52	AD
Swingarm Pivot Shaft Nut	108	11.0	79.7	
Swingarm Pivot Shaft	9.8	1.0	87 in·lb	
Swingarm Pivot Shaft Locknut	98	10	72	
Rear Shock Absorber Nut (Upper)	34	3.5	25	R
Rear Shock Absorber Nut (Lower)	34	3.5	25	R
Rocker Arm Nut	34	3.5	25	R
Tie-Rod Nuts	59	6.0	44	R
Steering				
Handlebar Holder Bolts	25	2.5	18	S
Rear View Mirror Locknut (Upper)	18	1.8	13	Lh
Rear View Mirror Nut (Lower)	30	3.1	22	
Switch Housing Screws	3.5	0.36	31 in·lb	
Upper Front Fork Clamp Bolts	20	2.0	15	
Steering Stem Head Bolt	108	11.0	79.7	
Lower Handlebar Holder Nuts	34	3.5	25	R
Steering Stem Nut	27	2.8	20	
Lower Front Fork Clamp Bolts	20.5	2.09	15.1	AL
Frame				
Rear View Mirror Locknut (Upper)	18	1.8	13	Lh
Rear View Mirror Nut (Lower)	30	3.1	22	
Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	
Front Fender Bolts	3.9	0.40	35 in·lb	
Footpeg Bracket Bolts	30	3.1	22	
Side Stand Switch Bolt	8.8	0.90	78 in·lb	L
Side Stand Bolt	29	3.0	21	
Side Stand Nut	44	4.5	32	R
Lower Fairing Mounting Bolts	9.8	1.0	87 in·lb	
Lower Fairing Bracket Bolts	9.8	1.0	87 in·lb	
License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	
Electrical System				
Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	
Meter Mounting Screws	1.2	0.12	11 in·lb	
Meter Assembly Screws	0.43	0.044	3.8 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
Oxygen Sensor	44	4.5	32	
Water Temperature Sensor	12	1.2	106 in·lb	
Stator Coil Bolts	12	1.2	106 in·lb	L
Alternator Rotor Bolt	155	15.8	114	
Starter Motor Clutch Bolts	12	1.2	106 in·lb	L

2-10 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Timing Rotor Bolt	39	4.0	29	
Starter Motor Mounting Bolts	11	1.1	97 in·lb	
Crankshaft Sensor Cover Bolts	11	1.1	97 in·lb	
Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	
Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	HG
Oil Pressure Switch	15	1.5	11	LG
Alternator Lead Holding Plate Bolt	12	1.2	106 in·lb	L
Alternator Cover Bolts	15	1.5	11	
Left Lower Fairing Bracket Bolts	11	1.1	97 in·lb	
Starter Relay Cable Terminal Bolts	3.9	0.40	35 in·lb	
Starter Motor Cable Terminal Nut	4.9	0.50	43 in·lb	
Starter Relay Bracket Bolts	6.9	0.70	61 in·lb	
Side Stand Switch Bolt	8.8	0.90	78 in·lb	L
Regulator/Rectifier Bracket Bolts	6.9	0.70	61 in·lb	
Regulator/Rectifier Bolts	6.9	0.70	61 in·lb	
Spark Plugs	13	1.3	115 in·lb	
Speed Sensor Bolt	12	1.2	106 in·lb	
Engine Ground Cable Terminal Bolt	9.8	1.0	87 in·lb	
Fuel Level Sensor Bolts	6.9	0.70	61 in·lb	L
Neutral Switch	15	1.5	11	

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

Basic Torque for General Fasteners

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

Specifications

Item	Standard	Service Limit
Fuel System (DFI)		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	---
Idle Speed	1 100 ±50 r/min (rpm)	---
Bypass Screws (Turn Out)	---	---
Throttle Body Vacuum	35.3 ±1.3 kPa (265 ±10 mmHg) at idle speed	---
Air Cleaner Element	Paper filter	---
Cooling System		
Coolant:		
Type (Recommended)	Permanent type antifreeze	---
Color	Green	---
Mixed Ratio	Soft water 50%, Coolant 50%	---
Freezing Point	-35°C (-31°F)	---
Total Amount	2.8 L (3.0 US qt)	---
Engine Top End		
Valve Clearance:		
Exhaust	0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)	---
Intake	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)	---
Clutch		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	---
Engine Lubrication System		
Engine Oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	---
Viscosity	SAE 10W-40	---
Capacity	3.1 L (3.3 US qt) (when filter is not removed)	---
	3.4 L (3.6 US qt) (when filter is removed)	---
	3.8 L (4.0 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	4.0 mm (0.16 in.)	1 mm (0.04 in.), (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	5.5 mm (0.22 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.), Over 130 km/h (80 mph): 3 mm (0.12 in.)

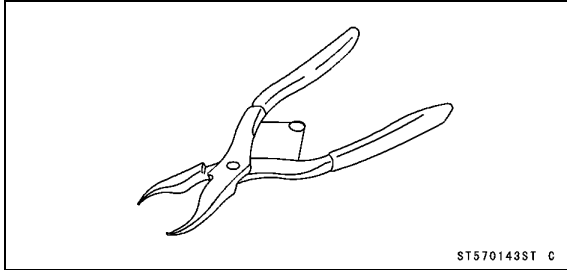
2-12 PERIODIC MAINTENANCE

Specifications

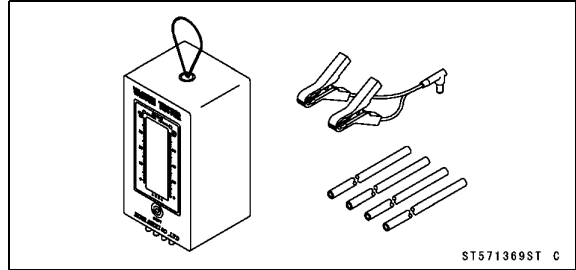
Item	Standard	Service Limit
Air Pressure (when Cold):		
Front	Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm ² , 36 psi)	---
Rear	Up to 180 kg (397 lb) load: 290 kPa (2.90 kgf/cm ² , 42 psi)	---
Final Drive		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	---
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	ENUMA	---
Type	EK520MVXL2	---
Link	114 Links	---
Brakes		
Brake Fluid:		
Grade	DOT4	---
Brake Pad Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5.0 mm (0.20 in.)	1.5 mm (0.06 in.)
Brake Light Timing:		
Front	Pulled ON	---
Rear	ON after about 10 mm (0.39 in.) of pedal travel	---
Electrical System		
Spark Plug:		
Type	NGK CR9EK or ND U27ETR	---
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	---

Special Tools

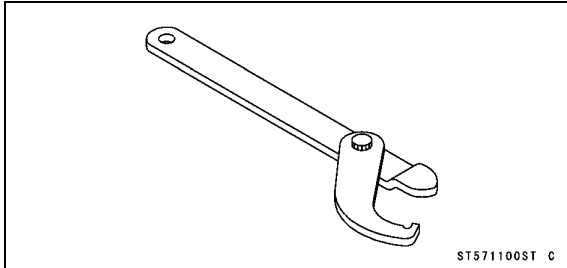
Inside Circlip Pliers:
57001-143



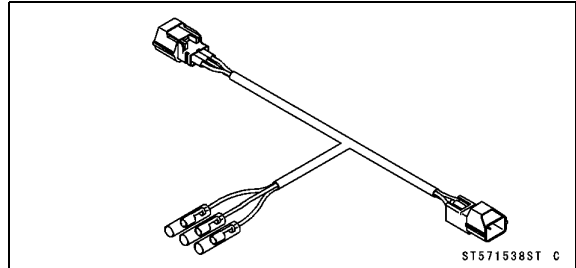
Vacuum Gauge:
57001-1369



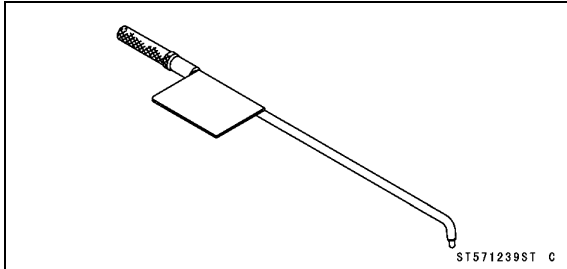
Steering Stem Nut Wrench:
57001-1100



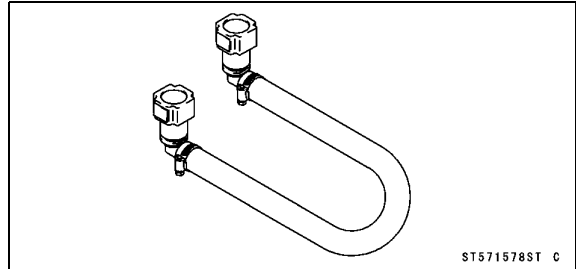
Throttle Sensor Setting Adapter:
57001-1538



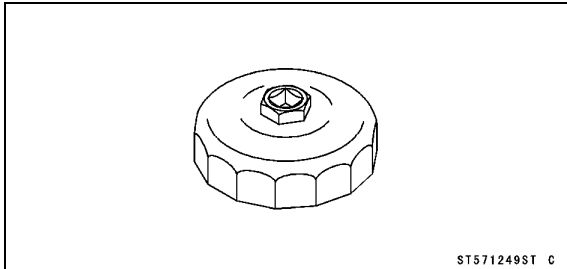
Pilot Screw Adjuster, A:
57001-1239



Extension Tube:
57001-1578



Oil Filter Wrench:
57001-1249



2-14 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Fuel System (DFI)

Air Cleaner Element Cleaning

NOTE

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

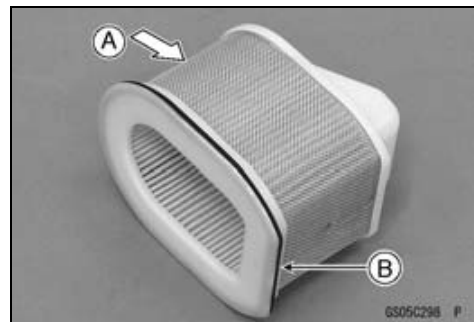
⚠ WARNING

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

NOTICE

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

- Remove the element (see Air Cleaner Element Replacement).
- Clean the element by tapping it lightly to loosen dust.
- Blow away the remaining dust by applying compressed air [A] from the outside to the inside (from the clean side to the dirty side).
- Visually inspect the element for no tears or no breaks and inspect the sponge gasket [B] also.
- ★ If the element or gasket has any tears or breaks, replace the element.



Air Cleaner Element Replacement

NOTE

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

⚠ WARNING

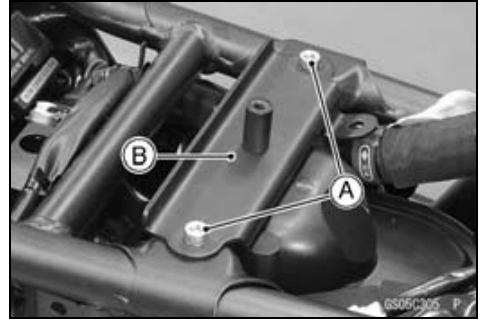
If dirt or dust is allowed to pass through into the throttle assy, the throttle may become stuck, possibly causing accident. Replace the air cleaner element according to the maintenance chart.

NOTICE

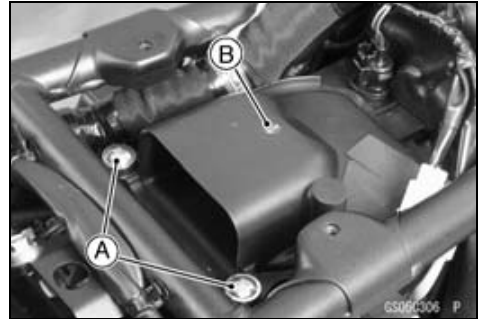
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

Periodic Maintenance Procedures

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Bolts [A]
 - Fuel Tank Bracket [B]



- Remove the air cleaner duct screws [A].
- Remove the air cleaner duct [B] backward.



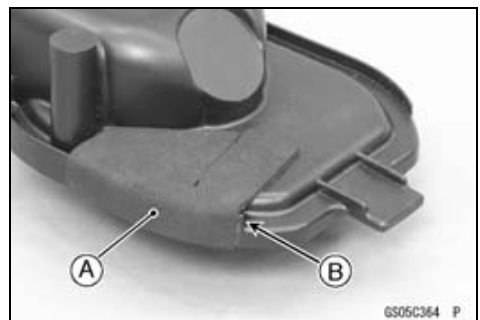
- Discard the air cleaner element [A].



- Install a new element [A] so that flat side [B] faces forward.



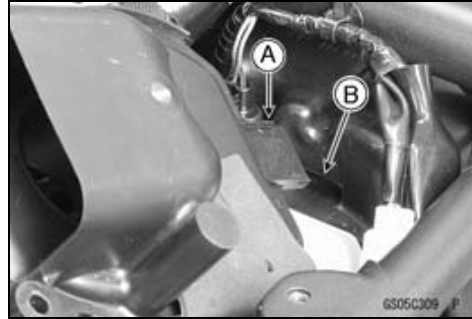
- ZR800A/B Models, when installing the pad [A], align the edge of the pad with the rib [B] of the air cleaner duct.



2-16 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Fit the tongue [A] of the air cleaner duct into the slot [B] of the air cleaner housing.
- Tighten:
Torque - Air Cleaner Duct Screws: 3.8 N·m (0.39 kgf·m, 34 in·lb)



Idle Speed Inspection

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



⚠ WARNING

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

- Check the idle speed.

Idle Speed

Standard: 1 100 ±50 r/min (rpm)

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

Idle Speed Adjustment

- Start the engine and warm it up thoroughly.
- Turn the adjusting screw [A] until the idle speed is correct.
- Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.

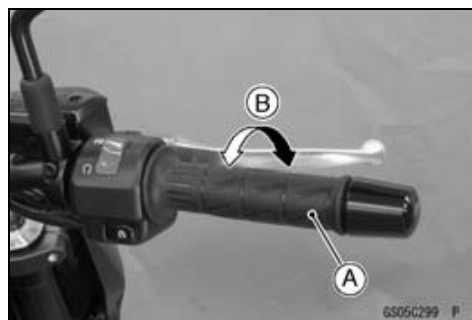


Throttle Control System Inspection

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

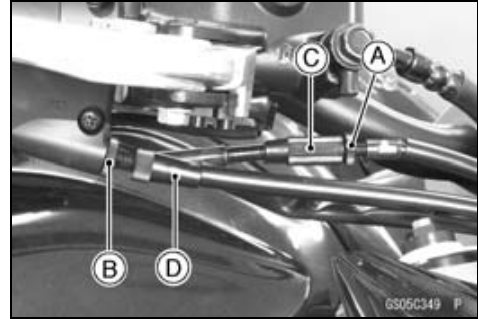
Throttle Grip Free Play

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



Periodic Maintenance Procedures

- ★ If the free play is incorrect, adjust the throttle cable as follows.
 - Loosen the locknuts [A] [B].
 - Screw both throttle cable adjusters [C] [D] to give the throttle grip plenty of play.
 - Turn the decelerator cable adjuster [C] until there is no play when the throttle grip play completely closed.
 - Tighten the locknut [A].
 - Turn the accelerator cable adjuster [D] until 2 ~ 3 mm (0.08 ~ 0.12 in.) of throttle grip play is obtained.
 - Tighten the locknut [B].
- ★ If the free play can not be adjusted with the adjusters, replace the cable.

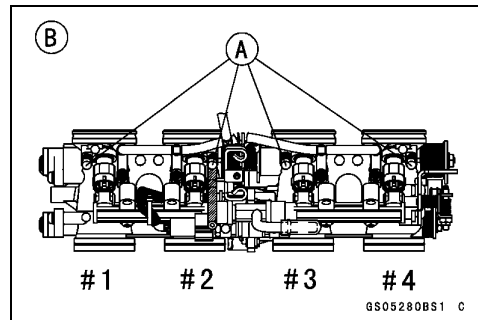
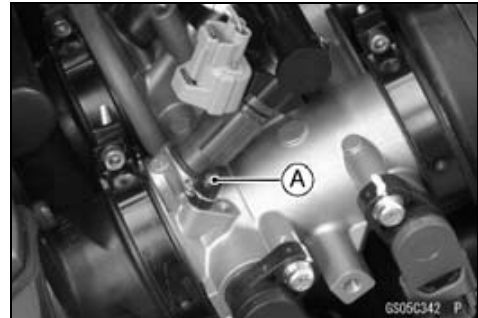


Engine Vacuum Synchronization Inspection

NOTE

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

- Situate the motorcycle so that it is vertical.
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Fuel Outlet Hose (see Fuel Hose Replacement)
 - Intake Air Pressure Sensor #1 (see Intake Air Pressure Sensor #1 Removal in the Fuel System (DFI) chapter)
- Plug the vacuum hose end.
- Pull off the rubber caps [A] from the fittings of each throttle body.
 - Upside View [B]



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



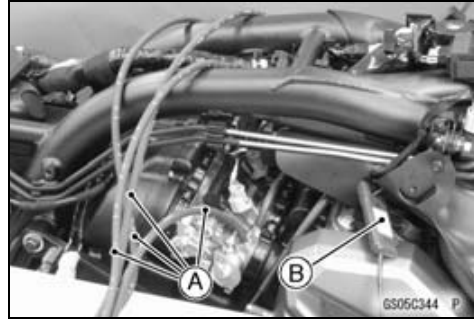
2-18 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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

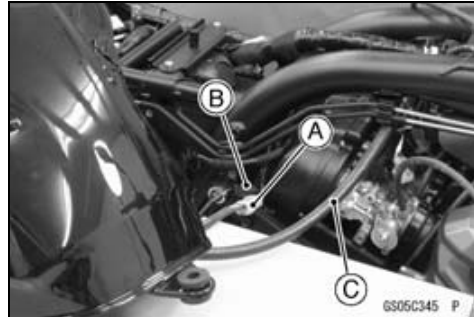
Special Tool - Vacuum Gauge: 57001-1369

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



- Connect the following parts temporary.
Fuel Pump Lead Connector [A]
Fuel Level Sensor Lead Connector [B]
Extension Tube [C]

Special Tool - Extension Tube: 57001-1578

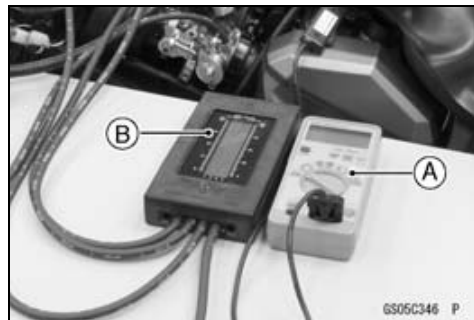


- Start the engine and warm it up thoroughly.
- Check the idle speed, using a highly accurate tachometer [A].

Idle Speed

Standard: 1 100 ±50 r/min (rpm)

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



NOTICE

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

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

Throttle Body Vacuum

Standard: 35.3 ±1.3 kPa (265 ±10 mmHg) at idle speed

Periodic Maintenance Procedures

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

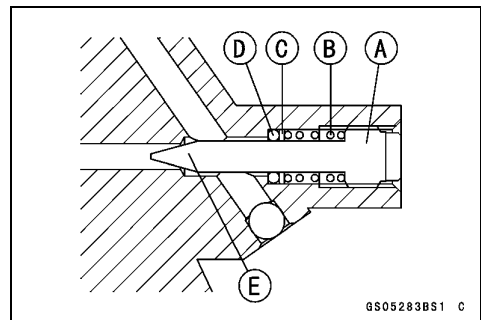
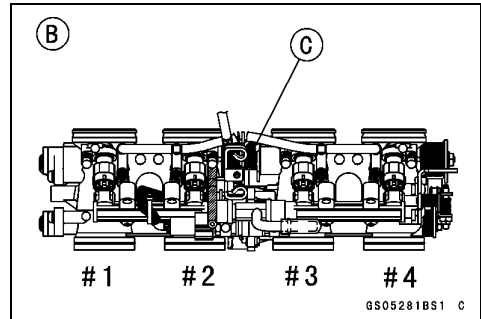
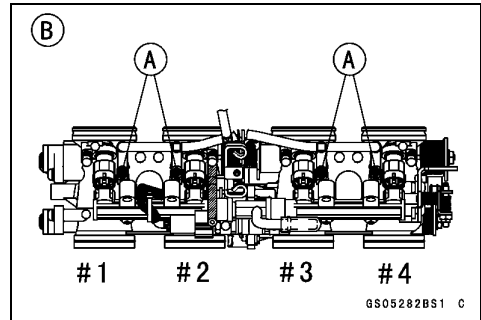
Special Tool - Pilot Screw Adjuster, A: 57001-1239

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

NOTE

○ Do not turn the center adjusting screw [C].

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



- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Turn in the bypass screw [A] with counting the number of turns until it seals fully but not tightly. Record the number of turns.
- Remove:
 - Bypass Screw
 - Spring [B]
 - Washer [C]
 - O-ring [D]
- Check the bypass screw hole in the throttle body for carbon deposits.
- ★ If any carbons accumulate, wipe the carbons off from the hole, using a cotton pad penetrated with a high flash-point solvent.
- Replace the bypass screw, spring, washer and O-ring as a set.
- Turn in the bypass screw until it seats fully but not tightly.

NOTICE

Do not over-tighten the bypass screw. The tapered portion [E] of the bypass screw could be damaged.

2-20 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Back out the same number of turns counted when first turned in. This is to set the screw to its original position.

NOTE

○A throttle body has different “turns out” of the bypass screw for each individual unit. On setting the bypass screw, use the “turns out” determined during disassembly.

- Repeat the same procedure for other bypass screws.
- Repeat the synchronization.
- ★ If the vacuums are correct, check the output voltage of the main throttle sensor (see Main Throttle Sensor Output Voltage Inspection in the Fuel System (DFI) chapter).

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

Main Throttle Sensor Output Voltage

Connections to Adapter:

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

Digital Meter (-) → W (sensor G) lead

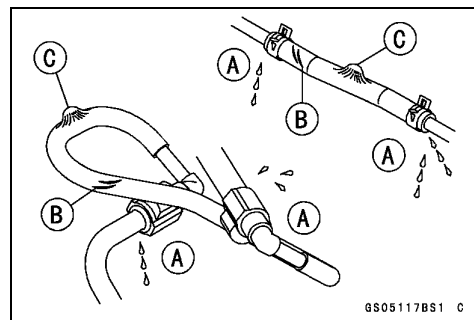
Standard: DC 0.995 ~ 1.025 V at idle throttle opening

- ★ If the output voltage is out of the standard, check the input voltage of the main throttle sensor (see Main Throttle Sensor Input Voltage Inspection in the Fuel System (DFI) chapter).
- Remove the vacuum gauge hoses and install the rubber caps on the original position.

Fuel System

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

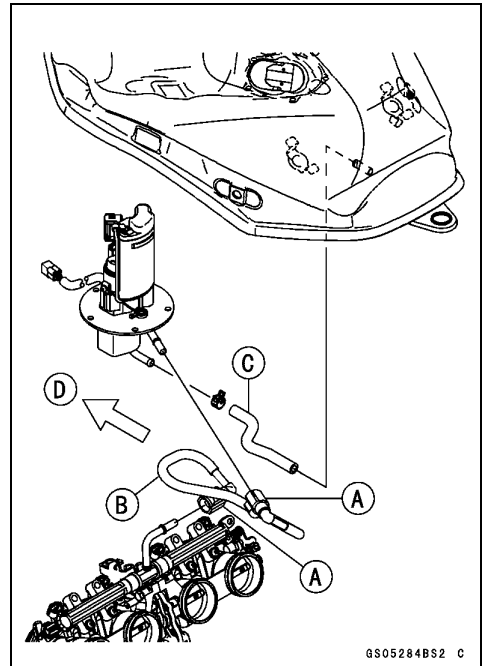
- If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak [A] or the hose to burst. Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter) and check the fuel hoses.
- ★ Replace the hose if any fraying, cracks [B] or bulges [C] are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



Periodic Maintenance Procedures

- Check that the hoses are routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- ★ Replace the hose if it has been sharply bent or kinked.

- Hose Joints [A]
- Fuel Outlet Hose [B]
- Fuel Intake Hose [C]
- Front [D]

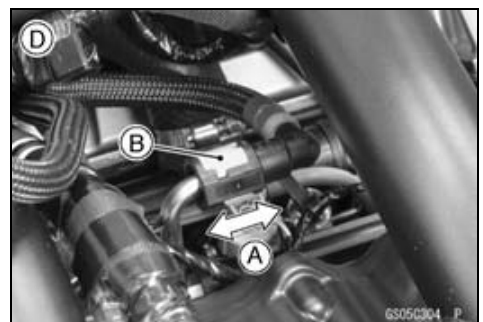
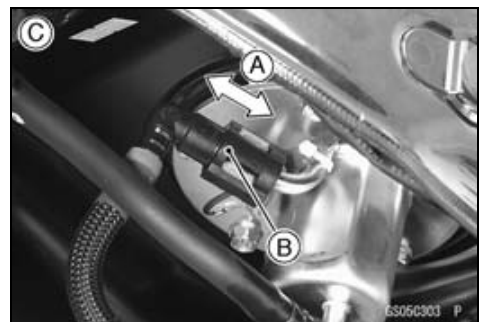


- Check that the outlet hose joints are securely connected.
- Push and pull [A] the hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

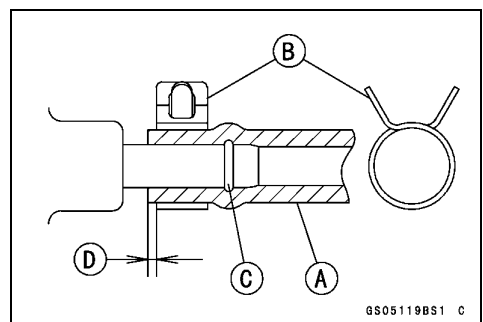
- Fuel Pump Side [C]
- Throttle Body Assy Side [D]

<p>⚠ WARNING</p> <p>Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe.</p>
--

- ★ If it comes off, reinstall the hose joint.



- Check that the intake hose [A] is onto the pipe fully and the clamps [B] are installed beyond the raised rib [C].
1 ~ 2 mm (0.039 ~ 0.079 in.) [D]



2-22 PERIODIC MAINTENANCE

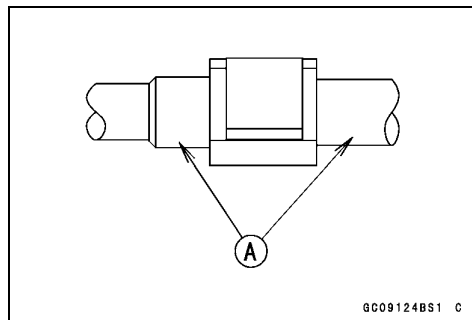
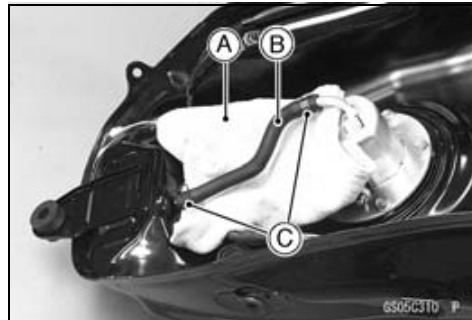
Periodic Maintenance Procedures

Fuel Hose Replacement

⚠ WARNING

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

- Draw the fuel out from the fuel tank with a commercially available electric pump.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.
- Turn the fuel tank upside down.
- Be sure to place a piece of cloth [A] around the fuel intake hose [B].
- Remove:
 - Clamps [C]
 - Fuel Intake Hose
- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.

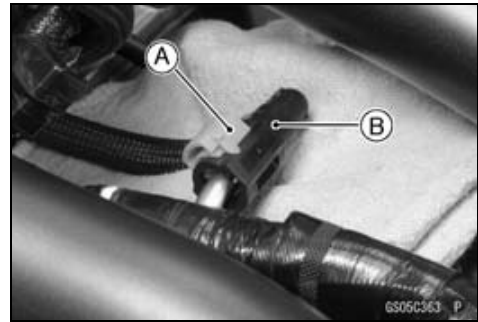


- Push the joint lock claws [A] with your fingers.

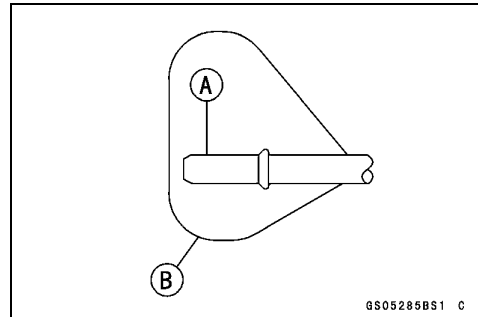


Periodic Maintenance Procedures

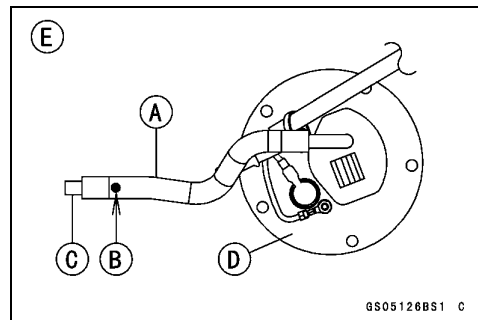
- Pull the joint lock [A] as shown.
- Pull the fuel outlet hose joint [B] out of the delivery pipe.



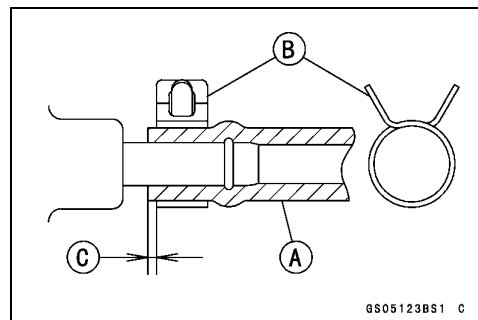
- Clean the delivery pipe [A].
- Cover the delivery pipe with the vinyl bag [B] to keep it clean.



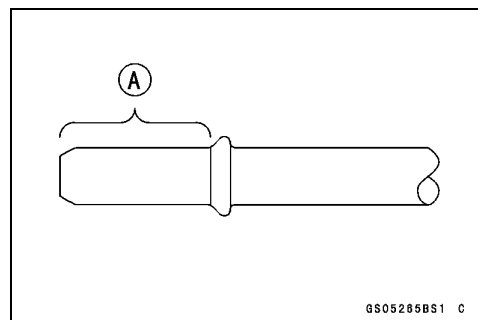
- Install a new fuel intake hose [A] so that the white mark side [B] faces outlet pipe [C] of the fuel tank.
Fuel Pump [D]
Bottom View [E]



- Fix the both ends of the fuel intake hose [A] with the clamps [B] as shown.
1 ~ 2 mm (0.039 ~ 0.079 in.) [C]



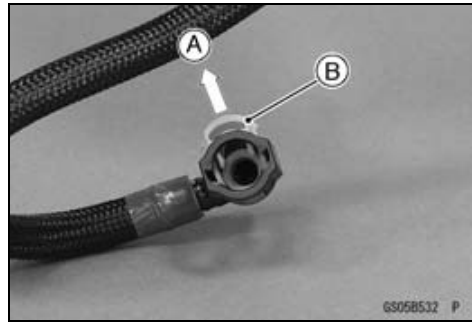
- Remove the vinyl bag on the pipe.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].



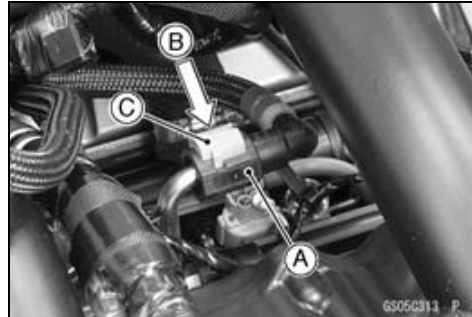
2-24 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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



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



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

⚠ WARNING

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

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



Periodic Maintenance Procedures

Cooling System

Coolant Level Inspection

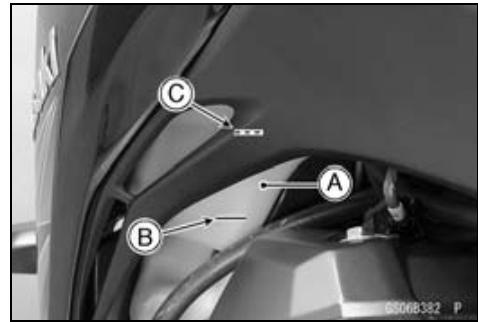
NOTE

○ 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 “L” level line [B], unscrew the reserve tank cap and add coolant to the “F” level line [C].

“L”: Low

“F”: Full



NOTICE

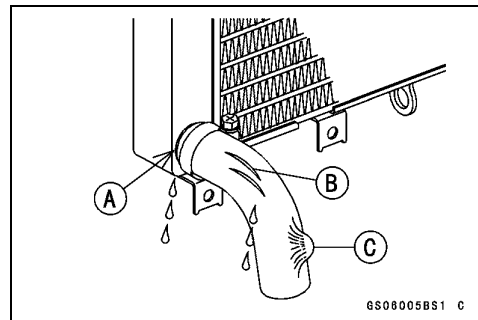
For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the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

Cooling System

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

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

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



Coolant Change

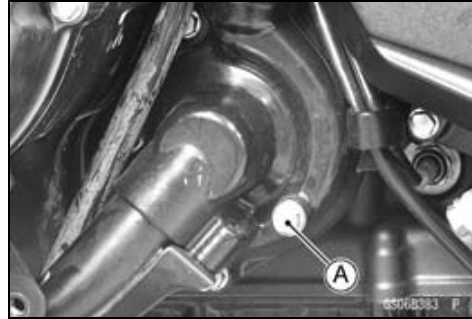
⚠ WARNING

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

2-26 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

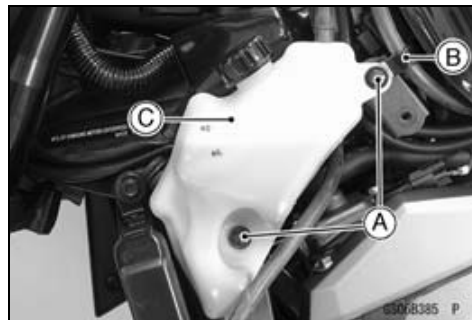
- Remove the left lower fairing (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter).
- Place a container under the coolant drain bolt [A], then remove the drain bolt.



- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Remove the radiator cap [A] in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.
- The coolant will drain from the radiator and engine.



- Remove:
 - Left Side Fairing (see Side Fairing Removal in the Frame chapter)
 - Reserve Tank Bolts [A]
 - Clamp [B]
- Turn over the reserve tank [C], remove the cap, and pour the coolant into a suitable container.
- Install the reserve tank.
- Tighten:
 - Torque - Reserve Tank Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Tighten the drain bolt with the gasket.
- Replace the drain bolt gasket with a new one.
 - Torque - Coolant Drain Bolt (Water Pump): 11 N·m (1.1 kgf·m, 97 in·lb)**
- When filling the coolant, choose a suitable mixture ratio by referring to the coolant manufacturer's directions.



NOTICE

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

Water and Coolant Mixture Ratio (Recommended)

Soft Water:	50%
Coolant:	50%
Freezing Point:	-35°C (-31°F)
Total Amount:	2.8 L (3.0 US qt)

Periodic Maintenance Procedures

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

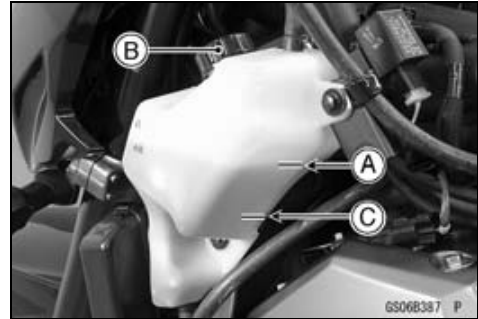
NOTE

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

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



- Fill the reserve tank up to the “F” (full) level line [A] with coolant and install the cap [B].
- Install the fuel tank (see Fuel Tank Installation in the Fuel System (DFI) chapter).
- Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank after the engine cools down.
- ★ If the coolant level is lower than the “L” (low) level line [C], add coolant to the “F” level line.



NOTICE

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

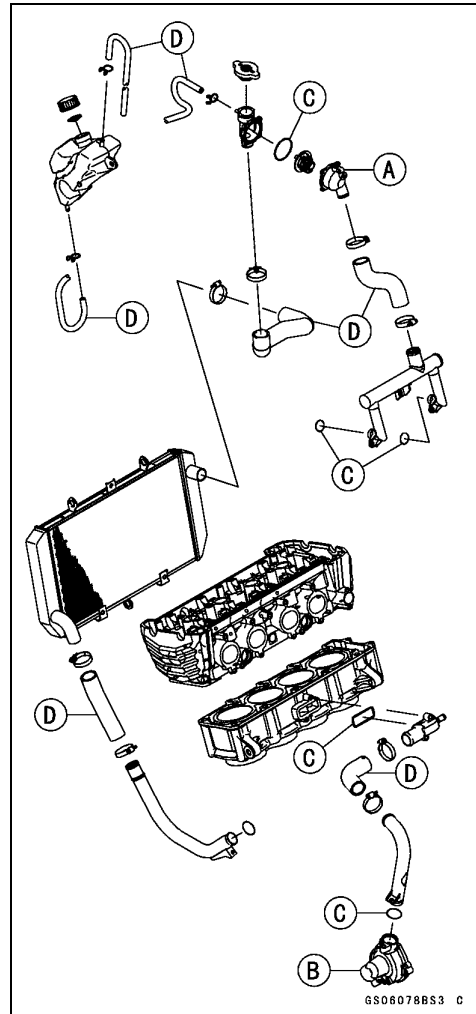
- Install the removed parts (see appropriate chapters).

2-28 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Water Hose and O-ring Replacement

- Drain the coolant (see Coolant Change).
- Remove:
 - Thermostat Housing [A] (see Thermostat Removal in the Cooling System chapter)
 - Water Pump Cover [B] (see Oil Pump Removal in the Engine Lubrication System chapter)
 - O-rings [C]
 - Hoses [D]
- Apply soap and water solution to the new O-rings and install them.
- Install the new hoses and tighten the clamps securely.
 - Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)**
- Fill the coolant (see Coolant Change).
- Check the cooling system for leaks.



Engine Top End

Valve Clearance Inspection

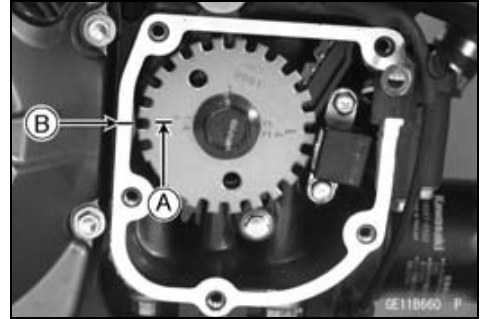
NOTE

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

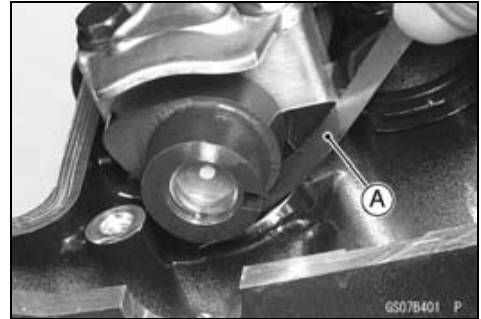
- Remove:
 - Crankshaft Sensor Cover (see Crankshaft Sensor Removal in the Electrical System chapter)
 - Cylinder Head Cover (see Cylinder Head Cover Removal in the Engine Top End chapter)

Periodic Maintenance Procedures

- Position the crankshaft at 1,4 piston TDC.
TDC Mark [A] for #1, 4 Pistons
Timing Mark [B] (Crankcase Halves Mating Surface)



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



Valve Clearance

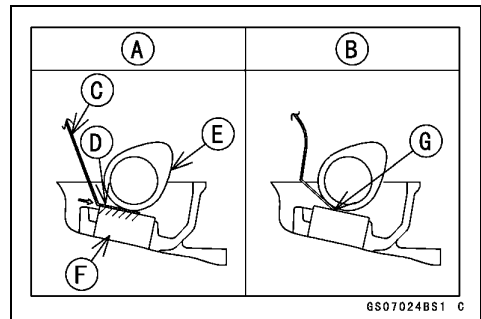
Standard:

Exhaust	0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)
Intake	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)

NOTE

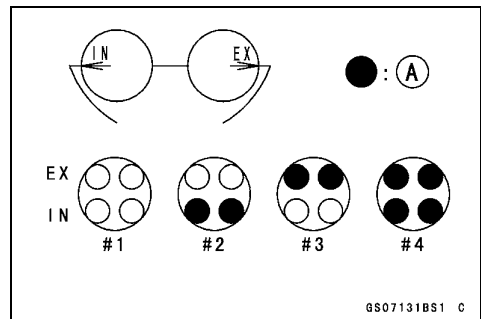
- Thickness gauge is horizontally inserted on the valve lifter.

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



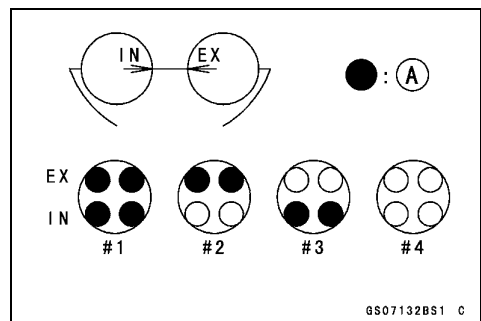
- When positioning #4 piston TDC at the end of the compression stroke:

- Intake Valve Clearance of #2 and #4 Cylinders
- Exhaust Valve Clearance of #3 and #4 Cylinders
- Measuring Valve [A]



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

- Intake Valve Clearance of #1 and #3 Cylinders
- Exhaust Valve Clearance of #1 and #2 Cylinders
- Measuring Valve [A]



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

2-30 PERIODIC MAINTENANCE

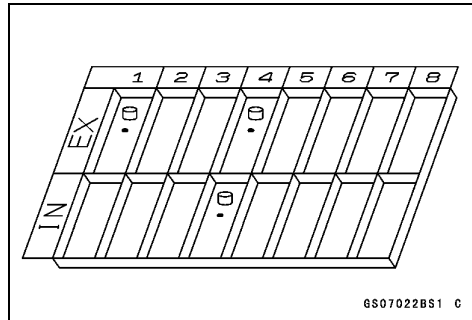
Periodic Maintenance Procedures

Valve Clearance Adjustment

- To change the valve clearance, remove the camshaft chain tensioner, camshafts and valve lifters. Replace the shim with one of a different thickness.

NOTE

- Mark and record the locations of the valve lifters and shims so that they can be reinstalled in their original positions.

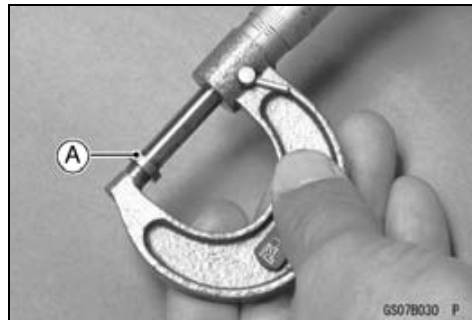


- Besides the standard shims in the valve clearance adjustment charts, the following additional shims maybe used.

Adjustment Shims

Part Number	Thickness
92180-0276	3.225 mm
92180-0277	3.275 mm
92180-0278	3.325 mm

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



Periodic Maintenance Procedures

VALVE CLEARANCE ADJUSTMENT CHART INTAKE VALVE

		PRESENT SHIM																Example						
PART No. (92180-)		1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054		
MARK		50	55	60	65	70	75	80	85	90	95	00	05	10	15	20	25	30	35	40	45	50		
THICKNESS (mm)		2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
VALVE CLEARANCE MEASUREMENT	Example	0.00~0.02	-	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	
		0.03~0.07	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	
		0.08~0.12	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	
		0.13~0.14	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	
		0.15~0.24	SPECIFIED CLEARANCE/NO CHANGE REQUIRED																					
		0.25~0.27	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
		0.28~0.32	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
		0.33~0.37	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
		0.38~0.42	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
		0.43~0.47	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
		0.48~0.52	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
		0.53~0.57	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
		0.58~0.62	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
		0.63~0.67	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
		0.68~0.72	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
		0.73~0.77	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
		0.78~0.82	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
		0.83~0.87	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
		0.88~0.92	3.20	3.25	3.30	3.35	3.40	3.45	3.50															
0.93~0.97	3.25	3.30	3.35	3.40	3.45	3.50																		
0.98~1.02	3.30	3.35	3.40	3.45	3.50																			
1.03~1.07	3.35	3.40	3.45	3.50																				
1.08~1.12	3.40	3.45	3.50																					
1.13~1.17	3.45	3.50																						
1.18~1.22	3.50																							

INSTALL THE SHIM OF THIS THICKNESS (mm)

8S07122B#3 C

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

Example: Present shim is **2.95 mm**
 Measured clearance is **0.45 mm**
 Replace **2.95 mm** shim with **3.20 mm** shim.

5. Remeasure the valve clearance and readjust if necessary.

2-32 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

VALVE CLEARANCE ADJUSTMENT CHART EXHAUST VALVE

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

INSTALL THE SHIM OF THIS THICKNESS (mm)

8S07120B#3 C

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

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

5. Remeasure the valve clearance and readjust if necessary.

Periodic Maintenance Procedures

NOTICE

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

- If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.
- When installing the shim, face the marked side toward the valve lifter. At this time, apply engine oil to the shim or the valve lifter to keep the shim in place during camshaft installation.

NOTICE

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

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

Air Suction System Damage Inspection

- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the air switching valve hose [A] out of the air cleaner housing.
- Start the engine and run it at idle speed.
- Plug the air switching valve hose end with your finger and feel vacuum pulsing in the hose.
- ★ If there is no vacuum pulsation, check the hose line for leak. If there is no leak, check the air switching valve (see Air Switching Valve Unit Test in the Electrical System chapter) or air suction valve (see Air Suction Valve Inspection in the Engine Top End chapter).



Clutch

Clutch Operation Inspection

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

Clutch Lever Free Play

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



2-34 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

⚠ WARNING

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

- Turn the adjuster [A] so that 5 ~ 6 mm (0.20 ~ 0.24 in.) [B] of threads are visible.
- Remove the right subframe cover (see Subframe Cover Removal in the Frame chapter).
- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen both adjusting nuts [B] at the clutch cover as far as they will go.
- Pull the clutch outer cable [C] tight and tighten the adjusting nuts against the clutch cover [D].
- Slip the dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.
- Push the release lever [A] toward the front of the motorcycle until it becomes hard to turn.
- At this time, the release lever should have the proper angle shown.
60° [B]
- ★ If the angle is wrong, check the clutch and release parts for wear.

⚠ WARNING

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

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

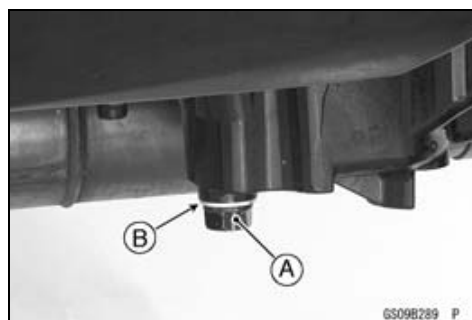
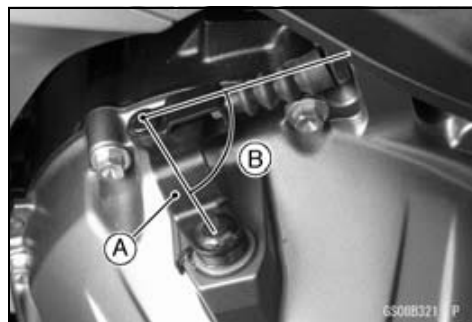
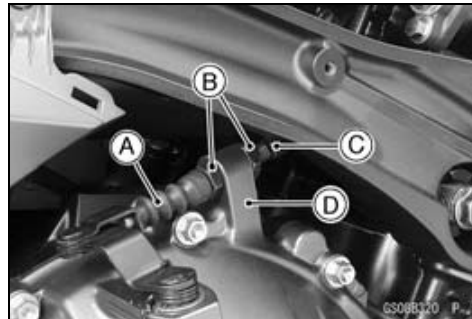
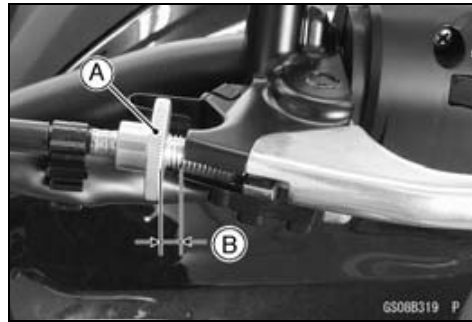
Engine Lubrication System

Engine Oil Change

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

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

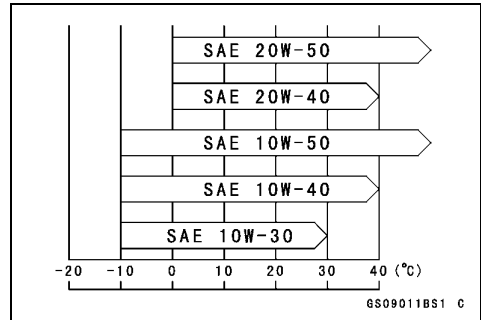
- Pour in the specified type and amount of oil.



Periodic Maintenance Procedures

Recommended Engine Oil

- Type: API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
- Viscosity: SAE 10W-40
- Capacity: 3.1 L (3.3 US qt) (when filter is not removed)
3.4 L (3.6 US qt) (when filter is removed)
3.8 L (4.0 US qt) (when engine is completely dry)



NOTE

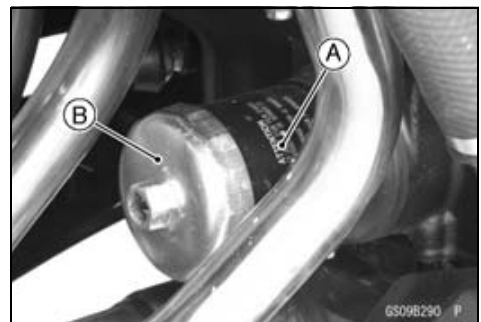
- Do not add any chemical additive to the oil. Oils fulfilling the above requirements are fully formulated and provide adequate lubrication for both the engine and the clutch.
- Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.

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

Oil Filter Replacement

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

Special Tool - Oil Filter Wrench: 57001-1249



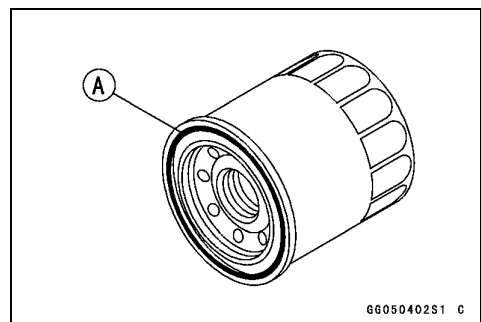
- Replace the filter with a new one.
- Apply grease to the gasket [A] before installation.
- Tighten the filter with the oil filter wrench.

Torque - Oil Filter: 17 N·m (1.7 kgf·m, 13 ft·lb)

NOTE

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

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



2-36 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

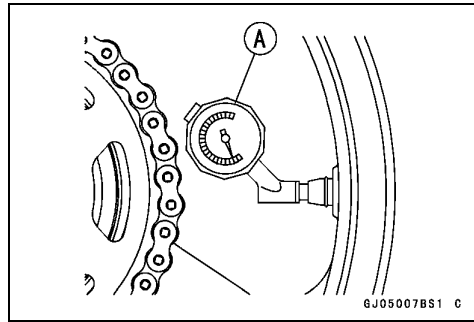
Wheels/Tires

Air Pressure Inspection

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

Air Pressure (when Cold)

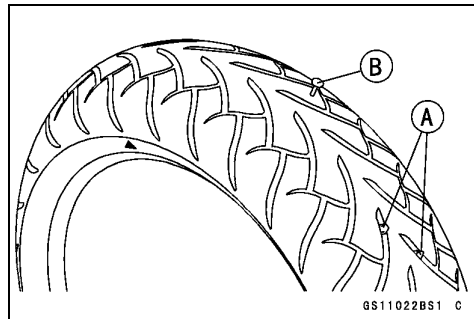
- Front: Up to 180 kg (397 lb)
250 kPa (2.50 kgf/cm², 36 psi)
- Rear: Up to 180 kg (397 lb)
290 kPa (2.90 kgf/cm², 42 psi)



Wheels and Tires

Wheel/Tire Damage Inspection

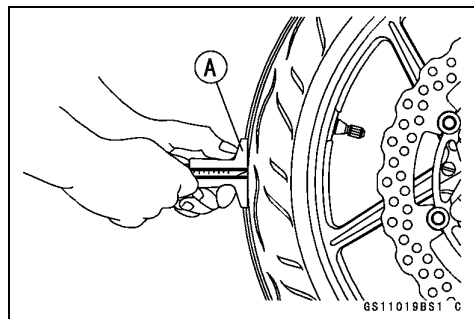
- Remove any imbedded stones [A] or other foreign particles [B] from tread.
- Visually inspect the tire for cracks and cuts, and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.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



Periodic Maintenance Procedures

Tread Depth

Standard:

Front 4.0 mm (0.16 in.)

Rear 5.5 mm (0.22 in.)

Service Limit:

Front 1 mm (0.04 in.)

(AT, CH, DE) 1.6 mm (0.06 in.)

Rear Up to 130 km/h (80 mph): 2 mm (0.08 in.)

Over 130 km/h (80 mph): 3 mm (0.12 in.)

⚠ WARNING

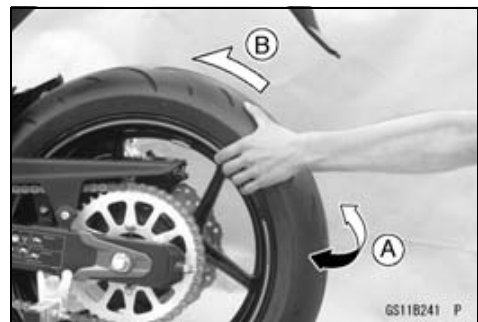
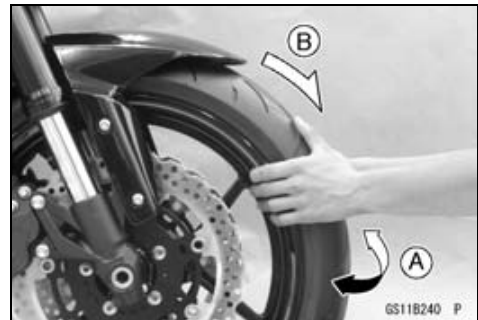
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

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



2-38 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Final Drive

Drive Chain Lubrication Condition Inspection

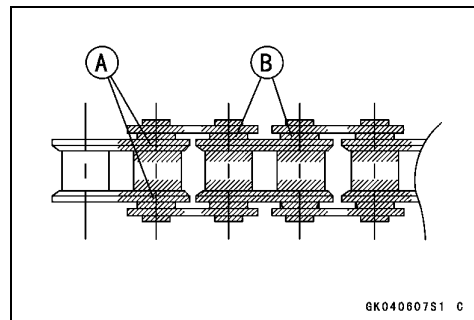
- If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.
- If the chain appears especially dirty, clean it before lubrication.

NOTICE

The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.

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

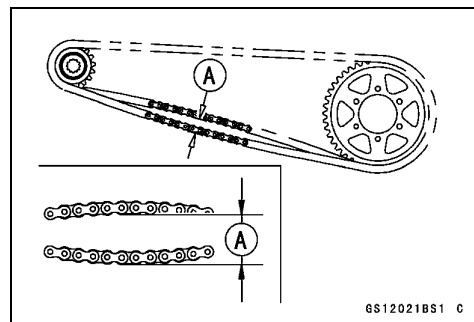
- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.
 - Oil Applied Areas [A]
 - O-rings [B]



Drive Chain Slack Inspection

NOTE

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



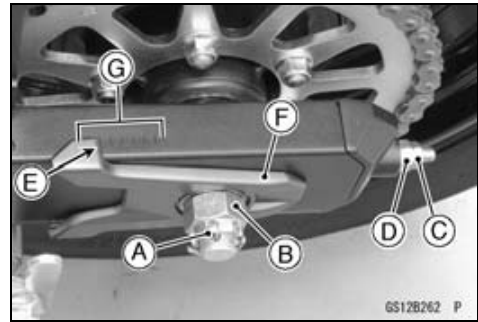
Chain Slack

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

Periodic Maintenance Procedures

Drive Chain Slack Adjustment

- Remove the cotter pin [A], and loosen the axle nut [B].
- Loosen the both chain adjuster locknuts [C].
- ★ If the chain is too loose, turn in the left and right chain adjusters [D] evenly.
- ★ If the chain is too tight, turn out the left and right chain adjusters evenly, and kick the wheel forward.
- Turn both chain adjusters evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the notch [E] on the left wheel alignment indicator [F] should align with the same swingarm mark or position [G] that the right indicator notch aligns with.



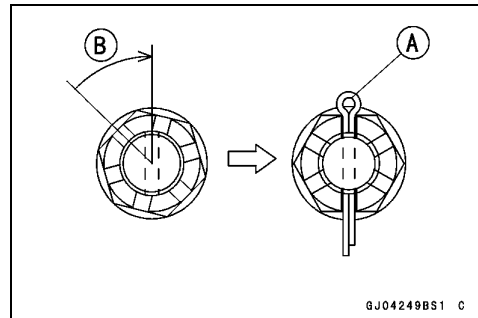
⚠ WARNING

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

- Tighten:
 - Torque - Chain Adjuster Locknuts: 16.5 N·m (1.68 kgf·m, 12.2 ft·lb)**
 - Rear Axle Nut: 108 N·m (11.0 kgf·m, 79.7 ft·lb)**
- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Insert a new cotter pin [A].

NOTE

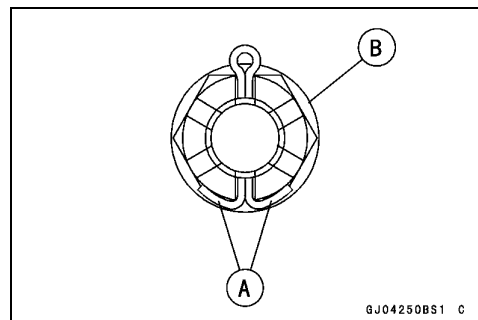
- When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.
- It should be within 30 degrees.
- Loosen once and tighten again when the slot goes past the nearest hole.



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

⚠ WARNING

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



2-40 PERIODIC MAINTENANCE

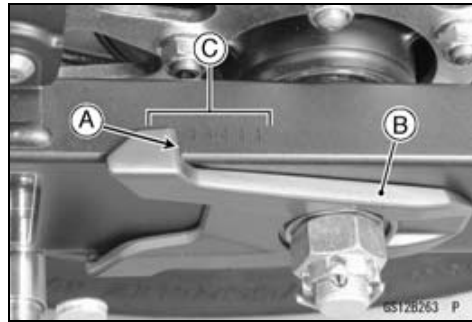
Periodic Maintenance Procedures

Wheel Alignment Inspection

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

NOTE

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

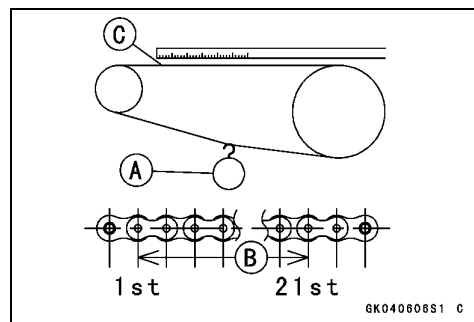


⚠ WARNING

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

Drive Chain Wear Inspection

- Remove the chain cover (see Drive Chain Removal/Installation in the Final Drive chapter).
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.
- ★ If there is any irregularity, replace the drive chain.
- ★ Lubricate the drive chain if it appears dry.
- Stretch the chain taut by hanging a 10 kg (22 lb) weight [A] on the chain.
- Measure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.
- ★ If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.



Drive Chain 20-link Length

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

Service Limit: 319 mm (12.6 in.)

⚠ WARNING

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

Standard Chain

Make: ENUMA

Type: EK520MVXL2

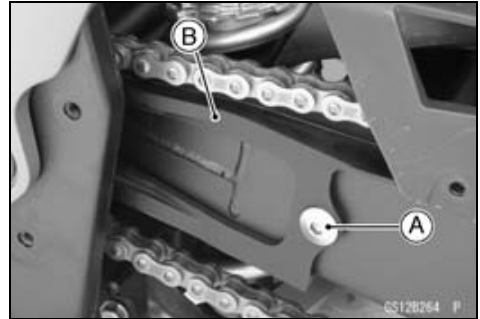
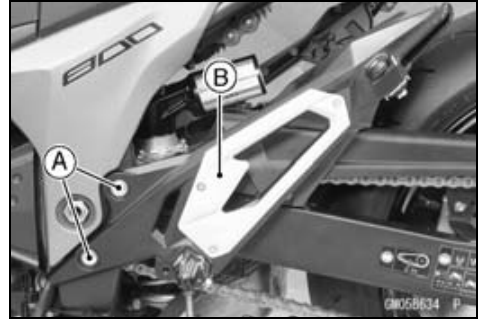
Link: 114 Links

Periodic Maintenance Procedures

Chain Guide Wear Inspection

- Remove:
 - Shift Pedal (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
 - Footpeg Bracket Bolts [A]
 - Left Footpeg Bracket [B]
 - Chain Cover (see Drive Chain Removal/Installation in the Final Drive chapter)

- Remove the bolt [A] and chain guide [B].
- Visually inspect the chain guide.
- ★ Replace the chain guide if it shows any signs of abnormal wear or damage.
- Install the removed parts (see appropriate chapters).
- Tighten:
 - Torque - Footpeg Bracket Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)**



2-42 PERIODIC MAINTENANCE

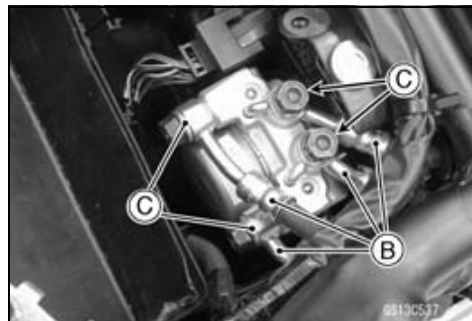
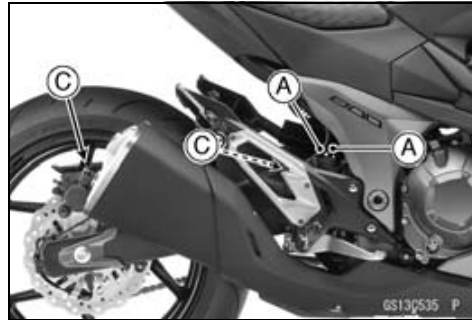
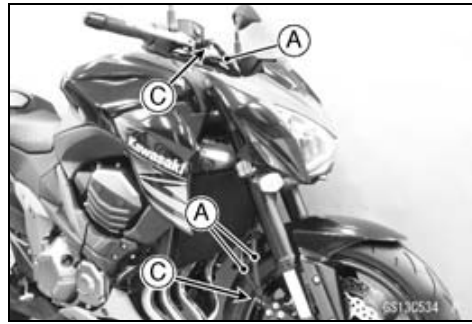
Periodic Maintenance Procedures

Brakes

Brake System

Brake Fluid Leak (Brake Hose and Pipe) Inspection

- For ABS equipped models; note the following.
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Right Side Fairing (see Side Fairing Removal in the Frame chapter)
- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A], pipes [B] (ABS equipped models) and fittings [C].
- ★ If the brake fluid leaked from any position, inspect or replace the problem part.



Periodic Maintenance Procedures

Brake Hose and Pipe Damage and Installation Condition Inspection

- For ABS equipped models; note the following.
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Right Side Fairing (see Side Fairing Removal in the Frame chapter)
- Inspect the brake hoses, pipes and fittings for deterioration, cracks and signs of leakage.
- The high pressure inside the brake line can cause fluid to leak [A] or the hose, pipes (ABS equipped models) to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.
- ★ Replace the hose and pipe (ABS equipped models) if any crack [B], bulge [C] or leakage is noticed.
- ★ Tighten any brake hose banjo bolts.

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

Brake Hose Banjo Bolts (ABS Unit) [ABS Equipped Models]: 33 N·m (3.4 kgf·m, 24 ft·lb)

- Inspect the brake hose routing.
- ★ If any brake hose routing is incorrect, route 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.

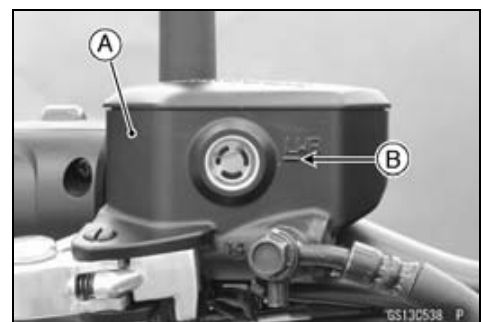
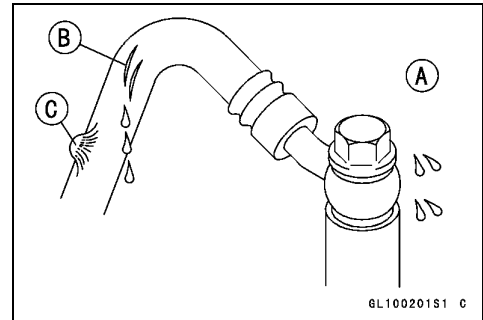
⚠ WARNING
When test riding the vehicle, be aware of surrounding traffic for your safety.

Brake Fluid Level Inspection

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

NOTE

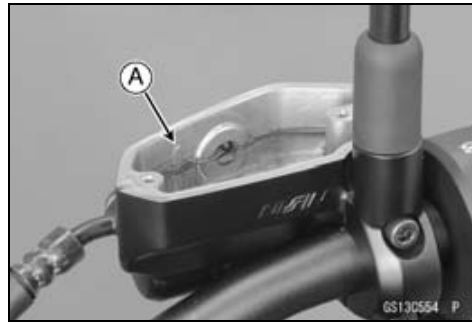
○ Hold the reservoir horizontal by turning the handlebars when checking brake fluid level.



2-44 PERIODIC MAINTENANCE

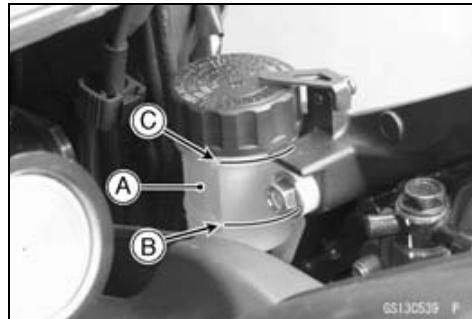
Periodic Maintenance Procedures

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



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

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



⚠ WARNING

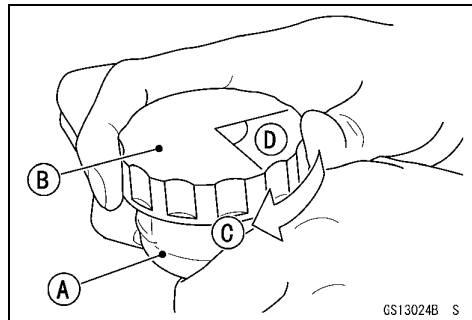
Mixing brands and types of brake fluid can reduce the brake system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the brake fluid in the brake line completely if the brake fluid must be re-filled but the type and brand of the brake fluid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

Recommended Disc Brake Fluid

Grade: DOT4

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

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



Brake Fluid Change

NOTE

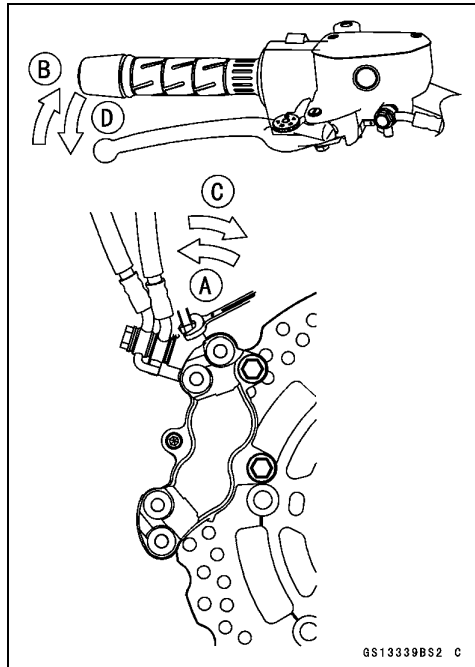
○ The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.

Periodic Maintenance Procedures

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



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

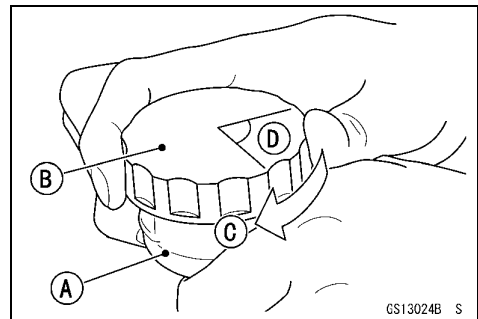


NOTE

- *The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.*
- *Front Brake: Repeat the above steps for the other caliper.*

- Remove the clear plastic hose.
- Install the diaphragm, diaphragm plate and reservoir cap.
- Tighten:
 - Torque - Front Master Cylinder Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)**

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



- Tighten the bleed valve, and install the rubber cap.
 - Torque - Bleed Valves: 7.8 N·m (0.80 kgf·m, 69 in·lb)**
- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.
- ★ If necessary, bleed the air from the lines.

2-46 PERIODIC MAINTENANCE

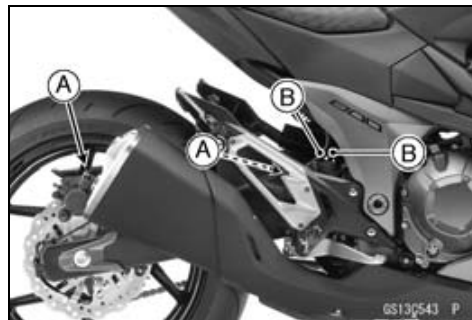
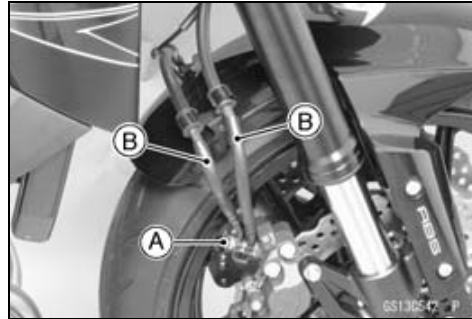
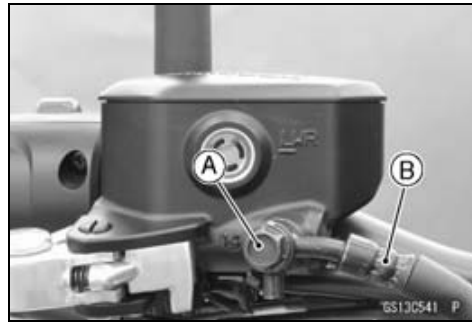
Periodic Maintenance Procedures

Brake Hose and Pipe Replacement

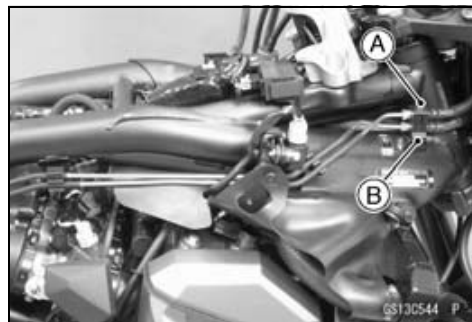
NOTICE

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

- Remove:
 - Upper Fairing (see Upper Fairing Removal in the Frame chapter)
 - Brake Hose Banjo Bolts [A]
- When removing the brake hose, take care not to spill the brake fluid on the painted or plastic parts.
- When removing the brake hoses [B], temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
- Immediately wash away any brake fluid that spills.



- For ABS equipped models; note the following.
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Right Side Fairing (see Side Fairing Removal in the Frame chapter)
 - Rear Fender (see Rear Fender Removal in the Frame chapter)
 - ABS Hydraulic Unit (see ABS Hydraulic Unit Removal in the Brakes chapter)
 - Bolts [A]
 - Brackets [B]
- Replace the brake hose and pipe as an assembly.
- There are washers on each side of the brake hose fitting and unit side. Replace them with new ones when installing.
- When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- Tighten:
 - Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Fill the brake line after installing the brake hose (see Brake Fluid Change).



Periodic Maintenance Procedures

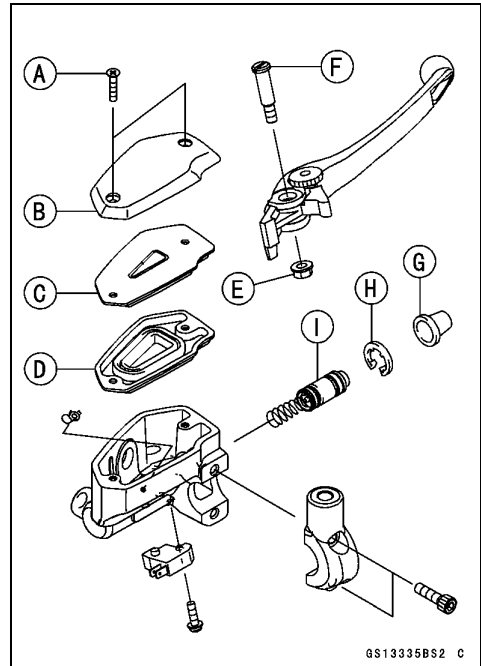
Master Cylinder Rubber Parts Replacement

Front Master Cylinder Disassembly

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

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the piston assembly [I].
- Replace:
 - Diaphragm [D]
 - Dust Cover [G]
 - Circlip [H]
 - Piston Assembly [I]



GS13335BS2 C

Rear Master Cylinder Disassembly

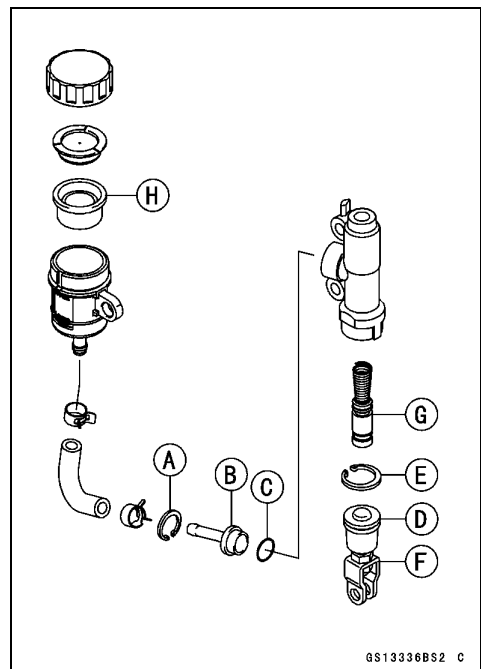
- Remove the rear master cylinder (see Rear Master Cylinder Removal in the Brakes chapter).
- Remove the circlip [A], connector [B] and O-ring [C].
- Slide the dust cover [D] out of place, and remove the circlip [E].
- Pull out the push rod assembly [F].
- Remove the piston assembly [G] and return spring.

Special Tool - Inside Circlip Pliers: 57001-143

NOTICE

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

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



GS13336BS2 C

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.

2-48 PERIODIC MAINTENANCE

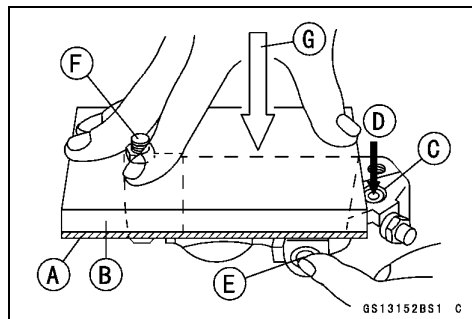
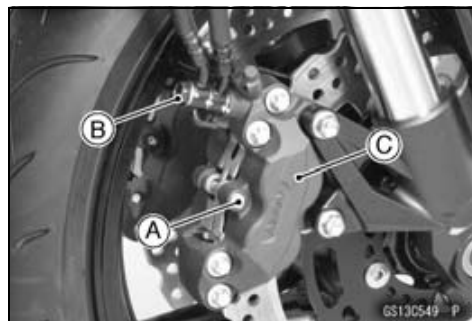
Periodic Maintenance Procedures

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease to the followings.
 - Front: Brake Lever Pivot Bolt
 - Rear: Dust Cover of Push Rod Assembly
- Tighten:
 - Torque - Brake Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 9 in·lb)**
 - Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)**
 - Front Master Cylinder Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)**

Caliper Rubber Parts Replacement

Front Caliper Disassembly (ZR800A/B/D Models)

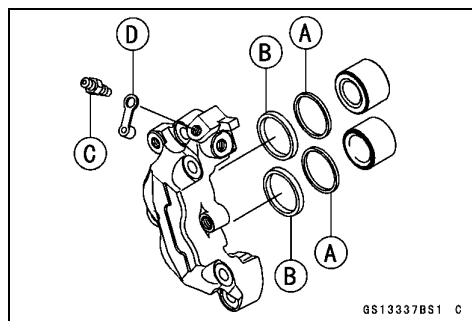
- Loosen the front caliper pad pin [A] and banjo bolt [B] and tighten them loosely.
- Remove:
 - Front Caliper [C] (see Front Caliper Removal in the Brakes chapter)
 - Brake Pads (see Front Brake Pad Removal in the brakes chapter)
 - Front Caliper Assembly Bolts
 - Oil Seal
- Using compressed air, remove the pistons. One way to remove the pistons is as follows.
- Install a rubber gasket [A] and a wooden board [B] more than 10 mm (0.4 in.) thick on the caliper half, and fasten them together with a suitable bolt and nut as shown. Leave one of the oil passages [C] open.
- Lightly apply compressed air [D] to the oil passage until the pistons hit the rubber gasket. Block the hose joint opening [E] during this operation if the caliper half has the opening.
 - Bolt [F] and Nut
 - Push down [G].



⚠ WARNING

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

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



Periodic Maintenance Procedures

Front Caliper Assembly (ZR800A/B/D Models)

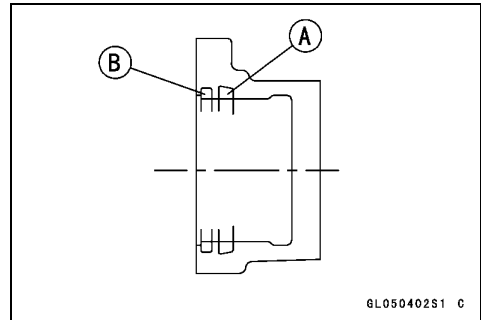
- Clean the caliper parts except for the pads.

NOTICE

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

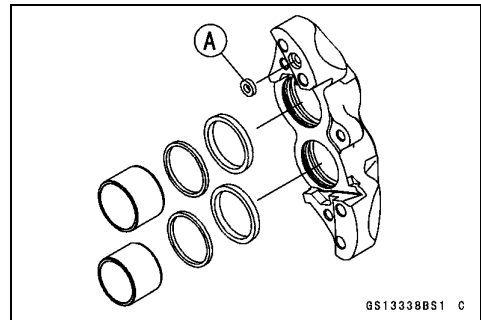
- Install the bleed valve and rubber cap.
Torque - Bleed Valves: 7.8 N·m (0.80 kgf·m, 69 in·lb)

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



- Replace the oil seal [A].
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Be sure to install the oil seal.
- Apply a non-permanent locking agent to the threads of the front caliper assembly bolts, and tighten them.

Torque - Front Caliper Assembly Bolts: 22 N·m (2.2 kgf·m, 16 ft·lb)

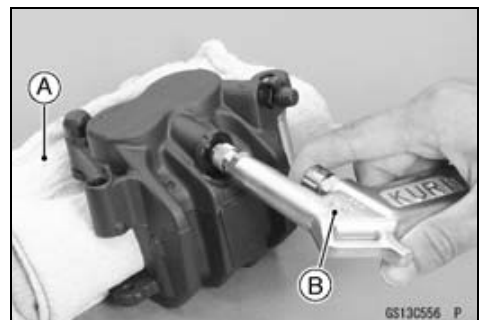


- Install the pads (see Front Brake Pad Installation in the Brakes chapter).
- Wipe up any spilled brake fluid on the caliper with wet cloth.

Front Caliper Disassembly (ZR800C Model)

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

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



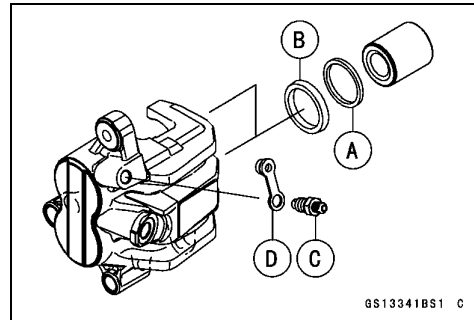
2-50 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

WARNING

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

- Pull out the pistons by hand.
- Remove the dust seals [A] and fluid seals [B].
- Remove the bleed valve [C] and rubber cap [D].



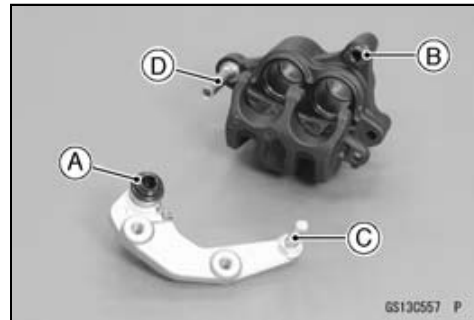
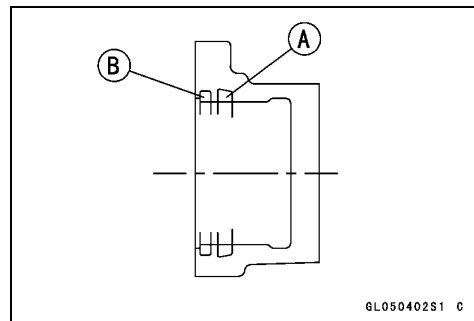
Front Caliper Assembly (ZR800C Model)

- Clean the caliper parts except for the pads.

NOTICE

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

- Install the bleed valve and rubber cap.
Torque - Bleed Valves: 7.8 N·m (0.80 kgf·m, 69 in·lb)
- Replace the fluid seals [A] with new ones.
- Apply silicone grease to the fluid seals, and install them into the cylinders by hand.
- Replace the dust seals [B] with new ones if they are damaged.
- Apply silicone grease to the dust seals, and install them into the cylinders by hand.
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the dust cover [A] and the friction boot [B] replace them with new ones if they are damaged.
- Apply a thin coat of silicone grease to the caliper holder shaft [C] and pin bolt [D].
- Install the caliper holder.



- 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

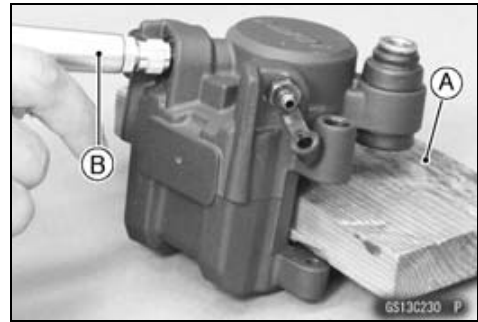
- Remove:
 - Rear Caliper (see Rear Caliper Removal in the Brakes chapter)
 - Brake Pads (see Rear Brake Pad Removal in the Brakes chapter)

Periodic Maintenance Procedures

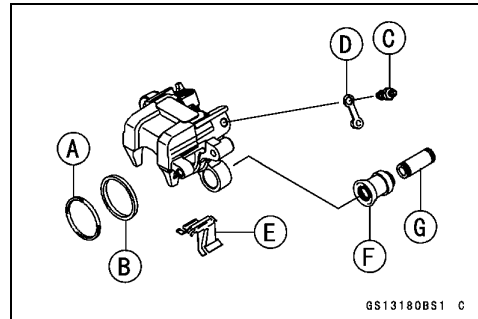
- Using compressed air, remove the piston.
- Cover the piston area with a wooden board [A].
- Blow compressed air [B] into the hole for the banjo bolt to remove the piston.

⚠ WARNING

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



- Remove:
 - Dust Seal [A] and Fluid Seal [B]
 - Bleed Valve [C] and Rubber Cap [D]
 - Pad Spring [E]
 - Rubber Boot [F]
 - Sleeve [G]



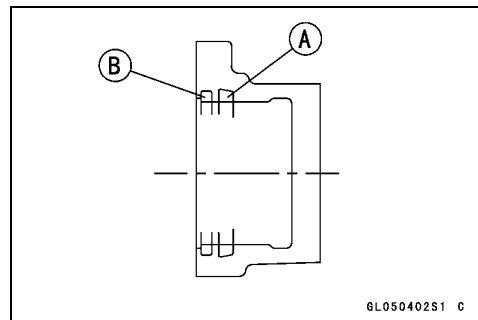
Rear Caliper Assembly

- Clean the caliper parts except for the pads.

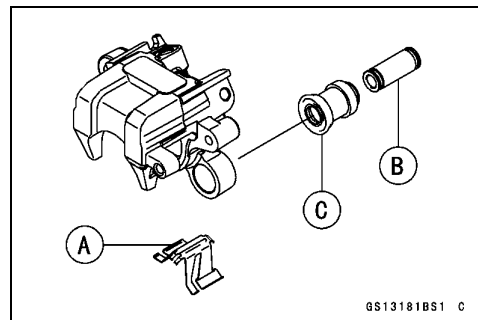
NOTICE

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

- Install the bleed valve and rubber cap.
 - Torque - Bleed Valves: 7.8 N·m (0.80 kgf·m, 69 in·lb)**
- Apply brake fluid to the cylinder bore.
- Replace the fluid seal [A] with a new one.
- Apply silicone grease to the fluid seal, and install it into the cylinder by hand.
- Replace the dust seal [B] with a new one if it is damaged.



- Install the pad spring [A].
- Apply silicone grease to the sleeve [B].
- Install the rubber boot [C] and sleeve.



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

2-52 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Brake Pad Wear Inspection

- Remove the brake pads (see Front/Rear Brake Pad Removal in the Brakes chapter).
- Check the lining thickness [A] of the pads in each caliper.
- ★ If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.
 - Front Brake Pad [C] (ZR800A/B/D Models)
 - Front Brake Pad [D] (ZR800C Model)
 - Rear Brake Pad [E]

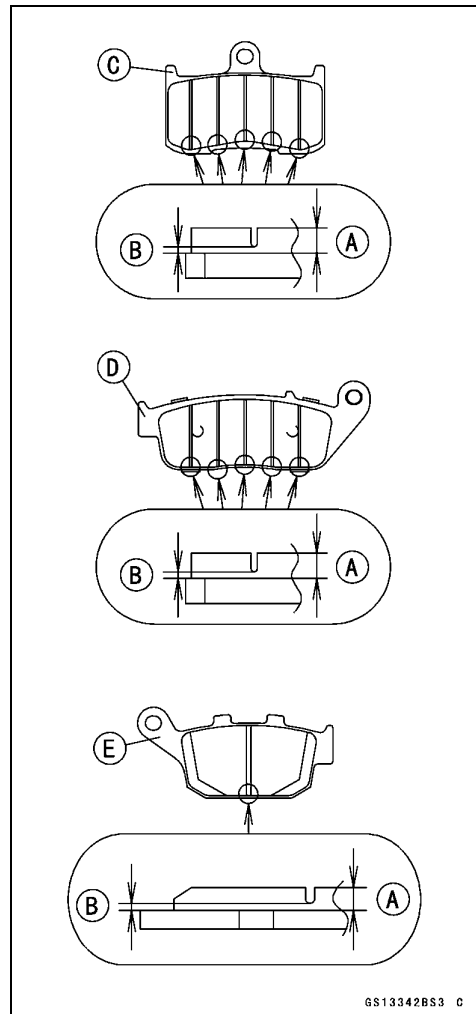
Pad Lining Thickness

Standard:

Front	4.0 mm (0.16 in.)
Rear	5.0 mm (0.20 in.)

Service Limit:

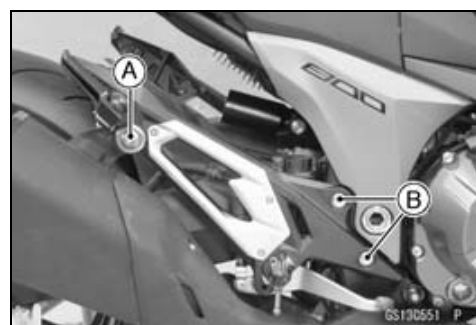
Front	1 mm (0.04 in.)
Rear	1.5 mm (0.06 in.)



Brake Light Switch Operation Inspection

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

- ★ If it does not, adjust the brake light switch.
- Remove:
 - Muffler Body Mounting Bolt [A] and Nut
 - Footpeg Bracket Blots [B]



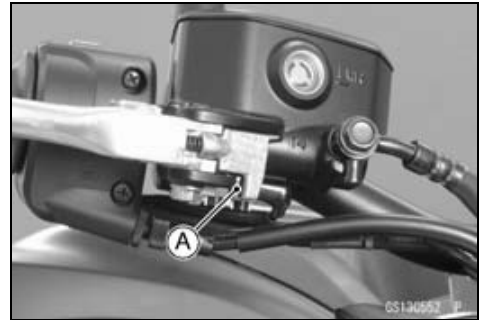
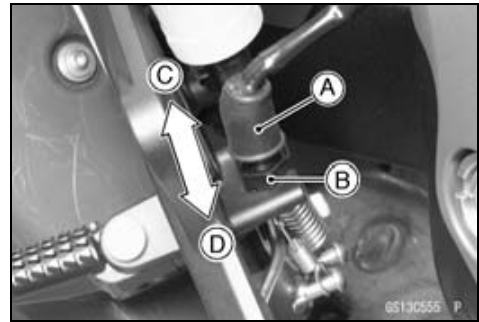
Periodic Maintenance Procedures

- While holding the switch body, turn the adjusting nut to adjust the switch.
 Switch Body [A]
 Adjusting Nut [B]
 Light sooner as the body rises [C]
 Light later as the body lowers [D]

NOTICE

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

- ★ If it does not go on, inspect or replace the following items.
 Battery (see Charging Condition Inspection in the Electrical System chapter)
 Brake Light (see Tail/Brake Light Removal in the Electrical System chapter)
 Main Fuse 30 A and Taillight Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
 Front Brake Light Switch [A] (see Switch Inspection in the Electrical System chapter)
 Rear Brake Light Switch (see Switch Inspection in the Electrical System chapter)
 Harness (see Wiring Inspection in the Electrical System chapter)

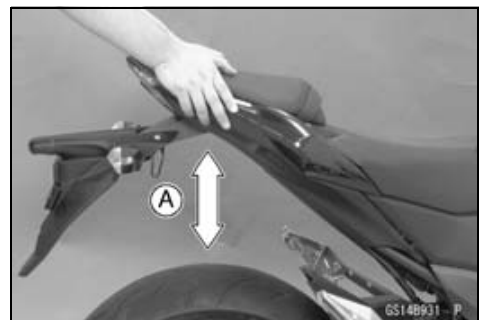


Suspension

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

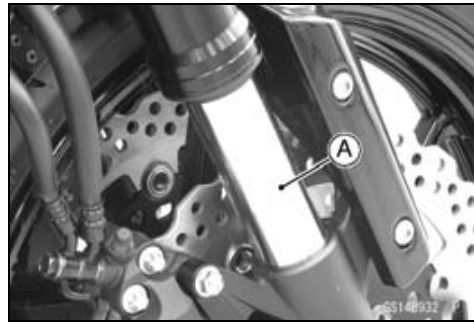


2-54 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Front Fork Oil Leak Inspection

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



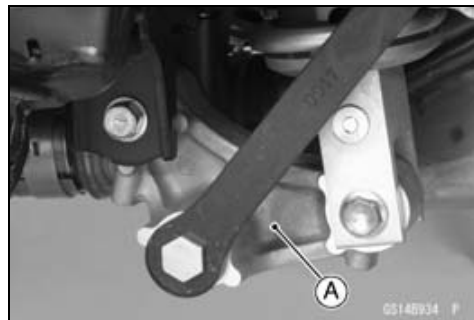
Rear Shock Absorber Oil Leak Inspection

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



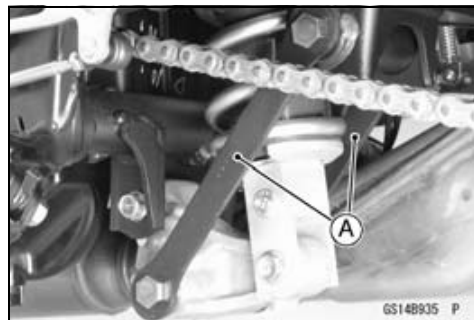
Rocker Arm Operation Inspection

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



Tie-Rod Operation Inspection

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

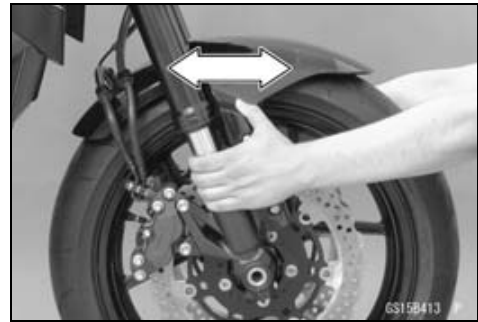


Periodic Maintenance Procedures

Steering System

Steering Play Inspection

- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).
- With the front wheel pointing straight ahead, alternately tap each end of the handlebars. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.
- ★ If the wheel binds or catches before the stop, the steering is too tight.
- Feel for steering looseness by pushing and pulling the forks.
- ★ If you feel looseness, the steering is too loose.

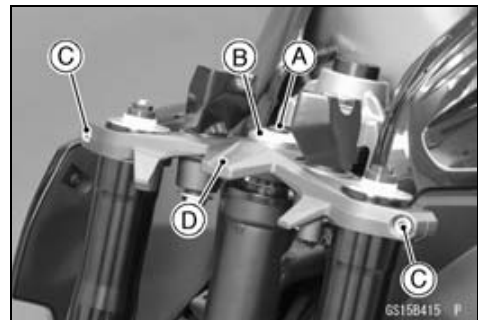
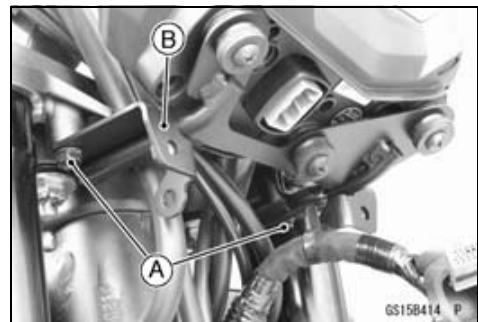


NOTE

- 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:
 - Upper Fairing (see Upper Fairing Removal in the Frame chapter)
 - Ignition Switch Cover (see Ignition Switch Cover Removal in the Frame chapter)
 - Handlebars (see Handlebar Removal in the Steering chapter)
 - Meter Bracket Bolts [A]
 - Meter Bracket [B] with Meter
 - Remove:
 - Steering Stem Head Bolt Plug [A]
 - Steering Stem Head Bolt [B]
 - Loosen the upper front fork clamp bolts [C].
 - Remove the stem head [D].
-
- Bend the claws [A] of the claw washer straighten.
 - Remove the steering stem locknut [B] and claw washer.



2-56 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Adjust the steering.

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

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

NOTE

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

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

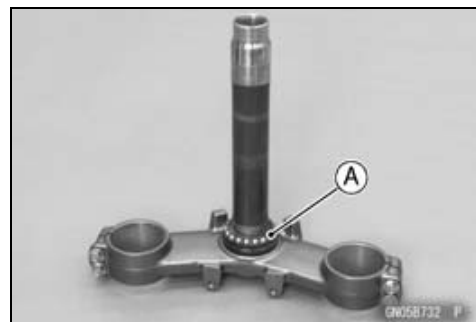
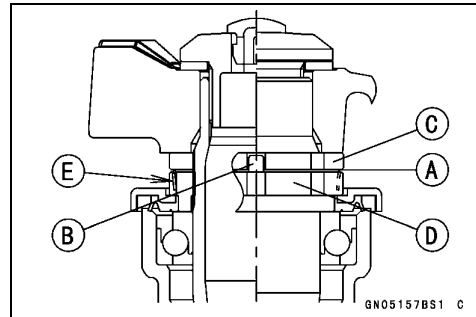
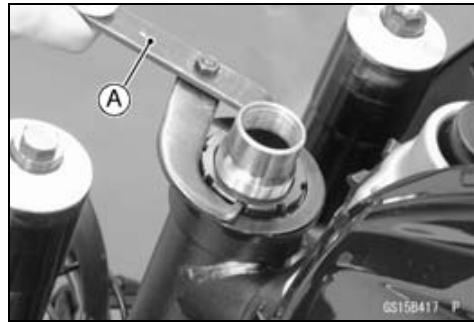
Torque - Steering Stem Head Bolt: 108 N·m (11.0 kgf·m, 79.7 ft·lb)

Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

- 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 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 [A] 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

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

City Lights [A]	go on
Taillight (LED) [B]	goes on
License Plate Light [C]	goes on
Meter Panel LCD [D]	goes on
Green Neutral Indicator Light (LED) [E]	goes on
Oil Pressure Warning Symbol and Red Warning Indicator Light (LED) [F]	blink
Yellow ABS Indicator Light (LED) [G] (ABS Equipped Models)	goes on

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

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

Main Fuse 30 A and Brake/Horn Fuse 7.5 A (see Fuse Inspection in the Electrical System chapter)

Applicable Bulb (see Wiring Diagram in the Electrical System chapter)

Meter Unit for Meter Panel LCD (see Electronic Combination Meter Unit Inspection in the Electrical System chapter)

Meter Unit for Green Neutral Indicator Light (LED) (see Electronic Combination Meter Unit Inspection in the Electrical System chapter)

Meter Unit for Red Warning Indicator Light (LED) (see Electronic Combination Meter Unit Inspection in the Electrical System chapter)

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

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

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

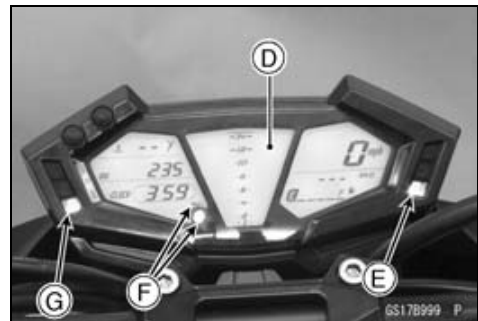
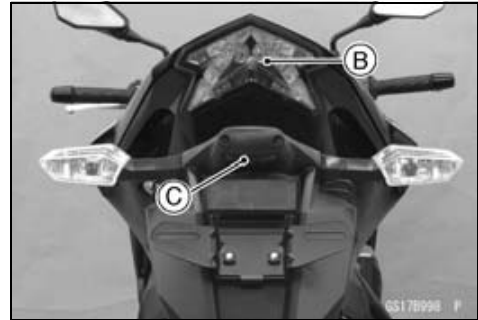
Harness (see Wiring Inspection in the Electrical System chapter)

Yellow ABS Indicator Light (LED) (ABS Equipped Models) (see Yellow ABS Indicator Light (LED) Inspection in the Brakes chapter)

- 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 to hazard position.



2-58 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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

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

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

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

Turn Signal Relay Fuse 7.5 A (see Fuse Inspection in the Electrical System chapter)

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

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

Harness (see Wiring Inspection in the Electrical System chapter)

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

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

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

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



Third Step

- Set the dimmer switch [A] to low beam position.
 - Start the engine.
 - The low beam headlight should go on.
- ★ If the low beam headlight does not go on, inspect or replace the following item.

Headlight Low Beam Bulb (see Headlight Bulb Replacement in the Electrical System chapter)

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

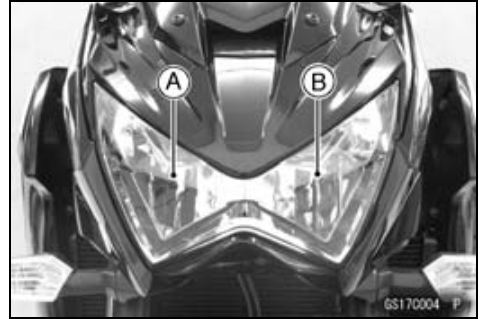
Dimmer Switch (see Switch Inspection in the Electrical System chapter)

Headlight Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)

Harness (see Wiring Inspection in the Electrical System chapter)

Periodic Maintenance Procedures

- Set the dimmer switch to high beam position.
- The low beam [A] and high beam [B] headlights should go on.
- The 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 item.
 - Headlight High Beam Bulb (see Headlight Bulb Replacement in the Electrical System chapter)
 - Dimmer Switch (see Switch Inspection in the Electrical System chapter)
- Turn the engine stop switch off.
- The low beam and high beam headlights should stay going on.
- ★ If the headlights and blue high beam indicator light (LED) does go off, inspect or replace the following item.
 - Headlight Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
- Turn the ignition switch off.
- The headlights and blue high beam indicator light (LED) should go off.



Headlight Aiming Inspection

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

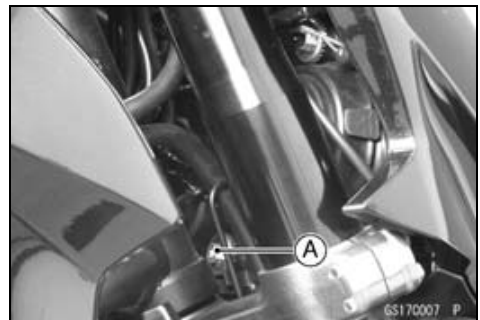
Headlight Beam Horizontal Adjustment

- Turn the horizontal adjuster [A] on the headlights in or out until the beam points straight ahead.
- ★ If the headlight beam points too low or high, adjust the vertical beam.



Headlight Beam Vertical Adjustment

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



NOTE

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

2-60 PERIODIC MAINTENANCE

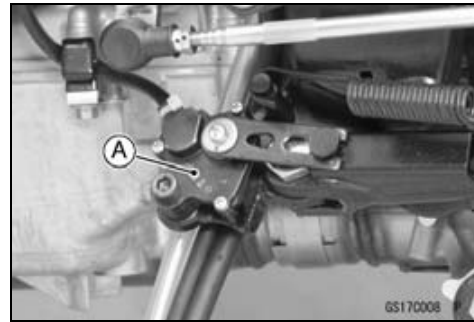
Periodic Maintenance Procedures

Side Stand Switch Operation Inspection

- Inspect the side stand switch [A] operation accordance to the following table.

Side Stand Switch Operation

Side Stand	Gear Position	Clutch Lever	Engine Start	Engine Run
Up	Neutral	Released	Starts	Continue running
Up	Neutral	Pulled in	Starts	Continue running
Up	In gear	Released	Does not start	Continue running
Up	In gear	Pulled in	Starts	Continue running
Down	Neutral	Released	Starts	Continue running
Down	Neutral	Pulled in	Starts	Continue running
Down	In gear	Released	Does not start	Stops
Down	In gear	Pulled in	Does not start	Stops



- ★ If the side stand switch operation does not work, inspect or replace the following item.

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

Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)

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

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

Side Stand Switch (see Switch Inspection in the Electrical System chapter)

Engine Stop Switch (see Switch Inspection in the Electrical System chapter)

Starter Button (see Switch Inspection in the Electrical System chapter)

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

Starter Relay (see Starter Relay Inspection in the Electrical System chapter)

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

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

Harness (see Wiring Inspection in the Electrical System chapter)

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

Periodic Maintenance Procedures

Engine Stop Switch Operation Inspection

First Step

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



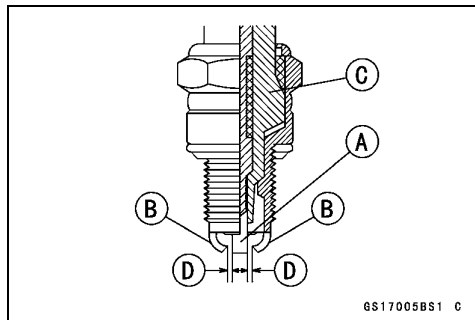
Second Step

- Turn the engine stop switch to run position [A].
- Push the starter button and run the engine.
- Turn the engine stop switch to stop position.
- Immediately the engine should be stop.
- ★ If the engine does not stop, inspect or replace the following item.
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)



Spark Plug Condition Inspection

- Remove the spark plugs (see Spark Plug Replacement), and visually inspect.
- Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool.
- ★ If the spark plug center electrode [A] and/or side electrode [B] are corrected or damaged, or if the insulator [C] is cracked, replace the spark plug.
- Measure the gaps [D] with a wire-type thickness gauge.
- ★ If the gap is incorrect, carefully bend the side electrode with a tool to obtain the correct gap.



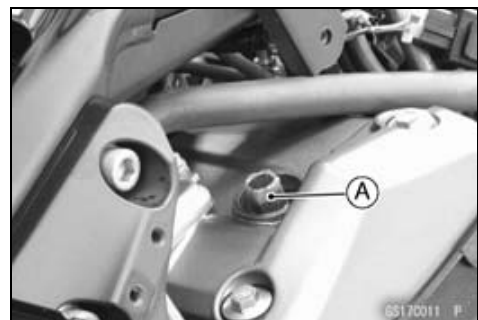
Spark Plug Gap: 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)

- Use the standard spark plug or its equivalent.

Spark Plug: NGK CR9EK or ND U27ETR

Spark Plug Replacement

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



2-62 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Replace the spark plug with a new one.

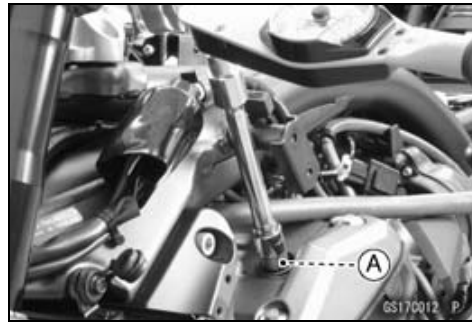
Standard Spark Plug

Type: NGK CR9EK or ND U27ETR

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

NOTICE

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



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

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

Others

Chassis Parts Lubrication

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

NOTE

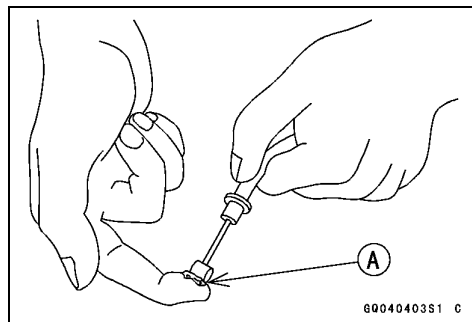
○ Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.

Pivots: Lubricate with Grease.

Brake Lever
Brake Pedal
Clutch Lever
Rear Brake Joint Pin
Side Stand

Points: Lubricate with Grease.

Clutch Inner Cable Upper and Lower Ends [A]
Throttle Inner Cable Upper and Lower Ends

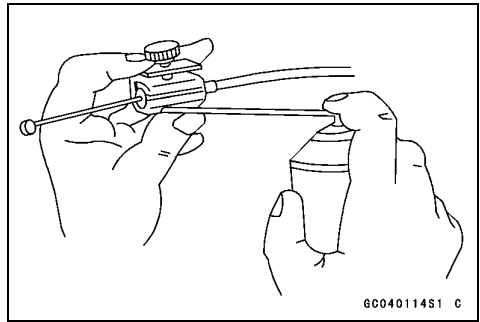


Periodic Maintenance Procedures

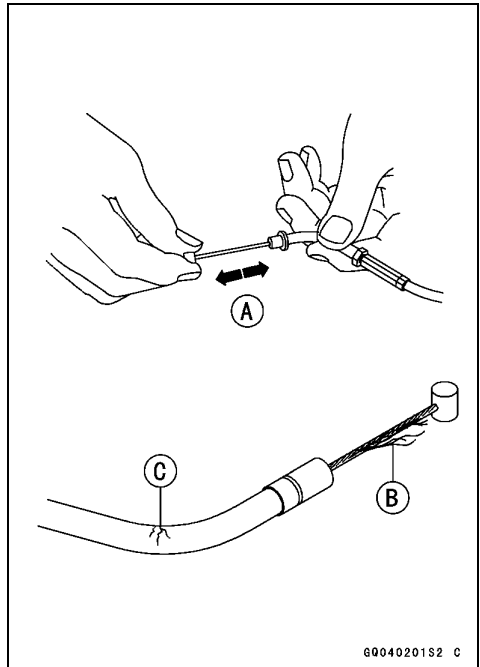
Cables: Lubricate with Rust Inhibitor.

- Clutch Cable
- Throttle Cables

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



- With the cable disconnected at both ends, the 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.



2-64 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:

- Clutch Lever Pivot Bolt Locknut
- Engine Mounting Bolts and Nuts
- Exhaust Pipe Manifold Holder Nuts
- Muffler Body Clamp Bolt
- Muffler Body Mounting Bolt and Nut
- Radiator Upper and Lower Bolts
- Subframe Bolts

Wheels:

- Front Axle
- Front Axle Clamp Bolt
- Rear Axle Nut
- Rear Axle Nut Cotter Pin

Brakes:

- Brake Lever Pivot Nut
- Brake Pedal Bolt
- Caliper Mounting Bolts
- Front Master Cylinder Clamp Bolts
- Rear Caliper Pin Bolt
- Rear Master Cylinder Mounting Bolts

Suspension:

- Front Fork Clamp Bolts
- Rear Shock Absorber Nuts
- Swingarm Pivot Shaft Locknut
- Swingarm Pivot Shaft Nut
- Tie-Rod Nuts
- Rocker Arm Nut

Steering:

- Handlebar Holder Bolts
- Steering Stem Head Bolt

Others:

- Footpeg Bracket Bolts
- Front Fender Bolts
- Side Stand Bolt

Fuel System (DFI)

Table of Contents

Exploded View	3-4
DFI System	3-10
DFI Parts Location	3-20
Specifications	3-22
Special Tools and Sealant	3-24
DFI Servicing Precautions	3-26
DFI Servicing Precautions	3-26
Troubleshooting the DFI System	3-28
Outline	3-28
Inquiries to Rider	3-32
DFI System Troubleshooting Guide	3-35
Self-Diagnosis	3-40
Self-Diagnosis Outline	3-40
Self-Diagnosis Procedures	3-41
Service Code Reading	3-44
Service Code Erasing	3-44
Backups	3-46
Main Throttle Sensor (Service Code 11)	3-49
Main Throttle Sensor Removal/Adjustment	3-49
Main Throttle Sensor Input Voltage Inspection	3-49
Main Throttle Sensor Output Voltage Inspection	3-50
Main Throttle Sensor Resistance Inspection	3-51
Intake Air Pressure Sensor #1 (Service Code 12)	3-53
Intake Air Pressure Sensor #1 Removal	3-53
Intake Air Pressure Sensor #1 Installation	3-53
Intake Air Pressure Sensor #1 Input Voltage Inspection	3-54
Intake Air Pressure Sensor #1 Output Voltage Inspection	3-55
Intake Air Temperature Sensor (Service Code 13)	3-59
Intake Air Temperature Sensor Removal/Installation	3-59
Intake Air Temperature Sensor Output Voltage Inspection	3-59
Intake Air Temperature Sensor Resistance Inspection	3-60
Water Temperature Sensor (Service Code 14)	3-62
Water Temperature Sensor Removal/Installation	3-62
Water Temperature Sensor Output Voltage Inspection	3-62
Water Temperature Sensor Resistance Inspection	3-63
Intake Air Pressure Sensor #2 (Service Code 16)	3-64
Intake Air Pressure Sensor #2 Removal	3-64
Intake Air Pressure Sensor #2 Installation	3-64
Intake Air Pressure Sensor #2 Input Voltage Inspection	3-65
Intake Air Pressure Sensor #2 Output Voltage Inspection	3-66
Crankshaft Sensor (Service Code 21)	3-68
Crankshaft Sensor Removal/Installation	3-68
Crankshaft Sensor Resistance Inspection	3-68
Crankshaft Sensor Peak Voltage Inspection	3-68
Speed Sensor (Service Code 24)	3-69
Speed Sensor Removal/Installation	3-69
Speed Sensor Input Voltage Inspection	3-69
Speed Sensor Output Voltage Inspection	3-70
Vehicle-down Sensor (Service Code 31)	3-72
Vehicle-down Sensor Removal	3-72

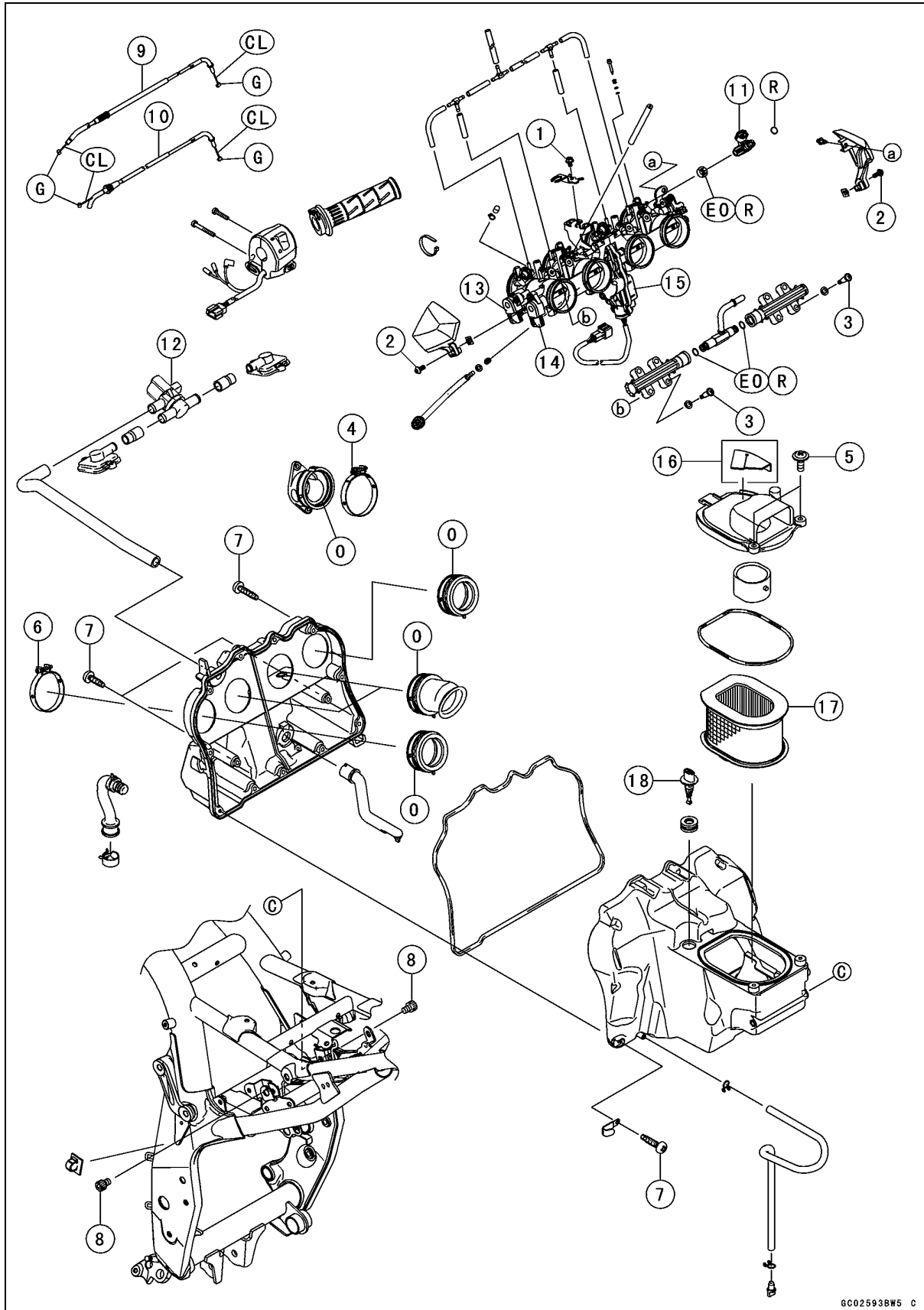
3-2 FUEL SYSTEM (DFI)

Vehicle-down Sensor Installation	3-72
Vehicle-down Sensor Input Voltage Inspection	3-73
Vehicle-down Sensor Output Voltage Inspection	3-74
Subthrottle Sensor (Service Code 32)	3-76
Subthrottle Sensor Removal/Adjustment	3-76
Subthrottle Sensor Input Voltage Inspection	3-76
Subthrottle Sensor Output Voltage Inspection	3-77
Subthrottle Sensor Resistance Inspection	3-79
Oxygen Sensor - not activated (Service Code 33)	3-80
Oxygen Sensor Removal/Installation	3-80
Oxygen Sensor Inspection	3-80
Exhaust Butterfly Valve Actuator Sensor (Service Code 34, ZR800A/B Models)	3-83
Exhaust Butterfly Valve Actuator Sensor Removal/Installation	3-83
Exhaust Butterfly Valve Actuator Sensor Input Voltage Inspection	3-83
Exhaust Butterfly Valve Actuator Sensor Output Voltage Inspection	3-84
Exhaust Butterfly Valve Actuator Sensor Resistance Inspection	3-85
Immobilizer Amplifier (Service Code 35)	3-86
Antenna Resistance Inspection	3-86
Amplifier Input Voltage Inspection	3-86
Blank Key Detection (Service Code 36)	3-87
Ignition Key Inspection	3-87
ECU Communication Error (Service Code 39)	3-89
ECU Communication Line Inspection	3-89
Stick Coils #1, #2, #3, #4 (Service Code 51, 52, 53, 54)	3-90
Stick Coil Removal/Installation	3-90
Stick Coil Primary Winding Resistance Inspection	3-90
Stick Coil Input Voltage Inspection	3-90
Radiator Fan Relay (Service Code 56)	3-92
Radiator Fan Relay Removal/Installation	3-92
Radiator Fan Relay Inspection	3-92
Subthrottle Valve Actuator (Service Code 62)	3-93
Subthrottle Valve Actuator Removal	3-93
Subthrottle Valve Actuator Inspection	3-93
Subthrottle Valve Actuator Resistance Inspection	3-93
Subthrottle Valve Actuator Input Voltage Inspection	3-94
Exhaust Butterfly Valve Actuator (Service Code 63, ZR800A/B Models)	3-96
Exhaust Butterfly Valve Actuator Removal	3-96
Exhaust Butterfly Valve Actuator Installation	3-96
Exhaust Butterfly Valve Actuator Inspection	3-98
Exhaust Butterfly Valve Actuator Resistance Inspection	3-99
Air Switching Valve (Service Code 64)	3-100
Air Switching Valve Removal/Installation	3-100
Air Switching Valve Inspection	3-100
Oxygen Sensor Heater (Service Code 67)	3-101
Oxygen Sensor Heater Removal/Installation	3-101
Oxygen Sensor Heater Resistance Inspection	3-101
Oxygen Sensor Heater Power Source Voltage Inspection	3-101
Oxygen Sensor - Incorrect Output Voltage (Service Code 94)	3-103
Oxygen Sensor Removal/Installation	3-103
Oxygen Sensor Inspection	3-103
Warning Indicator Light (LED)	3-106
Yellow Engine Warning Indicator Light (LED) Inspection	3-106
ECU	3-107
ECU Identification	3-107
ECU Removal	3-107
ECU Installation	3-108
ECU Power Supply Inspection	3-108

DFI Power Source	3-111
ECU Fuse Removal	3-111
ECU Fuse Installation	3-111
ECU Fuse Inspection	3-111
ECU Main Relay Removal/Installation	3-111
ECU Main Relay Inspection	3-111
Fuel Line	3-112
Fuel Pressure Inspection	3-112
Fuel Flow Rate Inspection	3-113
Fuel Pump	3-115
Fuel Pump Removal	3-115
Fuel Pump Installation	3-116
Fuel Pump Operation Inspection	3-116
Fuel Pump Operating Voltage Inspection	3-117
Pressure Regulator Removal	3-118
Pump Screen, Fuel Filter Cleaning	3-118
Fuel Pump Relay Removal/Installation	3-118
Fuel Pump Relay Inspection	3-118
Fuel Injectors	3-120
Fuel Injector Removal/Installation	3-120
Fuel Injector Audible Inspection	3-120
Fuel Injector Resistance Inspection	3-120
Fuel Injector Power Source Voltage Inspection	3-121
Fuel Injector Output Voltage Inspection	3-122
Fuel Injector Fuel Line Inspection	3-123
Throttle Grip and Cables	3-125
Free Play Inspection	3-125
Free Play Adjustment	3-125
Cable Installation	3-125
Cable Lubrication	3-125
Throttle Body Assy	3-126
Idle Speed Inspection/Adjustment	3-126
Synchronization Inspection/Adjustment	3-126
Throttle Body Assy Removal	3-126
Throttle Body Assy Installation	3-129
Throttle Body Assy Disassembly	3-130
Throttle Body Assy Assembly	3-131
Air Cleaner	3-133
Air Cleaner Element Removal/Installation	3-133
Air Cleaner Element Inspection	3-133
Air Cleaner Oil Draining	3-133
Air Cleaner Housing Removal	3-133
Fuel Tank	3-134
Fuel Tank Removal	3-134
Fuel Tank Installation	3-136
Fuel Tank and Cap Inspection	3-138
Fuel Tank Cleaning	3-138

3-4 FUEL SYSTEM (DFI)

Exploded View



GC02593BW5 C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Throttle Cable Plate Bolt	5.9	0.60	52 in·lb	
2	Throttle Body Cover Mounting Bolts	4.0	0.41	35 in·lb	
3	Delivery Pipe Assy Mounting Screws	3.5	0.36	31 in·lb	
4	Throttle Body Assy Holder Clamp Bolts	1.1	0.11	10 in·lb	
5	Air Cleaner Duct Screws	3.8	0.39	34 in·lb	
6	Air Duct Clamp Bolts	1.1	0.11	10 in·lb	
7	Air Cleaner Housing Tapping Screws	1.2	0.12	11 in·lb	
8	Air Cleaner Housing Mounting Bolts	9.8	1.0	87 in·lb	

- 9. Throttle Cable (Decelerator)
- 10. Throttle Cable (Accelerator)
- 11. Fuel Injectors
- 12. Air Switching Valve
- 13. Main Throttle Sensor
- 14. Subthrottle Sensor
- 15. Subthrottle Valve Actuator
- 16. Pad (ZR800A/B Models)
- 17. Air Cleaner Element
- 18. Intake Air Temperature Sensor
- CL: Apply cable lubricant.
- EO: Apply engine oil.
- G: Apply grease.
- O: Apply 2-stroke oil.
- R: Replacement Parts

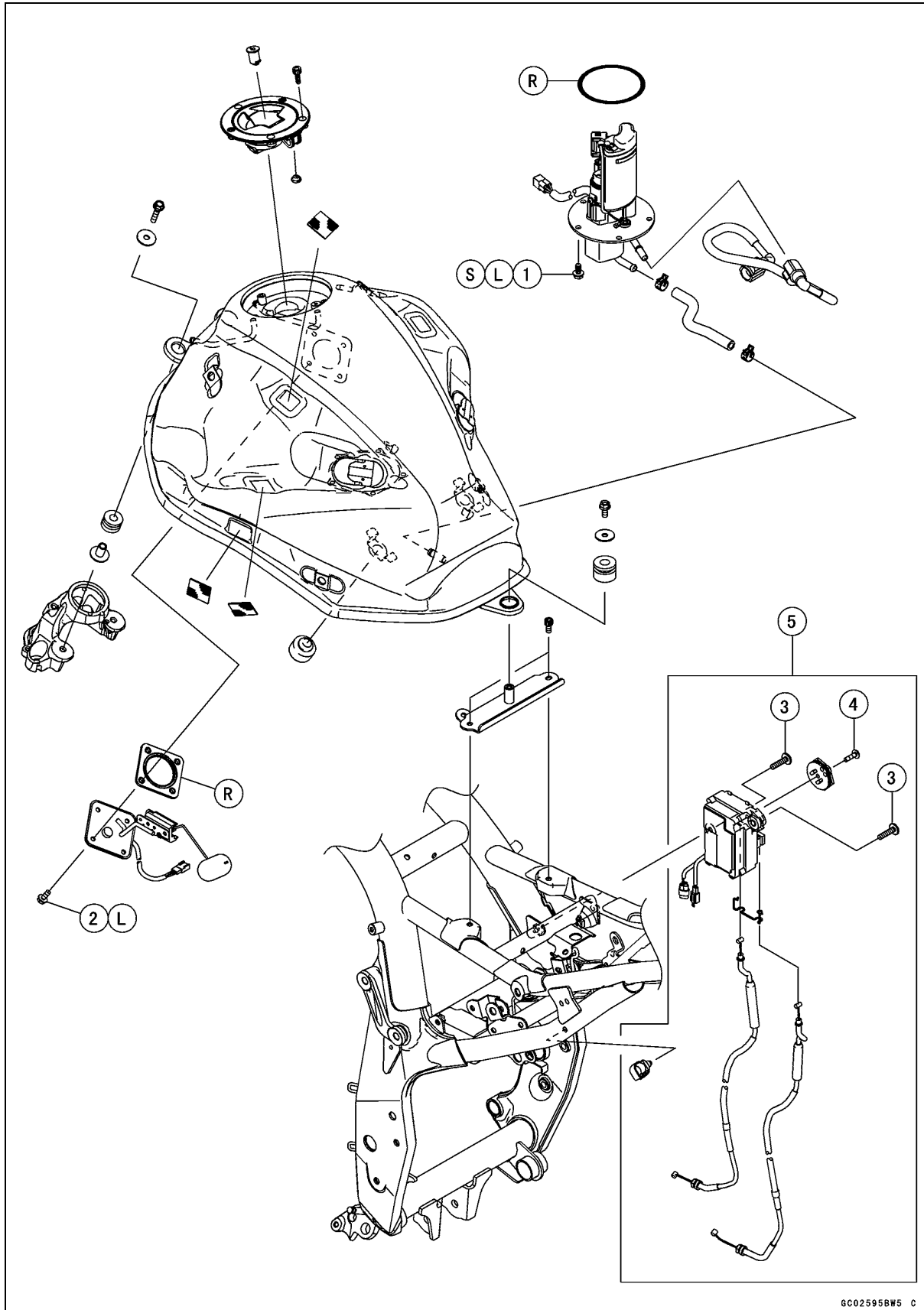
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Vehicle-down Sensor Bolts	5.9	0.60	52 in·lb	
2	Throttle Cable Plate Bolt	5.9	0.60	52 in·lb	
3	Water Temperature Sensor	12	1.2	106 in·lb	
4	Oxygen Sensor	44	4.5	32	
5	Speed Sensor Bolt	12	1.2	106 in·lb	
6	Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	

- 7. Vehicle-down Sensor
- 8. Intake Air Pressure Sensor #2
- 9. Intake Air Pressure Sensor #1
- 10. Stick Coils
- 11. ECU
- 12. Relay Box
- 13. Speed Sensor
- G: Apply grease.
- LG: Apply liquid gasket.
- R: Replacement Parts

3-8 FUEL SYSTEM (DFI)

Exploded View



GC02595BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
2	Fuel Level Sensor Bolts	6.9	0.70	61 in·lb	L
3	Exhaust Butterfly Valve Actuator Mounting Bolts	6.9	0.70	61 in·lb	
4	Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	

5. ZR800A/B Models

L: Apply a non-permanent locking agent.

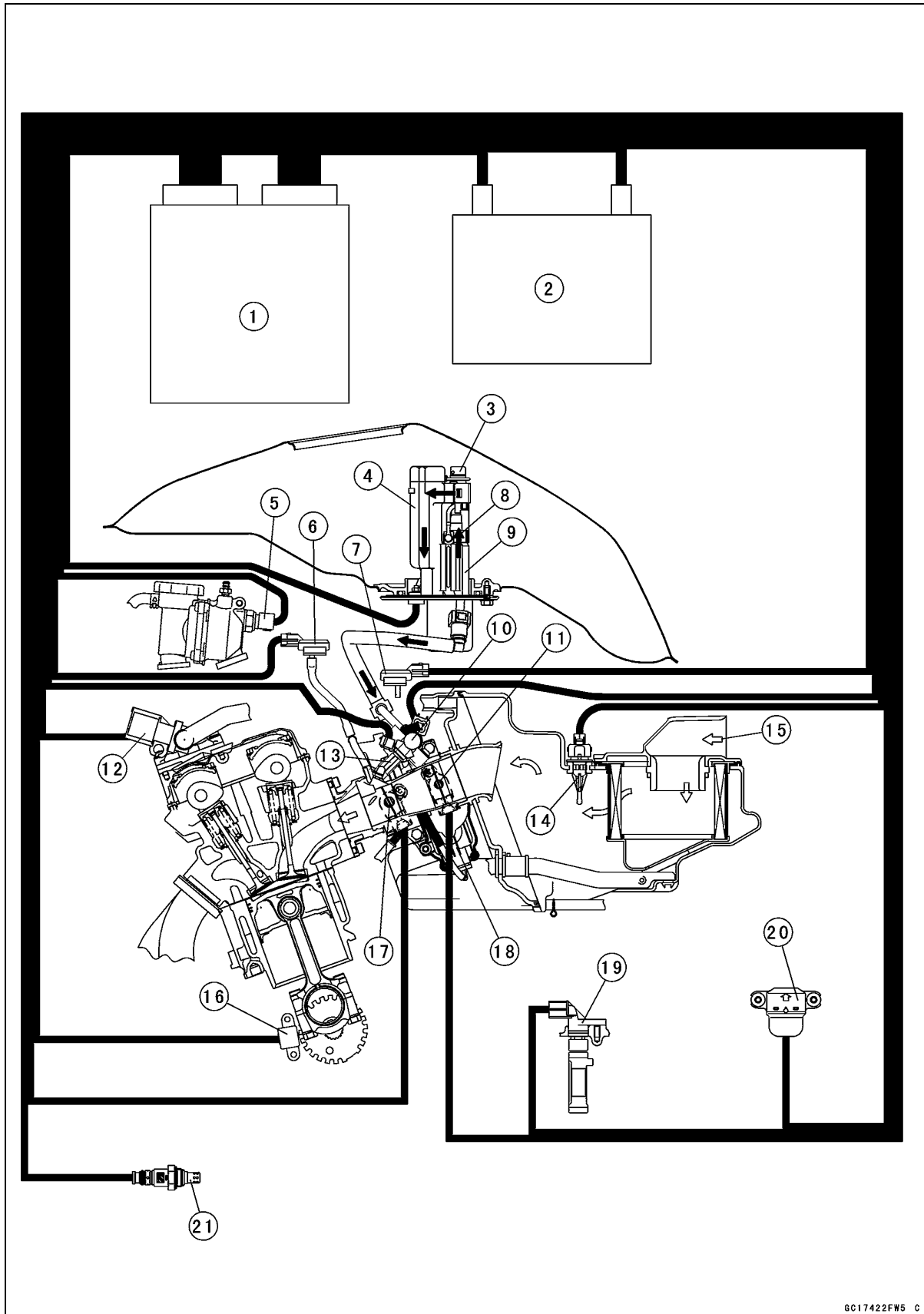
R: Replacement Parts

S: Follow the specified tightening sequence.

3-10 FUEL SYSTEM (DFI)

DFI System

DFI System



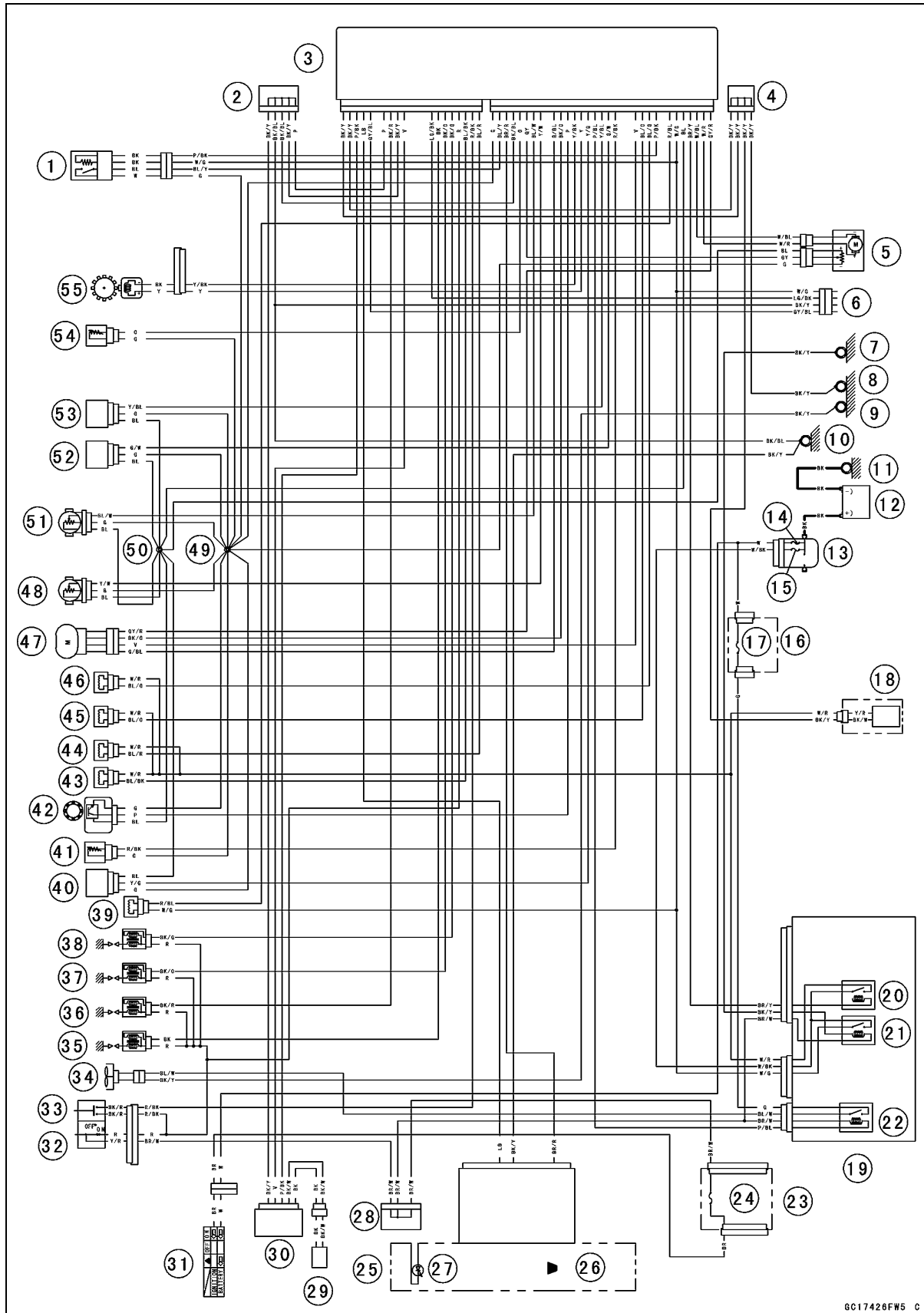
DFI System

1. ECU
2. Battery 12 V 8 Ah
3. Pressure Regulator
4. Fuel Filter
5. Water Temperature Sensor
6. Intake Air Pressure Sensor #2
7. Intake Air Pressure Sensor #1
8. Fuel Flow
9. Fuel Pump
10. Delivery Pipe Assy
11. Subthrottle Sensor
12. Air Switching Valve
13. Fuel Injectors
14. Intake Air Temperature Sensor
15. Air Flow
16. Crankshaft Sensor
17. Main Throttle Sensor
18. Subthrottle Valve Actuator
19. Speed Sensor
20. Vehicle-down Sensor
21. Oxygen Sensor

3-12 FUEL SYSTEM (DFI)

DFI System

DFI System Wiring Diagram (ZR800A/B Models)



DFI System

Part Names

1. Oxygen Sensor
2. Joint Connector E
3. ECU
4. Joint Connector D
5. Exhaust Butterfly Valve Actuator
6. Immobilizer/Kawasaki Diagnostic System Connector
7. Frame Ground 4
8. Frame Ground 3
9. Frame Ground 2
10. Frame Ground 1
11. Engine Ground
12. Battery 12 V 8 Ah
13. Starter Relay
14. Main Fuse 30 A
15. ECU Fuse 15 A
16. Fuse Box 2
17. Radiator Fan Fuse 15 A
18. Fuel Pump
19. Relay Box
20. Fuel Pump Relay
21. ECU Main Relay
22. Radiator Fan Relay
23. Fuse Box 1
24. Ignition Fuse 15 A
25. Meter Unit
26. Tachometer
27. Yellow Engine Warning Indicator Light
28. Joint Connector C
29. Immobilizer Antenna
30. Immobilizer Amplifier
31. Ignition Switch
32. Engine Stop Switch
33. Starter Button
34. Fan Motor
35. Stick Coil #1
36. Stick Coil #2
37. Stick Coil #3
38. Stick Coil #4
39. Air Switching Valve
40. Vehicle-down Sensor
41. Intake Air Temperature Sensor
42. Speed Sensor
43. Fuel Injector #1
44. Fuel Injector #2
45. Fuel Injector #3
46. Fuel Injector #4
47. Subthrottle Valve Actuator
48. Main Throttle Sensor
49. Water Proof Joint 2
50. Water Proof Joint 1
51. Subthrottle Sensor
52. Intake Air Pressure Sensor #2
53. Intake Air Pressure Sensor #1
54. Water Temperature Sensor
55. Crankshaft Sensor

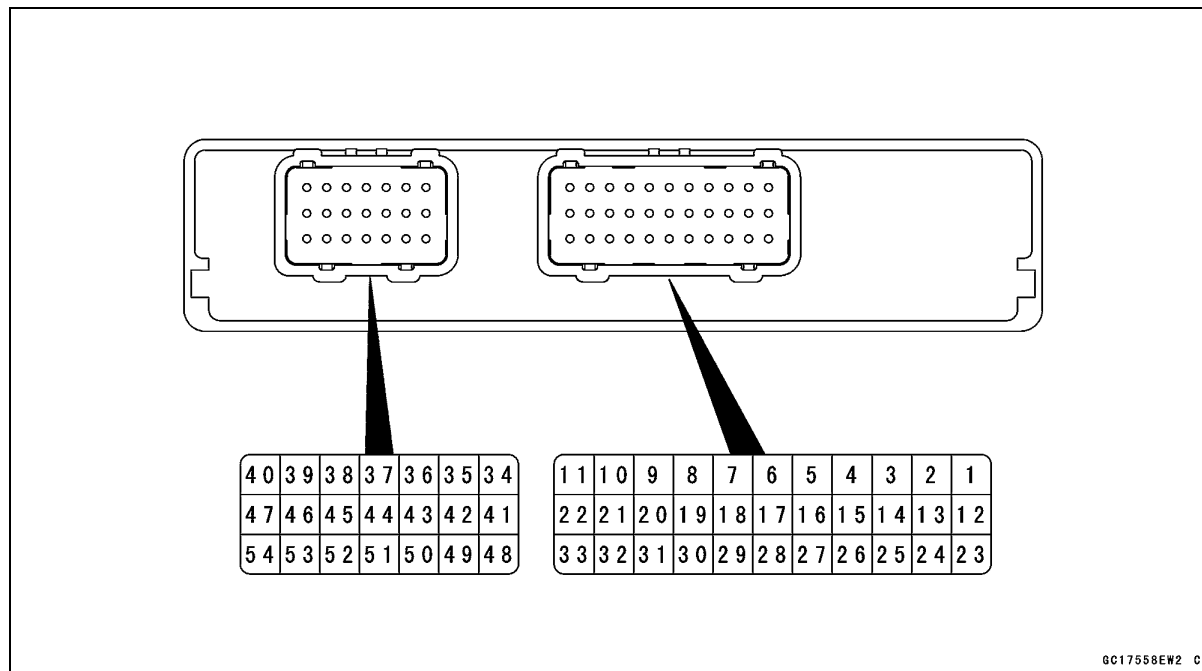
3-14 FUEL SYSTEM (DFI)

DFI System

○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		

Terminal Numbers of ECU Connectors (ZR800A/B Models)



Terminal Names

1. Subthrottle Valve Actuator: GY/R
2. Exhaust Butterfly Valve Actuator (-): W/R
3. Exhaust Butterfly Valve Actuator (+): W/BL
4. Fuel Pump Relay: BR/Y
5. Power Supply to Sensors: BL
6. Power Supply to ECU (from ECU Main Relay): W/G
7. Air Switching Valve: R/BL
8. Power Supply to ECU (from Battery): W/BK
9. Oxygen Sensor Heater: P/BK
10. Injector #4: BL/G
11. Injector #3: BL/O
12. Subthrottle Valve Actuator: V
13. Unused
14. Unused
15. Intake Air Temperature Sensor: R/BK
16. Intake Air Pressure Sensor #2: G/W
17. Intake Air Pressure Sensor #1: Y/BL
18. Radiator Fan Relay: P/BL
19. Vehicle-down Sensor: Y/G
20. Crankshaft Sensor (+): Y
21. Crankshaft Sensor (-): Y/BK
22. Speed Sensor: P
23. Subthrottle Valve Actuator: BK/O
24. Subthrottle Valve Actuator: G/BL
25. Side Stand Switch: G/BK

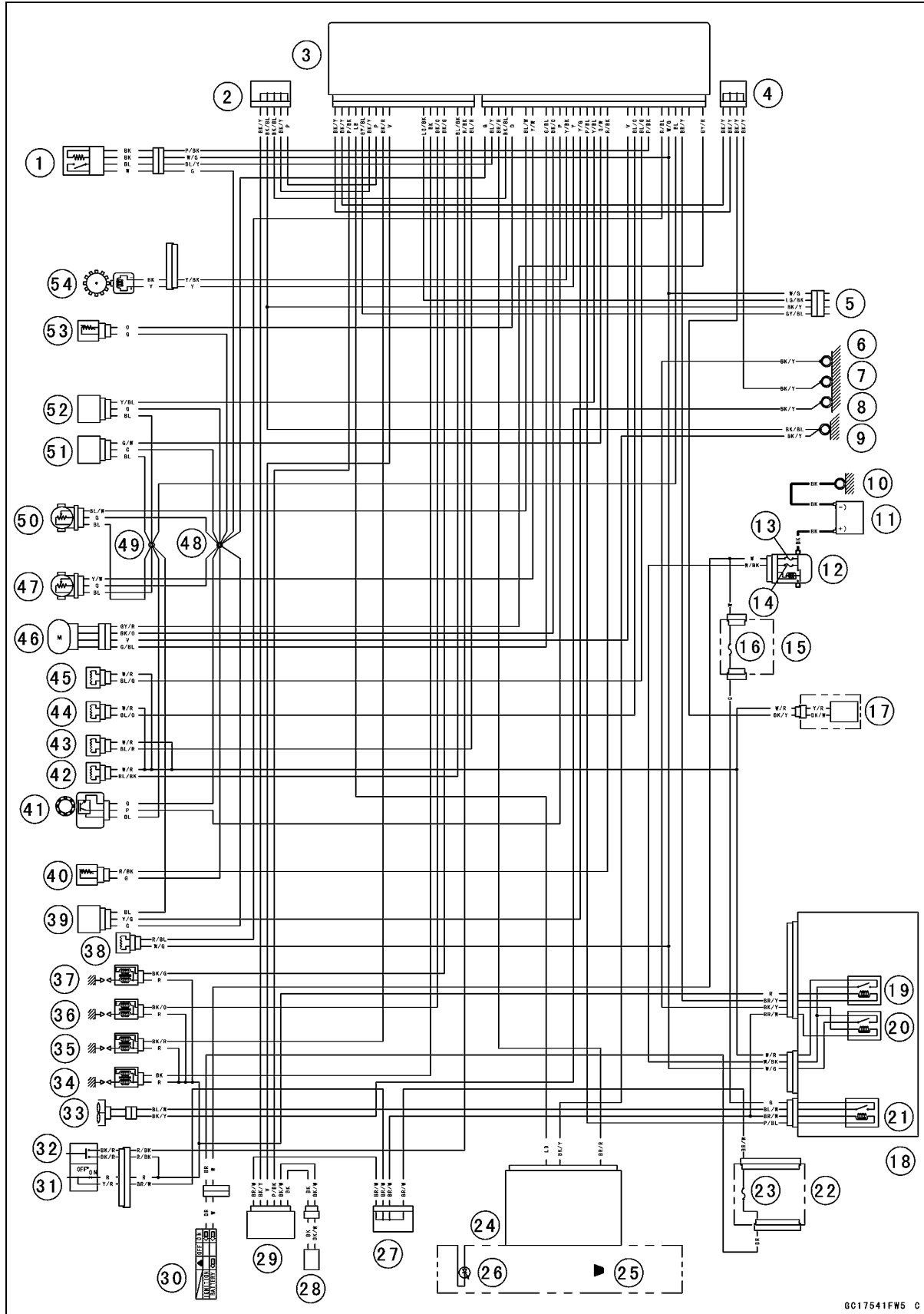
DFI System

- 26. Main Throttle Sensor: Y/W
 - 27. Subthrottle Sensor: BL/W
 - 28. Exhaust Butterfly Valve Actuator Sensor: GY
 - 29. Water Temperature Sensor: O
 - 30. Ground for ECU: BK/BL
 - 31. Warning Indicator Light (LED) (Meter Unit): BR/R
 - 32. Oxygen Sensor: BL/Y
 - 33. Ground for Sensors: G
 - 34. Injector #2: BL/R
 - 35. Starter Button: R/BK
 - 36. Injector #1: BL/BK
 - 37. Engine Stop Switch: R/BK
 - 38. Stick Coil #4: BK/G
 - 39. Stick Coil #3: BK/O
 - 40. Stick Coil #1: BK
 - 41. External Communication Line (Immobilizer System/*KDS): LG/BK
 - 42. Unused
 - 43. Neutral Switch: LG
 - 44. Starter Lockout Switch: R/G
 - 45. Immobilizer Amplifier: V
 - 46. Ground: BK/Y
 - 47. Stick Coil #2: BK/R
 - 48. Ground: P
 - 49. Unused
 - 50. External Communication Line (Immobilizer System/*KDS): GY/BL
 - 51. Meter Unit (Tachometer): LB
 - 52. Immobilizer Amplifier: P/BK
 - 53. Ground for Fuel System: BK/Y
 - 54. Ground for Ignition System: BK/Y
- *: KDS (Kawasaki Diagnostic System)

3-16 FUEL SYSTEM (DFI)

DFI System

DFI System Wiring Diagram (ZR800C/D Models)



DFI System

Part Names

1. Oxygen Sensor
2. Joint Connector E
3. ECU
4. Joint Connector D
5. Immobilizer/Kawasaki Diagnostic System Connector
6. Frame Ground 4
7. Frame Ground 3
8. Frame Ground 2
9. Frame Ground 1
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. ECU Fuse 15 A
15. Fuse Box 2
16. Radiator Fan Fuse 15 A
17. Fuel Pump
18. Relay Box
19. Fuel Pump Relay
20. ECU Main Relay
21. Radiator Fan Relay
22. Fuse Box 1
23. Ignition Fuse 15 A
24. Meter Unit
25. Tachometer
26. Yellow Engine Warning Indicator Light
27. Joint Connector C
28. Immobilizer Antenna
29. Immobilizer Amplifier
30. Ignition Switch
31. Engine Stop Switch
32. Starter Button
33. Fan Motor
34. Stick Coil #1
35. Stick Coil #2
36. Stick Coil #3
37. Stick Coil #4
38. Air Switching Valve
39. Vehicle-down Sensor
40. Intake Air Temperature Sensor
41. Speed Sensor
42. Fuel Injector #1
43. Fuel Injector #2
44. Fuel Injector #3
45. Fuel Injector #4
46. Subthrottle Valve Actuator
47. Main Throttle Sensor
48. Water Proof Joint 2
49. Water Proof Joint 1
50. Subthrottle Sensor
51. Intake Air Pressure Sensor #2
52. Intake Air Pressure Sensor #1
53. Water Temperature Sensor
54. Crankshaft Sensor

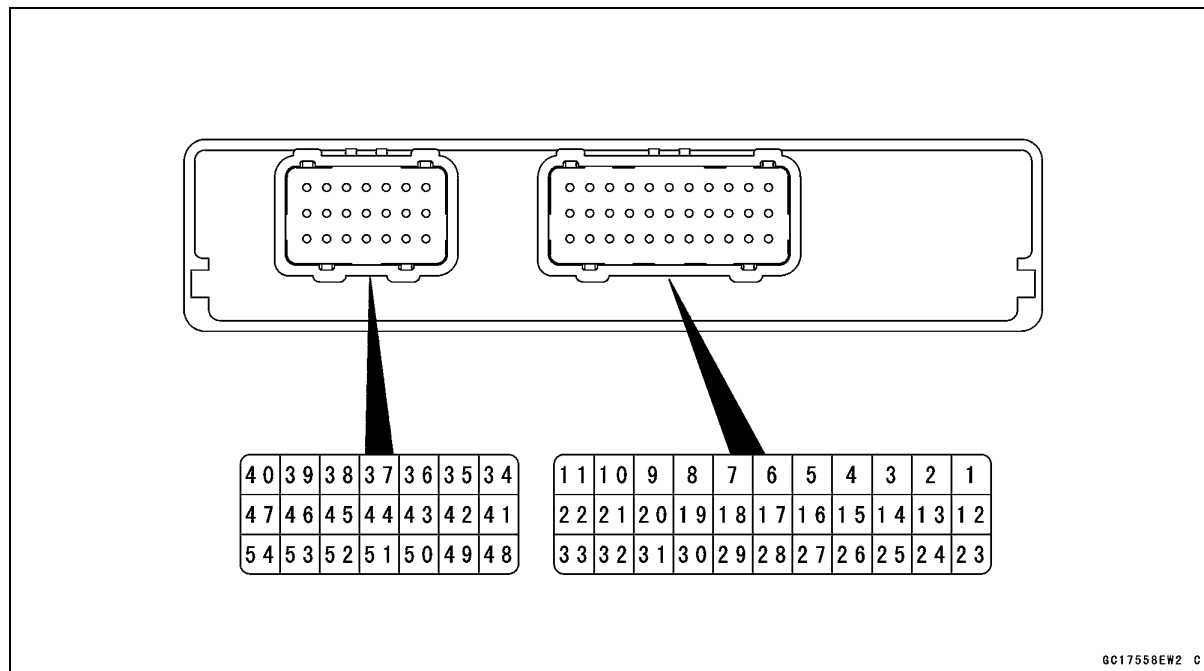
3-18 FUEL SYSTEM (DFI)

DFI System

○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		

Terminal Numbers of ECU Connectors (ZR800C/D Models)



Terminal Names

1. Subthrottle Valve Actuator: GY/R
2. Unused
3. Unused
4. Fuel Pump Relay: BR/Y
5. Power Supply to Sensors: BL
6. Power Supply to ECU (from ECU Main Relay): W/G
7. Air Switching Valve: R/BL
8. Power Supply to ECU (from Battery): W/BK
9. Oxygen Sensor Heater: P/BK
10. Injector #4: BL/G
11. Injector #3: BL/O
12. Subthrottle Valve Actuator: V
13. Unused
14. Unused
15. Intake Air Temperature Sensor: R/BK
16. Intake Air Pressure Sensor #2: G/W
17. Intake Air Pressure Sensor #1: Y/BL
18. Radiator Fan Relay: P/BL
19. Vehicle-down Sensor: Y/G
20. Crankshaft Sensor (+): Y
21. Crankshaft Sensor (-): Y/BK
22. Speed Sensor: P
23. Subthrottle Valve Actuator: BK/O
24. Subthrottle Valve Actuator: G/BL
25. Side Stand Switch: G/BK

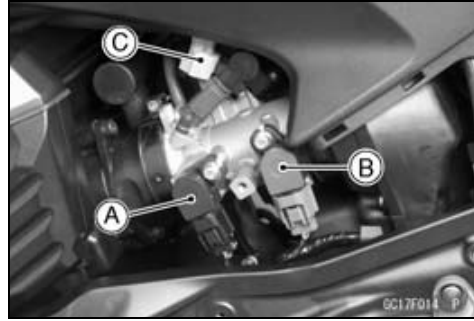
DFI System

- 26. Main Throttle Sensor: Y/W
 - 27. Subthrottle Sensor: BL/W
 - 28. Unused
 - 29. Water Temperature Sensor: O
 - 30. Ground for ECU: BK/BL
 - 31. Warning Indicator Light (LED) (Meter Unit): BR/R
 - 32. Oxygen Sensor: BL/Y
 - 33. Ground for Sensors: G
 - 34. Injector #2: BL/R
 - 35. Starter Button: R/BK
 - 36. Injector #1: BL/BK
 - 37. Engine Stop Switch: R/BK
 - 38. Stick Coil #4: BK/G
 - 39. Stick Coil #3: BK/O
 - 40. Stick Coil #1: BK
 - 41. External Communication Line (Immobilizer System/*KDS): LG/BK
 - 42. Unused
 - 43. Neutral Switch: LG
 - 44. Starter Lockout Switch: R/G
 - 45. Unused
 - 46. Immobilizer Amplifier: V
 - 47. Stick Coil #2: BK/R
 - 48. Ground: P
 - 49. Ground: BK/Y
 - 50. External Communication Line (Immobilizer System/*KDS): GY/BL
 - 51. Meter Unit (Tachometer): LB
 - 52. Immobilizer Amplifier: P/BK
 - 53. Ground for Fuel System: BK/Y
 - 54. Ground for Ignition System: BK/Y
- *: KDS (Kawasaki Diagnostic System)

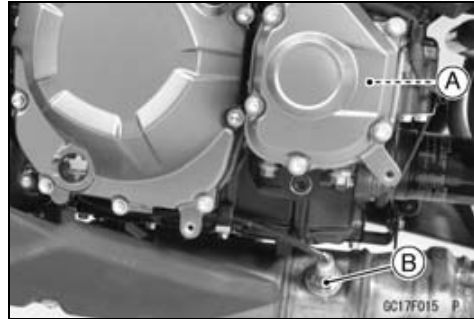
3-20 FUEL SYSTEM (DFI)

DFI Parts Location

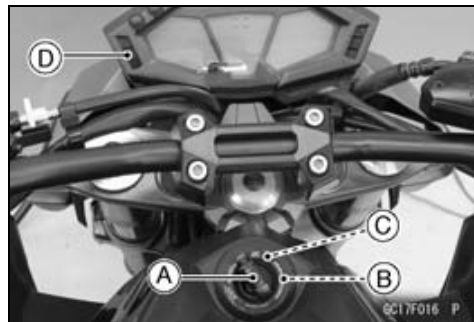
Main Throttle Sensor [A]
Subthrottle Sensor [B]
Fuel Injectors #1, #2, #3, #4 [C]



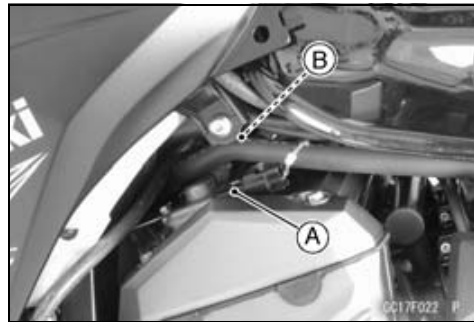
Crankshaft Sensor [A]
Oxygen Sensor [B]



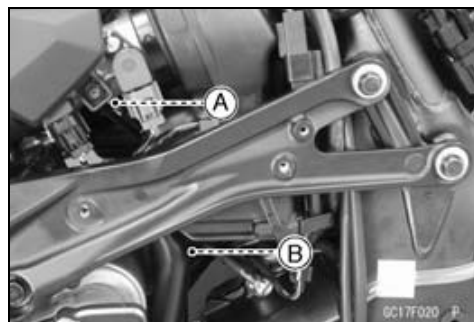
Ignition Key (Transponder) [A]
Ignition Switch [B]
Immobilizer Antenna [C]
Yellow Warning Indicator Light (LED) [D]



Stick Coils #1, #2, #3, #4 [A]
Air Switching Valve [B]

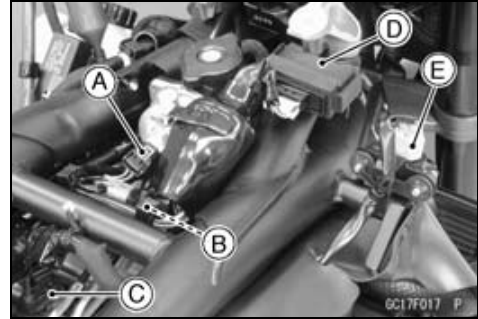


Subthrottle Valve Actuator [A]
Speed Sensor [B]

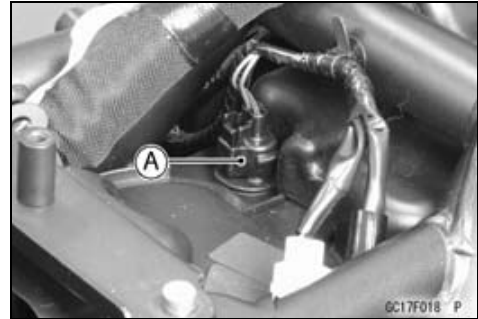


DFI Parts Location

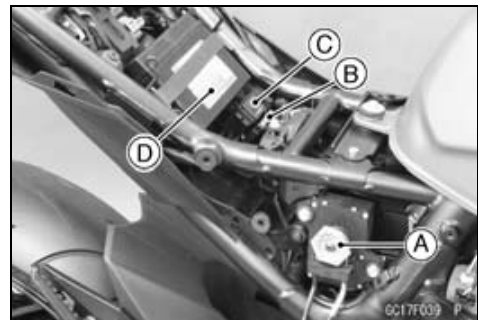
- Water Temperature Sensor [A]
- Intake Air Pressure Sensor #2 [B]
- Intake Air Pressure Sensor #1 [C]
- Immobilizer Amplifier [D]
- Vehicle-down Sensor [E]



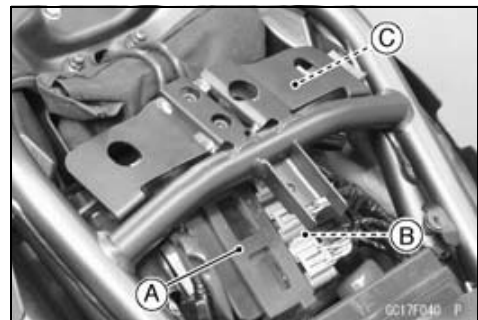
- Intake Air Temperature Sensor [A]



- Exhaust Butterfly Valve Actuator (ZR800A/B Models) [A]
- Fuse Box 2 [B] (Radiator Fan Fuse 15 A)
- Fuse Box 1 [C] (Ignition Fuse 15 A)
- Battery 12 V 8 Ah [D]



- Relay Box [A] (ECU Main Relay, Radiator Fan Relay, Fuel Pump Relay)
- ECU [B]
- Immobilizer/Kawasaki Diagnostic System Connector [C]



- Fuel Pump [A]



3-22 FUEL SYSTEM (DFI)

Specifications

Item	Standard
Digital Fuel Injection System	
Idle Speed	1 100 ±50 r/min (rpm)
Throttle Body Assy:	
Throttle Valve	Dual throttle valve
Bore	φ34 mm (1.34 in.)
Throttle Body Vacuum	35.3 ±1.3 kPa (265 ±10 mmHg) at idle speed
Bypass Screws (Turn Out)	— — —
ECU:	
Make	DENSO
Type	Digital memory type, with built in IC igniter, sealed with resin
Usable Engine Speed	80 ~ 11 600 r/min (rpm)
Fuel Pressure (High Pressure Line)	294 kPa (3.0 kgf/cm ² , 43 psi) with engine idling
Fuel Pump:	
Type	In-tank friction pump
Discharge	50 mL (1.7 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	INP-288
Nozzle Type	Fine atomizing type with 8 holes
Resistance	About 11.7 ~ 12.3 Ω at 20°C (68°F)
Main Throttle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 0.995 ~ 1.025 V at idle throttle opening DC 4.05 ~ 4.48 V at full throttle opening (for reference)
Resistance	4 ~ 6 kΩ
Intake Air Pressure Sensor #1/#2:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.80 ~ 4.20 V at standard atmospheric pressure (see this text for details)
Intake Air Temperature Sensor:	
Output Voltage	About DC 2.25 ~ 2.50 V at 20°C (68°F)
Resistance	2.21 ~ 2.69 kΩ at 20°C (68°F) About 0.322 kΩ at 80°C (176°F)
Water Temperature Sensor:	
Resistance	see the Electrical System chapter
Output Voltage	About DC 2.80 ~ 2.97 V at 20°C (68°F)
Speed Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	About DC 0.05 ~ 0.09 V or DC 4.5 ~ 4.9 V at ignition switch ON and 0 km/h
Vehicle-down Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V

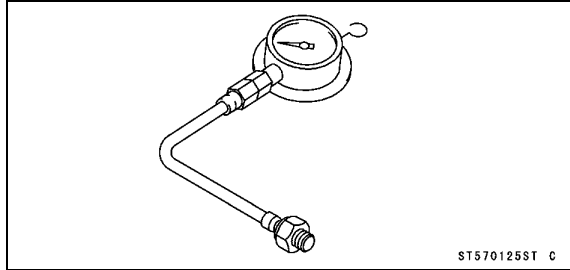
Specifications

Item	Standard
Output Voltage	With sensor tilted 60 ~ 70° or more right or left: DC 0.65 ~ 1.35 V
	With sensor arrow mark pointed up: DC 3.55 ~ 4.45 V
Subthrottle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 0.48 ~ 0.52 V at subthrottle valve full close position DC 3.65 ~ 4.38 V at subthrottle valve full open position
Resistance	4 ~ 6 kΩ
Exhaust Butterfly Valve Actuator Sensor (ZR800A/B Models):	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.46 ~ 3.76 V at pulley original position
Resistance	4 ~ 6 kΩ
Immobilizer Antenna:	
Resistance	About 3.0 ~ 4.6 Ω
Exhaust Butterfly Valve Actuator (ZR800A/B Models):	
Resistance	5 ~ 200 Ω (for reference)
Subthrottle Valve Actuator:	
Resistance	About 5.2 ~ 7.8 Ω
Input Voltage	DC 8.5 ~ 12.5 V or DC 8.5 ~ 12.5 V and then about 0 V
Oxygen Sensor:	
Output Voltage (Rich)	DC 0.7 V or more
Output Voltage (Lean)	DC 0.2 V or less
Heater Resistance	11.7 ~ 15.5 Ω at 20°C (68°F)
Throttle Grip and Cables	
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Air Cleaner	
Element	Paper filter

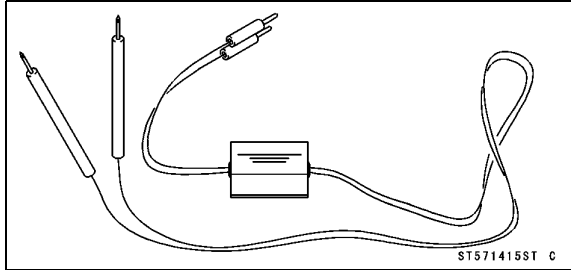
3-24 FUEL SYSTEM (DFI)

Special Tools and Sealant

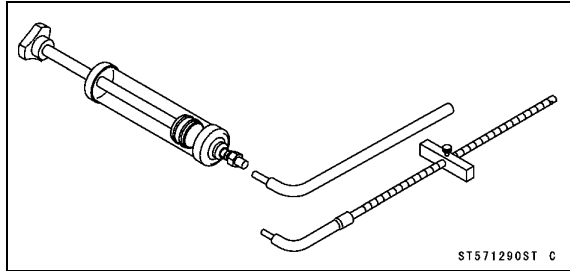
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



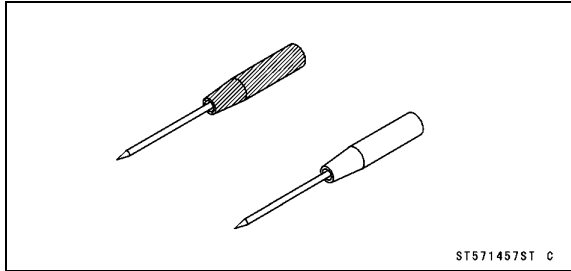
Peak Voltage Adapter:
57001-1415



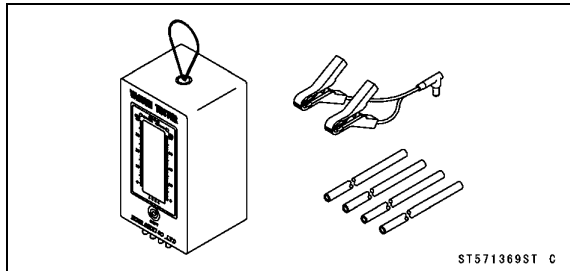
Fork Oil Level Gauge:
57001-1290



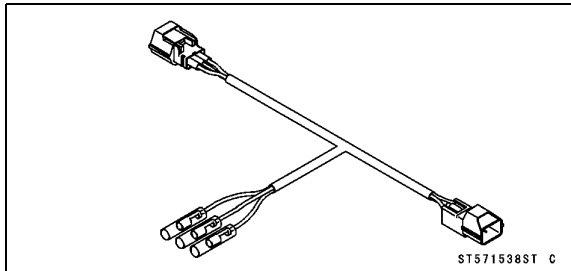
Needle Adapter Set:
57001-1457



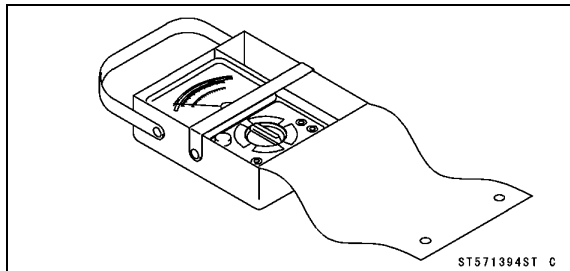
Vacuum Gauge:
57001-1369



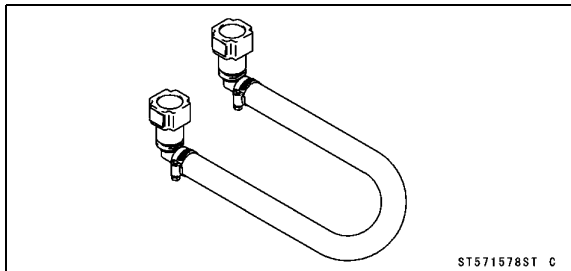
Throttle Sensor Setting Adapter:
57001-1538



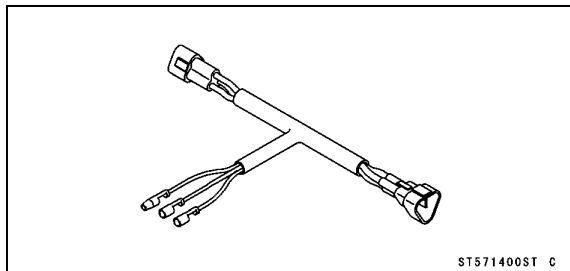
Hand Tester:
57001-1394



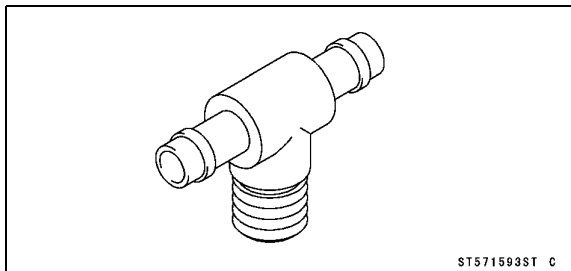
Extension Tube:
57001-1578



Throttle Sensor Setting Adapter #1:
57001-1400

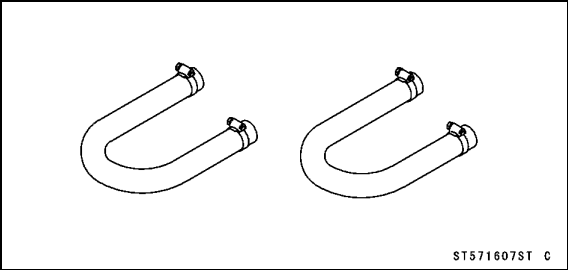


Fuel Pressure Gauge Adapter:
57001-1593

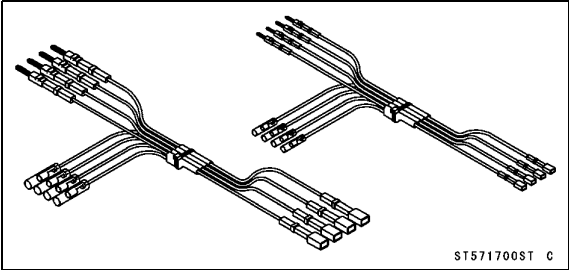


Special Tools and Sealant

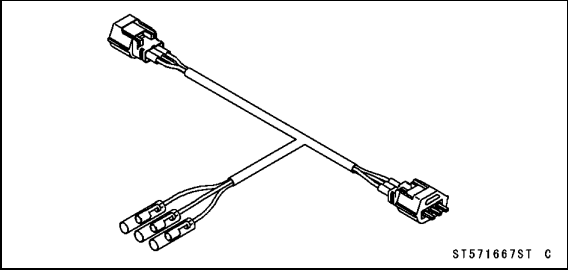
Fuel Hose:
57001-1607



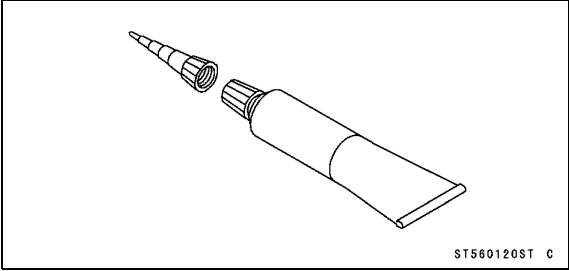
Measuring Adapter:
57001-1700



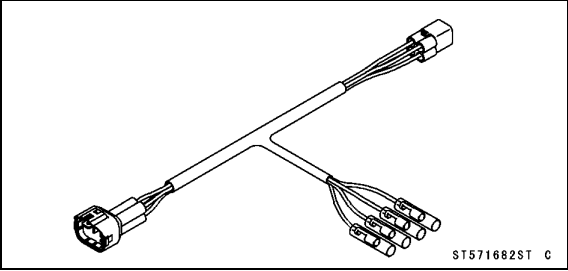
Speed Sensor Measuring Adapter:
57001-1667



Liquid Gasket, TB1211:
56019-120



Oxygen Sensor Measuring Adapter:
57001-1682



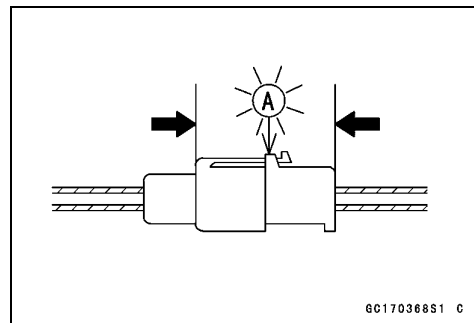
3-26 FUEL SYSTEM (DFI)

DFI Servicing Precautions

DFI Servicing Precautions

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

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



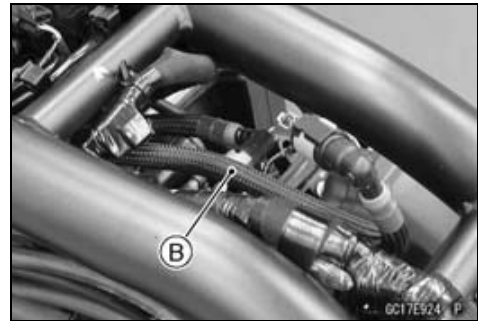
DFI Servicing Precautions

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

Fuel Intake Hose [A]

Fuel Outlet Hose [B]

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



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

Torque - Oil Filler Plug: 2.0 N·m (0.20 kgf·m, 18 in·lb)

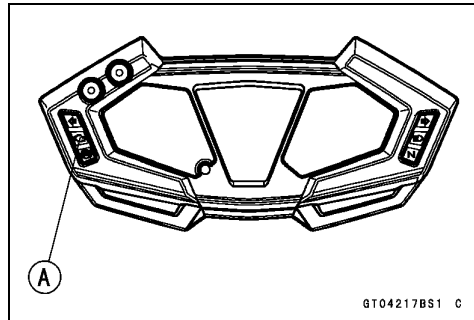


3-28 FUEL SYSTEM (DFI)

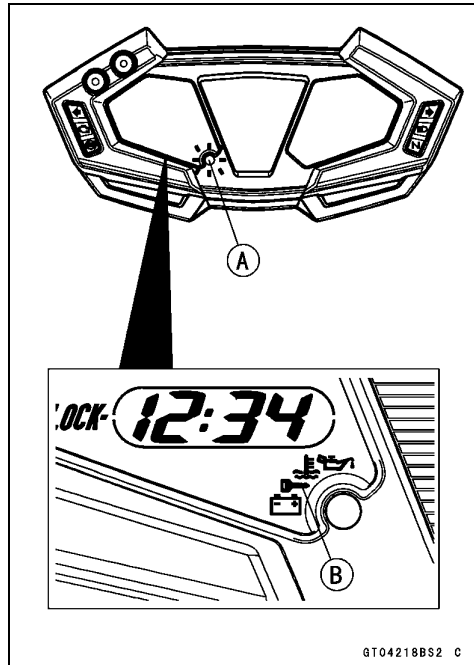
Troubleshooting the DFI System

Outline

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



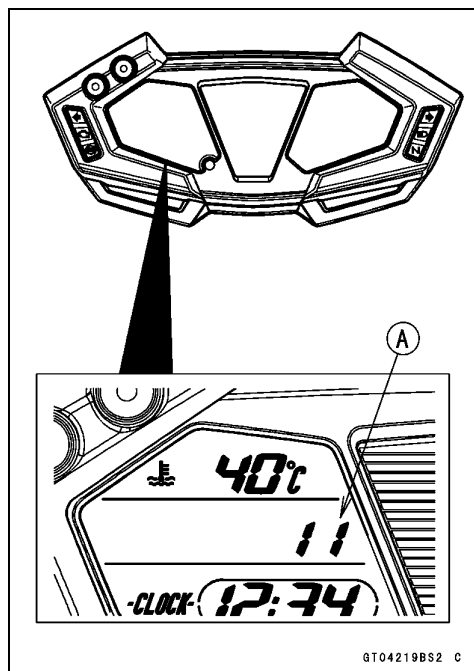
When a problem occurs with immobilizer system, the red warning indicator light (LED) [A] blinks and immobilizer warning symbol [B] is displayed on the LCD, when a problem occurs in the system.



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

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

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

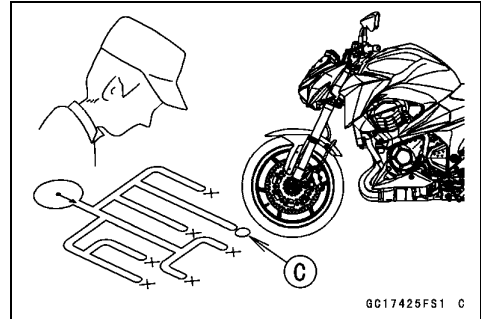
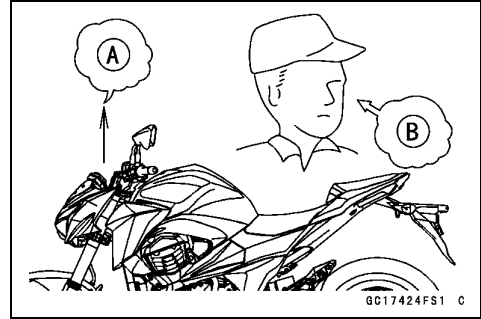


Troubleshooting the DFI System

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

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

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



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

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

When the repair has been done, the yellow warning indicator light (LED) goes off. But the service codes stored in memory of the ECU are not erased to preserve the problem history. The problem history can be referred using the KDS (Kawasaki Diagnostic System) when solving unstable problems

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

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

3-30 FUEL SYSTEM (DFI)

Troubleshooting the DFI System

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

Special Tool - Needle Adapter Set: 57001-1457

NOTICE

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

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

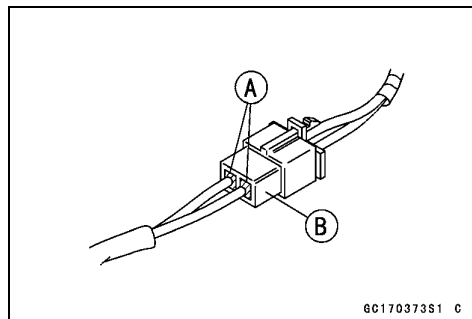
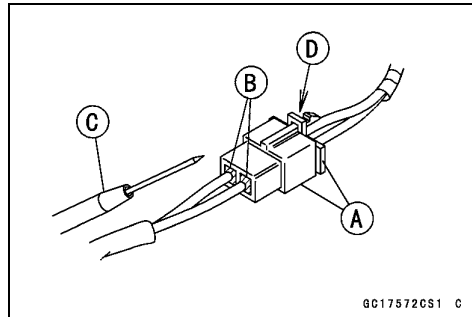
NOTICE

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

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

Sealant - Liquid Gasket, TB1211: 56019-120

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



Troubleshooting the DFI System

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

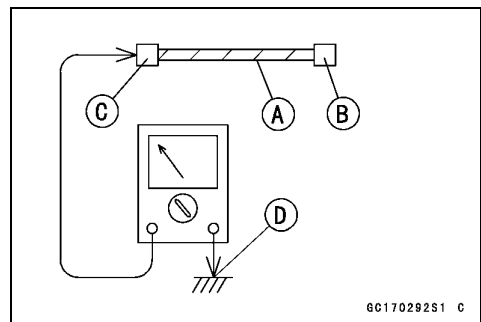
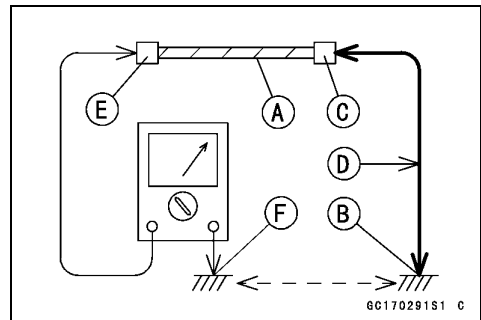
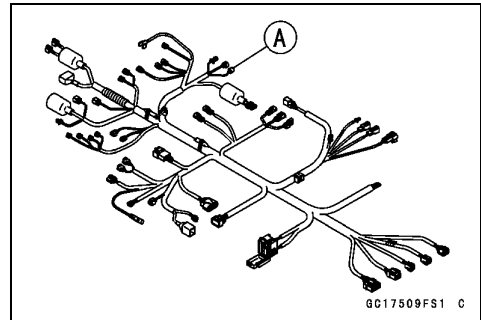
Special Tool - Hand Tester: 57001-1394

- Set the tester to the $\times 1 \Omega$ range, and read the tester.
- ★ If the tester does not read 0Ω , the lead is defective. Replace the lead or the main harness or the subharness.

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

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

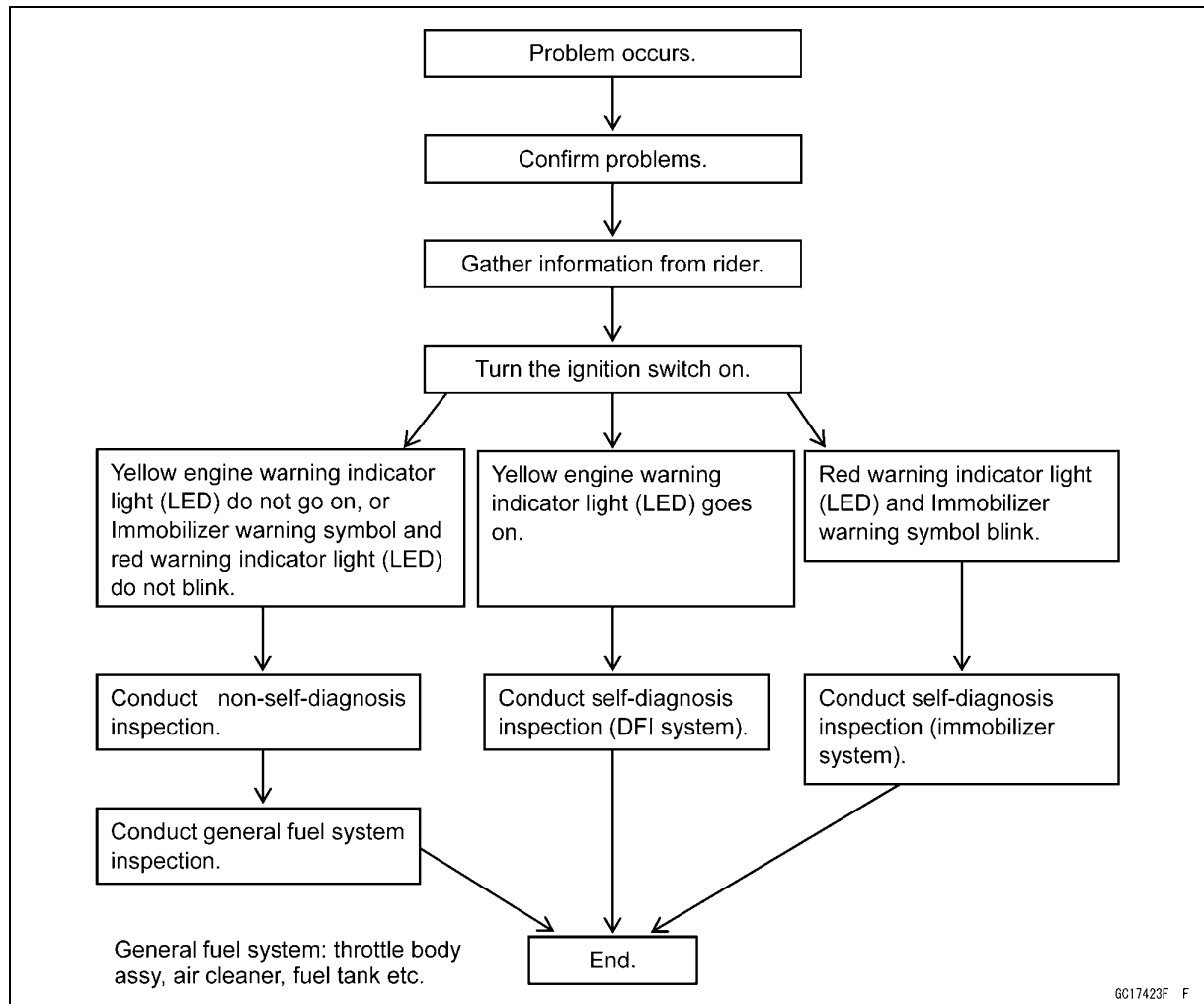
- Narrow down suspicious locations by repeating the continuity tests from the ECU connectors.
- ★ If no abnormality is found in the wiring or connectors, the DFI parts are the next likely suspects. Check the part, starting with input and output voltages. However, there is no way to check the ECU itself.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



3-32 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	<input type="checkbox"/> fine, <input type="checkbox"/> cloudy, <input type="checkbox"/> rain, <input type="checkbox"/> snow, <input type="checkbox"/> always, <input type="checkbox"/> other:	
Temperature	<input type="checkbox"/> hot, <input type="checkbox"/> warm, <input type="checkbox"/> cold, <input type="checkbox"/> very cold, <input type="checkbox"/> always, <input type="checkbox"/> other:	
Problem frequency	<input type="checkbox"/> chronic, <input type="checkbox"/> often, <input type="checkbox"/> once	
Road	<input type="checkbox"/> street, <input type="checkbox"/> highway, <input type="checkbox"/> mountain road (<input type="checkbox"/> uphill, <input type="checkbox"/> downhill), <input type="checkbox"/> bumpy, <input type="checkbox"/> pebble	
Altitude	<input type="checkbox"/> normal, <input type="checkbox"/> high (about 1 000 m or more)	
Motorcycle conditions when problem occurred.		
Warning indicator light (LED)	<input type="checkbox"/> Starts blinking about 3 seconds after from ignition switch ON, and goes off after engine pressure becomes high enough (with engine running).	
	<input type="checkbox"/> Starts blinking about 3 seconds after from ignition switch ON, and the FI warning symbol on the LCD starts blinking (DFI system problem).	
	<input type="checkbox"/> Starts blinking about 3 seconds after from ignition switch ON, and the immobilizer warning symbol on the LCD starts blinking (immobilizer system problem).	
	<input type="checkbox"/> Starts blinking about 3 seconds after from ignition switch ON, and about 10 seconds after, the FI warning symbol on the LCD starts blinking (ECU communication error).	
	<input type="checkbox"/> Does not blink about 3 seconds after ignition switch ON.	
	<input type="checkbox"/> light up (ECU or meter unit replace).	
Starting difficulty	<input type="checkbox"/> starter motor not rotating.	
	<input type="checkbox"/> starter motor rotating but engine do not turn over.	
	<input type="checkbox"/> starter motor and engine do not turn over.	
	<input type="checkbox"/> no fuel flow (<input type="checkbox"/> no fuel in tank, <input type="checkbox"/> no fuel pump sound).	
	<input type="checkbox"/> no spark.	
	<input type="checkbox"/> other:	
Engine stalls	<input type="checkbox"/> right after starting.	
	<input type="checkbox"/> when opening throttle grip.	
	<input type="checkbox"/> when closing throttle grip.	
	<input type="checkbox"/> when moving off.	
	<input type="checkbox"/> when stopping the motorcycle.	
	<input type="checkbox"/> when cruising.	
	<input type="checkbox"/> other:	

3-34 FUEL SYSTEM (DFI)

Troubleshooting the DFI System

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

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

Poor Running at Low Speed

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

3-36 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 #1 trouble	Inspect (see chapter 3).
Intake air pressure sensor #2 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Unstable (rough) idling:	
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Intake air pressure sensor #1 trouble	Inspect (see chapter 3).
Intake air pressure sensor #2 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor #1 trouble	Inspect (see chapter 3).
Intake air pressure sensor #2 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor #1 trouble	Inspect (see chapter 3).
Intake air pressure sensor #2 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor #1 trouble	Inspect (see chapter 3).
Intake air pressure sensor #2 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Surge:	
Unstable fuel pressure	Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and replace fuel pump) (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor #1 trouble	Inspect (see chapter 3).
Intake air pressure sensor #2 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
After fire:	
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Fuel injector trouble	Inspect (see chapter 3).
Intake air pressure sensor #1 trouble	Inspect (see chapter 3).
Intake air pressure sensor #2 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).

3-38 FUEL SYSTEM (DFI)

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Other:	
Intermittent any DFI fault and its recovery	Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 3).

Poor Running or No Power at High Speed

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

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Intake air temperature sensor trouble	Inspect (see chapter 3).
Miscellaneous:	
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Speed sensor trouble	Inspect (see chapter 3).
Throttle valves will not fully open	Inspect throttle cables and lever linkage (see chapter 3).
Engine overheating - Water temperature sensor, crankshaft sensor or speed sensor trouble	(see Overheating of Troubleshooting Guide in chapter 17)
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
Exhaust Smokes Excessively:	
(Black smoke)	
Air cleaner element clogged	Clean element (see chapter 2).
Fuel pressure too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
(Brown smoke)	
Air duct loose	Reinstall (see chapter 3).
Fuel pressure too low	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).

3-40 FUEL SYSTEM (DFI)

Self-Diagnosis

Self-Diagnosis Outline

The self-diagnosis system is monitoring the following mechanisms.

- DFI System and Ignition System
- Immobilizer System

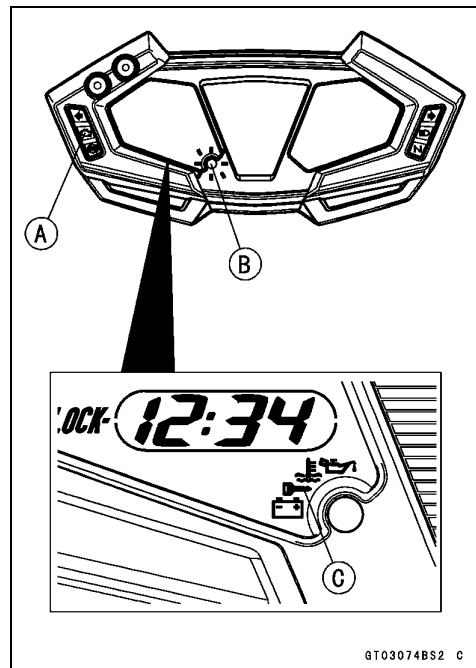
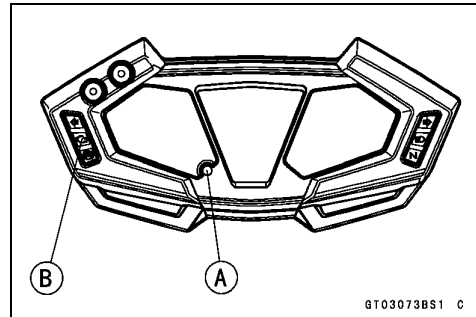
The following warning indicator lights (LED) are used for symbols of below table.

LED Color	Warning Indicator Symbols
Red [A]	Oil Pressure Battery Water Temperature Immobilizer
Yellow [B]	FI

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

User Mode

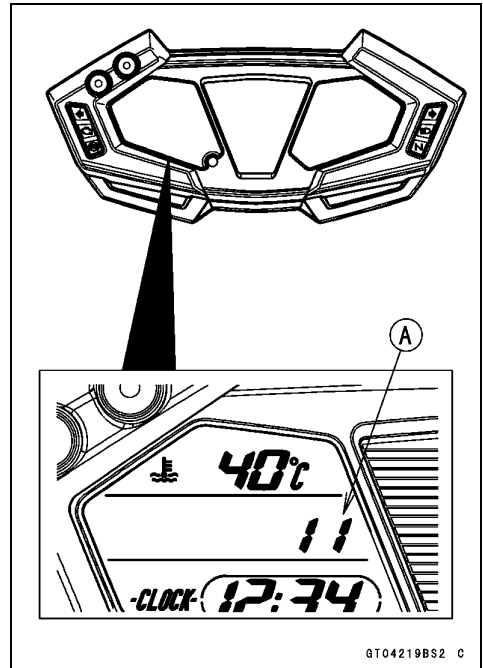
The ECU notifies the rider of troubles in DFI system, ignition system and immobilizer system by lighting or blinking the yellow engine warning indicator light (LED) [A], red warning indicator light (LED) [B] and warning symbol [C] when DFI, ignition and immobilizer system parts are faulty, and initiates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



Self-Diagnosis

Dealer Mode

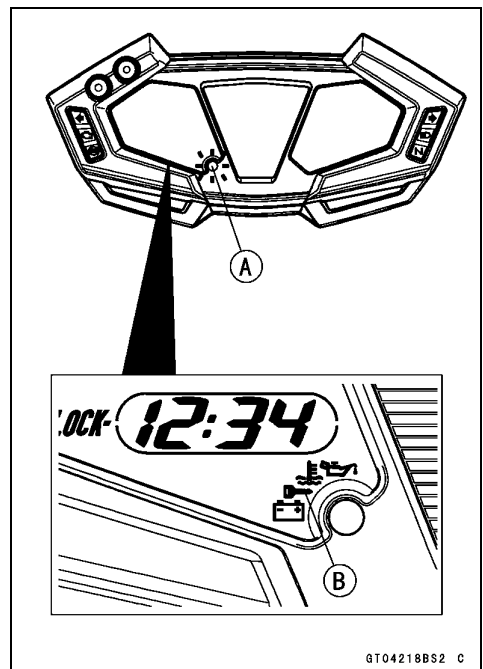
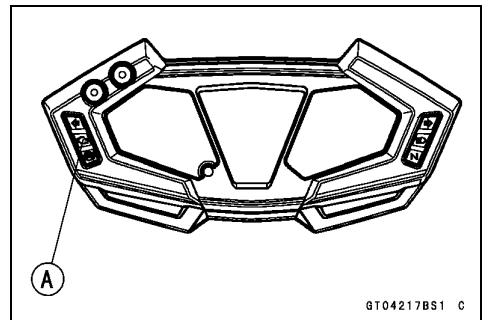
The LCD (Liquid Crystal Display) displays the service code(s) [A] to show the problem(s) which the above system has at the moment of diagnosis.



Self-Diagnosis Procedures

NOTE

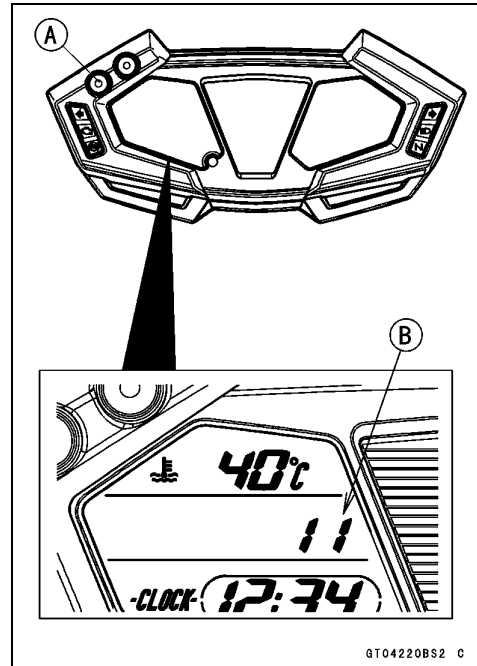
- Use a fully charged battery when conducting self-diagnosis. Otherwise, the light (LED) and symbol do not light or blink.
- Turn the ignition switch on.
- When a problem occurs with DFI system and ignition system, the yellow engine warning indicator light (LED) [A] goes on to alert the rider.
- When a problem occurs with immobilizer system (equipped models), the red warning indicator light (LED) [A] blinks and immobilizer warning symbol [B] is displayed on the LCD (Liquid Crystal Display).



3-42 FUEL SYSTEM (DFI)

Self-Diagnosis

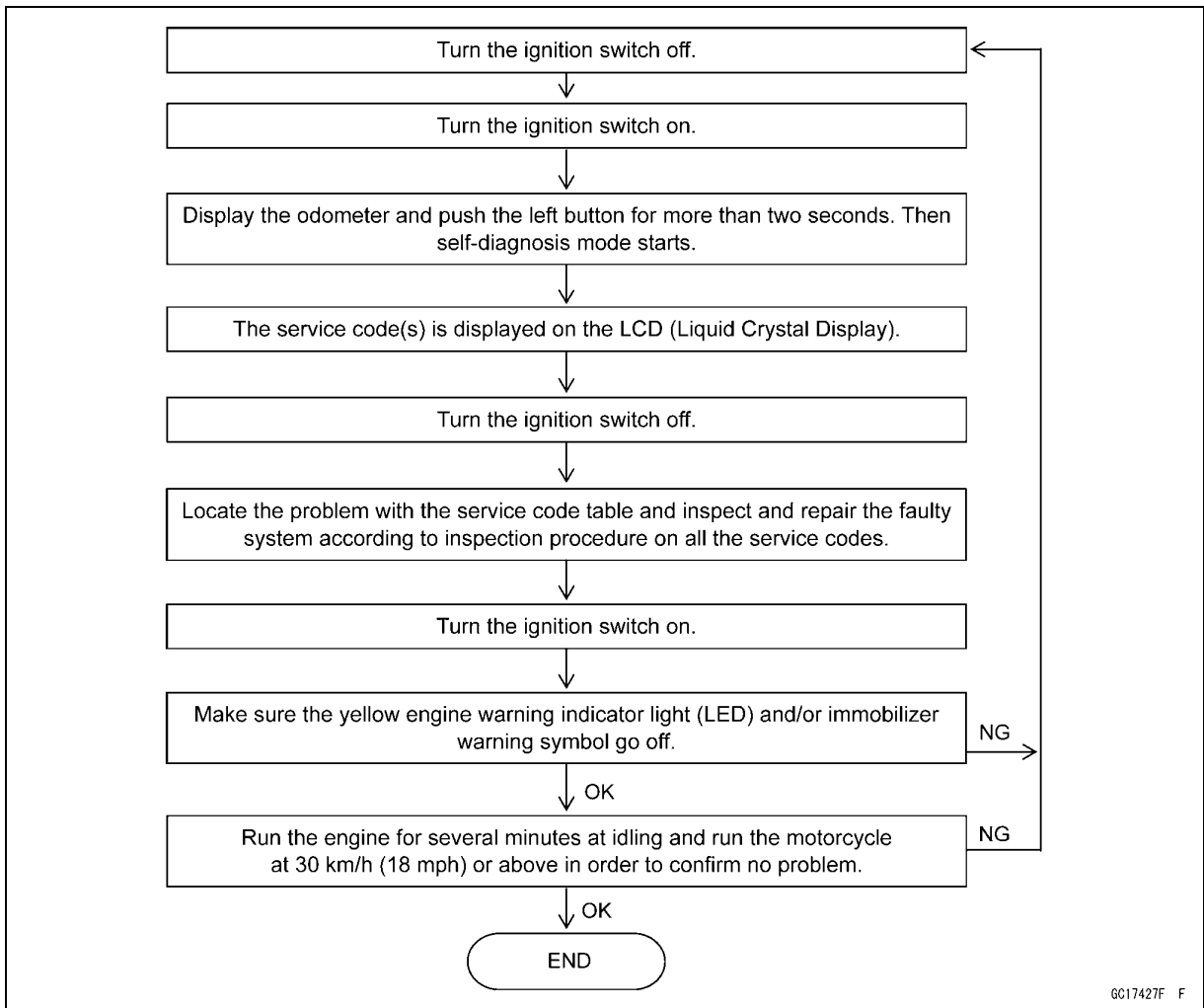
- Push the left button [A] to display the odometer.
- Push the left button for more than two seconds.
- The service code [B] is displayed on the LCD by the number of two digits.



- Any of the following procedures ends self-diagnosis.
- When the service code is displayed on the LCD, push the left button for more than two seconds. The display will return to the previous display.
- When the ignition switch is turned off.

Self-Diagnosis

Self-Diagnosis Flow Chart

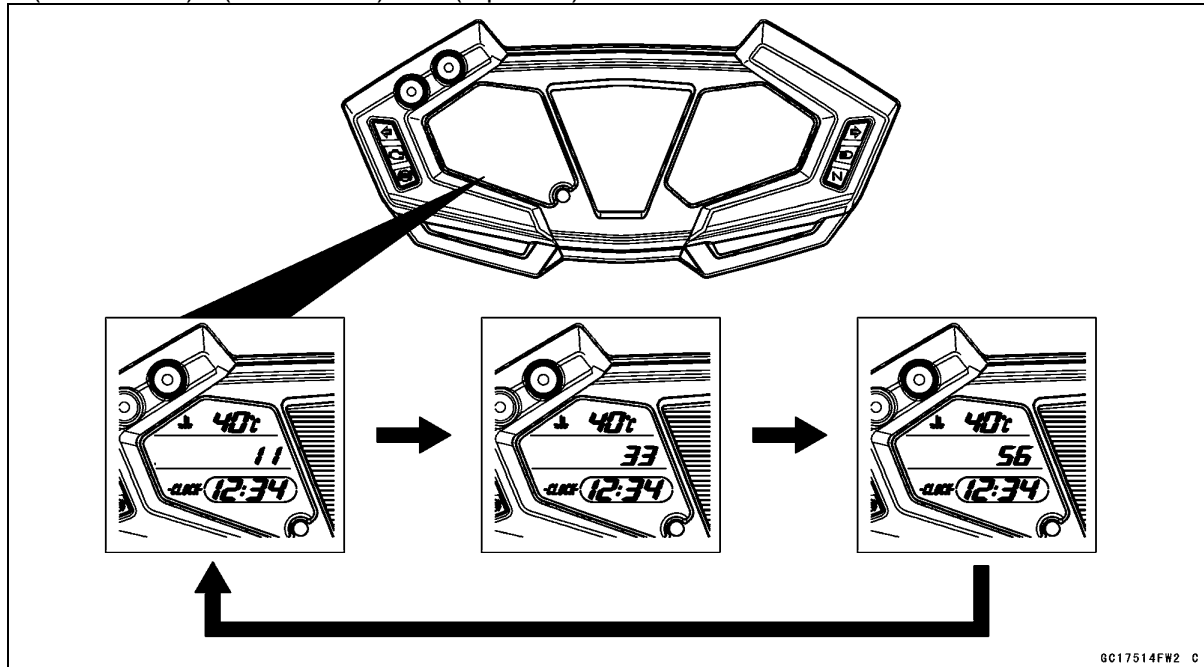


3-44 FUEL SYSTEM (DFI)

Self-Diagnosis

Service Code Reading

- The service code(s) is displayed on the LCD by the number of two digits.
- When there are a number of problems, all the service codes can be stored and the display will begin starting from the lowest number service code in the numerical order.
- Then after completing all codes, the display is repeated until the ignition switch is turned OFF or left button is pushed for more than two seconds.
- For example, if three problems occurred in the order of 56, 11, 33, the service codes are displayed (each two seconds) from the lowest number in the order listed as shown below. (11→33→56)→(11→33→56)→···(repeated)



- If there is no problem or when the repair has been done, yellow engine warning indicator light (LED) and/or immobilizer warning symbol go off and service code is not displayed.

Service Code Erasing

- When repair has been done, yellow engine warning indicator light (LED) and/or immobilizer warning symbol go off and service code is not displayed.
- ★But the service codes stored in memory of the ECU are not erased to preserve the problem history. In this model, the problem history can not be erased.

Self-Diagnosis

Service Code Table

Service Code	System	Problems
11	FI	Main throttle sensor malfunction, wiring open or short
12	FI	Intake air pressure sensor #1 malfunction, wiring open or short
13	FI	Intake air temperature sensor malfunction, wiring open or short
14	FI	Water temperature sensor malfunction, wiring open or short
16	FI	Intake air pressure sensor #2 malfunction, wiring open or short
21	FI	Crankshaft sensor malfunction, wiring open or short
24	FI	Speed sensor malfunction, wiring open or short
31	FI	Vehicle-down sensor malfunction, wiring open or short
32	FI	Subthrottle sensor malfunction, wiring open or short
33	FI	Oxygen sensor inactivation, wiring open or short
34	FI	Exhaust butterfly valve actuator sensor malfunction, wiring open or short (ZR800A/B Models)
35	Immobilizer	Immobilizer amplifier malfunction
36	Immobilizer	Blank key detection
39	FI	ECU communication error
51	FI	Stick coil #1 malfunction, wiring open or short
52	FI	Stick coil #2 malfunction, wiring open or short
53	FI	Stick coil #3 malfunction, wiring open or short
54	FI	Stick coil #4 malfunction, wiring open or short
56	FI	Radiator fan relay malfunction, wiring open or short
62	FI	Subthrottle valve actuator malfunction, wiring open or short
63	FI	Exhaust butterfly valve actuator malfunction, wiring open or short (ZR800A/B Models)
64	FI	Air switching valve malfunction, wiring open or short
67	FI	Oxygen sensor heater malfunction, wiring open or short
94	FI	Oxygen sensor malfunction, wiring open or short

Notes:

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

3-46 FUEL SYSTEM (DFI)

Self-Diagnosis

Backups

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

Service Codes	Parts	Output Signal Usable Range or Criteria	Backups by ECU
11	Main Throttle Sensor	Output Voltage 0.2 ~ 4.8 V	If the main throttle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the D-J method (1).
12	Intake Air Pressure Sensor #1	Intake Air Pressure (Absolute) Pv = 600 ~ 900 mmHg	If the intake air pressure sensor #1 system fails (the signal is out of the usable range, wiring short or open), the ECU sets the DFI in the α-N method (2).
13	Intake Air Temperature Sensor	Intake Air Temperature Ta = - 45 ~ + 135°C	If the intake air temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Ta at 40°C.
14	Water Temperature Sensor	Water Temperature Tw = - 30 ~ + 120°C	If the water temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Tw at 80°C. When an radiator fan is turning on, ECU sets Tw at 110°C.
16	Intake Air Pressure Sensor #2	Atmospheric Pressure (Absolute) Pa = 60 ~ 900 mmHg	If the intake air pressure sensor #2 system fails (the signal is out of the usable range, wiring short or open), the ECU sets Pa at 760 mmHg (the standard atmospheric pressure).
21	Crankshaft Sensor	Crankshaft sensor must send 22 signals to the ECU at the 1 cranking.	If the crankshaft sensor fails, the engine stops by itself.
24	Speed Sensor	Speed sensor must send 23 signals to the ECU at the one rotation of the drive shaft. The gear position is decided by the signal of the speed sensor.	If the speed sensor system fails (no signal, wiring short or open), the speedometer shows 0.
31	Vehicle-down Sensor	Output Voltage 0.10 ~ 4.84 V	If the vehicle-down sensor system has failures (the output voltage is out of the usable range, wiring short or open), the ECU shuts off the fuel pump relay, the fuel injectors and the ignition system.
32	Subthrottle Sensor	Output Voltage 0.15 ~ 4.85 V	If the subthrottle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU drive the subthrottle valve to the full closed position, and it stops the current to the subthrottle valve actuator.
33	Oxygen Sensor	The oxygen sensor is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor is not activated, the ECU stops the feedback mode of the oxygen sensor.

Self-Diagnosis

Service Codes	Parts	Output Signal Usable Range or Criteria	Backups by ECU
34	Exhaust Butterfly Valve Actuator Sensor (ZR800A/B Models)	Output Voltage 0.1 ~ 4.9 V	If the exhaust butterfly valve sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU locks the exhaust butterfly valve at full open position near, and it stops the current to the exhaust butterfly valve actuator.
35	Immobilizer Amplifier	–	If the immobilizer system fails (no signal, wiring short or open), the vehicle is no start and run.
36	Ignition Key	The ignition key must use register key.	If the blank key or broken key is used, the vehicle is no start and run.
39	ECU	The ECU send the data (for service code and key registration) to the meter unit.	–
51	Stick Coil #1*	The ECU sends signals (output voltage) continuously to the stick coil.	If the stick coil #1 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #1 to stop fuel to the cylinder #1, though the engine keeps running.
52	Stick Coil #2*	The ECU sends signals (output voltage) continuously to the stick coil.	If the stick coil #2 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #2 to stop fuel to the cylinder #2, though the engine keeps running.
53	Stick Coil #3*	The ECU sends signals (output voltage) continuously to the stick coil.	If the stick coil #3 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #3 to stop fuel to the cylinder #3, though the engine keeps running.
54	Stick Coil #4*	The ECU sends signals (output voltage) continuously to the stick coil.	If the stick coil #4 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #4 to stop fuel to the cylinder #4, though the engine keeps running.
56	Radiator Fan Relay	When the radiator fan relay is OFF, the relay is opened.	–
62	Subthrottle Valve Actuator	The actuator operates open and close of the subthrottle valve by the pulse signal from the ECU.	If the subthrottle valve actuator fails (the signal is out to the usable range, wiring short or open), the ECU stops the current to the actuator.
63	Exhaust Butterfly Valve Actuator (ZR800A/B Models)	The actuator operates open and close of the exhaust butterfly valve by the pulse signal from the ECU.	If the exhaust butterfly valve actuator fails (the signal is out to the usable range, wiring short or open), the ECU stops the current to the actuator.
64	Air Switching Valve	The air switching valve controls the flow of the secondary air by opening and shutting the solenoid valve.	–

3-48 FUEL SYSTEM (DFI)

Self-Diagnosis

Service Codes	Parts	Output Signal Usable Range or Criteria	Backups by ECU
67	Oxygen Sensor Heater	The oxygen sensor heater raises temperature of the sensor for its earlier activation.	If the oxygen sensor heater fails (wiring short or open), the ECU stops the current to the heater, and it stops the feedback mode of the oxygen sensor.
94	Oxygen Sensor	The oxygen sensor must send signals (output voltage) continuously to the ECU	If the oxygen sensor output voltage is incorrect, the ECU stops the feedback mode of the oxygen sensor.

Note:

- (1): D-J Method: When the engine load is light like at idling or low speed, the ECU determines the injection quantity by calculating from the throttle vacuum (vacuum sensor output voltage) and engine speed (crankshaft sensor output voltage). This method is called D-J method.
 - (2): α -N Method: As the engine speed increases, and the engine load turns middle to heavy, the ECU determines the injection quantity by calculating from the throttle opening (throttle sensor output voltage) and the engine speed. This method is called α -N method.
- *: This depends on the number of stopped cylinders.

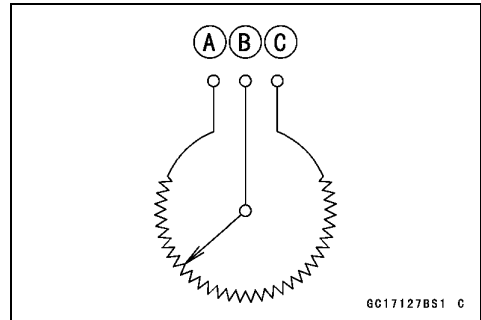
Main Throttle Sensor (Service Code 11)

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

Input Terminal [A]

Output Terminal [B]

Ground Terminal [C]



Main Throttle Sensor Removal/Adjustment

NOTICE

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

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



Main Throttle Sensor Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove:
 - Left Throttle Body Cover (see Throttle Body Assy Removal)
- Disconnect the main throttle sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

- Connect a digital meter to the harness adapter leads.

Main Throttle Sensor Input Voltage

Connections to Adapter:

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

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

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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

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



3-50 FUEL SYSTEM (DFI)

Main Throttle Sensor (Service Code 11)

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

○ Disconnect the ECU and sensor connectors.

Wiring Inspection

ECU Connector [A] ↔

Main Throttle Sensor Connector [B]

BL lead (ECU terminal 5) [C]

G lead (ECU terminal 33) [D]

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

Main Throttle Sensor Output Voltage Inspection

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

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

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

Main Throttle Sensor Output Voltage

Connections to Adapter:

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

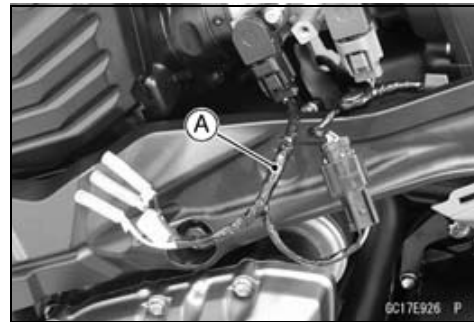
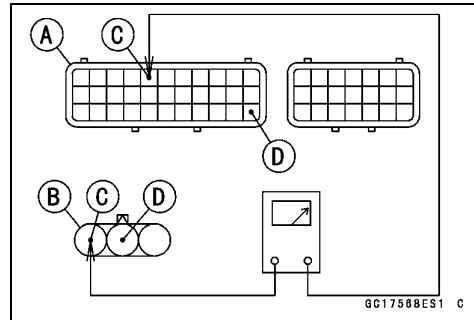
Digital Meter (-) → BK (sensor G) lead

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

Idle Speed

Standard: 1 100 ±50 r/min (rpm)

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



Main Throttle Sensor (Service Code 11)

- 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 0.995 ~ 1.025 V at idle throttle opening
 DC 4.05 ~ 4.48 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.

$$0.985 \times 4.75 \div 5.00 = 0.936 \text{ V}$$

$$1.015 \times 4.75 \div 5.00 = 0.964 \text{ V}$$

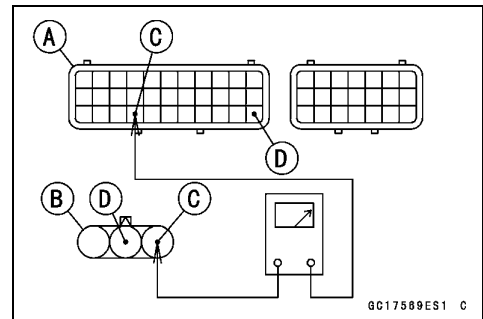
Thus, the valid range is 0.936 ~ 0.964 V

- Turn the ignition switch off.
- ★ If the reading is out of the standard, check the main throttle sensor resistance (see Main Throttle Sensor Resistance Inspection).
- ★ If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness side connectors.
- Disconnect the ECU and sensor connectors.

Wiring Inspection

ECU Connector [A] ↔
Main Throttle Sensor Connector [B]
Y/W lead (ECU terminal 26) [C]
G lead (ECU terminal 33) [D]

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



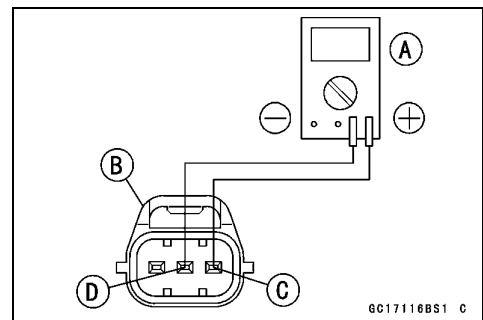
Main Throttle Sensor Resistance Inspection

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

Main Throttle Sensor Resistance

Connections: BL lead [C] ↔ G lead [D]
Standard: 4 ~ 6 kΩ

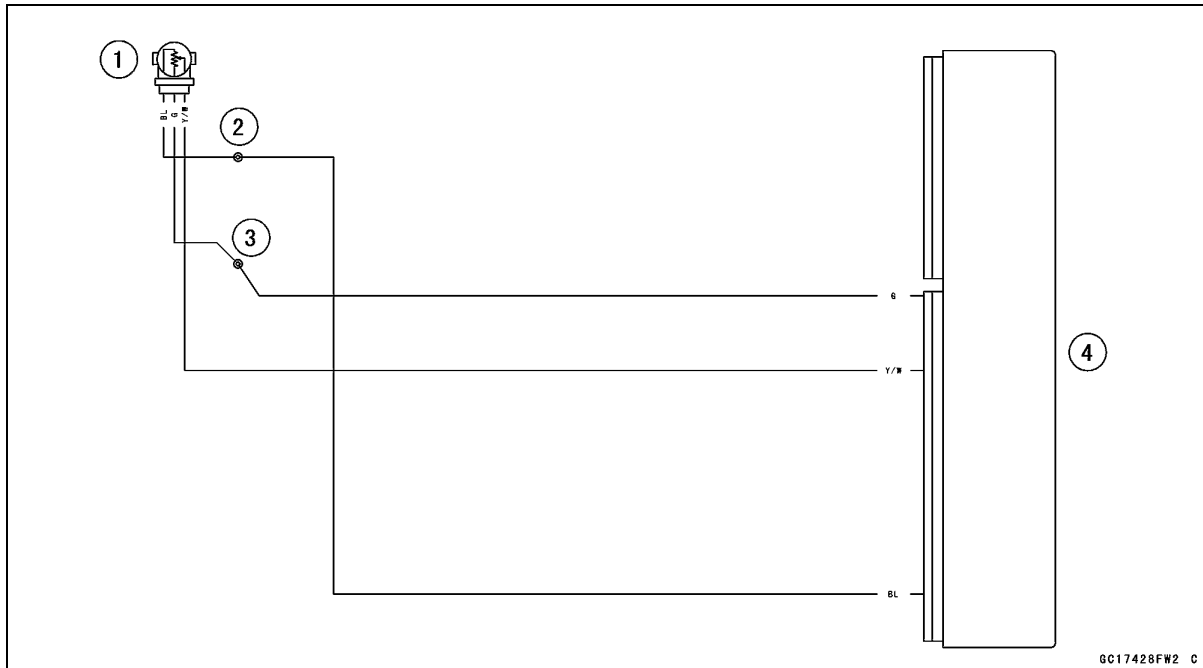
- ★ If the reading is out of the standard, replace the throttle body assy.
- ★ If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).



3-52 FUEL SYSTEM (DFI)

Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Circuit



1. Main Throttle Sensor
2. Water Proof Joint 1
3. Water Proof Joint 2
4. ECU

Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor #1 Removal

NOTICE

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

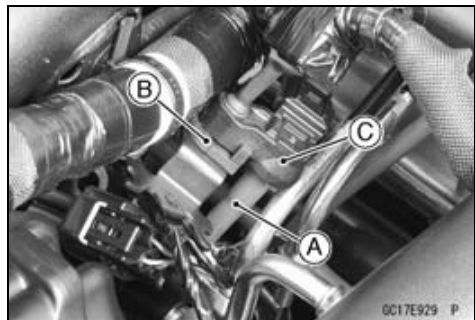
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the intake air pressure sensor #1 connector [A].



- Remove the bolt [A].



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



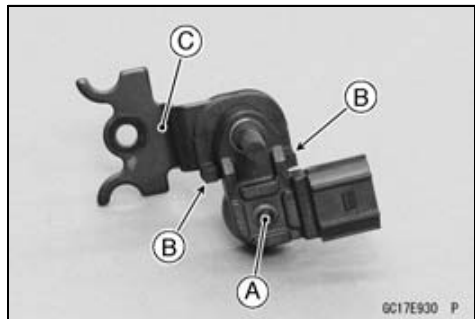
Intake Air Pressure Sensor #1 Installation

NOTE

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

- Installation is the reverse of removal.
- Position the intake air pressure sensor #1 [A] between the projections [B] on the rubber damper.
- Install the rubber damper on the bracket [C] as shown.
- Tighten:

Torque - Throttle Cable Plate Bolt: 5.9 N·m (0.60 kgf·m, 52 in·lb)



3-54 FUEL SYSTEM (DFI)

Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor #1 Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the intake air pressure sensor #1 connector and connect the measuring adapter [A] between these connectors.

Main Harness [B]

Intake Air Pressure Sensor #1 [C]

Special Tool - Measuring Adapter: 57001-1700

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

Intake Air Pressure Sensor #1 Input Voltage

Connections to Adapter:

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

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

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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.
- ★ If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor #1 Output Voltage Inspection).
- ★ If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- Disconnect the ECU and sensor connectors.

Wiring Inspection

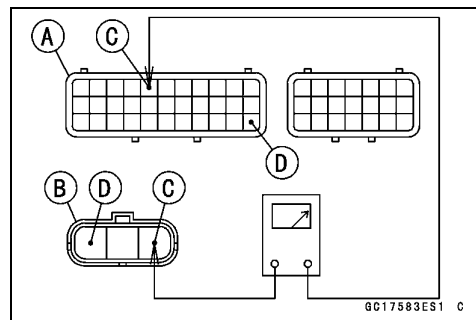
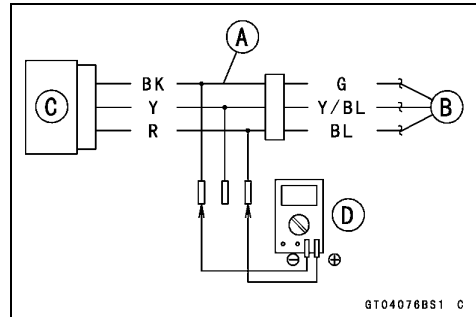
ECU Connector [A] ↔

Intake Air Pressure Sensor #1 Connector [B]

BL lead (ECU terminal 5) [C]

G lead (ECU terminal 33) [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).



Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor #1 Output Voltage Inspection

- Measure the output voltage at the intake air pressure sensor #1 in the same way as input voltage inspection, note the following.
- Disconnect the intake air pressure sensor #1 connector and connect the measuring adapter [A] between these connectors.
 - Main Harness [B]
 - Intake Air Pressure Sensor #1 [C]

Special Tool - Measuring Adapter: 57001-1700

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

Intake Air Pressure Sensor #1 Output Voltage Connections to Adapter:

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

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

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

Output Voltage

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

NOTE

○ The output voltage changes according to local atmospheric pressure.

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

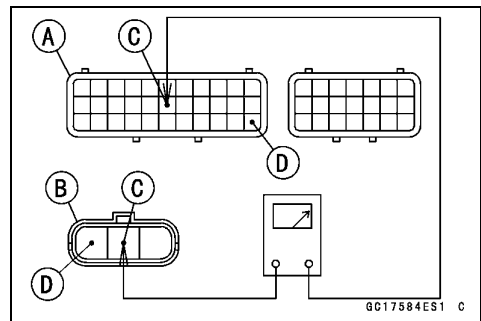
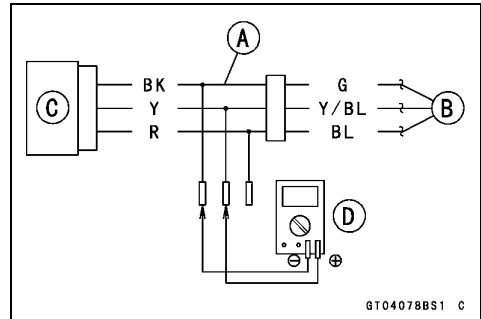
Wiring Inspection

ECU Connector [A] ↔

Intake Air Pressure Sensor #1 Connector [B]

Y/BL lead (ECU terminal 17) [C]

G lead (ECU terminal 33) [D]



3-56 FUEL SYSTEM (DFI)

Intake Air Pressure Sensor #1 (Service Code 12)

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

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

Intake Air Pressure Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → Y (sensor Y/BL) lead
Digital Meter (-) → BK (sensor G) lead

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

Suppose:

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

then

$$Pv = Pl - Pg$$

For example, suppose the following data is obtained:

Pg = 8 cmHg (Vacuum Gauge Reading)
Pl = 70 cmHg (Barometer Reading)
Vv = 3.2 V (Digital Meter Reading)

then

$$Pv = 70 - 8 = 62 \text{ cmHg (Absolute)}$$

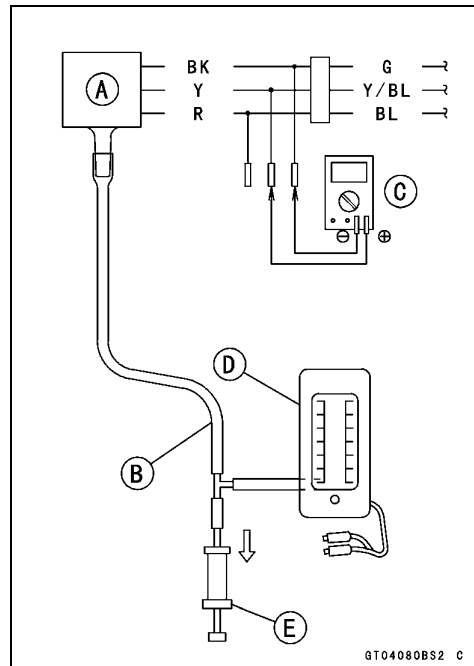
Plot this Pv (62 cmHg) at a point [1] on the chart and draw a vertical line through the point. Then, you can get the usable range [2] of the sensor output voltage.

Usable range = 3.08 ~ 3.48 V

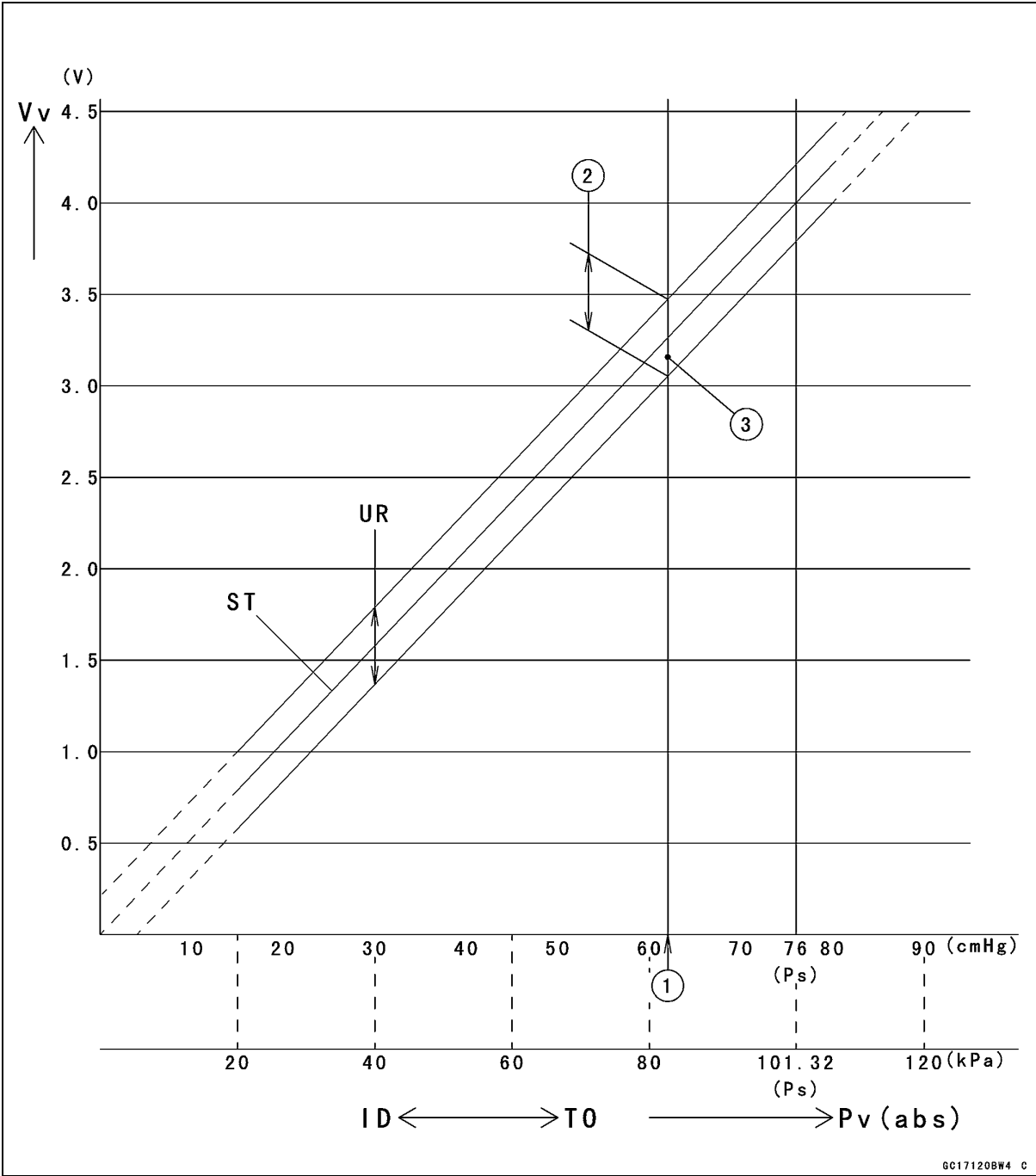
Plot Vv (3.2 V) on the vertical line. → Point [3].

Results: In the chart, Vv is within the usable range and the sensor is normal.

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



Intake Air Pressure Sensor #1 (Service Code 12)

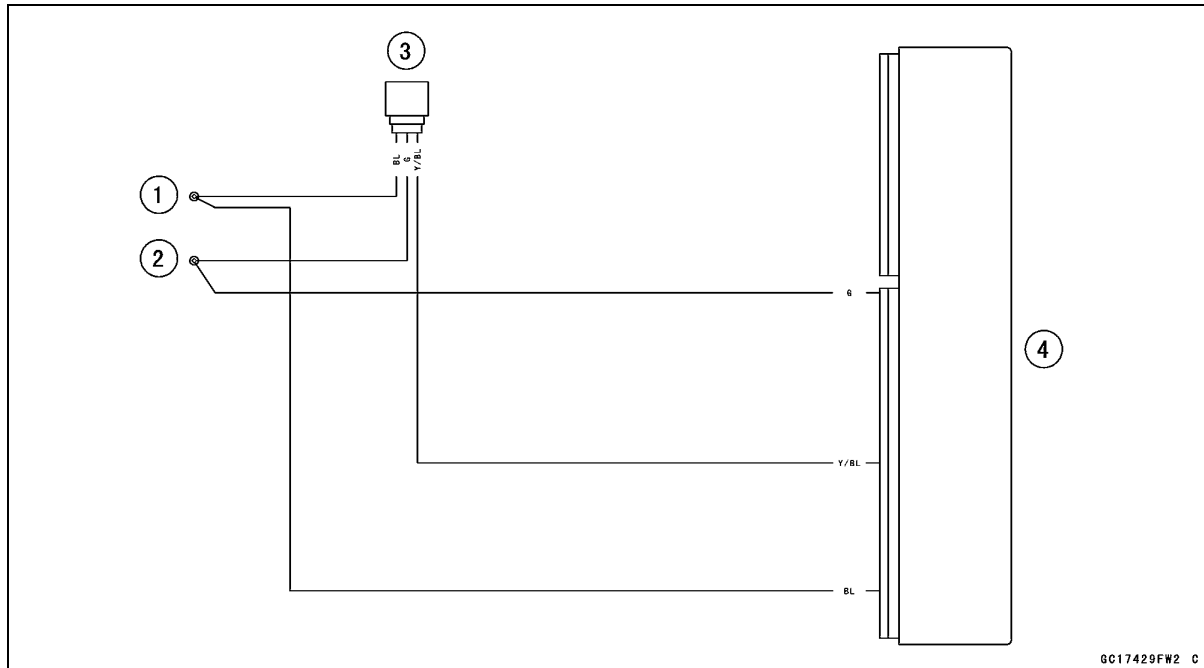


- ID: Idling
- Ps: Standard Atmospheric Pressure (Absolute)
- Pv: Throttle Vacuum Pressure (Absolute)
- ST: Standard of Sensor Output Voltage (V)
- TO: Throttle Full Open
- UR: Usable Range of Sensor Output Voltage (V)
- Vv: Intake Air Pressure Sensor #1 Output Voltage (V) (Digital Meter Reading)

3-58 FUEL SYSTEM (DFI)

Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor Circuit



1. Water Proof Joint 1
2. Water Proof Joint 2
3. Intake Air Pressure Sensor
4. ECU

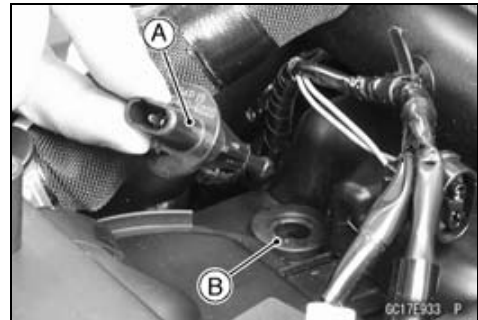
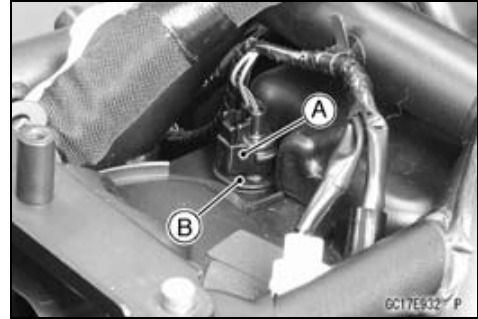
Intake Air Temperature Sensor (Service Code 13)

Intake Air Temperature Sensor Removal/Installation

NOTICE

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

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the connector [A] from the intake air temperature sensor [B].
- Pull out the intake air temperature sensor.
- Insert the intake air temperature sensor [A] into the grommet [B].



Intake Air Temperature Sensor Output Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the intake air temperature sensor connector and connect the harness adapter [A] between these connectors as shown.

Main Harness [B]

Intake Air Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

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

Intake Air Temperature Sensor Output Voltage Connections to Adapter:

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

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

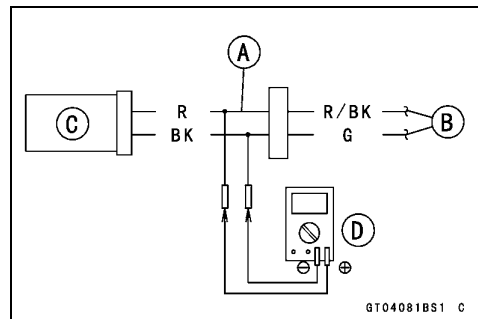
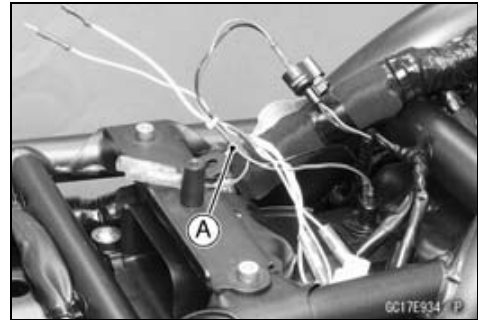
- Measure the output voltage with the engine stopped and the connector joined.
- Turn the ignition switch on.

Output Voltage

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

NOTE

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



3-60 FUEL SYSTEM (DFI)

Intake Air Temperature Sensor (Service Code 13)

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

Wiring Inspection

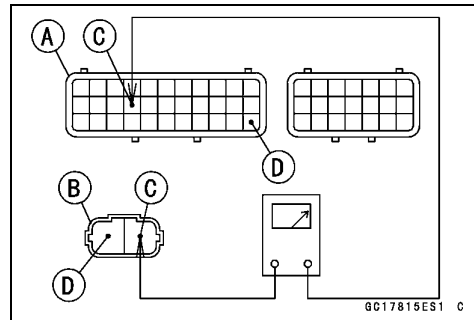
ECU Connector [A] ↔

Intake Air Temperature Sensor Connector [B]

R/BK lead (ECU terminal 15) [C]

G lead (ECU terminal 33) [D]

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



Intake Air Temperature Sensor Resistance Inspection

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

NOTE

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

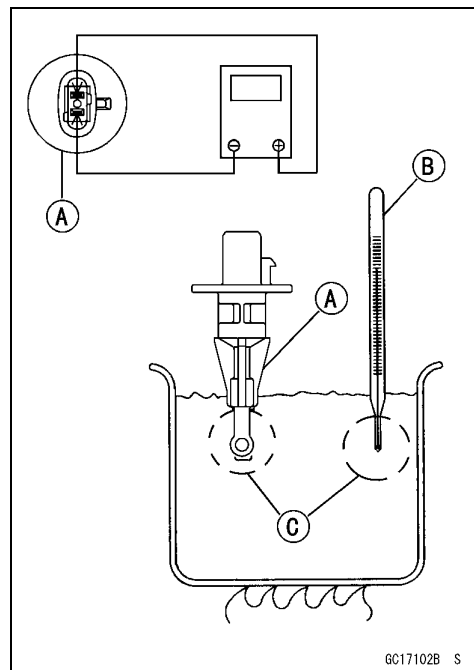
- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using a digital meter, measure the internal resistance of the sensor across the terminals at the temperatures shown in the following.

Intake Air Temperature Sensor Resistance

Standard: 2.21 ~ 2.69 k Ω at 20°C (68°F)

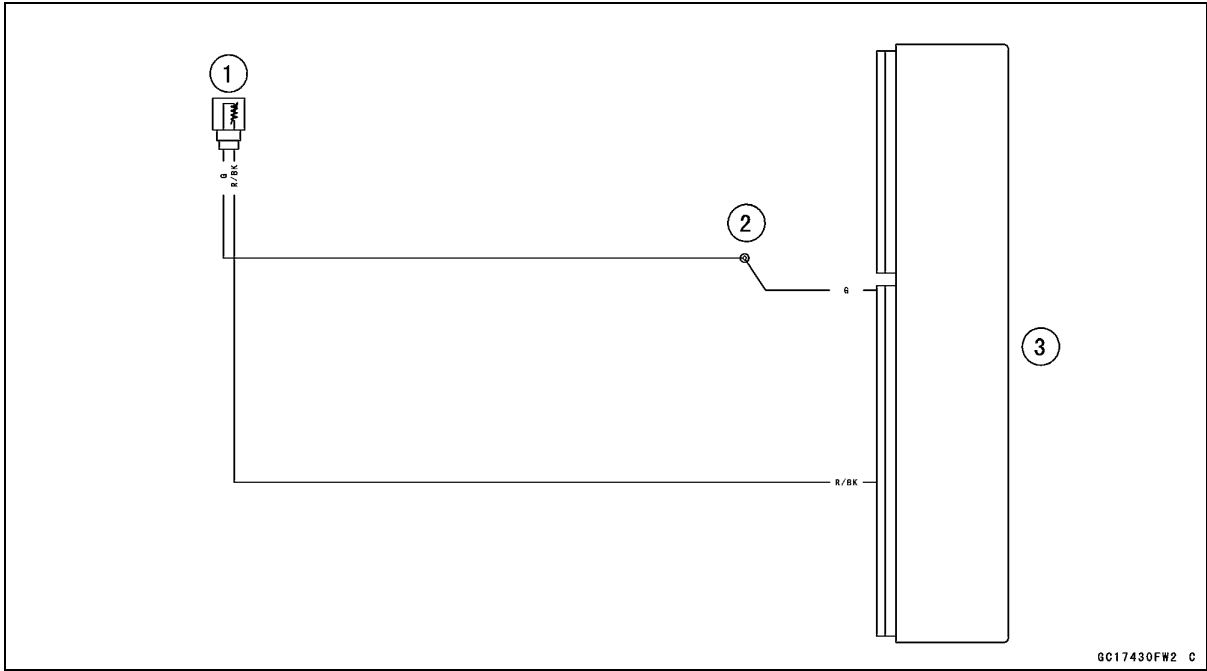
About 0.322 k Ω at 80°C (176°F)

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



Intake Air Temperature Sensor (Service Code 13)

Intake Air Temperature Sensor Circuit



- 1. Intake Air Temperature Sensor
- 2. Water Proof Joint 2
- 3. ECU

GC17430FW2 C

3-62 FUEL SYSTEM (DFI)

Water Temperature Sensor (Service Code 14)

Water Temperature Sensor Removal/Installation

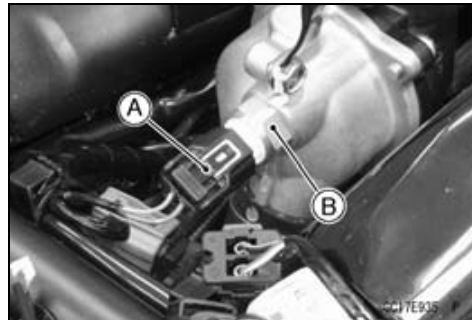
NOTICE

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

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

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

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



Water Temperature Sensor Output Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the water temperature sensor connector and connect the harness adapter [A] between these connectors as shown.

Main Harness [B]

Water Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

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

Water Temperature Sensor Output Voltage

Connections to Adapter:

Digital Meter (+) → R (sensor O) lead

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

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

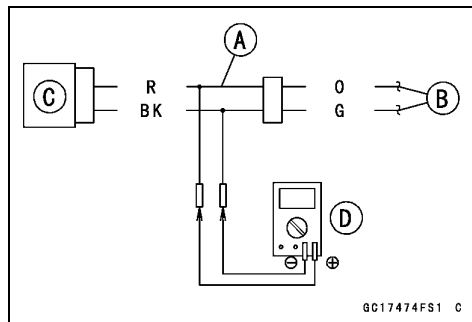
Output Voltage

Standard: About DC 2.80 ~ 2.97 V at 20°C (68°F)

NOTE

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

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



Water Temperature Sensor (Service Code 14)

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

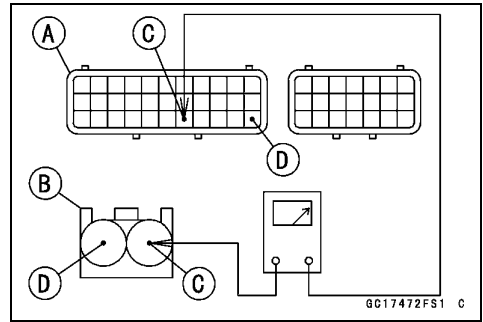
Wiring Inspection

ECU Connector [A] ↔

Water Temperature Sensor Connector [B]

O lead (ECU terminal 29) [C]

G lead (ECU terminal 33) [D]

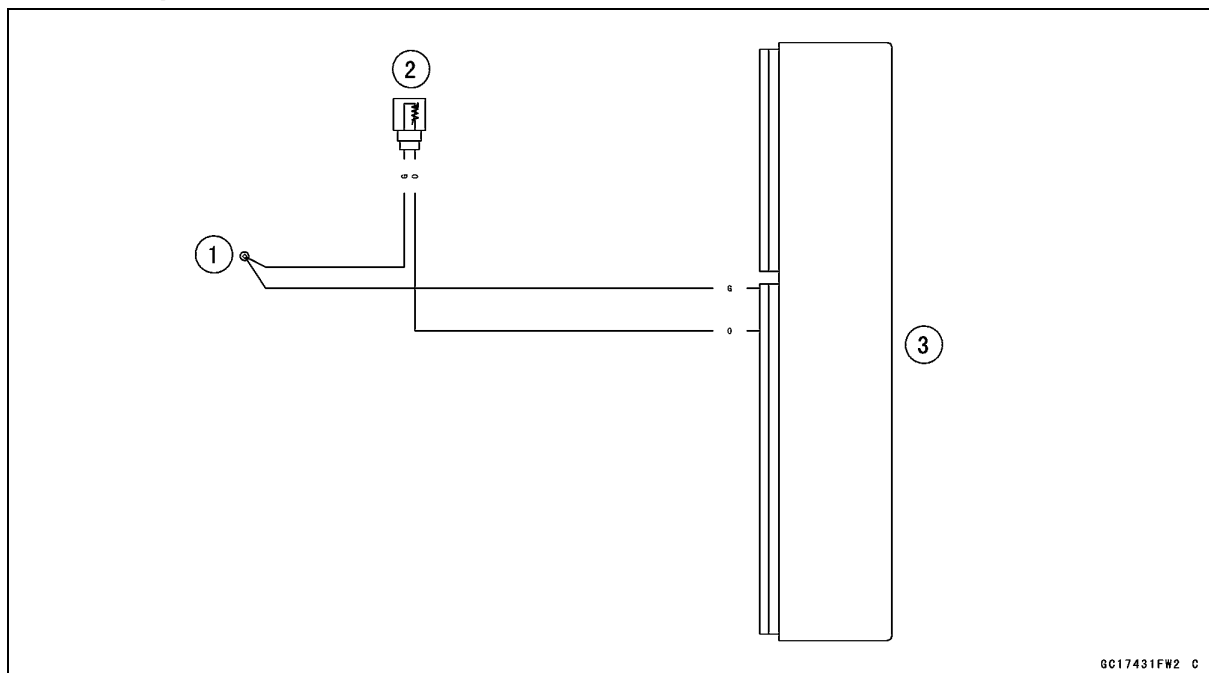


- ★ If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

Water Temperature Sensor Resistance Inspection

- Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.
- ★ If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).

Water Temperature Sensor Circuit



1. Water Proof Joint
2. Water Temperature Sensor
3. ECU

3-64 FUEL SYSTEM (DFI)

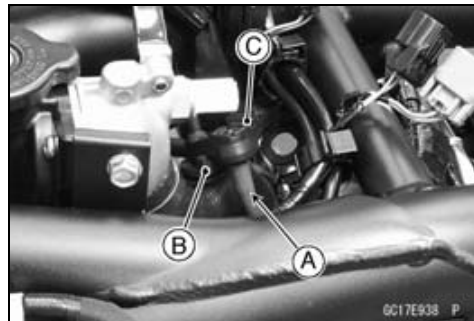
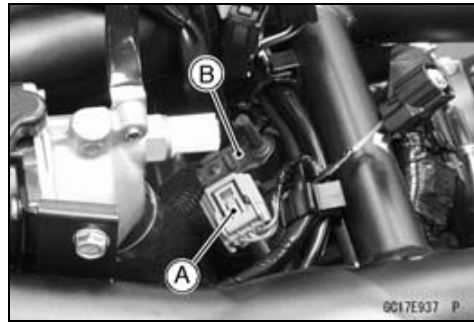
Intake Air Pressure Sensor #2 (Service Code 16)

Intake Air Pressure Sensor #2 Removal

NOTICE

Never drop the intake air pressure sensor #2 especially on a hard surface. Such a shock to the sensor can damage it.

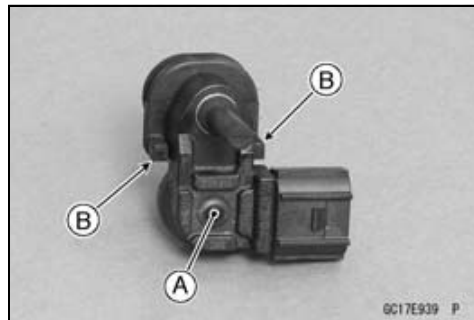
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect:
 - Water Temperature Sensor Connector
 - Intake Air Pressure Sensor #2 Connector [A]
- Remove the intake air pressure sensor #2 [B] from the bracket.
- Disconnect the vacuum hose [A], and remove the rubber damper [B] from the intake air pressure sensor #2 [C].



Intake Air Pressure Sensor #2 Installation

NOTE

- The intake air pressure sensor #2 is the same part as the intake air pressure sensor #1.
- Installation is basically the reverse of removal.
- Position the intake air pressure sensor #2 [A] between the projections [B] on the rubber damper.



Intake Air Pressure Sensor #2 (Service Code 16)

Intake Air Pressure Sensor #2 Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Disconnect the intake air pressure sensor #2 connector and connect the measuring adapter [A] between these connectors.

Main Harness [B]

Intake Air Pressure Sensor #2 [C]

Special Tool - Measuring Adapter: 57001-1700

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

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

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

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

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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.
- ★ If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor #2 Output Voltage Inspection).
- ★ If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

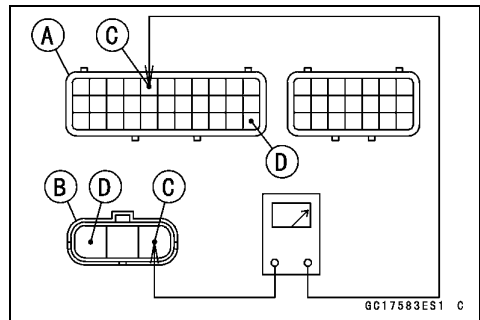
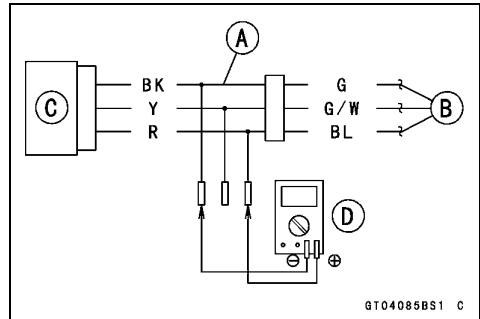
ECU Connector [A] ↔

Intake Air Pressure Sensor #2 Connector [B]

BL lead (ECU terminal 5) [C]

G lead (ECU terminal 33) [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).

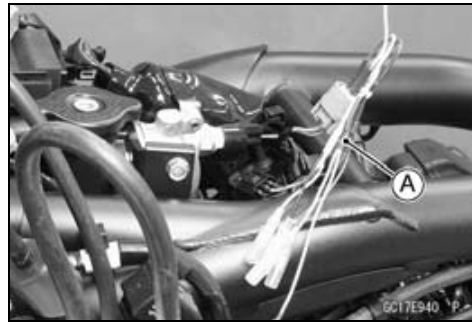


3-66 FUEL SYSTEM (DFI)

Intake Air Pressure Sensor #2 (Service Code 16)

Intake Air Pressure Sensor #2 Output Voltage Inspection

- Measure the output voltage at the intake air pressure sensor #2 in the same way as input voltage inspection, note the following.
- Disconnect the intake air pressure sensor #2 connector and connect the measuring adapter [A] between these connectors.
 - Main Harness [B]
 - Intake Air Pressure Sensor #2 [C]



Special Tool - Measuring Adapter: 57001-1700

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

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

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

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

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

Output Voltage

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

NOTE

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

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

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

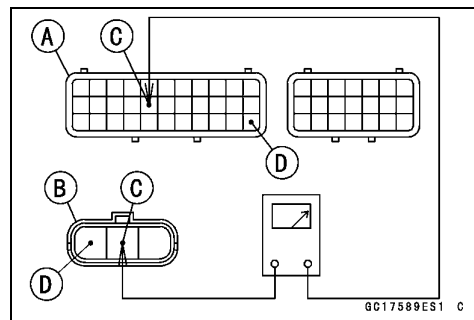
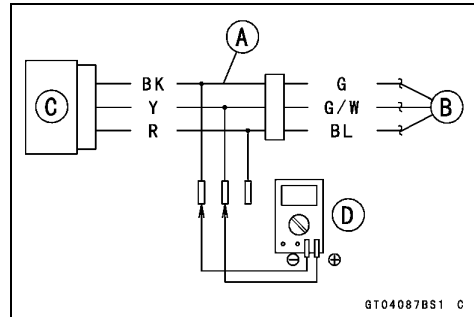
ECU Connector [A] ↔

Intake Air Pressure Sensor #2 Connector [B]

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

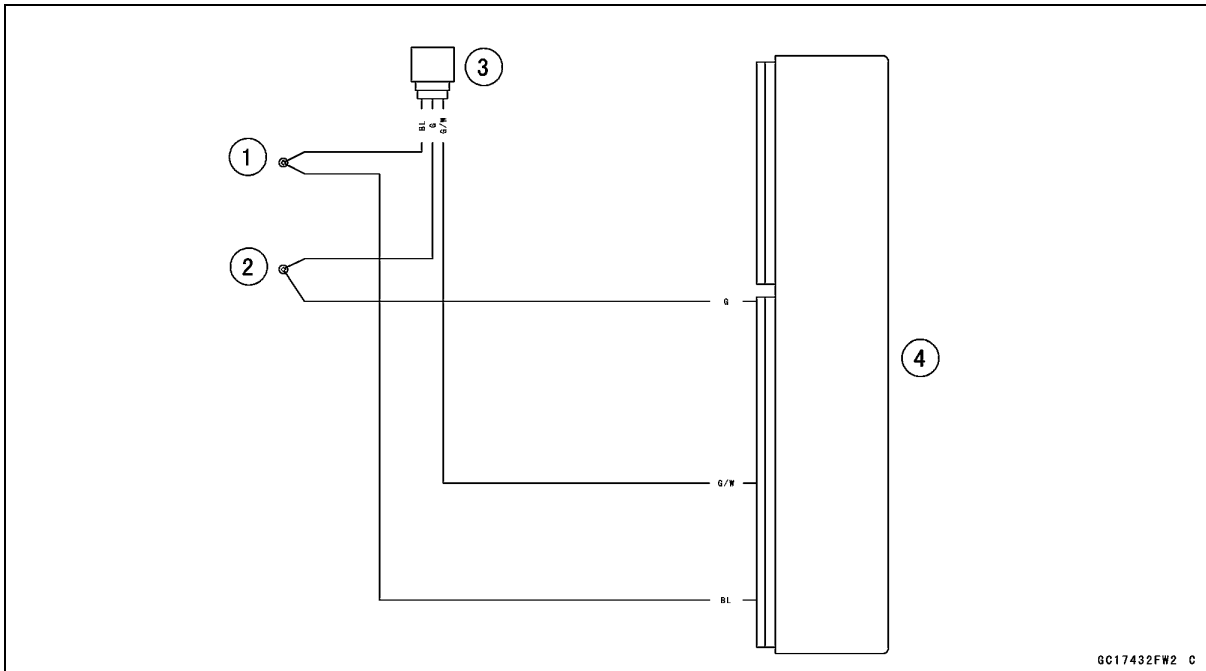
G lead (ECU terminal 33) [D]

- ★ If the wiring is good, check the sensor for various vacuum (see Intake Air Pressure Sensor #1 Output Voltage Inspection).



Intake Air Pressure Sensor #2 (Service Code 16)

Intake Air Pressure Sensor #2 Circuit



1. Water Proof Joint 1
2. Water Proof Joint 2
3. Intake Air Pressure Sensor #2
4. ECU

GC17432FW2 C

3-68 FUEL SYSTEM (DFI)

Crankshaft Sensor (Service Code 21)

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

Crankshaft Sensor Removal/Installation

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

Crankshaft Sensor Resistance Inspection

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

Crankshaft Sensor Peak Voltage Inspection

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

Wiring Inspection

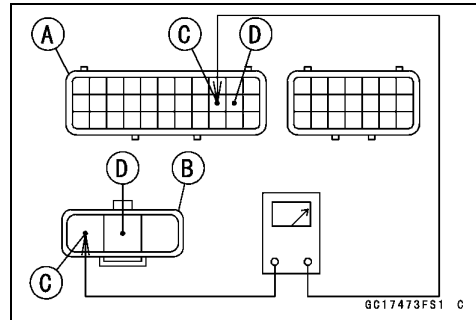
ECU Connector [A] ←→

Crankshaft Sensor Connector [B]

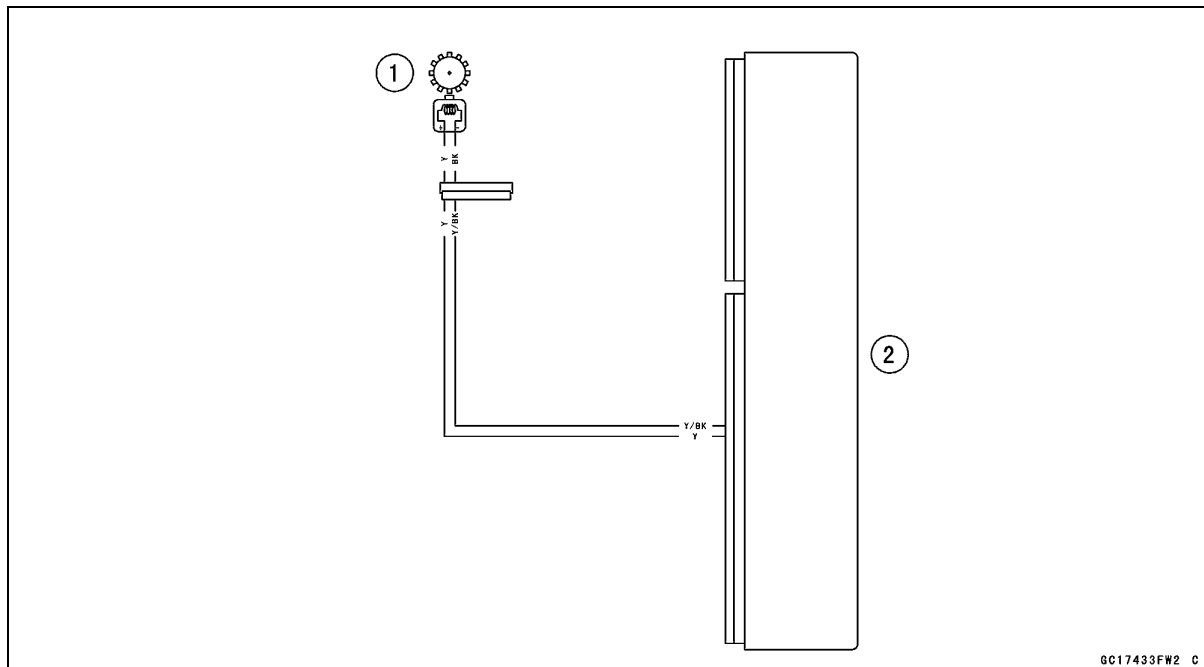
Y lead (ECU terminal 20) [C]

Y/BK lead (ECU terminal 21) [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. Crankshaft Sensor
2. ECU

Speed Sensor (Service Code 24)

Speed Sensor Removal/Installation

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

Speed Sensor Input Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

- Turn the ignition switch off.
- Disconnect the speed sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Speed Sensor Measuring Adapter: 57001-1667

- Connect a digital meter to the harness adapter leads.

Speed Sensor Input Voltage

Connections to Adapter:

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

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

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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

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

Wiring Inspection

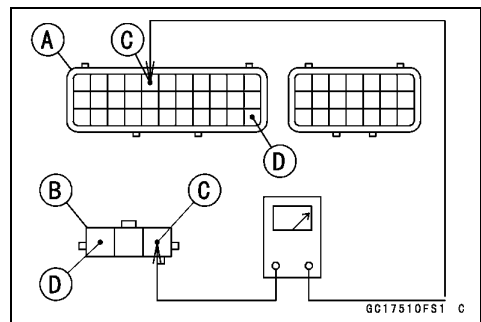
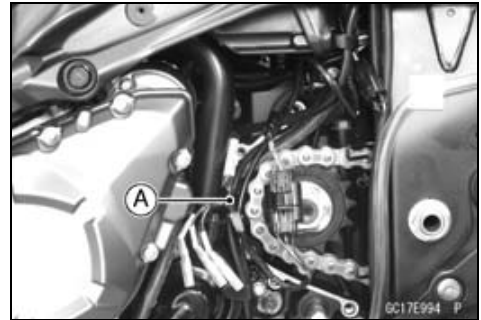
ECU Connector [A] ↔

Speed Sensor Connector [B]

BL lead (ECU terminal 5) [C]

G lead (ECU terminal 33) [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).



3-70 FUEL SYSTEM (DFI)

Speed Sensor (Service Code 24)

Speed Sensor Output Voltage Inspection

- Raise the rear wheel off the ground with the stand.
- Measure the output voltage at the speed sensor in the same way as input voltage inspection, note the following.
- Disconnect the speed sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Speed Sensor Measuring Adapter: 57001-1667

Speed Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → BL/Y (sensor P) lead

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

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

Output Voltage

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

NOTE

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

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

Wiring Inspection

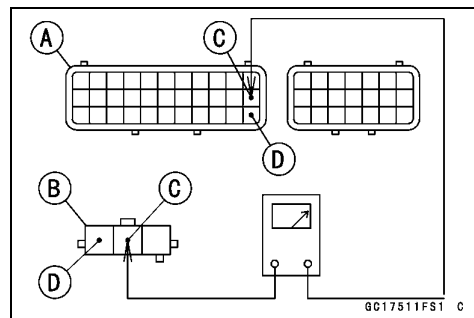
ECU Connector [A] ↔

Speed Sensor Connector [B]

P lead (ECU terminal 22) [C]

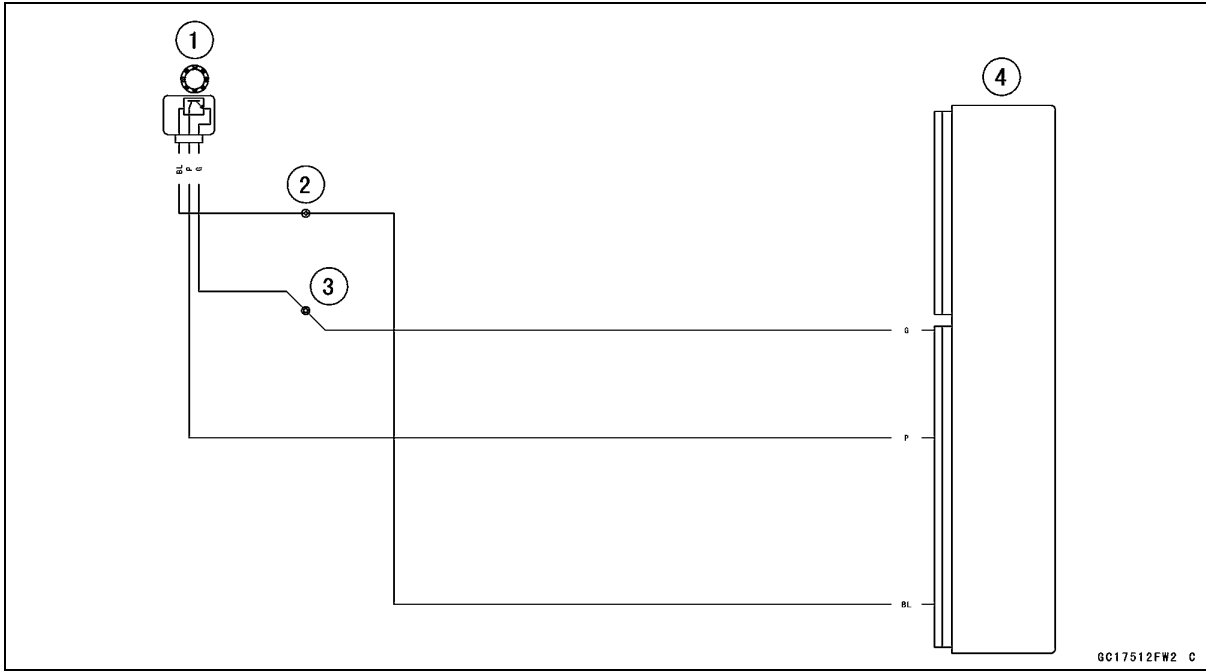
G lead (ECU terminal 33) [D]

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



Speed Sensor (Service Code 24)

Speed Sensor Circuit



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

GC17512FW2 C

3-72 FUEL SYSTEM (DFI)

Vehicle-down Sensor (Service Code 31)

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

Hall IC [B]

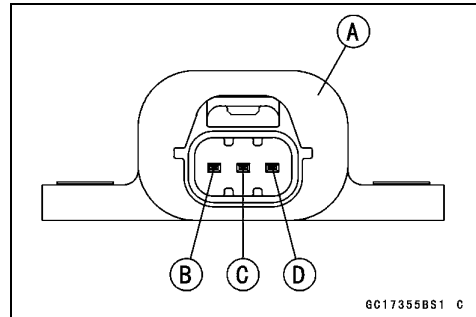
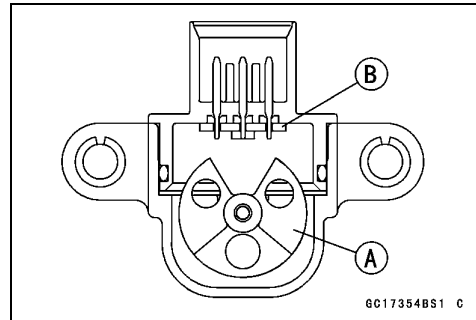
When the motorcycle is down, the ignition switch is left ON. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch off, and then on.

Vehicle-down Sensor [A]

Ground Terminal G [B]

Output Terminal Y/G [C]

Power Source Terminal BL [D]

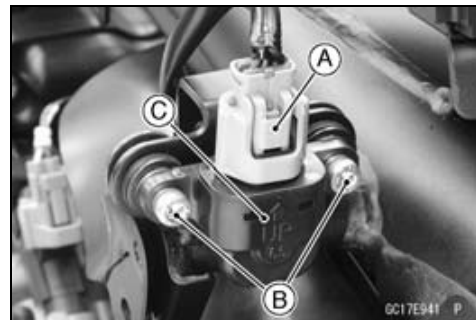


Vehicle-down Sensor Removal

NOTICE

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

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Right Side Fairing (see Side Fairing Removal in the Frame chapter)
- Disconnect the vehicle-down sensor connector [A].
- Remove:
 - Vehicle-down Sensor Bolts [B] and Bracket
 - Vehicle-down Sensor [C]



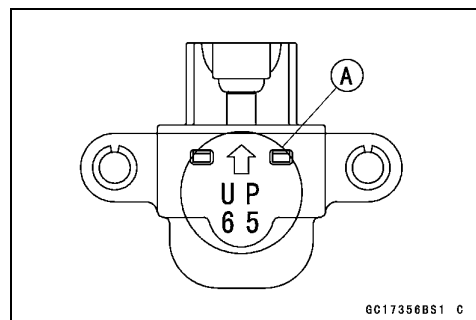
Vehicle-down Sensor Installation

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

Torque - Vehicle-down Sensor Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

⚠ 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 brackets.



Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

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

Special Tool - Measuring Adapter: 57001-1700

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

Vehicle-down Sensor Input Voltage

Connections to Adapter:

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

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

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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

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

Wiring Inspection

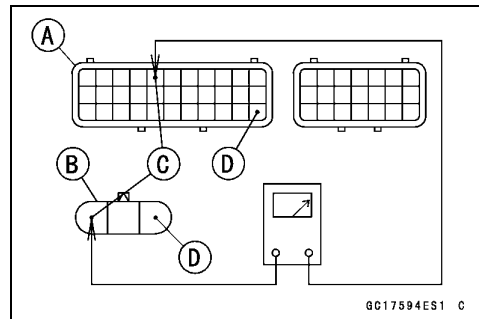
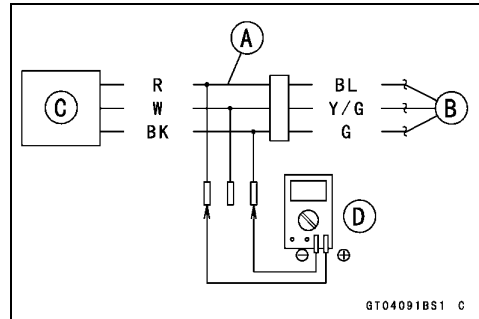
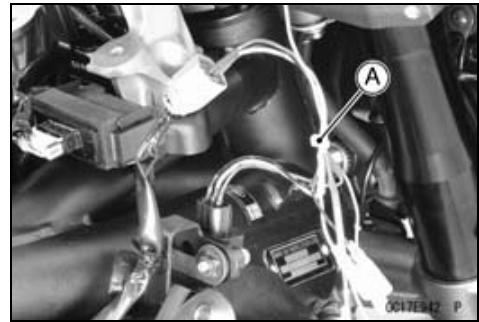
ECU Connector [A] ↔

Vehicle-down Sensor Connector [B]

BL lead (ECU terminal 5) [C]

G lead (ECU terminal 33) [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).



3-74 FUEL SYSTEM (DFI)

Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Output Voltage Inspection

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

Special Tool - Measuring Adapter: 57001-1700

Main Harness [B]

Vehicle-down Sensor [C]

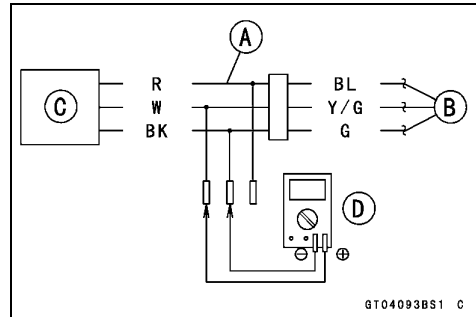
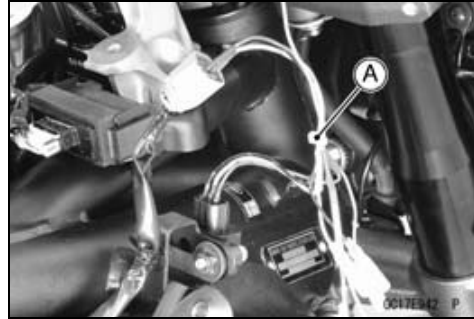
- Connect a digital meter [D] to the harness adapter leads.

Vehicle-down Sensor Output Voltage

Connections to Adapter:

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

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



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

Output Voltage

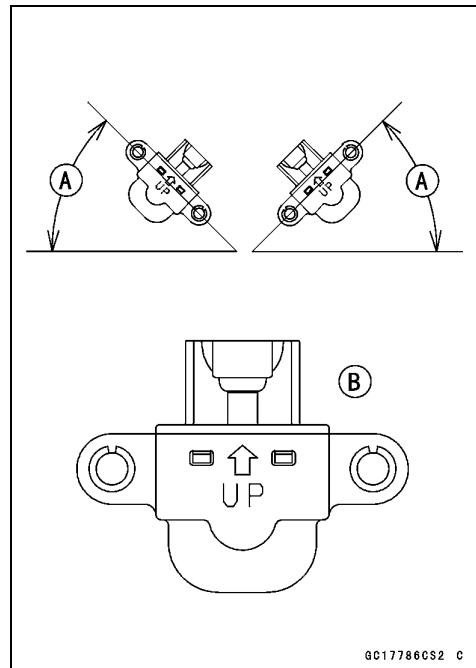
Standard: With sensor tilted 60 ~ 70° or more right or left: DC 0.65 ~ 1.35 V

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

NOTE

○ If you need to test again, turn the ignition switch off, and then on.

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



Vehicle-down Sensor (Service Code 31)

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

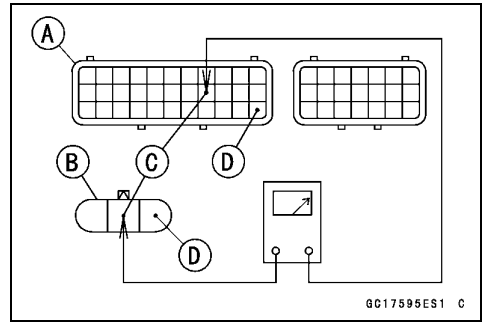
Wiring Inspection

ECU Connector [A] ←→

Vehicle-down Sensor Connector [B]

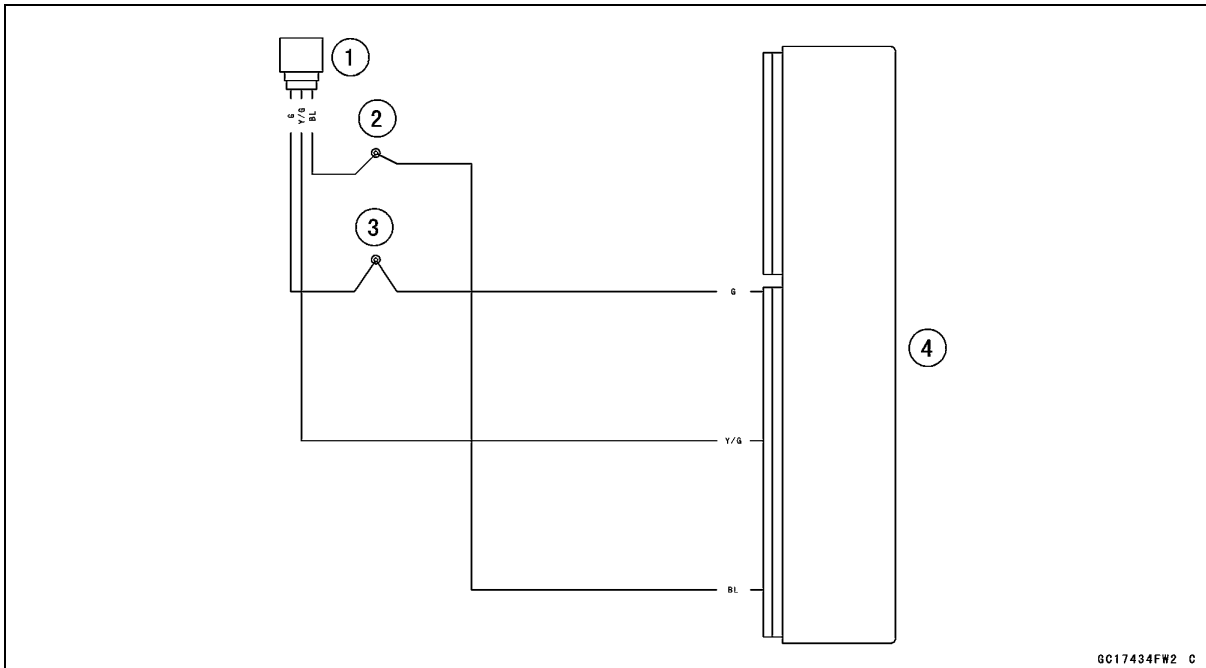
Y/G lead (ECU terminal 19) [C]

G lead (ECU terminal 33) [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. Vehicle-down Sensor
2. Water Proof Joint 1
3. Water Proof Joint 2
4. ECU

3-76 FUEL SYSTEM (DFI)

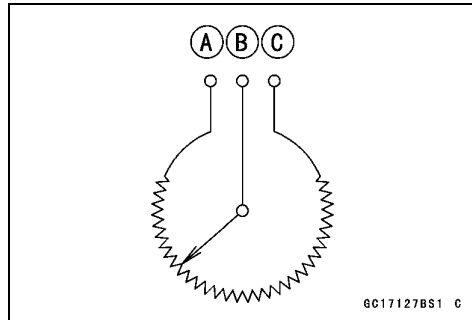
Subthrottle Sensor (Service Code 32)

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

Input Terminal [A]

Output Terminal [B]

Ground Terminal [C]



Subthrottle Sensor Removal/Adjustment

NOTICE

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

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



Subthrottle Sensor Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the left throttle body cover (see Throttle Body Assy Removal).
- Disconnect the subthrottle sensor and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

- Connect a digital meter to the harness adapter leads.

Subthrottle Sensor Input Voltage

Connections to Adapter:

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

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

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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

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



Subthrottle Sensor (Service Code 32)

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

Wiring Inspection

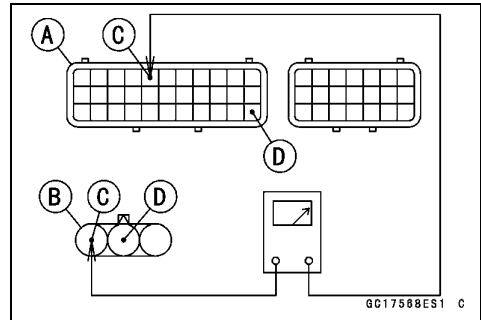
ECU Connector [A] ↔

Subthrottle Sensor Connector [B]

BL lead (ECU terminal 5) [C]

G lead (ECU terminal 33) [D]

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



Subthrottle Sensor Output Voltage Inspection

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

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

Subthrottle Sensor Output Voltage

Connections to Adapter:

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

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

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



3-78 FUEL SYSTEM (DFI)

Subthrottle Sensor (Service Code 32)

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

Output Voltage

Standard: DC 0.48 ~ 0.52 V at subthrottle valve full close position
DC 3.65 ~ 4.38 V at subthrottle valve full open position

NOTE

- Turn the lever clockwise, 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.
 $0.48 \times 4.75 \div 5.00 = 0.46 \text{ V}$
 $0.52 \times 4.75 \div 5.00 = 0.49 \text{ V}$
Thus, the valid range is 0.46 ~ 0.49 V
- Turn the ignition switch off.
- ★ If the reading is out of the standard, check the subthrottle sensor resistance (see Subthrottle Sensor Resistance Inspection).
- ★ If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- Disconnect the ECU and sensor connectors.

Wiring Inspection

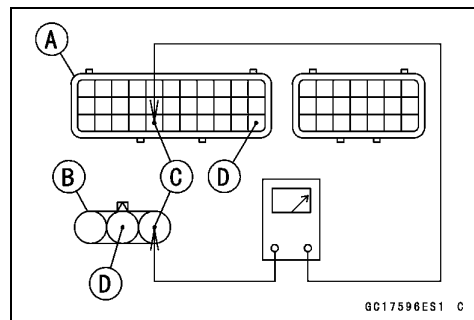
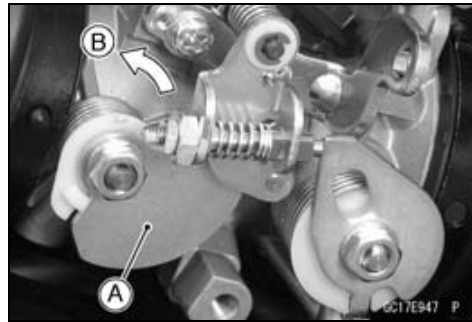
ECU Connector [A] ↔

Subthrottle Sensor Connector [B]

BL/W lead (ECU terminal 27) [C]

G lead (ECU terminal 33) [D]

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



Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Resistance Inspection

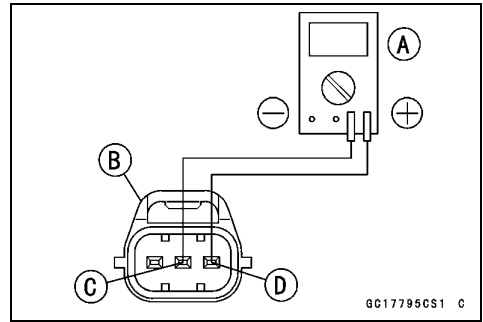
- Turn the ignition switch off.
- Disconnect the subthrottle sensor connector.
- Connect a digital meter [A] to the subthrottle sensor connector [B].
- Measure the subthrottle sensor resistance.

Subthrottle Sensor Resistance

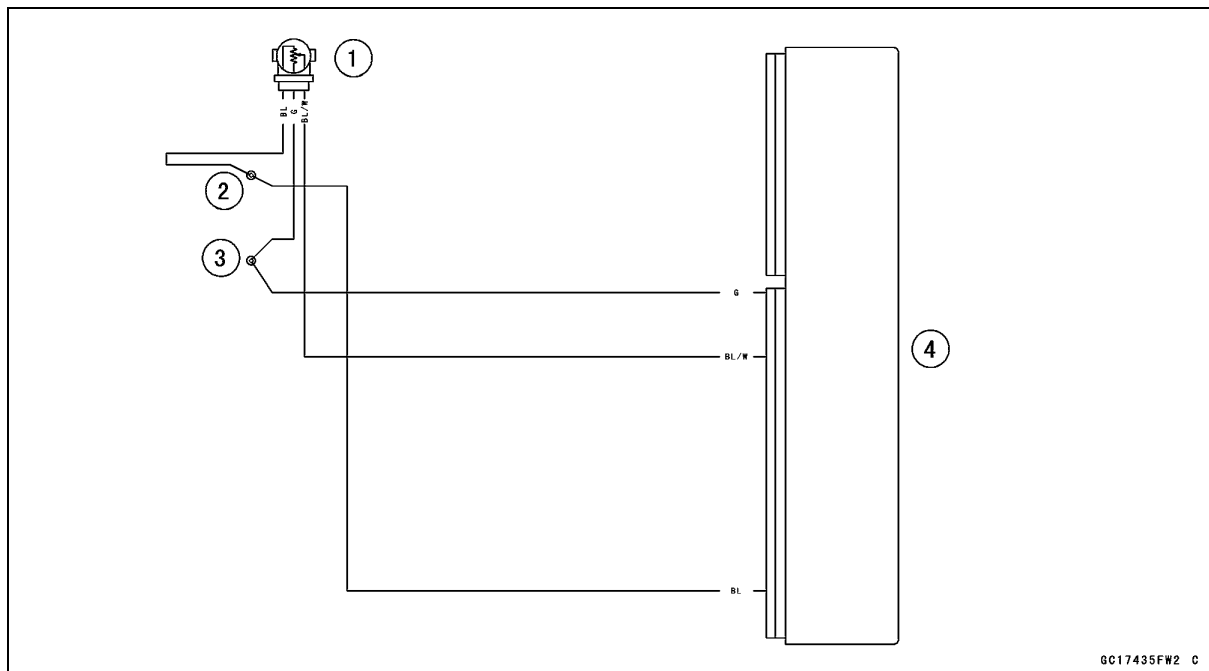
Connections: G lead [C] ↔ BL lead [D]

Standard: 4 ~ 6 kΩ

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



Subthrottle Sensor Circuit



1. Subthrottle Sensor
2. Water Proof Joint 1
3. Water Proof Joint 2
4. ECU

3-80 FUEL SYSTEM (DFI)

Oxygen Sensor - not activated (Service Code 33)

Oxygen Sensor Removal/Installation

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

Oxygen Sensor Inspection

- Turn the ignition switch off.
- Remove the right frame cover (see Frame Cover Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector (4 pins connector) and connect the harness adapter [A] between these connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001-1682

- Connect a digital meter to the harness adapter leads.

Oxygen Sensor Output Voltage

Connections to Adapter:

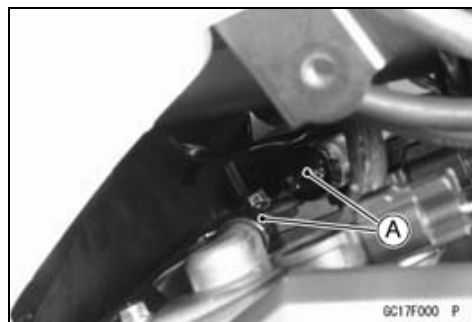
Digital Meter (+) → BL/Y (sensor BL) lead

Digital Meter (-) → BR/BK (sensor W) lead

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Air Suction Valve Covers (see Air Suction Valve Removal in the Engine Top End chapter)
 - Air Switching Valve (see Air Switching Valve Removal in the Engine Top End chapter)
- Install the air suction valve covers (see Air Suction Valve Installation in the Engine Top End chapter).
- Connect the air switching valve connector [A].



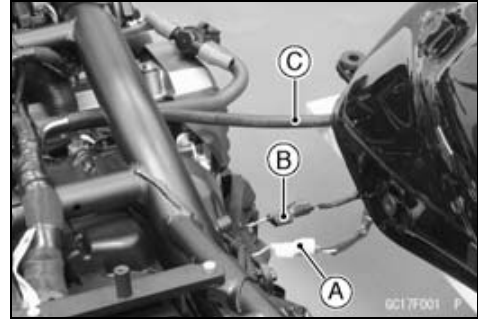
- Install the suitable plugs [A] on the fitting of the air suction valve covers, and shut off the secondary air.



Oxygen Sensor - not activated (Service Code 33)

- Remove the fuel outlet hose (see Fuel Hose Replacement in the Periodic Maintenance chapter).
- Connect the following parts temporary.
 - Fuel Pump Lead Connector [A]
 - Fuel Level Sensor Lead Connector [B]
 - Extension Tube [C]

Special Tool - Extension Tube: 57001-1578




- Start the engine, and let it idle.
- Warm up the engine thoroughly until the radiator fan starts.
- Measure the output voltage with the connector joined.

Output Voltage (with Plugs)

Standard: DC 0.7 V or more

- Next, remove the plugs from the fittings [A] with idling.

 WARNING
<p>The engine gets extremely hot during normal operation and can cause serious burns. Never touch a hot engine.</p>

- Measure the output voltage with the connector joined.

Output Voltage (without Plugs)

Standard: DC 0.2 V or less

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

Wiring Inspection

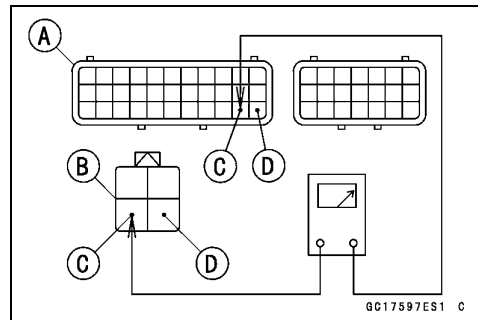
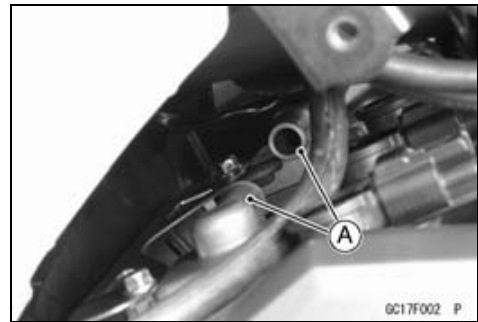
ECU Connectors [A] ↔

Oxygen Sensor Connector [B]

BL/Y lead (ECU terminal 32) [C]

G lead (ECU terminal 33) [D]

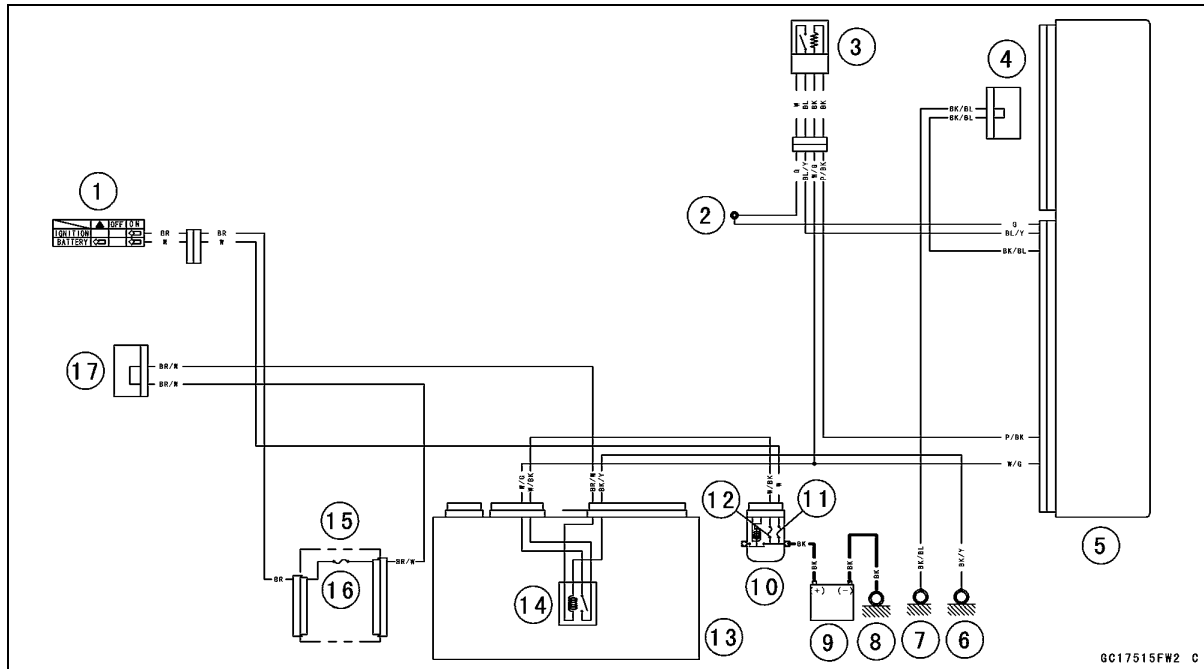
- ★ If the wiring is good, replace the sensor.
- ★ If the reading is within the standard (with plugs: DC 0.7 V or more, without plugs: DC 0.2 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see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



3-82 FUEL SYSTEM (DFI)

Oxygen Sensor - not activated (Service Code 33)

Oxygen Sensor Circuit



- | | |
|------------------------|------------------------|
| 1. Ignition Switch | 10. Starter Relay |
| 2. Water Proof Joint 2 | 11. Main Fuse 30 A |
| 3. Oxygen Sensor | 12. ECU Fuse 15 A |
| 4. Joint Connector E | 13. Relay Box |
| 5. ECU | 14. ECU Main Relay |
| 6. Frame Ground 4 | 15. Fuse Box 1 |
| 7. Frame Ground 1 | 16. Ignition Fuse 15 A |
| 8. Engine Ground | 17. Joint Connector C |
| 9. Battery 12 V 8 Ah | |

GC17515FW2 C

Exhaust Butterfly Valve Actuator Sensor (Service Code 34, ZR800A/B Models)

Exhaust Butterfly Valve Actuator Sensor Removal/Installation

The exhaust butterfly valve actuator sensor is built in the exhaust butterfly valve actuator. So, the sensor itself can not be removed. Remove the exhaust butterfly valve actuator (see Exhaust Butterfly Valve Actuator Removal).

Exhaust Butterfly Valve Actuator Sensor Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the exhaust butterfly valve actuator sensor lead connector (3 pins connector) and connect the harness adapter [A] between these connector.

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

- Connect a digital meter to the harness adapter leads.

Exhaust Butterfly Valve Actuator Sensor Input Voltage Connections to Adapter:

Digital Meter (+) → Y/W (actuator W) lead

Digital Meter (-) → BK/BL (actuator BK) lead

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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

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

Wiring Inspection

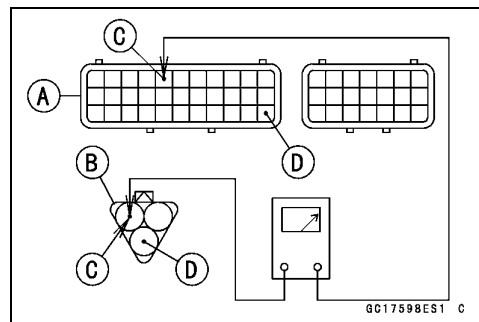
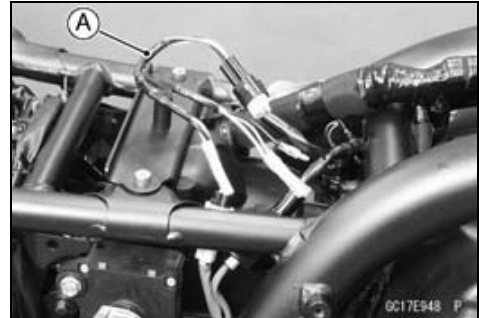
ECU Connector [A] ↔

Exhaust Butterfly Valve Actuator Sensor Connector [B]

BL lead (ECU terminal 5) [C]

G lead (ECU terminal 33) [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).



3-84 FUEL SYSTEM (DFI)

Exhaust Butterfly Valve Actuator Sensor (Service Code 34, ZR800A/B Models)

Exhaust Butterfly Valve Actuator Sensor Output Voltage Inspection

NOTE

○ Before this inspection, confirm the pulley [A] is original position (see Exhaust Butterfly Valve Actuator Installation).

- Disconnect:
 - 2 pins Connector [B]
 - 3 pins Connector [C]
 - Connect the harness adapter [A] between the 3 pins connectors.
- Special Tool - Throttle Sensor Setting Adapter #1: 57001-1400**
- Connect a digital meter to the harness adapter leads.

Exhaust Butterfly Valve Actuator Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → BL (actuator Y) lead

Digital Meter (-) → BK/BL (actuator BK) lead

- Measure the output voltage at the 3 pins connector of the exhaust butterfly valve actuator when the pulley is original position.
- Turn the ignition switch on.

Output Voltage

Standard: DC 3.46 ~ 3.76 V at pulley original position

- Turn the ignition switch off.
 - ★ If the reading is out of the standard, check the exhaust butterfly valve actuator sensor resistance (see Exhaust Butterfly Valve Actuator Sensor Resistance Inspection).
 - ★ If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- Disconnect the ECU and sensor connectors.

Wiring Inspection

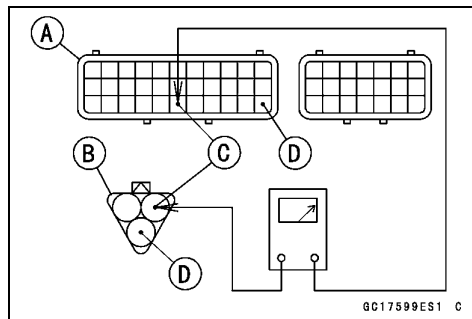
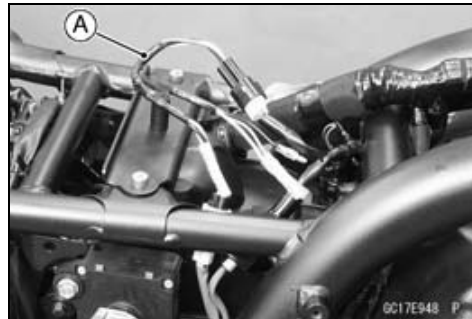
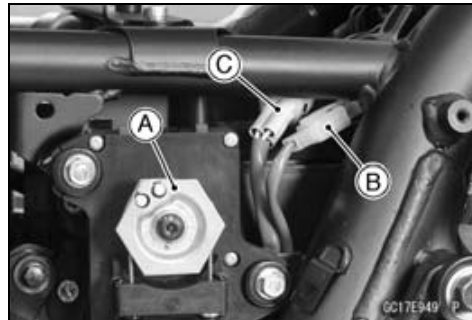
ECU Connector [A] ↔

Exhaust Butterfly Valve Actuator Sensor Connector [B]

GY lead (ECU terminal 28) [C]

G lead (ECU terminal 33) [D]

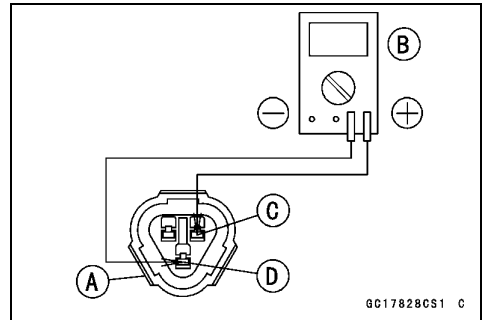
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



Exhaust Butterfly Valve Actuator Sensor (Service Code 34, ZR800A/B Models)

Exhaust Butterfly Valve Actuator Sensor Resistance Inspection

- Turn the ignition switch off.
- Disconnect the exhaust butterfly valve actuator sensor connector (3 pins connector) [A].
- Connect a digital meter [B] to the exhaust butterfly valve actuator sensor connector.
- Measure the exhaust butterfly valve actuator sensor resistance.



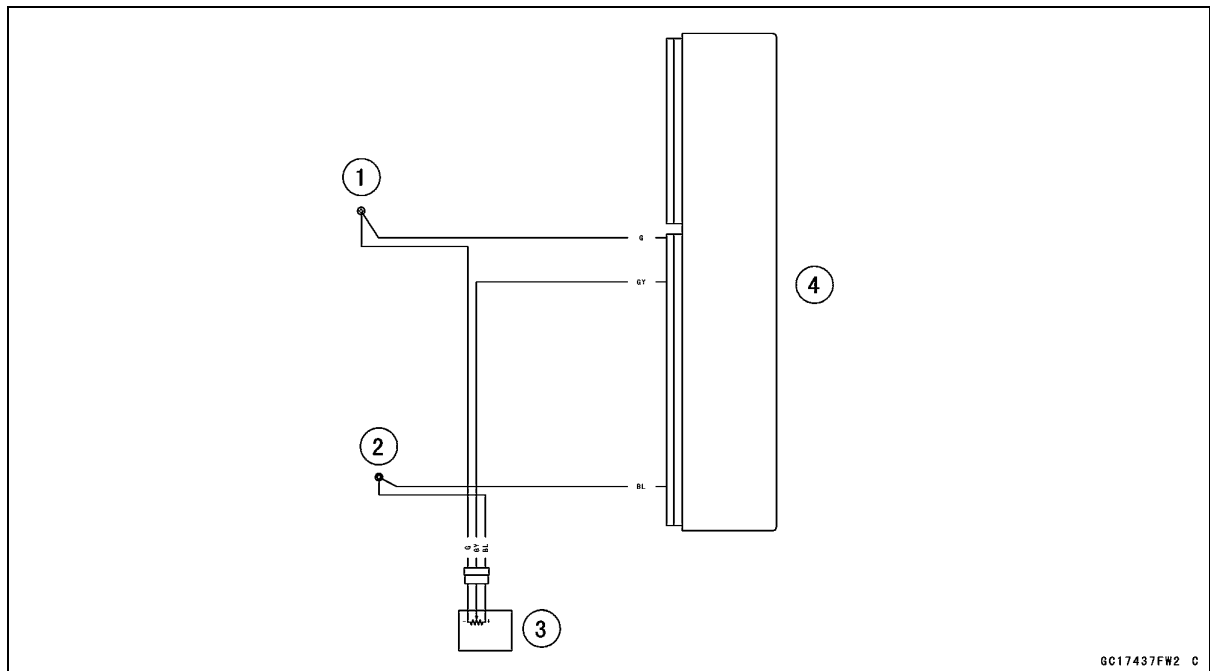
Exhaust Butterfly Valve Actuator Sensor Resistance

Connections: W lead [C] ↔ BK lead [D]

Standard: 4 ~ 6 kΩ

- ★ If the reading is out of the standard, replace the exhaust butterfly valve actuator.
- ★ If the reading within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).

Exhaust Butterfly Valve Actuator Sensor Circuit



1. Water Proof Joint 1
2. Water Proof Joint 2
3. Exhaust Butterfly Valve Actuator
4. ECU

3-86 FUEL SYSTEM (DFI)

Immobilizer Amplifier (Service Code 35)

Antenna Resistance Inspection

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the antenna lead connector [A].
- Measure the antenna resistance.

Antenna Resistance

Connections: BK lead ↔ BK/W lead

Standard: About 3.0 ~ 4.6 Ω

- ★ If the reading is out of the standard, replace the antenna (see Immobilizer System Parts Replacement in the Electrical System chapter).
- ★ If the reading is within the standard, check the wiring to the amplifier (see wiring diagram in next section).
- ★ If the wiring is good, check the input voltage of the amplifier (see Amplifier Input Voltage Inspection).

Amplifier Input Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Do not disconnect the connectors.
- Connect a digital meter to the amplifier connector [A] with needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

Amplifier Input Voltage

Connections to Amplifier Connector:

Digital Meter (+) → BR/W lead

Digital Meter (-) → BK/Y lead

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

Input Voltage

Standard: Battery Voltage

- Turn the ignition switch off.
- ★ If the reading is out of the standard, check the wiring (see wiring diagram in next section).
- ★ If the reading is within the standard, check the wiring to ECU (see wiring diagram in next section).
- ★ If the wiring is good, replace the amplifier (see Immobilizer System Parts Replacement in the Electrical System chapter).



Blank Key Detection (Service Code 36)

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



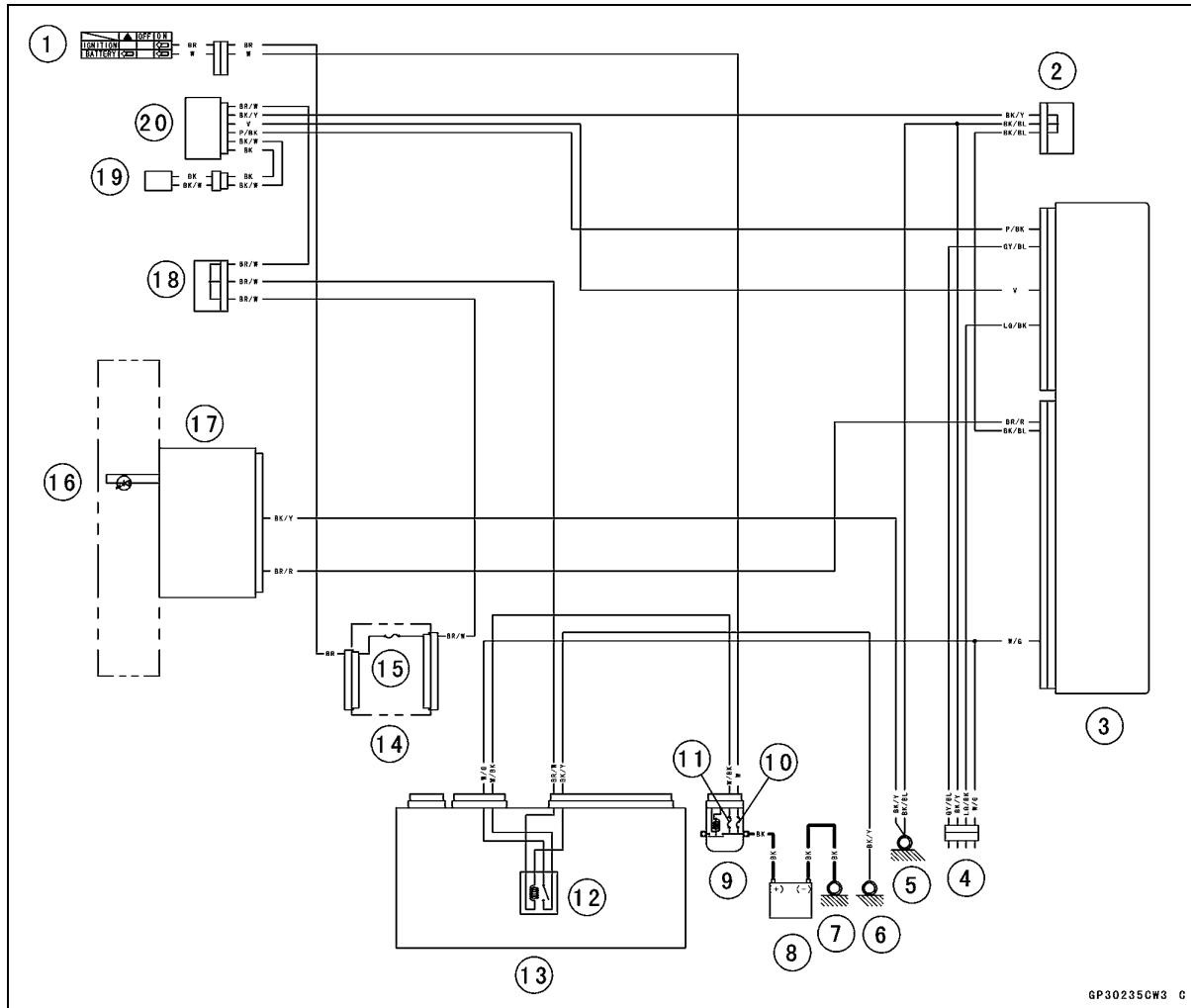
Ignition Key Inspection

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

3-88 FUEL SYSTEM (DFI)

Blank Key Detection (Service Code 36)

Immobilizer System Circuit



GP30235CW3 C

- | | |
|---|---------------------------------------|
| 1. Ignition Switch | 11. ECU Fuse 15 A |
| 2. Joint Connector E | 12. ECU Main Relay |
| 3. ECU | 13. Relay Box |
| 4. Immobilizer/Kawasaki Diagnostic System Connector | 14. Fuse Box 1 |
| 5. Frame Ground 1 | 15. Ignition Fuse 15 A |
| 6. Frame Ground 4 | 16. Red Warning Indicator Light (LED) |
| 7. Engine Ground | 17. Meter Unit |
| 8. Battery 12 V 8 Ah | 18. Joint Connector C |
| 9. Stater Relay | 19. Immobilizer Antenna |
| 10. Main Fuse 30 A | 20. Immobilizer Amplifier |

ECU Communication Error (Service Code 39)

ECU Communication Line Inspection

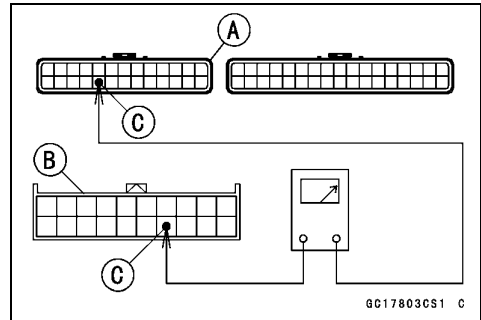
- When the data is not sent from the ECU to the meter unit for more than about 10 seconds, the service code 39 is displayed.
- The service code 39 is detected with meter unit.
- Remove the ECU and meter unit, check the wiring for continuity between main harness connector.
- Disconnect the ECU and meter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

Wiring Inspection

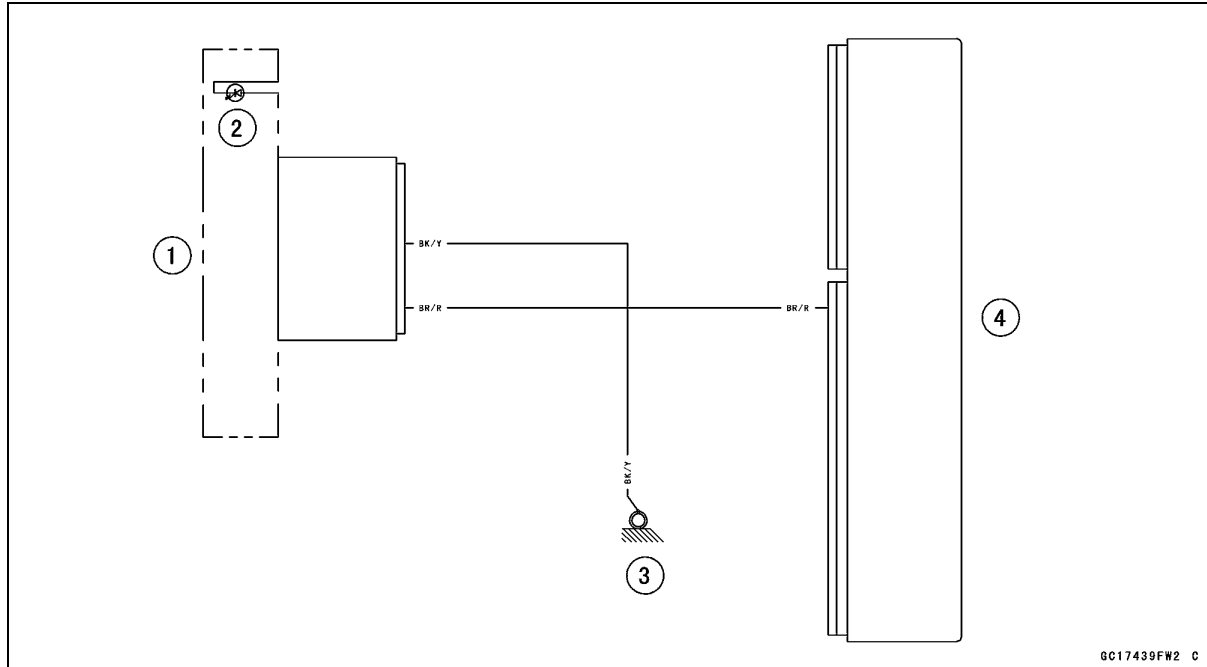
ECU Connector [A] ↔ Meter Unit Connector [B]

BR/R lead (ECU terminal 31) [C]

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



ECU Communication Line Circuit



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

3-90 FUEL SYSTEM (DFI)

Stick Coils #1, #2, #3, #4 (Service Code 51, 52, 53, 54)

- Stick Coil #1: Service Code 51
- Stick Coil #2: Service Code 52
- Stick Coil #3: Service Code 53
- Stick Coil #4: Service Code 54

Stick Coil Removal/Installation

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

Stick Coil Primary Winding Resistance Inspection

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

Stick Coil Input Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

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

Special Tool - Needle Adapter Set: 57001-1457

Stick Coil Input Voltage

Connections to ECU Connector:

For Stick Coil #1

- Digital Meter (+) → BK lead (terminal 40)
- Digital Meter (-) → BK/Y lead (terminal 54)

For Stick Coil #2

- Digital Meter (+) → BK/G lead (terminal 47)
- Digital Meter (-) → BK/Y lead (terminal 54)

For Stick Coil #3

- Digital Meter (+) → BK/W lead (terminal 39)
- Digital Meter (-) → BK/Y lead (terminal 54)

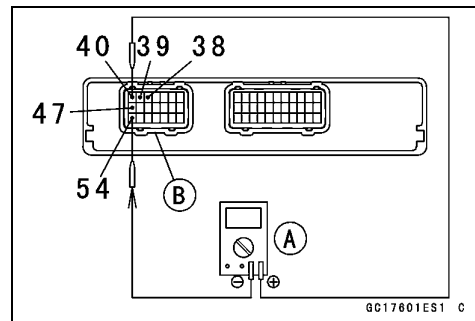
For Stick Coil #4

- Digital Meter (+) → BK/O lead (terminal 38)
- Digital Meter (-) → BK/Y lead (terminal 54)

- Measure the input voltage to each primary winding of the stick coils with the engine stopped and with the connectors joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

Input Voltage

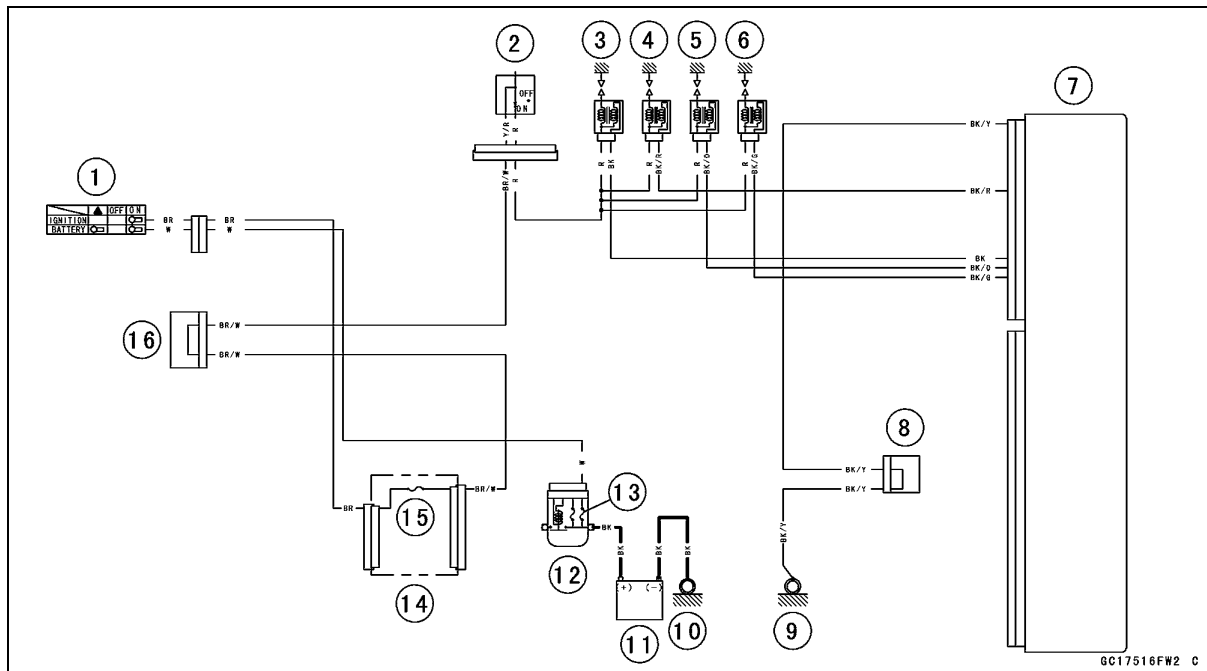
Standard: Battery Voltage



Stick Coils #1, #2, #3, #4 (Service Code 51, 52, 53, 54)

- Turn the ignition switch off.
- ★ If the input voltage is out of the standard, check the wiring for continuity (see wiring diagram in this section).
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★ If the input voltage is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Stick Coil Circuit



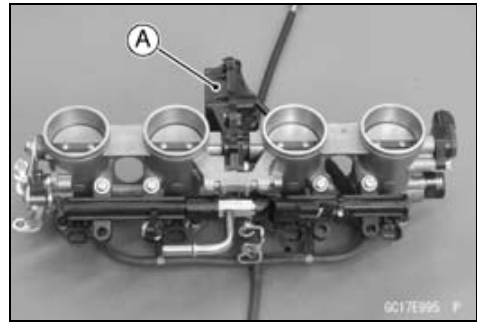
1. Ignition Switch
2. Engine Stop Switch
3. Stick Coil #1
4. Stick Coil #2
5. Stick Coil #3
6. Stick Coil #4
7. ECU
8. Joint Connector D
9. Frame Ground 3
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Fuse Box 1
15. Ignition Fuse 15 A
16. Joint Connector C

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Removal

NOTICE

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



Subthrottle Valve Actuator Inspection

NOTE

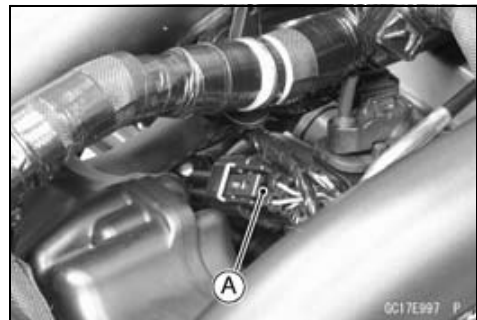
○Be sure the battery is fully charged.

- Remove the right throttle body cover (see Throttle Body Assy Removal).
- Turn the ignition switch on.
- Check to see that all the subthrottle valve lever [A] open and close smoothly.
- Turn the ignition switch off.
- ★ If the subthrottle valves do not operate, check the subthrottle valve actuator resistance (see Subthrottle Valve Actuator Resistance Inspection).



Subthrottle Valve Actuator Resistance Inspection

- Turn the ignition switch off.
- Disconnect the subthrottle valve actuator harness connector [A].



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

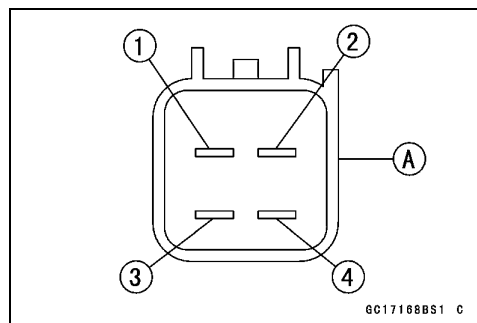
Subthrottle Valve Actuator Resistance

Connections: Y lead [1] ↔ P lead [2]

G lead [3] ↔ BK lead [4]

Standard: About 5.2 ~ 7.8 Ω

- ★ If the reading is out of the standard, replace the throttle body assy.
- ★ If the reading is within the standard, check the input voltage (see Subthrottle Valve Actuator Input Voltage Inspection).



3-94 FUEL SYSTEM (DFI)

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Disconnect the subthrottle valve actuator harness connector and connect the harness adapter [A] between these connectors as shown.

Main Harness [B]

Subthrottle Valve Actuator [C]

Special Tool - Measuring Adapter: 57001-1700

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

Special Tool - Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

Subthrottle Valve Actuator Input Voltage

Connections to Adapter:

(I) Digital Meter (+) → R (actuator GY/R) lead

Digital Meter (-) → Frame Ground terminal

(II) Digital Meter (+) → BK (actuator BK/O) lead

Digital Meter (-) → Frame Ground terminal

(III) Digital Meter (+) → W (actuator V) lead

Digital Meter (-) → Frame Ground terminal

(IV) Digital Meter (+) → Y (actuator G/BL) 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: DC 8.5 ~ 12.5 V or
DC 8.5 ~ 12.5 V and then about 0 V**

- Turn the ignition switch off.
- ★ If the reading is in specification, but the actuator does not operate, replace the throttle body assy.
- ★ If the reading is out of the specification, remove the ECU and check the wiring for continuity between main harness connectors.
- Disconnect the ECU and actuator connectors.

Wiring Inspection

ECU Connector [A] ↔

Subthrottle Valve Actuator Connector [B]

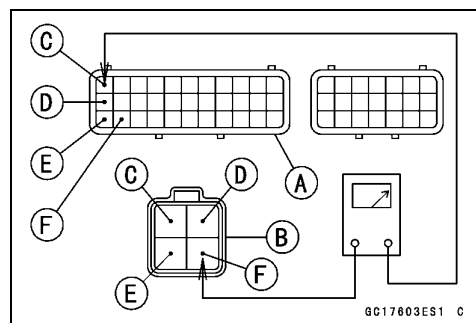
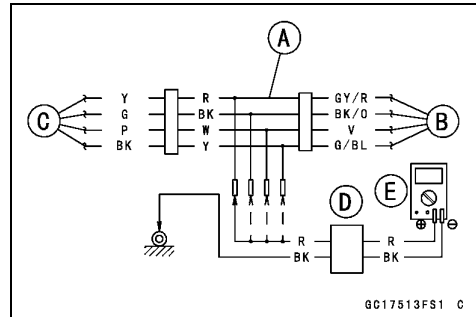
GY/R lead (ECU terminal 1) [C]

V lead (ECU terminal 12) [D]

BK/O lead (ECU terminal 23) [E]

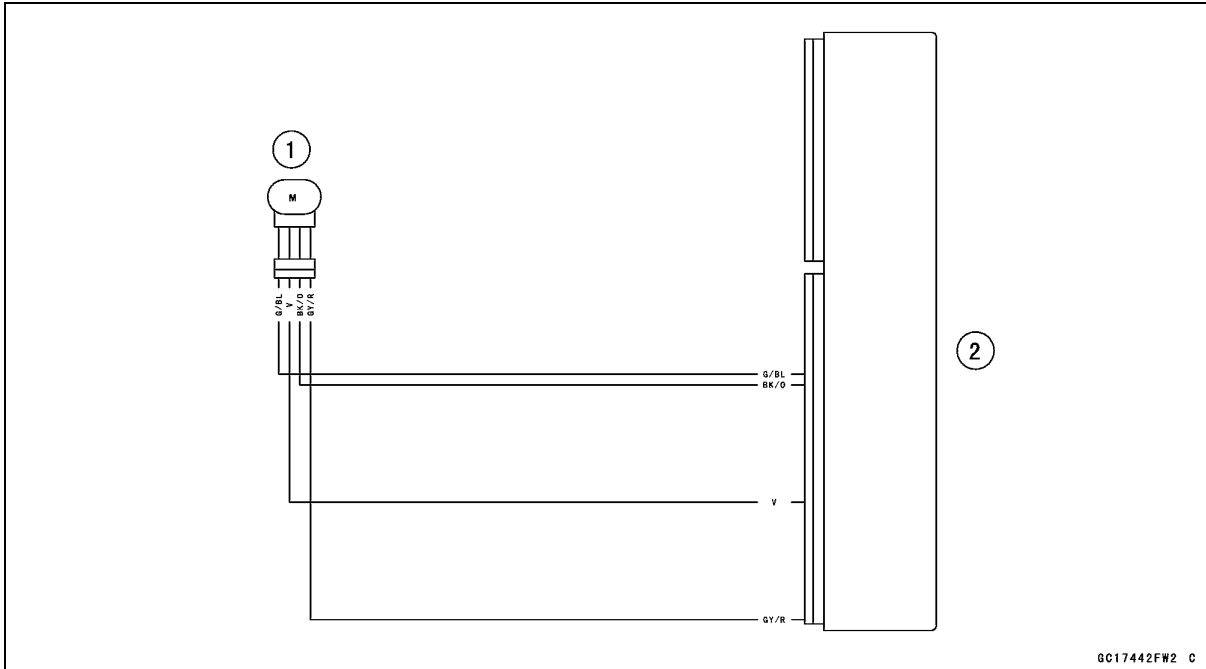
G/BL lead (ECU terminal 24) [F]

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



Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Circuit



- 1. Subthrottle Valve Actuator
- 2. ECU

3-96 FUEL SYSTEM (DFI)

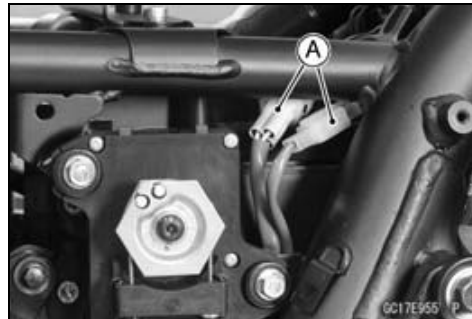
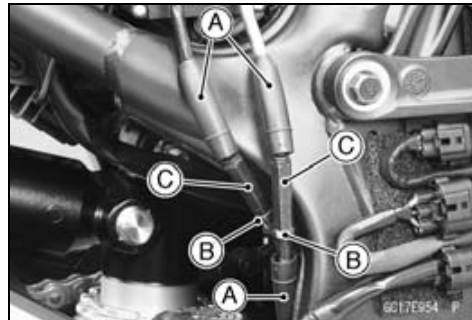
Exhaust Butterfly Valve Actuator (Service Code 63, ZR800A/B Models)

Exhaust Butterfly Valve Actuator Removal

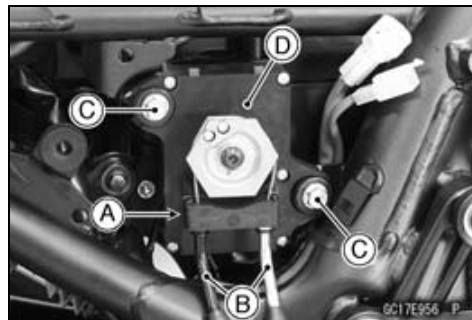
NOTICE

Never drop the exhaust butterfly valve actuator especially on a hard surface. Such a shock to the actuator can damage it.

- Slide the dust covers [A].
- Loosen the locknuts [B], and turn the adjusters [C] to give the cable plenty of play.
- Disconnect the connectors [A].



- Remove:
 - Clamp [A]
 - Exhaust Butterfly Valve Cables [B]
 - Bolts [C]
 - Exhaust Butterfly Valve Actuator [D]

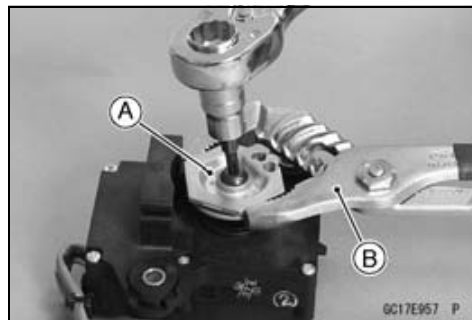


- Remove the pulley bolt while holding the pulley [A] with the suitable tool [B].

NOTICE

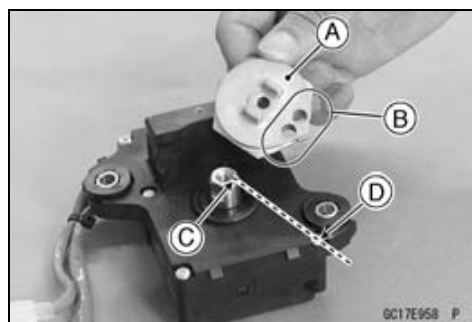
If the pulley bolt is removed without holding, the actuator damage will occur.

- Remove the pulley from the actuator.



Exhaust Butterfly Valve Actuator Installation

- Install the pulley [A] on the actuator so that the hole side [B] align with the groove [C] on the shaft.
- Check that the groove on the shaft faces to the center of the screw [D] as shown.
- If not, adjust the position (see the procedure on the next page).



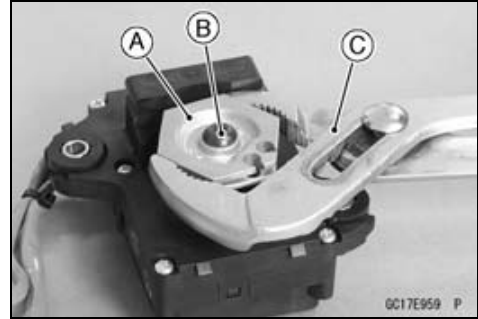
Exhaust Butterfly Valve Actuator (Service Code 63, ZR800A/B Models)

- Install the pulley [A] on the actuator as shown.
- Tighten the pulley bolt [B] while holding the pulley with the suitable tool [C].

Torque - Exhaust Butterfly Valve Actuator Pulley Bolt: 4.9 N·m (0.50 kgf·m, 43 in·lb)

NOTICE

If the pulley bolt is tightened without holding, the actuator damage will occur.



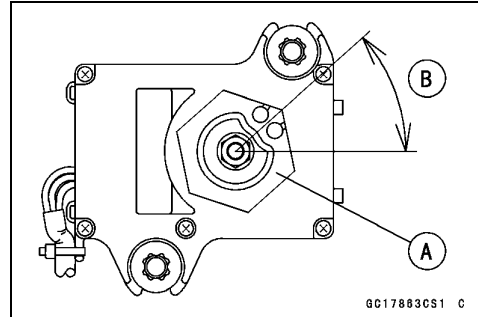
- After tightening the pulley bolt, confirm whether pulley [A] is an angle shown.
41.7° ±7° [B]
- This position is original position of the pulley.

NOTE

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

NOTICE

Do not correct the pulley position with the tool, forcibly. The actuator damage will occur.



- ★ If the pulley angle is wrong, adjust the angle as follows.
 - Connect:
 - 2 pins Connector
 - 3 pins Connector
 - Turn the ignition switch on.
 - Confirm the pulley turns clockwise and then counterclockwise.
 - The pulley stops at this side of the original position by the learning control.
 - The pulley returns to the original position.

3-98 FUEL SYSTEM (DFI)

Exhaust Butterfly Valve Actuator (Service Code 63, ZR800A/B Models)

★ If the position is not within the specified angle above, adjust the angle as follows.

○ Disconnect:

2 Pins Connector

3 Pins Connector

○ Connect the 12 V battery to the 2 pins connector terminals. Connect the battery to one terminal first, and connect to another terminal lightly to adjust the pulley position until it returns to the original position.

Pink (-) lead terminal [A]

Gray (+) lead terminal [B]

Clockwise:

Pink (-) lead terminal and Battery (-) terminal

Gray (+) lead terminal and Battery (+) terminal

Counterclockwise:

Pink (-) lead terminal and Battery (+) terminal

Gray (+) lead terminal and Battery (-) terminal

○ Connect:

2 Pins Connector

3 Pins Connector

○ Turn the ignition switch on.

○ Confirm the pulley turns clockwise and then counterclockwise.

○ The pulley stops at this side of the original position by the learning control.

○ The pulley returns to the original position.

○ Turn the ignition switch off.

★ If the position is not within the specified angle above, replace the exhaust butterfly valve actuator.

● Tighten:

Torque - Exhaust Butterfly Valve Actuator Mounting Bolts:

6.9 N·m (0.70 kgf·m, 61 in·lb)

● Install the close cable first and then open cable (see Exhaust Butterfly Valve Cable Installation (ZR800A/B Models) in the Engine Top End chapter).

Exhaust Butterfly Valve Actuator Inspection

NOTE

○ Be sure the battery is fully charged

● Remove the right side cover (see Side Cover Removal in the Frame chapter).

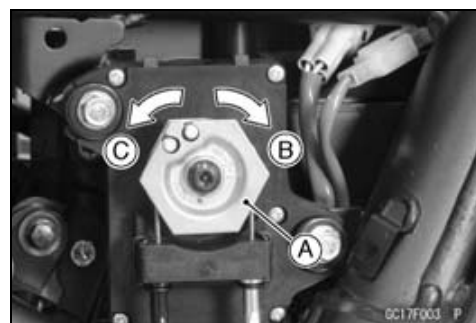
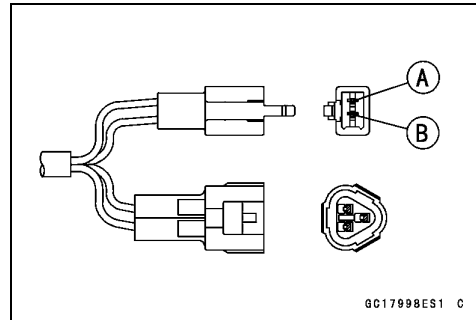
● Turn the ignition switch on.

● Check to see the pulley [A] clockwise [B] and counterclockwise [C] smoothly.

○ The pulley turns clockwise and then counterclockwise, and clockwise again.

● Turn the ignition switch off.

★ If the pulley does not operate, check the exhaust butterfly valve actuator resistance (see Exhaust Butterfly Valve Actuator Inspection Resistance Inspection).



Exhaust Butterfly Valve Actuator (Service Code 63, ZR800A/B Models)

Exhaust Butterfly Valve Actuator Resistance Inspection

- Turn the ignition switch off.
- Disconnect the exhaust butterfly valve actuator lead connector (2 pins connector) [A].
- Set the hand tester to the $\times 1 \Omega$ range and connect it to the exhaust butterfly valve actuator connector.

Special Tool - Hand Tester: 57001-1394

- Measure the exhaust butterfly valve actuator resistance.

Exhaust Butterfly Valve Actuator Resistance

Connections: P lead \longleftrightarrow GY lead

Standard: Any Reading Resistance (reference 5 ~ 200 Ω)

★If the reading is 0 or infinity (∞) Ω , replace the exhaust butterfly valve actuator.

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

○Disconnect the ECU and actuator connectors.

Wiring Inspection

ECU Connector [A] \longleftrightarrow

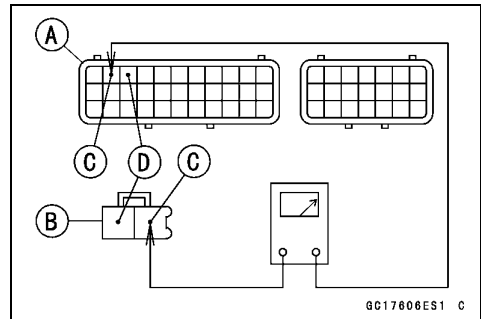
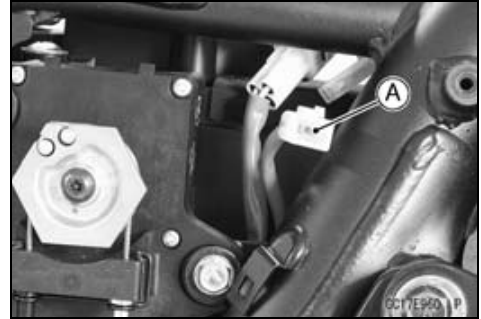
Exhaust Butterfly Valve Actuator Connector [B]

W/R lead (ECU terminal 2) [C]

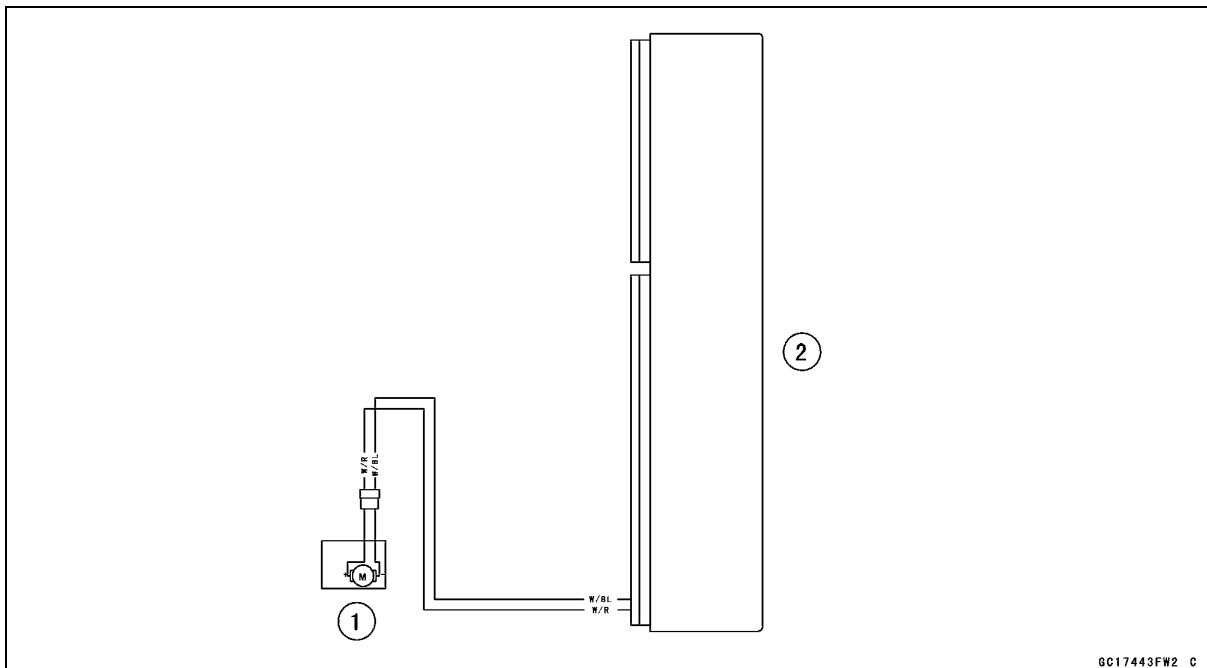
W/BL lead (ECU terminal 3) [D]

★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).



Exhaust Butterfly Valve Actuator Circuit



1. ECU
2. Exhaust Butterfly Valve Actuator

GC17443FW2 C

3-100 FUEL SYSTEM (DFI)

Air Switching Valve (Service Code 64)

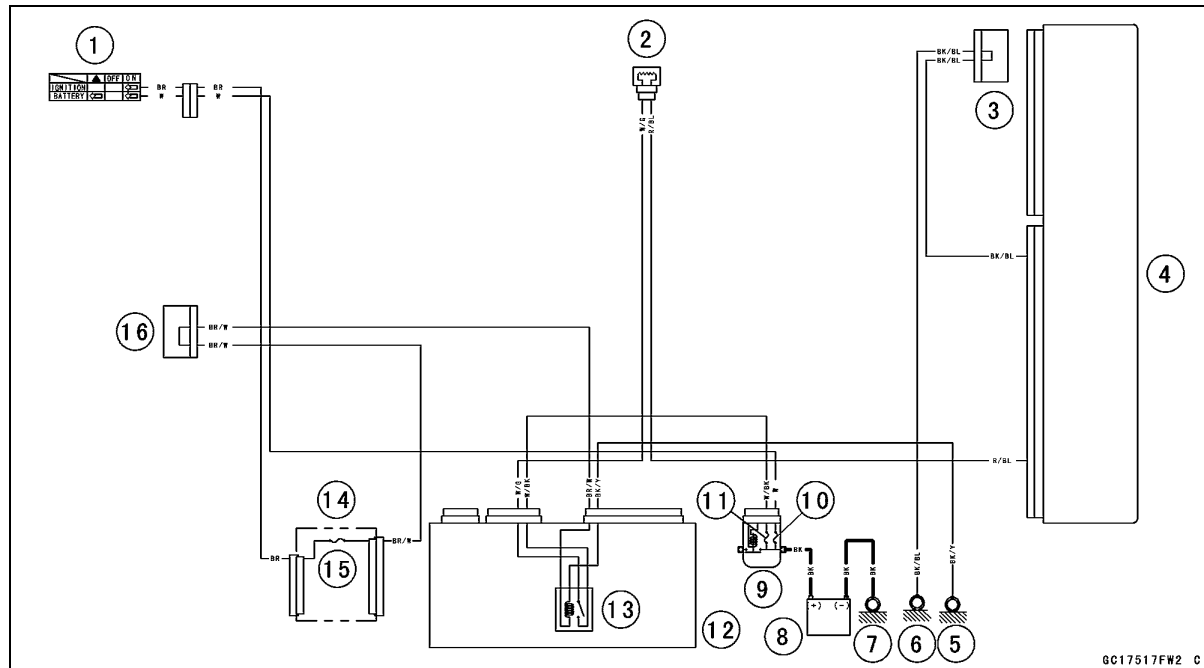
Air Switching Valve Removal/Installation

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

Air Switching Valve Inspection

- Refer to the Air Switching Valve Unit Test in the Electrical System chapter.
- ★ If the air switching valve is normal, check the wiring for continuity (see wiring diagram in this section).
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Air Switching Valve Circuit



- | | |
|------------------------|------------------------|
| 1. Ignition Switch | 9. Starter Relay |
| 2. Air Switching Valve | 10. Main Fuse 30 A |
| 3. Joint Connector E | 11. ECU Fuse 15 A |
| 4. ECU | 12. Relay Box |
| 5. Frame Ground 4 | 13. ECU Main Relay |
| 6. Frame Ground 1 | 14. Fuse Box 1 |
| 7. Engine Ground | 15. Ignition Fuse 15 A |
| 8. Battery 12 V 8 Ah | 16. Joint Connector C |

Oxygen Sensor Heater (Service Code 67)

Oxygen Sensor Heater Removal/Installation

The oxygen sensor heater is built in the oxygen sensor. So, the heater itself can not be removed. Remove the oxygen sensor (see Oxygen Sensor Removal in the Electrical System chapter).

Oxygen Sensor Heater Resistance Inspection

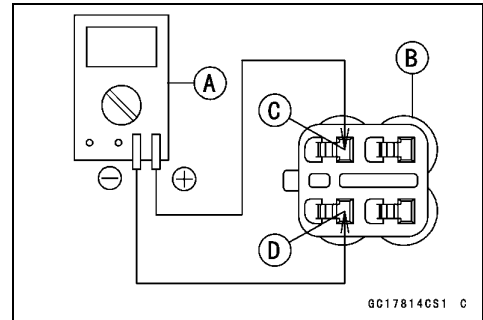
- Turn the ignition switch off.
- Remove:
 - Right Frame Cover (see Frame Cover Removal in the Frame chapter)
- Disconnect the oxygen sensor lead connector.
- Connect a digital meter [A] to the oxygen sensor lead connector [B].
- Measure the oxygen sensor heater resistance.

Oxygen Sensor Heater Resistance

Connections: BK lead [C] ↔ BK lead [D]

Standard: 11.7 ~ 15.5 Ω at 20°C (68°F)

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



Oxygen Sensor Heater Power Source Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

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

Special Tool - Oxygen Sensor Measuring Adapter: 57001-1682

- Connect a digital meter to the harness adapter lead.

Oxygen Sensor Power Source Voltage

Connections to Adapter:

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

Digital Meter (-) → Battery (-) terminal

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

Power Source Voltage

Standard: Battery Voltage

- Turn the ignition switch off.
- ★ If the reading is in specification, but the problem still exists, replace the ECU (see ECU Removal/Installation).
- ★ If the reading is out of the standard, check the following.
 - Oxygen Sensor Heater Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
 - Power Source Wiring (see wiring diagram in this section)



3-102 FUEL SYSTEM (DFI)

Oxygen Sensor Heater (Service Code 67)

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

○ Disconnect the ECU and sensor connectors.

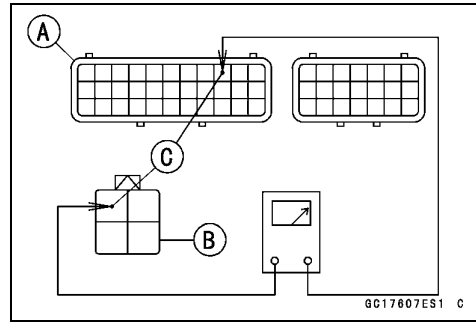
Wiring Inspection

ECU Connector [A] ←→

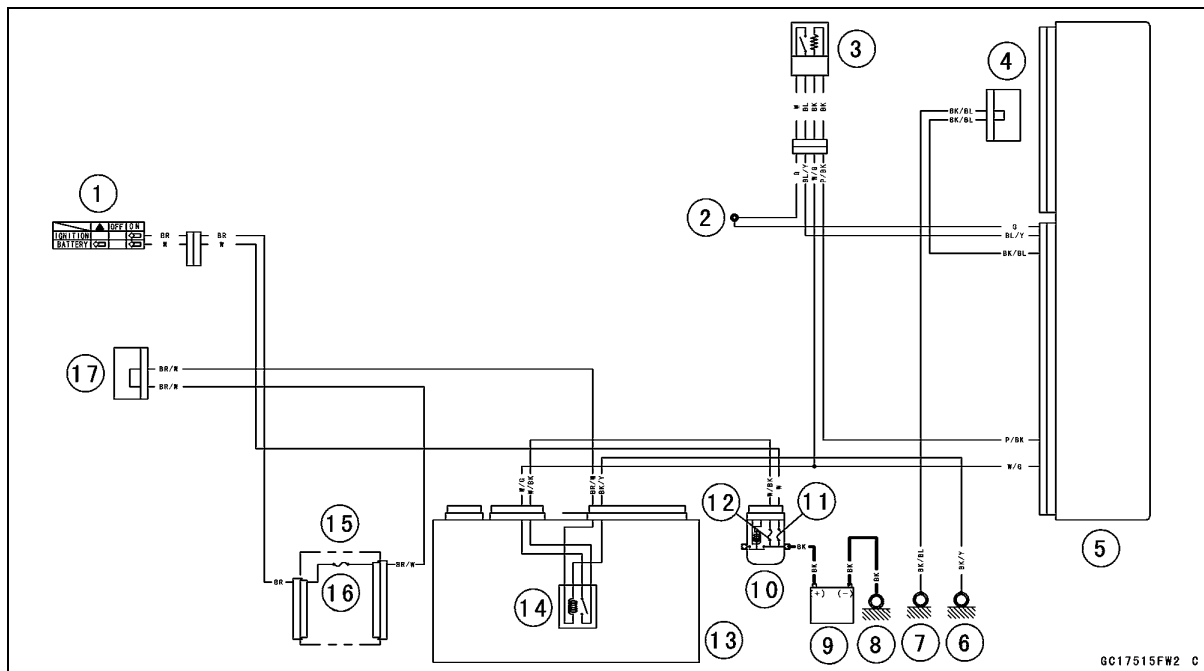
Oxygen Sensor Connector [B]

P/BK lead (ECU terminal 9) [C]

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



Oxygen Sensor Circuit



- | | |
|------------------------|------------------------|
| 1. Ignition Switch | 10. Starter Relay |
| 2. Water Proof Joint 2 | 11. Main Fuse 30 A |
| 3. Oxygen Sensor | 12. ECU Fuse 15 A |
| 4. Joint Connector E | 13. Relay Box |
| 5. ECU | 14. ECU Main Relay |
| 6. Frame Ground 4 | 15. Fuse Box 1 |
| 7. Frame Ground 1 | 16. Ignition Fuse 15 A |
| 8. Engine Ground | 17. Joint Connector C |
| 9. Battery 12 V 8 Ah | |

Oxygen Sensor - Incorrect Output Voltage (Service Code 94)

Oxygen Sensor Removal/Installation

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

Oxygen Sensor Inspection

- Turn the ignition switch off.
- Remove the right frame cover (see Frame Cover Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector (4 pins connector) and connect the harness adapter [A] between these connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001-1682

- Connect a digital meter to the harness adapter leads.

Oxygen Sensor Output Voltage

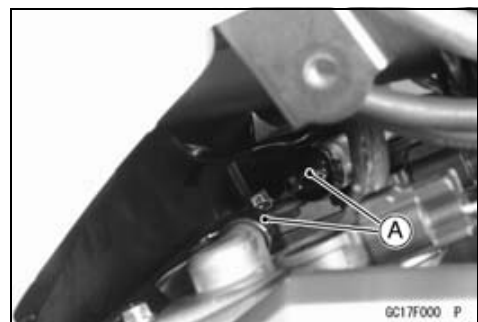
Connections to Adapter:

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

Digital Meter (-) → BR/BK (sensor W) lead

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Air Suction Valve Covers (see Air Suction Valve Removal in the Engine Top End chapter)
 - Air Switching Valve (see Air Switching Valve Removal in the Engine Top End chapter)
- Install the air suction valve covers (see Air Suction Valve Installation in the Engine Top End chapter).
- Connect the air switching valve connector [A].

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

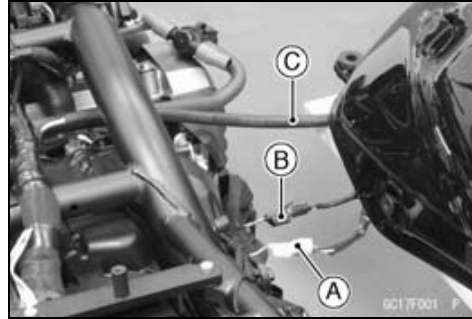


3-104 FUEL SYSTEM (DFI)

Oxygen Sensor - Incorrect Output Voltage (Service Code 94)

- Remove the fuel outlet hose (see Fuel Hose Replacement in the Periodic Maintenance chapter).
- Connect the following parts temporary.
 - Fuel Pump Lead Connector [A]
 - Fuel Level Sensor Lead Connector [B]
 - Extension Tube [C]

Special Tool - Extension Tube: 57001-1578



- Start the engine, and let it idle.
- Warm up the engine thoroughly until the radiator fan starts.
- Measure the output voltage with the connector joined.

Output Voltage (with Plugs)

Standard: DC 0.7 V or more

- Next, remove the plugs from the fittings [A] with idling.

⚠ WARNING

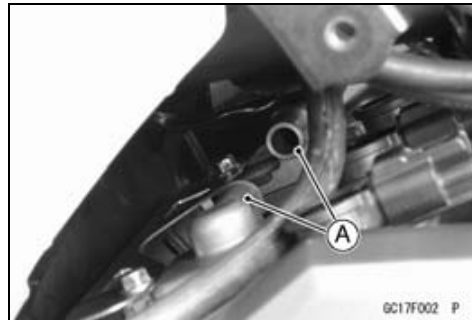
The engine gets extremely hot during normal operation and can cause serious burns. Never touch a hot engine.

- Measure the output voltage with the connector joined.

Output Voltage (without Plugs)

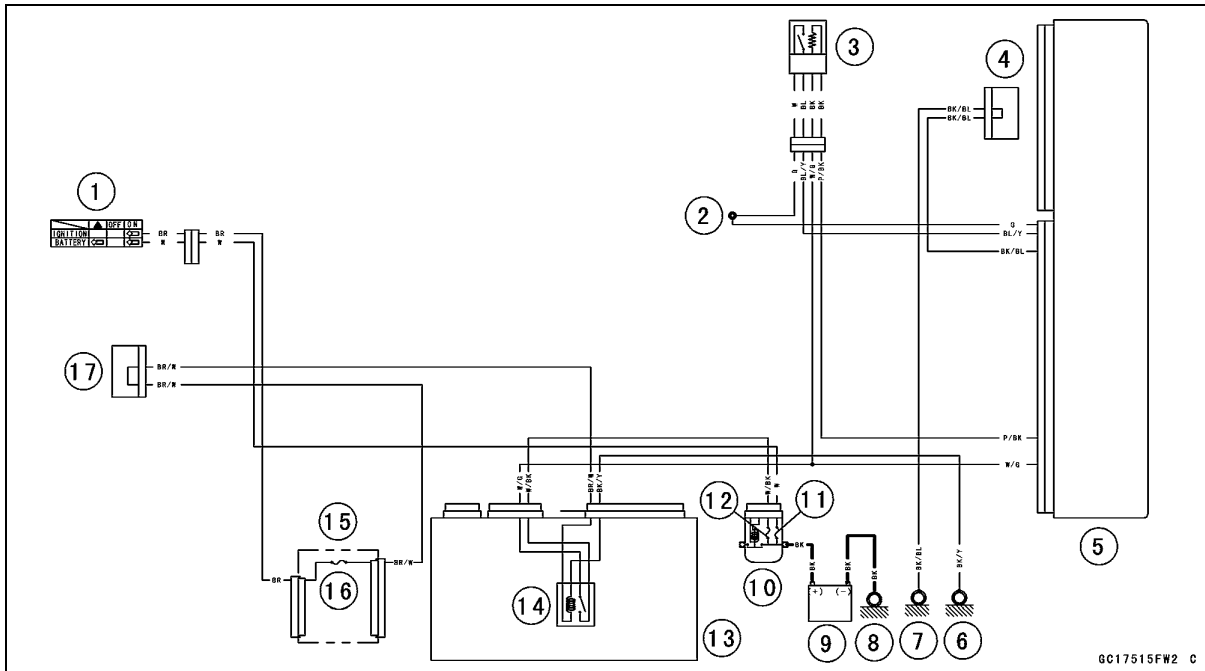
Standard: DC 0.2 V or less

- Turn the ignition switch off.
- ★ If the reading is out of the standard (with plugs: DC 0.7 V or more, without plugs: DC 0.2 V or less), check the following.
 - Fuel Pressure (see Fuel Pressure Inspection)
 - Fuel Injector (see Fuel Injectors section)
- ★ If the fuel pressure and fuel injectors are good, replace the sensor.
- ★ If the reading is within the standard (with plugs: DC 0.7 V or more, without plugs: DC 0.2 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



Oxygen Sensor - Incorrect Output Voltage (Service Code 94)

Oxygen Sensor Circuit



- | | |
|------------------------|------------------------|
| 1. Ignition Switch | 10. Starter Relay |
| 2. Water Proof Joint 2 | 11. Main Fuse 30 A |
| 3. Oxygen Sensor | 12. ECU Fuse 15 A |
| 4. Joint Connector E | 13. Relay Box |
| 5. ECU | 14. ECU Main Relay |
| 6. Frame Ground 4 | 15. Fuse Box 1 |
| 7. Frame Ground 1 | 16. Ignition Fuse 15 A |
| 8. Engine Ground | 17. Joint Connector C |
| 9. Battery 12 V 8 Ah | |

GC17515FW2 C

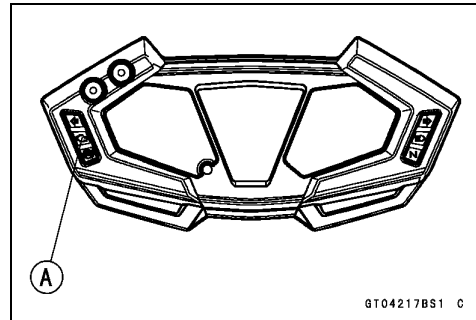
3-106 FUEL SYSTEM (DFI)

Warning Indicator Light (LED)

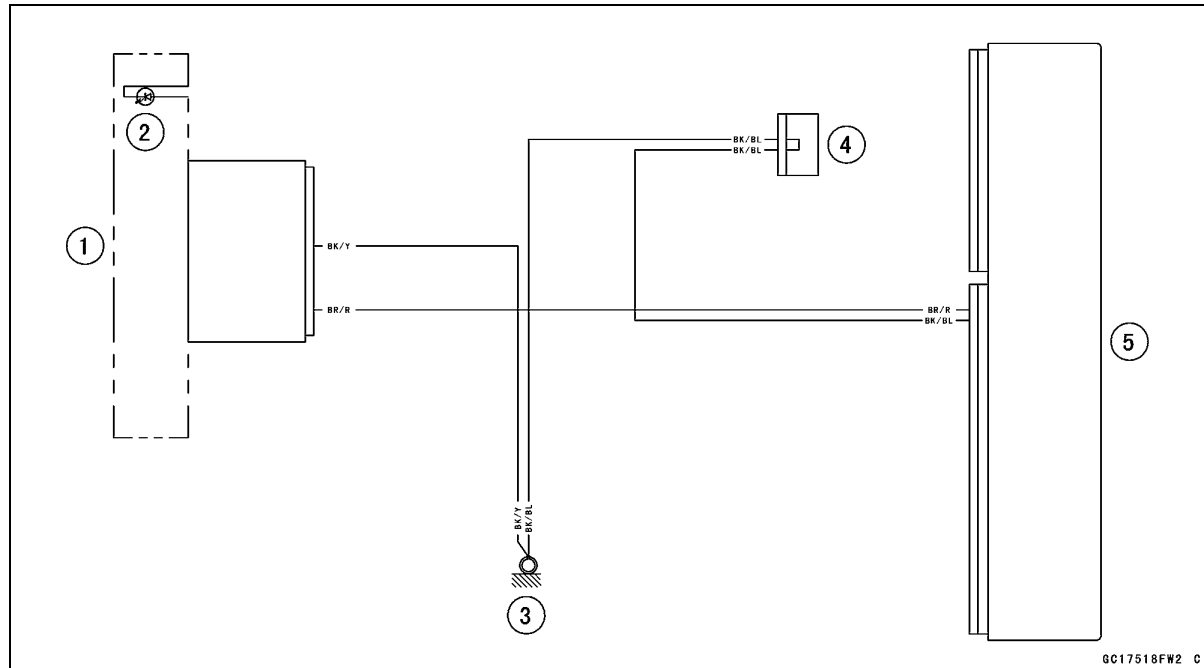
Yellow Engine Warning Indicator Light (LED) Inspection

Yellow Engine Warning Indicator Light (LED) [A]

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



Warning Indicator Light (LED) Circuit



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

ECU

ECU Identification

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

ECU Identification (ZR800A/B Models)

Part Number [A]	Specification
21175-0789	WVTA (FULL) GB WVTA (FULL) SEA-B2 AU
21175-0791	WVTA (78.2)
21175-0833	BR

ECU Identification (ZR800C/D Models)

Part Number [A]	Specification
21175-0806	WVTA (FULL)

ECU Removal

NOTICE

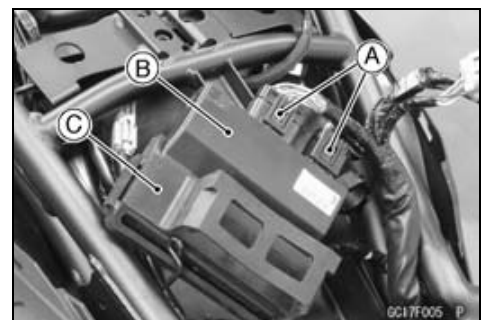
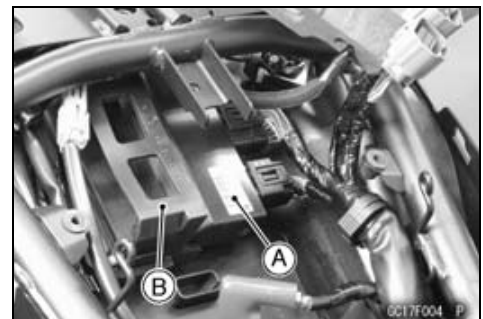
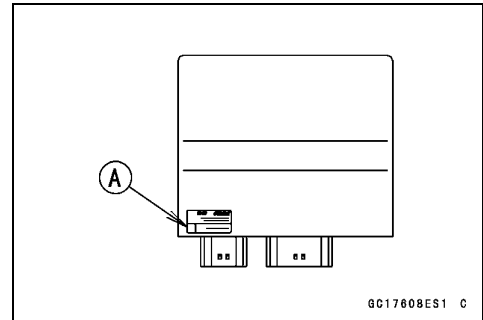
Never drop the ECU especially on a hard surface. Such a shock to the ECU can damage it.

NOTE

○Refer to the *Immobilizer System Parts Replacement in the Electrical System chapter for the models with guards.*

- Remove the relay box (see Relay Box Removal in the Electrical System chapter).
- Lift up the ECU [A] with rubber protector [B].

- Disconnect the ECU connectors [A].
- Remove the ECU [B] (with Rubber Protector [C]).

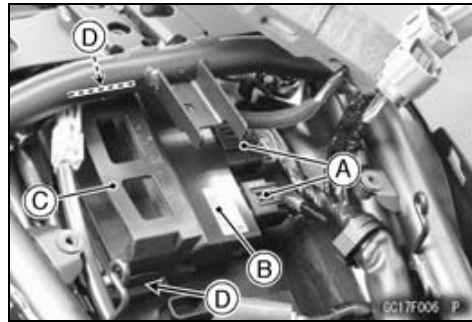


3-108 FUEL SYSTEM (DFI)

ECU

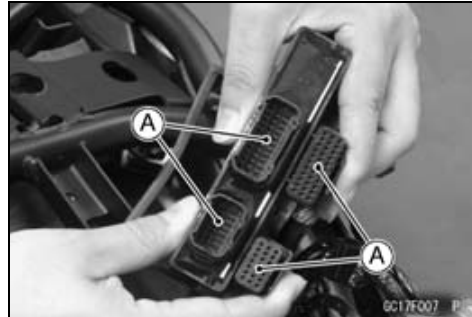
ECU Installation

- Connect the ECU connectors [A].
- Install the ECU [B] (in Rubber Protector [C]).
- Insert the slits of the rubber protector to the projections [D].



ECU Power Supply Inspection

- Remove the relay box (see Relay Box Removal in the Electrical System chapter).
- Visually inspect the ECU connectors.
- ★ If the connector is clogged with mud or dust, blow it off with compressed air.
- Remove the ECU (see ECU Removal).
- Visually inspect the terminals [A] of the ECU connectors.
- ★ If the terminals of the main harness connectors are damaged, replace the main harness.
- ★ If the terminals of the ECU connectors are damaged, replace the ECU.
- Turn the ignition switch off.
- Disconnect the ECU connectors [A].
- Set the hand tester [B] to the $\times 1 \Omega$ range and check the following wiring for continuity.



Special Tool - Hand Tester: 57001-1394

ECU Grounding Inspection

Connections:

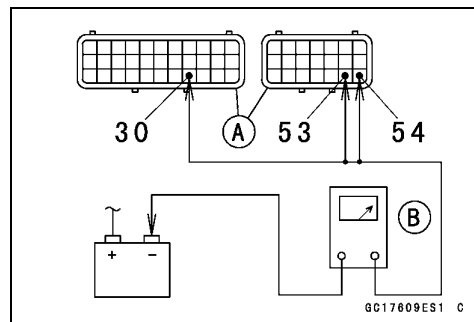
(I) BK/Y leads (ECU terminal 30, 53 or 54) \longleftrightarrow Battery (-) Terminal

(II) Engine Ground \longleftrightarrow Battery (-) Terminal

Criteria:

Both: 0Ω

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



ECU

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

NOTE

○Be sure the battery is fully charged.

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

Special Tool - Needle Adapter Set: 57001-1457

ECU Power Supply Inspection

Connections:

- (I) **Digital Meter (+) → Terminal 6 (W/G)**
Digital Meter (-) → Battery (-) terminal
- (II) **Digital Meter (+) → Terminal 8 (W/BK)**
Digital Meter (-) → Battery (-) terminal

Ignition Switch OFF:

- Terminal 6 (W/G): 0 V**
- Terminal 8 (W/BK): Battery Voltage**

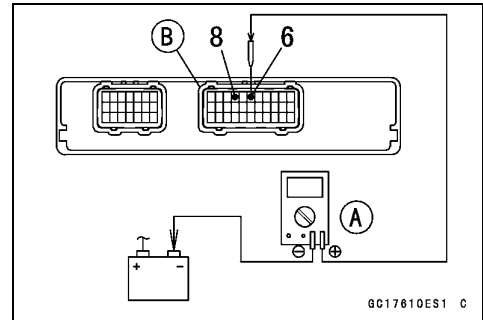
Ignition Switch ON:

Both: Battery Voltage

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

- Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)
- ECU Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
- ECU Main Relay (see Relay Circuit Inspection in the Electrical System chapter)
- Power Source Wiring (see wiring diagram in this section)

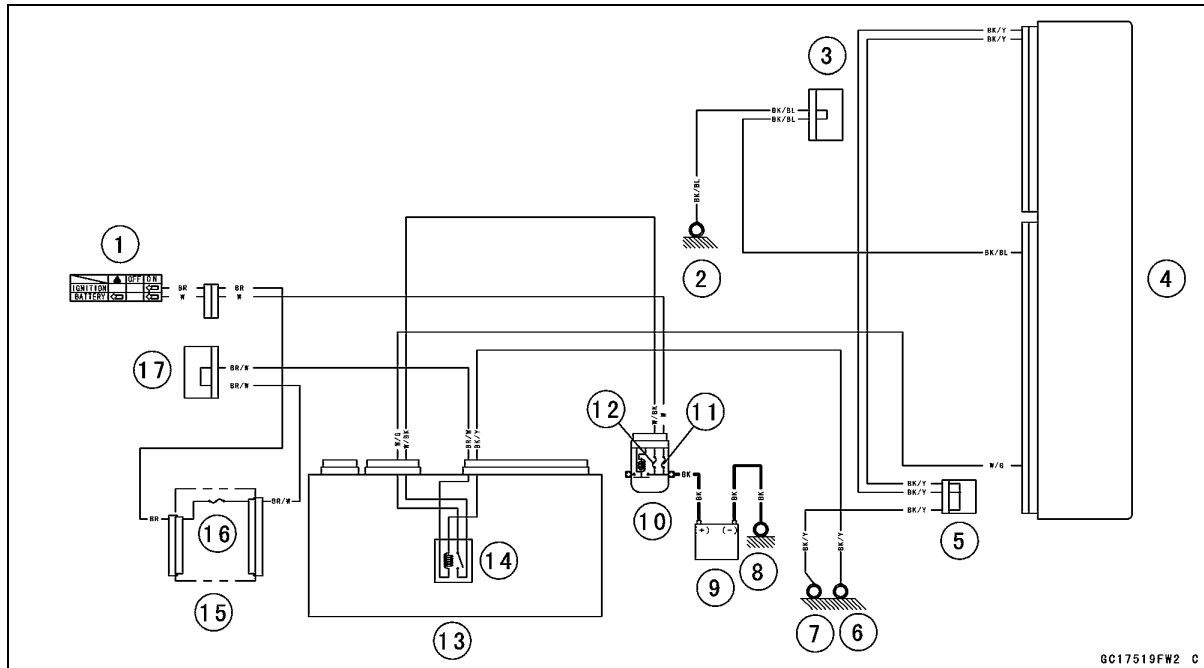
★If the fuse, wiring and relay are good, replace the ECU (see ECU Removal/Installation).



3-110 FUEL SYSTEM (DFI)

ECU

ECU Power Source Circuit



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

GC17519FW2 C

DFI Power Source

ECU Fuse Removal

- Refer to the 30 A Main/10 A ECU Fuse Removal in the Electrical System chapter.

ECU Fuse Installation

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

ECU Fuse Inspection

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

ECU Main Relay Removal/Installation

- The ECU main relay is built in the relay box [A].
- Refer to the Relay Box Removal in the Electrical System chapter.



ECU Main Relay Inspection

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

3-112 FUEL SYSTEM (DFI)

Fuel Line

Fuel Pressure Inspection

NOTE

○Be sure the battery is fully charged.

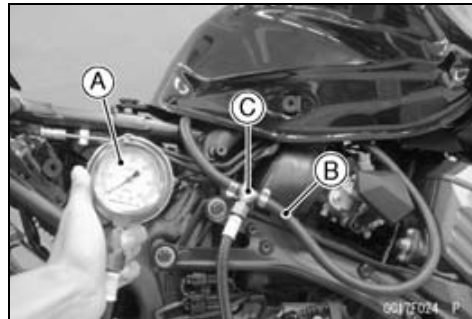
- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Fuel Outlet Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
- Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the delivery pipe of the throttle body assy.

⚠ WARNING

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

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

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



⚠ WARNING

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

- Connect:
 - Fuel Pump Lead Connector
 - Fuel Level Sensor Lead Connector
- Turn the engine stop switch run position.
- Turn the ignition switch on.
- The fuel pump should operate for 3 seconds, and then should stop.

NOTE

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

NOTICE

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

Fuel Line

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

Fuel Pressure (with Engine Idling)

Standard: 294 kPa (3.0 kgf/cm², 43 psi)

NOTE

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

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

Fuel Flow Rate Inspection

WARNING

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

NOTE

○ *Be sure the battery is fully charged.*

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

Special Tool - Fuel Hose: 57001-1607

- Remove the fuel tank bolt (see Fuel Tank Removal).

3-114 FUEL SYSTEM (DFI)

Fuel Line

- Open the fuel tank cap [A] to lower the pressure in the tank.
- Remove the fuel outlet hose from the fuel pump (see Fuel Tank Removal).
- Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump.

⚠ WARNING

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

- Connect the prepared fuel hose [A] to the fuel outlet pipe.
- Secure the fuel hose with a clamp.
- Insert the fuel hose into the measuring cylinder [B].

⚠ WARNING

Wipe off spilled out fuel immediately. Be sure to hold the measuring cylinder vertical.

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

NOTICE

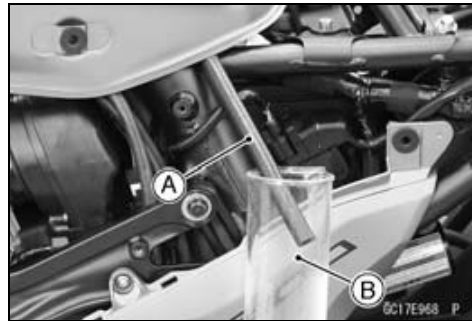
Do not drive the fuel pump 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

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

Amount of Fuel Flow

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

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



Fuel Pump

Fuel Pump Removal

⚠ WARNING

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

NOTICE

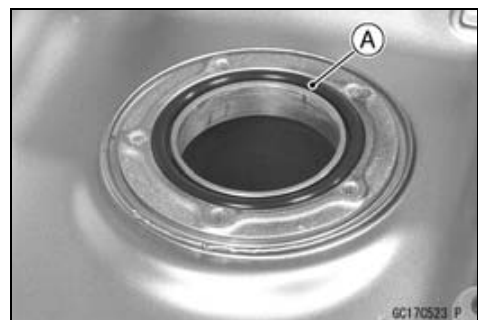
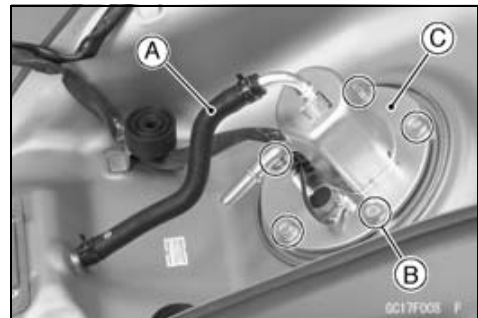
Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

- Draw the fuel out from the fuel tank with a commercially available electric pump.
- Remove the fuel tank (see Fuel Tank Removal).
- Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.
- Turn the fuel tank upside down.
- Remove the fuel intake hose [A].
- Unscrew the fuel pump bolts [B], and take out the fuel pump [C].

NOTICE

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

- Discard the fuel pump gasket [A].

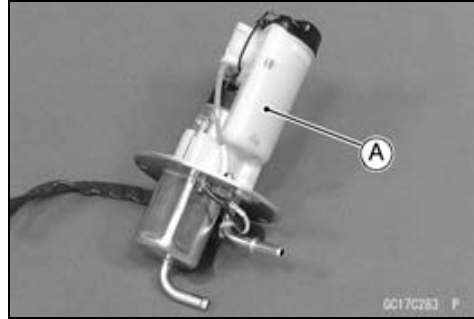


3-116 FUEL SYSTEM (DFI)

Fuel Pump

Fuel Pump Installation

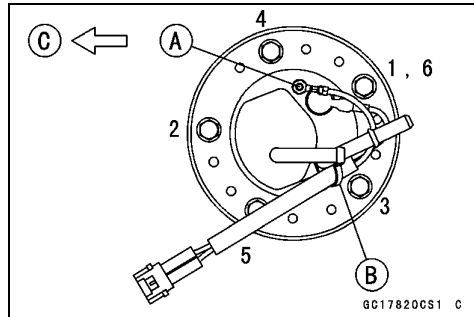
- Remove dirt or dust from the fuel pump [A] by lightly applying compressed air.
- Replace the fuel pump gasket with a new one.



- Check that the fuel pump terminal [A] and band [B] are in place.
Front [C]
- Apply a non-permanent locking agent to the threads of the fuel pump bolts.
- Tighten the fuel pump bolts to a snug fit, following the tightening sequence as shown.
- Following the tightening sequence, tighten the fuel pump bolts to the specified torque.

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

- Tighten the pump bolts again to check the tightness in the order shown.



Fuel Pump Operation Inspection

NOTE

○Be sure the battery is fully charged.

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

Fuel Pump

Fuel Pump Operating Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the right subframe cover (see Subframe Cover Removal in the Frame chapter).
- Disconnect the fuel pump lead connector and connect the harness adapter [A] between these connectors as shown.
Main Harness [B]
Fuel Pump [C]

Special Tool - Measuring Adapter: 57001-1700

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

Fuel Pump Operating Voltage

Connections to Adapter:

Digital Meter (+) → R (pump Y/R) lead

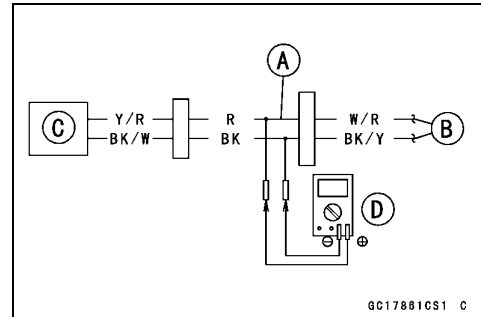
Digital Meter (-) → BK (pump BK/W) lead

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

Operating Voltage

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

- Turn the ignition switch off.
- ★ If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
- ★ If the pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★ If there is still no battery voltage, check the ECU main relay and fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
- ★ If the main relay and pump relay are normal, check the wiring for continuity (see wiring diagram in this section).
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★ If the reading is in specification, but the pump does not operate, replace the fuel pump (see Fuel Pump Removal/Installation).

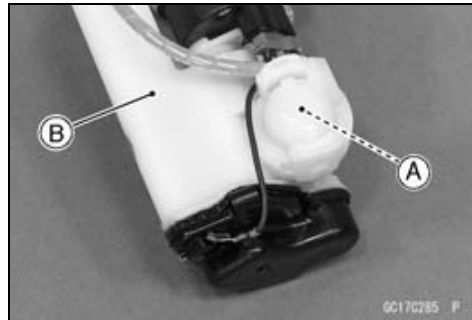


3-118 FUEL SYSTEM (DFI)

Fuel Pump

Pressure Regulator Removal

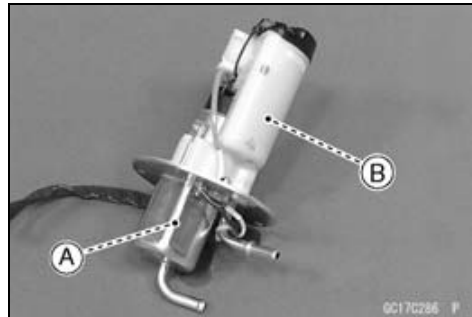
○The pressure regulator [A] is built into the fuel pump [B] and can not be removed.



Pump Screen, Fuel Filter Cleaning

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

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



Fuel Pump Relay Removal/Installation

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

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

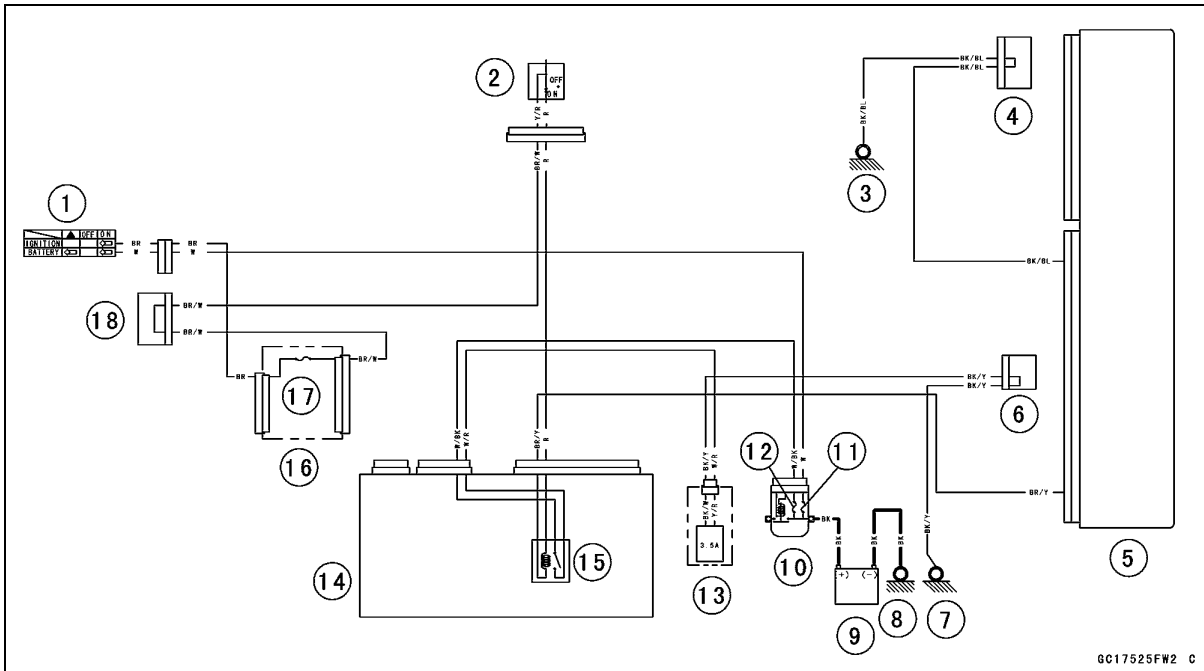


Fuel Pump Relay Inspection

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

Fuel Pump

Fuel Pump Circuit



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

GC17525FW2 C

3-120 FUEL SYSTEM (DFI)

Fuel Injectors

Fuel Injector Removal/Installation

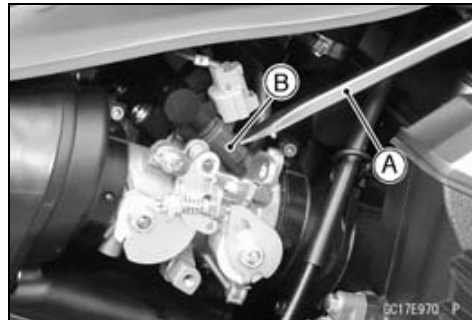
- Refer to the Throttle Body Assy Disassembly/Assembly.

Fuel Injector Audible Inspection

NOTE

○ Be sure the battery is fully charged.

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



Fuel Injector Resistance Inspection

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Fuel Outlet Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
- Disconnect the injector connector [A].
- Connect a digital meter to the terminals of the injector [B].
- Measure the fuel injector resistance.



Fuel Injector Resistance

Connections:

For Fuel Injector #1

W/R ↔ BL/BK terminal

For Fuel Injector #2

W/R ↔ BL/R terminal

For Fuel Injector #3

W/R ↔ BL/O terminal

For Fuel Injector #4

W/R ↔ BL/G terminal

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

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

Fuel Injectors

Fuel Injector Power Source Voltage Inspection

NOTE

○Be sure the battery is fully charged.

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

Special Tool - Measuring Adapter: 57001-1700

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

Fuel Injector Power Source Voltage

Connections to Adapter:

For Fuel Injector #1, #2, #3, #4

Digital Meter (+) → R (injector W/R) lead

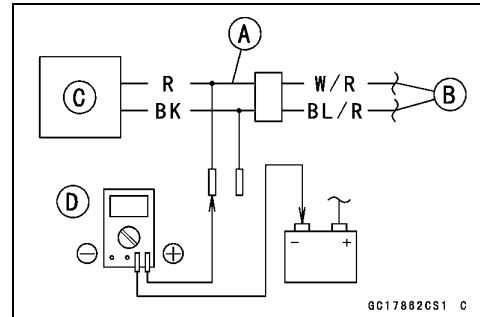
Digital Meter (-) → Battery (-) terminal

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

Power Source Voltage

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

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



3-122 FUEL SYSTEM (DFI)

Fuel Injectors

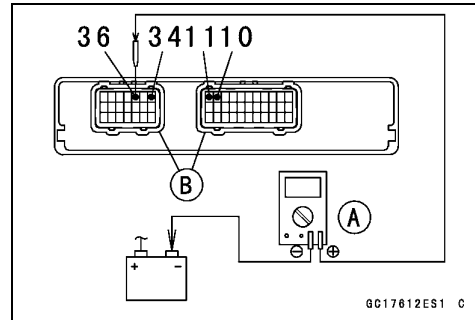
Fuel Injector Output Voltage Inspection

NOTE

○Be sure the battery is fully charged.

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

Special Tool - Needle Adapter Set: 57001-1457



Fuel Injector Output Voltage

Connections to ECU Connector:

For Fuel Injector #1

Digital Meter (+) → BL/BK lead (ECU terminal 36)

Digital Meter (-) → Battery (-) terminal

For Fuel Injector #2

Digital Meter (+) → BL/R lead (ECU terminal 34)

Digital Meter (-) → Battery (-) terminal

For Fuel Injector #3

Digital Meter (+) → BL/O lead (ECU terminal 11)

Digital Meter (-) → Battery (-) terminal

For Fuel Injector #4

Digital Meter (+) → BL/G lead (ECU terminal 10)

Digital Meter (-) → Battery (-) terminal

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

Output Voltage

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

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

Fuel Injectors

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

Wiring Inspection

ECU Connector [A] ↔ Fuel Injector Connector [B]

For Fuel Injector #1 [C]

BL/BK lead (ECU terminal 36) [D]

For Fuel Injector #2

BL/R lead (ECU terminal 34)

For Fuel Injector #3

BL/O lead (ECU terminal 11)

For Fuel Injector #4

BL/G lead (ECU terminal 10)

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

Fuel Injector Fuel Line Inspection

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Fuel Outlet Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
- Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the delivery pipe of the throttle body assy.

WARNING

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

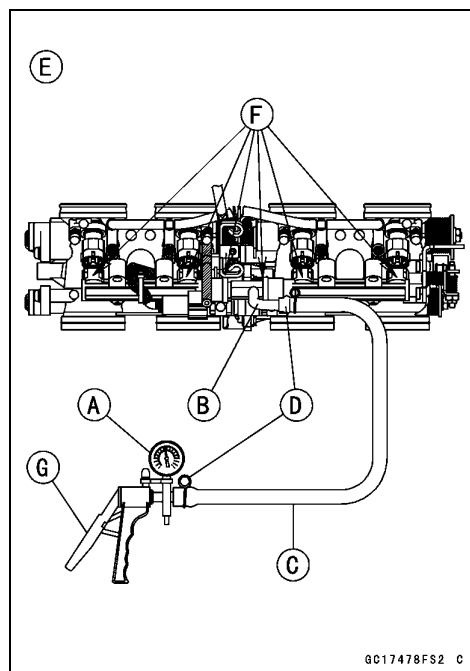
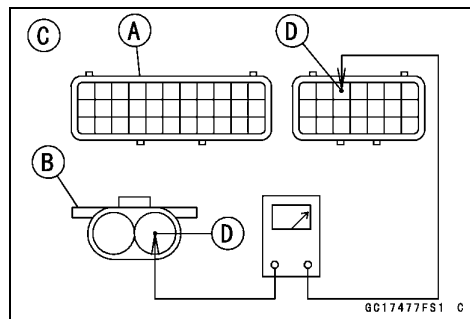
- Check the injector fuel line for leakage as follows.
 - Connect a commercially available vacuum/pressure pump [A] to the nipple of the delivery pipe [B] with the fuel hose [C] (both ends with the clamps [D]) as shown.
 - Upside View [E]
 - Apply soap and water solution to the areas [F] as shown.
 - Watching the pressure gauge, squeeze the pump lever [G], and build up the pressure until the pressure reaches the maximum pressure.

Injector Fuel Line Maximum Pressure

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

NOTICE

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

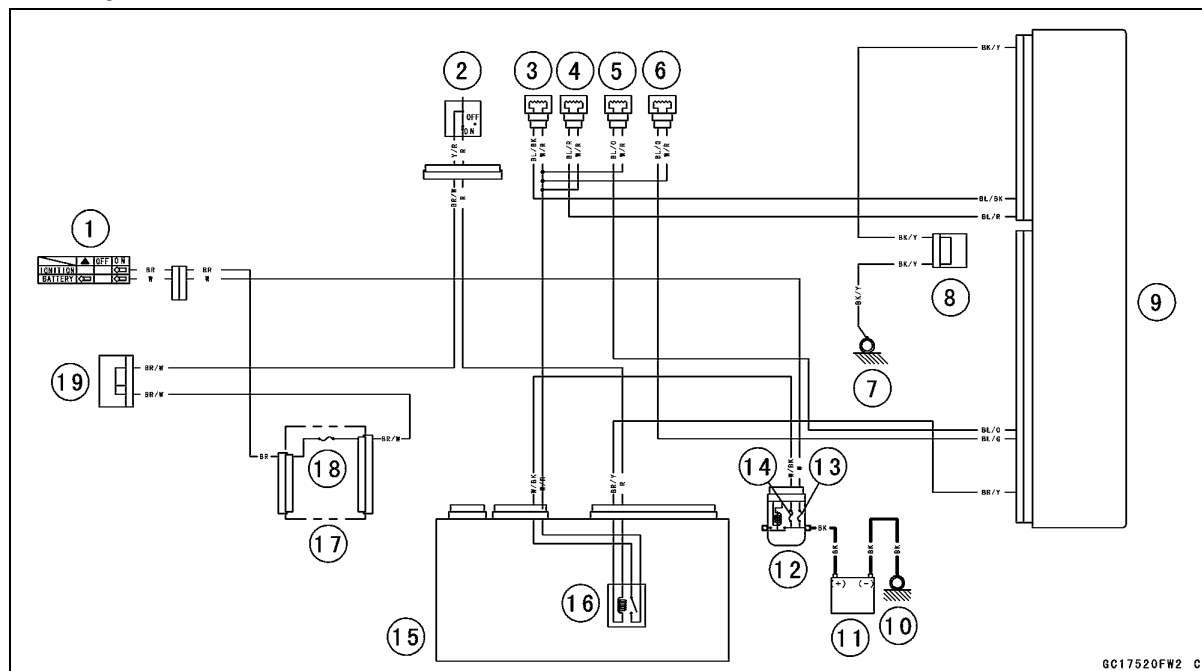


3-124 FUEL SYSTEM (DFI)

Fuel Injectors

- Watch the gauge for at least 6 seconds.
- ★ If the pressure holds steady, the fuel line is good.
- ★ If the pressure drops at once or if bubbles are found in the area, the fuel line is leaking. Replace the delivery pipe assy, injectors and related parts.
- Repeat the leak test, and check the fuel line for no leakage.
- Install:
 - Fuel Outlet Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
 - Fuel Tank (see Fuel Tank Installation)
- Start the engine and check for fuel leakage.

Fuel Injector Circuit



- | | |
|-----------------------|------------------------|
| 1. Ignition Switch | 11. Battery 12 V 8 Ah |
| 2. Engine Stop Switch | 12. Starter Relay |
| 3. Fuel Injector #1 | 13. Main Fuse 30 A |
| 4. Fuel Injector #2 | 14. ECU Fuse 15 A |
| 5. Fuel Injector #3 | 15. Relay Box |
| 6. Fuel Injector #4 | 16. Fuel Pump Relay |
| 7. Frame Ground 3 | 17. Fuse Box 1 |
| 8. Joint Connector D | 18. Ignition Fuse 15 A |
| 9. ECU | 19. Joint Connector C |
| 10. Engine Ground | |

GC17520FW2 C

Throttle Grip and Cables

Free Play Inspection

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

Free Play Adjustment

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

Cable Installation

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

 WARNING
--

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

Cable Lubrication

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

3-126 FUEL SYSTEM (DFI)

Throttle Body Assy

Idle Speed Inspection/Adjustment

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

Synchronization Inspection/Adjustment

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

Throttle Body Assy Removal

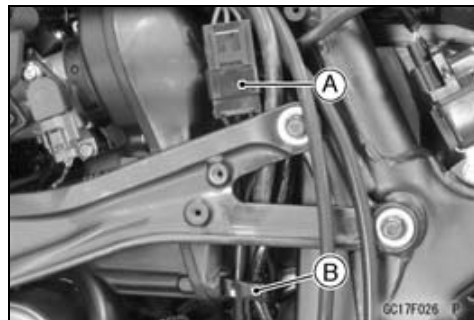
⚠ WARNING

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

NOTICE

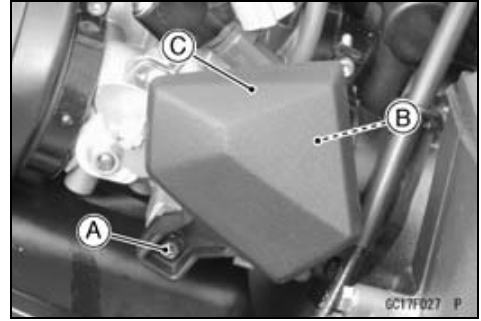
Never drop the throttle body assy especially on a hard surface. Such a shock to the body assy can damage it.

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Pad [A]
- Disconnect the alternator lead connector [A].
- Open the clamp [B] and pull the alternator lead connector downward.

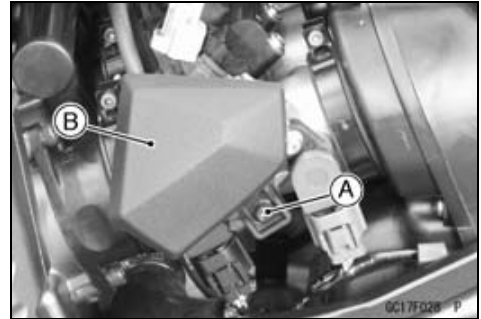


Throttle Body Assy

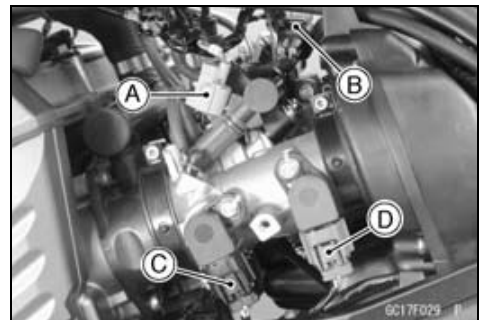
- Remove:
 - Throttle Body Cover Mounting Bolt [A]
 - Quick Rivet [B]
 - Right Throttle Body Cover [C]



- Remove:
 - Throttle Body Cover Mounting Bolt [A]
 - Left Throttle Body Cover [B]



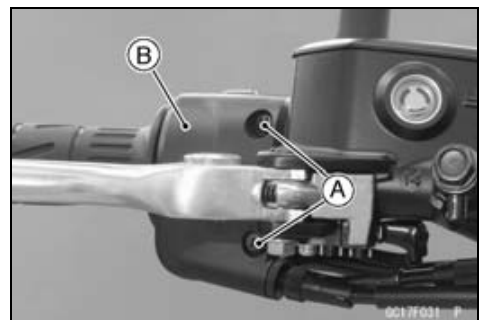
- Remove the intake air pressure sensor #1/#2 (see Intake Air Pressure Sensor #1/#2 Removal).
- Disconnect:
 - Air Switching Valve Hose
 - Fuel Injector Connectors (#1 ~ #4) [A]
 - Subthrottle Valve Actuator Harness Connector [B]
 - Main Throttle Sensor Connector [C]
 - Subthrottle Sensor Connector [D]



- Open the clamp [A].



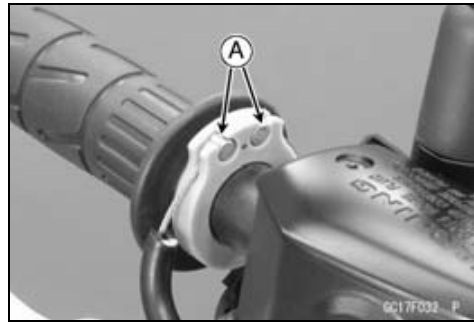
- Remove:
 - Screws [A]
 - Right Switch Housing [B]



3-128 FUEL SYSTEM (DFI)

Throttle Body Assy

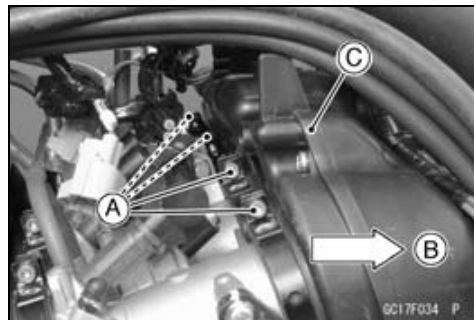
- Remove the throttle cable upper ends [A].



- Remove:
 - Fuel Tank Bracket (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
 - Air Cleaner Housing Mounting Bolt [A] (Both Sides)



- Loosen the air duct clamp bolts [A].
- Move [B] the air cleaner housing [C] backward, and pull out the air ducts from the throttle body assy.



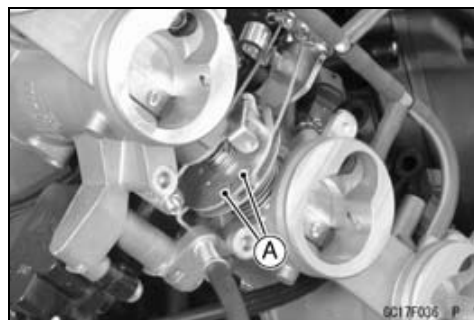
- Loosen the throttle body assy holder clamp bolts [A], and pull out the throttle body assy [B] backward.
- Remove the throttle body assy to left side of motorcycle.
- After removing the throttle body assy, stuff pieces of lint-free, clean cloth into the throttle body assy holders.



NOTICE

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

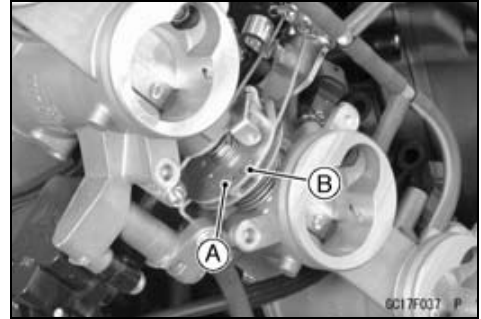
- Remove the throttle cable lower ends [A] from the throttle pulley.



Throttle Body Assy

Throttle Body Assy Installation

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

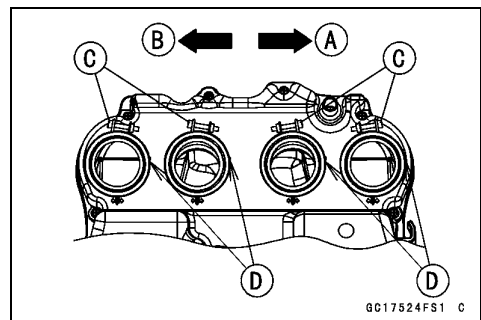
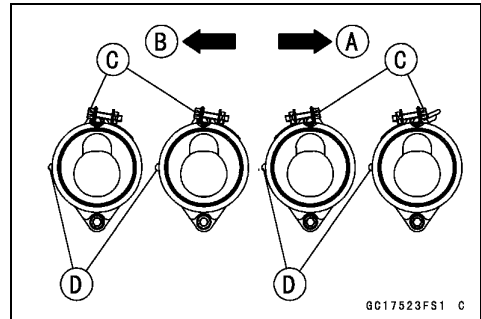


- Install the throttle body assy holder clamp bolts in the direction as shown.
Right Side [A]
Left Side [B]
Bolt Heads [C]
- Fit the projections [D] of the holder into the holes in the clamps.
- Install the throttle body assy to the throttle body assy holders.
- Apply a small amount of 2-stroke oil to the throttle body assy holder for easy installation.
- Tighten:

**Torque - Throttle Body Assy Holder Clamp Bolts: 1.1 N·m
(0.11 kgf·m, 10 in·lb)**

- Install the air duct clamp bolts in the direction as shown.
Left Side [A]
Right Side [B]
Bolt Heads [C]
- Fit the projections [D] of the holder into the holes in the clamps.
- Install the air ducts to the throttle body assy.
- Apply a small amount of 2-stroke oil to the throttle body assy holder for easy installation.
- Tighten:

**Torque - Air Duct Clamp Bolts: 1.1 N·m (0.11 kgf·m, 10 in·lb)
Air Cleaner Housing Mounting Bolts: 9.8 N·m (1.0
kgf·m, 87 in·lb)**



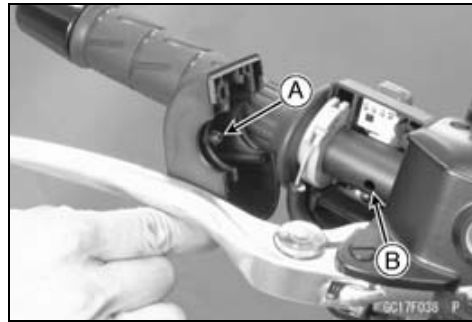
3-130 FUEL SYSTEM (DFI)

Throttle Body Assy

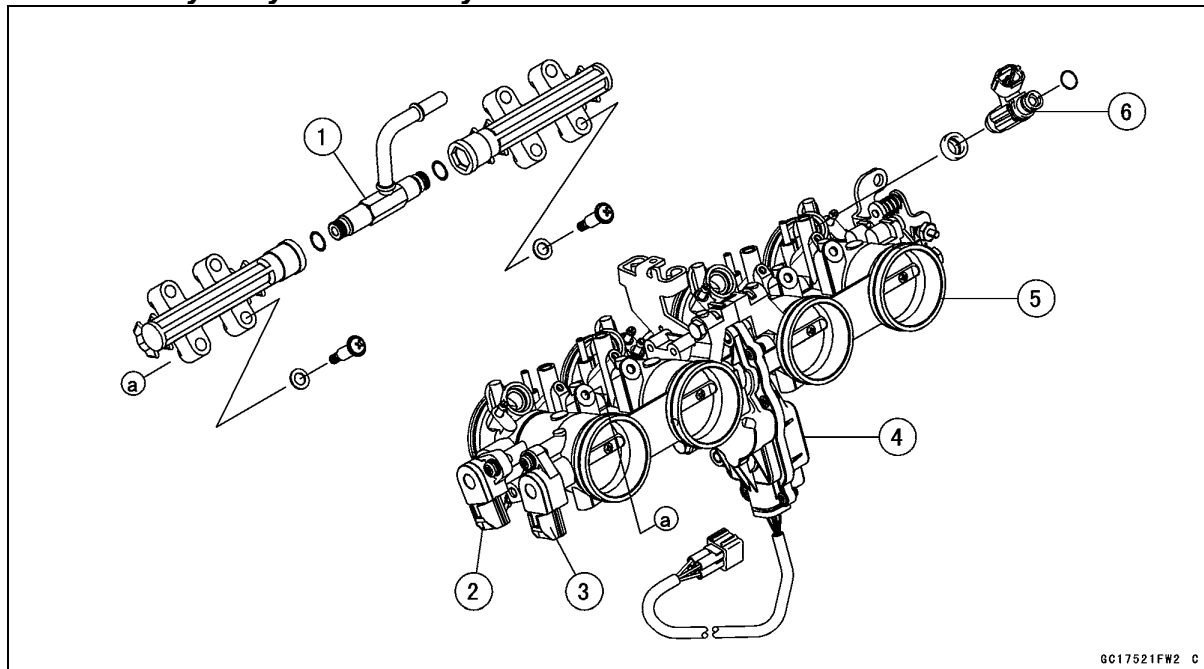
- Apply a thin coating of grease to the throttle cable upper ends.
- Install the upper ends of the throttle cables in the grip.
- Fit the projection [A] of the right switch housing into the hole [B] of the handlebars.
- Turn the throttle grip and make sure that the throttle valves move smoothly and return by spring force.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Tighten:

**Torque - Throttle Body Cover Mounting Bolts: 4.0 N·m
(0.41 kgf·m, 35 in·lb)**

- Adjust:
Throttle Grip Free Play (see Throttle Control System Inspection in the Periodic Maintenance chapter)
Idle Speed (see Idle Speed Adjustment in the Periodic Maintenance chapter)



Throttle Body Assy Disassembly



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

NOTICE

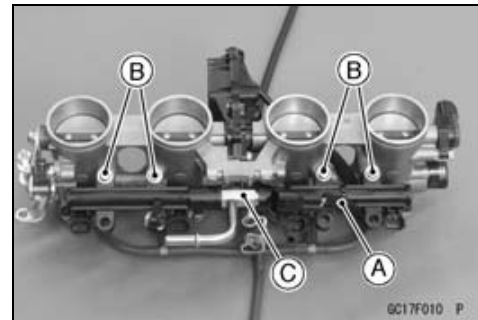
Do not remove, disassemble or adjust the main throttle sensor, subthrottle sensor, subthrottle valve actuator, throttle link mechanism and throttle body assy, because they are adjust or set surely at the manufacturer. Adjustment of these parts could result in poor performance, requiring replacement of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

Throttle Body Assy

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

NOTE

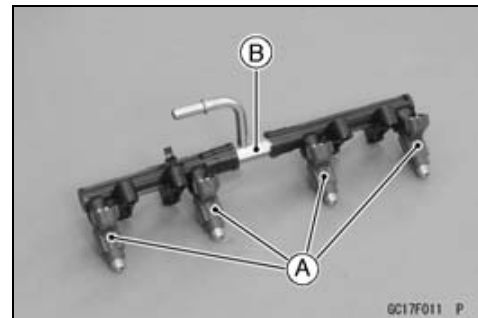
○Do not damage the insertion portions of the injectors when they are pulled out from the throttle body.



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

NOTE

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

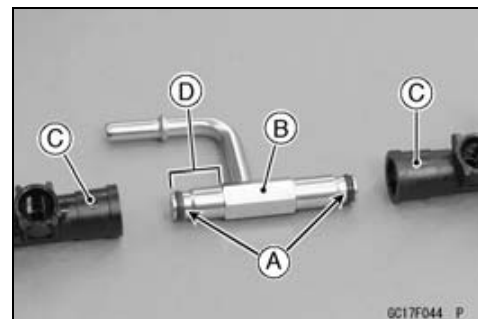


NOTICE

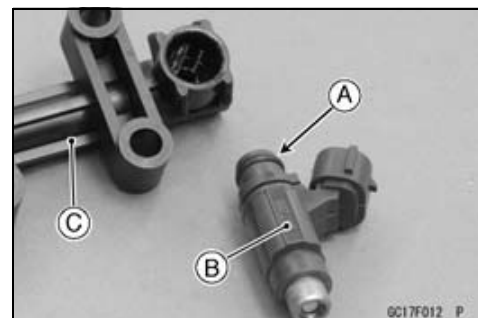
Never drop the fuel injector especially on a hard surface. Such a shock to the injector can damage it.

Throttle Body Assy Assembly

- Before assembling, blow away dirt or dust from the throttle body and delivery pipe by applying compressed air.
- Replace the O-rings [A] of the joint pipe [B] with new ones.
- Apply engine oil to the new O-rings, and insert it to the delivery pipes [C].
- Insert the joint pipe so that the short side [D] faces right side.
- Left and right delivery pipes are identical.



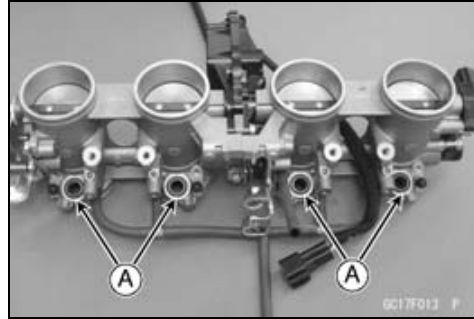
- Replace the O-rings [A] of each injector [B] with new ones.
- Insert them to the delivery pipe assy [C] and confirm whether the injectors turn smoothly or not.



3-132 FUEL SYSTEM (DFI)

Throttle Body Assy

- Replace the dust seals [A] with new ones.
- Apply engine oil to the new dust seals.
- Install the injectors along with the delivery pipe assy to the throttle body.
- Tighten:
**Torque - Delivery Pipe Assy Mounting Screws: 3.5 N·m
(0.36 kgf·m, 31 in·lb)**
- Connect the subthrottle valve actuator connector, and bind the harness with band.
- Install the throttle body assy (see Throttle Body Assy Installation).



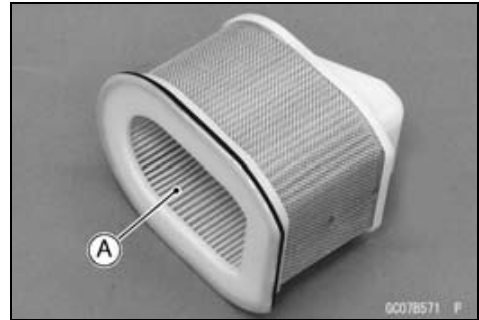
Air Cleaner

Air Cleaner Element Removal/Installation

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

Air Cleaner Element Inspection

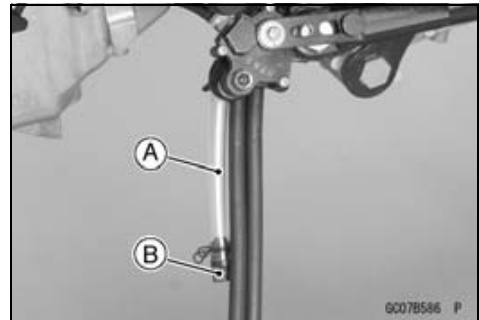
- Remove the air cleaner element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
- Visually check the element [A] for tears or breaks.
- ★ If the element has any tears or breaks, replace the element.



Air Cleaner Oil Draining

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

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

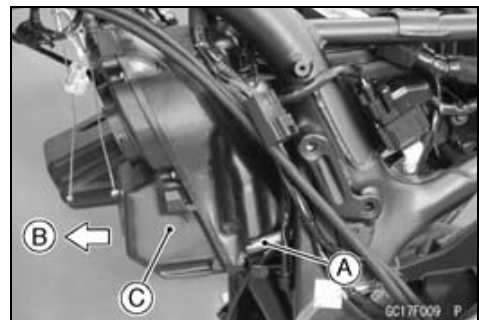


⚠ WARNING

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

Air Cleaner Housing Removal

- Remove:
 - Engine (see Engine Removal in the Engine Removal/Installation chapter)
 - Air Cleaner Drain Hose [A]
- Disconnect the intake air temperature sensor connector.
- Pull [B] the air cleaner housing [C] forward, and remove it from the frame.



3-134 FUEL SYSTEM (DFI)

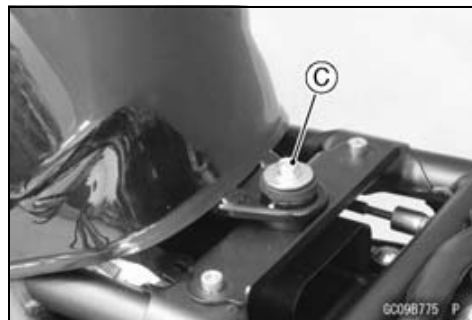
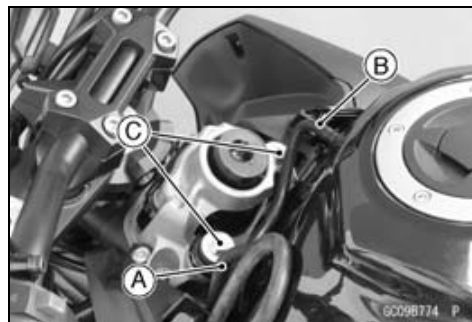
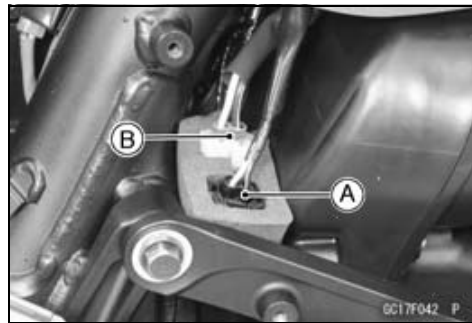
Fuel Tank

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.

- Turn the ignition switch off.
- Wait until the engine cools down.
- Remove:
 - Middle Fairing (see Middle Fairing Removal in the Frame chapter)
 - Ignition Switch Cover (see Ignition Switch Cover Removal in the Frame chapter)
- Disconnect:
 - Battery (-) Terminal (see Battery Removal in the Electrical System chapter)
 - Fuel Level Sensor Lead Connector [A]
 - Fuel Pump Lead Connector [B]
- Disconnect:
 - Fuel Tank Drain Hose [A]
 - Fuel Tank Breather Hose [B]
- Remove the fuel tank bolts [C].

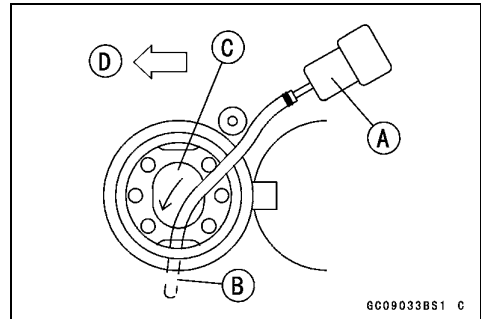


Fuel Tank

- Open the fuel tank cap [A] to lower the pressure in the tank.
- During tank removal, keep the tank cap open to release pressure in the tank. This makes fuel spillage less.



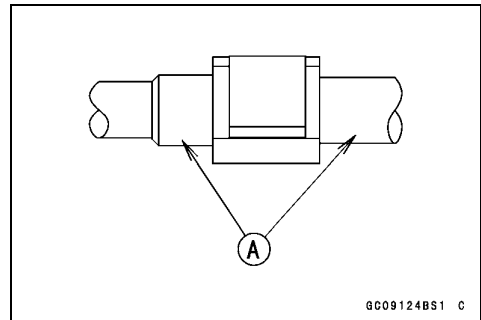
- Draw the fuel out from the fuel tank with a commercially available pump [A].
- Use a soft plastic hose [B] as a pump intake hose in order to insert the hose smoothly.
- Put the hose through the fill opening [C] into the tank and draw the fuel out.
Front [D]



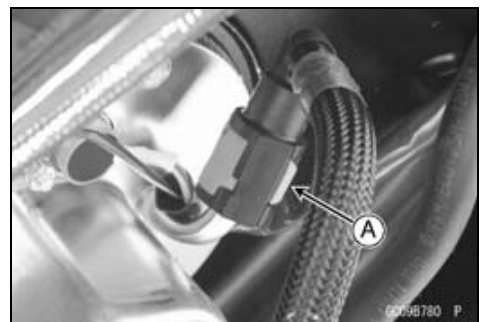
⚠ WARNING

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

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



- Push the joint lock claws [A] with your fingers.



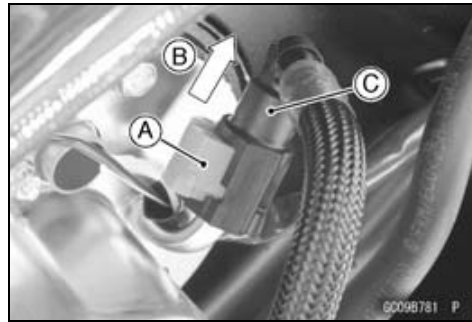
3-136 FUEL SYSTEM (DFI)

Fuel Tank

- Pull the joint lock [A] fully as shown.

NOTICE

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

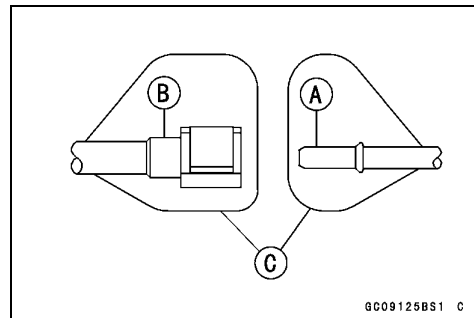


- Pull [B] the fuel hose joint [C] out of the fuel outlet pipe.

⚠ WARNING

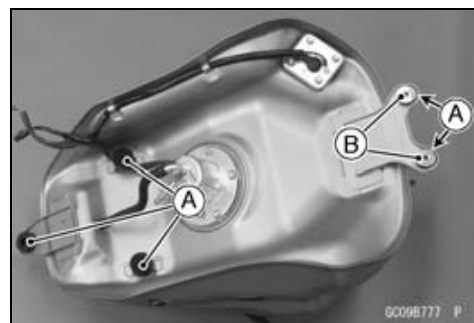
Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection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

- Close the fuel tank cap.
- Remove the fuel tank, and place it on a flat surface.
- Do not apply the load to the fuel outlet pipe of the fuel pump.
- Clean the pipe [A].
- Cover the pipe and the hose joint [B] with the vinyl bags [C] to keep it clean.



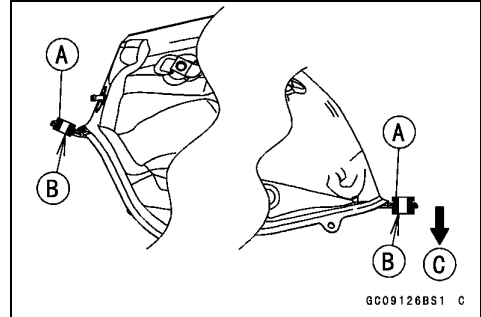
Fuel Tank Installation

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

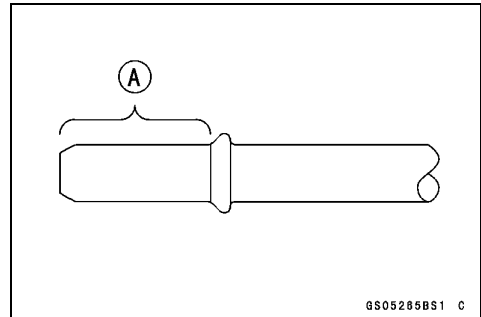


Fuel Tank

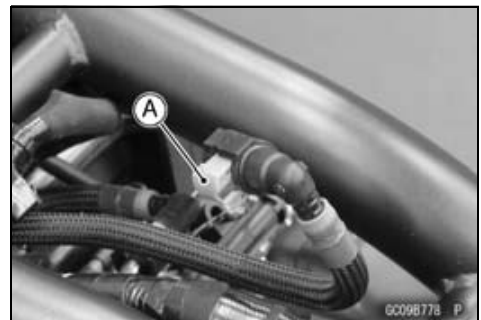
- When installing the dampers [A], position the thick side [B] to frame side [C].



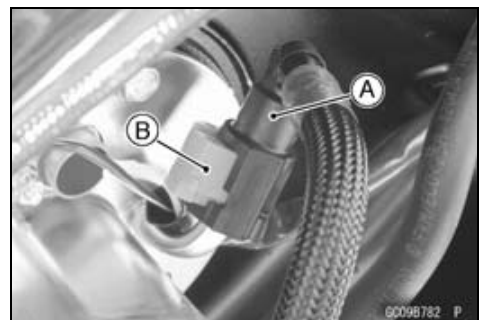
- Remove the vinyl bag on the pipe and fuel hose joint.
- Check the joint lock for deformation and wear.
- ★ If the joint lock is deformed, replace the fuel hose with a new one.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].
- Apply engine oil to the pipe.



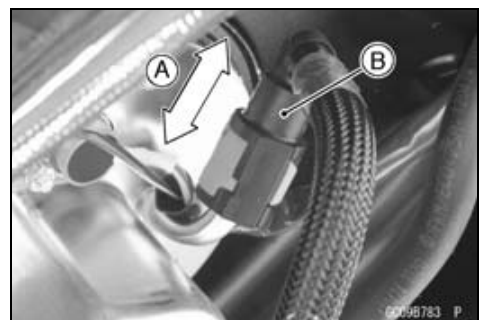
- Pull the joint lock [A] as shown.



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



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



⚠ WARNING

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

- ★ If it comes off, reinstall the hose joint.
- Connect the fuel pump, fuel level sensor lead connectors and the battery (–) terminal (see Battery Installation in the Electrical System chapter).

3-138 FUEL SYSTEM (DFI)

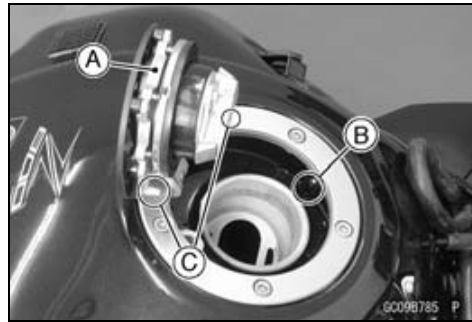
Fuel Tank

Fuel Tank and Cap Inspection

- Open the tank cap.
- Visually inspect the gasket [A] on the tank cap for any damage.
- ★ Replace the gasket if it is damaged.
- Check to see if the water drain pipe [B] in the tank are not clogged. Check the tank cap breather also.
- ★ If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.

NOTICE

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



Fuel Tank Cleaning

⚠ WARNING

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 Intake Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
 - 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 Intake Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
 - Fuel Tank (see Fuel Tank Installation)

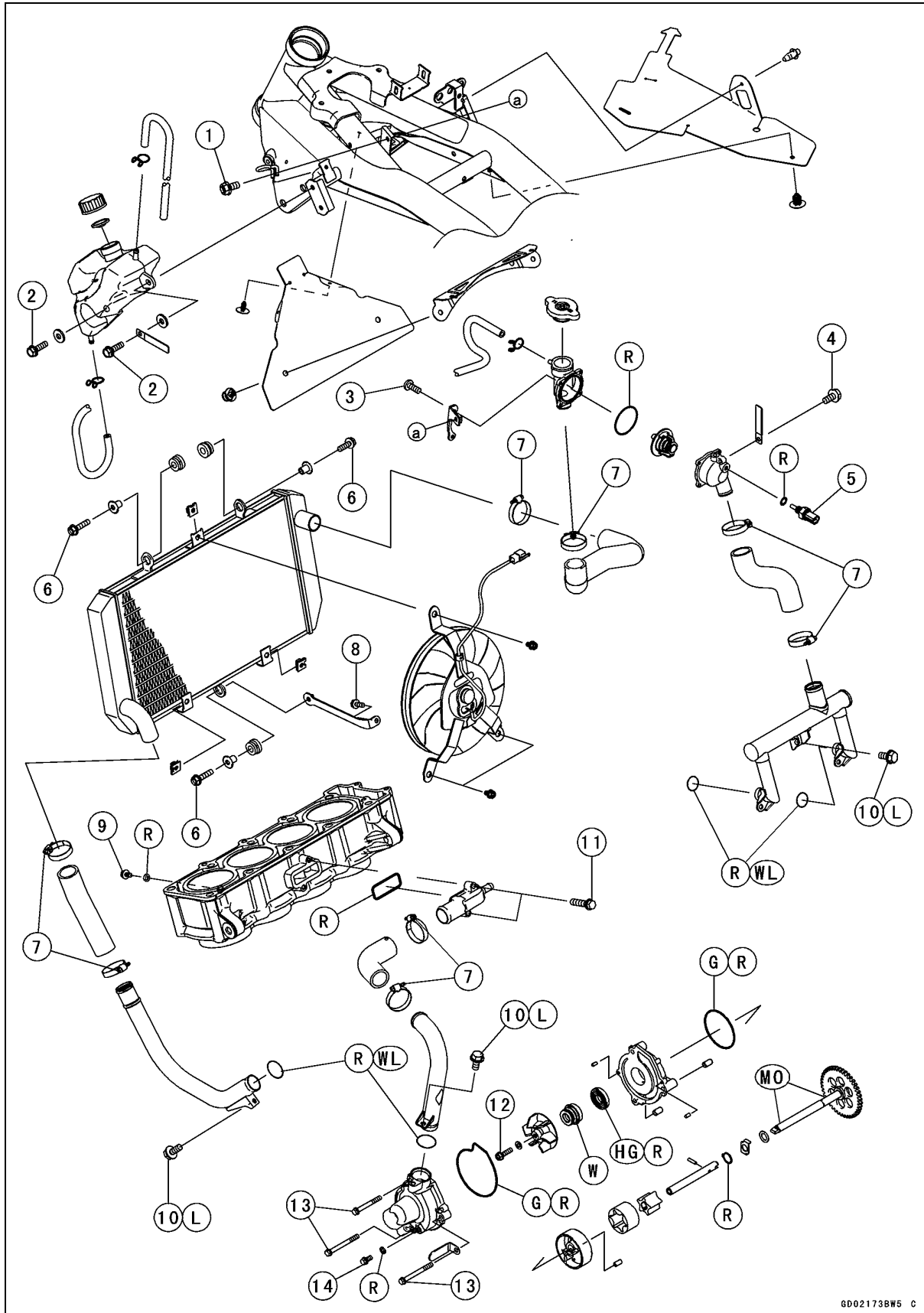
Cooling System

Table of Contents

Exploded View	4-2
Coolant Flow Chart	4-4
Specifications	4-6
Special Tools	4-7
Coolant	4-8
Coolant Deterioration Inspection	4-8
Coolant Level Inspection	4-8
Coolant Draining	4-8
Coolant Filling	4-8
Pressure Testing	4-8
Cooling System Flushing	4-9
Coolant Reserve Tank Removal/Installation	4-9
Water Pump	4-10
Water Pump Removal	4-10
Water Pump Installation	4-10
Water Pump Inspection	4-10
Water Pump Impeller Disassembly/Assembly	4-10
Water Pump Impeller Inspection	4-10
Water Pump Housing Disassembly	4-10
Water Pump Housing Assembly	4-11
Mechanical Seal Inspection	4-11
Radiator	4-12
Radiator and Radiator Fan Removal	4-12
Radiator and Radiator Fan Installation	4-13
Radiator Inspection	4-13
Radiator Cap Inspection	4-14
Radiator Filler Neck Inspection	4-14
Thermostat	4-15
Thermostat Removal	4-15
Thermostat Installation	4-15
Thermostat Inspection	4-16
Hose and Pipes	4-17
Hose Installation	4-17
Hose Inspection	4-17
Water Temperature Sensor	4-18
Water Temperature Sensor Removal/Installation	4-18
Water Temperature Sensor Inspection	4-18

4-2 COOLING SYSTEM

Exploded View



GD02173BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Thermostat Bracket Bolt	6.9	0.70	61 in·lb	
2	Reserve Tank Bolts	9.8	1.0	87 in·lb	
3	Thermostat Housing Screws	2.6	0.27	23 in·lb	
4	Thermostat Housing Clamp Bolt	6.9	0.70	61 in·lb	
5	Water Temperature Sensor	12	1.2	106 in·lb	
6	Radiator Bolts	6.9	0.70	61 in·lb	
7	Water Hose Clamp Screws	3.0	0.31	27 in·lb	
8	Radiator Bracket Mounting Bolt	6.9	0.70	61 in·lb	
9	Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
10	Water Pipe Bolts	11	1.1	97 in·lb	L
11	Cylinder Fitting Mounting Bolts	11	1.1	97 in·lb	
12	Water Pump Impeller Bolt	9.8	1.0	87 in·lb	
13	Water Pump Cover Bolts	11	1.1	97 in·lb	
14	Coolant Drain Bolt (Water Pump)	11	1.1	97 in·lb	

G: Apply grease.

HG: Apply high-temperature grease.

L: Apply a non-permanent locking agent.

MO: Apply molybdenum disulfide grease oil solution.

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

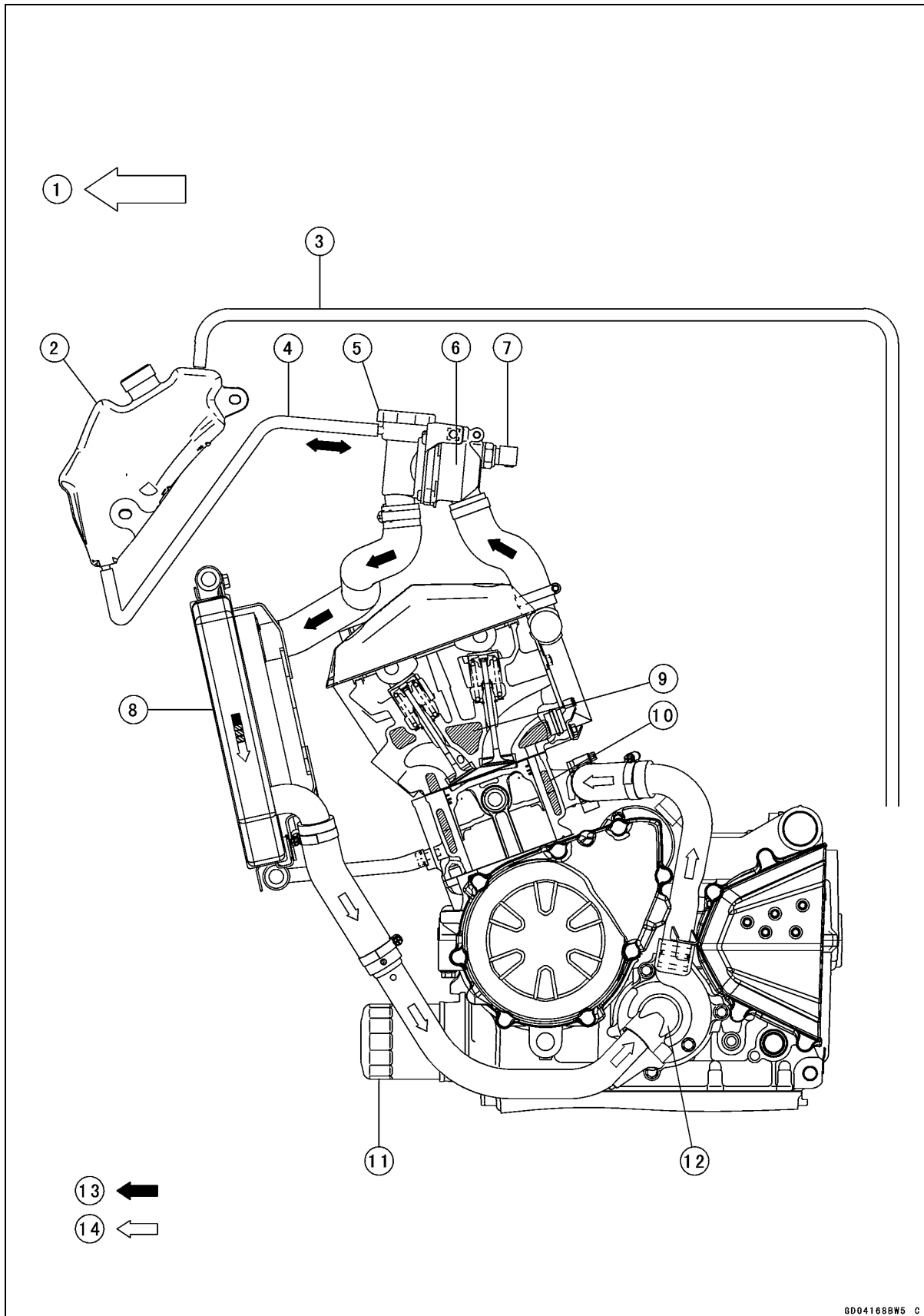
R: Replacement Parts

W: Apply water.

WL: Apply soap and water solution or rubber lubricant.

4-4 COOLING SYSTEM

Coolant Flow Chart



Coolant Flow Chart

- | | |
|-------------------------------|-------------------------|
| 1. Front | 8. Radiator |
| 2. Reserve Tank | 9. Cylinder Head Jacket |
| 3. Reserve Tank Overflow Hose | 10. Cylinder Jacket |
| 4. Reserve Tank Hose | 11. Oil Filter |
| 5. Radiator Cap | 12. Water Pump |
| 6. Thermostat Housing | 13. Hot Coolant |
| 7. Water Temperature Sensor | 14. Cold Coolant |

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is less than 55°C (131°F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 58 ~ 62°C (136 ~ 144°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 100°C (212°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature is below 97.5°C (208°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

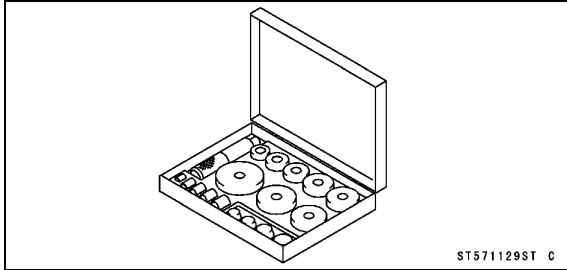
4-6 COOLING SYSTEM

Specifications

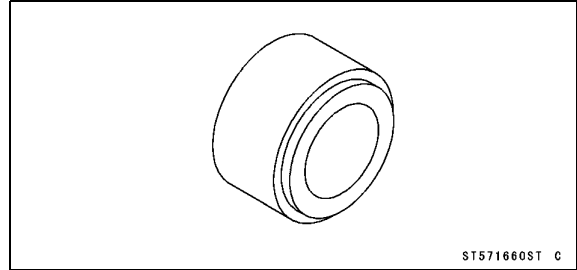
Item	Standard
Coolant Provided when Shipping Type (Recommended) Color Mixed Ratio Freezing Point Total Amount	Permanent type antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators) Green Soft water 50%, coolant 50% -35°C (-31°F) 2.8 L (3.0 US qt) (reserve tank full level, including radiator and engine)
Radiator Cap Relief Pressure	93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm ² , 13 ~ 18 psi)
Thermostat Valve Opening Temperature Valve Full Opening Lift	58 ~ 62°C (136 ~ 144°F) 8 mm (0.31 in.) or more at 75°C (167°F)

Special Tools

**Bearing Driver Set:
57001-1129**



**Oil Seal Driver:
57001-1660**

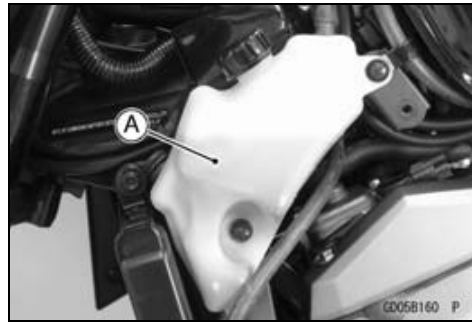


4-8 COOLING SYSTEM

Coolant

Coolant Deterioration Inspection

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



Coolant Level Inspection

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

Coolant Draining

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

Coolant Filling

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

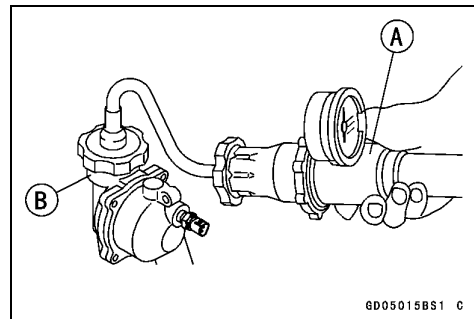
Pressure Testing

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Remove the radiator cap, and install a cooling system pressure tester [A] on the filler neck [B].

NOTE

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

- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kgf/cm², 18 psi).



NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kgf/cm², 18 psi).

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

Coolant

Cooling System Flushing

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

- The coolant reserve tank is removed and installed during coolant change (see Coolant Change in the Periodic Maintenance chapter).

4-10 COOLING SYSTEM

Water Pump

Water Pump Removal

- Refer to the Oil Pump Removal in the Engine Lubrication System chapter.

Water Pump Installation

- Refer to the Oil Pump Installation in the Engine Lubrication System chapter.

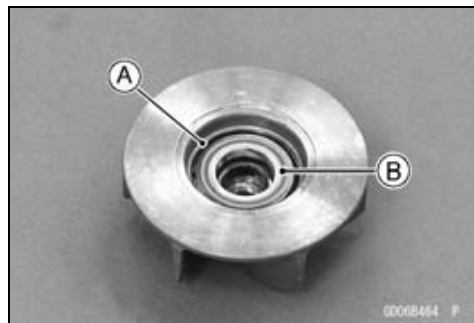
Water Pump Inspection

- Remove the left lower fairing (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter).
- Check the drainage outlet passage [A] at the bottom of the water pump body for coolant leaks.
- ★ If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the mechanical seal unit.



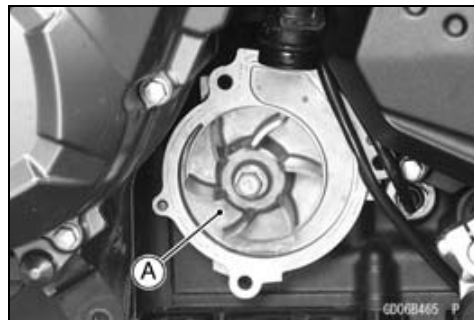
Water Pump Impeller Disassembly/Assembly

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



Water Pump Impeller Inspection

- Remove the water pump cover (see Oil Pump Removal in the Engine Lubrication System chapter).
- Visually inspect the water pump impeller [A].
- ★ If the surface is corroded or if the blades are damaged, replace the impeller.

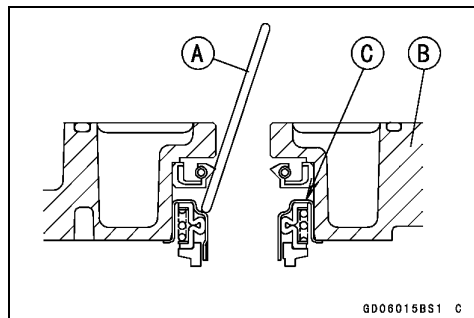


Water Pump Housing Disassembly

NOTICE

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

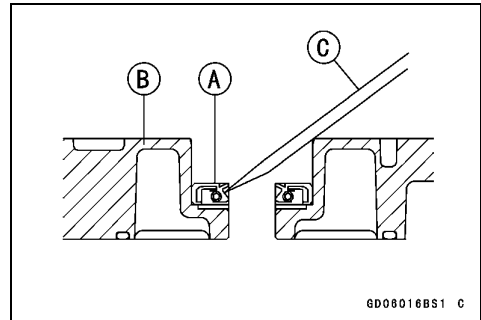
- Insert a bar [A] into the pump housing [B], and hammer evenly around the circumference of the mechanical seal bottom [C].



GD06015BS1 C

Water Pump

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



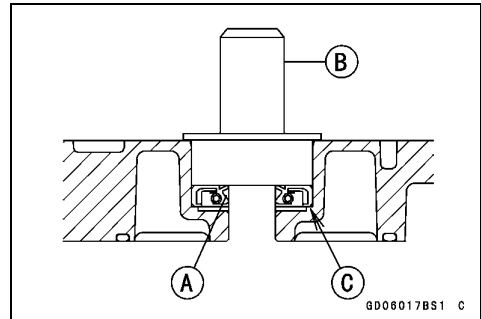
Water Pump Housing Assembly

NOTICE

Do not reuse the mechanical seal and oil seal.

- Apply high-temperature grease to the oil seal lips [A].
- Press the new oil seal into the housing with a bearing driver [B] until it stops at the bottom surface [C] of the housing.

Special Tool - Bearing Driver Set: 57001-1129

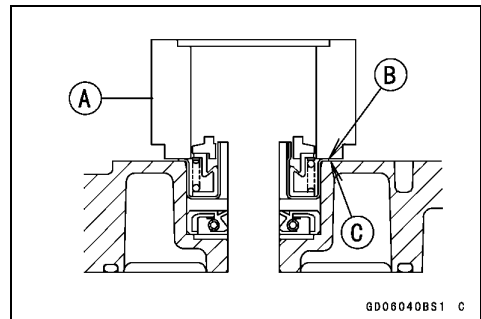


NOTICE

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

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

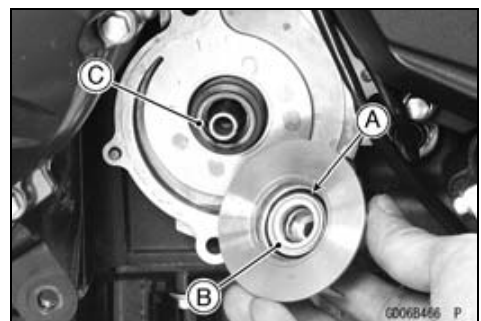
Special Tool - Oil Seal Driver: 57001-1660



Mechanical Seal Inspection

- Remove the water pump impeller (see Oil Pump Removal in the Engine Lubrication System chapter).
- Visually inspect the mechanical seal.
- ★ If any one of the parts is damaged, replace the mechanical seal as a unit.

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

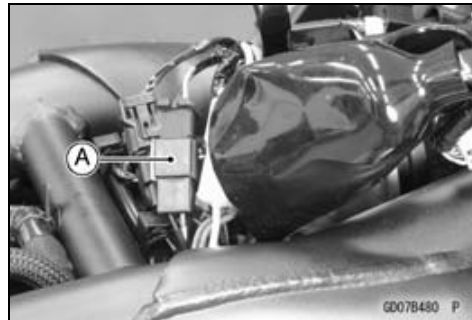


4-12 COOLING SYSTEM

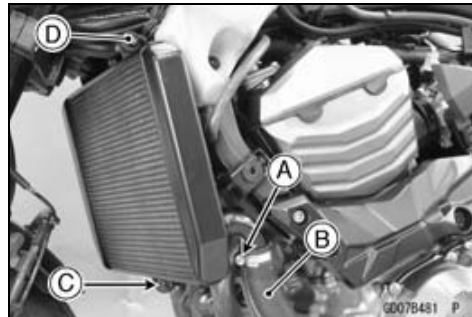
Radiator

Radiator and Radiator Fan Removal

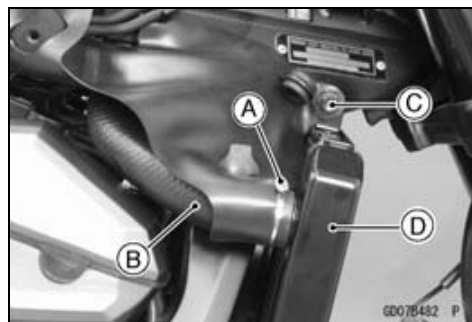
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the side fairings (see Side Fairing Removal in the Frame chapter).
- Disconnect the radiator fan motor lead connector [A].



- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove:
 - Radiator Lower Bolt [C]
 - Radiator Upper Bolt (Left) [D]



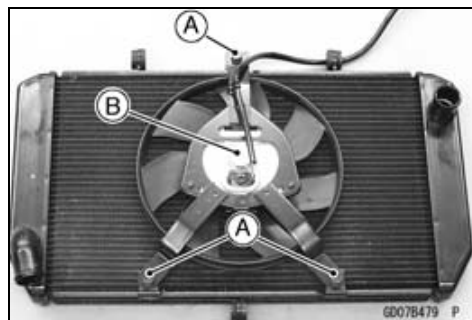
- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove:
 - Radiator Upper Bolt (Right) [C]
 - Radiator [D]



NOTICE

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

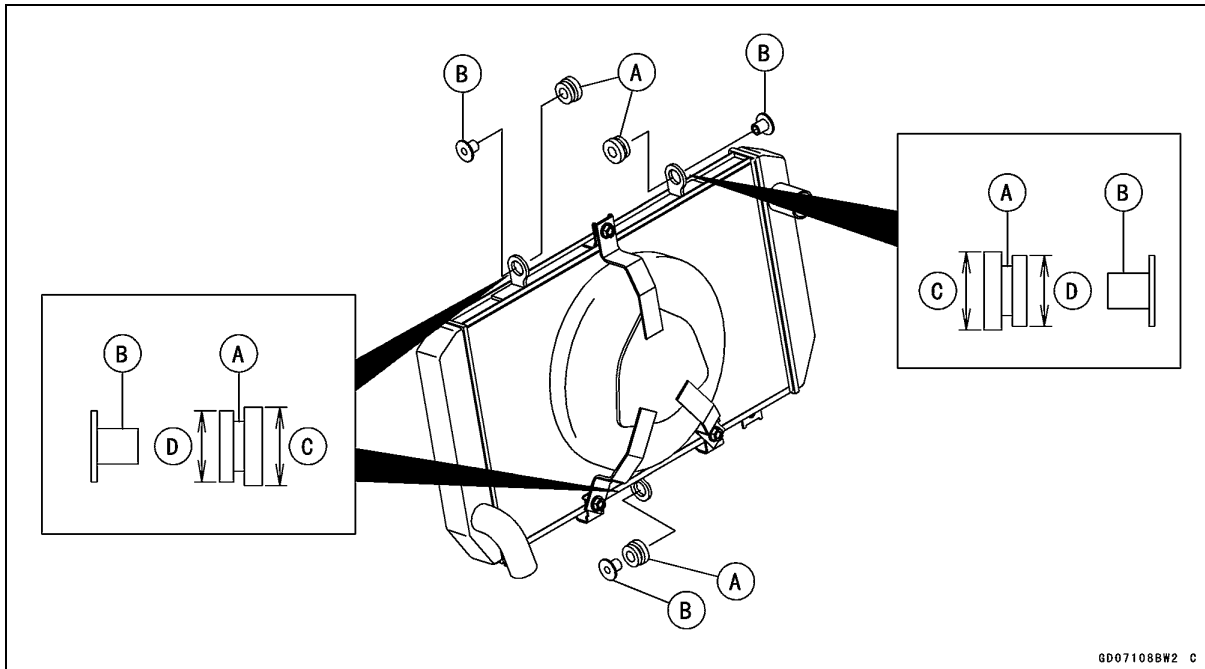
- Remove:
 - Radiator Fan Mounting Bolts [A]
 - Radiator Fan [B]



Radiator

Radiator and Radiator Fan Installation

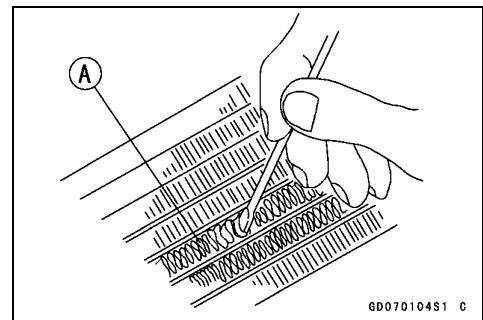
- Installation is the reverse of removal.
- Install the rubber dampers [A] and radiator bracket collars [B] as shown.
 - Larger [C]
 - Smaller [D]



- Run the radiator fan motor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:
 - Torque - Radiator Bolts: 6.9 N·m (0.70 kgf·m, 16 in·lb)
 - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)
- Install the removed parts (see appropriate chapter).

Radiator Inspection

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

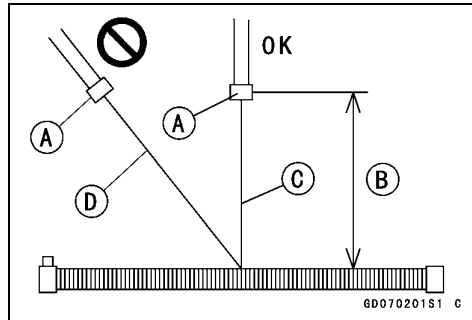


4-14 COOLING SYSTEM

Radiator

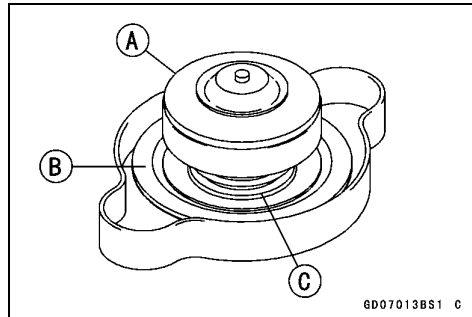
NOTICE

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



Radiator Cap Inspection

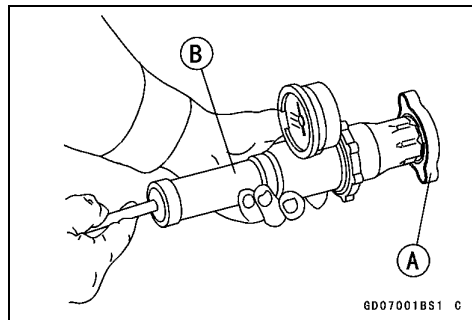
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Radiator Cap
- Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].
- ★ If any one of them shows visible damage, replace the cap with a new one.
- Install the cap [A] on a cooling system pressure tester [B].



NOTE

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

- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle flicks downward. Stop pumping and measure leak time at once. The relief valve must open within the specified range in the table below and the gauge hand must remain within the same range at least 6 seconds.



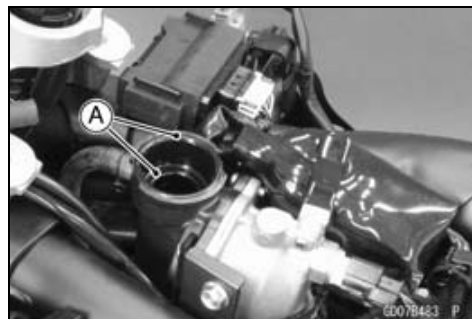
Radiator Cap Relief Pressure

Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi)

- ★ If the cap can not hold the specified pressure or if it holds too much pressure, replace it with a new one.

Radiator Filler Neck Inspection

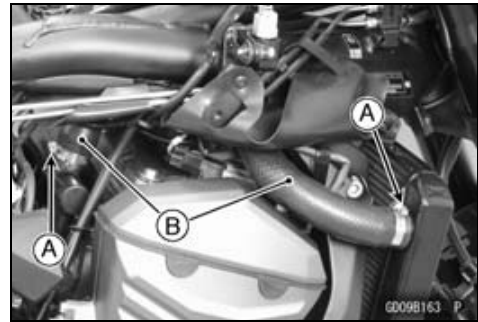
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.



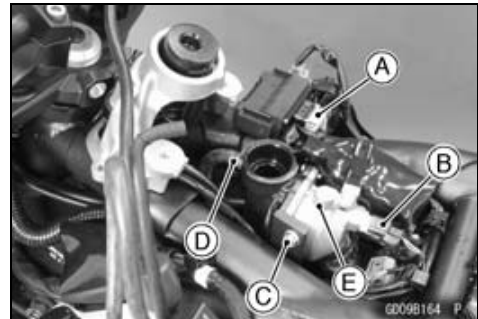
Thermostat

Thermostat Removal

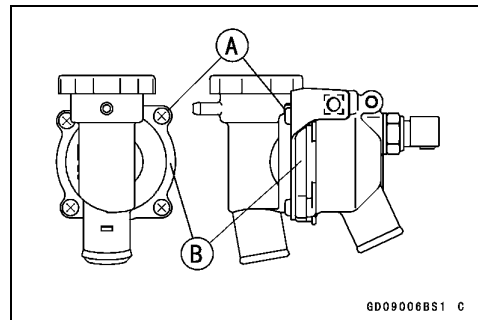
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the side fairings (see Side Fairing Removal in the Frame chapter).
- Loosen the water hose clamp screws [A].
- Disconnect the water hoses [B].



- Disconnect the immobilizer amplifier connector [A] and water temperature sensor lead connector [B].
- Remove:
 - Radiator Cap
 - Thermostat Bracket Bolt [C]
- Disconnect the reserve tank hose [D].
- Remove the thermostat housing [E].



- Remove:
 - Thermostat Housing Screws [A]
 - Cap [B]
 - Thermostat



Thermostat Installation

- Install the thermostat [A] in the housing so that the air bleeder hole [B] is on top.
- Apply grease to the new O-ring.
- Install a new O-ring into the housing.
- Tighten:

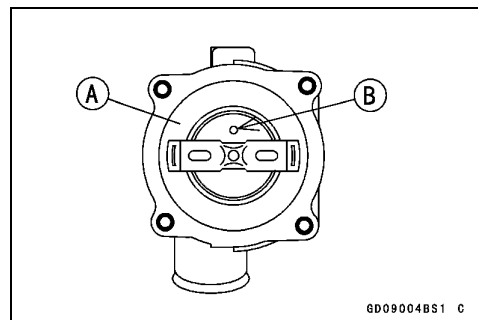
Torque - Thermostat Housing Screws: 2.6 N·m (0.27 kgf·m, 23 in·lb)

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

Torque - Thermostat Bracket Bolt: 6.9 N·m (0.70 kgf·m, 61 in·lb)

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

- Fill the radiator with coolant (see Coolant Change in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

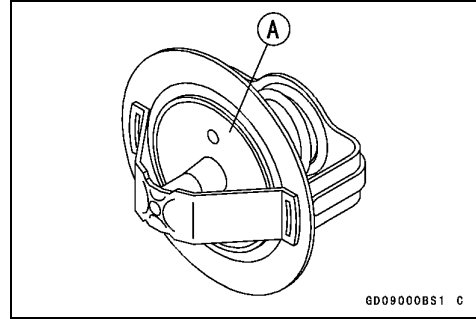


4-16 COOLING SYSTEM

Thermostat

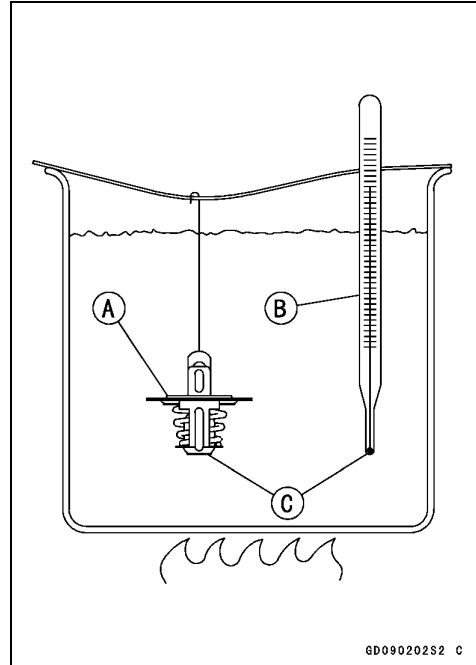
Thermostat Inspection

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



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

Thermostat Valve Opening Temperature
58 ~ 62°C (136 ~ 144°F)



Hose and Pipes

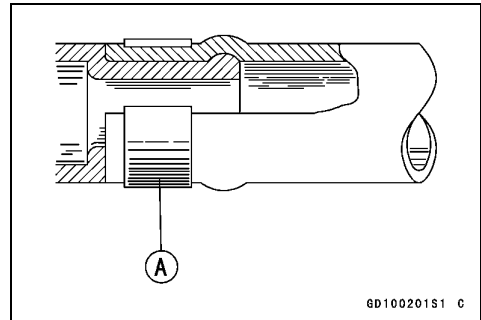
Hose Installation

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

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

Hose Inspection

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



4-18 COOLING SYSTEM

Water Temperature Sensor

NOTICE

The water temperature sensor should never be allowed to fall on a hard surface. Such a shock to the water temperature sensor can damage it.

Water Temperature Sensor Removal/Installation

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

Water Temperature Sensor Inspection

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

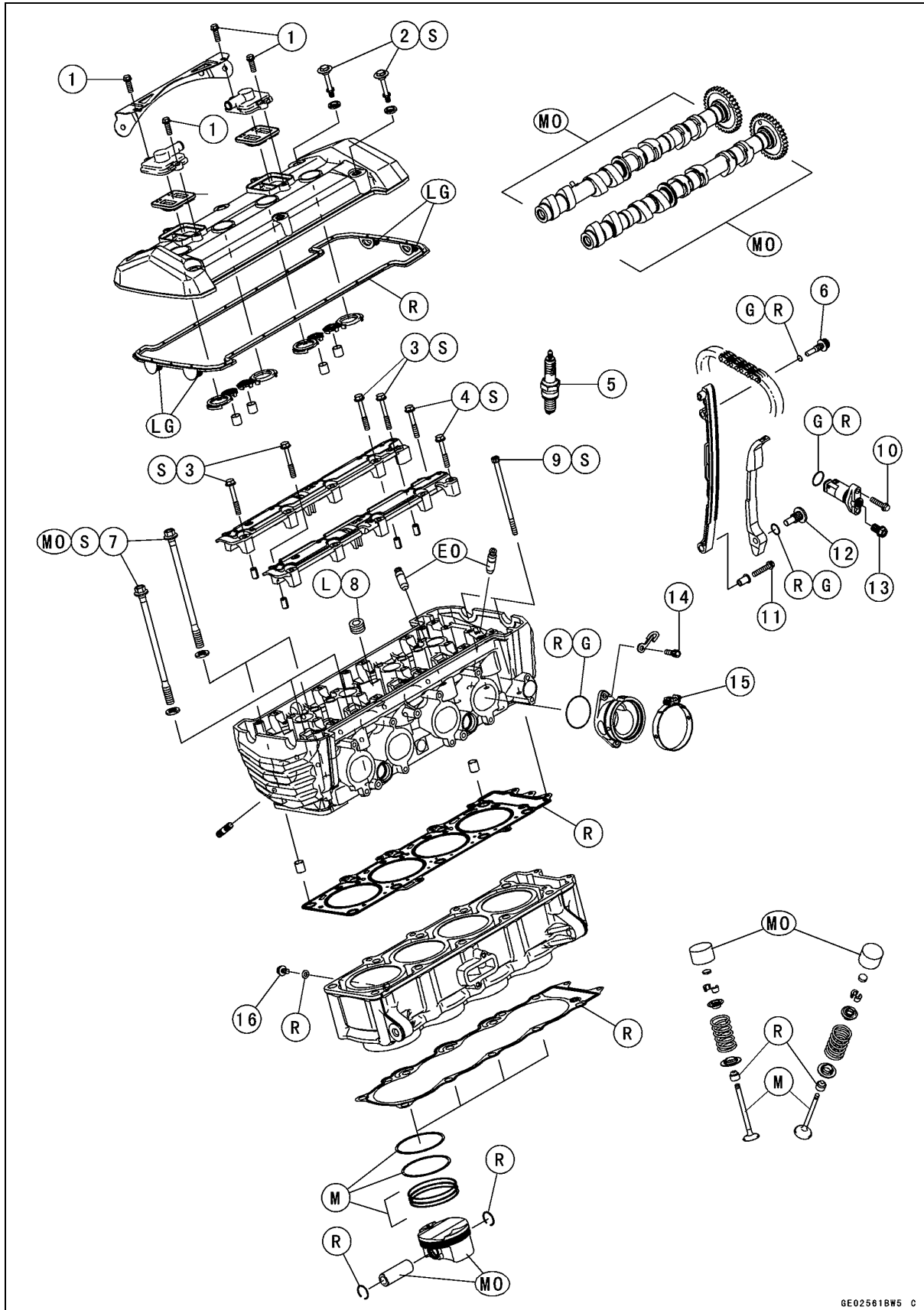
Engine Top End

Table of Contents

Exploded View	5-2	Valves	5-27
Exhaust System.....	5-8	Valve Clearance Inspection	5-27
Specifications	5-10	Valve Clearance Adjustment.....	5-27
Special Tools and Sealant	5-12	Valve Removal	5-27
Clean Air System.....	5-14	Valve Installation	5-27
Air Suction Valve Removal.....	5-14	Valve Guide Removal	5-27
Air Suction Valve Installation.....	5-14	Valve Guide Installation	5-28
Air Suction Valve Inspection	5-15	Valve-to-Guide Clearance	
Air Switching Valve Removal	5-15	Measurement (Wobble	
Air Switching Valve Installation ...	5-15	Method).....	5-29
Air Switching Valve Operation		Valve Seat Inspection	5-29
Test.....	5-15	Valve Seat Repair	5-30
Air Switching Valve Unit Test	5-16	Cylinder, Pistons.....	5-35
Clean Air System Hose		Cylinder Removal.....	5-35
Inspection.....	5-16	Cylinder Installation.....	5-35
Cylinder Head Cover	5-17	Piston Removal.....	5-36
Cylinder Head Cover Removal	5-17	Piston Installation.....	5-36
Cylinder Head Cover Installation .	5-17	Cylinder Wear Inspection.....	5-37
Camshaft Chain Tensioner	5-19	Piston Wear Inspection	5-37
Camshaft Chain Tensioner		Piston Ring, Piston Ring Groove	
Removal.....	5-19	Wear Inspection	5-38
Camshaft Chain Tensioner		Piston Ring Groove Width	
Installation	5-19	Inspection.....	5-38
Camshaft, Camshaft Chain	5-20	Piston Ring Thickness Inspection	5-38
Camshaft Removal	5-20	Piston Ring End Gap Inspection ..	5-39
Camshaft Installation	5-20	Throttle Body Holder.....	5-40
Camshaft, Camshaft Cap Wear		Throttle Body Holder Installation..	5-40
Inspection.....	5-21	Muffler.....	5-41
Camshaft Runout Inspection.....	5-22	Muffler Body Removal.....	5-41
Cam Wear Inspection	5-22	Muffler Body Installation.....	5-43
Camshaft Chain Removal	5-22	Exhaust Pipe Removal.....	5-45
Cylinder Head.....	5-23	Exhaust Pipe Installation.....	5-46
Cylinder Compression		Exhaust Butterfly Valve Cable	
Measurement	5-23	Removal (ZR800A/B Models) ...	5-46
Cylinder Head Removal	5-24	Exhaust Butterfly Valve Cable	
Cylinder Head Installation	5-24	Installation (ZR800A/B Models)	5-47
Cylinder Head Warp Inspection ...	5-26		

5-2 ENGINE TOP END

Exploded View



GE02561BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	
2	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
3	Camshaft Cap Bolts (L = 45 mm)	12	1.2	106 in·lb	S
4	Camshaft Cap Bolts (L = 40 mm)	12	1.2	106 in·lb	S
5	Spark Plugs	13	1.3	115 in·lb	
6	Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
7	Cylinder Head Bolts (M10)	See the text	←	←	MO, S
8	Cylinder Head Jacket Plugs	21.6	2.20	15.9	L
9	Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
10	Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in·lb	
11	Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
12	Rear Camshaft Chain Guide Bolt	25	2.5	18	
13	Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
14	Throttle Body Assy Holder Bolts	13	1.3	115 in·lb	
15	Throttle Body Assy Holder Clamp Bolts	1.1	0.11	10 in·lb	
16	Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket.

M: Apply molybdenum disulfide grease.

MO: Apply molybdenum disulfide oil solution.

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

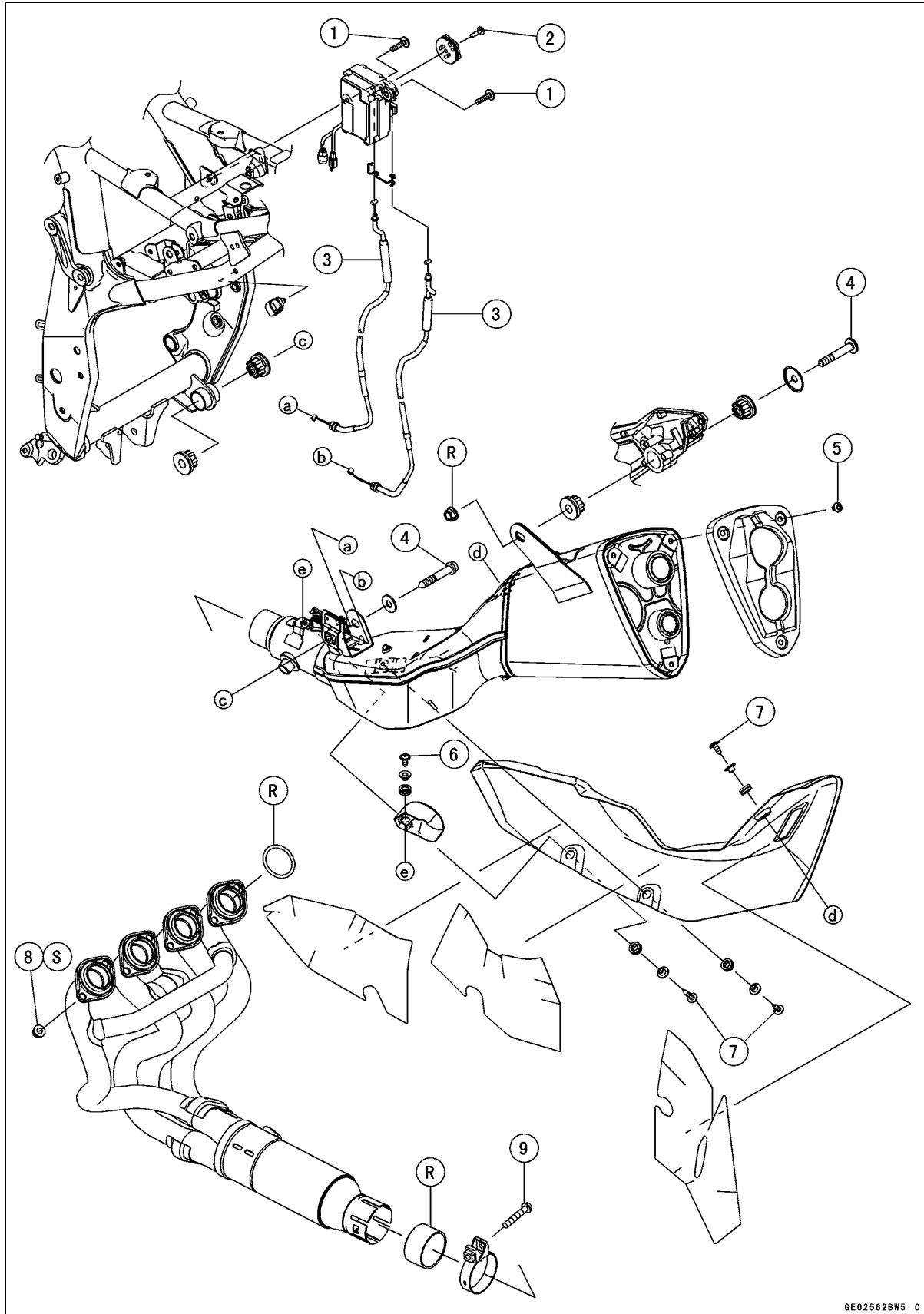
R: Replacement Parts

S: Follow the specified tightening sequence.

5-4 ENGINE TOP END

Exploded View

ZR800A/B Models



GE02562BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust Butterfly Valve Actuator Mounting Bolts	6.9	0.70	61 in·lb	
2	Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	
3	Exhaust Butterfly Valve Cable Adjuster Locknuts	6.9	0.70	61 in·lb	
4	Muffler Body Mounting Bolts	34	3.5	25	
5	Muffler Body End Cover Bolts	11	1.1	97 in·lb	
6	Exhaust Butterfly Valve Cover Bolt	11	1.1	97 in·lb	
7	Muffler Body Cover Bolts	6.9	0.70	61 in·lb	
8	Exhaust Pipe Manifold Holder Nuts	17	1.7	13	S
9	Muffler Body Clamp Bolt	17	1.7	13	

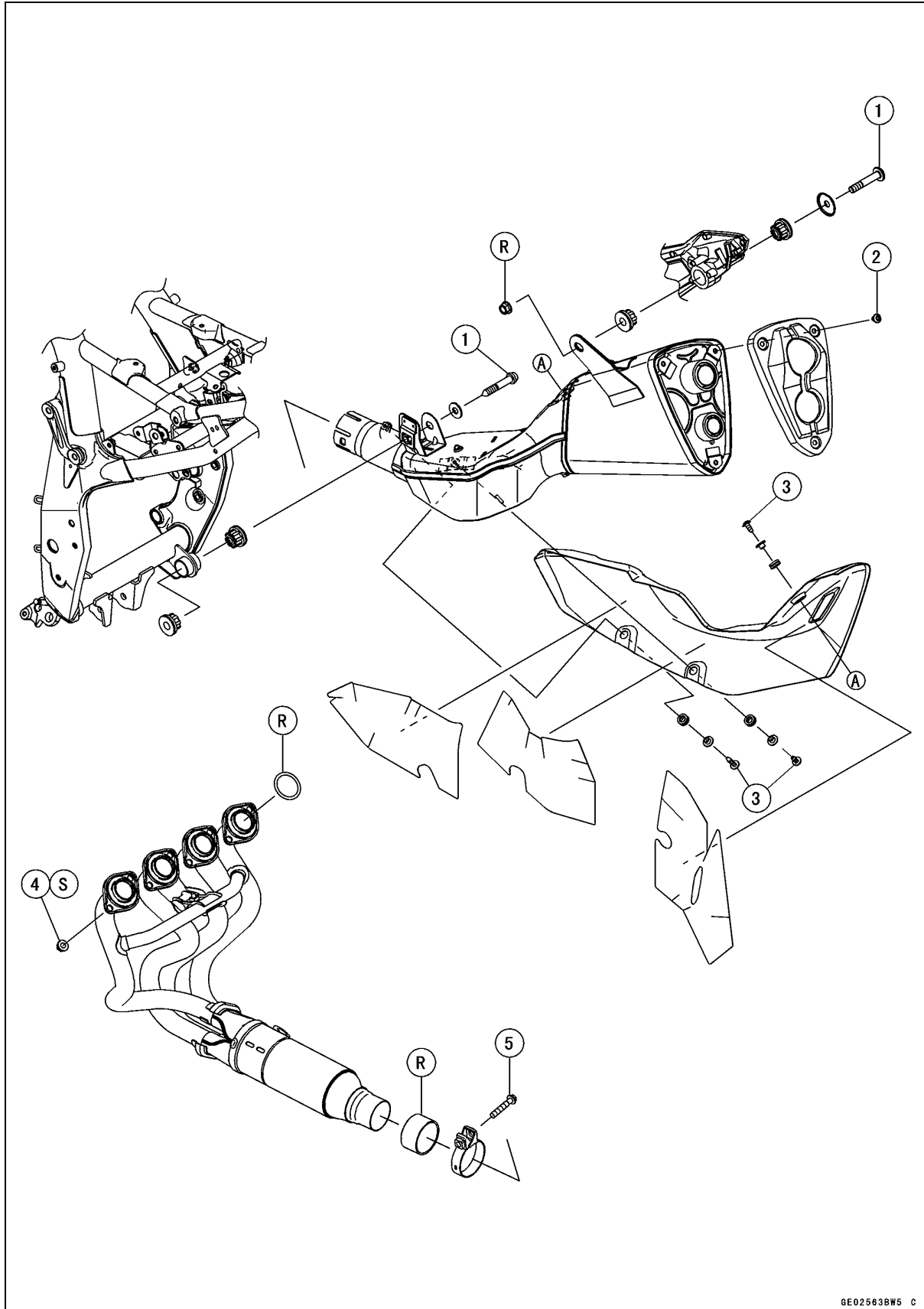
R: Replacement Parts

S: Follow the specified tightening sequence.

5-6 ENGINE TOP END

Exploded View

ZR800C/D Models



GE02563BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Muffler Body Mounting Bolts	34	3.5	25	
2	Muffler Body End Cover Bolts	11	1.1	97 in·lb	
3	Muffler Body Cover Bolts	6.9	0.70	61 in·lb	
4	Exhaust Pipe Manifold Holder Nuts	17	1.7	13	S
5	Muffler Body Clamp Bolt	17	1.7	13	

R: Replacement Parts

S: Follow the specified tightening sequence.

5-8 ENGINE TOP END

Exhaust System

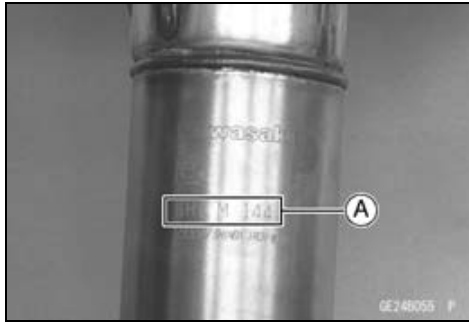
Exhaust System

MANIFOLD	MUFFLER BODY	SPECIFICATION	MODEL
Honeycomb Type Catalyst <hr/> P/No. 39178-0191 Mark: KHI M 144	Non-Catalyst <hr/> P/No. 18091-0910 Mark : KHI K 621	WVTA (FULL)	ZR800AD ZR800BD
		UK WVTA (FULL)	ZR800AD ZR800BD
		WVTA (78.2)	ZR800AD ZR800BD
		AU	ZR800BD
		SEA-B2	ZR800AD
Honeycomb Type Catalyst <hr/> P/No. 39178-189 Mark: KHI M 150	Non-Catalyst <hr/> P/No. 18091-0910 Mark : KHI K 621	BR	ZR800AD ZR800BD
Honeycomb Type Catalyst <hr/> P/No. 39178-0192 Mark: KHI M 145	Non-Catalyst <hr/> P/No. 18091-0911 Mark : KHI K 624	WVTA (FULL)	ZR800CD ZR800DD

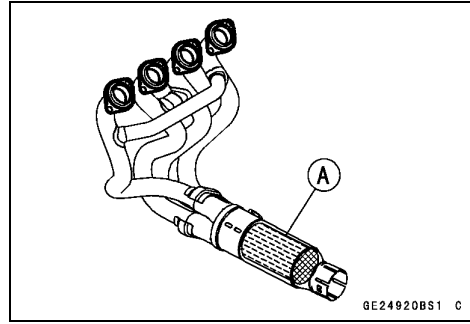
GE24919B F

Exhaust System

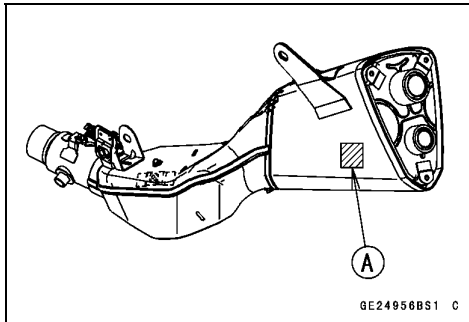
Manifold Mark Position [A]



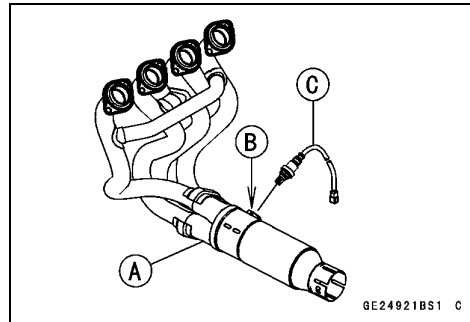
Honeycomb Type Catalyst Position [A]



Muffler Body Mark Position [A]



Manifold [A] with Hole [B] for Oxygen Sensor [C].



5-10 ENGINE TOP END

Specifications

Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	35.742 ~ 35.858 mm (1.4072 ~ 1.4117 in.)	35.64 mm (1.403 in.)
Intake	35.942 ~ 36.058 mm (1.4150 ~ 1.4196 in.)	35.84 mm (1.411 in.)
Camshaft Journal, Camshaft Cap Clearance	0.028 ~ 0.071 mm (0.0011 ~ 0.0028 in.)	0.16 mm (0.0063 in.)
Camshaft Journal Diameter	23.950 ~ 23.972 mm (0.9429 ~ 0.9438 in.)	23.92 mm (0.942 in.)
Camshaft Bearing Inside Diameter	24.000 ~ 24.021 mm (0.9449 ~ 0.9457 in.)	24.08 mm (0.948 in.)
Camshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.004 in.)
Cylinder Head		
Cylinder Compression	(Usable Range) 1 120 ~ 1 698 kPa (11.4 ~ 17.3 kgf/cm ² , 162 ~ 246 psi) at 330 r/min (rpm)	— — —
Cylinder Head Warp	— — —	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)	— — —
Intake	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)	— — —
Valve Head Thickness:		
Exhaust	1.0 mm (0.039 in.)	0.5 mm (0.020 in.)
Intake	0.5 mm (0.020 in.)	0.25 mm (0.012 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	3.955 ~ 3.970 mm (0.1557 ~ 0.1563 in.)	3.94 mm (0.155 in.)
Intake	3.975 ~ 3.990 mm (0.1565 ~ 0.1571 in.)	3.96 mm (0.156 in.)
Valve Guide Inside Diameter:		
Exhaust	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in.)	4.08 mm (0.161 in.)
Intake	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in.)	4.08 mm (0.161 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in.)	0.38 mm (0.015 in.)
Intake	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)	0.32 mm (0.013 in.)
Valve Seat Cutting Angle	32°, 45°, 60°	— — —
Valve Seating Surface:		
Width:		
Exhaust	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)	— — —
Intake	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)	— — —
Outside Diameter:		
Exhaust	21.6 ~ 21.8 mm (0.850 ~ 0.858 in.)	— — —
Intake	26.4 ~ 26.6 mm (1.039 ~ 1.047 in.)	— — —
Valve Spring Free Length:		
Exhaust	40.7 mm (1.602 in.)	38.9 mm (1.531 in.)
Intake	40.7 mm (1.602 in.)	38.9 mm (1.531 in.)

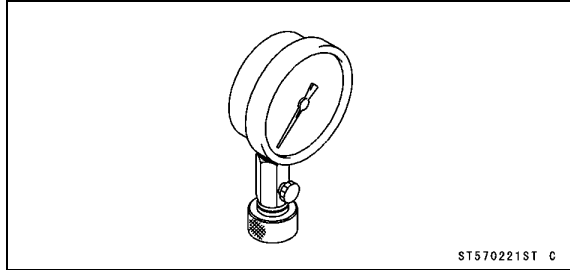
Specifications

Item	Standard	Service Limit
Cylinder, Pistons		
Cylinder Inside Diameter	70.992 ~ 71.008 mm (2.7950 ~ 2.7956 in.)	71.11 mm (2.7996 in.)
Piston Diameter	70.974 ~ 70.984 mm (2.7942 ~ 2.7946 in.)	70.82 mm (2.7882 in.)
Piston/Cylinder Clearance	0.008 ~ 0.034 mm (0.0003 ~ 0.0013 in.)	— — —
Piston Ring/Groove Clearance:		
Top	0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Second	0.02 ~ 0.05 mm (0.0008 ~ 0.0020 in.)	0.15 mm (0.0059 in.)
Piston Ring Groove Width:		
Top	0.83 ~ 0.85 mm (0.0327 ~ 0.0335 in.)	0.93 mm (0.037 in.)
Second	0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)	0.91 mm (0.036 in.)
Piston Ring Thickness:		
Top	0.78 ~ 0.79 mm (0.0307 ~ 0.0311 in.)	0.71 mm (0.028 in.)
Second	0.78 ~ 0.79 mm (0.0307 ~ 0.0311 in.)	0.71 mm (0.028 in.)
Piston Ring End Gap:		
Top	0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)	0.6 mm (0.024 in.)
Second	0.45 ~ 0.55 mm (0.0177 ~ 0.0217 in.)	0.9 mm (0.035 in.)

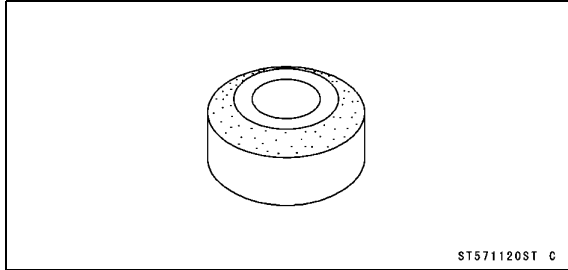
5-12 ENGINE TOP END

Special Tools and Sealant

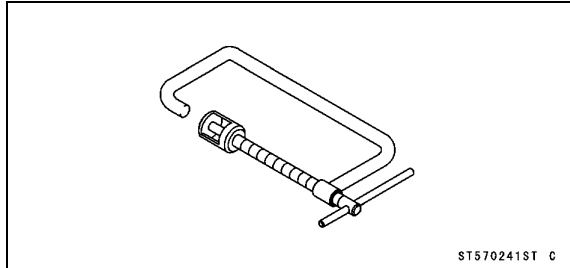
**Compression Gauge, 20 kgf/cm²:
57001-221**



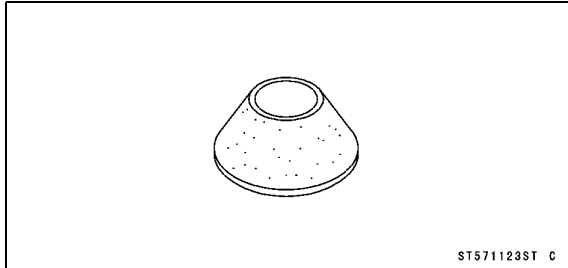
**Valve Seat Cutter, 32° - ϕ 30:
57001-1120**



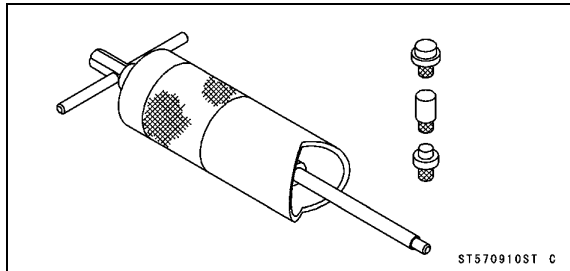
**Valve Spring Compressor Assembly:
57001-241**



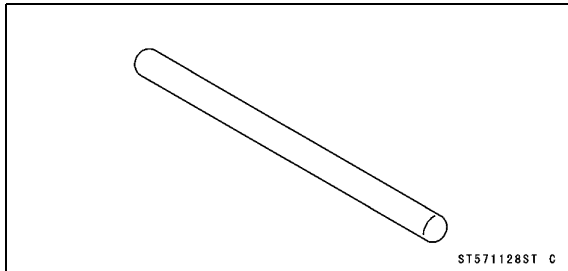
**Valve Seat Cutter, 60° - ϕ 30:
57001-1123**



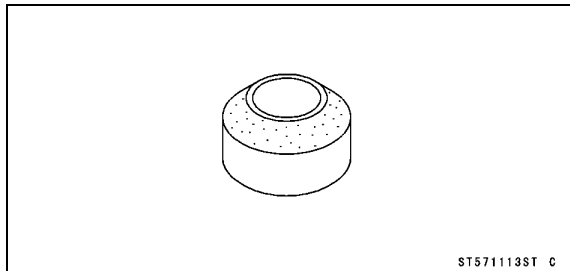
**Piston Pin Puller Assembly:
57001-910**



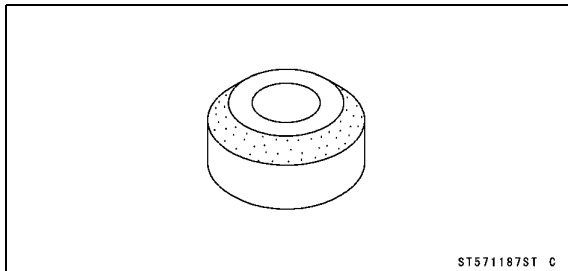
**Valve Seat Cutter Holder Bar:
57001-1128**



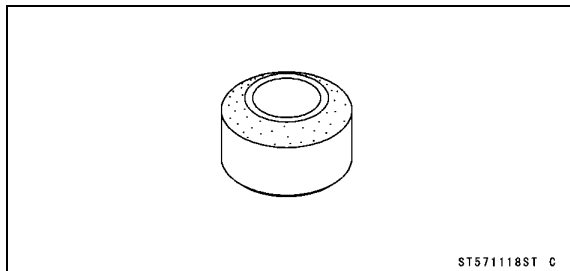
**Valve Seat Cutter, 45° - ϕ 24.5:
57001-1113**



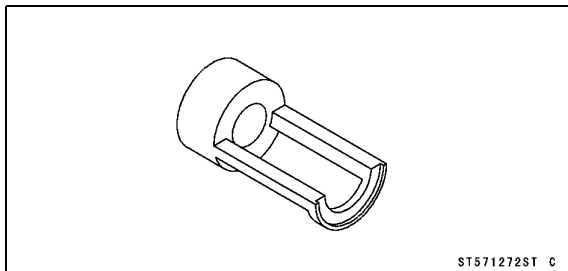
**Valve Seat Cutter, 45° - ϕ 30:
57001-1187**



**Valve Seat Cutter, 32° - ϕ 25:
57001-1118**

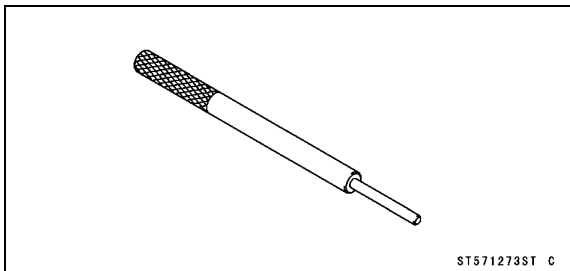


**Valve Spring Compressor Adapter, ϕ 21:
57001-1272**

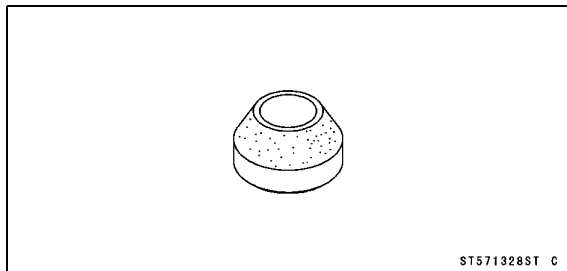


Special Tools and Sealant

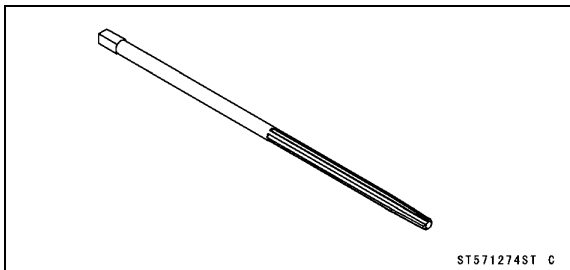
Valve Guide Arbor, $\phi 4$:
57001-1273



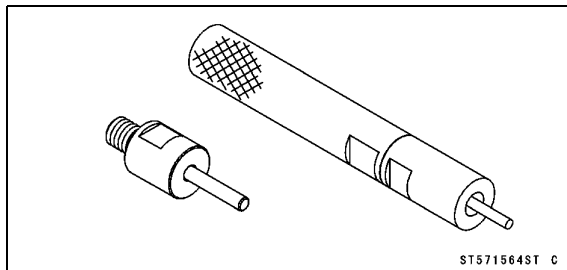
Valve Seat Cutter, 60° - $\phi 25$:
57001-1328



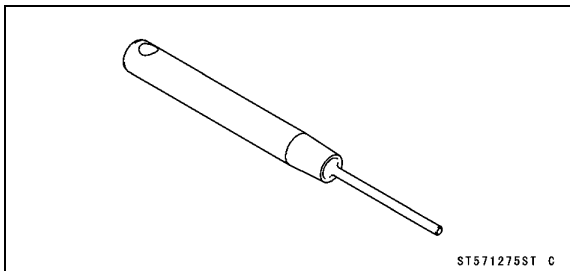
Valve Guide Reamer, $\phi 4$:
57001-1274



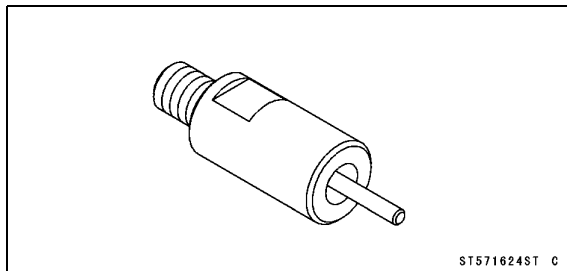
Valve Guide Driver:
57001-1564



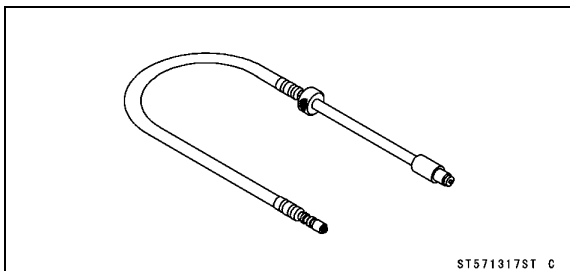
Valve Seat Cutter Holder, $\phi 4$:
57001-1275



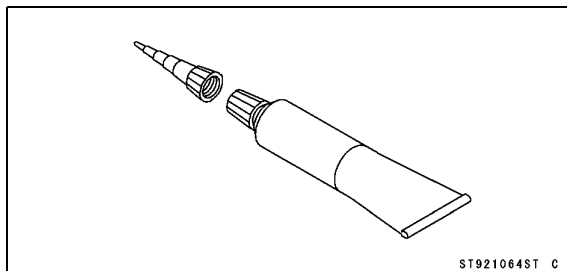
Valve Guide Driver Attachment, C:
57001-1624



Compression Gauge Adapter, M10 x 1.0:
57001-1317



Liquid Gasket, TB1216B:
92104-1064



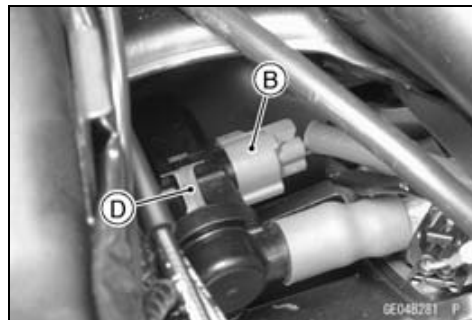
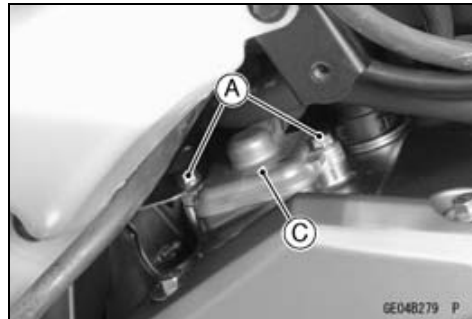
5-14 ENGINE TOP END

Clean Air System

Air Suction Valve Removal

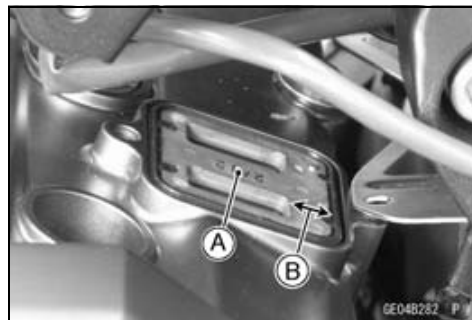
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Side Fairings (see Side Fairing Removal in the Frame chapter)
- Disconnect the hose [A].

- Remove:
 - Thermostat Housing (see Thermostat Removal in the Cooling System chapter)
 - Stick Coils (see Stick Coil Removal in the Electrical System chapter)
 - Air Suction Valve Cover Bolts [A] (Both Sides)
- Disconnect the air switching valve connector [B].
- Remove the air suction valve covers [C] with the air switching valve [D].
- Remove the air suction valves.



Air Suction Valve Installation

- Install the air suction valve [A] so that its wider side [B] of the reed valve case faces the front.
- Tighten:
 - Torque - Air Suction Valve Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install the removed parts (see appropriate chapters).



Clean Air System

Air Suction Valve Inspection

- Remove the air suction valve (see Air Suction Valve Removal).
- Visually inspect the reeds for cracks, folds, warps, heat damage or other damage.
- ★ If there is any doubt as to the condition of the reeds [A], replace the air suction valve as an assembly.
- Check the reed contact areas [B] of the valve holder for grooves, scratches, any signs of separation from the holder or heat damage.
- ★ If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.
- ★ If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high flash-point solvent.

NOTICE

Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.

Air Switching Valve Removal

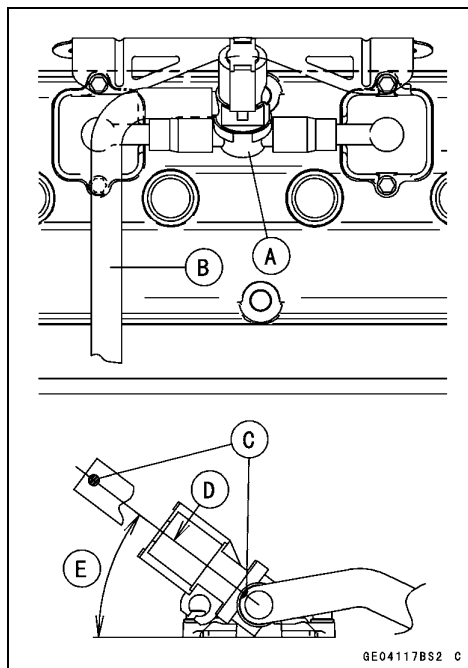
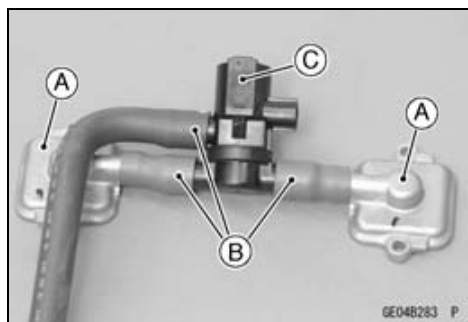
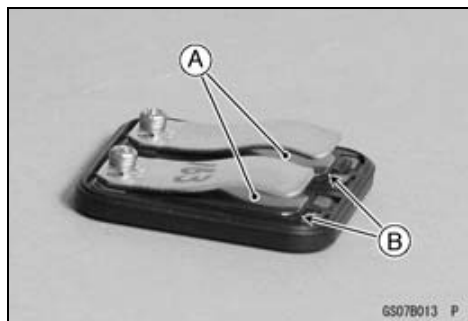
- Remove:
 - Air Suction Valve Covers [A] (see Air Suction Valve Removal)
 - Hoses [B]
 - Air Switching Valve [C]

NOTICE

Never drop the air switching valve especially on a hardsurface. Such a shock to the air switching valve can damaged it.

Air Switching Valve Installation

- Install the air switching valve [A] with hose [B] as shown.
- Align the white mark [C] of the hose and center line [D] of the air switching valve.
- 30 ~ 40° [E]



Air Switching Valve Operation Test

- Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

5-16 ENGINE TOP END

Clean Air System

Air Switching Valve Unit Test

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

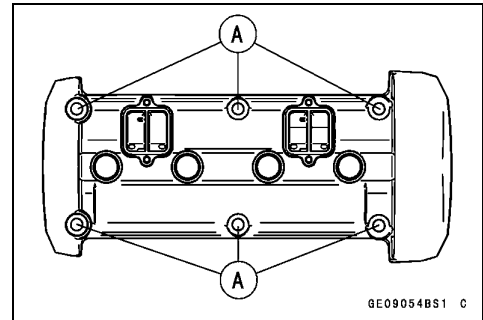
Clean Air System Hose Inspection

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

Cylinder Head Cover

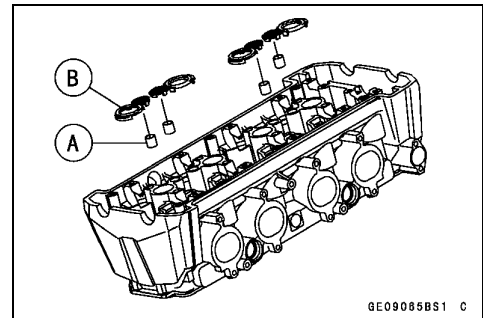
Cylinder Head Cover Removal

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Thermostat Housing (see Thermostat Removal in the Cooling System chapter)
 - Coolant Reserve Tank (see Coolant Change in the Periodic Maintenance chapter)
 - Stick Coils (see Stick Coil Removal in the Electrical System chapter)
 - Air Suction Valve (see Air Suction Valve Removal)
 - Cylinder Head Cover Bolts [A]
 - Cylinder Head Cover



Cylinder Head Cover Installation

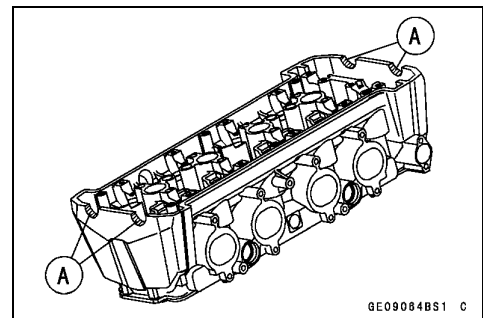
- Install:
 - Dowel Pins [A]
 - Plug Hole Gaskets [B]



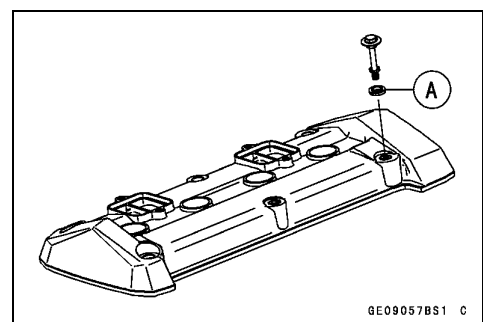
- Replace the head cover gasket with a new one.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the cylinder head as shown.
 - Sealant - Liquid Gasket, TB1216B: 92104-1064**
- Install the new head cover gasket.

NOTE

○ Make the application finish within 20 minutes when the liquid gasket to the mating surface of the cylinder head cover is applied.



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



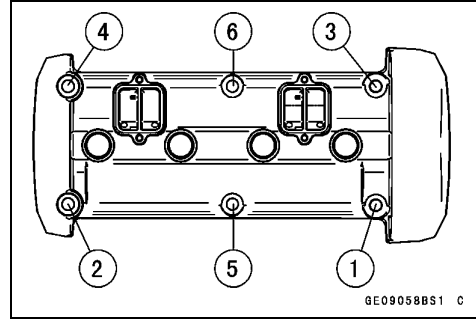
5-18 ENGINE TOP END

Cylinder Head Cover

- Tighten the cover bolts following the specified tightening sequence.

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

- Install the removed parts (see appropriate chapters).



Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

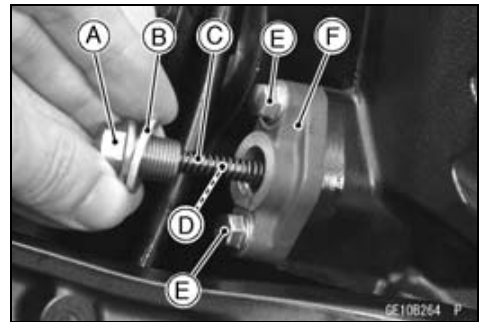
NOTICE

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.

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

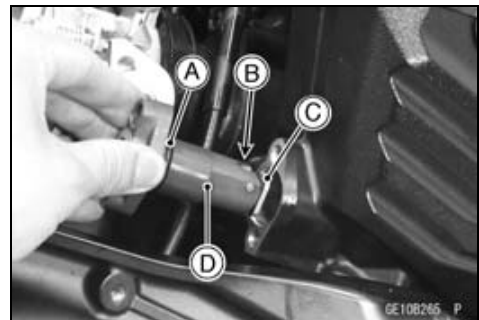
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove:
 - Right Subframe Cover (see Subframe Cover Removal in the Frame chapter)
 - Right Throttle Body Cover (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
 - Cap Bolt [A]
 - Washer [B]
 - Spring [C]
 - Rod [D]
 - Mounting Bolts [E]
 - Camshaft Chain Tensioner [F]

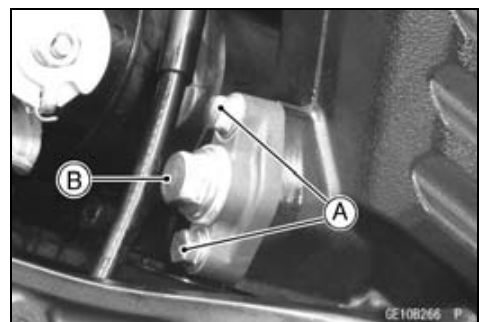


Camshaft Chain Tensioner Installation

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Release the stopper [B] and push the push rod [C] into the tensioner body [D].
- Install the tensioner body so that the stopper faces upward.



- Tighten the tensioner mounting bolts [A].
 - Torque - Camshaft Chain Tensioner Mounting Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**
- Install the rod, spring and washer.
- Tighten the cap bolt [B].
 - Torque - Camshaft Chain Tensioner Cap Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)**
- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.



5-20 ENGINE TOP END

Camshaft, Camshaft Chain

Camshaft Removal

- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Crankshaft Sensor Cover (see Crankshaft Sensor Removal in the Electrical System chapter)
- Position the crankshaft at #1, 4 piston TDC.
 - TDC mark [A] for #1, 4 Pistons
 - Timing Mark (Crankcase Halves Mating Surface) [B]
- Remove:
 - Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
 - Camshaft Cap Bolts [A]
 - Camshaft Caps [B]
 - Camshafts [C]
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.

NOTICE

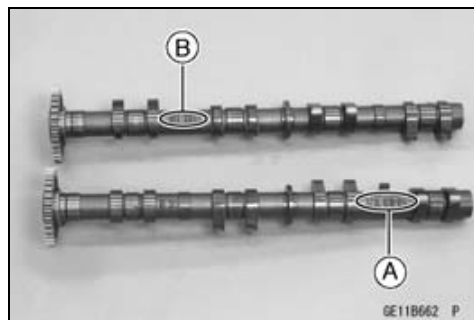
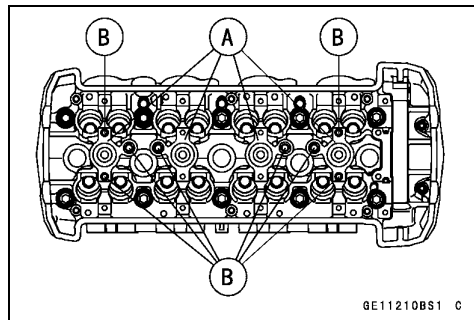
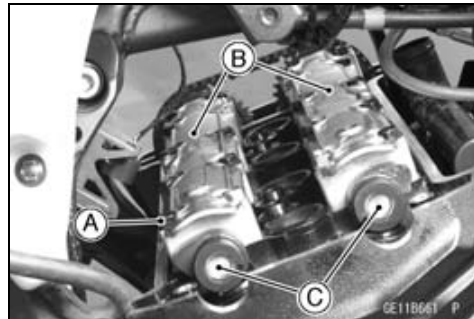
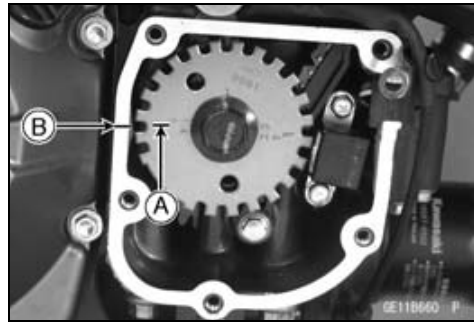
The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

Camshaft Installation

- Be sure to install the following parts.
 - Plug Hole Gaskets [A]
 - Dowel Pins [B]
- Apply molybdenum disulfide oil solution to all cam parts and journals.
- If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.

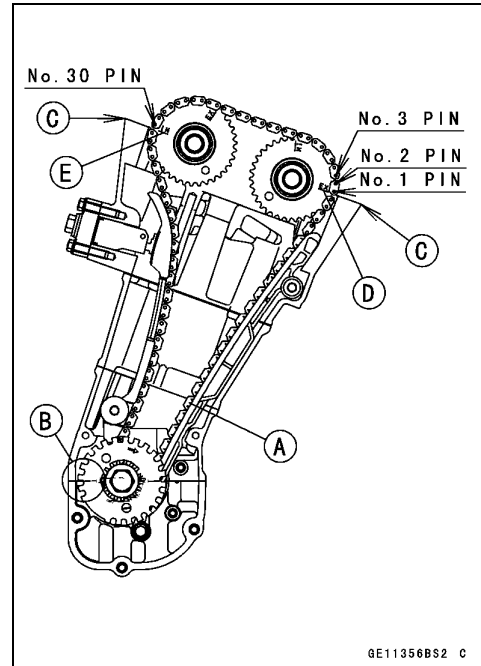
NOTE

- The exhaust camshaft has a 1883 EX mark [A] and the intake camshaft has a 1182 IN mark [B]. Be careful not to mix up these shafts.



Camshaft, Camshaft Chain

- Position the crankshaft at #1, 4 piston TDC.
- Pull the tension side (exhaust side) [A] of the chain taut to install the chain.
- Engage the camshaft chain with the camshaft sprockets so that the timing marks on the sprockets are positioned as shown.
- The timing marks of #1, 4T must be aligned with the lower surface of crankcase of rear side [B].
- The timing marks must be aligned with the cylinder head upper surface [C].
EX Mark [D]
IN Mark [E]
- Before installing the camshaft caps, install the camshaft chain tensioner body temporarily (see Camshaft Chain Tensioner Installation).

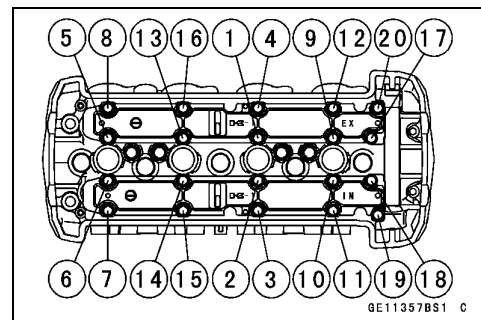


- Install the camshaft caps.
- First tighten the all camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence.

Torque - Camshaft Cap Bolts (L = 45 mm) [5, 6, 9, 10]: 12 N·m (1.2 kgf·m, 106 in·lb)

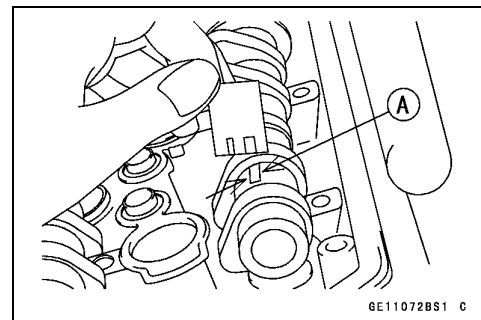
Camshaft Cap Bolts (L = 40 mm) [1 ~ 4, 7, 8, 11 ~ 20]: 12 N·m (1.2 kgf·m, 106 in·lb)

- Install:
Camshaft Chain Tensioner (see Camshaft Chain Tensioner Installation)
Cylinder Head Cover (see Cylinder Head Cover Installation)



Camshaft, Camshaft Cap Wear Inspection

- Remove:
Camshaft Caps (see Camshaft Removal)
- Cut strips of plastigage to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Measure each clearance between the camshaft journal and the camshaft cap using plastigage (press gauge) [A].
- Tighten the camshaft cap bolts (see Camshaft Installation).



NOTE

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

Camshaft Journal, Camshaft Cap Clearance

Standard: 0.028 ~ 0.071 mm (0.0011 ~ 0.0028 in.)

Service Limit: 0.16 mm (0.0063 in.)

5-22 ENGINE TOP END

Camshaft, Camshaft Chain

- ★ If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

Camshaft Journal Diameter

Standard: 23.950 ~ 23.972 mm (0.9429 ~ 0.9438 in.)

Service Limit: 23.92 mm (0.942 in.)

- ★ If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.
- ★ If the clearance still remains out of the limit, replace the cylinder head unit.

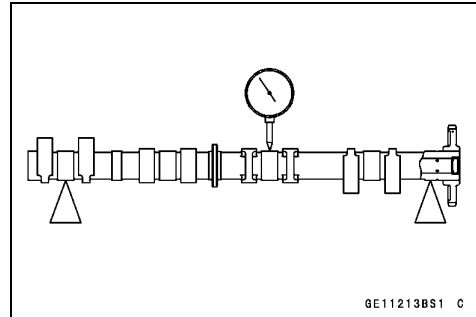
Camshaft Runout Inspection

- Remove the camshafts (see Camshaft Removal).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure runout with a dial gauge at the specified place as shown.
- ★ If the runout exceeds the service limit, replace the shaft.

Camshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.1 mm (0.004 in.)



Cam Wear Inspection

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

Cam Height

Standard:

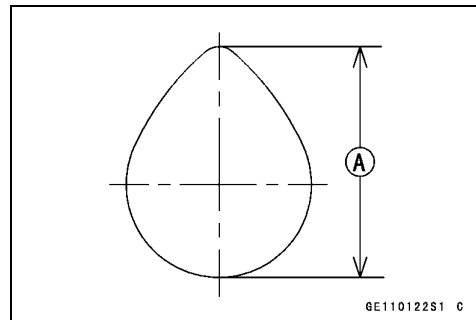
Exhaust 35.742 ~ 35.858 mm (1.4072 ~ 1.4117 in.)

Intake 35.942 ~ 36.058 mm (1.4150 ~ 1.4196 in.)

Service Limit:

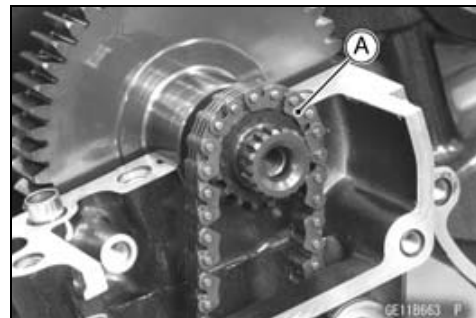
Exhaust 35.64 mm (1.403 in.)

Intake 35.84 mm (1.411 in.)



Camshaft Chain Removal

- Split the crankcase (see Crankcase Splitting in the Crankshaft/Transmission chapter).
- Remove the camshaft chain [A] from the crankshaft sprocket.



Cylinder Head

Cylinder Compression Measurement

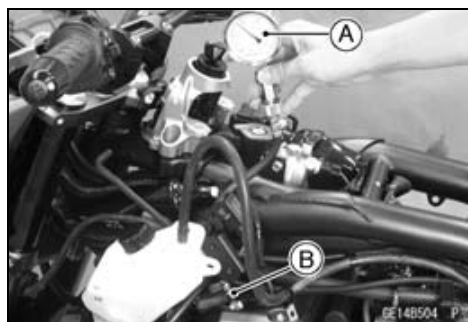
NOTE

○ Use the battery which is fully charged.

- Warm up the engine thoroughly.
- Stop the engine.
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Stick Coils (see Stick Coil Removal in the Electrical System chapter)
 - Spark Plugs (see Spark Plug Replacement in the Periodic Maintenance chapter)

- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

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



Cylinder Compression

Usable Range: 1 120 ~ 1 698 kPa (11.4 ~ 17.3 kgf/cm², 162 ~ 246 psi) at 330 r/min (rpm)

- Repeat the measurement for the other cylinders.
- Install the spark plugs.

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

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

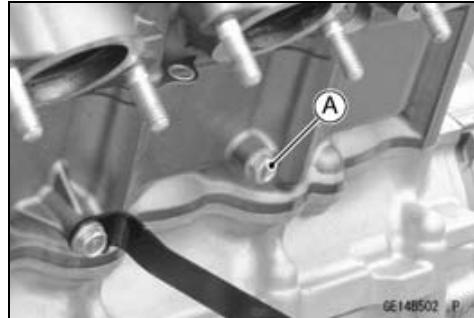
Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range.	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace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

5-24 ENGINE TOP END

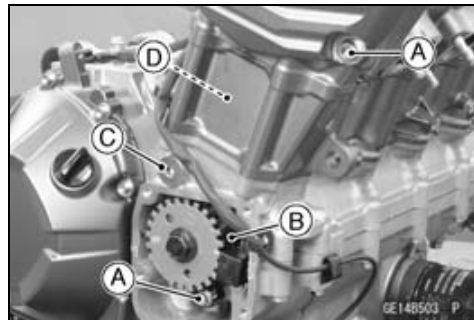
Cylinder Head

Cylinder Head Removal

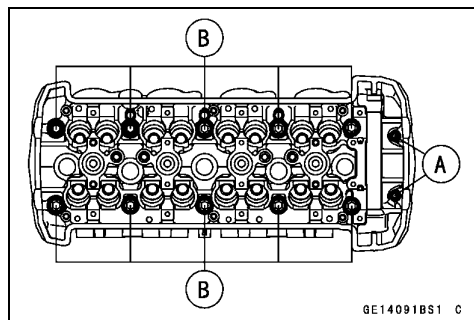
- Remove:
 - Engine (see Engine Removal in the Engine Removal/Installation chapter)
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Camshafts (see Camshaft Removal)
- Drain the coolant from the cylinder.
- Place a container under the drain bolt [A] and remove it.
- Tighten the drain bolt with new gasket.
Torque - Coolant Drain Bolt (Cylinder): 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Remove:
 - Crankshaft Sensor (see Crankshaft Sensor Removal in the Electrical System chapter)
 - Front Camshaft Chain Guide Bolts [A]
 - Front Camshaft Chain Guide [B]
 - Rear Camshaft Chain Guide Bolt [C]
 - Rear Camshaft Chain Guide [D]



- Remove:
 - M6 Cylinder Head Bolts [A]
 - M10 Cylinder Head Bolts [B]
 - Cylinder Head

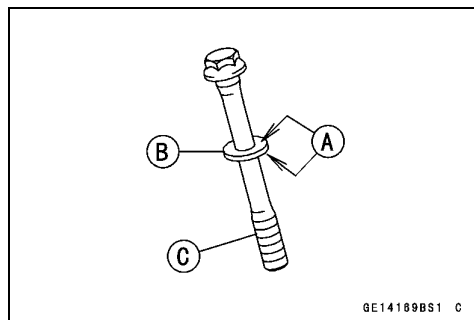


Cylinder Head Installation

NOTE

○ The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.

- Install a new cylinder head gasket and dowel pins.
- Apply molybdenum disulfide oil solution to both sides [A] of the cylinder head bolt washers [B] and the threads of the head bolts [C].



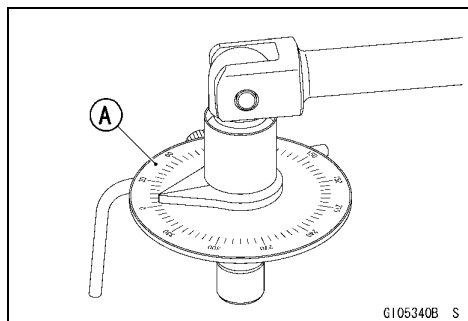
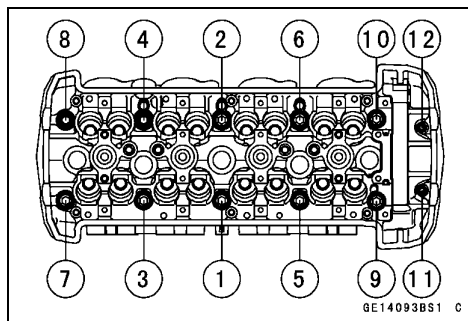
Cylinder Head

- Tighten the M10 cylinder head bolts following the tightening sequence [1 ~10].
- First, tighten the bolts with **10 N·m (1.0 kgf·m, 15 ft·lb)** of torque.
- Next, in accordance with the following table tighten the bolts with the specified torque. And using a torque angle gauge [A], tighten the bolts with the specified angle.

Order	Cylinder Head Bolts (M10)	New Bolt Torque N·m (kgf·m, ft·lb) or Angle	Used Bolt Torque N·m (kgf·m, ft·lb) or Angle
1	[1]	30 (3.1, 22)	30 (3.1, 22)
2	[1]	120° ±5	100° ±5
3	[2]	30 (3.1, 22)	30 (3.1, 22)
4	[2]	120° ±5	100° ±5
5	[3]	30 (3.1, 22)	30 (3.1, 22)
6	[3]	120° ±5	100° ±5
7	[4]	30 (3.1, 22)	30 (3.1, 22)
8	[4]	120° ±5	100° ±5
9	[5]	30 (3.1, 22)	30 (3.1, 22)
10	[5]	120° ±5	100° ±5
11	[6]	30 (3.1, 22)	30 (3.1, 22)
12	[6]	120° ±5	100° ±5
13	[7]	30 (3.1, 22)	30 (3.1, 22)
14	[7]	120° ±5	100° ±5
15	[8]	30 (3.1, 22)	30 (3.1, 22)
16	[8]	120° ±5	100° ±5
17	[9]	30 (3.1, 22)	30 (3.1, 22)
18	[9]	120° ±5	100° ±5
19	[10]	30 (3.1, 22)	30 (3.1, 22)
20	[10]	120° ±5	100° ±5

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

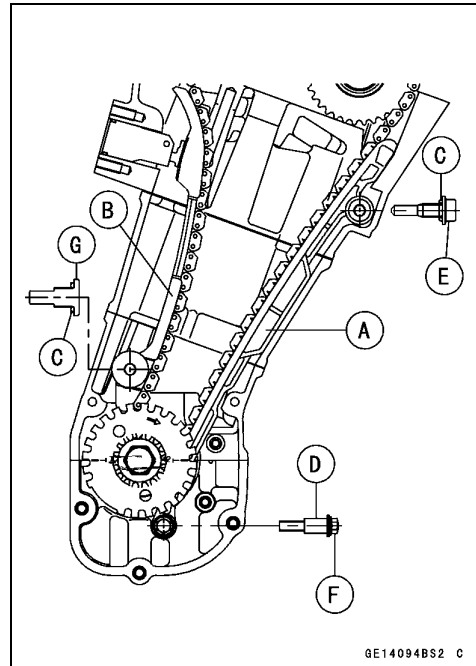
Torque - Cylinder Head Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)



5-26 ENGINE TOP END

Cylinder Head

- Install:
 - Front Camshaft Chain Guide [A]
 - Rear Camshaft Chain Guide [B]
 - New O-rings [C]
 - Collar [D]
- Apply grease to the new O-ring.
- Tighten:
 - Torque - Front Camshaft Chain Guide Bolt (Upper) [E]: 25 N·m (2.5 kgf·m, 18 ft·lb)**
 - Front Camshaft Chain Guide Bolt (Lower) [F]: 12 N·m (1.2 kgf·m, 106 in·lb)**
 - Rear Camshaft Chain Guide Bolt [G]: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Install the removed parts (see appropriate chapters).



Cylinder Head Warp Inspection

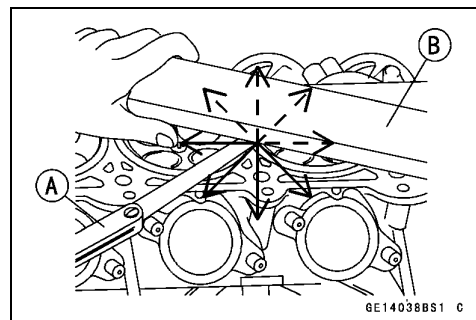
- Clean the cylinder head.
- Lay a straightedge across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

Cylinder Head Warp

Standard: ---

Service Limit: 0.05 mm (0.002 in.)

- ★ If the cylinder head is warped more than the service limit, replace it.
- ★ If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).



Valves

Valve Clearance Inspection

- Refer to the Valve Clearance Inspection in the Periodic Maintenance chapter.

Valve Clearance Adjustment

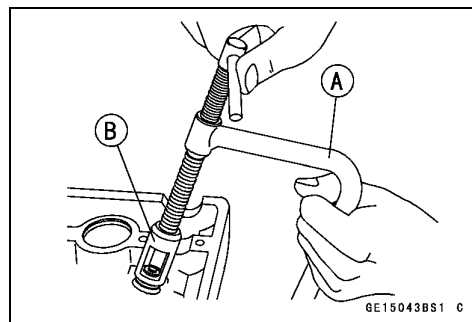
- Refer to the Valve Clearance Adjustment in the Periodic Maintenance chapter.

Valve Removal

- Remove:
 - Cylinder Head (see Cylinder Head Removal)
 - Valve Lifter and Shim
- Mark and record the valve lifter and shim locations so they can be installed in their original positions.
- Using the valve spring compressor assembly, remove the valve.

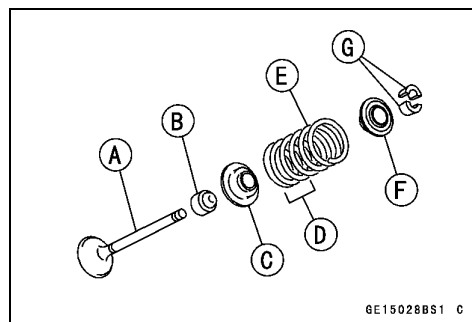
Special Tools - Valve Spring Compressor Assembly [A]:
57001-241

Valve Spring Compressor Adapter, ϕ 21 [B]:
57001-1272



Valve Installation

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



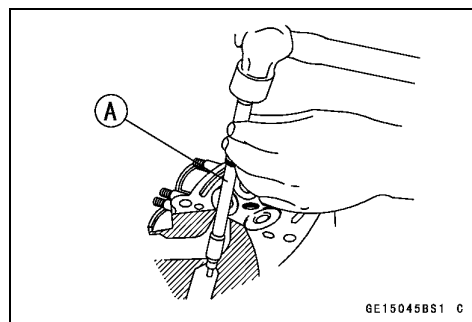
Valve Guide Removal

- Remove:
 - Valve (see Valve Removal)
 - Oil Seal
 - Spring Seat
- Heat the area around the valve guide to 120 ~ 150°C (248 ~ 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

NOTICE

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

Special Tool - Valve Guide Arbor, ϕ 4: 57001-1273



5-28 ENGINE TOP END

Valves

Valve Guide Installation

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

NOTICE

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

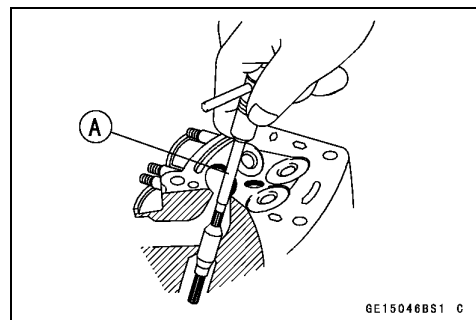
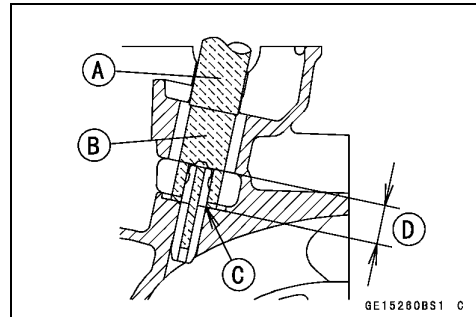
- Using the valve guide driver [A] and attachment [B], press and insert the valve guide in until the attachment surface [C] touches the head surface.
13.3 ~ 13.5 mm (0.52 ~ 0.53 in.) [D]

Special Tools - Valve Guide Driver: 57001-1564

Valve Guide Driver Attachment, C: 57001-1624

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

Special Tool - Valve Guide Reamer, $\phi 4$: 57001-1274

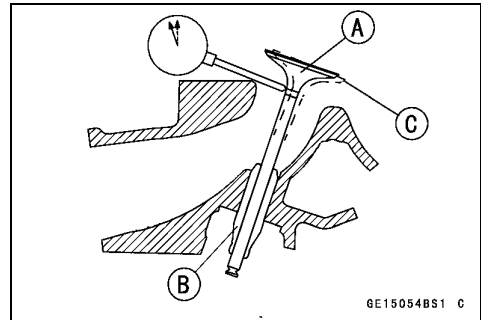


Valves

Valve-to-Guide Clearance Measurement (Wobble Method)

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.
- ★ If the reading exceeds the service limit, replace the guide.



NOTE

○ The reading is not actual valve/valve guide clearance because the measuring point is above the guide.

Valve/Valve Guide Clearance (Wobble Method)

Standard:

Exhaust	0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in.)
Intake	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)

Service Limit:

Exhaust	0.38 mm (0.015 in.)
Intake	0.32 mm (0.013 in.)

Valve Seat Inspection

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

Valve Seating Surface Outside Diameter

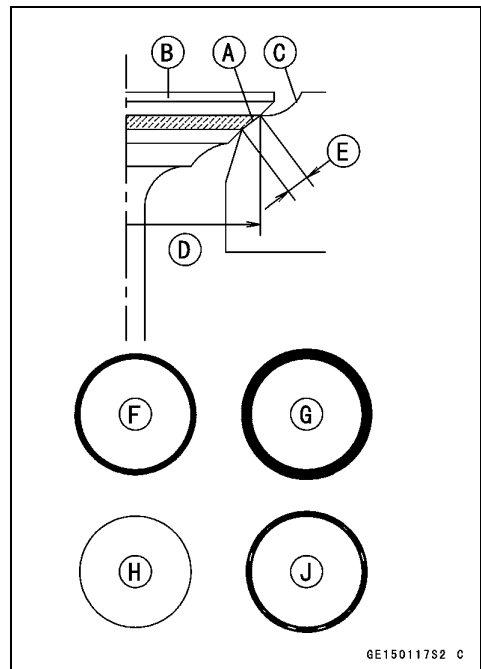
Standard:

Exhaust	21.6 ~ 21.8 mm (0.850 ~ 0.858 in.)
Intake	26.4 ~ 26.6 mm (1.039 ~ 1.047 in.)

○ Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.

Good [F]

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



Valve Seating Surface Width

Standard:

Exhaust	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)
Intake	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)

5-30 ENGINE TOP END

Valves

Valve Seat Repair

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

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

Valve Seat Cutter Holder, $\phi 4$ [C]: 57001-1275

[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.

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.

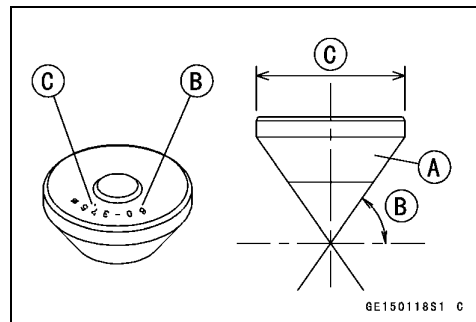
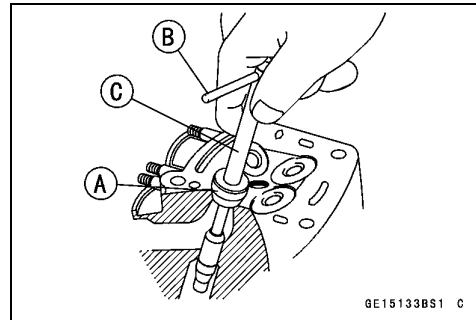
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

Marks Stamped on the Cutter

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

60° Cutter angle [B]

37.5 ϕ Outer diameter of cutter [C]



Valves

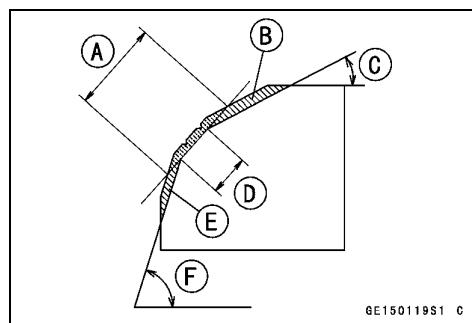
Operating Procedures

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

NOTICE

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

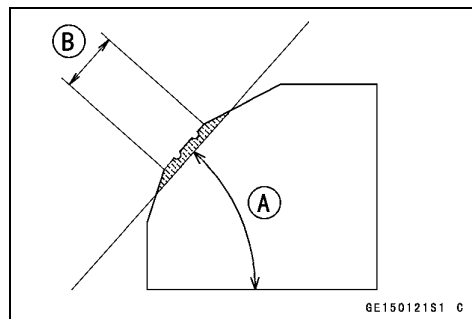
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
 - Widened Width [A] of engagement by machining with 45° cutter
 - Ground Volume [B] by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



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

NOTE

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



5-32 ENGINE TOP END

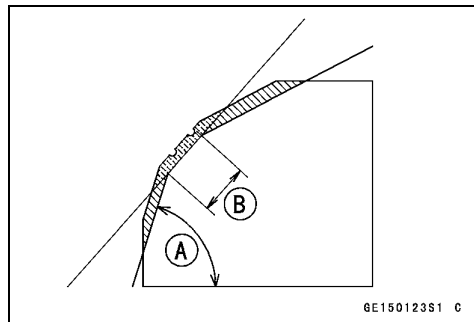
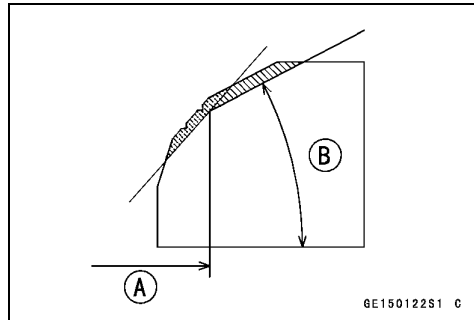
Valves

- ★ 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

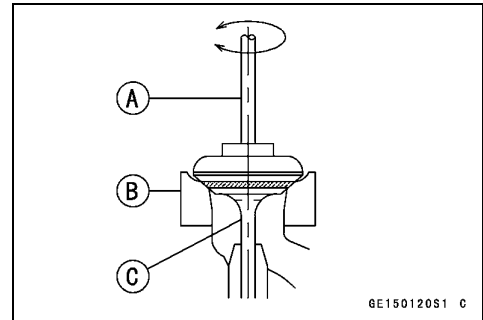
The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

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



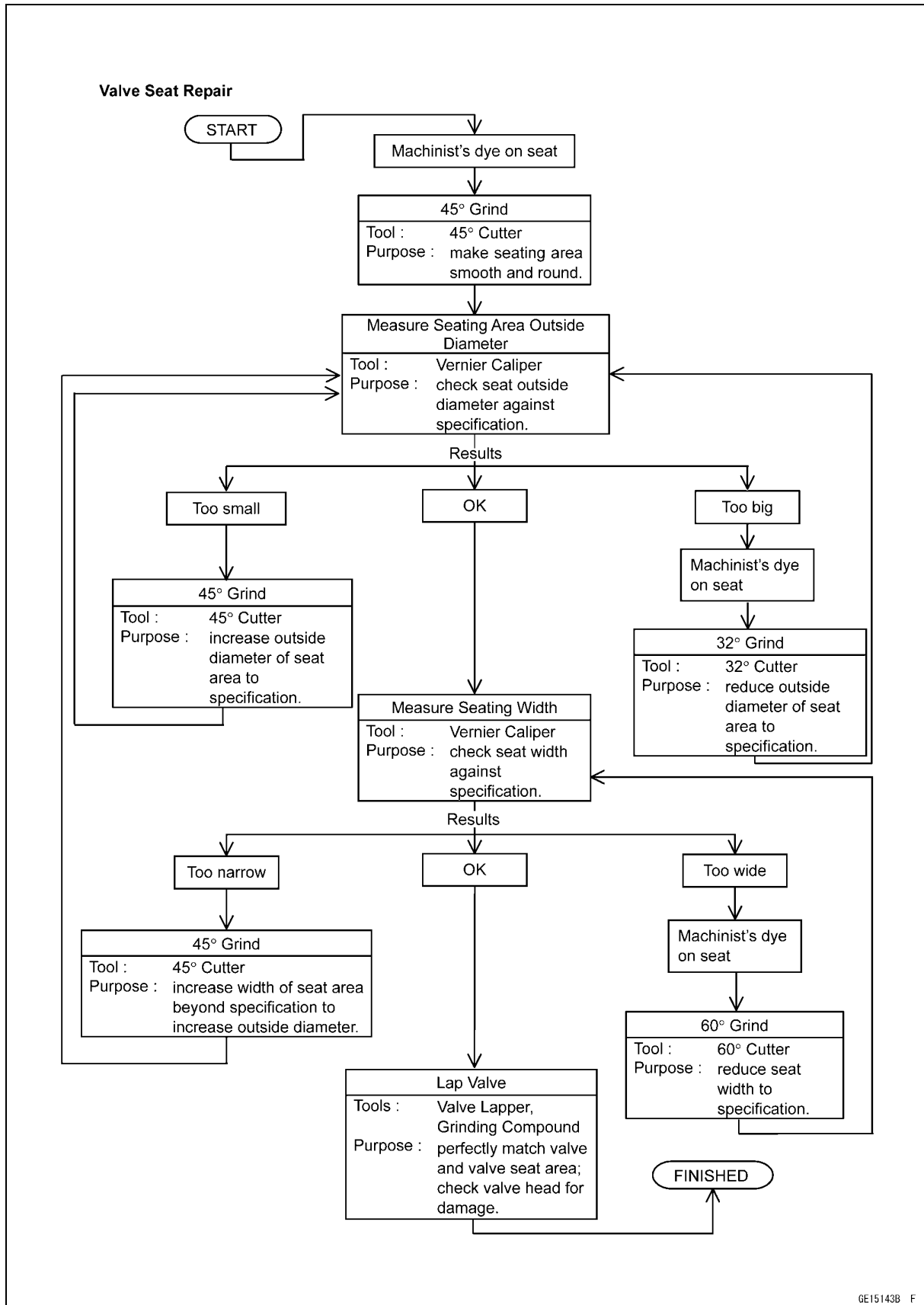
Valves

- Lap the valve to the 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).



5-34 ENGINE TOP END

Valves

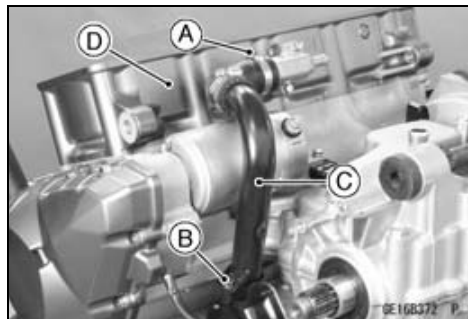


GE15143B F

Cylinder, Pistons

Cylinder Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Loosen the water hose clamp screw [A].
- Remove:
 - Water Pipe Bolt [B]
 - Water Pipe [C] and Water Hose
 - Cylinder [D]

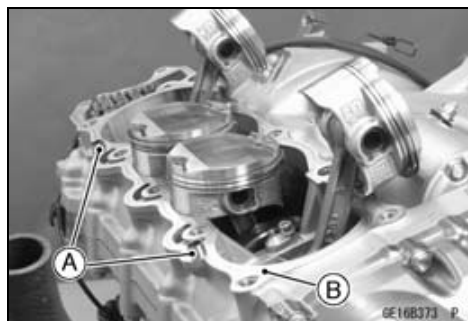


Cylinder Installation

NOTE

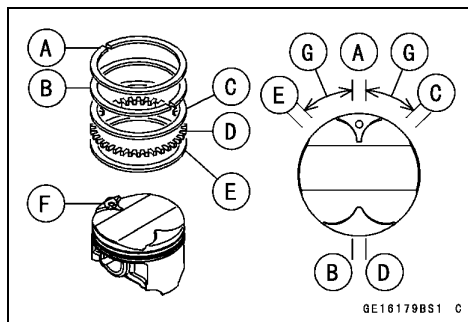
○ If a new cylinder is used, use new piston ring.

- Install the dowel pins [A] and new cylinder gasket [B].
- Apply molybdenum disulfide oil solution to the cylinder bore.

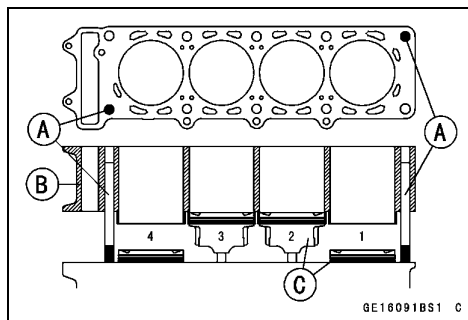
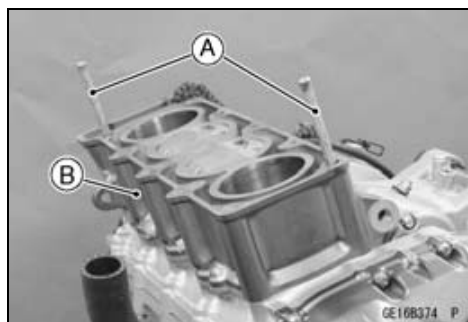


- The piston ring openings must be positioned as shown. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.

- Top Ring [A]
- Second Ring [B]
- Upper Oil Ring Steel Rail [C]
- Oil Ring Expander [D]
- Lower Oil Ring Steel Rail [E]
- Dent [F]
- 30 ~ 40° [G]



- Position the crankshaft at #2, 3 piston TDC.
- Prepare two auxiliary head bolts with their head cut.
- Install the two cylinder head bolts [A] diagonally in the crankcase.
- Install the cylinder block [B].
 - Pistons [C]
- First insert the #2, 3 pistons, and then rotate the crankshaft at 90° angle.
- Insert the piston rings with your thumbs or the standard tip screwdriver.



5-36 ENGINE TOP END

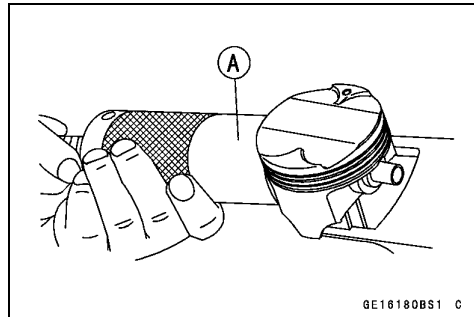
Cylinder, Pistons

Piston Removal

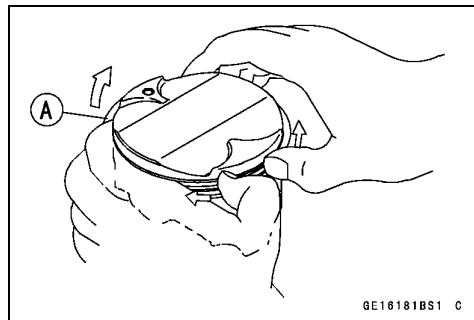
- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the pistons and remove the piston pin snap ring [A] from the outside of each piston.



- Remove the piston pins.
Special Tool - Piston Pin Puller Assembly [A]: 57001-910
- Remove the pistons.

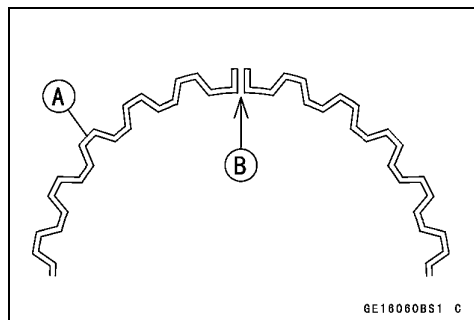


- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Piston Installation

- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.
- Spread the rail with your thumbs, but only enough to fit the rail over the piston.
- Release the rail into the bottom piston ring groove.

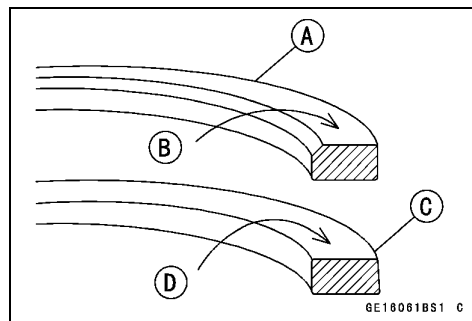


NOTE

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

Cylinder, Pistons

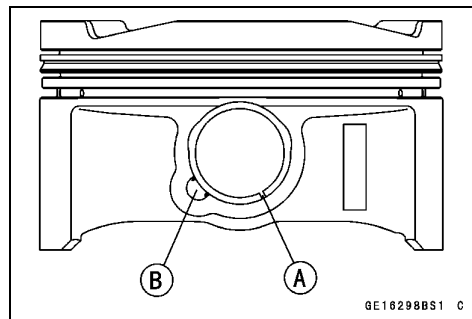
- Do not mix up the top and second ring.
- Install the top ring [A] so that the "1R" mark [B] faces up.
- Install the second ring [C] so that the "2R" mark [D] faces up.
- Apply molybdenum disulfide oil solution to the piston rings.



NOTE

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

- Install the piston with its dent mark facing forward.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.
- Apply molybdenum disulfide oil solution to the piston pins and piston journals.
- When installing the piston pin snap ring, compress it only enough to install it and no more.



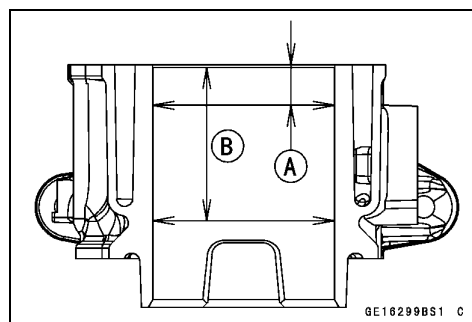
NOTICE

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

- Install the cylinder (see Cylinder Installation).

Cylinder Wear Inspection

- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four measurements) shown.
- ★ If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.
 - 10 mm (0.39 in.) [A]
 - 60 mm (2.36 in.) [B]



Cylinder Inside Diameter

Standard: 70.992 ~ 71.008 mm (2.7950 ~ 2.7956 in.)

Service Limit: 71.11 mm (2.7996 in.)

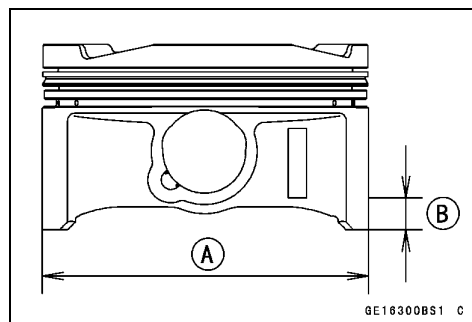
Piston Wear Inspection

- Measure the outside diameter [A] of each piston 5 mm (0.20 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.
- ★ If the measurement is under service limit, replace the piston.

Piston Diameter

Standard: 70.974 ~ 70.984 mm (2.7942 ~ 2.7946 in.)

Service Limit: 70.82 mm (2.7882 in.)



5-38 ENGINE TOP END

Cylinder, Pistons

Piston Ring, Piston Ring Groove Wear Inspection

- Check for uneven groove wear by inspecting the ring seating.
- ★ The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.
- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.

Piston Ring/Groove Clearance

Top

Standard: 0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in.)

Service Limit: 0.17 mm (0.0067 in.)

Second

Standard: 0.02 ~ 0.05 mm (0.0008 ~ 0.0020 in.)

Service Limit: 0.15 mm (0.0059 in.)

Piston Ring Groove Width Inspection

- Measure the piston ring groove width.
- Use a vernier caliper at several points around the piston.

Piston Ring Groove Width

Top [A]

Standard: 0.83 ~ 0.85 mm (0.0327 ~ 0.0335 in.)

Service Limit: 0.93 mm (0.037 in.)

Second [B]

Standard: 0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)

Service Limit: 0.91 mm (0.036 in.)

- ★ If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

Piston Ring Thickness Inspection

- Measure the piston ring thickness.
- Use the micrometer to measure at several points around the ring.

Piston Ring Thickness

Top [A]

Standard: 0.78 ~ 0.79 mm (0.0307 ~ 0.0311 in.)

Service Limit: 0.71 mm (0.028 in.)

Second [B]

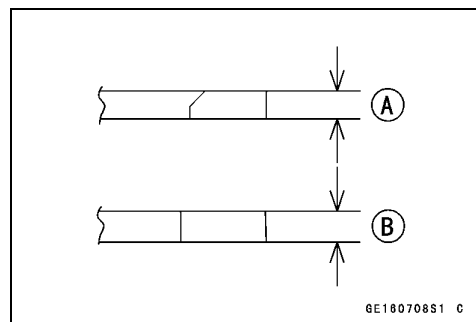
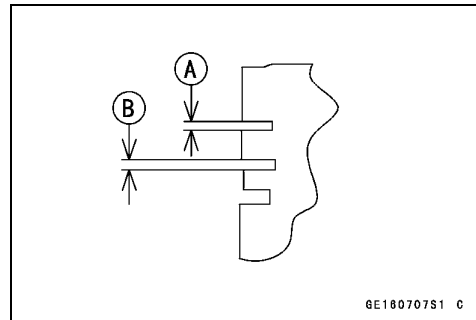
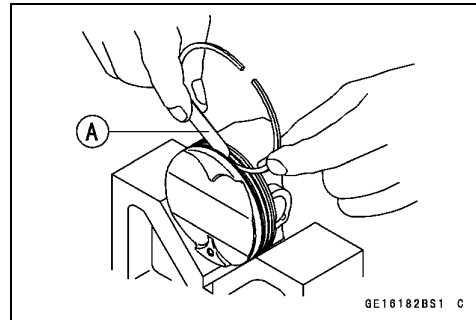
Standard: 0.78 ~ 0.79 mm (0.0307 ~ 0.0311 in.)

Service Limit: 0.71 mm (0.028 in.)

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

NOTE

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



Cylinder, Pistons

Piston Ring End Gap Inspection

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

Piston Ring End Gap

Top

Standard: 0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)

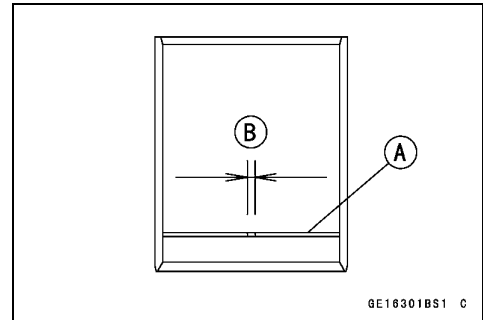
Service Limit: 0.6 mm (0.024 in.)

Second

Standard: 0.45 ~ 0.55 mm (0.0177 ~ 0.0217 in.)

Service Limit: 0.9 mm (0.035 in.)

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

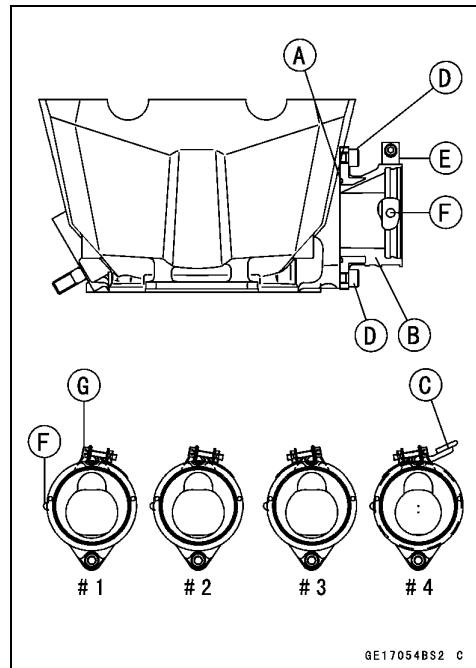


5-40 ENGINE TOP END

Throttle Body Holder

Throttle Body Holder Installation

- Apply grease to the new O-rings [A].
- Be sure to install the O-rings.
- Install the holders [B] as shown.
 - Clamp [C]
- Tighten:
 - Torque - Throttle Body Assy Holder Bolts [D]: 13 N·m (1.3 kgf·m, 115 in·lb)**
- Install the clamps [E] as shown and so that its hole fit on the projection [F] of the holder.
- Tighten:
 - Torque - Throttle Body Assy Holder Clamp Bolts [G]: 1.1 N·m (0.11 kgf·m, 10 in·lb)**



Muffler

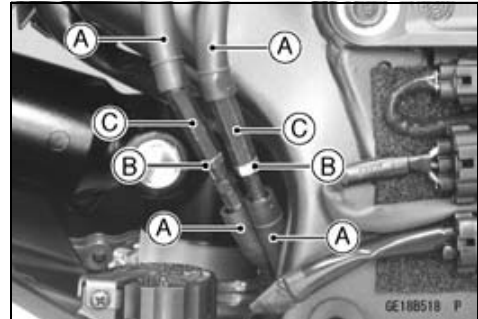
WARNING

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

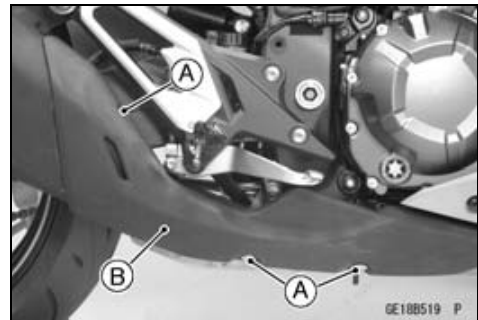
Muffler Body Removal

ZR800A/B Models

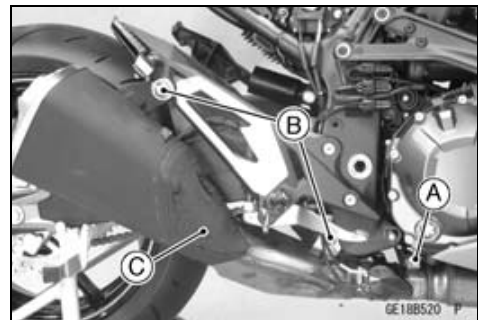
- Remove the right frame cover (see Frame Cover Removal in the Frame chapter).
- Slide the dust covers [A].
- Loosen the locknuts [B], and turn the adjusters [C] to give the cable plenty of play.



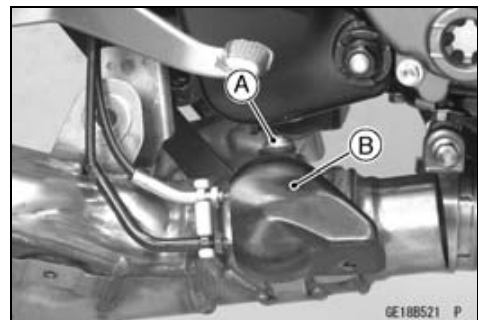
- Remove:
 - Muffler Body Cover Bolts [A]
 - Muffler Body Cover [B]



- Loosen the clamp bolt [A].
- Remove the mounting bolts [B] and nut, and pull out the muffler body [C] backward from the exhaust pipe.



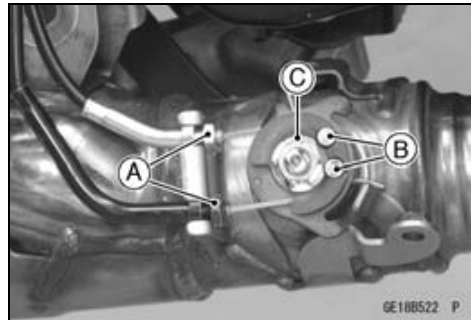
- Remove:
 - Exhaust Butterfly Valve Cover Bolt [A]
 - Exhaust Butterfly Valve Cover [B]



5-42 ENGINE TOP END

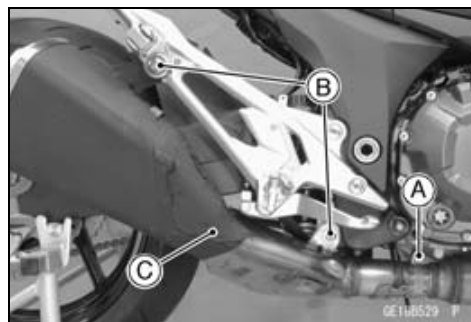
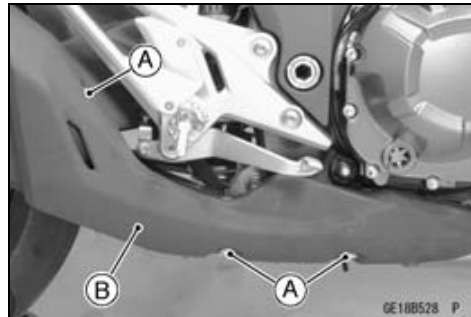
Muffler

- Loosen the locknuts [A].
- Remove the exhaust butterfly valve cable lower ends [B] from the pulley [C].



ZR800C/D Models

- Remove:
 - Muffler Body Cover Bolts [A]
 - Muffler Body Cover [B]
- Loosen the clamp bolt [A].
- Remove the mounting bolts [B] and nut, and pull out the muffler body [C] backward from the exhaust pipe.



Muffler

Muffler Body Installation

ZR800A/B Models

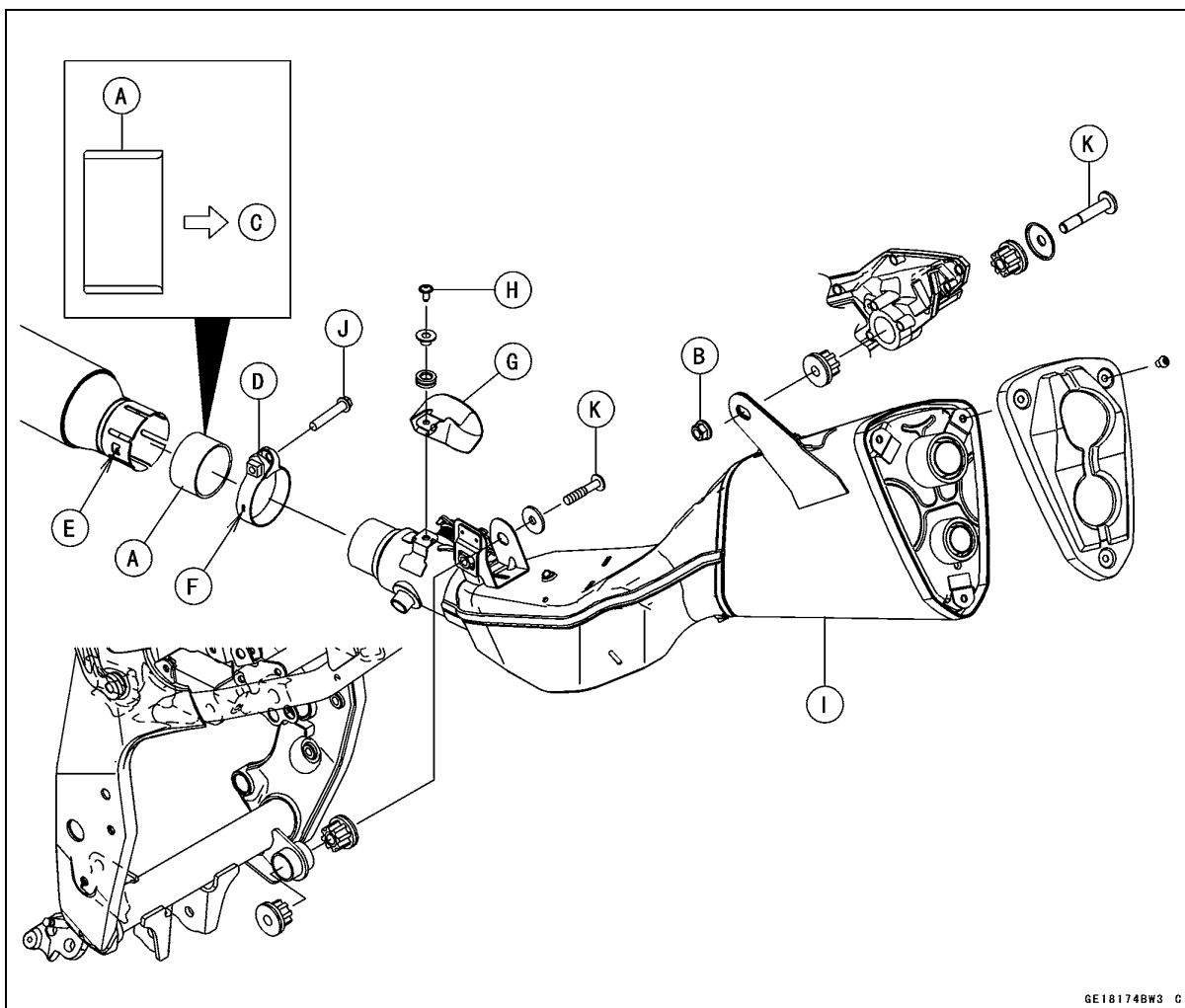
- Replace the muffler body gasket [A] and nut [B] with new ones.
- Install the muffler body gasket until it is bottomed so that the inside chamfer side faces rear [C].
- Install the muffler body clamp [D] so that the insert the projection [E] into the clamp slit [F].
- Install the exhaust butterfly valve cable (see Exhaust Butterfly Valve Cable Installation).
- Install the exhaust butterfly valve cover [G].
- Tighten:

Torque - Exhaust Butterfly Valve Cover Bolt [H]: 11 N·m (1.1 kgf·m, 97 in·lb)

- Install the muffler body [I].
- Install the muffler body until it stops at the bottom surface of the exhaust pipe.
- Tighten:

Torque - Muffler Body Clamp Bolt [J]: 17 N·m (1.7 kgf·m, 13 ft·lb)

Muffler Body Mounting Bolts [K]: 34 N·m (3.5 kgf·m, 25 ft·lb)



GE18174BW3 C

5-44 ENGINE TOP END

Muffler

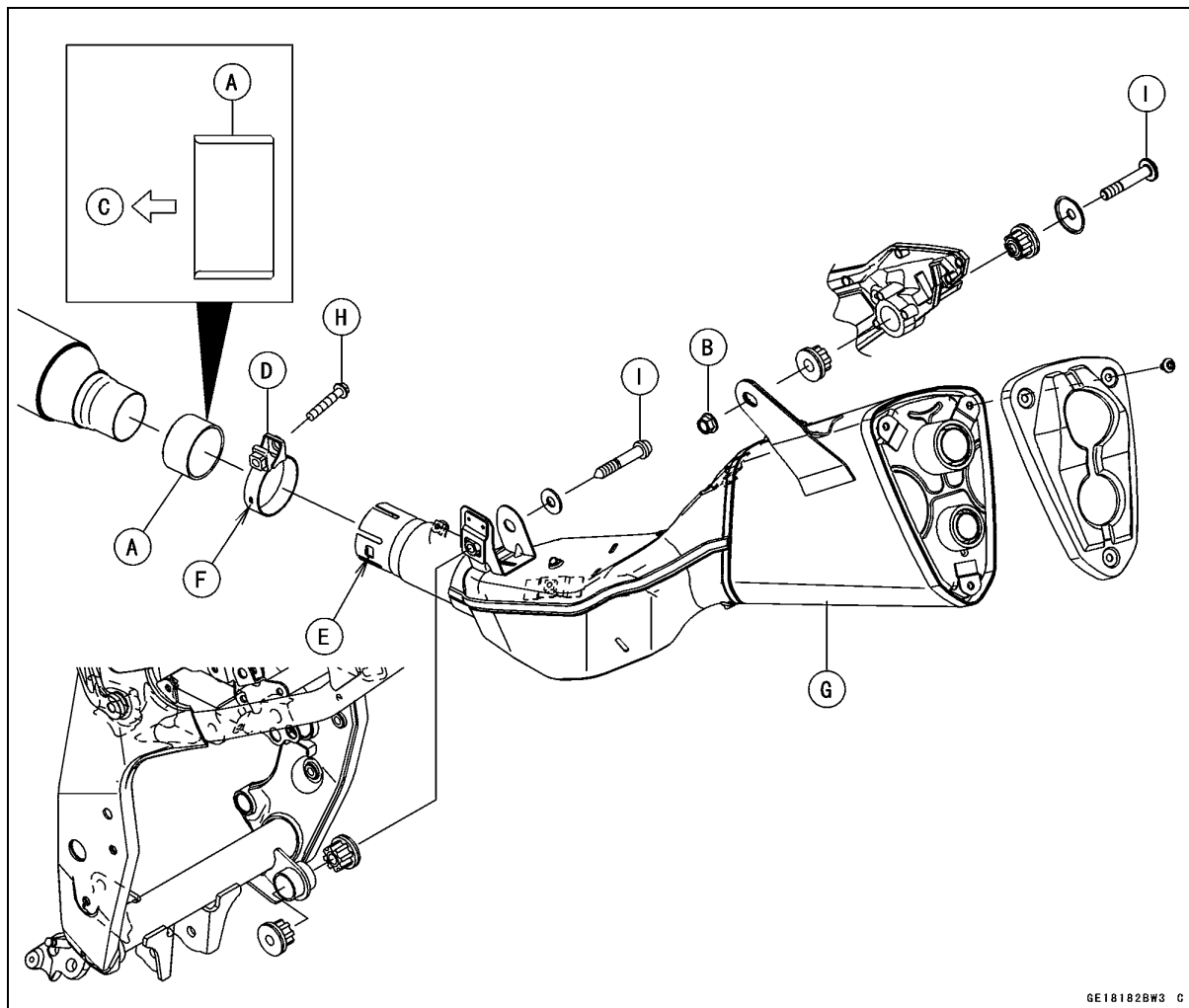
- Adjust the exhaust butterfly cables (see Exhaust Butterfly Valve Cable Installation).
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and nut.

ZR800C/D Models

- Replace the muffler body gasket [A] and nut [B] with new ones.
- Install the muffler body gasket until it is bottomed so that the inside chamfer side faces front [C].
- Install the muffler body clamp [D] so that the insert the projection [E] into the clamp slit [F].
- Install the muffler body [G].
- Install the muffler body until it stops at the bottom surface of the exhaust pipe.
- Tighten:

Torque - Muffler Body Clamp Bolt [H]: 17 N·m (1.7 kgf·m, 13 ft·lb)

Muffler Body Mounting Bolts [I]: 34 N·m (3.5 kgf·m, 25 ft·lb)

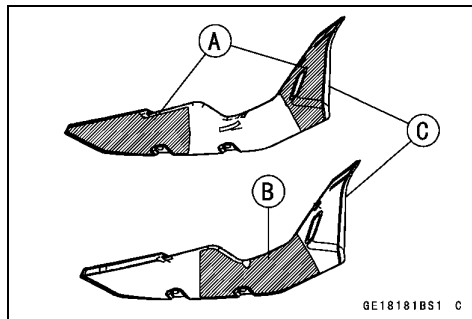


- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and nut.

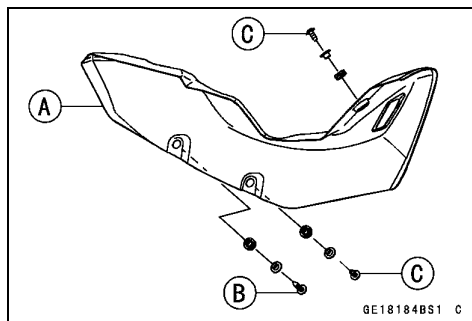
GEI8182BW3 C

Muffler

- When installing the pads, note the following.
- Install the pads [A] first. Next, install the pad [B] as shown.
Muffler Body Cover [C]



- Install the muffler body cover [A].
- Tighten:
 - Torque - Muffler Body Cover Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)**
 - L = 27 mm (1.06 in.) [B]
 - L = 14 mm (0.55 in.) [C]



- Install the removed parts (see appropriate chapters).
- When installing, run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Exhaust Pipe Removal

- Remove:
 - Oxygen Sensor (see Oxygen Sensor Removal in the Electrical System chapter)
 - Muffler Body (see Muffler Body Removal)
 - Exhaust Pipe Manifold Holder Nuts [A]
 - Exhaust Pipe

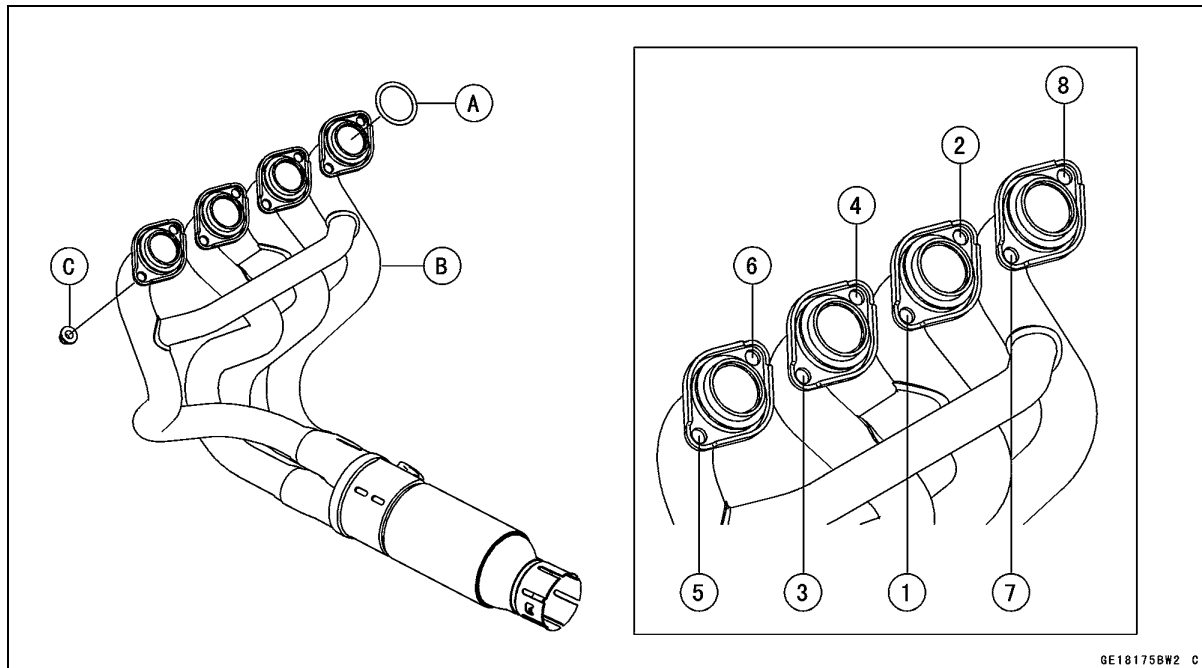


5-46 ENGINE TOP END

Muffler

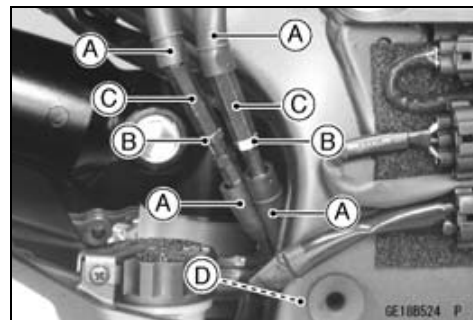
Exhaust Pipe Installation

- Replace the exhaust pipe gaskets [A] and muffler body gasket with new ones and install them.
- Install the exhaust pipe [B].
- Tighten the exhaust pipe manifold holder nuts [C] following the specified tightening sequence.
- Do not deform the exhaust pipe gaskets.
- Tighten:
 - Torque - Exhaust Pipe Manifold Holder Nuts [C]: 17 N·m (1.7 kgf·m, 13 ft·lb)**
- Install:
 - Muffler Body (see Muffler Body Installation)
 - Oxygen Sensor (see Oxygen Sensor Installation in the Electrical System chapter)
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolt and nuts.
- Install the removed parts (see appropriate chapters).
- When installing, run the each leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



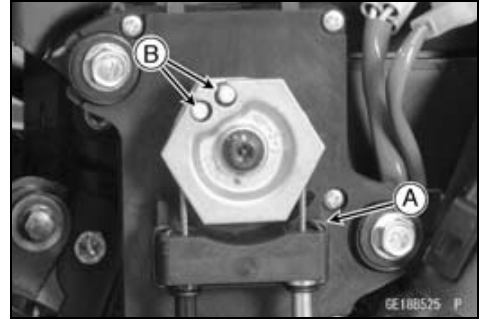
Exhaust Butterfly Valve Cable Removal (ZR800A/B Models)

- Remove the right frame cover (see Frame Cover Removal in the Frame chapter).
- Slide the dust covers [A].
- Loosen the locknuts [B], and turn the adjusters [C] to give the cable plenty of play.
- Open the clamp [D] and free the cables.



Muffler

- Remove:
 - Clamp [A]
 - Exhaust Butterfly Valve Cable Upper Ends [B]



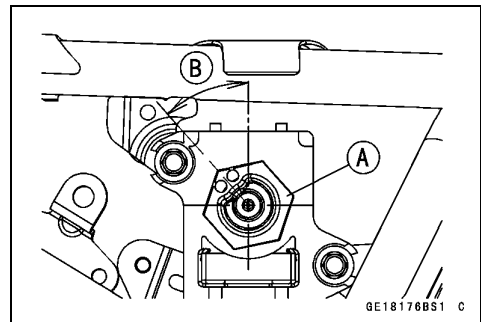
- Remove:
 - Exhaust Butterfly Valve Cable Lower Ends (see Muffler Body Removal)
 - Exhaust Butterfly Valve Cables

Exhaust Butterfly Valve Cable Installation (ZR800A/B Models)

- Confirm whether pulley [A] is an angle as shown. $41.7^\circ \pm 7^\circ$ [B]
- This position is original position of the pulley.

NOTE

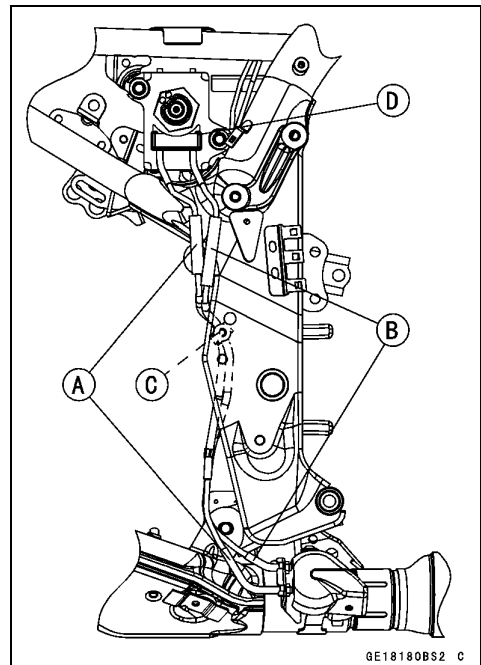
- Correct the position electrically after confirming use is discontinued and there is no damage when differing from the angle of shown.



NOTICE

Do not correct the pulley position with the tool, forcibly. The actuator damage will occur.

- ★ If the angle is wrong, adjust the pulley (see Exhaust Butterfly Valve Actuator Installation in the Fuel System (DFI) chapter).
- Install the exhaust butterfly valve cable lower ends to the pulley of muffler body.
 - Close Cable (Black) [A]
 - Open Cable (White) [B]
- Install the muffler body (see Muffler Body Installation).
- Run the exhaust butterfly valve cables to the inside of the clamp [C].
- Install the exhaust butterfly valve cable upper ends to the pulley of actuator.
- Install the clamp [D].



5-48 ENGINE TOP END

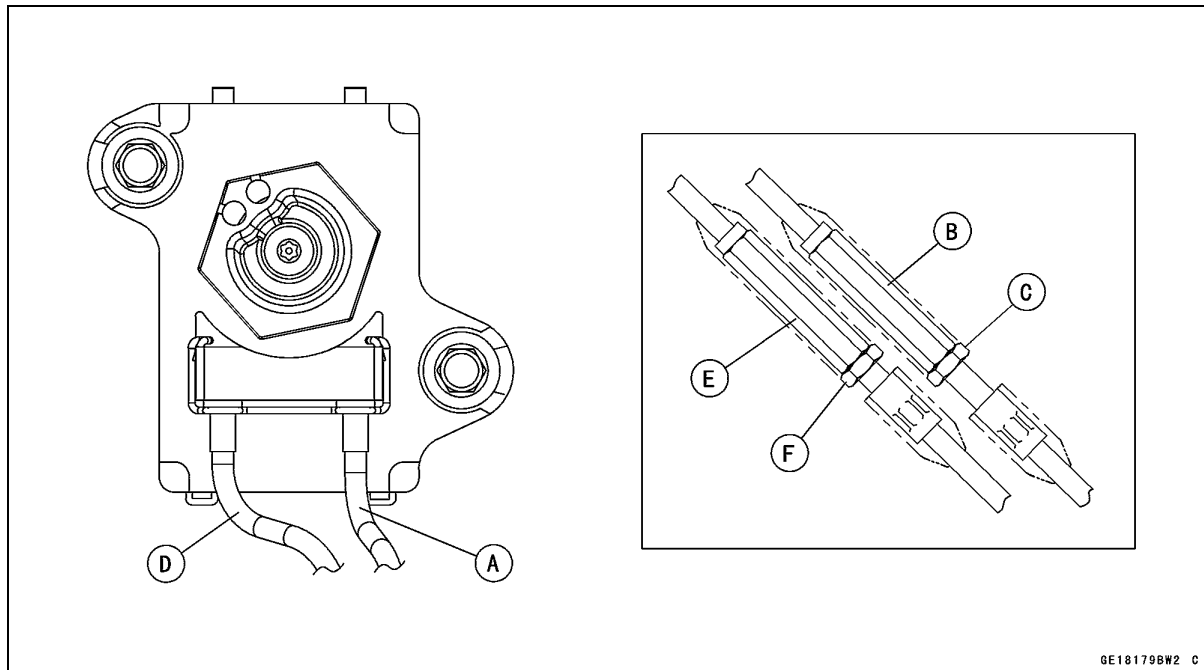
Muffler

- Stretch the open cable (white) [A] first by using the adjuster [B].
- Turn the adjuster counterclockwise until the play of the open cable becomes no play.
Locknut of White [C]

NOTICE

To keep the correct exhaust butterfly valve position, adjust the open cable first. Do not overstretch. If the adjustment of the exhaust butterfly valve cables are incorrect, the exhaust butterfly valve actuator does not operate correctly.

- Then, stretch the close cable (black) [D] by using the adjuster [E].
- Turn the adjuster counterclockwise until the play of the close cable becomes no play.
Locknut of Black [F]
- Tighten:
**Torque - Exhaust Butterfly Valve Cable Adjuster Locknuts:
6.9 N·m (0.70 kgf·m, 61 in·lb)**
- After installation, cover the dust covers on the adjusters.



- After connecting the cables, turn the ignition switch in and make sure that the pulley turns clockwise and counterclockwise, then it returns clockwise slightly.
- Install the removed parts (see appropriate chapters).

GE18179BW2 C

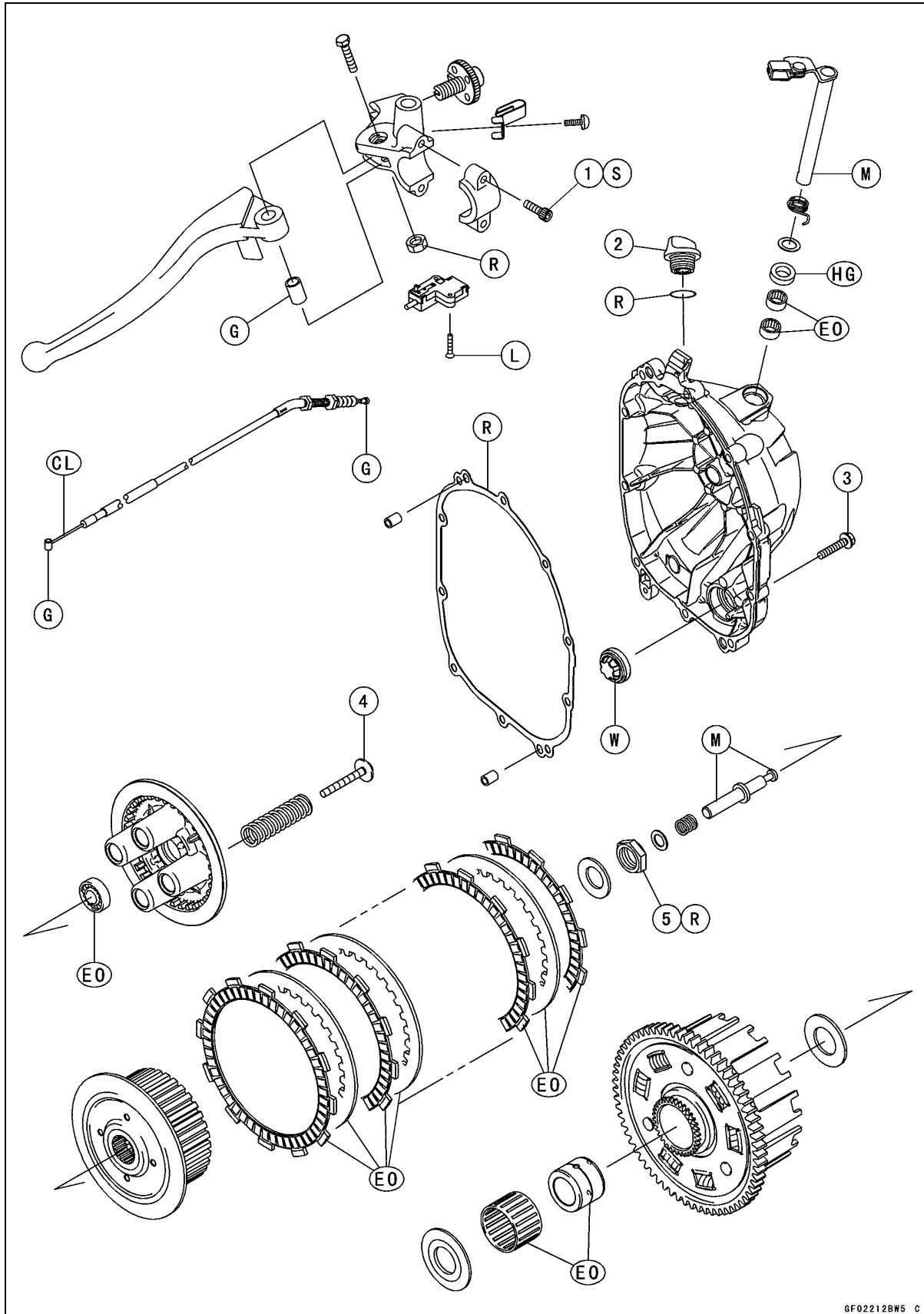
Clutch

Table of Contents

Exploded View	6-2
Specifications	6-4
Special Tool and Sealant	6-5
Clutch Lever and Cable	6-6
Clutch Lever Free Play Inspection	6-6
Clutch Lever Free Play Adjustment	6-6
Clutch Cable Removal	6-6
Clutch Cable Installation	6-6
Clutch Cable Lubrication	6-6
Clutch Lever Installation	6-6
Clutch Cover	6-7
Clutch Cover Removal	6-7
Clutch Cover Installation	6-7
Release Shaft Removal	6-7
Release Shaft Installation	6-8
Clutch Cover Disassembly	6-8
Clutch Cover Assembly	6-8
Clutch	6-9
Clutch Removal	6-9
Clutch Installation	6-9
Clutch Plate Assembly Inspection	6-11
Clutch Plate Assembly Adjustment	6-11
Clutch Plate, Wear, Damage Inspection	6-12
Clutch Plate Warp Inspection	6-12
Clutch Spring Free Length Measurement	6-12

6-2 CLUTCH

Exploded View



GF02212BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Lever Clamp Bolts	11	1.1	97 in·lb	S
2	Oil Filler Plug	2.0	0.20	18 in·lb	
3	Clutch Cover Mounting Bolts	11	1.1	97 in·lb	
4	Clutch Spring Bolts	8.8	0.90	78 in·lb	
5	Clutch Hub Nut	135	13.8	100	R

CL: Apply cable lubricant.

EO: Apply engine oil.

G: Apply grease.

HG: Apply high-temperature grease.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

R: Replacement Parts

S: Follow the specified tightening sequence.

W: Apply water.

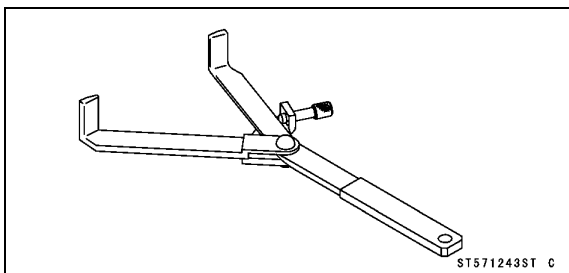
6-4 CLUTCH

Specifications

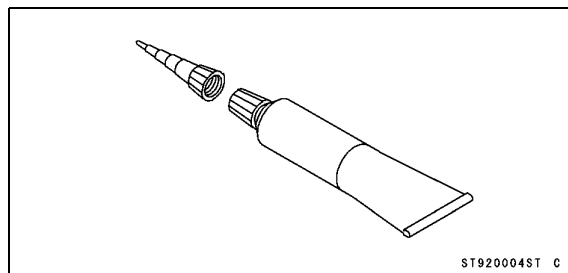
Item	Standard	Service Limit
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	— — —
Clutch		
Clutch Plate Assembly Length	37.7 ~ 38.3 mm (1.48 ~ 1.51 in.)	— — —
Friction Plate Thickness	2.72 ~ 2.88 mm (0.107 ~ 0.113 in.)	2.4 mm (0.094 in.)
Friction and Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.012 in.)
Clutch Spring Free Length	64.1 mm (2.52 in.)	61.2 mm (2.41 in.)

Special Tool and Sealant

Clutch Holder:
57001-1243



Liquid Gasket, TB1211F:
92104-0004



6-6 CLUTCH

Clutch Lever and Cable

Clutch Lever Free Play Inspection

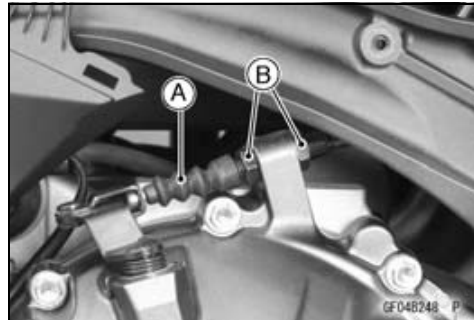
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment

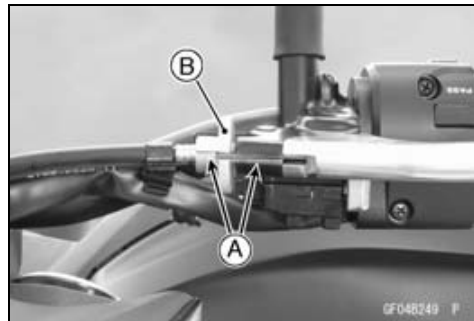
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Cable Removal

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen the nuts [B], and slide the lower end of the clutch cable to give the cable plenty of play.



- Screw in the adjuster.
- Line up the slots [A] in the clutch lever and adjuster [B], and then free the cable from the lever.
- Push the release lever toward the front of the motorcycle.
- Free the clutch inner cable tip from the clutch release lever.
- Pull the clutch cable out of the frame.



Clutch Cable Installation

- Run the clutch cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

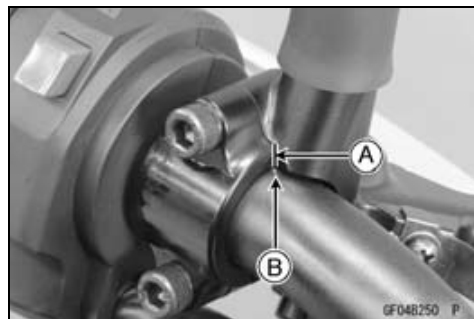
Clutch Cable Lubrication

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

Clutch Lever Installation

- Install the clutch lever so that the mating surface [A] of the clutch lever clamp is aligned with the punch mark [B].
- Tighten the upper clamp bolt first, and then the lower clamp bolt. There will be a gap at the lower part of the clamp after tightening.

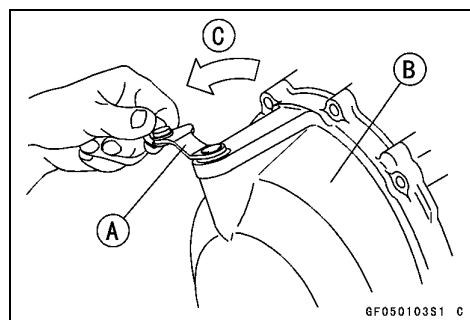
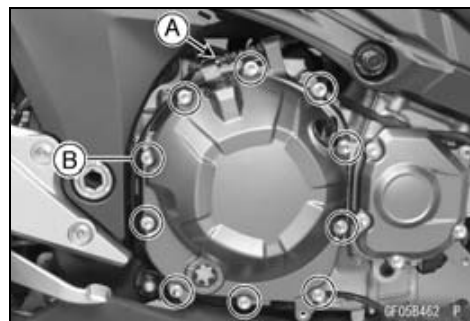
Torque - Clutch Lever Clamp Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)



Clutch Cover

Clutch Cover Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Right Subframe Cover (see Subframe Cover Removal in the Frame chapter)
 - Right Lower Fairing (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter)
 - Clutch Cable Lower End [A]
 - Clutch Cover Mounting Bolts [B]
- Turn the release lever [A] toward the rear as shown, and remove the clutch cover [B].
About 90° [C]

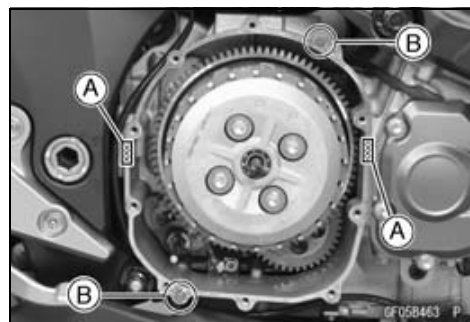


Clutch Cover Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the area [A] where the mating surface of the crankcase touches the clutch cover gasket.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Be sure that the dowel pins [B] are in position.
- Replace the clutch cover gasket with a new one.
- Tighten:
 - Torque - Clutch Cover Mounting Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)
- Install the removed parts (see appropriate chapters).



Release Shaft Removal

NOTICE

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

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

6-8 CLUTCH

Clutch Cover

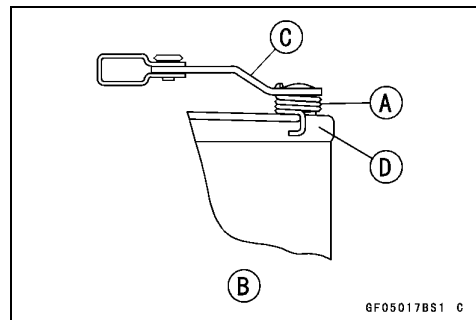
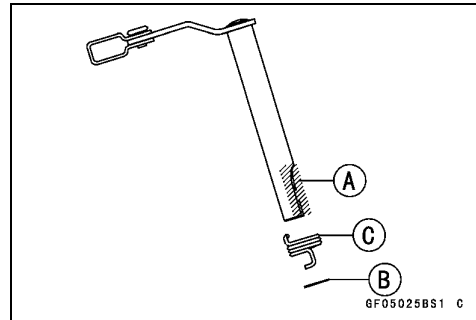
Release Shaft Installation

- Apply high-temperature grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine oil to the needle bearings in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Install the washer [B] and spring [C].
- Insert the release shaft straight into the upper hole of the clutch cover.

NOTICE

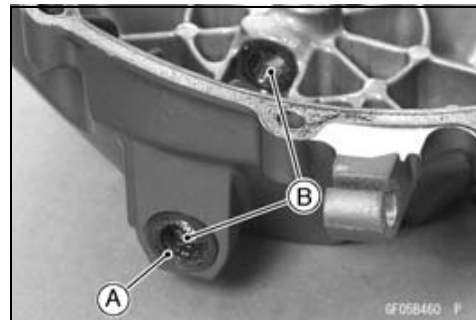
When inserting the release shaft, be careful not to remove the spring of the oil seal.

- Fit the spring [A] as shown.
Viewed from Rear [B]
Release Shaft [C]
Clutch Cover [D]



Clutch Cover Disassembly

- Remove:
Release Shaft (see Release Shaft Removal)
Oil Seal [A]
Needle Bearings [B]
Oil Level Inspection Window



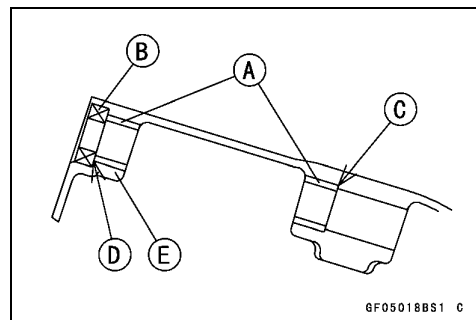
Clutch Cover Assembly

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

NOTE

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

- Install the needle bearings [A] and oil seal [B] position as shown.
- Press the needle bearing until the bottom [C].
- Press the needle bearing so that the bearing surface [D] is flush with the housing end of clutch cover [E].
- Install the oil level inspection window until the bottom.



Clutch

Clutch Removal

- Remove:
 - Clutch Cover (see Clutch Cover Removal)
 - Clutch Spring Bolts [A]
 - Clutch Springs
 - Clutch Spring Plate [B] (with Thrust Bearing, Pusher [C], Spring and Washer)



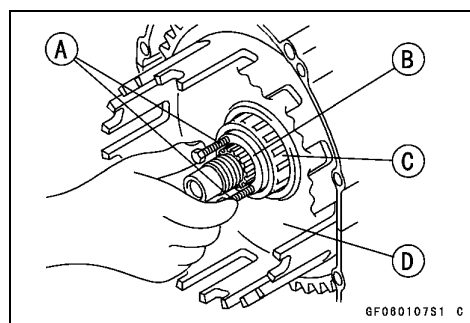
- Remove:
 - Friction Plates and Steel Plates
 - Clutch Hub Nut [A]
- Holding the clutch hub [B], remove the nut and washer.

Special Tool - Clutch Holder [C]: 57001-1243

- Remove:
 - Clutch Hub
 - Spacer

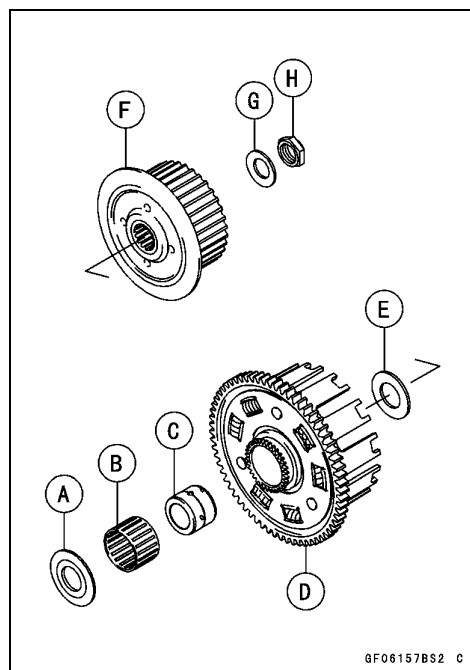


- Using the two 4 mm (0.16 in.) bolts [A], pull out the sleeve [B], needle bearing [C] and clutch housing [D].
- Remove the spacer.



Clutch Installation

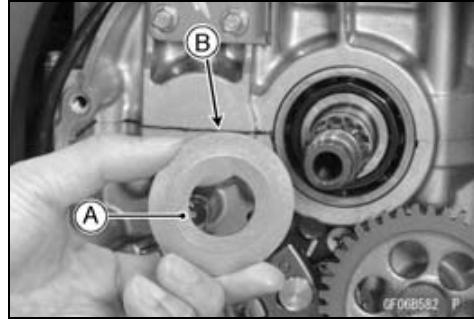
- Install the following parts on the drive shaft.
 - Spacer [A]
 - Needle Bearing [B]
 - Sleeve [C]
 - Clutch Housing [D]
 - Spacer [E]
 - Clutch Hub [F]
 - Washer [G]
 - Nut [H]



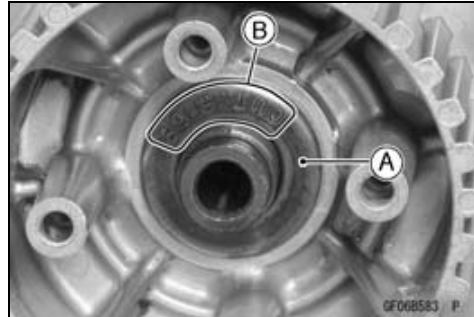
6-10 CLUTCH

Clutch

○ Install the spacer [A] so that the tapered side [B] faces inward.



○ Install the spacer [A] so that the "OUTSIDE" mark [B] faces outward.



- Replace the clutch hub nut with a new one.
- Holding the clutch hub, tighten the clutch hub nut.

Special Tool - Clutch Holder: 57001-1243

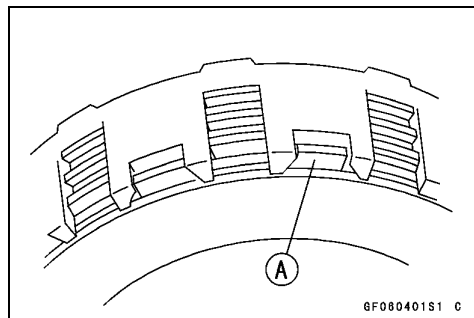
Torque - Clutch Hub Nut: 135 N·m (13.8 kgf·m, 99.6 ft·lb)

- Install the friction plates and steel plates, starting with a friction plate and alternating them.

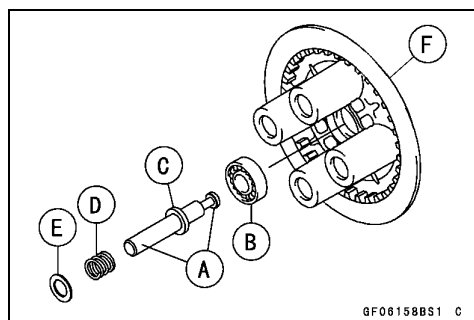
NOTICE

If new dry friction plates and steel plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

○ Install the last friction plate [A] fitting the tangs in the grooves in the housing as shown.

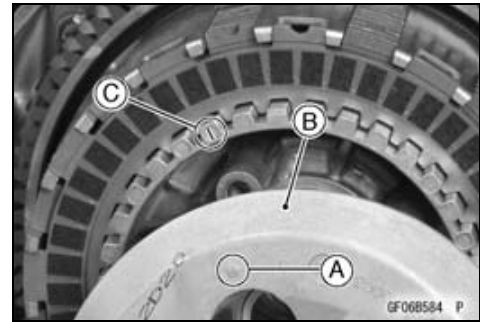


- Apply molybdenum disulfide grease to the pusher ends [A] and install the thrust bearing [B], pusher [C], spring [D] and washer [E] in the clutch spring plate [F].
- Apply engine oil to the needle bearing.



Clutch

- Align the mark [A] of the clutch spring plate [B] with the groove [C] of the clutch hub.
- Install:
 - Clutch Spring Plate
 - Clutch Springs
- Tighten:
 - Torque - Clutch Spring Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Install the clutch cover (see Clutch Cover Installation).



Clutch Plate Assembly Inspection

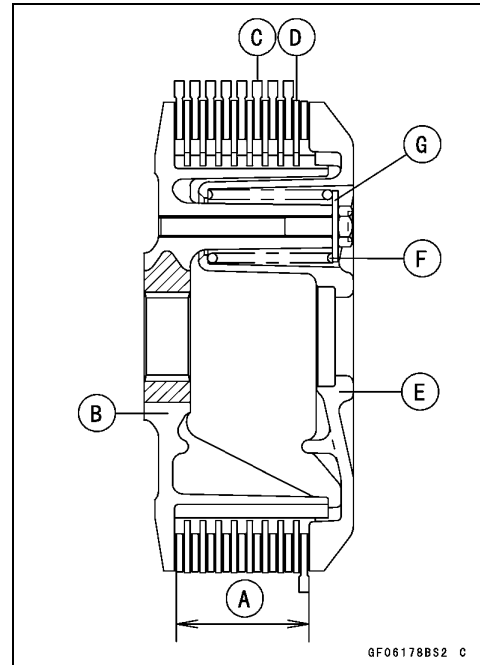
- Inspect the friction plate thickness (see Clutch Plate, Wear, Damage Inspection).
- Measure the length [A] of the clutch plate assembly as shown.
- Assemble:
 - Clutch Hub [B]
 - Friction Plates [C]
 - Steel Plates [D]
 - Clutch Spring Plate [E]
 - Clutch Springs [F]
 - Clutch Spring Bolts [G]

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

Clutch Plate Assembly Length

Standard: 37.7 ~ 38.3 mm (1.48 ~ 1.51 in.)

- ★ If the length is not within the specified range, adjust the length (see Clutch Plate Assembly Adjustment).



Clutch Plate Assembly Adjustment

- Inspect the clutch plate assembly length, and then replace the steel plate(s) which brings the length within the specified range.
- Remove:
 - Clutch Spring Bolts
 - Clutch Springs
 - Clutch Spring Plate
- Replace the following steel plate(s).

Thickness	Part Number
1.4 mm (0.055 in.)	13089-1126
1.6 mm (0.063 in.) (STD)	13089-013
2.0 mm (0.079 in.)	13089-1073

NOTE

○ Do not use the steel plate of 1.4 mm (0.055 in.) and 2.0 mm (0.079 in.) thickness at the same time.

- Install the removed parts, and inspect the clutch plate assembly length.

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

6-12 CLUTCH

Clutch

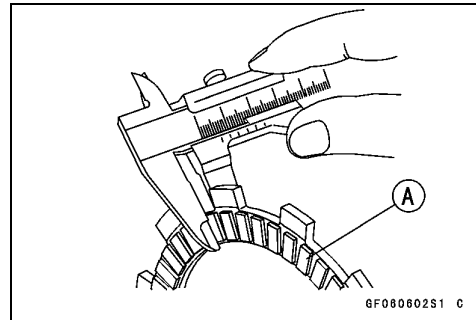
Clutch Plate, Wear, Damage Inspection

- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.
- ★ If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

Friction Plate Thickness

Standard: 2.72 ~ 2.88 mm (0.107 ~ 0.113 in.)

Service Limit: 2.4 mm (0.094 in.)



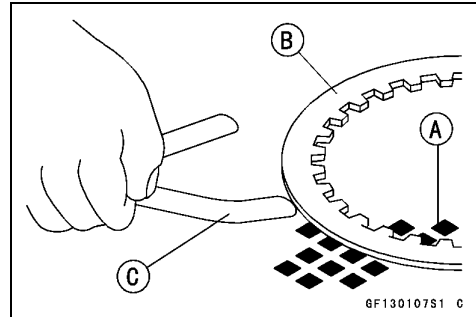
Clutch Plate Warp Inspection

- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.
- ★ If any plate is warped over the service limit, replace it with a new one.

Friction and Steel Plate Warp

Standard: 0.15 mm (0.0059 in.) or less

Service Limit: 0.3 mm (0.012 in.)



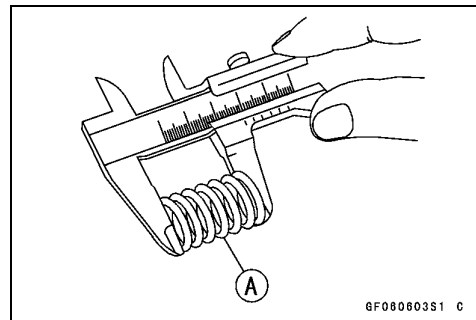
Clutch Spring Free Length Measurement

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

Clutch Spring Free Length

Standard: 64.1 mm (2.52 in.)

Service Limit: 61.2 mm (2.41 in.)



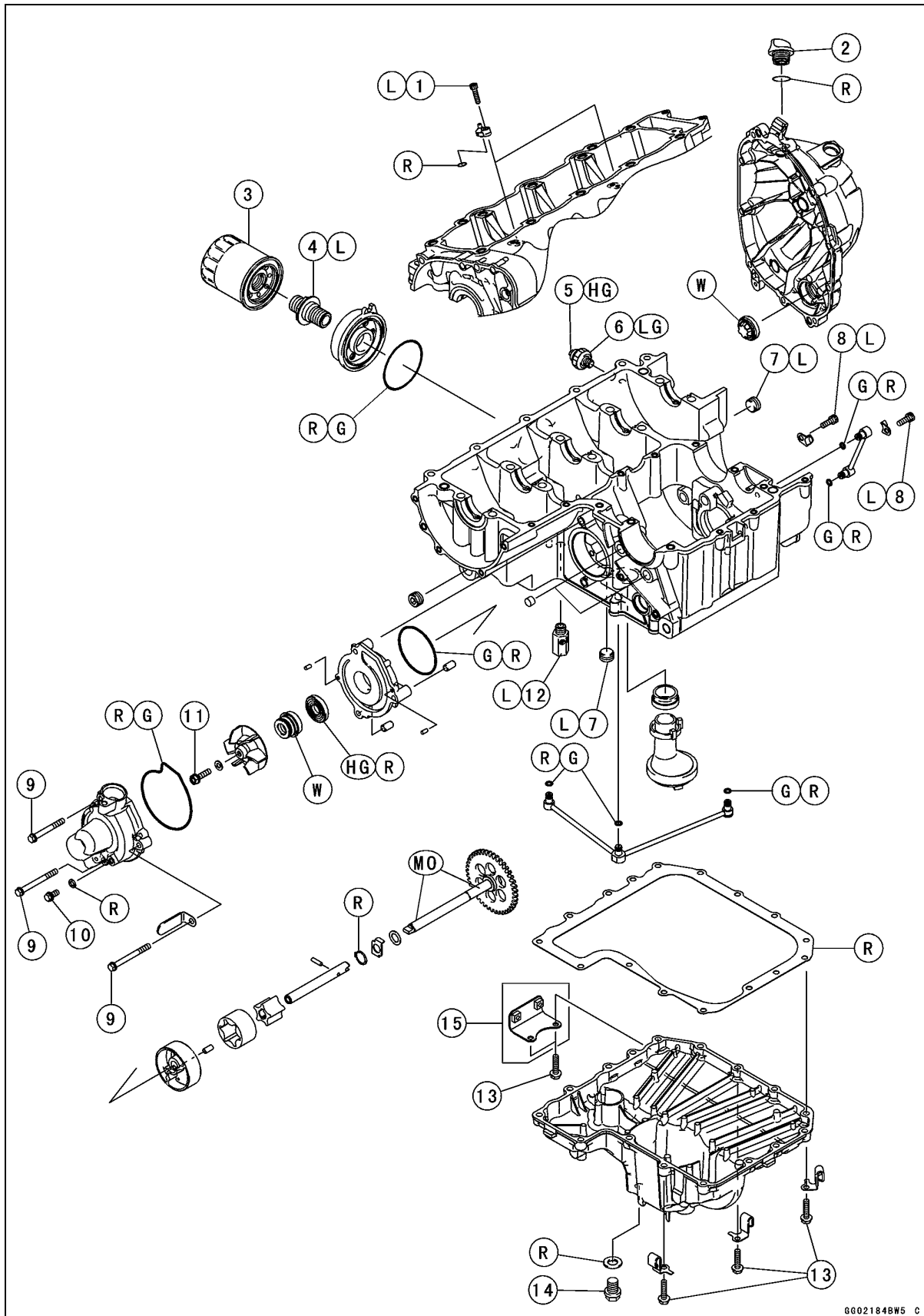
Engine Lubrication System

Table of Contents

Exploded View	7-2
Engine Oil Flow Chart.....	7-4
Specifications	7-6
Special Tools and Sealant	7-7
Engine Oil and Oil Filter.....	7-8
Oil Level Inspection.....	7-8
Engine Oil Change.....	7-8
Oil Filter Replacement	7-8
Oil Pan.....	7-9
Oil Pan Removal	7-9
Oil Pan Installation	7-9
Oil Pressure Relief Valve.....	7-10
Oil Pressure Relief Valve Removal	7-10
Oil Pressure Relief Valve Installation	7-10
Oil Pressure Relief Valve Inspection.....	7-10
Oil Pump.....	7-11
Oil Pump Removal	7-11
Oil Pump Installation	7-11
Oil Pump Drive Gear Removal.....	7-12
Oil Pump Drive Gear Installation.....	7-12
Oil Pressure Measurement.....	7-13
Oil Pressure Measurement	7-13
Oil Pressure Switch	7-14
Oil Pressure Switch Removal	7-14
Oil Pressure Switch Installation	7-14

7-2 ENGINE LUBRICATION SYSTEM

Exploded View



00021848W5 C

ENGINE LUBRICATION SYSTEM 7-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Jet Nozzle Bolts	6.9	0.70	61 in·lb	L
2	Oil Filler Plug	2.0	0.20	18 in·lb	
3	Oil Filter	17	1.7	13	
4	Oil Filter Holder	78	8.0	58	L
5	Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	HG
6	Oil Pressure Switch	15	1.5	11	LG
7	Oil Passage Plugs	20	2.0	15	L
8	Oil Pipe Holder Bolts	13	1.3	115 in·lb	L
9	Water Pump Cover Bolts	11	1.1	97 in·lb	
10	Coolant Drain Bolt (Water Pump)	11	1.1	97 in·lb	
11	Water Pump Impeller Bolt	9.8	1.0	87 in·lb	
12	Oil Pressure Relief Valve	15	1.5	11	L
13	Oil Pan Bolts	15	1.5	11	
14	Engine Oil Drain Bolt	30	3.1	22	

15. ZR800A/B Models

G: Apply grease.

HG: Apply high-temperature grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket.

MO: Apply molybdenum disulfide oil solution.

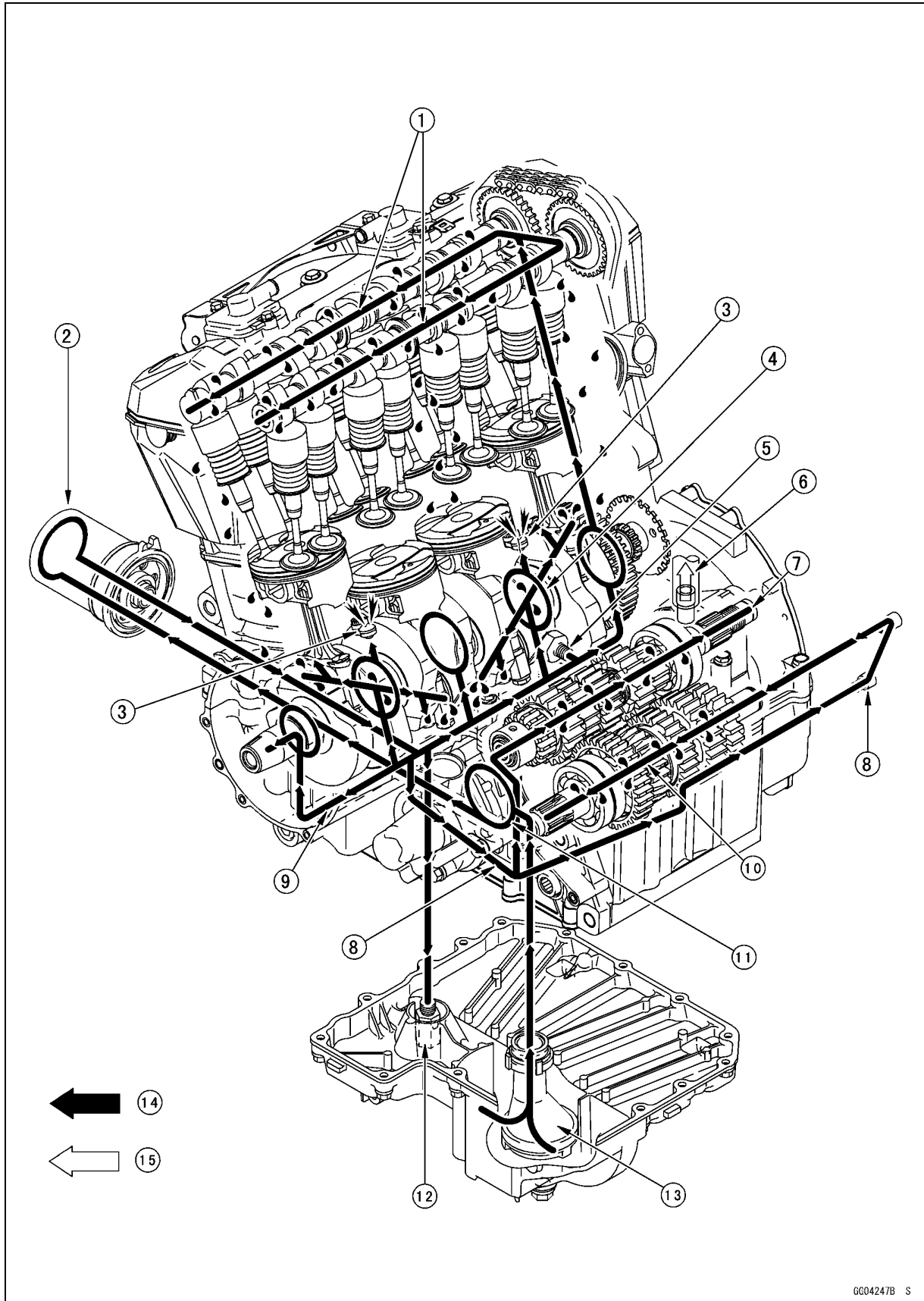
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)

R: Replacement Parts

W: Apply water.

7-4 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



Engine Oil Flow Chart

1. Camshaft Oil Passage
2. Oil Filter
3. Oil Jet
4. Crankshaft Oil Passage
5. Oil Pressure Switch
6. Breather Hose
7. Drive Shaft Oil Passage
8. Oil Pipe
9. Main Oil Passage
10. Output Shaft Oil Passage
11. Oil Pump
12. Oil Pressure Relief Valve
13. Oil Screen
14. Oil
15. Blowby Gas

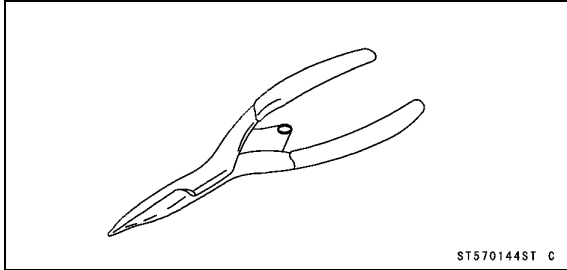
7-6 ENGINE LUBRICATION SYSTEM

Specifications

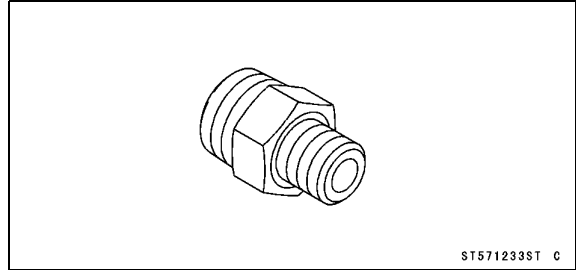
Item	Standard
Engine Oil Type Viscosity Capacity: Level	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 SAE 10W-40 3.1 L (3.3 US qt) (when filter is not removed) 3.4 L (3.6 US qt) (when filter is removed) 3.8 L (4.0 US qt) (when engine is completely dry) Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)
Oil Pressure Measurement Oil Pressure	147 ~ 226 kPa (1.5 ~ 2.3 kgf/cm ² , 21 ~ 33 psi) at 4 000 r/min (rpm), Oil Temperature 90°C (194°F)

Special Tools and Sealant

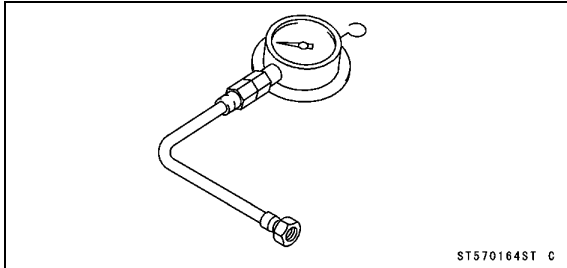
Outside Circlip Pliers:
57001-144



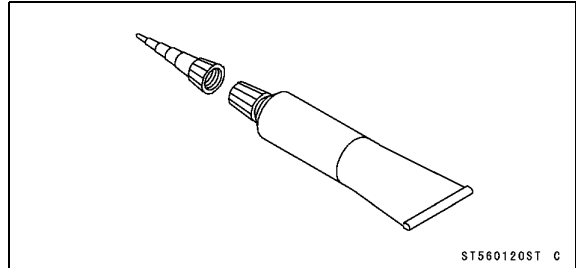
Oil Pressure Gauge Adapter, PT3/8:
57001-1233



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



Liquid Gasket, TB1211:
56019-120



7-8 ENGINE LUBRICATION SYSTEM

Engine Oil and Oil Filter

⚠ WARNING

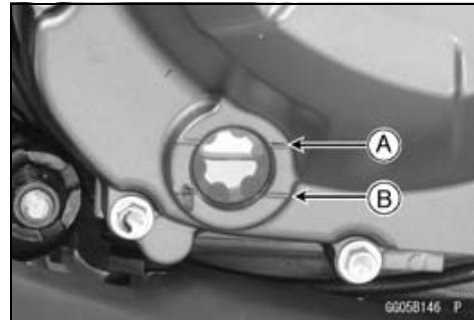
Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection

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

NOTE

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



NOTICE

Racing the engine before the oil reaches every part can cause engine seizure.

If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the red warning indicator light (LED) and oil pressure warning symbol will blink. If this blink stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

- ★ If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- ★ If the oil level is too low, add the correct amount of oil through the oil filter opening. Use the same type and make of oil that is already in the engine.

NOTE

- If the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.

Engine Oil Change

- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

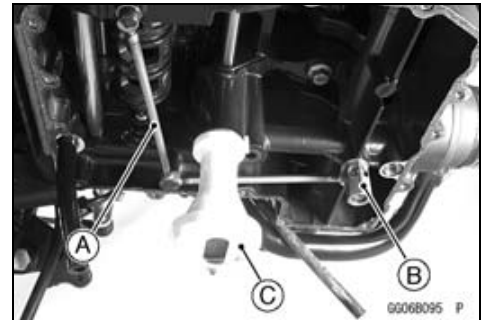
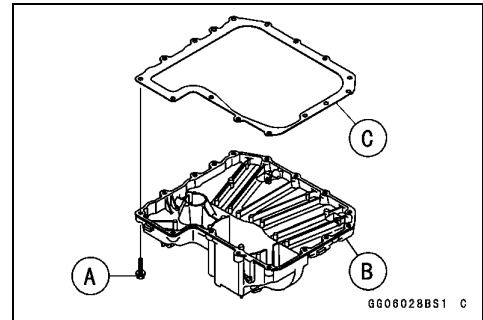
Oil Filter Replacement

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

Oil Pan

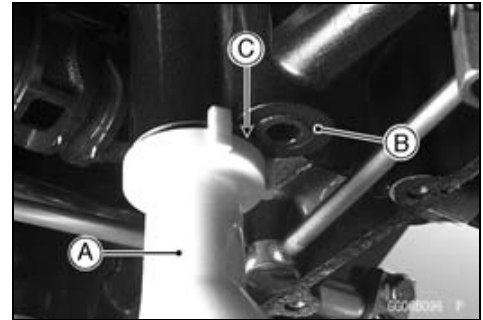
Oil Pan Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Lower Fairings (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter)
 - Muffler Body (see Muffler Body Removal in the Engine Top End chapter)
 - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
 - Oil Pan Bolts [A]
 - Clamps
 - Bracket (ZR800A/B Models)
 - Oil Pan [B] and Gasket [C]
- Remove the oil pipe [A], oil pressure relief valve [B] and oil screen [C] as necessary.



Oil Pan Installation

- Clean the oil screen [A].
- Install the oil screen so that the crankcase rib [B] fits the slot [C] of the oil screen.
- Apply grease to the O-rings on the oil pipe.
- ★ If the oil pressure relief valve was removed, install it.
- Apply a non-permanent locking agent to the threads of the oil pressure relief valve, and tighten it.

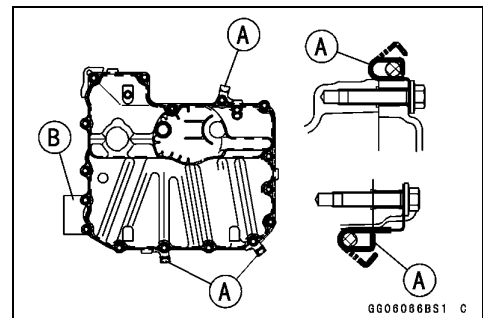


NOTICE

Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Replace the oil pan gasket with a new one.
- Install the clamps [A] as shown.
- Install the bracket (ZR800A/B Models) [B].
- Tighten:
 - Torque - Oil Pan Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)**
- Install the removed parts (see appropriate chapters).



7-10 ENGINE LUBRICATION SYSTEM

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal

- Refer to the Oil Pan Removal.

Oil Pressure Relief Valve Installation

- Refer to the Oil Pan Installation.

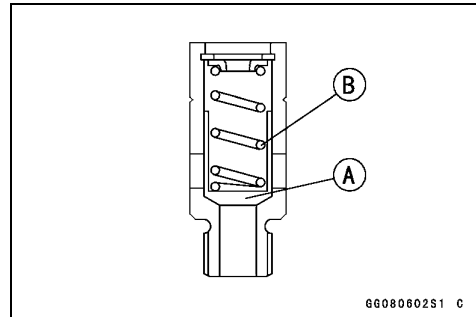
Oil Pressure Relief Valve Inspection

- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.

NOTE

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

- ★ If any rough spots are found during above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.



⚠ WARNING

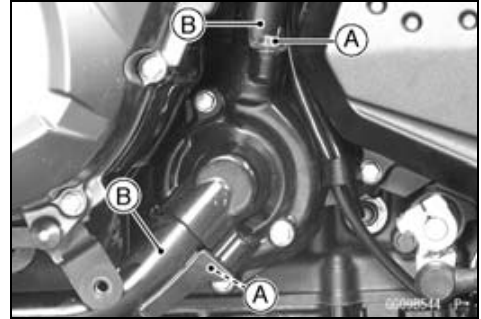
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline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

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

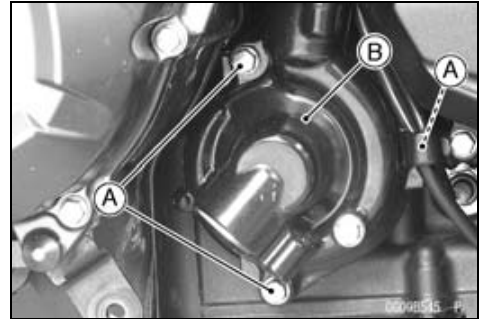
Oil Pump

Oil Pump Removal

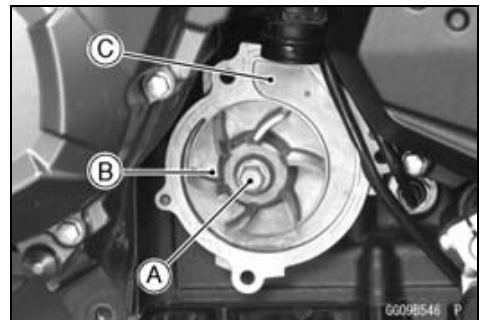
- Drain:
 - Coolant (see Coolant Change in the Periodic Maintenance chapter)
 - Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove the water pipe bolts [A].
- Disconnect the water pipes [B].



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

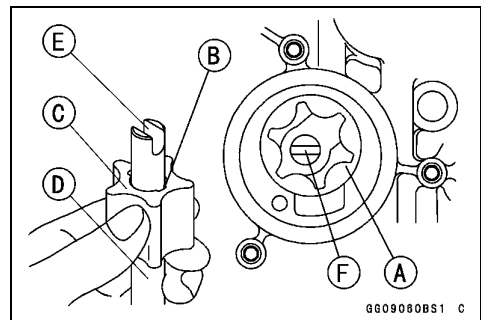


- Remove:
 - Impeller Bolt [A]
 - Washer
 - Impeller [B]
 - Water Pump Body [C]
 - Oil Pump Cover
 - Oil (Water) Pump Shaft
 - Outer Rotor and Inner Rotor

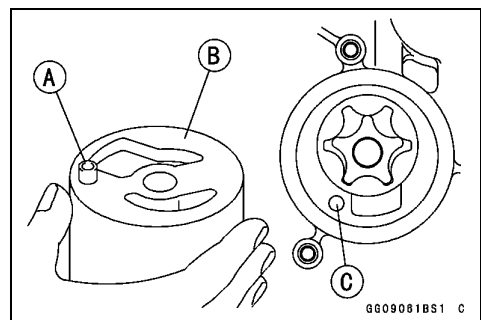


Oil Pump Installation

- Install the outer rotor [A] into the crankcase.
- Install the pin [B], inner rotor [C] and oil (water) pump shaft [D].
- Turn the pump shaft so that the slot [E] in its shaft fits onto the projection [F] of the pump drive gear shaft.



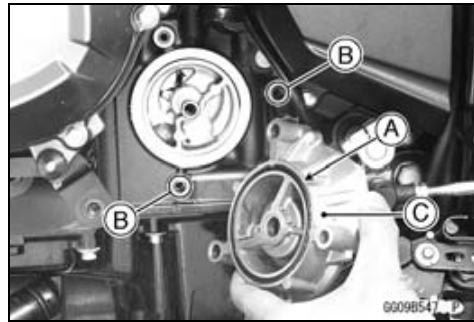
- Fit the pin [A] of the oil pump cover [B] into the hole [C] in the crankcase.



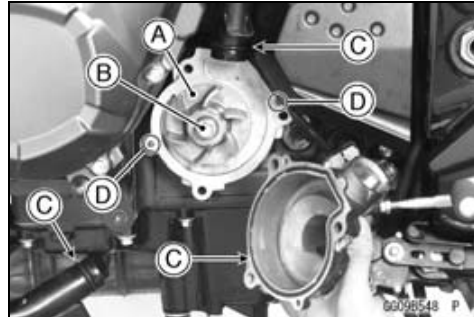
7-12 ENGINE LUBRICATION SYSTEM

Oil Pump

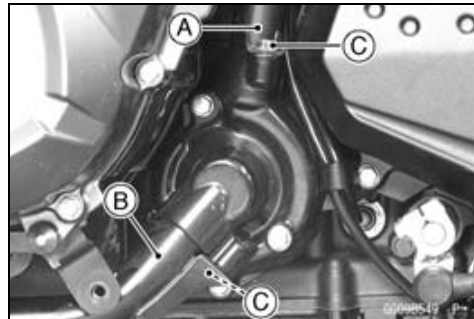
- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install:
 - Pins [B]
 - Water Pump Body [C]



- Install the impeller [A], washer and bolt [B].
- Tighten:
 - **Torque - Water Pump Impeller Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Replace the O-rings [C] with new ones.
- Apply grease to the O-rings.
- Install the pins [D] and water pump cover.
- Tighten:
 - **Torque - Water Pump Cover Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**



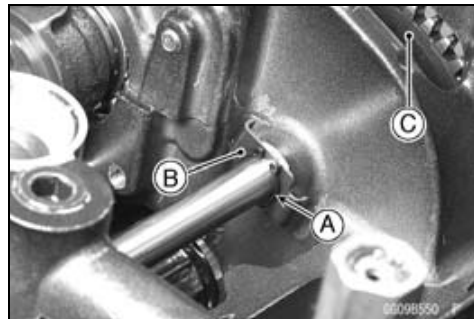
- Install the upper water pipe [A] and lower water pipe [B].
- Apply a non-permanent locking agent to the threads of the water pipe bolts [C] and tighten them.
 - **Torque - Water Pipe Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**



Oil Pump Drive Gear Removal

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

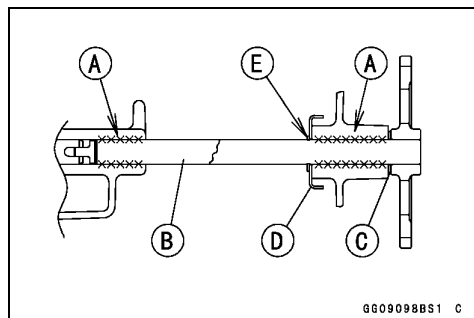
Special Tool - Outside Circlip Pliers: 57001-144



Oil Pump Drive Gear Installation

- Apply molybdenum disulfide oil solution to the journal portions [A] on the oil pump drive gear shaft [B].
- Install the washers [C] [D].
- Install the new circlip [E] into the groove of the oil pump drive gear shaft.

Special Tool - Outside Circlip Pliers: 57001-144



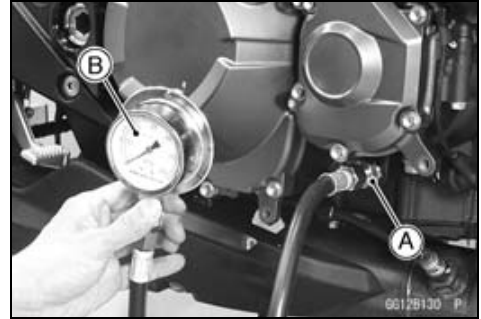
GG09098BS1 C

Oil Pressure Measurement

Oil Pressure Measurement

- Remove the right lower fairing (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter).
- Remove the oil passage plug, and attach the adapter [A] and gauge [B] to the plug hole.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
Oil Pressure Gauge Adapter, PT3/8: 57001-1233



- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.
- ★ If the oil pressure is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.
- ★ If the reading is much higher than the standard, check the oil passages for clogging.

Oil Pressure

Standard: 147 ~ 226 kPa (1.5 ~ 2.3 kgf/cm², 21 ~ 33 psi) at 4 000 r/min (rpm), Oil Temperature 90°C (194°F)

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply a non-permanent locking agent to the oil passage plug, and install it.

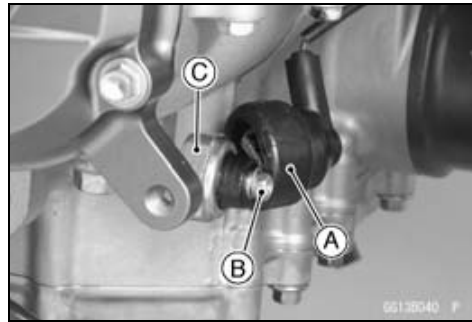
Torque - Oil Passage Plug: 20 N·m (2.0 kgf·m, 15 ft·lb)

7-14 ENGINE LUBRICATION SYSTEM

Oil Pressure Switch

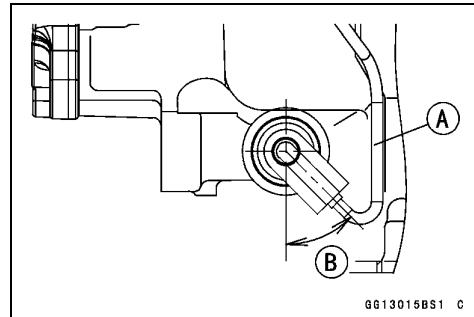
Oil Pressure Switch Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Right Lower Fairing (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter)
 - Switch Cover [A]
 - Switch Terminal Bolt [B]
 - Oil Pressure Switch [C]



Oil Pressure Switch Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
 - Apply liquid gasket to the threads of the oil pressure switch and tighten it.
- Sealant - Liquid Gasket, TB1211: 56019-120**
- Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)**
- Install the switch lead [A] as shown.
 - 45° [B]
 - Apply high-temperature grease to the terminal.
 - Tighten the terminal bolt.



- Torque - Oil Pressure Switch Terminal Bolt: 2.0 N·m (0.20 kgf·m, 18 in·lb)**

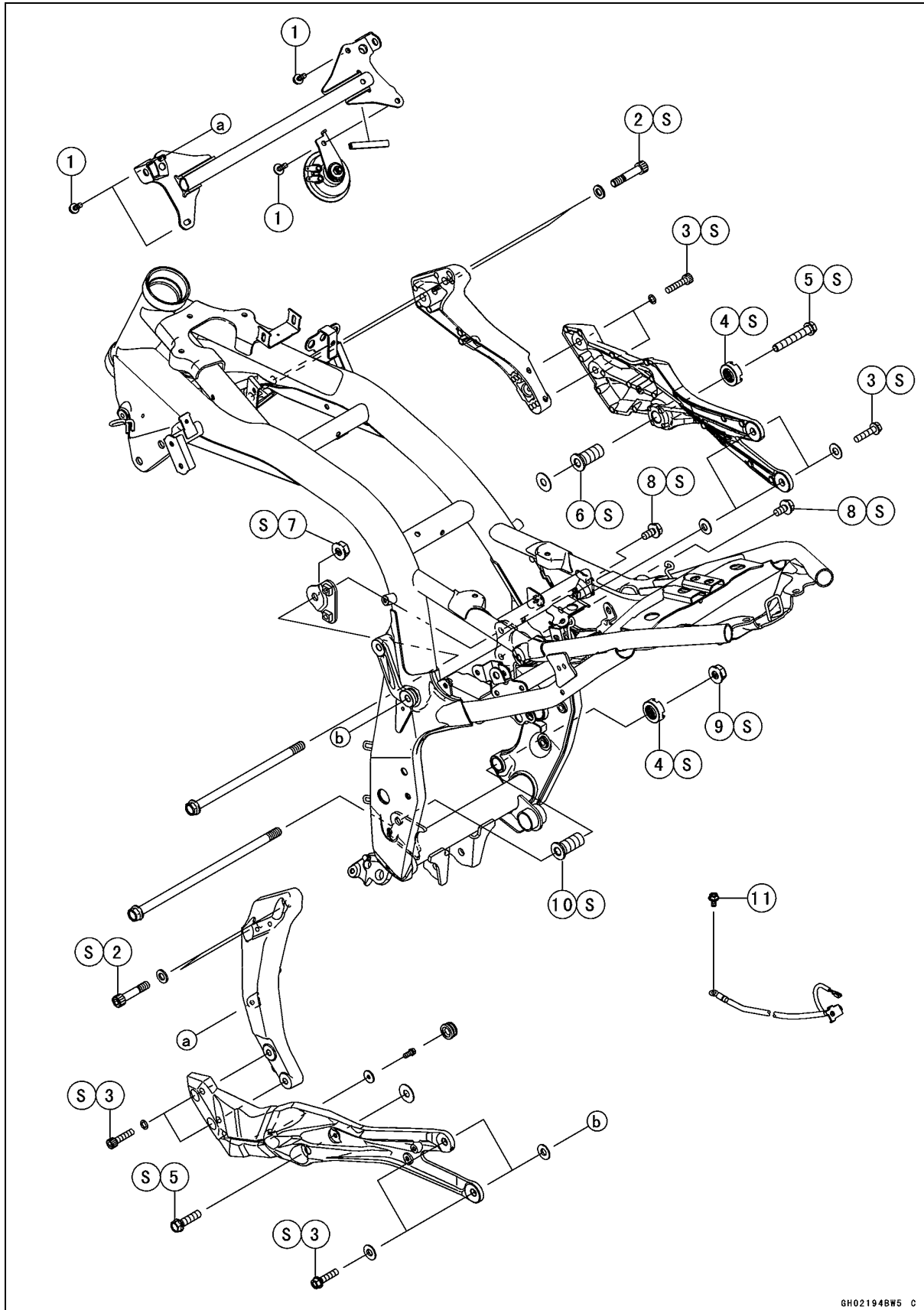
Engine Removal/Installation

Table of Contents

Exploded View	8-2
Special Tool	8-4
Engine Removal/Installation	8-5
Engine Removal.....	8-5
Engine Installation.....	8-9

8-2 ENGINE REMOVAL/INSTALLATION

Exploded View



GH02194BWS C

ENGINE REMOVAL/INSTALLATION 8-3

Exploded View

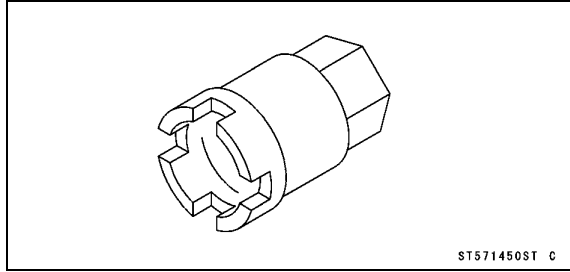
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Engine Bracket Bolts	11	1.1	97 in·lb	
2	Upper Engine Bracket Bolts	44	4.5	32	S
3	Subframe Bolts	25	2.5	18	S
4	Adjusting Collar Locknuts	49	5.0	36	S
5	Front Engine Mounting Bolts	44	4.5	32	S
6	Upper Adjusting Collar	9.8	1.0	87 in·lb	S
7	Middle Engine Mounting Nut	44	4.5	32	S
8	Rear Engine Bracket Bolts	25	2.5	18	S
9	Lower Engine Mounting Nut	44	4.5	32	S
10	Lower Adjusting Collar	4.9	0.50	43 in·lb	S
11	Engine Ground Cable Terminal Bolt	9.8	1.0	87 in·lb	

S: Follow the specified tightening sequence.

8-4 ENGINE REMOVAL/INSTALLATION

Special Tool

Engine Mount Nut Wrench:
57001-1450



Engine Removal/Installation

Engine Removal

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

⚠ WARNING

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

NOTICE

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

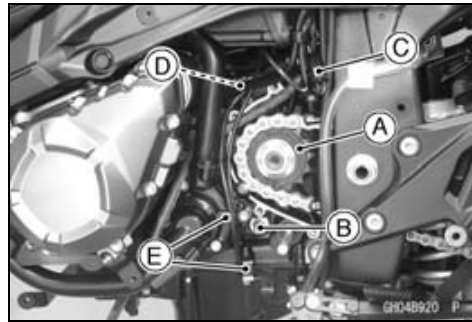


- Drain:
 - Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
 - Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
 - Side Fairings (see Side Fairing Removal in the Frame chapter)
 - Frame Covers (see Frame Cover Removal in the Frame chapter)
 - Lower Fairings (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter)
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Clutch Cable Lower End (see Clutch Cable Removal in the Clutch chapter)
 - Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
 - Thermostat Housing (see Thermostat Removal in the Cooling System chapter)
 - Coolant Reserve Tank (see Coolant Change in the Periodic Maintenance chapter)
 - Muffler Body (see Muffler Body Removal in the Engine Top End chapter)
 - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
 - Stick Coils (see Stick Coil Removal in the Electrical System chapter)
 - Air Suction Valves (see Air Suction Valve Removal in the Engine Top End chapter)
 - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
 - Shift Pedal (see Shift Pedal Removal in the Crankshaft/Transmission chapter)

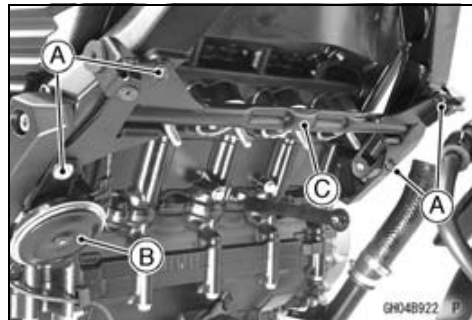
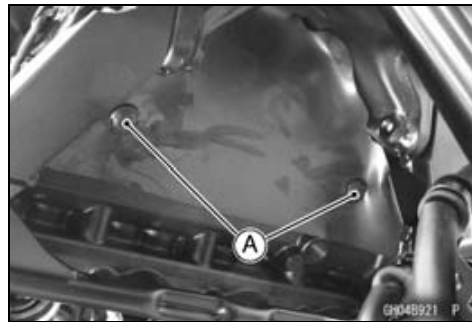
8-6 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

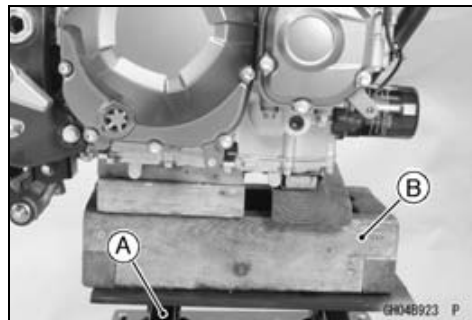
- Remove the engine sprocket [A] (see Engine Sprocket Removal in the Final Drive chapter).
- Disconnect:
 - Crankshaft Sensor Lead Connector and Oil Pressure Switch Lead Terminal (see Crankshaft Sensor Removal in the Electrical System chapter)
 - Starter Motor Cable (see Starter Motor Removal in the Electrical System chapter)
 - Alternator Lead Connector (see Alternator Cover Removal in the Electrical System chapter)
 - Neutral Switch Lead Connector [B]
 - Side Stand Switch Lead Connector [C]
 - Speed Sensor Lead Connector [D]
- Open the clamps [E].
- Remove the quick rivets [A].



- Remove:
 - Front Engine Bracket Bolts [A]
 - Horn [B]
 - Front Engine Bracket [C]

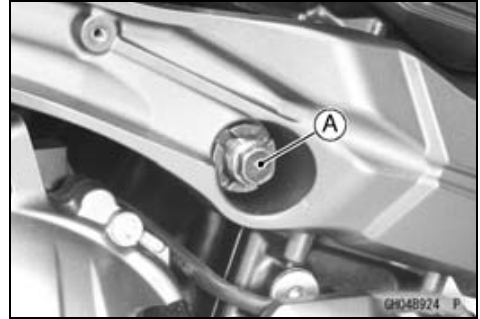


- Support the engine with a suitable stand [A].
 - Put a plank [B] onto the suitable stand for engine balance.

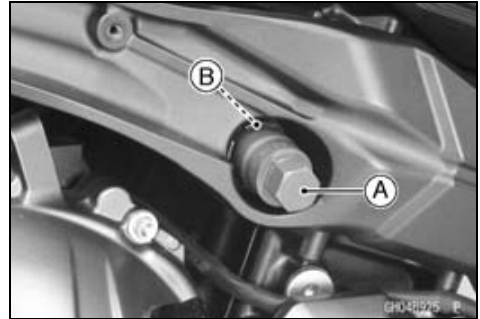


Engine Removal/Installation

- Remove the right front engine mounting bolt [A].



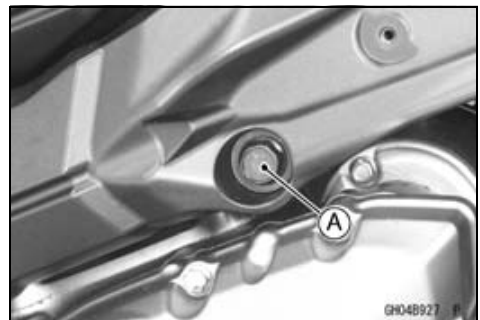
- Using the nut wrench [A], loosen the lock nut [B].
Special Tool - Engine Mount Nut Wrench: 57001-1450



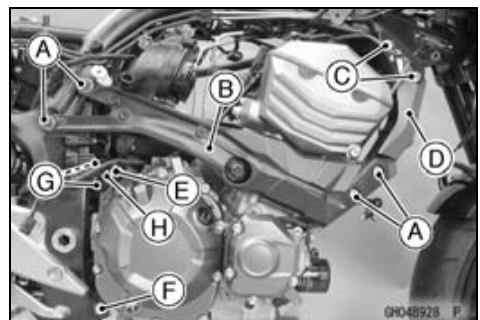
- Using the Hexagon Wrench, turn the upper adjusting collar [A] counterclockwise to make the gap between the engine and upper adjusting collar.



- Remove the left front engine mounting bolt [A].



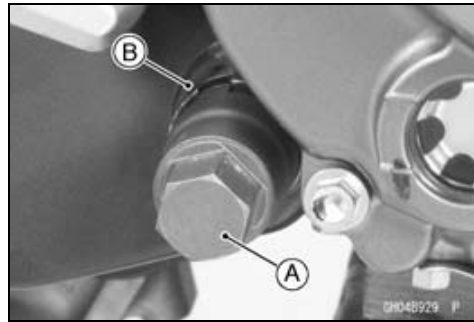
- Remove:
 - Subframe Bolts [A] (Both Sides)
 - Subframe [B] (Both Sides)
 - Upper Engine Bracket Bolts [C] (Both Sides)
 - Upper Engine Bracket [D] (Both Sides)
 - Middle Engine Mounting Nut [E] and Bolt
 - Lower Engine Mounting Nut [F] and Bolt
 - Rear Engine Bracket Bolts [G]
 - Rear Engine Bracket [H]



8-8 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

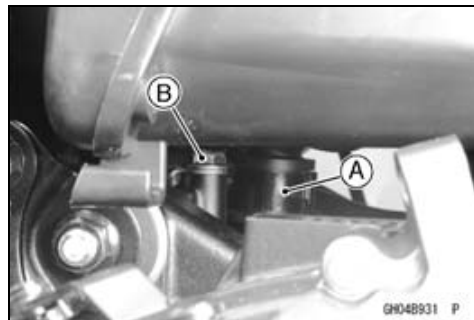
- Using the nut wrench [A], loosen the locknut [B].
Special Tool - Engine Mount Nut Wrench: 57001-1450



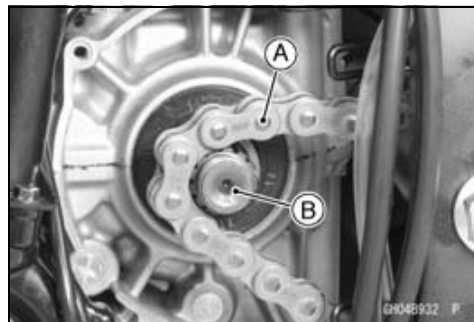
- Using the Hexagon Wrench, turn the lower adjusting collar [A] counterclockwise to make the gap between the engine and lower adjusting collar.



- Disconnect the breather hose end [A].
- Remove the engine ground cable terminal bolt [B].



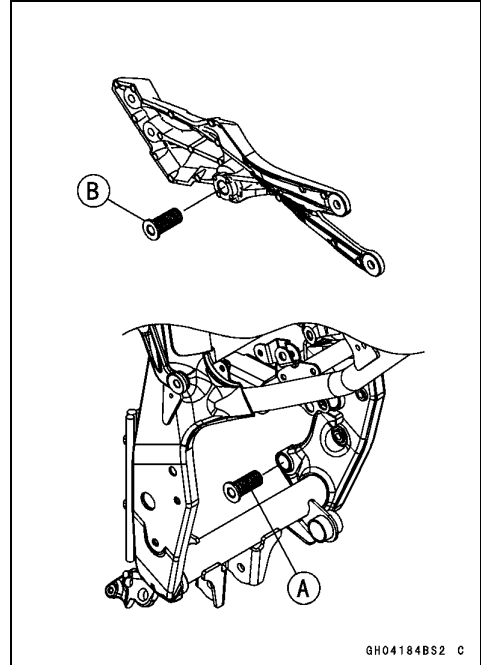
- Remove the drive chain [A] from the output shaft [B].
- Using the stand, take out the engine.



Engine Removal/Installation

Engine Installation

- Support the engine with a suitable stand.
- Put a plank onto the suitable stand for engine balance.
- Screw the lower adjusting collar [A] to the frame.
- Screw the upper adjusting collar [B] to the subframe.



- Hang the drive chain over the output shaft just before moving the engine into its final position in the frame.
- Run the breather hose and engine ground cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Torque - Engine Ground Cable Terminal Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

NOTE

- Hold the mounting bolt at the right side of the frame not to turn when tightening the upper and lower engine mounting nuts at the left side of the frame.

8-10 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

- Install the engine mounting bolts and nuts, following the specified installing sequence.
- 1st, install the rear engine bracket [A] and tighten the bolts [B] temporarily.
- 2nd, install the left upper engine bracket [C], left subframe [D] and spherical washers [E] so that the spherical side faces inward and tighten the bolts [F] [G] [H] [I] temporarily.
- 3rd, tighten the subframe bolts [F] [G].
Torque - Subframe Bolts [F] [G]: 25 N·m (2.5 kgf·m, 18 ft·lb)
- 4th, loosen the subframe bolt [F], and tighten the subframe bolt [F].
Torque - Subframe Bolt [F]: 25 N·m (2.5 kgf·m, 18 ft·lb)
- 5th, loosen the subframe bolt [G], and tighten the subframe bolt [G].
Torque - Subframe Bolt [G]: 25 N·m (2.5 kgf·m, 18 ft·lb)
- 6th, tighten the subframe bolts [H] and upper engine bracket bolts [I].
Torque - Subframe Bolts [H]: 25 N·m (2.5 kgf·m, 18 ft·lb)
Upper Engine Bracket Bolts [I]: 44 N·m (4.5 kgf·m, 32 ft·lb)
- 7th, insert the lower [J] and middle [K] engine mounting bolts.
- 8th, tighten the left front engine mounting bolt [L].
Torque - Front Engine Mounting Bolt [L]: 44 N·m (4.5 kgf·m, 32 ft·lb)
- 9th, tighten the rear engine bracket bolts [B].
Torque - Rear Engine Bracket Bolts [B]: 25 N·m (2.5 kgf·m, 18 ft·lb)
- 10th, tighten the lower adjusting collar [M] until the clearance between the engine and lower adjusting collar come to 0 mm.
Torque - Lower Adjusting Collar [M]: 4.9 N·m (0.50 kgf·m, 43 in·lb)
- 11th, tighten the adjusting collar locknut [N].
Torque - Adjusting Collar Locknut [N]: 49 N·m (5.0 kgf·m, 36 ft·lb)
- 12th, tighten the lower [O] and middle [P] engine mounting nuts.
Torque - Lower Engine Mounting Nut [O]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Middle Engine Mounting Nut [P]: 44 N·m (4.5 kgf·m, 32 ft·lb)
- 13th, install the right upper engine bracket [Q], right subframe [R] and spherical washers [S] so that the spherical side faces inward and tighten the bolts [T] [U] [V] [W] temporarily.
- 14th, insert the right front engine mounting bolt [X] temporarily.
- 15th, tighten the subframe bolts [T] [U].
Torque - Subframe Bolts [T] [U]: 25 N·m (2.5 kgf·m, 18 ft·lb)

Engine Removal/Installation

○16th, loosen the subframe bolt [T], and tighten the subframe bolt [T].

Torque - Subframe Bolt [T]: 25 N·m (2.5 kgf·m, 18 ft·lb)

○17th, loosen the subframe bolt [U], and tighten the subframe bolt [U].

Torque - Subframe Bolt [U]: 25 N·m (2.5 kgf·m, 18 ft·lb)

○18th, tighten the subframe bolts [V] and upper engine bracket bolts [W].

Torque - Subframe Bolts [V]: 25 N·m (2.5 kgf·m, 18 ft·lb)

Upper Engine Bracket Bolts [W]: 44 N·m (4.5 kgf·m, 32 ft·lb)

○19th, remove the right front engine mounting bolt [X].

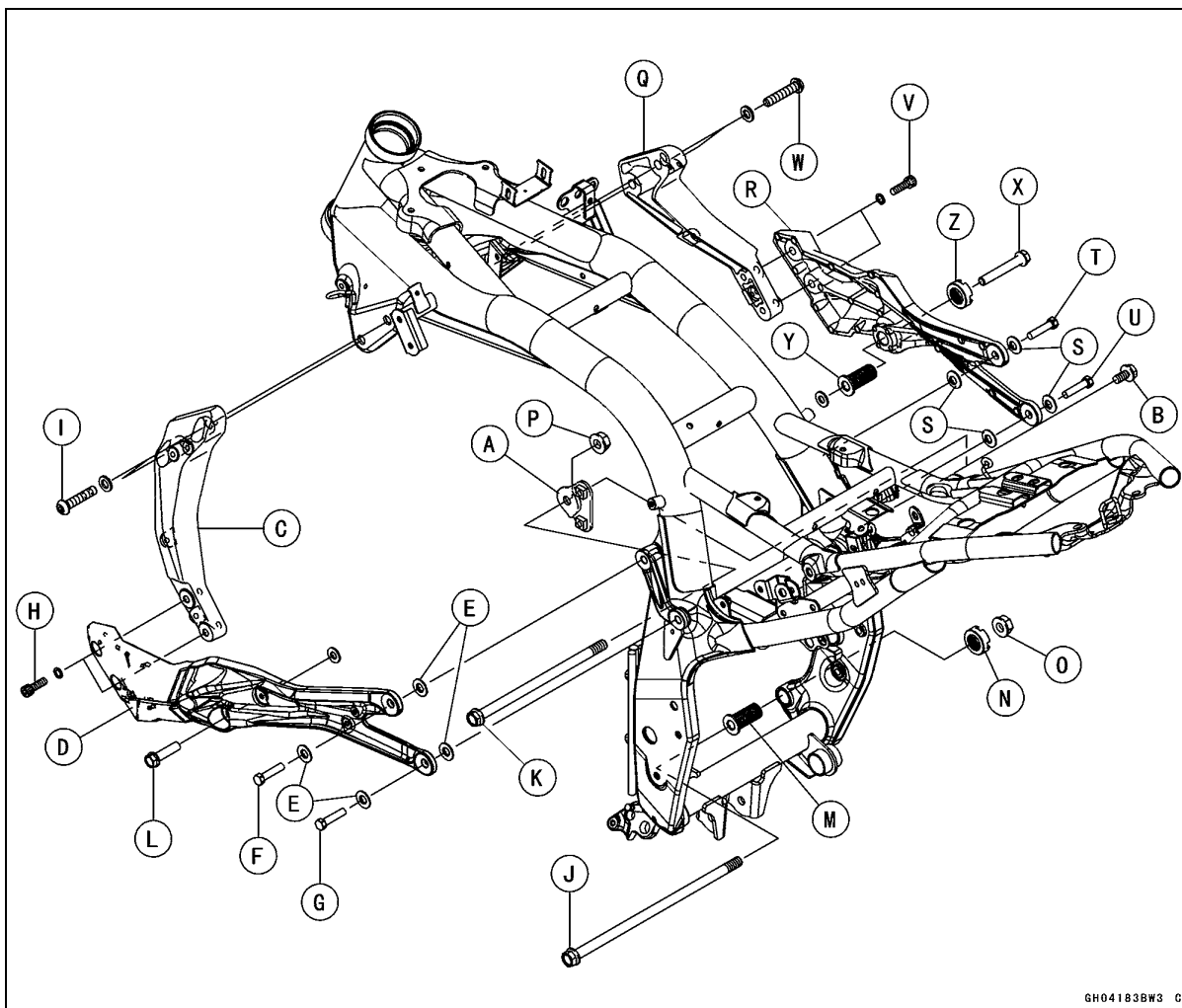
○20st, tighten the upper adjusting collar [Y] until the clearance between the washer and upper adjusting collar come to 0 mm.

Torque - Upper Adjusting Collar [Y]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

○Lastly, tighten the adjusting collar locknut [Z] and right front engine mounting bolt [X].

Torque - Adjusting Collar Locknut [Z]: 49 N·m (5.0 kgf·m, 36 ft·lb)

Front Engine Mounting Bolt [X]: 44 N·m (4.5 kgf·m, 32 ft·lb)



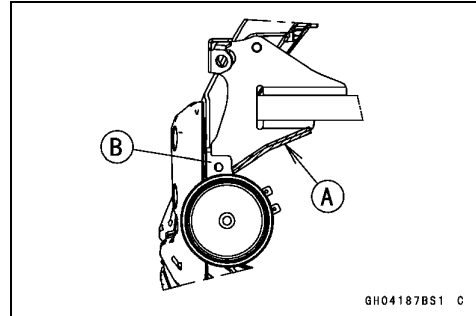
GH04183BW3 C

8-12 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

- Install the front engine bracket and horn.
- Tighten:
Torque - Front Engine Bracket Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

- When installing the trim [A], note the following.
 - Touch the trim to the horn bracket [B].



- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:
 - Throttle Cables (see Throttle Control System Inspection in the Periodic Maintenance chapter)
 - Clutch Cable (see Clutch Operation Inspection in the Periodic Maintenance chapter)
 - Drive Chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).

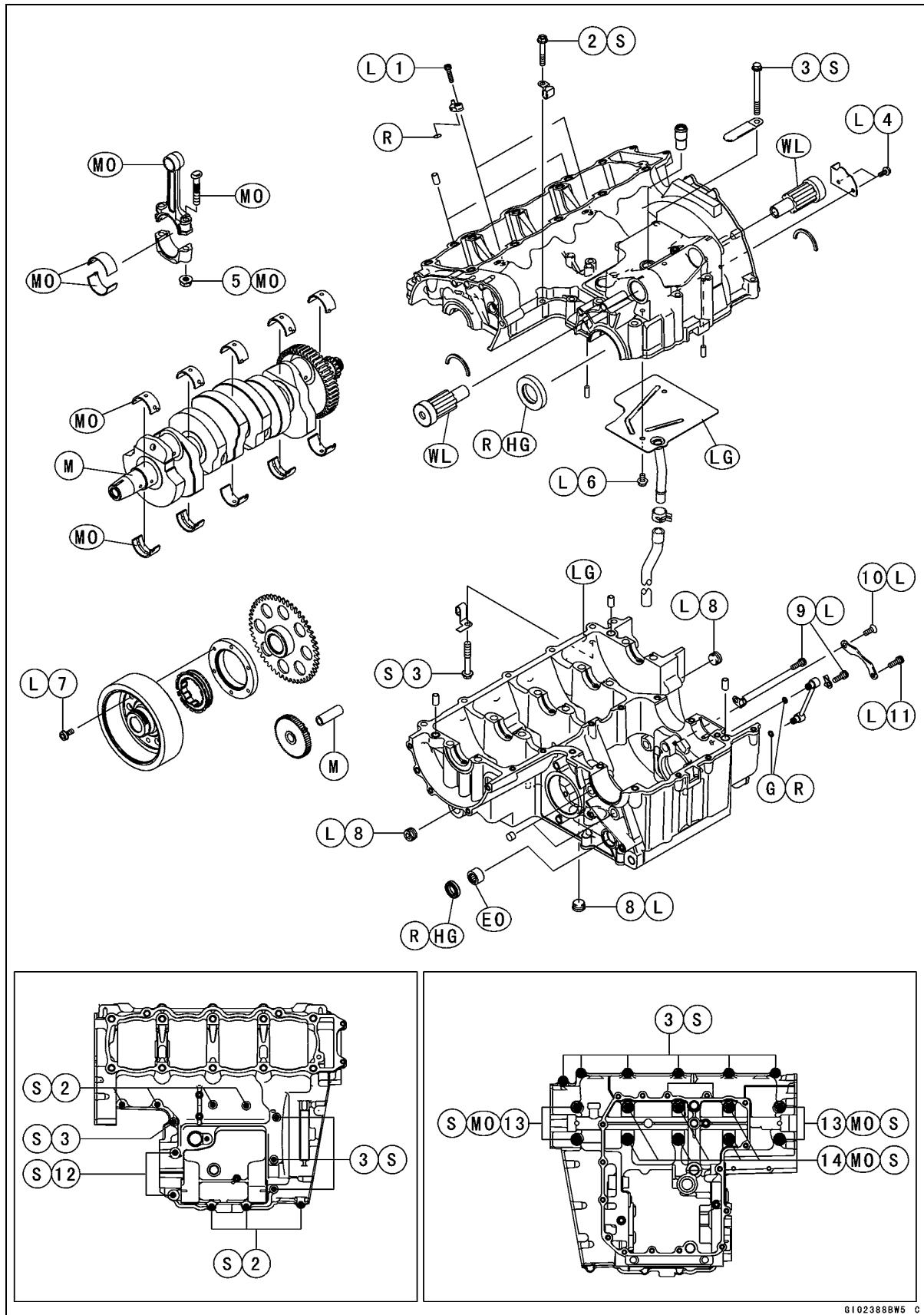
Crankshaft/Transmission

Table of Contents

Exploded View	9-2
Specifications	9-6
Special Tools and Sealant	9-8
Crankcase Splitting.....	9-9
Crankcase Splitting	9-9
Crankcase Assembly	9-10
Crankshaft and Connecting Rods.....	9-15
Crankshaft Removal	9-15
Crankshaft Installation	9-15
Connecting Rod Removal.....	9-15
Connecting Rod Installation	9-15
Crankshaft/Connecting Rod Cleaning.....	9-19
Connecting Rod Bend Inspection	9-19
Connecting Rod Twist Inspection.....	9-20
Connecting Rod Big End Side Clearance Inspection.....	9-20
Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection.....	9-20
Crankshaft Side Clearance Inspection.....	9-22
Crankshaft Runout Inspection.....	9-23
Crankshaft Main Bearing Insert/Journal Wear Inspection.....	9-23
Starter Motor Clutch	9-25
Starter Motor Clutch Removal/Installation	9-25
Starter Motor Clutch Inspection	9-25
Starter Motor Clutch Disassembly	9-25
Starter Motor Clutch Assembly	9-25
Transmission	9-26
Shift Pedal Removal	9-26
Shift Pedal Installation	9-26
External Shift Mechanism Removal.....	9-27
External Shift Mechanism Installation.....	9-27
External Shift Mechanism Inspection.....	9-28
Transmission Shaft Removal	9-28
Transmission Shaft Installation	9-28
Transmission Shaft Disassembly.....	9-29
Transmission Shaft Assembly.....	9-30
Shift Drum and Fork Removal.....	9-33
Shift Drum and Fork Installation.....	9-33
Shift Drum Disassembly.....	9-33
Shift Drum Assembly	9-33
Shift Fork Bending Inspection	9-34
Shift Fork/Gear Groove Wear Inspection.....	9-34
Shift Fork Guide Pin/Drum Groove Wear Inspection	9-34
Gear Dog and Gear Dog Hole Damage Inspection	9-34

9-2 CRANKSHAFT/TRANSMISSION

Exploded View



G102388BWS C

CRANKSHAFT/TRANSMISSION 9-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Jet Nozzle Bolts	6.9	0.70	61 in·lb	L
2	Crankcase Bolts (M6)	12	1.2	106 in·lb	S
3	Crankcase Bolts (M7)	20	2.0	15	S
4	Side Breather Plate Bolts	5.9	0.60	52 in·lb	L
5	Connecting Rod Big End Nuts	See the text	←	←	MO
6	Upper Breather Plate Bolts	9.8	1.0	87 in·lb	L
7	Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
8	Oil Passage Plugs	20	2.0	15	L
9	Oil Pipe Holder Bolts	13	1.3	115 in·lb	L
10	Shift Drum Bearing Holder Screw	5.9	0.60	52 in·lb	L
11	Shift Drum Bearing Holder Bolt	12	1.2	106 in·lb	L
12	Crankcase Bolts (M8)	27	2.8	20	S
13	Crankcase Bolts (M9, L = 95 mm)	See the text	←	←	MO, S
14	Crankcase Bolts (M9, L = 81 mm)	See the text	←	←	MO, S

EO: Apply engine oil.

G: Apply grease.

HG: Apply high-temperature grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket.

M: Apply molybdenum disulfide grease.

MO: Apply molybdenum disulfide oil solution.

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

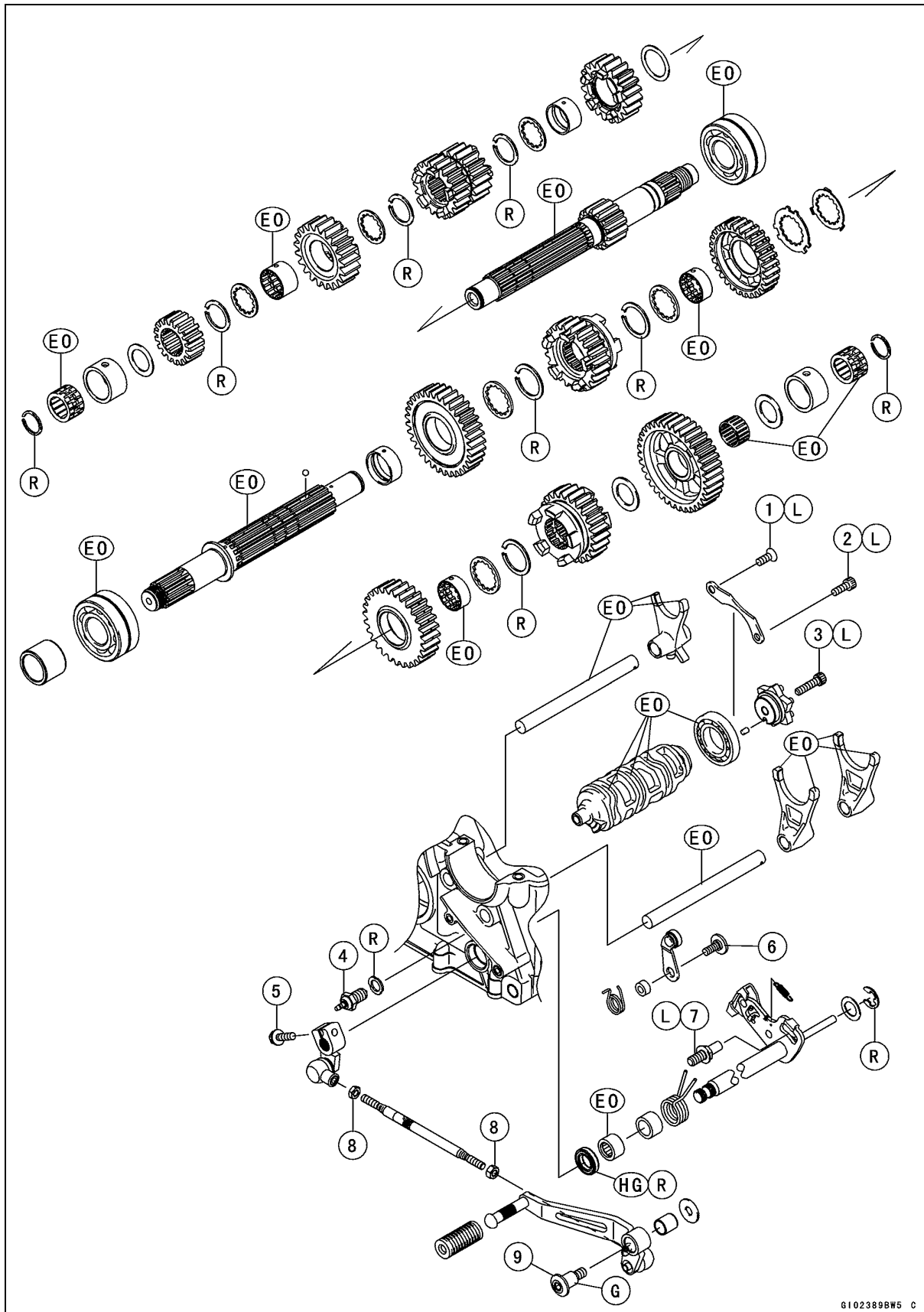
R: Replacement Parts

S: Follow the specified tightening sequence.

WL: Apply soap and water solution or rubber lubricant.

9-4 CRANKSHAFT/TRANSMISSION

Exploded View



CRANKSHAFT/TRANSMISSION 9-5

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Shift Drum Bearing Holder Screw	5.9	0.60	52 in·lb	L
2	Shift Drum Bearing Holder Bolt	12	1.2	106 in·lb	L
3	Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	L
4	Neutral Switch	15	1.5	11	
5	Shift Lever Bolt	6.9	0.70	61 in·lb	
6	Gear Positioning Lever Bolt	12	1.2	106 in·lb	
7	Shift Shaft Return Spring Pin	29	3.0	21	L
8	Tie-Rod Locknuts	6.9	0.70	61 in·lb	
9	Shift Pedal Mounting Bolt	25	2.5	18	

EO: Apply engine oil.

G: Apply grease.

HG: Apply high-temperature grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

9-6 CRANKSHAFT/TRANSMISSION

Specifications

Item	Standard	Service Limit																					
Crankshaft, Connecting Rods																							
Connecting Rod Bend	— — —	TIR 0.2/100 mm (0.008/3.94 in.)																					
Connecting Rod Twist	— — —	TIR 0.2/100 mm (0.008/3.94 in.)																					
Connecting Rod Big End Side Clearance	0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)	0.58 mm (0.023 in.)																					
Connecting Rod Big End Bearing Insert/Crankpin Clearance	0.041 ~ 0.071 mm (0.0016 ~ 0.0028 in.)	0.11 mm (0.0043 in.)																					
Crankpin Diameter:	34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)	34.97 mm (1.3768 in.)																					
Marking	None	— — —																					
	○	— — —																					
Connecting Rod Big End Inside Diameter:	38.000 ~ 38.016 mm (1.4961 ~ 1.4967 in.)	— — —																					
Marking	None	— — —																					
	○	— — —																					
Connecting Rod Big End Bearing Insert Thickness:																							
	Brown	1.475 ~ 1.480 mm (0.05807 ~ 0.05827 in.)																					
	Black	1.480 ~ 1.485 mm (0.05827 ~ 0.05846 in.)																					
	Blue	1.485 ~ 1.490 mm (0.05846 ~ 0.05866 in.)																					
Connecting Rod Big End Bearing Insert Selection:																							
<table border="1"> <thead> <tr> <th rowspan="2">Con-rod Big End Inside Diameter Marking</th> <th rowspan="2">Crankpin Diameter Marking</th> <th colspan="2">Bearing Insert</th> </tr> <tr> <th>Size Color</th> <th>Part Number</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>○</td> <td>Brown</td> <td>92139-1110</td> </tr> <tr> <td>None</td> <td>None</td> <td rowspan="2">Black</td> <td rowspan="2">92139-1109</td> </tr> <tr> <td>○</td> <td>○</td> </tr> <tr> <td>○</td> <td>None</td> <td>Blue</td> <td>92139-1108</td> </tr> </tbody> </table>				Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert		Size Color	Part Number	None	○	Brown	92139-1110	None	None	Black	92139-1109	○	○	○	None	Blue	92139-1108
Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert																					
		Size Color	Part Number																				
None	○	Brown	92139-1110																				
None	None	Black	92139-1109																				
○	○																						
○	None	Blue	92139-1108																				
Connecting Rod Bolt Stretch:	(Usable Range)																						
New Connecting Rod	0.24 ~ 0.36 mm (0.0094 ~ 0.0142 in.)	— — —																					
Used Connecting Rod	0.20 ~ 0.32 mm (0.0079 ~ 0.0126 in.)	— — —																					
Crankshaft Side Clearance	0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)	0.40 mm (0.0157 in.)																					
Crankshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.05 mm (0.0020 in.)																					

CRANKSHAFT/TRANSMISSION 9-7

Specifications

Item	Standard	Service Limit
Crankshaft Main Bearing Insert/Journal Clearance	0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in.)	0.07 mm (0.0028 in.)
Crankshaft Main Journal Diameter:	32.984 ~ 33.000 mm (1.2986 ~ 1.2992 in.)	32.96 mm (1.2976 in.)
Marking	None	- - -
	1	- - -
Crankcase Main Bearing Inside Diameter:	36.000 ~ 36.016 mm (1.4173 ~ 1.4179 in.)	- - -
Marking	○	- - -
	None	- - -
Crankshaft Main Bearing Insert Thickness:		
	Brown	- - -
	Black	- - -
	Blue	- - -

Crankshaft Main Bearing Insert Selection:

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1868	3, 5
			92028-1829	1, 2, 4
None	1	Black	92028-1867	3, 5
			92028-1828	1, 2, 4
○	None	Blue	92028-1866	3, 5
			92028-1827	1, 2, 4

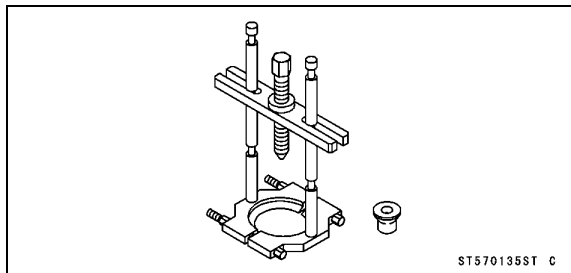
*The bearing inserts for Nos. 1, 2 and 4 journals have an oil groove, respectively.

Transmission		
Shift Fork Ear Thickness	5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)	5.8 mm (0.228 in.)
Gear Groove Width	6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)	6.25 mm (0.246 in.)
Shift Fork Guide Pin Diameter	6.9 ~ 7.0 mm (0.272 ~ 0.276 in.)	6.8 mm (0.268 in.)
Shift Drum Groove Width	7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)	7.3 mm (0.287 in.)

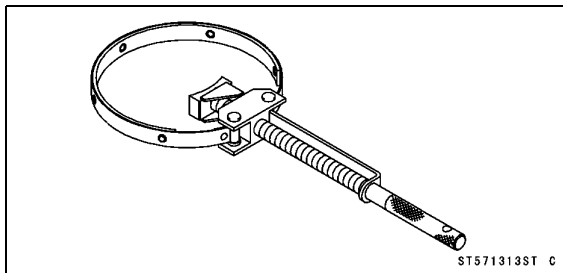
9-8 CRANKSHAFT/TRANSMISSION

Special Tools and Sealant

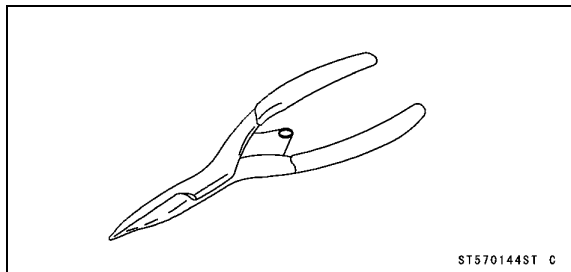
Bearing Puller:
57001-135



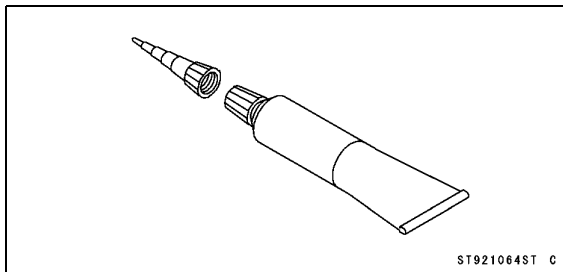
Flywheel Holder:
57001-1313



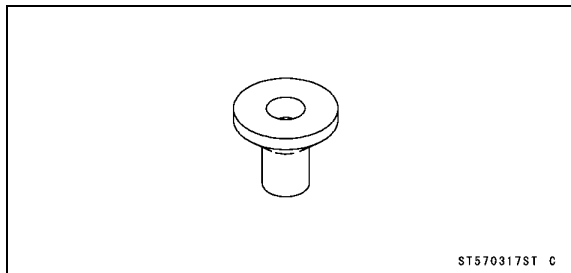
Outside Circlip Pliers:
57001-144



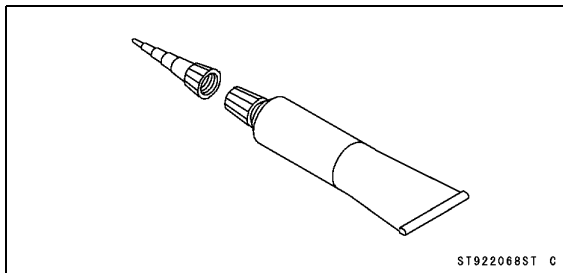
Liquid Gasket, TB1216B:
92104-1064



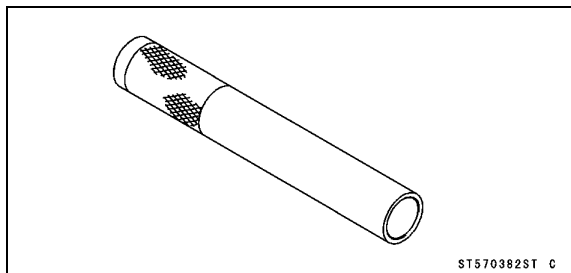
Bearing Puller Adapter:
57001-317



Liquid Gasket, TB1207B:
92104-2068



Bearing Driver, $\phi 32$:
57001-382

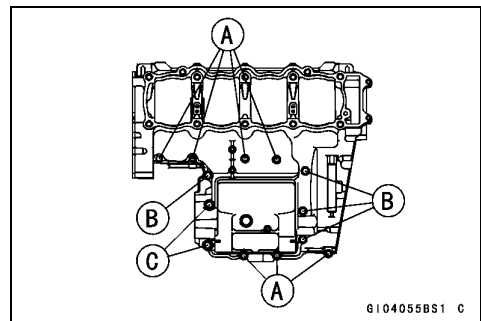


Crankcase Splitting

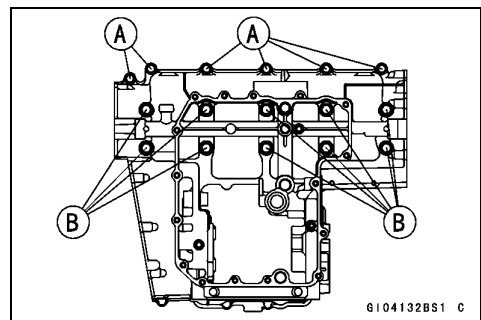
Crankcase Splitting

- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
 - Oil Pressure Switch Terminal (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
 - Crankshaft Sensor (see Crankshaft Sensor Removal in the Electrical System chapter)
 - Starter Motor (see Starter Motor Removal in the Electrical System chapter)
 - Clutch (see Clutch Removal in the Clutch chapter)
 - Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
 - Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
 - Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)
 - Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)
 - Oil Screen (see Oil Pan Removal in the Engine Lubrication System chapter)
- ★ If the crankshaft is to be removed, remove the pistons (see Piston Removal in the Engine Top End chapter).

- Remove the upper crankcase bolts.
 - First loosen the M6 bolts.
 - M6 Bolts [A]
 - M7 Bolts [B]
 - M8 Bolts [C]



- Remove the lower crankcase bolts.
 - First loosen the M7 bolts.
 - M7 Bolts [A]
 - M9 Bolts [B]
 - Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase. Take care not to damage the crankcase.



9-10 CRANKSHAFT/TRANSMISSION

Crankcase Splitting

Crankcase Assembly

NOTICE

The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- Using a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
- Using compressed air, blow out the oil passages in the crankcase halves.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the upper breather plate mating surface [A] 1 mm (0.04 in.) or more thick, and then install the upper breather plate.

22 mm (0.87 in.) [B]

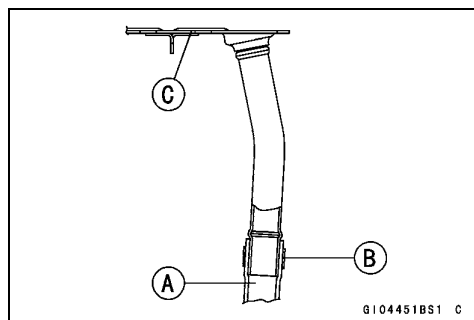
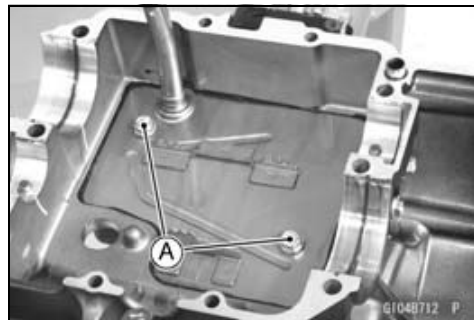
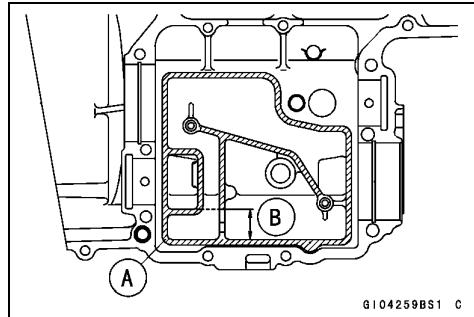
Sealant - Liquid Gasket, TB1207B: 92104-2068

NOTE

- Make the application finish within 7 minutes when the liquid gasket to the mating surface of the upper breather plate is applied.
- Moreover fit the plate and tighten the bolts just after application of the liquid gasket.
- Apply a non-permanent locking agent to the threads of the upper breather plate bolts [A] and tighten them.

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

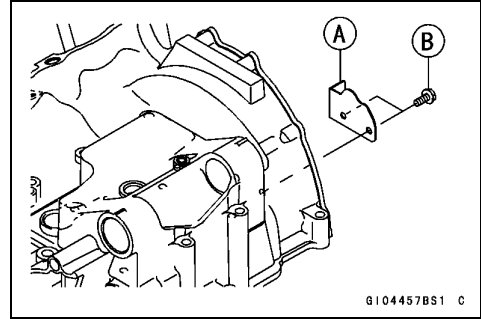
- Install the breather hose [A].
- Align the white mark on the hose with the white mark on the pipe.
- Install the clamp [B] so that its head faces to right side. Upper Breather Plate [C]



Crankcase Splitting

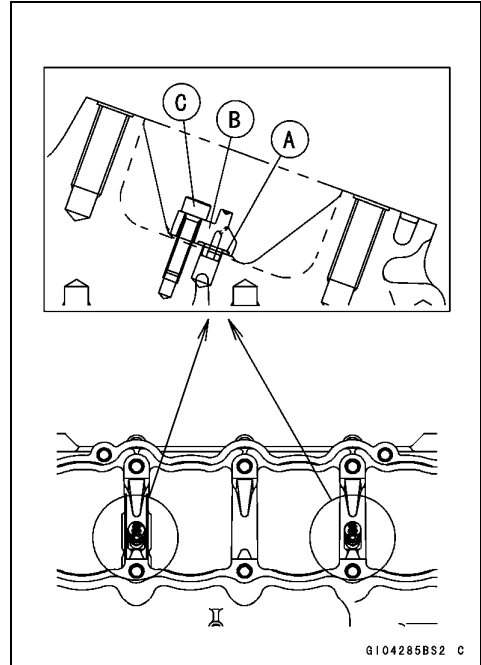
- Install the side breather plate [A].
- Apply a non-permanent locking agent to the threads of the side breather plate bolts [B] and tighten them.

Torque - Side Breather Plate Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

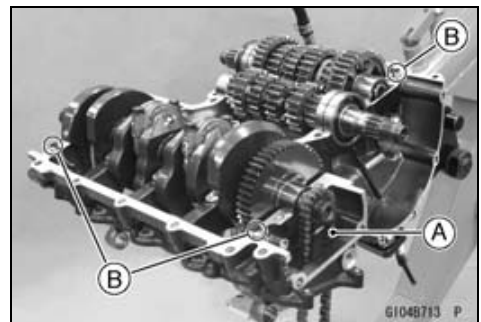


- Replace the O-rings [A] with new ones.
- Install the oil jet nozzles [B].
- Apply a non-permanent locking agent to the threads of oil jet nozzle bolts [C].
- Tighten:

Torque - Oil Jet Nozzle Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)



- Install:
 - Crankshaft (see Crankshaft Installation)
 - Connecting Rods (see Connecting Rod Installation)
 - Camshaft Chain [A]
 - Transmission Shafts and Gears (see Transmission Shaft Installation)
 - Dowel Pins [B]
 - Shift Drum (see Shift Drum and Fork Installation)
 - Shift Forks and Shift Rods (see Shift Drum and Fork Installation)
- Before fitting the lower case on the upper case, check the following.
 - Be sure to hang the camshaft chain on the crankshaft.
 - Check to see that the shift drum and transmission gears are in the neutral position.



9-12 CRANKSHAFT/TRANSMISSION

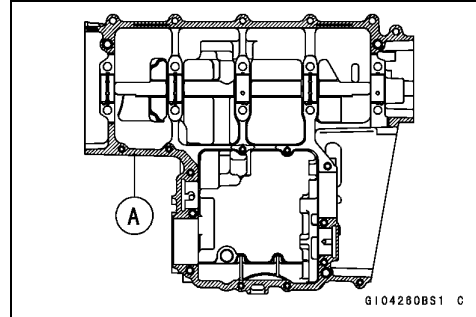
Crankcase Splitting

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the mating surface of the lower crankcase half.

Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTE

- Especially, apply a liquid gasket so that it shall be filled up on the grooves.



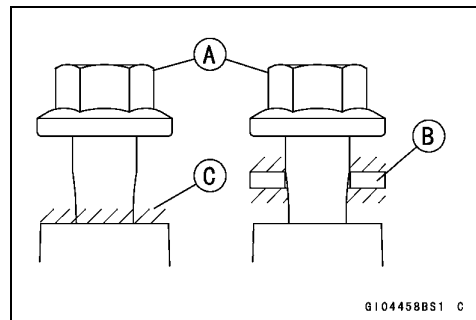
NOTICE

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

- Fit the lower crankcase to the upper crankcase.

NOTE

- Make the application finish within 20 minutes when the liquid gasket to the mating surface of the crankcase half is applied.
- Moreover fit the case and tighten the bolts just after application of the liquid gasket.
- The M9 bolts [A] have a copper plated washer [B], replace it with a new one.
- Apply molybdenum disulfide oil solution to the following.
Seating Surface [C] of Lower Crankcase and M9 Bolts
Both Sides of Copper Plated Washers
Threads of M9 Bolts

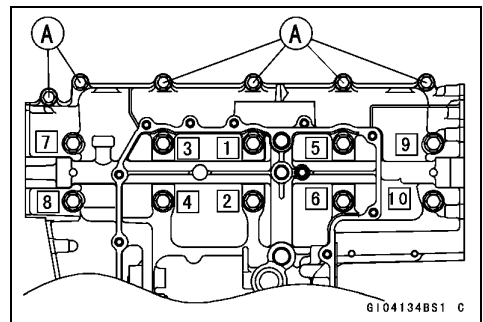
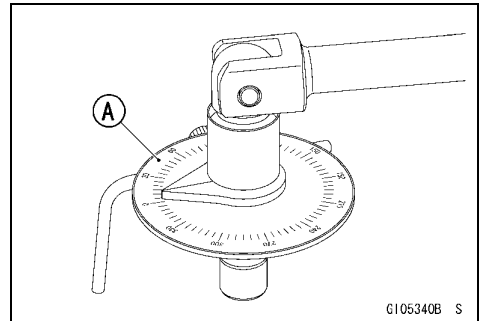
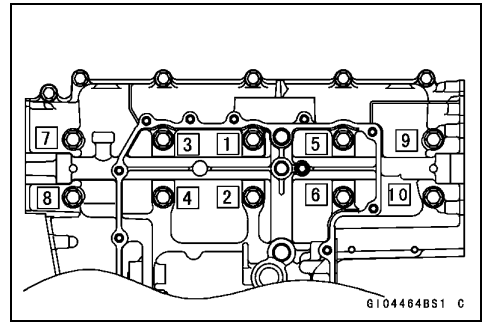


Crankcase Splitting

- Tighten the M9 crankcase bolts following the tightening sequence [1 ~10].
 - L = 81 mm (3.19 in.) [1 ~ 6]
 - L = 95 mm (3.74 in.) [7 ~ 10]
- First, tighten the bolts with **10 N·m (1.0 kgf·m, 89 ft·lb)** of torque.
- Next, in accordance with the following table tighten the bolts with the specified torque. And using a torque angle gauge [A], tighten the bolts with the specified angle.

Order	Crankcase Bolts (M9)	Torque N·m (kgf·m, ft·lb) or Angle
1	[1]	20 (2.0, 15)
2	[1]	60° ±5
3	[2]	20 (2.0, 15)
4	[2]	60° ±5
5	[3]	20 (2.0, 15)
6	[3]	60° ±5
7	[4]	20 (2.0, 15)
8	[4]	60° ±5
9	[5]	20 (2.0, 15)
10	[5]	60° ±5
11	[6]	20 (2.0, 15)
12	[6]	60° ±5
13	[7]	20 (2.0, 15)
14	[7]	60° ±5
15	[8]	20 (2.0, 15)
16	[8]	60° ±5
17	[9]	20 (2.0, 15)
18	[9]	60° ±5
19	[10]	20 (2.0, 15)
20	[10]	60° ±5

- Tighten:
Torque - Crankcase Bolts (M7) [A]: 20 N·m (2.0 kgf·m, 15 ft·lb)



9-14 CRANKSHAFT/TRANSMISSION

Crankcase Splitting

- Tighten the upper crankcase bolts in the order listed.

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

Crankcase Bolts (M7) [B] [C]: 20 N·m (2.0 kgf·m, 15 ft·lb)

Crankcase Bolts (M6) [D] [E] [F]: 12 N·m (1.2 kgf·m, 106 in·lb)

L = 85 mm (3.35 in.) [B]

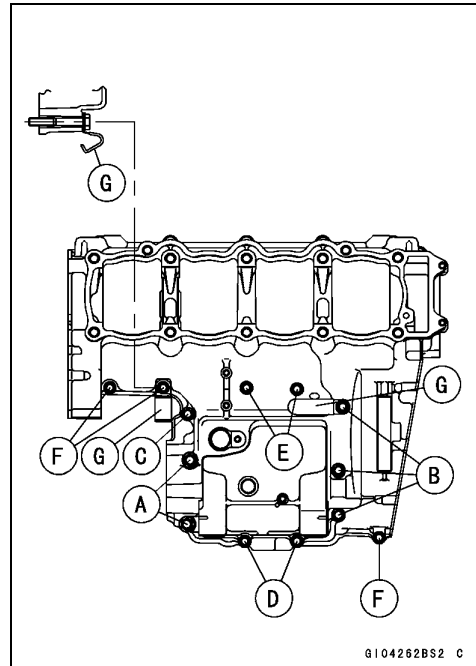
L = 50 mm (1.97 in.) [C]

L = 90 mm (3.54 in.) [D]

L = 60 mm (2.36 in.) [E]

L = 40 mm (1.57 in.) [F]

Clamps [G]

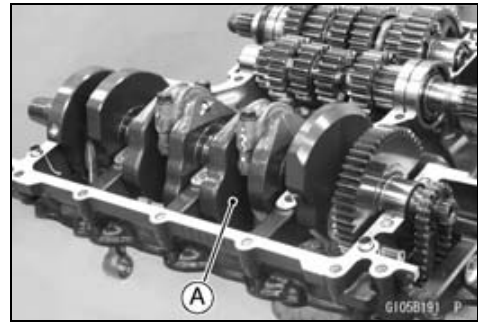


- After tightening all crankcase bolts, check the following items.
 - Wipe up the liquid gasket that seeps out around the crankcase mating surface.
 - Crankshaft and transmission shafts turn freely.
 - While spinning the output shaft, gears shift smoothly from the 1st to 6th gear, and 6th to 1st.
 - When the output shaft stays still, the gear can not be shifted to 2nd gear or other higher gear positions.
- Install the removed parts (see appropriate chapters).

Crankshaft and Connecting Rods

Crankshaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the crankshaft [A].

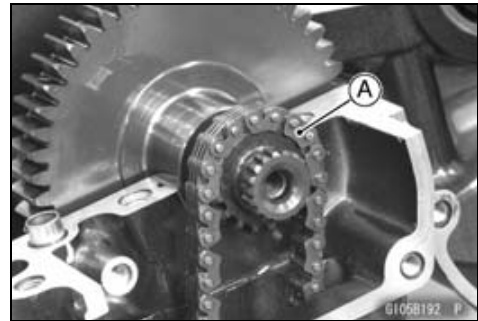


Crankshaft Installation

NOTICE

If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.
- Install the crankshaft with the camshaft chain [A] hanging on it.



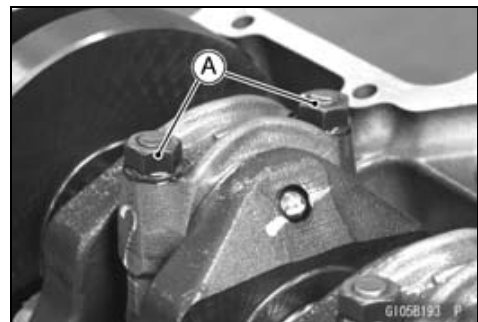
Connecting Rod Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the connecting rod big end nuts [A].
- Remove the crankshaft.

NOTE

○ Mark and record the locations of the connecting rods and their big end caps so that they can be reassembled in their original positions.

- Remove the connecting rods from the crankshaft.



NOTICE

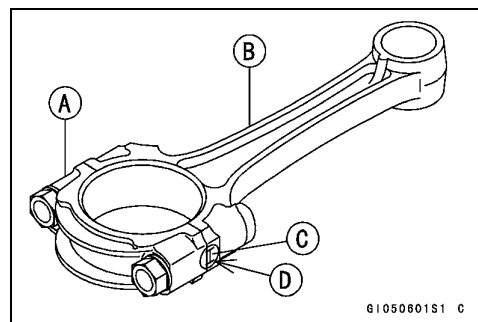
Discard the connecting rod bolts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

Connecting Rod Installation

NOTICE

To minimize vibration, the connecting rods should have the same weight mark.

- Big End Cap [A]
- Connecting Rod [B]
- Weight Mark, Alphabet [C]
- Diameter Mark [D]: "O" or no mark



NOTICE

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

9-16 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

- Apply molybdenum disulfide oil solution [A] to the inner surfaces of upper and lower bearing inserts.
- Do not apply any grease or oil to the cap inside and cap insert outside [B].
- Install the inserts so that their nails [C] are on the same side and fit them into the recess of the connecting rod and cap.

NOTICE

Wrong application of oil and grease could cause bearing damage.

- When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows.

Installation [D] to Cap

Installation [E] to Connecting Rod

Push [F]

Spare Dowel Pin [G]

Connecting Rod Bolts [H]

- Remove debris and clean the surface of inserts.
- Install the cap on the connecting rod, aligning the weight and diameter marks.
- Apply molybdenum disulfide oil solution [MO] to the threads and seating surfaces of the big end nuts and bolts.

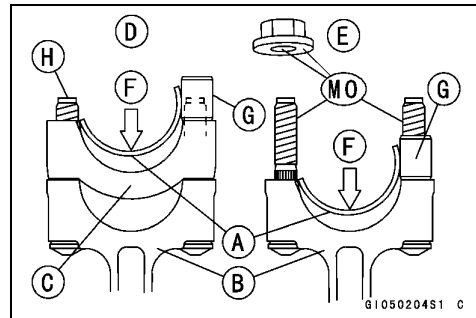
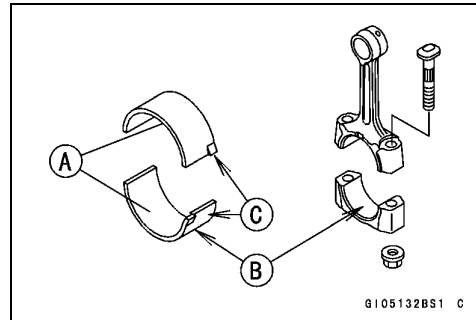
- Install the crankshaft (see Crankshaft Installation).
- Install each connecting rod on its original crankpin.
- The connecting rod big end is bolted using the “plastic region fastening method”.
- This method precisely achieves the needed clamping force without exceeding it unnecessarily, allowing the use of thinner, lighter bolts further decreasing connecting rod weight.
- There are two types of the plastic region fastening. One is a bolt length measurement method and other is a rotation angle method. Observe one of the following two, but the bolt length measurement method is preferable because this is a more reliable way to tighten the big end nuts.

NOTICE

The connecting rod bolts are designed to stretch when tightened. Never reuse the connecting rod bolts. See the table below for correct bolt and nut usage.

NOTICE

Be careful not to overtighten the nuts. The bolts must be positioned on the seating surface correctly to prevent the bolt heads from hitting the crankcase.



Crankshaft and Connecting Rods

(1) Bolt Length Measurement Method

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

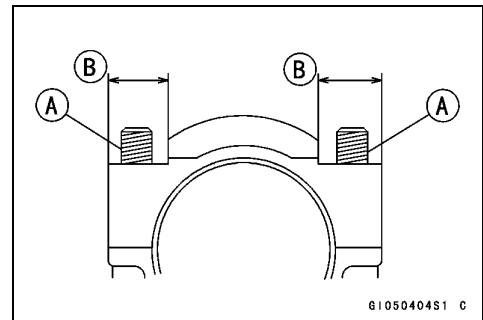
⚠ WARNING

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

NOTICE

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

- Apply a small amount of molybdenum disulfide oil solution to the following.
 - Threads [A] of Nuts and Bolts
 - Seating Surfaces [B] of Nuts and Connecting Rods
- Install new bolts in the connecting rods.



9-18 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

- Dent both bolt head and bolt tip with a punch as shown.
- Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values to find the bolt stretch.

Connecting Rod [A]

Mark here with a punch [B].

Nuts [C]

Fit micrometer pins into punch marks [D].

- Tighten the big end nuts until the bolt elongation reaches the length specified in the table.
- Check the length of the connecting rod bolts.
- ★ If the stretch is more than the usable range, the bolt has stretched too much. An overelongated bolt may break in use.

$$\begin{array}{r} \text{Bolt Length} \\ \text{after tightening} \end{array} - \begin{array}{r} \text{Bolt Length} \\ \text{before tightening} \end{array} = \text{Bolt Stretch}$$

Connect- ing Rod Assy	Bolt	Nut	Usable Range of Connecting Rod Bolt Stretch
New	Use the bolts attached to new con-rod.	Attached to new con-rod	0.24 ~ 0.36 mm (0.0094 ~ 0.0142 in.)
		New	
Used	Replace the bolts with new ones.	Used	0.20 ~ 0.32 mm (0.0079 ~ 0.0126 in.)
		New	

(2) Rotation Angle Method

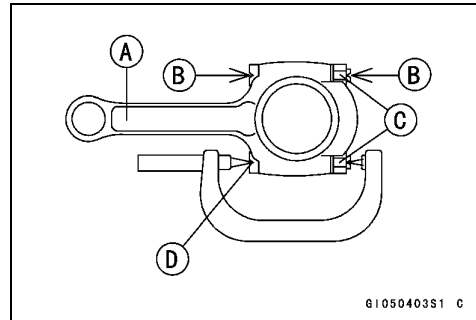
- ★ If you don't have a point micrometer, you may tighten the nuts using the "Rotation Angle Method".
- Be sure to clean the bolts and nuts thoroughly with a high flash-point solvent, because the new bolts and nuts are treated with an anti-rust solution.

⚠ WARNING

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

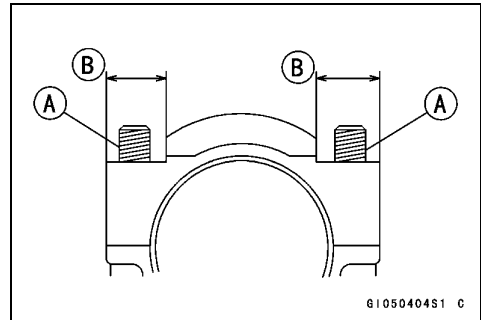
NOTICE

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

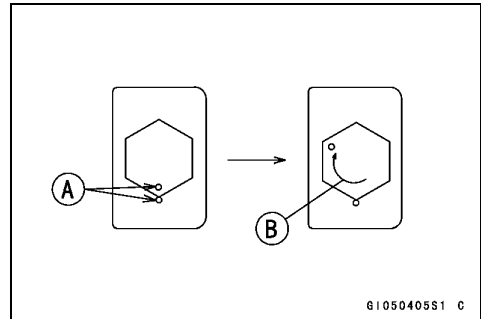


Crankshaft and Connecting Rods

- Apply a small amount of molybdenum disulfide oil solution to the following.
 - Threads [A] of Nuts and Bolts
 - Seating Surfaces [B] of Nuts and Connecting Rods
- Install new bolts in the connecting rods.



- First, tighten the nuts to the specified torque. See the table below.
- Next, tighten the nuts $120^\circ \pm 5^\circ$.
- Mark [A] the connecting rod big end caps and nuts so that nuts can be turned 120° [B] properly.
- Tighten the hexagon nut by 2 corners.
- The nuts can be tightened by using an angle torque gauge. For details refer to "Crankcase Assembly."



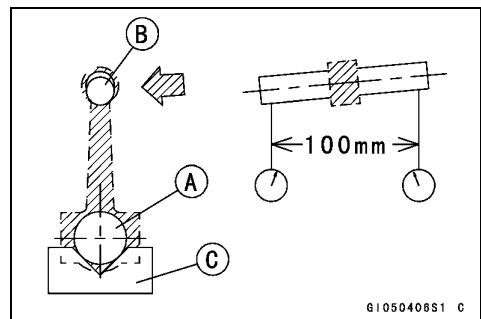
Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, ft·lb)
New	Use the bolts attached to new con-rod.	Attached to new con-rod	18 (1.8, 13) + 120°
		New	20 (2.0, 15) + 120°
Used	Replace the bolts with new ones.	Used	24 (2.4, 18) + 120°
		New	25 (2.5, 18) + 120°

Crankshaft/Connecting Rod Cleaning

- After removing the connecting rods from the crankshaft, clean them with a high flash-point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

Connecting Rod Bend Inspection

- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.
- ★ If connecting rod bend exceeds the service limit, the connecting rod must be replaced.



Connecting Rod Bend

Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

9-20 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

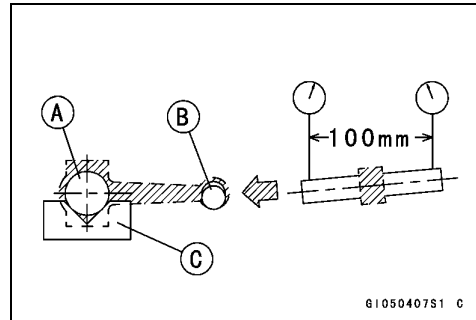
Connecting Rod Twist Inspection

- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

★ If connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Twist

Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)



Connecting Rod Big End Side Clearance Inspection

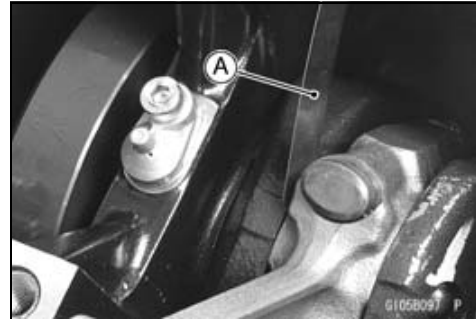
- Measure connecting rod big end side clearance.
- Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance

Standard: 0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)

Service Limit: 0.58 mm (0.023 in.)

- ★ If the clearance exceeds the service limit, replace the connecting rod with new one and then check clearance again. If clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

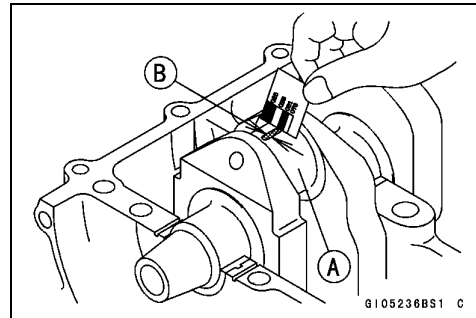


Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection

- Measure the bearing insert/crankpin [A] clearance with plastigage [B].
- Tighten the big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

- Do not move the connecting rod and crankshaft during clearance measurement.



NOTICE

After measurement, replace the connecting rod bolts.

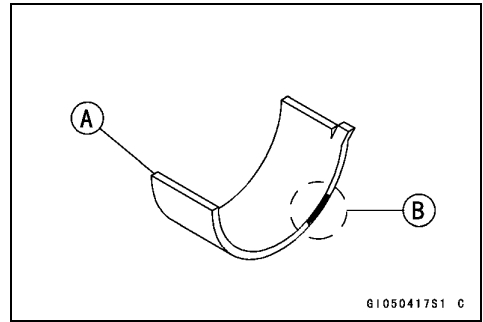
Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: 0.041 ~ 0.071 mm (0.0016 ~ 0.0028 in.)

Service Limit: 0.11 mm (0.0043 in.)

Crankshaft and Connecting Rods

- ★ If the clearance is within the standard, no bearing replacement is required.
- ★ If the clearance is between 0.072 mm (0.0028 in.) and the service limit (0.11 mm, 0.0043 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★ If the clearance exceeds the service limit, measure the diameter of the crankpins.

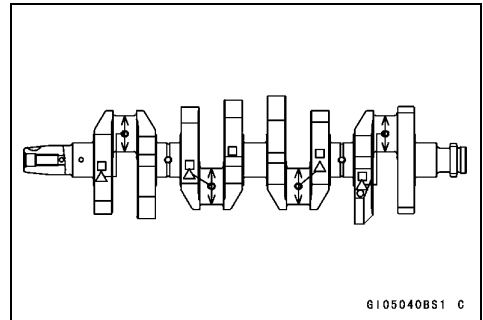


Crankpin Diameter

Standard: 34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)

Service Limit: 34.97 mm (1.3768 in.)

- ★ If any crankpin has worn past the service limit, replace the crankshaft with a new one.
- ★ If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.



Crankpin Diameter Marks

None 34.984 ~ 34.992 mm (1.3773 ~ 1.3776 in.)

○ 34.993 ~ 35.000 mm (1.3777 ~ 1.3780 in.)

△: Crankpin Diameter Marks, "○" or no mark.

9-22 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

- *The mark already on the big end should almost coincide with the measurement.*

Connecting Rod Big End Inside Diameter Marks

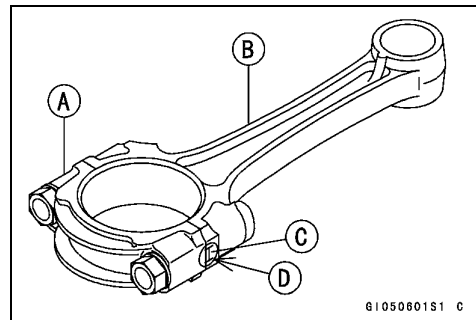
- None 38.000 ~ 38.008 mm (1.4961 ~ 1.4964 in.)
 ○ 38.009 ~ 38.016 mm (1.4964 ~ 1.4967 in.)

Big End Cap [A]

Connecting Rod [B]

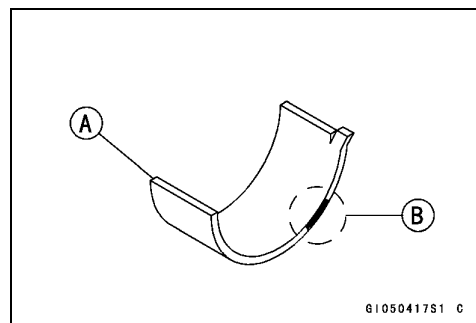
Weight Mark, Alphabet [C]

Diameter Mark (Around Weight Mark) [D]: "○" or no mark



- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding. Size Color [B]

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-1110
None	None	Black	92139-1109
○	○		
○	None	Blue	92139-1108



- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

Crankshaft Side Clearance Inspection

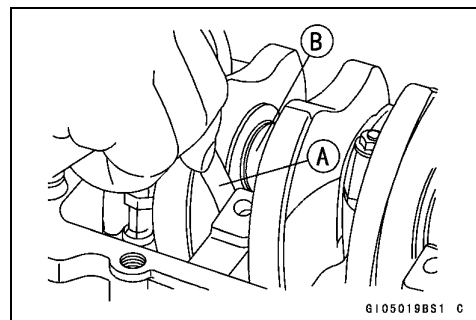
- Insert a thickness gauge [A] between the crankcase main bearing and the crank web at the No.2 journal [B] to determine clearance.
- ★ If the clearance exceeds the service limit, replace the crankcase halves as a set.

NOTE

- *The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.*

Crankshaft Side Clearance

- Standard: 0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)
 Service Limit: 0.40 mm (0.0157 in.)



Crankshaft and Connecting Rods

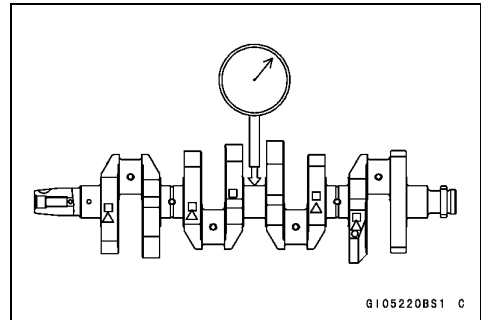
Crankshaft Runout Inspection

- Measure the crankshaft runout.
- ★ If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.05 mm (0.0020 in.)

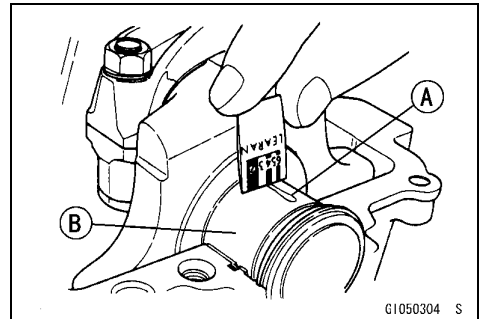


Crankshaft Main Bearing Insert/Journal Wear Inspection

- Using a plastigage (press gauge) [A], measure the bearing insert/journal [B] clearance.

NOTE

- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).
- Do not turn the crankshaft during clearance measurement.
- Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.

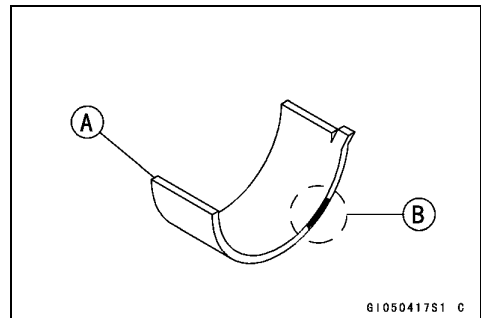


Crankshaft Main Bearing Insert/Journal Clearance

Standard: 0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in.)

Service Limit: 0.07 mm (0.0028 in.)

- ★ If the clearance is within the standard, no bearing replacement is required.
- ★ If the clearance is between 0.045 mm (0.0018 in.) and the service limit (0.07 mm, 0.0028 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★ If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.

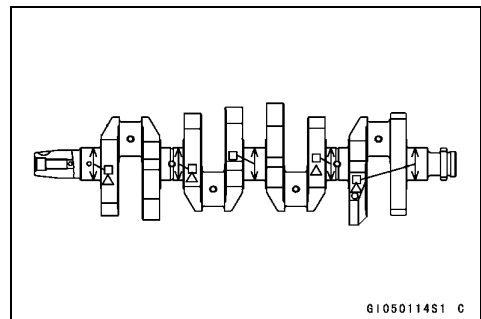


Crankshaft Main Journal Diameter

Standard: 32.984 ~ 33.000 mm (1.2986 ~ 1.2992 in.)

Service Limit: 32.96 mm (1.2976 in.)

- ★ If any journal has worn past the service limit, replace the crankshaft with a new one.
- ★ If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.



Crankshaft Main Journal Diameter Marks

None 32.984 ~ 32.992 mm (1.2986 ~ 1.2989 in.)

1 32.993 ~ 33.000 mm (1.2989 ~ 1.2992 in.)

□: Crankshaft Main Journal Diameter Marks, "1" or no mark.

9-24 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

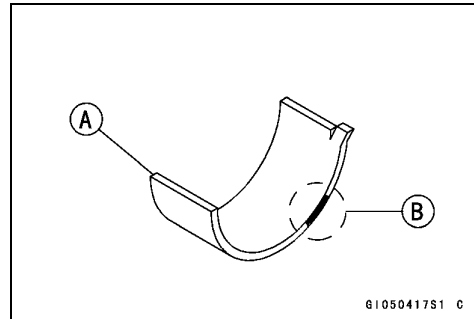
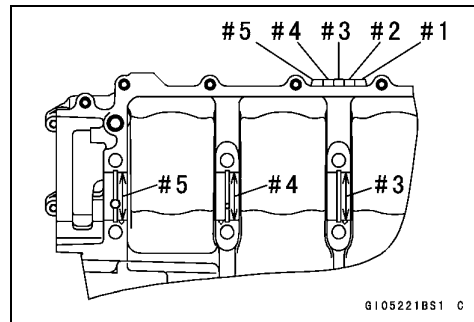
- Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
Crankcase Main Bearing Inside Diameter Marks: "○" or no mark.
- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).

NOTE

- *The mark already on the upper crankcase half should almost coincide with the measurement.*

Crankcase Main Bearing Inside Diameter Marks

- **36.000 ~ 36.008 mm (1.4173 ~ 1.4176 in.)**
None 36.009 ~ 36.016 mm (1.4177 ~ 1.4179 in.)
- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
Size Color [B]



Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1868	3, 5
			92028-1829	1, 2, 4
None	1	Black	92028-1867	3, 5
○	None		92028-1828	1, 2, 4
None	None	Blue	92028-1866	3, 5
			92028-1827	1, 2, 4

* The bearing inserts for Nos. 1, 2 and 4 journals have an oil groove, respectively.

- Install the new inserts in the crankcase halves and check insert/journal clearance with the plastigage.

Starter Motor Clutch

Starter Motor Clutch Removal/Installation

- Refer to the Alternator Rotor Removal/Installation in the Electrical System chapter.

Starter Motor Clutch Inspection

- Remove:
Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
Starter Idle Gear and Shaft
- Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].
- ★ If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.
- Disassemble the starter motor clutch, and visually inspect the clutch parts.
- ★ If there is any worn or damaged part, replace it.

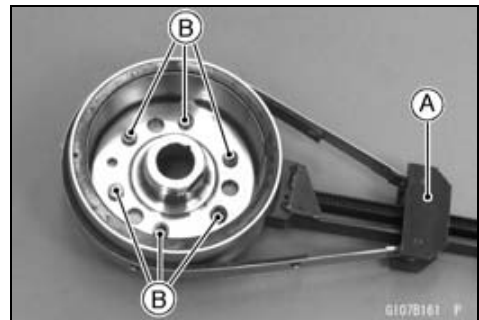


NOTE

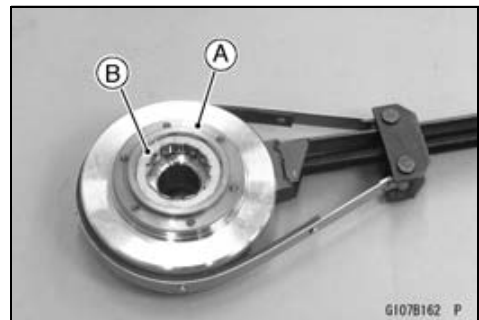
○ Examine the starter motor clutch gear as well. Replace it if it worn or damaged.

Starter Motor Clutch Disassembly

- Remove the alternator rotor (see Alternator Rotor Removal in the Electrical System chapter).
 - Hold the alternator rotor with the flywheel holder [A].
- Special Tool - Flywheel Holder: 57001-1313**
- Remove the starter motor clutch bolts [B].



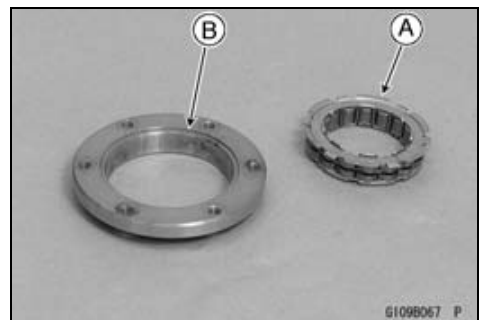
- Remove:
Starter Motor Clutch Housing [A]
Starter Motor Clutch [B]



Starter Motor Clutch Assembly

- Install the starter motor clutch to the housing so that the flange [A] fit to the housing groove [B].
- Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

Torque - Starter Motor Clutch Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

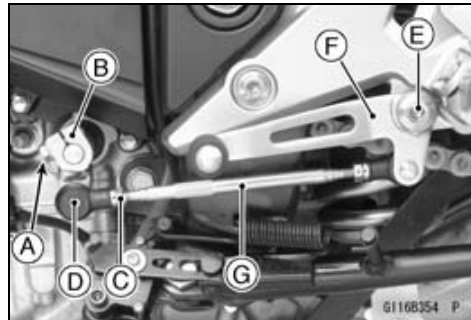


9-26 CRANKSHAFT/TRANSMISSION

Transmission

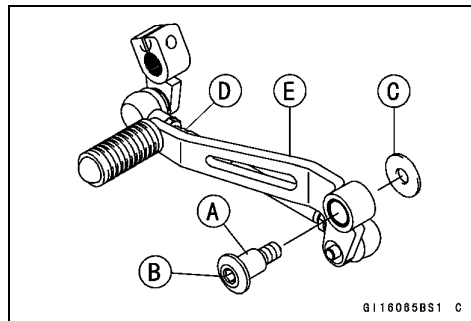
Shift Pedal Removal

- Remove:
 - Shift Lever Bolt [A]
 - Shift Lever [B]
- ★ If the tie-rod is removed from the shift pedal and shift lever, note the following.
- The following portions have left-hand threads.
 - Locknut [C] of Shift Lever Side
 - Ball Joint [D] of Shift Lever
- Remove:
 - Shift Pedal Mounting Bolt [E]
 - Shift Pedal [F] with Tie-rod [G]

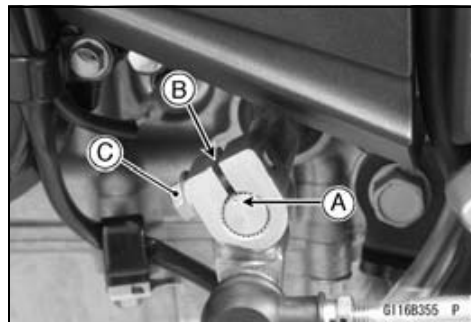


Shift Pedal Installation

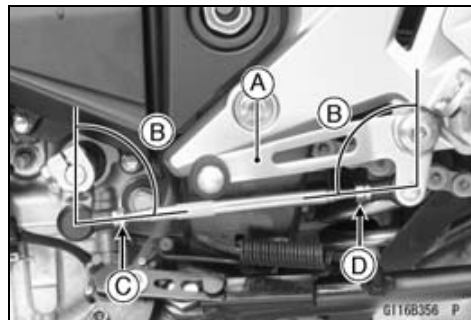
- Apply grease to the sliding surface [A] on the shift pedal mounting bolt [B].
- Install:
 - Washer [C]
 - Tie-Rod [D] and Shift Pedal [E]
- Tighten:
 - Torque - Shift Pedal Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**



- Align the punch mark [A] on the shift shaft with the slit [B] of the shift lever.
- Tighten:
 - Torque - Shift Lever Bolt [C]: 6.9 N·m (0.70 kgf·m, 61 in·lb)**



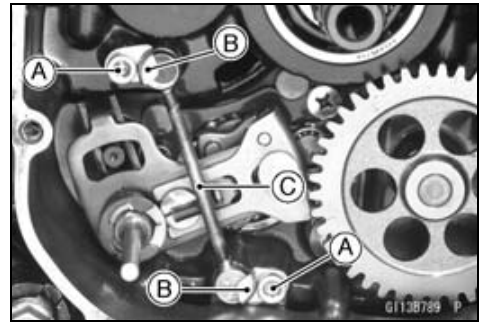
- After installation, confirm that the shift pedal [A] is positioned as shown.
 - About 90° [B]
- ★ If the pedal position is different, adjust it as follows.
- To adjust the pedal position, loosen the front locknut [C] (left-hand threads) and rear locknut [D], and then turn the tie-rod.
- Tighten:
 - Torque - Tie-Rod Locknuts: 6.9 N·m (0.70 kgf·m, 61 in·lb)**



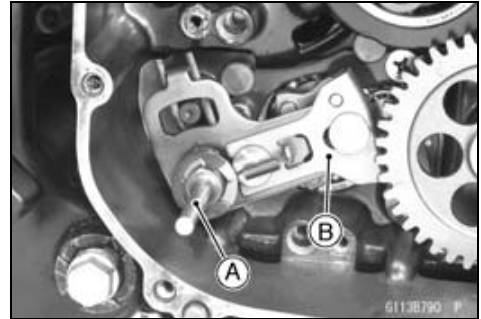
Transmission

External Shift Mechanism Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Shift Lever (see Shift Pedal Removal)
 - Clutch (see Clutch Removal in the Clutch chapter)
 - Oil Pipe Holder Bolts [A]
 - Oil Pipe Holders [B]
 - Oil Pipe [C] and O-rings



- Remove the shift shaft assembly [A] while pulling out the shift mechanism arm [B].

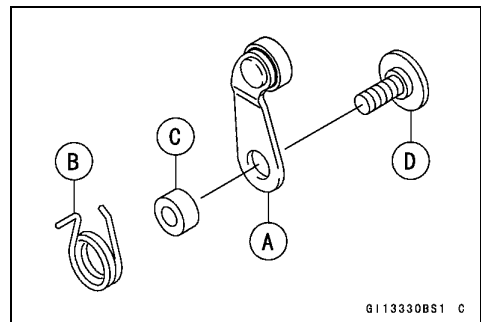


- Remove:
 - Oil Pump Drive Gear (see Oil Pump Drive Gear Removal in the Engine Lubrication System chapter)
 - Gear Positioning Lever Bolt [A]
 - Gear Positioning Lever [B]
 - Collar and Spring



External Shift Mechanism Installation

- Install the gear positioning lever [A] as shown.
 - Spring [B]
 - Collar [C]
 - Gear Positioning Lever Bolt [D]
- Tighten:
 - Torque - Gear Positioning Lever Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)**
- Apply grease to the new O-rings on the oil pipe ends.
- Apply a non-permanent locking agent to the threads of the oil pipe holder bolts and tighten them.
 - Torque - Oil Pipe Holder Bolts: 13 N·m (1.3 kgf·m, 115 in·lb)**
- Install the removed parts (see appropriate chapters).

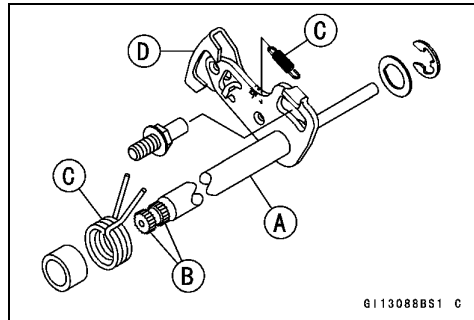


9-28 CRANKSHAFT/TRANSMISSION

Transmission

External Shift Mechanism Inspection

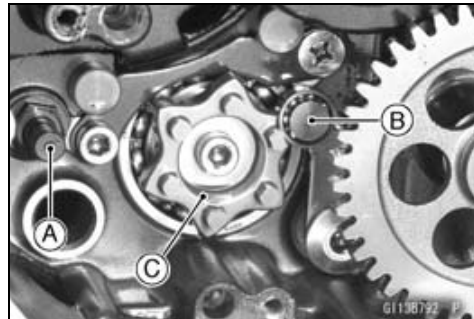
- Examine the shift shaft [A] for any damage.
- ★ If the shaft is bent, straighten or replace it.
- ★ If the serration [B] are damaged, replace the shaft.
- ★ If the springs [C] are damaged in any way, replace them.
- ★ If the shift mechanism arm [D] is damaged in any way, replace the shaft.



- Check the return spring pin [A] is not loose.
- ★ If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

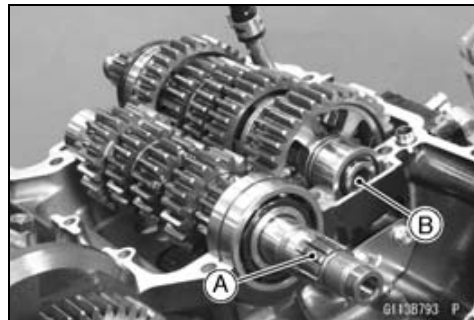
Torque - Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m, 21 ft·lb)

- Check the gear positioning lever [B] and its spring for breaks or distortion.
- ★ If the lever or spring are damaged in any way, replace them.
- Visually inspect the shift drum cam [C].
- ★ If they are badly worn or if they show any damage, replace it.



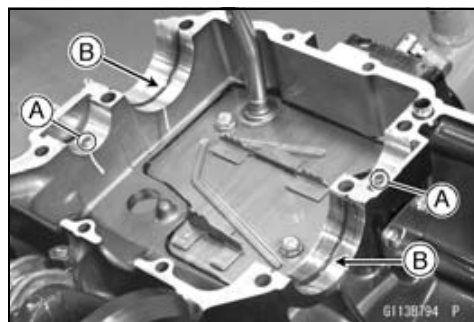
Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the drive shaft [A] and output shaft [B].



Transmission Shaft Installation

- Check to see that the set pins [A] and set rings [B] are in place.

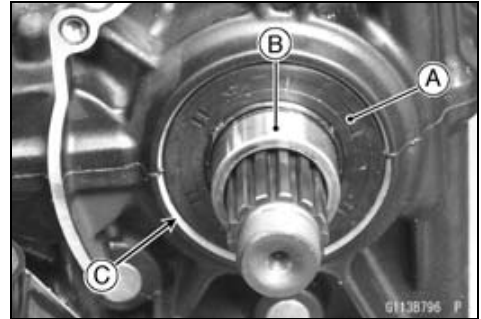


Transmission

- Install the drive shaft and output shaft into the upper crankcase half.
- Apply engine oil to the bearings.
- The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly matched, there is no clearance [A] between the crankcase and the bearing outer races.



- Assemble the crankcase (see Crankcase Assembly).
- Apply high-temperature grease to the oil seal lips.
- Press in the oil seal [A] onto collar [B] so that the surface of the oil seal is flush with the counterbore bottom surface [C] of the crankcase.

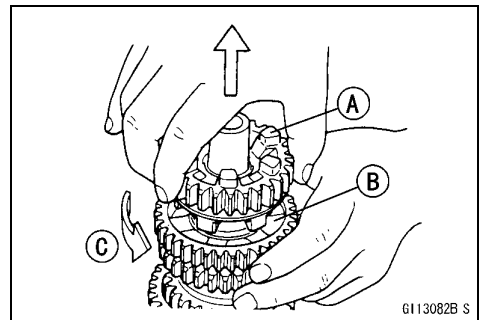


Transmission Shaft Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips, disassemble the transmission shafts.

Special Tool - Outside Circlip Pliers: 57001-144

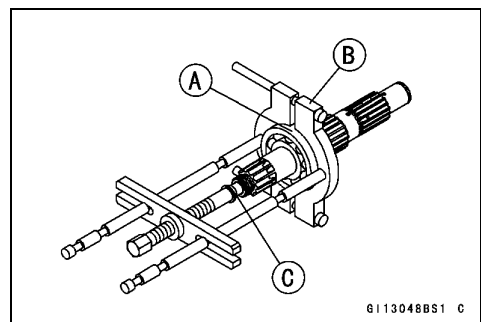
- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.
- Set the output shaft in a vertical position holding the 3rd gear [B].
- Spin the 5th gear quickly [C] and pull it off upward.



- Remove the ball bearing [A] from drive shaft.

Special Tools - Bearing Puller [B]: 57001-135
Bearing Puller Adapter [C]: 57001-317

- Discard the bearing.



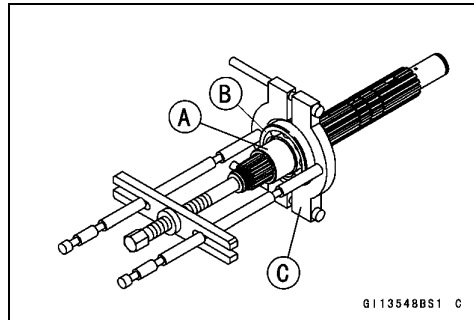
9-30 CRANKSHAFT/TRANSMISSION

Transmission

- Remove the collar [A] together with the ball bearing [B] from output shaft.

Special Tool - Bearing Puller [C]: 57001-135

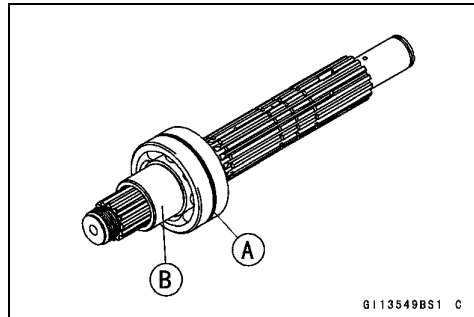
- Discard the bearing.



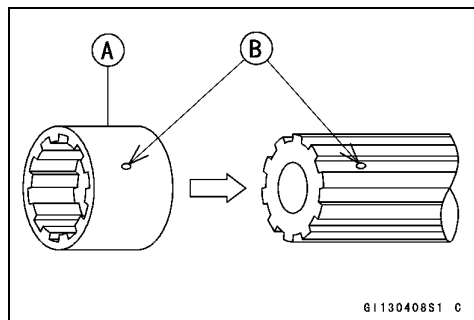
Transmission Shaft Assembly

- Install the new ball bearing [A] and collar [B] (output shaft) on the each shafts, using the bearing driver.

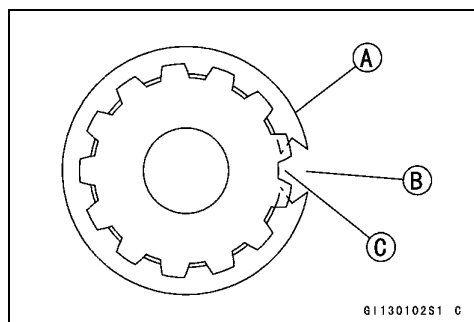
Special Tool - Bearing Driver, ϕ 32: 57001-382



- Apply engine oil to the bushings, ball bearings and shafts.
- Install the gear bushings [A] on the shaft with their holes [B] aligned.



- Replace any circlips removed with new ones.
- Install the circlips [A] so that the opening [B] is aligned with a spline groove [C].

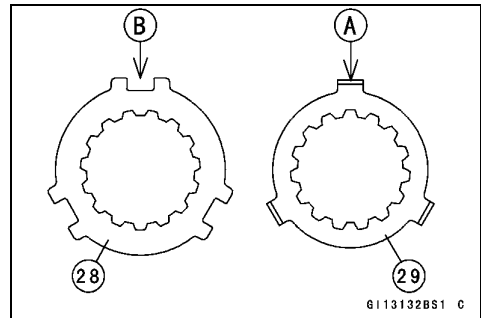


Transmission

- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 3rd/4th gear onto the drive shaft with their oil holes aligned.
- Install the 6th gear bushing onto the drive shaft with their oil holes aligned.
- The output shaft gears can be recognized by size: the gear with the largest diameter is 1st gear, and the smallest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 6th gear onto the output shaft with their oil holes aligned.
- Install the 3rd/4th gear bushings onto the output shaft with their oil holes aligned.

NOTE

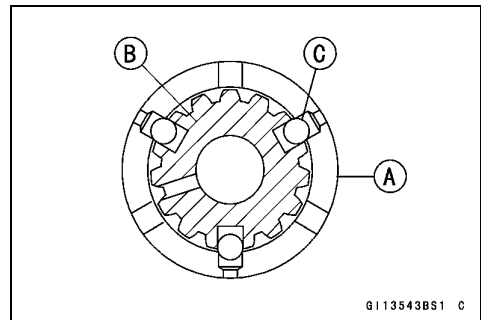
- When the toothed washers [28] [29] are assembled onto the output shaft, note the following.
- When the tangs [A] of the toothed washer [29] shall be assembled, they should be installed into the notch [B] of the toothed washer [28] (see Page 9-32).



- Fit the steel balls into the 5th gear holes in the output shaft.
 5th Gear [A]
 Output Shaft [B]
 Steel Balls [C]

NOTICE

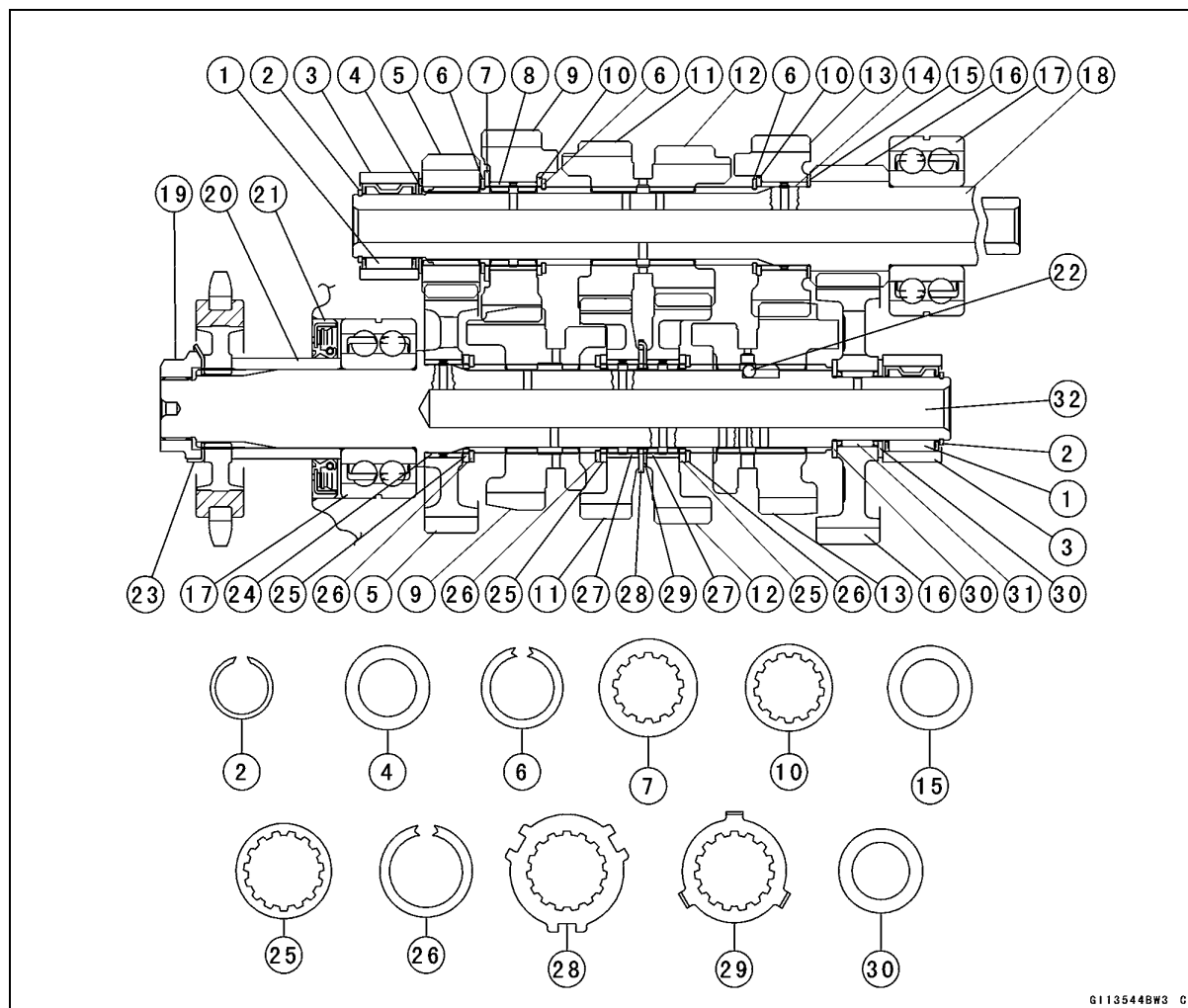
Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.



- After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear doesn't come out of the output shaft when moving it up and down by hand.
- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

9-32 CRANKSHAFT/TRANSMISSION

Transmission



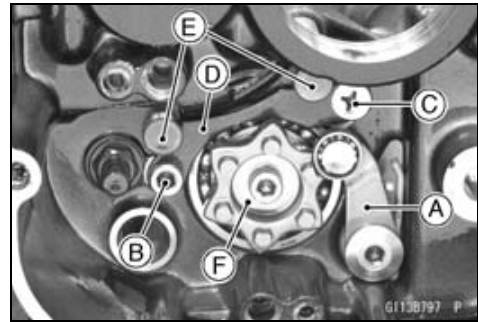
G113544BW3 C

- | | |
|--------------------------------------|--------------------------------------|
| 1. Needle Bearing | 17. Ball Bearing |
| 2. Circlip | 18. Drive Shaft |
| 3. Bearing Outer Race | 19. Nut |
| 4. Thrust Washer, 30 mm (1.18 in.) | 20. Collar |
| 5. 2nd Gear | 21. Oil Seal |
| 6. Circlip, 29 mm (1.14 in.) | 22. Steel Ball |
| 7. Toothed Washer, 35 mm (1.38 in.) | 23. Washer |
| 8. Bushing | 24. Bushing |
| 9. 6th (Top) Gear | 25. Toothed Washer, 34 mm (1.34 in.) |
| 10. Toothed Washer, 31 mm (1.22 in.) | 26. Circlip, 33 mm (1.30 in.) |
| 11. 4th Gear | 27. Bushing |
| 12. 3rd Gear | 28. Toothed Washer |
| 13. 5th Gear | 29. Toothed Washer |
| 14. Bushing | 30. Thrust Washer, 31 mm (1.22 in.) |
| 15. Thrust Washer, 33 mm (1.30 in.) | 31. Needle Bearing |
| 16. 1st Gear | 32. Output Shaft |

Transmission

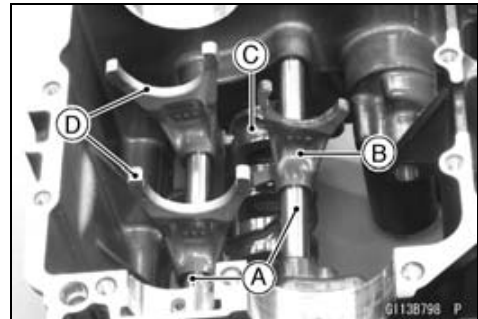
Shift Drum and Fork Removal

- Remove:
 - Lower Crankcase Half (see Crankcase Splitting)
 - Transmission Shafts
 - Gear Positioning Lever [A] (see External Shift Mechanism Removal)
 - Bolt [B] and Screw [C]
 - Shift Drum Bearing Holder [D]
- Pull out the shift rods [E], and take off the shift forks.
- Pull out the shift drum [F].



Shift Drum and Fork Installation

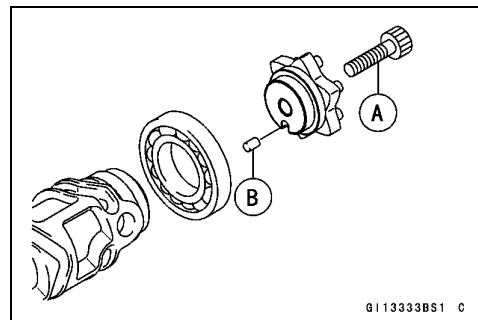
- Apply engine oil to the shift drum, forks and rods.
- Install the shift rods [A], noting the groove position.
 - The rods are identical.
 - Position the one with shortest ears [B] on the drive shaft and place the pin in the center groove in the shift drum [C].
 - The two forks [D] on the output shaft are identical.
- Install the forks so that its "266" and "267" side faces clutch side.
- Apply a non-permanent locking agent to the threads of the shift drum bearing holder bolt and screw, and tighten them.



Torque - Shift Drum Bearing Holder Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)
Shift Drum Bearing Holder Screw: 5.9 N·m (0.60 kgf·m, 52 in·lb)

Shift Drum Disassembly

- Remove the shift drum (see Shift Drum and Fork Removal).
- While holding the shift drum with a vise, remove the shift drum cam holder bolt.
 - Shift Drum Cam Holder Bolt [A]
 - Dowel Pin [B]



Shift Drum Assembly

- Be sure to install the dowel pin.
- Apply a non-permanent locking agent to the threads of the shift drum cam holder bolt, and tighten it.

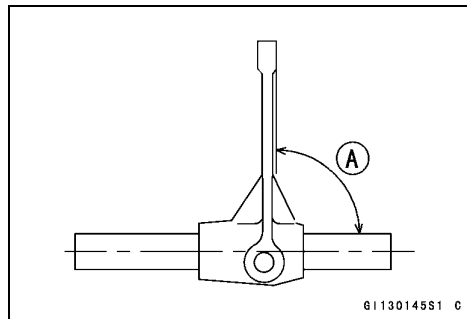
Torque - Shift Drum Cam Holder Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

9-34 CRANKSHAFT/TRANSMISSION

Transmission

Shift Fork Bending Inspection

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
90° [A]



Shift Fork/Gear Groove Wear Inspection

- Measure the thickness of the shift fork ears [A], and measure the width [B] of the gear grooves.
- ★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness

Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)

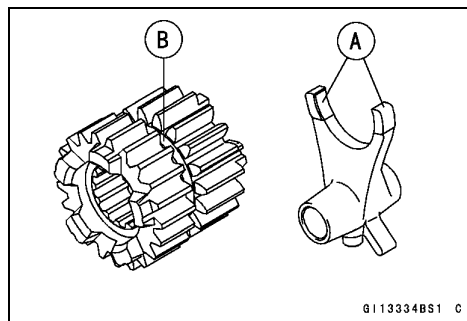
Service Limit: 5.8 mm (0.228 in.)

- ★ If the gear groove is worn over the service limit, the gear must be replaced.

Gear Groove Width

Standard: 6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)

Service Limit: 6.25 mm (0.246 in.)



Shift Fork Guide Pin/Drum Groove Wear Inspection

- Measure the diameter of each shift fork guide pin [A], and measure the width [B] of each shift drum groove.
- ★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter

Standard: 6.9 ~ 7.0 mm (0.272 ~ 0.276 in.)

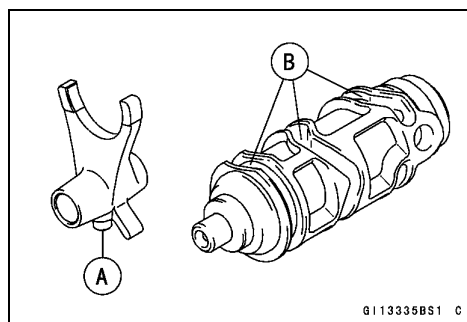
Service Limit: 6.8 mm (0.268 in.)

- ★ If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width

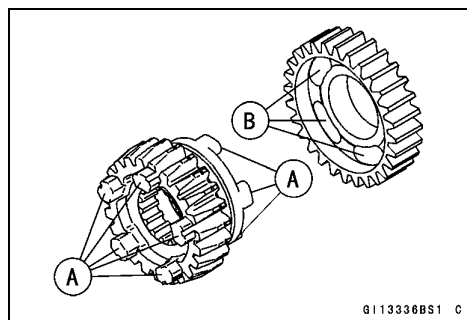
Standard: 7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)

Service Limit: 7.3 mm (0.287 in.)



Gear Dog and Gear Dog Hole Damage Inspection

- Visually inspect the gear dogs [A] and gear dog holes [B].
- ★ Replace any damaged gears or gears with excessively worn dogs or dog holes.



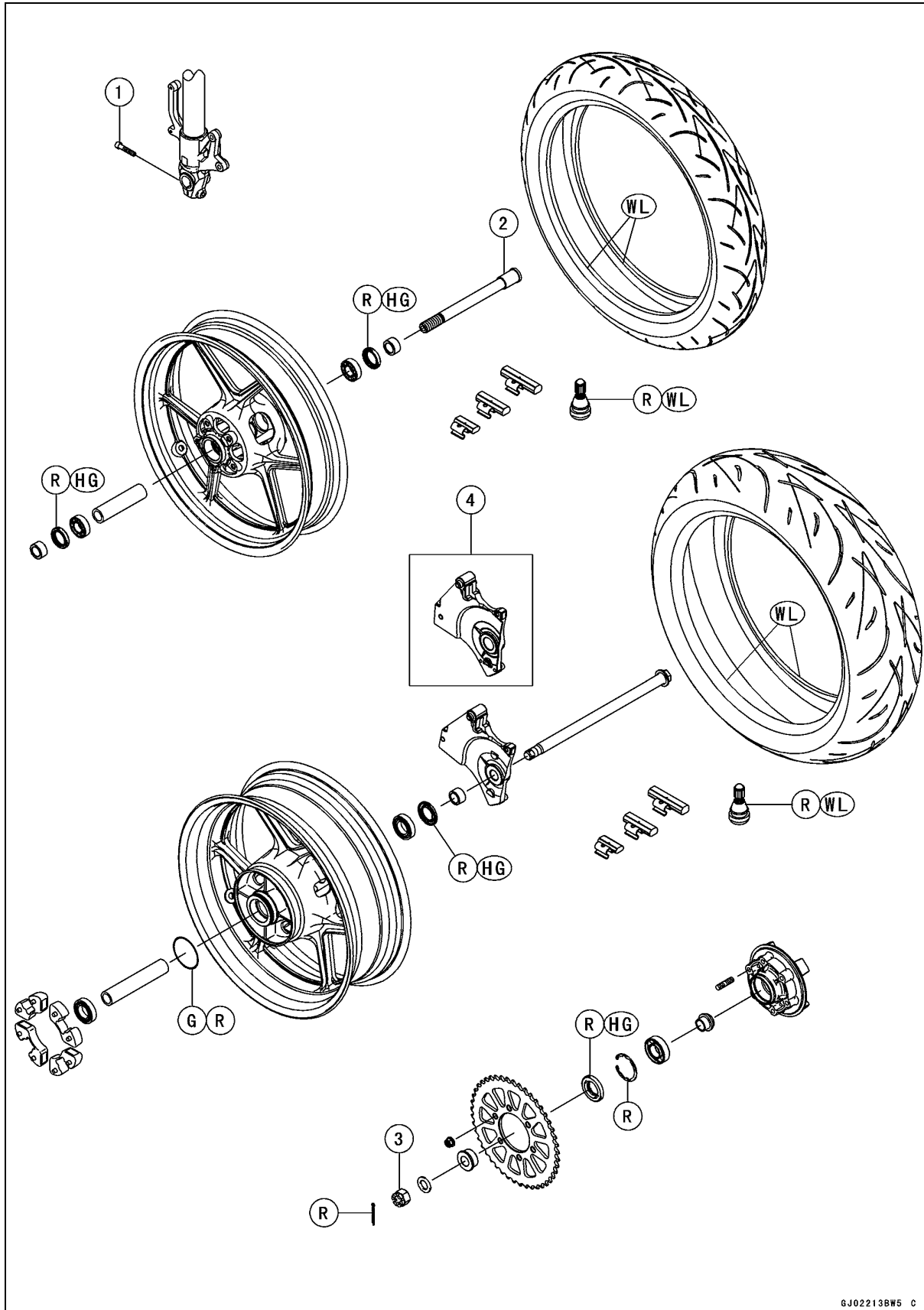
Wheels/Tires

Table of Contents

Exploded View	10-2
Specifications	10-4
Special Tools	10-5
Wheels (Rims)	10-6
Front Wheel Removal	10-6
Front Wheel Installation	10-7
Rear Wheel Removal	10-7
Rear Wheel Installation	10-8
Wheel Inspection	10-10
Axle Inspection	10-10
Balance Inspection	10-11
Balance Adjustment	10-11
Balance Weight Removal	10-11
Balance Weight Installation	10-11
Tires	10-13
Air Pressure Inspection/Adjustment	10-13
Tire Inspection	10-13
Tire Removal	10-13
Tire Installation	10-13
Tire Repair	10-15
Hub Bearing	10-16
Hub Bearing Removal	10-16
Hub Bearing Installation	10-16
Hub Bearing Inspection	10-17
Hub Bearing Lubrication	10-17

10-2 WHEELS/TIRES

Exploded View



GJ02213BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Clamp Bolt	20	2.0	15	
2	Front Axle	108	11.0	79.7	
3	Rear Axle Nut	108	11.0	79.7	

4. ABS Equipped Models

G: Apply grease.

HG: Apply high-temperature grease.

R: Replacement Parts

WL: Apply soap and water solution or rubber lubricant.

10-4 WHEELS/TIRES

Specifications

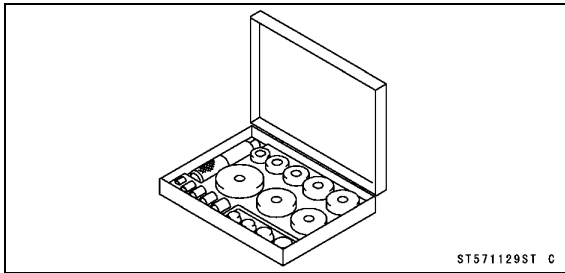
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.03 mm (0.0012 in.) or less	TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less	— — —
Balance Weights	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)	— — —
Rim Size:		
Front	J17M/C × MT3.50	— — —
Rear	J17M/C × MT5.50	— — —
Tires		
Air Pressure (when Cold):		
Front	Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm ² , 36 psi)	— — —
Rear	Up to 180 kg (397 lb) load: 290 kPa (2.90 kgf/cm ² , 42 psi)	— — —
Tread Depth:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.) (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	5.5 mm (0.22 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)
Standard Tire:		
Front:		
Size	120/70ZR17 M/C (58W)	— — —
Make	DUNLOP	— — —
Type	SPORTMAX D214F J, Tubeless	— — —
Rear:		
Size	180/55ZR17 M/C (73W)	— — —
Make	DUNLOP	— — —
Type	SPORTMAX D214 J, Tubeless	— — —

WARNING

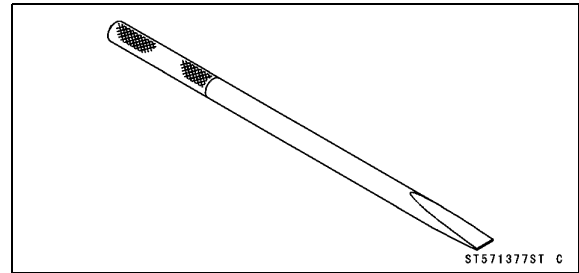
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

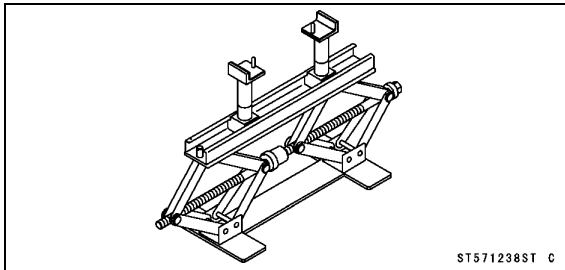
**Bearing Driver Set:
57001-1129**



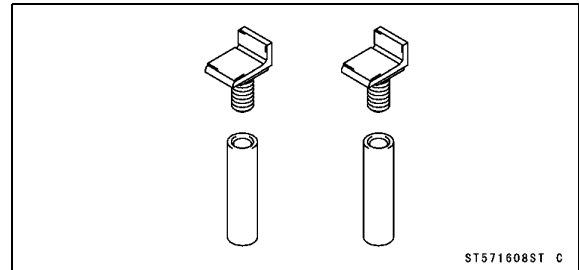
**Bearing Remover Shaft, $\phi 13$:
57001-1377**



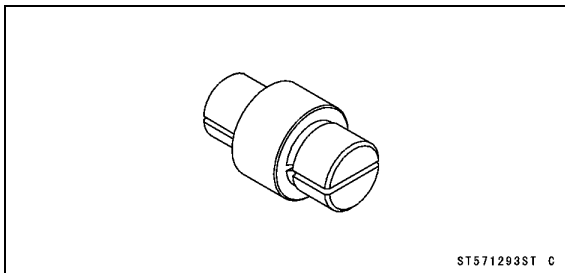
**Jack:
57001-1238**



**Jack Attachment:
57001-1608**



**Bearing Remover Head, $\phi 20 \times \phi 22$:
57001-1293**

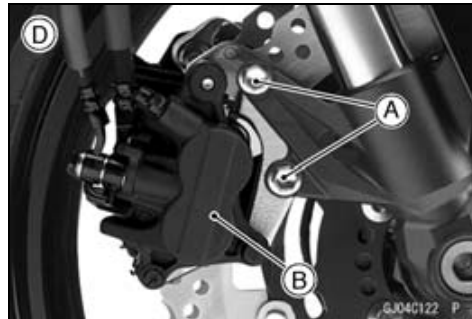
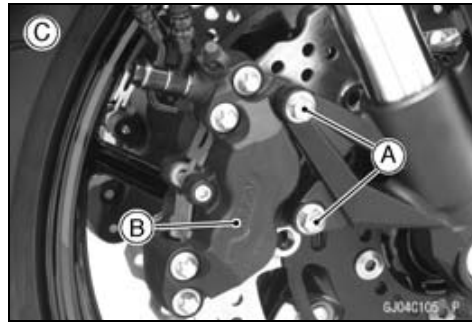


10-6 WHEELS/TIRES

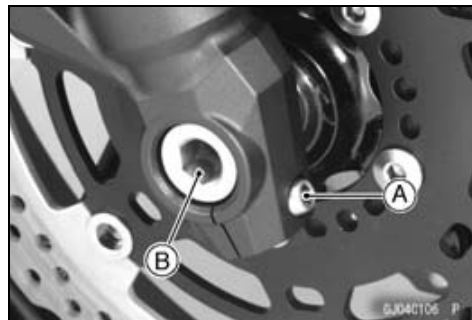
Wheels (Rims)

Front Wheel Removal

- Remove:
 - Front Caliper Mounting Bolts [A] (Both Sides)
 - Front Caliper [B] (Both Sides)
- ZR800A/B/D Models [C]
- ZR800C Model [D]
- For ABS equipped models, remove the front wheel rotation sensor (see Front Wheel Rotation Sensor Removal in the Brake chapter).



- Loosen:
 - Front Axle Clamp Bolt [A]
 - Front Axle [B]



- Remove:
 - Lower Fairing (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter)
 - Oxygen Sensor (see Oxygen Sensor Removal in the Electrical System chapter)
- Raise the front wheel off the ground.
 - Special Tools - Jack: 57001-1238**
 - Jack Attachment: 57001-1608**
- Pull out the axle to the right and drop the front wheel out of the forks.

NOTICE

Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Wheels (Rims)

Front Wheel Installation

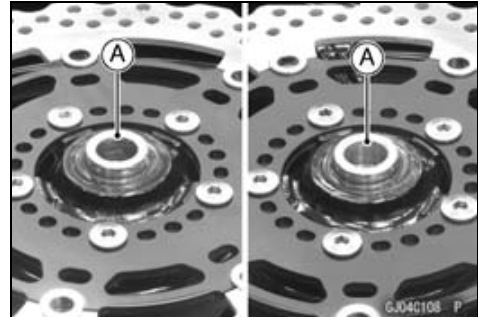
NOTE

○The direction of the wheel rotation [A] is shown by an arrow [B] on the wheel hub.

- Check the wheel rotation mark on the front wheel and install it.



- Apply high-temperature grease to the grease seal lips.
- Fit the collars [A] on the both sides of the hub.
- The collars are identical.
- Insert the front axle from the right side.
- Tighten:
 - Torque - Front Axle: 108 N·m (11.0 kgf·m, 79.7 ft·lb)**



- Before tightening the axle clamp bolt [A] on the right front fork leg, pump the front fork up and down 4 or 5 times to allow the right front fork leg to seat on the front axle.

NOTE

○Put a block in front of the front wheel to stop moving.

- Tighten:
 - Torque - Front Axle Clamp Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)**
- Install the removed parts (see appropriate chapters).
- Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

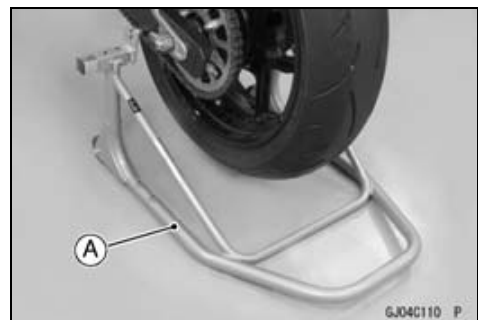


⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Rear Wheel Removal

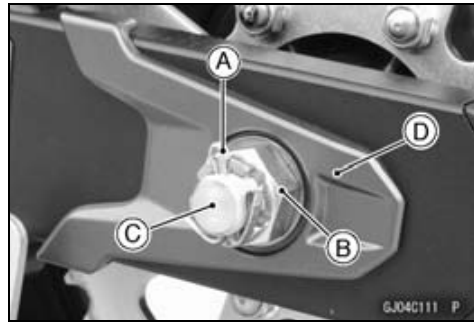
- Raise the rear wheel off the ground with the stand [A].



10-8 WHEELS/TIRES

Wheels (Rims)

- Remove:
 - Cotter Pin [A]
 - Axle Nut [B]
 - Washer
 - Axle [C] (from Right Side)
 - Wheel Alignment Indicator [D] (Both Sides)
- For ABS equipped models, remove the rear wheel rotation sensor from the caliper bracket (see Rear Wheel Rotation Sensor Removal in the Brakes chapter).



- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel back and remove it.

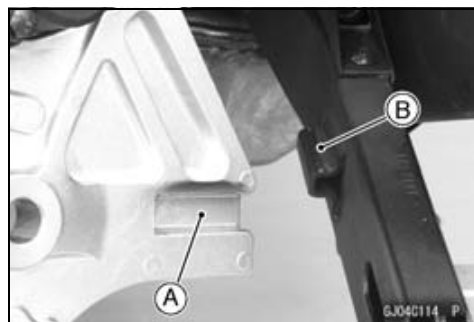
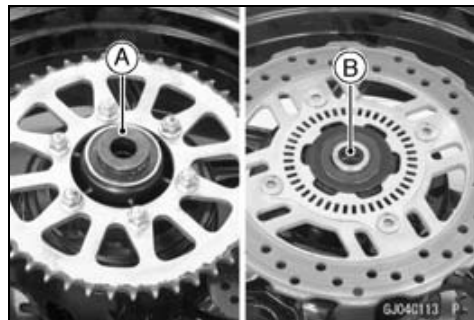


NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

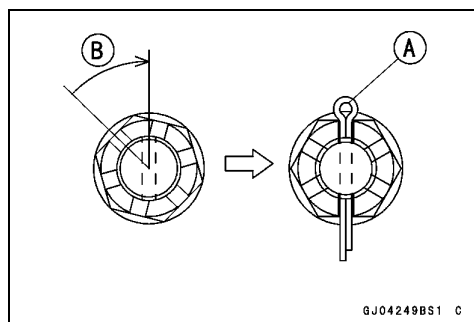
- Apply high-temperature grease to the grease seal lips.
- Fit the collars on the both sides of the hub.
 - Left Side Collar [A] (with Flange)
 - Right Side Collar [B]
- Engage the drive chain with the rear sprocket.
- Install the caliper bracket [A] onto the swingarm stop [B].
- Install the right wheel alignment indicator to the axle.
- Insert the axle from the right side of the wheel.
- Install the left wheel alignment indicator.
- Tighten:
 - Torque - Rear Axle Nut: 108 N·m (11.0 kgf·m, 79.7 ft·lb)



- Insert a new cotter pin [A].

NOTE

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

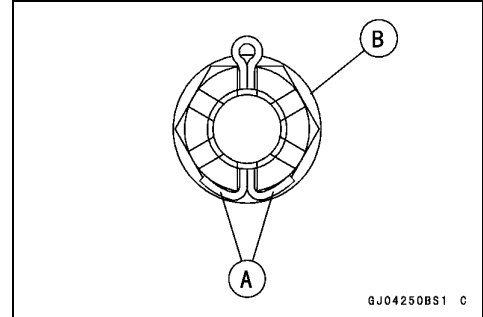


Wheels (Rims)

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

⚠ WARNING

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



- Adjust the drive chain slack after installation (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- For ABS equipped models, install the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Installation in the Brakes chapter).
- Check the rear brake effectiveness.

⚠ WARNING

After servicing, it takes several applications of the brake lever or pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever or pedal is obtained by pumping the lever or pedal until the pads are against the disc.

10-10 WHEELS/TIRES

Wheels (Rims)

Wheel Inspection

- Raise the front/rear wheel off the ground (see Front/Rear Wheel Removal).
- Spin the wheel lightly, and check for roughness or binding.
- ★ If roughness or binding is found, replace the hub bearings (see Hub Bearing Removal/Installation).
- Inspect the wheel for small cracks, dents, bending, or warp.
- ★ If there is any damage to the wheel, replace the wheel.
- Remove the wheel, and support it with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.
- ★ If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection).
- ★ If the problem is not due to the bearings, replace the wheel.

Rim Runout (with tire installed)

Standard:

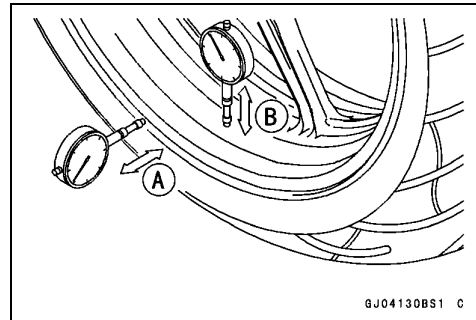
Axial TIR 0.5 mm (0.02 in.) or less

Radial TIR 0.8 mm (0.03 in.) or less

Service Limit:

Axial TIR 1.0 mm (0.04 in.)

Radial TIR 1.0 mm (0.04 in.)



⚠ WARNING

Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

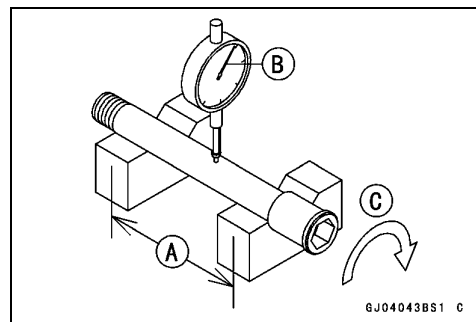
Axle Inspection

- Remove the front and rear axles (see Front/Rear Wheel Removal).
- Visually inspect the front and rear axle for damages.
- ★ If the axle is damaged or bent, replace it.
- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.
- ★ If axle runout exceeds the service limit, replace the axle.

Axle Runout/100 mm (3.94 in.)

Standard: TIR 0.03 mm (0.0012 in.) or less

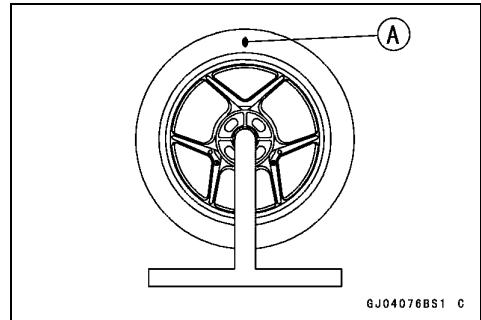
Service Limit: TIR 0.2 mm (0.008 in.)



Wheels (Rims)

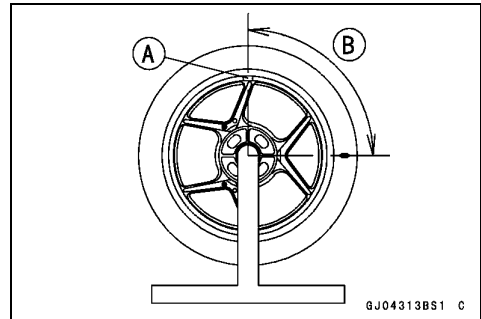
Balance Inspection

- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.
- Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.
- ★ If the wheel always stops in one position, adjust the wheel balance (see Balance Adjustment).



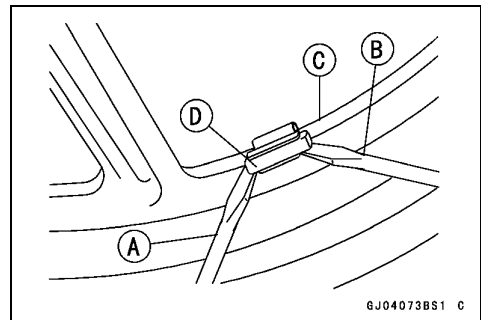
Balance Adjustment

- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.
- ★ If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.
- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.



Balance Weight Removal

- Insert standard tip screwdrivers [A] [B] between the rib [C] and the weight [D] as shown.
- Pry the balance weight with two screwdrivers and remove the balance weight.
- Discard the used balance weight.

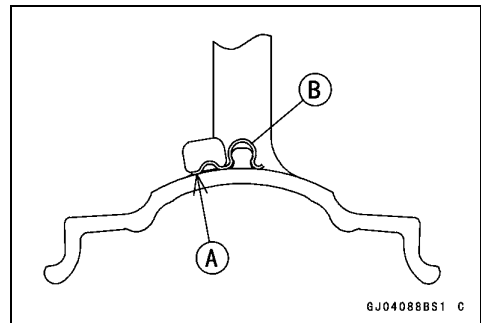


NOTICE

Do not tap the screwdrivers. The rim could be damaged.

Balance Weight Installation

- Check if the weight portion has any play on the blade [A] and clip [B].
- ★ If it does, discard it.



⚠ WARNING

Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, the blade and/or clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight.

10-12 WHEELS/TIRES

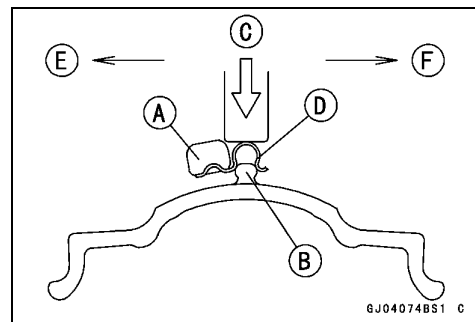
Wheels (Rims)

Balance Weight

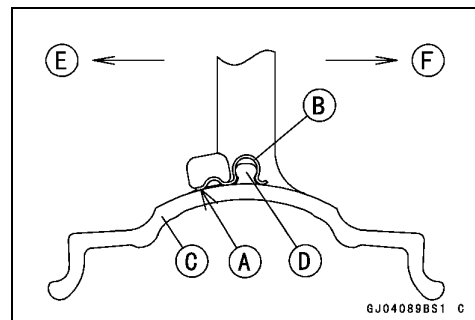
Part Number	Weight
41075-0007	10 g (0.35 oz.)
41075-0008	20 g (0.71 oz.)
41075-0009	30 g (1.06 oz.)

NOTE

- Balance weights are available from Kawasaki dealers in 10, 20, and 30 grams (0.35, 0.71, and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.
- Do not use four or more balance weights (more than 90 grams, 3.17 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.
- Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].
Left Side [E]
Right Side [F]



- Be sure to install the balance weight.
- Check that the blade [A] and clip [B] are fully seated on the rim [C] and that the clip is hooked over the rib [D].
Left Side [E]
Right Side [F]



Tires

Air Pressure Inspection/Adjustment

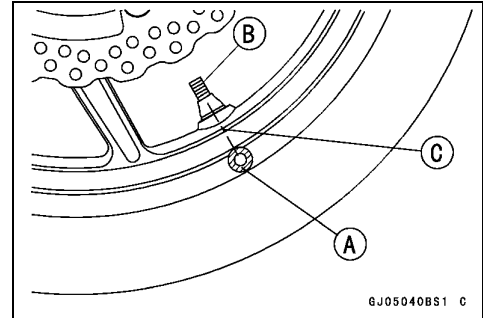
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

Tire Inspection

- Refer to the Wheel/Tire Damage Inspection in the Periodic Maintenance chapter.

Tire Removal

- Remove:
 - Wheels (see Front/Rear Wheel Removal)
 - Valve Core (Let out the air)
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
 - Chalk Mark or Yellow Mark [A]
 - Air Valve [B]
 - Align [C]
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.



NOTICE

Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.

- Remove the tire from the rim using a suitable commercially available tire changer.

NOTE

○The tires cannot be removed with hand tools because they fit the rims too tightly.

Tire Installation

⚠ WARNING

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

- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

NOTICE

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

10-14 WHEELS/TIRES

Tires

- Install a new valve in the rim.
- Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.

NOTICE

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

- The air valve is as shown.

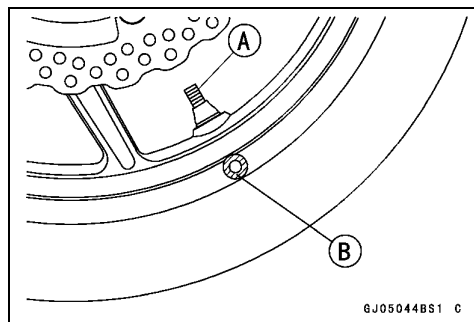
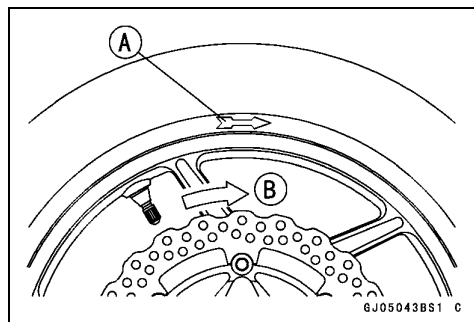
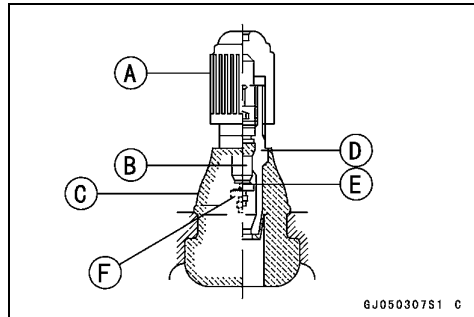
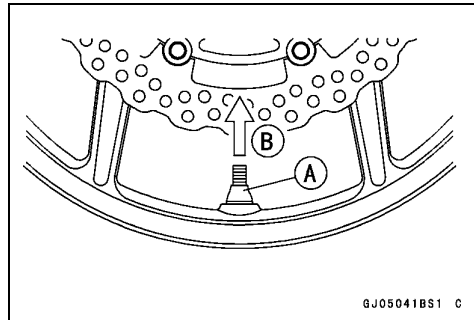
Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]

- 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 air valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).
- Install the tire bead over the rim flange using a suitable commercially available tire changer.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.

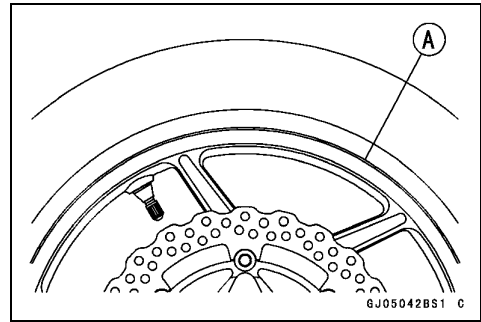
⚠ WARNING

Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi).



Tires

- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.
- ★ If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.
- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.
- Inflate the tire slightly above standard inflation.
- Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.
- Adjust the air pressure to the specified pressure (see Air Pressure Inspection in the Periodic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).



Tire Repair

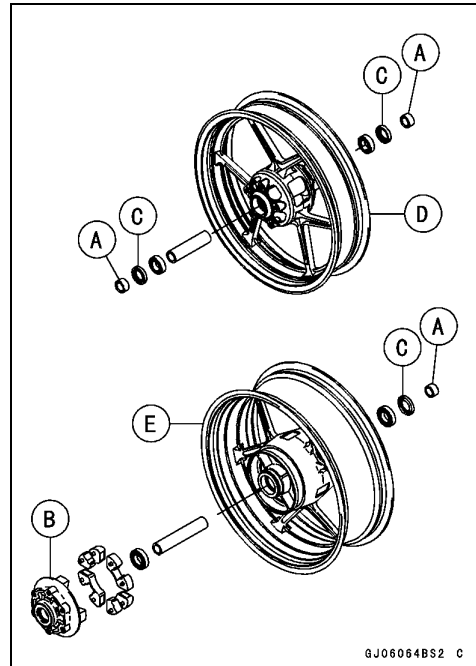
Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

10-16 WHEELS/TIRES

Hub Bearing

Hub Bearing Removal

- Remove the wheels (see Front/Rear Wheel Removal), and take out the following.
 - Collars [A]
 - Coupling [B] (Out of rear hub)
 - Grease Seals [C]
 - Front Wheel [D]
 - Rear Wheel [E]



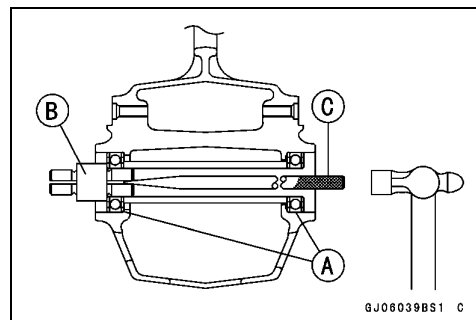
- Use the bearing remover to remove the hub bearings [A].

NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place wooden blocks under the wheel so that the disc does not touch the ground.

Special Tools - Bearing Remover Head, $\phi 20 \times \phi 22$ [B]:
57001-1293

Bearing Remover Shaft, $\phi 13$ [C]: 57001-1377



Hub Bearing Installation

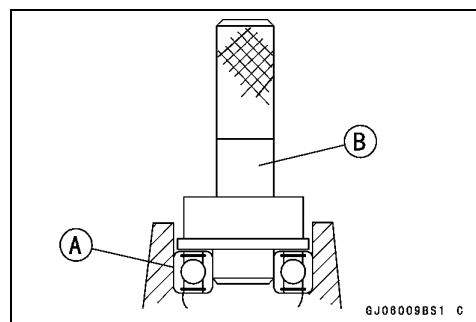
- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.

NOTE

Install the bearings so that the marked side faces out.

- Press in each bearing [A] right until they are bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

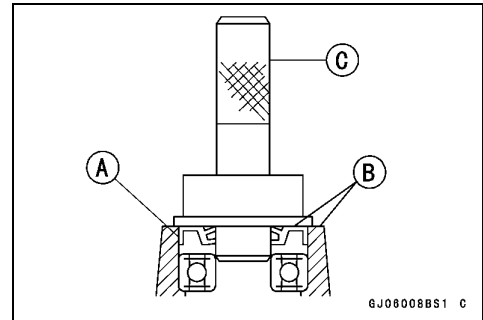


Hub Bearing

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.
- Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set [C]: 57001-1129

- Install the removed parts (see appropriate chapters).



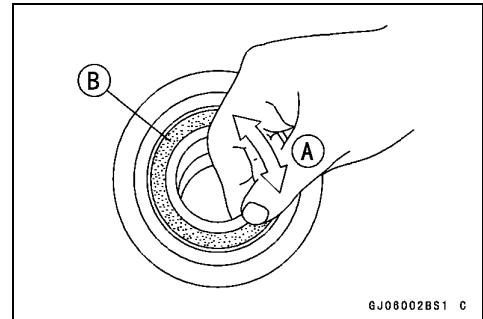
Hub Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○ Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.
- ★ If bearing play, roughness, or binding is found, replace the bearing.
- Examine the bearing seal [B] for tears or leakage.
- ★ If the seal is torn or is leaking, replace the bearing.



Hub Bearing Lubrication

NOTE

○ Since the hub bearings are packed with grease and sealed, lubrication is not required.

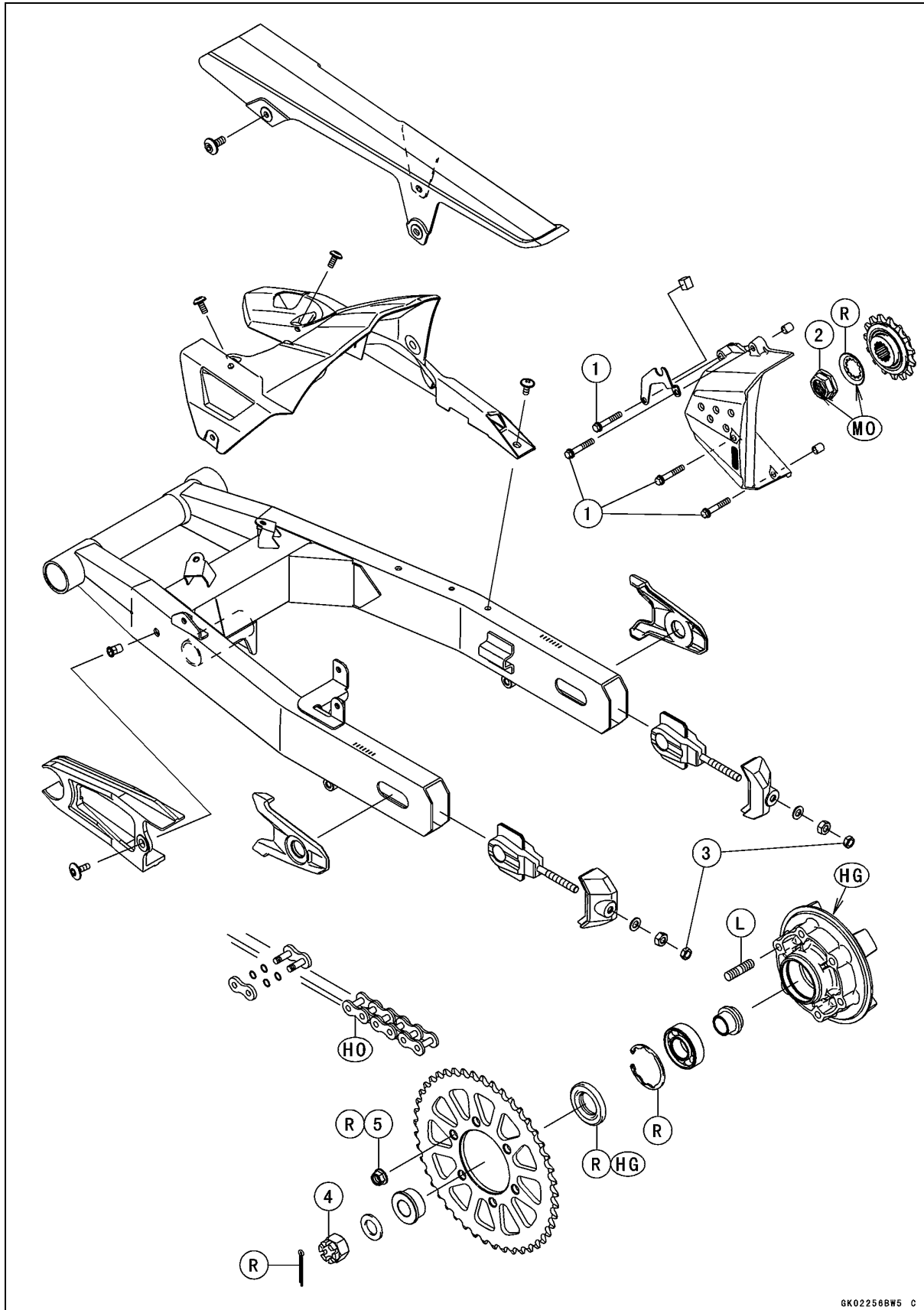
Final Drive

Table of Contents

Exploded View	11-2
Specifications	11-4
Special Tools	11-5
Drive Chain	11-6
Drive Chain Slack Inspection	11-6
Drive Chain Slack Adjustment	11-6
Wheel Alignment Inspection/Adjustment	11-6
Drive Chain Wear Inspection	11-6
Drive Chain Lubrication.....	11-6
Drive Chain Removal/Installation.....	11-6
Sprocket, Coupling	11-10
Engine Sprocket Removal	11-10
Engine Sprocket Installation	11-10
Rear Sprocket Removal.....	11-11
Rear Sprocket Installation.....	11-11
Coupling Installation.....	11-12
Coupling Bearing Removal	11-12
Coupling Bearing Installation	11-12
Coupling Bearing Inspection	11-13
Coupling Bearing Lubrication.....	11-13
Coupling Damper Inspection.....	11-13
Sprocket Wear Inspection.....	11-13
Rear Sprocket Warp Inspection	11-14

11-2 FINAL DRIVE

Exploded View



GK02256BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Cover Bolts	6.9	0.70	61 in·lb	
2	Engine Sprocket Nut	167	17.0	123	MO
3	Chain Adjuster Locknuts	16.5	1.68	12.2	
4	Rear Axle Nut	108	11.0	79.7	
5	Rear Sprocket Nuts	59	6.0	44	R

HG: Apply high-temperature grease.

HO: Apply heavy oil.

L: Apply a non-permanent locking agent.

MO: Apply molybdenum disulfide oil solution.

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

R: Replacement Parts

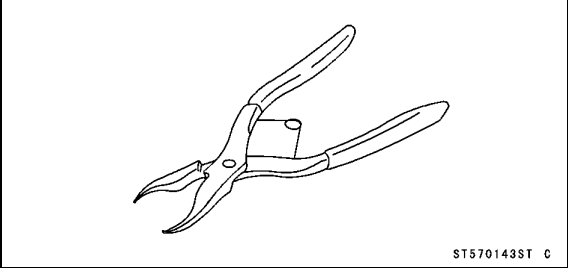
11-4 FINAL DRIVE

Specifications

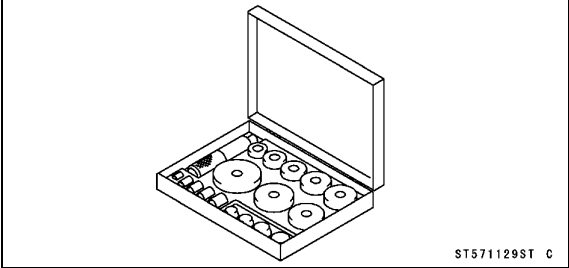
Item	Standard	Service Limit
Drive Chain		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	— — —
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	ENUMA	— — —
Type	EK520MVXL2	— — —
Link	114 links	— — —
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tools

Inside Circlip Pliers:
57001-143



Bearing Driver Set:
57001-1129



11-6 FINAL DRIVE

Drive Chain

Drive Chain Slack Inspection

- Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter.

Drive Chain Slack Adjustment

- Refer to the Drive Chain Slack Adjustment in the Periodic Maintenance chapter.

Wheel Alignment Inspection/Adjustment

- Refer to the Wheel Alignment Inspection in the Periodic Maintenance chapter.

Drive Chain Wear Inspection

- Refer to the Drive Chain Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Lubrication

- Refer to the Drive Chain Lubrication Condition Inspection in the Periodic Maintenance chapter.

Drive Chain Removal/Installation

- Remove:
 - Chain Cover Bolts [A]
 - Chain Cover [B]
 - Engine Sprocket Cover (see Engine Sprocket Removal)

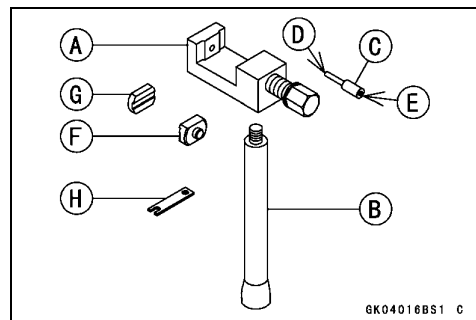


NOTICE

For safety, if the drive chain shall be replaced, replace it using a recommended tool.

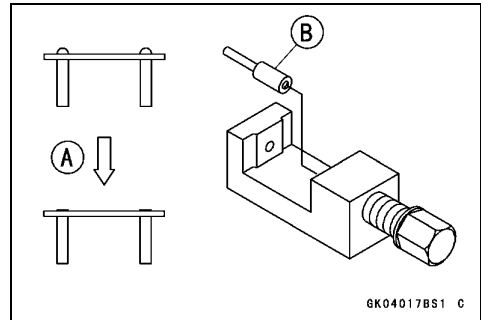
Recommended Tool - Type: EK Joint Tool #50
Brand: ENUMA

Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
For Riveting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]

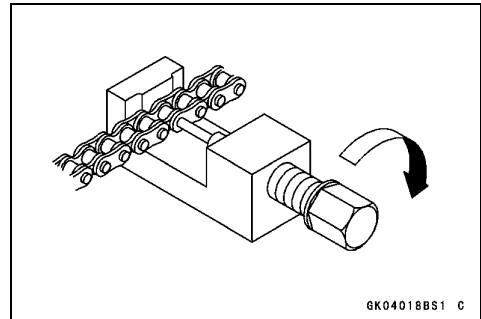


Drive Chain

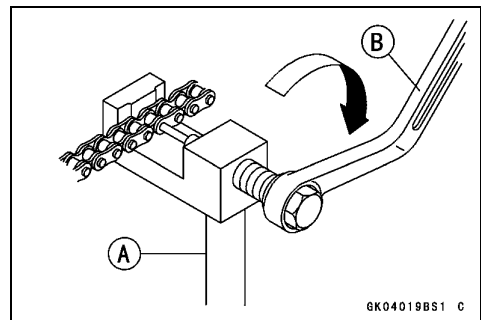
- Grind [A] the pin head to make it flat.
- Set the cutting and riveting pin [B] as shown.



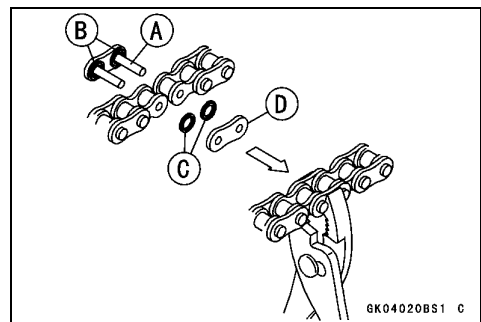
- Screw the pin holder until it touches chain pin.
- Be sure that the cutting pin hits center of chain pin.



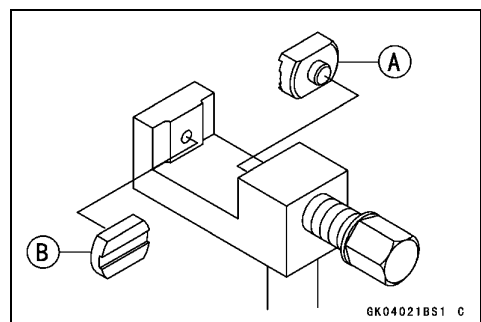
- Screw the handlebar [A] into body.
- Turn the pin holder with wrench [B] clockwise to extract chain pin.



- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals.
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- In case of grease seals chain, be sure to set the grease seals correctly.



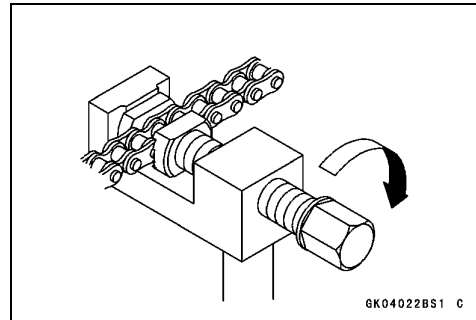
- Set the plate holder (A) [A] and plate holder (B) [B] on the body.



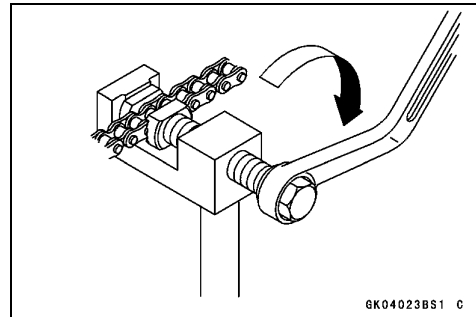
11-8 FINAL DRIVE

Drive Chain

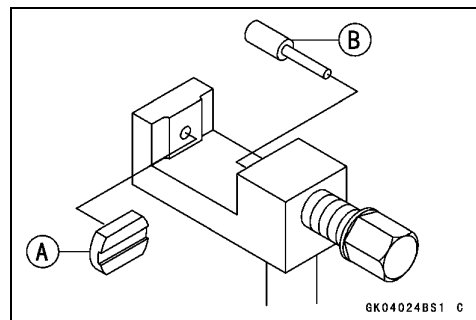
- Fit the plate holder (A) to link plate.
- Turn the pin holder by hand until plate holder (B) touches the other link plate.



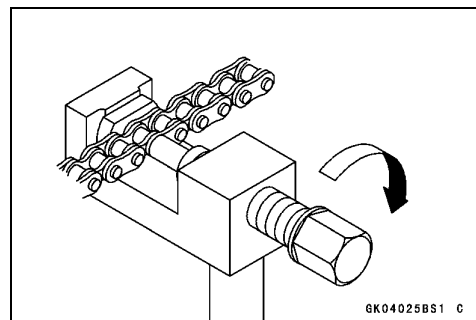
- Turn the pin holder by wrench clockwise until two pins of link come into groove of plate holder (A).
- Take off the plate holder.



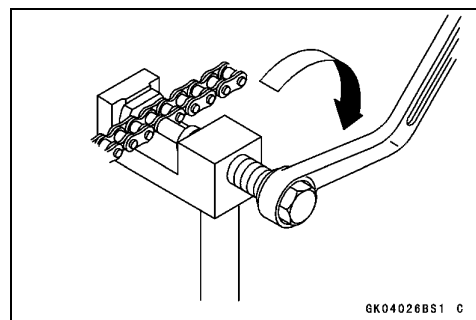
- Set the plate holder (B) [A] and cutting and riveting pin [B] as shown.



- Turn the pin holder until riveting pin touches link pin.



- Turn the wrench clockwise until tip of riveting pin hits of link pin.
- Rivet it.
- Same work for the other link pin.



Drive Chain

- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

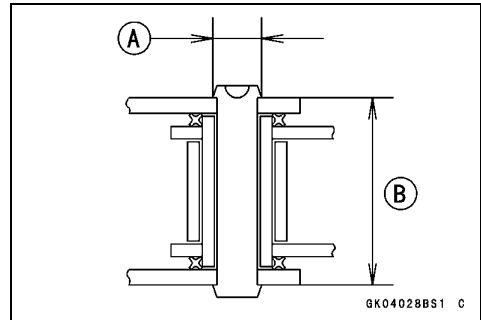
Link Pin Outside Diameter

Standard: 5.7 ~ 6.0 mm (0.22 ~ 0.24 in.)

Link Plates Outside Width

Standard: 17.25 ~ 17.45 mm (0.679 ~ 0.687 in.)

- ★ If the reading exceeds the specified length, cut and rejoin the chain again.
- Check:
 - Movement of the Rollers
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

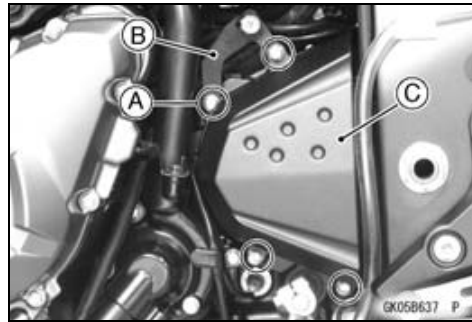


11-10 FINAL DRIVE

Sprocket, Coupling

Engine Sprocket Removal

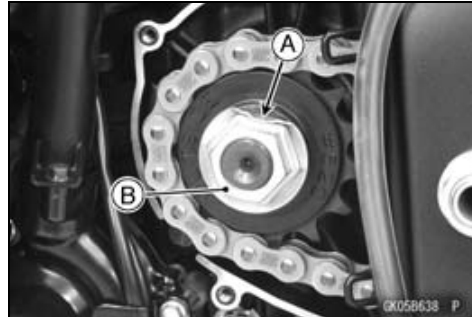
- Remove:
 - Left Frame Cover (see Frame Cover Removal in the Frame chapter)
 - Engine Sprocket Cover Bolts [A]
 - Bracket [B]
 - Engine Sprocket Cover [C]



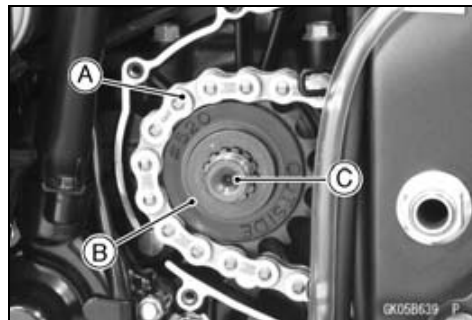
- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

NOTE

○When loosening the engine sprocket nut, hold the rear brake on.



- Raise the rear wheel off the ground with the stand.
- Loosen the drive chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Remove the drive chain from the rear sprocket toward the right.
- Disengage the drive chain [A] from the engine sprocket [B].
- Pull the engine sprocket off the output shaft [C].



Engine Sprocket Installation

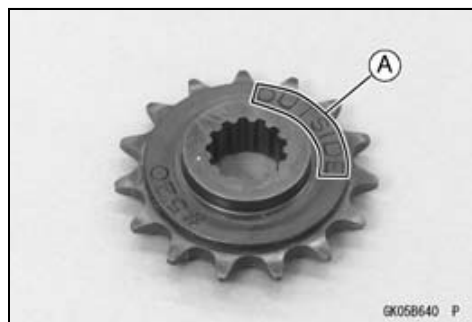
- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket so that "OUTSIDE" letters [A] face outward.
- Apply molybdenum disulfide oil solution to the threads and the seating surface of the engine sprocket nut.
- Tighten:

Torque - Engine Sprocket Nut: 167 N·m (17.0 kgf·m, 123 ft·lb)

NOTE

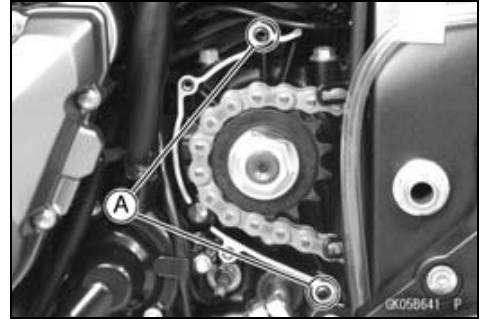
○Tighten the nut while applying the rear brake.

- After torquing the engine sprocket nut, bend the one side of the washer over the nut.

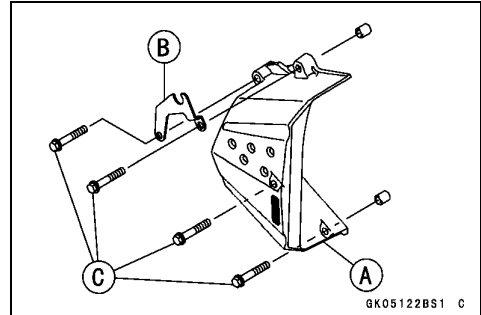


Sprocket, Coupling

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



- Install the engine sprocket cover [A].
 - Install the bracket [B] as shown, and tighten the cover bolts [C].
- Torque - Engine Sprocket Cover Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)**
- Adjust the drive chain slack after installing the engine sprocket (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

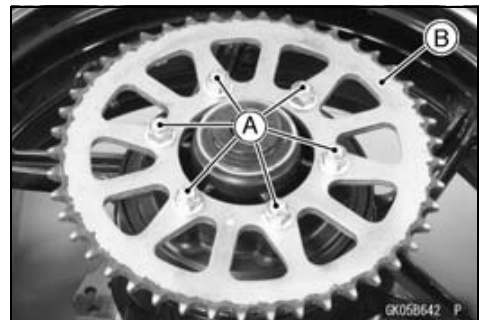


Rear Sprocket Removal

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

NOTICE

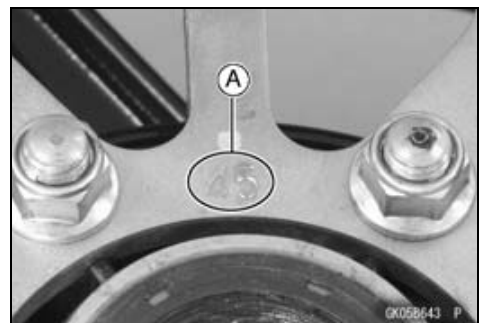
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



- Remove the rear sprocket nuts [A].
- Remove the rear sprocket [B].

Rear Sprocket Installation

- Install the sprocket facing the tooth number marking [A] outward.
- Replace the rear sprocket nuts with new ones.
- Tighten:
 - Torque - Rear Sprocket Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)**
- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).

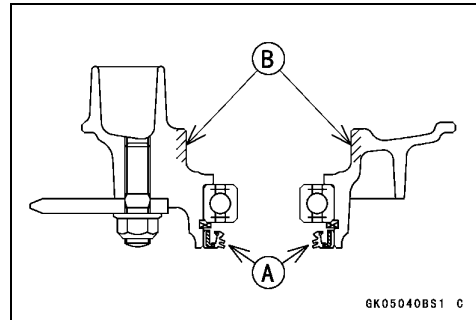


11-12 FINAL DRIVE

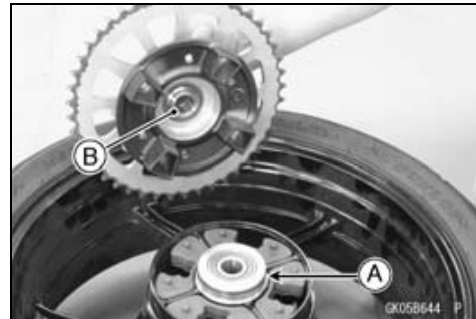
Sprocket, Coupling

Coupling Installation

- Apply high-temperature grease to the following.
 - Coupling Grease Seal Lips [A]
 - Coupling Internal Surface [B]



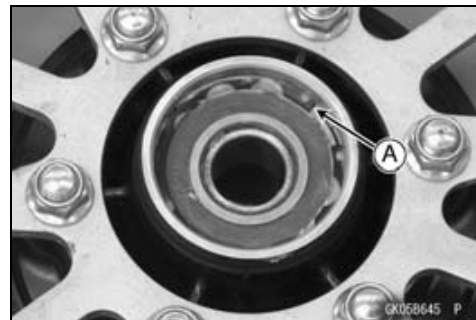
- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install the collar [B].



Coupling Bearing Removal

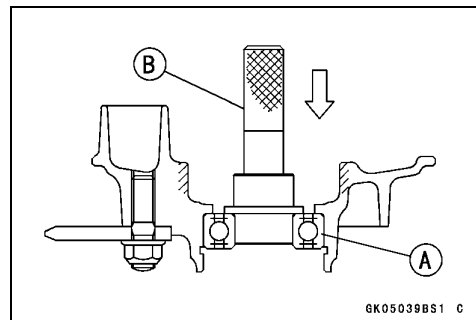
- Remove:
 - Coupling
 - Grease Seal
 - Circlip [A]

Special Tool - Inside Circlip Pliers: 57001-143



- Remove the bearing [A] by tapping from the wheel side.

Special Tool - Bearing Driver Set [B]: 57001-1129



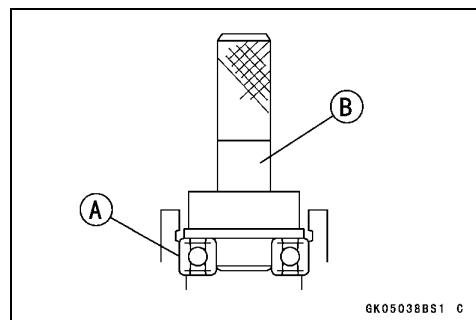
Coupling Bearing Installation

- Replace the bearing with a new one.
- Press in the bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

- Replace the circlip with a new one.

Special Tool - Inside Circlip Pliers: 57001-143



Sprocket, Coupling

- Replace the grease seal with a new one.
- Press in the grease seal so that the seal surface is flush with the end of the hole.
- Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001-1129

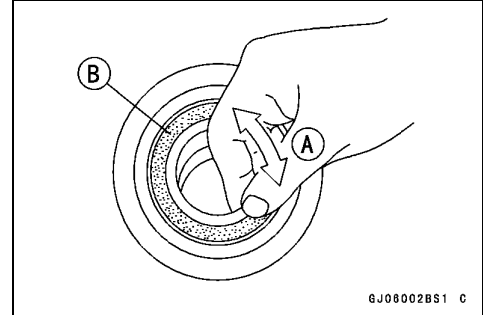
Coupling Bearing Inspection

Since the coupling bearing is made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○ It is not necessary to remove the coupling bearing for inspection. If the bearing is removed, it will need to be replaced with a new one.

- Turn the bearing in the coupling back and forth [A] while checking for plays, roughness or binding.
- ★ If the bearing play, roughness or binding is found, replace the bearing.
- Examine the bearing seal [B] for tears or leakage.
- ★ If the seal is torn or is leaking, replace the bearing.



Coupling Bearing Lubrication

NOTE

○ Since the coupling bearing is packed with grease and sealed, lubrication is not required.

Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.



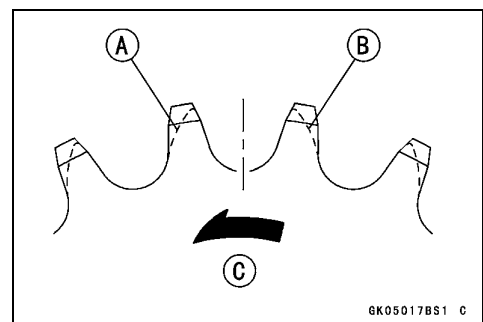
Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.
- ★ If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection in the Periodic Maintenance chapter).

Worn Tooth (Engine Sprocket) [A]

Worn Tooth (Rear Sprocket) [B]

Direction of Rotation [C]



NOTE

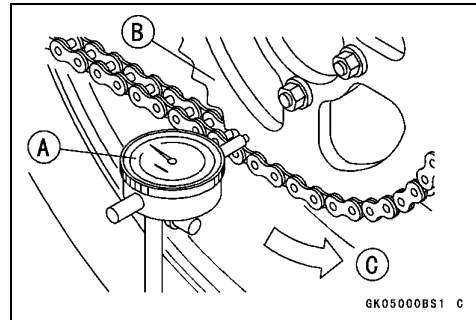
○ If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.

11-14 FINAL DRIVE

Sprocket, Coupling

Rear Sprocket Warp Inspection

- Raise the rear wheel off the ground with the stand so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).
- ★ If the runout exceeds the service limit, replace the rear sprocket.



Rear Sprocket Warp

Standard: TIR 0.4 mm (0.016 in.) or less

Service Limit: TIR 0.5 mm (0.020 in.)

Brakes

Table of Contents

Exploded View	12-4
Specifications	12-14
Special Tools	12-15
Brake Lever, Brake Pedal.....	12-16
Brake Lever Position Adjustment.....	12-16
Brake Pedal Position Inspection	12-16
Brake Pedal Position Adjustment.....	12-16
Brake Pedal Removal	12-16
Brake Pedal Installation	12-17
Calipers	12-18
Front Caliper Removal	12-18
Rear Caliper Removal.....	12-18
Caliper Installation	12-18
Front Caliper Disassembly.....	12-19
Front Caliper Assembly.....	12-19
Rear Caliper Disassembly	12-19
Rear Caliper Assembly	12-20
Caliper Fluid Seal Damage Inspection.....	12-20
Caliper Dust Seal Damage Inspection	12-21
Front Caliper Dust Boot and Friction Boot Damage Inspection (ZR800C Model).....	12-21
Rear Caliper Dust Boot and Friction Boot Damage Inspection.....	12-21
Caliper Piston and Cylinder Damage Inspection	12-22
Front Caliper Holder Shaft Wear Inspection (ZR800C Model).....	12-22
Rear Caliper Holder Wear Inspection	12-23
Brake Pads	12-24
Front Brake Pad Removal.....	12-24
Front Brake Pad Installation.....	12-24
Rear Brake Pad Removal	12-26
Rear Brake Pad Installation	12-26
Brake Pad Wear Inspection	12-27
Master Cylinder	12-28
Front Master Cylinder Removal	12-28
Front Master Cylinder Installation	12-28
Rear Master Cylinder Removal.....	12-28
Rear Master Cylinder Installation.....	12-29
Front Master Cylinder Disassembly	12-29
Rear Master Cylinder Disassembly.....	12-29
Master Cylinder Assembly	12-29
Master Cylinder Inspection (Visual Inspection).....	12-30
Brake Disc	12-31
Brake Disc Removal	12-31
Brake Disc Installation	12-31
Brake Disc Wear Inspection.....	12-31
Brake Disc Warp Inspection.....	12-31
Brake Fluid	12-32
Brake Fluid Level Inspection.....	12-32
Brake Fluid Change	12-32
Brake Line Bleeding.....	12-32
Brake Hose.....	12-35
Brake Hose and Pipe Removal/Installation.....	12-35

12-2 BRAKES

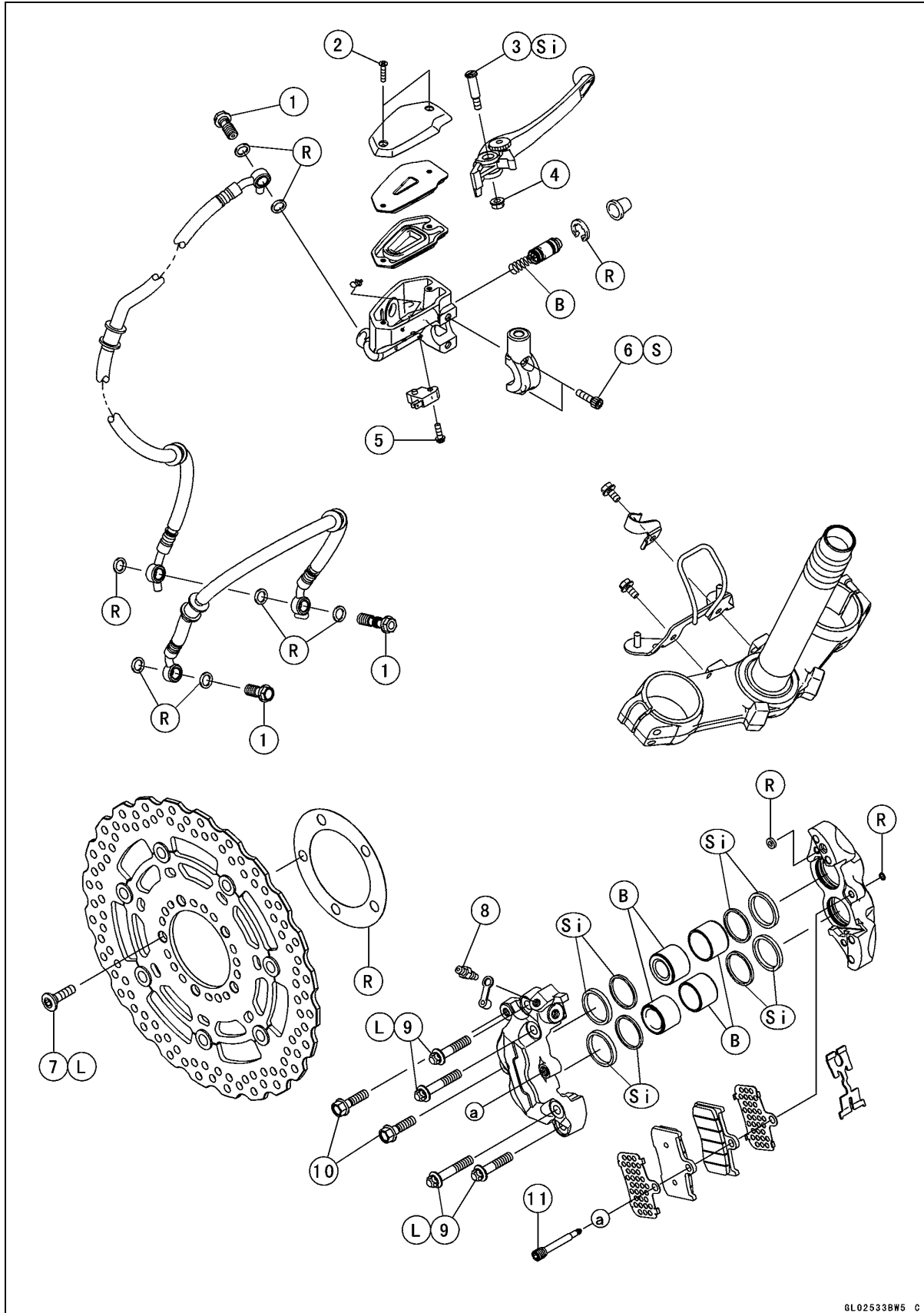
Brake Hose and Pipe Inspection.....	12-35
Anti-Lock Brake System (Equipped Models).....	12-36
ABS Servicing Precautions.....	12-39
ABS Troubleshooting Outline.....	12-41
Inquiries to Rider.....	12-44
Self-diagnosis Outline.....	12-46
Self-diagnosis Procedures.....	12-46
Service Code Clearing Procedures.....	12-47
How to Read Service Codes.....	12-50
How to Erase Service Codes.....	12-50
Yellow ABS Indicator Light (LED) Inspection.....	12-52
ABS Unit Solenoid Valve Inspection (Service Code 13, 14, 17, 18).....	12-55
ABS Solenoid Valve Relay Inspection (Service Code 19).....	12-55
Front, Rear Wheel Rotation Difference Abnormal Inspection (Service Code 25).....	12-55
ABS Motor Inspection (Service Code 35).....	12-56
Wheel Rotation Sensor Signal Abnormal Inspection (Front: Service Code 42) (Rear: Service Code 44).....	12-56
Front or Rear Wheel Rotation Sensor Wiring Inspection (Service Code 43).....	12-57
Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45).....	12-59
Power Supply Voltage Abnormal Inspection (Service Code 52: Low Voltage) (Service Code 53: High Voltage).....	12-61
ABS Hydraulic Unit Internal Error Inspection (Service Code 55).....	12-62
ABS Hydraulic Unit Removal.....	12-63
ABS Hydraulic Unit Installation.....	12-65
ABS Hydraulic Unit Inspection.....	12-65
Front Wheel Rotation Sensor Removal.....	12-66
Front Wheel Rotation Sensor Installation.....	12-66
Rear Wheel Rotation Sensor Removal.....	12-66
Rear Wheel Rotation Sensor Installation.....	12-67
Wheel Rotation Sensor Inspection.....	12-68
Wheel Rotation Sensor Air Gap Inspection.....	12-68
Wheel Rotation Sensor Rotor Inspection.....	12-69
Fuse Removal.....	12-69
Fuse Installation.....	12-69
Fuse Inspection.....	12-69

This page intentionally left blank.

12-4 BRAKES

Exploded View

ZR800A Model



GL02533BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Front Master Cylinder Reservoir Cap Screws	1.5	0.15	13 in·lb	
3	Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
4	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
5	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
6	Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
7	Front Brake Disc Mounting Bolts	27	2.8	20	L
8	Bleed Valve	7.8	0.80	69 in·lb	
9	Front Caliper Assembly Bolts	22	2.2	16	L
10	Front Caliper Mounting Bolts	25	2.5	18	
11	Front Brake Pad Pins	17.2	1.75	12.7	

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

R: Replacement Parts

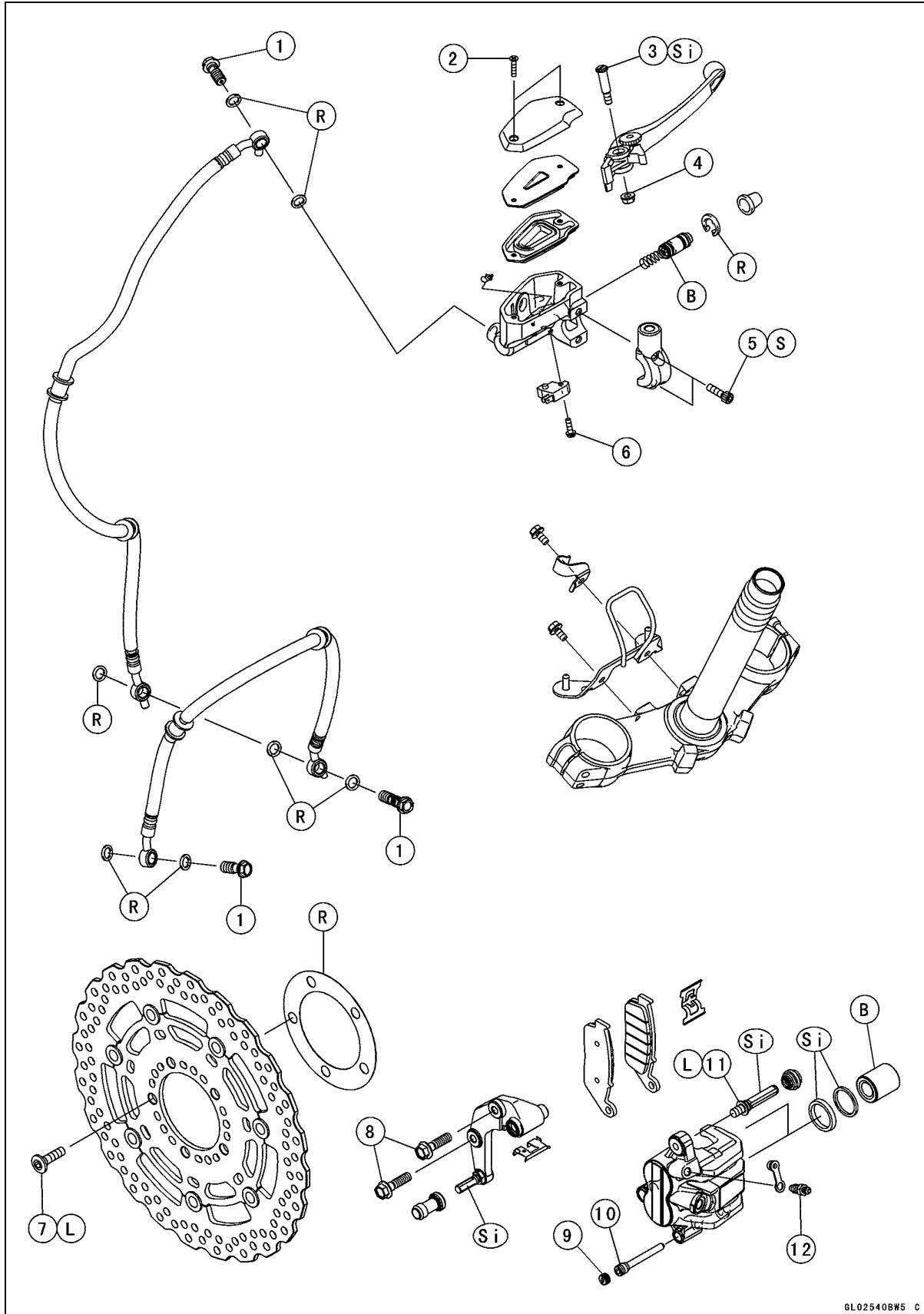
S: Follow the specified tightening sequence.

Si: Apply silicone grease.

12-6 BRAKES

Exploded View

ZR800C Model



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Front Master Cylinder Reservoir Cap Screws	1.5	0.15	13 in·lb	
3	Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
4	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
5	Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
6	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
7	Front Brake Disc Mounting Bolts	27	2.8	20	L
8	Front Caliper Mounting Bolts	25	2.5	18	
9	Front Brake Pad Pin Plugs	2.5	0.25	22 in·lb	
10	Front Brake Pad Pins	17.2	1.75	12.7	
11	Front Caliper Holder Pin Bolts	22	2.2	16	L, Si
12	Bleed Valves	7.8	0.80	69 in·lb	

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

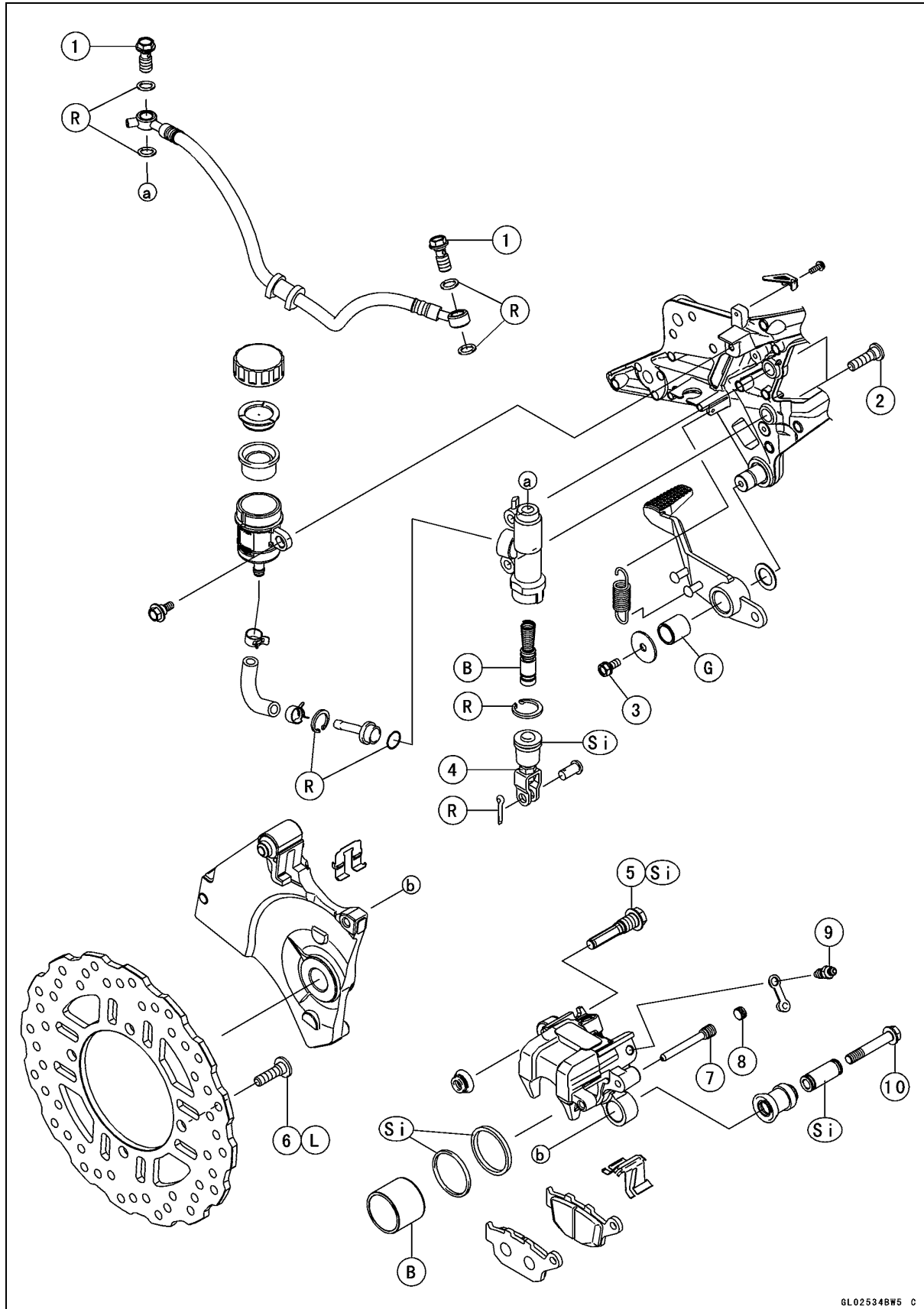
R: Replacement Parts

S: Follow the specified tightening sequence.

Si: Apply silicone grease.

12-8 BRAKES

Exploded View



GL02534BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Rear Master Cylinder Mounting Bolts	25	2.5	18	
3	Brake Pedal Bolt	8.8	0.90	78 in·lb	
4	Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
5	Rear Caliper Pin Bolt	27	2.8	20	Si
6	Rear Brake Disc Mounting Bolts	27	2.8	20	L
7	Rear Brake Pad Pin	17.2	1.75	12.7	
8	Rear Brake Pad Pin Plug	2.5	0.25	22 in·lb	
9	Bleed Valve	7.8	0.80	69 in·lb	
10	Rear Caliper Mounting Bolt	22	2.2	16	

B: Apply brake fluid.

G: Apply grease.

L: Apply a non-permanent locking agent.

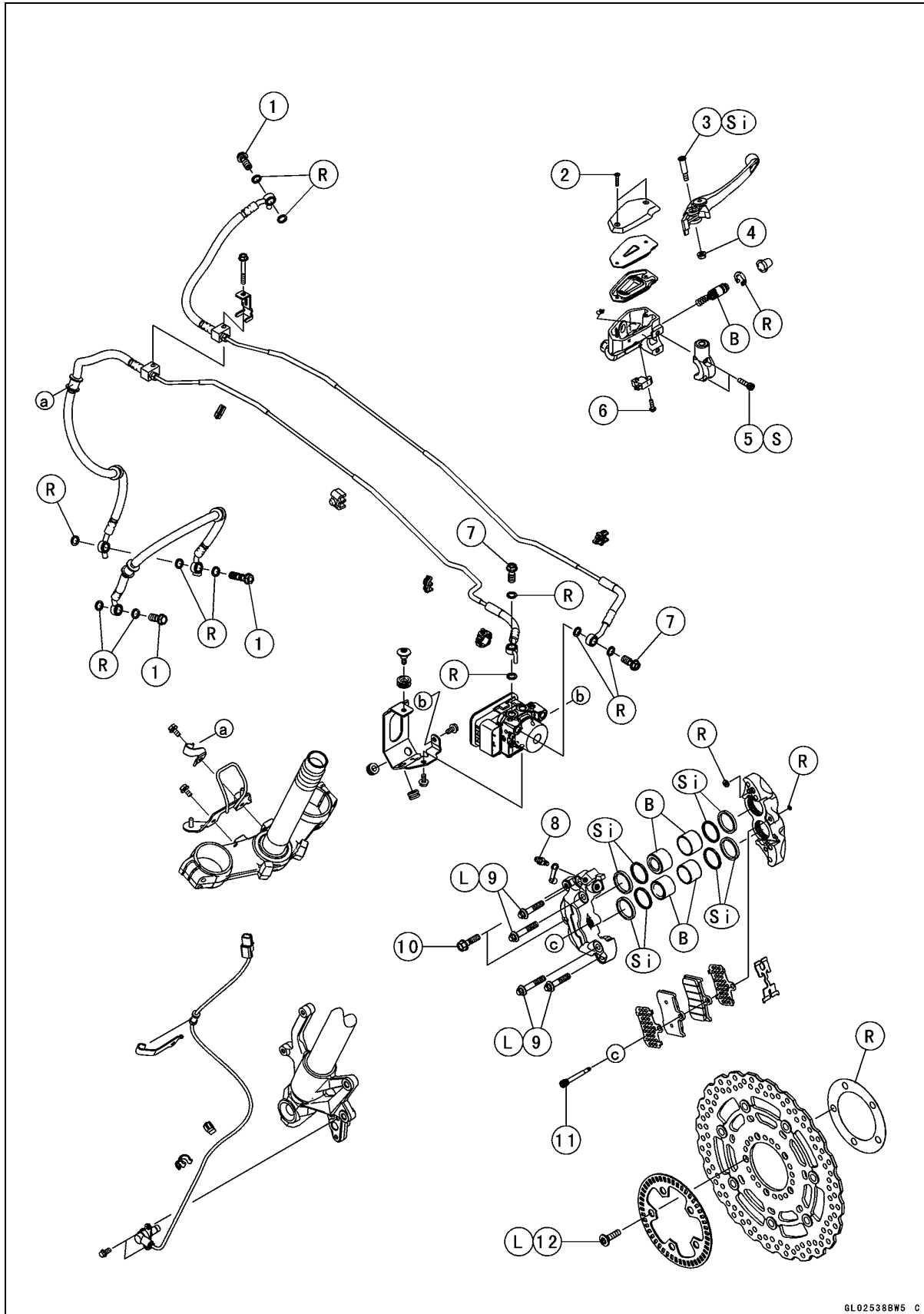
R: Replacement Parts

Si: Apply silicone grease.

12-10 BRAKES

Exploded View

ABS Equipped Models



GL02538BW5 C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Front Master Cylinder Reservoir Cap Screws	1.5	0.15	13 in·lb	
3	Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
4	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
5	Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
6	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
7	Brake Hose Banjo Bolts (ABS Hydraulic Unit)	33	3.4	24	
8	Bleed Valves	7.8	0.80	69 in·lb	
9	Front Caliper Assembly Bolts	22	2.2	16	L
10	Front Caliper Mounting Bolts	25	2.5	18	
11	Front Brake Pad Pins	17.2	1.75	12.7	
12	Front Brake Disc Mounting Bolts	27	2.8	20	L

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

R: Replacement Parts

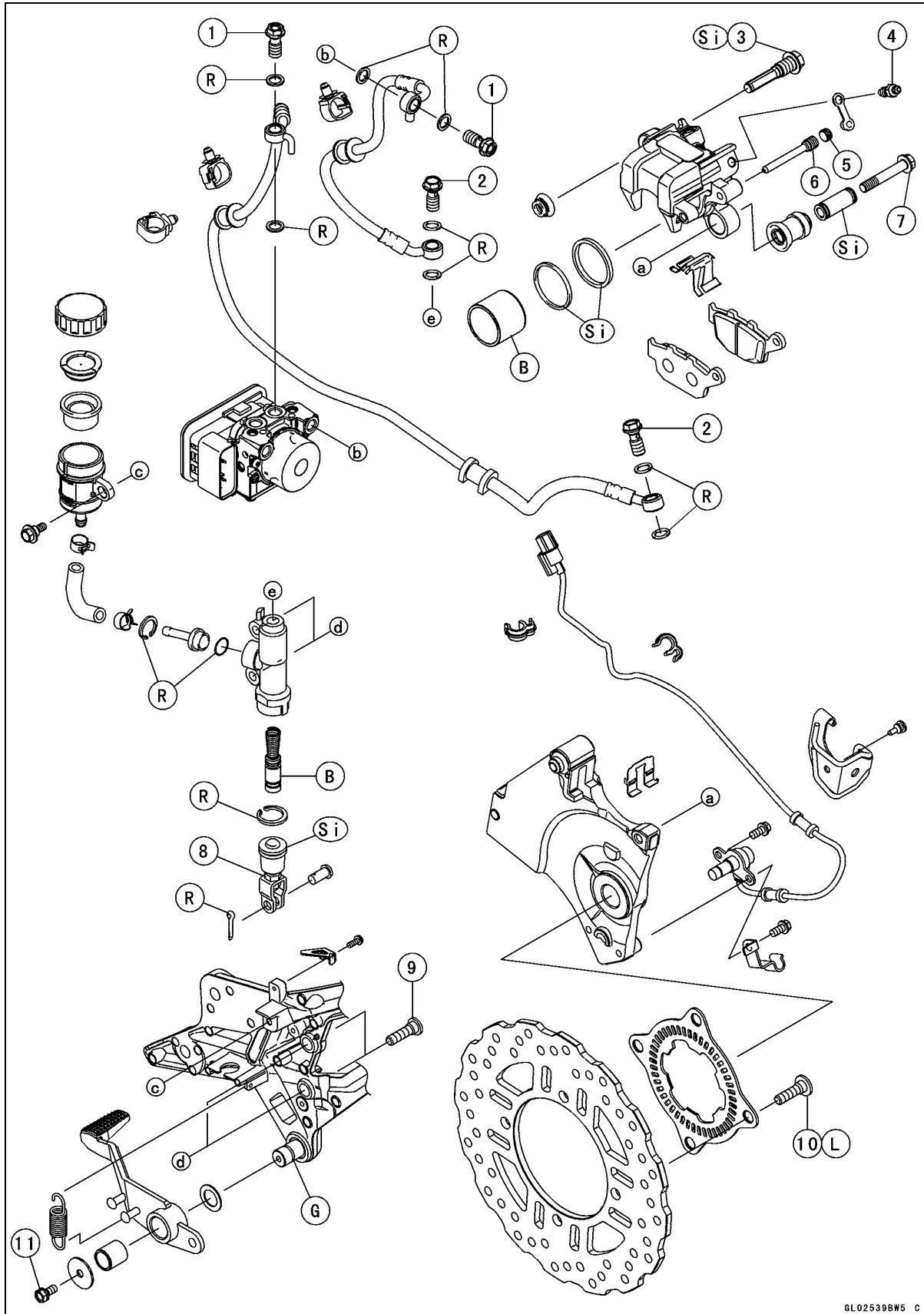
S: Follow the specified tightening sequence.

Si: Apply silicone grease.

12-12 BRAKES

Exploded View

ABS Equipped Models



GL02539BW5 C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts (ABS Hydraulic Unit)	33	3.4	24	
2	Brake Hose Banjo Bolts	25	2.5	18	
3	Rear Caliper Pin Bolt	27	2.8	20	Si
4	Bleed Valve	7.8	0.80	69 in·lb	
5	Rear Brake Pad Pin Plug	2.5	0.25	22 in·lb	
6	Rear Brake Pad Pin	17.2	1.75	12.7	
7	Rear Caliper Mounting Bolt	22	2.2	16	
8	Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
9	Rear Master Cylinder Mounting Bolts	25	2.5	18	
10	Rear Brake Disc Mounting Bolts	27	2.8	20	L
11	Brake Pedal Bolt	8.8	0.90	78 in·lb	

B: Apply brake fluid.

G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

Si: Apply silicone grease.

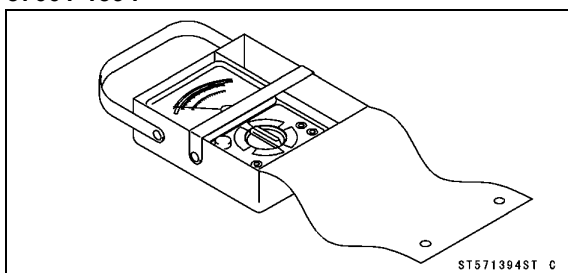
12-14 BRAKES

Specifications

Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	5-way adjustable (to suit rider)	---
Brake Lever Free Play	Non-adjustable	---
Pedal Free Play	Non-adjustable	---
Pedal Position	About 40 mm (1.57 in.) below footpeg top	---
Brake Pads		
Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5.0 mm (0.20 in.)	1.5 mm (0.06 in.)
Brake Discs		
Thickness:		
Front	4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Rear	5.8 ~ 6.2 mm (0.23 ~ 0.24 in.)	5.5 mm (0.22 in.)
Runout	TIR 0.15 mm (0.006 in.) or less	TIR 0.3 mm (0.01 in.)
Brake Fluid		
Grade	DOT4	---
ABS (Equipped Models)		
Wheel Rotation Sensor Air Gap:		
Front	0.1 ~ 1.5 mm (0.004 ~ 0.059 in.)	---
Rear	0.1 ~ 1.5 mm (0.004 ~ 0.059 in.)	---

Special Tools

**Hand Tester:
57001-1394**



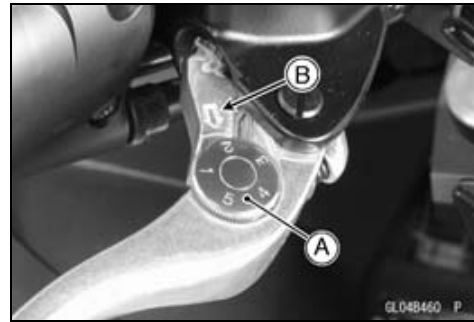
12-16 BRAKES

Brake Lever, Brake Pedal

Brake Lever Position Adjustment

The brake lever adjuster has 5 positions so that the brake lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B] on the lever holder.
- The distance from the grip to the lever is minimum at number 5 and maximum at number 1.



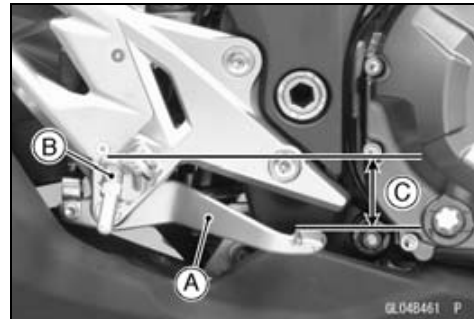
Brake Pedal Position Inspection

- Check that the brake pedal [A] is in the correct position. Footpeg [B]

Pedal Position

Standard: About 40 mm (1.57 in.) [C] below top of footpeg

- ★ If it is incorrect, adjust the brake pedal position.



Brake Pedal Position Adjustment

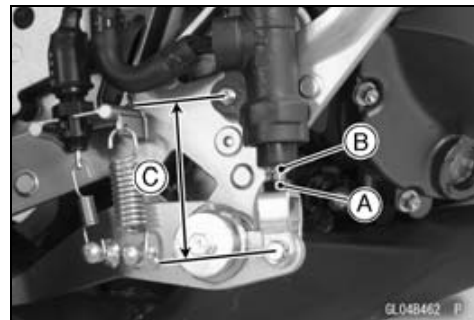
NOTE

○ Usually it is not necessary to adjust the pedal position, but always adjust it when the push rod locknut has been loosened.

- Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.
- ★ If the length [C] shown is 69 ± 1 mm (2.72 ± 0.04 in.), the pedal position will be within the standard range.
- Tighten:

Torque - Rear Master Cylinder Push Rod Locknut: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).



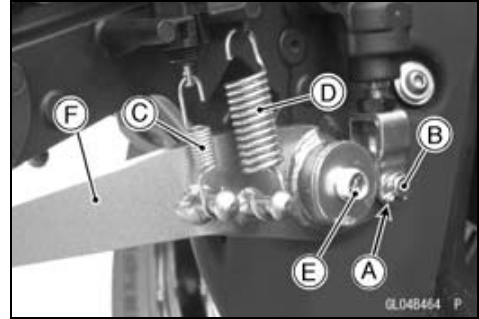
Brake Pedal Removal

- Remove the right frame cover (see Frame Cover Removal in the Frame chapter).
- Disconnect the rear brake light switch connector [A].
- Remove:
 - Footpeg Bracket Bolts [B]
 - Muffler Body Mounting Bolt [C] and Nut



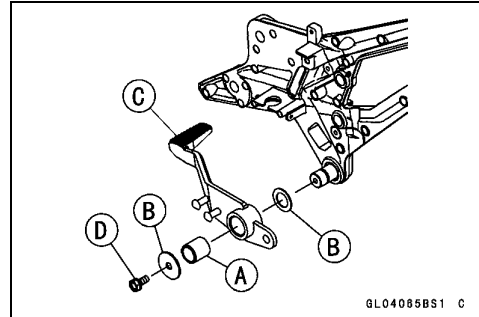
Brake Lever, Brake Pedal

- Remove:
 - Cotter Pin [A]
 - Joint Pin [B]
 - Rear Brake Light Switch Spring [C]
 - Return Spring [D]
 - Brake Pedal Bolt [E]
 - Brake Pedal [F]

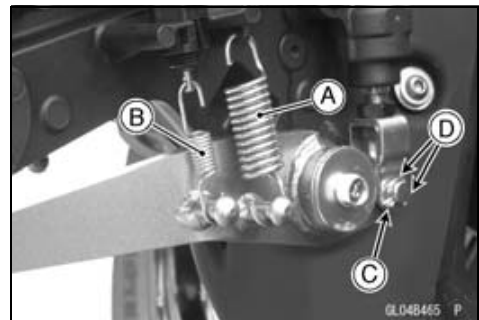


Brake Pedal Installation

- Apply grease to the inside of the bushing [A].
- Install:
 - Washers [B]
 - Bushing
 - Brake Pedal [C]
- Tighten:
 - Torque - Brake Pedal Bolt [D]: 8.8 N·m (0.90 kgf·m, 78 in·lb)**



- Hook the return spring [A] on the brake pedal and footpeg bracket as shown.
- Hook the rear brake light switch spring [B] on the switch and brake pedal as shown.
- Replace the cotter pin with a new one.
- Insert the cotter pin [C] and bend the pin ends [D].



- Install the footpeg bracket.
- Tighten:
 - Torque - Footpeg Bracket Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)**
 - Muffler Body Mounting Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)**
- Check the brake pedal position (see Brake Pedal Position Inspection).

12-18 BRAKES

Calipers

Front Caliper Removal

ZR800A/B/D Models

- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.

NOTICE

Do not loosen the caliper assembly bolts. Take out only the caliper mounting bolts for caliper removal. Loosening the caliper assembly bolts will cause brake fluid leakage.

- Unscrew the banjo bolt and remove the brake hoses [D] from the caliper (see Brake Hose and Pipe Removal/Installation).

NOTICE

Immediately wash away any brake fluid that spills.

ZR800C Model

- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper (see Brake Hose and Pipe Removal/Installation).

NOTICE

Immediately wash away any brake fluid that spills.

Rear Caliper Removal

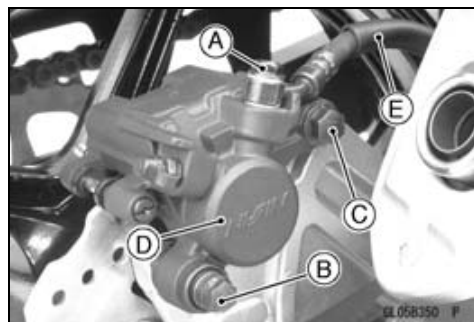
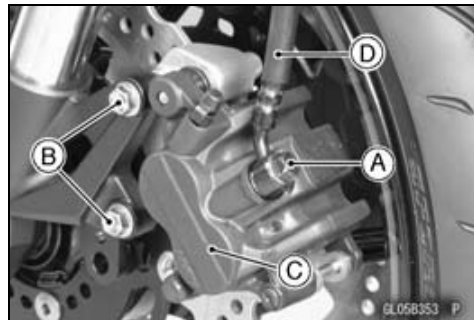
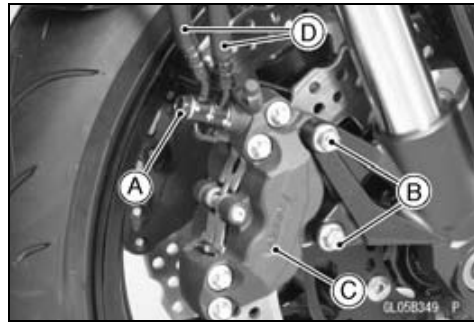
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the rear caliper mounting bolt [B] and rear caliper pin bolt [C], and detach the caliper [D] from the disc.
- Unscrew the banjo bolt and remove the brake hose [E] from the caliper (see Brake Hose and Pipe Removal/Installation).

NOTICE

Immediately wash away any brake fluid that spills.

Caliper Installation

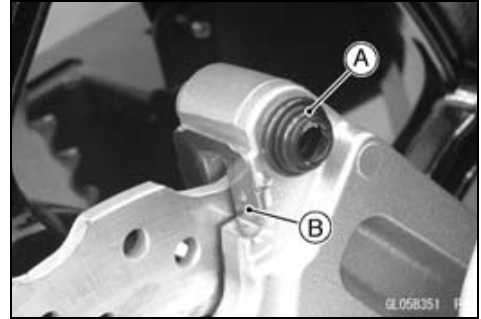
- Install the caliper and brake hose lower end.
- Replace the washers on each side of hose fitting with new ones.



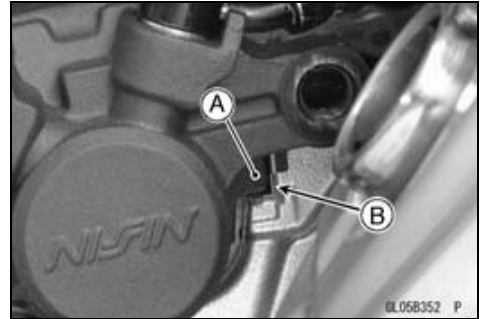
Calipers

Rear Caliper

- Install:
 - Rubber Boot [A]
 - Guide [B]



- Fit the rear brake pads [A] to the guide [B].



- Apply silicone grease to the rear caliper pin bolt.
- Tighten:
 - Torque - Caliper Mounting Bolts:**
 - Front: 25 N·m (2.5 kgf·m, 18 ft·lb)
 - Rear: 22 N·m (2.2 kgf·m, 16 ft·lb)
 - Rear Caliper Pin Bolt: 27 N·m (2.8 kgf·m, 20 ft·lb)**
 - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Check the fluid level in the brake reservoirs.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

After servicing, it takes several applications of the brake lever or pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever or pedal is obtained by pumping the lever or pedal until the pads are against the disc.

Front Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Front Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

12-20 BRAKES

Calipers

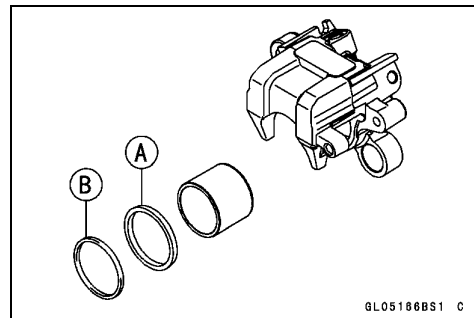
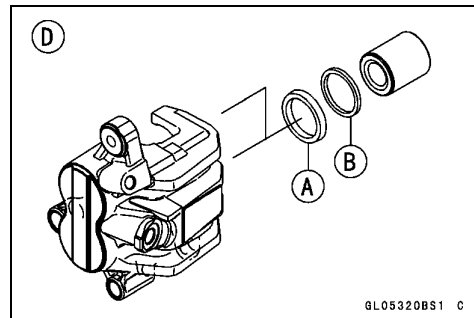
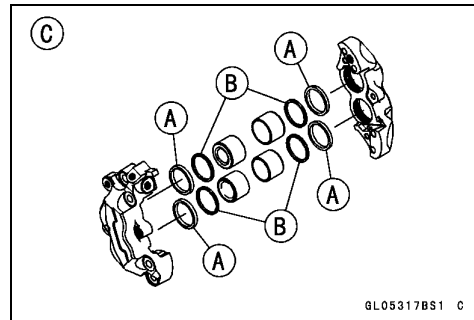
Rear Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Caliper Fluid Seal Damage Inspection

The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- Replace the fluid seal if it exhibits any of the conditions listed below.
 - Brake fluid leakage around the pad.
 - Brakes overheat.
 - Considerable difference in inner and outer pad wear.
 - Seal and piston are stuck together.
- ★ If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.
- ZR800A/B/D Models [C]
- ZR800C Model [D]



Calipers

Caliper Dust Seal Damage Inspection

- Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.

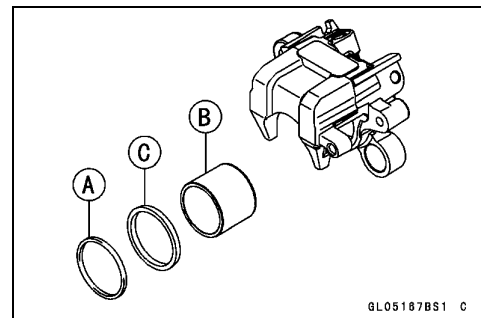
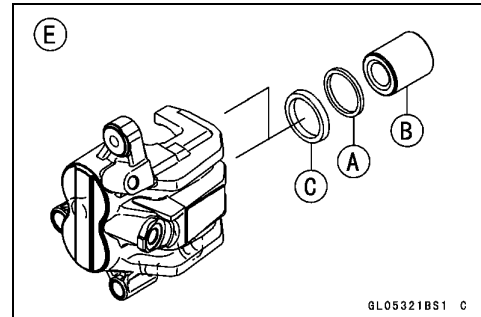
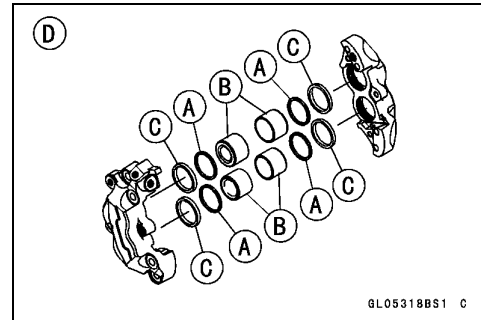
★ If they show any damage, replace the dust seals with new ones.

Pistons [B]

Fluid Seals [C]

○ ZR800A/B/D Models [D]

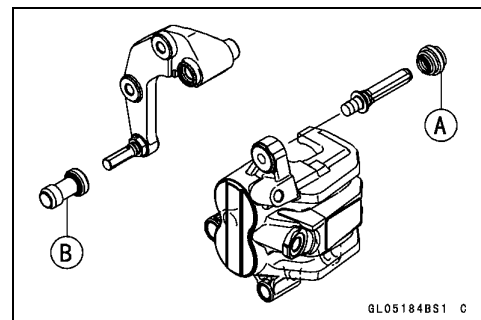
○ ZR800C Model [E]



Front Caliper Dust Boot and Friction Boot Damage Inspection (ZR800C Model)

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

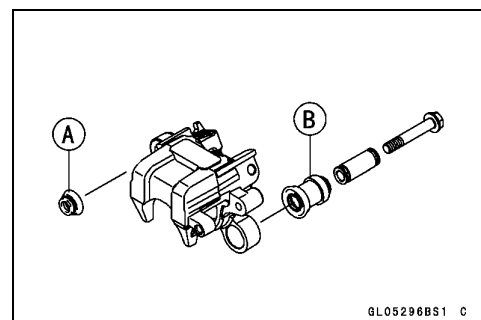
★ If they show any damage, replace it.



Rear Caliper Dust Boot and Friction Boot Damage Inspection

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

★ If they show any damage, replace it.

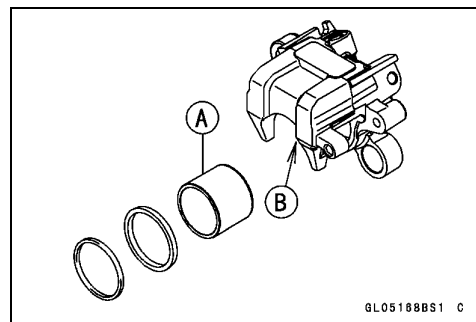
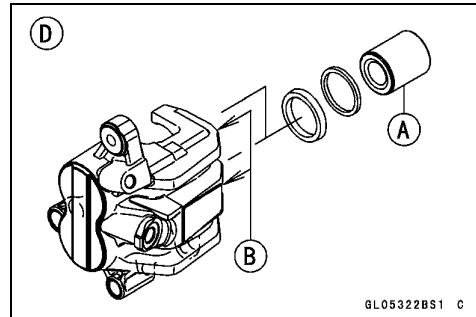
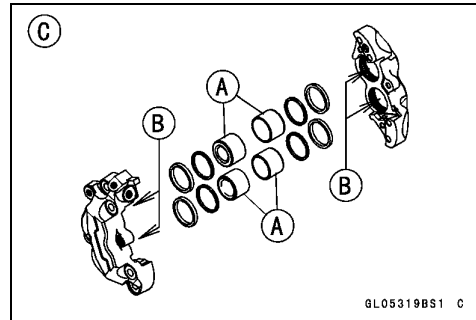


12-22 BRAKES

Calipers

Caliper Piston and Cylinder Damage Inspection

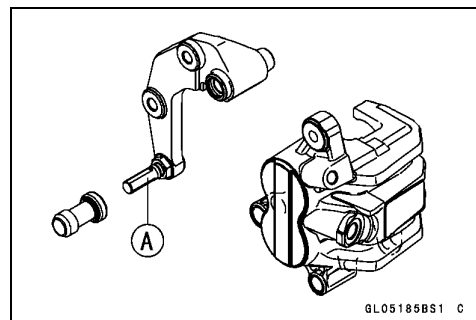
- Visually inspect the pistons [A] and cylinder surfaces [B].
- ★ Replace the caliper if the cylinder and piston are badly scored or rusty.
- ZR800A/B/D Models [C]
- ZR800C Model [D]



Front Caliper Holder Shaft Wear Inspection (ZR800C Model)

The caliper body must slide smoothly on the caliper holder shaft [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 shaft are not badly worn or stepped, and that the friction boot is not damaged.
- ★ If the friction boot is damaged, replace the friction boot. To replace the friction boot, remove the pads and the caliper holder.
- ★ If the caliper holder shaft is damage, replace the caliper holder.

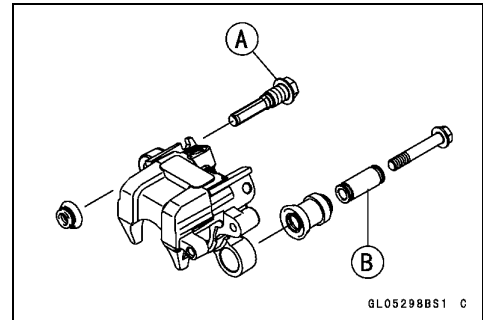


Calipers

Rear Caliper Holder Wear Inspection

The caliper body must slide smoothly on the rear caliper pin bolt [A] and sleeve [B]. 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 rear caliper pin bolt and the sleeve are not badly worn or stepped, and that the rubber boots are not damaged.
- ★ If the rear caliper pin bolt is damaged, replace the rear caliper pin bolt.
- ★ If the sleeve is damaged, replace the sleeve.
- ★ If the rubber boots are damaged, replace the rubber boot.



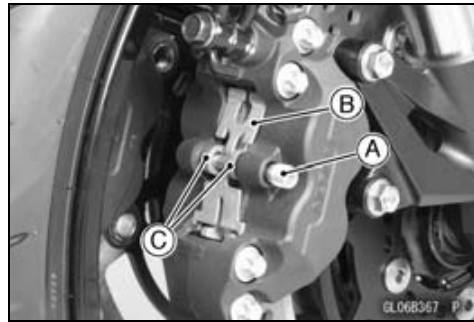
12-24 BRAKES

Brake Pads

Front Brake Pad Removal

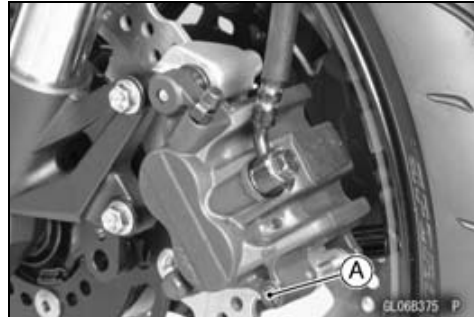
ZR800A/B/D Models

- Remove:
 - Pad Pin [A]
 - Pad Spring [B]
 - Brake Pads [C]



ZR800C Model

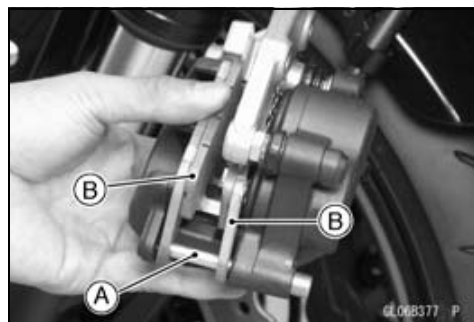
- Remove the pad pin plug [A].



- Loosen the pad pin [A].
- Remove the caliper mounting bolts [B].
- Remove the caliper with the hose installed.



- Remove:
 - Pad Pin [A]
 - Brake Pads [B]



Front Brake Pad Installation

ZR800A/B/D Models

- Push the caliper pistons in by hand as far as they will go.
- Install the outside pad [A] and insert the pad pin [B] as shown.

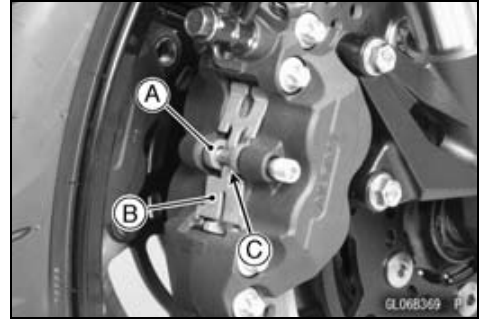


Brake Pads

- Set:
 - Inside Pad [A]
 - Pad Spring [B]
- Push down the pin holder [C] and insert the pad pin.
 - Torque - Front Brake Pad Pin: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

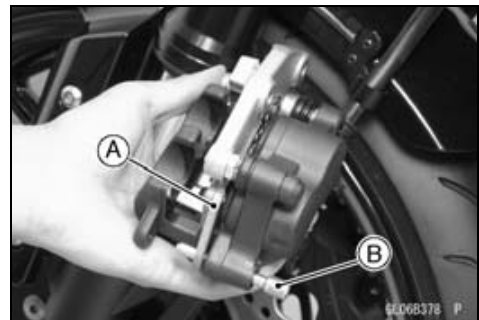
WARNING

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.



ZR800C Model

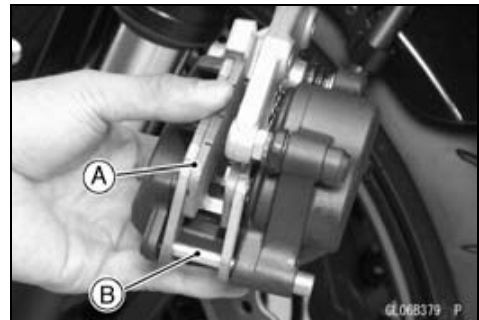
- Push the caliper pistons in by hand as far as they will go.
- Install the pad springs in its correct position.
- Install the outside pad [A] and insert the pad pin [B] as shown.



- Set:
 - Inside Pad [A]
 - Pad Pin [B]
- Install the caliper (see Caliper Installation).
- Tighten the pad pin and plug.
 - Torque - Front Brake Pad Pins: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)
 - Front Brake Pad Pin Plugs: 2.5 N·m (0.25 kgf·m, 22 in·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.

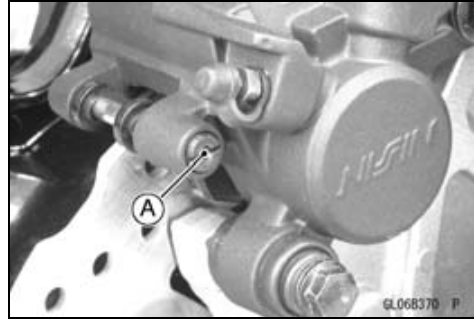


12-26 BRAKES

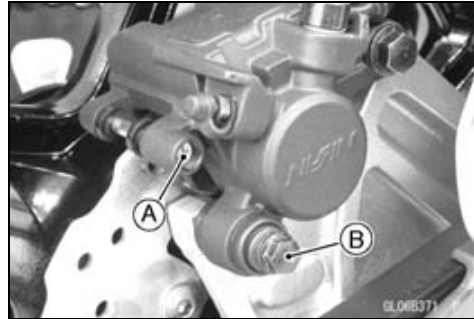
Brake Pads

Rear Brake Pad Removal

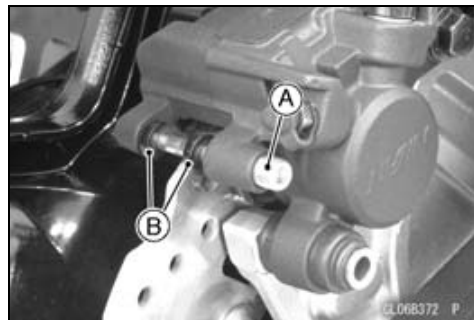
- Unscrew the pad pin plug [A].



- Loosen the pad pin [A].
- Unscrew the bolt [B].

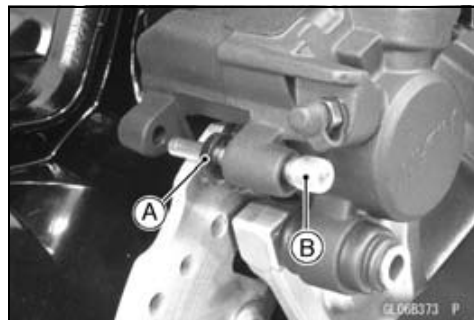


- Remove:
Pad Pin [A]
Brake Pads [B]



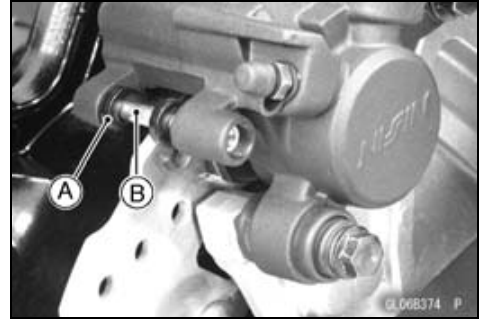
Rear Brake Pad Installation

- Push the caliper piston in by hand as far as they will go.
- Install the outside pad [A] and insert the pad pin [B] as shown.



Brake Pads

- Set:
 - Inside Pad [A]
 - Pad Pin [B]
- Install the caliper (see Caliper Installation).
- Tighten the pad pin and plug.
 - Torque - Rear Brake Pad Pin: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)**
 - Rear Brake Pad Pin Plug: 2.5 N·m (0.25 kgf·m, 22 in·lb)**



⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

Brake Pad Wear Inspection

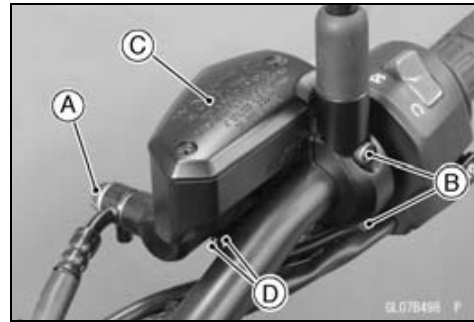
- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

12-28 BRAKES

Master Cylinder

Front Master Cylinder Removal

- Remove the banjo bolt [A] to disconnect the brake hose from the master cylinder (see Brake Hose and Pipe Removal/Installation).
- Unscrew the clamp bolts [B], and take off the master cylinder [C] as an assembly with the reservoir, brake lever, and brake switch installed.
- Disconnect the front brake light switch connectors [D].



NOTICE

Immediately wash away any brake fluid that spills.

Front Master Cylinder Installation

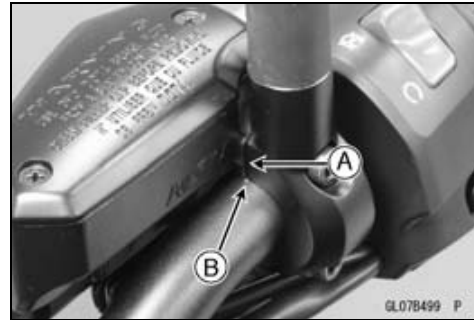
- Set the front master cylinder to match its mating surface [A] to the punch mark [B] of the handlebars.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

Torque - Front Master Cylinder Clamp Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

- Replace the washers that are on each side of the hose fitting with new ones.
- Tighten:

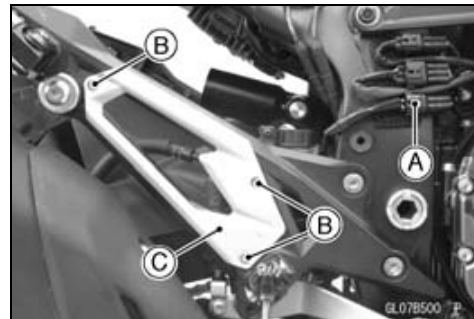
Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.



Rear Master Cylinder Removal

- Remove the right frame cover (see Frame Cover Removal in the Frame chapter).
- Disconnect the brake light switch connector [A].
- Remove:
 - Bolts [B]
 - Cover [C]

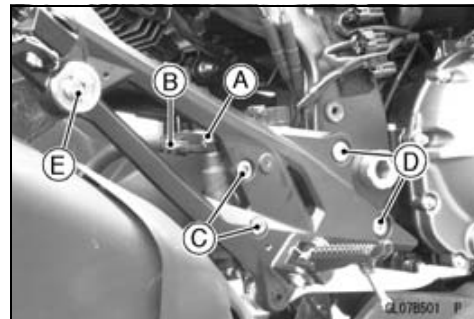


- Remove the brake hose banjo bolt [A] and disconnect the brake hose [B] from the rear master cylinder (see Brake Hose and Pipe Removal/Installation).

NOTICE

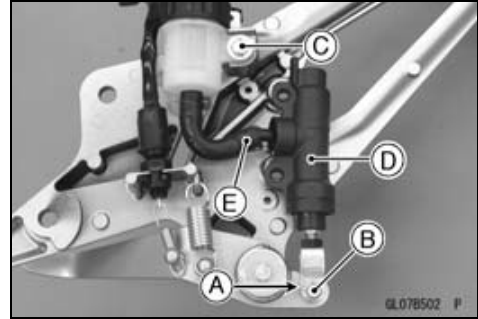
Immediately wash away any brake fluid that spills

- Remove:
 - Rear Master Cylinder Mounting Bolts [C]
 - Footpeg Bracket Bolts [D]
 - Muffler Body Mounting Bolt [E] and Nut



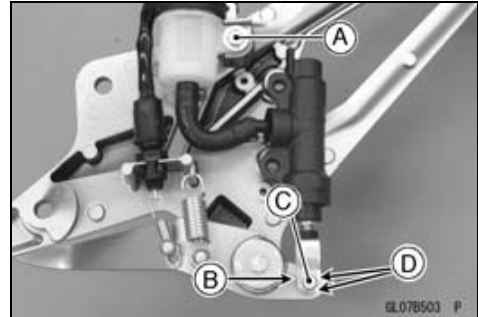
Master Cylinder

- Remove:
 - Cotter Pin [A]
 - Joint Pin [B]
 - Bolt [C]
 - Rear Master Cylinder [D]
- Slide out the clamp [E].
- Pull off the reservoir hose lower end, and drain the brake fluid into a container.



Rear Master Cylinder Installation

- Install the reservoir hose lower end, and install the clamp.
- Tighten the bolt [A].
- Replace the cotter pin [B] with a new one.
- Insert the cotter pin to the hole of the joint pin [C] and separate the cotter pin ends [D].



- Install the footpeg bracket.
- Tighten:
 - **Torque - Footpeg Bracket Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)**
 - **Muffler Body Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**
 - **Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Replace the washers that are on each side of the hose fitting with new ones.
- Install the brake hose.
- Touch the brake hose to the stopper of the rear master cylinder.
- Tighten:
 - **Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Install the cover.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Front Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

12-30 BRAKES

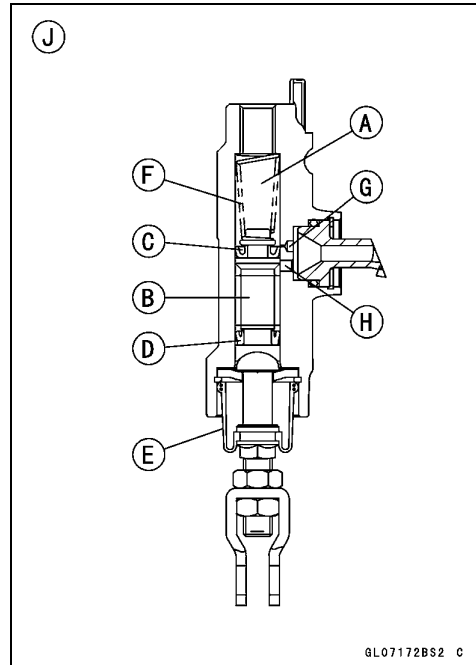
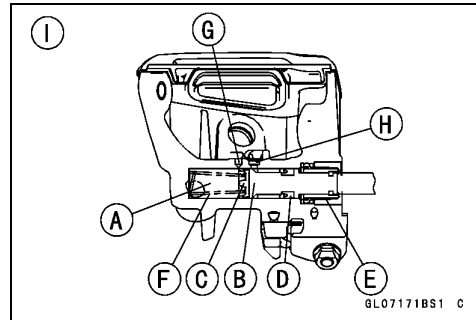
Master Cylinder

Master Cylinder Inspection (Visual Inspection)

- Remove the master cylinders (see Front/Rear Master Cylinder Removal).
- Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter).
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].
- ★ If a master cylinder or piston shows any damage, replace them.
- Inspect the primary cup [C] and secondary cup [D].
- ★ If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.
- ★ If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.
- Check the dust covers [E] for damage.
- ★ If they are damaged, replace them.
- Check the piston return springs [F] for any damage.
- ★ If the springs are damaged, replace them.
- Check that relief port [G] and supply port [H] are not plugged.
- ★ If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Front Master Cylinder [I]

Rear Master Cylinder [J]



Brake Disc

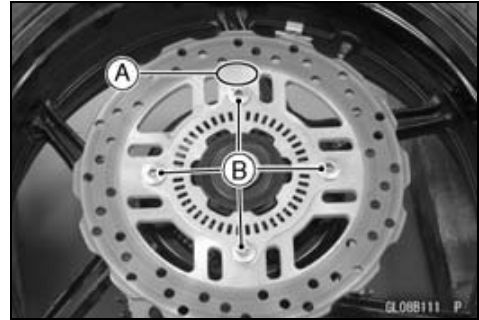
Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the brake disc mounting bolts, and take off the disc.
- Remove the sensor rotor (ABS equipped models).
- Remove the gaskets.

Brake Disc Installation

- Replace the gaskets with new ones.
- Install the brake disc on the wheel so that the marked side [A] faces out.
- Install the sensor rotor on the brake disc so that the marked side faces out (ABS equipped models).
- Apply a non-permanent locking agent to the threads of the front and rear brake disc mounting bolts [B], and tighten them.

Torque - Brake Disc Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)



Brake Disc Wear Inspection

- Measure the thickness of each disc [A] at the point where it has worn the most.
 - ★ If the disc has worn past the service limit, replace it.
- Measuring Area [B]

Brake Discs Thickness

Standard:

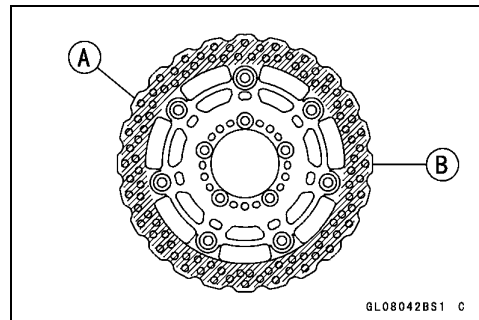
Front 4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)

Rear 5.8 ~ 6.2 mm (0.23 ~ 0.24 in.)

Service Limit:

Front 4.5 mm (0.18 in.)

Rear 5.5 mm (0.22 in.)



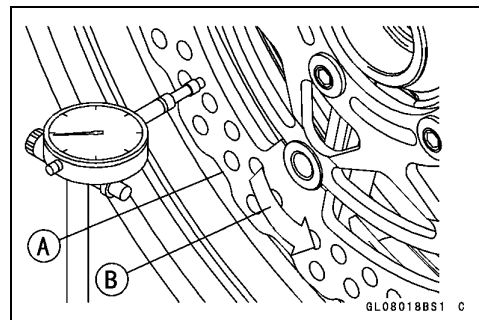
Brake Disc Warp Inspection

- Raise the front/rear wheel off the ground (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- For front disc inspection, turn the handlebars fully to one side.
- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.
- ★ If runout exceeds the service limit, replace the disc.

Disc Runout

Standard: TIR 0.15 mm (0.006 in.) or less

Service Limit: TIR 0.3 mm (0.01 in.)



12-32 BRAKES

Brake Fluid

Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Brake Fluid Change

- Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

Brake Line Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

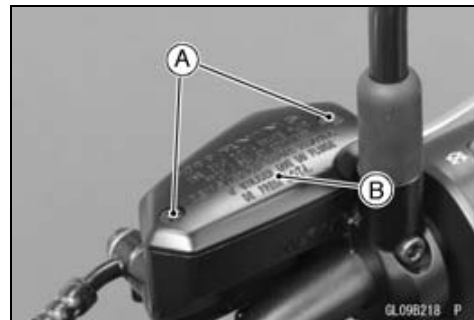
⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever or pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTE

- *The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

- Remove:
 - Screws [A]
 - Front 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.
- Bleed the air completely from the master cylinder by this operation.
- Remove the rubber cap [A] from the bleed valve on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.

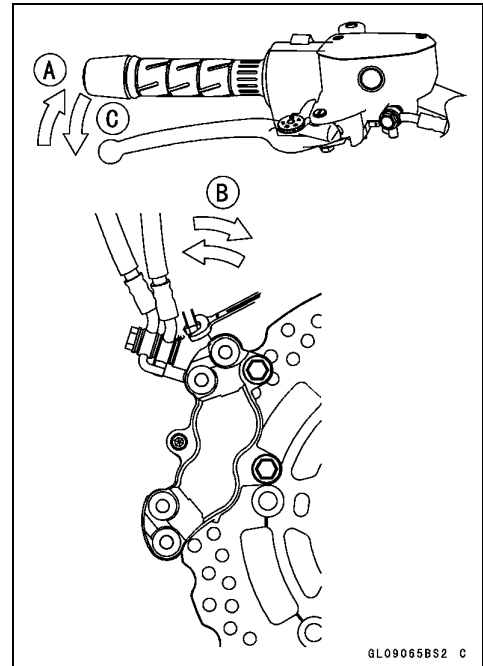


Brake Fluid

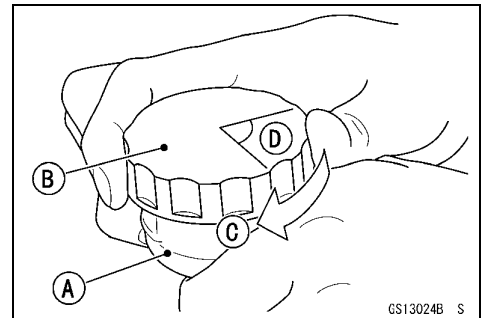
- Bleed the brake line and the caliper.
- Repeat this operation until no more air can be seen coming out into the plastic hose.
 1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
 2. Quickly open and close [B] the bleed valve while holding the brake applied.
 3. Release the brake [C].

NOTE

- *The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*
- *Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*
- *Front Brake: First bleeding the right caliper then repeat the above steps for the left caliper.*
- Remove the clear plastic hose.
- Install:
 - Diaphragm
 - Diaphragm Plate
 - Front Brake Reservoir Cap



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



- Install the clamp and screw.
- Tighten:
 - Torque - Front Master Cylinder Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)**
- Tighten the bleed valve, and install the rubber cap.
 - Torque - Bleed Valves: 7.8 N·m (0.80 kgf·m, 69 in·lb)**
- Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
- After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

12-34 BRAKES

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.**

Brake Hose

Brake Hose and Pipe Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

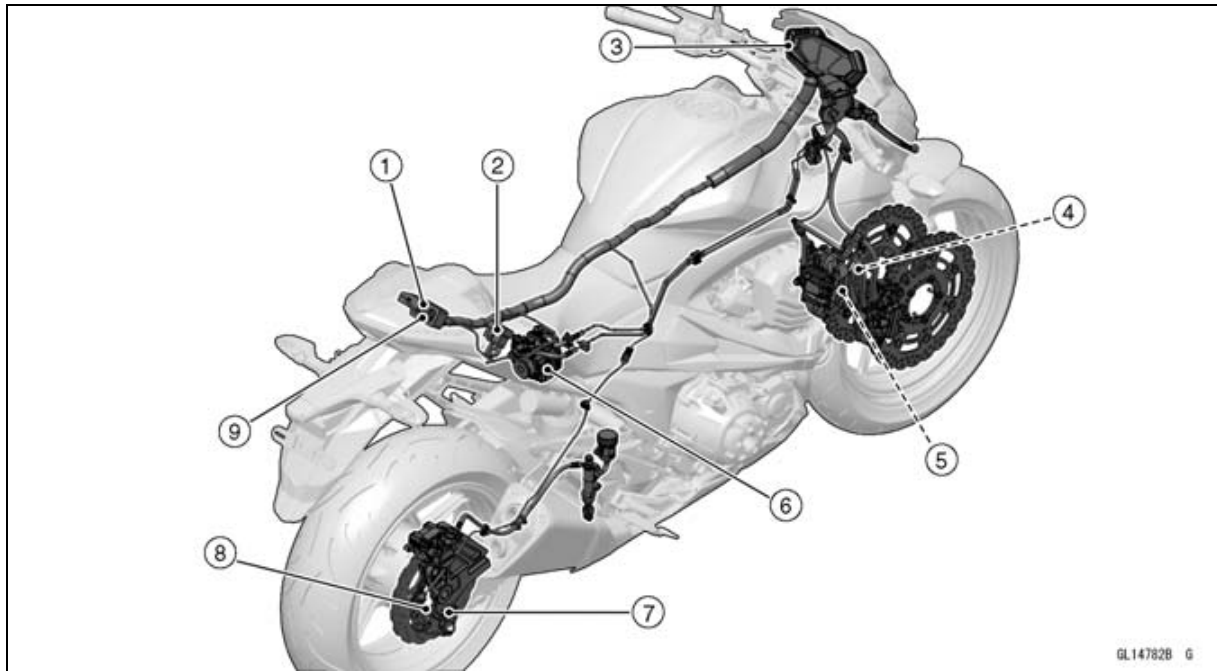
Brake Hose and Pipe Inspection

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

12-36 BRAKES

Anti-Lock Brake System (Equipped Models)

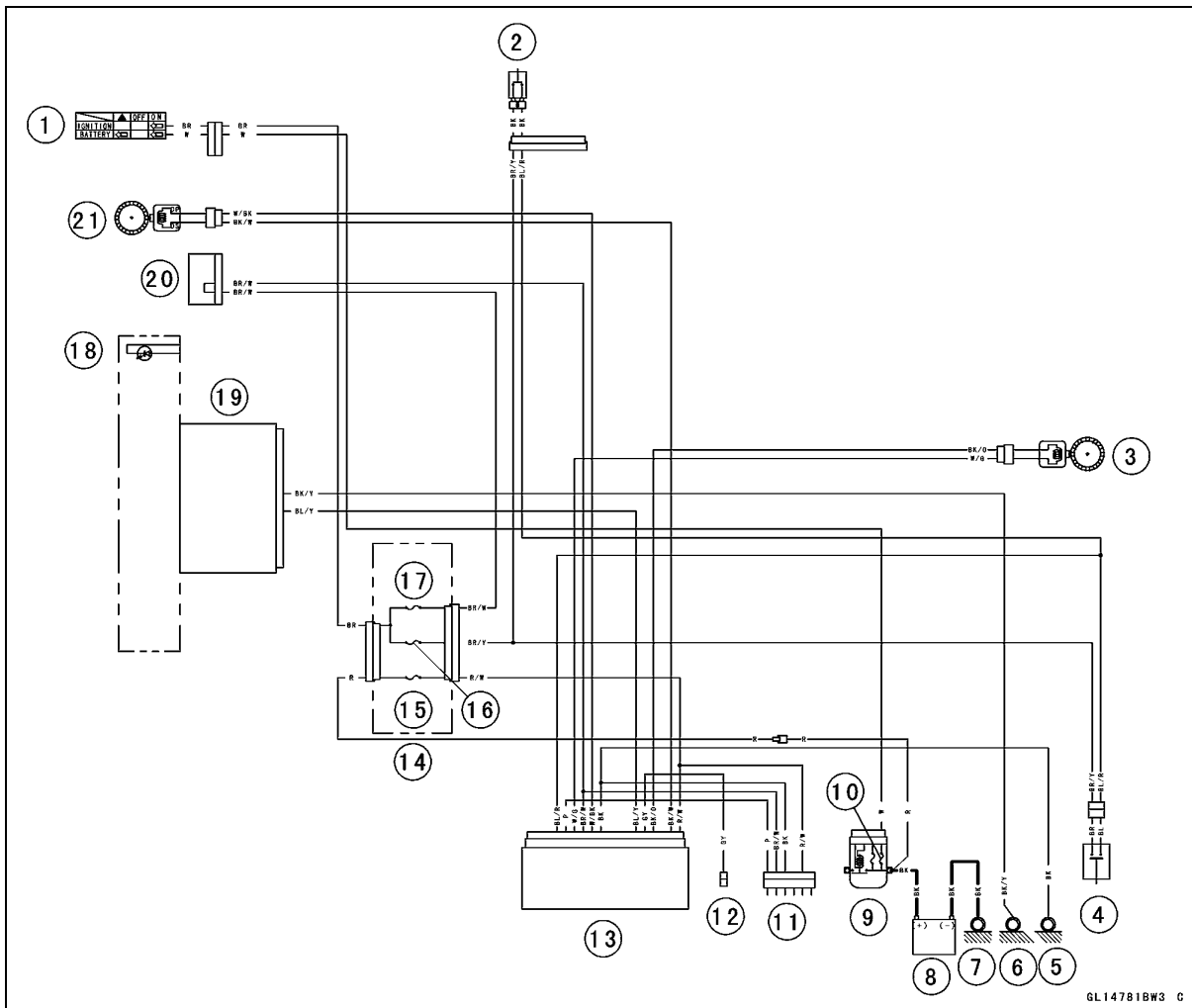
Parts Location



1. ABS Kawasaki Self-diagnosis System Connector
2. Fuse Box 1
3. Yellow ABS Indicator Light (LED)
4. Front Wheel Rotation Sensor Rotor
5. Front Wheel Rotation Sensor
6. ABS Hydraulic Unit
7. Rear Wheel Rotation Sensor
8. Rear Wheel Rotation Sensor Rotor
9. ABS Self-diagnosis Terminal

Anti-Lock Brake System (Equipped Models)

ABS System Wiring Diagram



- | | |
|--|--------------------------------------|
| 1. Ignition Switch | 12. ABS Self-diagnosis Terminal |
| 2. Front Brake Switch | 13. ABS Hydraulic Unit |
| 3. Rear Wheel Rotation Sensor | 14. Fuse Box 1 |
| 4. Rear Brake Switch | 15. ABS Fuse 30 A |
| 5. Frame Ground 5 | 16. Brake/Hone Fuse 7.5 A |
| 6. Frame Ground 1 | 17. Ignition Fuse 15 A |
| 7. Engine Ground | 18. Yellow ABS Indicator Light (LED) |
| 8. Battery 12 V 8 Ah | 19. Meter Unit |
| 9. Starter Relay | 20. Joint Connector C |
| 10. Main Fuse 30 A | 21. Front Wheel Rotation Sensor |
| 11. ABS Kawasaki Self-diagnosis System Connector | |

○Color Codes:

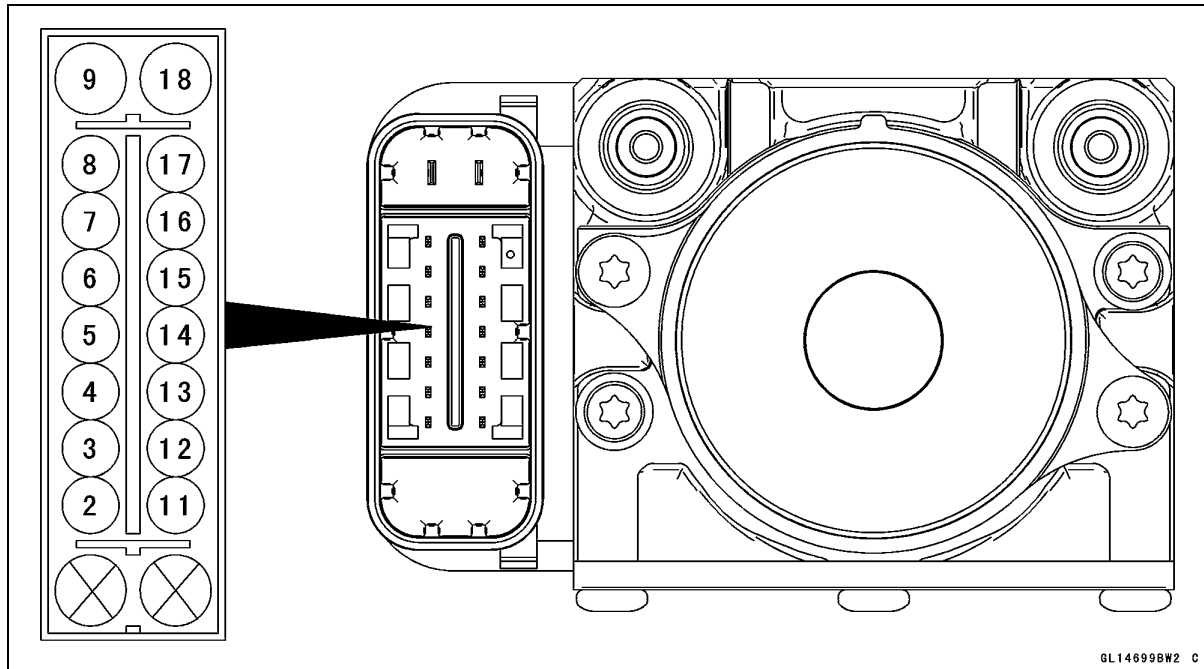
BK: Black	GY: Gray	PU: Purple
BL: Blue	LB: Light Blue	R: Red
BR: Brown	LG: Light Green	V: Violet
CH: Chocolate	O: Orange	W: White
DG: Dark Green	P: Pink	Y: Yellow
G: Green		

GL14781BW3 C

12-38 BRAKES

Anti-Lock Brake System (Equipped Models)

ABS Hydraulic Unit Terminal Names



2. Unused
3. Unused
4. Front and Rear Brake Light Switch Signal: BL/R
5. ABS Kawasaki Self-diagnosis System Terminal: P
6. Power Supply to Rear Wheel Rotation Sensor: W/G
7. Power Supply: BR/W
8. Power Supply to Front Wheel Rotation Sensor: W/BK
9. Ground: BK
11. Unused
12. Unused
13. Yellow ABS Indicator Light: BL/Y
14. ABS Self-diagnosis Terminal: GY
15. Rear Wheel Rotation Sensor Signal Input: BK/O
16. Unused
17. Front Wheel Rotation Sensor Signal Input: BK/W
18. Power Supply to ABS Motor Relay: R/W

Anti-Lock Brake System (Equipped Models)

ABS Servicing Precautions

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

- This ABS system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ABS hydraulic unit.
- To prevent damage to the ABS parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Do not turn the ignition switch on while any of the ABS electrical connectors are disconnected. The ABS hydraulic unit memorizes service codes.
- Do not spray water on the electrical parts, ABS parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the ABS system is not influenced by electric wave radiated from the antenna. Locate the antenna as far as possible away from the ABS hydraulic unit.
- Whenever the ABS electrical connections are to be disconnected, first turn the ignition switch off.
- The ABS parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- The ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the ABS parts, replace it.
- The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

12-40 BRAKES

Anti-Lock Brake System (Equipped Models)

⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If any of the brake line fittings, including the ABS hydraulic unit joint nuts, or the bleed valve is opened at any time, the air must be bled completely from the brake line. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

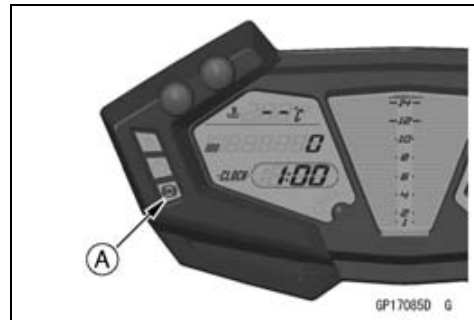
NOTICE

Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.

- The yellow ABS indicator light (LED) [A] may light if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light lights, remedy the problem and clear the service code.

⚠ WARNING

Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.

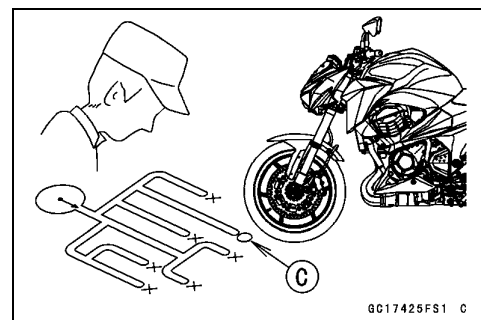
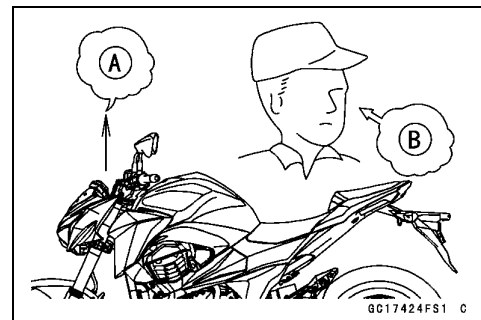


Anti-Lock Brake System (Equipped Models)

- The yellow ABS indicator light (LED) may come on if the engine is run with the motorcycle on its stand and the transmission in gear. If the indicator light comes on, just turn the ignition switch off, then clear service code 42, which indicates a "Faulty front wheel rotation sensor".
- When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the ABS is operating normally.
- Service codes detected once by the ABS hydraulic unit will be memorized in the ABS hydraulic unit. Therefore, after maintenance work is finished, be sure to erase the service codes. Do not erase the service codes during troubleshooting. Wait until all the checks and repair work are finished to prevent duplication of previous service codes and unnecessary maintenance work.
- Before delivering the motorcycle to the customer, be sure to erase any service codes which might be stored in the ABS hydraulic unit. Using the self-diagnosis feature, make sure that the yellow ABS indicator light (LED) lights. A fully charged battery is a must for conducting reliable self-diagnosis. Test run the motorcycle at a speed of more than 30 km/h (19 mph) to see that the yellow ABS indicator light (LED) does not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (19 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (the reaction force generated is felt in the brake lever and pedal). This completes the final inspection.

ABS Troubleshooting Outline

When an abnormality in the system occurs, the yellow ABS indicator light (LED) lights up to alert the rider. In addition, the nature of the fault is stored in the memory of the ABS hydraulic unit and when in the self-diagnosis mode, the service code [A] is indicated by the number of times the yellow ABS indicator light (LED) blinks. The service codes stored in memory are not erased until the mode has been changed to the fault erase mode after the fault has been corrected. Therefore, after correcting the problem, always erase the service codes and then run the self-diagnosis program to confirm normal signal output. When, due to a malfunction, the yellow ABS indicator light (LED) remains lit, get a thorough understanding of the background before starting the repair work. Ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C]. Do not rely solely on the ABS self-diagnosis function, use common sense; check the brakes for proper braking power, and brake fluid level, search for leaks, etc.



12-42 BRAKES

Anti-Lock Brake System (Equipped Models)

Even when the ABS is operating normally, the yellow ABS indicator light (LED) may light up under the conditions listed below. Turn the ignition switch off to stop the indicator light. If the motorcycle runs without erasing the service code, the light may light up again.

- After continuous riding on a rough road.
- When the engine is started with the stand raised and the transmission engaged, and the rear wheel turns.
- When accelerating so abruptly that the front wheel leaves the ground.
- When the ABS has been subjected to strong electrical interference.
- When tire pressure is abnormal. Adjust tire pressure.
- When a tire different in size from the standard size is being used. Replace with standard size.
- When the wheel is deformed. Replace the wheel.

Much of the ABS troubleshooting work consists of confirming continuity of the wiring. The ABS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the ABS hydraulic unit.

The basic troubleshooting procedures are listed below.

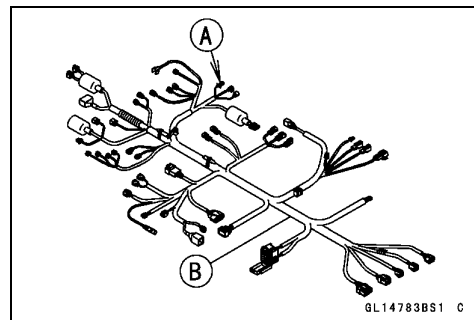
- Carry out pre-diagnosis inspections as a preliminary inspection.
- Determine the fault using the self-diagnosis function.
- Check wiring and connections from the ABS hydraulic unit connector to the suspected faulty ABS part, using the hand tester.

Special Tool - Hand Tester: 57001-1394

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

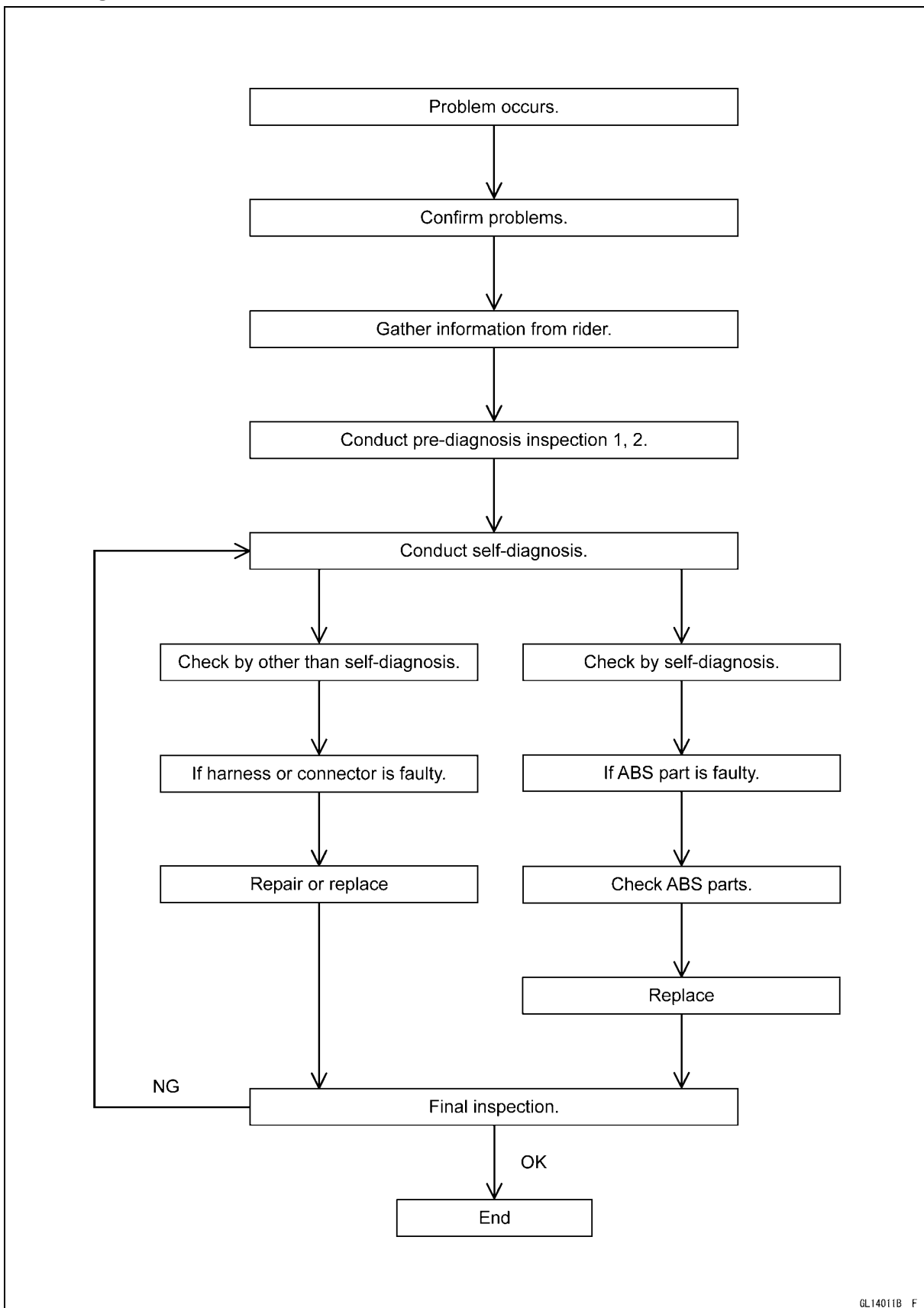
Special Tool - Hand Tester: 57001-1394

- Set the tester to the $\times 1 \Omega$ range, and read the tester.
- ★ If the tester does not read 0Ω , the lead is defective. Replace the main harness [B] if necessary.
- Narrow down suspicious parts and close in on the faulty ABS part by repeating the continuity tests.
- ★ If no abnormality is found in the wiring or connectors, the ABS parts are the next likely suspects. Check each part one by one.
- ★ If an abnormality is found, replace the affected ABS part.



Anti-Lock Brake System (Equipped Models)

ABS Diagnosis Flow Chart



GL14011B F

12-44 BRAKES

Anti-Lock Brake System (Equipped Models)

Inquiries to Rider

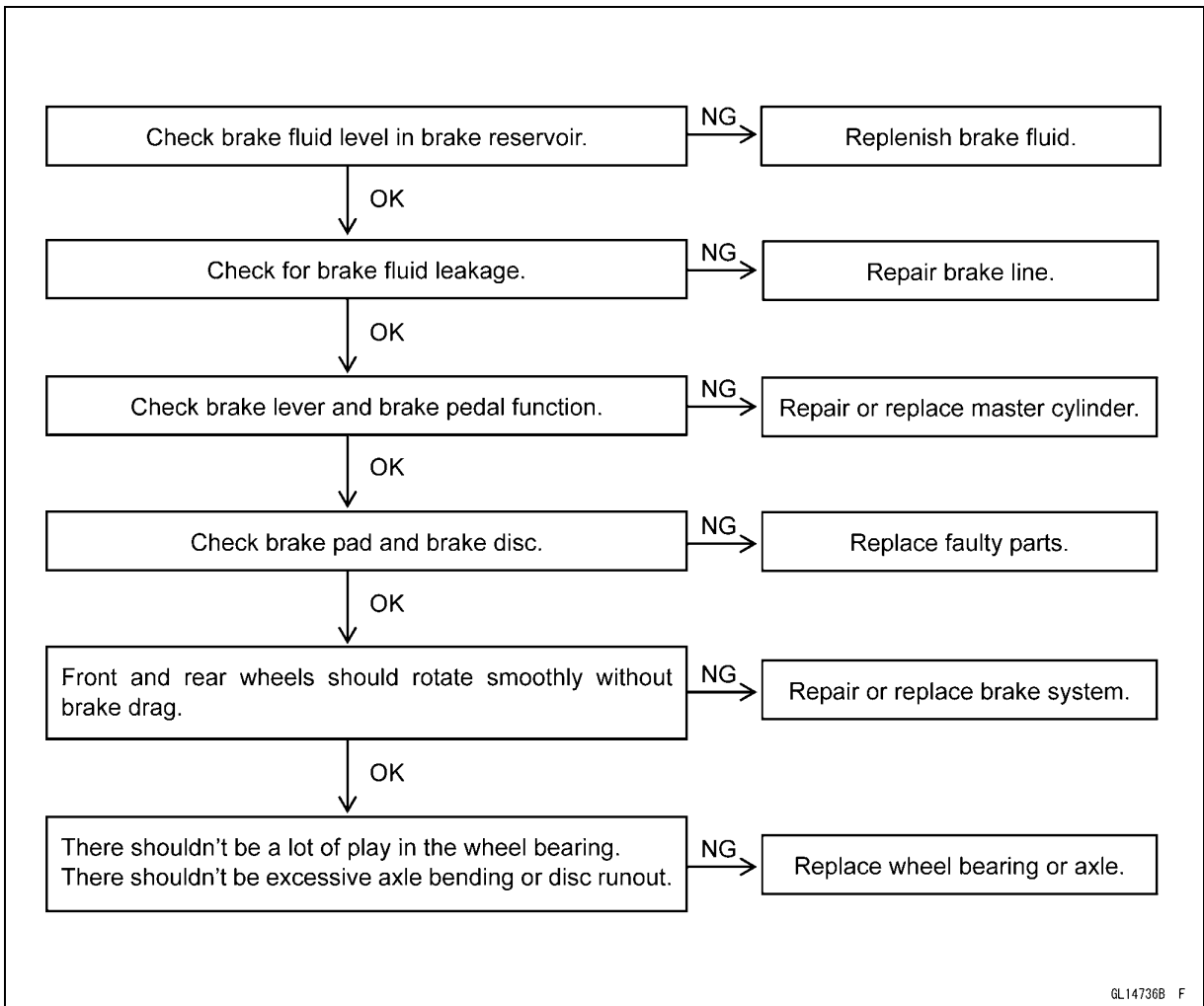
- Each rider reacts to problems in different ways, so it is important to confirm what kind of condition the rider is dissatisfied with.
- Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the shop.
- The diagnosis sheet will help prevent you from overlooking any keys, so always use it.

Sample Diagnosis Sheet

Rider name:	Registration No. (license plate No.):
Year of initial registration:	Model:
Engine No.:	Frame No.:
Date problem occurred:	Frequency:
Weather:	Mileage:
Phenomenon	<input type="checkbox"/> Brake lever vibration or noise
	<input type="checkbox"/> Pedal vibration or noise
	<input type="checkbox"/> Yellow ABS indicator light (LED) blinks
	<input type="checkbox"/> Yellow ABS indicator light (LED) remains lit up
	<input type="checkbox"/> Braking distance too long
	<input type="checkbox"/> Abnormal brake lever movement
	<input type="checkbox"/> Abnormal pedal movement
	<input type="checkbox"/> ABS not working
	<input type="checkbox"/> ABS works but yellow ABS indicator light (LED) doesn't light up
<input type="checkbox"/> ABS operating too frequently	
Engine conditions at problem	<input type="checkbox"/> At start-up <input type="checkbox"/> After starting <input type="checkbox"/> At 5 000 r/min (rpm) or more
Road conditions	<input type="checkbox"/> Slippery road (<input type="checkbox"/> snow, <input type="checkbox"/> gravel, <input type="checkbox"/> other) <input type="checkbox"/> Rough surface <input type="checkbox"/> Other
Driving conditions	<input type="checkbox"/> High-speed cornering <input type="checkbox"/> Driving 30 km/h (19 mph) or above <input type="checkbox"/> Driving below 30 km/h (19 mph) <input type="checkbox"/> When stopping <input type="checkbox"/> When turning
Brake application	<input type="checkbox"/> Gradual <input type="checkbox"/> Abrupt
Other conditions	<input type="checkbox"/> Large brake lever stroke <input type="checkbox"/> Large pedal stroke

Anti-Lock Brake System (Equipped Models)

Pre-Diagnosis Inspection 1

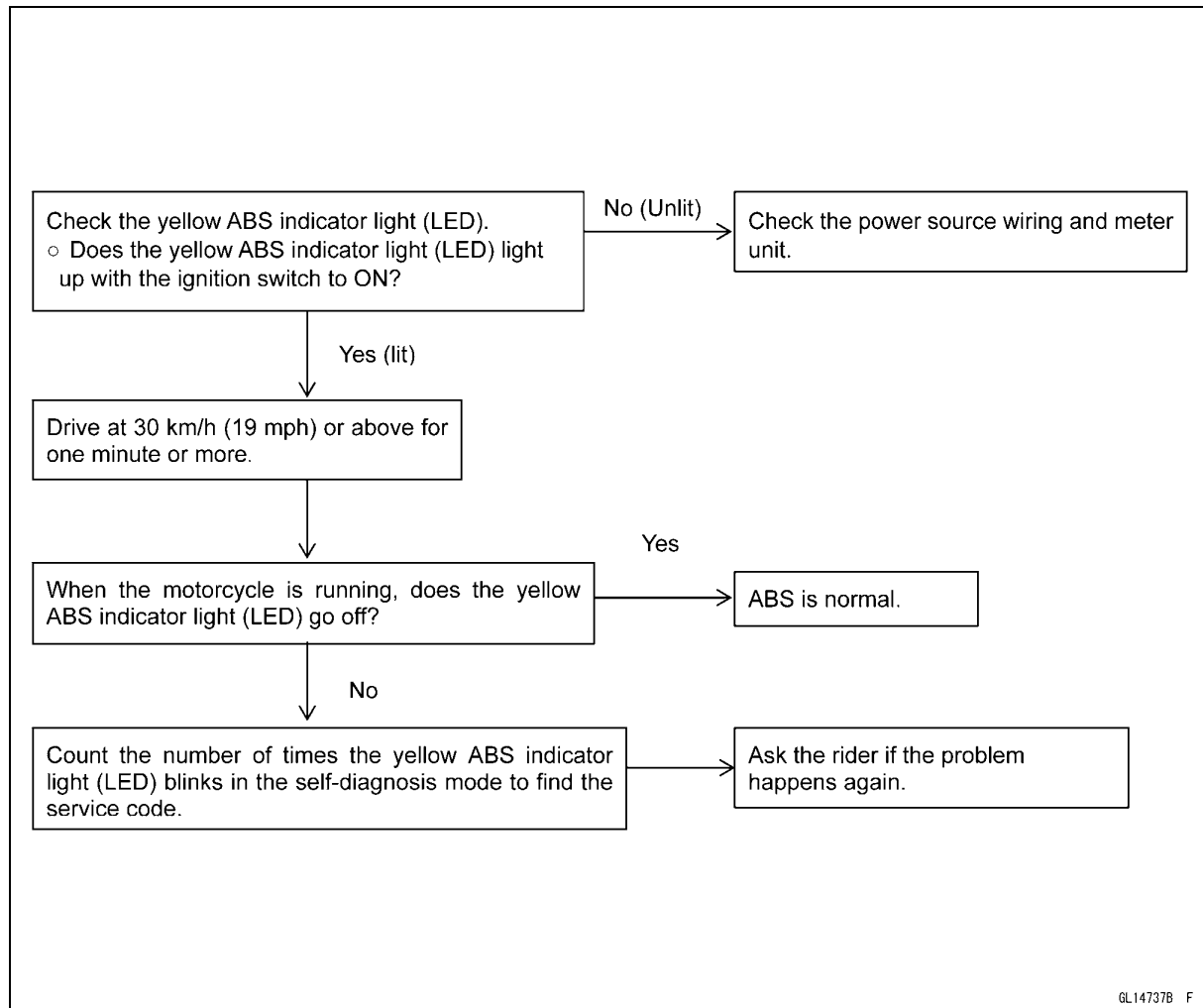


GL14736B F

12-46 BRAKES

Anti-Lock Brake System (Equipped Models)

Pre-Diagnosis Inspection 2



Self-diagnosis Outline

When the yellow ABS indicator light (LED) has blinked or come on, the ABS hydraulic unit memorizes and stores the service code for the service person to troubleshoot easily. The service code memory is powered directly by the battery and cannot be canceled by the ignition switch.

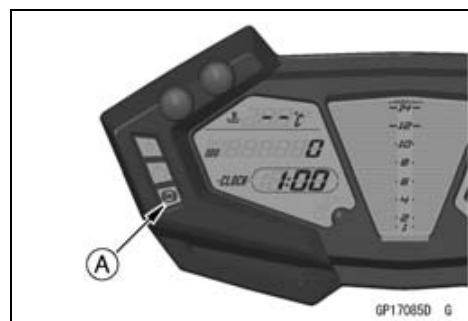
The ABS hydraulic unit can memorize up to all service codes. Further service codes are memorized after erasing the preceding all service codes. If there is no fault, the yellow ABS indicator light (LED) lights, indicating that "The ABS is normal".

Self-diagnosis Procedures

○ Before performing the self-diagnosis procedures, make sure that the yellow ABS indicator light (LED) [A] stays on to indicate any electrical problem occurring in the ABS system.

NOTE

- Use a fully charged battery for performing self-diagnosis procedure properly. A insufficient battery may cause improperly result.
- The self-diagnosis procedures should be done with the motorcycle is stopped.



Anti-Lock Brake System (Equipped Models)

- The ABS hydraulic unit can be store the service codes including previous ones.
- To read out the current service code, erase the stored service codes once prior reading the service code (see Service Code Clearing Procedures).
- Test ride the motorcycle with 30 km/h (19 mph) or more in a safety area to store the service code, which correspond to the current problems.
- Remove the rear seat (see Rear Seat Removal in the Frame chapter).
- Ground the self-diagnosis terminal [A] (Gray) to a frame ground, using a suitable auxiliary lead. Keep the auxiliary lead ground during self-diagnosis procedure.
- Turn the ignition switch on and read the service code (see How to Read Service Code).
- To exit the self-diagnosis mode, remove the auxiliary lead from the self-diagnosis terminal.

NOTE

- *The grounding auxiliary lead must be removed after the self-diagnosis procedure.*

Service Code Clearing Procedures

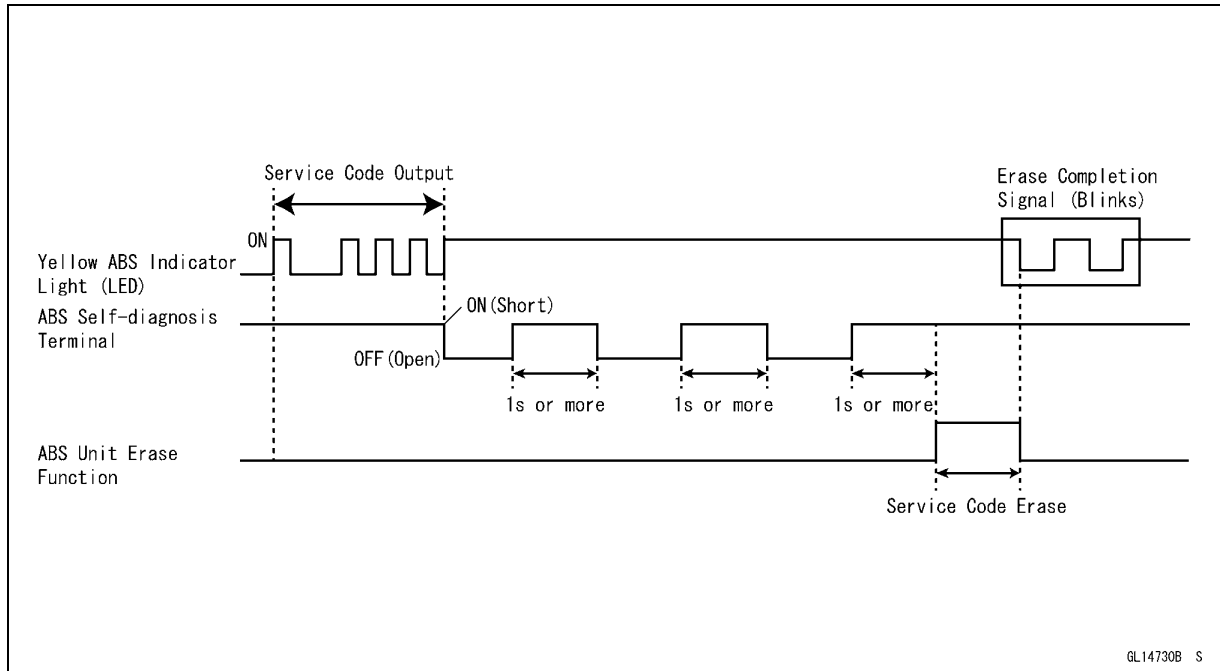
- Start the service code erase mode with the following procedure.
 - The erase mode starts when the ABS self-diagnosis terminal is disconnected from the frame ground after starting the self-diagnosis mode.
 - The service code can be erased by grounding (time for at least one second) and ungrounding the ABS self-diagnosis terminal three times or more within about 12.5 seconds after starting the erase mode and grounding it.
 - The yellow ABS indicator light (LED) remains lit during the erase mode.
 - After erasing, the yellow ABS indicator light (LED) blinks two times and lights.
 - Once erasing is finished, enter the self-diagnosis mode again to confirm that the service codes have been erased. If the ABS has been reset and all codes have been erased, the yellow ABS indicator light (LED) lights.



12-48 BRAKES

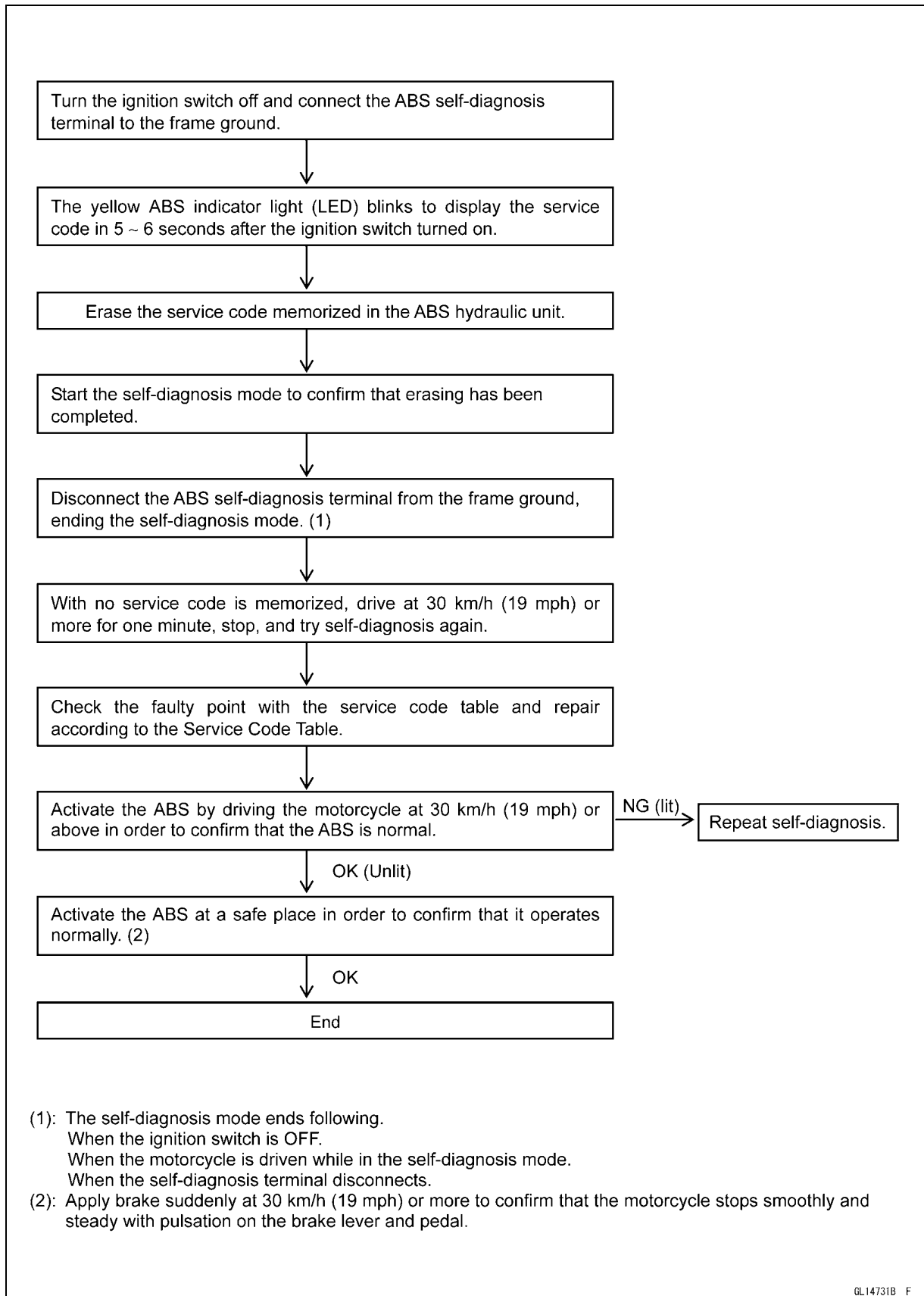
Anti-Lock Brake System (Equipped Models)

Erasing of Service Code



Anti-Lock Brake System (Equipped Models)

Self-diagnosis Flow Chart

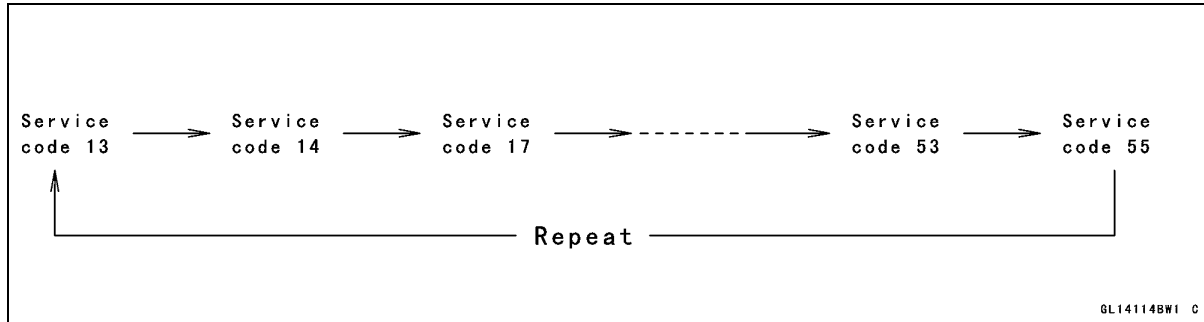


12-50 BRAKES

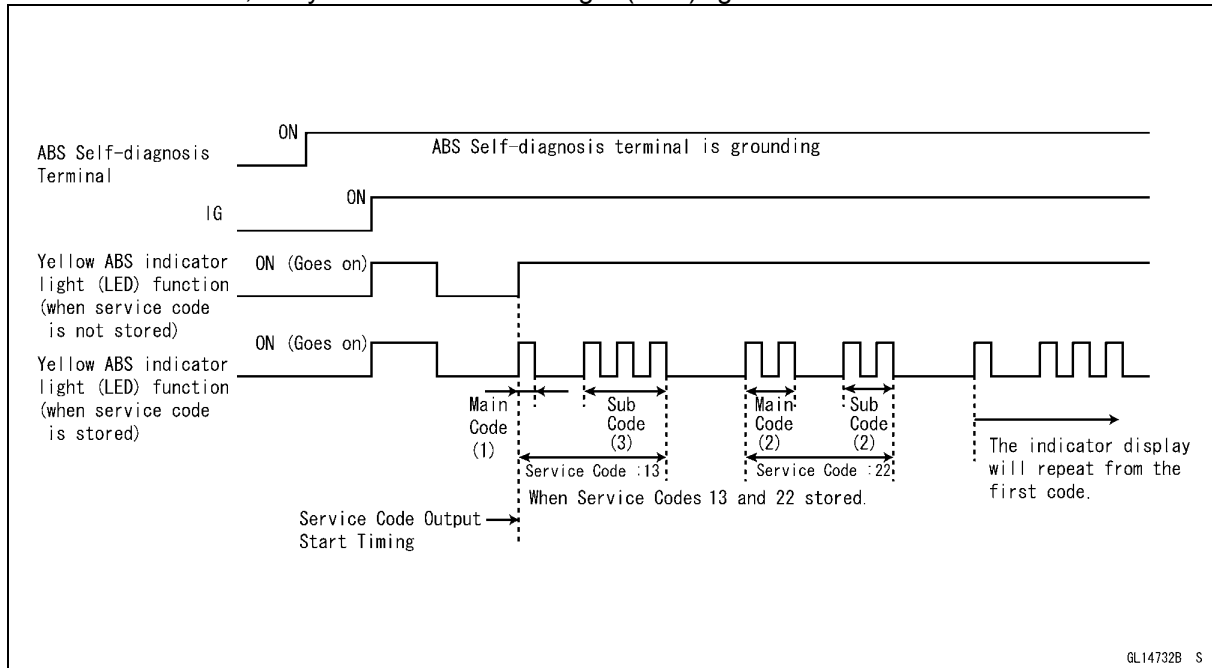
Anti-Lock Brake System (Equipped Models)

How to Read Service Codes

- Service codes are shown by a series of long and short blinks of the yellow ABS indicator light (LED) as shown below.
- Read 10th digit and unit digit as the yellow ABS indicator light (LED) blinks.
- When there are a number of faults, a maximum of all service codes can be stored and the display will begin starting from the small number code entered.
- For the display pattern, first the smallest number code is shown, next up to all service codes starting with the last one stored, then the display is repeated from the smallest number code once again.



○ If there is no fault, the yellow ABS indicator light (LED) lights as shown.


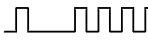



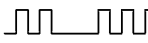



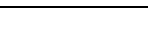
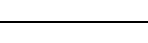
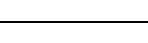
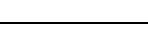
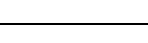


How to Erase Service Codes

- Even if the ignition switch is turned off, the battery or the ABS hydraulic unit are disconnected, all service codes remain in the ABS hydraulic unit.
- Refer to the Service Code Clearing Procedure for the service code erasure.

Anti-Lock Brake System (Equipped Models)

Service Code Table

Service Code	Yellow ABS Indicator Light (LED)	Problems	Light State
–	Stays on* (Error function after the ignition switch turned on)	Main harness, meter unit, wheel rotation sensor(s) or ABS unit abnormal	ON
–	Does not go on (When the ignition switch turned on)	Main harness, meter unit or ABS unit abnormal	OFF
13	 ON OFF	Rear intake solenoid valve trouble (wiring shorted or open)	ON
14		Rear outlet solenoid valve trouble (wiring shorted or open)	ON
17		Front intake solenoid valve trouble (wiring shorted or open)	ON
18		Front outlet solenoid valve trouble (wiring shorted or open)	ON
19		ABS solenoid valve relay trouble [stuck relay (ON or OFF)]	ON
25		Front, rear wheel rotation difference abnormal (substandard tire)	ON
35		ABS motor trouble (mechanical stuck)	ON
42		Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)	ON
43		Front or rear wheel rotation sensor wiring (wiring shorted or open, connector bad connection)	ON
44		Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)	ON
45		Rear wheel rotation sensor wiring (wiring shorted or open, connector bad connection)	ON
52		Power supply voltage abnormal (low-voltage)	ON
53		Power supply voltage abnormal (high-voltage)	ON
55		ABS Hydraulic Unit Internal Error (ECU operation abnormal)	ON

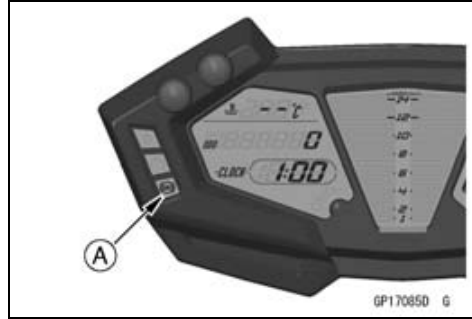
*: In spite of the service code is not stored, the yellow ABS Indicator Light (LED) does not go off when the 2 seconds later from the ignition switch turned on.

12-52 BRAKES

Anti-Lock Brake System (Equipped Models)

Yellow ABS Indicator Light (LED) Inspection

○ In this model, the yellow ABS indicator light (LED) [A] goes on or blinks by the control of the ABS hydraulic unit.



Yellow ABS Indicator Light (LED) Stays ON (Error function after the ignition switch turned on - No Service Code)

- Perform the Pre-Diagnosis Inspection 1.
- Check the system connectors for loose or poorly contact.

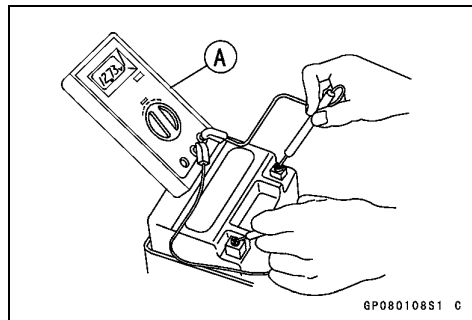
Step 1

- Check the ignition fuse 15 A [A] in the fuse box 1 for blown.
- ★ If the fuse is blown, replace the fuse.
- ★ If the fuse is not blown, go to next step.



Step 2

- Measure the battery terminal voltage using a voltmeter [A].
- The battery voltage should be within 10 ~ 16 V.
- ★ If the voltage without specifications, recharge or replace the battery.
- ★ If the voltage within specifications, go to next step.

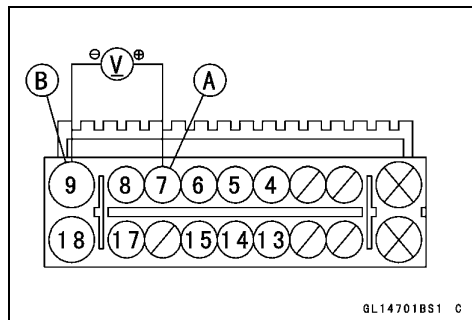


Step 3

- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 7 (BR/W) (+) [A] and terminal 9 (BK) (-) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

- The battery voltage (10 ~ 16 V) should be appeared while the ignition switch turned on.
- ★ If the battery voltage appeared, go to step 4.
- ★ If the battery voltage does not appear, go to next step.

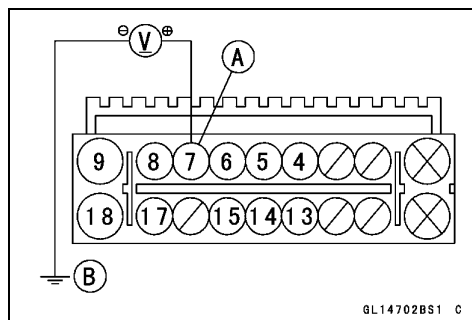


Step 3-1

- Check the voltage between the terminal 7 (BR/W) (+) [A] of the ABS hydraulic unit connector and a frame ground (-) [B].

Special Tool - Hand Tester: 57001-1394

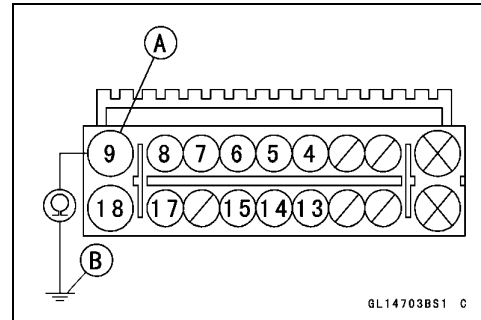
- The battery voltage (10 ~ 16 V) should be appeared while the ignition switch turned on.
- ★ If the battery voltage does not appear, repair or replace the main harness.
- ★ If the battery voltage appeared, go to next step.



Anti-Lock Brake System (Equipped Models)

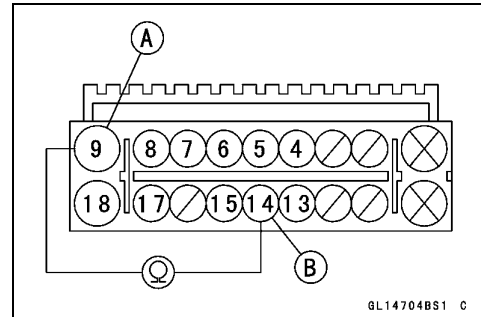
Step 3-2

- Check for continuity between the terminal 9 (BK) [A] of the ABS hydraulic unit connector and a frame ground [B].
- ★ If there is no continuity, repair or replace the main harness.
- ★ If there is continuity, replace the ABS hydraulic unit.



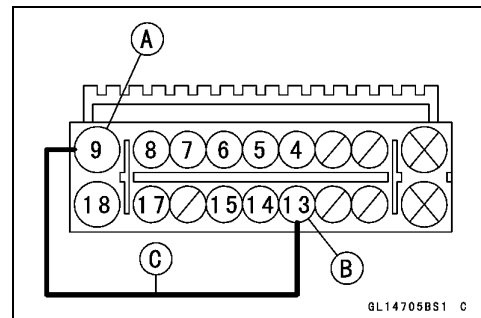
Step 4

- With the self-diagnosis terminal connected to the ground, check for continuity between the terminal 9 (BK) [A] and terminal 14 (GY) [B] of the ABS hydraulic unit connector.
- ★ If there is no continuity, repair or replace the main harness.
- ★ If there is continuity, go to next step.



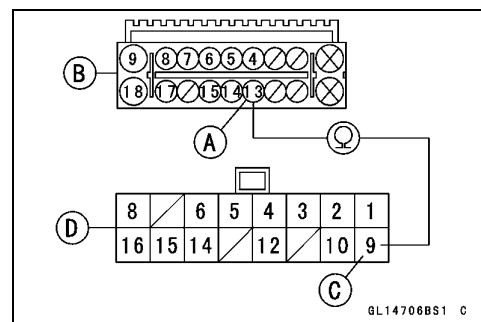
Step 5

- Jump the terminal 9 (BK) [A] and terminal 13 (BL/Y) [B] at the ABS hydraulic unit connector using a jumper read [C].
- Check the yellow ABS indicator light (LED) with the ignition switch turned on.
- ★ If the indicator goes off, replace the ABS hydraulic unit.
- ★ If the indicator goes on, go to next step.



Step 6

- Disconnect the connector from the meter unit (see Meter Unit Removal/Installation in the Electrical System chapter).
- Check for continuity between the terminal 13 (BL/Y) [A] of the ABS hydraulic unit connector [B] and terminal 9 (BK) [C] of the meter connector [D].
- ★ If there is no continuity, repair or replace the main harness.
- ★ If there is continuity, replace the meter unit with a new one.



Yellow ABS Indicator Light (LED) does not go on (When the Ignition Switch turned on)

- Perform the Pre-Diagnosis Inspection 1.
- Check the system connectors for loose or poorly contact.

Step 1

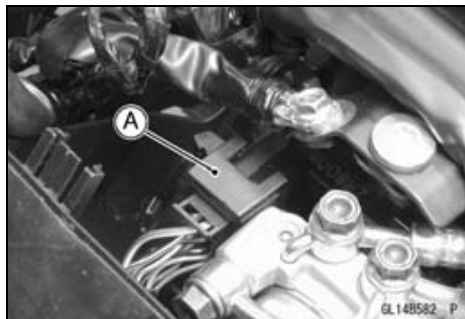
- Check the meter fuse 7.5 A in the fuse box 1 for blown.
- ★ If the fuse is blown, replace the fuse.
- ★ If the fuse is not blown, go to next step.

12-54 BRAKES

Anti-Lock Brake System (Equipped Models)

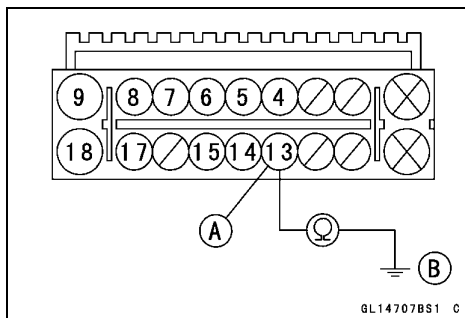
Step 2

- Disconnect the ABS hydraulic unit connector [A] and check the yellow ABS indicator light (LED) for function.
- The yellow ABS indicator light (LED) should go on when the ignition switch is turned on.
- ★ If the indicator does not go on, go to the next step.
- ★ If the indicator goes on, go to step 3.



Step 2-1

- Disconnect the connector from the meter unit (see Meter Unit Removal/Installation in the Electrical System chapter).
- Check for continuity between terminal 13 (BL/Y) [A] of the ABS hydraulic unit connector and a frame ground [B].
- ★ If there is continuity, repair or replace the main harness.
- ★ If there is no continuity, replace the meter unit with a new one.

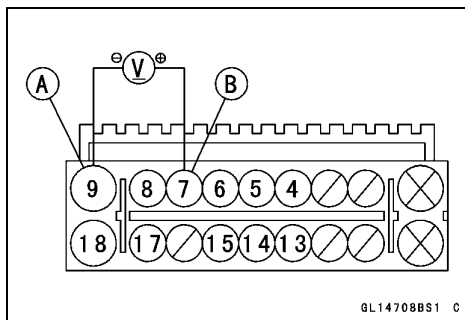


Step 3

- Check the voltage between terminal 9 (BK) (-) [A] and terminal 7 (BR/W) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

- The battery voltage (10 ~ 16 V) should not appear while the ignition switch is turned off.
- ★ If the battery voltage appeared, repair or replace the main harness.
- ★ If the battery voltage does not appear, go to the next step.

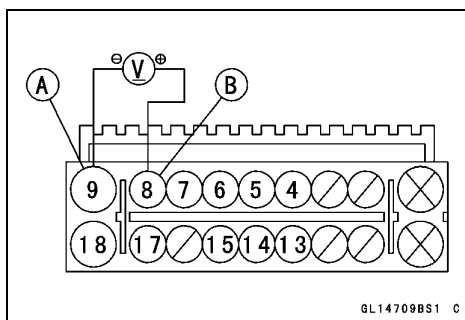


Step 4

- Check the voltage between terminal 9 (BK) (-) [A] and terminal 8 (W/BK) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

- The battery voltage (10 ~ 16 V) should not appear while the ignition switch is turned off.
- ★ If the battery voltage appeared, repair or replace the main harness.
- ★ If the battery voltage does not appear, go to the next step.

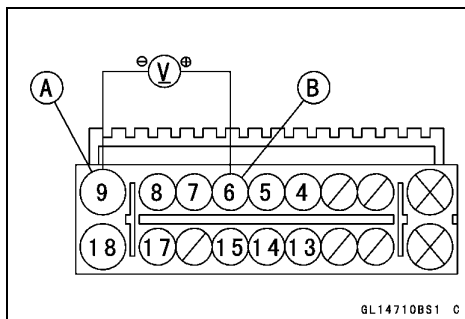


Step 5

- Check the voltage between terminal 9 (BK) (-) [A] and terminal 6 (W/G) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

- The battery voltage (10 ~ 16 V) should not appear while the ignition switch is turned off.
- ★ If the battery voltage appeared, repair or replace the main harness.
- ★ If the battery voltage does not appear, replace the ABS hydraulic unit.



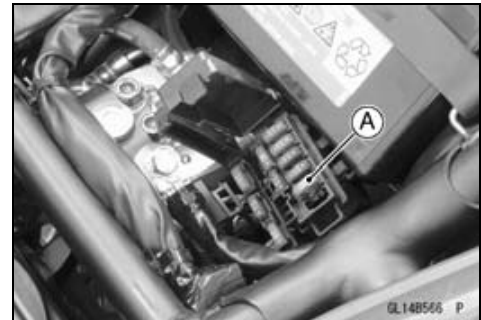
Anti-Lock Brake System (Equipped Models)

ABS Unit Solenoid Valve Inspection (Service Code 13, 14, 17, 18)

- These codes indicate there is a problem in the solenoid valves, which are integrated into the ABS Hydraulic Unit. Therefore the solenoid valves cannot be checked directly.
- Check the system connectors for loose or poor contact.
- In order to confirm an existing problem in the system, erase the service code and then perform the pre-diagnosis inspection 1 and 2.
- ★ If the same service code is indicated again, replace the solenoid valve in the ABS hydraulic unit. Replace the ABS hydraulic unit.
- ★ If the service code does not indicate, the ABS system is normal (service code is not stored; temporary failure).

ABS Solenoid Valve Relay Inspection (Service Code 19)

- Perform the Pre-Diagnosis Inspection 1 and 2.
 - Check the system connectors for loose or poor contact.
- Step 1**
- Check the ABS fuse 30 A [A] in the fuse box 1 for blown.
 - ★ If the ABS fuse is blown, replace the fuse.
 - ★ If the fuse is not blown, go to the next step.

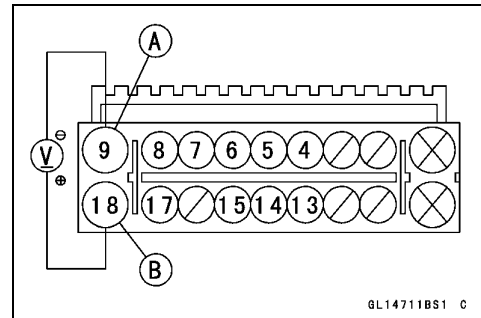


Step 2

- Disconnect the ABS hydraulic unit connector.
- Check the voltage between terminal 9 (BK) (-) [A] and terminal 18 (R/W) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

- The battery voltage (10 ~ 16 V) should appear while the ignition switch is turned on.
- ★ If the battery voltage does not appear, repair or replace the main harness.
- ★ If the battery voltage appeared, replace the ABS hydraulic unit.



Front, Rear Wheel Rotation Difference Abnormal Inspection (Service Code 25)

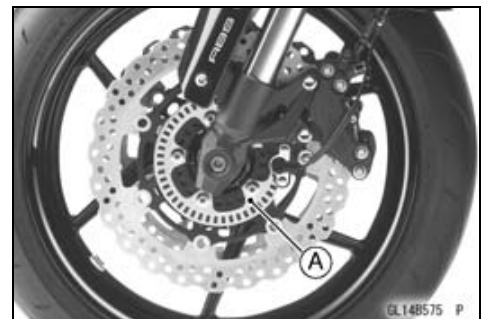
- Perform the Pre-Diagnosis Inspection 1 and 2.

Step 1

- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).
- ★ If the tire and/or wheel are in bad condition, correct them to the normal condition.
- ★ If there is no problem, go to the next step.

Step 2

- Visually inspect the sensor rotor [A] for missing teeth or clogging with foreign matter (see Wheel Rotation Sensor Rotor Inspection).
- ★ Clean or correct the parts if necessary.
- ★ If all parts are correct, go to the next step.



12-56 BRAKES

Anti-Lock Brake System (Equipped Models)

Step 3

- Measure the front and rear wheel rotation sensor air gaps (see Wheel Rotation Sensor Air Gap Inspection).
- ★ If the air gap is not within the specification, recheck the hub bearing, sensor, sensor rotor and sensor installation condition.
- ★ If the air gap is within the specification, replace the ABS hydraulic unit.

ABS Motor Inspection (Service Code 35)

- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.
- In order to confirm a existing problem in the system, erase the service code and then recheck the yellow ABS indicator light (LED).
- ★ If same service code is indicated again, faulty ABS Motor in the ABS hydraulic unit. Replace the ABS hydraulic unit.
- ★ If the service code does not indicate, ABS system is normal (service code is not stored; temporary failure).

Wheel Rotation Sensor Signal Abnormal Inspection (Front: Service Code 42) (Rear: Service Code 44)

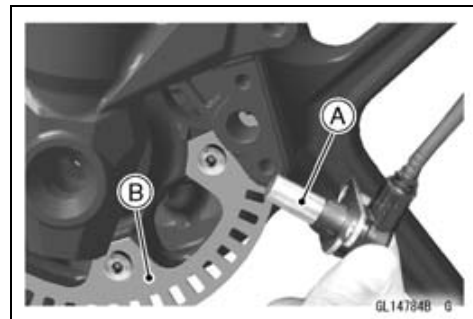
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1

- Measure the front or rear wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection).
- ★ If the air gap is not within the specification, recheck the hub bearing, sensor, sensor rotor and sensor installation condition.
- ★ If the air gap is within the specification, go to next step.

Step 2

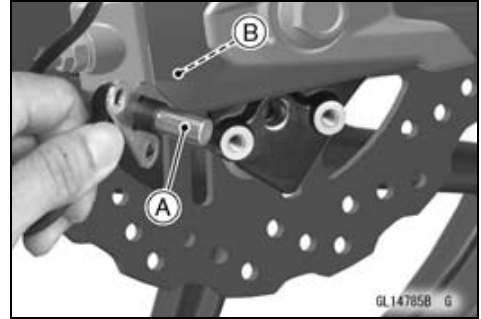
- Check that there is iron or other magnetic deposits between the front or rear wheel rotation sensor [A] and sensor rotor, and the sensor rotor slots [B] for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor tip and sensor rotor slots for deformation or damage (e.g. chipped sensor rotor teeth).
- ★ If the sensor and sensor rotor in bad condition, clean or replace the faulty parts.
- ★ If all items are correct, go to next step.



Anti-Lock Brake System (Equipped Models)

Step 3

- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).
- ★ If the tire and/or wheel are in bad condition, correct them if necessary and recheck.
- ★ If all items are good condition, replace the ABS unit.



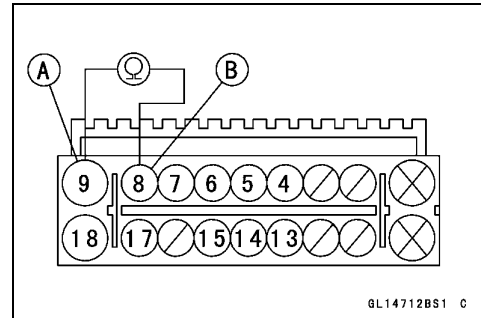
Front or Rear Wheel Rotation Sensor Wiring Inspection (Service Code 43)

○ This code indicates there is a trouble in the front or rear wheel rotation sensor.

- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

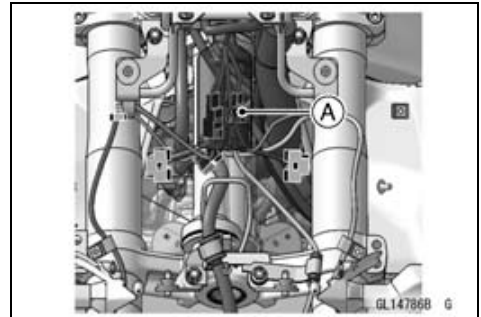
Step 1

- Disconnect the ABS hydraulic unit connector.
- Check for continuity between the terminal 9 (BK) [A] and terminal 8 (W/BK) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, go to next step.
- ★ If there is no continuity, go to step 2.



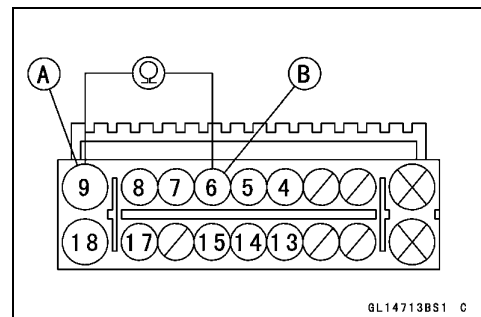
Step 1-1

- Disconnect the front wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 9 (BK) and terminal 8 (W/BK) of the ABS hydraulic unit connector.
- ★ If there is continuity, repair or replace the main harness.
- ★ If there is no continuity, replace the front wheel rotation sensor.



Step 2

- Check for continuity between the terminal 9 (BK) [A] and terminal 6 (W/G) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, go to next step.
- ★ If there is no continuity, go to step 3.

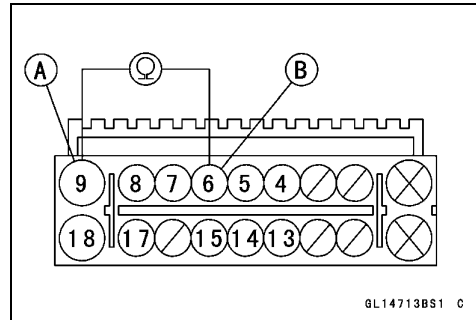


12-58 BRAKES

Anti-Lock Brake System (Equipped Models)

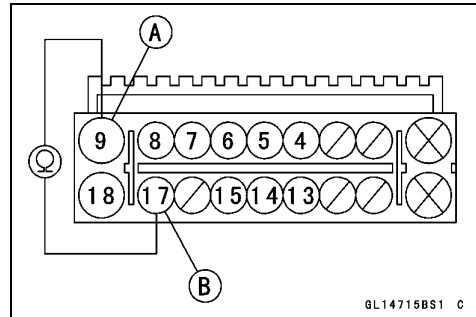
Step 2-1

- Disconnect the rear wheel rotation sensor connector.
 - Recheck the continuity between the terminal 9 (BK) [A] and terminal 6 (W/G) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, repair or replace the main harness.
★ If there is no continuity, replace the rear wheel rotation sensor.



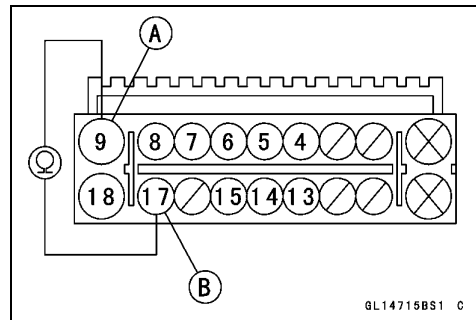
Step 3

- Connect the front wheel rotation sensor connector.
 - Check for continuity between the terminal 9 (BK) [A] and terminal 17 (BK/W) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, go to next step.
★ If there is no continuity, go to step 4.



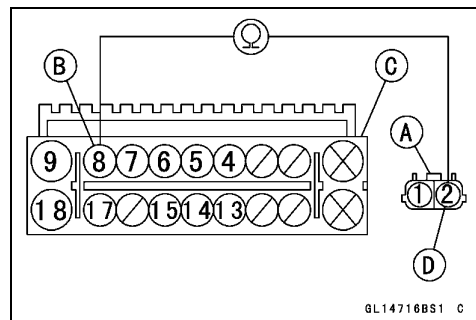
Step 3-1

- Disconnect the front wheel rotation sensor connector.
 - Recheck the continuity between the terminal 9 (BK) [A] and terminal 17 (BK/W) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, repair or replace the main harness.
★ If there is no continuity, replace the front wheel rotation sensor.



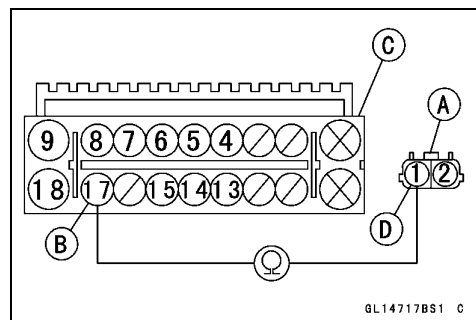
Step 4

- Disconnect the front wheel rotation sensor connector [A].
 - Check for continuity between the terminal 8 (W/BK) [B] of the ABS hydraulic unit connector [C] and terminal 2 (W/BK) [D] of the front wheel rotation sensor connector (main harness side).
- ★ If there is no continuity, repair or replace the main harness.
★ If there is continuity, go to next step.



Step 5

- With disconnecting the front wheel rotation sensor connector [A], check for continuity between the terminal 17 (BK/W) [B] of the ABS hydraulic unit connector [C] and the 1 (BK/W) terminal [D] of the front wheel rotation sensor connector (main harness side).
- ★ If there is no continuity, repair or replace the main harness.
★ If there is continuity, go to next step.



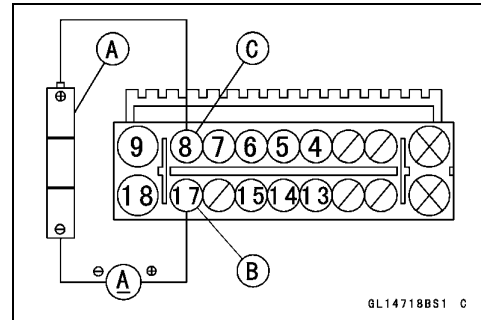
Anti-Lock Brake System (Equipped Models)

Step 6

- Connect the front wheel rotation sensor connector.
- Connect the 4.5 ~ 5.0 V DC power (e.g. three AA dry battery in series [A]) between the terminal 17 (BK/W) (-) [B] and terminal 8 (W/BK) (+) [C] of the ABS hydraulic unit connector to measure DC amperage.

Special Tool - Hand Tester: 57001-1394

- Be careful not to reverse connection of the DC power polarity.
- The measured DC amperage should be within 3 ~ 17 mA.
- ★ If measurement is abnormal, replace the front wheel rotation sensor.
- ★ If measurement is normal, replace the ABS hydraulic unit.

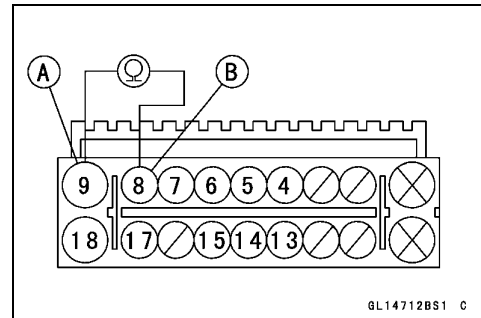


Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)

- This code indicates there is a trouble in the rear wheel rotation sensor. However the front and rear wheel rotation sensor inspection should be performed if this code is indicated.
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

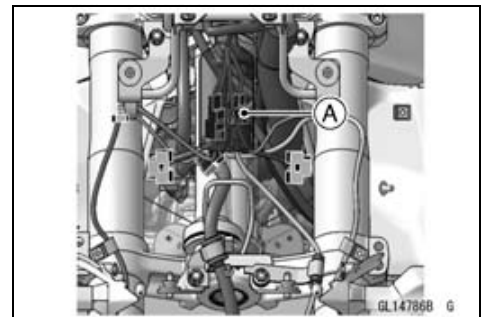
Step 1

- Disconnect the ABS hydraulic unit connector.
- Check for continuity between the terminal 9 (BK) [A] and terminal 8 (W/BK) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, go to next step.
- ★ If there is no continuity, go to step 2.



Step 1-1

- Disconnect the front wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 9 (BK) and terminal 8 (W/BK) of the ABS hydraulic unit connector.
- ★ If there is continuity, repair or replace the main harness.
- ★ If there is no continuity, replace the front wheel rotation sensor.

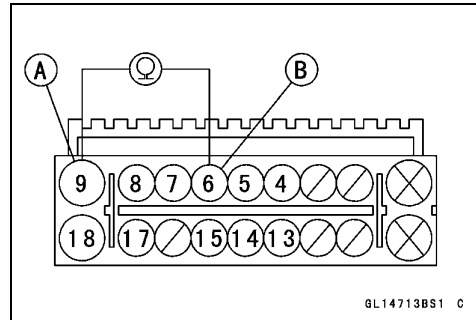


12-60 BRAKES

Anti-Lock Brake System (Equipped Models)

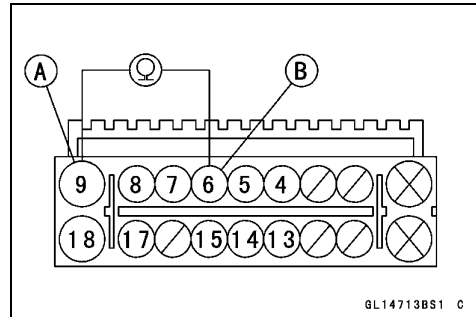
Step 2

- Check for continuity between the terminal 9 (BK) [A] and terminal 6 (W/G) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, go to next step.
- ★ If there is no continuity, go to step 3.



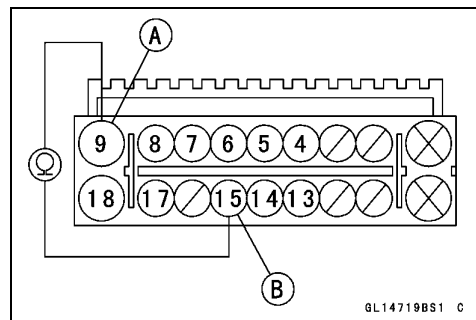
Step 2-1

- Disconnect the rear wheel rotation sensor connector.
- Recheck the continuity between the terminal 9 (BK) [A] and terminal 6 (W/G) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, repair or replace the main harness.
- ★ If there is no continuity, replace the rear wheel rotation sensor.



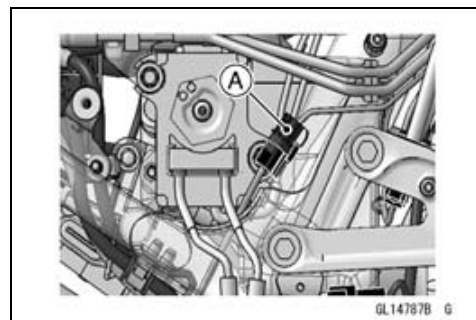
Step 3

- Connect the rear wheel rotation sensor connector.
- Check for continuity between the terminal 9 (BK) [A] and terminal 15 (BK/O) [B] of the ABS hydraulic unit connector.
- ★ If there is continuity, go to next step.
- ★ If there is no continuity, go to step 4.



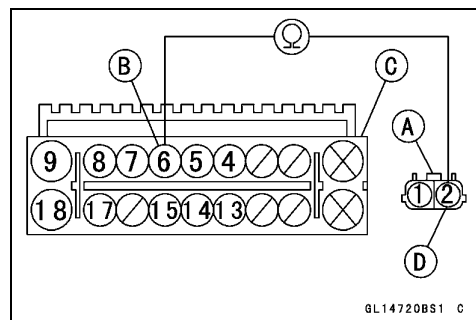
Step 3-1

- Disconnect the rear wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 9 (BK) and terminal 15 (BK/O) of the ABS hydraulic unit connector.
- ★ If there is continuity, repair or replace the main harness.
- ★ If there is no continuity, replace the rear wheel rotation sensor.



Step 4

- Disconnect the rear wheel rotation sensor connector [A].
- Check for continuity between the terminal 6 (W/G) [B] of the ABS hydraulic unit connector [C] and terminal 2 (W/G) [D] of the rear wheel rotation sensor connector (main harness side).
- ★ If there is no continuity, repair or replace the main harness.
- ★ If there is continuity, go to next step.



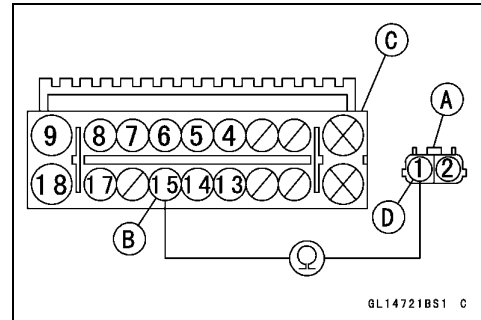
Anti-Lock Brake System (Equipped Models)

Step 5

- With disconnecting the rear wheel rotation sensor connector [A], check for continuity between the terminal 15 (BK/O) [B] of the ABS hydraulic unit connector [C] and terminal 1 (BK/O) [D] of the rear wheel rotation sensor connector (main harness side).

★ If there is no continuity, repair or replace the main harness.

★ If there is continuity, go to next step.



Step 6

- Connect the rear wheel rotation sensor connector.
- Connect the 4.5 ~ 5.0 V DC power (e.g. three AA dry battery in series [A]) between the terminal 15 (BK/O) (-) [B] and terminal 6 (W/G) (+) [C] of the ABS hydraulic unit connector to measure DC amperage.

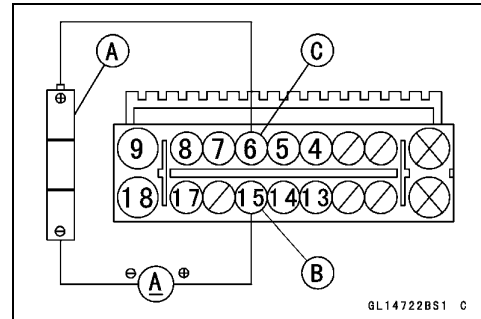
Special Tool - Hand Tester: 57001-1394

○ Be careful not to reverse connection of the DC power polarity.

○ The measured DC amperage should be within 3 ~ 17 mA.

★ If measurement is abnormal, replace the rear wheel rotation sensor.

★ If measurement is normal, replace the ABS hydraulic unit.



Power Supply Voltage Abnormal Inspection (Service Code 52: Low Voltage) (Service Code 53: High Voltage)

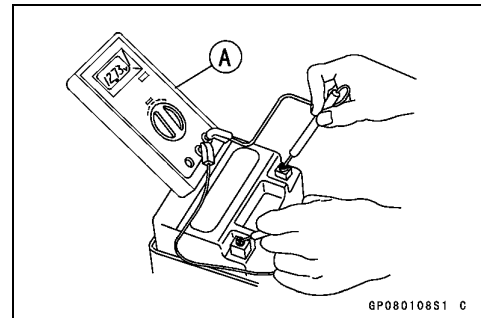
Step 1

- Measure the battery terminal voltage using a voltmeter [A].

○ The battery voltage should be within 10 ~ 16 V.

★ If the voltage is not within the specifications, recharge or replace the battery.

★ If the voltage within the specifications, go to next step.

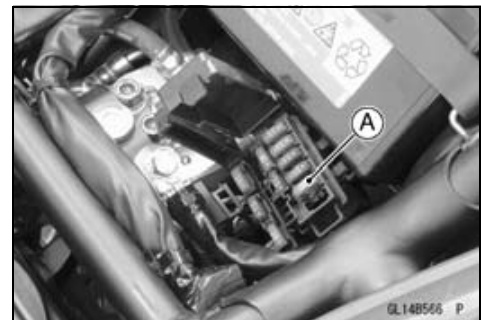


Step 2

- Check the ABS fuse 30A [A] in the fuse box 1 for blown.

★ If the ABS fuse is blown, replace the fuse.

★ If the fuse is not blown, go to next step.



12-62 BRAKES

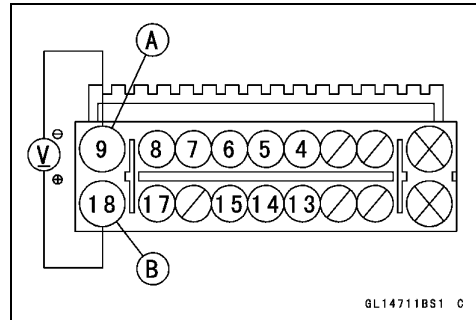
Anti-Lock Brake System (Equipped Models)

Step 3

- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 9 (BK) (-) [A] and terminal 18 (R/W) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

- The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.
- ★ If the battery voltage does not appear, repair or replace the main harness.
- ★ If the battery voltage appeared, go to next step.

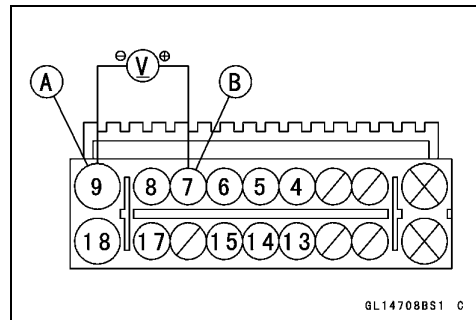


Step 4

- Check the voltage between the terminal 9 (BK) (-) [A] and terminal 7 (BR/W) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

- The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.
- ★ If the battery voltage not appeared, repair or replace the main harness.
- ★ If the battery voltage does appear, replace the ABS hydraulic unit.



ABS Hydraulic Unit Internal Error Inspection (Service Code 55)

- This service code indicates there is an internal error for the ECU integrated with the ABS hydraulic unit regarding the wheel speed detection.

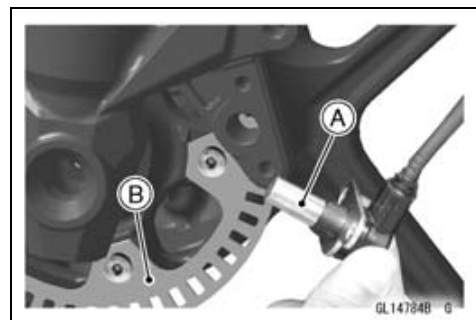
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1

- Measure the front and rear wheel rotation sensor air gaps (see Wheel Rotation Sensor Air Gap Inspection).
- ★ If the air gap is not within the specification, correct the air gap accordingly.
- ★ If the air gap is within the specification, go to next step.

Step 2

- Check that there is iron or other magnetic deposits between the both wheel rotation sensor [A] and sensor rotor, and the sensor rotor slots [B] for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor tip and sensor rotor slots for deformation or damage (e.g. chipped sensor rotor teeth).
- ★ If the sensor and sensor rotor in bad condition, clean or replace the faulty parts.
- ★ If all items are correct, go to next step.



Step 3

- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).
- ★ If the tire and/or wheel are in bad condition, correct them to the normal condition.
- ★ If there is no problem, replace the ABS hydraulic unit.

Anti-Lock Brake System (Equipped Models)

ABS Hydraulic Unit Removal

NOTICE

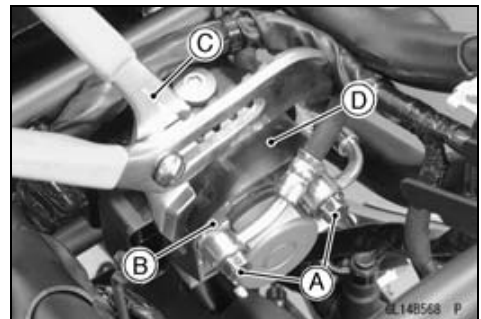
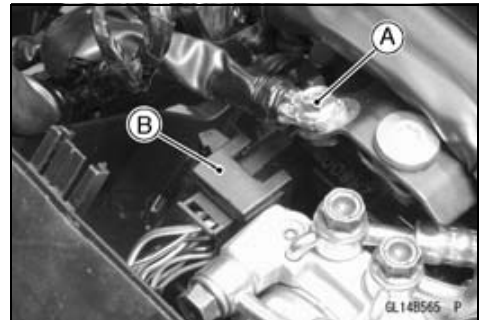
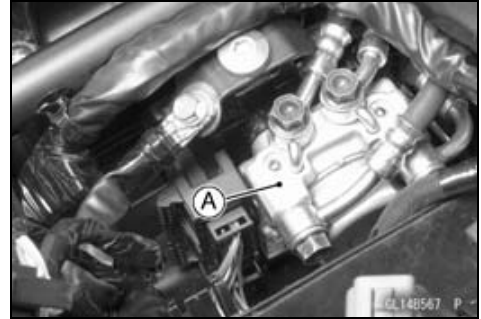
The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface.
Be careful not to get water or mud on the ABS hydraulic unit.

- Drain the brake fluid from the front and rear brake lines.
- Drain the brake fluid through the bleed valve by pumping the brake lever and pedal.
- Remove:
 - Seats (see Rear/Front Seat Removal in the Frame chapter)
 - Battery (see Battery Removal in the Electrical System chapter)
 - Bolt [A]
- Disconnect the ABS hydraulic unit connector [B].
- Remove:
 - Exhaust Butterfly Valve Actuator (ZR800B Model, see Exhaust Butterfly Valve Actuator Removal in the Fuel System (DFI) chapter)
 - Rear Fender (see Rear Fender Removal in the Frame chapter)
- Clean the ABS hydraulic unit.

NOTICE

Clean all fittings on the ABS hydraulic unit and the rear master cylinder because dirt around the banjo bolts could contaminate the brake fluid in the line during removal/installation.
Spread out a shop towel around the ABS hydraulic unit before removing the brake line so that brake fluid does not leak on the parts.

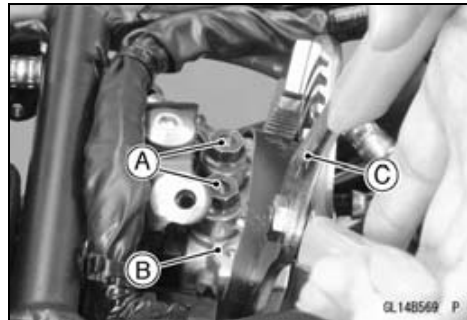
- Remove the brake hose banjo bolts [A] while holding the ABS hydraulic unit [B] with a suitable plier [C].
- Cover the ABS hydraulic unit with a suitable rubber sheet [D] or thick cloth to prevent the damage.



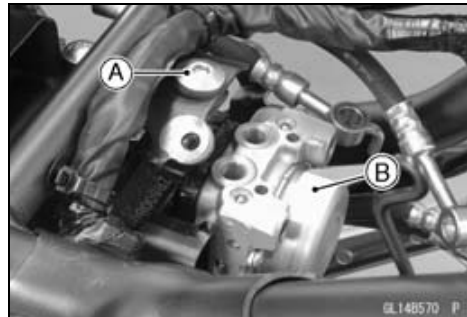
12-64 BRAKES

Anti-Lock Brake System (Equipped Models)

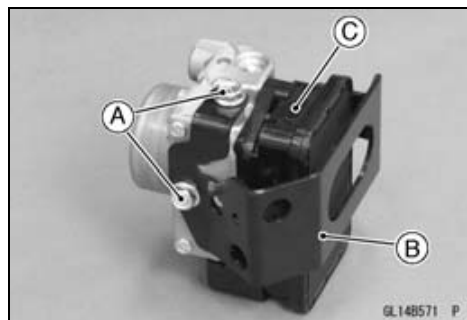
- Remove the brake hose banjo bolts [A] while holding the ABS hydraulic unit [B] with a suitable plier [C].



- Remove:
Bolt [A]
ABS Hydraulic Unit Assembly [B]

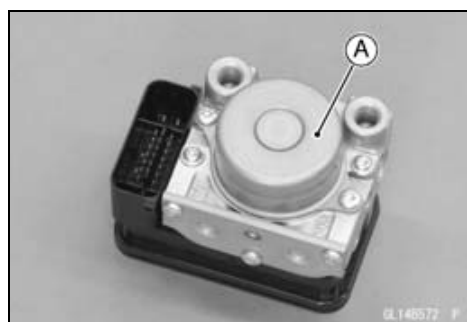


- Remove:
Bolts [A]
Bracket [B]
ABS Hydraulic Unit [C]



NOTICE

The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Do not try to disassemble and repair the ABS hydraulic unit.



Anti-Lock Brake System (Equipped Models)

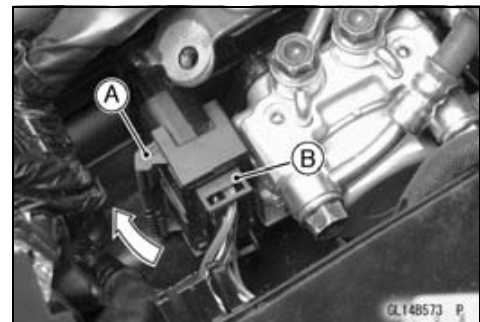
ABS Hydraulic Unit Installation

- Installation is the reverse of removal.

NOTICE

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

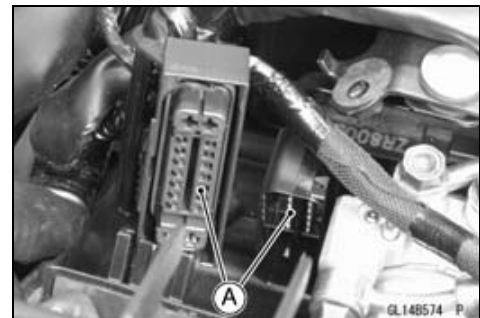
- When installing the hoses and pipes, avoid sharp bending, kinking, flattening or twisting, and run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- Tighten:
 - Torque - Brake Hose Banjo Bolts (ABS Hydraulic Unit): 33 N·m (3.4 kgf·m, 24 ft·lb)**
- Run the lead correctly, and connect the connector securely.
- Pull the lever [A] forward to connect the ABS hydraulic unit connector [B].



- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.
- Install the removed parts (see appropriate chapters).

ABS Hydraulic Unit Inspection

- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal).
- Visually inspect the ABS hydraulic unit.
- ★ Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.
- 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.



12-66 BRAKES

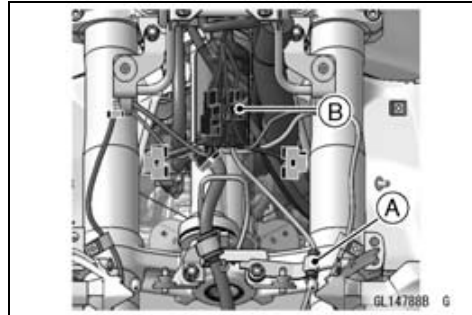
Anti-Lock Brake System (Equipped Models)

Front Wheel Rotation Sensor Removal

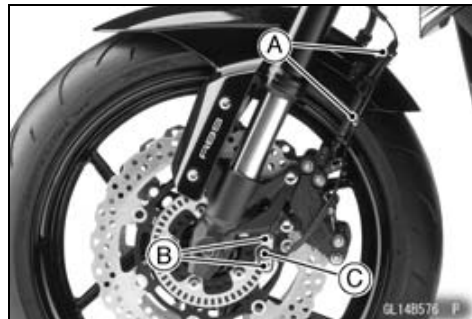
NOTICE

The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. Do not try to disassemble or repair the wheel rotation sensor.

- Remove:
 - Upper Fairing (see Upper Fairing Removal in the Frame chapter)
 - Clamp [A]
- Disconnect the connector [B].



- Remove:
 - Clamps [A]
 - Bolts [B]
 - Front Wheel Rotation Sensor [C]



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).

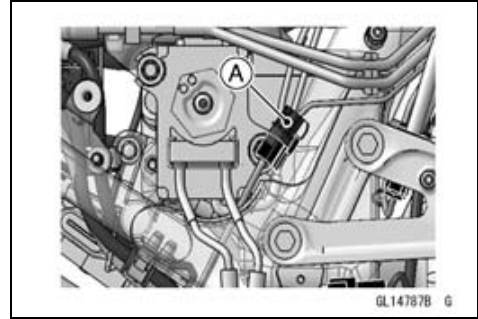
Rear Wheel Rotation Sensor Removal

NOTICE

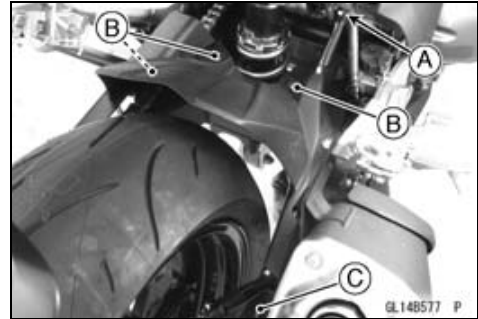
The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. Do not try to disassemble or repair the wheel rotation sensor.

Anti-Lock Brake System (Equipped Models)

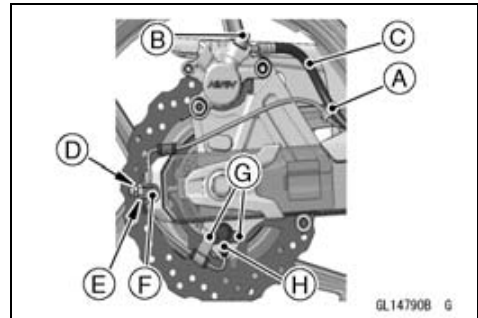
- Remove:
 - Right Side Cover (see Side Cover Removal in the Frame chapter)
- Disconnect the connector [A].



- Remove:
 - Clamp [A]
 - Bolts [B]
 - Screw [C]



- Remove:
 - Clamp [A]
 - Brake Hose Banjo Bolt [B]
- Clear the brake hose [C] from the hole of the rear inner fender.
- Remove:
 - Chain Adjuster Locknut [D]
 - Chain Adjuster [E]
 - Clamp [F]
 - Bolts [G]
 - Rear Wheel Rotation Sensor [H]



Rear Wheel Rotation Sensor Installation

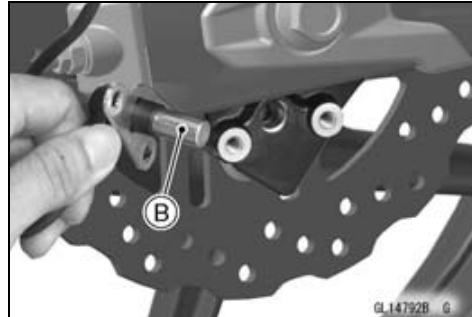
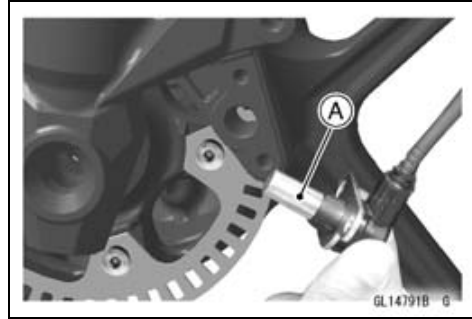
- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:
 - Torque - Chain Adjuster Locknut: 16.5 N·m (1.68 kgf·m, 12.2 ft·lb)**

12-68 BRAKES

Anti-Lock Brake System (Equipped Models)

Wheel Rotation Sensor Inspection

- Remove the front wheel rotation sensor [A] from the front fork.
- Remove the rear wheel rotation sensor [B] from the caliper bracket.
- Visually inspect the wheel rotation sensors.
- ★ Replace the wheel rotation sensor if it is cracked, bent, or otherwise damaged.



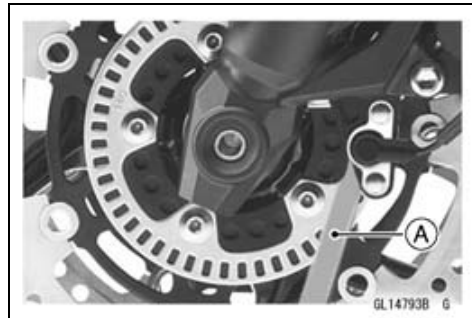
Wheel Rotation Sensor Air Gap Inspection

- Raise the front/rear wheel off the ground (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Measure the air gap between the sensor and sensor rotor at several points by turning the wheel slowly. Thickness Gauge [A]

Air Gap

Standard:

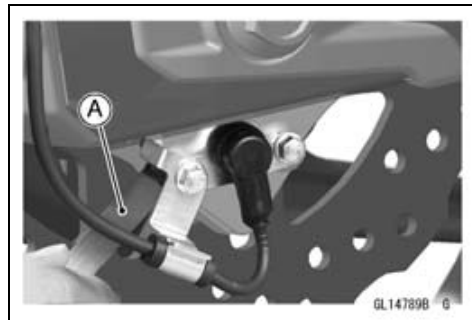
Front	0.1 ~ 1.5 mm (0.004 ~ 0.059 in.)
Rear	0.1 ~ 1.5 mm (0.004 ~ 0.059 in.)



NOTE

○ The sensor air gap cannot be adjusted.

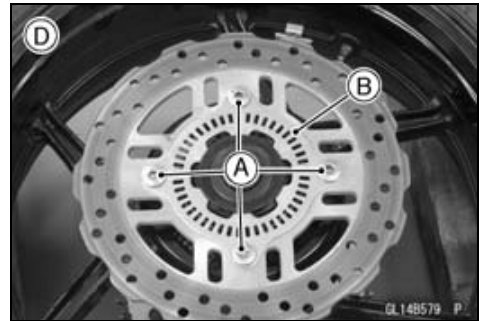
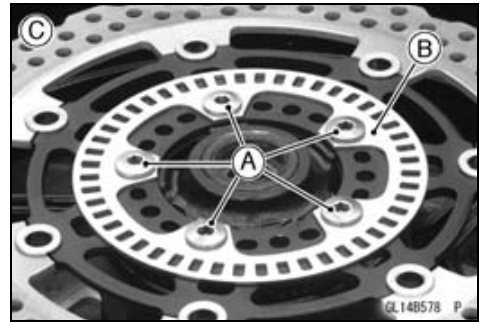
- ★ If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection in the Wheels/Tires chapter), sensor installation condition and sensor (see Wheel Rotation Sensor Inspection).



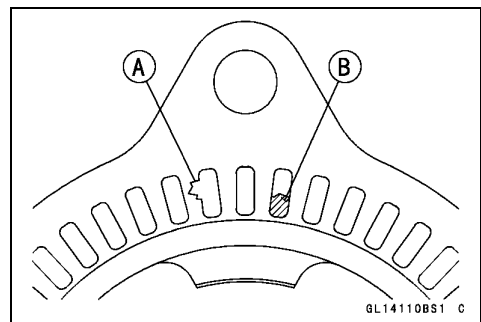
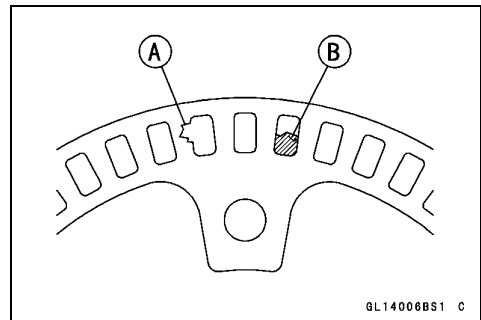
Anti-Lock Brake System (Equipped Models)

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.



Fuse Removal

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

Fuse Installation

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

Fuse Inspection

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

Suspension

Table of Contents

Exploded View	13-2
Specifications	13-8
Special Tools	13-10
Front Fork	13-13
Rebound Damping Force Adjustment (ZR800A/B Models, Right Front Fork Only)	13-13
Spring Preload Adjustment (ZR800A/B Models)	13-13
Front Fork Removal (Each Fork Leg)	13-14
Front Fork Installation	13-14
Front Fork Oil Change (ZR800A/B Models)	13-14
Front Fork Oil Change (ZR800C/D Models)	13-25
Front Fork Disassembly	13-32
Front Fork Assembly	13-34
Inner Tube, Outer Tube Inspection	13-35
Dust Seal Inspection	13-35
Spring Tension Inspection	13-35
Rear Shock Absorber	13-36
Rebound Damping Force Adjustment (ZR800A/B Models)	13-36
Spring Preload Adjustment (ZR800A/B Models)	13-36
Spring Preload Adjustment (ZR800C/D Models)	13-37
Rear Shock Absorber Removal	13-38
Rear Shock Absorber Installation	13-39
Rear Shock Absorber Inspection	13-39
Rear Shock Absorber Scrapping	13-39
Swingarm	13-41
Swingarm Removal	13-41
Swingarm Installation	13-42
Swingarm Bearing Removal	13-43
Swingarm Bearing Installation	13-43
Swingarm Bearing, Sleeve Inspection	13-44
Swingarm Bearing Lubrication	13-45
Chain Guide Inspection	13-45
Tie-Rod, Rocker Arm	13-46
Tie-Rod Removal	13-46
Tie-Rod Installation	13-46
Rocker Arm Removal	13-46
Rocker Arm Installation	13-46
Tie-Rod and Rocker Arm Bearing Removal	13-47
Tie-Rod and Rocker Arm Bearing Installation	13-47
Rocker Arm/Tie-Rod Bearing, Sleeve Inspection	13-48
Rocker Arm/Tie-Rod Bearing Lubrication	13-48

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Front Fork Clamp Bolts	20	2.0	15	
2	Front Fork Top Plugs	22.5	2.29	16.6	
3	Piston Rod Nuts	15	1.5	11	
4	Lower Front Fork Clamp Bolts	20.5	2.09	15.1	AL
5	Cylinder Units	70	7.1	52	AD
6	Front Axle Clamp Bolt	20	2.0	15	

7. Inner Tube (ABS Equipped Models)

AD: Apply adhesive (see the text).

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

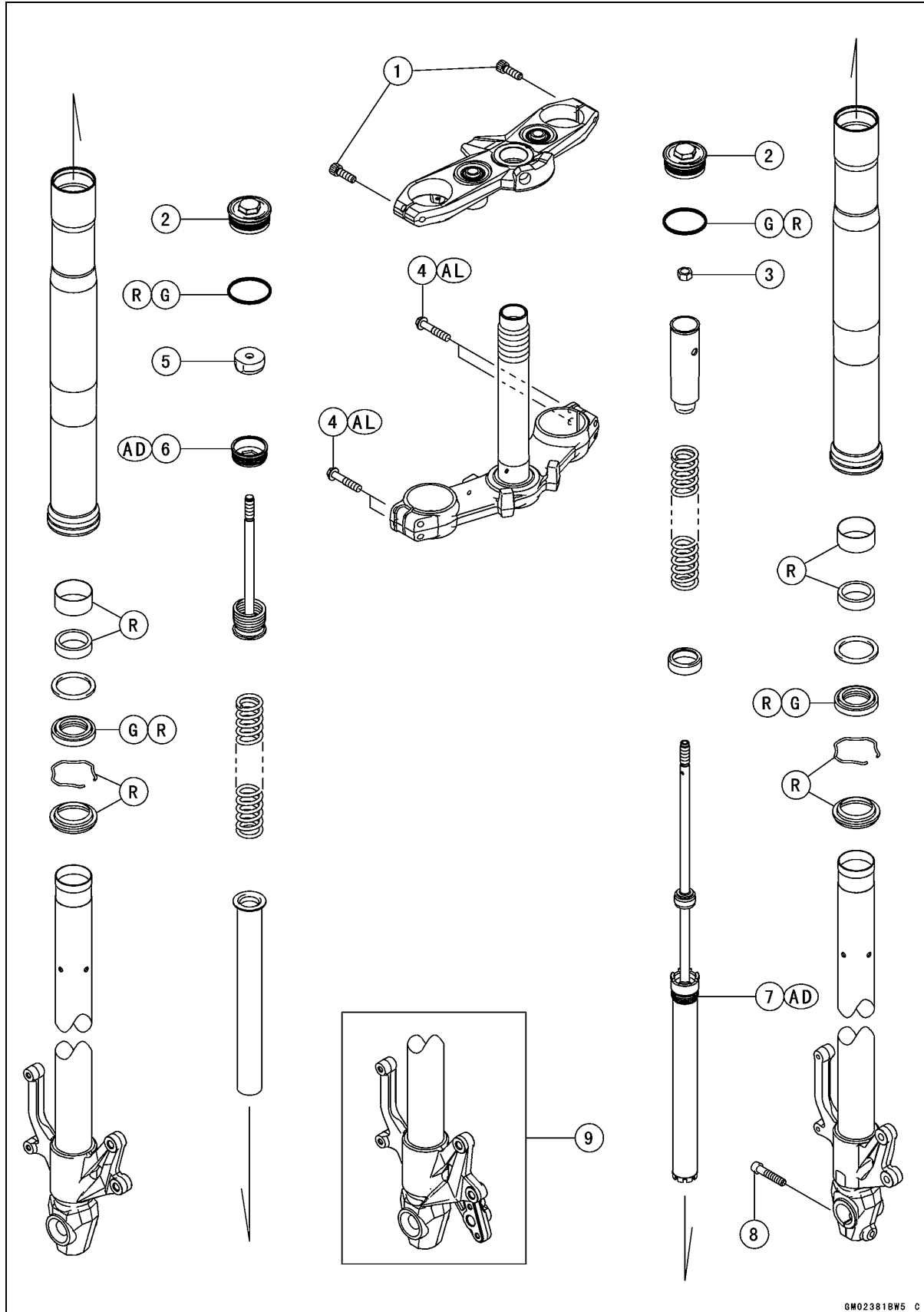
G: Apply grease.

R: Replacement Parts

13-4 SUSPENSION

Exploded View

ZR800C/D Models



GM02381BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Front Fork Clamp Bolts	20	2.0	15	
2	Front Fork Top Plugs	22.5	2.29	16.6	
3	Piston Rod Nut	15	1.5	11	
4	Lower Front Fork Clamp Bolts	20.5	2.09	15.1	AL
5	Piston Rod Rubber Nut	15	1.5	11	
6	Piston Rod Assy Stopper	17.5	1.78	12.9	AD
7	Cylinder Unit	70	7.1	52	AD
8	Front Axle Clamp Bolt	20	2.0	15	

9. Inner Tube (ABS Equipped Models)

AD: Apply adhesive (see the text).

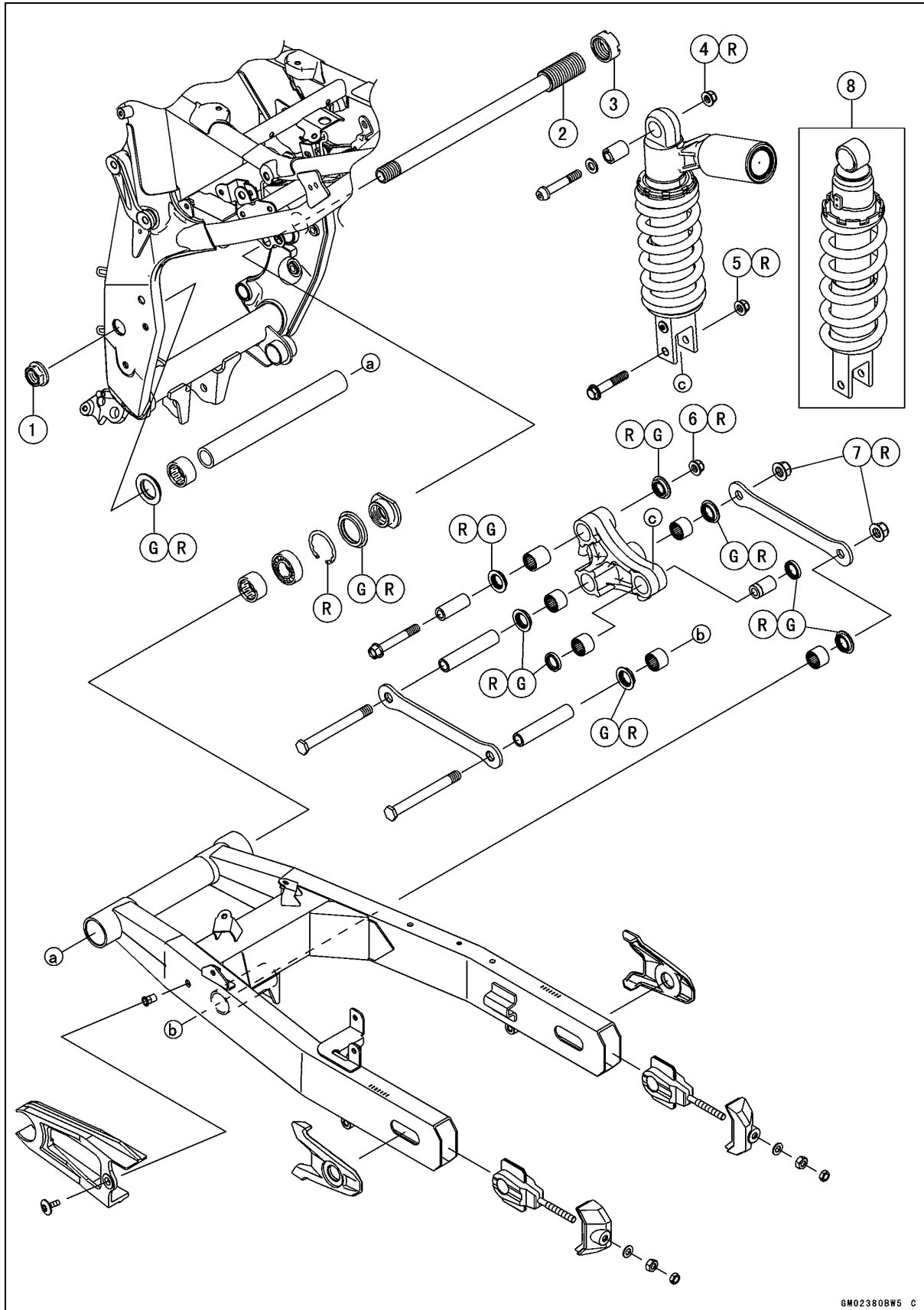
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.

G: Apply grease.

R: Replacement Parts

13-6 SUSPENSION

Exploded View



GM02380BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Swingarm Pivot Shaft Nut	108	11.0	79.7	
2	Swingarm Pivot Shaft	9.8	1.0	87 in·lb	
3	Swingarm Pivot Shaft Locknut	98	10	72	
4	Rear Shock Absorber Nut (Upper)	34	3.5	25	R
5	Rear Shock Absorber Nut (Lower)	34	3.5	25	R
6	Rocker Arm Nut	34	3.5	25	R
7	Tie-Rod Nuts	59	6.0	44	R

8. ZR800C/D Models
 G: Apply grease.
 R: Replacement Parts

13-8 SUSPENSION

Specifications

Item	Standard
Front Fork (ZR800A/B Models, Per One Unit) Fork Inner Tube Diameter Air Pressure Rebound Damper Setting (Right Front Fork Only) Fork Spring Preload Setting Fork Oil: Recommend Oil Amount: When Changing Oil After Disassembly and Completely Dry Right Front Fork Left Front Fork Fork Oil Level: (Fully compressed, without fork spring, below from the top of the outer tube) Right Front Fork Left Front Fork Fork Spring Free Length	$\phi 41$ mm (1.6 in.) Atmospheric pressure (Non-adjustable) 12th click from the 1st click of the fully clockwise position (Usable range: 0 \longleftrightarrow 26 clicks) Adjuster protrusion is 9 mm (0.4 in.) [Usable range: 4 ~ 19 mm (0.16 ~ 0.75 in.)] KHL15-10 or equivalent Approx. 405 mL (13.7 US oz.) 464 ± 4 mL (15.7 ± 0.135 US oz.) 469 ± 4 mL (15.9 ± 0.135 US oz.) 106 ± 2 mm (4.17 ± 0.08 in.) 109 ± 2 mm (4.29 ± 0.08 in.) 252.5 mm (9.94 in.) [Service Limit: 247.5 mm (9.74 in.)]
Front Fork (ZR800C/D Models, Per One Unit) Fork Inner Tube Diameter Air Pressure Fork Oil: Recommend Oil Amount: When Changing Oil Right Front Fork Left Front Fork After Disassembly and Completely Dry Right Front Fork Left Front Fork Fork Oil Level: (Fully compressed, without fork spring, below from the top of the outer tube) Right Front Fork Left Front Fork Fork Spring Free Length	$\phi 41$ mm (1.6 in.) Atmospheric pressure (Non-adjustable) KHL15-10 or equivalent Approx. 410 mL (13.9 US oz.) Approx. 450 mL (15.2 US oz.) 481 ± 4 mL (16.3 ± 0.135 US oz.) 529 ± 4 mL (17.9 ± 0.135 US oz.) 98 ± 2 mm (3.86 ± 0.08 in.) --- 262 mm (10.3 in.) [Service Limit: 257 mm (10.1 in.)]
Rear Shock Absorber Rebound Damper Setting (ZR800A/B Models)	1 1/4 turns out from the fully clockwise position (Usable range: 0 \longleftrightarrow 2 2/4 turns out)

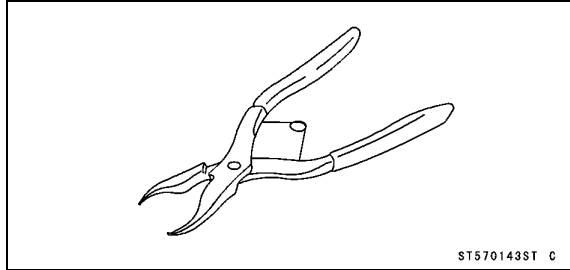
Specifications

Item	Standard
Spring Preload Setting Position (ZR800A/B Models): Standard Usable Range	Spring length: 175.2 mm (6.90 in.) Spring length: 170.2 ~ 180.2 mm (6.70 ~ 7.09 in.) (stronger to weaker)
Spring Preload Setting Position (ZR800C/D Models): Standard Usable Range Gas Pressure	4th position 1st ~ 7th position 980 kPa (10 kgf/cm ² , 142 psi, Non-adjustable)

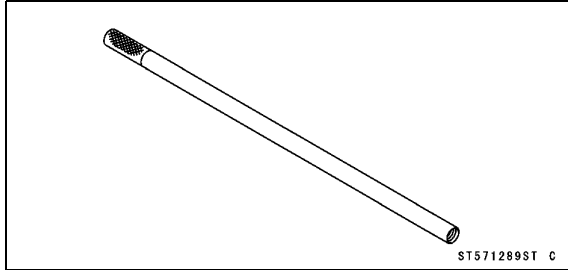
13-10 SUSPENSION

Special Tools

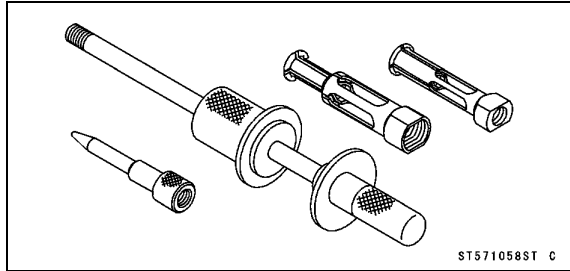
Inside Circlip Pliers:
57001-143



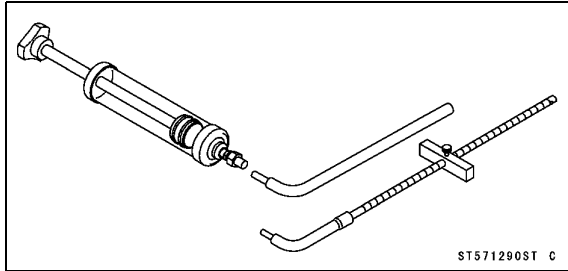
Fork Piston Rod Puller, M12 × 1.25:
57001-1289



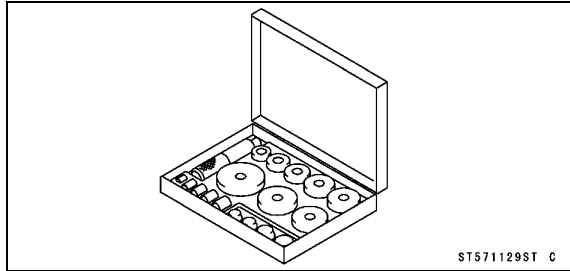
Oil Seal & Bearing Remover:
57001-1058



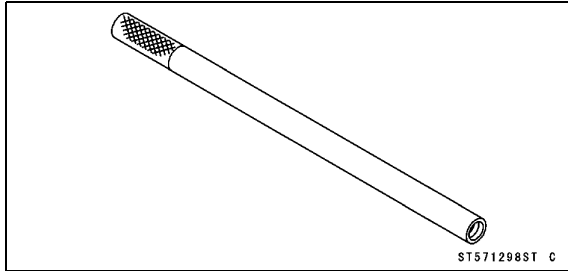
Fork Oil Level Gauge:
57001-1290



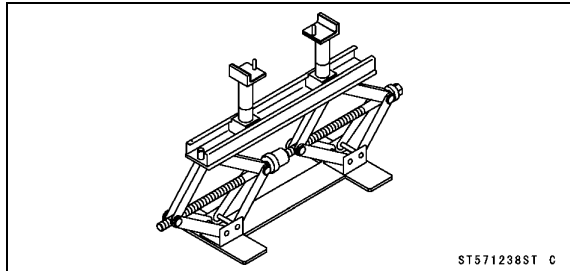
Bearing Driver Set:
57001-1129



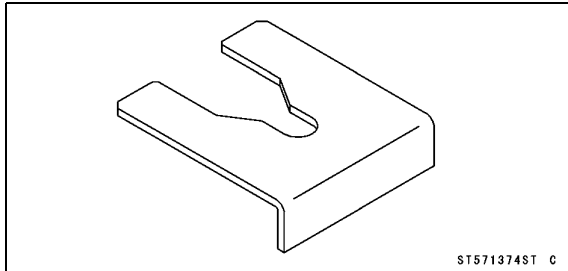
Fork Piston Rod Puller, M10 × 1.0:
57001-1298



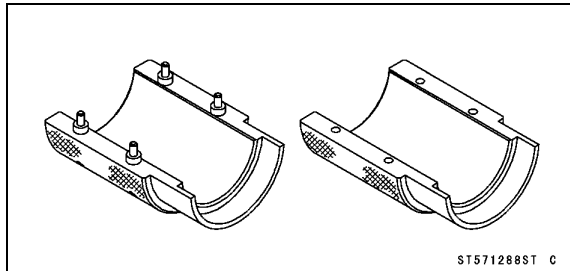
Jack:
57001-1238



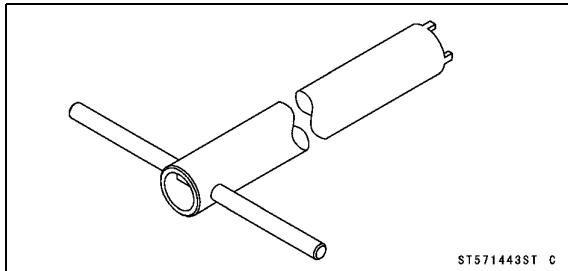
Fork Spring Stopper:
57001-1374



Fork Oil Seal Driver, $\phi 41$:
57001-1288

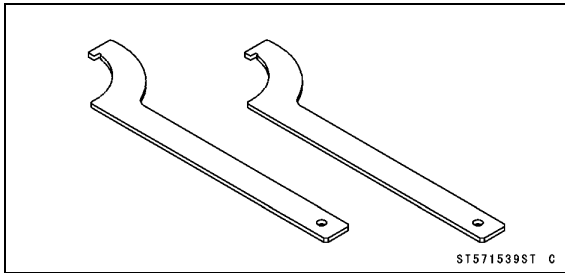


Fork Cylinder Holder:
57001-1443

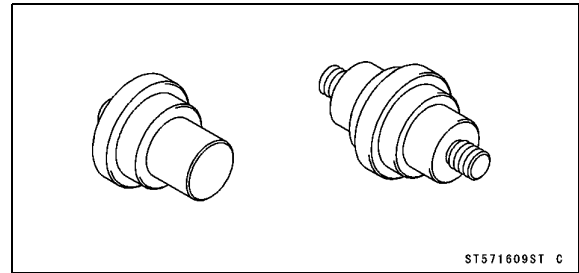


Special Tools

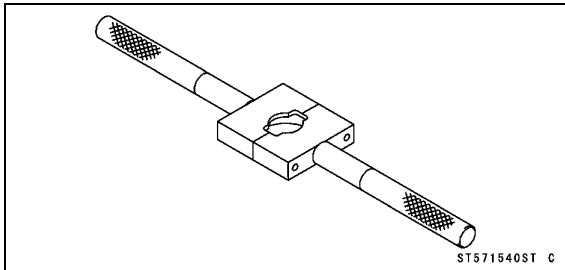
Hook Wrench T=3.2 R37:
57001-1539



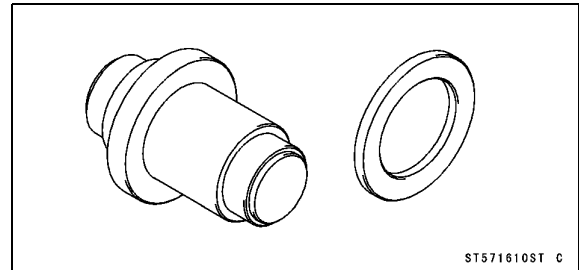
Needle Bearing Driver, $\phi 17/\phi 18$:
57001-1609



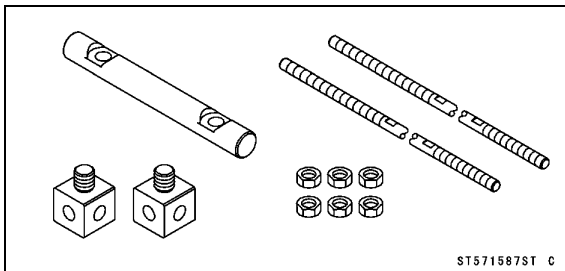
Fork Spring Compressor:
57001-1540



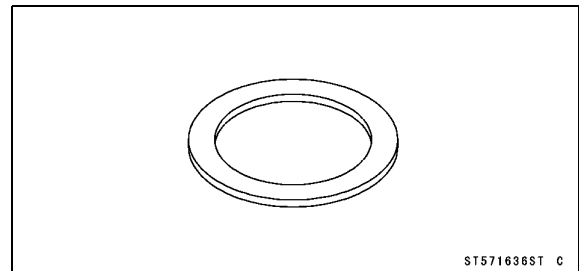
Needle Bearing Driver, $\phi 28$:
57001-1610



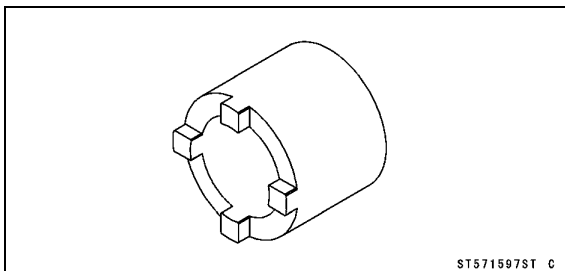
Fork Spring Compressor:
57001-1587



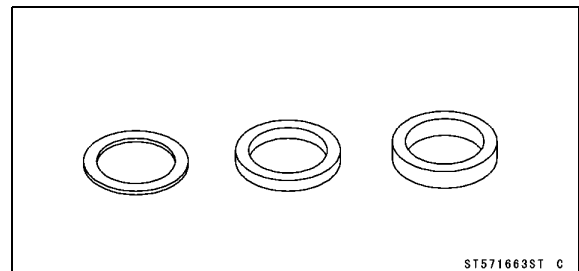
Spacer, $\phi 18$:
57001-1636



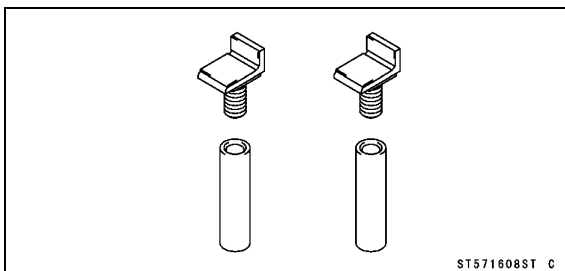
Swingarm Pivot Nut Wrench:
57001-1597



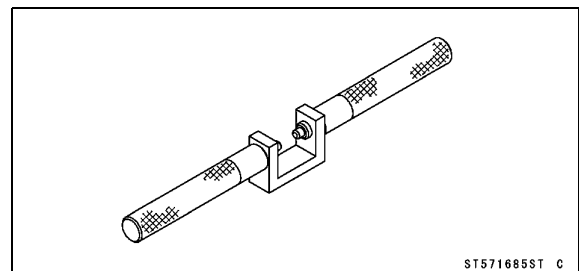
Spacer $\phi 28$:
57001-1663



Jack Attachment:
57001-1608



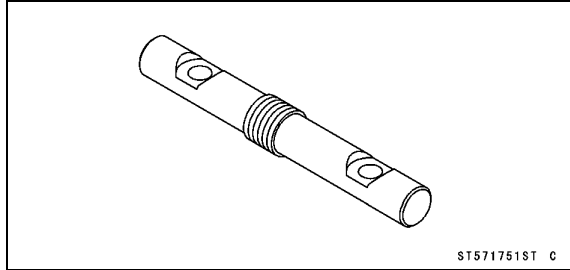
Fork Spring Compressor:
57001-1685



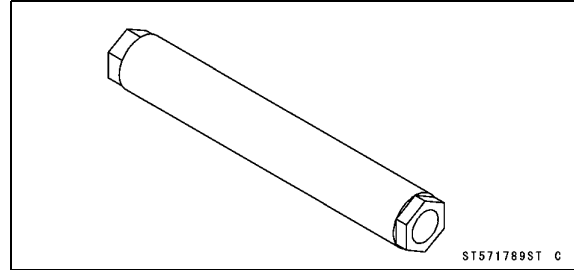
13-12 SUSPENSION

Special Tools

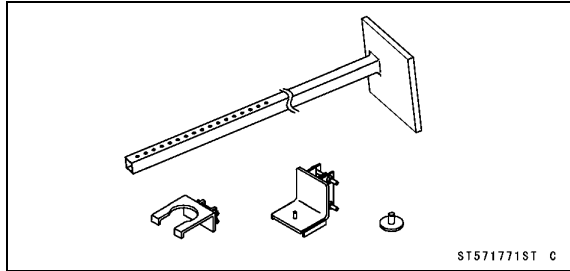
Bar:
57001-1751



Fork Piston Rod Stopper Holder:
57001-1789



Fork Spring Compressor:
57001-1771



Front Fork

Rebound Damping Force Adjustment (ZR800A/B Models, Right Front Fork Only)

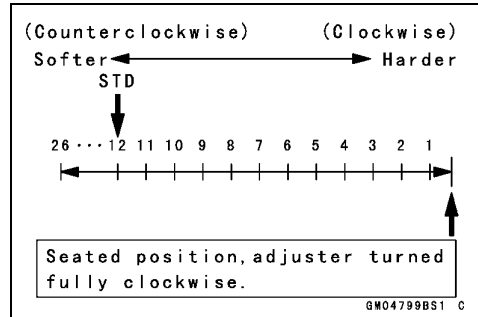
- To adjust the rebound damping force, turn the rebound damping adjuster [A].
- The standard adjuster setting is the **12th click** from the fully clockwise position.



- The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the damping feels too soft or too stiff, adjust it in accordance with the following table.

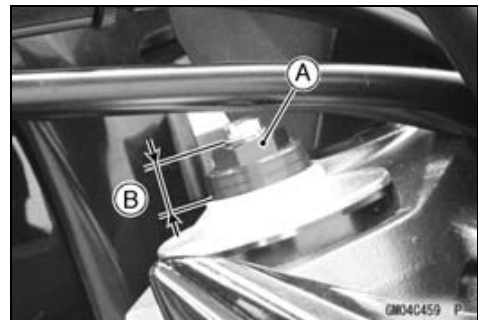
Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
26	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High



Spring Preload Adjustment (ZR800A/B Models)

- Turn the spring preload adjuster [A] to change spring preload setting.
- The standard adjuster setting is the **9 mm (0.4 in.) [B]** from the fully counterclockwise position.



Adjuster Protrusion (from top)

- Standard:** 9 mm (0.4 in.)
- Usable Range:** 4 ~ 19 mm (0.16 ~ 0.75 in.)

⚠ WARNING

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result. Be sure the adjusters are set equally.

- The spring preload can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

Spring Action

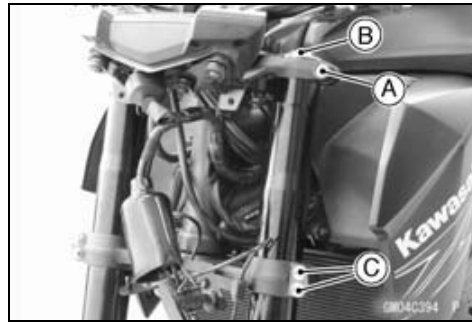
Adjuster Position	Damping Force	Setting	Load	Road	Speed
19 mm	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
4 mm	Strong	Hard	Heavy	Bad	High

13-14 SUSPENSION

Front Fork

Front Fork Removal (Each Fork Leg)

- Remove:
 - Upper Fairing (see Upper Fairing Removal in the Frame chapter)
 - Front Fender (see Front Fender Removal in the Frame chapter)
 - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
- ★ Loosen the upper front fork clamp bolt [A] and fork top plug [B] beforehand if the fork leg is to be disassembled.



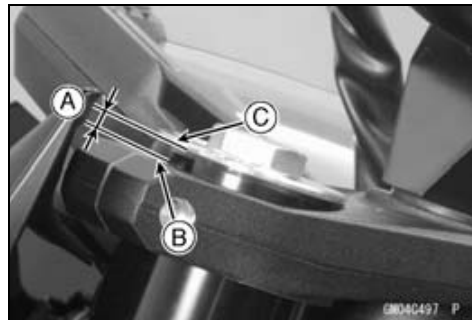
NOTE

○ Loosen the top plug after loosening the upper front fork clamp bolt.

- Loosen the lower front fork clamp bolts (upper, lower) [C].
- With a twisting motion, work the fork leg down and out.

Front Fork Installation

- Install the fork so that the length is 6 mm (0.24 in.) [A] from the outside upper flat surface [B] of the steering stem head to upper surface [C] of the outer tube.
- Tighten:
 - Torque - Lower Front Fork Clamp Bolts: 20.5 N·m (2.09 kgf·m, 15.1 ft·lb)**
 - Front Fork Top Plugs: 22.5 N·m (2.29 kgf·m, 16.6 ft·lb)**
 - Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)**



NOTE

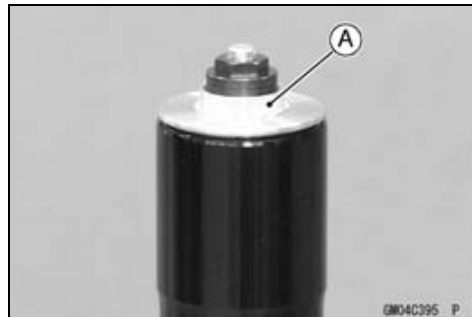
○ Tighten the top plug before tightening the upper front fork clamp bolt.

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

- Install the removed parts (see appropriate chapters).
- Adjust:
 - Spring Preload (ZR800A/B Models, see Spring Preload Adjustment)

Front Fork Oil Change (ZR800A/B Models)

- Remove the front fork (see Front Fork Removal).
- Hold the inner tube lower end in a vise.
- Unscrew the top plug [A] out of the outer tube.



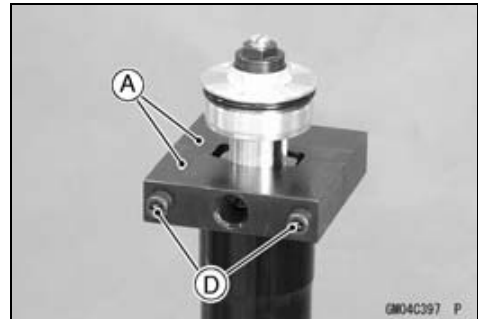
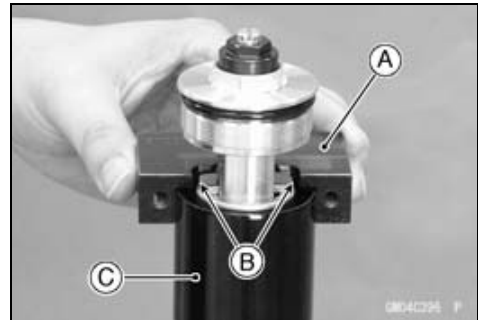
Front Fork

- Install the clamps [A] as shown.

NOTE

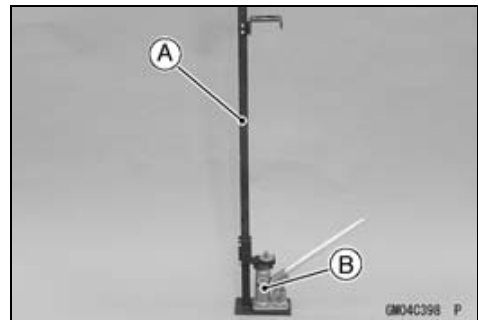
○ Set the clamps so that the cutout [B] of the upper side does not touch the tongue shape of stopper, pull up the outer tube [C] to hold it by the clamps, and then tighten the two bolts [D]. The outer tube is used as a guide.

Special Tool - Fork Spring Compressor: 57001-1540

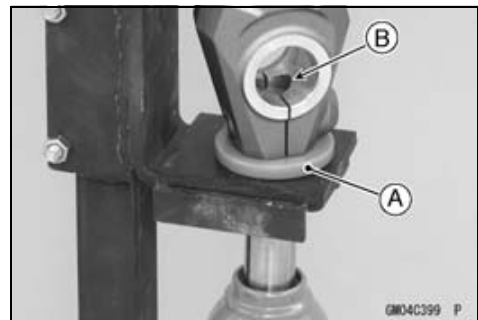


- Set the spring compressor [A] and a suitable jack [B] as shown.

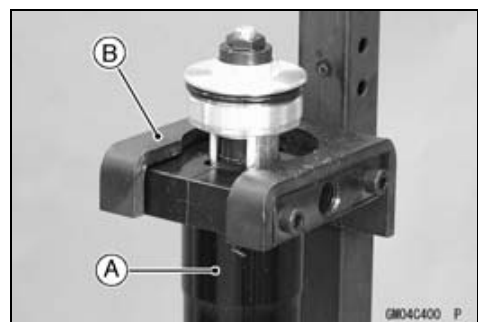
Special Tool - Fork Spring Compressor: 57001-1771



- Insert the projection of the protector [A] into the front fork bottom hole [B].



- Set the front fork [A] under the holder [B].
- Lift up the suitable jack, and hold the front fork.

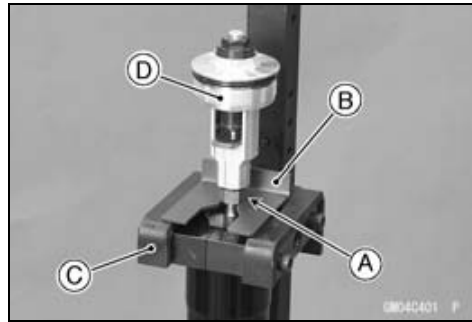


13-16 SUSPENSION

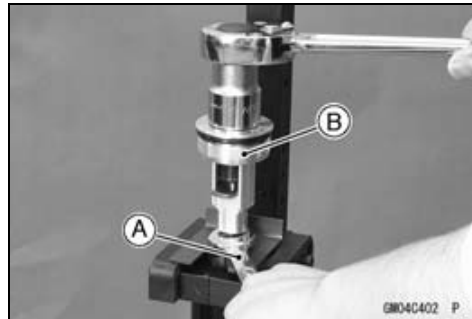
Front Fork

- Lift up the suitable jack until the piston rod nut [A] comes out.
- Insert the fork spring stopper [B] between the piston rod nut and the holder [C] while holding up the top plug [D].

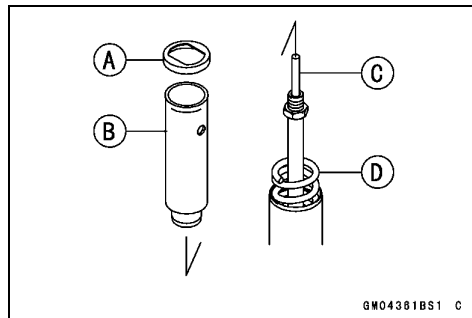
Special Tool - Fork Spring Stopper: 57001-1374



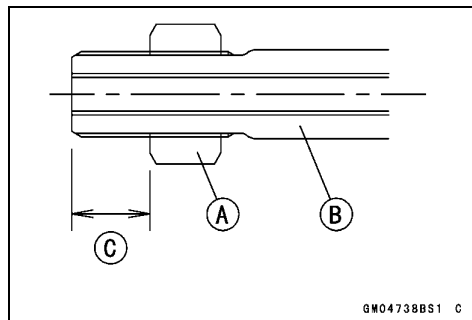
- Holding the piston rod nut with a wrench [A], remove the top plug [B] from the piston rod.



- Remove the front fork from the fork spring compressor.
- Remove:
 - Washer [A]
 - Collar [B]
 - Rebound Damping Adjuster Rod [C] (Right Front Fork only)
 - Fork Spring [D]

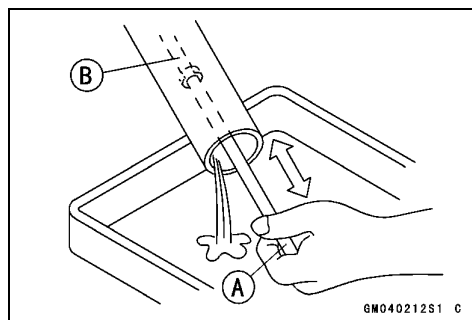


- Screw the rod nut [A] onto the piston rod [B] as shown. 12 mm (0.47 in.) or more [C]



- Drain the fork oil into a suitable container and remove the spring seat.
- Using the piston rod puller [A], pump the piston rod [B] up and down at least ten times to expel the oil from the fork.

Special Tool - Fork Piston Rod Puller, M12 × 1.25: 57001-1289



Front Fork

- Hold the fork tube upright, press the inner tube [A] and the piston rod all the way down.
- Pour in the type and amount of fork oil specified.

Recommended Oil

KHL15-10 or equivalent

Amount (Per Side):

When changing oil: Approx. 405 mL (13.7 US oz.)

After disassembly and completely dry:

Right Front Fork 464 ±4 mL (15.7 ±0.135 US oz.)

Left Front Fork 469 ±4 mL (15.9 ±0.135 US oz.)

★If necessary, measure the oil level as follows.

- Hold the inner tube vertically in a vise.
- Using the piston rod puller [A], move the piston rod [B] up and down more than ten times in order to expel all the air from the fork oil.

Special Tool - Fork Piston Rod Puller, M12 × 1.25: 57001-1289

- Remove the piston rod puller.
- Wait until the oil level settles.
- With the fork fully compressed and the piston rod fully pushed in, insert a tape measure or rod into the inner tube, and measure the distance from the top of the outer tube to the oil.

Oil Level (fully compressed, without spring)

Standard:

Right Front Fork 106 ±2 mm (4.17 ±0.08 in.)

(from the top of the outer tube)

Left Front Fork 109 ±2 mm (4.29 ±0.08 in.)

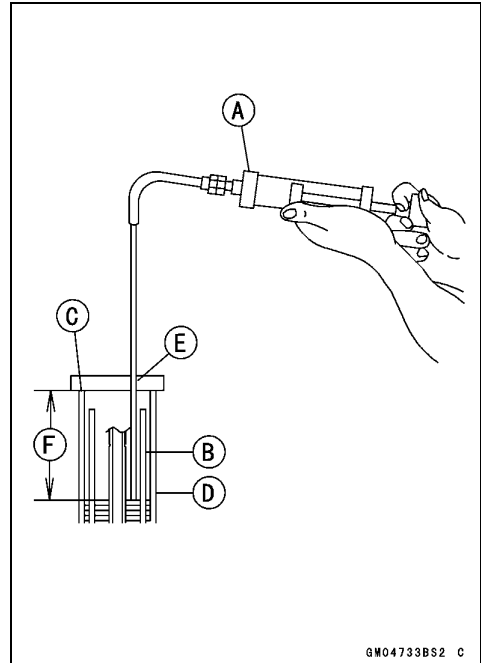
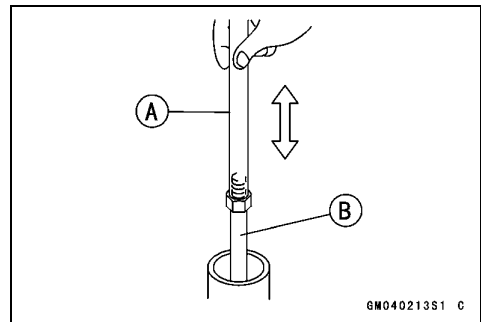
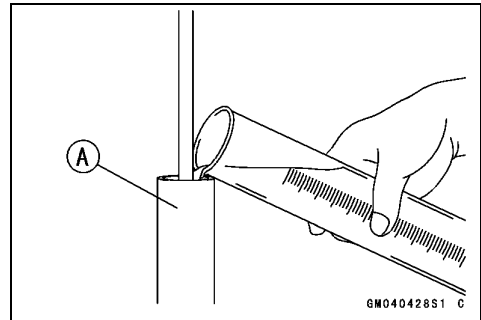
(from the top of the outer tube)

NOTE

- Fork oil lever may also be measured using the fork oil level gauge.

Special Tool - Fork Oil Level Gauge [A]: 57001-1290

- With the fork fully compressed and without fork spring, insert the gauge tube into the inner tube [B] and position the stopper across the top end [C] of the outer tube [D].
- Set the gauge stopper [E] so that its lower side shows the oil level distance specified [F].
- Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
- ★If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



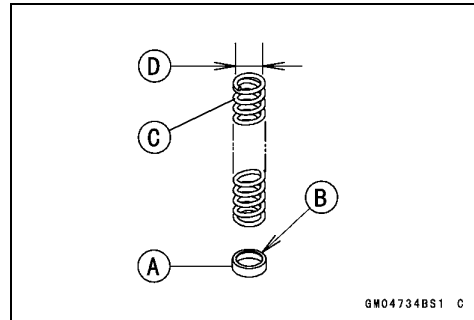
13-18 SUSPENSION

Front Fork

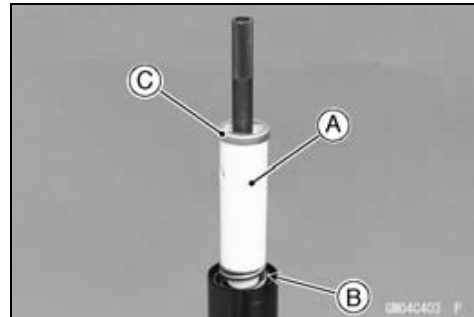
- Screw the fork piston rod puller onto the end of the piston rod.

Special Tool - Fork Piston Rod Puller, M12 × 1.25: 57001-1289

- Pull the puller up above the outer tube top.
- Install the spring seat [A] with the flat surface [B] facing upward.
- Install the fork spring [C] with the smaller end [D] facing upward.



- Install the collar [A] so that the cut side [B] faces downward.
- Install the washer [C] on the collar.

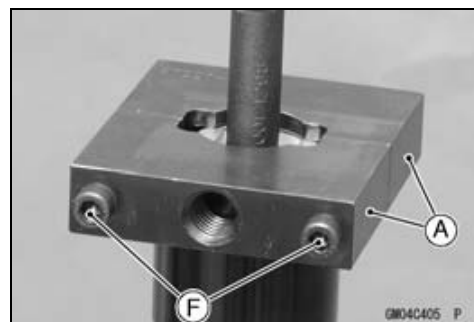
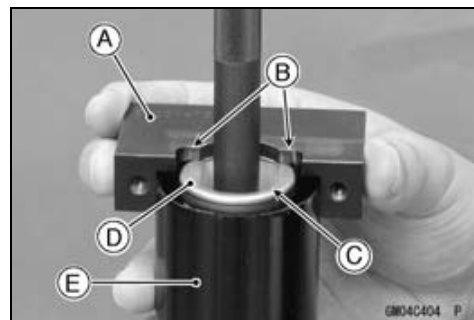


- Install the clamps [A] as shown.

Special Tool - Fork Spring Compressor: 57001-1540

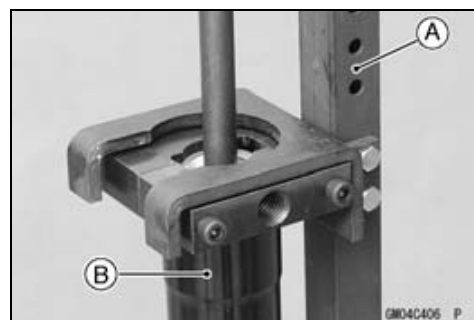
NOTE

○ Set the clamps so that the cutouts [B] do not fit the hole [C] of the washer [D], pull up the outer tube [E] to hold it by the clamps, and then tighten the two bolts [F]. The outer tube is used as a guide.



- Set the fork spring compressor [A], front fork [B], protector and suitable jack.
- Lift up the suitable jack until the piston rod nut comes out.

Special Tool - Fork Spring Compressor: 57001-1771

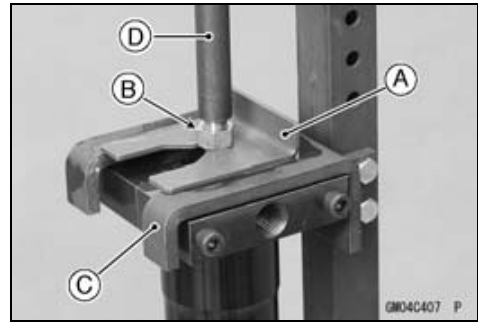


Front Fork

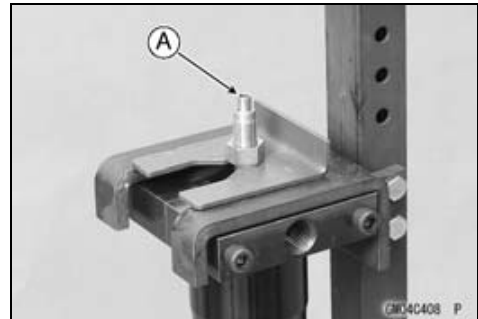
- Hold up the fork piston rod puller.
- Insert the fork spring stopper [A] between the piston rod nut [B] and the holder [C] while holding up the fork piston rod puller [D].

Special Tool - Fork Spring Stopper: 57001-1374

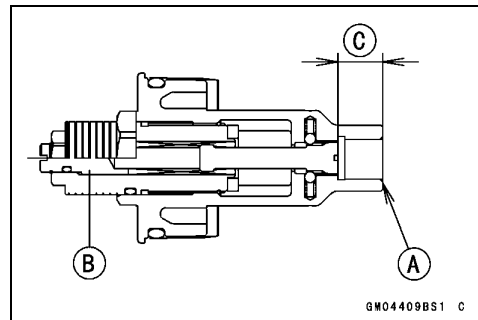
- Remove the fork piston rod puller.



- Install the rebound damping adjuster rod [A] (Right Front Fork Only).

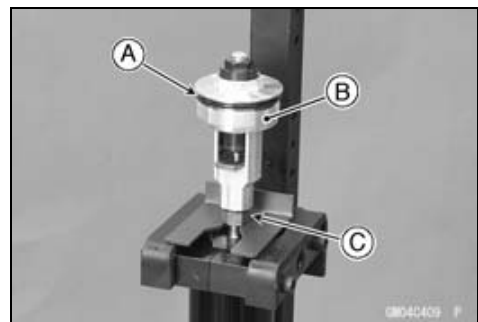


- Check the distance between the bottom end [A] of the top plug and rebound damping adjuster [B] with a pair of vernier caliper (Right Front Fork Only).
13 mm (0.51 in.) [C]

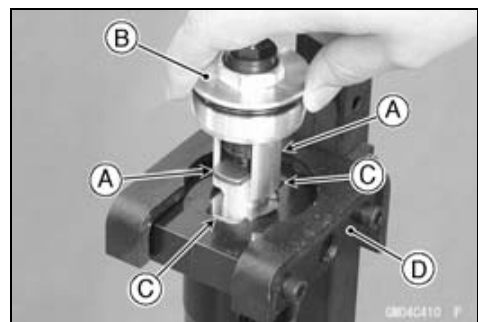


- Replace the O-ring [A] on the top plug [B] with a new one.
- Apply grease to the new O-ring.
- Install the top plug on the piston rod, and screw it.
- Holding the top plug with a wrench, tighten the piston rod nut [C] against the top plug.

Torque - Piston Rod Nuts: 15 N·m (1.5 kgf·m, 11 ft·lb)



- Remove the fork spring stopper.
- Align the stoppers [A] of the top plug [B] with the grooves [C] of the clamp [D], and down the suitable jack.
- Remove the front fork from the fork spring compressor.
- Raise the outer tube and screw the top plug into it.
- Install the front fork (see Front Fork Installation).
- Adjust the spring preload (see Spring Preload Adjustment).
- Adjust the rebound damping force (see Rebound Damping Force Adjustment, Right Front Fork Only).



13-20 SUSPENSION

Front Fork

If using the spring compressor (57001-1587).

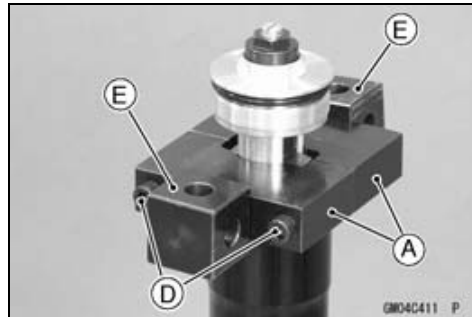
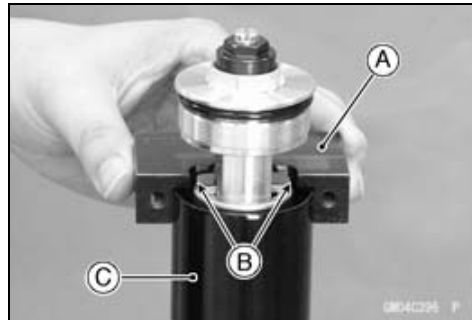
- Install the clamps [A] as shown.

NOTE

○ Set the clamps so that the cutout [B] of the upper side does not touch the tongue shape of stopper, pull up the outer tube [C] to hold it by the clamps, and then tighten the two bolts [D]. The outer tube is used as a guide.

Special Tools - Fork Spring Compressor: 57001-1540
Fork Spring Compressor: 57001-1587

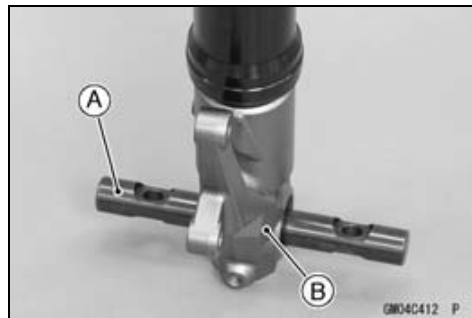
- Install the holders [E] to the clamps as shown.



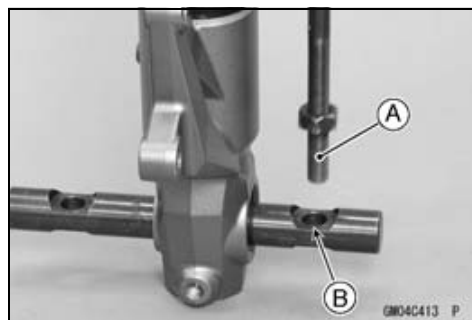
- Insert the holder bar [A] into the axle hole of the front fork [B].

Special Tool - Bar: 57001-1751 (For Left Fork Leg)

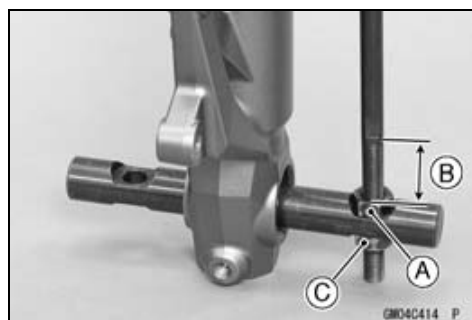
○ Position the bar left and right and evenly.



- Insert the lower end of the compression shaft [A] into the hole [B] of the holder bar.

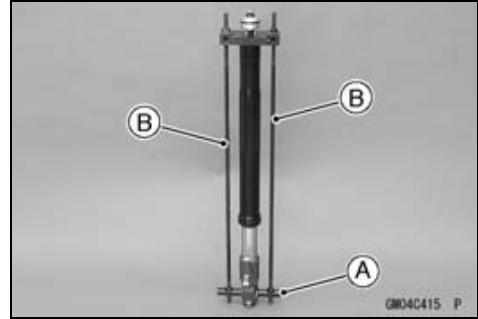


- Screw the adjust nut [A] onto the compression shaft as shown.
About 20 mm (0.79 in.) [B]
- Screw the locknut [C].
- Set the other side compression shaft same process.

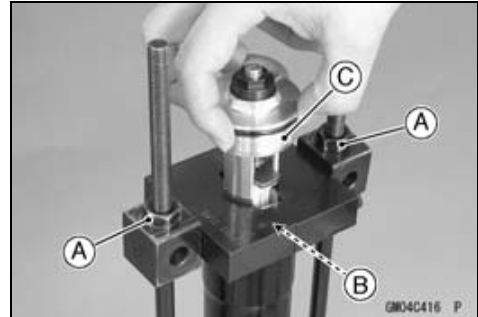


Front Fork

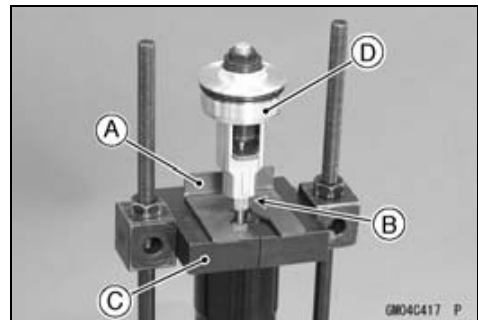
- Set the holder bar [A] and compression shafts [B].



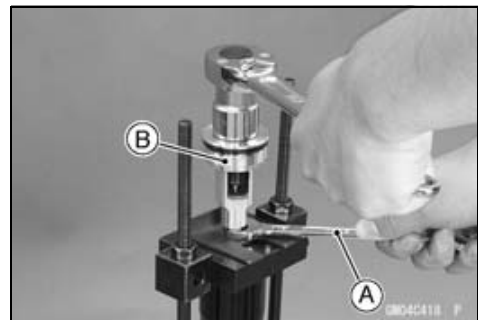
- Screw in the nuts [A] until the piston rod nut [B] comes out.
- Hold up the top plug [C] while screwing in the nut.



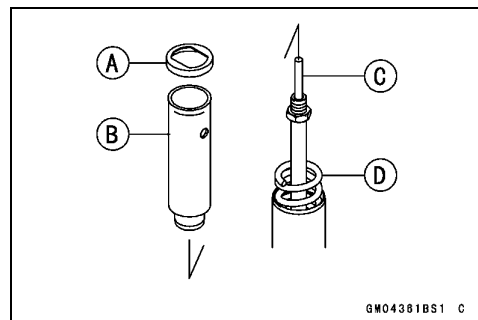
- Insert the fork spring stopper [A] between the piston rod nut [B] and the clamp [C] while holding up the top plug [D].
- Special Tool - Fork Spring Stopper: 57001-1374**



- Holding the piston rod nut with a wrench [A], remove the top plug [B] from the piston rod.



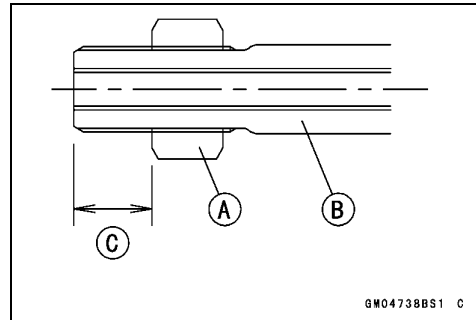
- Remove the fork spring compressor from the front fork.
- Remove:
 - Washer [A]
 - Collar [B]
 - Rebound Damping Adjuster Rod [C] (Right Front Fork Only)
 - Fork Spring [D]



13-22 SUSPENSION

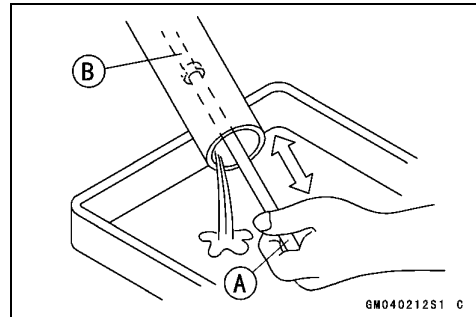
Front Fork

- Screw the rod nut [A] onto the piston rod [B] as shown.
12 mm (0.47 in.) or more [C]



- Drain the fork oil into a suitable container and remove the spring seat.
- Using the piston rod puller [A], pump the piston rod [B] up and down at least ten times to expel the oil from the fork.

Special Tool - Fork Piston Rod Puller, M12 × 1.25: 57001-1289



- Hold the fork tube upright, press the inner tube [A] and the piston rod all the way down.
- Pour in the type and amount of fork oil specified.

Recommended Oil

KHL15-10 or equivalent

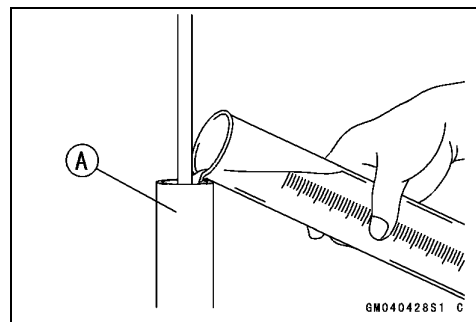
Amount (Per Side):

When changing oil: Approx. 405 mL (13.7 US oz.)

After disassembly and completely dry:

Right Front Fork 464 ±4 mL (15.7 ±0.135 US oz.)

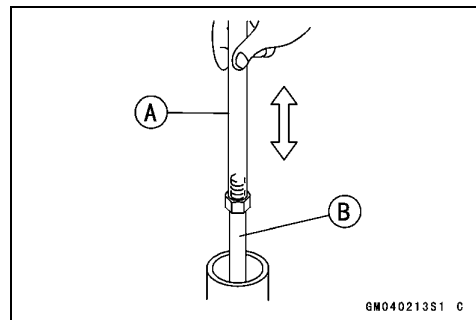
Left Front Fork 469 ±4 mL (15.9 ±0.135 US oz.)



- ★ If necessary, measure the oil level as follows.
- Hold the inner tube vertically in a vise.
- Using the piston rod puller [A], move the piston rod [B] up and down more than ten times in order to expel all the air from the fork oil.

Special Tool - Fork Piston Rod Puller, M12 × 1.25: 57001-1289

- Remove the piston rod puller.
- Wait until the oil level settles.
- With the fork fully compressed and the piston rod fully pushed in, insert a tape measure or rod into the inner tube, and measure the distance from the top of the outer tube to the oil.



Front Fork

Oil Level (fully compressed, without spring)

Standard:

Right Front Fork **106 ±2 mm (4.17 ±0.08 in.)**
 (from the top of the outer tube)

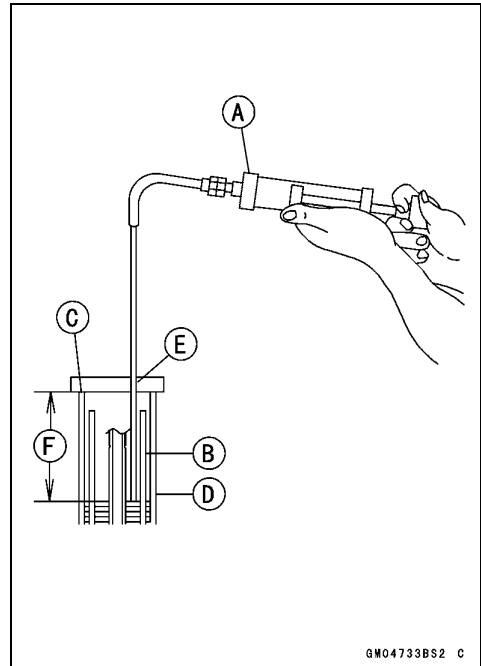
Left Front Fork **109 ±2 mm (4.29 ±0.08 in.)**
 (from the top of the outer tube)

NOTE

○ Fork oil level may also be measured using the fork oil level gauge.

Special Tool - Fork Oil Level Gauge [A]: 57001-1290

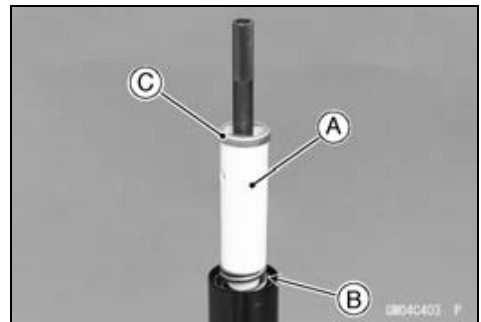
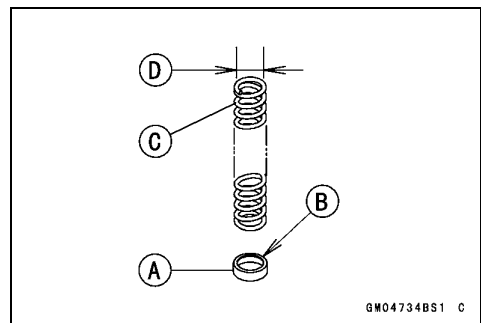
- With the fork fully compressed and without fork spring, insert the gauge tube into the inner tube [B] and position the stopper across the top end [C] of the outer tube [D].
- Set the gauge stopper [E] so that its lower side shows the oil level distance specified [F].
- Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
- ★ If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



- Screw the fork piston rod puller onto the end of the piston rod.

Special Tool - Fork Piston Rod Puller, M12 × 1.25: 57001-1289

- Pull the puller up above the outer tube top.
- Install the spring seat [A] with the flat surface [B] facing upward.
- Install the fork spring [C] with the smaller end [D] facing upward.
- Install the collar [A] so that the cut side [B] faces downward.
- Install the washer [C] on the collar.



13-24 SUSPENSION

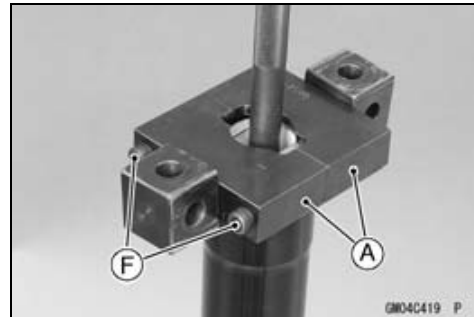
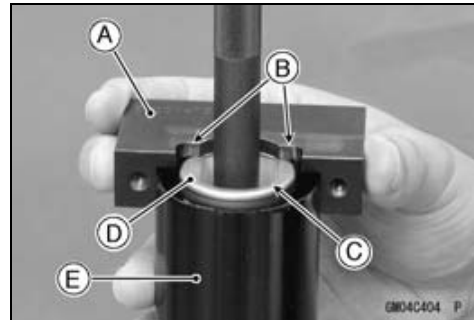
Front Fork

- Install the clamps [A] as shown.

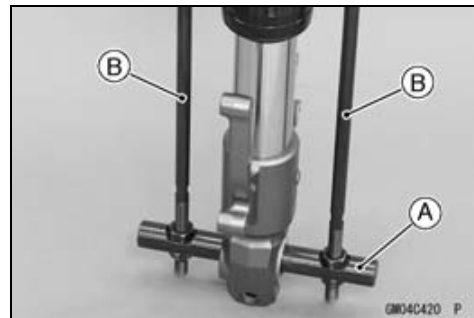
Special Tools - Fork Spring Compressor: 57001-1540
Fork Spring Compressor: 57001-1587

NOTE

○ Set the clamps so that the cutouts [B] do not fit the hole [C] of the washer [D], pull up the outer tube [E] to hold it by the clamps, and then tighten the two bolts [F]. The outer tube is used as a guide.



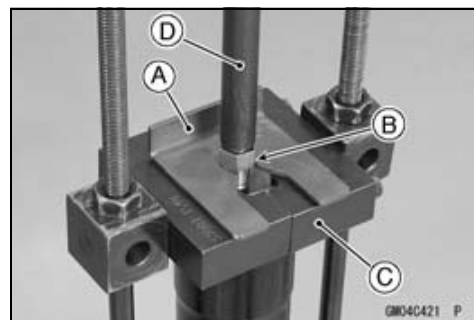
- Set the holder bar [A] and compression shafts [B].
Special Tool - Bar: 57001-1751 (For Left Fork Leg)
- Screw in the fork compressor nut come out the piston rod nut.
- Hold up the fork piston rod puller while screwing in the nut.



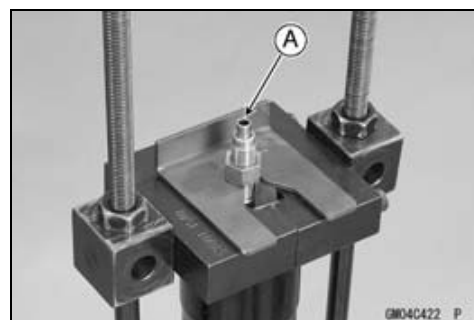
- Insert the fork spring stopper [A] between the piston rod nut [B] and the clamp [C] while holding up the fork piston rod puller [D].

Special Tool - Fork Spring Stopper: 57001-1374

- Remove the fork piston rod puller.

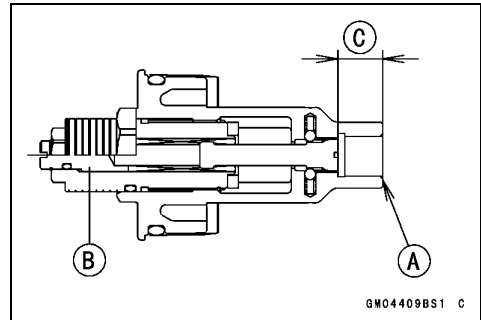


- Install the rebound damping adjuster rod [A] (Right Front Fork Only).



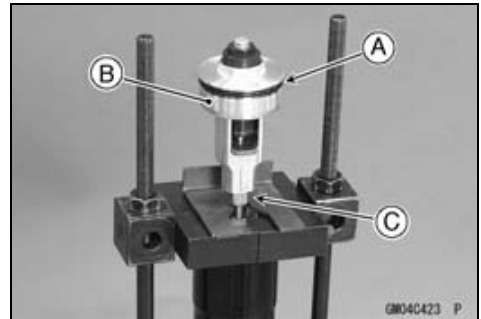
Front Fork

- Check the distance between the bottom end [A] of the top plug and rebound damping adjuster [B] with a pair of vernier caliper (Right Front Fork Only).
13 mm (0.51 in.) [C]

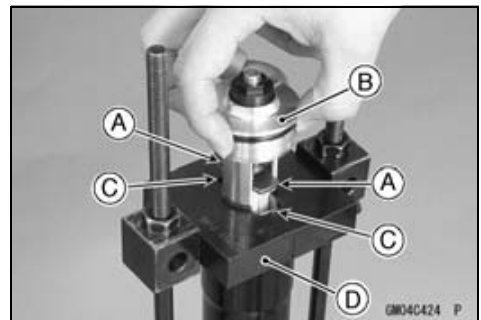


- Replace the O-ring [A] on the top plug [B] with a new one.
- Apply grease to the new O-ring.
- Install the top plug on the piston rod, and screw it.
- Holding the top plug with a wrench, tighten the piston rod nut [C] against the top plug.

Torque - Piston Rod Nuts: 15 N·m (1.5 kgf·m, 11 ft·lb)



- Remove the fork spring stopper.
- Align the stoppers [A] of the top plug [B] with the grooves [C] of the clamp [D], and loosen the fork spring compressor nut.
- Remove the fork spring compressor and clamps.
- Raise the outer tube and screw the top plug into it.
- Install the front fork (see Front Fork Installation).
- Adjust the spring preload (see Spring Preload Adjustment).
- Adjust the rebound damping force (see Rebound Damping Force Adjustment, Right Front Fork Only).



Front Fork Oil Change (ZR800C/D Models) Right Front Fork

- Remove the front fork (see Front Fork Removal).
- Hold the inner tube lower end in a vice.
- Unscrew the top plug [A] out of the outer tube.

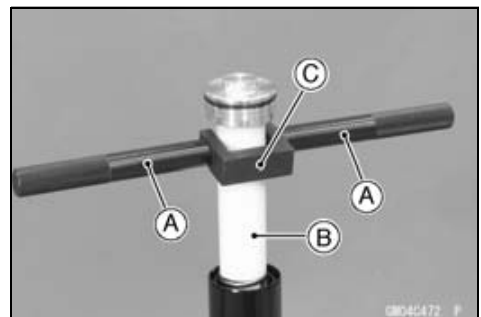


- Install the fork spring compressor as shown in the figure.

NOTE

○Set the fork spring compressor so that the end of the handle [A] passes the upper side hole on the spacer [B] by screwing the handle in the holder [C] to the bottom.

Special Tool - Fork Spring Compressor: 57001-1685

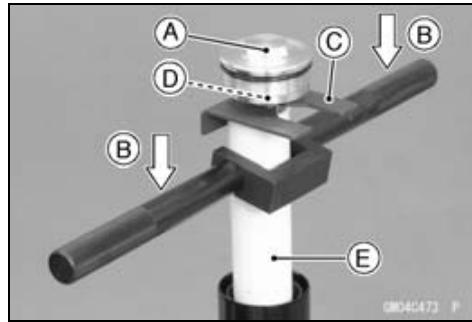


13-26 SUSPENSION

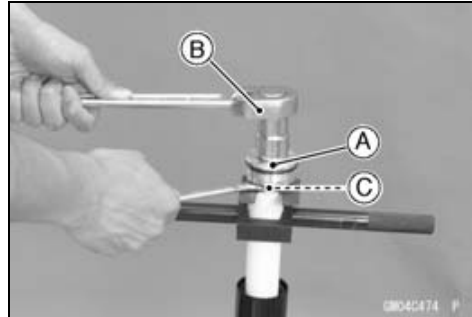
Front Fork

- While holding up the top plug [A] by one person, push down [B] the fork spring compressor and insert the fork spring stopper [C] between the piston rod nut [D] and the spacer [E].

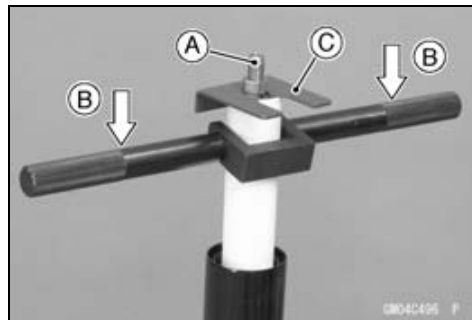
Special Tool - Fork Spring Stopper: 57001-1374



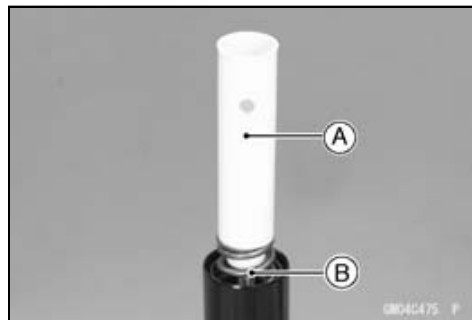
- Holding the top plug [A] with a wrench [B], loosen the piston rod nut [C].
- Remove the top plug.



- While holding up the piston rod [A] by one person, push down [B] the fork spring compressor, and pull out the fork spring stopper [C].
- Remove the fork spring compressor.

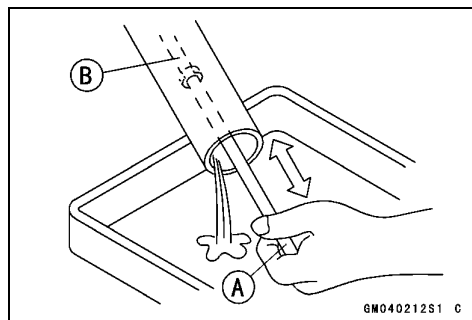


- Remove:
Spacer [A]
Fork Spring [B]



- Drain the fork oil into a suitable container and remove the spring seat.
- Using the piston rod puller [A], pump the piston rod [B] up and down at least ten times to expel the oil from the fork.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001-1298



Front Fork

- Hold the fork tube upright, press the outer tube [A] and the piston rod all the way down.
- Pour in the type and amount of fork oil specified.

Recommended Oil

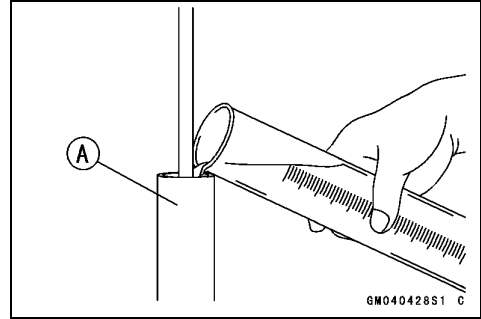
KHL15-10 or equivalent

Amount:

When changing oil: Approx. 410 mL (13.9 US oz.)

After disassembly and completely dry:

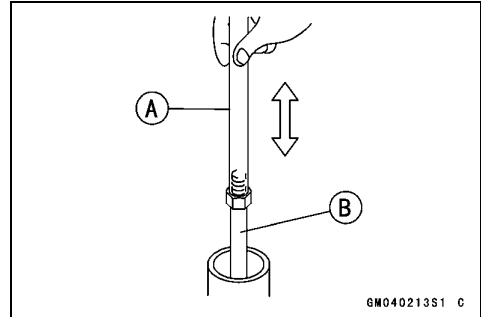
481 ±4 mL (16.3 ±0.135 US oz.)



- ★ If necessary, measure the oil level as follows.
 - Hold the inner tube vertically in a vise.
 - Using the piston rod puller [A], move the piston rod [B] up and down more than ten times in order to expel all the air from the fork oil.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001-1298

- Remove the piston rod puller.
- Wait until the oil level settles.
- With the fork fully compressed and the piston rod fully pushed in, insert a tape measure or rod into the inner tube, and measure the distance from the top of the outer tube to the oil.



Oil Level (fully compressed, without spring)

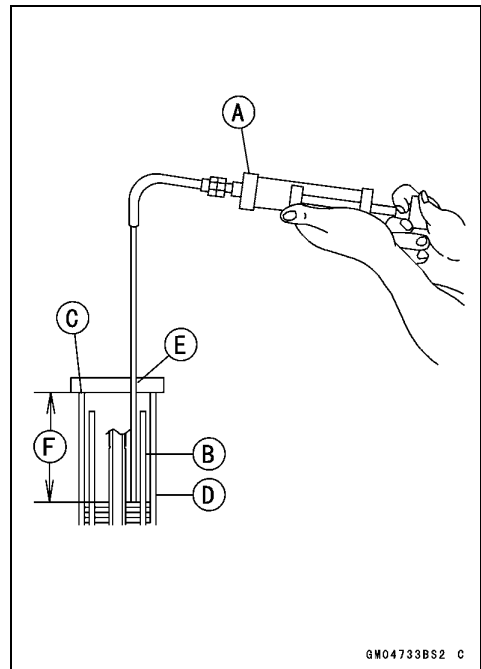
Standard: 98 ±2 mm (3.86 ±0.08 in.) (from the top of the outer tube)

NOTE

- Fork oil level may also be measured using the fork oil level gauge.

Special Tool - Fork Oil Level Gauge [A]: 57001-1290

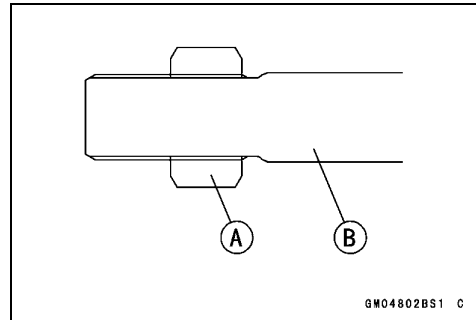
- With the fork fully compressed and without fork spring, insert the gauge tube into the inner tube [B] and position the stopper across the top end [C] of the outer tube [D].
- Set the gauge stopper [E] so that its lower side shows the oil level distance specified [F].
- Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
- ★ If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



13-28 SUSPENSION

Front Fork

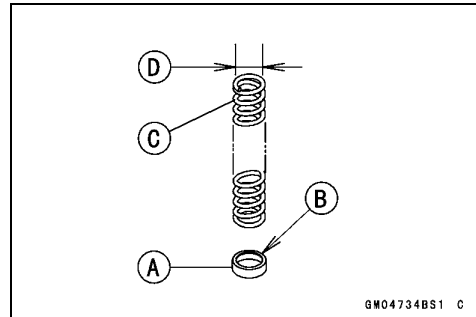
- Screw on the rod nut [A] fully to the piston rod [B].



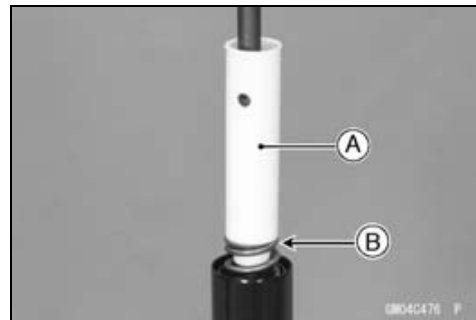
- Screw the fork piston rod puller onto the end of the piston rod.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001-1298

- Pull the puller up above the outer tube top.
- Install the spring seat [A] with the flat surface [B] facing upward.
- Install the fork spring [C] with the smaller end [D] facing upward.



- Install the spacer [A] so that the cut side [B] faces downward.

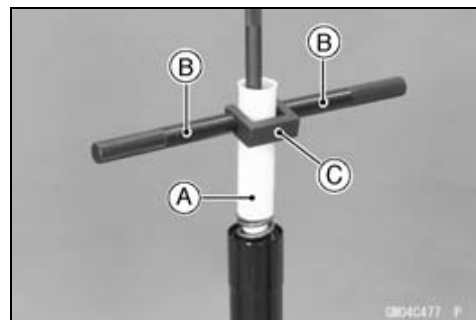


- Set the fork spring compressor on the spacer [A].

Special Tool - Fork Spring Compressor: 57001-1685

NOTE

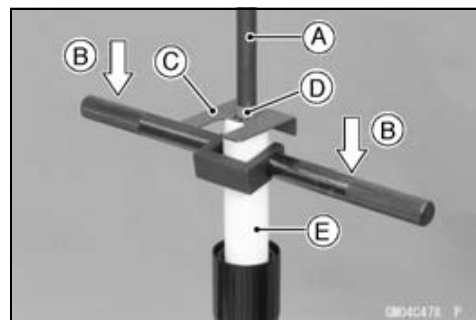
○Set the fork spring compressor so that the end of the handle [B] passes the upper side hole on the spacer by screwing the handle in the holder [C] to the bottom.



- While holding up the piston rod puller [A] by one person, push down [B] the fork spring compressor, and insert the fork spring stopper [C] between the piston rod nut [D] and the spacer [E].

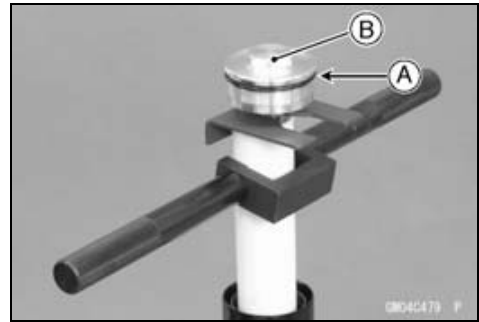
Special Tool - Fork Spring Stopper: 57001-1685

- Remove the piston rod puller.



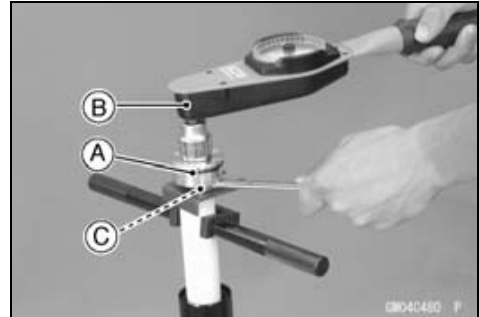
Front Fork

- Replace the O-ring [A] on the top plug [B] with a new one.
- Apply grease to the new O-ring.
- Screw in the top plug stopped onto the piston rod.

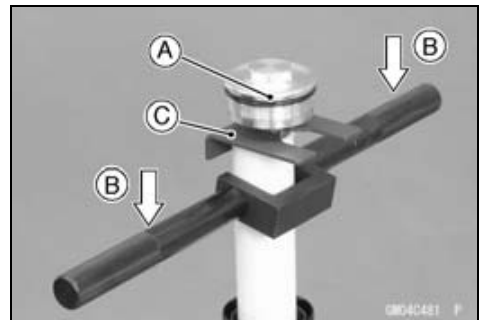


- Holding the top plug [A] with a wrench [B], tighten the piston rod nut [C] against the top plug.

Torque - Piston Rod Nut: 20 N·m (2.0 kgf·m, 15 ft·lb)



- While holding up the top plug [A] by one person, push down [B] the fork spring compressor, and pull out the fork spring stopper [C].
- Remove the fork spring compressor.
- Rise the outer tube and screw the top plug into it.
- Install the front fork (see Front Fork Installation).

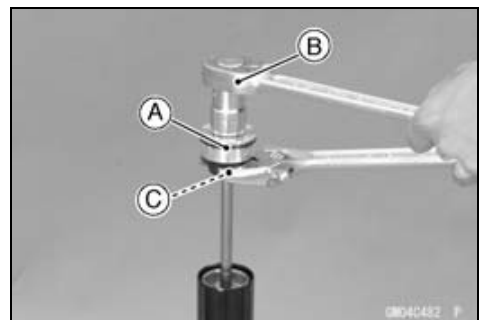


Left Front Fork

- Remove the front fork (see Front Fork Removal).
- Hold the inner tube lower end in a vice.
- Unscrew the top plug [A] out of the outer tube.



- Holding the top plug [A] with a wrench [B], loosen the piston rod rubber nut [C].



13-30 SUSPENSION

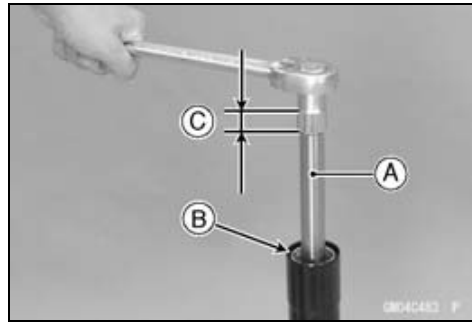
Front Fork

- Using the fork piston rod stopper holder [A], remove the piston rod assy stopper [B].

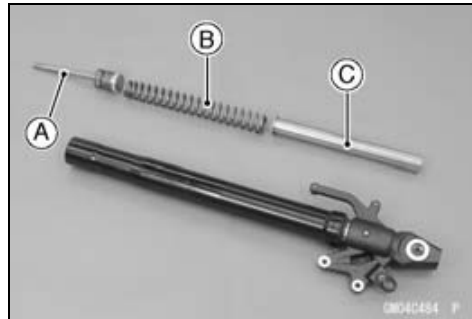
Special Tool - Fork Piston Rod Stopper Holder: 5700-1789

NOTE

○Install the fork piston rod stopper holder so that the long side [C] faces upward.



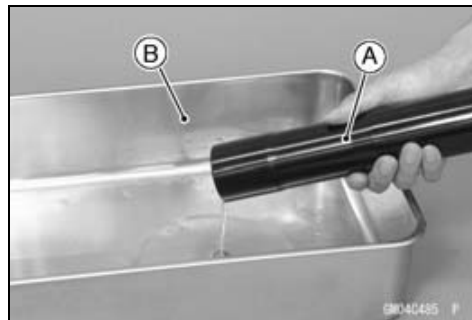
- Remove:
Piston Rod Assy [A]
Fork Spring [B]
Spacer [C]



- Hold the left front fork tube [A] upside down over a clean container [B] and drain the oil.

NOTE

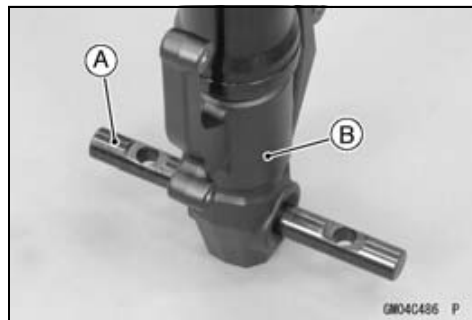
○Pump the left front fork outer tube up and down to discharge the fork oil.



- Insert the holder bar [A] into the axle hole of the front fork [B].

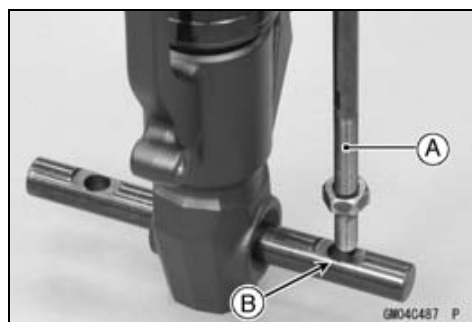
Special Tool - Bar: 57001-1751

○Position the bar left and right and evenly.



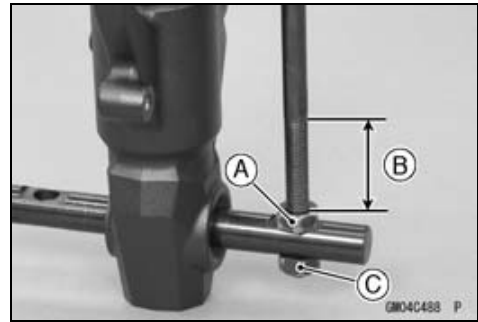
- Insert the lower end of the compression shaft [A] into the hole [B] of the holder bar.

Special Tool - Fork Spring Compressor: 57001-1587

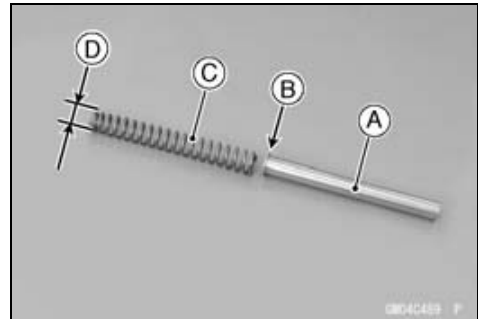


Front Fork

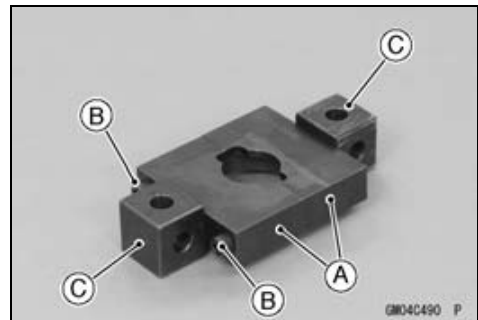
- Screw the adjust nut [A] onto the compression shaft as shown.
About 40 mm (1.57 in.) [B]
- Screw the locknut [C].
- Set the other side compression shaft same process.



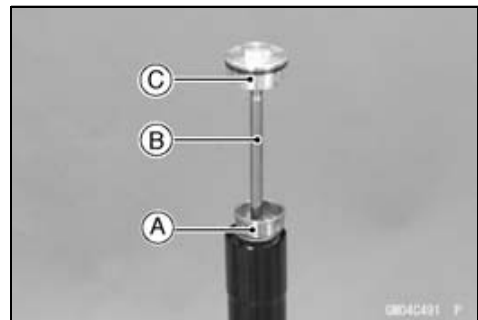
- Install the spacer [A] with the flat surface [B] facing upward.
- Install the fork spring [C] with the smaller end [D] facing upward.



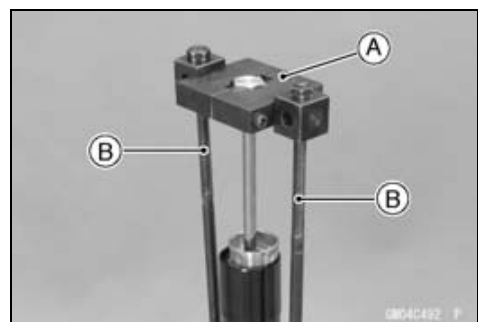
- Set the clamps [A] as shown.
Special Tool - Fork Spring Compressor: 57001-1540
- Tighten the two bolts [B].
- Install the holders [C] to the clamps as shown.
Special Tool - Fork Spring Compressor: 57001-1587



- Using a high flash-point solvent, clean of any oil or dirt that may be on the adhesive coating area. Dry them with a clean cloth.
- Apply adhesive (ThreeBond: TB1342 or equivalent) to the threads of the piston rod assy stopper [A].
- Install:
Piston Rod Assy [B]
Piston Rod Assy Stopper
- Screw the top plug [C].



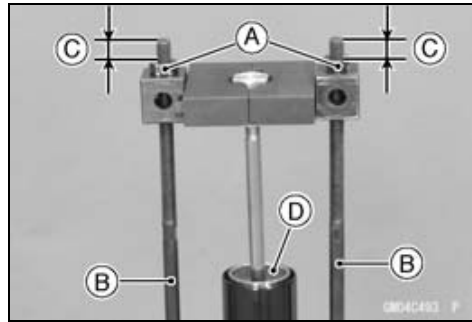
- Set the clamps [A] and compression shafts [B].



13-32 SUSPENSION

Front Fork

- Screw the nuts [A] onto the compression shafts [B] as shown.
About 15 mm (0.59 in.) [C]
- Screw the piston rod assy stopper [D].
- Remove the following special tools.
Fork Spring Compressors
Bar
- Remove the top plug.



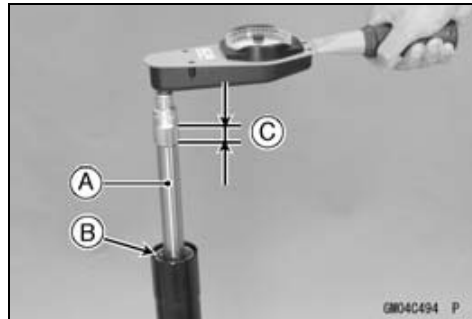
- Hold the inner tube lower end in a vice.
- Using the fork piston rod stopper holder [A], tighten the piston rod assy stopper [B].

Special Tool - Fork Piston Rod Stopper Holder: 5700-1789

Torque - Piston Rod Assy Stopper: 17.5 N·m (1.78 kgf·m, 12.9 ft·lb)

NOTE

○ Install the fork piston rod stopper holder so that the long side [C] faces upward.



- Pour in the type and amount of fork oil specified, into the left front fork [A].

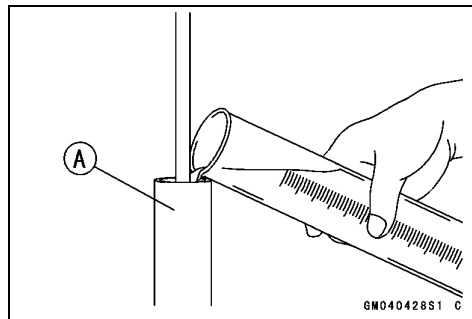
Recommended Oil

KHL15-10 or equivalent

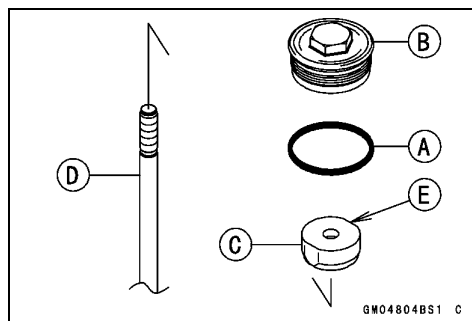
Amount:

When changing oil: Approx. 450 mL (15.2 US oz.)

**After disassembly and completely dry:
529 ±4 mL (17.9 ±0.135 US oz.)**



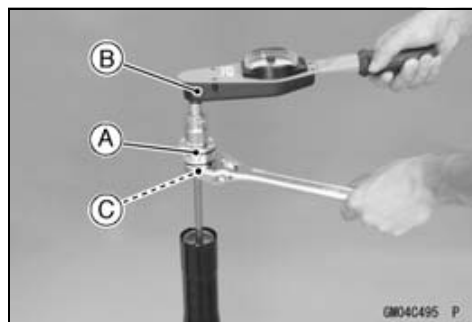
- Replace the O-ring [A] on the top plug [B] with a new one.
- Apply grease to the new O-ring.
- Screw on the piston rod rubber nut [C] fully to the piston rod [D].
- Screw the piston rod rubber nut with the flat surface [E] facing upward.
- Screw in the top plug stopped onto the piston rod.



- Holding the top plug [A] with a wrench [B], tighten the piston rod rubber nut [C] against the top plug.

Torque - Piston Rod Rubber Nut: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Rise the outer tube and screw the top plug into it.
- Install the front fork (see Front Fork Installation).

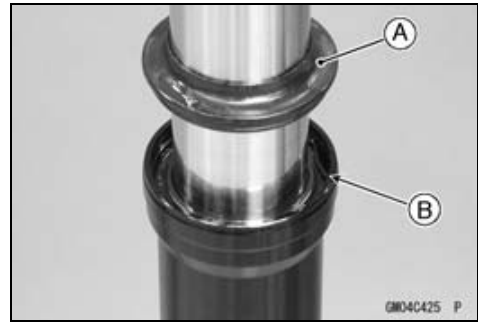


Front Fork Disassembly

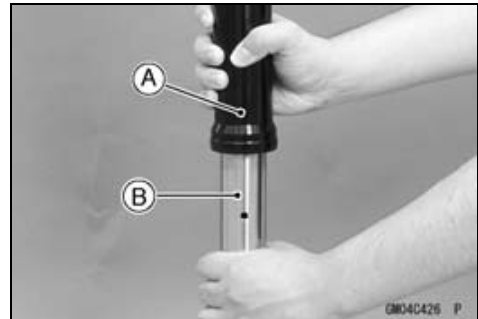
- Remove the front fork (see Front Fork Removal).
- Drain the fork oil (see Fork Oil Change).

Front Fork

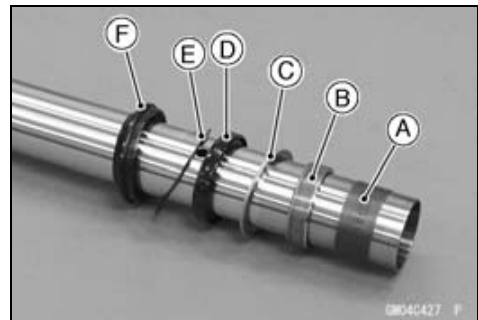
- Separate the inner tube from the outer tube as follows.
 - Slide up the dust seal [A].
 - Remove the retaining ring [B] from the outer tube.



- Holding the outer tube [A] by hand, pull the inner tube [B] several times to pull out the outer tube.

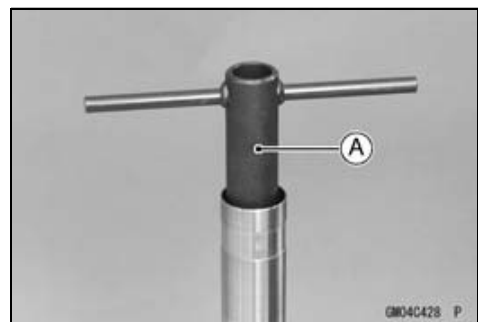


- Remove the following parts from the inner tube.
 - Inner Tube Guide Busing [A]
 - Outer Tube Guide Busing [B]
 - Washer [C]
 - Oil Seal [D]
 - Retaining Ring [E]
 - Dust Seal [F]

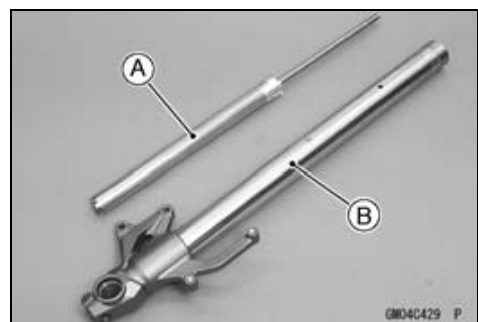


Other than ZR800C/D Models Left Front Fork

- Hold the inner tube lower end in a vice.
 - Using the fork cylinder holder [A], loosen the cylinder unit.
- Special Tool - Fork Cylinder Holder: 57001-1443**



- Take the cylinder unit [A] out of the inner tube [B].
- Do not disassemble the cylinder unit and inner tube.



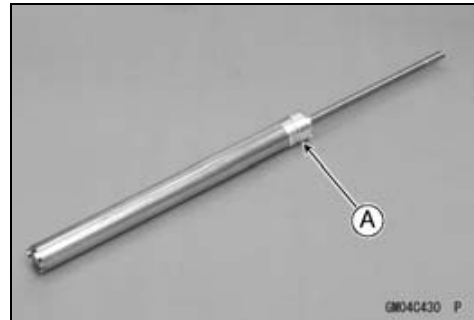
13-34 SUSPENSION

Front Fork

Front Fork Assembly

Other than ZR800C/D Models Left Front Fork

- Using a high flash-point solvent, clean off any oil or dirt that may be on the adhesive coating area. Dry them with a clean cloth.
- Apply adhesive (ThreeBond: TB1344N or equivalent) to the threads of the cylinder unit [A].

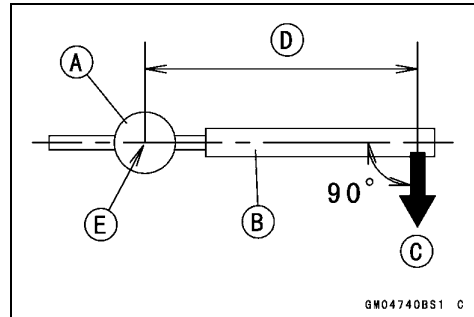


- Install the cylinder unit into the inner tube.
- Tighten the cylinder unit with the specified torque using the fork cylinder holder [A] and a suitable bar [B].

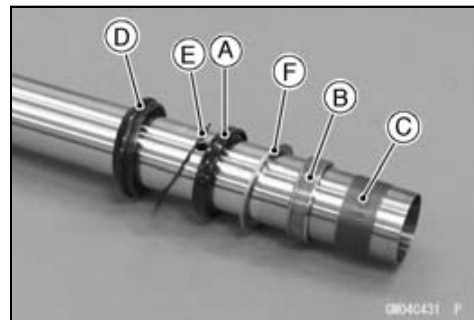
Special Tool - Fork Cylinder Holder: 57001-1443

Torque - Cylinder Unit: 70 N·m (7.1 kgf·m, 52 ft·lb)

- To tighten the cylinder unit with the specified torque, pull the bar with 234 N (23.9 kgf, 52.6 lbf) [C] force at the point of 300 mm (11.8 in.) [D] from the center [E] of the fork cylinder holder in the direction as shown.



- Replace the following parts with new one.
 - Oil Seal [A]
 - Outer Tube Guide Bushing [B]
 - Inner Tube Guide Bushing [C]
 - Dust Seal [D]
 - Retaining Ring [E]
- Install the following parts onto the inner tube.
 - Dust Seal
 - Retaining Ring
 - Oil Seal
 - Washer [F]
 - Outer Tube Guide Bushing
 - Inner Tube Guide Bushing



- Insert the inner tube to the outer tube.
- Fit the new outer tube guide bushing [A] into the outer tube.

NOTE

- When assembling the new outer tube guide bushing, hold the washer against the new outer tube guide bushing and tap the washer with the fork oil seal driver [B] until it stops.

Special Tool - Fork Oil Seal Driver, $\phi 41$: 57001-1288

- Install the oil seal by using the fork oil seal driver.
 - Special Tool - Fork Oil Seal Driver, $\phi 41$: 57001-1288**
- Install the retaining ring and dust seal into the outer tube.
- Pour in the specified type of oil (see Fork Oil Change).



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 tube [A] and outer tube [B], and pump [C] them back and forth manually to check for smooth operation.
- ★ If you feel binding or catching, the inner and outer tubes must be replaced.

WARNING

A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Dust Seal Inspection

- Inspect the dust seal [A] for any signs of deterioration or damage.
- ★ Replace it if necessary.

Spring Tension Inspection

- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.
- ★ If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Spring Free Length (ZR800A/B Models)

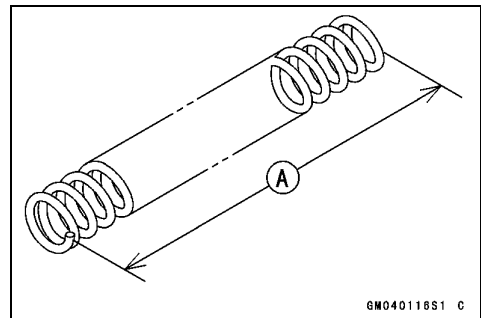
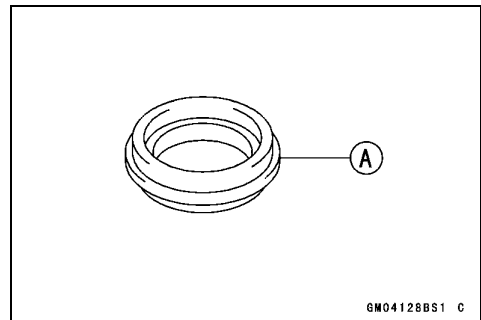
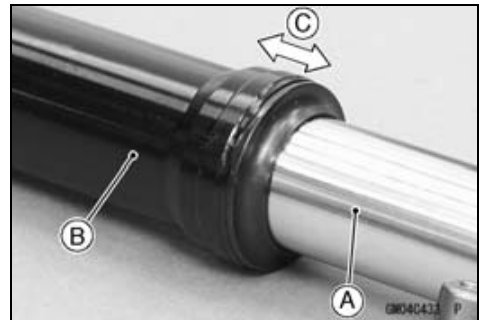
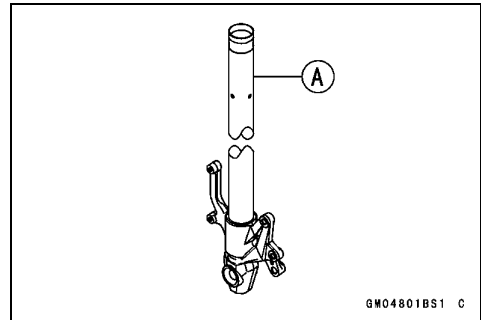
Standard: 252.5 mm (9.94 in.)

Service Limit: 247.5 mm (9.74 in.)

Spring Free Length (ZR800C/D Models)

Standard: 262 mm (10.3 in.)

Service Limit: 257 mm (10.1 in.)



13-36 SUSPENSION

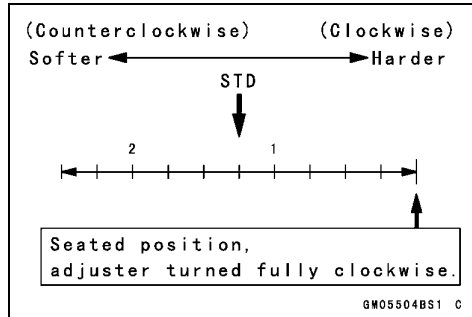
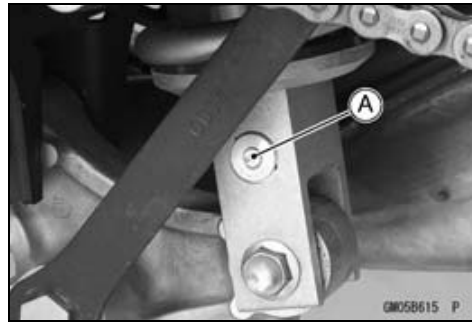
Rear Shock Absorber

Rebound Damping Force Adjustment (ZR800A/B Models)

- To adjust the rebound damping force, turn the lower damping adjuster [A].
- The standard adjuster setting is the **1 1/4 turns out** from the fully clockwise position.

Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
2 2/4 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High



Spring Preload Adjustment (ZR800A/B Models)

- Remove the rear shock absorber from the frame (see Rear Shock Absorber Removal).
- Loosen the locknut and turn out the adjusting nut to free the spring.

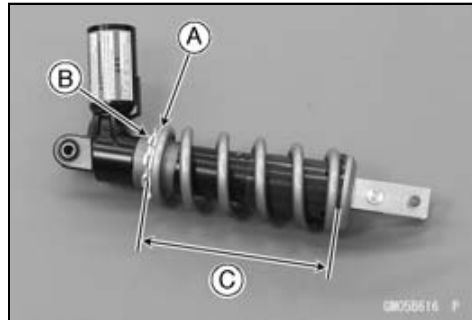
Special Tool - Hook Wrench T = 3.2 R37: 57001-1539

- To adjust the spring preload, turn in the adjusting nut [A] to the desired position and tighten the locknut [B]. Spring Length [C]

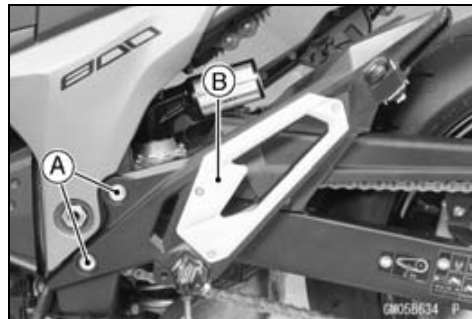
Spring Preload Setting

Standard: Spring length 175.2 mm (6.90 in.)

Usable Range: Spring length 170.2 ~ 180.2 mm (6.70 ~ 7.09 in.)

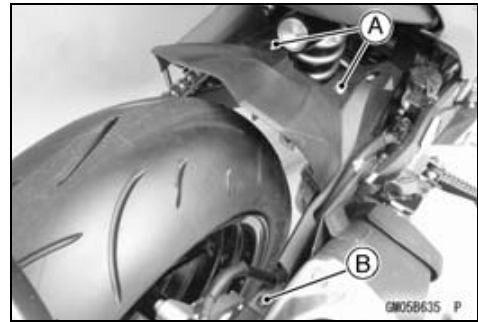


- Remove:
 - Shift Pedal (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
 - Footpeg Bracket Bolts [A]
 - Left Footpeg Bracket [B]
 - Chain Cover (see Drive Chain Removal/Installation in the Final Drive chapter)



Rear Shock Absorber

- Remove:
 - Bolts [A]
 - Screw [B]



- To adjust the spring preload, turn in the adjusting nut to the desired position and tighten the locknut by using hook wrenches [A] with the rear shock absorber attached the frame.

Special Tool - Hook Wrench T = 3.2 R37: 57001-1539

- ★ If the spring action feels too soft or too stiff, adjust it.

Spring Adjustment

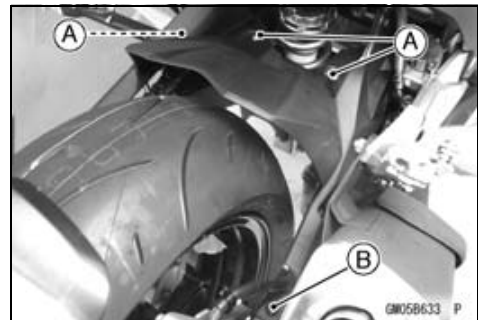
Adjuster Position	Damping Force	Setting	Load	Road	Speed
180.2 mm (7.09 in.)	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
170.2 mm (6.70 in.)	Strong	Hard	Heavy	Bad	High



- Install the removed parts (see appropriate chapters).

Spring Preload Adjustment (ZR800C/D Models)

- Remove:
 - Bolts [A]
 - Screw [B]



13-38 SUSPENSION

Rear Shock Absorber

- Using the hook wrench [A], turn the adjusting nut [B] to adjust the spring preload.
- The standard adjuster setting is 4th position.

Spring Preload Setting

Standard Position: 4th position

Adjustable Range: 1st to 7th position

- If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

Spring Preload Adjustment

Adjuster Position	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
7th	Strong	Hard	Heavy	Bad	Highway

- Install the removed parts (see appropriate chapters).

Rear Shock Absorber Removal

- Raise the rear wheel off the ground with the jack.

Special Tools - Jack: 57001-1238

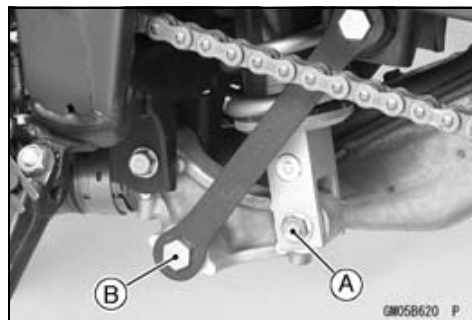
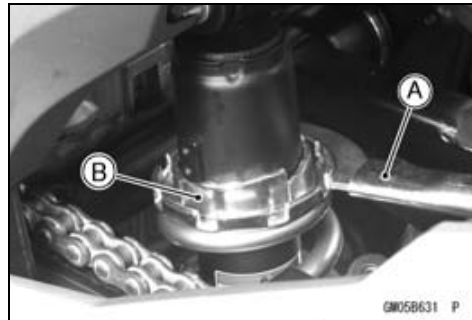
Jack Attachment: 57001-1608

- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

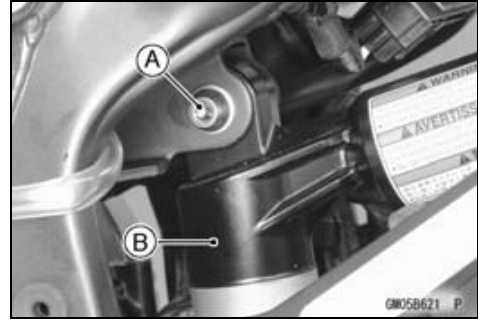
Be sure to hold the front brake when removing the shock absorber, or the motorcycle may fall over. It could cause an accident and injury.

- Remove:
 - Frame Covers (see Frame Cover Removal in the Frame chapter)
 - Lower Shock Absorber Nut and Bolt [A]
 - Lower Tie-Rod Nut and Bolt [B]



Rear Shock Absorber

- Remove the upper shock absorber nut and bolt [A].
- Remove the shock absorber [B] from downside.



Rear Shock Absorber Installation

- Replace the rear shock absorber nuts (upper and lower) and tie-rod nut with new ones.
- Tighten:
 - Torque - Rear Shock Absorber Nuts (Upper and Lower): 34 N·m (3.5 kgf·m, 25 ft·lb)
 - Tie-Rod Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)

Rear Shock Absorber Inspection

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
 - Oil Leakage
 - Crack or Dent
- ★ If there is any damage to the rear shock absorber, replace it.
- Visually inspect the rubber bushing.
- ★ If it show any signs of damage, replace it.

Rear Shock Absorber Scrapping ZR800A/B Models

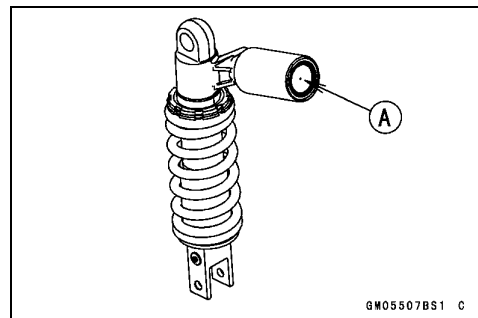
⚠ WARNING

Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen and removing the shraeder valve.

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Drill the hole [A] of the reservoir tank using about 2 mm (0.08 in.) drillbit.

⚠ WARNING

Pressurized gas can cause injury. Do not point the drill toward your face or body.



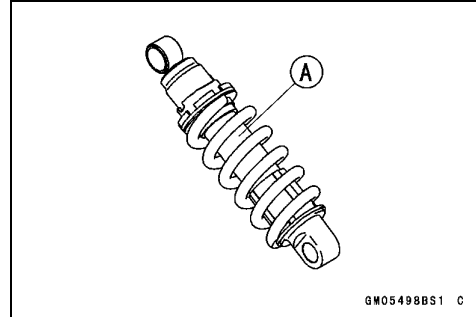
13-40 SUSPENSION

Rear Shock Absorber

ZR800C/D Models

WARNING

Since the rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode. Before a rear shock absorber is scrapped, drill a hole at the point [A] shown to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may blow out bits of drilled metal when the hole opens.



Swingarm

Swingarm Removal

- Remove:
 - Frame Covers (see Frame Cover Removal in the Frame chapter)
 - Chain Cover (see Drive Chain Removal in the Final Drive chapter)

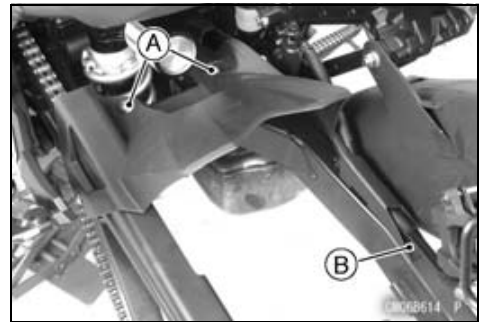
- Raise the rear wheel off the ground with jack.

Special Tools - Jack: 57001-1238

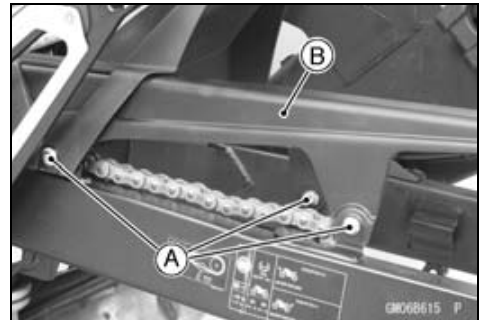
Jack Attachment: 57001-1608

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

- Remove:
 - Bolts [A]
 - Screw [B]



- Remove:
 - Bolts [A]
 - Chain Cover [B]
 - Rear Shock Absorber (see Rear Shock Absorber Removal)



- Unscrew the swingarm pivot shaft locknut [A], using the nut wrench [B].

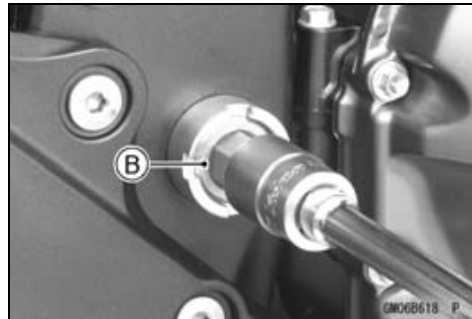
Special Tool - Swingarm Pivot Nut Wrench: 57001-1597



13-42 SUSPENSION

Swingarm

- Remove:
 - Swingarm Pivot Shaft Nut [A]
 - Swingarm Pivot Shaft [B]
 - Swingarm



Swingarm Installation

- Replace the following parts with a new one.
 - Lower Shock Absorber Nut
 - Upper Tie-Rod Nut
- Place the collar [A] on the stopper [B] inside the frame [C].
- Insert the pivot shaft into the frame from the right side.
- Tighten the pivot shaft so that the clearance [D] between the collar and the frame come to 0 mm.
- Right Side [E]
- Loosen the pivot shaft once, and tighten the pivot shaft securely.

Torque - Swingarm Pivot Shaft: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Tighten the pivot shaft locknut, using the nut wrench.

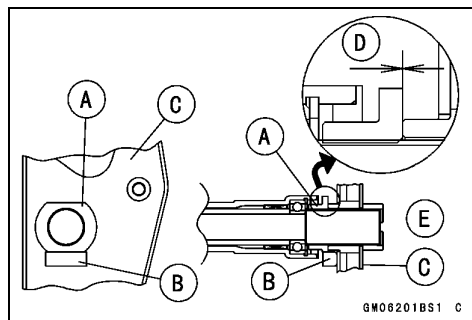
Special Tool - Swingarm Pivot Nut Wrench: 57001-1597

Torque - Swingarm Pivot Shaft Locknut: 98 N·m (10 kgf·m, 72 ft·lb)

- Tighten:

Torque - Swingarm Pivot Shaft Nut: 108 N·m (11.0 kgf·m, 79.7 ft·lb)

- Install the removed parts (see appropriate chapters).

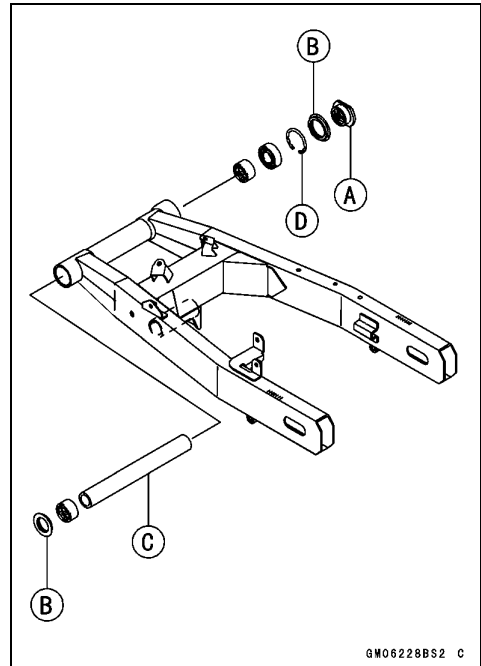


Swingarm

Swingarm Bearing Removal

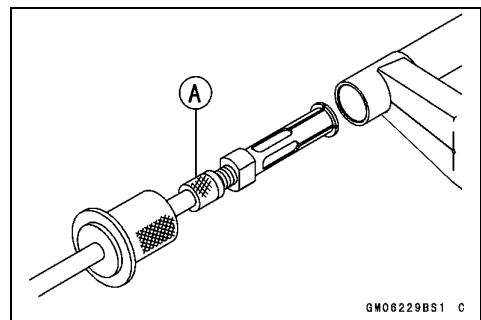
- Remove:
 - Swingarm (see Swingarm Removal)
 - Collar [A]
 - Oil Seals [B]
 - Sleeve [C]
 - Circlip [D] (Right Side)

Special Tool - Inside Circlip Pliers: 57001-143



- Remove the ball bearing and needle bearings.

Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



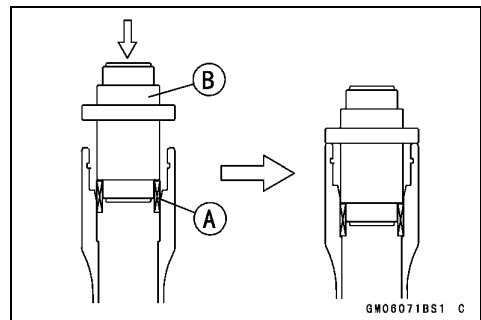
Swingarm Bearing Installation

- Replace the ball and needle bearings [A] with new ones.
- Install the ball and needle bearings so that the manufacturer's marks face out.

Special Tools - Bearing Driver Set: 57001-1129

Needle Bearing Driver, $\phi 28$ [B]: 57001-1610

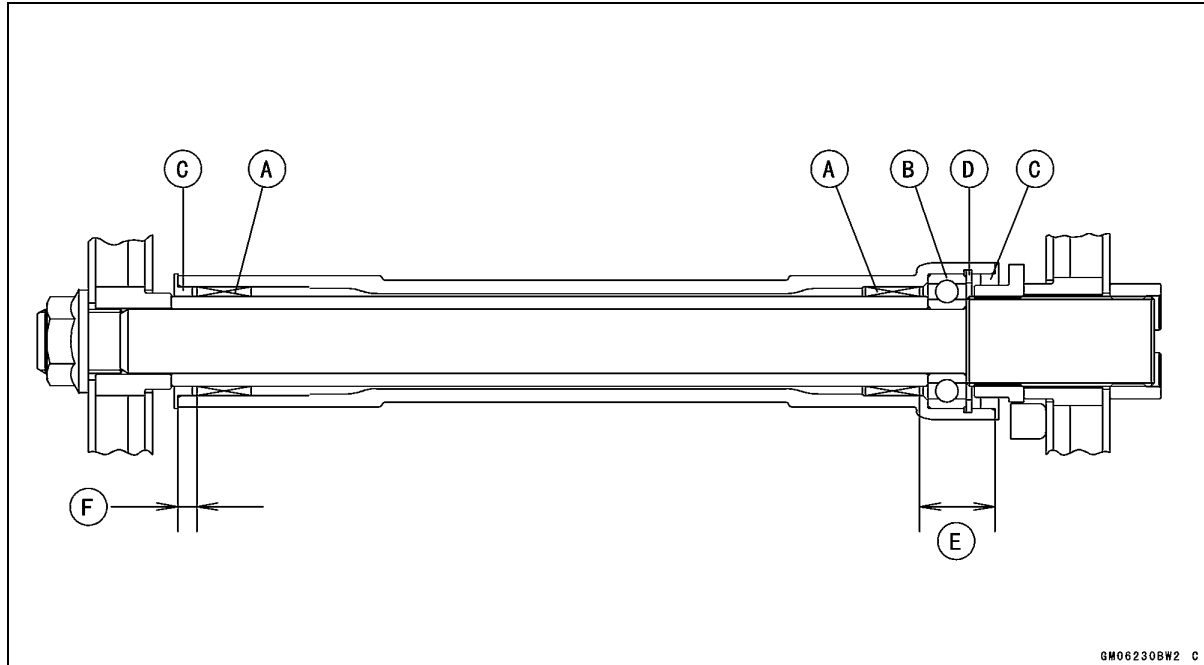
Spacer $\phi 28$: 57001-1663



13-44 SUSPENSION

Swingarm

- Install the needle bearings [A], ball bearing [B] and oil seals [C] position as shown.
Circlip [D]
23.5 ±0.4 mm (0.93 ±0.02 in.) [E]
6 ±0.4 mm (0.24 ±0.02 in.) [F]

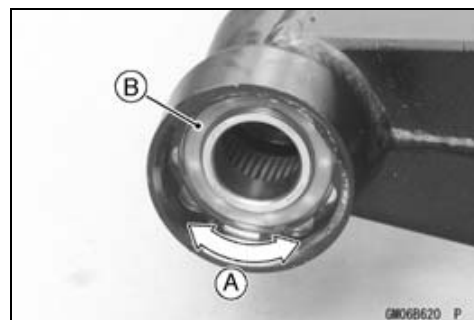


Swingarm Bearing, Sleeve Inspection

NOTICE

Do not remove the bearings for inspection. Removal may damage them.

- Inspect the needle bearings [A] and ball bearing installed in the swingarm.
- The rollers and ball in a bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.
- ★ If the needle bearing and sleeve [B] show any signs of abnormal wear, discoloration, or damage, replace them as a set.
- Turn the bearing in the swingarm back and forth [A] while checking for plays, roughness, or binding.
- ★ If bearing play, roughness, or binding is found, replace the bearing.
- Examine the bearing seal [B] for tears or leakage.
- ★ If the seal is torn or is leaking, replace the bearing.



Swingarm

Swingarm Bearing Lubrication

NOTE

○ *Since the bearings are packed with grease and sealed, lubrication is not required.*

Chain Guide Inspection

- Refer to the Chain Guide Wear Inspection in the Periodic Maintenance chapter.

13-46 SUSPENSION

Tie-Rod, Rocker Arm

Tie-Rod Removal

- Squeeze the brake lever slowly and hold it with a band [A].

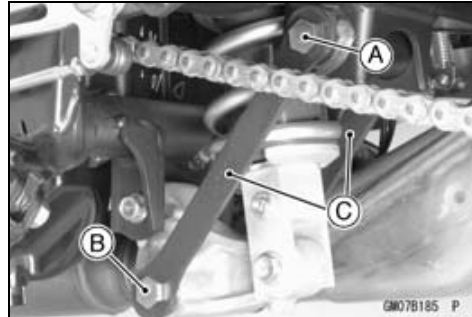


- Raise the rear wheel off the ground with the jack.

Special Tools - Jack: 57001-1238

Jack Attachment: 57001-1608

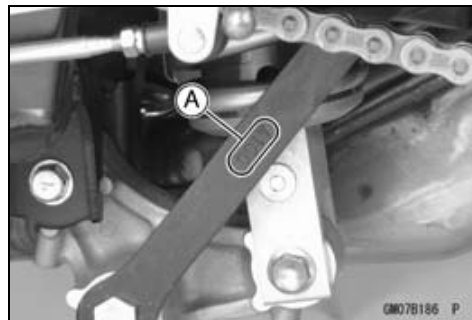
- Remove:
Upper Tie-Rod Nut and Bolt [A]
Lower Tie-Rod Nut and Bolt [B]
Tie-Rods [C]



Tie-Rod Installation

- Apply grease to the inside of the oil seals.
- Install the tie-rods so that the marked side faces [A] outside.
- Replace the tie-rod nuts with new ones.
- Tighten:

Torque - Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)



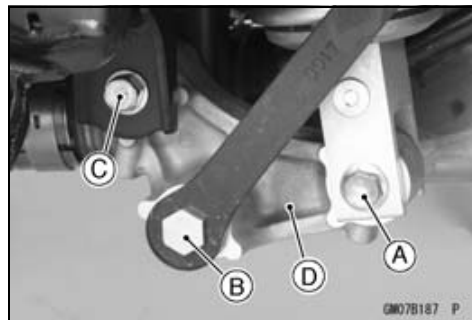
Rocker Arm Removal

- Squeeze the brake lever slowly and hold it with a band.
- Raise the rear wheel off the ground with the jack.

Special Tools - Jack: 57001-1238

Jack Attachment: 57001-1608

- Remove:
Lower Rear Shock Absorber Nut and Bolt [A]
Lower Tie-Rod Nut and Bolt [B]
Rocker Arm Nut and Bolt [C]
Rocker Arm [D]



Rocker Arm Installation

- Apply grease to the inside of the oil seals.
- Replace the following nuts with new ones.
Rocker Arm Nut
Tie-Rod Nut
Rear Shock Absorber Nut (Lower)
- Tighten:

Torque - Rocker Arm Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)

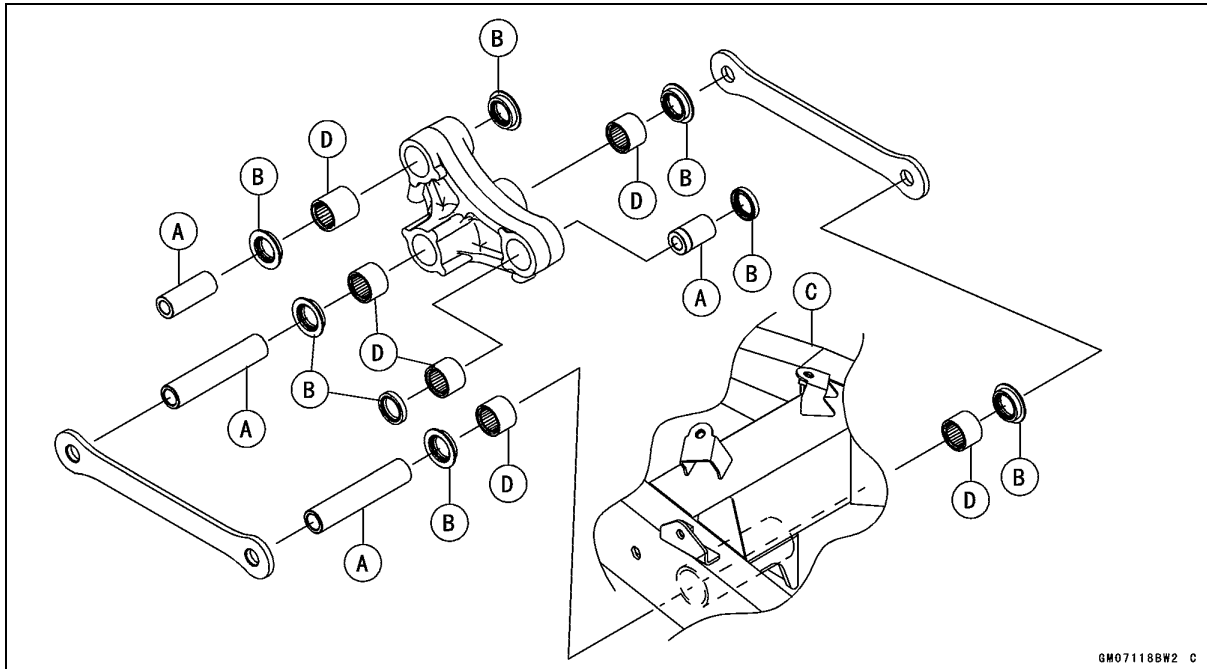
Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

Rear Shock Absorber Nut (Lower): 34 N·m (3.5 kgf·m, 25 ft·lb)

Tie-Rod, Rocker Arm

Tie-Rod and Rocker Arm Bearing Removal

- Remove:
 - Tie-Rods (see Tie-Rod Removal)
 - Rocker Arm (see Rocker Arm Removal)
 - Sleeves [A]
 - Oil Seals [B]
 - Swingarm [C] (see Swingarm Removal)
- Remove the needle bearings [D], using a suitable tool.



GM07118BW2 C

Tie-Rod and Rocker Arm Bearing Installation

- Replace the needle bearings and oil seals with new ones.
- Apply plenty of grease to the lips of the oil seals.
- Install the needle bearings and oil seals position as shown.

- Screw the needle bearing driver [A] into the driver holder [B].

NOTE

- For a bearing of inner diameter $\phi 18$, select the pressing side of the needle bearing driver according to its pressing depth.

- Insert the needle bearing driver into the needle bearing [C] and press the needle bearing into the housing until the driver contacts the end surface of the housing.

Bearing Pressing Depth: 5.5 mm (0.22 in.) [D]

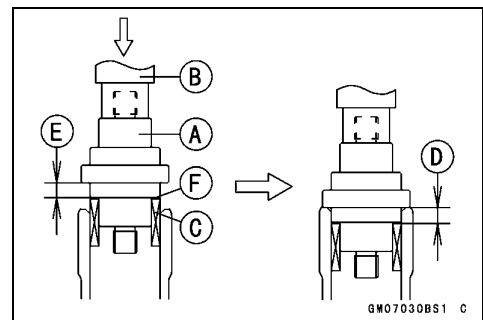
5.0 mm (0.20 in.) [E]

Spacer, $\phi 18$ [F] Thickness: 0.5 mm (0.02 in.)

Special Tools - Bearing Driver Set: 57001-1129

Needle Bearing Driver, $\phi 17/\phi 18$: 57001-1609

Spacer, $\phi 18$: 57001-1636



GM07030BS1 C

13-48 SUSPENSION

Tie-Rod, Rocker Arm

NOTE

○ Install the needle bearings so that the marked side faces in.

Needle Bearings [A]

Oil Seals [B]

Front [C]

Right Side [D]

Left Side [E]

Rear Shock Absorber [F]

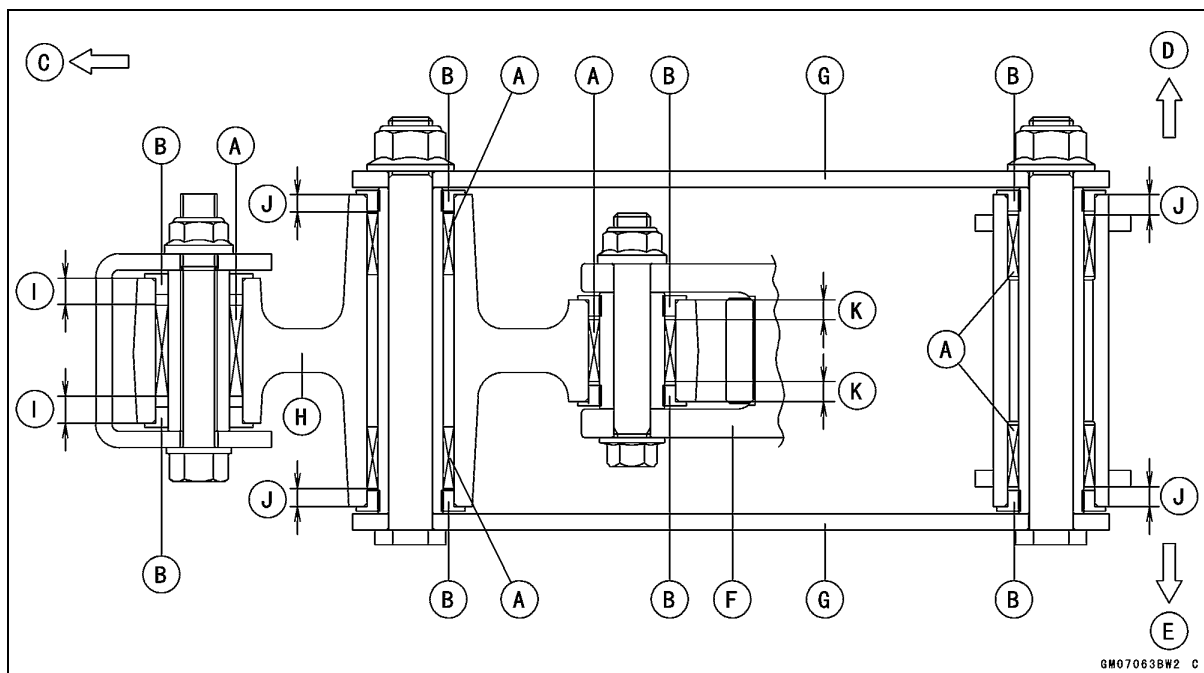
Tie-Rods [G]

Rocker Arm [H]

7.5 mm (0.30 in.) [I]

5.0 ±0.4 mm (0.20 ±0.02 in.) [J]

5.5 mm (0.22 in.) [K]



Rocker Arm/Tie-Rod Bearing, Sleeve Inspection

NOTICE

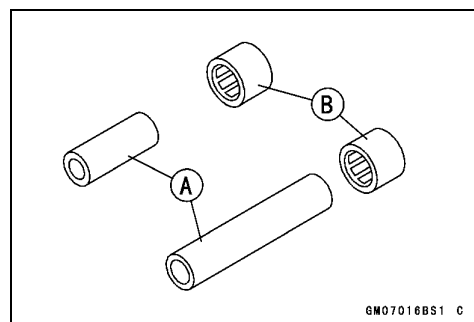
Do not remove the bearings for inspection. Removal may damage them.

- Visually inspect the rocker arm, or tie-rod sleeves [A] and needle bearings [B].
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
- ★ If there is any doubt as to the condition of any of the needle bearings or sleeve, replace the sleeve and needle bearings as a set.

Rocker Arm/Tie-Rod Bearing Lubrication

NOTE

○ Since the bearings are packed with grease, lubrication is not required.



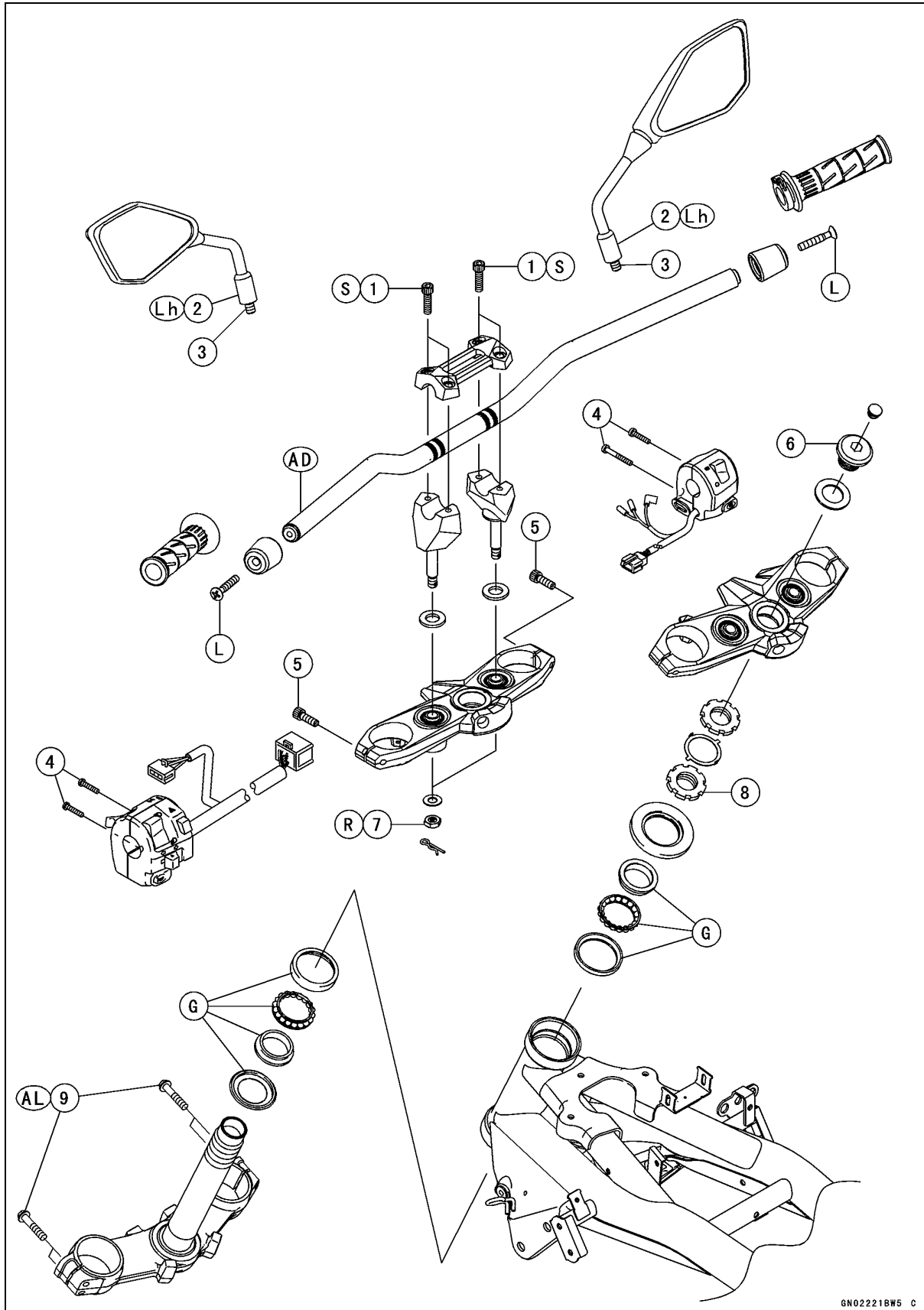
Steering

Table of Contents

Exploded View	14-2
Special Tools	14-4
Steering	14-5
Steering Inspection	14-5
Steering Adjustment.....	14-5
Steering Stem.....	14-6
Stem, Stem Bearing Removal.....	14-6
Stem, Stem Bearing Installation.....	14-7
Steering Stem Bearing Lubrication	14-8
Steering Stem Warp Inspection	14-9
Stem Cap Deterioration, Damage Inspection	14-9
Handlebar	14-10
Handlebar Removal	14-10
Handlebar Installation	14-10

14-2 STEERING

Exploded View



GN0221BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Holder Bolts	25	2.5	18	S
2	Rear View Mirror Locknut (Upper)	18	1.8	13	Lh
3	Rear View Mirror Nut (Lower)	30	3.1	22	
4	Switch Housing Screws	3.5	0.36	31 in·lb	
5	Upper Front Fork Clamp Bolts	20	2.0	15	
6	Steering Stem Head Bolt	108	11.0	79.7	
7	Lower Handlebar Holder Nuts	34	3.5	25	R
8	Steering Stem Nut	27	2.8	20	
9	Lower Front Fork Clamp Bolts	20.5	2.09	15.1	AL

AD: Apply adhesive.

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

G: Apply grease.

L: Apply a non-permanent locking agent.

Lh: Left-hand Threads

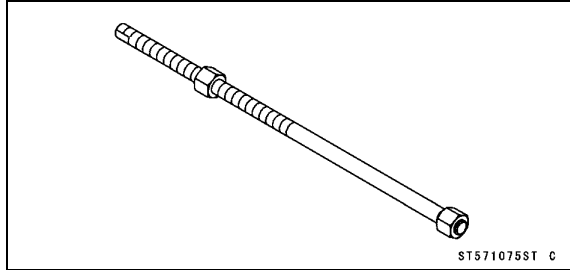
R: Replacement Parts

S: Follow the specified tightening sequence.

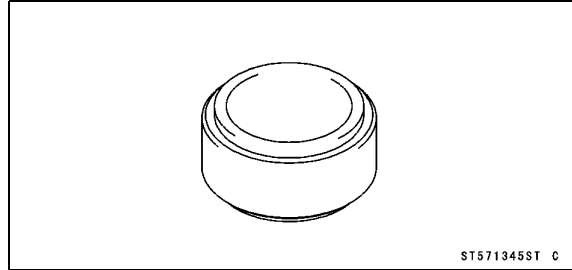
14-4 STEERING

Special Tools

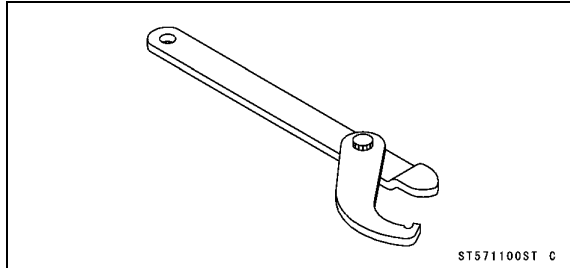
Head Pipe Outer Race Press Shaft:
57001-1075



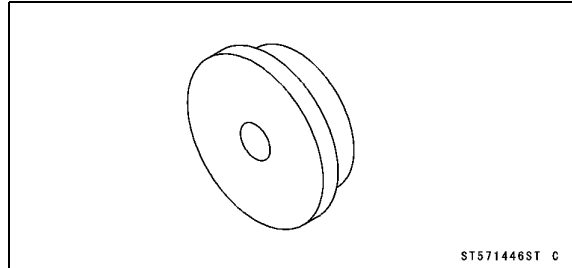
Steering Stem Bearing Driver Adapter, $\phi 41.5$:
57001-1345



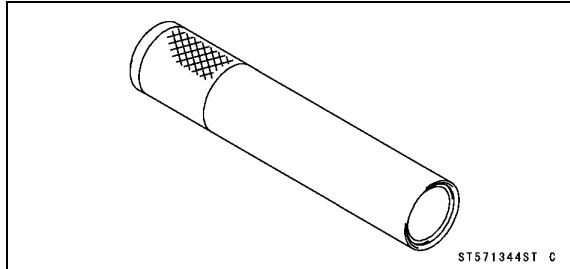
Steering Stem Nut Wrench:
57001-1100



Head Pipe Outer Race Driver, $\phi 55$:
57001-1446



Steering Stem Bearing Driver, $\phi 42.5$:
57001-1344



Steering

Steering Inspection

- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

Steering Adjustment

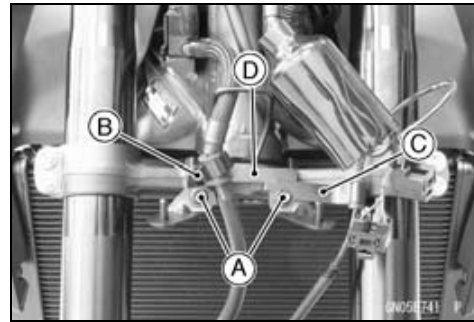
- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

14-6 STEERING

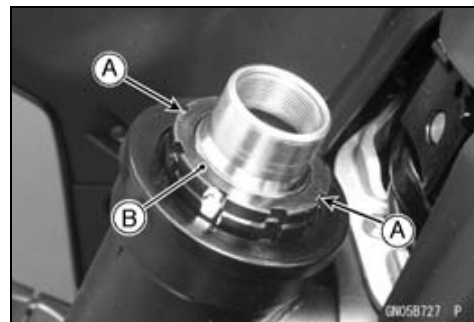
Steering Stem

Stem, Stem Bearing Removal

- Remove:
 - Upper Fairing (see Upper Fairing Removal in the Frame chapter)
 - Bolts [A]
 - Clamp [B]
 - Clamp [C] (ABS Equipped Models)
 - Bracket [D]
 - Handlebars (see Handlebar Removal)
 - Steering Stem Head (see Steering Play Adjustment in the Periodic Maintenance chapter)
 - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
 - Front Forks (see Front Fork Removal in the Suspension chapter)



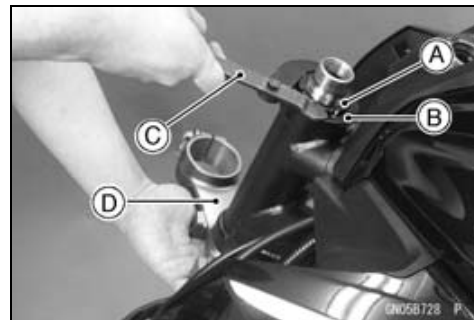
- Bend the claws [A] of claw washer straighten.
- Remove the steering stem locknut [B].
 - Special Tool - Steering Stem Nut Wrench: 57001-1100**
- Remove the claw washer.



- Pushing up the stem base, and remove the steering stem nut [A] with stem cap [B].

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

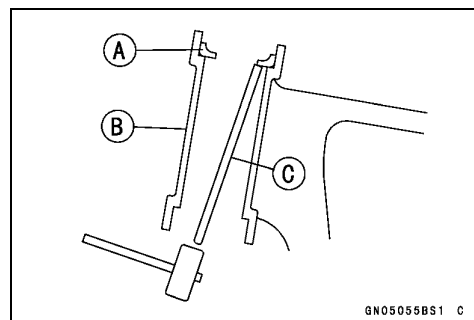
- Remove:
 - Steering Stem [D]
 - Upper Ball Bearing Inner Race and Ball Bearing



- To remove the ball bearing outer races [A] pressed into the head pipe [B], insert a bar [C] into the recesses of head pipe, and applying it to both recess alternately hammer it to drive the race out.

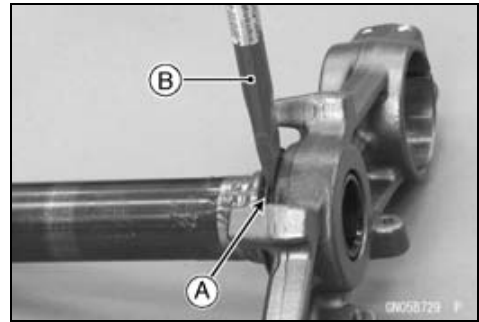
NOTE

○If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.



Steering Stem

- Remove the lower ball bearing inner race (with its oil seal) [A] which is pressed onto the steering stem with a suitable commercially available chisel [B].

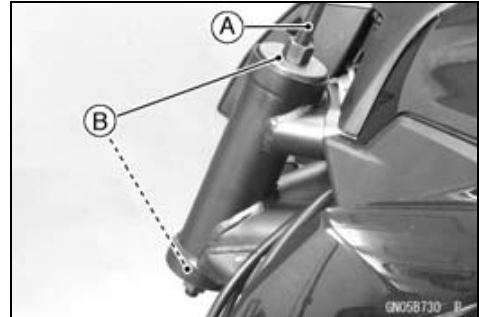


Stem, Stem Bearing Installation

- Replace the bearing outer races with new ones.
- Apply grease to the outer races.
- Drive them into the head pipe at the same time.

Special Tools - Head Pipe Outer Race Press Shaft [A]:
57001-1075

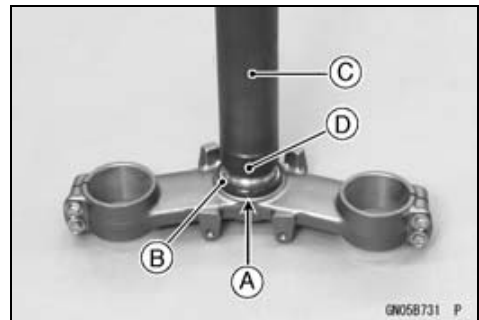
Head Pipe Outer Race Driver, $\phi 55$ [B]: 57001-1446



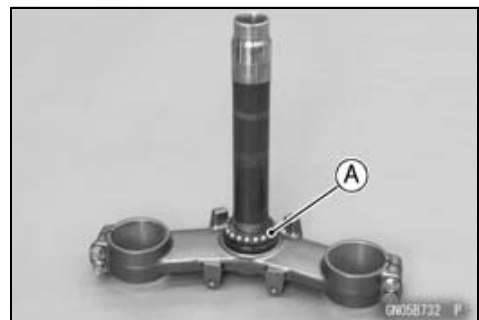
- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Install the oil seal [A] on the steering stem, and drive the lower ball bearing inner race [B] applied the grease onto the stem.

Special Tools - Steering Stem Bearing Driver, $\phi 42.5$ [C]:
57001-1344

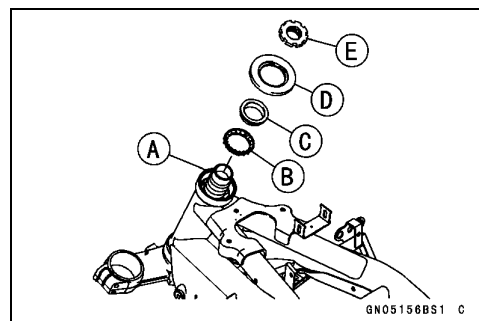
Steering Stem Bearing Driver Adapter, $\phi 41.5$ [D]: 57001-1345



- Install the lower ball bearing [A] onto the stem.
- Grease the following.
 - Inner and Outer Races
 - Lower and Upper Ball Bearings
- The lower and upper ball bearings are identical.



- Install the stem [A] through the head pipe and install the ball bearing [B] and inner race [C] on it.
- Install:
 - Stem Cap [D]
 - Steering Stem Nut [E]



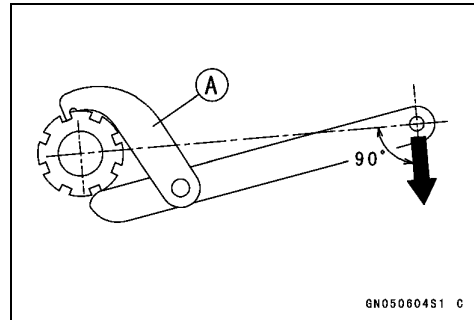
14-8 STEERING

Steering Stem

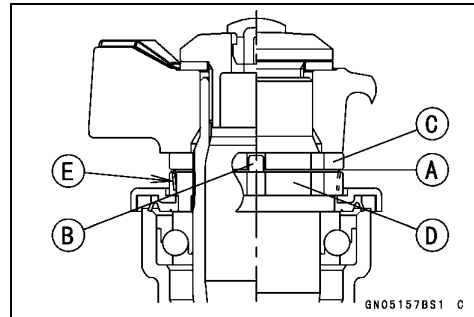
- Settle the bearings in place as follows.
- Tighten the steering stem nut with **55 N·m (5.6 kgf·m, 41 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a steering stem nut wrench [A].

Special Tool - Steering Stem Nut Wrench: 57001-1100

Torque - Steering Stem Nut: 27 N·m (2.8 kgf·m, 20 ft·lb)



- Install the claw washer [A] so that its bent side [B] faces upward, and engage the bent claws with the grooves of stem locknut [C].
- Hand tighten the stem locknut until it touches the claw washer.
- Tighten the stem locknut clockwise until the claws are aligned with the grooves (ranging from 2nd to 4th) of stem nut [D], and bend the 2 claws downward [E].
- Install the stem head.
- Install the washer, and temporary tighten the steering stem head bolt.
- Install the front forks (see Front Fork Installation in the Suspension chapter).



NOTE

- Tighten the upper front fork clamp bolts first, next the stem head bolt, last the lower front fork clamp bolts.
- Tighten the two lower front fork clamp bolts (upper, lower) alternately two times to ensure even tightening torque.

Torque - Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

Steering Stem Head Bolt: 108 N·m (11.0 kgf·m, 79.7 ft·lb)

Lower Front Fork Clamp Bolts: 20.5 N·m (2.09 kgf·m, 15.1 ft·lb)

WARNING

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

- Install the removed parts (see appropriate chapters).
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

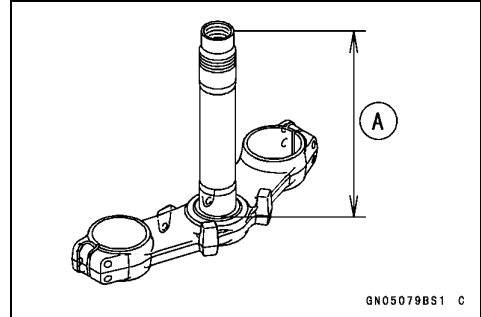
Steering Stem Bearing Lubrication

- Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem

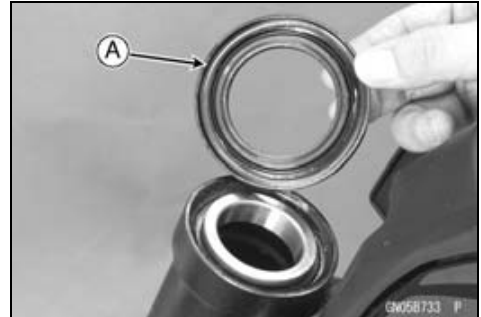
Steering Stem Warp Inspection

- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.
- ★ If the steering stem [A] is bent, replace the steering stem.



Stem Cap Deterioration, Damage Inspection

- ★ Replace the stem cap if its oil seal [A] shows damage.



14-10 STEERING

Handlebar

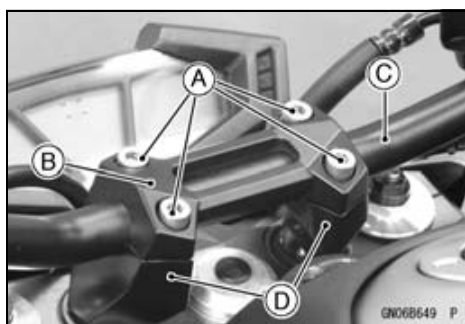
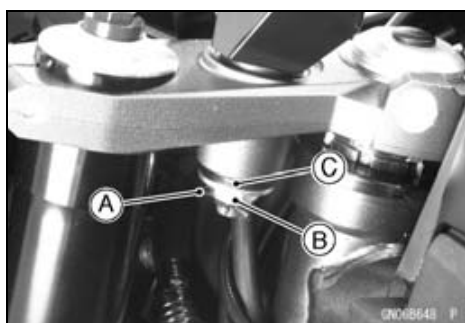
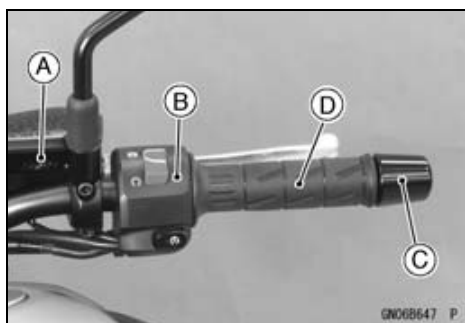
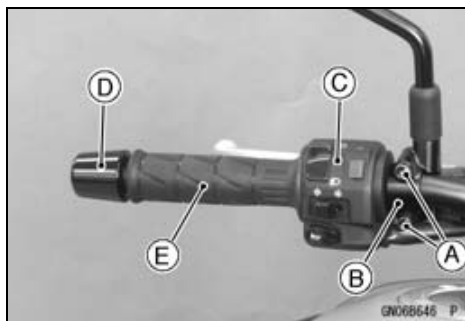
Handlebar Removal

- Remove:
 - Clutch Lever Clamp Bolts [A]
 - Clutch Lever Assembly [B]
 - Left Switch Housing [C]
 - Handlebar Weight [D]
 - Handlebar Grip [E]

- Remove:
 - Front Master Cylinder [A] (see Front Master Cylinder Removal in the Brakes chapter)
 - Right Switch Housing [B]
 - Handlebar Weight [C]
 - Throttle Grip [D]

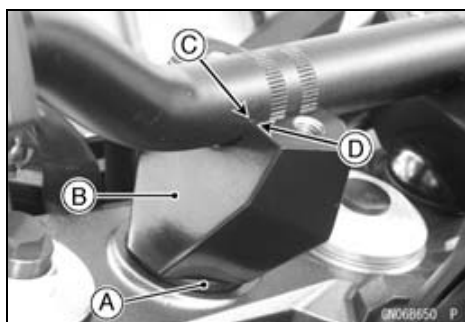
- When removing the lower handlebar holders, remove the following parts.
 - Cotter Pin [A] (Both Sides)
 - Lower Holder Nut [B] (Both Sides)
 - Washer [C] (Both Sides)

- Remove:
 - Handlebar Holder Bolts [A]
 - Handlebar Holder [B]
 - Handlebars [C]
 - Lower Handlebar Holders [D] and Dampers (If necessary)



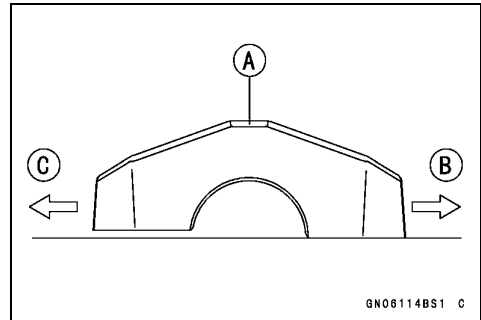
Handlebar Installation

- Install the dampers [A] and lower handlebar holders [B] if removed.
- Align the punch mark [C] on the handlebars and the corner edge [D] on the lower handlebar holder.

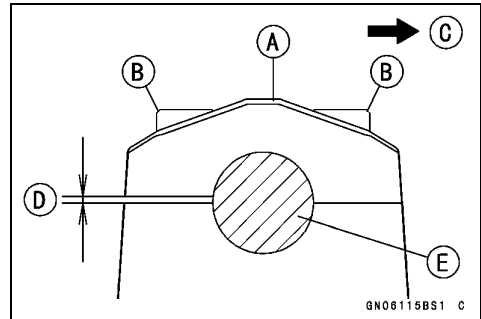


Handlebar

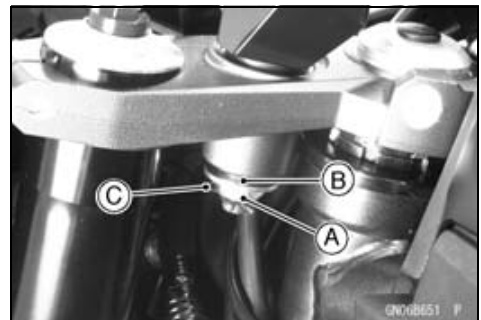
- Put the upper handlebar holder [A] on the flat surface to confirm the installation direction.
Front [B]
Rear [C]



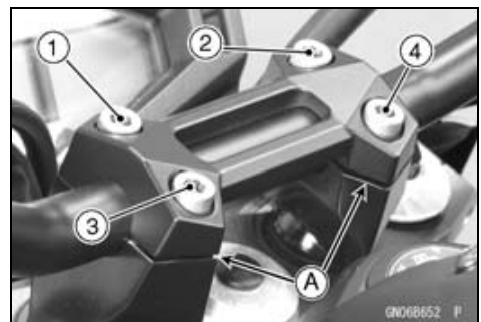
- When installing the lower handlebar holders, install the upper handlebar holder [A] and handlebar holder bolts [B] temporarily as shown.
Front [C]
Gap [D]
Handlebars [E]



- Replace the lower handlebar holder nuts [A] with new ones.
- Install the washers [B].
- Tighten:
Torque - Lower Handlebar Holder Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)
- Insert the cotter pins [C] from forward.



- Tighten the handlebar holder bolts following the tightening sequence [1 ~ 4].
- There will be a gap [A] at the rear part of the holder after tightening.
Torque - Handlebar Holder Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



14-12 STEERING

Handlebar

- Using a high flash-point solvent, clean of any oil or dirt that may be on the adhesive coating area. Dry them with a clean cloth.
- Apply adhesive cement to the left side of the handlebars.
- Install the handlebar grip.
- Wipe off any protruding adhesive cement.
- Apply a non-permanent locking agent to the left handlebar weight screw, and tighten it.
- Install the left switch housing.
- Fit the projection [A] into a hole [B] in the handlebars.
- Tighten:

Torque - Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)

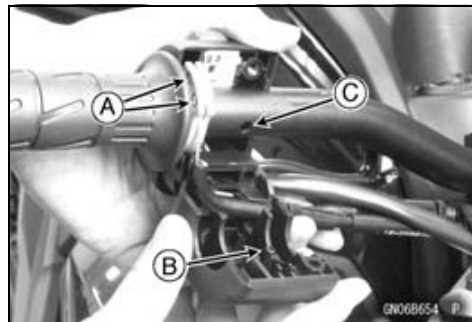
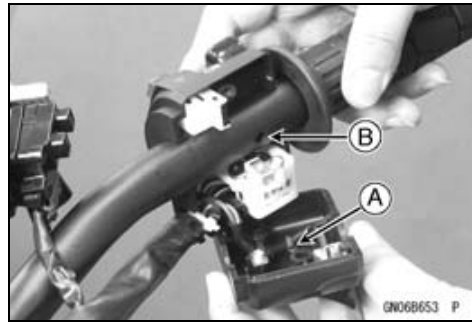
- Install the clutch lever (see Clutch Lever Installation in the Clutch chapter).

- Install:
 - Throttle Grip
 - Throttle Cable Tips [A]
 - Right Switch Housing

○ Fit the projection [B] into a hole [C] in the handlebars.

Torque - Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)

- Apply a non-permanent locking agent to the threads of the right handlebar weight screw, and tighten it.
- Install the front master cylinder (see Front Master Cylinder Installation in the Brake chapter).
- Run the leads, cables and hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



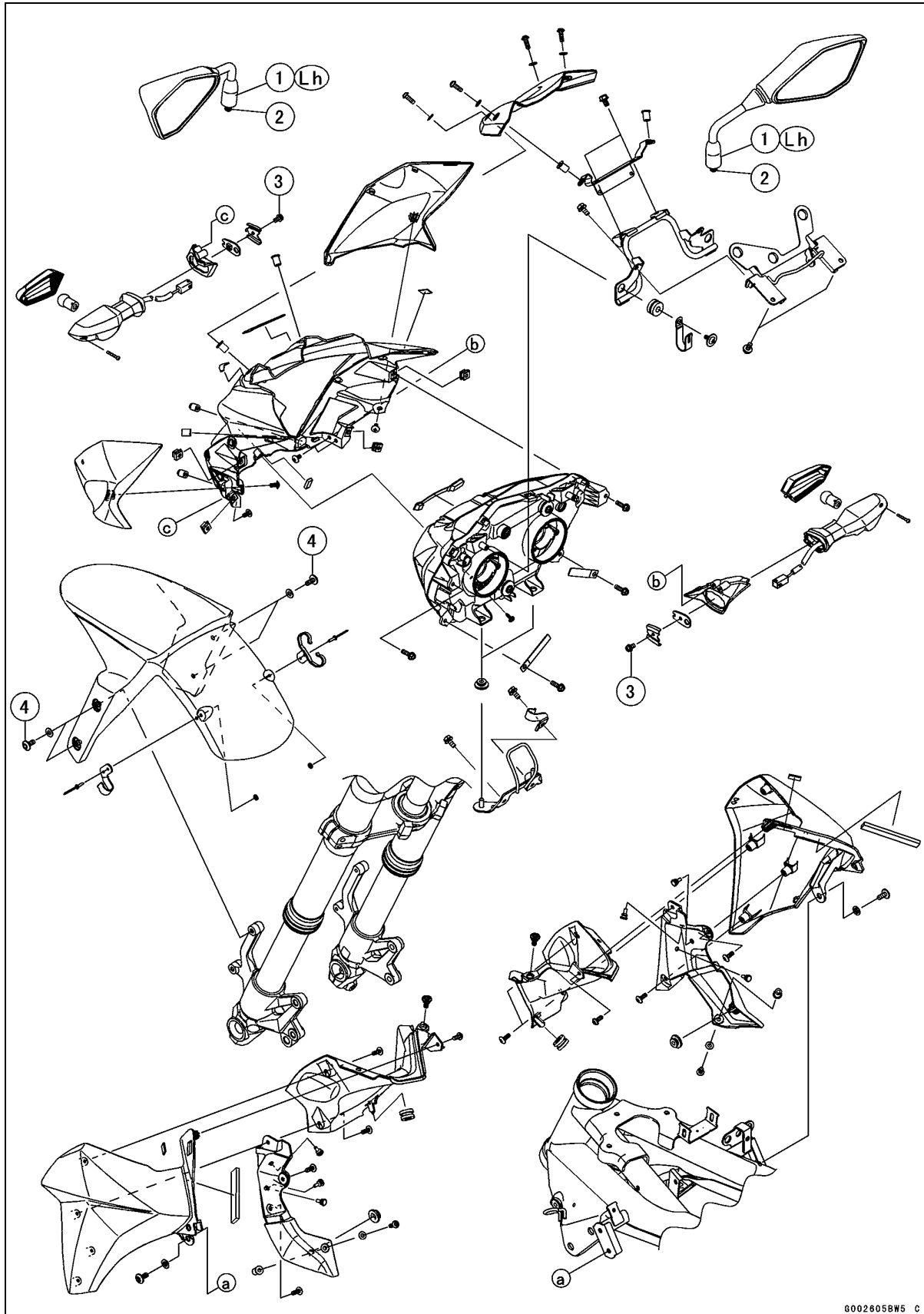
Frame

Table of Contents

Exploded View	15-2
Seats	15-8
Rear Seat Removal.....	15-8
Rear Seat Installation.....	15-8
Front Seat Removal	15-8
Front Seat Installation	15-8
Fairings.....	15-9
Upper Fairing Removal	15-9
Upper Fairing Disassembly.....	15-9
Upper Fairing Assembly.....	15-10
Upper Fairing Installation	15-10
Ignition Switch Cover Removal	15-10
Ignition Switch Cover Installation	15-11
Tank Cover Removal.....	15-11
Tank Cover Installation.....	15-11
Middle Fairing Removal	15-12
Middle Fairing Installation	15-12
Side Fairing Removal.....	15-13
Side Fairing Installation.....	15-13
Lower Fairing Removal (ZR800A/B Models)	15-14
Lower Fairing Installation (ZR800A/B Models)	15-14
Side Covers	15-15
Side Cover Removal	15-15
Side Cover Installation	15-16
Seat Covers.....	15-18
Seat Cover Removal.....	15-18
Seat Cover Installation.....	15-18
Fenders	15-19
Front Fender Removal	15-19
Front Fender Installation	15-19
Rear Fender Removal.....	15-19
Rear Fender Installation.....	15-20
Rear Inner Fender Removal	15-20
Rear Inner Fender Installation	15-20
Flap Removal	15-20
Flap Installation.....	15-22
Frame	15-23
Frame Inspection	15-23
Side Stand.....	15-24
Side Stand Removal	15-24
Side Stand Installation	15-24
Frame Cover.....	15-25
Subframe Cover Removal.....	15-25
Subframe Cover Installation.....	15-25
Frame Cover Removal.....	15-26
Frame Cover Installation.....	15-26
Rear View Mirrors	15-27
Rear View Mirror Removal	15-27
Rear View Mirror Installation	15-27

15-2 FRAME

Exploded View



0002805BWS C

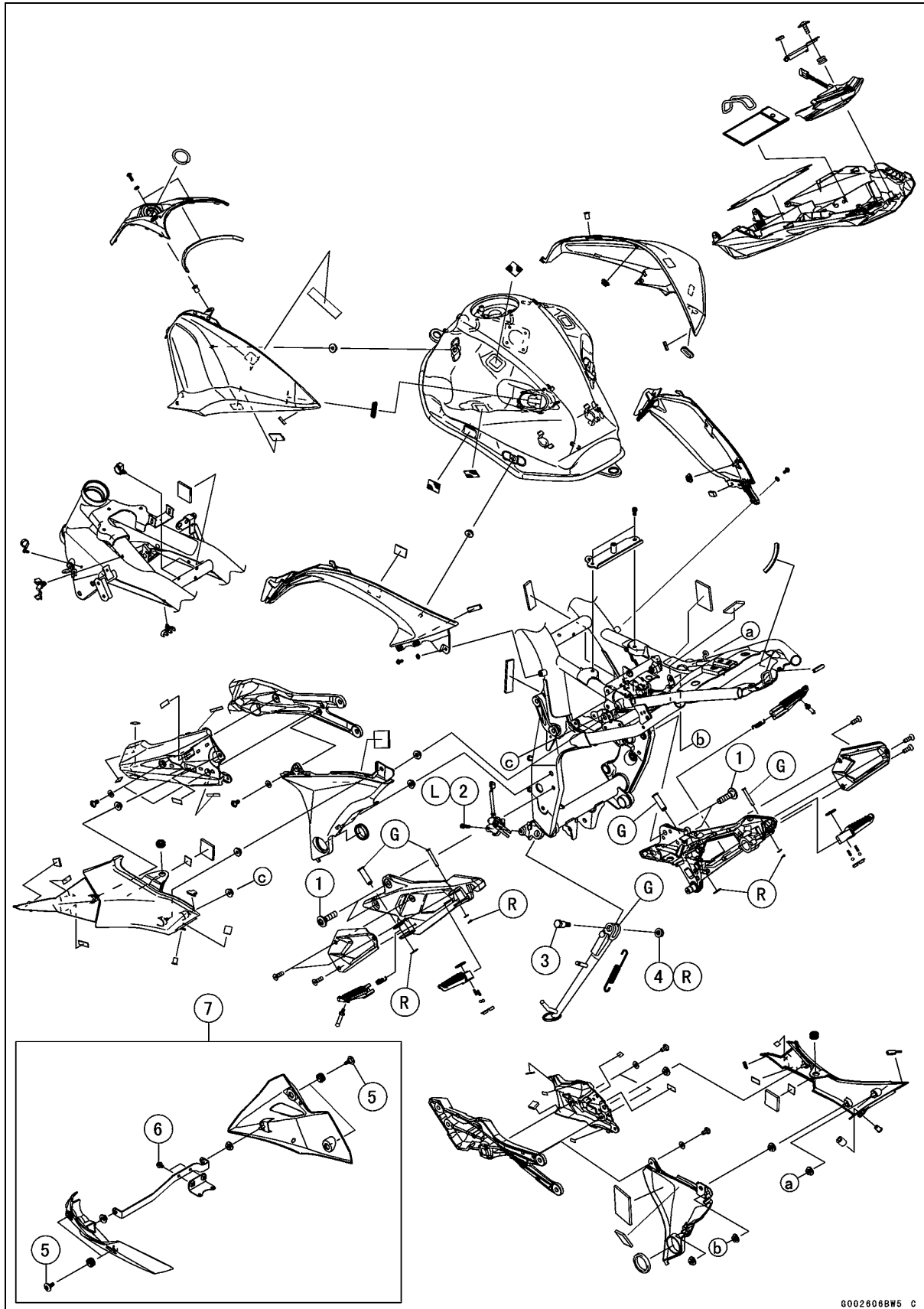
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear View Mirror Locknut (Upper)	18	1.8	13	Lh
2	Rear View Mirror Nut (Lower)	30	3.1	22	
3	Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	
4	Front Fender Bolts	3.9	0.40	35 in·lb	

Lh: Left-hand Threads

15-4 FRAME

Exploded View



0002806BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Footpeg Bracket Bolts	30	3.1	22	
2	Side Stand Switch Bolt	8.8	0.90	78 in·lb	L
3	Side Stand Bolt	29	3.0	21	
4	Side Stand Nut	44	4.5	32	R
5	Lower Fairing Mounting Bolts	9.8	1.0	87 in·lb	
6	Lower Fairing Bracket Bolts	9.8	1.0	87 in·lb	

7. ZR800A/B Models

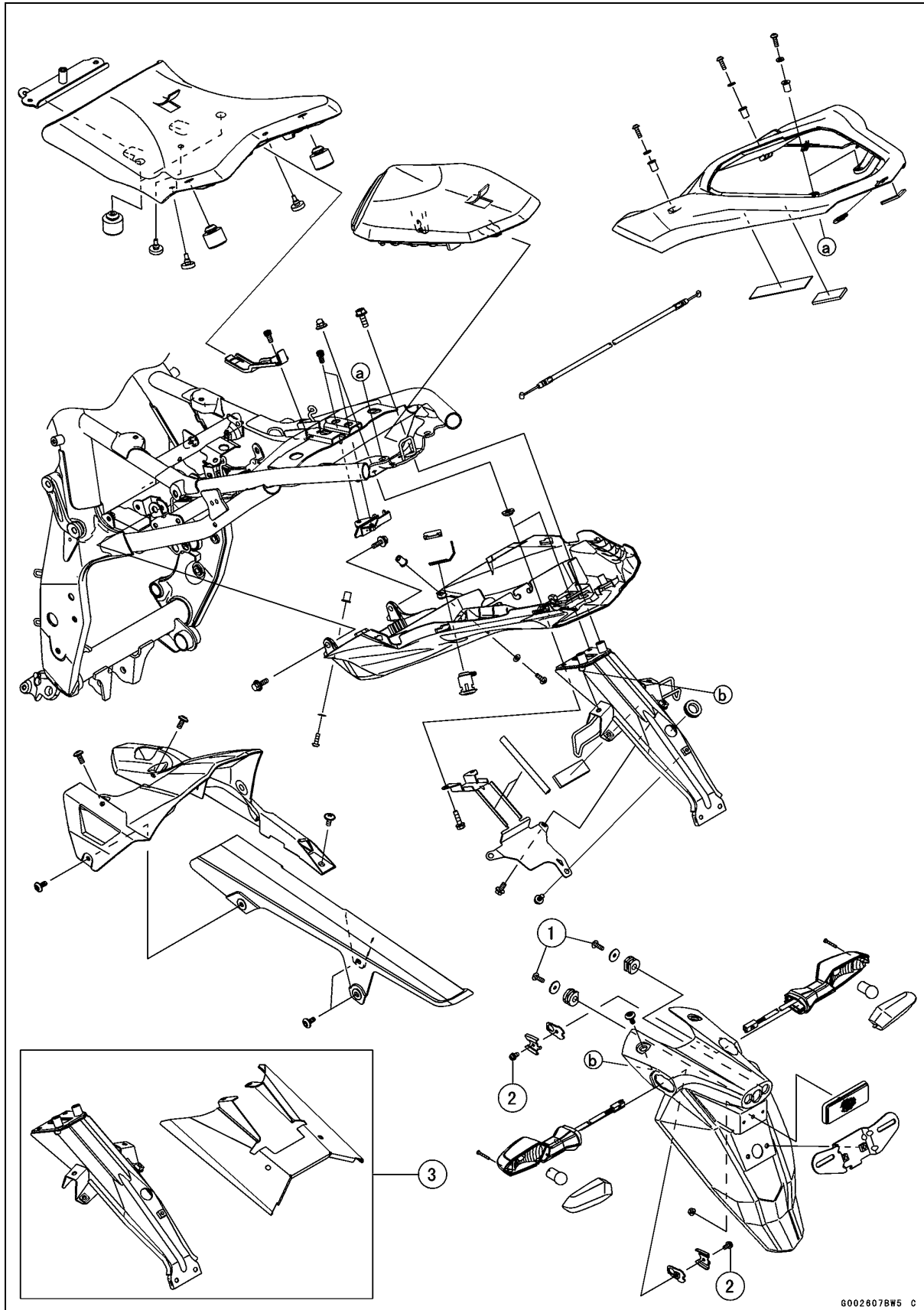
G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

15-6 FRAME

Exploded View



0002607BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
2	Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	

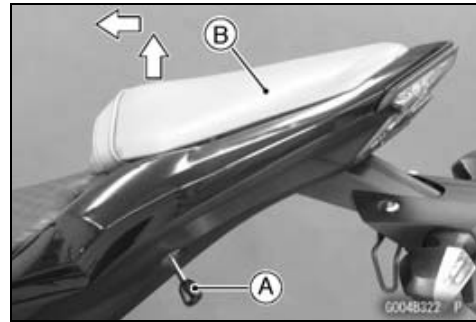
3. AU Model

15-8 FRAME

Seats

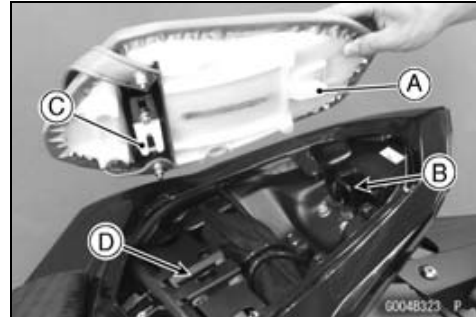
Rear Seat Removal

- Insert the ignition switch key [A] into the seat lock, turning the key clockwise, pulling the front part of the seat [B] up, and pull the seat forward.



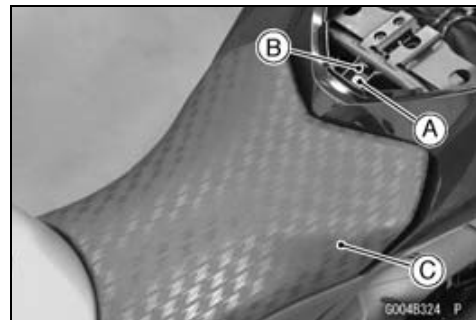
Rear Seat Installation

- Insert the rear seat hook [A] into the bracket [B] of the frame.
- Insert the seat hook [C] into the latch hole [D].
- Push down the front part of the seat until the lock clicks.



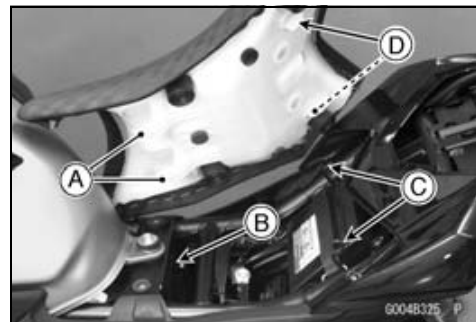
Front Seat Removal

- Remove:
 - Rear Seat (see Rear Seat Removal)
 - Bolt [A]
 - Bracket [B]
- Remove the front seat [C] by pulling the rear of it up and backward.

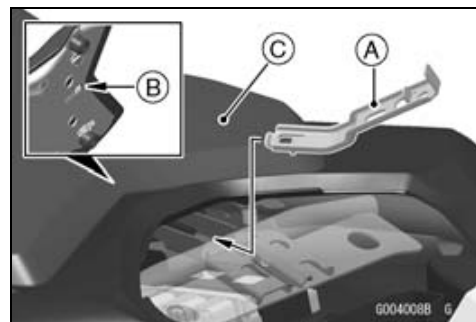


Front Seat Installation

- Insert the front seat hooks [A] under the slots [B] of the fuel tank bracket.
- Insert the hooks [C] into the seat holes [D].



- Insert the bracket [A] into the hole [B] at the rear of front seat [C] while pushing down the rear part of the front seat.
- Tighten the bolts while pushing forward the rear part of the front seat.



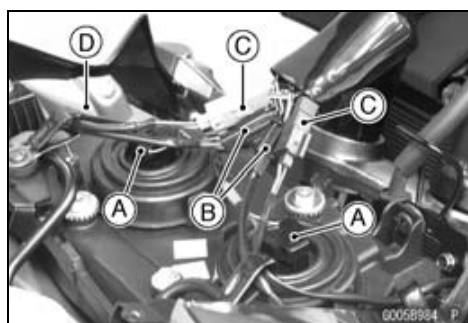
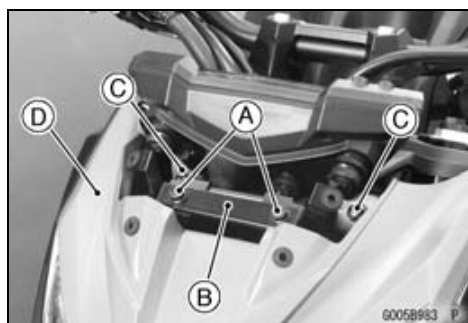
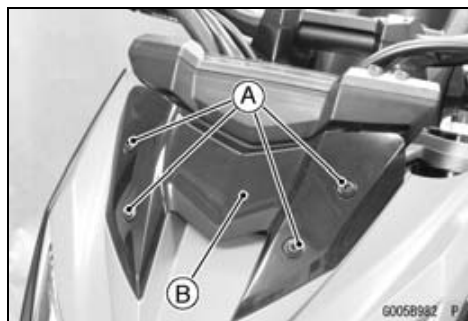
Fairings

Upper Fairing Removal

- Remove:
 - Bolts [A]
 - Meter Cover [B]

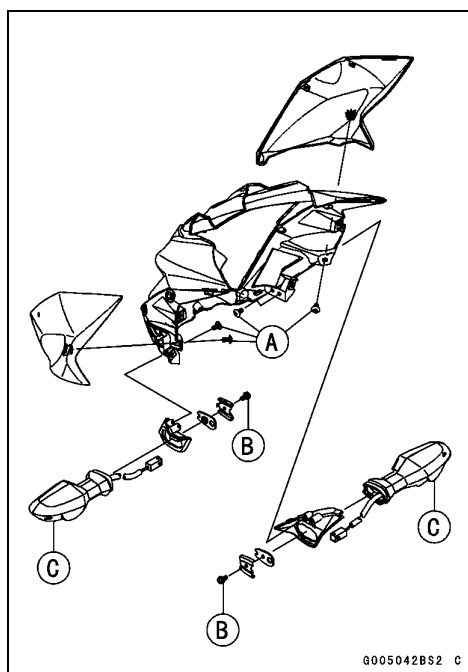
- Remove:
 - Bolts [A]
 - Bracket [B]
- Remove the bolts [C] and pull out the upper fairing [D] forward.

- Disconnect:
 - Headlight Lead Connectors [A]
 - City Light Lead Connectors [B]
 - Left and Right Turn Signal Light Lead Connectors [C]
- Remove the upper fairing [D].



Upper Fairing Disassembly

- Remove:
 - Upper Fairing (see Upper Fairing Removal)
 - Headlight (see Headlight Removal/Installation in the Electrical System chapter)
 - Screws [A]
 - Turn Signal Light Mounting Screws [B]
 - Turn Signal Light Assembly [C]

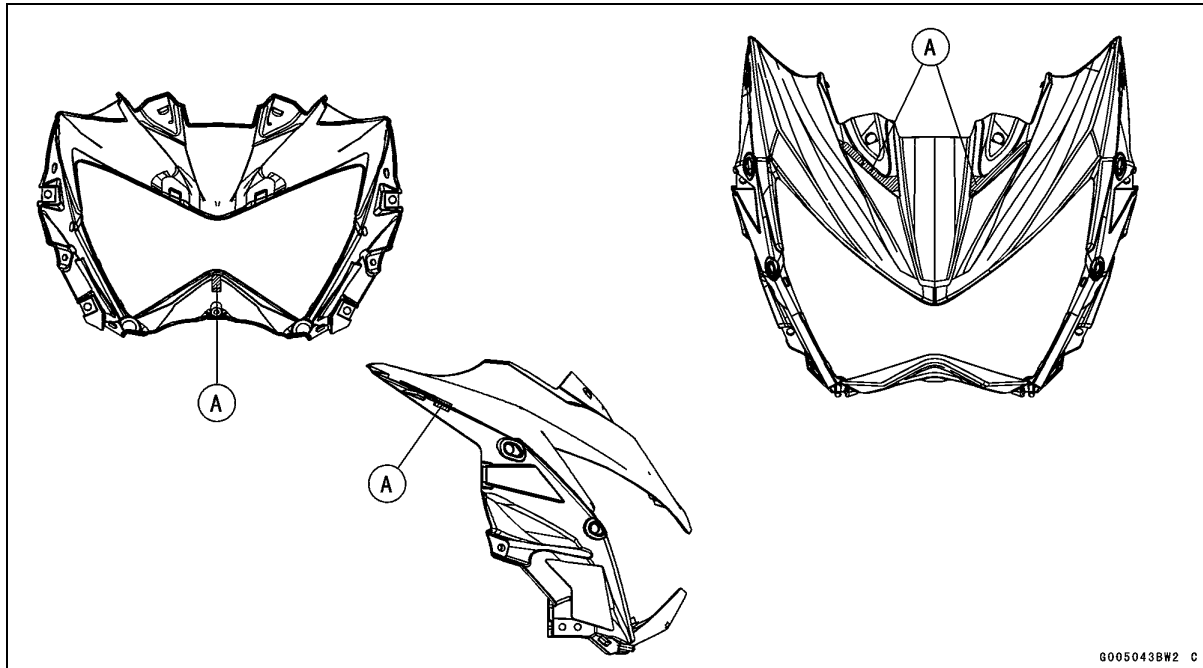


15-10 FRAME

Fairings

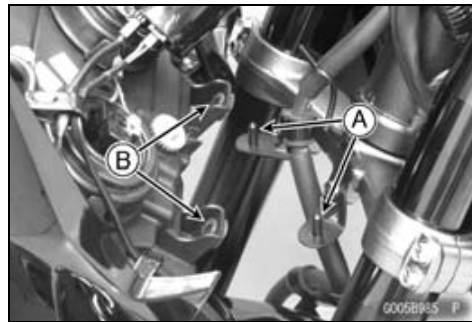
Upper Fairing Assembly

- Check the pads [A] are in place on the upper fairing.
- Installation is the reverse of removal.



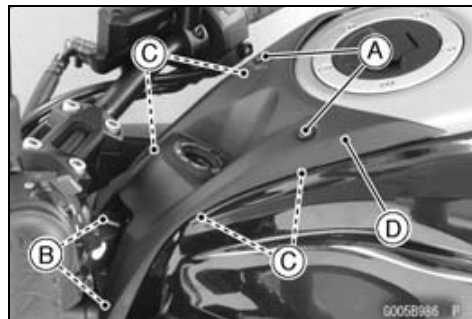
Upper Fairing Installation

- Connect:
 - City Light Lead Connectors
 - Headlight Lead Connectors
 - Left and Right Turn Signal Light Lead Connectors
- Fit the projections [A] on the bracket into the holes [B] of the headlight.
- Tighten the bolts.
- Install:
 - Bracket
 - Bolts
 - Meter Cover



Ignition Switch Cover Removal

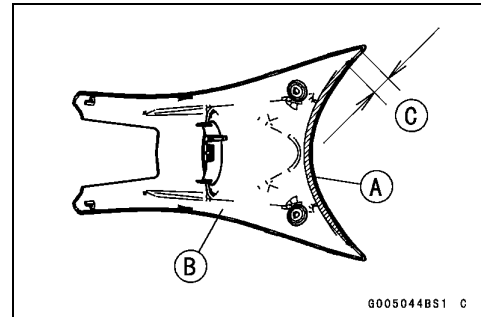
- Remove the bolts [A].
- Clear the hooks [B] and tabs [C] and remove the ignition switch cover [D].



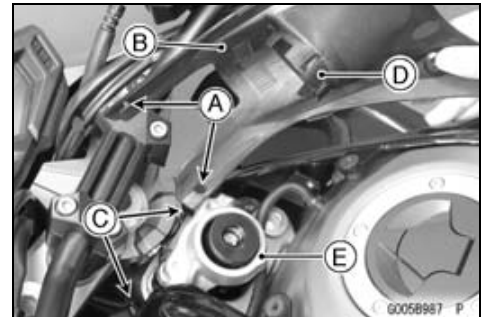
Fairings

Ignition Switch Cover Installation

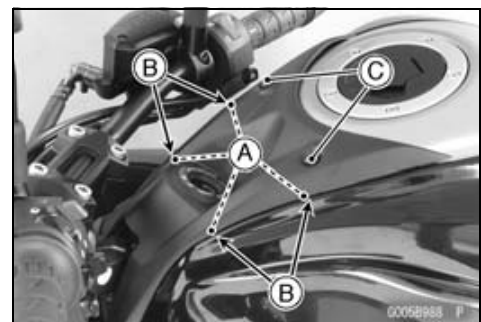
- Check that the pad [A] is in place on the ignition switch cover [B].
10 mm (0.39 in.) [C]



- Fit the hooks [A] of the ignition switch cover [B] on the ribs [C] of the tank cover.
- Insert the pin [D] on the ignition switch cover into the hole [E] on the bracket.

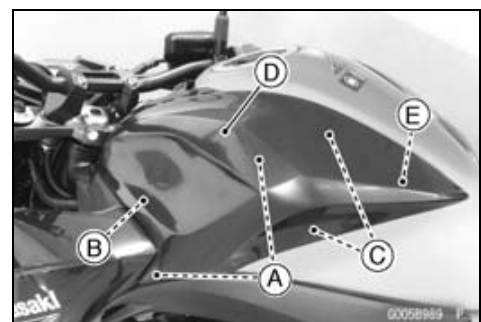


- Insert the tabs [A] on the ignition switch cover into the slots [B] of the tank cover.
- Tighten the bolts [C] with the washers.



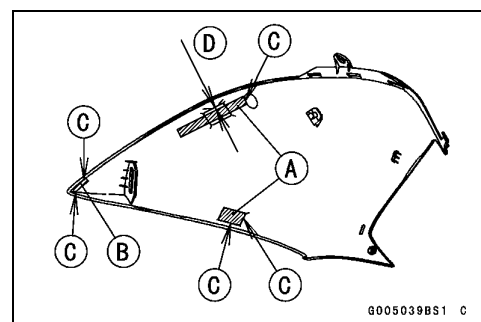
Tank Cover Removal

- Remove the ignition switch cover (see Ignition Switch Cover Removal).
- Clear the projections [A], tab [B] and hook fasteners [C] on the tank cover [D].
- Pull the tank cover forward to clear the hook [E].



Tank Cover Installation

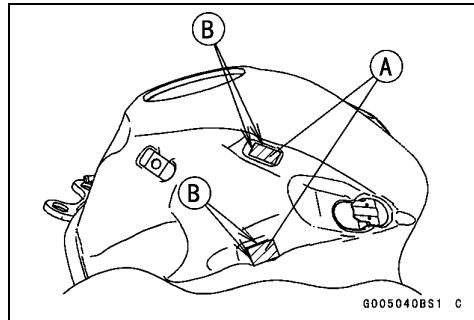
- When installing the hook fasteners [A] and pad [B], align the edge of the hook fasteners and pad with the lines [C] of the tank cover.
5 mm (0.2 in.) [D]



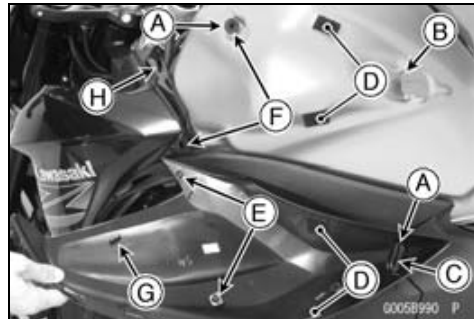
15-12 FRAME

Fairings

- When installing the hook fasteners [A], align the edge of the hook fasteners with the lines [B] of the fuel tank.

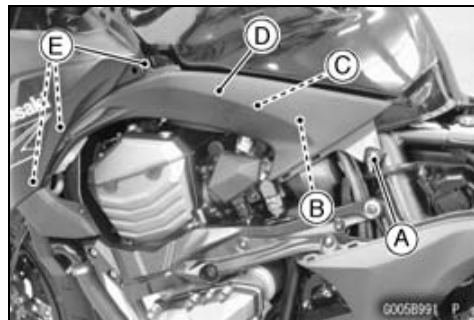


- Check that the grommets [A] are in place on the fuel tank and tank cover.
- Insert the hook [B] on the fuel tank into the slot [C] of the tank cover.
- Fit the hook fasteners [D].
- Insert the projections [E] into the holes [F], and insert the tab [G] into the slot [H].
- Install the ignition switch cover (see Ignition Switch Cover Installation).



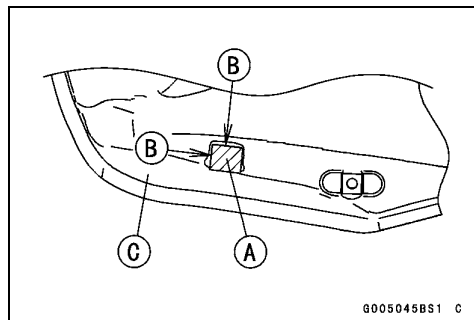
Middle Fairing Removal

- Remove:
 - Seats (see Rear/Front Seat Removal)
 - Tank Cover (see Tank Cover Removal)
 - Side Cover (see Side Cover Removal)
 - Subframe Cover (see Subframe Cover Removal)
 - Bolt [A]
- Clear the projection [B] and hook fastener [C] and pull the middle fairing [D] backward to clear the hooks [E].

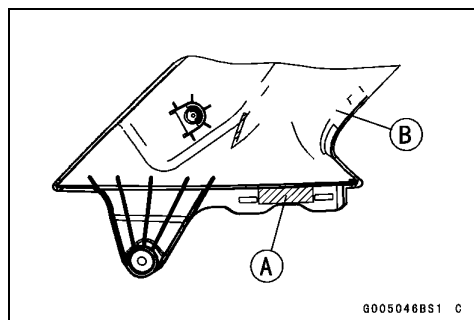


Middle Fairing Installation

- When installing the hook fastener [A], align the edge of the hook fastener with the lines [B] of the fuel tank [C].

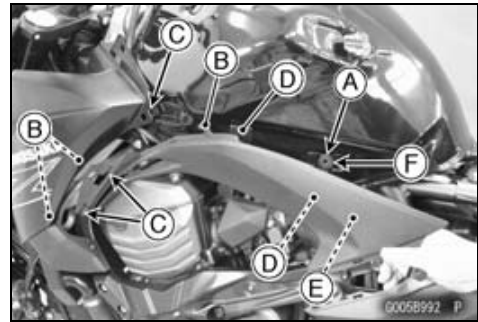


- Check that the pad [A] is in place on the middle fairing [B].



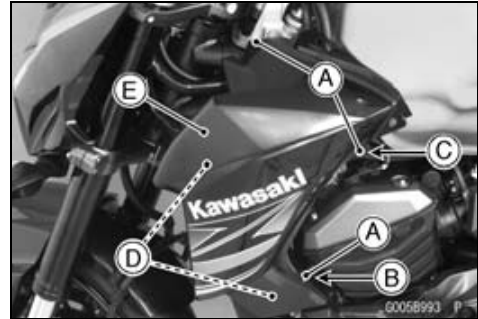
Fairings

- Check that the grommet [A] is in place on the fuel tank.
- Insert the tabs [B] into the slots [C].
- Fit the hook fasteners [D].
- Insert the projection [E] into the hole [F].
- Tighten the bolt.
- Install the removed parts (see appropriate chapters).



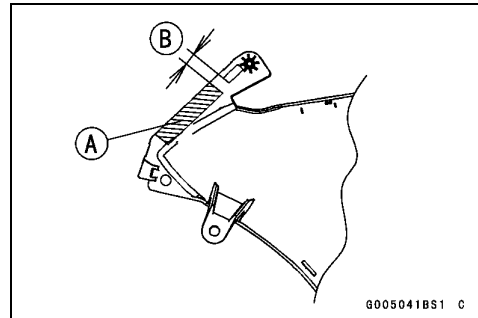
Side Fairing Removal

- Remove:
 - Middle Fairing (see Middle Fairing Removal)
 - Bolts [A]
 - Washer [B]
 - Collar [C]
- Clear the projections [D] and remove the side fairing [E].

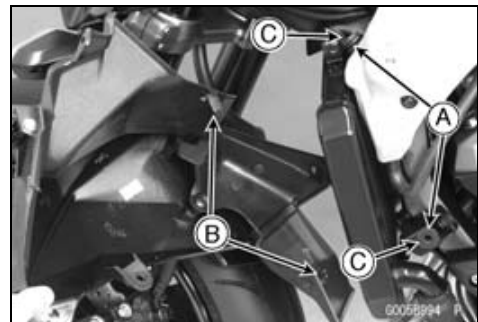


Side Fairing Installation

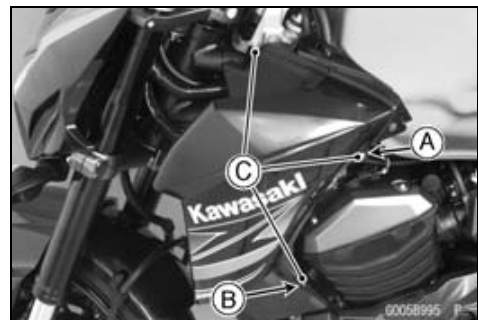
- Check that the pad [A] is in place on the side fairing.
 - 10 mm (0.39 in.) [B]



- Check that the grommets [A] are in place.
- Insert the projections [B] into the holes [C].



- Install:
 - Collar [A]
 - Washer [B]
 - Bolts [C]
- Tighten the bolts.
- Install the removed parts (see appropriate chapters).

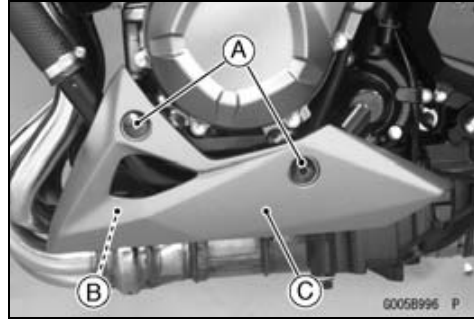


15-14 FRAME

Fairings

Lower Fairing Removal (ZR800A/B Models)

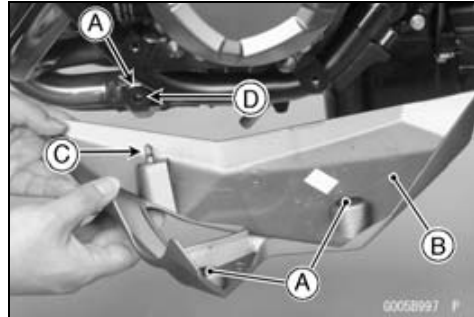
- Remove the bolts [A].
- Clear the projection [B] and remove the lower fairing [C].



Lower Fairing Installation (ZR800A/B Models)

- Check that the grommets [A] are in place on the lower fairing [B] and bracket.
- Insert the projection [C] into the hole [D].
- Tighten:

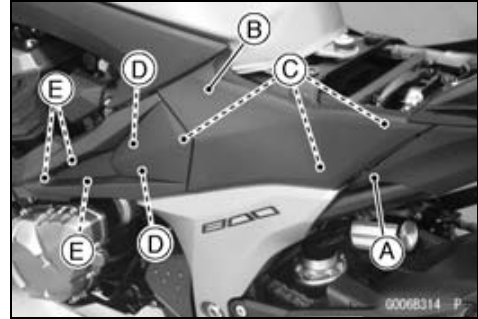
Torque - Lower Fairing Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Side Covers

Side Cover Removal

- Remove:
 - Seats (see Rear/Front Seat Removal)
 - Bolt [A] with washer
- Pull the side cover [B] evenly outward to clear the projections [C].
- Pull the side cover backward to clear the hook fasteners [D] and projections [E].

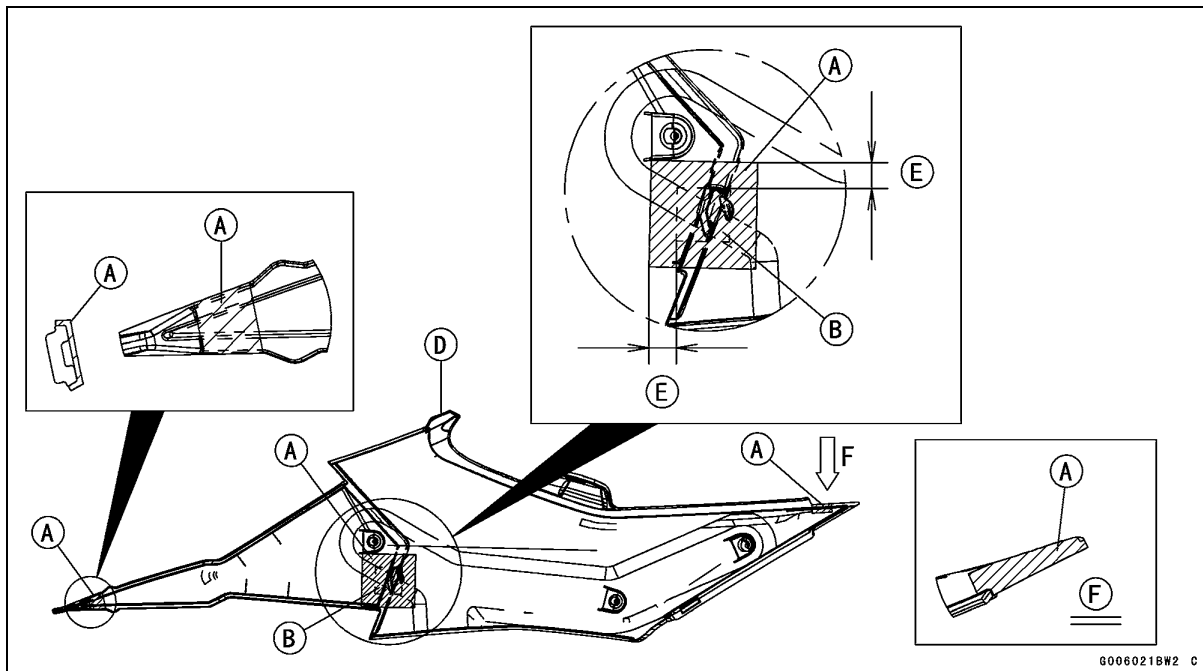
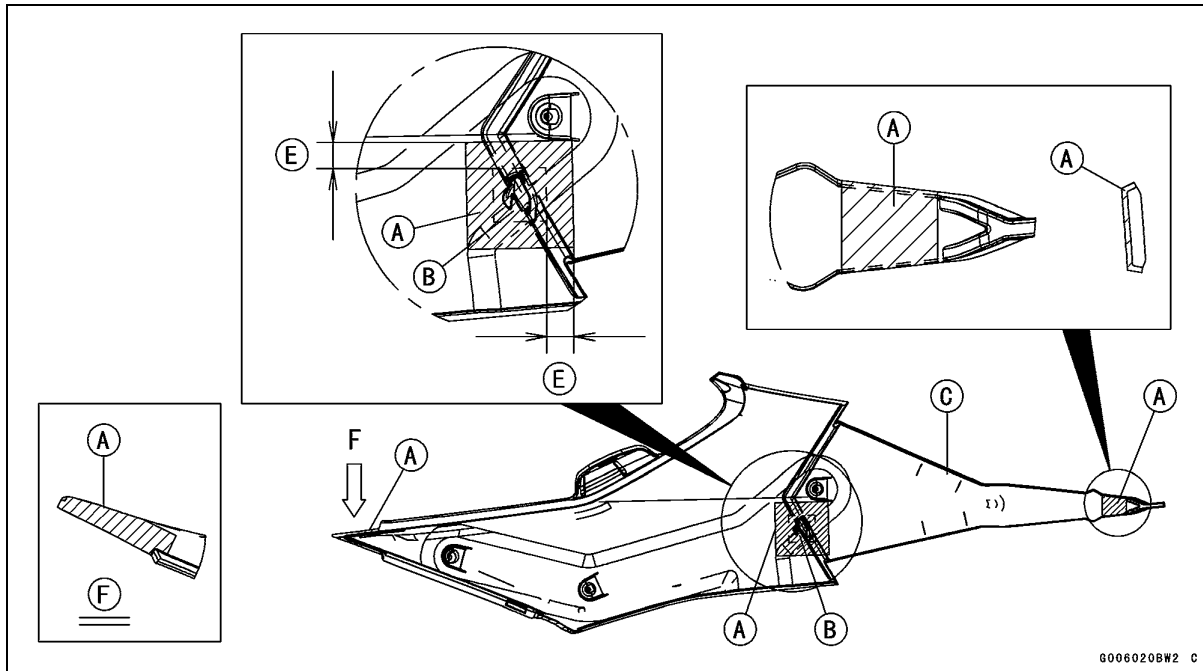


15-16 FRAME

Side Covers

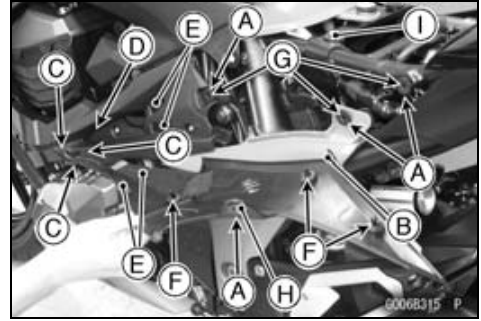
Side Cover Installation

- Check that the pads [A] and damper [B] are in place on the side covers as follows.
- Install the adhesive surface of the damper to the adhesive surface of the pad.
 - Left Side Cover [C]
 - Right Side Cover [D]
 - 10 mm (0.39 in.) [E]
 - View from F [F]



Side Covers

- Check that the grommets [A] and pad [B] are in place.
- Insert the projections [C] into the hole [D].
- Fit the hook fasteners [E].
- Insert the projections [F] into the holes [G].
- Fit the grommet [H] on the bolt [I].
- Tighten the bolt with washer.

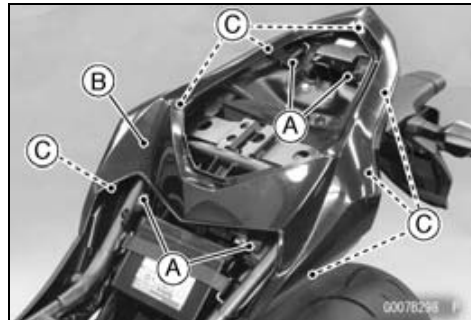


15-18 FRAME

Seat Covers

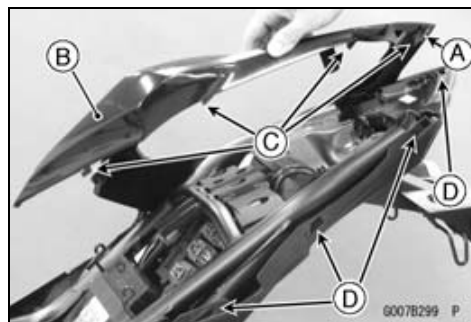
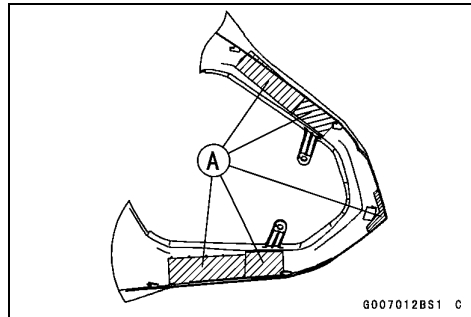
Seat Cover Removal

- Remove:
 - Seats (see Rear/Front Seat Removal)
 - Bolts [A]
- Pull the seat cover [B] backward to clear the hooks [C].



Seat Cover Installation

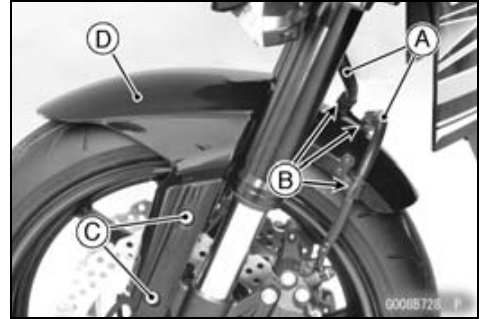
- Check that the pads [A] are in place on the seat cover.
- Check that the damper [A] is in place on the seat cover [B].
- Insert the hooks [C] into the slots [D] on both sides.
- Install the removed parts (see appropriate chapters).



Fenders

Front Fender Removal

- Free the brake hoses [A] from the clamps [B].
- Remove:
 - Bolts [C] with Washers (Both Sides)
 - Front Fender [D]

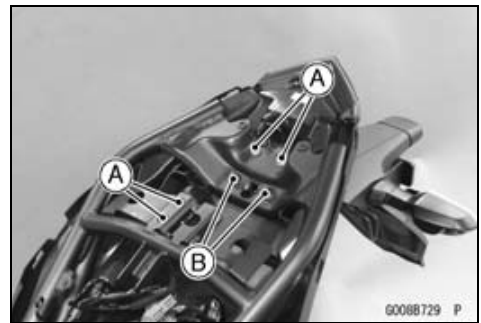


Front Fender Installation

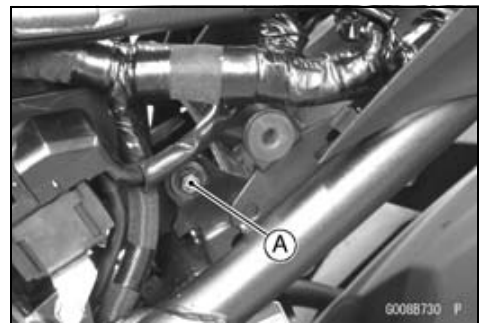
- Install the front fender to the front fork.
- Tighten:
 - Torque - Front Fender Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)**
- Run the brake hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Rear Fender Removal

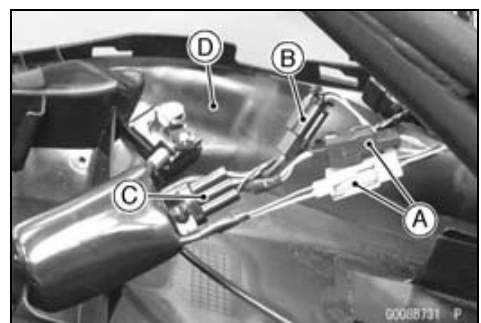
- Remove:
 - Seats (see Rear/Front Seat Removal)
 - Seat Cover (see Seat Cover Removal)
 - Side Cover (see Side Cover Removal)
 - Battery (see Battery Removal in the Electrical System chapter)
 - ECU (see ECU Removal in the Fuel System (DFI) chapter)
 - Regulator/Rectifier (see Regulator/Rectifier Inspection in the Electrical System chapter)
 - Bolts [A]
 - Nuts [B]



- Remove the bolt [A] on both sides.



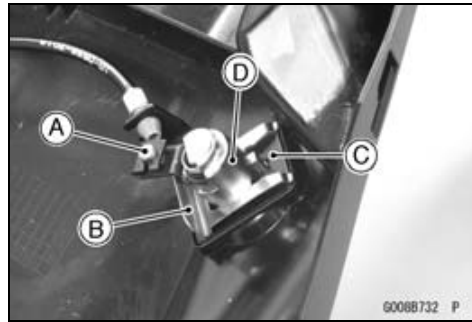
- Disconnect:
 - Left and Right Turn Signal Light Lead Connectors [A]
 - License Plate Light Lead Connector [B]
 - Tail/Brake Light Lead Connector [C]
- Pull out the rear fender [D].
- Remove the flap assembly (see Flap Removal).



15-20 FRAME

Fenders

- Remove the seat lock cable tip [A].
- Pull out the bracket [B].
- Remove:
 - Bracket [C]
 - Key Cylinder [D]

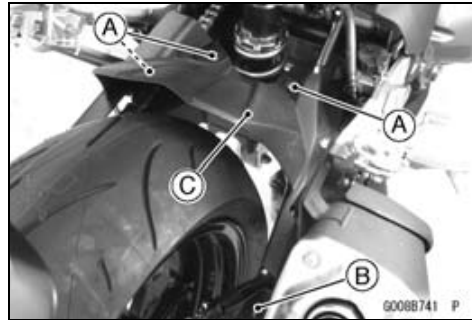


Rear Fender Installation

- Installation is the reverse of removal.
- Install the removed parts (see appropriate chapters).
- Run the cables, leads, harness and hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Rear Inner Fender Removal

- Remove:
 - Bolts [A]
 - Screw [B]
 - Brake Hose Banjo Bolt of Rear Caliper Side (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter)
- For ABS equipped models, remove the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Removal in the Brakes chapter).
- Remove the rear inner fender [C].

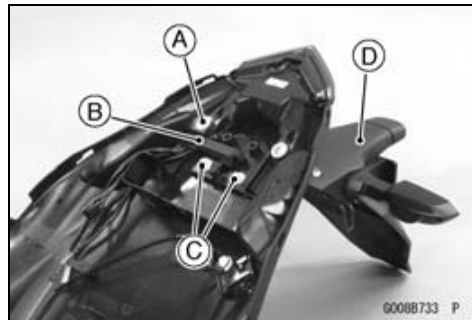


Rear Inner Fender Installation

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

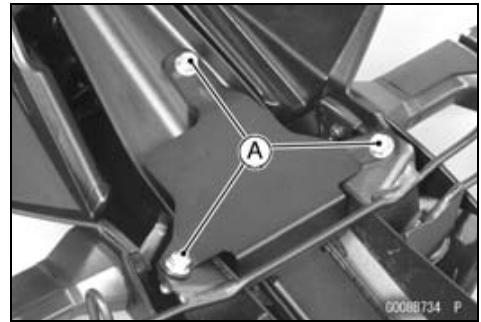
Flap Removal

- Remove:
 - Rear Fender (see Rear Fender Removal)
 - Screw [A] with Washer
 - Bracket [B]
 - Nuts [C]
 - Flap Assembly [D]

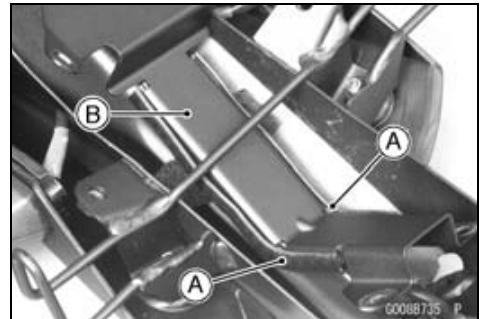


Fenders

- Remove the bolts [A].



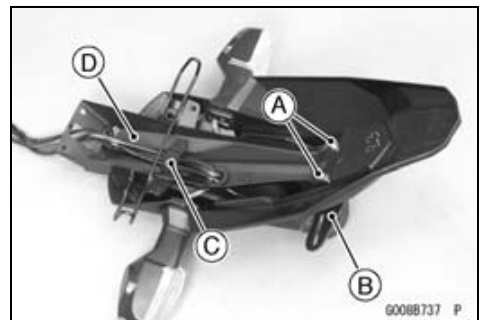
- Remove:
Trims [A]
Bracket [B]



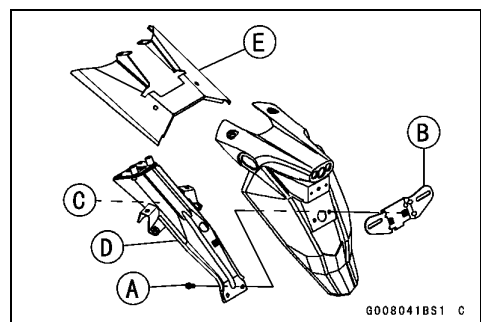
- Remove the bolts [A].



- Remove:
Bolts [A]
License Plate Bracket [B]
Pad [C]
Flap Bracket [D]



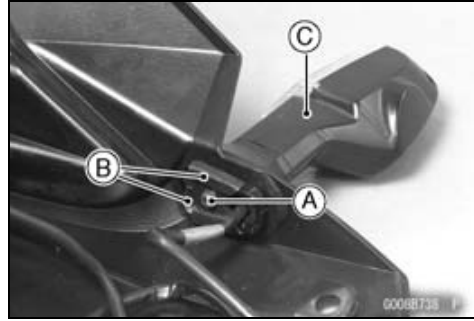
- Remove:
(For AU model)
Bolts [A]
License Plate Bracket [B]
Pad [C]
Flap Bracket [D]
Flap [E]



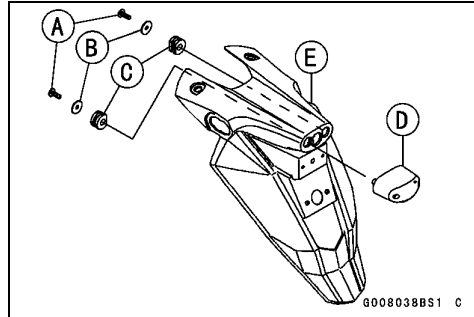
15-22 FRAME

Fenders

- Remove:
 - Screw [A]
 - Washers [B]
 - Rear Turn Signal Light Assembly [C]

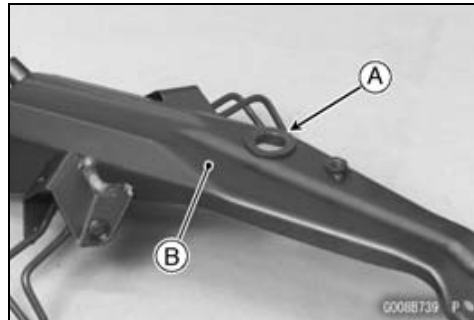


- Remove:
 - Screws [A]
 - Washers [B]
 - Dampers [C]
 - License Plate Light Assembly [D]
 - Flap [E]

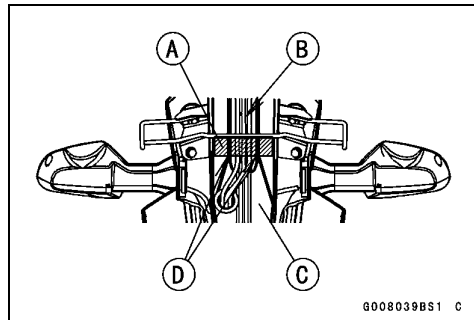


Flap Installation

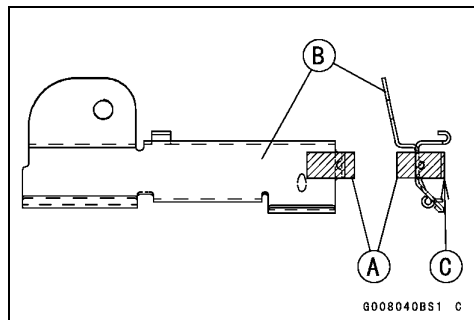
- Installation is the reverse of removal.
- Check that the grommet [A] is in place on the flap bracket [B].
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



- When installing the pad [A], position the leads [B] on the center of flap bracket [C] and align the edge of the pad with the these edge [D] of flap bracket.



- Check that the pad [A] is in place on the bracket [B].
- Align the edge of the pad with the edge [C] of bracket.



Frame

Frame Inspection

- Visually inspect the frame for cracks, dents, bending, or warp.
- If there is any damage to the frame, replace it.

 WARNING
--

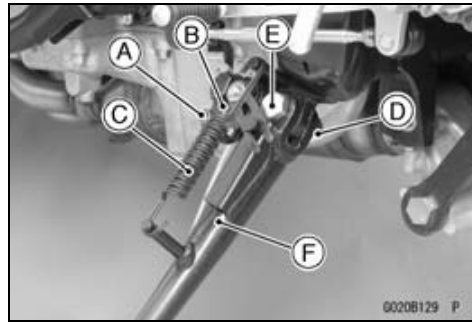
A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

15-24 FRAME

Side Stand

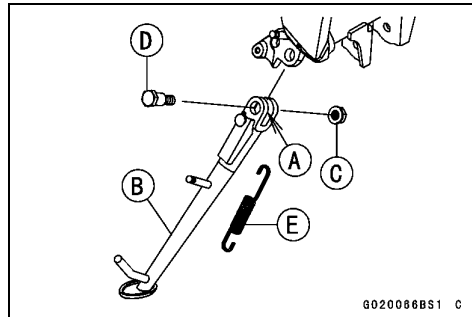
Side Stand Removal

- Raise the rear wheel off the ground with the stand.
- Remove:
 - Side Stand Switch Bolt [A]
 - Side Stand Switch [B]
 - Spring [C]
 - Side Stand Nut [D]
 - Side Stand Bolt [E]
 - Side Stand [F]



Side Stand Installation

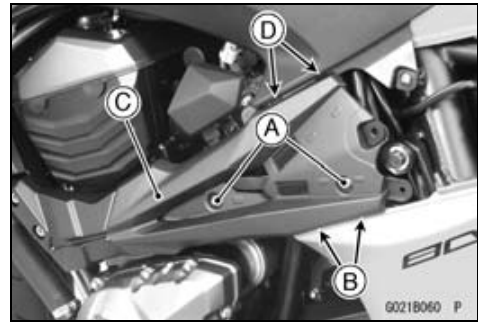
- Apply grease to the sliding area [A] of the side stand [B].
 - Replace the side stand nut [C] with a new one.
 - Tighten the side stand bolt [D] first, and then the side stand nut.
- Torque - Side Stand Bolt: 29 N·m (3.0 kgf·m, 21 ft·lb)**
Side Stand Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)
- Hook the spring [E] so that the long spring end faces upward.
 - Install the spring hook direction as shown.
 - Install the side stand switch.
 - Apply a non-permanent locking agent to the thread of the side stand switch bolt, and tighten it.
- Torque - Side Stand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)**



Frame Cover

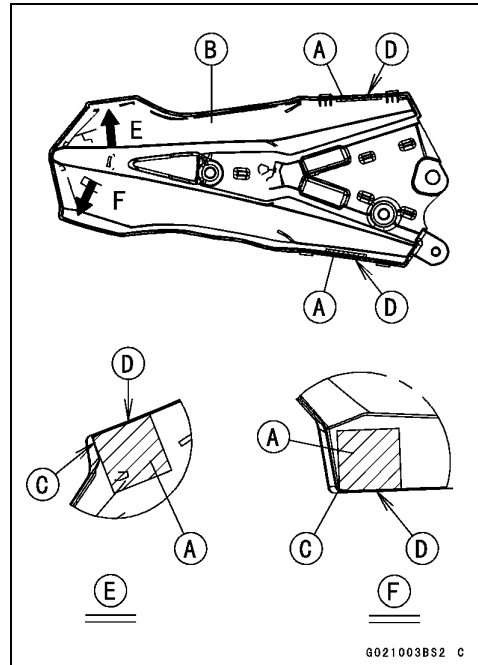
Subframe Cover Removal

- Remove:
 - Side Cover (see Side Cover Removal)
 - Bolts [A] with Washers
- Clear the tabs [B] on the subframe cover [C] by pulling up the lower part of the subframe cover.
- Clear the tabs [D] on the subframe cover and remove the subframe cover.

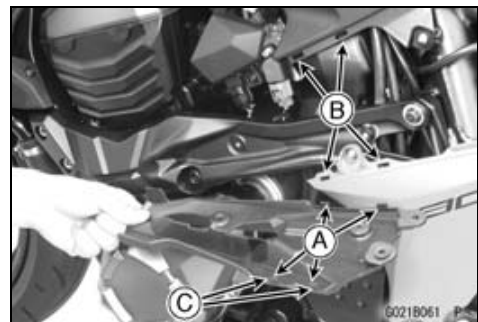


Subframe Cover Installation

- Check that the pads [A] are in place on the subframe cover [B].
- Align the edge of the pad with the line [C] and edge [D] of the subframe cover.
 - View from E [E]
 - View from F [F]



- Insert the tabs [A] into the slots [B].
- Insert the tabs [C] first, then insert the remainder sequentially.
- Tighten the bolts with washers.
- Install the removed parts (see appropriate chapters).

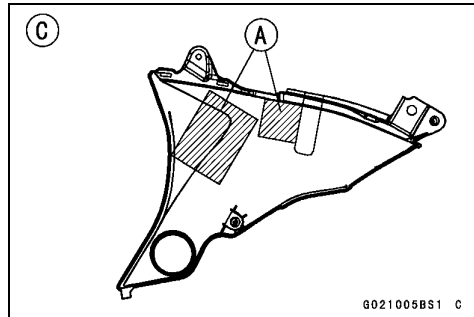
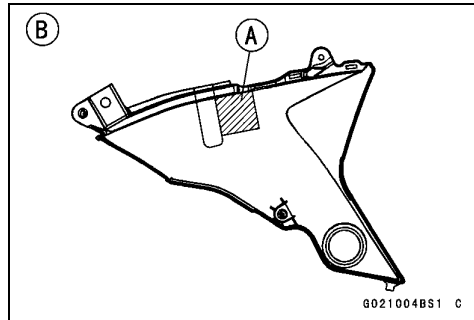


15-26 FRAME

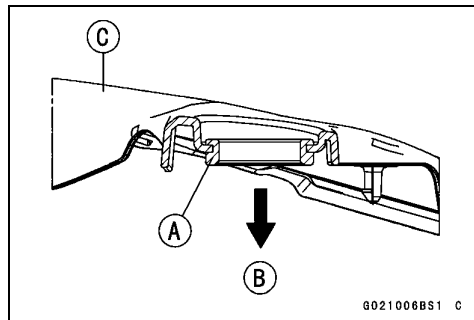
Frame Cover

Frame Cover Removal

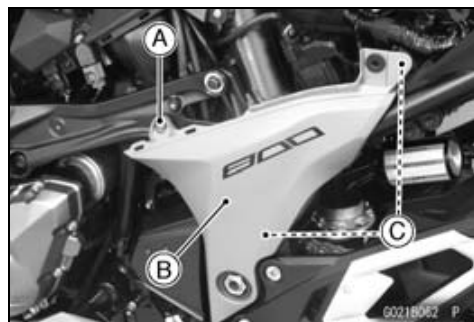
- Check that the pads [A] are in place on the frame cover.
 - Left Frame Cover [B]
 - Right Frame Cover [C]



- When installing the grommet [A], face the thick side toward the inside [B] of the left frame cover [C].

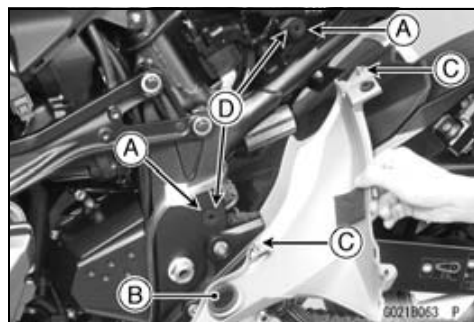


- Remove:
 - Subframe Cover (see Subframe Cover Removal)
 - Bolt [A]
- Pull out the frame cover [B], and clear the projections [C].



Frame Cover Installation

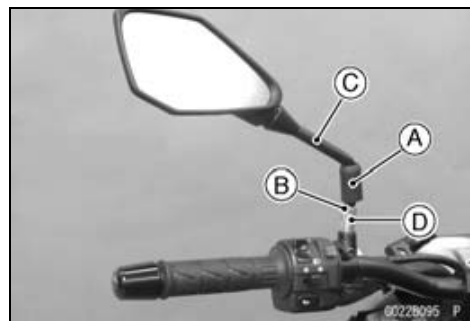
- Check that the grommets [A] and damper [B] are in place.
- Insert the projections [C] into the holes [D].
- Tighten the bolts.
- Install the removed parts (see appropriate chapters).



Rear View Mirrors

Rear View Mirror Removal

- Slide the dust cover [A].
- Loosen the rear view mirror locknut (upper) [B], and remove the rear view mirror stay [C] from the rear view mirror nut (lower) [D].
- The rear view mirror locknut (upper) and rear view mirror stay are left-hand thread.
- Loosen the rear view mirror nut (lower), and remove it.



Rear View Mirror Installation

- Tighten the rear view mirror nut (lower) [A].
- Torque - Rear View Mirror Nut (Lower): 30 N·m (3.1 kgf·m, 22 ft·lb)**
- Apply grease to the threads of the rear view mirror stay [B].

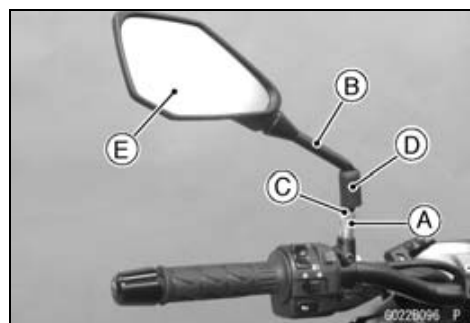
NOTE

○ *The threads of the new rear view mirror stay applied with a grease.*

- Tighten the rear view mirror stay until the fully position.
- Adjust the rear view mirror stay to assure the safe conditions of the rear with the rider sitting on the motorcycle.
- The rear view mirror locknut (upper) [C] and rear view mirror stay are left-hand thread.
- Tighten the rear view mirror locknut (upper).

Torque - Rear View Mirror Locknut (Upper): 18 N·m (1.8 kgf·m, 13 ft·lb)

- Install the dust cover [D].
- Adjust the rear view mirror [E] by slightly moving only the mirror portion of the assembly.
- 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

Table of Contents

Exploded View	16-3
Specifications	16-10
Special Tools and Sealant	16-11
Parts Location.....	16-13
Wiring Diagram (ZR800A without GPS Unit).....	16-16
Wiring Diagram (ZR800A with GPS Unit).....	16-18
Wiring Diagram (ZR800B without GPS Unit).....	16-20
Wiring Diagram (ZR800B with GPS Unit).....	16-22
Wiring Diagram (ZR800C).....	16-24
Wiring Diagram (ZR800D).....	16-26
Precautions.....	16-28
Electrical Wiring.....	16-29
Wiring Inspection	16-29
Battery	16-30
Battery Removal	16-30
Battery Installation	16-30
Battery Activation	16-31
Precautions	16-34
Interchange	16-34
Charging Condition Inspection.....	16-34
Refreshing Charge.....	16-35
Charging System	16-36
Alternator Cover Removal.....	16-36
Alternator Cover Installation.....	16-36
Stator Coil Removal	16-37
Stator Coil Installation.....	16-37
Alternator Rotor Removal	16-37
Alternator Rotor Installation	16-38
Charging Voltage Inspection	16-40
Alternator Inspection	16-40
Regulator/Rectifier Inspection.....	16-42
Ignition System	16-44
Crankshaft Sensor Removal	16-44
Crankshaft Sensor Installation.....	16-45
Crankshaft Sensor Inspection.....	16-45
Crankshaft Sensor Peak Voltage Inspection.....	16-46
Timing Rotor Removal	16-46
Timing Rotor Installation	16-46
Stick Coil Removal.....	16-47
Stick Coil Installation.....	16-47
Stick Coil Inspection.....	16-48
Stick Coil Primary Peak Voltage	16-48
Spark Plug Removal	16-49
Spark Plug Installation	16-49
Spark Plug Condition Inspection.....	16-49
Interlock Operation Inspection	16-49
IC Igniter Inspection.....	16-50
Electric Starter System.....	16-53
Starter Motor Removal.....	16-53
Starter Motor Installation.....	16-53

16-2 ELECTRICAL SYSTEM

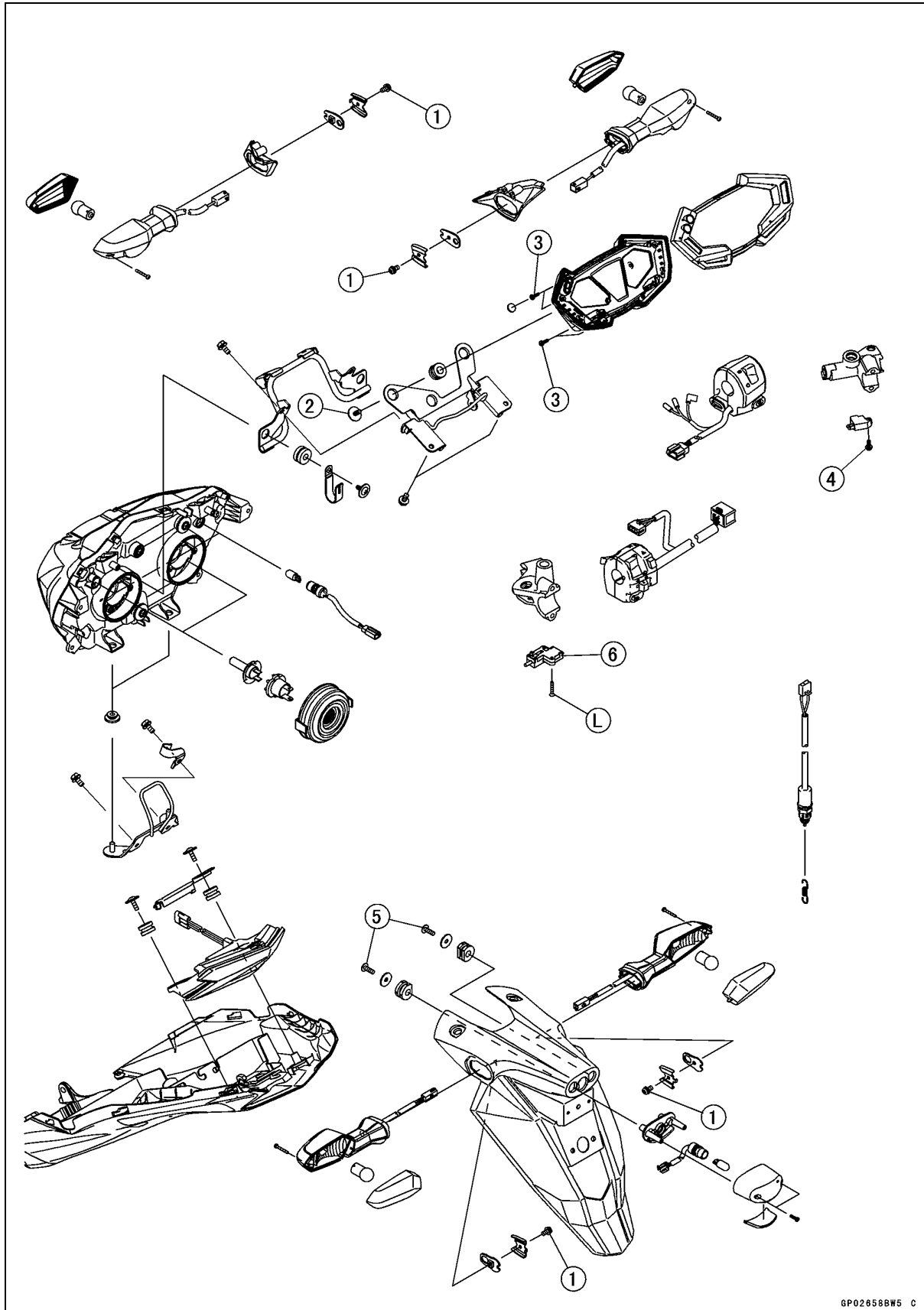
Starter Motor Disassembly.....	16-53
Starter Motor Assembly.....	16-54
Brush Inspection.....	16-55
Commutator Cleaning and Inspection.....	16-55
Armature Inspection.....	16-56
Brush Lead Inspection.....	16-56
Brush Plate and Terminal Bolt Inspection.....	16-56
Starter Relay Inspection.....	16-57
Lighting System.....	16-59
Headlight Beam Horizontal Adjustment.....	16-59
Headlight Beam Vertical Adjustment.....	16-59
Headlight Bulb Replacement.....	16-59
Headlight Removal/Installation.....	16-60
City Light Bulb Replacement.....	16-60
Tail/Brake Light (LED) Removal.....	16-61
Tail/Brake Light (LED) Installation.....	16-61
License Plate Light Bulb Replacement.....	16-61
Turn Signal Light Bulb Replacement.....	16-63
Turn Signal Relay Inspection.....	16-63
Air Switching Valve.....	16-66
Air Switching Valve Operation Test.....	16-66
Air Switching Valve Unit Test.....	16-66
Radiator Fan System.....	16-68
Fan Motor Inspection.....	16-68
Meter, Gauge, Indicator Unit.....	16-70
Meter Unit Removal/Installation.....	16-70
Meter Unit Disassembly.....	16-70
Meter Unit Assembly.....	16-70
Electronic Combination Meter Unit Inspection.....	16-71
Fuel Level Sensor Line Self-Diagnosis Mode Inspection.....	16-82
Immobilizer System.....	16-84
Operational Cautions.....	16-84
Key Registration.....	16-84
Immobilizer System Parts Replacement.....	16-102
Immobilizer System Inspection.....	16-105
Switches and Sensors.....	16-107
Brake Light Timing Inspection.....	16-107
Brake Light Timing Adjustment.....	16-107
Switch Inspection.....	16-107
Water Temperature Sensor Inspection.....	16-108
Speed Sensor Removal.....	16-108
Speed Sensor Installation.....	16-108
Speed Sensor Inspection.....	16-108
Oxygen Sensor Removal.....	16-109
Oxygen Sensor Installation.....	16-109
Oxygen Sensor Inspection.....	16-109
Fuel Level Sensor Inspection.....	16-110
Relay Box.....	16-111
Relay Box Removal.....	16-111
Relay Circuit Inspection.....	16-111
Diode Circuit Inspection.....	16-112
Fuse.....	16-114
30 A Main/15 A ECU Fuse Removal.....	16-114
Fuse Box Fuse Removal.....	16-114
Fuse Installation.....	16-114
Fuse Inspection.....	16-115

Exploded View

This page intentionally left blank.

16-4 ELECTRICAL SYSTEM

Exploded View



GP02658BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	
2	Meter Mounting Screws	1.2	0.12	11 in·lb	
3	Meter Assembly Screws	0.43	0.044	3.8 in·lb	
4	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
5	License Plate Light Mounting Screws	1.2	0.12	11 in·lb	

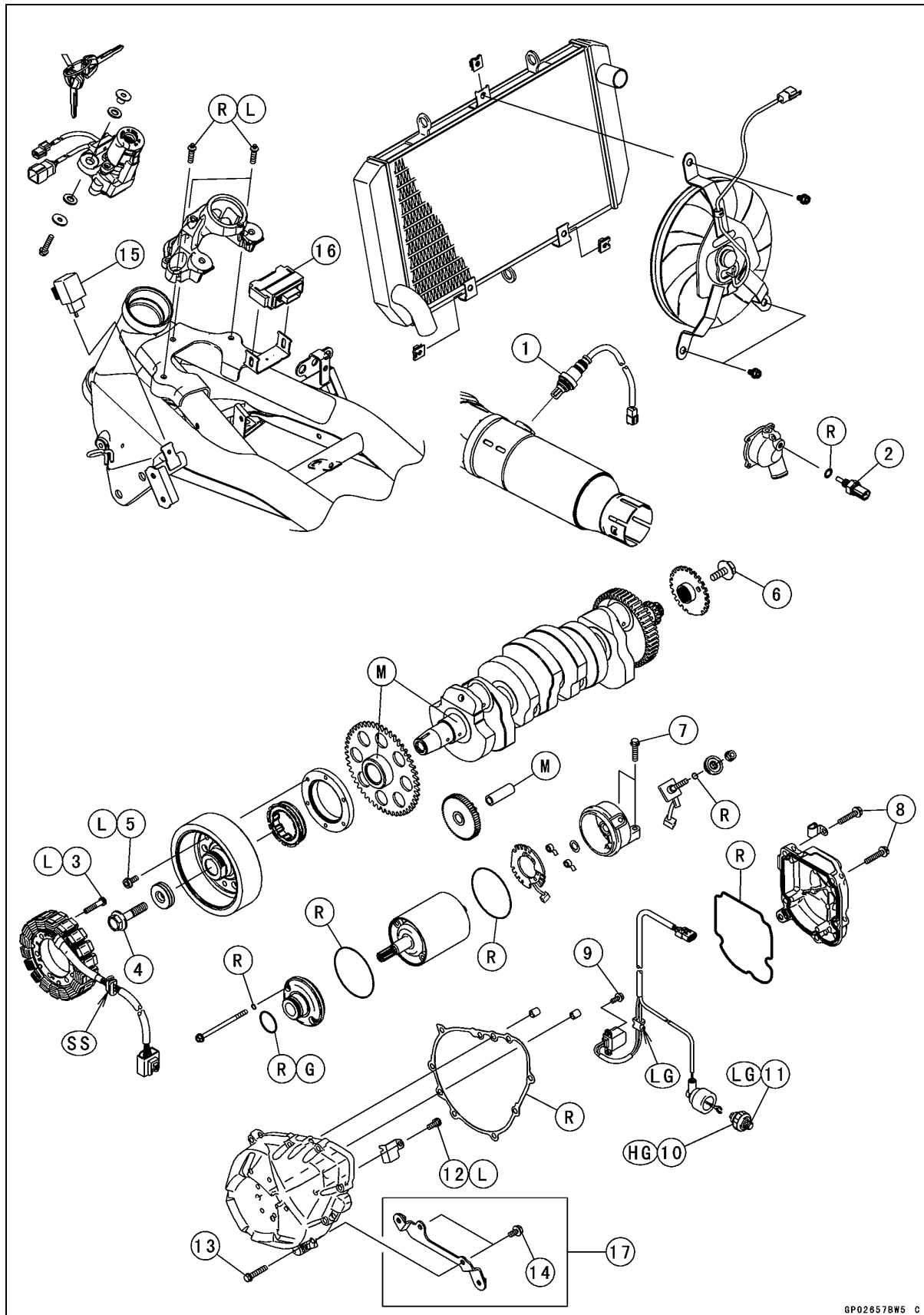
6. Starter Lockout Switch

L: Apply a non-permanent locking agent.

R: Replacement Parts

16-6 ELECTRICAL SYSTEM

Exploded View



GP02657BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oxygen Sensor	44	4.5	32	
2	Water Temperature Sensor	12	1.2	106 in·lb	
3	Stator Coil Bolts	12	1.2	106 in·lb	L
4	Alternator Rotor Bolt	155	15.8	114	
5	Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
6	Timing Rotor Bolt	39	4.0	29	
7	Starter Motor Mounting Bolts	11	1.1	97 in·lb	
8	Crankshaft Sensor Cover Bolts	11	1.1	97 in·lb	
9	Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	
10	Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	HG
11	Oil Pressure Switch	15	1.5	11	LG
12	Alternator Lead Holding Plate Bolt	12	1.2	106 in·lb	L
13	Alternator Cover Bolts	15	1.5	11	
14	Left Lower Fairing Bracket Bolts	11	1.1	97 in·lb	

- 15. Turn Signal Relay
- 16. Immobilizer Amplifier
- 17. ZR800A/B Models

G: Apply grease.

HG: Apply high-temperature grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket.

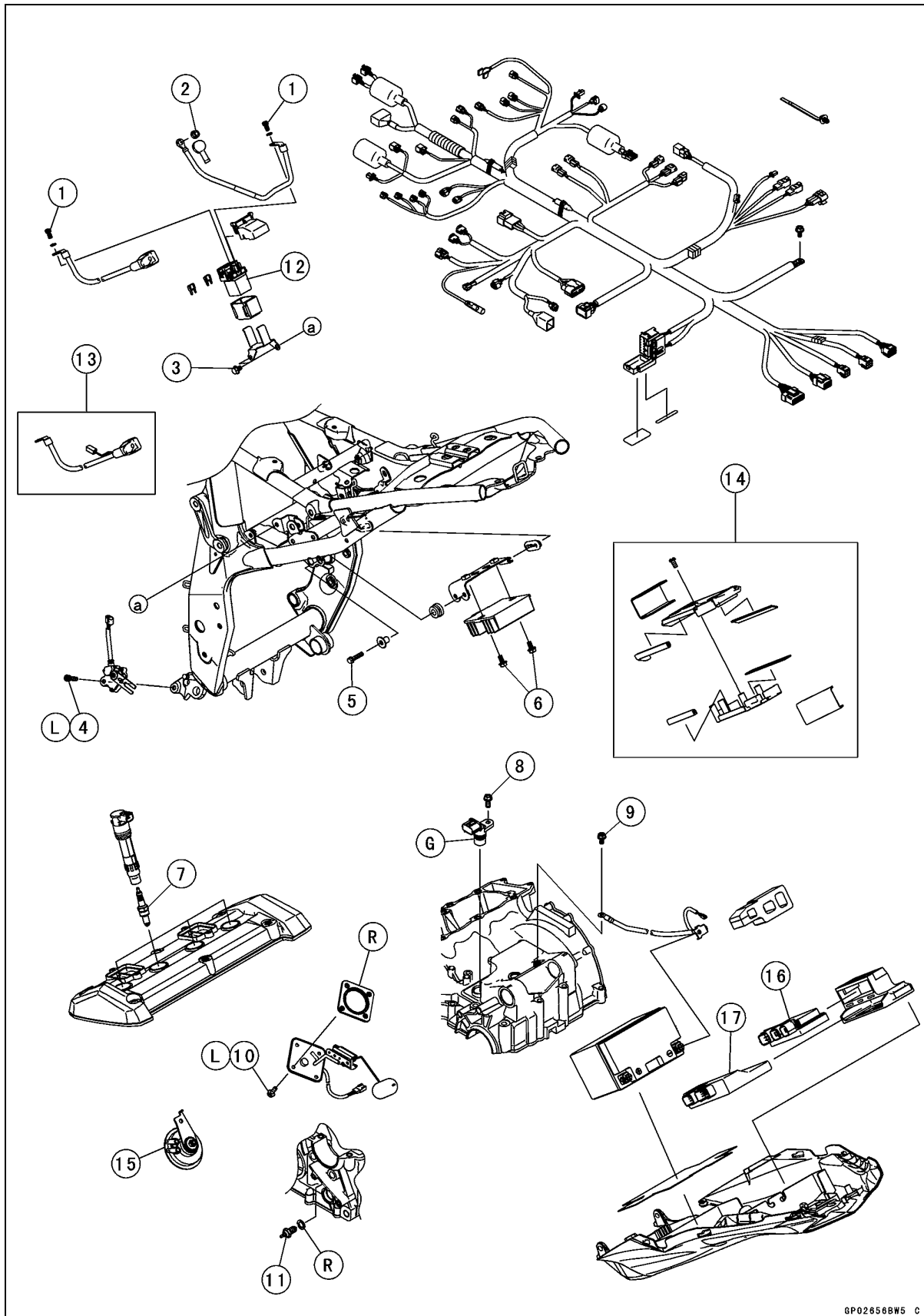
M: Apply molybdenum disulfide grease.

R: Replacement Parts

SS: Apply silicone sealant.

16-8 ELECTRICAL SYSTEM

Exploded View



GP02656BWS C

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Starter Relay Cable Terminal Bolts	3.9	0.40	35 in·lb	
2	Starter Motor Cable Terminal Nut	4.9	0.50	43 in·lb	
3	Starter Relay Bracket Bolts	6.9	0.70	61 in·lb	
4	Side Stand Switch Bolt	8.8	0.90	78 in·lb	L
5	Regulator/Rectifier Bracket Bolts	6.9	0.70	61 in·lb	
6	Regulator/Rectifier Bolts	6.9	0.70	61 in·lb	
7	Spark Plugs	13	1.3	115 in·lb	
8	Speed Sensor Bolt	12	1.2	106 in·lb	
9	Engine Ground Cable Terminal Bolt	9.8	1.0	87 in·lb	
10	Fuel Level Sensor Bolts	6.9	0.70	61 in·lb	L
11	Neutral Switch	15	1.5	11	

12. Starter Relay

13. ABS Equipped Model

14. ZR800A/B Models: WVTA (78.2) and UK WVTA (FULL) Models
 ZR800C/D Models: WVTA (FULL) Model with Guard

15. Horn

16. Relay Box

17. ECU

G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

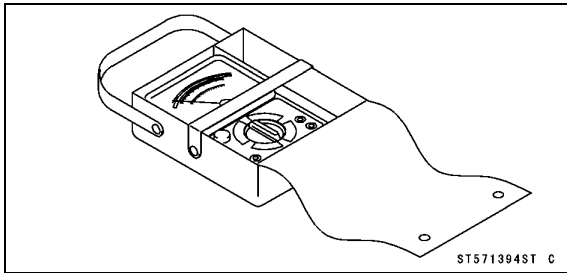
16-10 ELECTRICAL SYSTEM

Specifications

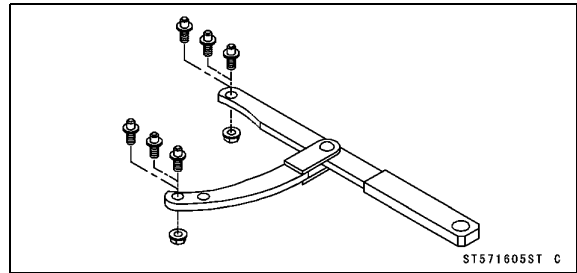
Item	Standard
Battery	
Type	Sealed Battery
Model Name	FTX9-BS
Capacity	12 V 8 Ah
Voltage	12.6 V or more
Gross Weight	3.0 kg (6.6 lb)
Electrolyte Volume	0.41 L (25 cu in.)
Charging System	
Type	Three-phase AC
Alternator Output Voltage	39 V or more at 4 000 r/min (rpm)
Stator Coil Resistance	0.05 ~ 0.6 Ω at 20°C (68°F)
Charging Voltage (Regulator/Rectifier Output Voltage)	14.2 ~ 14.8 V
Ignition System	
Crankshaft Sensor Resistance	376 ~ 564 Ω
Crankshaft Sensor Peak Voltage	2.0 V or more
Stick Coil:	
Primary Winding Resistance	1.1 ~ 1.5 Ω
Secondary Winding Resistance	6.4 ~ 9.6 k Ω
Primary Peak Voltage	100 V or more
Spark Plug:	
Type	NGK CR9EK or ND U27ETR
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Electric Starter System	
Starter Motor:	
Brush Length	12 mm (0.47 in.) [Service limit: 10 mm (0.39 in.)]
Commutator Diameter	28 mm (1.10 in.) [Service limit: 27 mm (1.06 in.)]
Air Switching Valve	
Resistance	18 ~ 22 Ω at 20°C (68°F)
Switches and Sensors	
Rear Brake Light Switch Timing	ON after about 10 mm (0.39 in.) pedal travel
Engine Oil Pressure Switch Connections	When engine is stopped: ON When engine is running: OFF
Water Temperature Sensor Resistance	in the text
Fuel Level Sensor Resistance:	
Full Position	9 ~ 11 Ω
Empty Position	213 ~ 219 Ω

Special Tools and Sealant

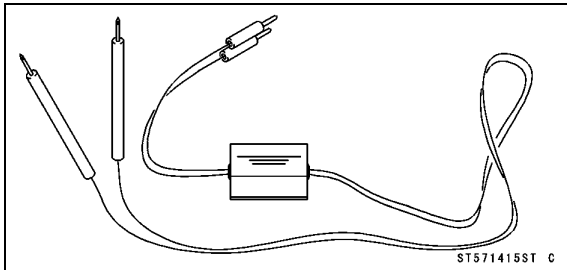
Hand Tester:
57001-1394



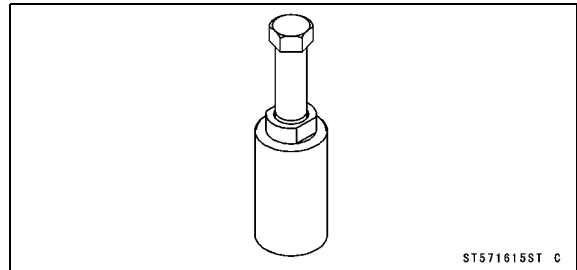
Flywheel & Pulley Holder:
57001-1605



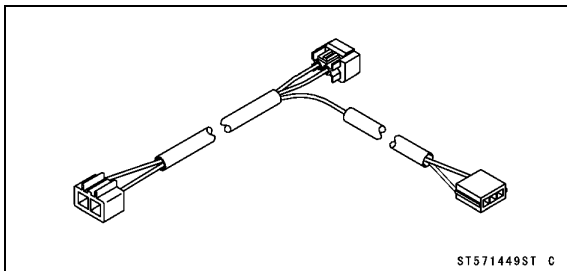
Peak Voltage Adapter:
57001-1415



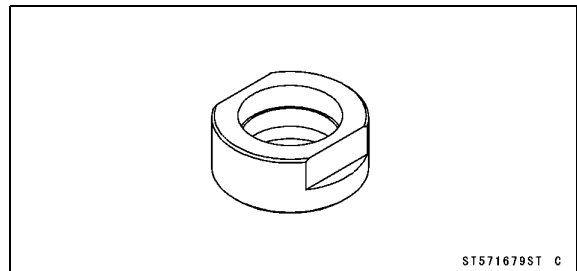
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1615



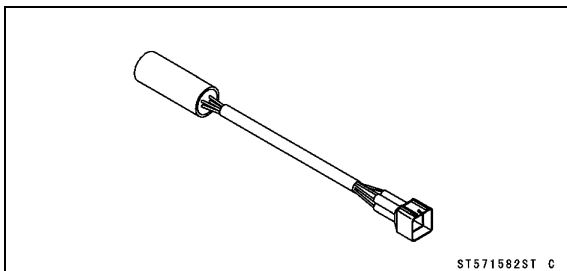
Lead Wire - Peak Voltage Adapter:
57001-1449



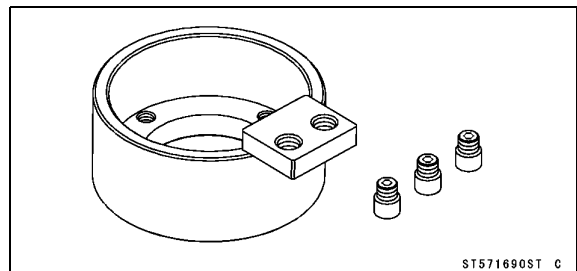
Stopper:
57001-1679



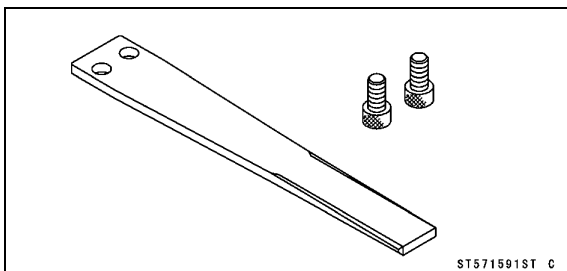
Key Registration Unit:
57001-1582



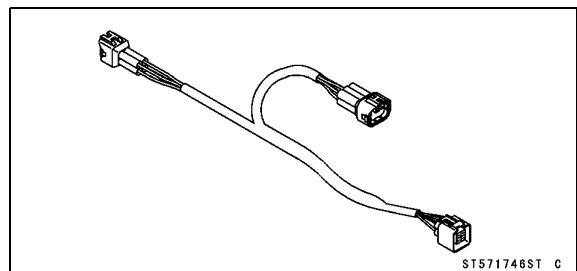
Rotor Holder:
57001-1690



Grip:
57001-1591



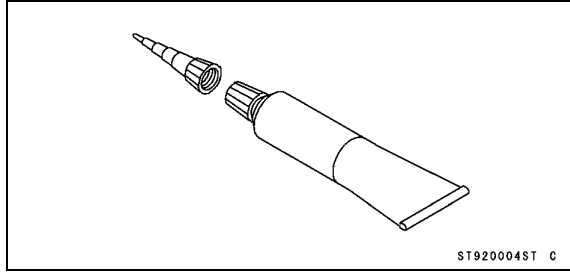
Key Registration Adapter:
57001-1746



16-12 ELECTRICAL SYSTEM

Special Tools and Sealant

Liquid Gasket, TB1211F:
92104-0004

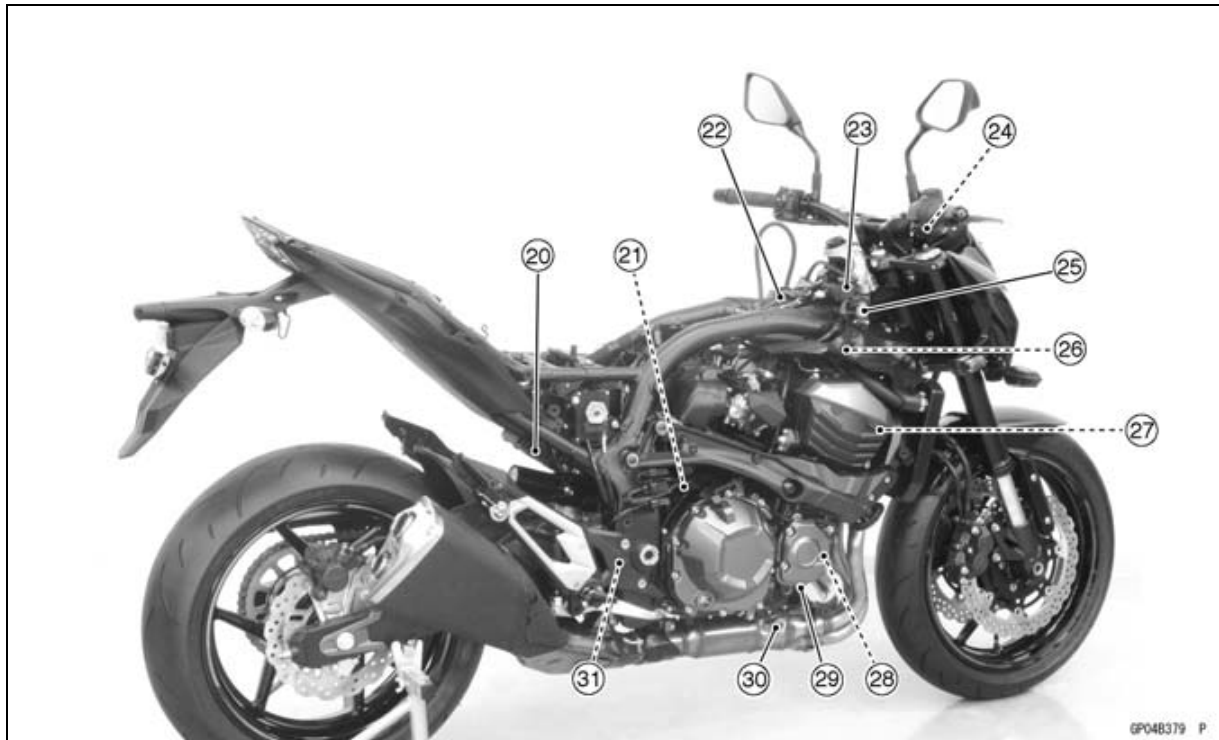
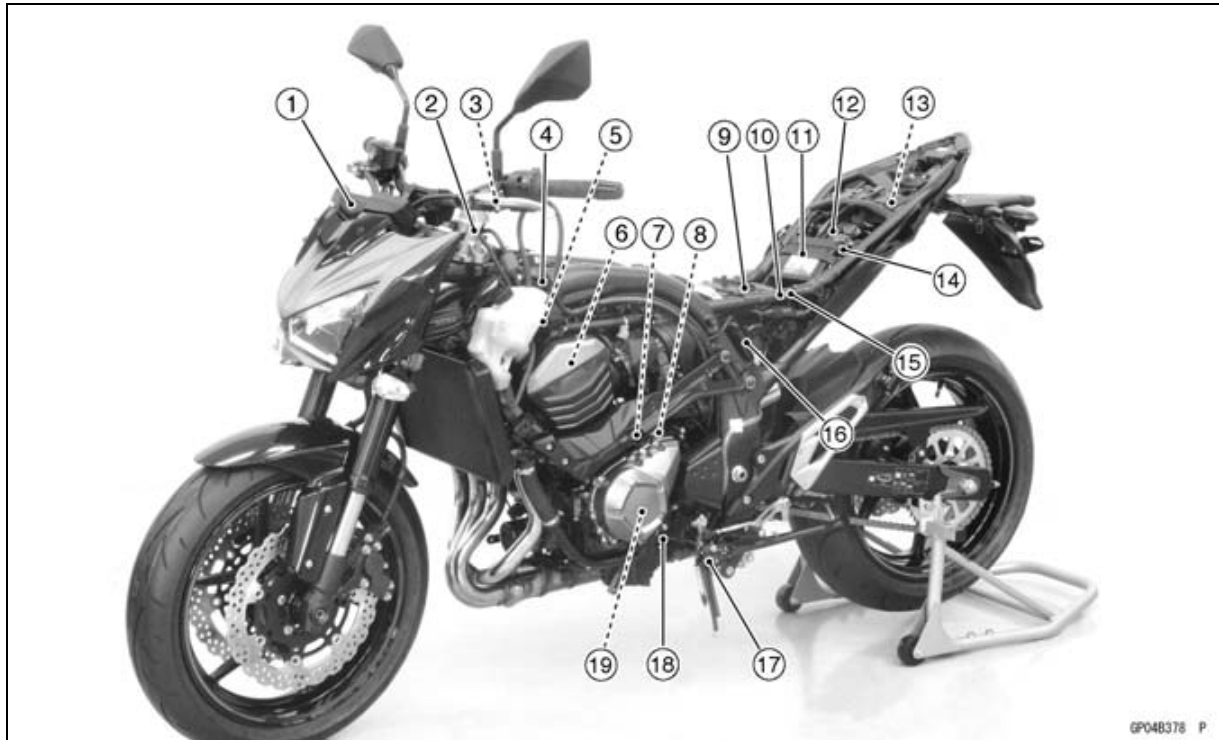


Parts Location

This page intentionally left blank.

16-14 ELECTRICAL SYSTEM

Parts Location

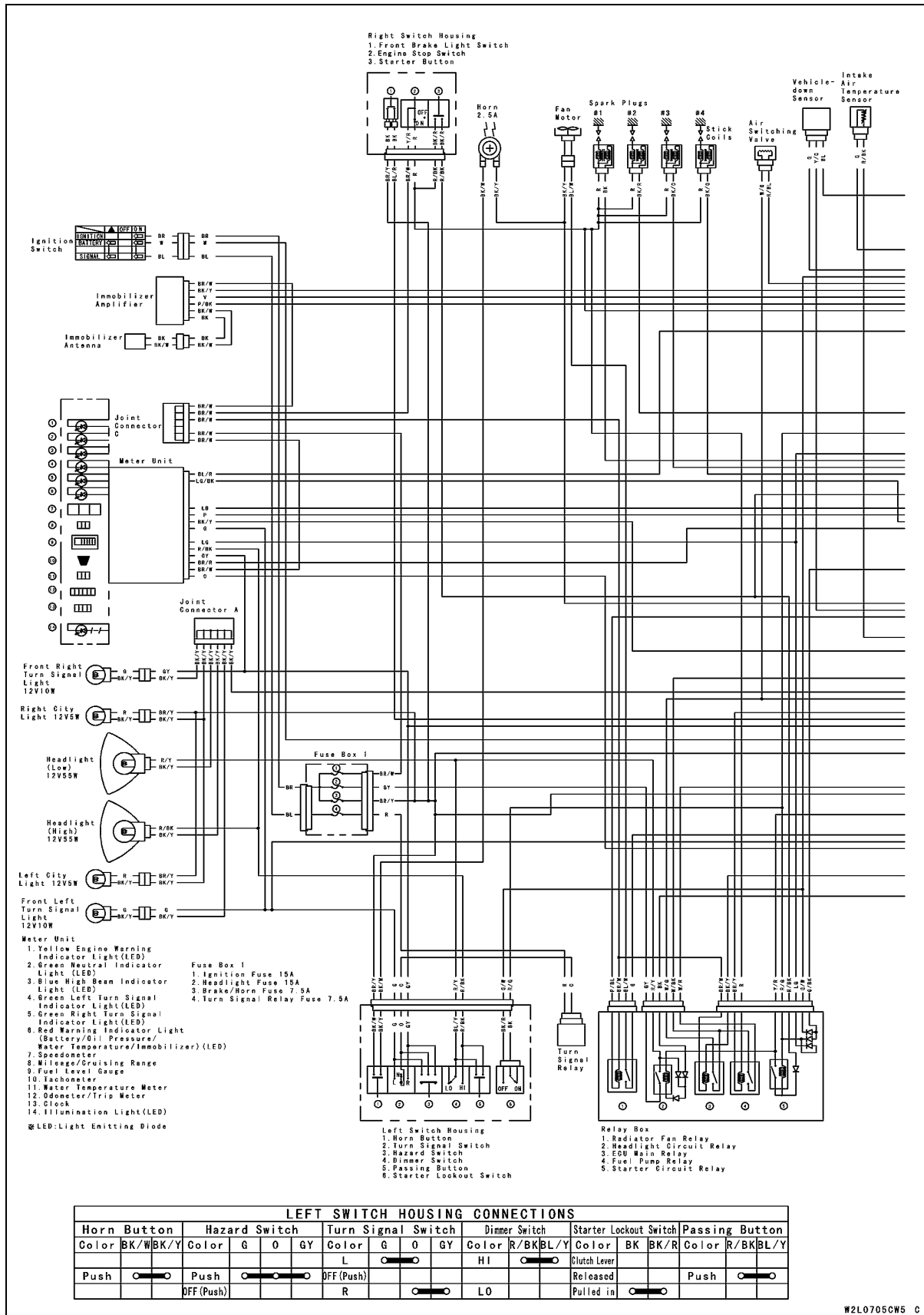


Parts Location

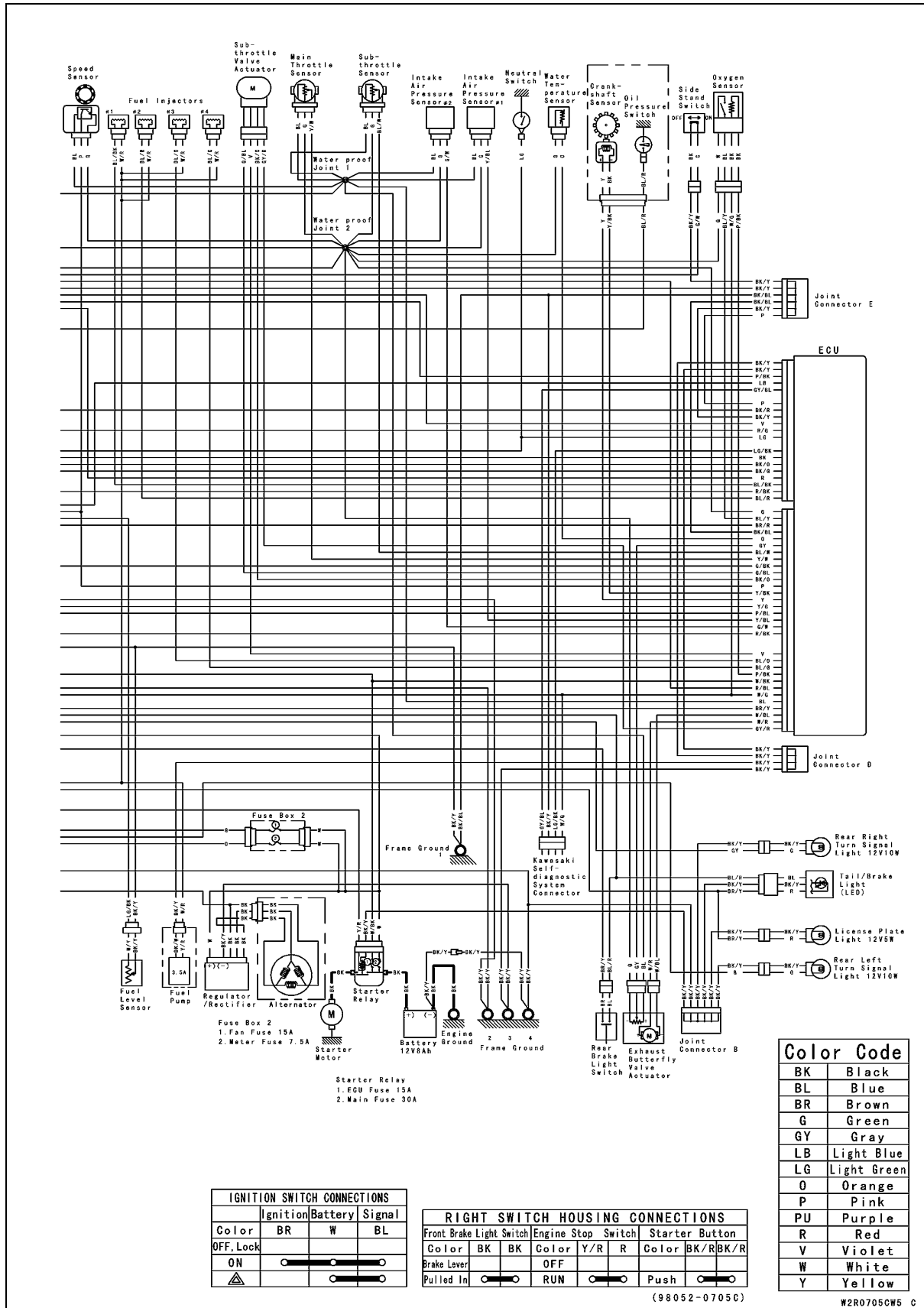
1. Meter Unit
2. Ignition Switch
3. Starter Lockout Switch
4. Turn Signal Relay
5. Stick Coils
6. Spark Plugs
7. Starter Motor
8. Speed Sensor
9. Frame Ground
10. Fuse Box 2
11. Battery 12 V 8 Ah
12. Relay Box
13. Immobilizer/Kawasaki Diagnostic System Connector
14. ECU
15. Fuse Box 1
16. Starter Relay
17. Side Stand Switch
18. Neutral Switch
19. Alternator
20. Regulator/Rectifier
21. Engine Ground
22. Water Temperature Sensor
23. Immobilizer Amplifier
24. Front Brake Light Switch
25. Vehicle-down Sensor
26. Air Switching Valve
27. Radiator Fan Motor
28. Crankshaft Sensor
29. Oil Pressure Switch
30. Oxygen Sensor
31. Rear Brake Light Switch

16-16 ELECTRICAL SYSTEM

Wiring Diagram (ZR800A without GPS Unit)

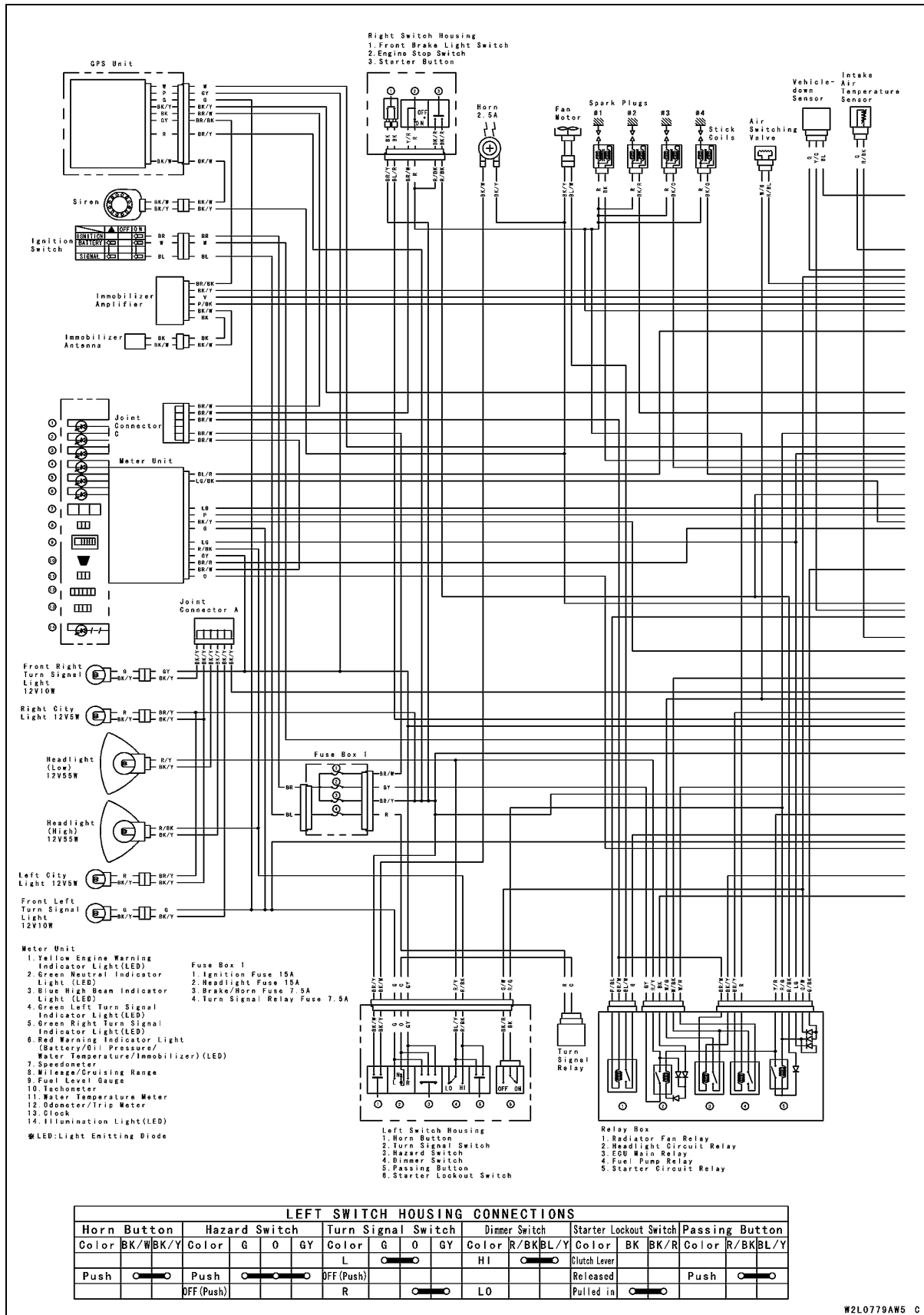


Wiring Diagram (ZR800A without GPS Unit)



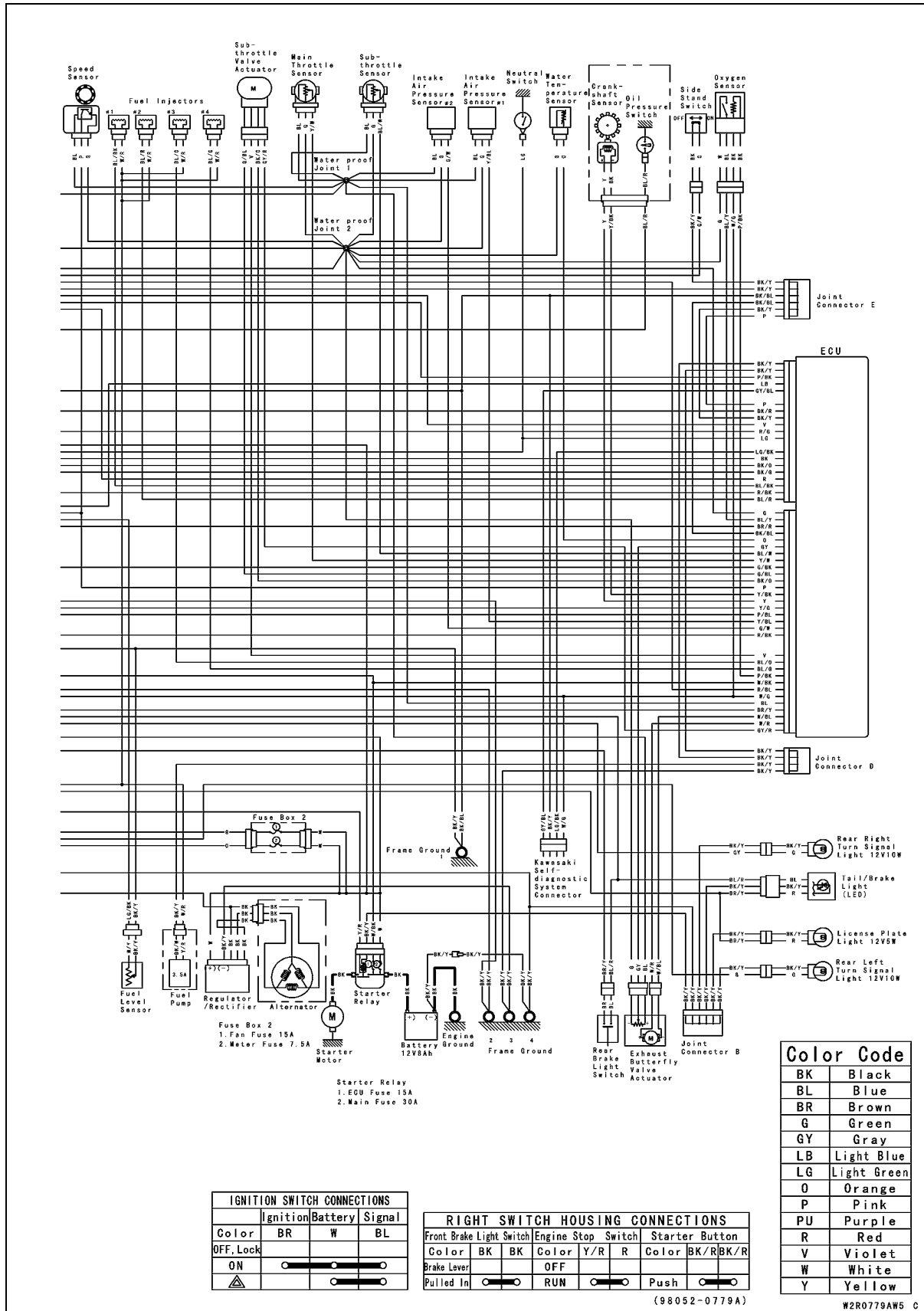
16-18 ELECTRICAL SYSTEM

Wiring Diagram (ZR800A with GPS Unit)



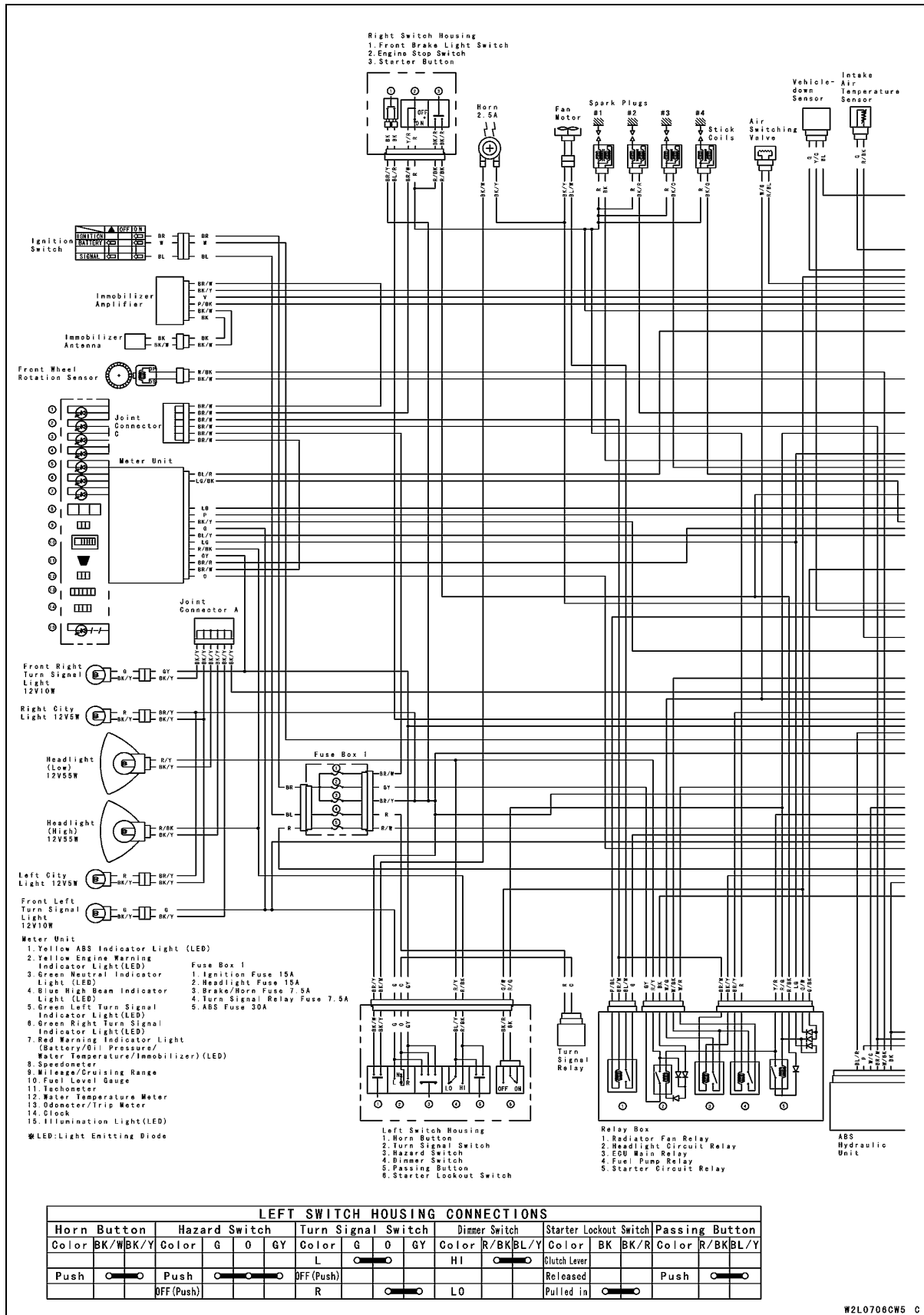
LEFT SWITCH HOUSING CONNECTIONS						
Horn Button	Hazard Switch		Turn Signal Switch		Dimmer Switch	Starter Lockout Switch
Color BK/WBK/Y	Color G	O	GY	Color G	O	GY
Push	Push	OFF (Push)	L	HI	Clutch Lever	Released
	OFF (Push)		R	LO	Pulled in	Push

Wiring Diagram (ZR800A with GPS Unit)

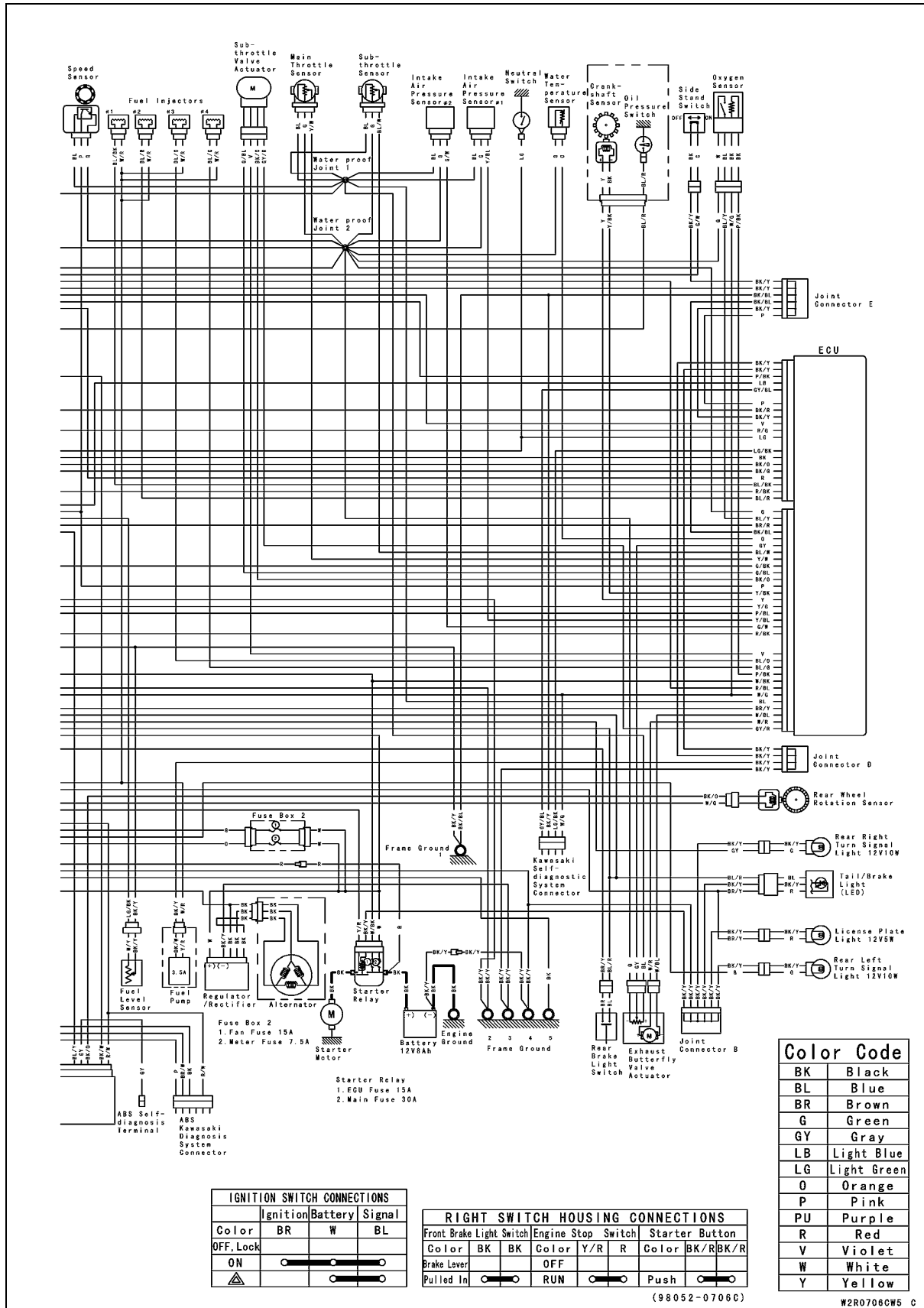


16-20 ELECTRICAL SYSTEM

Wiring Diagram (ZR800B without GPS Unit)



Wiring Diagram (ZR800B without GPS Unit)



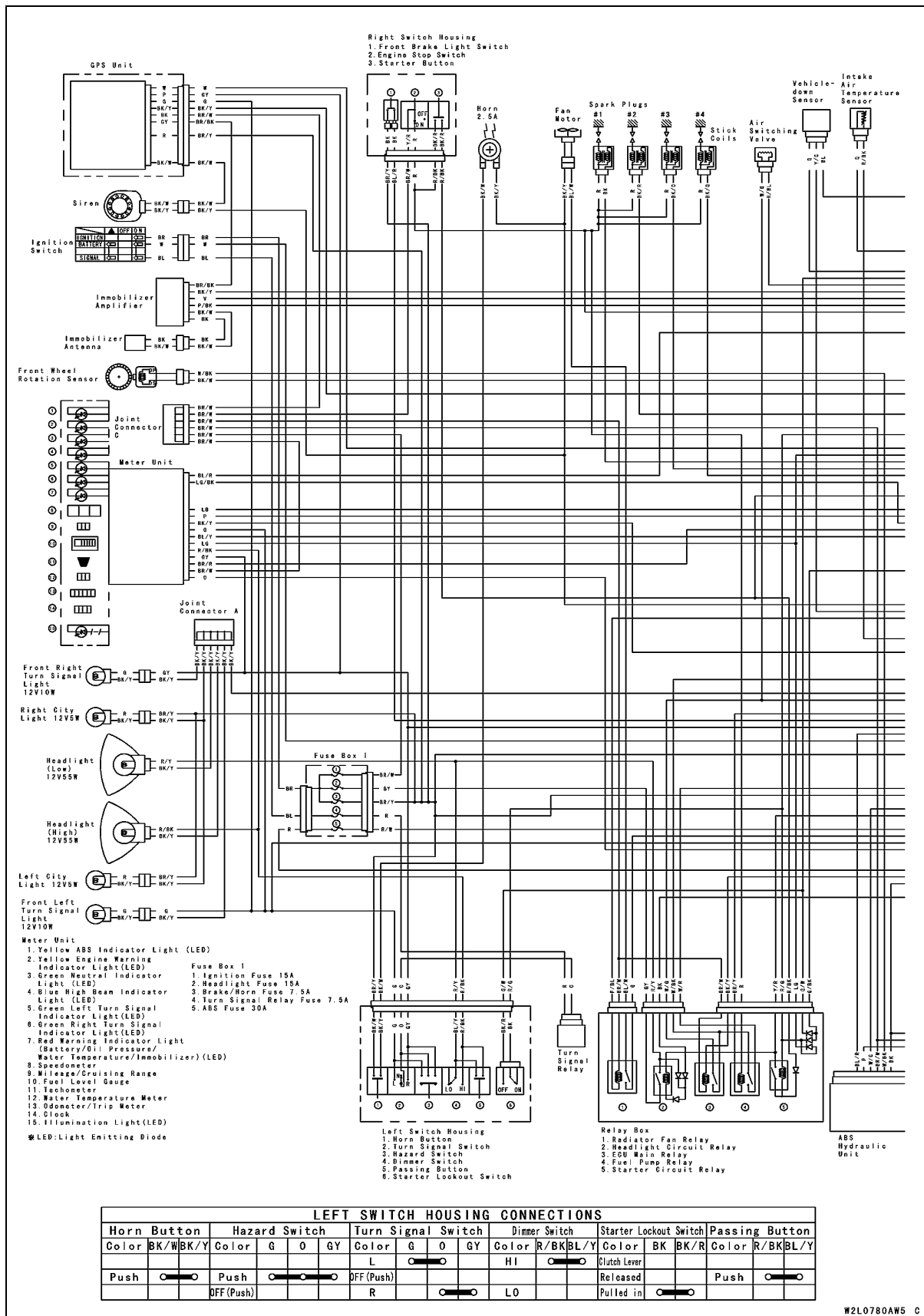
IGNITION SWITCH CONNECTIONS			
	Ignition	Battery	Signal
Color	BR	W	BL
OFF, Lock	○	○	○
ON	○	○	○
	○	○	○

RIGHT SWITCH HOUSING CONNECTIONS							
Front Brake Light Switch	Engine Stop Switch	Starter Button					
Color	BK	BK	Color	Y/R	R	Color	BK/RBK/R
Brake Lever	○	○	OFF	○	○	Push	○
Pulled In	○	○	RUN	○	○		○

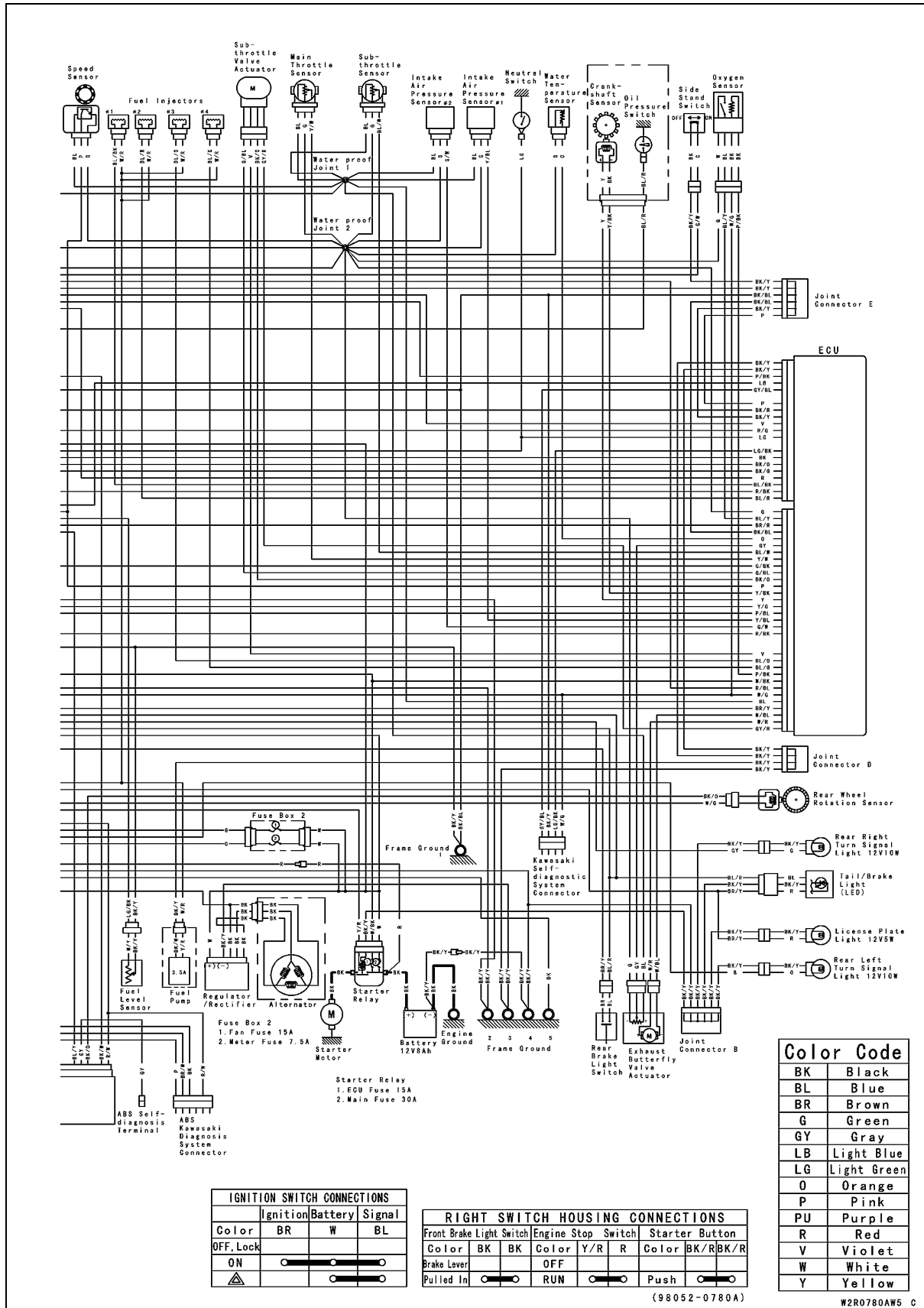
Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

16-22 ELECTRICAL SYSTEM

Wiring Diagram (ZR800B with GPS Unit)

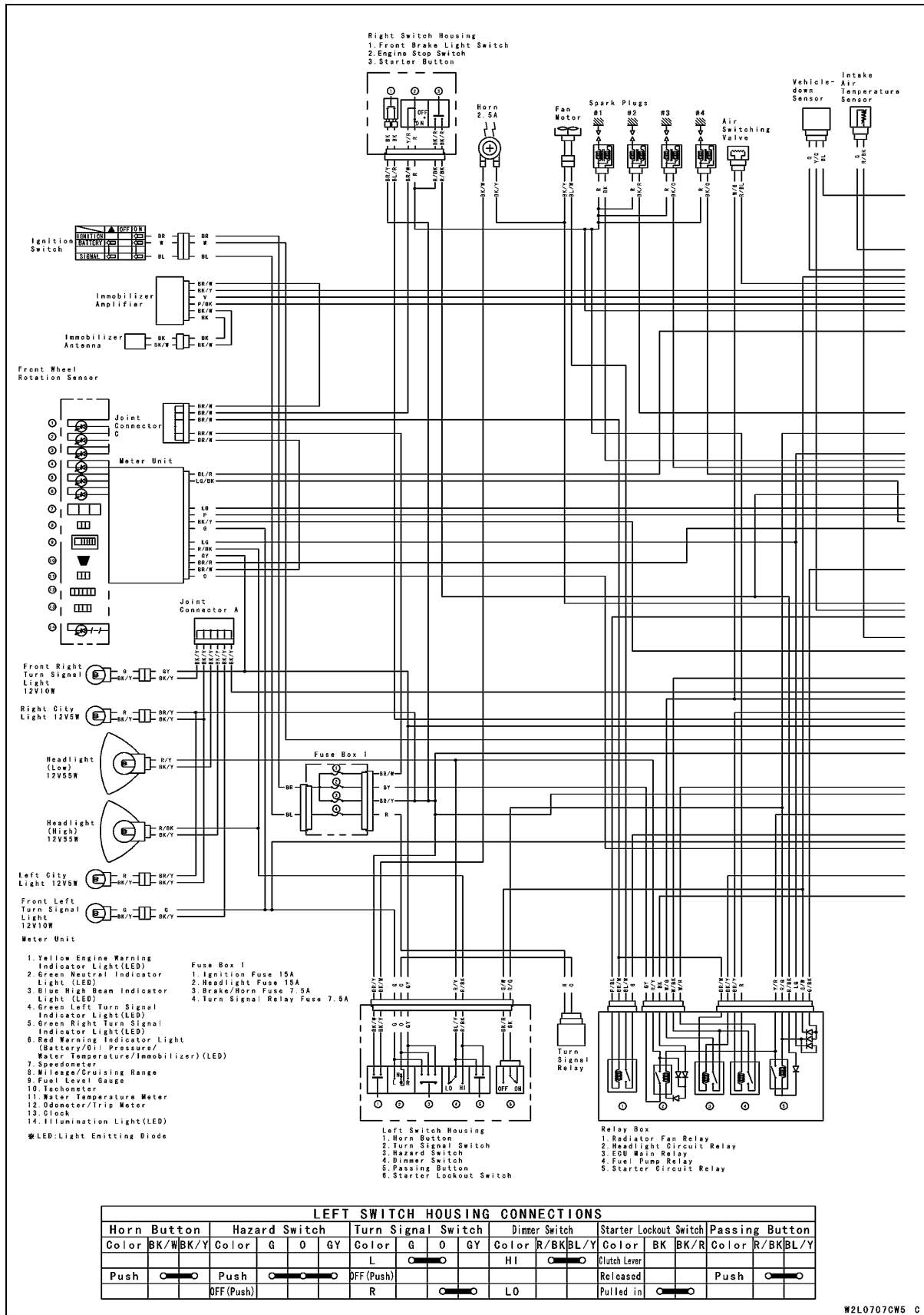


Wiring Diagram (ZR800B with GPS Unit)

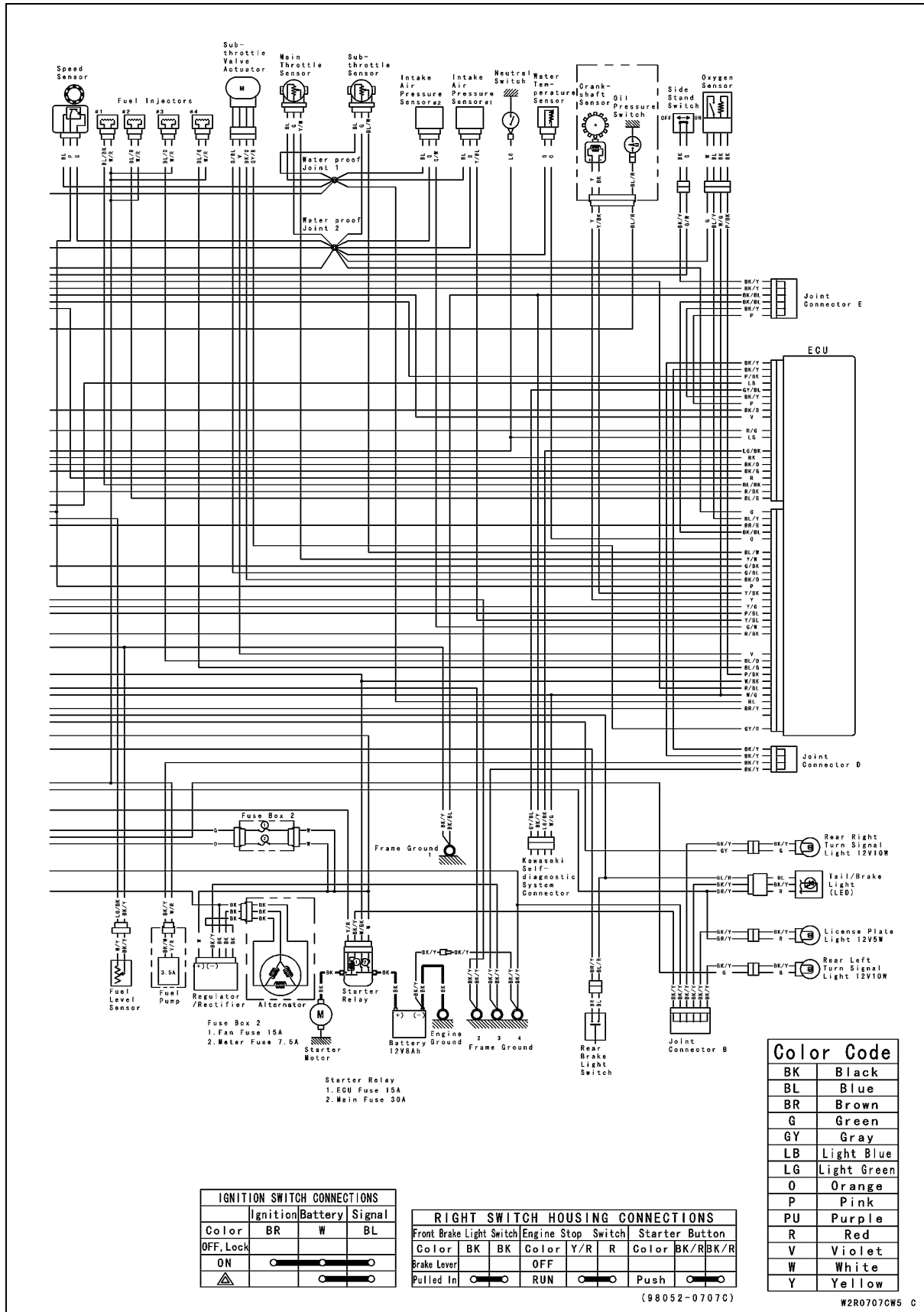


16-24 ELECTRICAL SYSTEM

Wiring Diagram (ZR800C)



Wiring Diagram (ZR800C)



Color Code	Color
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

IGNITION SWITCH CONNECTIONS			
	Ignition	Battery	Signal
Color	BR	W	BL
OFF, Lock	○	○	○
ON	○	○	○
	○	○	○

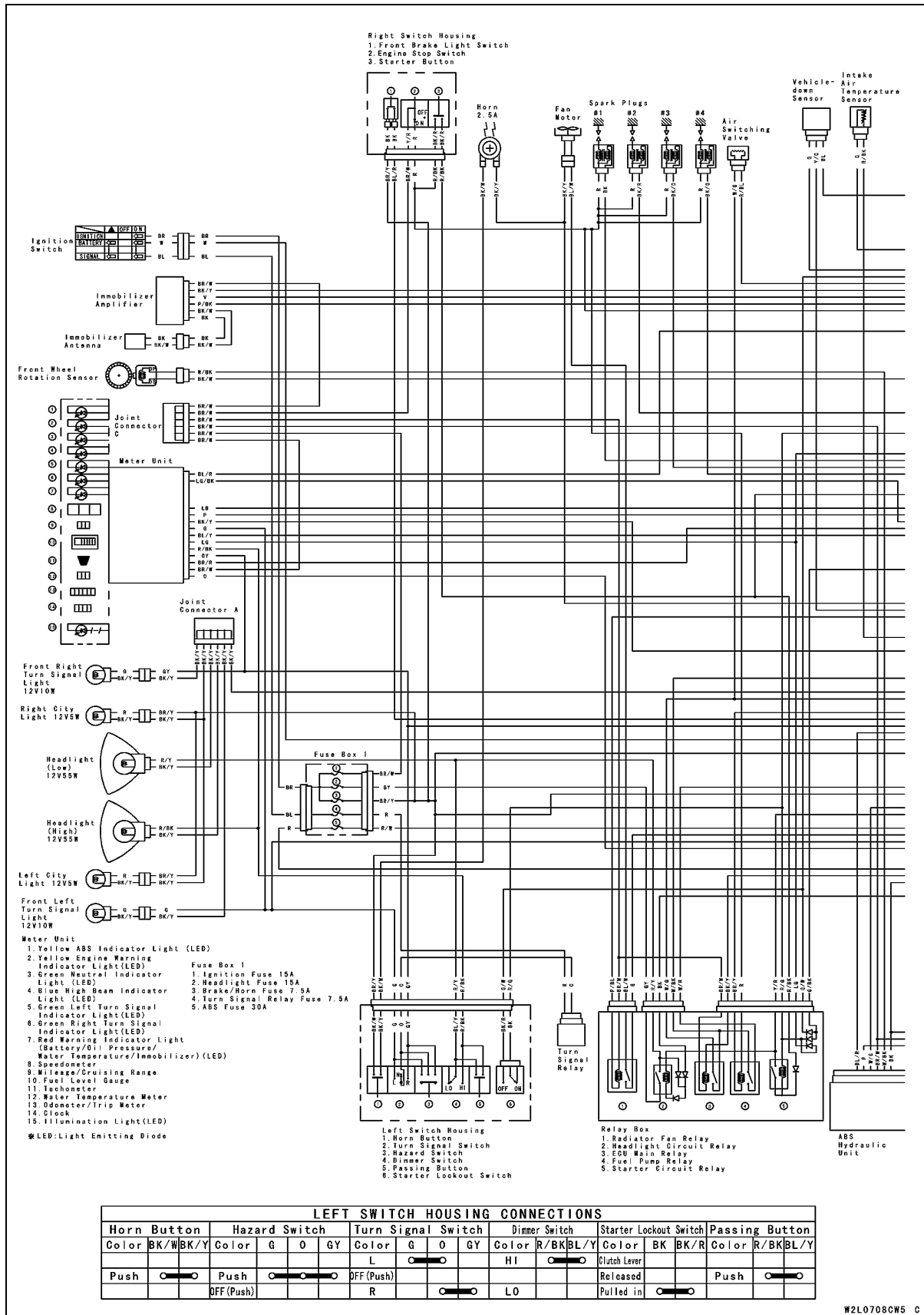
RIGHT SWITCH HOUSING CONNECTIONS						
Front Brake Light Switch	Engine Stop Switch	Color	Y/R	R	Color	
Color	BK	BK	Color	Y/R	R	Color
Brake Lever	OFF	○	○	○	○	BK/R/BK/R
Pulled In	RUN	○	○	○	○	Push

(98052-0707C)

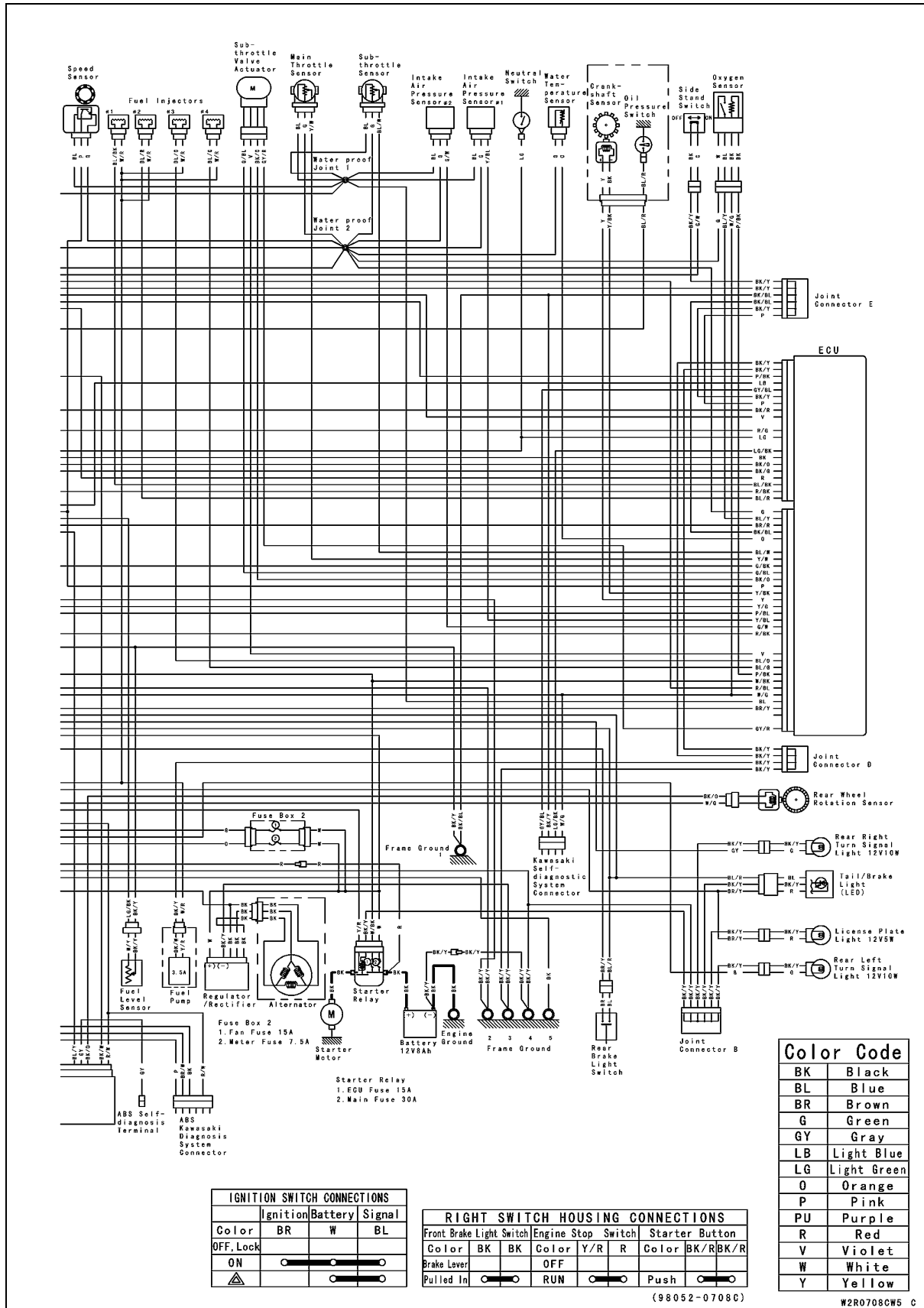
#ZR0707CWS C

16-26 ELECTRICAL SYSTEM

Wiring Diagram (ZR800D)



Wiring Diagram (ZR800D)



Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

IGNITION SWITCH CONNECTIONS			
	Ignition	Battery	Signal
Color	BR	W	BL
OFF, Lock	○	○	○
ON	○	○	○
	○	○	○

RIGHT SWITCH HOUSING CONNECTIONS				
Color	BK	BK	Color	Y/R R
Front Brake Light Switch	○	○	Color	Y/R R
Engine Stop Switch	○	○	Color	BK/RBK/R
Starter Button	○	○	Color	BK/RBK/R
Brake Lever	○	○	OFF	○
Pulled In	○	○	RUN	○
	○	○	Push	○

16-28 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 on, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

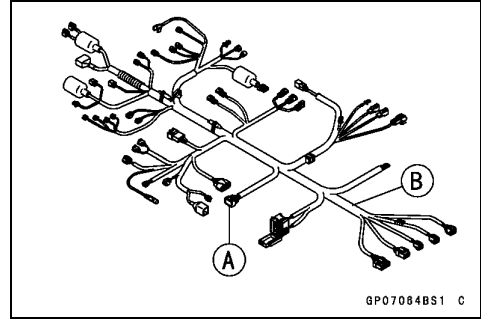
Electrical Wiring

Wiring Inspection

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

Special Tool - Hand Tester: 57001-1394

- Set the tester to the $\times 1 \Omega$ range, and read the tester.
- ★ If the tester does not read 0Ω , the lead is defective. Replace the lead or the wiring harness [B] if necessary.

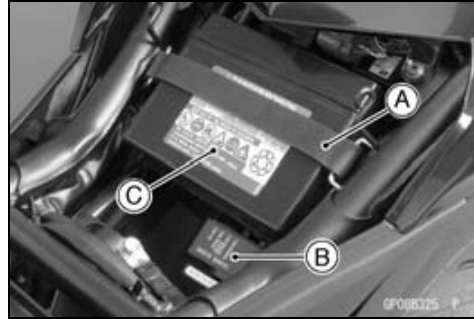


16-30 ELECTRICAL SYSTEM

Battery

Battery Removal

- Turn the ignition switch off.
- Remove:
 - Seats (see Rear/Front Seat Removal in the Frame chapter)
 - Band [A]
- Remove the Fuse Box [B] from the battery case.
- Take out the battery [C] from the battery case.

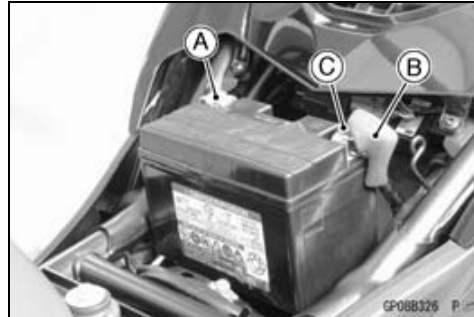


- Disconnect the negative (-) cable [A].

NOTICE

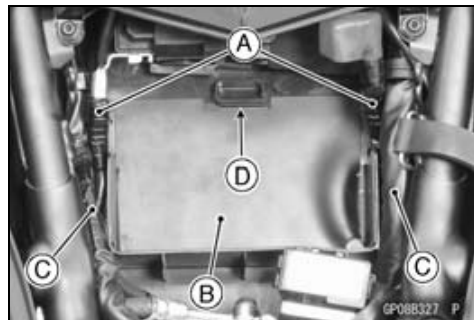
Be sure to disconnect the negative (-) cable first.

- Slide out the positive (+) terminal cap [B] and disconnect the positive (+) cable [C].
- Remove the battery.

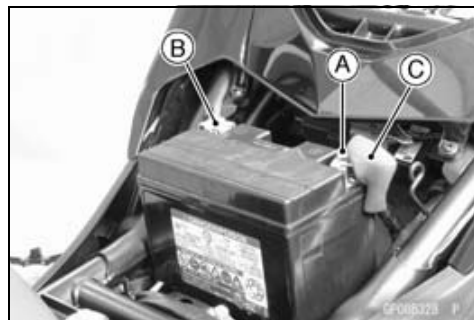


Battery Installation

- Turn the ignition switch off.
- Run the battery cables [A] outside the battery case [B] and under the main harness [C].
 - [D] Projection on the Battery Case



- Install the positive (+) cable [A] first.
- Install the negative (-) cable [B].
- Apply a light coat of grease on the terminals to prevent corrosion.
- Cover the positive (+) terminal with the red cap [C].
- Place the battery in the original place so that the battery fits to the projection on the battery case.
- Install the removed parts (see appropriate chapters).



Battery

Battery Activation

Electrolyte Filling

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name

ZR800A/B: FTX9-BS

NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overflow 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.

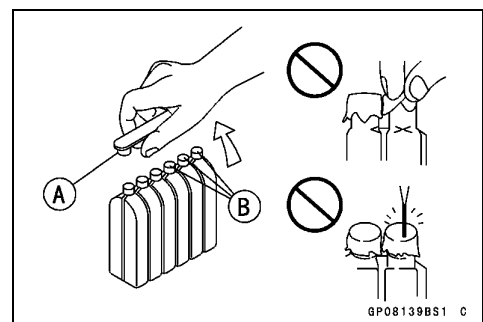
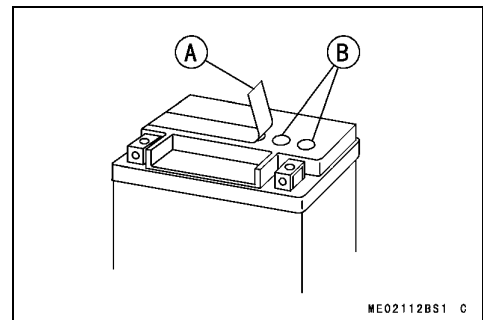
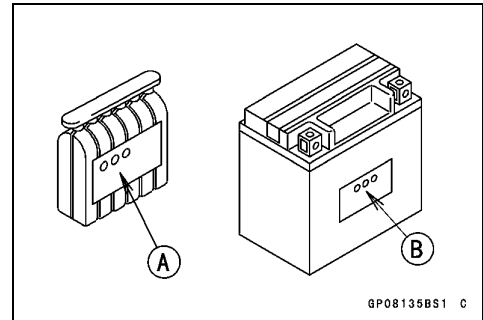
NOTE

- *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.*



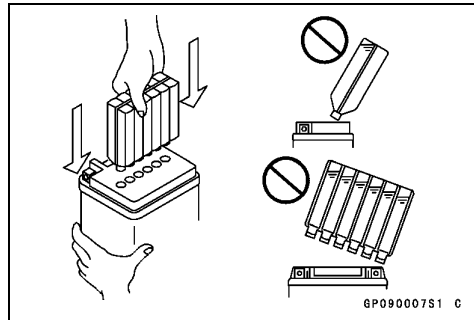
16-32 ELECTRICAL SYSTEM

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.

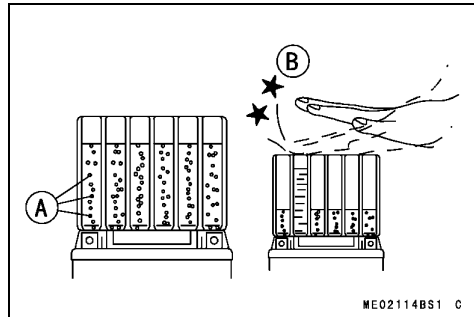


- Check the electrolyte flow.
- ★ If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.

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.



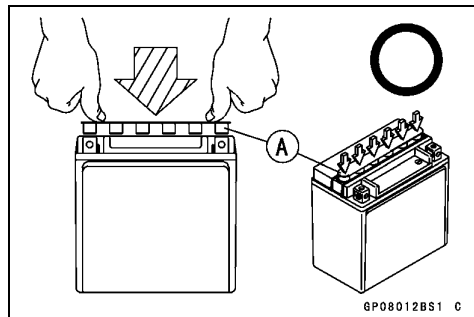
NOTICE

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.

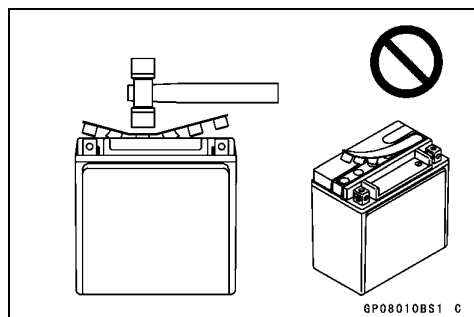
NOTICE

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: 0.9 A × 5 ~ 10 hours

- ★ If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:

Battery Mate 150-9

OptiMate PRO 4-S/PRO S/PRO2

Yuasa MB-2040/2060

Christie C10122S

- ★ If the above chargers are not available, use equivalent one.
- Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

NOTE

- *Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.6 V, repeat charging cycle.*
- *To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds. Re-check voltage and if less than 12.6 V repeat the charging cycle and load test. If still below 12.6 V the battery is defective.*

16-34 ELECTRICAL SYSTEM

Battery

Precautions

- 1) No need of topping-up
No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.
- 2) Refreshing charge.
If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).
When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.

If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

- 3) When you do not use the motorcycle for months.
Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge **once a month** during storage.
- 4) Battery life.
If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek 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).
- Disconnect the battery terminals.

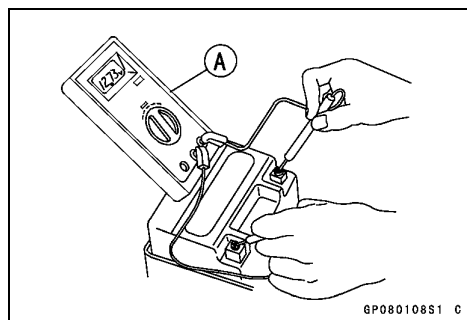
NOTICE

Be sure to disconnect the negative (-) cable first.

- Measure the battery terminal voltage.

NOTE

- Measure with a digital voltmeter which can be read one decimal place voltage.



Battery

- ★ If the reading is 12.6 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

Battery Terminal Voltage

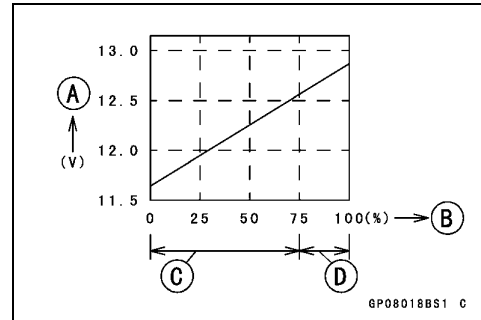
Standard: 12.6 V or more

Terminal Voltage (V) [A]

Battery Charge Rate (%) [B]

Refresh charge is required [C]

Good [D]

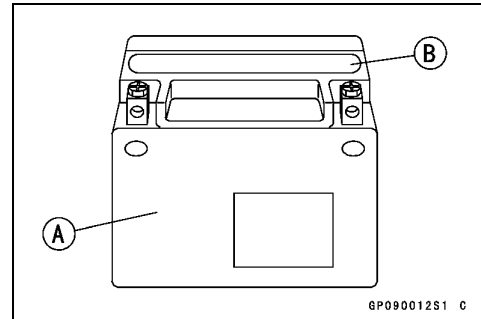


Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



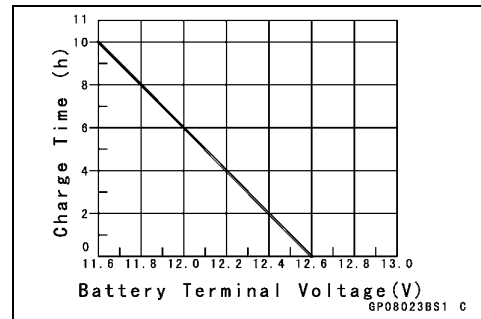
Terminal Voltage: 11.5 ~ less than 12.6 V

Standard Charge 0.9 A × 5 ~ 10 h (see following chart)

Quick Charge 4 A × 1 h

NOTICE

If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.



Terminal Voltage: less than 11.5 V

Charging Method: 0.9 A × 20 h

NOTE

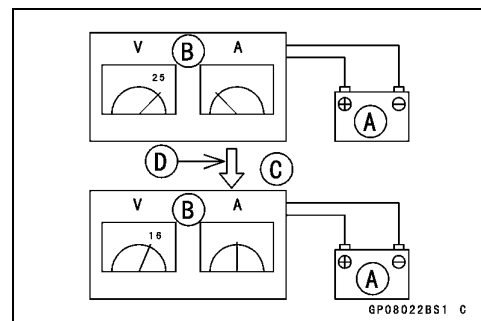
- Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.

Battery [A]

Battery Charger [B]

Standard Value [C]

Current starts to flow [D]



- Determine the battery condition after refresh charge.
- Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

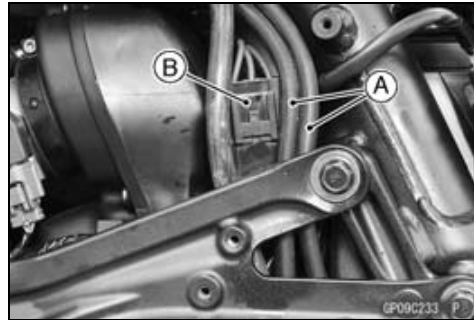
Criteria	Judgement
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

16-36 ELECTRICAL SYSTEM

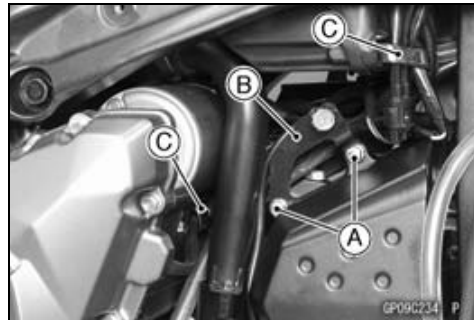
Charging System

Alternator Cover Removal

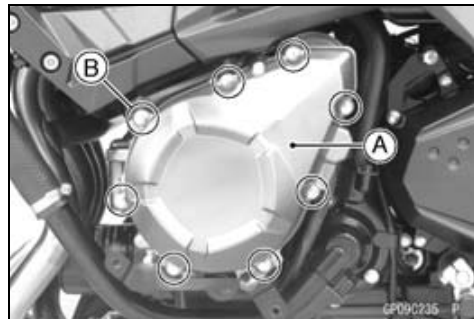
- Remove:
 - Left Frame Cover (see Frame Cover Removal in the Frame chapter)
 - Left Lower Fairing (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter)
- Free the hoses [A].
- Disconnect the alternator lead connector [B].



- Remove the engine sprocket cover bolts [A] and bracket [B].
- Open the clamps [C].



- Place a suitable container under the alternator cover [A].
- Remove:
 - Alternator Cover Bolts [B]
 - Alternator Cover



Alternator Cover Installation

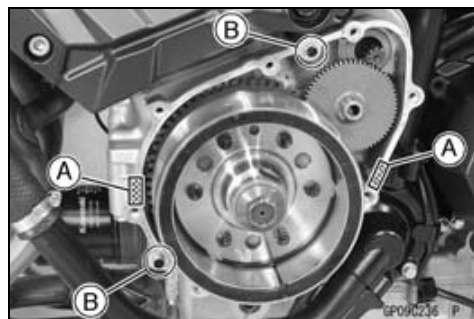
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the alternator lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Check that dowel pins [B] are in place on the crankcase.
- Install a new gasket and the alternator cover.
- Tighten:

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

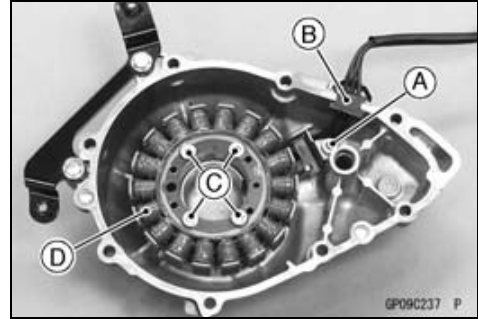
- Run the alternator lead and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).



Charging System

Stator Coil Removal

- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Holding Plate Bolt [A] and Plate
 - Alternator Lead Grommet [B]
 - Stator Coil Bolts [C]
 - Stator Coil [D]

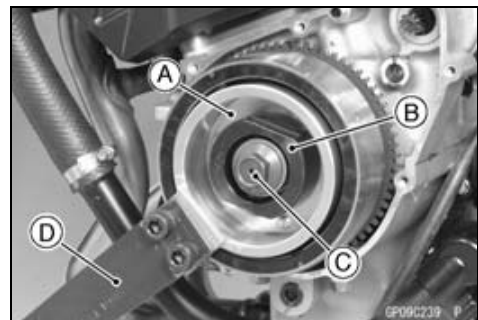
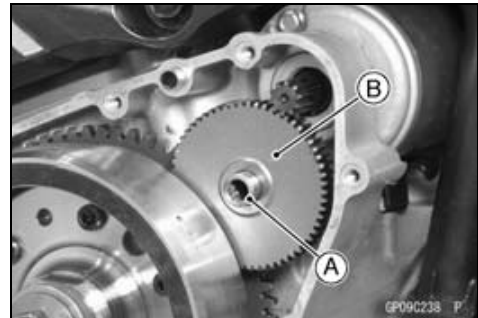


Stator Coil Installation

- Apply a non-permanent locking agent to the threads of the stator coil bolts and tighten them.
 - Torque - Stator Coil Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)**
- Secure the alternator lead with a holding plate.
- Apply a non-permanent locking agent to the threads of the plate bolt and tighten it.
 - Torque - Alternator Lead Holding Plate Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)**
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the alternator lead grommet, and fit the grommet into the notch of the cover securely.
 - Sealant - Liquid Gasket, TB1211F: 92104-0004**
- Install the alternator cover (see Alternator Cover Installation).

Alternator Rotor Removal

- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Shaft [A]
 - Starter Idle Gear [B]
- Hold the alternator rotor steady with the rotor holder [A] and stopper [B].
- Remove the rotor bolt [C] and washer.
 - Special Tools - Grip [D]: 57001-1591**
 - Stopper: 57001-1679**
 - Rotor Holder: 57001-1690**



16-38 ELECTRICAL SYSTEM

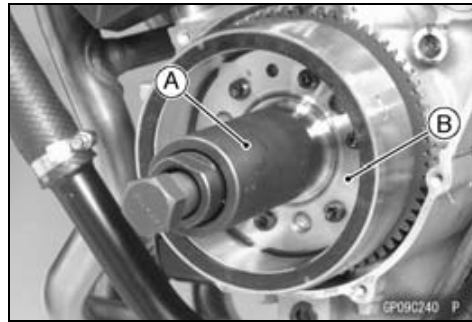
Charging System

- Using the flywheel puller [A], remove the alternator rotor [B] from the crankshaft.

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1615

NOTICE

Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.



Alternator Rotor Installation

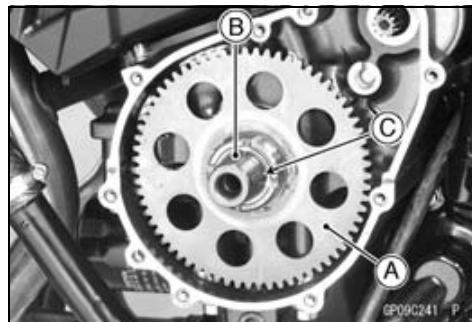
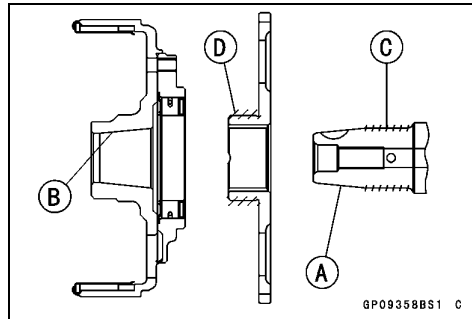
- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
 - Crankshaft Tapered Portion [A]
 - Alternator Rotor Tapered Portion [B]
- Apply a thin coat of molybdenum disulfide grease to the crankshaft [C].

NOTE

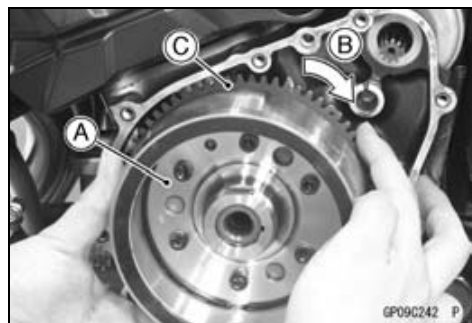
○ Do not apply of molybdenum disulfide grease to the face [D] of the starter clutch gear.

- ★ If the apply of molybdenum disulfide grease to the face of the starter clutch gear, dry them with a clean cloth.

- Install the starter clutch gear [A].
- Again, clean the crankshaft tapered portion [B] and dry there.
- Fit the woodruff key [C] securely in the slot in the crankshaft before installing the alternator rotor.

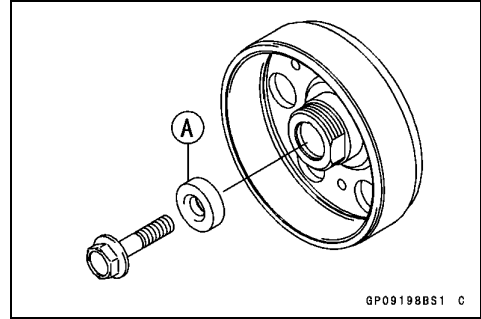


- Install the alternator rotor [A] while turning [B] the starter clutch gear [C].



Charging System

- Using a cleaning fluid, clean off any oil or dirt on the washer [A] and dry it with a clean cloth.



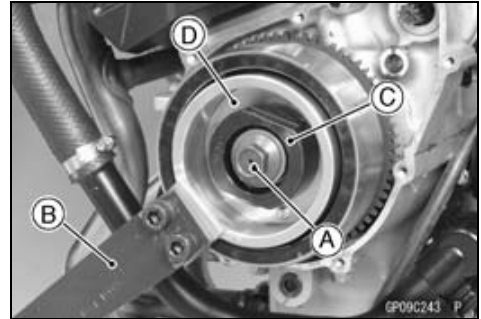
- Install the washer.

NOTE

○ Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.

- Install the rotor bolt [A] and tighten it with 70 N·m (7.0 kgf·m, 52 ft·lb) of torque.

Special Tools - Grip [B]: 57001-1591
Stopper [C]: 57001-1679
Rotor Holder [D]: 57001-1690



- Remove the rotor bolt and washer.
- Check the tightening torque with flywheel puller.

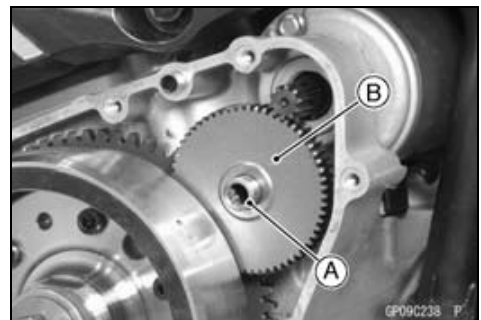
Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1615

- ★ If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.
- ★ If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion and washer, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.
- Tighten the alternator rotor bolt while holding the alternator rotor steady with the rotor holder.

Special Tools - Grip: 57001-1591
Stopper: 57001-1679
Rotor Holder: 57001-1690

Torque - Alternator Rotor Bolt: 155 N·m (15.8 kgf·m, 114 ft·lb)

- Apply a thin coat of molybdenum disulfide grease to the shaft [A], and install it and starter idle gear [B].
- Install the alternator cover (see Alternator Cover Installation).



16-40 ELECTRICAL SYSTEM

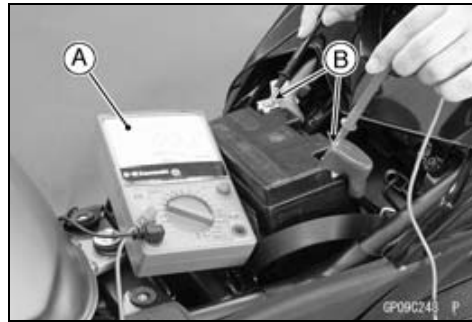
Charging System

Charging Voltage Inspection

- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Take out the battery from the rear fender with the cables connected (see Battery Removal).
- Check that the ignition switch is turned off, and connect the hand tester [A] to the battery terminals [B].

Special Tool - Hand Tester: 57001-1394

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector on the headlight unit.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.



Charging Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
25 V DC	Battery (+)	Battery (-)	14.2 ~ 14.8 V

- Turn the ignition switch off to stop the engine, and disconnect the hand tester.
- ★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★ If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

Charging System

- To check the alternator output voltage, do the following procedures.
 - Turn the ignition switch off.
 - Remove the left frame cover (see Frame Cover Removal in the Frame chapter).
 - Disconnect the alternator lead connector [A].
 - Connect the hand tester as shown in the table 1.

Special Tool - Hand Tester: 57001-1394

- Start the engine.
- Run it at the rpm given in the table 1.
- Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage at 4 000 r/min (rpm)

Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
250 V AC	One Black lead	Another Black lead	39 V or more

- ★ If the output voltage shows the value in the table, the alternator operates properly.
- ★ If the output voltage shows a much lower reading than that given in the table, stop the engine and inspect the stator coil resistance.
- Check the stator coil resistance as follows.
 - Stop the engine.
 - Connect the hand tester as shown in the table 2.

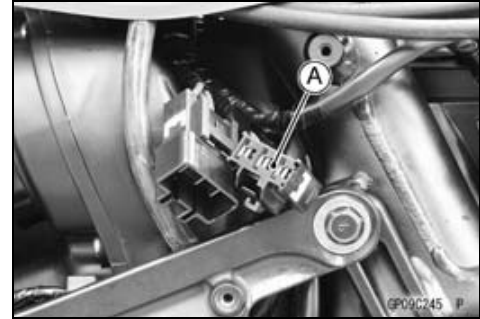
Special Tool - Hand Tester: 57001-1394

- Note the readings (total 3 measurements).

Table 2 Stator Coil Resistance at 20°C (68°F)

Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
× 1 Ω	One Black lead	Another Black lead	0.05 ~ 0.6 Ω

- ★ If there is more resistance than shown in the table, or no hand tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
- Using the highest resistance range of the hand tester, measure the resistance between each of the black leads and chassis ground.
- ★ Any hand tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
- ★ If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

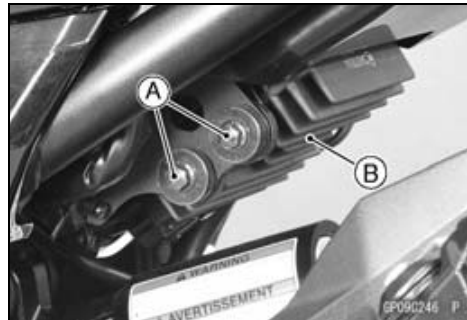


16-42 ELECTRICAL SYSTEM

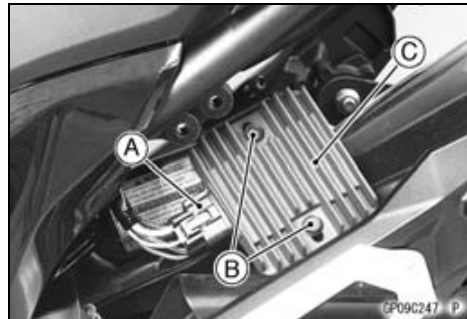
Charging System

Regulator/Rectifier Inspection

- Remove:
 - Regulator/Rectifier Bracket Bolts [A]
 - Regulator/Rectifier Assembly [B]



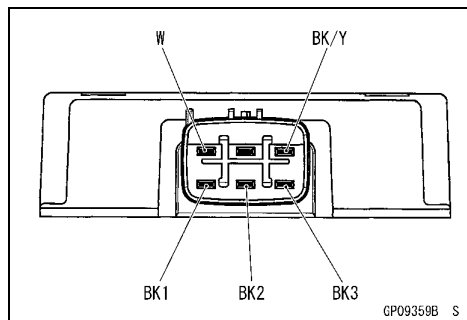
- Disconnect the connector [A].
- Remove:
 - Regulator/Rectifier Bolts [B]
 - Regulator/Rectifier [C]



- Set the hand tester to the $\times 1 \text{ k}\Omega$ range and make the measurements shown in the table.

Special Tool - Hand Tester: 57001-1394

- Connect the hand tester to the regulator/rectifier.
- ★ If the tester readings are not as specified, replace the regulator/rectifier.



NOTICE

Use only Kawasaki Hand Tester 57001-1394 for this test. A tester other than the Kawasaki Hand Tester may show different readings. If a megger or a meter with a large capacity battery is used, the regulator/rectifier will be damaged.

Regulator/Rectifier Resistance (Unit: $\text{k}\Omega$)

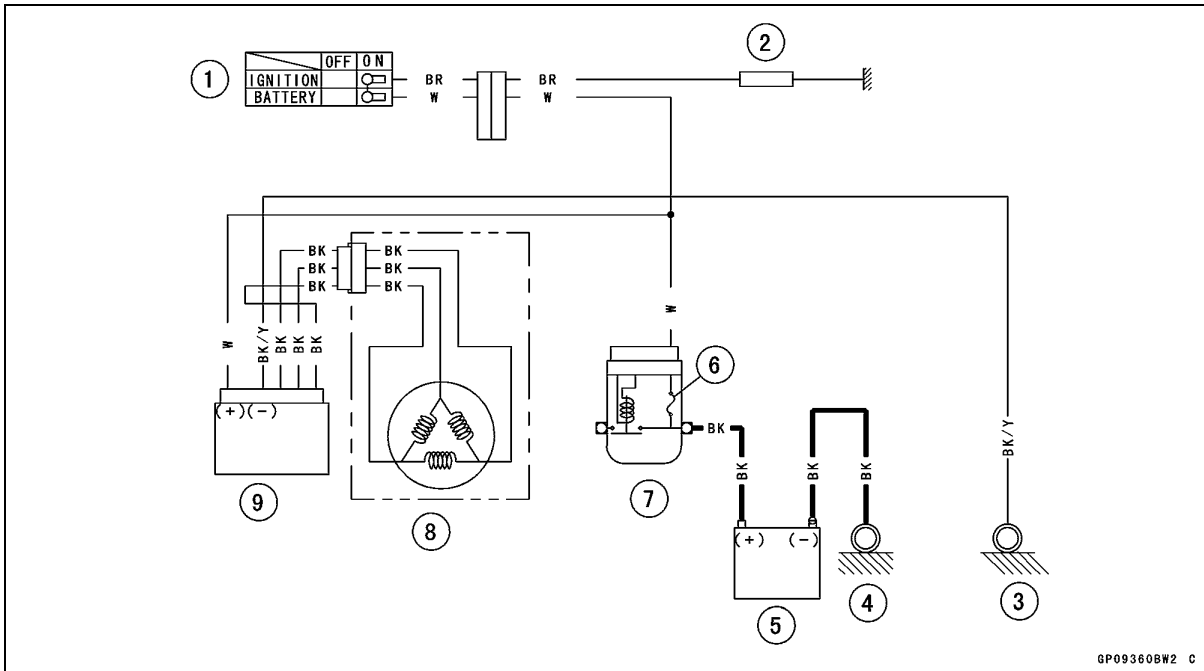
		Tester (+) Lead Connection				
		Terminal	W	BK1	BK2	BK3
(-)*	W	-	2.5 ~ 25	2.5 ~ 25	2.5 ~ 25	3.3 ~ 67
	BK1	∞	-	∞	∞	2.5 ~ 25
	BK2	∞	∞	-	∞	2.5 ~ 25
	BK3	∞	∞	∞	-	2.5 ~ 25
	BK/Y	∞	∞	∞	∞	-

(-)*: Tester (-) Lead Connection

- Install the regulator/rectifier.
- Tighten:
 - Torque - Regulator/Rectifier Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)**
 - Regulator/Rectifier Bracket Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)**
- Install the removed parts (see appropriate chapters).

Charging System

Charging System Circuit



1. Ignition Switch
2. Load
3. Frame Ground 3
4. Engine Ground
5. Battery 12 V 8 Ah
6. Main Fuse 30 A
7. Starter Relay
8. Alternator
9. Regulator/Rectifier

GP09360B2 C

16-44 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.

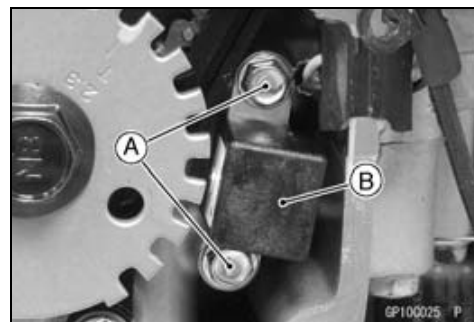
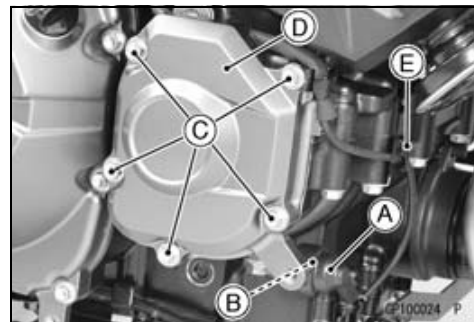
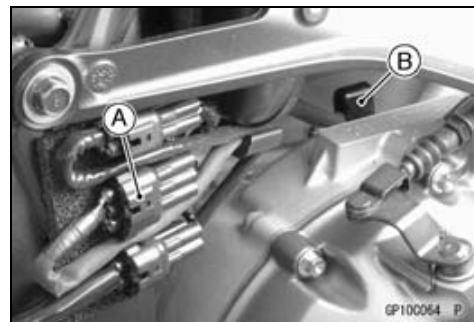
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.

Crankshaft Sensor Removal

NOTICE

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

- Remove:
 - Right Frame Cover (see Frame Cover Removal in the Frame chapter)
 - Right Lower Fairing (see Lower Fairing Removal (ZR800A/B) in the Frame chapter)
- Disconnect the crankshaft sensor lead connector [A].
- Open the clamp [B].
- Slide out the rubber boot [A].
- Remove:
 - Oil Pressure Switch Lead Terminal [B]
 - Crankshaft Sensor Cover Bolts [C] with Clamp
 - Crankshaft Sensor Cover [D]
- Open the clamp [E].
- Remove:
 - Crankshaft Sensor Bolts [A]
 - Crankshaft Sensor [B]



Ignition System

Crankshaft Sensor Installation

- Run the crankshaft sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

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

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the crankshaft sensor lead grommet and crankcase halves mating surface on the front and rear sides of the crankshaft sensor cover mount.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Apply high-temperature grease to the switch terminal [A] to prevent rust.
- Do not protrude the grease from the rubber boot [B].
- Install the oil pressure switch lead terminal securely.
- Install the lead terminal direction upward.

Torque - Oil Pressure Switch Terminal Bolt: 2.0 N·m (0.20 kgf·m, 18 in·lb)

- Install the rubber boot.
- Install the removed parts (see appropriate chapters).
- Replace the O-ring in the crankshaft sensor cover [A] with a new one.
- Install:
 - Crankshaft Sensor Cover
 - Clamp [B]
- Tighten:

Torque - Crankshaft Sensor Cover Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

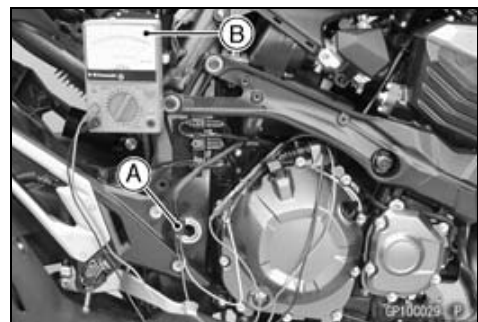
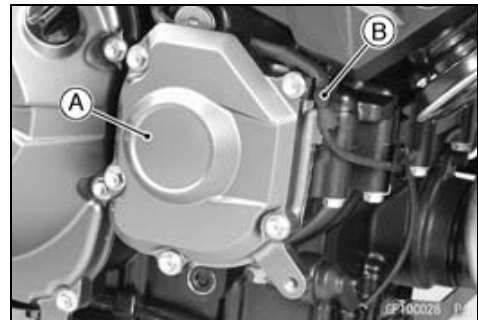
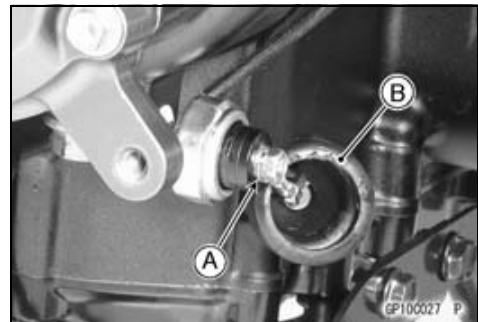
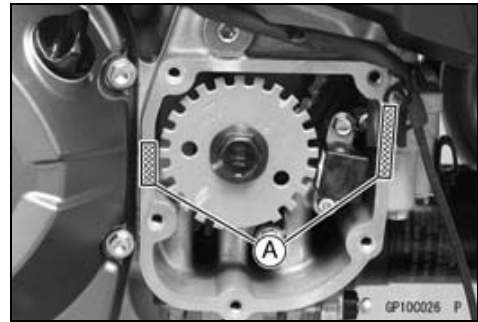
Crankshaft Sensor Inspection

- Remove the right frame cover (see Frame Cover Removal in the Frame chapter).
- Disconnect the crankshaft sensor lead connector [A] (see Crankshaft Sensor Removal).
- Set the hand tester [B] to the $\times 10 \Omega$ range and connect (+) lead to the yellow lead and (-) lead to the black lead in the connector.

Special Tool - Hand Tester: 57001-1394

Crankshaft Sensor Resistance: 376 ~ 564 Ω

- ★ If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.
- Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads and chassis ground.
- ★ Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor assembly.



16-46 ELECTRICAL SYSTEM

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.

- Remove the right frame cover (see Frame Cover Removal in the Frame chapter).
- Disconnect the crankshaft sensor lead connector [B] (see Crankshaft Sensor Removal).
- Set the hand tester [C] to the DC 10 V range.
- Connect the peak voltage adapter to the hand tester and crankshaft sensor leads in the connector.

Special Tools - Hand Tester: 57001-1394

Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

Connections:

Crankshaft Sensor Lead		Peak Voltage Adapter		Hand Tester
Yellow	←	Red	→	(+)
Black	←	Black	→	(-)

- Turn the ignition switch and engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.

Crankshaft Sensor Peak Voltage

Standard: 2.0 V or more

- ★ If the tester reading is not specified one, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

Timing Rotor Removal

- Remove the crankshaft sensor cover (see Crankshaft Sensor Removal).
- Remove the timing rotor [A].
- Holding the timing rotor with the flywheel & pulley holder [B] and remove the rotor bolt [C].

Special Tool - Flywheel & Pulley Holder: 57001-1605

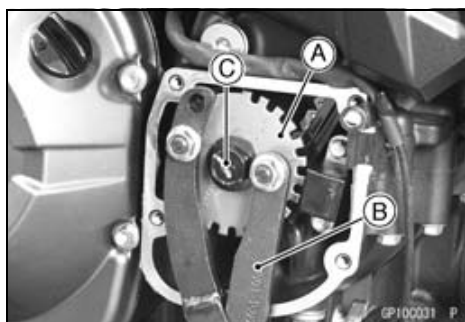
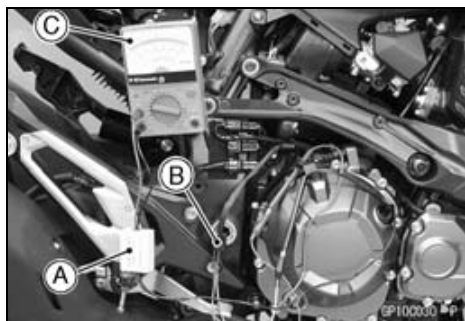
Timing Rotor Installation

- Install the timing rotor [A] on the crankshaft [B] with their teeth [C] aligned.
- Holding the timing rotor with the flywheel & pulley holder and tighten the bolt.

Torque - Timing Rotor Bolt: 39 N·m (4.0 kgf·m, 29 ft·lb)

Special Tool - Flywheel & Pulley Holder: 57001-1605

- Install the removed parts (see appropriate chapters).



Ignition System

Stick Coil Removal

NOTICE

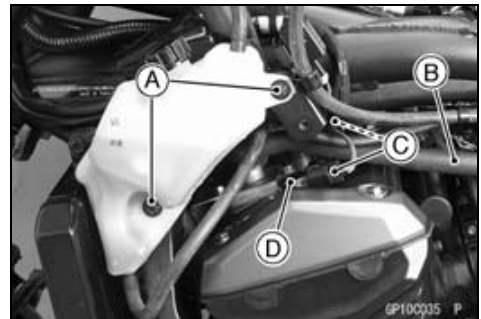
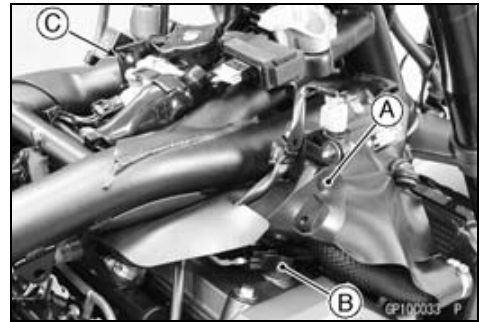
**Never drop the stick coils especially on a hard surface.
Such a shock to the stick coils can damage it.**

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Side Fairings (see Side Fairing Removal in the Frame chapter)
- Remove the quick rivet [A] (for Stick Coil #4).
- Disconnect the stick coil connector and pull the stick coil #4 [B] off the spark plug.

NOTICE

Do not pry the connector part of the coil while removing the coil.

- Remove:
 - Bolt [C] (for Stick Coil #2 and #3)
 - Disconnect the stick coil connector and pull the stick coil #3 [A] off the spark plug.
 - Take out the stick coil #3 from between the frame and thermostat housing.
-
- Remove the reserve tank bolts [A] with the clamp.
 - Disconnect the air switching valve hose [B] (for Stick Coil #2).
 - Disconnect the stick coil connectors [C].
 - Pull the stick coil #1 [D] and #2 off the spark plugs.
 - Take out the stick coil #2 from between the frame and thermostat housing.



Stick Coil Installation

- Insert the stick coils.
- Be sure the stick coils are installed by pulling up it lightly.
- Connect the connectors.

NOTICE

Do not tap the coil head while installing the coil.

- Run the hoses and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

16-48 ELECTRICAL SYSTEM

Ignition System

Stick Coil Inspection

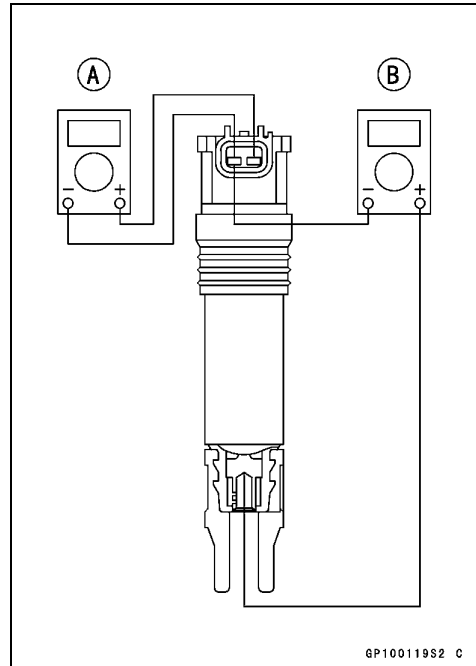
- Remove the stick coils (see Stick Coil Removal).
- Measure the primary winding resistance [A] as follows.
 - Connect the hand tester between the coil terminals.
 - Set the tester to the $\times 1 \Omega$ range, and read the tester.
- Measure the secondary winding resistance [B] as follows.
 - Connect the tester between the plug terminal and (-) coil terminal.
 - Set the tester to the $\times 1 \text{ k}\Omega$ range and read the tester.

Stick Coil Winding Resistance

Primary Windings: 1.1 ~ 1.5 Ω

Secondary Windings: 6.4 ~ 9.6 $\text{k}\Omega$

★ If the tester does not read as specified, replace the coil.



Stick Coil Primary Peak Voltage

NOTE

○ Be sure the battery is fully charged.

- Remove the stick coils (see Stick Coil Removal), but do not remove the spark plugs.
- Measure the primary peak voltage as follows.
 - Install the new spark plug [A] into each stick coil [B], and ground them onto the engine.
 - Connect the peak voltage adapter [C] into the hand tester [D] which is set to the DC 250 V range.
 - Connect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.

ECU [F]

Battery [G]

Special Tools - Hand Tester: 57001-1394

Peak Voltage Adapter: 57001-1415

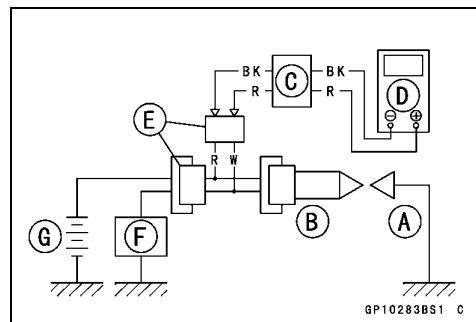
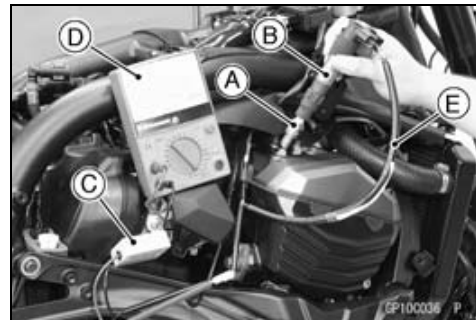
Type: KEK-54-9-B

Lead Wire-Peak Voltage Adapter: 57001-1449

Primary Lead Connection

Adapter (R, +) to lead wire-peak voltage adapter (W)

Adapter (BK, -) to lead wire-peak voltage adapter (R)



Ignition System

WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch and the engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
- Repeat the measurements 5 times for one stick coil.

Stick Coil Primary Peak Voltage

Standard: 100 V or more

- Repeat the test for the other stick coil.
- ★ If the reading is less than the specified value, check the following.
 - Stick Coils (see Stick Coil Inspection)
 - Crankshaft Sensor (see Crankshaft Sensor Inspection)
 - ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

Spark Plug Removal

- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Spark Plug Installation

- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Spark Plug Condition Inspection

- Refer to the Spark Plug Condition Inspection in the Periodic Maintenance chapter.

Interlock Operation Inspection

- Raise the rear wheel off the ground with stand.
- Turn the engine stop switch on (run position).

1st Check

- Start the engine to the following conditions.

Condition:

Transmission Gear → 1st Position

Clutch Lever → Release

Side Stand → Down or Up

- Turn the ignition switch on and push the starter button.
- Then the starter motor should not turn when the starter system circuit is normality.
- ★ If the engine is start, inspect the starter lockout switch, neutral switch and relay box.

16-50 ELECTRICAL SYSTEM

Ignition System

2nd Check

- Start the engine to the following conditions.

Condition:

Transmission Gear → 1st Position

Clutch Lever → Pulled in

Side Stand → Up

- Turn the ignition switch on and push the starter button.
- Then the starter motor should turn when the starter system circuit is normality.
- ★ If the starter motor is not turn, inspect the starter lockout switch, side stand switch, relay box and starter relay.

3rd Check

- Inspect the engine for its secure stop after the following operations are completed.
- Run the engine to the following conditions.

Condition:

Transmission Gear → 1st Position

Clutch Lever → Release

Side Stand → Up

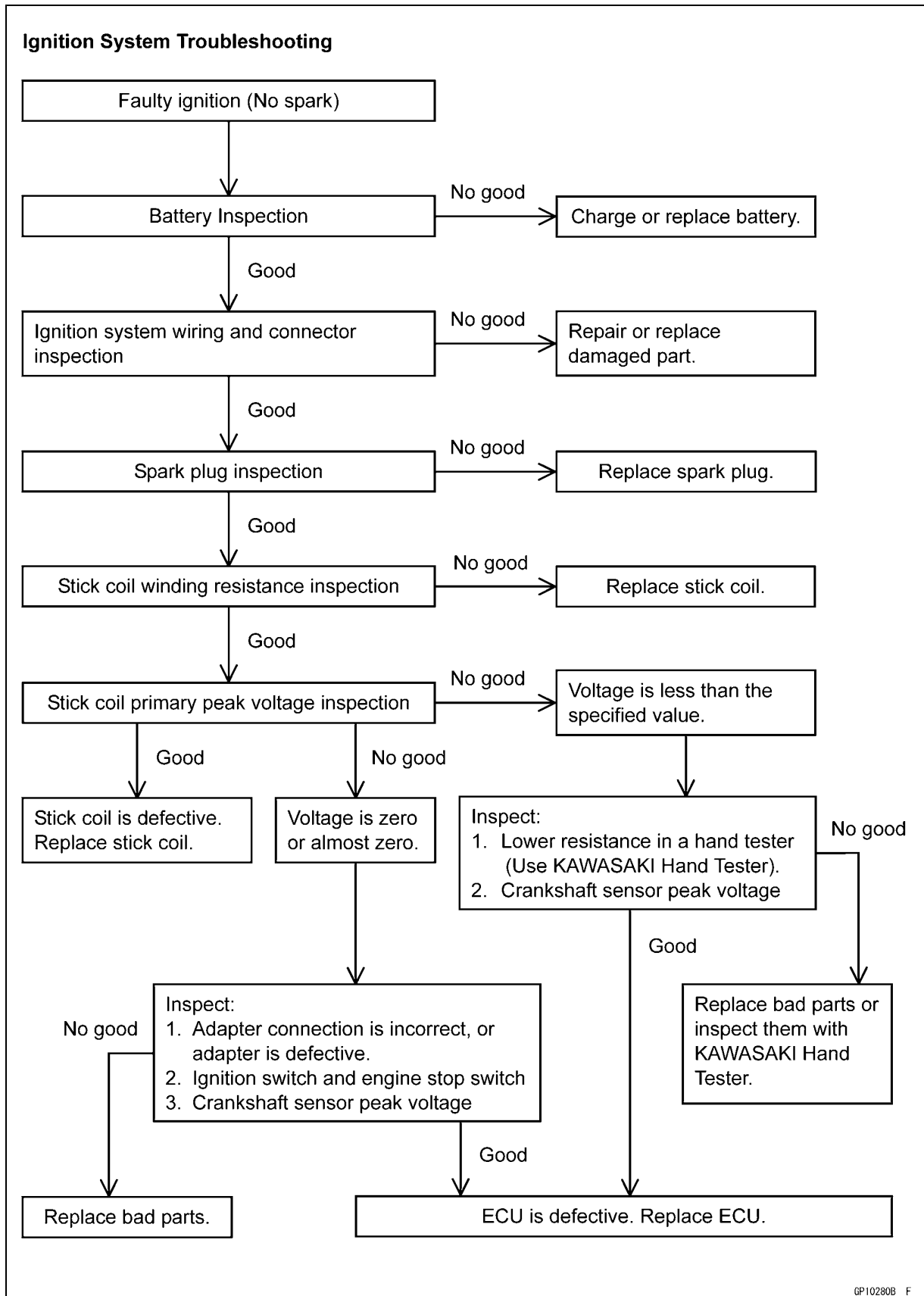
- Set the side stand on the ground, then the engine will stop.
- ★ If the engine does not stop, inspect the neutral switch, side stand switch and relay box.
- ★ If their parts are normality, replace the ECU.

IC Igniter Inspection

- The IC igniter is built in the ECU [A].
- Refer to the following items.
 - Interlock Operation Inspection (see Interlock Operation Inspection)
 - Ignition System Troubleshooting (see Ignition System section)
 - ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)



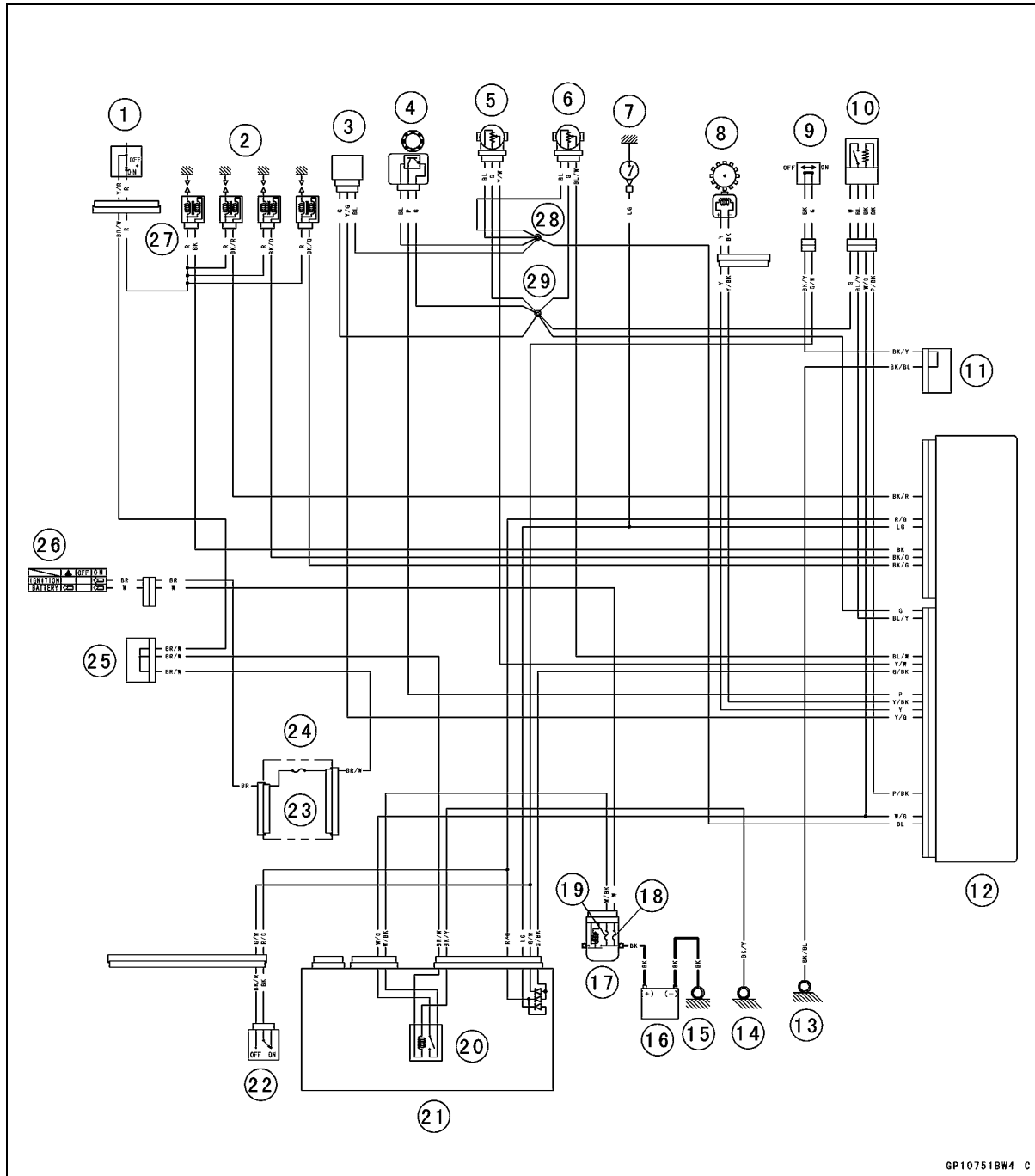
Ignition System



16-52 ELECTRICAL SYSTEM

Ignition System

Ignition System Circuit



GP10751BW4 C

- | | | |
|-------------------------|-----------------------|----------------------------|
| 1. Engine Stop Switch | 11. Joint Connector E | 21. Relay Box |
| 2. Stick Coils | 12. ECU | 22. Starter Lockout Switch |
| 3. Vehicle-down Sensor | 13. Frame Ground 1 | 23. Ignition Fuse 15 A |
| 4. Speed Sensor | 14. Frame Ground 4 | 24. Fuse Box 1 |
| 5. Main Throttle Sensor | 15. Engine Ground | 25. Joint Connector C |
| 6. Subthrottle Sensor | 16. Battery 12 V 8 Ah | 26. Ignition Switch |
| 7. Neutral Switch | 17. Starter Relay | 27. Spark Plugs |
| 8. Crankshaft Sensor | 18. Main Fuse 30 A | 28. Water-proof Joint 1 |
| 9. Side Stand Switch | 19. ECU Fuse 15 A | 29. Water-proof Joint 2 |
| 10. Oxygen Sensor | 20. ECU Main Relay | |

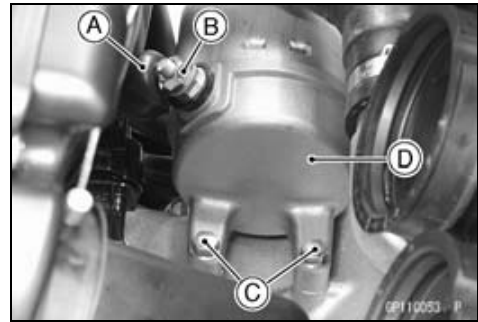
Electric Starter System

Starter Motor Removal

NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Slide back the rubber cap [A].
- Remove the starter motor cable terminal nut [B].
- Remove the mounting bolts [C].
- Pull out the starter motor [D].

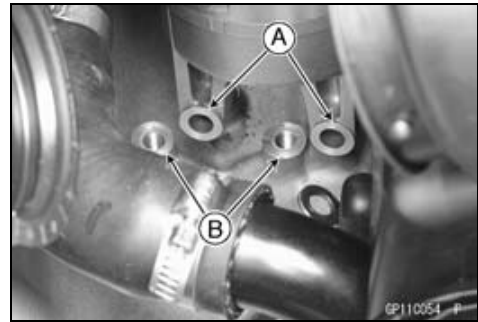


Starter Motor Installation

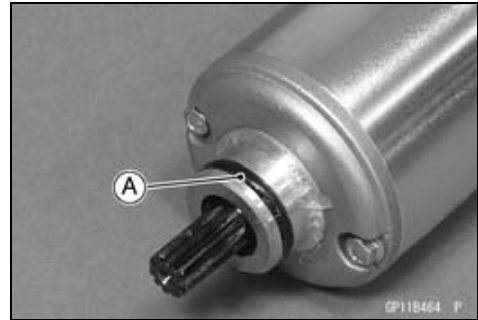
NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- When installing the starter motor, clean the starter motor legs [A] and crankcase [B] where the starter motor is grounded.

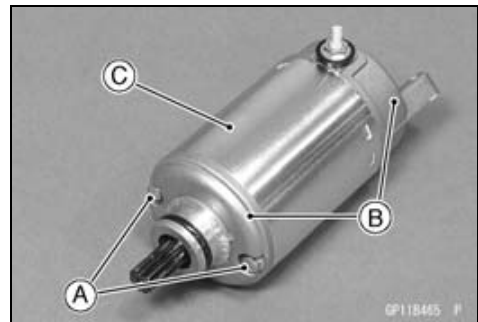


- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Tighten:
 - Torque - Starter Motor Mounting Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**
- Install the starter motor cable.
- Tighten:
 - Torque - Starter Motor Cable Terminal Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb)**
- Install the removed parts (see appropriate chapters).



Starter Motor Disassembly

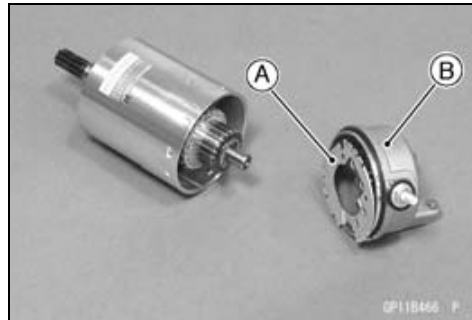
- Remove the starter motor (see Starter Motor Removal).
- Remove the starter motor through bolts [A] and remove the both end covers [B] and pull the armature out of the yoke [C].



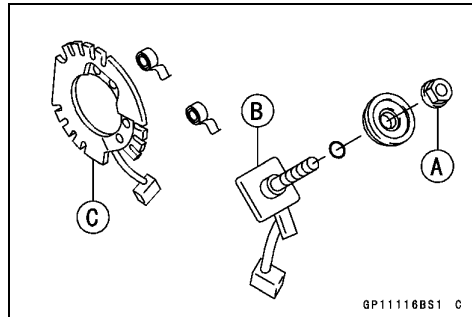
16-54 ELECTRICAL SYSTEM

Electric Starter System

○ The brush plate [A] and brushes come off with the right-hand end cover [B].

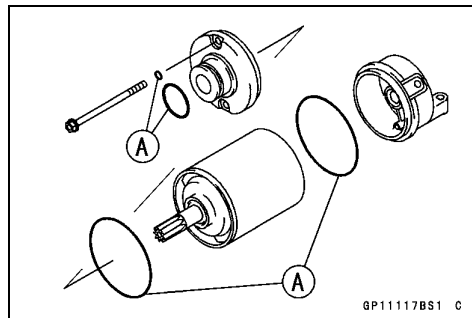


- Remove the terminal locknut [A] and terminal bolt [B], and then remove the brush with the brush plate [C] from the right-hand end cover.

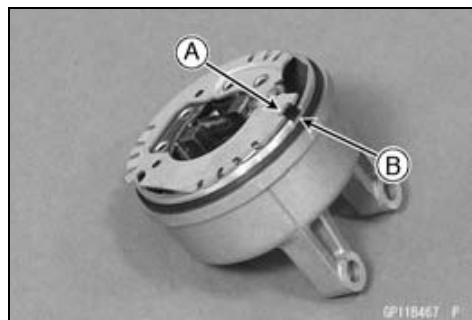


Starter Motor Assembly

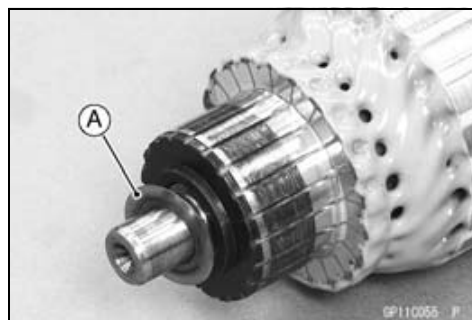
- Replace the O-rings [A] with new ones.



- Install the brush plate so that the notch [A] of the brush plate aligns with the notch [B] of the end cover.

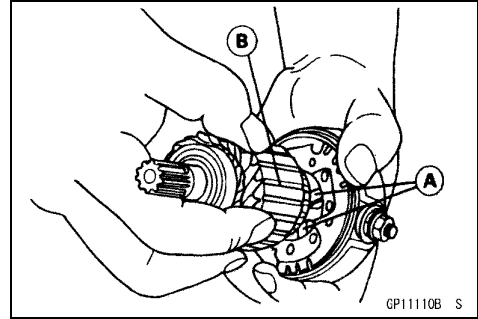


- Install the shim [A] on the armature shaft.

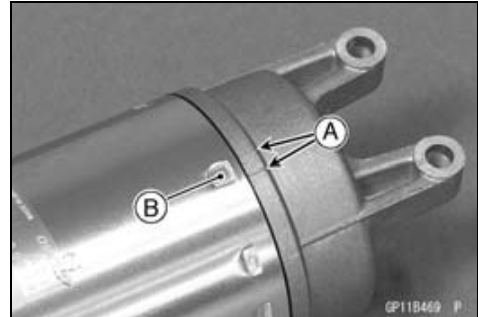


Electric Starter System

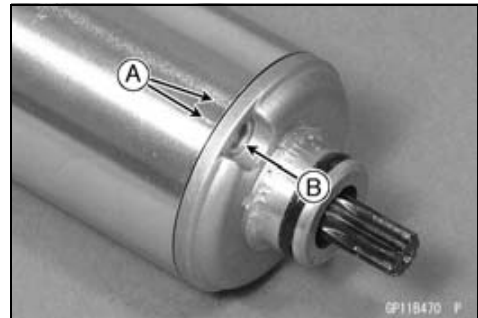
- Install the armature [B] among the brushes [A].



- Align the line marks [A] of the end cover with the square mark [B] on the yoke.



- Align the line marks [A] of the yoke with the through bolt hole [B] in the end cover.
- Install the new O-rings and tighten the bolts.



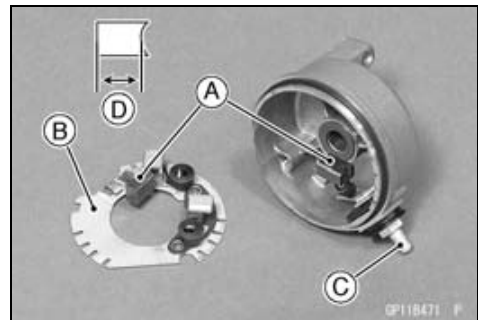
Brush Inspection

- Measure the length of each brush [A].
- ★ If any is worn down to the service limit, replace the brush plate assembly [B] and the terminal bolt assembly [C].

Starter Motor Brush Length [D]

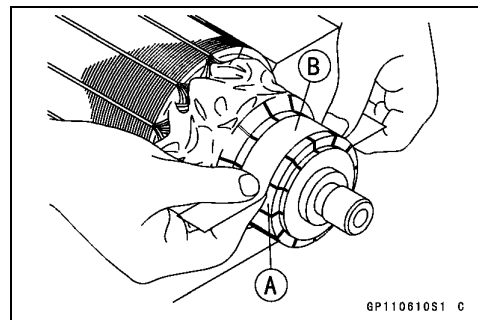
Standard: 12 mm (0.47 in.)

Service Limit: 10 mm (0.39 in.)



Commutator Cleaning and Inspection

- Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.



16-56 ELECTRICAL SYSTEM

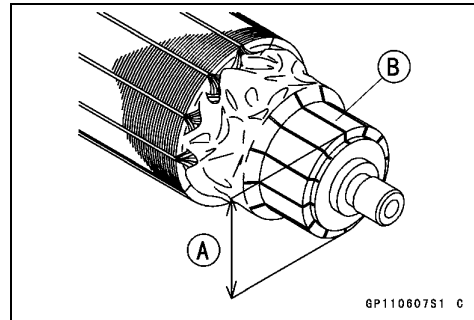
Electric Starter System

- Measure the diameter [A] of the commutator [B].
- ★ If the commutator diameter is less than the service limit, replace the starter motor with a new one.

Commutator Diameter

Standard: 28 mm (1.10 in.)

Service Limit: 27 mm (1.06 in.)

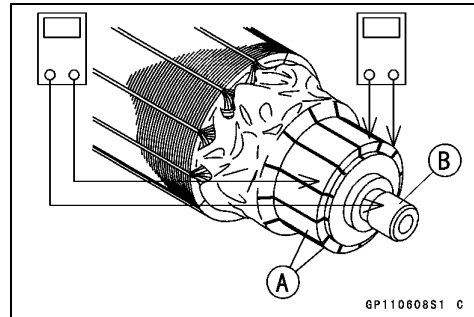


Armature Inspection

- Using the $\times 1 \Omega$ hand tester range, measure the resistance between any two commutator segments [A].

Special Tool - Hand Tester: 57001-1394

- ★ If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.
- Using the highest hand tester range, measure the resistance between the segments and the shaft [B].
- ★ If there is any reading at all, the armature has a short and the starter motor must be replaced.



NOTE

○ Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

Brush Lead Inspection

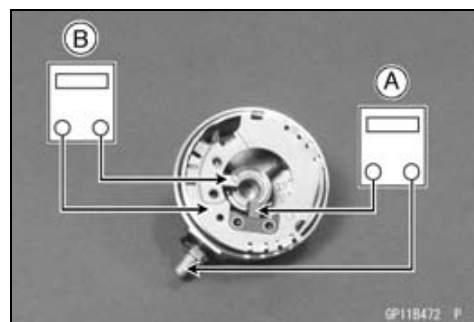
- Using the $\times 1 \Omega$ hand tester range, measure the resistance as shown.

Terminal Bolt and Positive Brush [A]

Brush Plate and Negative Brush [B]

Special Tool - Hand Tester: 57001-1394

- ★ If there is not close to zero ohms, the brush lead has an open. Replace the terminal bolt assembly and/or the brush plate assembly.



Brush Plate and Terminal Bolt Inspection

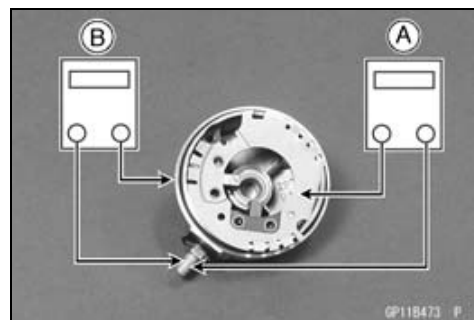
- Using the highest hand tester range, measure the resistance as shown.

Terminal Bolt and Brush Plate [A]

Terminal Bolt and Right-hand End Cover [B]

Special Tool - Hand Tester: 57001-1394

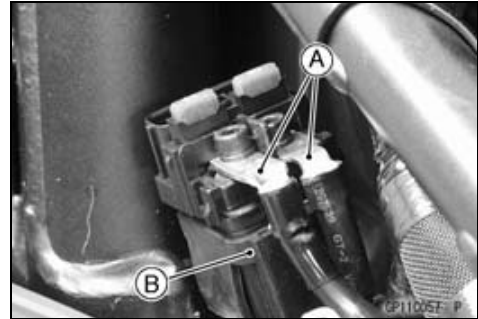
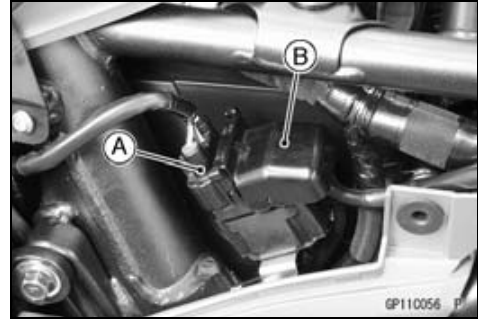
- ★ If there is any reading, the brush holder assembly and/or terminal bolt assembly have a short. Replace the brush holder assembly and the terminal bolt assembly.



Electric Starter System

Starter Relay Inspection

- Remove:
 - Battery Negative (–) Cable (see Battery Removal)
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
 - Disconnect the connector [A].
 - Remove the starter relay cover [B].
-
- Disconnect the cable terminals [A].
 - Remove the Starter Relay [B].



- Connect the hand tester [A] and 12 V battery [B] to the starter relay [C] as shown.

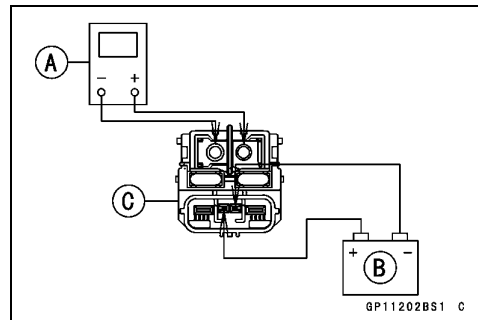
Special Tool - Hand Tester: 57001-1394

- ★ If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

Tester Range: × 1 Ω range

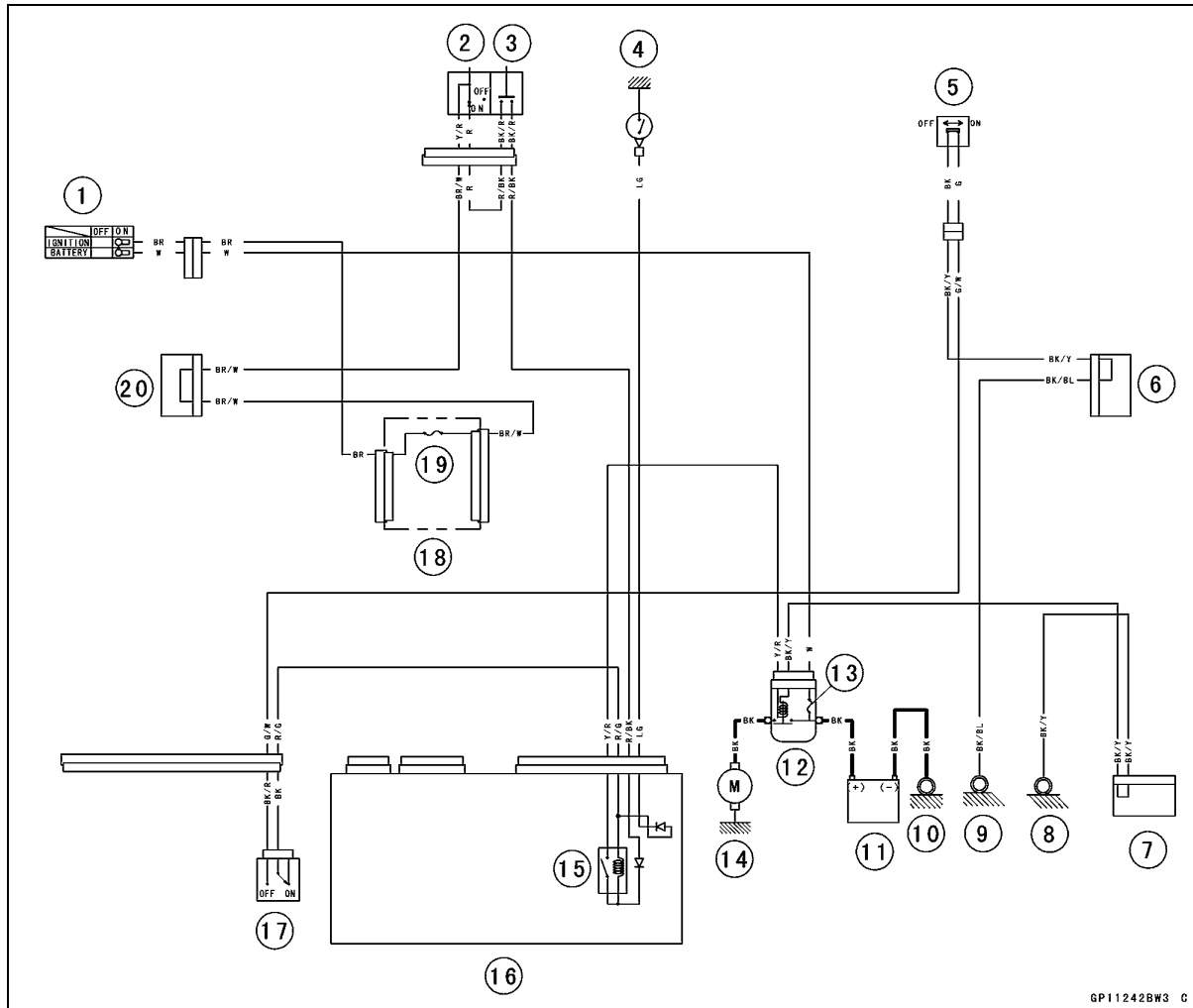
Criteria: When battery is connected → 0 Ω
 When battery is disconnected → ∞ Ω



16-58 ELECTRICAL SYSTEM

Electric Starter System

Electric Starter Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Neutral Switch
5. Side Stand Switch
6. Joint Connector E
7. Joint Connector B
8. Frame Ground 4
9. Frame Ground 1
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Starter Motor
15. Starter Circuit Relay
16. Relay Box
17. Starter Lockout Switch
18. Fuse Box 1
19. Ignition Fuse 15 A
20. Joint Connector C

Lighting System

This motorcycle adopt the daylight system and have a headlight relay in the relay box. The headlight does not go on when the ignition switch and the engine stop switch are first turned on. The headlight comes on after the starter button is released and stays on until the ignition switch is turned off. The headlight will go out momentarily whenever the starter button is pressed and come back on when the button is released.

Headlight Beam Horizontal Adjustment

- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

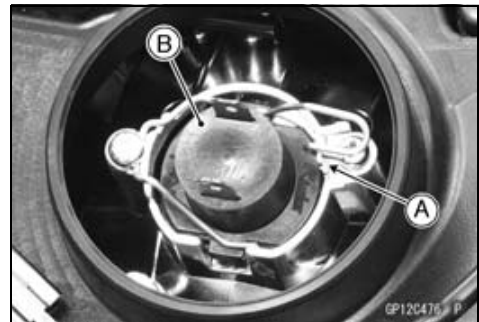
Headlight Beam Vertical Adjustment

- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Bulb Replacement

- Remove:
 - Upper Fairing (see Upper Fairing Removal in the Frame chapter)
 - Headlight Bulb Dust Cover [A]

- Remove:
 - Hook [A]
 - Headlight Bulb [B]



NOTICE

When handling the quartz-halogen bulb [A], 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.

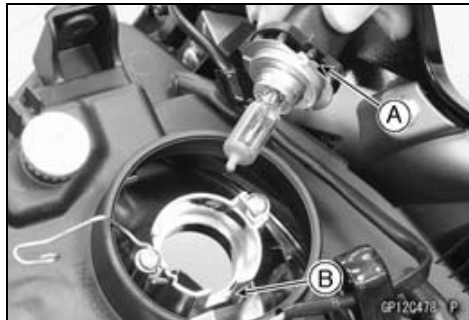
NOTE

- Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.

16-60 ELECTRICAL SYSTEM

Lighting System

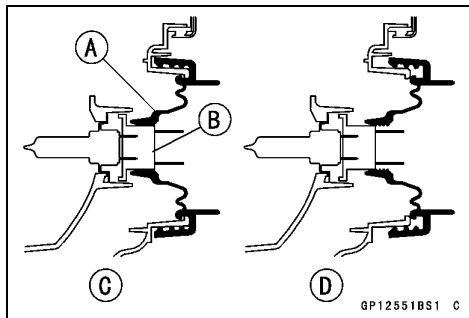
- Replace the headlight bulb.
- Fit the projection [A] of the bulb in the hollow [B] of the headlight.



- Install the hook [A].

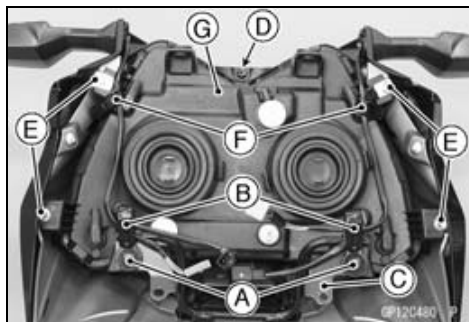


- Fit the dust cover [A] onto the bulb [B] firmly as shown.
Good [C]
Bad [D]
- After installation, adjust the headlight aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter).



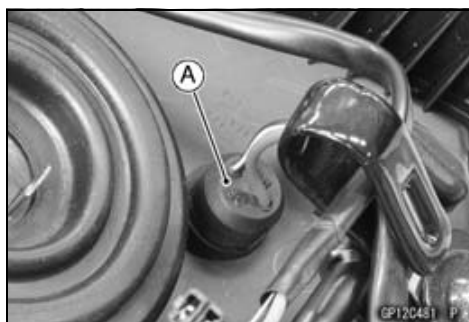
Headlight Removal/Installation

- Remove:
 - Upper Fairing (see Upper Fairing Removal in the Frame chapter)
 - Screws [A] and Clamps [B]
 - Bracket [C]
 - Screw [D]
 - Bolts [E] and Clamps [F]
 - Headlight Assy [G]
- Installation is the reverse of removal.



City Light Bulb Replacement

- Remove the upper fairing (see Upper Fairing Removal in the Frame chapter).
- Remove the socket [A] with the bulb.



Lighting System

- Pull out the bulb [A] straight from the socket.

NOTICE

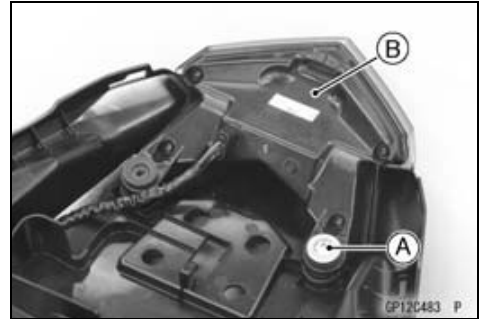
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.

- Replace the bulb with a new one.
- Install the socket securely.



Tail/Brake Light (LED) Removal

- Remove:
 - Rear Fender (see Rear Fender Removal in the Frame chapter)
 - Flap (see Flap Removal in the Frame chapter)
 - Tail/Brake Light Mounting Screw [A]
 - Tail/Brake Light (LED) [B]

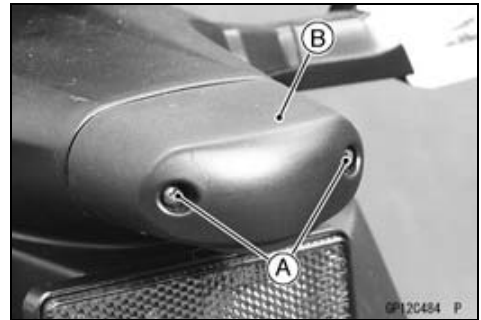


Tail/Brake Light (LED) Installation

- Installation is the reverse of removal.

License Plate Light Bulb Replacement

- Remove:
 - Screws [A]
 - License Plate Light Cover [B]

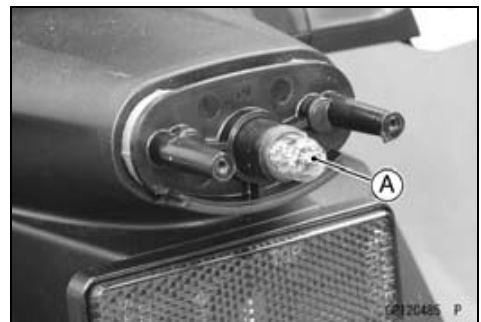


- Pull out the bulb [A] straight from the socket.

NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.

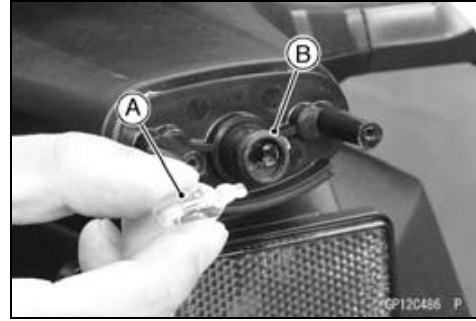
- Replace the bulb with a new one.



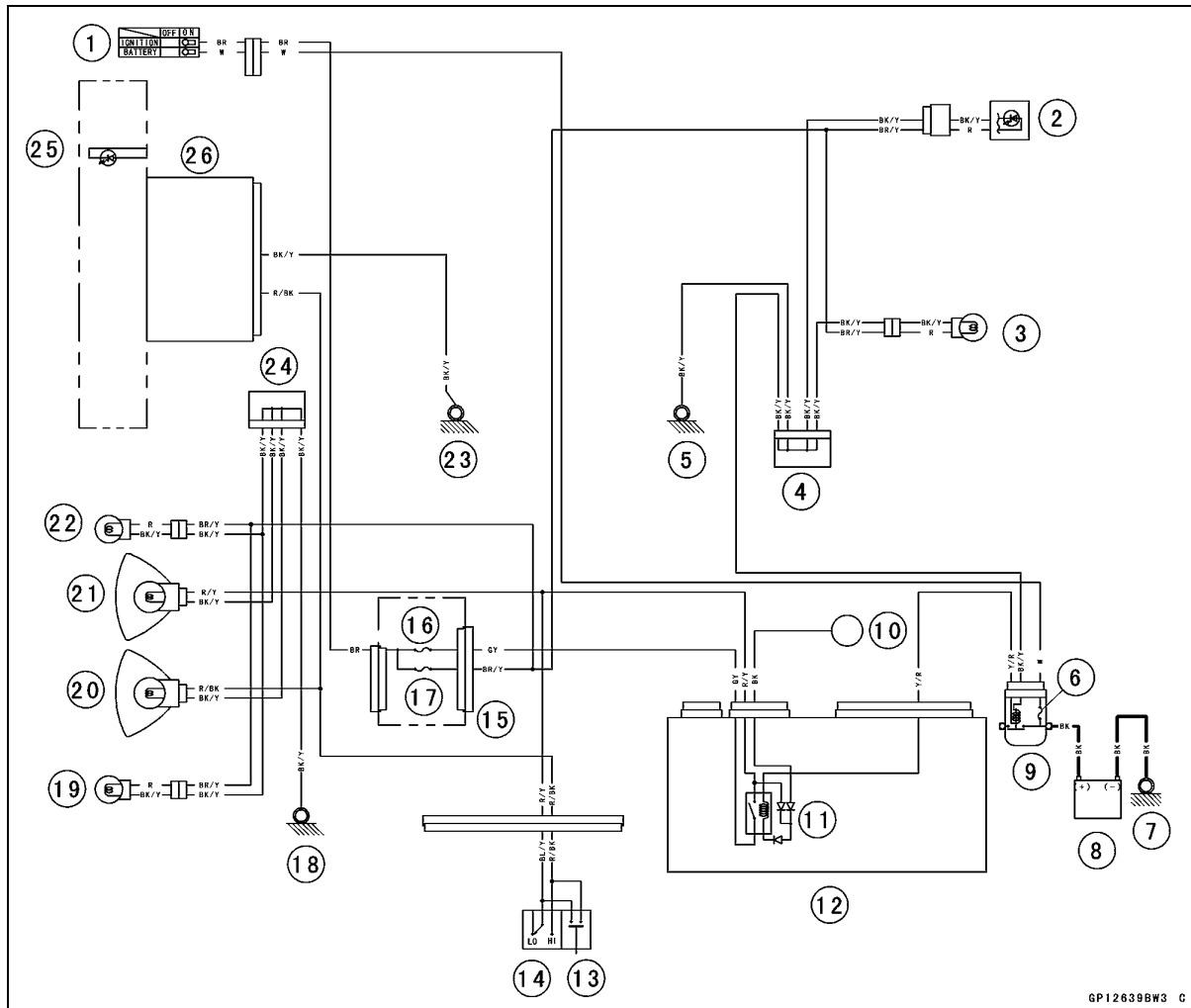
16-62 ELECTRICAL SYSTEM

Lighting System

- Insert the new bulb [A] into the socket [B].
- Install the license plate light cover.



Headlight/Tail Light Circuit



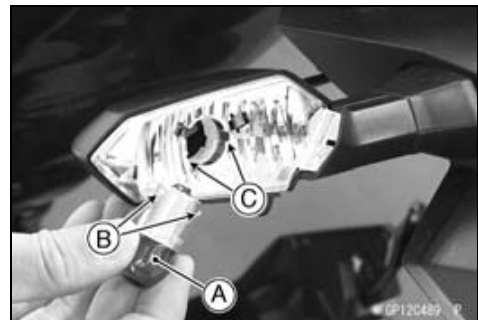
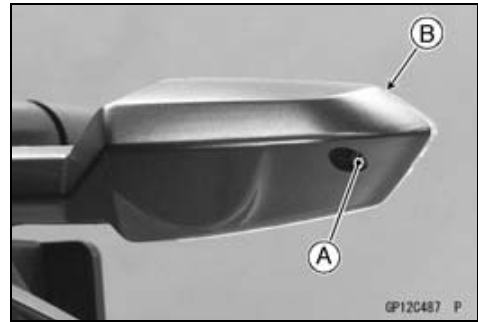
- | | | |
|---------------------------------|------------------------------|--|
| 1. Ignition Switch | 10. Alternator | 20. Headlight (High) 12 V 55 W |
| 2. Tail/Brake Light (LED) | 11. Headlight Circuit Relay | 21. Headlight (Low) 12 V 55 W |
| 3. License Plate Light 12 V 5 W | 12. Relay Box | 22. Right City Light 12 V 5 W |
| 4. Joint Connector B | 13. Passing Button | 23. Frame Ground 1 |
| 5. Frame Ground 4 | 14. Dimmer Switch | 24. Joint Connector A |
| 6. Main Fuse 30 A | 15. Fuse Box 1 | 25. Blue High Beam Indicator Light (LED) |
| 7. Engine Ground | 16. Headlight Fuse 15 A | 26. Meter Unit |
| 8. Battery 12 V 8 Ah | 17. Brake/Horn Fuse 7.5 A | |
| 9. Starter Relay | 18. Frame Ground 2 | |
| | 19. Left City Light 12 V 5 W | |

GP12639BW3 C

Lighting System

Turn Signal Light Bulb Replacement

- Remove the screw [A] and remove the lens [B].
- Push and turn the bulb [A] counterclockwise and remove it.
- Insert the new bulb [A] by aligning its upper and lower pins [B] with the upper and lower grooves [C] in the socket, and turn the bulb clockwise.
- Turn the bulb about 15°.
- Fit the projection [A] of the lens into the groove [B] of the turn signal light.
- Tighten the screw.



Turn Signal Relay Inspection

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Left Side Fairing (see Side Fairing Removal in the Frame chapter)
 - Turn Signal Relay [A]



16-64 ELECTRICAL SYSTEM

Lighting System

- Connect one 12 V battery and turn signal lights as indicated, and count how many times the lights blink for one minute.

Turn Signal Relay [A]

Turn Signal Lights [B]

12 V Battery [C]

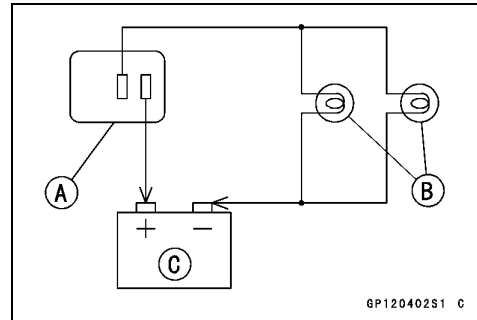
- ★ If the lights do not blink as specified, replace the turn signal relay.

Testing Turn Signal Relay

Load		Blinking Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	140 ~ 250
2	20	75 ~ 95

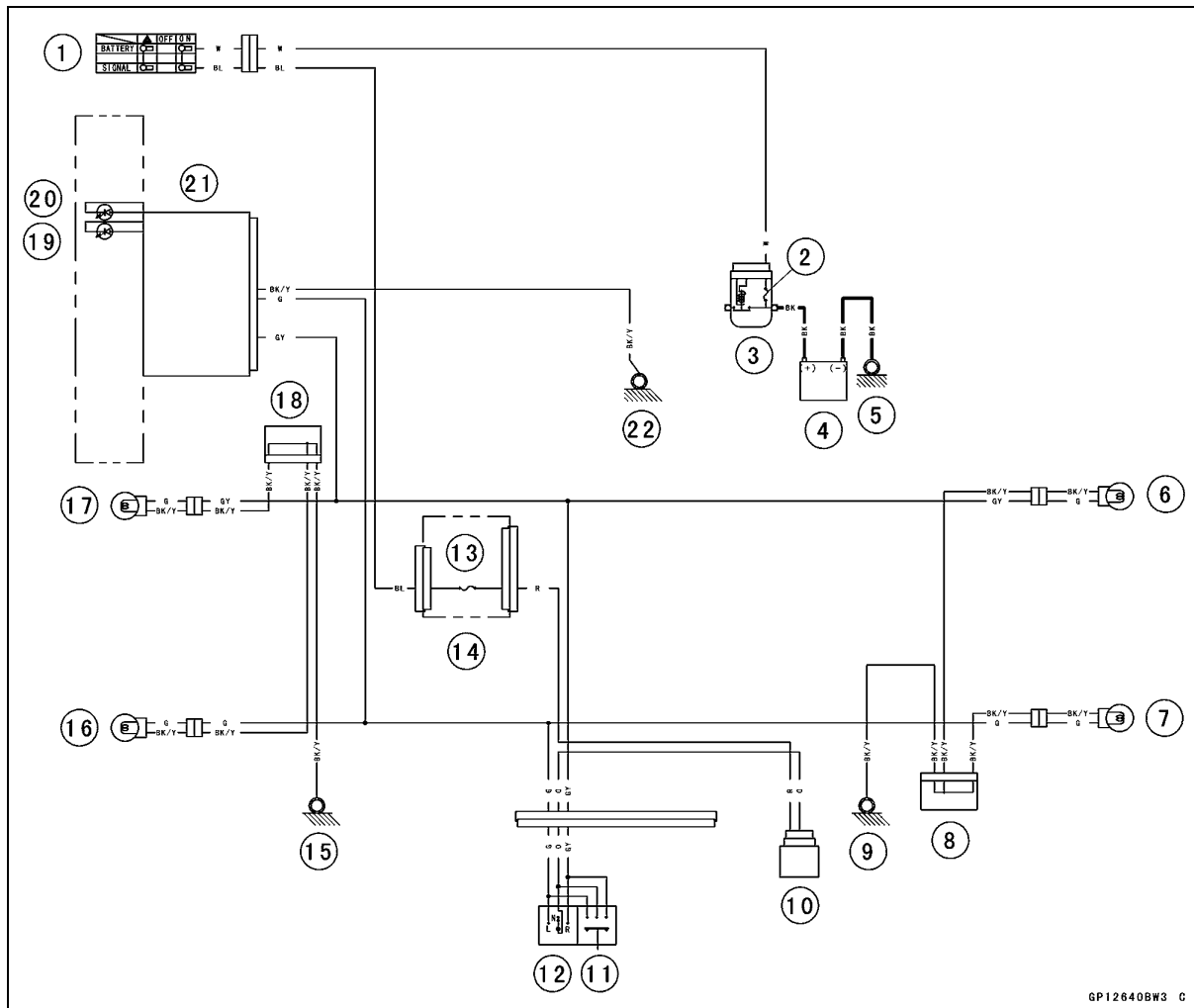
(*): Cycle(s) per minute

(**): Corrected to "one light burned out".



Lighting System

Turn Signal Light Circuit



GP12640BW3 C

1. Ignition Switch
2. Main Fuse 30 A
3. Starter Relay
4. Battery 12 V 8 Ah
5. Engine Ground
6. Rear Right Turn Signal Light 12 V 10 W
7. Rear Left Turn Signal Light 12 V 10 W
8. Joint Connector B
9. Frame Ground 4
10. Turn Signal Relay
11. Hazard Button
12. Turn Signal Switch
13. Turn Signal Relay Fuse 7.5 A
14. Fuse Box 1
15. Frame Ground 2
16. Front Left Turn Signal Light 12 V 10 W
17. Front Right Turn Signal Light 12 V 10 W
18. Joint Connector A
19. Green Right Turn Signal Indicator Light (LED)
20. Green Left Turn Signal Indicator Light (LED)
21. Meter Unit
22. Frame Ground 1

16-66 ELECTRICAL SYSTEM

Air Switching Valve

Air Switching Valve Operation Test

- Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

Air Switching Valve Unit Test

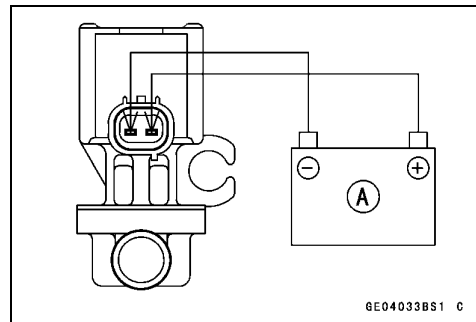
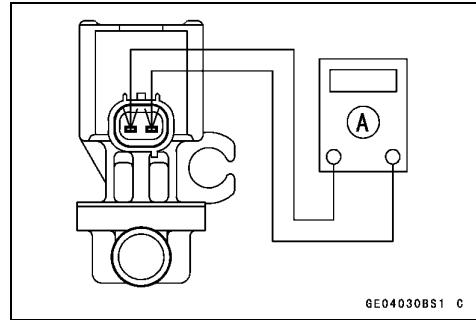
- Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).
- Set the hand tester [A] to the $\times 1 \Omega$ range and connect it to the air switching valve terminals as shown.

Special Tool - Hand Tester: 57001-1394

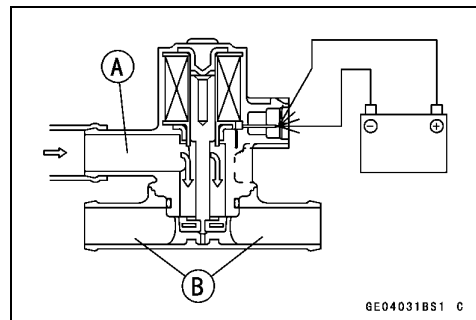
Air Switching Valve Resistance

Standard: 18 ~ 22 Ω at 20°C (68°F)

- ★ If the tester does not read as specified value, replace it with a new one.
- Connect the 12 V battery [A] to the air switching valve terminals as shown.



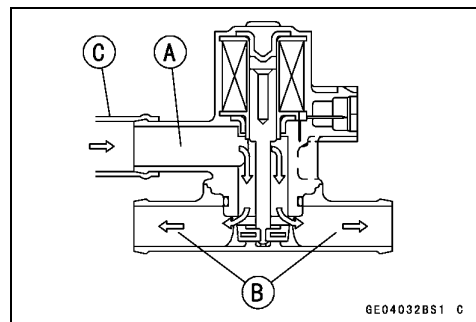
- Blow the air to the intake air duct [A], and make sure does not flow the blown air from the outlet air duct [B].



- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air duct [B].
- ★ If the air switching valve does not operate as described, replace it with a new one.

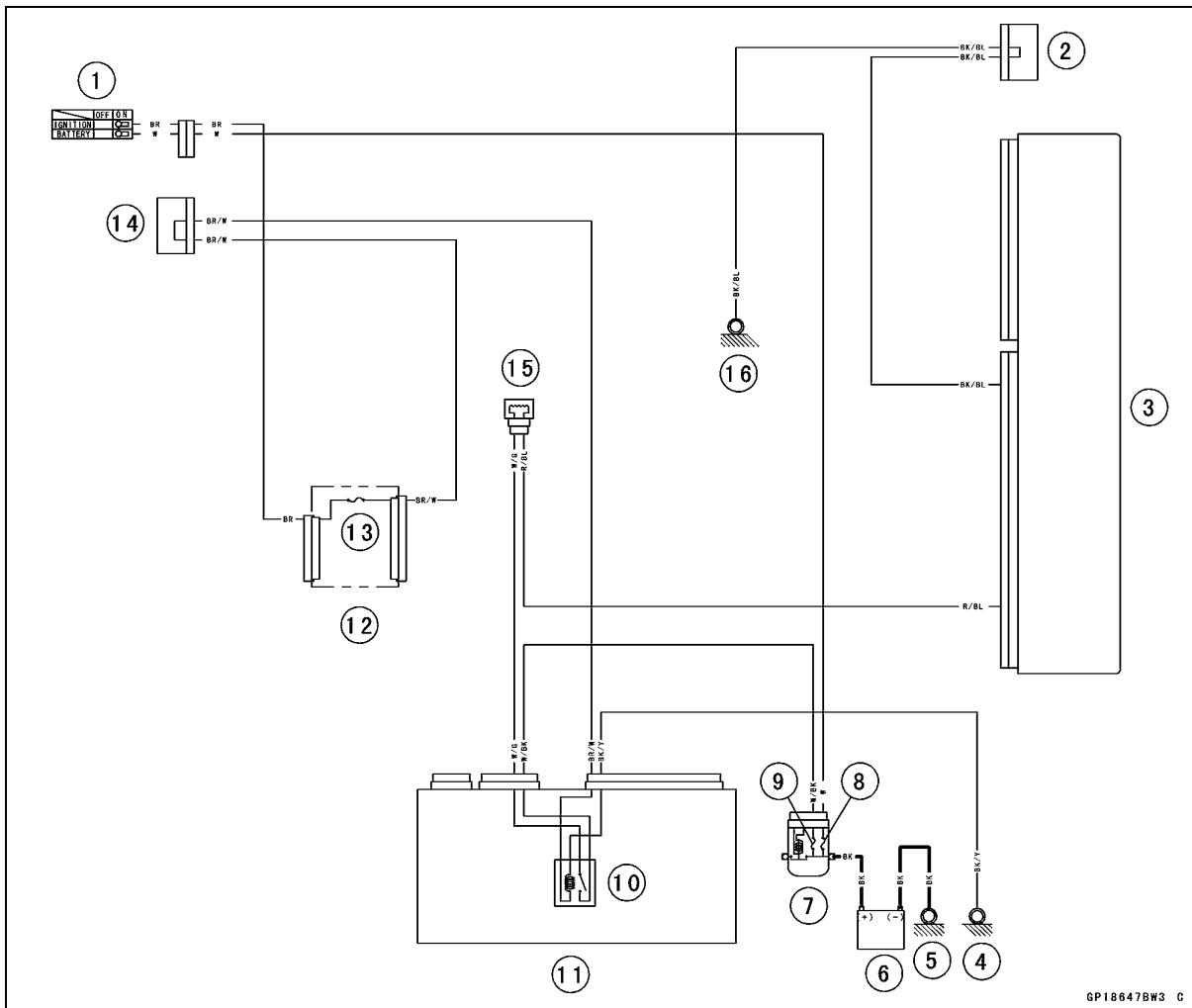
NOTE

- To check air flow through the air switching valve, just blow through the air switching valve hose (intake side) [C].



Air Switching Valve

Air Switching Valve Circuit



GP18647BW3 C

1. Ignition Switch
2. Joint Connector E
3. ECU
4. Frame Ground 4
5. Engine Ground
6. Battery 12 V 8 Ah
7. Starter Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. ECU Main Relay
11. Relay Box
12. Fuse Box 1
13. Ignition Fuse 15 A
14. Joint Connector C
15. Air Switching Valve
16. Frame Ground 1

16-68 ELECTRICAL SYSTEM

Radiator Fan System

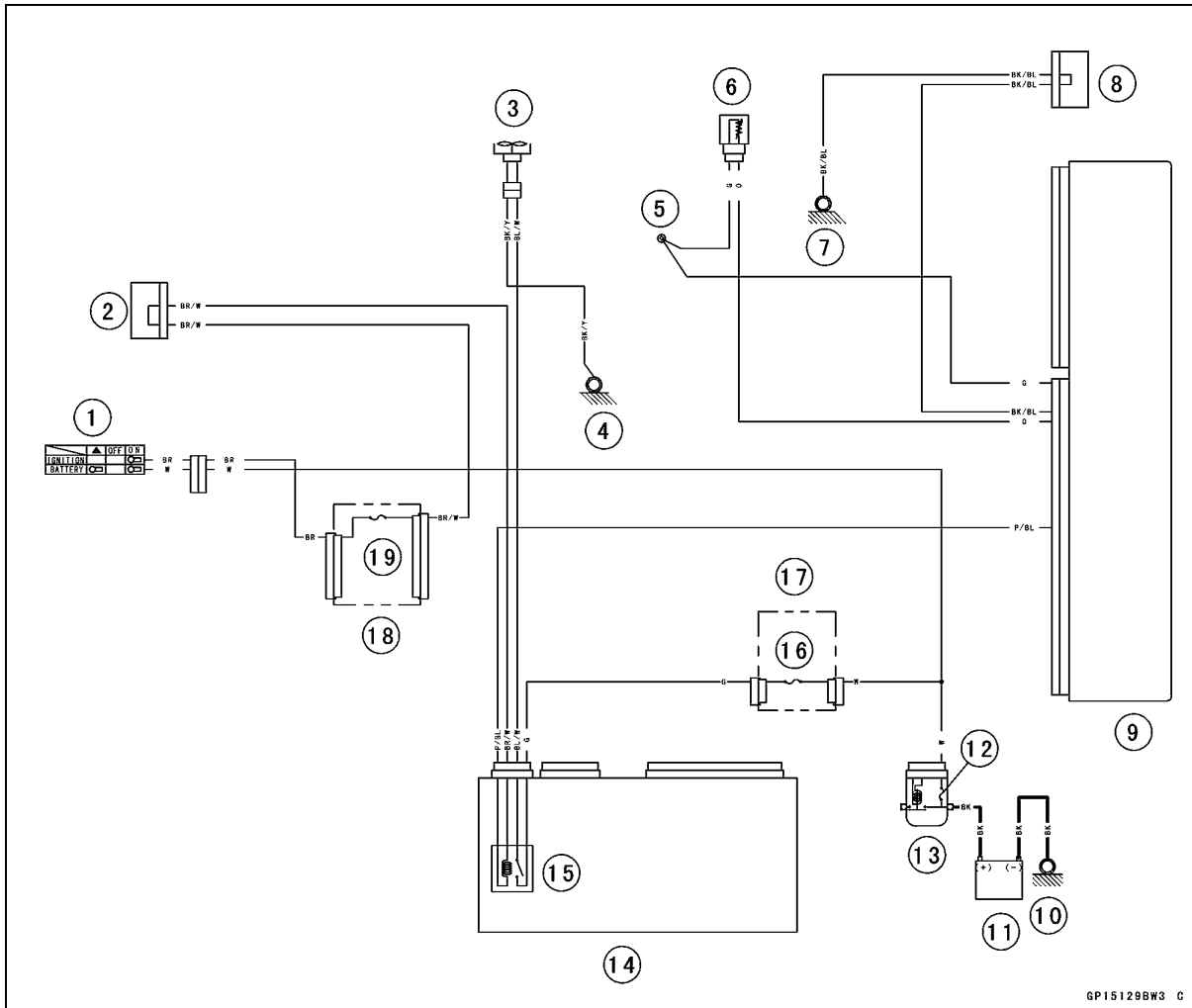
Fan Motor Inspection

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the radiator fan motor lead connector [A].
- Using an auxiliary leads, supply battery power to the fan motor.
- ★ If the fan does not rotate, the fan motor is defective and must be replaced.



Radiator Fan System

Radiator Fan Circuit



GP15129BW3 C

1. Ignition Switch
2. Joint Connector C
3. Fan Motor
4. Frame Ground 2
5. Water-proof Joint 2
6. Water Temperature Sensor
7. Frame Ground 1
8. Joint Connector E
9. ECU
10. Engine Ground
11. Battery 12 V 8 Ah
12. Main Fuse 30 A
13. Starter Relay
14. Relay Box
15. Radiator Fan Relay
16. Fan Fuse 15 A
17. Fuse Box 2
18. Fuse Box 1
19. Ignition Fuse 15 A

16-70 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

Meter Unit Removal/Installation

- Remove:
 - Upper Fairing (see Upper Fairing Removal in the Frame chapter)
- Slide the dust cover [A] and disconnect the connector.
- Remove the meter unit by taking off the mounting screws [B] with the washers.

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.

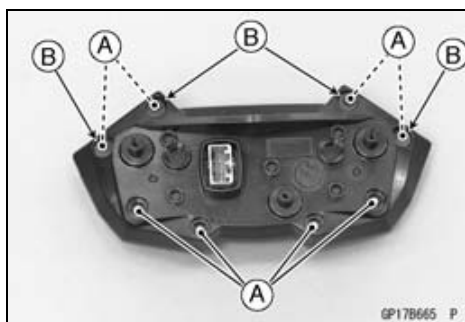
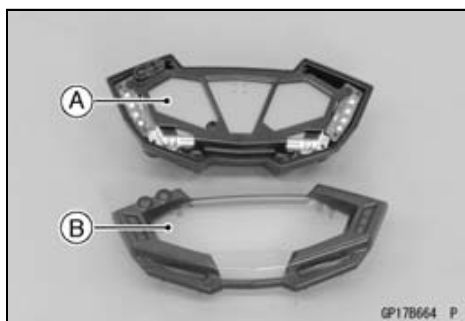
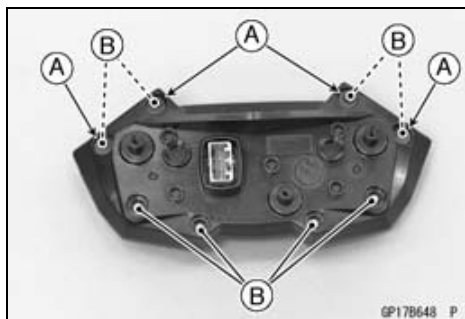
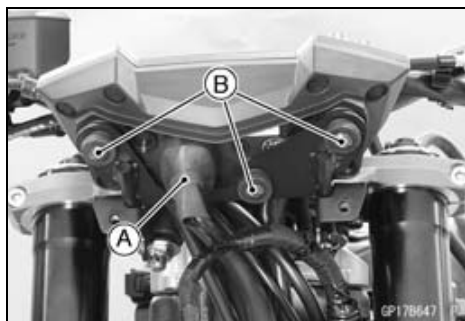
- Installation is the reverse of removal.
- Run the cables, leads and hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:
 - Torque - Meter Mounting Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)**

Meter Unit Disassembly

- Remove:
 - Meter Unit (see Meter Unit Removal/Installation)
 - Caps [A]
 - Meter Assembly Screws [B]
- Separate the meter assembly [A] and upper meter cover [B].

Meter Unit Assembly

- Assemble the following parts.
 - Meter Assembly
 - Upper Meter Cover
- Tighten:
 - Torque - Meter Assembly Screws [A]: 0.43 N·m (0.044 kgf·m, 3.8 in·lb)**
- Replace the caps [B] with new ones, and put them.



Meter, Gauge, Indicator Unit

Electronic Combination Meter Unit Inspection

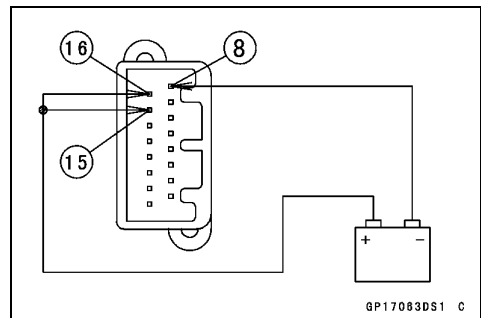
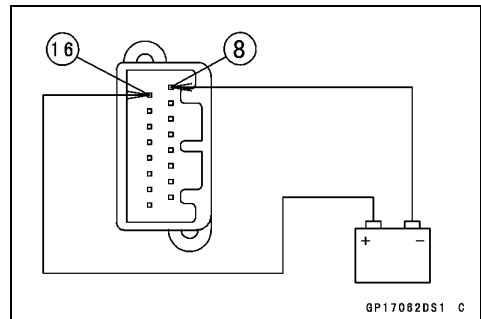
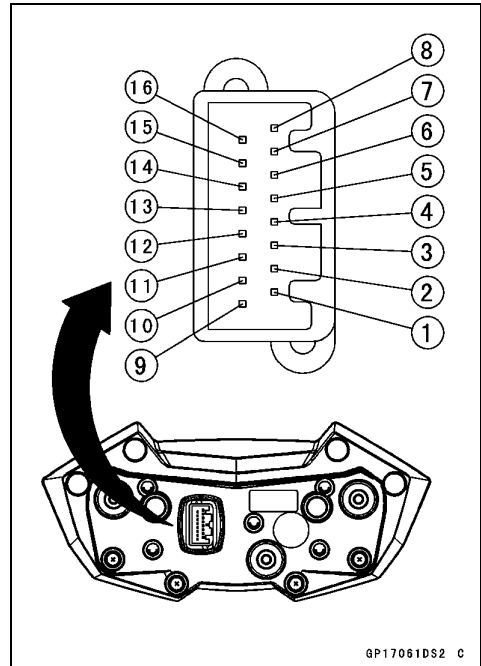
- Remove the meter unit (see Meter Unit Removal/Installation).
- [1] Red Warning Indicator Light (LED) Ground (-)
- [2] Fuel Level Sensor
- [3] Unused
- [4] Unused
- [5] Unused
- [6] Tachometer Pulse
- [7] Speed Sensor Pulse
- [8] Ground (-)
- [9] Green Left Turn Signal Indicator Light (LED) (+)
- [10] Yellow ABS Indicator Light (LED) Ground (-)
(Equipped Models)
- [11] Green Neutral Indicator Light (LED) Ground (-)
- [12] Blue High Beam Indicator Light (LED)
- [13] Green Right Turn Signal Light (LED) (+)
- [14] ECU Communication Line
- [15] Ignition
- [16] Battery (+)

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

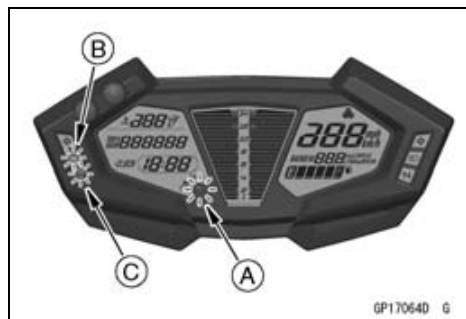
- Using the auxiliary leads, the 12 V battery to the meter unit connector as follows.
 - Connect the battery positive (+) terminal to the terminal [16].
 - Connect the battery negative (-) terminal to the terminal [8].
- Connect the terminal [15] to the battery (+) terminal.



16-72 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

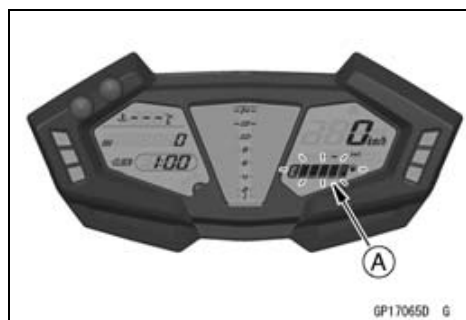
- When the terminals are connected, the meter unit displays the following.
 - All the LCD segments appear for about 1 second.
 - The red warning indicator light (LED) [A] and yellow engine warning indicator light (LED) [B] go on for about 1 second.
 - The yellow ABS indicator light goes on [C] (equipped models).



- About 3 seconds after, the all fuel level gauge segments and fuel warning symbol start blinking [A].
 - ★ If the fuel level gauge does not blink, replace the meter assembly.

NOTE

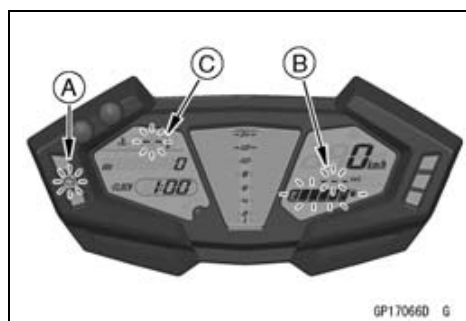
○ This meter unit has a failure detection function (for open or short) of the fuel level gauge. When the fuel level gauge is open or short, the meter unit alerts the rider by the all fuel level gauge segments blinks in the display.



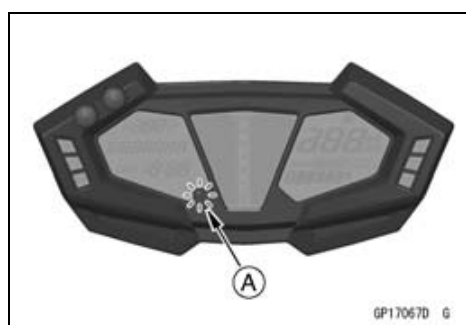
- About 10 seconds after, the yellow engine warning indicator light (LED) [A] goes on and the LCD segments [B] [C] blink in the display.
 - ★ If the yellow engine warning indicator light (LED) does not go on and/or the LCD segments do not blink, replace the meter assembly.

NOTE

○ This meter unit has a failure detection function of the communication. When the communication error was detected, the meter unit alerts the rider by the yellow engine warning indicator light (LED) goes on and the LCD segments blinking in the display.



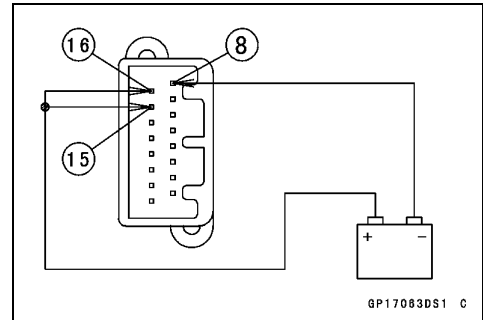
- Disconnect the terminal [15].
 - All the LCD segments disappear.
 - The red warning indicator light (LED) [A] starts blinking (see Abstract section in the Immobilizer System).
 - ★ If the segments do not disappear, replace the meter assembly.



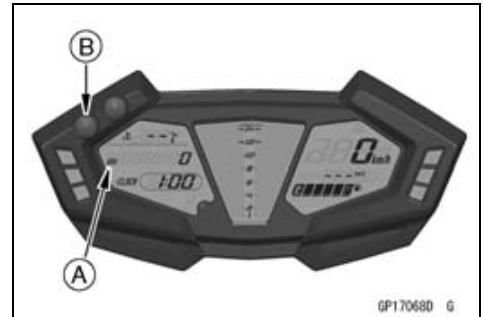
Meter, Gauge, Indicator Unit

Check 2: Meter Communication Line (Service Code 39) Check

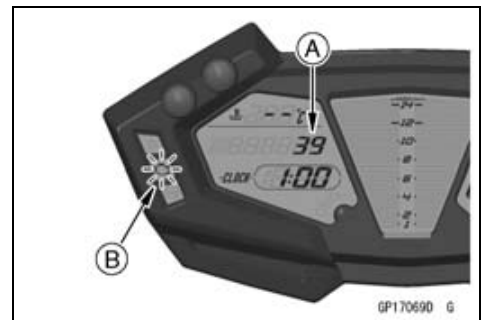
- Connect the leads in the same circuit as Check 1.
- Wait 10 seconds and the yellow engine warning indicator light (LED) goes on.



- Set the ODO mode [A] by pushing the left button [B].
- Push the left button for more than 2 seconds.



- Check the following items.
 - The number 39 [A] in the display appear and yellow engine warning indicator light (LED) [B] goes on.
 - Push the left button for more than 2 seconds.
 - Check the following items.
 - The display returns ODO mode from number 39.
 - The yellow engine warning indicator light (LED) goes on.
 - ★ If the meter unit does not work, replace the meter assembly.

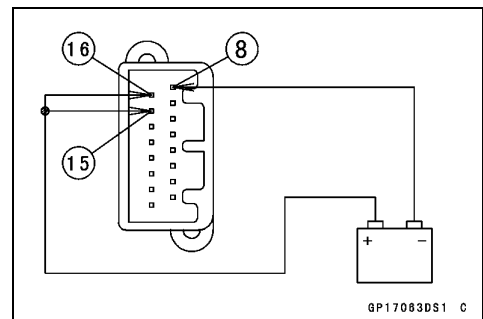


NOTE

- The number 39 is service code of Self-Diagnosis (see Fuel System chapter). It is the service code of the meter communication line error.
- The number 39 in the display and yellow engine warning indicator light (LED) disappear when the meter unit is connected to main harness of the normal motorcycle.

Check 3: Left Button Operation Check

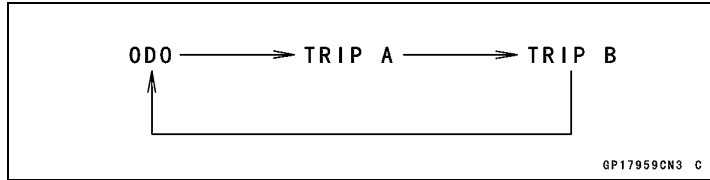
- Connect the leads in the same circuit as Check 1.



16-74 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

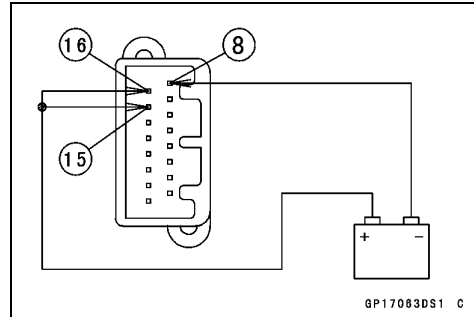
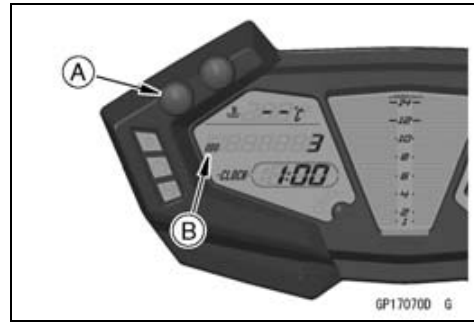
- By pushing the left button [A] each time, check that the display [B] changes as follows.



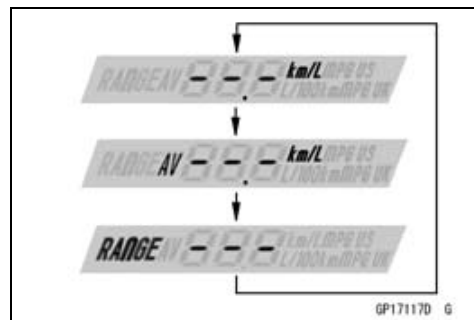
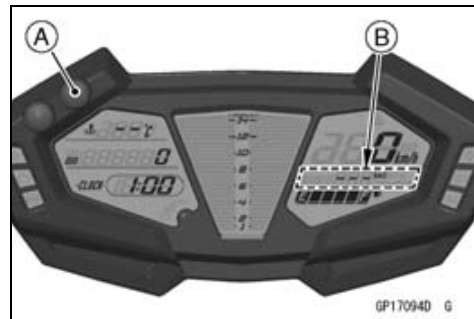
- ★ If the display function does not work, replace the meter assembly.

Check 4: Mileage Indication Changing Check

- Connect the leads in the same circuit as Check 1.

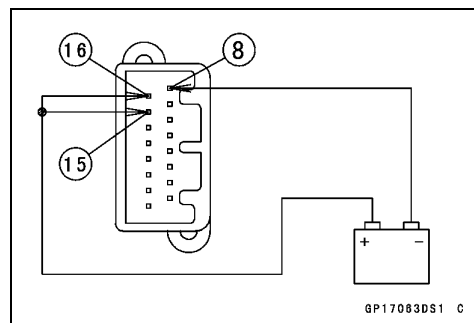


- By pushing (within 2 seconds) the right button [A] each time, check that the display [B] changes as follows.
- ★ If the display function does not work, replace the meter assembly.



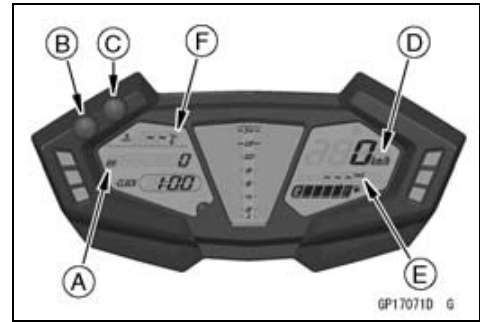
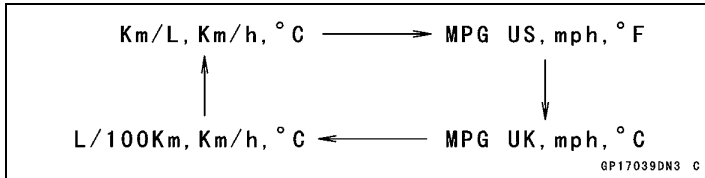
Check 5: Unit Changing Check

- Connect the leads in the same circuit as Check 1.



Meter, Gauge, Indicator Unit

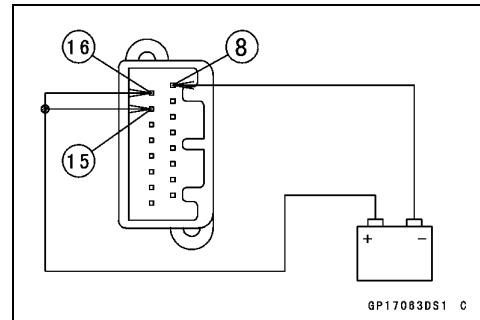
- Set the ODO mode [A] by pushing the left button [B].
- During the right button [C] pushing, the unit of the speed [D], distance [E] and temperature [F] change every time the left button is pushed within 2 seconds.



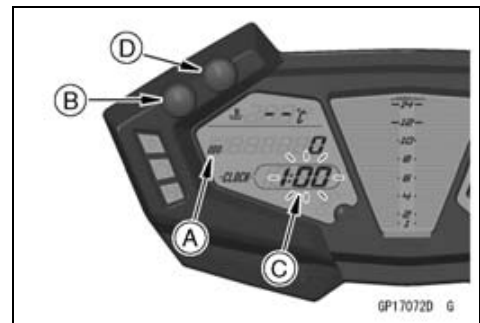
★If the meter function does not work, replace the meter assembly.

Check 6: Clock Setting Check

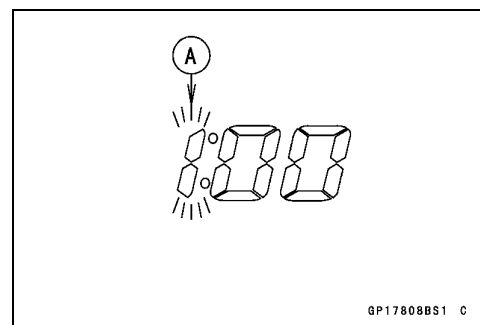
- Connect the leads in the same circuit as Check 1.



- Set the ODO mode [A] by pushing the left button [B].
- Push the left button for more than two seconds within 10 seconds connecting the terminal [15].
- The clock setting menu (hour and minute) [C] should blink.
- Push the right button [D].



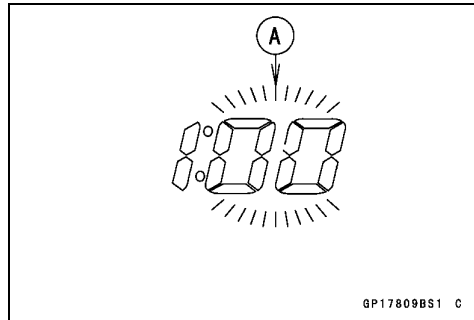
- The hour display [A] starts blinking.
- By pushing the left button each time, check that the hour display changes.



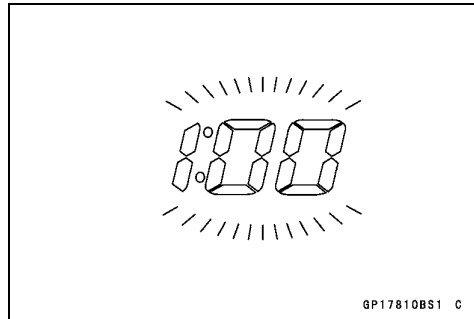
16-76 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

- By pushing the right button, check that the hour display decides and minute display [A] starts blinking.
- By pushing the left button each time, check that the minute display changes.

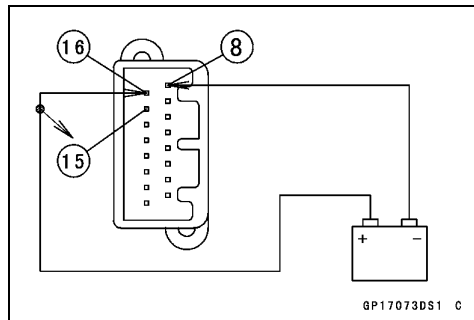


- By pushing the right button, check that the hour and minute display start blinking.
- By pushing the left button, check that the hour and minute display decide.
- When both hour and minute display is blinking, by pushing the right button, check that the hour display start blinking. This blinking returns the hour setting display.
- ★ If the display function does not work, replace the meter assembly.
- If the terminal 15 disconnected when the clock is setting, clock is set at time of that time.

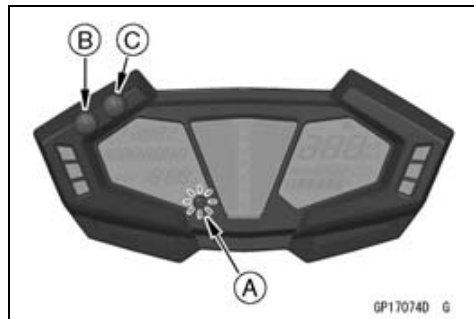


Check 7: Immobilizer Blinking Mode Inspection

- Connect the leads in the same circuit as Check 1.
- Disconnect the terminal [15].



- Check that the red warning indicator light (LED) [A] starts blinking (Immobilizer Blinking Mode).
- Push the left [B] and right [C] buttons more than 2 second, within 20 seconds after the terminal [15] disconnected.
- Check that the red warning indicator light (LED) goes on 1 second, and then the light goes off (Immobilizer No Blinking Mode).

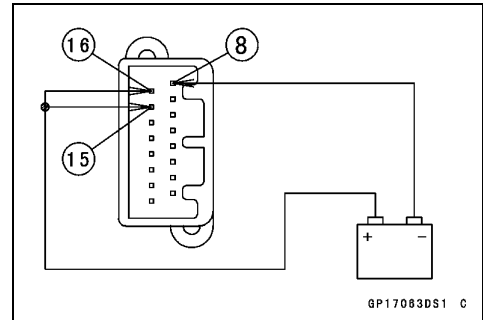


NOTE

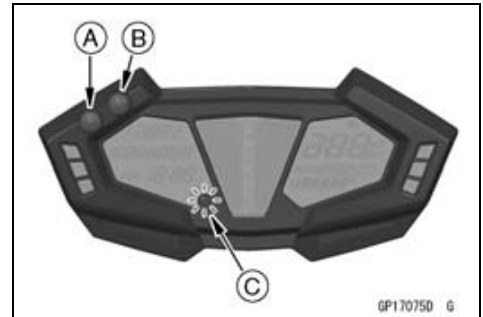
○ For this inspection, be sure the battery is 12.2 V or more. Immobilizer Blinking Mode does not work, when the battery voltage is less than 12 ± 0.2 V.

Meter, Gauge, Indicator Unit

- Connect the terminal [15] to the battery (+) terminal.
- And then, disconnect the terminal [15].

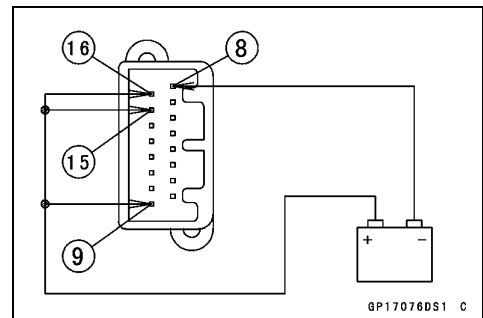


- Push the left [A] and right [B] buttons more than 2 second, within 20 seconds after the terminal [15] disconnected.
- Check that the red warning indicator light (LED) [C] goes on 1 second, and then the light starts blinking (Immobilizer Warning Indicator Light Blinking Mode).
- ★If the meter function does not work, replace the meter assembly.

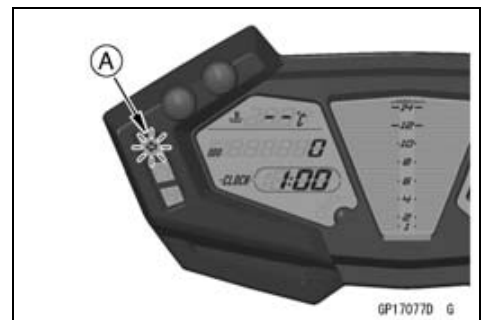


Check 8: Green Left Turn Signal Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [9] to the battery (+) terminal.

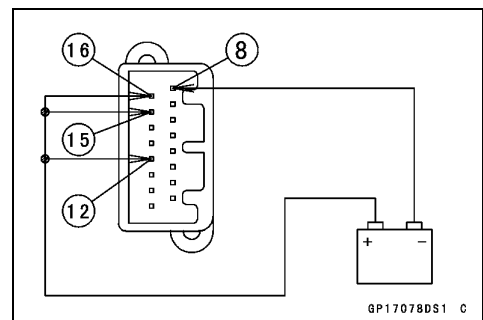


- Check that the green left turn signal indicator light (LED) [A] goes on.
- ★If the indicator light (LED) does not go on, replace the meter assembly.



Check 9: Blue High Beam Indicator Light (LED) Inspection

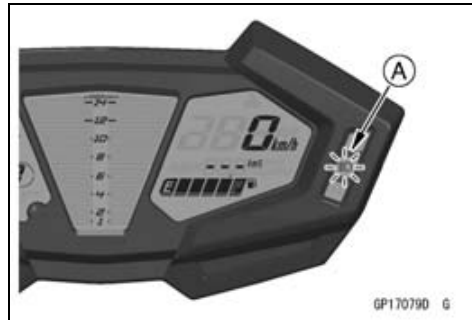
- Connect the leads in the same circuit as Check 1.
- Connect the terminal [12] to the battery (+) terminal.



16-78 ELECTRICAL SYSTEM

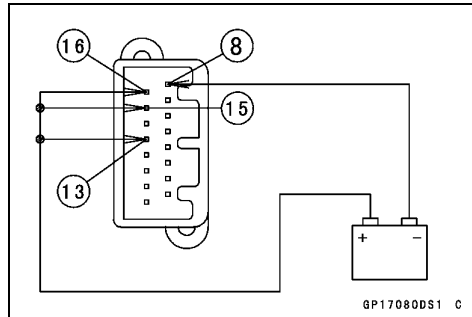
Meter, Gauge, Indicator Unit

- Check that the blue high beam indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter assembly.

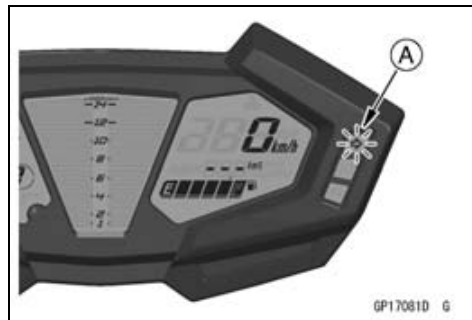


Check 10: Green Right Turn Signal Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [13] to the battery (+) terminal.

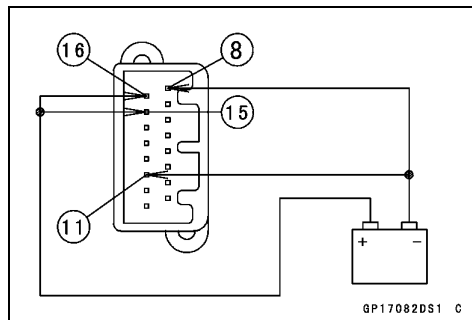


- Check that the green right turn signal indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter assembly.

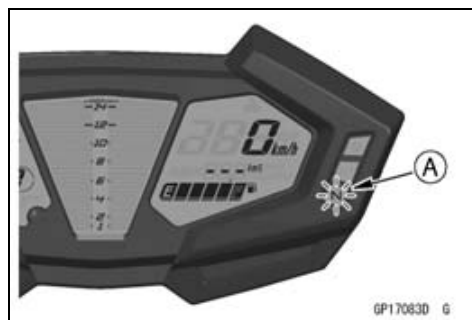


Check 11: Green Neutral Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [11] to the battery (-) terminal.



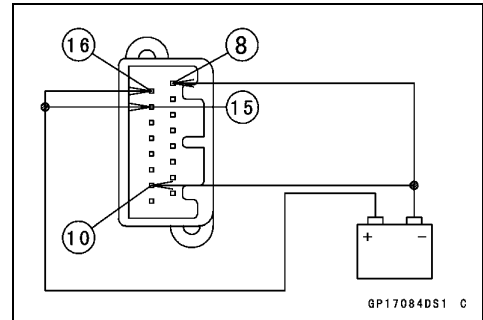
- Check that the green neutral indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter assembly.



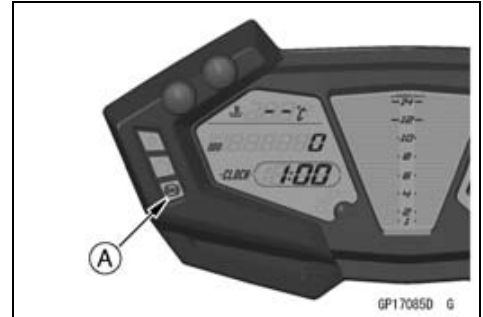
Meter, Gauge, Indicator Unit

Check 12: Yellow ABS Indicator Light (LED) Inspection (Equipped Models)

- Connect the leads in the same circuit as Check 1.
- The yellow ABS indicator light (LED) goes on.
- Connect the terminal [10] to the battery (-) terminal.

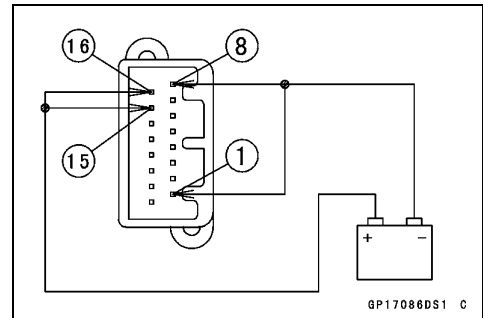


- Check that the yellow ABS indicator light (LED) [A] goes off.
- ★ If the indicator light (LED) does not go off, replace the meter assembly.

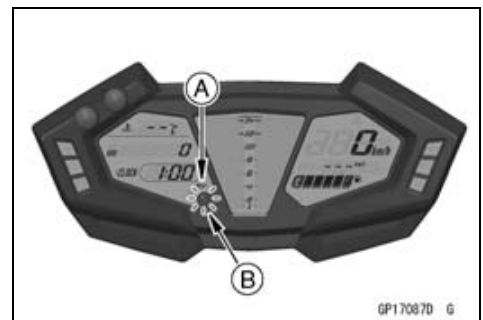


Check 13: Red Warning Indicator Light (LED) Inspection (Oil Pressure Warning)

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [1] to the battery (-) terminal.

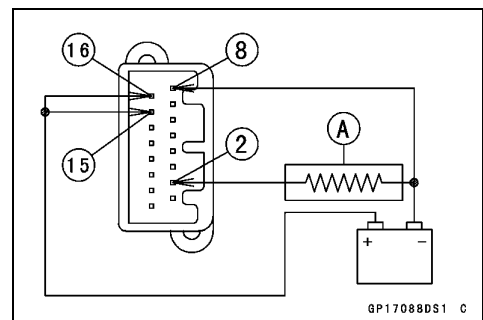


- Check that the oil symbol [A] and red warning indicator light (LED) [B] go on.
- ★ If the oil symbol and indicator light (LED) do not go on, replace the meter assembly.



Check 14: Fuel Gauge Inspection

- Connect the leads in the same circuit as Check 1.
- The all segments of the fuel gauge in the display will blink.
- Connect the variable rheostat [A] to the terminal [2] and the battery (-) terminal.



16-80 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

- Check that the segments number of the fuel level gauge [A] matches the resistance value of the variable rheostat.
- When the terminal [2] is connected, 1 segment in the fuel level gauge should appear about every 15 seconds.

Variable Rheostat Resistance (Ω)	Display Segments
20	6 segments go on
60	5 segments go on
90	4 segments go on
110	3 segments go on
140	2 segments go on
170	1 segment goes on
210	1 segment blinks

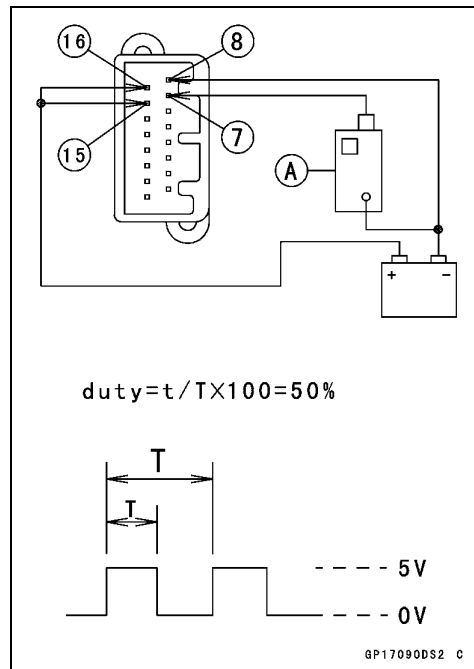
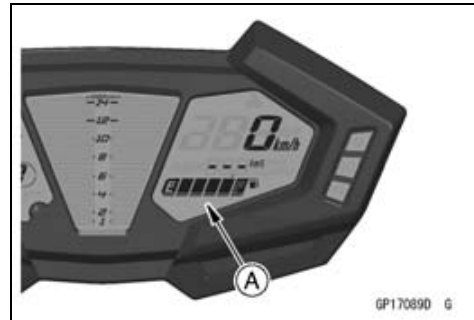
- ★ If the display function does not work, replace the meter assembly.

Check 15: 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 [7].
- Indicates approximately 60 km/h if the input frequency is approximately 560 Hz.
- Indicates approximately 60 mph if the input frequency is approximately 904 Hz.
- ★ If the meter function does not work, replace the meter assembly.

NOTE

- The input frequency of the oscillator adds the integrated value of the odometer.
- The integrated value of the odometer cannot be reset.

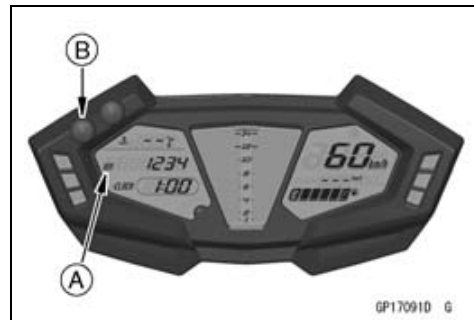


Check 16: Odometer Inspection

- Connect the leads in the same circuit as Check 15.
- Set the ODO mode [A] by pushing the left button [B].
- Raise the input frequency of the oscillator to see the result of this inspection.
- Example: Indicates the increase of approximately 1 km/h, if the input frequency is approximately 525 Hz for one minute.
- Example: Indicates the increase of approximately 1 mile, if the input frequency is approximately 840 Hz for one minute.
- ★ If the value indicated by the odometer does not increase, replace the meter assembly.

NOTE

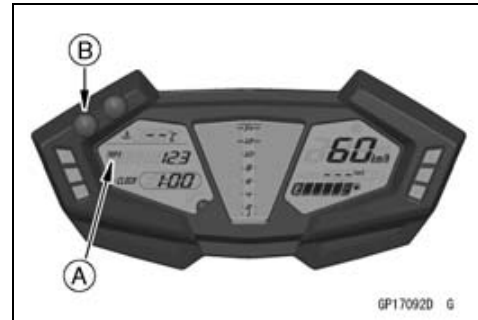
- The integrated value of the odometer cannot be reset.



Meter, Gauge, Indicator Unit

Check 17: Trip Meter Inspection

- Connect the leads in the same circuit as Check 15.
- Set the TRIP mode [A] by pushing the left button [B].
- Raise the input frequency of the oscillator to see the result of odometer inspection.
- ★ If the value indicated by the trip meter does not increase, replace the meter assembly.
- When pushing the left button for more than two seconds, check that the display changes 0.0.
- ★ If the display function does not change, replace the meter assembly.

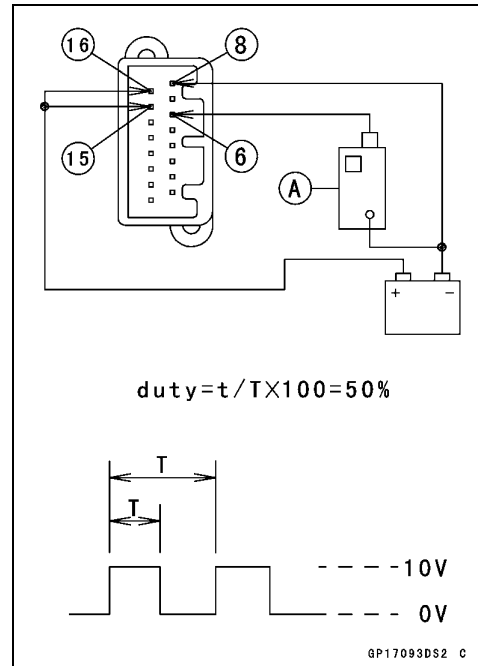


NOTE

- The integrated value of the odometer cannot be reset.

Check 18: 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 [6].
- Indicates approximately 4 000 rpm if the input frequency is approximately 133.3 Hz.
- ★ If the meter function does not work, replace the meter assembly.



Check 19: Other Inspection

- The following items are displayed while running.
 - AVERAGE
 - CURRENT
 - RANGE
 - ECO Mark
 - Water Temperature
- When the above item is faulty indication check the following items.
 - Wiring (see Wiring Inspection)
 - ECU Communication Line (see ECU Communication Line Inspection in the Fuel System (DFI) chapter)
 - Fuel Injectors (see Fuel Injectors section in the Fuel System (DFI) chapter)
 - Fuel Level Sensor (see Fuel Level Sensor Inspection)
- ★ If the above items are good, replace the meter assembly and/or ECU.

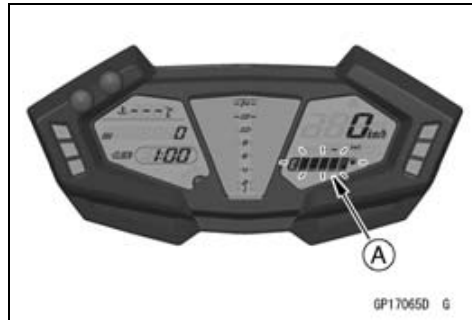
16-82 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

Fuel Level Sensor Line Self-Diagnosis Mode Inspection

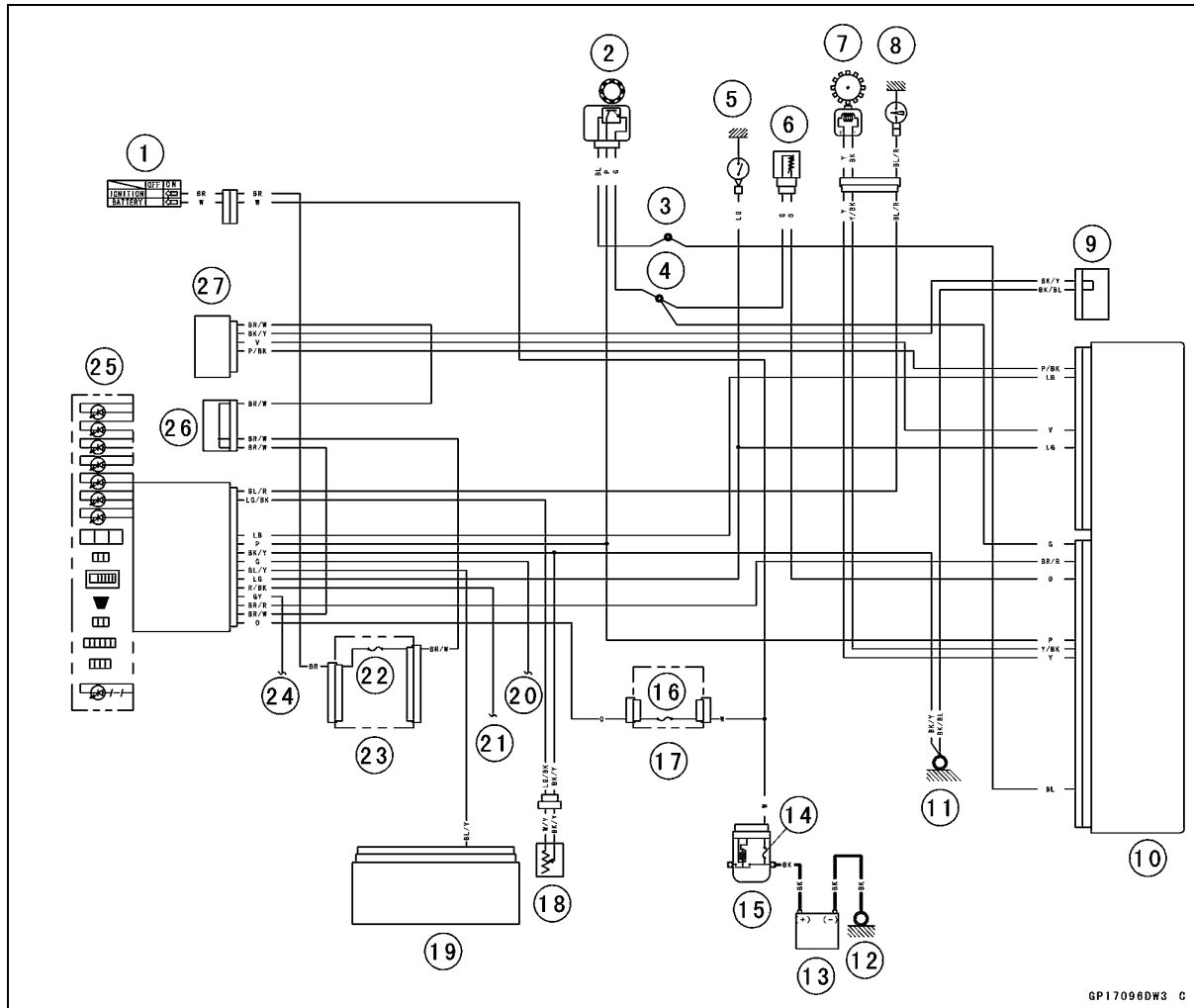
NOTE

- Usually when the open or short of the fuel level sensor circuit is detected, it becomes the Fuel Level Sensor Line Self-Diagnosis Mode.
- The all segments of the fuel gauge and fuel warning symbol [A] in the display will blink. (This function is Fuel Level Sensor Line Self-Diagnosis Mode.)
- ★ If the meter enters the self-diagnosis mode when the meter is installed in the motorcycle, check the fuel level sensor (see Fuel Level Sensor Inspection) and wiring.
- ★ If the fuel level sensor and wiring are good, replace the meter assembly.



Meter, Gauge, Indicator Unit

Meter Circuit



- | | |
|-----------------------------|--|
| 1. Ignition Switch | 15. Starter Relay |
| 2. Speed Sensor | 16. Meter Fuse 7.5 A |
| 3. Water-proof Joint 1 | 17. Fuse Box 2 |
| 4. Water-proof Joint 2 | 18. Fuel Level Sensor |
| 5. Neutral Switch | 19. ABS Hydraulic Unit (Equipped Models) |
| 6. Water Temperature Sensor | 20. Turn Signal Switch (Left) |
| 7. Crankshaft Sensor | 21. Dimmer Switch |
| 8. Oil Pressure Switch | 22. Ignition Fuse 15 A |
| 9. Joint Connector E | 23. Fuse Box 1 |
| 10. ECU | 24. Turn Signal Switch (Right) |
| 11. Frame Ground 1 | 25. Meter Unit |
| 12. Engine Ground | 26. Joint Connector C |
| 13. Battery 12 V 8 Ah | 27. Immobilizer Amplifier |
| 14. Main Fuse 30 A | |

16-84 ELECTRICAL SYSTEM

Immobilizer System

This motorcycle is equipped with an immobilizer system to protect the motorcycle from theft. This system provides a theft proof device by means of matching a code between the inbuilt key transponder and ECU. If the code does not match, ignition system, injectors, subthrottle valve actuator and exhaust butterfly valve actuator (ZR800A/B Models) will not operate and the engine will not start.

Abstract

- Do not keep more than one immobilizer key of any system on a key ring. Jamming of the key code signal may occur and the operation of the system may be affected.
- The red warning indicator light (LED) will blink for a period of 24 hours once the ignition switch has been switched off and the key removed. This blinking can be set to on or off as desired by holding the left and right buttons down for 2 seconds within 20 seconds of switching the ignition off.
- If all coded keys are lost the ECU and ignition switch will have to be replaced.
- The immobilizer system can not function until the ignition key code is registered in the ECU.
- A total of five keys can be registered in the ECU at any one time.

Operational Cautions

1. Do not put two keys of any immobilizer system on the same key ring.
2. Do not submerge any key in water.
3. Do not expose any key to excessively high temperature.
4. Do not place any key close to magnet.
5. Do not place a heavy item on any key.
6. Do not grind any key or alter its shape.
7. Do not disassemble the plastic part of any key.
8. Do not drop the key and/or apply any shocks to the key.
9. When an ignition key is lost, the user should go to his dealer to invalidate the lost key registration in the ECU.
10. When all ignition keys are lost, the user should go to his dealer and have a new ECU installed and register the ignition keys.

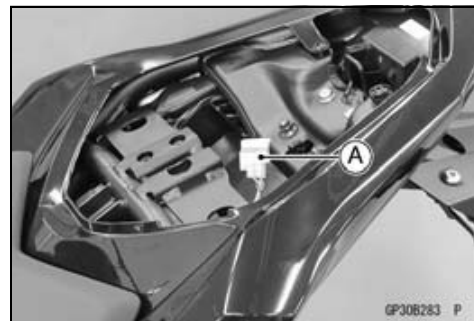
NOTE

○No.9 and 10 are strongly recommended to the customer to ensure security of the motorcycle.

Key Registration

Case 1: When additional spare ignition key is required.

- Prepare a new spare ignition key.
- Cut the key in accordance with the shape of the current ignition key.
- Remove the rear seat (see Rear Seat Removal in the Frame chapter).
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].

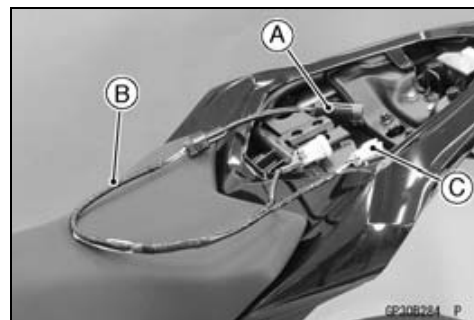


- Connect the key registration unit [A] and key registration adapter [B] as shown.

Immobilizer/Kawasaki Diagnostic System Connector [C]

Special Tools - Key Registration Unit: 57001-1582

Key Registration Adapter: 57001-1746

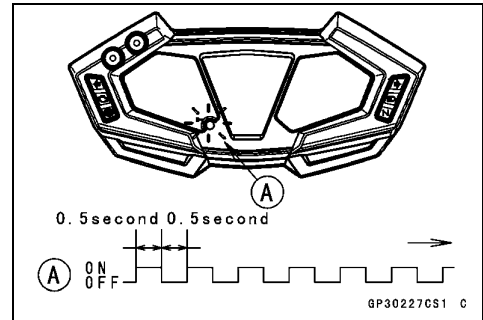


Immobilizer System

- Insert the registered ignition key to the ignition switch and turn it to “ON.”

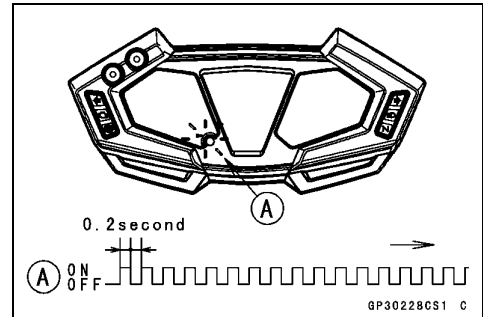
Verified

- The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode (go to the next step).

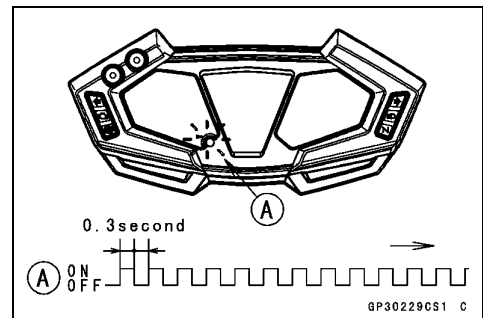


Not Verified

- The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error (refer to the following failure illustrations).
Immobilizer Amplifier Failure



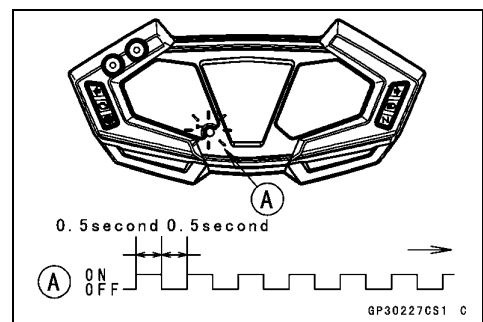
Registered Ignition Key Collation Error



- Turn the registered ignition key to “OFF” and remove the registered ignition key.
- ★ If there are other registered ignition keys, they should all do the procedure above.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink continuously to display that the ECU is in the registration mode for 15 seconds.

NOTE

- Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) and immobilizer warning symbol stop blinking.
- To return to the registration mode start the registered ignition key(s) verification procedure. This applies to all ignition key registration.



- Insert the ignition key 1 to the ignition switch and turn it to “ON.”

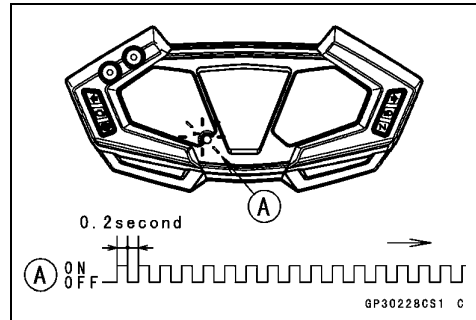
NOTE

- Keep the other ignition key away from the immobilizer antenna.

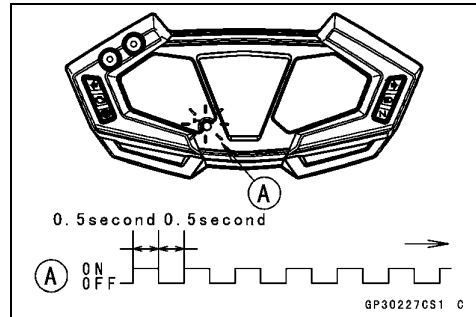
16-86 ELECTRICAL SYSTEM

Immobilizer System

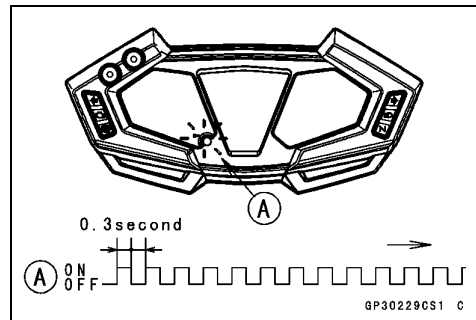
- If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
Immobilizer Amplifier Failure



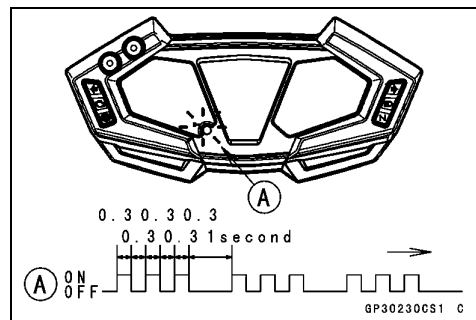
When Registered Ignition Key is Inserted.



Ignition Key Collation Error



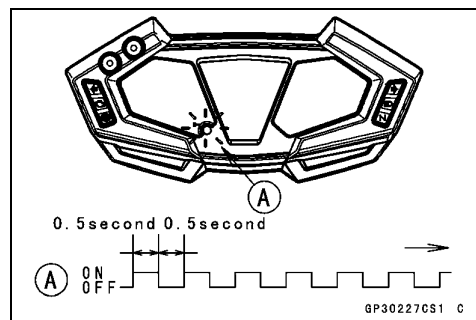
- The ignition key 1 is successfully registered in the ECU.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 3 times and stops for 1 second and then repeats this cycle.



- Turn the ignition key 1 to "OFF" and remove the ignition key 1.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode.

NOTE

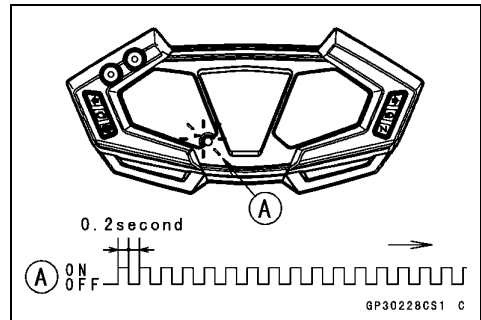
- Turn to "OFF" the ignition switch and wait for the period of 15 seconds or more. The registration mode automatically finishes and the red warning indicator light (LED) and immobilizer warning symbol will switch off.
- This procedure registered the registered ignition key and one ignition key.
- Continue with the procedure to register the second and later keys before the 15 seconds period has elapsed.



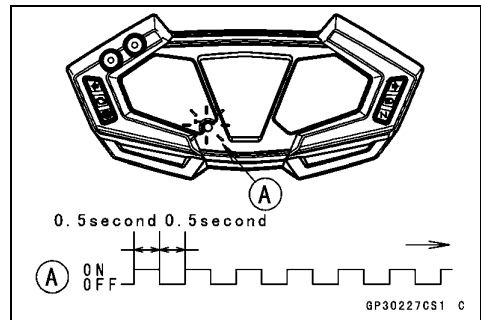
Immobilizer System

- Insert the ignition key 2 to the ignition switch and turn it to “ON.”

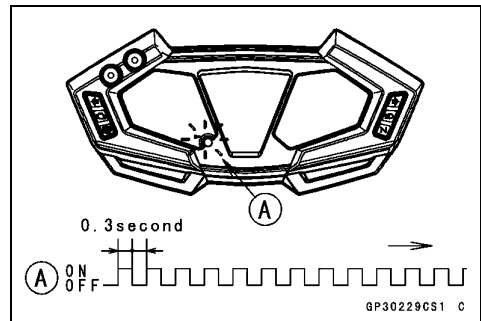
○ If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
 Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.



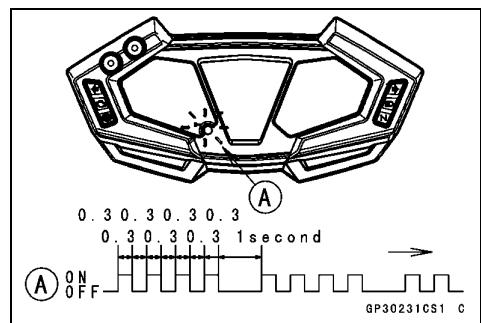
Ignition Key Collation Error



- The ignition key 2 is registered in the ECU.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 4 times and stops for 1 second and then repeats this cycle.
- This procedure has registered the 2 ignition keys.
- Continue with the procedure to register an additional one ignition key.

NOTE

○ The ECU can store up the five key codes.



Red Warning Indicator Light (LED) and Symbol Blink

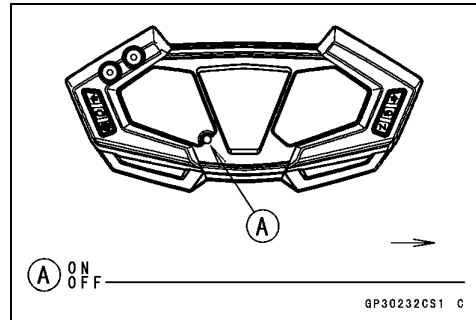
	Indicator Light and Symbol Blink	Indicator Light and Symbol Stop	Remarks
Ignition Key 3	5 times	1 second	Repeat

- Turn to “OFF” the ignition switch and wait for period of more than 15 seconds.
- The registration mode automatically ends.

16-88 ELECTRICAL SYSTEM

Immobilizer System

- The red warning indicator light (LED) [A] goes off.



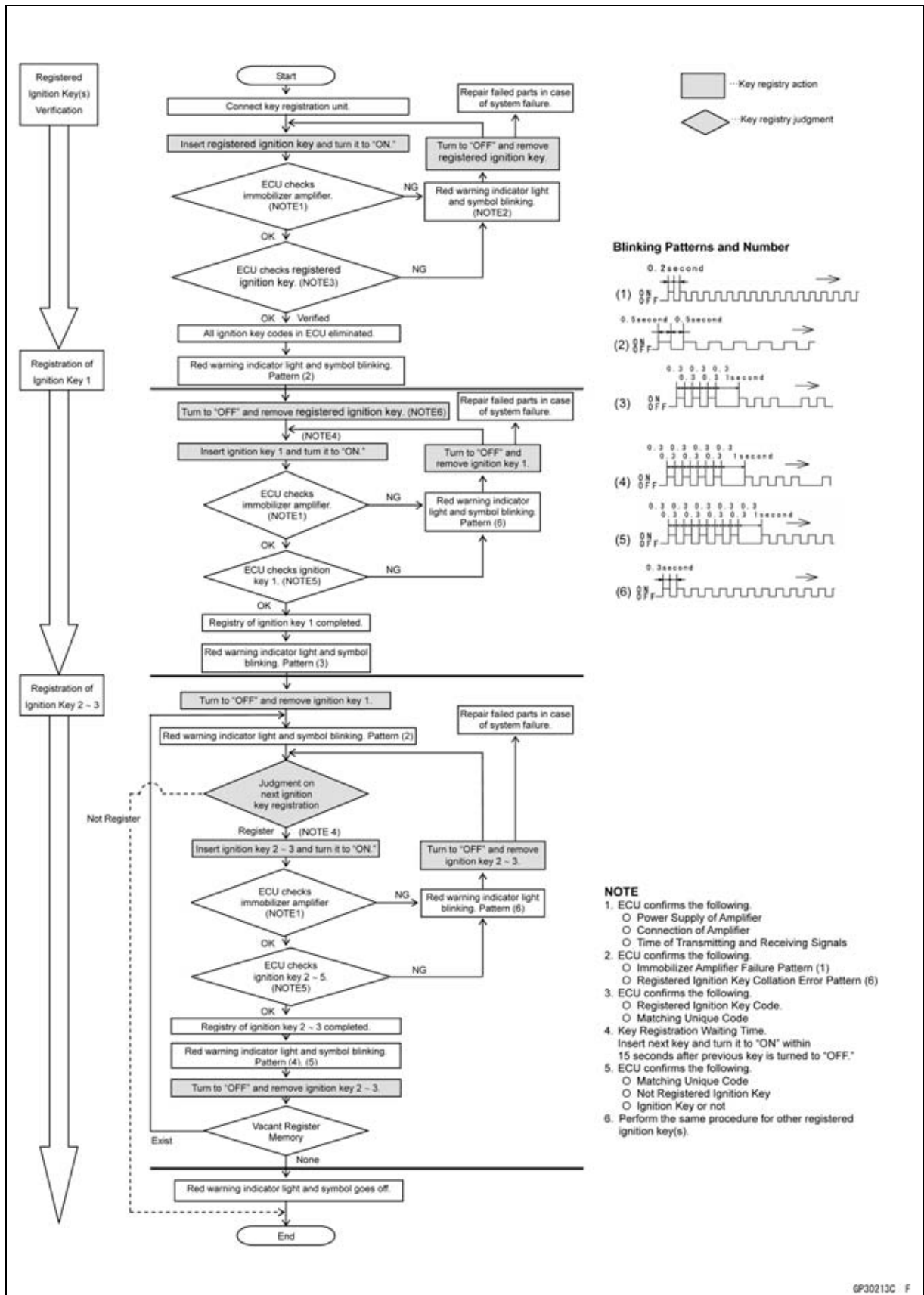
- Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

NOTE

- Turn the ignition switch to "ON" with the registered ignition key.
- Check that the engine can be started using all registered ignition keys.

Immobilizer System

Spare Ignition Key Registration Flow Chart

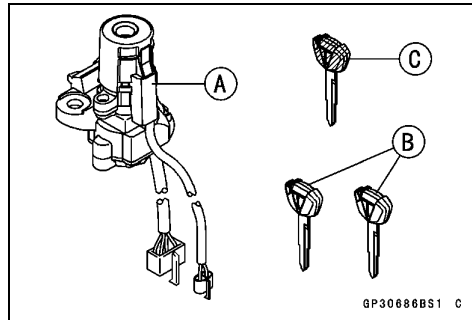


16-90 ELECTRICAL SYSTEM

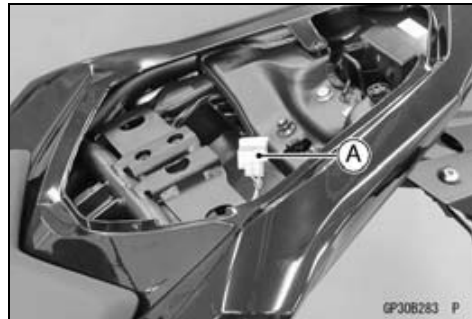
Immobilizer System

Case 2: When the ignition switch is faulty and to be replaced.

- Prepare a new ignition switch [A] and two new ignition keys [B].
- These parts are available as a set. Prepare the current registered ignition key [C].



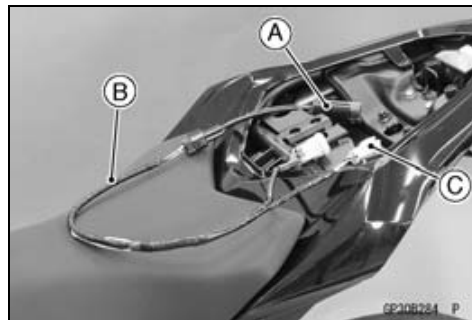
- Remove:
 - Ignition Switch (see Immobilizer System Parts Replacement)
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].



- Connect the key registration unit [A] and key registration adapter [B] as shown.
Immobilizer/Kawasaki Diagnostic System Connector [C]

Special Tools - Key Registration Unit: 57001-1582

Key Registration Adapter: 57001-1746

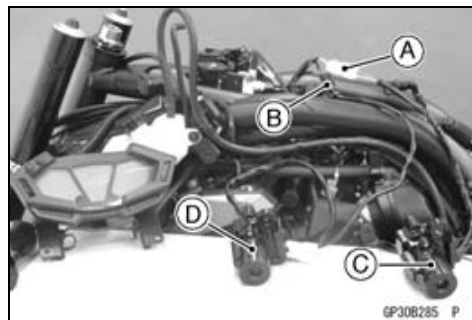


- Connect:
 - New Ignition Switch Lead Connector [A]
 - Current Immobilizer Antenna Lead Connector [B]

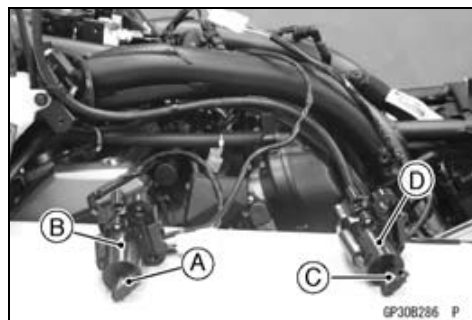
NOTE

- Keep the ignition switch more than 15 cm (5.9 in.).

New Ignition Switch [C]
Current Ignition Switch [D]

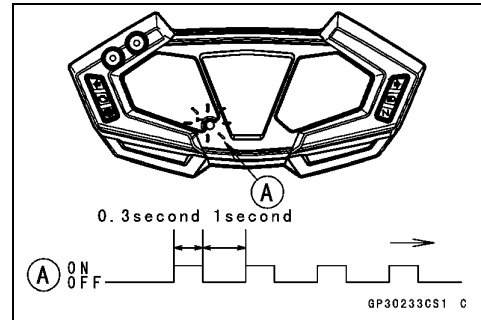


- Insert the current registered ignition key [A] at the current ignition switch [B].
- Insert the new ignition key 1 [C] to the new ignition switch [D] and turn it to "ON."



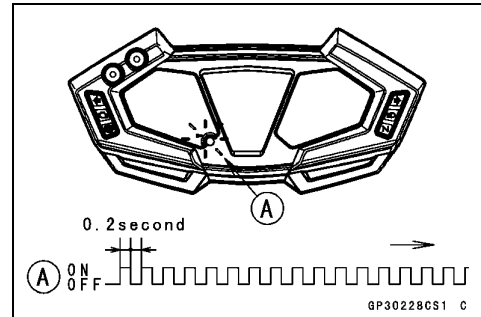
Immobilizer System

- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 1 time and stops for 1 second and repeats this cycle.

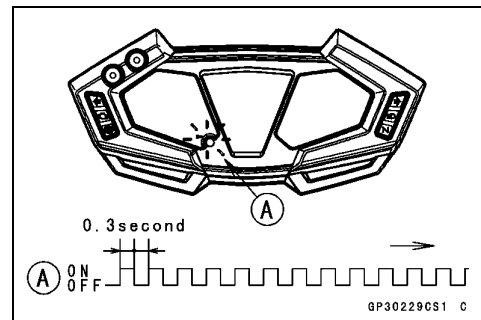


Not Verified

- The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error. Immobilizer Amplifier Failure



Registered Ignition Key Collation Error



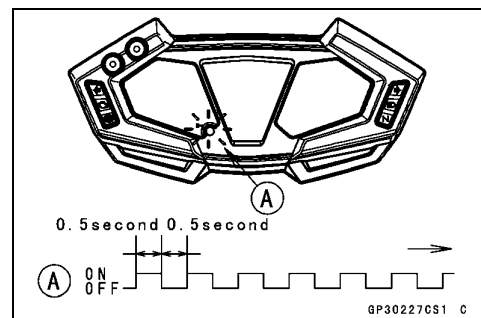
- Turn to “OFF” and remove the new ignition key 1.

NOTE

- Insert the next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) and immobilizer warning symbol stop blinking.

Verified

- The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the ECU is in the registration mode (go to the next step).



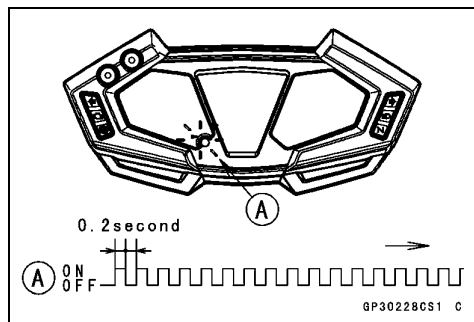
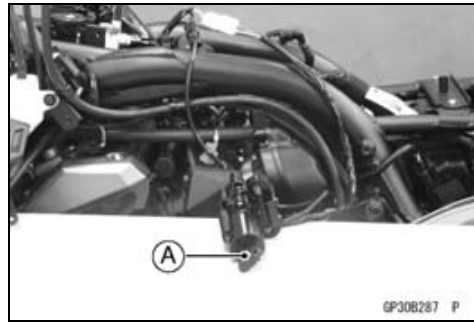
16-92 ELECTRICAL SYSTEM

Immobilizer System

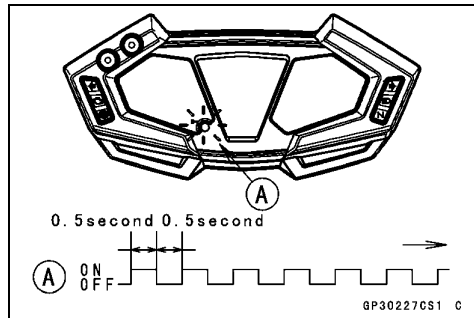
- Disconnect the immobilizer antenna connector, then connect the antenna connector of the new ignition switch.
- Insert the ignition key 1 [A] again into the new ignition switch and turn it to "ON."

NOTE

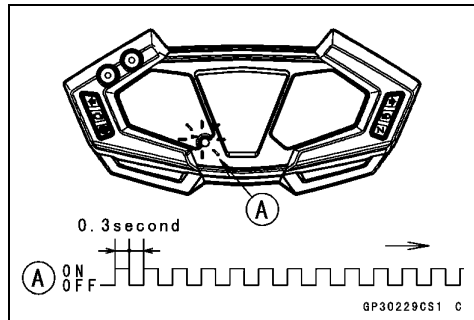
- Insert the next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF" and removed otherwise registration mode will be ended and the red warning indicator light (LED) and immobilizer warning symbol stop blinking.
 - To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.
 - Keep other ignition keys away from the ignition switch.
- If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
- Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

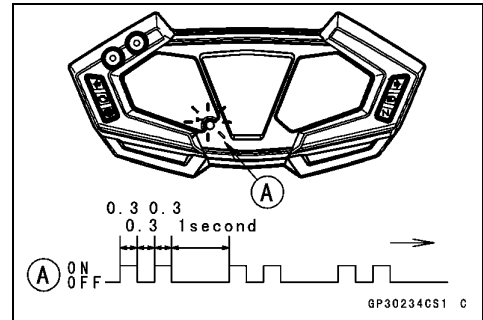


Ignition Key Collation Error



Immobilizer System

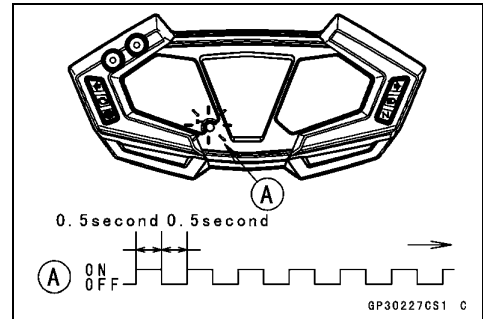
- The ignition key 1 is successfully registered in the ECU.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registering of ignition key 1.



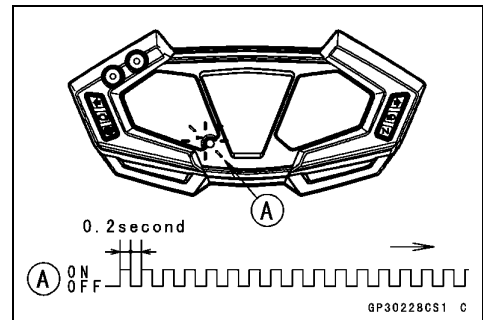
- Turn to "OFF" and remove ignition key 1.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode.

NOTE

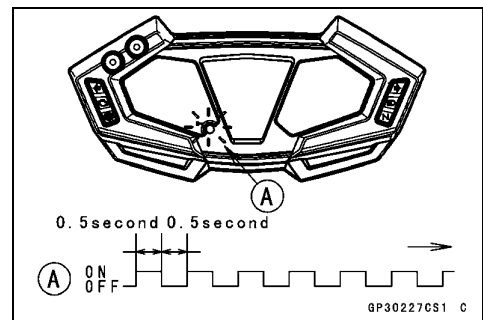
- Turn to "OFF" the ignition switch and wait for the period more than 15 seconds. The registration mode automatically ends and red warning indicator light (LED) and immobilizer warning symbol go off.
- This procedure has, registered the registered ignition key and one ignition key.
- Continue the procedure to program the second and later keys.
- Insert the ignition key 2 to the ignition switch and turn it to "ON."



- If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.



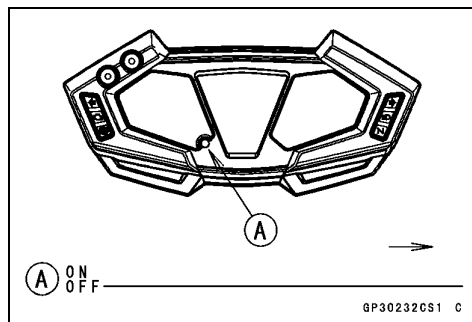
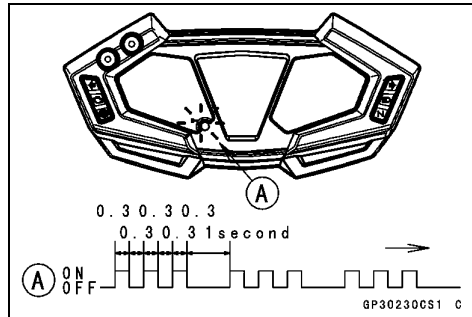
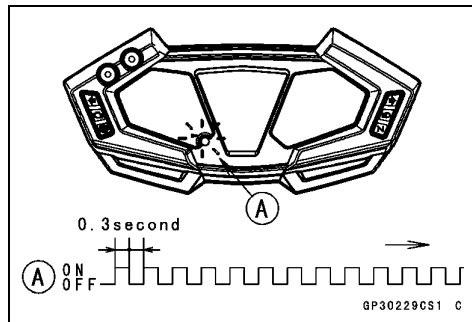
16-94 ELECTRICAL SYSTEM

Immobilizer System

Ignition Key Collation Error

- The ignition key 2 is successfully registered in the ECU.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 3 times and stops for 1 second and then repeat this cycle to indicate successful programming of ignition key 2.
- Turn to "OFF" the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.

- The red warning indicator light (LED) [A] goes off.



- Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

NOTE

- Turn the ignition switch to "ON" with the registered ignition key.
- Check that the engine can be started using all registered ignition keys.

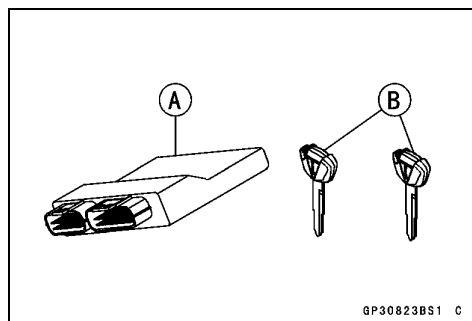
- Install the new ignition switch (see Immobilizer System Parts Replacement).

Case 3: When the ECU is faulty and has to be replaced.

- Prepare a new ECU [A] and, current registered ignition key(s) [B].

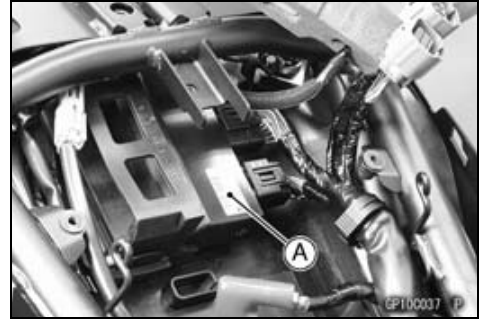
NOTE

- The key registration unit is not required.
- After replacing the ECU, be sure to register the 2 ignition keys. If the 2 keys are not registered, the engine can not be started.



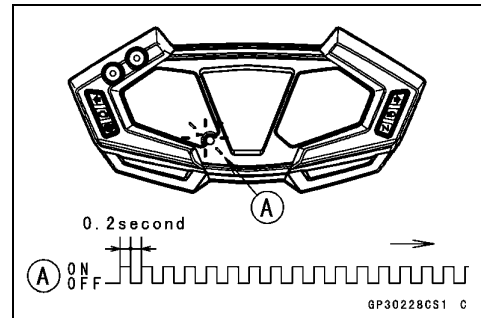
Immobilizer System

- Replace:
ECU [A] (see Immobilizer System Parts Replacement)

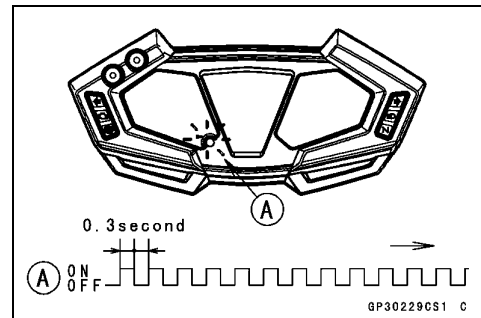


- Insert the current registered ignition key into the ignition switch and turn it to "ON."

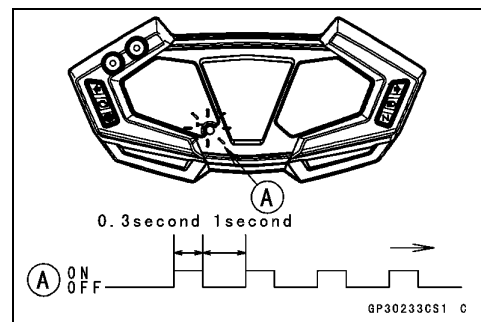
- If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
Immobilizer Amplifier Failure



Registered Ignition Key Collation Error



- The registered ignition key is registered in the ECU.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the registered ignition key.



16-96 ELECTRICAL SYSTEM

Immobilizer System

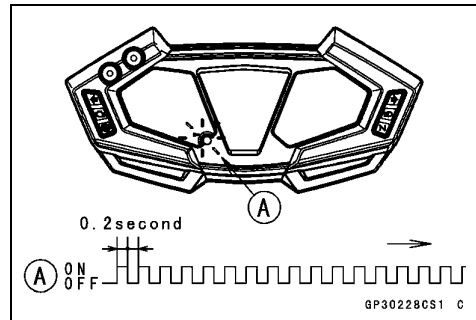
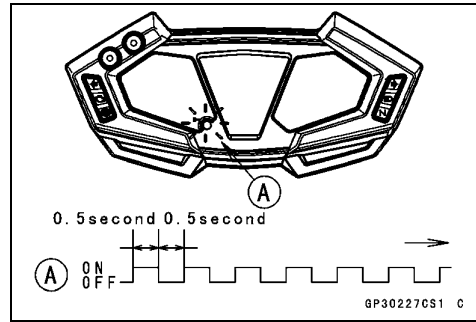
- Turn to “OFF” the registered ignition key and remove it.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode.

NOTE

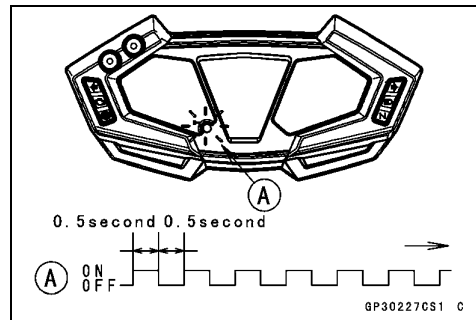
- Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) and immobilizer warning symbol go off.
 - To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.
- Insert the other remaining registered ignition key to the ignition switch and turn it to “ON.”

NOTE

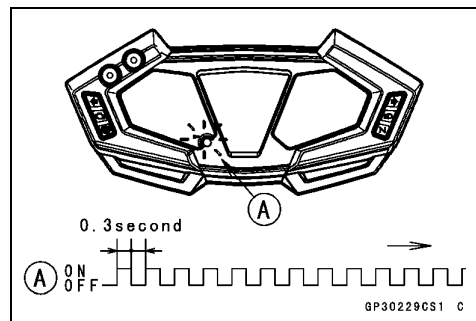
- Keep the other ignition keys away from the immobilizer antenna.
- If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

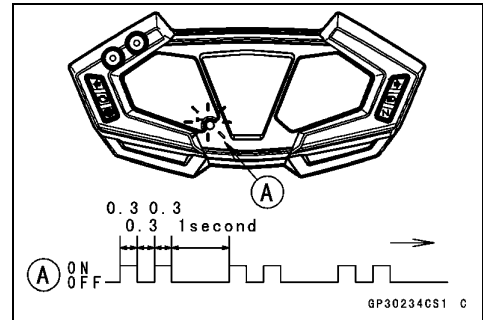


Ignition Key Collation Error

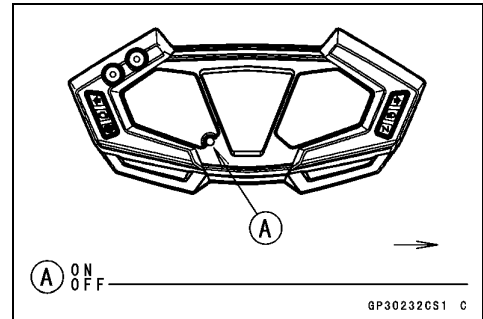


Immobilizer System

- The other remaining ignition key is registered in the ECU.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of ignition key.



- Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.
- The red warning indicator light (LED) [A] goes off.



NOTE

- Turn the ignition switch to “ON” with the registered ignition key.
- Check that the engine can be started using all registered ignition keys.

Case 4: When all registered ignition keys are faulty or lost.

The all registered ignition keys replacement is considered very rare case. However if it is required, the following is necessary.

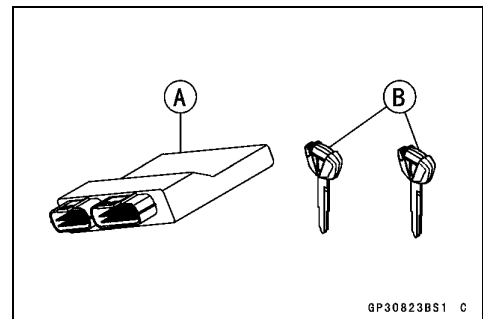
NOTE

- The ECU must be replaced with a new one because the registered ignition key code that is registered in the current ECU can not be rewritten.

- Prepare a new ECU [A] and 2 new ignition keys [B].

NOTE

- The key registration unit is not required.
- After replacing the ECU, be sure to register the 2 ignition keys. If the 2 keys are not registered, the engine can not be started.

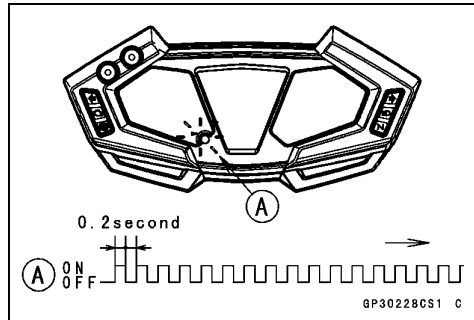


- Insert the first ignition key into the ignition switch and turn it to “ON.”

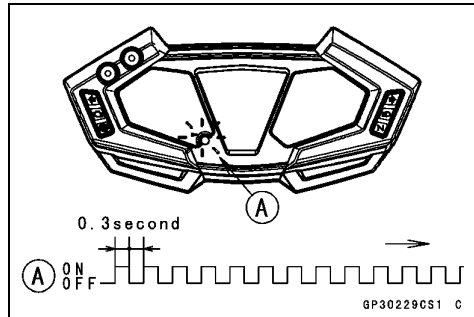
16-98 ELECTRICAL SYSTEM

Immobilizer System

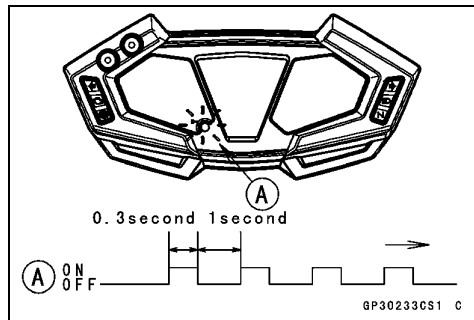
○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
Immobilizer Amplifier Failure



Ignition Key Collation Error



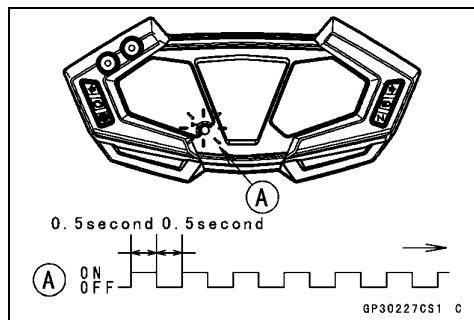
- The first ignition key is registered in the ECU.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the first ignition key.



- Turn to “OFF” the first ignition key and remove it.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode.

NOTE

- Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) and immobilizer warning symbol go off.
- To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.



- Insert the second ignition key to the ignition switch and turn it to “ON.”

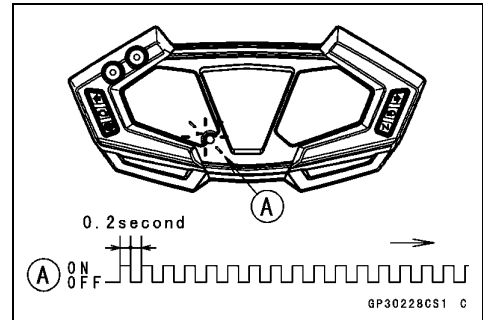
NOTE

- Keep the other ignition keys away from the immobilizer antenna.

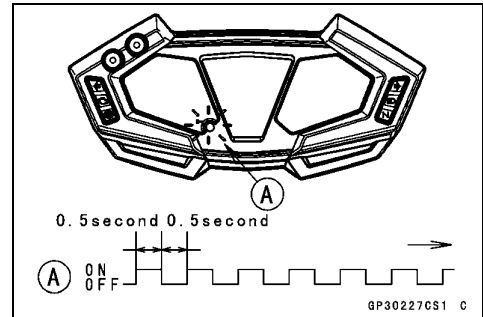
Immobilizer System

○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.

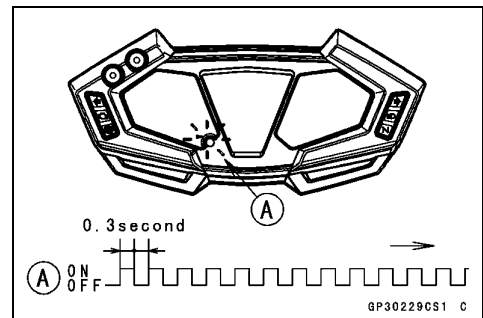
Immobilizer Amplifier Failure



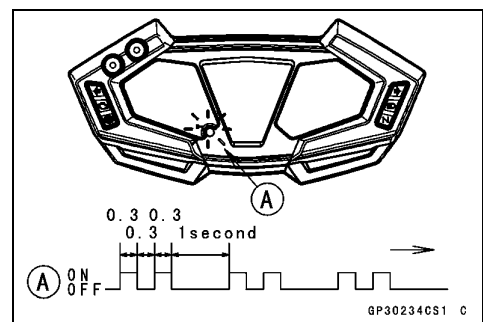
When Registered Ignition Key is Inserted



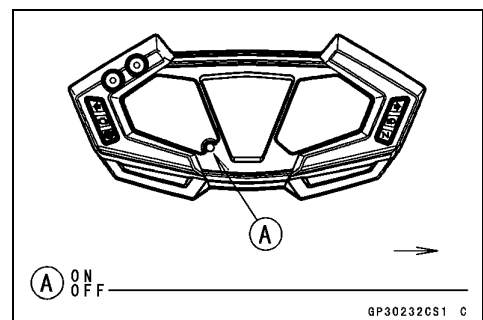
Ignition Key Collation Error



- The second ignition key is registered in the ECU.
- The red warning indicator light (LED) and immobilizer warning symbol [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of second ignition key.
- Turn to "OFF" the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.



- The red warning indicator light (LED) [A] goes off.



16-100 ELECTRICAL SYSTEM

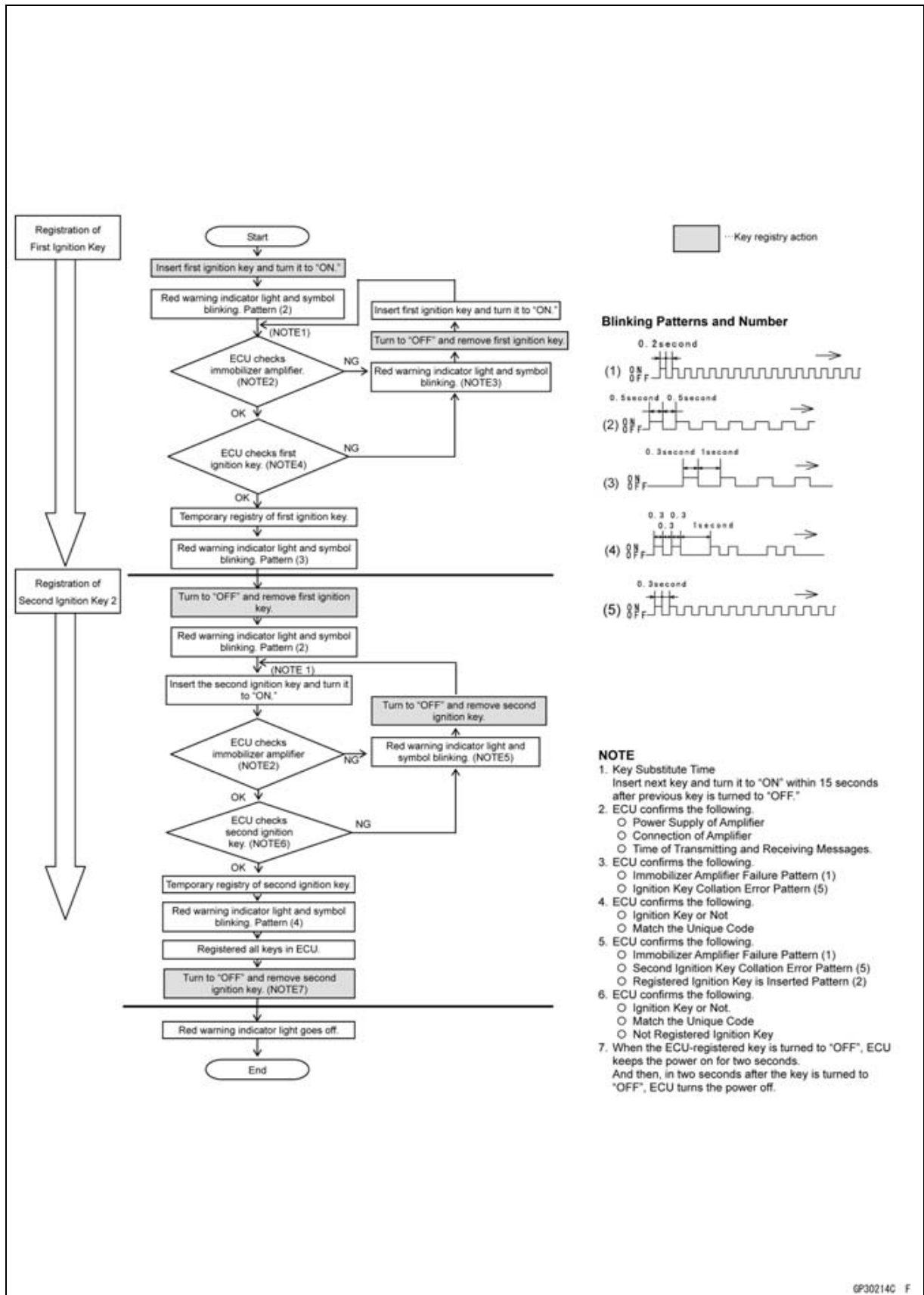
Immobilizer System

NOTE

- Turn the ignition switch to "ON" with the registered ignition key.
- Check that the engine can be started using all registered ignition keys.

Immobilizer System

All Keys Initial Registration Flow Chart



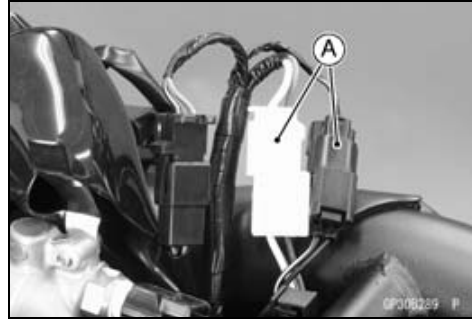
16-102 ELECTRICAL SYSTEM

Immobilizer System

Immobilizer System Parts Replacement

Ignition Switch Replacement

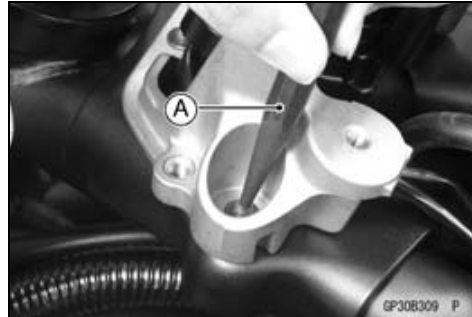
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Side Fairings (see Fairing Removal in the Frame chapter)
- Disconnect the lead connectors [A].



- Remove the steering stem head (see Steering Play Adjustment in the Periodic Maintenance chapter).
- Using a punch [A], mark the punch mark at the center of broken Torx bolt head.

NOTE

○Make the punch mark at center of the bolt head surely.



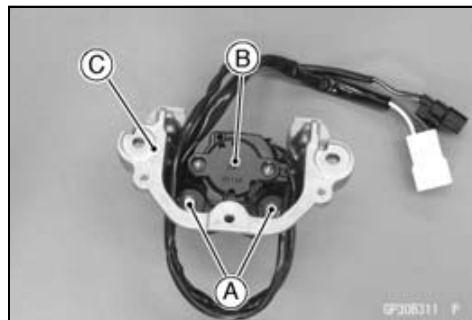
- Extend the punch mark with the $\phi 2$ mm drill [A]. In addition, extend the punch mark with the $\phi 3.5$ mm drill. Lastly, shave off the Torx bolt head with the $\phi 6.5$ mm drill.

NOTE

○Be sure to do not damage the lead wires and component parts with a drill.



- Remove the ignition switch bolts [A] to separate the ignition switch [B] and bracket [C].

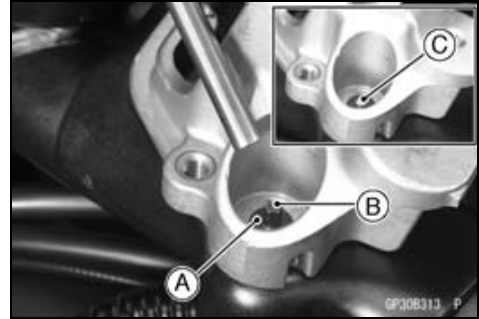


- Replace the ignition switch with a new one.
- Tighten the ignition switch bolts [A].



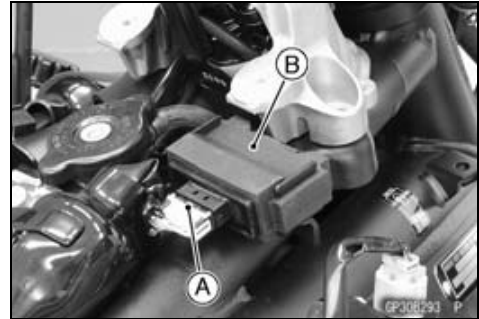
Immobilizer System

- Tighten a new Torx bolt [A] until the bolt head [B] is broken [C].
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Register the more than two ignition keys (see Key Registration).



Immobilizer Amplifier Replacement

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A].
- Remove the Immobilizer Amplifier [B].
- Installation is the reverse of removal.



ECU Replacement

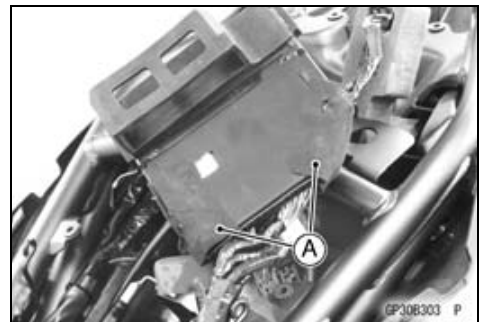
NOTICE

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

NOTE

- Replace the ECU according to the following procedure for the models with guards.
- Refer to the ECU section in the Fuel System (DFI) chapter for the models without guards.

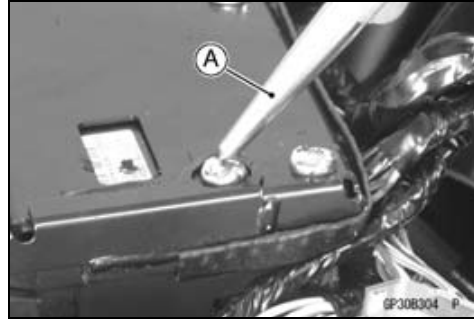
- Remove:
 - Seats (see Rear/Front Seat Removal in the Frame chapter)
 - Seat Cover (see Seat Cover Removal in the Frame chapter)
 - Battery (see Battery Removal)
 - Relay Box (see Relay Box Removal)
- Take out the ECU from rear fender hook.
- Remove the pad [A].



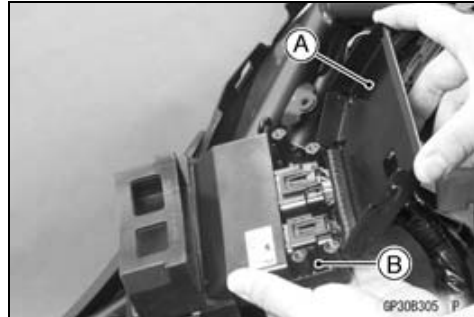
16-104 ELECTRICAL SYSTEM

Immobilizer System

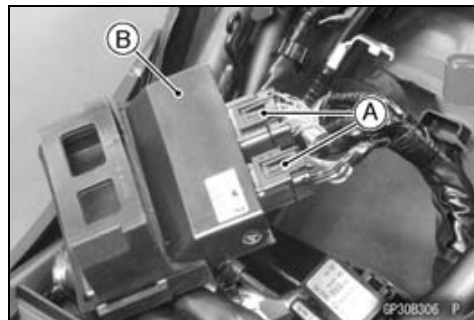
- Using a small chisel [A] or other suitable tool, remove the screws.



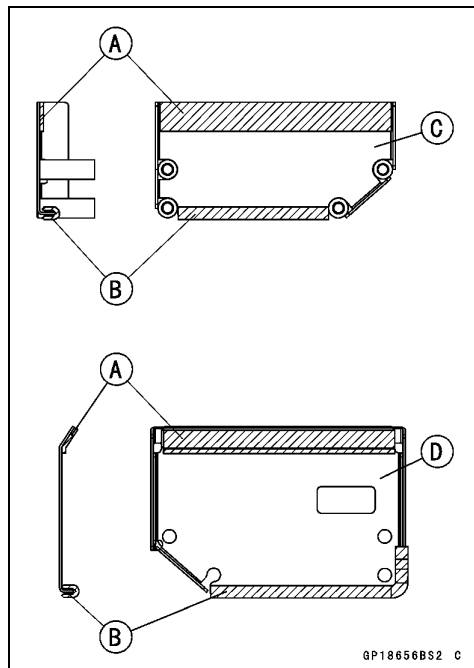
- Remove the upper guard [A] and lower guard [B].



- Disconnect the connectors [A].
- Remove the ECU [B].



- Check that the pad [A] and trim [B] are in place on the lower [C] and upper [D] guards.



Immobilizer System

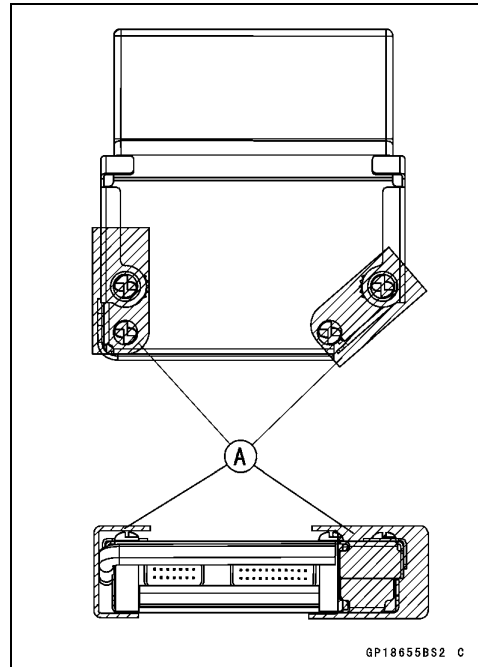
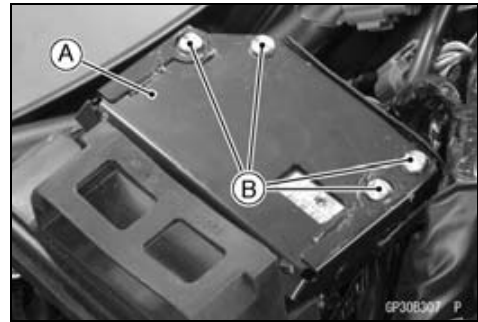
- Connect the connectors to the ECU.
- Install the lower and upper [A] guards to the ECU.

NOTICE

Do not pinch the leads.

- Tighten the new screws [B] using the Kawasaki genuine screws of which threads are coated with locking agent.

- Install the pads [A] over the guards as shown.



Registered Immobilizer Relational Parts Replacement Chart

		Failed or Lost Part			
		Ignition Keys	Ignition Switch	Amplifier	ECU
*	Ignition Key	●	○		
	Ignition Switch		●		
	Amplifier			●	
	ECU	○			●

*	Replacement Part
●	Main Replacement Part
○	Additional Replacement Part

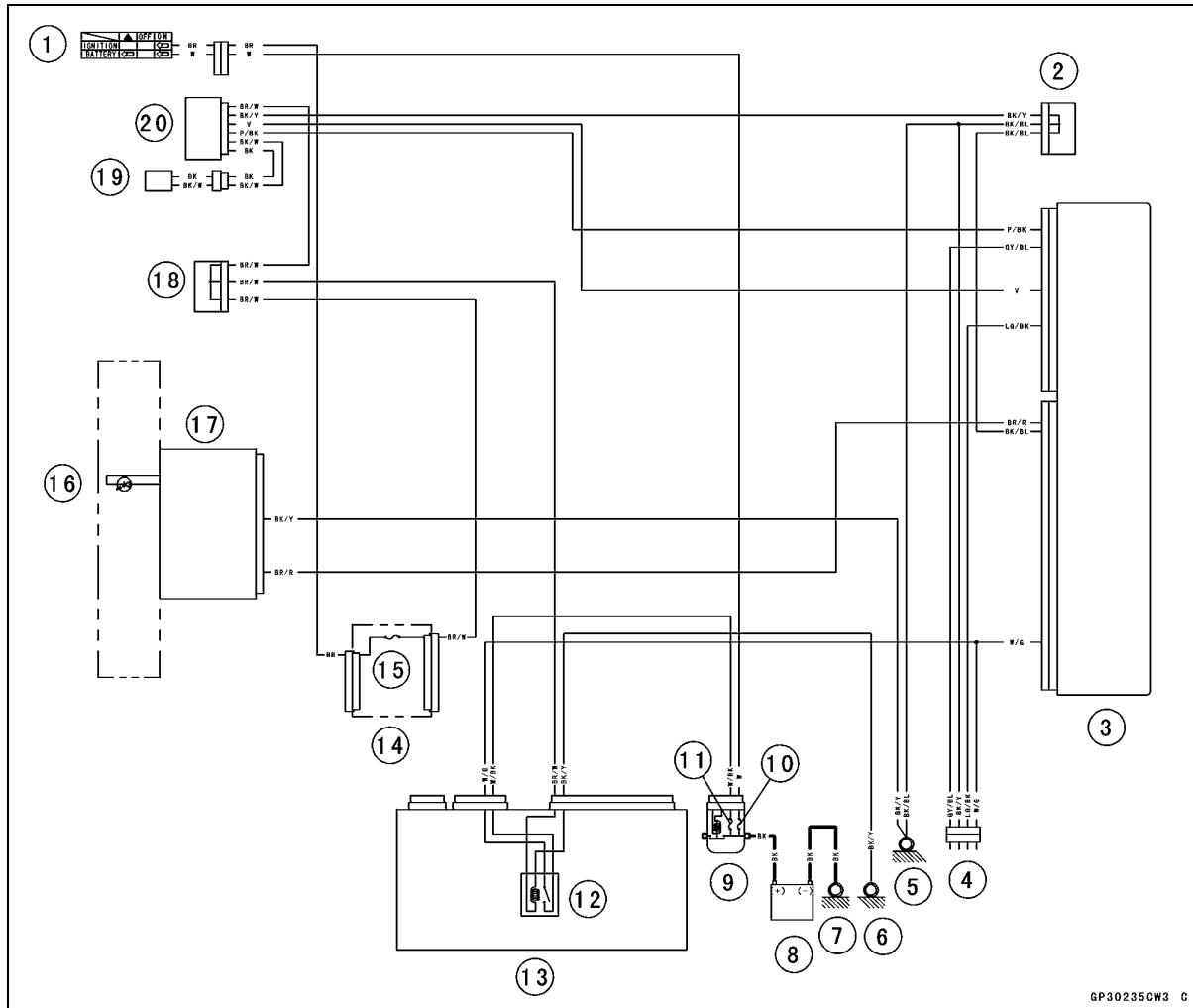
Immobilizer System Inspection

- Refer to the Immobilizer Amplifier and Blank Key Detection section in the Fuel System (DFI) chapter.

16-106 ELECTRICAL SYSTEM

Immobilizer System

Immobilizer System Circuit



GP30235CW3 C

1. Ignition Switch
2. Joint Connector E
3. ECU
4. Immobilizer/Kawasaki Diagnostic System Connector
5. Frame Ground 1
6. Frame Ground 4
7. Engine Ground
8. Battery 12 V 8 Ah
9. Starter Relay
10. Main Fuse 30 A
11. ECU Fuse 15 A
12. ECU Main Relay
13. Relay Box
14. Fuse Box 1
15. Ignition Fuse 15 A
16. Red Warning Indicator Light (LED)
17. Meter Unit
18. Joint Connector C
19. Immobilizer Antenna
20. Immobilizer Amplifier

Switches and Sensors

Brake Light Timing Inspection

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

- Using a hand tester, check to see that only the connections shown in the table have continuity (about zero ohms).
- For the switch housings and the ignition switch, refer to the tables in the Wiring Diagram.
- ★ If the switch has an open or short, repair it or replace it with a new one.

Special Tool - Hand Tester: 57001-1394

Rear Brake Light Switch Connections

Rear Brake Light Switch Connections		
Color	BR	BL
When brake pedal is pushed down	○ — ○	○ — ○
When brake pedal is released		

Side Stand Switch Connections

Side Stand Switch Connections		
Color	BK/Y	G/W
When side stand is down		
When side stand is up	○ — ○	○ — ○

Neutral Switch Connections

Neutral Switch Connections		
Color	SW. Terminal	Ground
When transmission is in neutral	○ — ○	○ — ○
When transmission is not in neutral		

Oil Pressure Switch Connections*

Oil Pressure Switch Connections *		
Color	SW. Terminal	Ground
When engine is stopped	○ — ○	○ — ○
When engine is running		

*: Engine lubrication system is in good condition.

16-108 ELECTRICAL SYSTEM

Switches and Sensors

Water Temperature Sensor Inspection

- Remove the water temperature sensor (see Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter).
- Suspend the sensor [A] in a container of coolant so that the threaded portion is submerged.
- Suspend an accurate thermometer [B] with temperature sensing portions [C] located in almost the same depth.

NOTE

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

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the sensor.
- ★ If the hand tester does not show the specified values, replace the sensor.

Water Temperature Sensor Resistance

Temperature	Resistance (k Ω)
-20°C (-4°F)	*18.80 \pm 2.37
0°C (32°F)	*(about 6.544)
40°C (104°F)	1.136 \pm 0.095
100°C (212°F)	0.1553 \pm 0.0070

*: Reference Information

Speed Sensor Removal

NOTICE

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

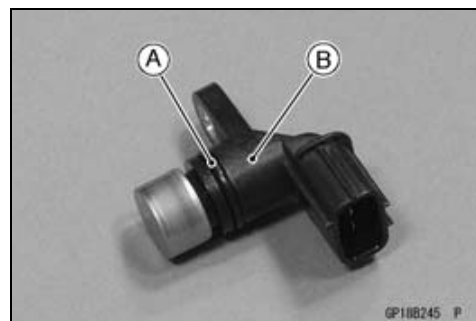
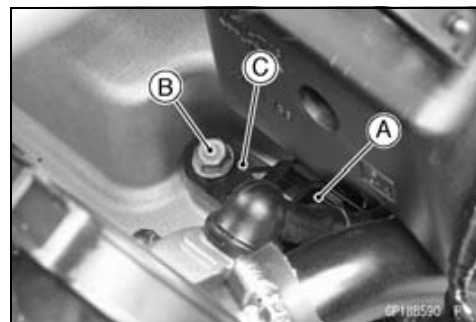
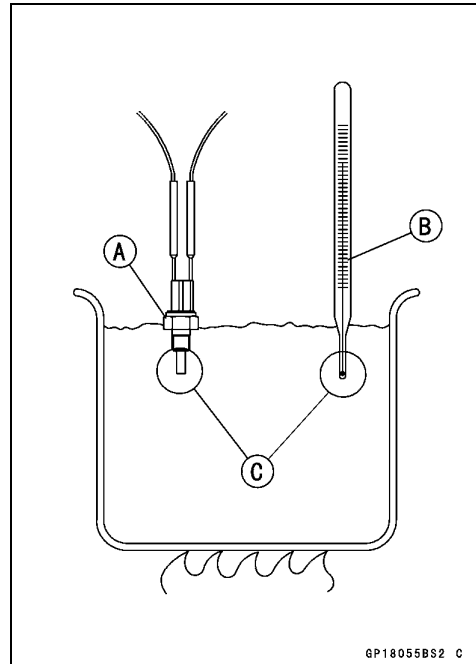
- Remove:
 - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
 - Connector [A]
 - Speed Sensor Bolt [B]
 - Speed Sensor [C]

Speed Sensor Installation

- Apply grease to the O-ring [A] on the speed sensor [B].
- Tighten:
 - Torque - Speed Sensor Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)**
- Install the removed parts (see appropriate chapters).

Speed Sensor Inspection

- Refer to the Speed Sensor section in the Fuel System (DFI) chapter (see Speed Sensor section in the Fuel System (DFI) chapter).



Switches and Sensors

Oxygen Sensor Removal

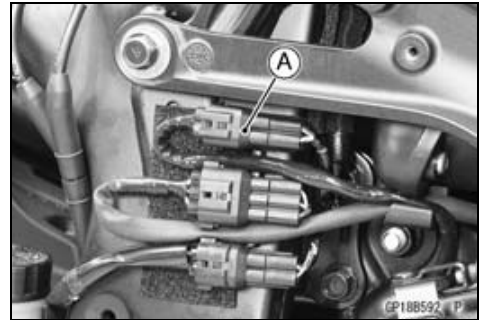
NOTICE

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

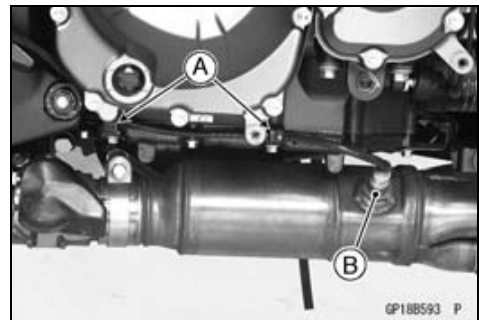
NOTICE

Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.

- Remove:
 - Right Frame Cover (see Frame Cover Removal in the Frame chapter)
 - Right Lower Fairing (see Lower Fairing Removal (ZR800A/B Models) in the Frame chapter)
 - Muffler Body Cover (see Muffler Body Removal in the Engine Top End chapter)
- Disconnect the oxygen sensor lead connector [A].



- Free the lead from the clamps [A].
- Remove the oxygen sensor [B].

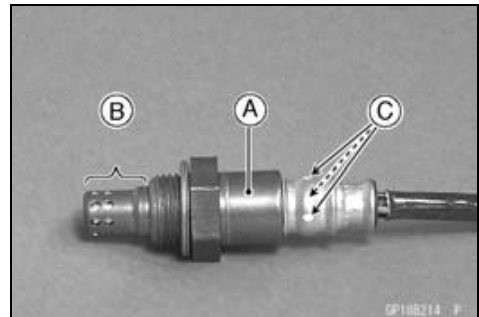


Oxygen Sensor Installation

NOTICE

Never drop the oxygen sensor [A] especially on a hard surface. Such a shock to the unit can damage it. Do not touch the sensing part [B] and filter holes [C] of the sensor to prevent oil contact. Oil contamination from hands can reduce sensor performance.

- Tighten:
 - Torque - Oxygen Sensor: 44 N·m (4.5 kgf·m, 32 ft·lb)
- Run the oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



Oxygen Sensor Inspection

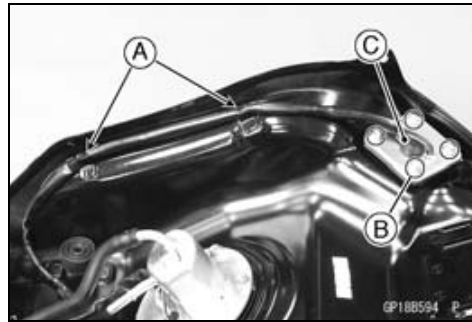
- Refer to the Oxygen Sensor Inspection in the Fuel System (DFI) chapter.

16-110 ELECTRICAL SYSTEM

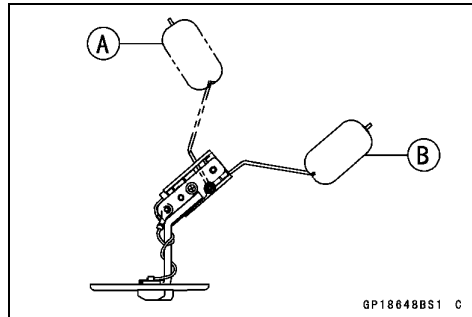
Switches and Sensors

Fuel Level Sensor Inspection

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Open the clamps [A].
- Remove:
 - Bolts [B]
 - Fuel Level Sensor [C]



- Check that the float moves up and down smoothly without binding. It should go down under its own weight.
- ★ If the float does not move smoothly, replace the sensor.
 - Float in Full Position [A]
 - Float in Empty Position [B]



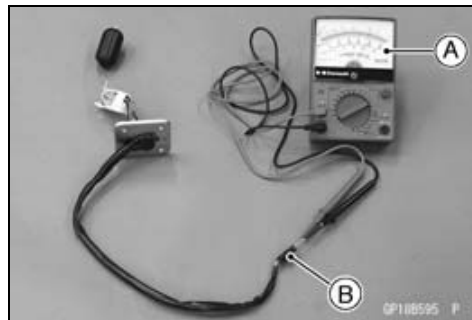
- Using the hand tester [A], measure the resistance across the terminals in the fuel level sensor lead connector [B].

Special Tool - Hand Tester: 57001-1394

- ★ If the tester readings are not as specified, or do not change smoothly according as the float moves up and down, replace the sensor.

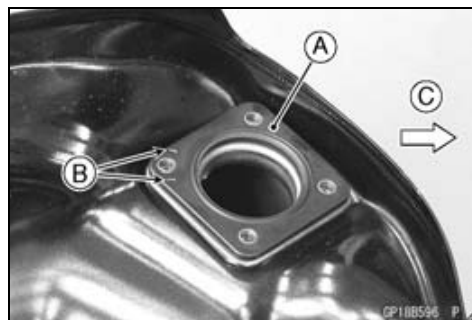
Fuel Level Sensor Resistance

Standard: Full position: 9 ~ 11 Ω
Empty position: 213 ~ 219 Ω



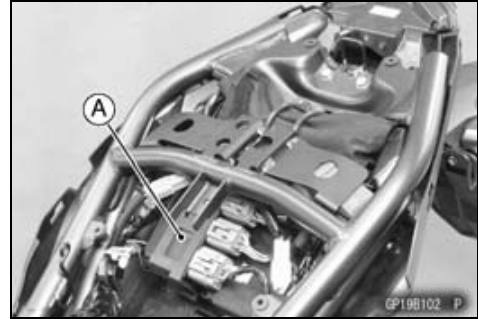
- Install a new gasket [A] on the fuel level sensor as shown.
 - Hollows [B]
 - Front [C]
- Apply a non-permanent locking agent to the threads of the fuel level sensor bolts and tighten them.

Torque - Fuel Level Sensor Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)



Relay Box

The relay box [A] has relays and diodes. The relays and diodes can not be removed.



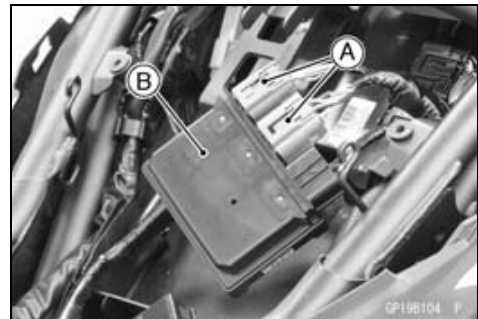
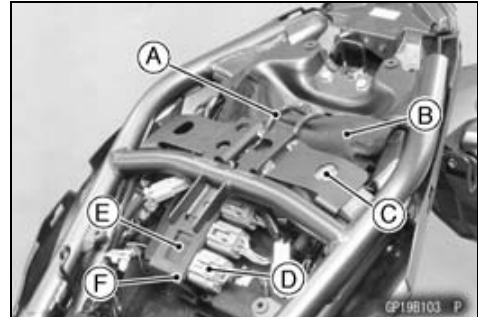
Relay Box Removal

NOTICE

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

- Remove:
 - Seat Cover (see Seat Cover Removal in the Frame chapter)
 - Battery (see Battery Removal)
- Remove the band [A] and tool kit [B].
- Take out the immobilizer/Kawasaki diagnostic system connector [C] with the pad.
- Disconnect the connector [D].
- Remove the relay box [E] from the rubber protect [F].

- Disconnect the connectors [A].
- Remove the relay box [B].



Relay Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following numbered terminals by connecting the hand tester and one 12 V battery to the relay box as shown (see Relay Box Internal Circuit in this section).
- ★ If the tester does not read as specified, replace the relay box.

16-112 ELECTRICAL SYSTEM

Relay Box

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)
Headlight Relay	1-3	∞
ECU Main Relay	7-6	∞
	4-5	Not ∞^*
Fuel Pump Relay	7-8	∞
	9-10	Not ∞^*
Starter Circuit Relay	11-16	∞
	11-12	∞
Fan Relay	17-20	∞
	18-19	Not ∞^*

*: The actual reading varies with the hand tester used.

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (-)	Tester Connection	Tester Reading (Ω)
ECU Main Relay	2-11	1-3	0
	4-5	7-6	0
Fuel Pump Relay	9-10	7-8	0
Fan Relay	18-19	17-20	0

	Battery Connection (+) (-)	Tester Connection DC 25 V Range (+) (-)	Tester Reading (V)
Starter Circuit Relay	16-12	11-12	Battery Voltage

(+): Apply positive lead.

(-): Apply negative lead.

Diode Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following pairs of terminals (see Relay Box Internal Circuit in this section).

Diode Circuit Inspection

Tester Connection	1-11, 2-11, 12-13, 12-15, 12-16, 13-14, 13-15
-------------------	---

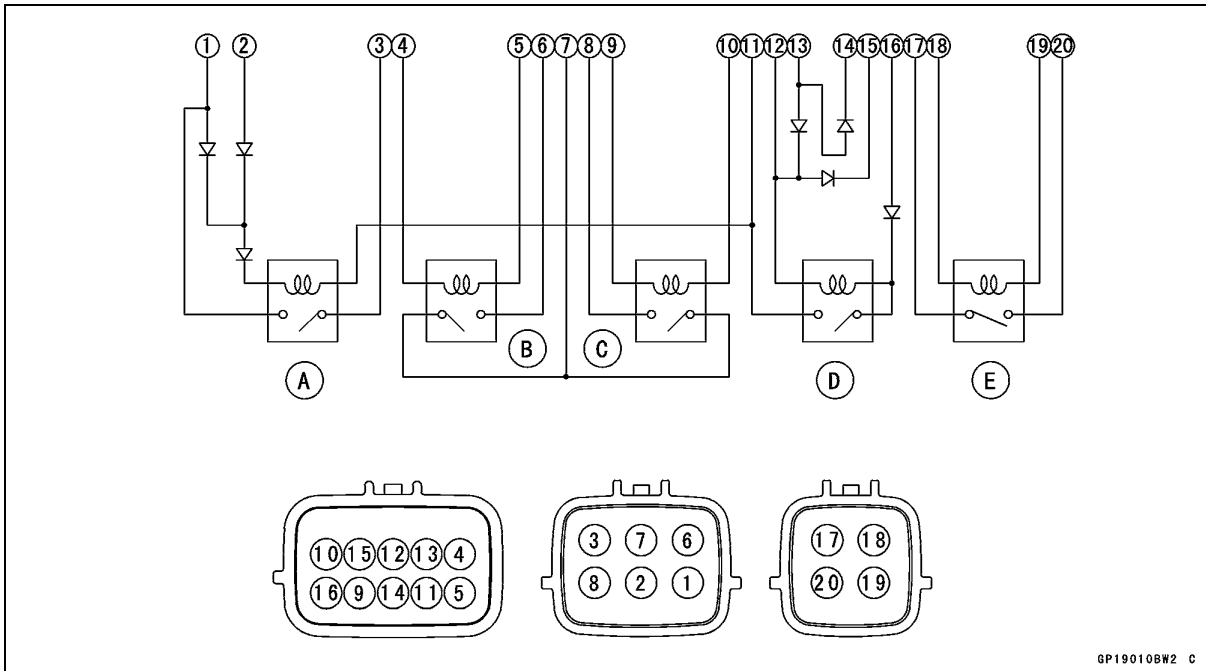
- ★ The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

NOTE

- The actual meter reading varies with the meter or tester used and the individual diodes, but generally speaking, the lower reading should be from zero to one half the scale.

Relay Box

Relay Box Internal Circuit



GP19010BW2 C

- A: Headlight Circuit Relay
- B: ECU Main Relay
- C: Fuel Pump Relay
- D: Starter Circuit Relay
- E: Radiator Fan Relay

16-114 ELECTRICAL SYSTEM

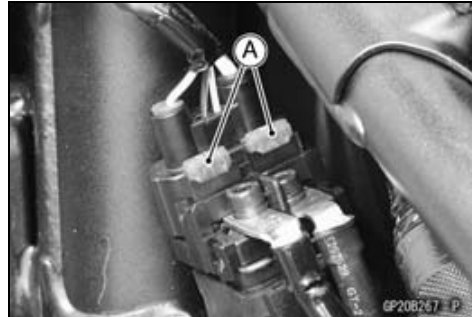
Fuse

30 A Main/15 A ECU Fuse Removal

- Remove:
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
 - Starter Relay Cover [A]

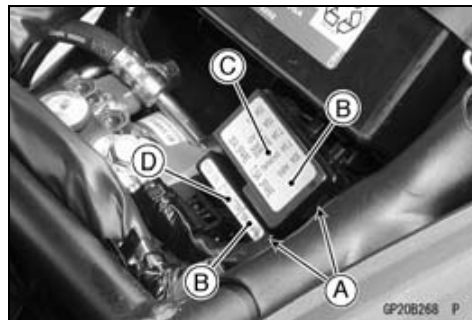


- Pull out the fuses [A] from the starter relay with needle nose pliers.

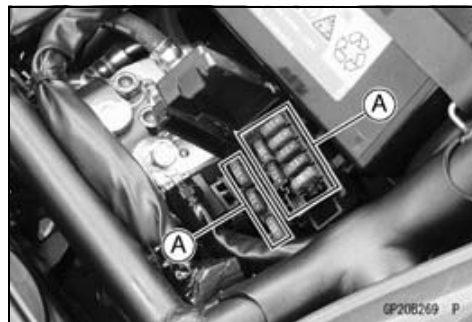


Fuse Box Fuse Removal

- Remove the seats (see Rear/Front Seat Removal in the Frame chapter).
- Unlock the hooks [A] to lift up the lids [B].
 - Fuse Box 1 [C]
 - Fuse Box 2 [D]



- Pull the fuses [A] straight out of the fuse boxes 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

Fuse Inspection

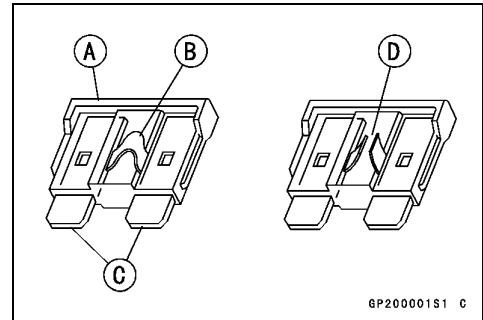
- Remove the fuse (see 30 A Main/15 A ECU/Fuse Box/Fuse Removal).
- Inspect the fuse element.
- ★ If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]

Fuse Element [B]

Terminals [C]

Blown Element [D]



NOTE

- A mass current flows to the battery according to the state of the battery which needs refreshing charge when the engine is turned causing main fuse blown out.

NOTICE

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

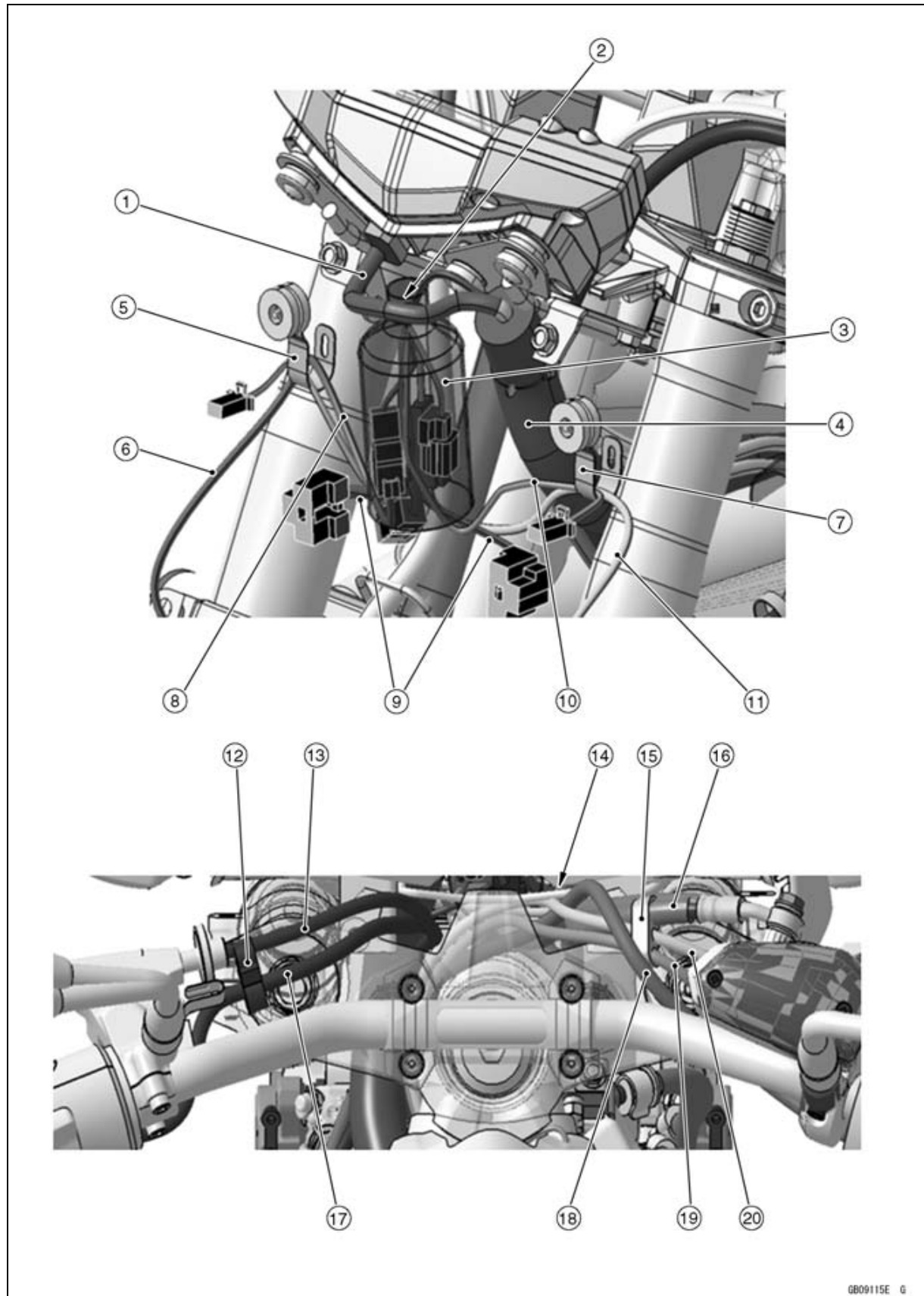
Appendix

Table of Contents

Cable, Wire, and Hose Routing	17-2
Troubleshooting Guide	17-40

17-2 APPENDIX

Cable, Wire, and Hose Routing

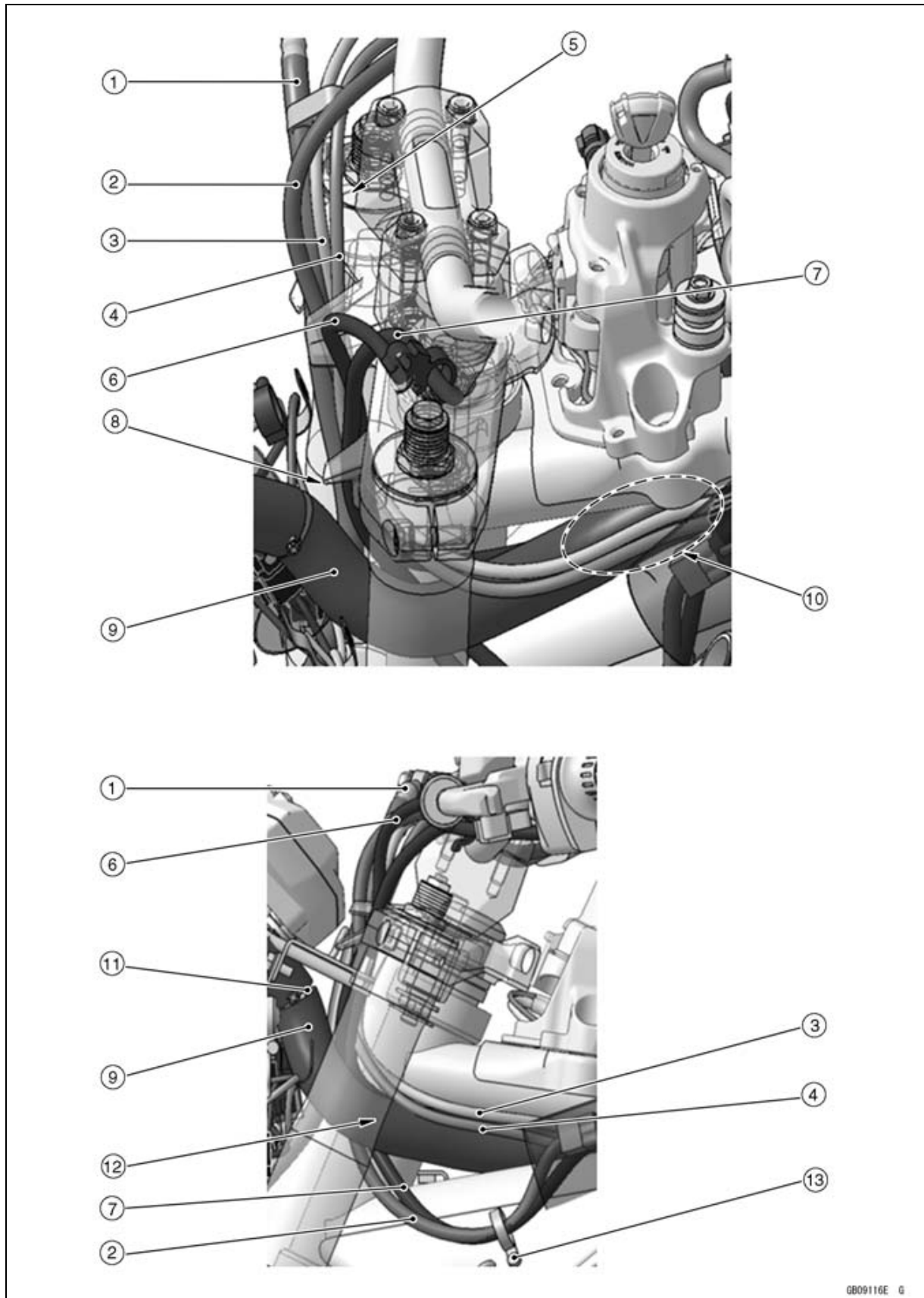


Cable, Wire, and Hose Routing

1. Meter Lead
2. Run the meter lead to the front of the rubber cover.
3. Cover the city light lead connectors, turn signal light lead connectors, front wheel rotation sensor lead connector (ABS equipped models) with the rubber cover.
4. Main Harness
5. Clamp (Hold the right turn signal lead and right city light lead.)
6. Right Turn Signal Lead
7. Clamp (Hold the left turn signal lead and left city light lead.)
8. Right City Light Lead
9. Head Light Leads
10. Left City Light Lead
11. Left Turn Signal Lead
12. Clamp (Hold the left switch housing lead and clutch cable. Install the clamp near the clutch cable adjuster.)
13. Clutch Cable
14. Run the front brake hose between the bar of the meter bracket and front fork.
15. Clamp (Hold the front brake hose and throttle cables. Face the open side of the clamp downward.)
16. Brake Hose
17. Left Switch Housing Lead
18. Right Switch Housing Lead
19. Throttle Cable (Decelerator)
20. Throttle Cable (Accelerator)

17-4 APPENDIX

Cable, Wire, and Hose Routing

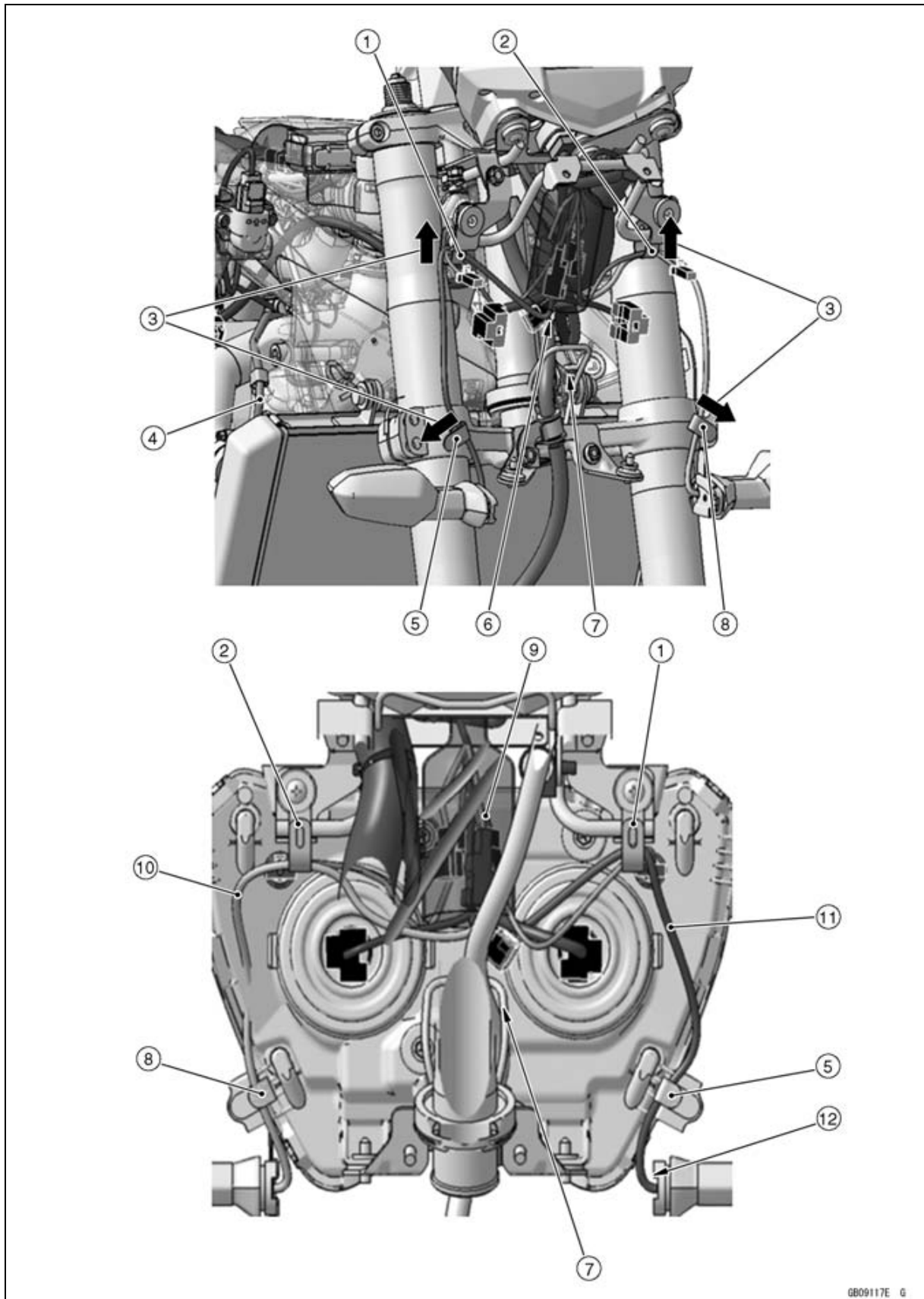


Cable, Wire, and Hose Routing

1. Front Brake Hose
2. Right Switch Housing Lead
3. Throttle Cable (Accelerator)
4. Throttle Cable (Decelerator)
5. Do not twist the throttle cables.
6. Clutch Cable
7. Left Switch Housing Lead
8. Run the main harness, front brake hose, throttle cables and switch housing leads in order from the front.
9. Main Harness
10. Run the throttle cables to the outside of the main harness.
11. Hold the main harness with the clamp, and insert the projection of the clamp into the bracket.
12. Run the main harness between the throttle cables and switch housing lead.
13. Clamp (Hold the switch housing leads.)

17-6 APPENDIX

Cable, Wire, and Hose Routing



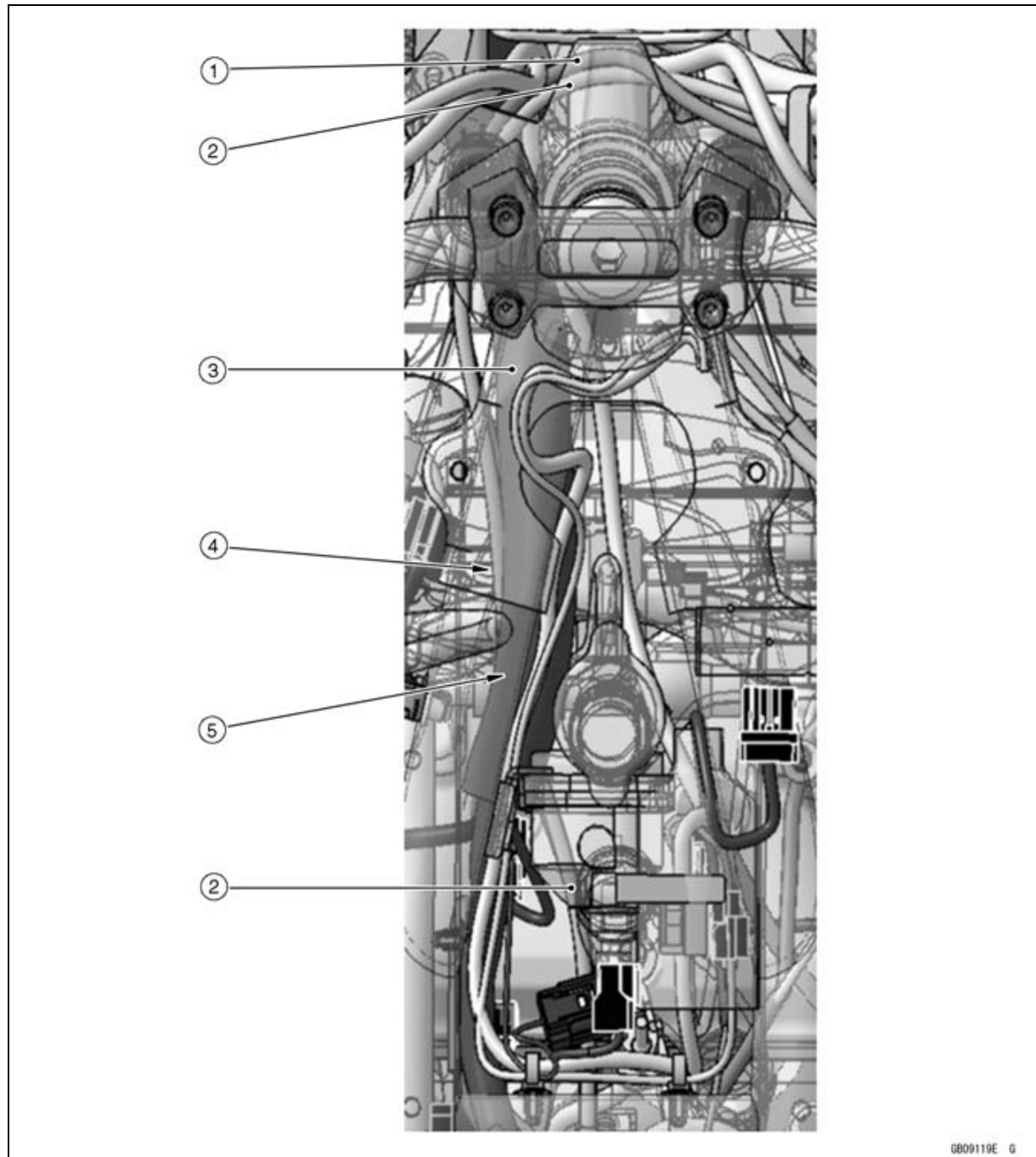
GB09117E G

Cable, Wire, and Hose Routing

1. Clamp (Hold the right city light lead and right turn signal light lead.)
2. Clamp (Hold the left city light lead and left turn signal light lead.)
3. Bend the clamps in the direction of arrows.
4. Horn Lead
5. Clamp (Hold the right turn signal lead.)
6. Run the main harness, front brake hose, throttle cables and switch housing leads in order of the front.
7. Run the front brake hose through the clamp.
8. Clamp (Hold the left turn signal lead.)
9. Cover the city light lead connectors, turn signal light lead connectors, front wheel rotation sensor lead connector (ABS equipped models) with the rubber cover.
10. Left Turn Signal Lead
11. Right Turn Signal Lead
12. The left turn signal lead has the gray color connector.

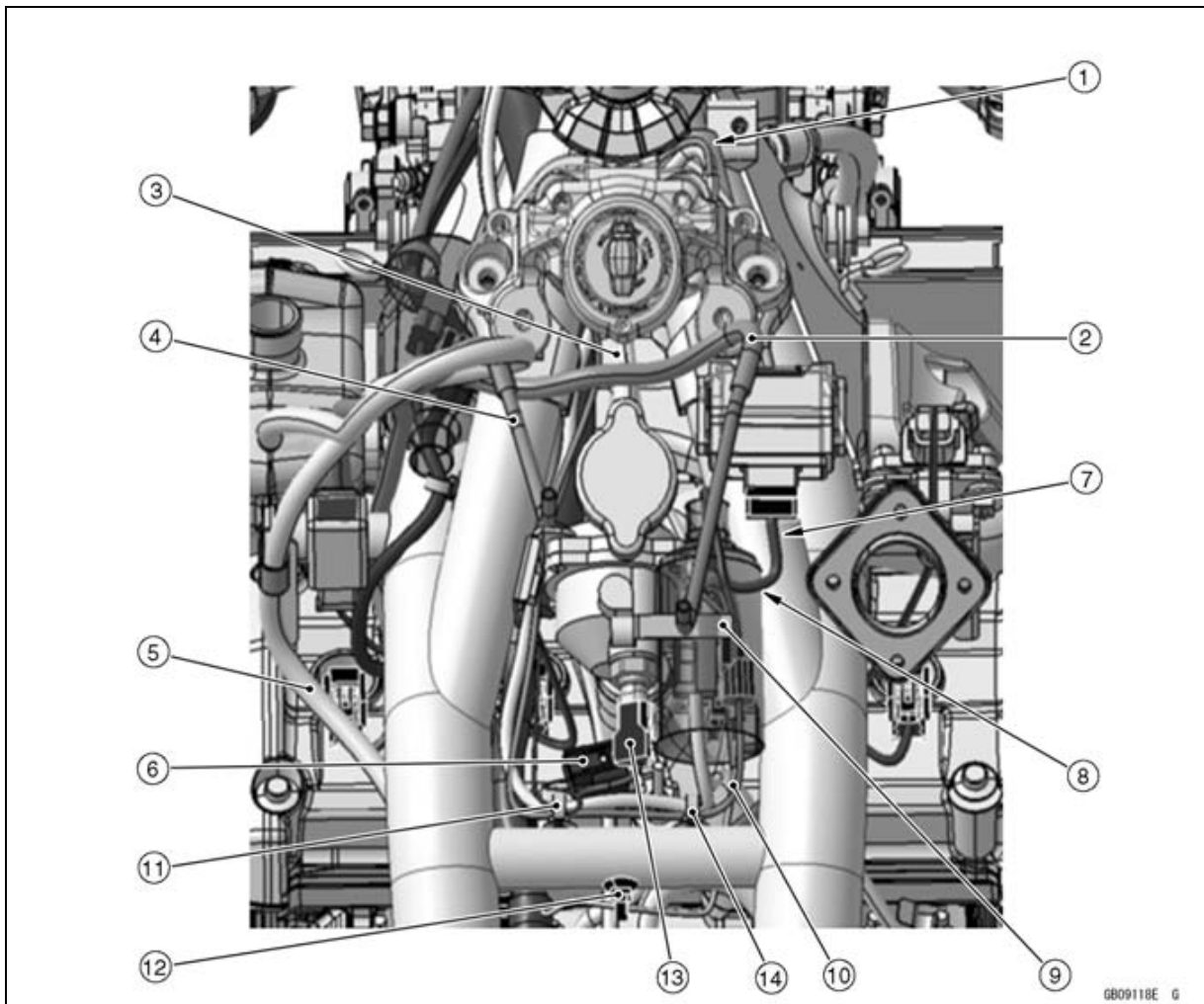
17-8 APPENDIX

Cable, Wire, and Hose Routing



1. Throttle Cable (Decelerator)
2. Throttle Cable (Accelerator)
3. Main Harness
4. Run the throttle cables to the outside of the main harness and frame.
5. Run the throttle cables under the main harness.

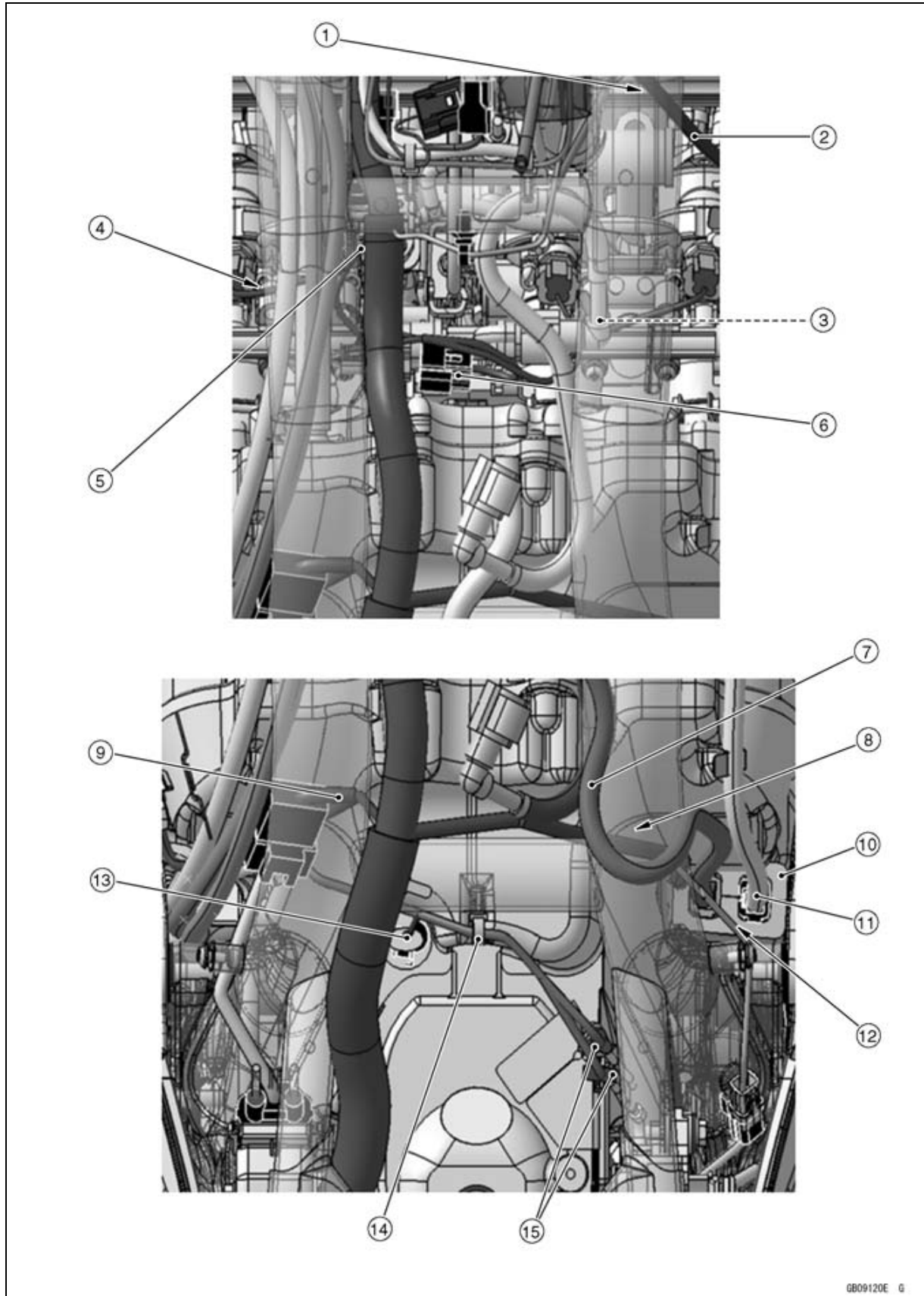
Cable, Wire, and Hose Routing



1. Run the ignition switch lead and immobilizer antenna lead between the frame and thermostat housing.
2. Fuel Tank Breather Hose
3. Radiator Overflow Hose
4. Fuel Tank Drain Hose
5. Reserve Tank Overflow Hose
6. Intake Air Pressure Sensor #2 Connector
7. Do not bend the immobilizer amplifier lead near the immobilizer amplifier connector.
8. Run the immobilizer amplifier lead to the upside of the rubber cover.
9. Clamp (Bend the clamp by 90° after the connectors are covered with rubber cover.)
10. Radiator Fan Motor Lead
11. Clamp (Hold the immobilizer antenna lead, ignition switch lead, intake air pressure sensor lead and water temperature sensor lead.)
12. Clamp (Hold the main harness)
13. Water Temperature Sensor Connector
14. Clamp (Hold the immobilizer antenna lead and ignition switch lead.)

17-10 APPENDIX

Cable, Wire, and Hose Routing



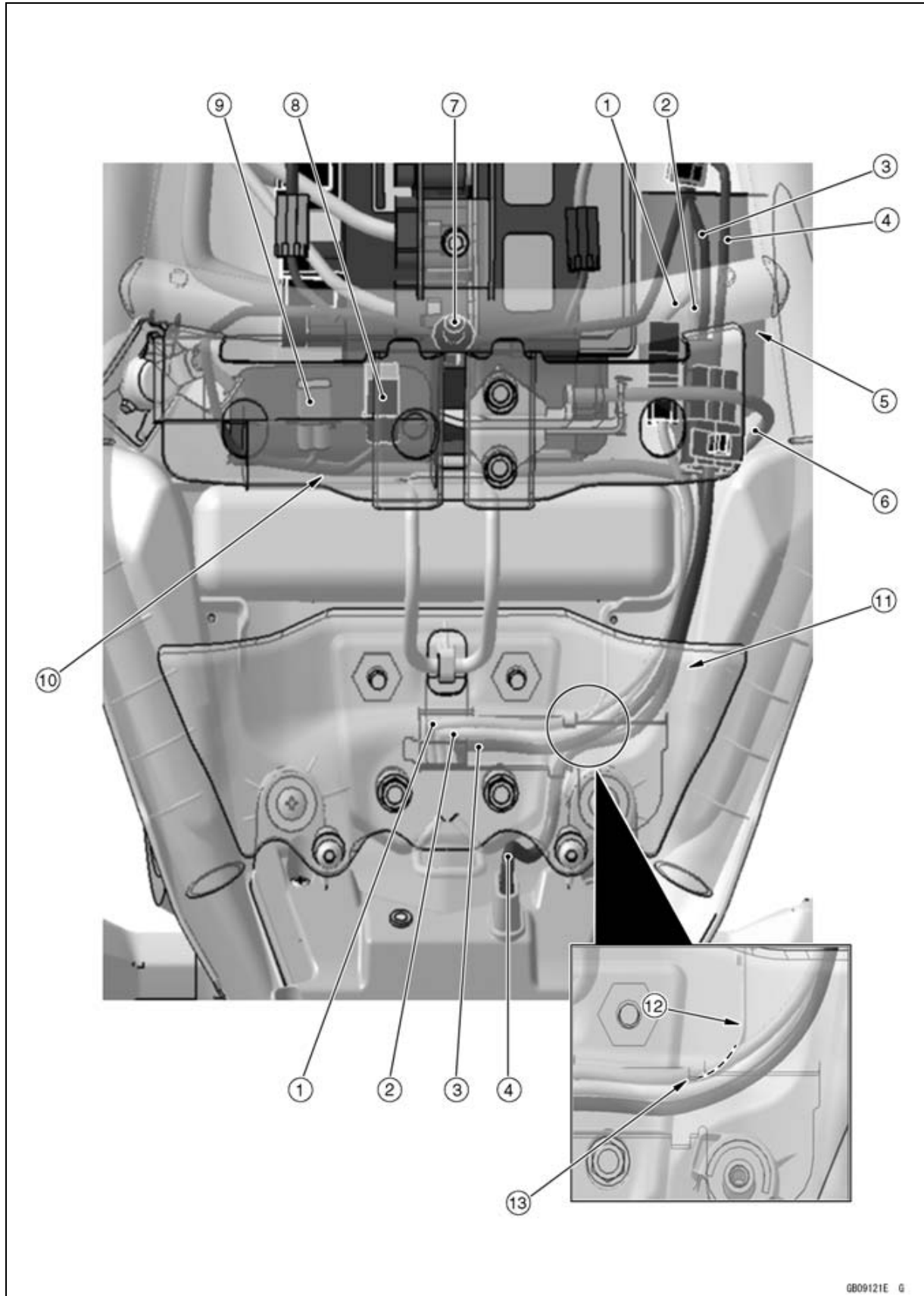
Cable, Wire, and Hose Routing

1. Run the clutch cable to the right side of the thermostat housing.
2. Clutch Cable
3. Clamp (Hold the fuel injector #4 lead. Insert the projection of the clamp into the hole second from the right.
4. Run the fuel injector #1 lead between the air switching valve hose and other three hoses.
5. Intake Air Pressure Sensor #1 Connector
6. Sub Throttle Valve Actuator Lead Connector
7. Fuel Pump Lead
8. Run the main harness between the pad and air cleaner housing.
9. Alternator Lead
10. Pad
11. Fuel Level Sensor Lead
12. Insert the connectors to the pad from the bottom side.
13. Intake Air Temperature Sensor Connector
14. Clamp (Hold the exhaust butterfly valve actuator leads. Insert the projection of the clamp into the frame.)*
15. Exhaust Butterfly Valve Actuator Connectors*

*: ZR800A/B Models

17-12 APPENDIX

Cable, Wire, and Hose Routing

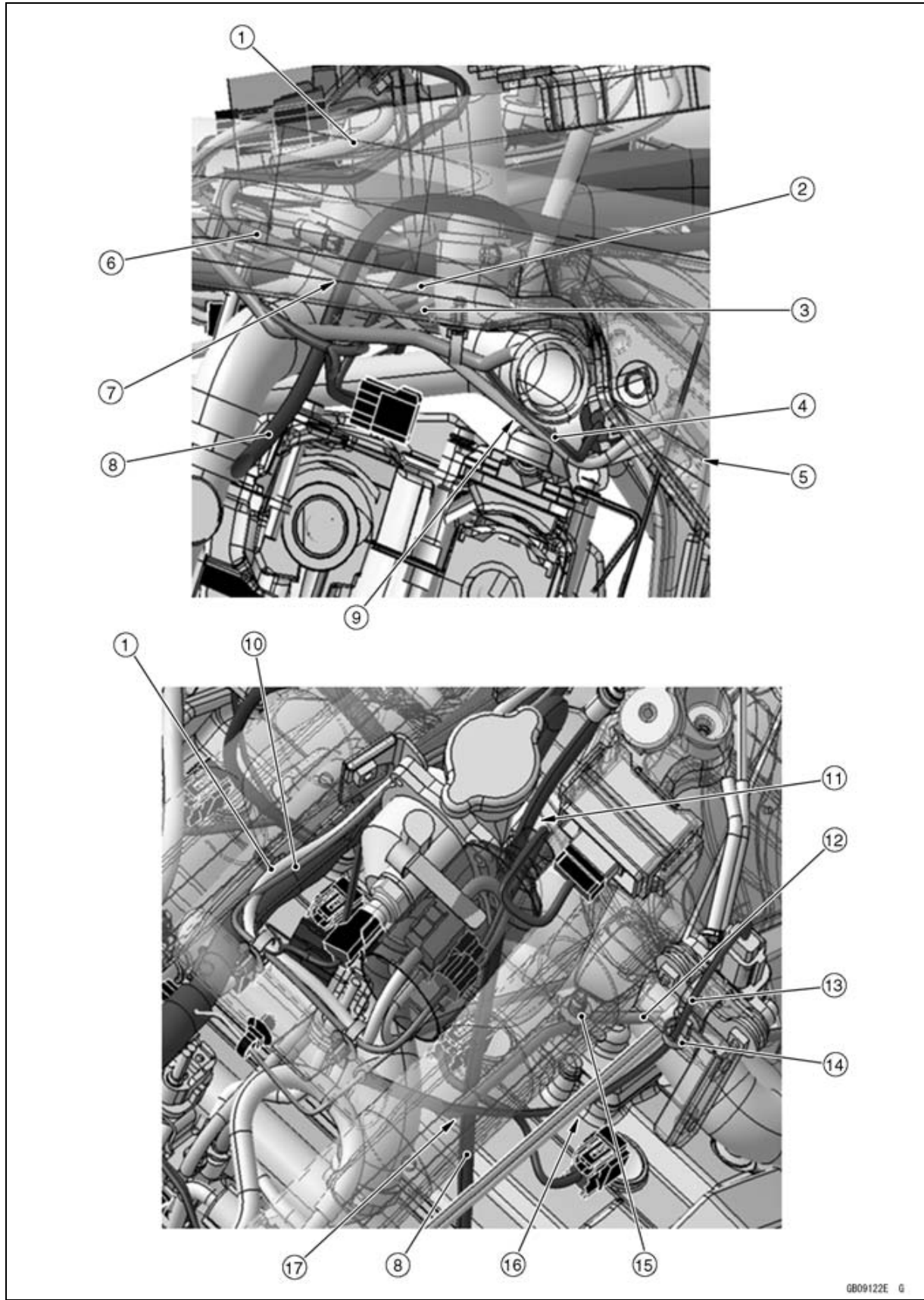


Cable, Wire, and Hose Routing

1. Left Turn Signal Light Lead
2. License Plate Light Lead
3. Right Turn Signal Light Lead
4. Tail/Brake Light Lead
5. Cover the turn signal light lead connectors and license plate light lead connector with the rubber cover.
6. Seat Lock Cable
7. Clamp (Hold the main harness. Insert the projection of the clamp into the frame.)
8. ABS Self-Diagnosis System Connector (ABS Equipped Models)
9. Kawasaki Diagnostic System Connector
10. Run the seat lock cable under the ABS self-diagnosis system lead (ABS equipped models), Kawasaki diagnostic system lead and rubber cover.
11. Run the leads under the bracket.
12. Guide
13. Do not run the leads to the upside of the guide. This figure is bad sample.

17-14 APPENDIX

Cable, Wire, and Hose Routing

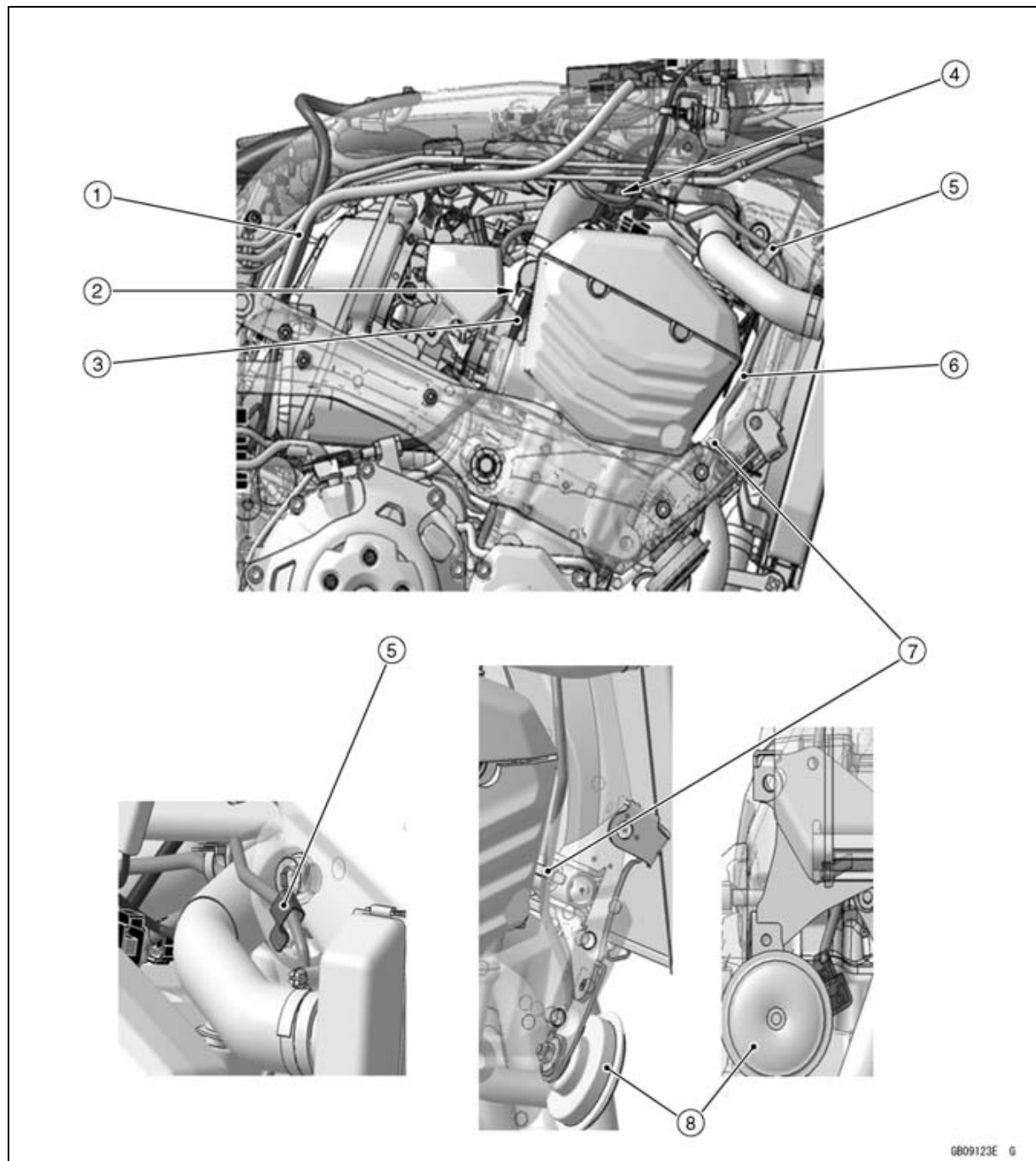


Cable, Wire, and Hose Routing

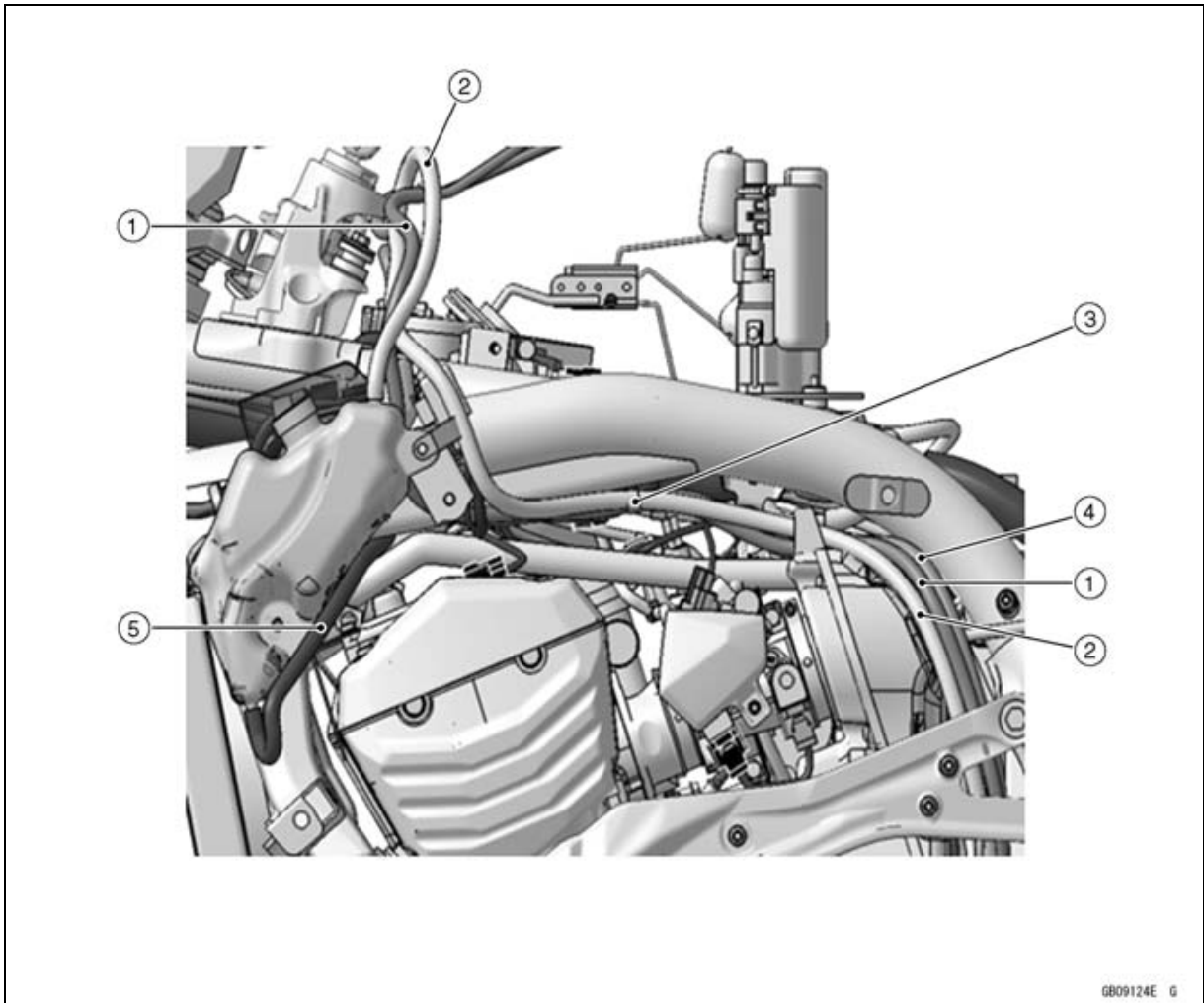
1. Ignition Switch Lead
2. Throttle Cable (Accelerator)
3. Throttle Cable (Decelerator)
4. Air Switching Valve Lead
5. Run the radiator fan motor lead between the heat insulation rubber plate and engine bracket.
6. Radiator Fan Motor Lead
7. Run the radiator fan motor lead under the clutch cable.
8. Clutch Cable
9. Run the radiator fan motor lead under the water hose and air switching valve lead.
10. Immobilizer Antenna Lead
11. Run the clutch cable to the right side of the thermostat housing.
12. Horn Lead
13. Vehicle-down Sensor Lead
14. Clamp (Hold the vehicle-down sensor lead.)
15. Clamp (Hold the horn lead. Insert the projection of the clamp into the frame.)
16. Run the vehicle-down sensor lead to the outside of the ABS brake pipes (ABS equipped models).
17. Run the clutch cable under the vehicle-down sensor lead and horn lead.

17-16 APPENDIX

Cable, Wire, and Hose Routing



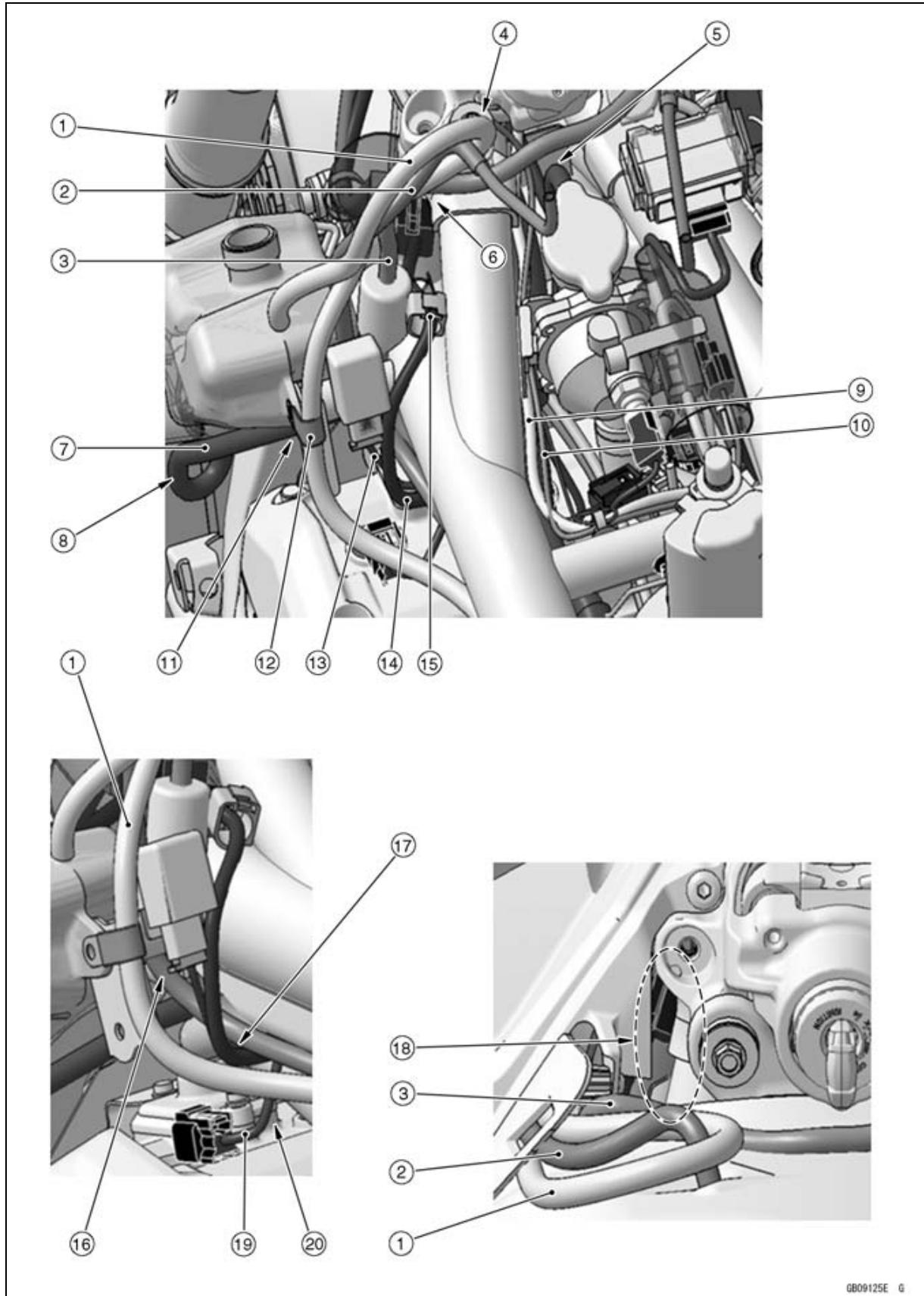
1. Fuel Level Sensor Lead
2. Run the clutch cable through the clamp.
3. Clutch Cable
4. Run the clutch cable under the vehicle-down sensor lead and horn lead.
5. Clamp (Hold the horn lead. Bend the clamp as shown.)
6. Horn Lead
7. Clamp (Hold the horn lead.)
8. Horn

Cable, Wire, and Hose Routing

1. Fuel Tank Drain Hose
2. Reserve Tank Overflow Hose
3. Clamp (Hold the reserve tank over flow hose, fuel tank drain hose and fuel tank breather hose in order from the outside. Hold the fuel tank breather hose at the tape position.)
4. Fuel Tank Breather Hose
5. Radiator Overflow Hose

17-18 APPENDIX

Cable, Wire, and Hose Routing

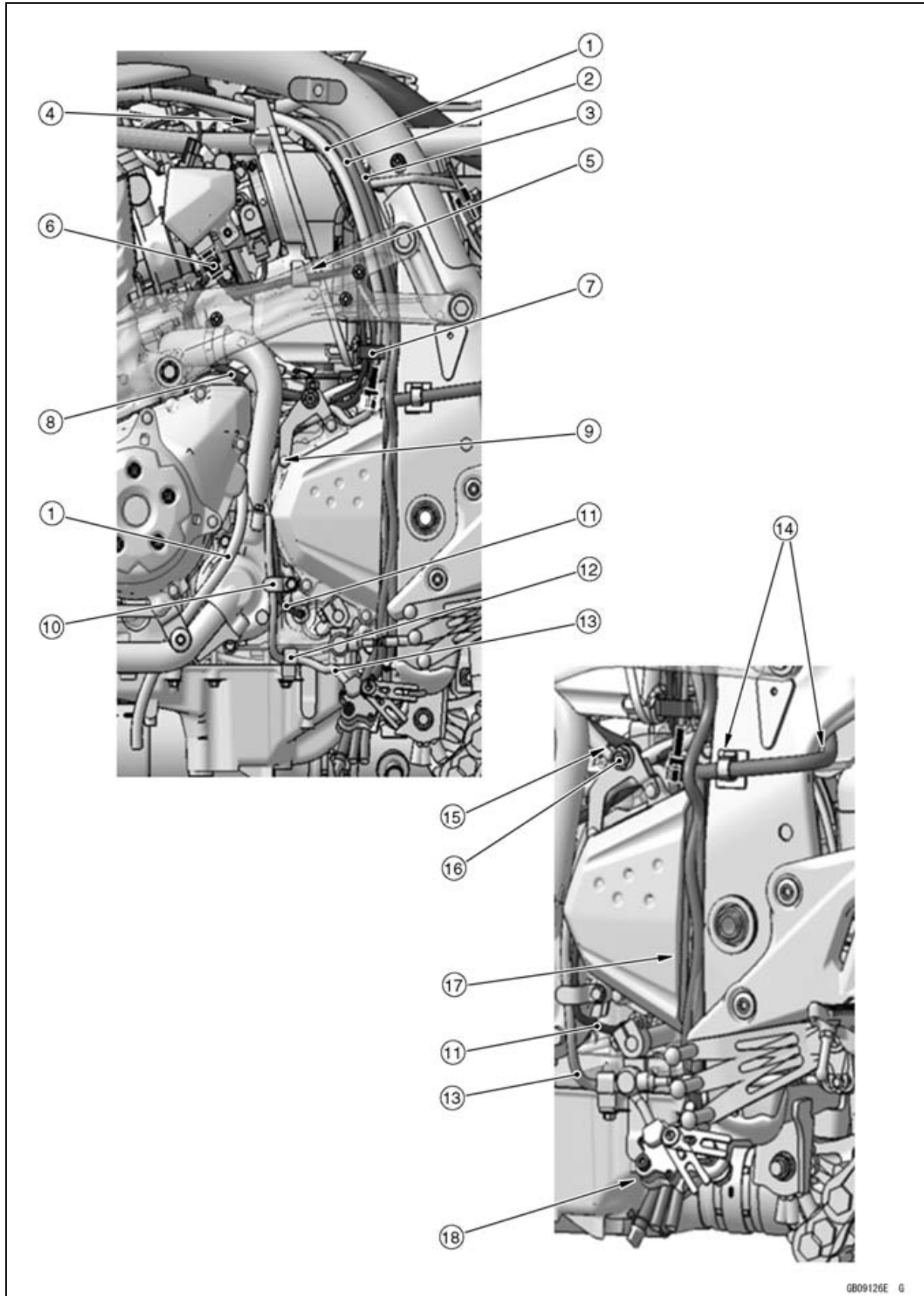


Cable, Wire, and Hose Routing

1. Reserve Tank Overflow Hose
2. Fuel Tank Drain Hose
3. Fuel Tank Breather Hose
4. Run the reserve tank over flow hose to the outside of the fuel tank drain hose as shown.
5. Run the radiator overflow hose to the left side of the fan motor and clutch cable. Run the radiator overflow hose to the right side of the ignition switch, main harness and throttle cables.
6. Run the fuel tank breather hose to the front of the fuel tank drain hose and reserve tank overflow hose.
7. Radiator Overflow Hose
8. Bend the radiator overflow hose to the outside as shown.
9. Ignition Switch Lead
10. Immobilizer Antenna Lead
11. Run the radiator overflow hose under the frame.
12. Clamp (Hold the reserve tank overflow hose at the yellow tape position.)
13. Turn Signal Light Relay Lead
14. Left/Right Switch Housing Lead
15. Clamp (Hold the left/right switch housing lead at the white tape position. Face the open side of the clamp to the upside.)
16. Run the fuel tank breather hose and fuel tank drain hose to the front of the reserve tank bracket.
17. Run the left/right switch housing lead and turn signal light relay lead between the reserve tank overflow hose and fuel tank drain hose.
18. Do not run the hoses in this space.
19. Stick Coil #1 Lead
20. Run the stick coil #1 lead between the air switching valve hose and three hoses.

17-20 APPENDIX

Cable, Wire, and Hose Routing

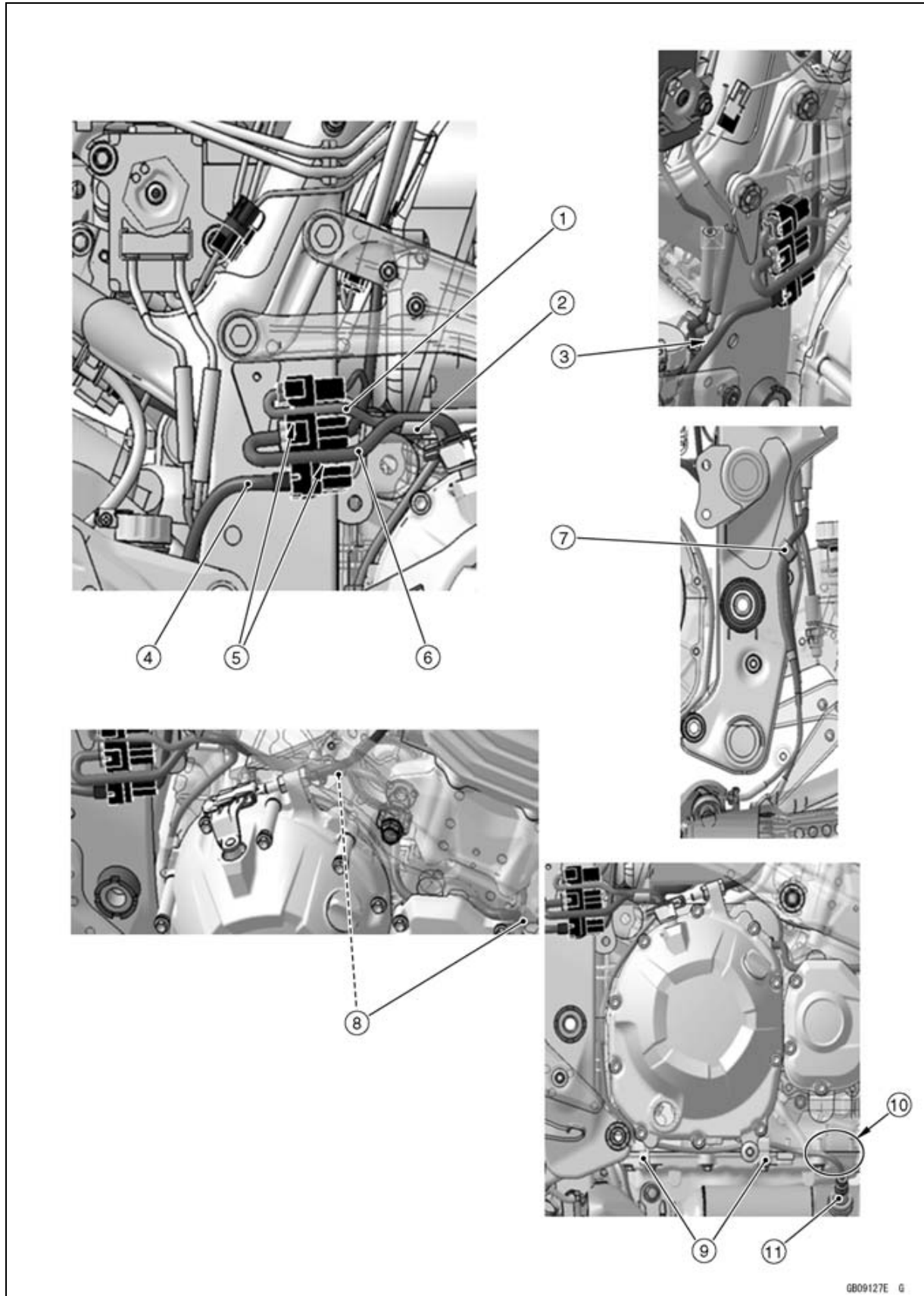


Cable, Wire, and Hose Routing

1. Reserve Tank Overflow Hose
2. Fuel Tank Drain Hose
3. Fuel Tank Breather Hose
4. Run the three hoses to the inside of the hook of the air cleaner housing.
5. Run the throttle position sensor lead through the hook of the air cleaner housing.
6. Throttle Position Sensor Connector
7. Clamp (Hold the alternator lead, side stand switch lead, speed sensor lead and neutral switch lead.)
8. Idle Adjusting Cable
9. Run the reserve tank overflow hose to the inside of the water pipe.
10. Clamp (Hold the side stand switch lead and neutral switch lead.)
11. Neutral Switch Lead
12. Clamp (Hold side stand switch lead.)
13. Side Stand Switch Lead
14. Hold the air cleaner drain hose with the clamp so that the hose is not blocked up at the corner.
15. Run the idle adjusting cable to the upside of the other hoses and leads.
16. Idle Adjusting Screw
17. Run the fuel tank drain hose, air cleaner drain hose and fuel tank breather hose in order from the outside.
18. Clamp (Hold the air cleaner drain hose, fuel tank drain hose and fuel tank breather hose in order from the front.)

17-22 APPENDIX

Cable, Wire, and Hose Routing



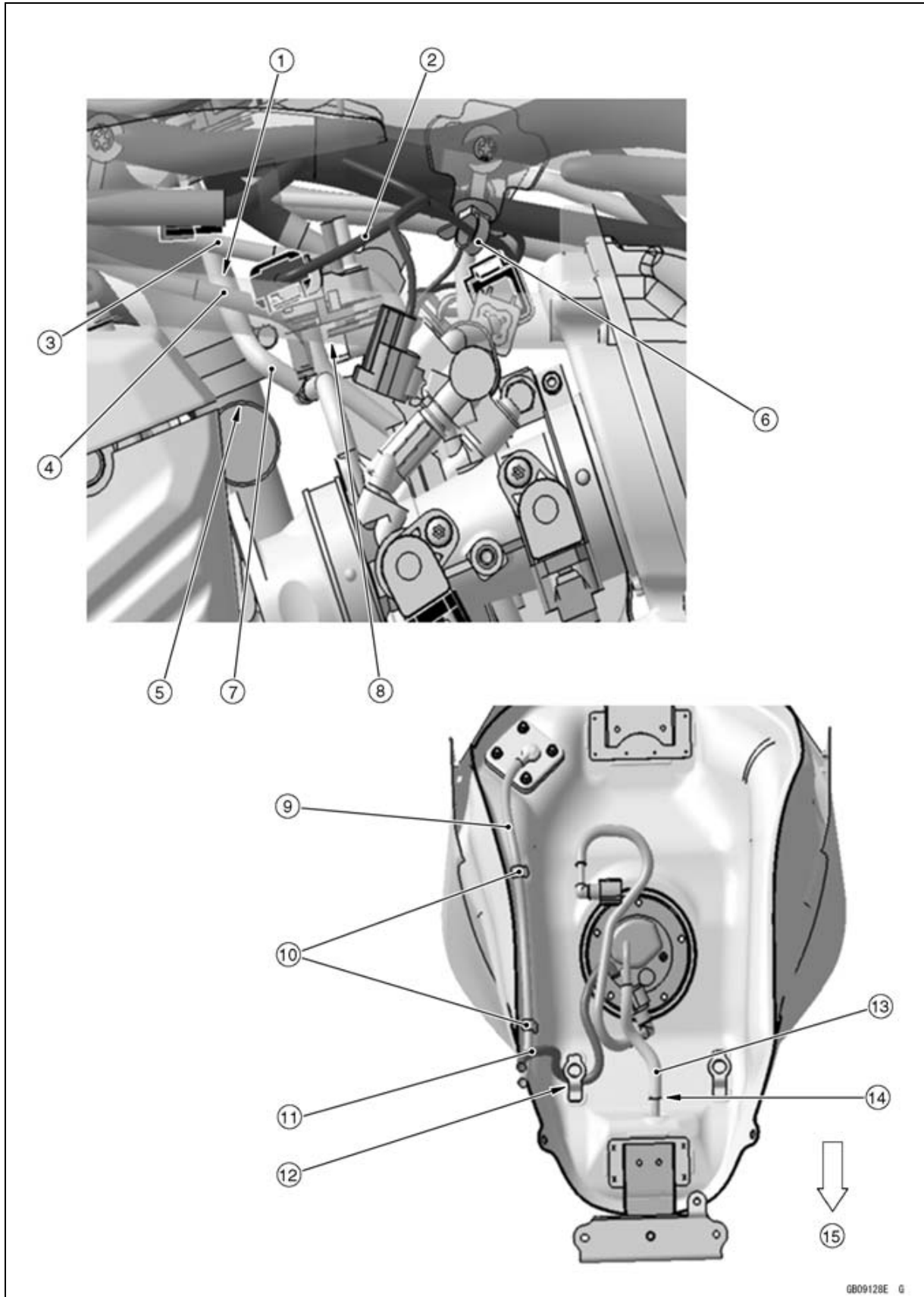
Cable, Wire, and Hose Routing

1. Oxygen Sensor Lead
2. Clamp (Hold the crankshaft sensor/oil pressure switch lead and oxygen sensor lead in order of the outside.)
3. Run the rear brake switch lead to the outside of the exhaust butterfly valve cables.*
4. Rear Brake Switch Lead
5. Set the leads between two connectors.
6. Crankshaft Sensor/Oil Pressure Switch Lead
7. Clamp (Hold the exhaust butterfly valve cables.)*
8. Clamps (Hold the crankshaft sensor/oil pressure switch lead.)
9. Clamps (Hold the oxygen sensor lead.)
10. Do not pull the oxygen sensor lead by force.
11. Oxygen Sensor

*: ZR800A/B Models

17-24 APPENDIX

Cable, Wire, and Hose Routing

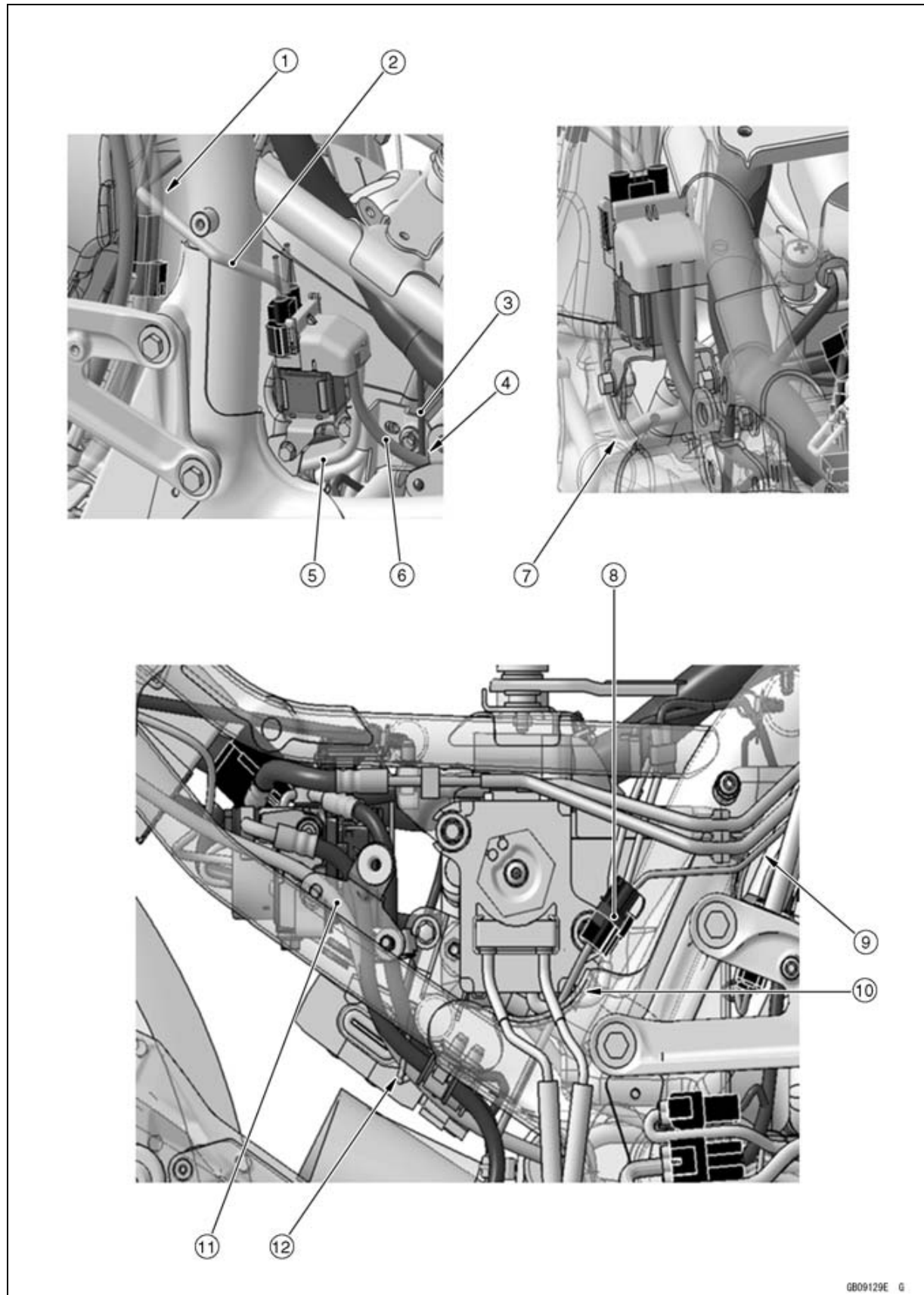


Cable, Wire, and Hose Routing

1. Run the intake air pressure sensor hose to the right side of the throttle cables.
2. Intake Air Pressure Sensor #1 Lead
3. Throttle Cable (Accelerator)
4. Throttle Cable (Decelerator)
5. Run the main harness, throttle cables and intake air pressure sensor hose in order from the upside.
6. Clamp (Hold the intake air pressure sensor #1/fuel injector lead. Insert the projection of the clamp into the frame.)
7. Intake Air Pressure Sensor Hose
8. Run the air switching valve hose between the main harness and intake air pressure sensor hose.
9. Fuel Level Sensor Lead
10. Run the fuel level sensor lead through the clamps.
11. Fuel Pump Lead
12. Run the fuel pump lead through the bracket.
13. Sub Fuel Hose
14. Position the mark rearward, and face the mark to the front of this figure.
15. Rear

17-26 APPENDIX

Cable, Wire, and Hose Routing



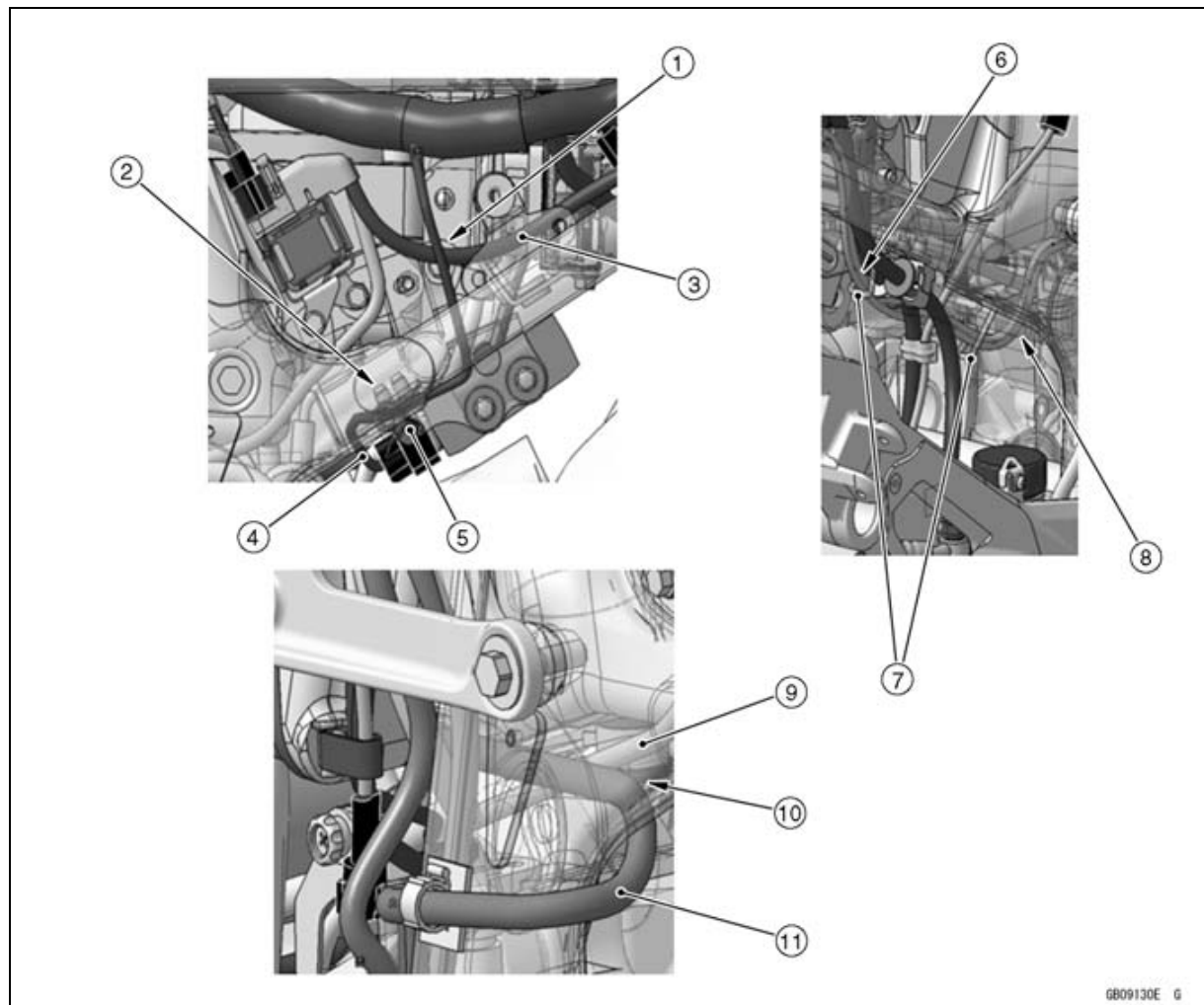
Cable, Wire, and Hose Routing

1. Run the starter relay lead backward the hoses.
2. Starter Relay Lead
3. Regulator/Rectifier Lead
4. Run the battery positive (+) cable to the outside of the regulator/rectifier lead.
5. Starter Motor Cable
6. Battery Positive (+) Cable
7. Run the starter motor cable between the bracket and air cleaner housing.
8. Insert projection of the rear wheel rotation sensor connector into the frame (ABS equipped models).
9. Run the rear wheel rotation sensor lead under the ABS brake pipes (ABS equipped models).
10. Run the rear wheel rotation sensor lead to the inside of the exhaust butterfly valve cables (ABS equipped models).*
11. Battery Negative (-) Cable
12. Run the battery negative (-) cable through the clamp. Run the battery negative (-) cable to the inside of the ABS brakes hose (ABS equipped models).

*: ZR800A/B Models

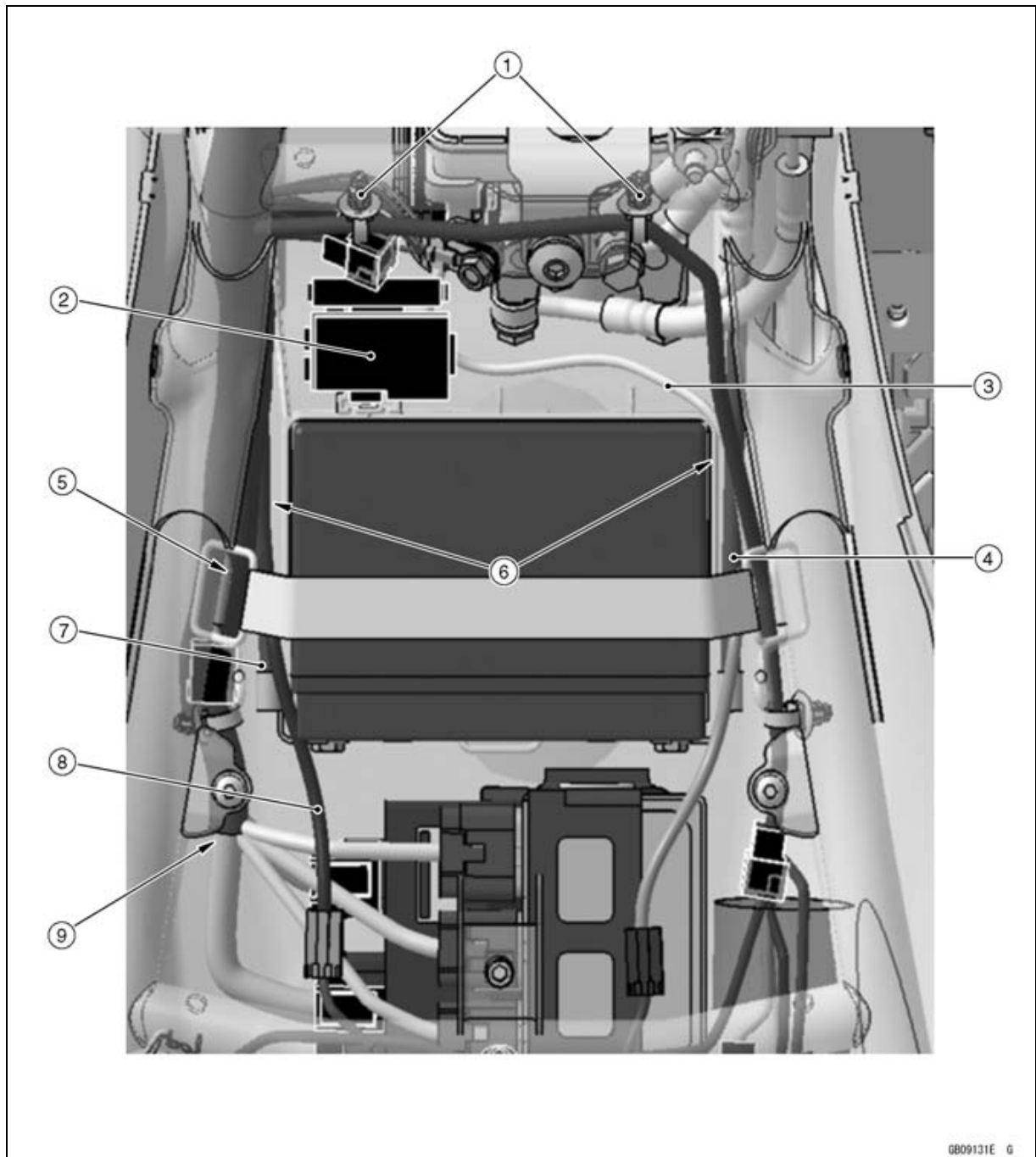
17-28 APPENDIX

Cable, Wire, and Hose Routing



1. Run the regulator/rectifier lead to the outside of the battery positive (+) cable.
2. Run the regulator/rectifier lead under the cross pipe.
3. Battery Positive (+) Cable
4. Regulator/Rectifier Lead
5. Clamp (Hold the regulator/rectifier lead. Insert the projection of the clamp into the frame.)
6. Run the battery negative (-) cable to the inside of the ABS brake hoses (ABS equipped models).
7. Run the battery negative (-) cable through the clamps.
8. Run the battery negative (-) cable under the cross pipe.
9. Starter Motor Cable
10. Run the air cleaner drain hose to the outside of the starter motor cable.
11. Air Cleaner Drain Hose

Cable, Wire, and Hose Routing

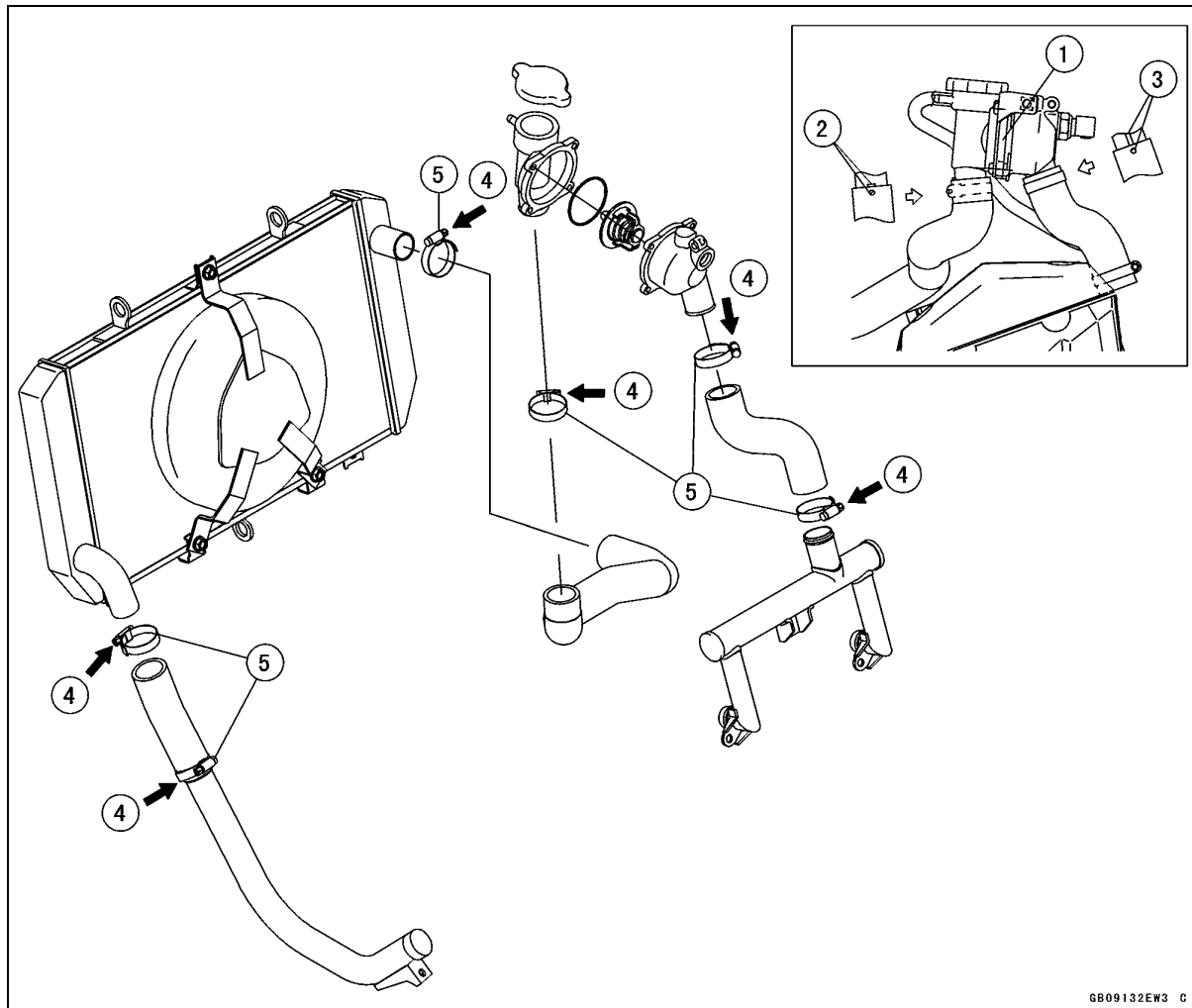


1. Clamps (Hold the main harness. Insert the projection of the clamp into the frame.)
2. Fuse Box
3. ABS Hydraulic Unit Lead (ABS Equipped Models)
4. Battery Negative (-) Cable
5. Run the main harness to the outside of the clamp of the battery band.
6. Run the battery cable under the main harness.
7. Battery Positive (+) Cable
8. This read is ABS equipped models only.
9. Run the ECU lead under the relay box lead.

GB09131E 0

17-30 APPENDIX

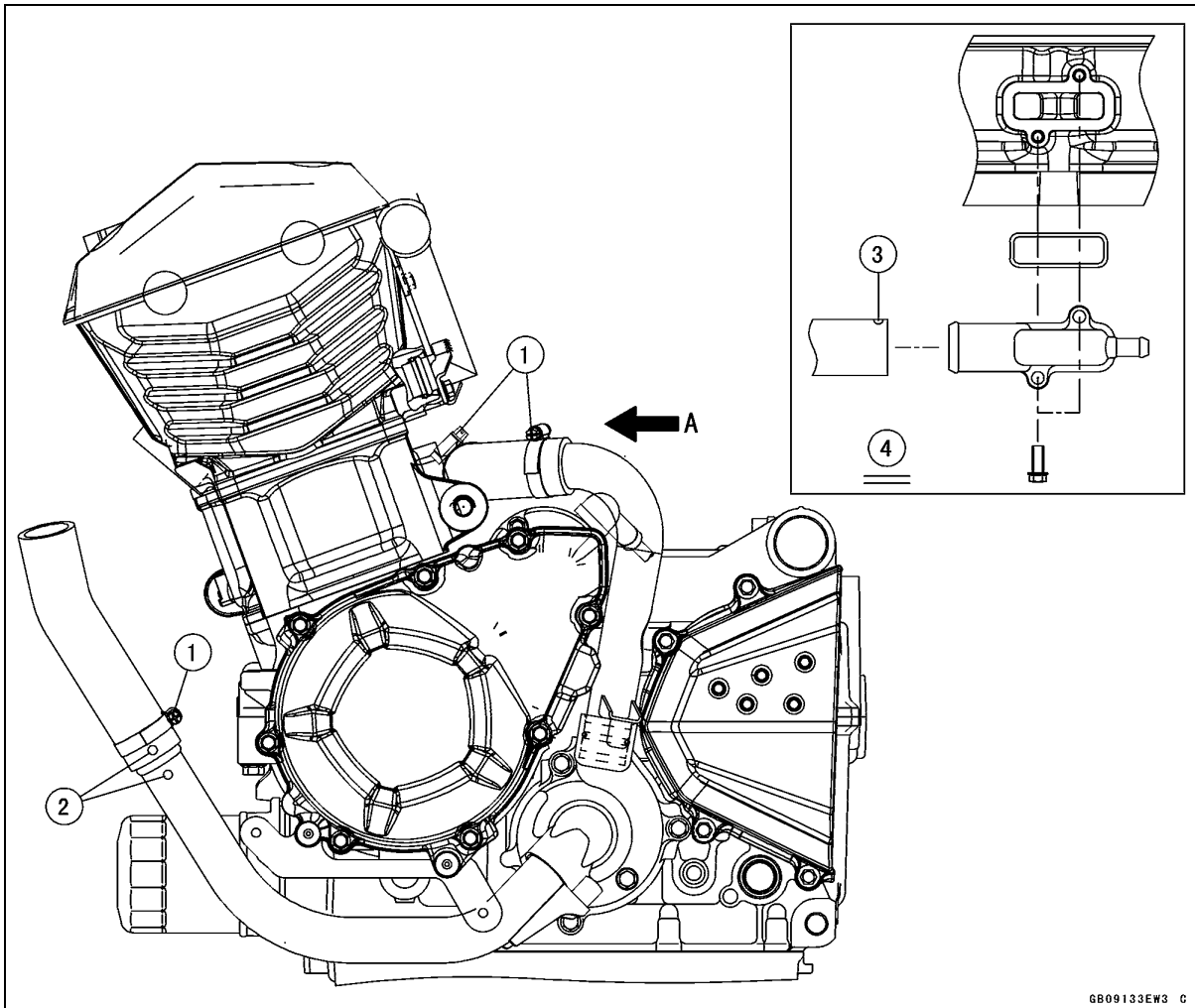
Cable, Wire, and Hose Routing



1. Thermostat Housing
2. Align the white paint of the water hose (from thermostat housing to radiator) with projection of the thermostat housing.
3. Align the white paint of the water hose (from cylinder head to thermostat housing) with rib of the thermostat housing.
4. Screw Heads
5. Clamps

6B09132EW3 C

Cable, Wire, and Hose Routing

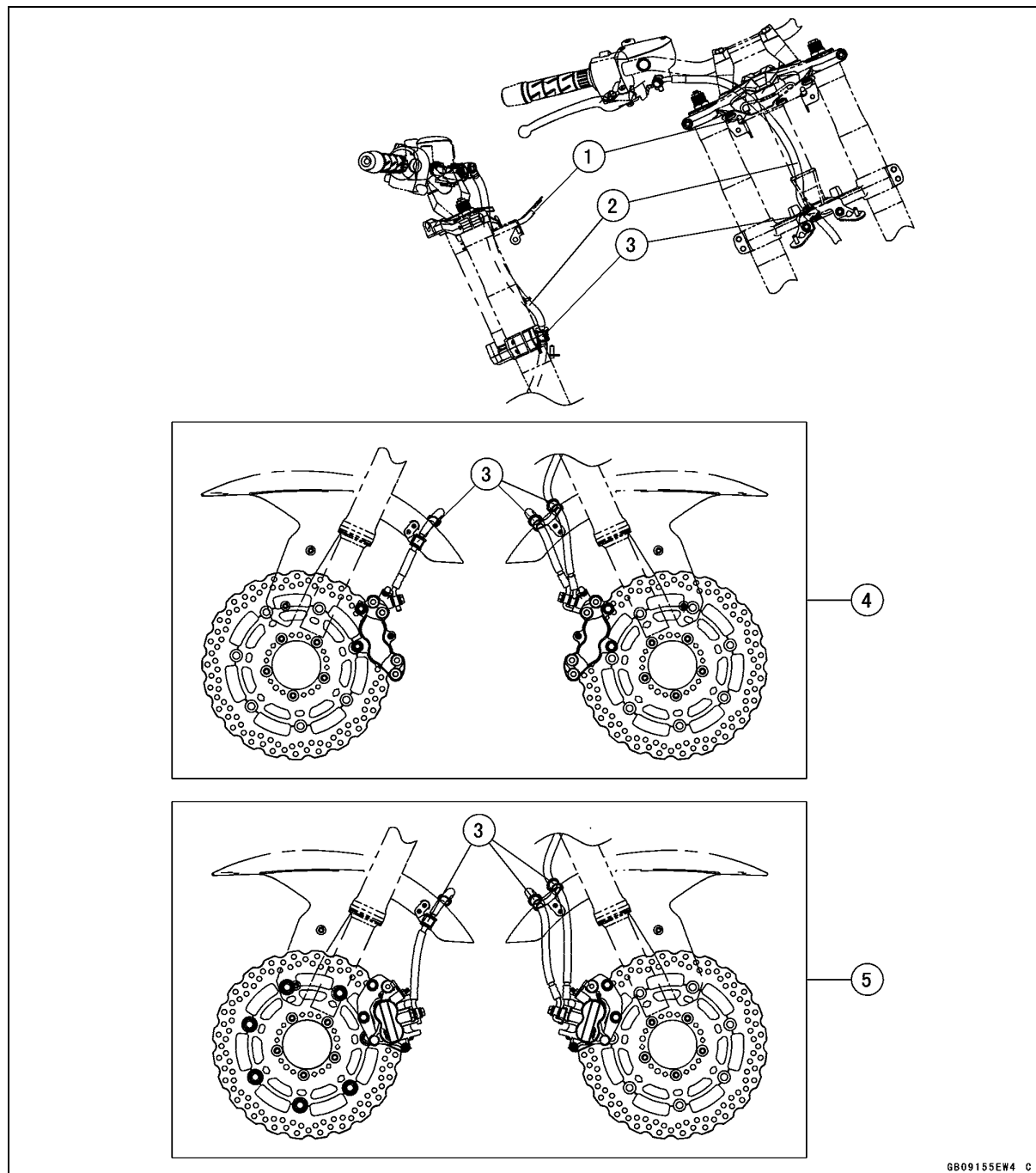


1. Clamps (Install the clamp as shown.)
2. Align the white paint of the water hose (from radiator to water pump) with projection of the water pipe.
3. Face the white paint position of the water hose to the upside.
4. Viewed from A

6B09133EW3 C

17-32 APPENDIX

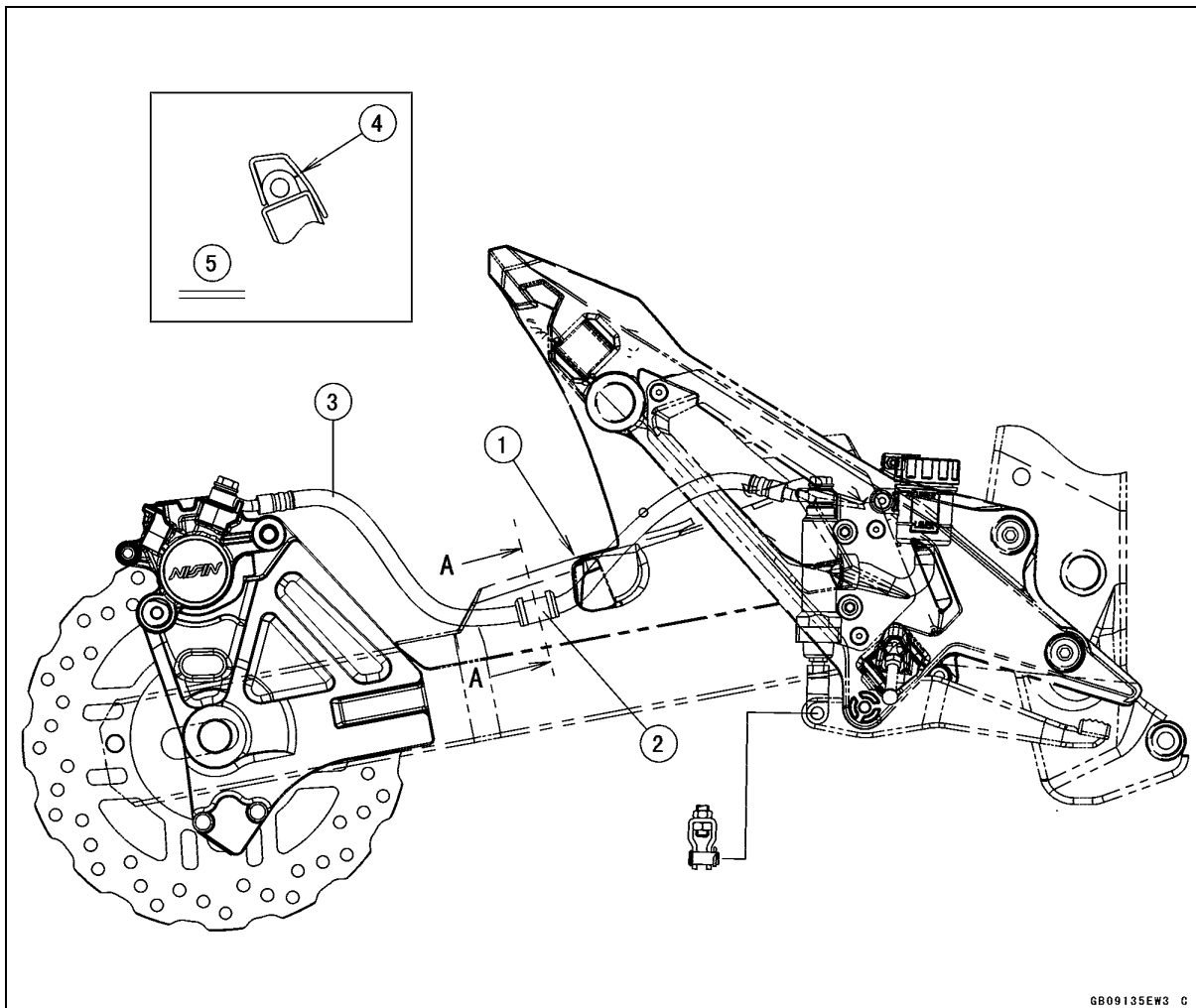
Cable, Wire, and Hose Routing



1. Meter Bracket
2. Front Brake Hose
3. Clamps (Hold the front brake hose.)
4. ZR800A/B/D Models
5. ZR800C Model

GB09155EW4 C

Cable, Wire, and Hose Routing

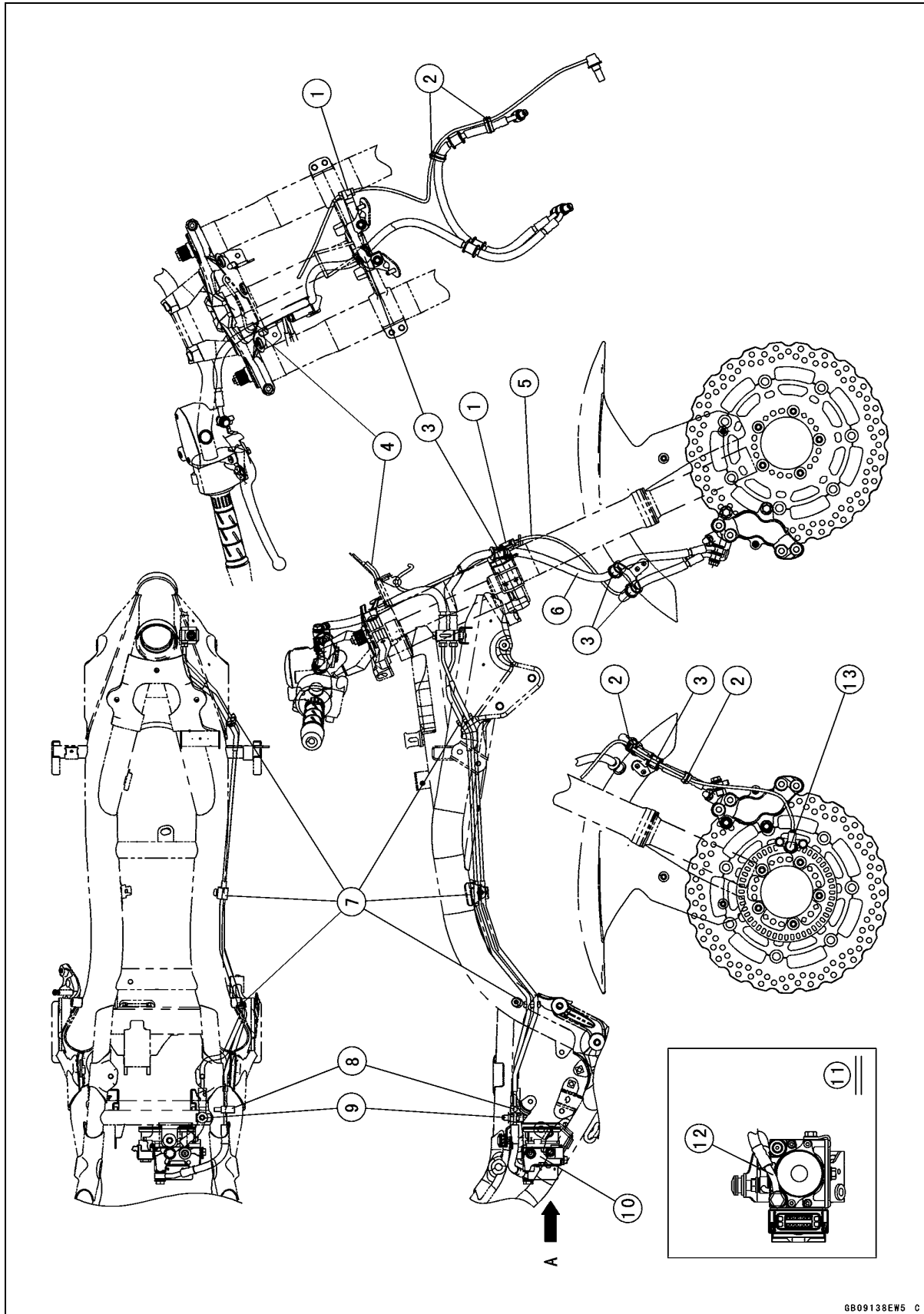


1. Run the rear brake hose to the inside of the mud guard.
2. Damper
3. Rear Brake Hose
4. Hold the damper with the mud guard.
5. Section A-A

17-34 APPENDIX

Cable, Wire, and Hose Routing

ABS Equipped Models



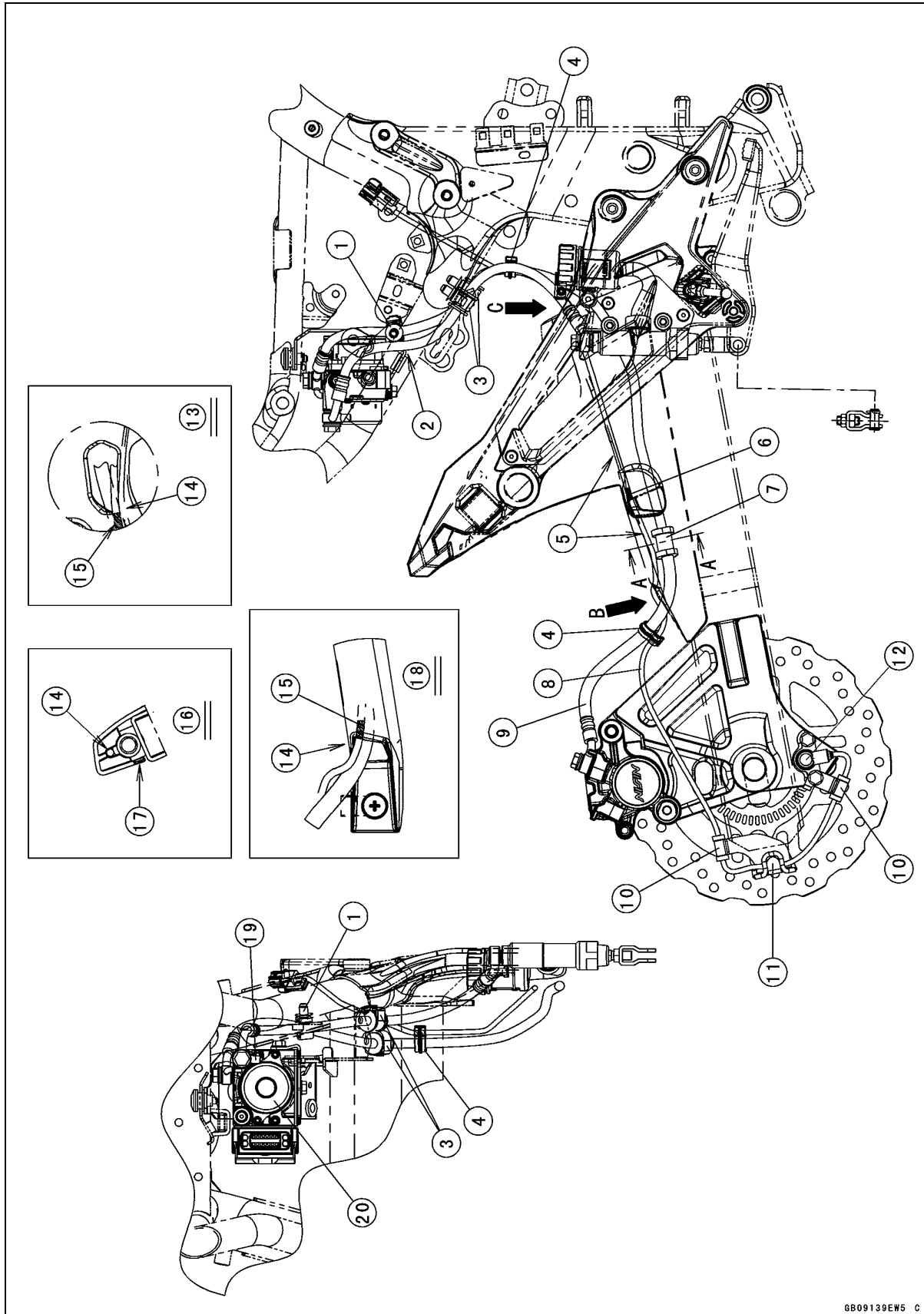
Cable, Wire, and Hose Routing

1. Clamp (Hold the front wheel rotation sensor lead.)
2. Clamps (Hold the front brake hose and front wheel rotation sensor lead at the white tape position of the front wheel rotation sensor lead.)
3. Clamps (Hold the front brake hose.)
4. Meter Bracket
5. Front Wheel Rotation Sensor Lead
6. Front Brake Hose
7. Clamps (Hold the ABS brake pipes.)
8. Clamp (Hold the ABS brake pipe.)
9. Clamp (Hold the ABS brake hose.)
10. ABS Hydraulic Unit
11. Viewed from A
12. Touch the ABS brake pipe to the ABS hydraulic unit.
13. Front Wheel Rotation Sensor

17-36 APPENDIX

Cable, Wire, and Hose Routing

ABS Equipped Models



6B09139EWS C

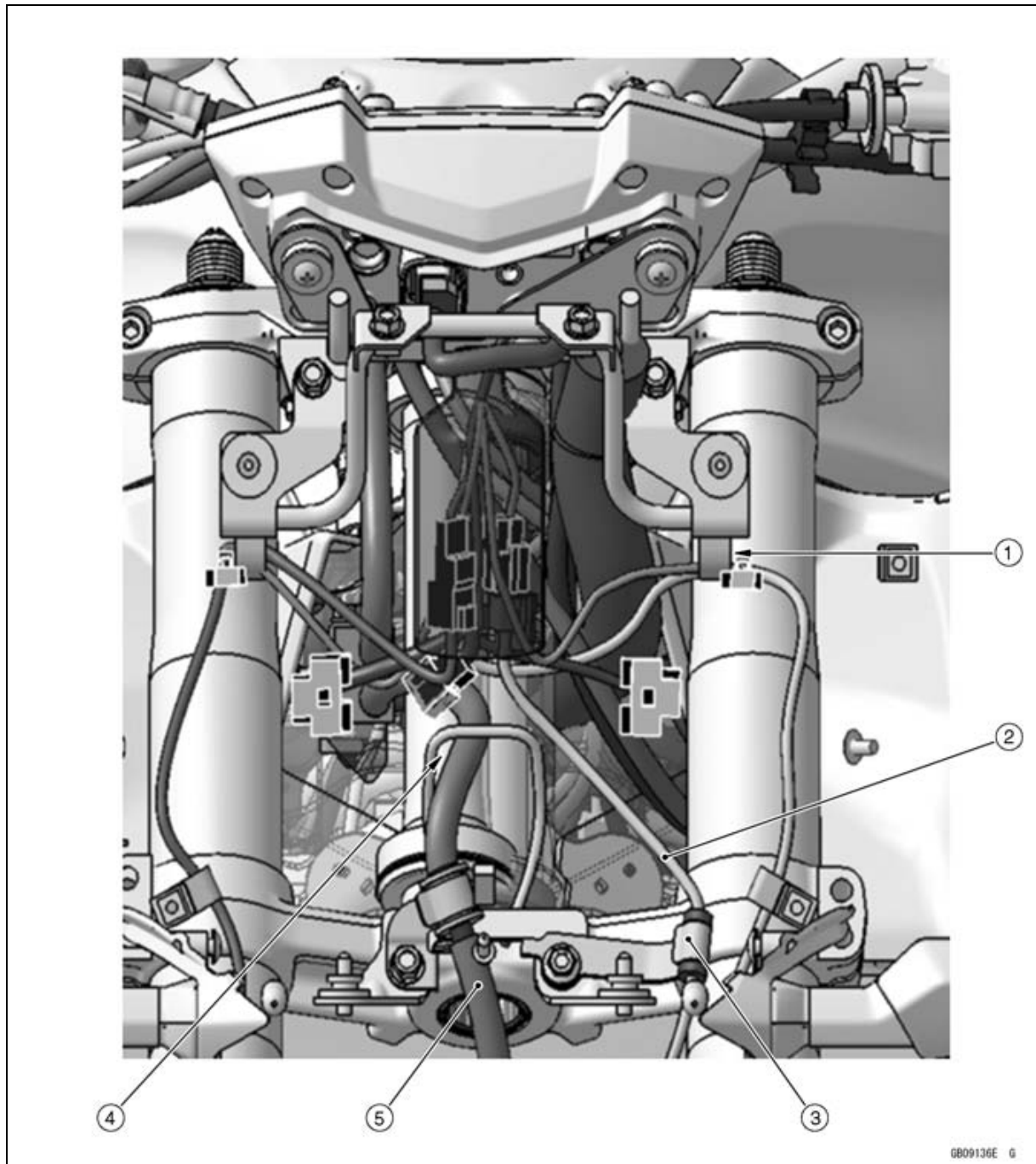
Cable, Wire, and Hose Routing

1. Clamp (Hold the rear brake hose.)
2. Run the rear brake hose of rear master cylinder under the clamp.
3. Clamps (Hold the rear brake hoses so that the rear brake hose of the master cylinder is outside.)
4. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the white tape position of the rear wheel rotation sensor lead.)
5. Run the rear brake hose and rear wheel rotation sensor lead to the inside of the mud guard.
6. Insert the rear wheel rotation sensor lead to the slit without looking the white tape position.
7. Damper
8. Rear Wheel Rotation Sensor Lead
9. Rear Brake Hose
10. Clamps (Hold the rear wheel rotation sensor.)
11. Run the rear wheel rotation sensor lead through the clamp. Do not fit the rear wheel rotation sensor lead to the clamp after tightening the chain adjuster nut.
12. Rear Wheel Rotation Sensor
13. Viewed from C
14. Insert the rear wheel rotation sensor lead to the slit.
15. White Tapes
16. Section A-A
17. Hold the damper with the mud guard.
18. Viewed from B
19. Touch the ABS brake pipe to the ABS hydraulic unit.
20. ABS Hydraulic Unit

17-38 APPENDIX

Cable, Wire, and Hose Routing

ABS Equipped Models

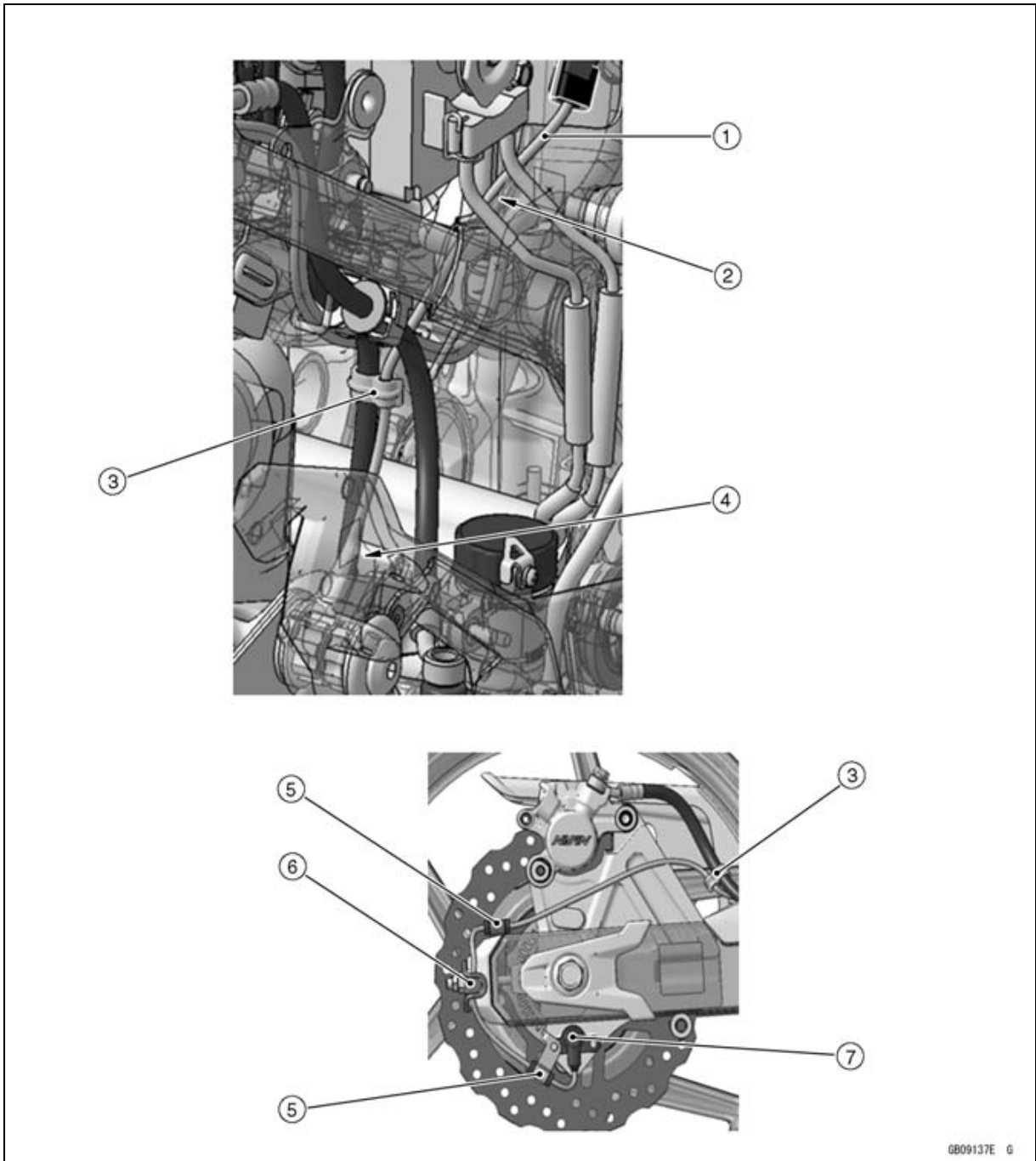


1. Do not hold the front wheel rotation sensor with the clamp.
2. Front Wheel Rotation Sensor
3. Clamp (Hold the front wheel rotation sensor.)
4. Run the front brake hose through the clamp.
5. Front Brake Hose

GB09136E G

Cable, Wire, and Hose Routing

ABS Equipped Models



1. Rear Wheel Rotation Sensor Lead

2. Run the rear wheel rotation sensor to the inside of the exhaust butterfly valve cables.*

3. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead.)

4. Run the rear brake hose and rear wheel rotation sensor to the inside of mud guard.

5. Clamps (Hold the rear wheel rotation sensor lead.)

6. Run the rear wheel rotation sensor lead through the clamp. Do not fit the rear wheel rotation sensor lead to the clamp after tightening the chain adjuster nut.

7. Rear Wheel Rotation Sensor

*: ZR800A/B Models

GB09137E G

Troubleshooting Guide

NOTE

- Refer to the Fuel System chapter for most of DFI trouble shooting guide.
- This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:

- Ignition and engine stop switch not ON
- Starter lockout switch or gear position switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Starter system wiring shorted or open
- Ignition switch trouble
- Engine stop switch trouble
- Main 30 A or ignition fuse blown

Starter motor rotating but engine doesn't turn over:

- Vehicle-down sensor (DFI) coming off
- Immobilizer system trouble
- Starter clutch trouble
- Starter idle gear trouble

Engine won't turn over:

- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure

No fuel flow:

- No fuel in tank
- Fuel pump trouble
- Fuel tank air vent obstructed
- Fuel filter clogged
- Fuel line clogged

No spark; spark weak:

- Vehicle-down sensor coming off
- Ignition switch not ON
- Engine stop switch turned to stop position
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Immobilizer system trouble
- Spark plug dirty, broken, or gap maladjusted
- Spark plug incorrect
- Stick coil shorted or not in good contact

- Stick coil trouble
- ECU trouble
- Gear position, starter lockout, or side stand switch trouble
- Crankshaft sensor trouble
- Ignition switch or engine stop switch shorted
- Starter system wiring shorted or open
- Main 30 A or ignition fuse blown

Fuel/air mixture incorrect:

- Bypass screw maladjusted
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Leak from oil filler cap, crankcase breather hose or air cleaner drain hose.

Compression Low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- No valve clearance
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:

- Battery voltage low
- Immobilizer system trouble
- Stick coil trouble
- Stick coil shorted or not in good contact
- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- ECU trouble
- Crankshaft sensor trouble

Fuel/air mixture incorrect:

- Bypass screw maladjusted
- Air passage clogged
- Air bleed pipe bleed holes clogged
- Pilot passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Fuel to injector insufficient
- Fuel line clogged
- Throttle bodyassy holder loose
- Air cleaner housing holder loose

Compression low:

- Spark plug loose

Troubleshooting Guide

Cylinder head not sufficiently tightened down
 No valve clearance
 Cylinder, piston worn
 Piston ring bad (worn, weak, broken, or sticking)
 Piston ring/groove clearance excessive
 Cylinder head gasket damaged
 Cylinder head warped
 Valve spring broken or weak
 Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
 Camshaft cam worn

Run-on (dieseling):

Ignition switch trouble
 Engine stop switch trouble
 Fuel injector trouble
 Loosen terminal of battery (-) cable or ECU ground lead
 Carbon accumulating on valve seating surface
 Engine overheating

Other:

ECU trouble
 Throttle body assy not synchronizing
 Engine oil viscosity too high
 Drive train trouble
 Brake dragging
 Clutch slipping
 Engine overheating
 Air suction valve trouble
 Air switching valve trouble

Poor Running or No Power at High Speed:

Firing incorrect:

Spark plug dirty, broken, or maladjusted
 Spark plug incorrect
 Stick coil shorted or not in good contact
 Stick coil trouble
 ECU trouble

Fuel/air mixture incorrect:

Air cleaner clogged, poorly sealed, or missing
 Throttle body assy holder loose
 Air cleaner housing holder loose
 Water or foreign matter in fuel
 Fuel to fuel injector insufficient
 Fuel tank air vent obstructed
 Fuel line clogged
 Fuel pump trouble

Compression low:

Spark plug loose
 Cylinder head not sufficiently tightened down
 No valve clearance

Cylinder, piston worn
 Piston ring bad (worn, weak, broken, or sticking)
 Piston ring/groove clearance excessive
 Cylinder head gasket damaged
 Cylinder head warped
 Valve spring broken or weak
 Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

Knocking:

Carbon built up in combustion chamber
 Fuel poor quality or incorrect
 Spark plug incorrect
 ECU trouble

Miscellaneous:

Throttle valve won't fully open
 Brake dragging
 Clutch slipping
 Engine overheating
 Engine oil level too high
 Engine oil viscosity too high
 Drive train trouble
 Camshaft cam worn
 Air suction valve trouble
 Air switching valve trouble
 Catalytic converter melt down due to muffler overheating (KLEEN)

Overheating:

Firing incorrect:

Spark plug dirty, broken, or maladjusted
 Spark plug incorrect
 ECU trouble

Muffler overheating:

For KLEEN, do not run the engine even if with only one cylinder misfiring or poor running (Request the nearest service facility to correct it)
 For KLEEN, do not push-start with a dead battery (Connect another full-charged battery with jumper cables, and start the engine using the electric starter)
 For KLEEN, do not start the engine under misfire due to spark plug fouling or poor connection of the stick coil
 For KLEEN, do not coast the motorcycle with the ignition switch off (Turn the ignition switch ON and run the engine)
 ECU trouble

Fuel/air mixture incorrect:

Throttle body assy holder loose
 Air cleaner housing holder loose
 Air cleaner poorly sealed, or missing
 Air cleaner clogged

Compression high:

Carbon built up in combustion chamber

Troubleshooting Guide

Engine load faulty:

- Brake dragging
- Clutch slipping
- Engine oil level too high
- Engine oil viscosity too high
- Drive train trouble

Lubrication inadequate:

- Engine oil level too low
- Engine oil poor quality or incorrect

Water temperature meter incorrect:

- Water temperature meter broken
- Water temperature sensor broken

Coolant incorrect:

- Coolant level too low
- Coolant deteriorated
- Wrong coolant mixed ratio

Cooling system component incorrect:

- Radiator fin damaged
- Radiator clogged
- Thermostat trouble
- Radiator cap trouble
- Radiator fan relay trouble
- Fan motor broken
- Fan blade damaged
- Water pump not turning
- Water pump impeller damaged

Over Cooling:

Water temperature meter incorrect:

- Water temperature meter broken
- Water temperature sensor broken

Cooling system component incorrect:

- Thermostat trouble

Clutch Operation Faulty:

Clutch slipping:

- Friction plate worn or warped
- Steel plate worn or warped
- Clutch spring broken or weak
- Clutch hub or housing unevenly worn
- No clutch lever play
- Clutch inner cable trouble
- Clutch release mechanism trouble

Clutch not disengaging properly:

- Clutch plate warped or too rough
- Clutch spring compression uneven
- Engine oil deteriorated
- Engine oil viscosity too high
- Engine oil level too high
- Clutch housing frozen on drive shaft
- Clutch hub nut loose
- Sub clutch hub spline damaged
- Clutch friction plate installed wrong
- Clutch lever play excessive
- Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:

- Clutch not disengaging
- Shift fork bent or seized
- Gear stuck on the shaft
- Gear positioning lever binding
- Shift return spring weak or broken
- Shift return spring pin loose
- Shift ratchet assembly spring broken
- Shift ratchet assembly broken
- Shift pawl broken

Jumps out of gear:

- Shift fork ear worn, bent
- Gear groove worn
- Gear dogs and/or dog holes worn
- Shift drum groove worn
- Gear positioning lever spring weak or broken
- Shift fork guide pin worn
- Drive shaft, output shaft, and/or gear splines worn

Overshifts:

- Gear positioning lever spring weak or broken
- Shift ratchet assembly spring weak or broken

Abnormal Engine Noise:

Knocking:

- ECU trouble
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- Overheating

Piston slap:

- Cylinder/piston clearance excessive
- Cylinder, piston worn
- Connecting rod bent
- Piston pin, piston pin hole worn

Valve noise:

- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearing worn
- Valve lifter worn

Other noise:

- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring/groove clearance excessive
- Piston ring worn, broken, or stuck
- Piston ring groove worn
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection

Troubleshooting Guide

Crankshaft runout excessive
 Engine mounting portions loose
 Crankshaft bearing worn
 Primary gear worn or chipped
 Camshaft chain tensioner trouble
 Camshaft chain, sprocket, guide worn
 Air suction valve damaged
 Air switching valve damaged
 Alternator rotor loose
 Catalytic converter melt down due to muffler
 overheating (KLEEN)
 Exhaust butterfly valve cable loose
 (ZR800A/B Models)

Abnormal Drive Train Noise:

Clutch noise:

Clutch damper weak or damaged
 Clutch housing/friction plate clearance excessive
 Clutch housing gear worn
 Wrong installation of outside friction plate

Transmission noise:

Bearings worn
 Transmission gear worn or chipped
 Metal chips jammed in gear teeth
 Engine oil insufficient

Drive line noise:

Drive chain adjusted improperly
 Drive chain worn
 Rear and/or engine sprocket worn
 Chain lubrication insufficient
 Rear wheel misaligned

Abnormal Frame Noise:

Front fork noise:

Oil insufficient or too thin
 Spring weak or broken

Rear shock absorber noise:

Shock absorber damaged

Disc brake noise:

Pad installed incorrectly
 Pad surface glazed
 Disc warped
 Caliper trouble

Other noise:

Bracket, nut, bolt, etc. not properly
 mounted or tightened

Warning Indicator Light (Oil Pressure Warning) Doesn't Go OFF:

Engine oil pump damaged
 Engine oil screen clogged
 Engine oil filter clogged
 Engine oil level too low
 Engine oil viscosity too low
 Camshaft bearing worn

Crankshaft bearing worn
 Oil pressure switch damaged
 Wiring faulty
 Relief valve stuck open
 O-ring at the oil passage in the crankcase
 damaged

Exhaust Smokes Excessively:

White smoke:

Piston oil ring worn
 Cylinder worn
 Valve oil seal damaged
 Valve guide worn
 Engine oil level too high

Black smoke:

Air cleaner clogged

Brown smoke:

Air cleaner housing holder loose
 Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:

Handlebars hard to turn:

Cable routing incorrect
 Hose routing incorrect
 Wiring routing incorrect
 Steering stem nut too tight
 Steering stem bearing damaged
 Steering stem bearing lubrication inadequate
 Steering stem bent
 Tire air pressure too low

Handlebars shakes or excessively vibrates:

Tire worn
 Swingarm pivot bearing worn
 Rim warped, or not balanced
 Wheel bearing worn
 Handlebar clamp bolt loose
 Steering stem nut loose
 Front, rear axle runout excessive
 Engine mounting portions loose

Handlebars pulls to one side:

Frame bent
 Wheel misalignment
 Swingarm bent or twisted
 Swingarm pivot shaft runout excessive
 Steering maladjusted
 Front fork bent
 Right and left front fork oil level 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

17-44 APPENDIX

Troubleshooting Guide

- (Too soft)
- Tire air pressure too low
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Rear shock adjustment too soft
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking

Brake Doesn't Hold:

- Air in the brake line
- Pad or disc worn
- Brake fluid leakage
- Disc warped
- Contaminated pad
- Brake fluid deteriorated
- Primary or secondary cup damaged in master cylinder
- Master cylinder scratched inside

Battery Trouble:

Battery discharged:

- Charge insufficient
- Battery faulty (too low terminal voltage)
- Battery cable making poor contact
- Load excessive (e.g., bulb of excessive wattage)
- Ignition switch trouble
- Alternator trouble
- Wiring faulty
- Regulator/rectifier trouble

Battery overcharged:

- Alternator trouble
- Regulator/rectifier trouble
- Battery faulty

MODEL APPLICATION

Year	Model	Beginning Frame No.
2013	ZR800AD	JKBZR800AADA00001
2013	ZR800BD	JKBZR800B1□DDA00001 JKBZR800ABDA00001
2013	ZR800CD	JKBZR800CCDA00001
2013	ZR800DD	JKBZR800CDDA00001

□:This digit in the frame number changes from one machine to another.



KAWASAKI HEAVY INDUSTRIES, LTD.
Motorcycle & Engine Company

Part No.99924-1463-01

Printed in Japan