Versys-X 300 ABS

# Motorcycle Service Manual





# Versys-X 300 Versys-X 300 ABS

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# Motorcycle Service Manual

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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

|        | LIST OF ABBREVIATIONS        |      |                          |  |
|--------|------------------------------|------|--------------------------|--|
| А      | ampere(s)                    | in.  | inch(es)                 |  |
| 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(es)               | oz   | ounce(s)                 |  |
| DC     | direct current               | Pa   | pascal(s)                |  |
| DFI    | digital fuel injection       | PS   | horsepower               |  |
| DOHC   | double overhead camshaft     | psi  | pound(s) per square inch |  |
| DOT    | department of transportation | qt   | quart(s)                 |  |
| ECU    | electronic control unit      | r    | revolution               |  |
| F      | farad(s)                     | rpm  | revolution(s) per minute |  |
| °F     | degree(s) Fahrenheit         | s    | second(s)                |  |
| ft     | foot, feet                   | TDC  | top dead center          |  |
| g      | gram(s)                      | TIR  | total indicator reading  |  |
| gal    | gallon(s)                    | V    | volt(s)                  |  |
| h      | hour(s)                      | W    | watt(s)                  |  |
| HP     | horsepower(s)                | Ω    | ohm(s)                   |  |
| IC     | integrated circuit           |      |                          |  |

# **COUNTRY AND AREA CODES**

| AT  | Austria     | EUR         | Europe                  |
|-----|-------------|-------------|-------------------------|
| AU  | Australia   | IN          | India                   |
| BR  | Brazil      | PH          | Philippines             |
| CA  | Canada      | SEA-B1      | Southeast Asia B1       |
| CAL | California  | SEA-B3      | Southeast Asia B3       |
| СН  | Switzerland | TH          | Thailand                |
| CN  | China       | US          | United States           |
| CO  | Colombia    | WVTA (FULL) | WVTA Model (Full Power) |
| DE  | Germany     |             |                         |

# **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.

# **EMISSION CONTROL INFORMATION**

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

1. Crankcase Emission Control System

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

2. Exhaust Emission Control System

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

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

3. Evaporative Emission Control System

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

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

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

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

### NOTE

- OThe phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows.
  - Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.
  - 2. Tampering could include.
    - a.Maladjustment of vehicle components such that the emission standards are exceeded.
    - b. Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.
    - c.Addition of components or accessories that result in the vehicle exceeding the standards.
    - d.Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.

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

# TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

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

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

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

# **Foreword**

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

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

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

To get the longest life out of your vehicle.

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

# **How to Use This Manual**

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

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

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

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

### A DANGER

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

### **A** 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.
- Olndicates 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 | 1-9  |
| Unit Conversion Table  | 1-12 |

1

### 1-2 GENERAL INFORMATION

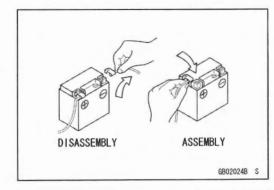
# **Before Servicing**

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.



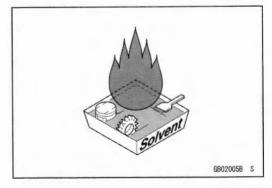
## **Edges of Parts**

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



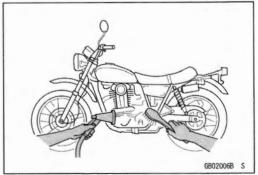
### Solvent

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

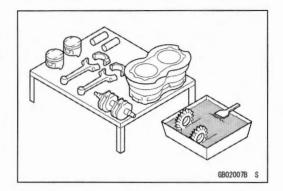
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



# **Before Servicing**

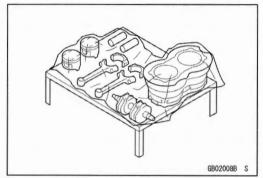
# Arrangement and Cleaning of Removed Parts

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.



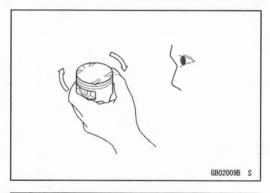
## Storage of Removed Parts

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.



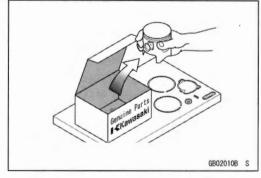
# Inspection

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.



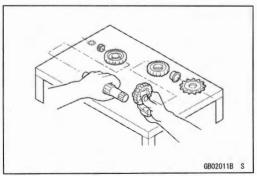
### Replacement Parts

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.



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

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

# Force

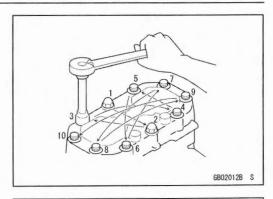
Use common sense during disassembly and assembly, excessive force can cause expensive or hard to repair damage. When necessary, remove screws that have a non-permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.

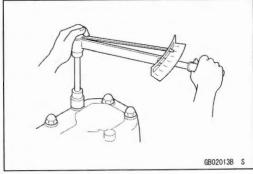
# Gasket, O-ring

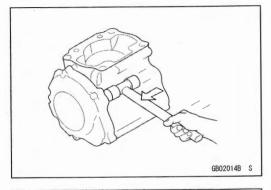
Hardening, shrinkage, or damage of both gaskets and O-rings after disassembly can reduce sealing performance. Remove old gaskets and clean the sealing surfaces thoroughly so that no gasket material or other material remains. Install the new gaskets and replace the used O-rings when re-assembling.

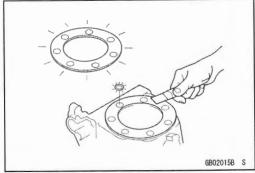
# Liquid Gasket, Non-permanent Locking Agent

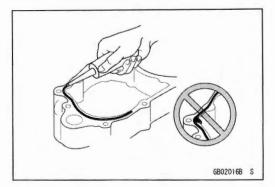
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.







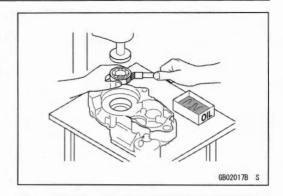




# **Before Servicing**

### **Press**

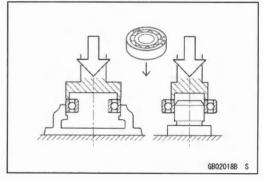
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



### Ball Bearing and Needle Bearing

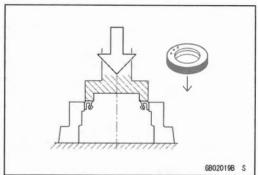
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

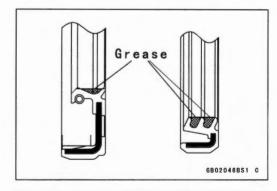


### Oil Seal, Grease Seal

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

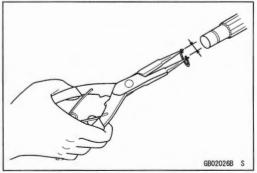


Apply specified grease to the lip of seal before installing the seal.



### Circlips, Cotter Pins

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

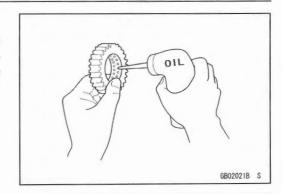


### 1-6 GENERAL INFORMATION

# **Before Servicing**

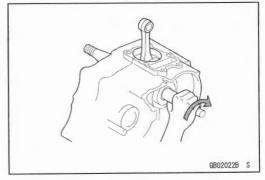
### Lubrication

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.



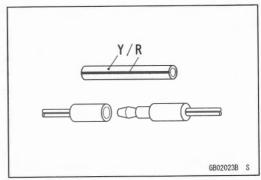
**Direction of Engine Rotation** 

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).



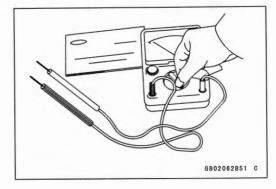
### **Electrical Wires**

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.



### Handling Electronic Parts

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

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

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

# **GENERAL INFORMATION 1-7**

# **Model Identification**

# **KLE300AH Left Side View**



# **KLE300AH Right Side View**



# 1-8 GENERAL INFORMATION

# **Model Identification**

# KLE300BH/CH Left Side View



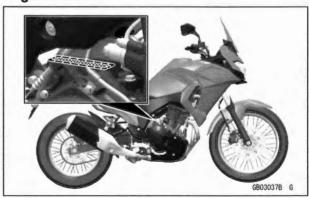
# KLE300BH/CH Right Side View



### Frame Number



# **Engine Number**



# **General Specifications**

| Items                           | KLE300AH ~ AJ/BH ~ BJ/CH ~ CJ                          |  |
|---------------------------------|--|--|
| Dimensions                      |  |  |
| Overall Length                  | 2 170 mm (85.43 in.)                                   |  |
| Overall Width:                  |  |  |
| KLE300A                         | 940 mm (37.0 in.)                                      |  |
| KLE300B/C                       | 860 mm (33.9 in.)                                      |  |
| Overall Height                  | 1 390 mm (54.72 in.)                                   |  |
| Wheel Base                      | 1 450 mm (57.09 in.)                                   |  |
| Ground Clearance                | 180 mm (7.09 in.)                                      |  |
| Seat Height                     | 815 mm (32.1 in.)                                      |  |
|                                 | (EUR) 845 mm (33.3 in.)                                |  |
| Curb Mass:                      |  |  |
| KLE300A:                        | 184 kg (406 lb)  |  |
| Front                           | 90 kg (198 lb)   |  |
| Rear                            | 94 kg (207 lb)   |  |
| KLE300B:                        | 173 kg (381 lb)  |  |
| Front                           | 86 kg (190 lb)   |  |
| Rear                            | 87 kg (192 lb)   |  |
| KLE300C:                        | 175 kg (386 lb)  |  |
| Front                           | 87 kg (192 lb)   |  |
| Rear                            | 88 kg (194 lb)   |  |
| Fuel Tank Capacity              | 17 L (4.5 US gal)                                      |  |
| Performance                     |  |  |
| Minimum Turning Radius          | 2.5 m (8.2 ft)   |  |
| Engine                          |  |  |
| Туре                            | 4-stroke, DOHC, 2-cylinder                             |  |
| Cooling System                  | Liquid-cooled  |  |
| Bore and Stroke                 | 62.0 × 49.0 mm (2.44 × 1.93 in.)                       |  |
| Displacement                    | 296 cm <sup>3</sup> (18.1 cu in.)                      |  |
| Compression Ratio               | 10.6 : 1   |  |
| Maximum Horsepower              | 29.3 kW (40 PS) @11 500 r/min (rpm)                    |  |
| · ·                             | (KLE300AH/BH/CH AU) 29 kW (39 PS) @11 500 r/min        |  |
|                                 | (rpm)  |  |
|                                 | (CN) 21.8 kW (30 PS) @10 000 r/min (rpm)               |  |
| Maximum Torque                  | 25.7 N·m (2.6 kgf·m, 19 ft·lb) @10 000 r/min (rpm)     |  |
| Waximum Torque                  | (KLE300AH/BH/CH AU) 26 N·m (2.7 kgf·m, 19 ft·lb) @10   |  |
|                                 | 000 r/min (rpm)  |  |
|                                 | (CN) 24.8 N·m (2.5 kgf·m, 18 ft·lb) @7 000 r/min (rpm) |  |
|                                 | (CA,US,CAL)  |  |
| Fuel System                     | FI (Fuel injection) KEIHIN TTK 32 × 2                  |  |
| Fuel Type                       | Unleaded gasoline                                      |  |
| Minimum Octane Rating:          |  |  |
| Research Octane number (RON)    | 91   |  |
| Antiknock Index (RON + MON) / 2 |  |  |
| Starting System                 | Electric Starter                                       |  |
| Ignition System                 | Battery and coil (transistorized)                      |  |

# 1-10 GENERAL INFORMATION

# **General Specifications**

| Items                      | KLE300AH ~ AJ/BH ~ BJ/CH ~ CJ   |
|----------------------------|---|
| Timing Advance             | Electronically advanced (digital igniter in ECU)  |
| Ignition Timing            | 10.0° BTDC @1 300 r/min (rpm) ~ 35.7° BTDC @4 000 r/min (rpm)<br>(CA,US,CAL,AU) 10° BTDC @1 300 r/min (rpm) ~ 35° |
|                            | BTDC @4 000 r/min (rpm)<br>(CN) 11.1° BTDC @1 300 r/min (rpm) ~ 39.9° BTDC @4<br>300 r/min (rpm)                  |
| Spark Plug                 | NGK CR8E  |
| Cylinder Numbering Method  | Left to right, 1-2  |
| Firing Order Valve Timing: | 1-2   |
| Intake:                    |   |
| Open                       | 36° (BTDC)  |
| Close                      | 56° (ABDC)  |
| Duration                   | 272°  |
| Exhaust:                   |   |
| Open                       | 61° (BBDC)  |
| Close                      | 31° (ATDC)  |
| Duration                   | 272°  |
| Lubrication System         | Forced lubrication (wet sump)   |
| Engine Oil:                |   |
| Type                       | API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2   |
| Viscosity                  | SAE 10W-40  |
| Capacity                   | 2.4 L (2.5 US qt)   |
| Drive Train                |   |
| Primary Reduction System:  | ·   |
| Туре                       | Gear  |
| Reduction Ratio            | 3.087 (71/23)   |
| Clutch Type                | Wet multi disc  |
| Transmission:              |   |
| Туре                       | 6-speed, constant mesh, return shift  |
| Gear Ratios:               |   |
| 1st                        | 2.714 (38/14)   |
| 2nd                        | 1.789 (34/19)   |
| 3rd                        | 1.409 (31/22)   |
| 4th                        | 1.160 (29/25)   |
| 5th                        | 1.000 (27/27)   |
| 6th                        | 0.857 (24/28)   |
| Final Drive System:        | Oh a in alain a   |
| Type                       | Chain drive   |
| Reduction Ratio            | 3.286 (46/14)<br>(CN) 2.643 (37/14)   |
| Overall Drive Ratio        | 8.694 at Top gear (CN) 6.993 at Top gear  |
| Frame                      |   |
| Туре                       | Tubular, diamond  |

# **General Specifications**

| Items                | KLE300AH ~ AJ/BH ~ BJ/CH ~ CJ                |  |
|----------------------|--|--|
| Caster (Rake Angle)  | 24.3°  |  |
| Trail                | 108 mm (4.25 in.)                            |  |
| Front Tire:          |  |  |
| Туре                 | Tube type                                    |  |
| Size                 | 100/90-19M/C 57S<br>(BR) 100/90-19M/C 57H TL |  |
| Rim Size             | 19 × 2.15                                    |  |
| Rear Tire:           |  |  |
| Туре                 | Tube type                                    |  |
| Size                 | 130/80-17M/C 65S<br>(BR) 130/80-17M/C 65H TL |  |
| Rim Size             | 17M/C × MT3.00                               |  |
| Suspension:          |  |  |
| Front                |  |  |
| Туре                 | Telescopic fork                              |  |
| Wheel Travel         | 130 mm (5.12 in.)                            |  |
| Rear                 |  |  |
| Туре                 | Swingarm (uni-trak)                          |  |
| Wheel Travel         | 148 mm (5.83 in.)                            |  |
| Brake Type:          |  |  |
| Front                | Single disc                                  |  |
| Rear                 | Single disc                                  |  |
| Electrical Equipment |  |  |
| Battery              | 12 V 8 Ah (10 HR)                            |  |
| Headlight:           |  |  |
| Bulb:                |  |  |
| High                 | 12 V 60 W                                    |  |
| Low                  | 12 V 55 W                                    |  |
| Tail/Brake Light     |  |  |
| Bulb:                | 12 V 21/5 W                                  |  |
| Alternator:          |  |  |
| Туре                 | Three-phase AC                               |  |
| Maximum Output       | 14.0 V – 21.0 A @5 000 r/min (rpm)           |  |

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

# 1-12 GENERAL INFORMATION

# **Unit Conversion Table**

# **Prefixes for Units:**

| Prefix | Symbol | Power       |
|--------|--------|-------------|
| mega   | М      | × 1 000 000 |
| kilo   | k      | × 1 000     |
| centi  | С      | × 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:**

| × | 0.1020 | =                   | kg                      |                              |
|---|--------|---------------------|-------------------------|------------------------------|
| × | 0.2248 | =                   | lb                      |                              |
| × | 9.807  | =                   | N                       |                              |
| × | 2.205  | =                   | lb                      |                              |
|   | ×      | × 0.2248<br>× 9.807 | × 0.2248 =<br>× 9.807 = | × 0.2248 = Ib<br>× 9.807 = N |

# **Units of Length:**

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

# **Units of Torque:**

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

# **Units of Pressure:**

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

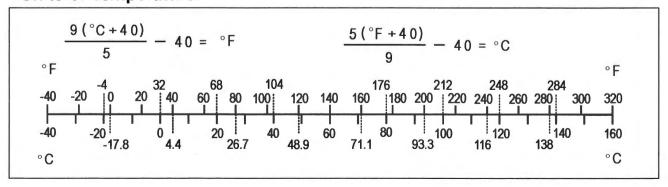
# **Units of Speed:**

| km/h | × | 0.6214 | = | mph |
|------|---|--------|---|-----|
|------|---|--------|---|-----|

# **Units of Power:**

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

# **Units of Temperature:**



# **Periodic Maintenance**

# **Table of Contents**

| Periodic Maintenance Chart                                       | 2-3          |
|--|--------------|
| Torque and Locking Agent   | 2-5          |
| Specifications   | 2-10         |
| Special Tools  | 2-12         |
| Periodic Maintenance Procedures                                  | 2-13         |
| Fuel System (DFI)  | 2-13         |
| Air Cleaner Element Cleaning                                     | 2-13         |
| Air Cleaner Element Replacement                                  | 2-14         |
| Idle Speed Inspection  | 2-15         |
| Idle Speed Adjustment  | 2-15         |
| Throttle Control System Inspection                               | 2-15         |
| Engine Vacuum Synchronization Inspection                         | 2-16         |
| Fuel System  | 2-18         |
| Fuel Filter Replacement  | 2-10         |
| Fuel Hose Replacement  | 2-13         |
| Evaporative Emission Control System Inspection (Equipped Models) | 2-24         |
|  | 2-24         |
| Cooling System   | 2-25<br>2-25 |
| Coolant Level Inspection   |              |
| Cooling System   | 2-25         |
| Coolant Change   | 2-25         |
| Water Hose and O-ring Replacement                                | 2-27         |
| Engine Top End   | 2-28         |
| Valve Clearance Inspection                                       | 2-28         |
| Valve Clearance Adjustment                                       | 2-29         |
| Air Suction System Damage Inspection                             | 2-31         |
| Clutch   | 2-31         |
| Clutch Operation Inspection                                      | 2-31         |
| Engine Lubrication System  | 2-32         |
| Engine Oil Change  | 2-32         |
| Oil Filter Replacement   | 2-33         |
| Wheels/Tires   | 2-34         |
| Air Pressure Inspection  | 2-34         |
| Wheels and Tires   | 2-34         |
| Wheel Bearing Damage Inspection                                  | 2-35         |
| Spoke Tightness and Rim Runout Inspection                        | 2-36         |
| Final Drive  | 2-37         |
| Drive Chain Lubrication Condition Inspection                     | 2-37         |
| Drive Chain Slack Inspection                                     | 2-37         |
| Drive Chain Slack Adjustment                                     | 2-38         |
| Wheel Alignment Inspection                                       | 2-39         |
| Drive Chain Wear Inspection                                      | 2-39         |
| Chain Guide Wear Inspection                                      | 2-40         |
| Brakes   | 2-40         |
| Brake System Inspection  | 2-40         |
| Brake Operation Inspection                                       | 2-41         |
| Brake Fluid Level Inspection                                     | 2-41         |
| Brake Fluid Change   | 2-41         |
| Brake Hose and Pipe Replacement                                  | 2-42         |
| Master Cylinder Rubber Parts Replacement                         | 2-44<br>2-49 |
| Caliper Rubber Parts Replacement                                 | 2-49         |
| οαιίροι πάρρει τ από περιασεπιετίτ                               | 2-00         |

# 2-2 PERIODIC MAINTENANCE

| Brake Pad Wear Inspection                                   | 2-54 |
|---|------|
| Brake Light Switch Operation Inspection                     | 2-54 |
| Suspension  | 2-55 |
| Suspension System   | 2-55 |
| Lubrication of Rear Suspension                              | 2-56 |
| Steering  | 2-57 |
| Steering Play Inspection                                    | 2-57 |
| Steering Play Adjustment                                    | 2-57 |
| Steering Stem Bearing Lubrication                           | 2-58 |
| Electrical System   | 2-59 |
| Lights and Switches Operation Inspection                    | 2-59 |
| Headlight Aiming Inspection                                 | 2-61 |
| Side Stand Switch Operation Inspection                      | 2-63 |
| Engine Stop Switch Operation Inspection                     | 2-64 |
| Spark Plug Replacement                                      | 2-65 |
| Others  | 2-65 |
| Chassis Parts Lubrication                                   | 2-65 |
| Condition of Bolts, Nuts and Fasteners Tightness Inspection | 2-67 |
|   |      |

### **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.
- O: Emission Related Item

Q: Inspection

Change or Replace

: Lubrication

|    |  | year         | Odometer Reading (*B)<br>× 1 000 km (× 1 000 mile) |               |             |              |              |              |
|----|--|--------------|--|---------------|-------------|--------------|--------------|--------------|
|    | Items  | (*A)         | 1<br>(0.6)   | 6<br>(3.8)    | 12<br>(7.6) | 18<br>(11.4) | 24<br>(15.2) | Page         |
| Fu | el System  |              |  |               |             |              |              |              |
| 0  | Air cleaner element (*C)                               | Ø: 2         |  |               | Q           |              | Q            | 2-13         |
| 0  | Idle speed   |              | Q  |               | Q           |              | Q            | 2-15         |
| 0  | Throttle control system (play, smooth return, no drag) | Q:1          | Q  |               | Q           |              | Q            | 2-15         |
| 0  | Engine vacuum synchronization                          |              |  |               | Q           |              | Q            | 2-16         |
|    | Fuel system  | Q:1          | Q  |               | Q           |              | Q            | 2-18         |
|    | Fuel filter  |              |  |               |             |              | \$           | 2-19         |
|    | Fuel hose  | \$:5         |  |               |             |              |              | 2-22         |
| 0  | Evaporative emission control system (Equipped Models)  |              | Q  | Q             | Q           | Q            | Q            | 2-24         |
| Co | ooling System  |              |  |               |             |              |              |              |
|    | Coolant level  |              | Q  |               | Q           |              | Q            | 2-25         |
|    | Cooling system   | Q:1          | Q  |               | Q           |              | Q            | 2-25         |
|    | Coolant, water hose and O-ring                         | <b>\$</b> :3 |  | (22 500 mile) |             |              |              | 2-25<br>2-27 |
| Er | igine Top End  |              |  |               |             |              |              |              |
| 0  | Valve clearance  |              |  |               | Q           |              | Q            | 2-28         |
| 0  | Air suction system                                     |              |  |               | Q           |              | Q            | 2-31         |
| CI | utch   |              |  |               |             |              |              |              |
|    | Clutch operation (play, engagement, disengagement)     |              | Q  |               | Q           |              | Q            | 2-31         |
| Er | ngine Lubrication System                               |              |  |               |             |              |              |              |
|    | Engine oil (*C) and oil filter                         | Ø:1          | \$   |               | 47          |              | \$           | 2-32<br>2-33 |
| W  | heels and Tires  |              |  |               |             |              |              |              |
|    | Tire air pressure                                      | Q:1          |  |               | Q           |              | Q            | 2-34         |
|    | 100 1 11   | 0.           |  |               | 0           |              | 0            | 2.2          |

# **2-4 PERIODIC MAINTENANCE**

# **Periodic Maintenance Chart**

|   | year | Odometer Reading (*B) × 1 000 km (× 1 000 mile) |                            |             |               | See          |      |  |
|---|------|---|----------------------------|-------------|---------------|--------------|------|--|
| Items   | (*A) | 1<br>(0.6)                                      | 6<br>(3.8)                 | 12<br>(7.6) | 18<br>(11.4)  | 24<br>(15.2) | Page |  |
| Wheel bearing damage                              | Q:1  |   |                            | Q           |               | Q            | 2-35 |  |
| Spoke tightness and rim runout                    |      | Q   | Q                          | Q           | Q             | Q            | 2-36 |  |
| Final Drive                                       |      |   |                            |             |               |              |      |  |
| Drive chain lubrication condition (*C)            |      | Q:  | Q: every 600 km (400 mile) |             |               |              |      |  |
| Drive chain slack (*C)                            |      | Q:  | every                      | 1 000 k     | m (600        | mile)        | 2-37 |  |
| Drive chain wear (*C)                             |      |   |                            | Q           |               | Q            | 2-39 |  |
| Drive chain guide wear                            |      |   |                            | Q           |               | Q            | 2-40 |  |
| Brakes  |      |   |                            |             |               |              |      |  |
| Brake system                                      | Q:1  | Q   |                            | Q           |               | Q            | 2-40 |  |
| Brake operation (effectiveness, play, no drag)    | Q:1  | Q   |                            | Q           |               | Q            | 2-41 |  |
| Brake fluid level                                 | Q:1  | Q   |                            | Q           |               | Q            | 2-41 |  |
| Brake fluid (front and rear)                      | \$:2 |   |                            |             |               | 47           | 2-42 |  |
| Brake hose  | \$:4 |   |                            |             |               |              | 2-44 |  |
| Rubber parts of brake master cylinder and caliper | Φ:4  | (30 000 mile)                                   |                            |             | 2-49,<br>2-50 |              |      |  |
| Brake pad wear (*C)                               |      |   | Q                          | Q           | Q             | Q            | 2-54 |  |
| Brake light switch operation                      |      | Q   | Q                          | Q           | Q             | Q            | 2-54 |  |
| Suspension  |      |   |                            |             |               |              |      |  |
| Suspension system                                 | Q: 1 |   | -                          | Q           |               | Q            | 2-55 |  |
| Lubrication of rear suspension                    |      |   |                            |             |               | ~            | 2-56 |  |
| Steering  |      |   |                            |             |               |              |      |  |
| Steering play                                     | Q:1  | Q   |                            | Q           |               | Q            | 2-57 |  |
| Steering stem bearing                             | 1>:2 |   |                            |             |               | ~            | 2-58 |  |
| Electrical System                                 |      |   |                            |             |               |              |      |  |
| Electrical system                                 | Q:1  |   |                            | Q           |               | Q            | 2-59 |  |
| O Spark plug                                      |      |   |                            | 47          |               | 47           | 2-65 |  |
| Others  |      |   |                            |             |               |              |      |  |
| Chassis parts                                     | 1>:1 |   |                            | *           |               | ~            | 2-65 |  |
| Condition of bolts, nuts and fasteners            |      | Q   |                            | Q           |               | Q            | 2-67 |  |

# **Torque and Locking Agent**

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

Letters used in the "Remarks" column mean:

- L: Apply a non-permanent locking agent.
- 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 (ex. PBC grease).

| Torque          |          |  |
|-----------------|----------|--|
| gf·m ft·lb      | Remarks  |  |
|                 |          |  |
| 0.25 22 in·lb   | <b>,</b> |  |
| 0.43 37 in·lb   | ,        |  |
| 0.41   35 in·lb | ,        |  |
| 0.11 10 in·lb   | <b>,</b> |  |
| 0.12   11 in·lb | •        |  |
| 0.20   18 in·lb | )        |  |
| 0.35 30 in·lb   | <b>,</b> |  |
| 1.3 115 in·lb   | 0        |  |
| 4.50 32.5       |          |  |
| 1.2 106 in·lb   | b        |  |
| .100 8.7 in·lb  | o R      |  |
| 1.0 87 in·lb    | L, S     |  |
| 1.0 87 in·lb    | ,        |  |
| 1.0 87 in·lb    | ,        |  |
|                 |          |  |
| 0.41 35 in lb   | )        |  |
| 1.0 87 in lb    | <b>)</b> |  |
| 1.0 87 in·lb    | )        |  |
| 0.86 74 in·lb   | )        |  |
| 1.2 106 in·lb   | b        |  |
| 1.0 87 in·lb    | )        |  |
| 0.60   52 in·lb | )        |  |
| 1.0 87 in·lb    | ) L      |  |
| 1.0 87 in·lb    | )        |  |
| 1.0 87 in·lb    | ) L      |  |
| 1.0 87 in·lb    | L        |  |
| 1.0 87 in·lb    | )        |  |
| 1.0 87 in lb    | )        |  |
| 1.0 87 in lb    | <b>)</b> |  |
| 1.0 87 in lb    | ·        |  |
| 1.0 87 in lb    | D L      |  |
| 1.0             | 87 in·lb |  |

# 2-6 PERIODIC MAINTENANCE

# Torque and Locking Agent

| Fastener Engine Top End   | N·m          | kgf·m | 64 11     | Remarks |
|---|--------------|-------|-----------|---------|
| Engine Top End  |              | •     | ft·lb     | ROMANA  |
| i de la companya de |              |       |           |         |
| Air Suction Valve Cover Bolts   | 9.8          | 1.0   | 87 in·lb  |         |
| Cylinder Head Cover Bolts   | 9.8          | 1.0   | 87 in·lb  |         |
| Cylinder Head Bolts (M8), L = 146 mm (5.75 in.)   | see the text |       | -         | MO, S   |
| Cylinder Head Bolts (M8), L = 115 mm (4.53 in.)   | 32           | 3.3   | 24        | MO, S   |
| Camshaft Cap Bolts  | 12           | 1.2   | 106 in·lb | S       |
| Spark Plugs   | 13           | 1.3   | 115 in·lb |         |
| Cylinder Head Jacket Plugs  | 22           | 2.2   | 16        | L       |
| Throttle Body Assy Holder Clamp Screws  | 2.0          | 0.20  | 18 in·lb  |         |
| Camshaft Sprocket Bolts   | 15           | 1.5   | 11        | L       |
| Coolant Drain Bolt (Cylinder)   | 5.9          | 0.60  | 52 in·lb  |         |
| Cylinder Head Bolt (M6)   | 12           | 1.2   | 106 in·lb | S       |
| Camshaft Chain Tensioner Mounting Bolts   | 9.8          | 1.0   | 87 in·lb  |         |
| Camshaft Chain Tensioner Cap Bolt   | 5.0          | 0.51  | 44 in·lb  |         |
| Rear Camshaft Chain Guide Bolt  | 17           | 1.7   | 13        |         |
| Muffler Cover Bolts   | 9.8          | 1.0   | 87 in·lb  |         |
| Muffler Body Mounting Bolt  | 30           | 3.1   | 22        |         |
| Muffler End Cover Bolts   | 4.4          | 0.45  | 39 in·lb  |         |
| Exhaust Pipe Holder Nuts  | 12           | 1.2   | 106 in·lb | S       |
| Oxygen Sensor   | 44.1         | 4.50  | 32.5      |         |
| Muffler Cover Clamp Bolt  | 6.9          | 0.70  | 61 in·lb  |         |
| Muffler Body Clamp Bolt   | 10           | 1.0   | 89 in·lb  | Ti:     |
| Clutch  |              |       | _         |         |
| Clutch Lever Holder Clamp Bolt  | 8.8          | 0.90  | 78 in⋅lb  |         |
| Clutch Stopper Bolts  | 8.8          | 0.90  | 78 in·lb  |         |
| Clutch Hub Nut  | 132          | 13.5  | 97.4      |         |
| Clutch Cover Bolts  | 9.8          | 1.0   | 87 in⋅lb  | S       |
| Engine Lubrication System   |              |       |           |         |
| Oil Pipe Banjo Bolts (Outside)  | 19.6         | 2.00  | 14.5      |         |
| Oil Pipe Bolt   | 9.8          | 1.0   | 87 in·lb  | L       |
| Breather Plate Bolts  | 9.8          | 1.0   | 87 in·lb  | L       |
| Oil Filter  | 17.5         | 1.78  | 12.9      | R       |
| Crankcase Oil Passage Plugs   | 20           | 2.0   | 15        | L       |
| Oil Pump Driven Gear Bolt   | 9.8          | 1.0   | 87 in·lb  | L       |
| Oil Pump Mounting Bolts   | 9.8          | 1.0   | 87 in·lb  |         |
| Oil Pressure Switch   | 15           | 1.5   | 11        | LG      |
| Oil Pipe Banjo Bolt (Inside)  | 12           | 1.2   | 106 in·lb |         |
| Oil Pressure Relief Valve   | 15           | 1.5   | 11        | L       |
| Oil Pan Bolts   | 9.8          | 1.0   | 87 in·lb  | S       |
| Engine Oil Drain Bolt   | 30           | 3.1   | 22        |         |
| Lower Fairing Bracket Bolts   | 9.8          | 1.0   | 87 in·lb  |         |
| Engine Removal/Installation   |              |       |           |         |
| Engine Bracket Nut  | 69           | 7.0   | 51        | s       |

# Torque and Locking Agent

| Torque                                     |              |       |           |         |
|--|--------------|-------|-----------|---------|
| Fastener                                   | N·m          | kgf·m | ft·lb     | Remarks |
| Front Engine Mounting Nut                  | 69           | 7.0   | 51        | S       |
| Upper Engine Mounting Nut                  | 69           | 7.0   | 51        | S       |
| Lower Engine Mounting Nut                  | 69           | 7.0   | 51        | S       |
| Crankshaft/Transmission                    |              |       |           |         |
| Connecting Rod Nuts                        | see the text | _     | _         | MO, R   |
| Starter Motor Clutch Bolts                 | 34.3         | 3.50  | 25.3      | L       |
| Breather Plate Bolts                       | 9.8          | 1.0   | 87 in·lb  | L       |
| Crankcase Bolts (M6), L = 60 mm (2.4 in.)  | 11           | 1.1   | 97 in·lb  |         |
| Crankcase Bolts (M6), L = 85 mm (3.3 in.)  | 11           | 1.1   | 97 in·lb  |         |
| Crankcase Bolts (M6), L = 22 mm (0.87 in.) | 11           | 1.1   | 97 in·lb  |         |
| Crankcase Bolts (M8), L = 73 mm (2.9 in.)  | 23.5         | 2.40  | 17.3      | MO, S   |
| Crankcase Bolts (M6), L = 38 mm (1.5 in.)  | 11           | 1.1   | 97 in·lb  |         |
| Crankcase Bolts (M8), L = 90 mm (3.5 in.)  | 27.5         | 2.80  | 20.3      | MO, S   |
| Crankcase Bolts (M6), L = 135 mm (5.3 in.) | 11           | 1.1   | 97 in·lb  | R       |
| Gear Positioning Lever Bolt                | 12           | 1.2   | 106 in·lb | L       |
| Shift Drum Bearing Holder Screws           | 4.4          | 0.45  | 39 in·lb  | L       |
| Shift Shaft Return Spring Pin              | 19.6         | 2.00  | 14.5      | L       |
| Shift Drum Cam Bolt                        | 9.0          | 0.92  | 80 in·lb  | L       |
| Gear Position Sensor Shaft Bolt            | 5.9          | 0.60  | 52 in·lb  | L       |
| Shift Pedal Bolt                           | 12           | 1.2   | 106 in·lb |         |
| Wheels/Tires                               |              |       |           |         |
| Spoke Nipple                               | 5.2          | 0.53  | 46 in·lb  |         |
| Front Axle Nut                             | 98           | 10    | 72        |         |
| Rear Axle Nut                              | 98           | 10    | 72        |         |
| Final Drive                                |              |       |           |         |
| Chain Guide Bolts                          | 9.8          | 1.0   | 87 in·lb  |         |
| Engine Sprocket Cover Bolts                | 9.8          | 1.0   | 87 in·lb  |         |
| Engine Sprocket Nut                        | 127          | 13.0  | 93.7      | MO      |
| Rear Sprocket Nuts                         | 59           | 6.0   | 44        | R       |
| Brakes                                     |              |       |           |         |
| Front Brake Fluid Reservoir Cap Screws     | 1.5          | 0.15  | 13 in·lb  |         |
| Brake Lever Pivot Bolt                     | 5.9          | 0.60  | 52 in·lb  | Si      |
| Brake Lever Pivot Bolt Locknut             | 5.9          | 0.60  | 52 in·lb  |         |
| Front Brake Light Switch Screw             | 1.2          | 0.12  | 11 in·lb  |         |
| Front Master Cylinder Clamp Bolts          | 8.8          | 0.90  | 78 in⋅lb  | S       |
| Brake Hose Banjo Bolts                     | 25           | 2.5   | 18        |         |
| Front Caliper Mounting Bolts               | 25           | 2.5   | 18        |         |
| Front Caliper Holder Pin Bolt              | 22           | 2.2   | 16        | L, Si   |
| Bleed Valve                                | 5.5          | 0.56  | 49 in·lb  |         |
| Front Brake Pad Pin                        | 17           | 1.7   | 13        | · ·     |
| Front Brake Disc Mounting Bolts            | 27           | 2.8   | 20        | L, S    |
| Rear Master Cylinder Mounting Bolts        | 25           | 2.5   | 18        |         |
| Rear Master Cylinder Push Rod Locknut      | 17           | 1.7   | 13        |         |

# 2-8 PERIODIC MAINTENANCE

# Torque and Locking Agent

| Torque                           |     |       |           |         |
|----------------------------------|-----|-------|-----------|---------|
| Fastener                         | N·m | kgf·m | ft·lb     | Remarks |
| Rear Brake Pad Pins              | 17  | 1.7   | 13        |         |
| Rear Caliper Holder Pin Bolt     | 17  | 1.7   | 13        | Si      |
| Rear Caliper Holder Pin Nut      | 22  | 2.2   | 16        | L       |
| Rear Wheel Rotation Sensor Bolt  | 8.0 | 0.82  | 71 in·lb  | L       |
| Rear Caliper Mounting Bolts      | 25  | 2.5   | 18        |         |
| Rear Brake Disc Mounting Bolts   | 27  | 2.8   | 20        | L       |
| Brake Pipe Joint Nuts            | 18  | 1.8   | 13        |         |
| Front Wheel Rotation Sensor Bolt | 8.0 | 0.82  | 71 in·lb  | L       |
| Suspension                       |     |       |           | •       |
| Front Fork Top Plugs             | 22  | 2.2   | 16        |         |
| Upper Front Fork Clamp Bolts     | 20  | 2.0   | 15        |         |
| Lower Front Fork Clamp Bolts     | 30  | 3.1   | 22        |         |
| Front Fork Bottom Allen Bolts    | 20  | 2.0   | 15        | L       |
| Upper Rear Shock Absorber Nut    | 59  | 6.0   | 44        | R       |
| Swingarm Pivot Shaft Nut         | 98  | 10    | 72        |         |
| Rocker Arm Bolt                  | 59  | 6.0   | 44        | R       |
| Lower Rear Shock Absorber Bolt   | 59  | 6.0   | 44        | R       |
| Tie-Rod Bolts                    | 59  | 6.0   | 44        | R       |
| Steering                         |     |       |           |         |
| Switch Housing Screws            | 2.5 | 0.25  | 22 in·lb  |         |
| Handlebar Holder Bolts           | 25  | 2.5   | 18        | S       |
| Steering Stem Head Nut           | 54  | 5.5   | 40        |         |
| Upper Front Fork Clamp Bolts     | 20  | 2.0   | 15        |         |
| Steering Stem Nut                | 4.9 | 0.50  | 43 in·lb  |         |
| Lower Front Fork Clamp Bolts     | 30  | 3.1   | 22        |         |
| Frame                            |     |       |           |         |
| Windshield Bolts                 | 3.3 | 0.34  | 29 in·lb  |         |
| Lower Fairing Bolt (Upper)       | 4.4 | 0.45  | 39 in·lb  |         |
| Lower Fairing Bolts (Lower)      | 8.8 | 0.90  | 78 in⋅lb  |         |
| Lower Fairing Bracket Bolts      | 9.8 | 1.0   | 87 in·lb  |         |
| Left Lower Fairing Bracket Bolts | 9.8 | 1.0   | 87 in·lb  | L       |
| Upper Fairing Bracket Nuts       | 25  | 2.5   | 18        | S       |
| Grab Rail Bolts                  | 25  | 2.5   | 18        |         |
| Side Stand Switch Bolt           | 8.8 | 0.90  | 78 in⋅lb  | L       |
| Side Stand Bolt                  | 44  | 4.5   | 32        |         |
| Engine Guard Bolts               | 17  | 1.7   | 13        |         |
| Saddlebag Lock Nut               | 3.0 | 0.31  | 27 in·lb  |         |
| Center Stand Nuts                | 44  | 4.5   | 32        | R       |
| Saddlebag Guard Screws           | 1.5 | 0.15  | 13 in·lb  |         |
| Electrical System                |     |       |           |         |
| Fog Light Mounting Bolts         | 9.8 | 1.0   | 87 in·lb  |         |
| Accessory Socket Ring Nut        | 2.8 | 0.29  | 25 in·lb  |         |
| Turn Signal Light Lens Screws    | 1.0 | 0.10  | 8.9 in lb |         |

# **Torque and Locking Agent**

| Fastener                                    |       |       | Remarks   |         |
|---|-------|-------|-----------|---------|
| rastener                                    | N·m   | kgf⋅m | ft·lb     | Remarks |
| License Plate Light Screws                  | 1.2   | 0.12  | 11 in·lb  |         |
| Regulator/Rectifier Bolts                   | 9.8   | 1.0   | 87 in·lb  | L       |
| Spark Plugs                                 | 13    | 1.3   | 115 in·lb |         |
| Fuel Pump Bolts                             | 9.8   | 1.0   | 87 in⋅lb  | L, S    |
| Starter Motor Cable Terminal Nut            | 9.8   | 1.0   | 87 in:lb  |         |
| Starter Motor Mounting Bolts                | 9.8   | 1.0   | 87 in·lb  |         |
| Starter Motor Terminal Locknut              | 11    | 1.1   | 97 in·lb  |         |
| Starter Motor Brush Holder Screw            | 3.8   | 0.39  | 34 in·lb  |         |
| Starter Motor Through Bolts                 | 5.0   | 0.51  | 44 in·lb  |         |
| Stator Coil Bolts                           | 12    | 1.2   | 106 in·lb |         |
| Crankshaft Sensor Screws                    | 5.2   | 0.53  | 46 in·lb  |         |
| Alternator Cover Bolts, L = 75 mm (3.0 in.) | 9.8   | 1.0   | 87 in⋅lb  |         |
| Alternator Cover Bolts, L = 30 mm (1.2 in.) | 9.8   | 1.0   | 87 in·lb  |         |
| Alternator Cover Bolts, L = 50 mm (2.0 in.) | 9.8   | 1.0   | 87 in·lb  | L       |
| Chain Guide Bolts                           | 9.8   | 1.0   | 87 in·lb  |         |
| Alternator Rotor Bolt                       | 107.8 | 10.99 | 79.51     |         |
| Starter Motor Clutch Bolts                  | 34.3  | 3.50  | 25.3      | · L     |
| Switch Housing Screws                       | 2.5   | 0.25  | 22 in·lb  |         |
| Water Temperature Sensor                    | 12    | 1.2   | 106 in·lb |         |
| Side Stand Switch Bolt                      | 8.8   | 0.90  | 78 in⋅lb  | L       |
| Oil Pressure Switch                         | 15    | 1.5   | 11        | LG      |
| Oxygen Sensor                               | 44.1  | 4.50  | 32.5      |         |
| Gear Position Sensor Bolt                   | 9.8   | 1.0   | 87 in·lb  |         |

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 | Torque    |             |               |
|------------------|-----------|-------------|---------------|
| (mm)             | 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     |

# 2-10 PERIODIC MAINTENANCE

# Specifications

| Item                                | Standard   | Service Limit  |
|-------------------------------------|--|--|
| Fuel System (DFI)                   | o talladia   | 901 VIOO EIIIII  |
| Throttle Grip Free Play             | 2 ~ 3 mm (0.08 ~ 0.12 in.)   |  |
| Idle Speed                          | 1 300 ±50 r/min (rpm)  |  |
| Throttle Body Vacuum                | 24.7 ±1.33 kPa (185 ±10 mmHg) at idle  |  |
| Tillottie Body vacdum               | speed speed  |  |
| Bypass Screws (Turn Out)            | 0 ~ 2 1/2 (for reference)  |  |
| Main Throttle Sensor Output Voltage | DC 1.02 ~ 1.05 V at idle throttle opening  |  |
| Air Cleaner Element                 | Polyurethane foam  |  |
| Cooling System Coolant:             |  |  |
| Type (Recommended)                  | Permanent type of antifreeze   |  |
| Color                               | Green  |  |
| Mixed Ratio                         | Soft water 50%, coolant 50%  |  |
| Freezing Point                      | -35°C (-31°F)  |  |
| Total Amount                        | 1.5 L (1.6 US qt)  |  |
| Engine Top End                      |  |  |
| Valve Clearance:                    |  |  |
| Exhaust                             | 0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)   |  |
| 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:                         |  |  |
| Туре                                | API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2                                  |  |
| Viscosity                           | SAE 10W-40   |  |
| Capacity                            | 2.0 L (2.1 US qt) (When filter is not removed.)                                    |  |
|                                     | 2.2 L (2.3 US qt) (When filter is removed.)  |  |
|                                     | 2.4 L (2.5 US qt) (When engine is completely dry.)                                 |  |
| Level                               | Between upper and lower level lines (Wait several minutes after idling or running) |  |
| Wheels/Tires                        |  |  |
| Tire Tread Depth:                   |  |  |
| Front                               | 4.3 mm (0.17 in.)  | 1 mm (0.04 in.),   |
|                                     |  | (AT, CH, DE)<br>1.6 mm (0.06 in.)  |
| Rear                                | 6.7 mm (0.26 in.)  | Up to 130 km/h (80 mph):<br>2 mm (0.08 in.),<br>Over 130 km/h (80 mph):<br>3 mm (0.12 in.) |
|                                     |  |  |

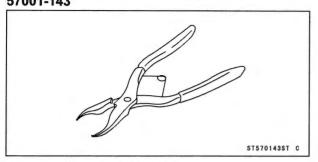
# Specifications

| Item                           | Standard  | Service Limit         |
|--------------------------------|---|-----------------------|
| Tire Air Pressure (when cold): |   |                       |
| Front                          | 200 kPa (2.00 kgf/cm², 28 psi)                  |                       |
| Rear                           | 225 kPa (2.25 kgf/cm², 32 psi)                  |                       |
| Rim Runout:                    |   |                       |
| Axial                          | TIR 1.0 mm (0.04 in.) or less                   | TIR 2.0 mm (0.08 in.) |
| Radial                         | TIR 1.0 mm (0.04 in.) or less                   | TIR 2.0 mm (0.08 in.) |
| Final Drive                    |   |                       |
| Drive Chain Slack              | 25 ~ 35 mm (1.0 ~ 1.4 in.)                      |                       |
| Drive Chain 20-link Length     | 317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)            | 319 mm (12.56 in.)    |
| Standard Chain:                |   |                       |
| Make                           | ENUMA<br>L.G.B (when shipping)                  |                       |
| Туре                           | EK520RMX/3D<br>R520HPXR (when shipping)         |                       |
| Link                           | 112 links                                       |                       |
| Brakes                         |   |                       |
| Brake Fluid:                   |   |                       |
| Grade:                         |   |                       |
| Front                          | DOT3 or DOT4                                    |                       |
| Rear                           | DOT4  |                       |
| Brake Pad Lining Thickness:    |   |                       |
| Front                          | 4.0 mm (0.16 in.)                               | 1.5 mm (0.06 in.)     |
| Rear                           | 4.5 mm (0.18 in.)                               | 1.5 mm (0.06 in.)     |
| Brake Light Timing:            |   |                       |
| Front                          | Pulled ON                                       |                       |
| Rear                           | ON after about 10 mm (0.39 in.) of pedal travel |                       |
| Electrical System              |   |                       |
| Spark Plug:                    |   |                       |
| Туре                           | NGK CR8E  |                       |
| Gap                            | 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)                |                       |

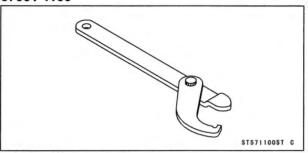
# 2-12 PERIODIC MAINTENANCE

# **Special Tools**

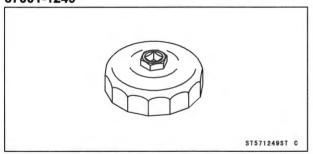
Inside Circlip Pliers: 57001-143



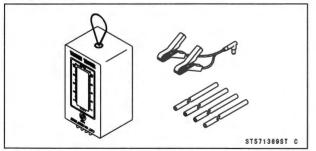
Steering Stem Nut Wrench: 57001-1100



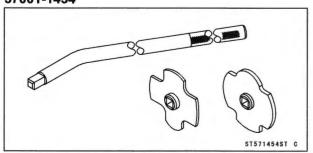
Oil Filter Wrench: 57001-1249



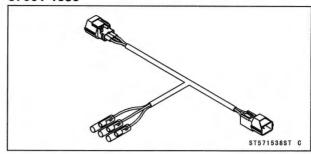
Vacuum Gauge: 57001-1369



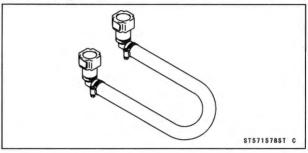
Filler Cap Driver: 57001-1454



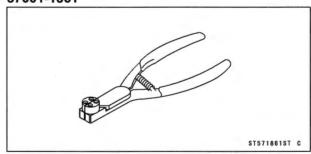
Throttle Sensor Setting Adapter: 57001-1538



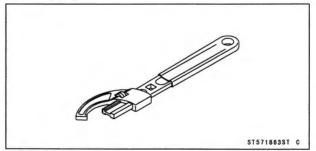
**Extension Tube: 57001-1578** 



Brake Caliper Piston Pliers ( $\phi$ 16 ~  $\phi$ 26): 57001-1861



Adjust Hook Wrench: 57001-1863



# Fuel System (DFI) Air Cleaner Element Cleaning

#### NOTE

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

# **A** 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.

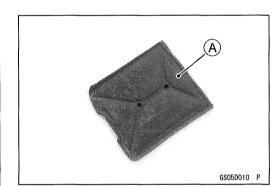
#### NOTICE

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

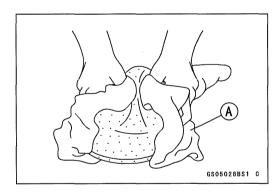
Remove the element (see Air Cleaner Element Replacement).

# **A** WARNING

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



- Clean the element [A] in a bath of high flash-point solvent.
- Squeeze it dry in a clean towel [A]. Do not wring the element or blow it dry; the element can be damaged.
- Check all the parts of the element for visible damage.
- ★If any of the parts of the element are damaged, replace them.



 After cleaning, saturate the element with a high-quality foam-air-filter oil, squeeze out the excess, then wrap it in a clean towel and squeeze it as dry as possible.

OBe careful not to tear the sponge filter.

#### 2-14 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

#### Air Cleaner Element Replacement

#### NOTE

- OIn dusty areas, the element should be replaced more frequently than the recommended interval.
- OAfter riding through rain or on muddily roads, the element should be replaced immediately.

# **A** WARNING

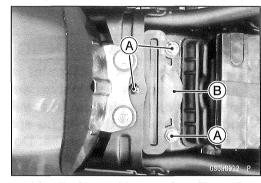
If dirt or dust is allowed to pass through into the throttle assy, the throttle may become stuck, possibly causing accident. Replace the air cleaner element according to the maintenance chart.

#### NOTICE

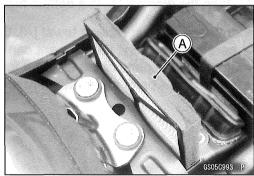
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

Remove:

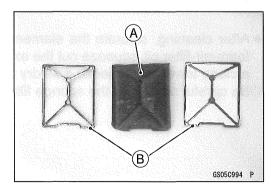
Seat (see Seat Removal in the Frame chapter) Air Cleaner Element Cap Screws [A] Air Cleaner Element Cap [B]



• Pull out the air cleaner element [A].



• Remove the air cleaner element [A] from the frames [B].



- Install a new element and air cleaner element cap.
- Tighten:

Torque - Air Cleaner Element Cap Screws: 4.2 N·m (0.43 kgf·m, 37 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 handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed or damaged. Be sure to correct any of these conditions before riding (see Throttle Control System Inspection and Cable, Wire, and Hose Routing section in the Appendix chapter).

# A) GS05C395 P

#### **A** WARNING

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

• Check the idle speed.

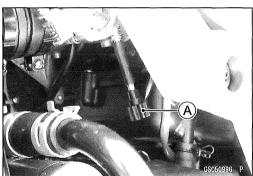
#### Idle Speed

Standard: 1 300 ±50 r/min (rpm)

★ If the idle speed is out of 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.

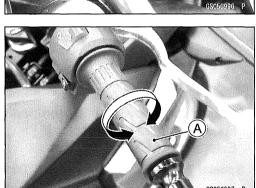


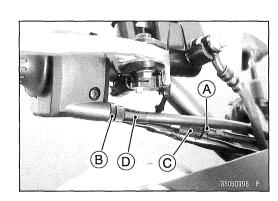
#### Throttle Control System Inspection

- 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.

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

- ★If the free play is incorrect, adjust the throttle cable as follows.
- Loosen the locknuts [A] [B].
- Screw both throttle cable adjusters [C] [D] to give the throttle grip plenty of play.
- Turn the decelerator cable adjuster [C] until it has no play when the throttle grip is completely closed.
- Tighten the locknut [A].
- Turn the accelerator cable adjuster [D] until 2  $\sim$  3 mm (0.08  $\sim$  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.





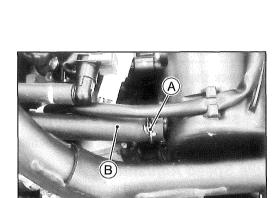
#### 2-16 PERIODIC MAINTENANCE

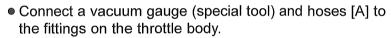
#### **Periodic Maintenance Procedures**

# Engine Vacuum Synchronization Inspection

#### NOTE

- OThese 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 Hose (see Fuel Hose Replacement)
- Pull off the rubber caps or vacuum hoses [A] from the fittings of each throttle body.
- OThe evaporative emission control system equipped models are equipped the vacuum hoses.
- Slide the clamp [A].
- Disconnect the air switching valve hose [B] from the air cleaner housing.
- Plug the air switching valve hose end and air cleaner housing fitting.





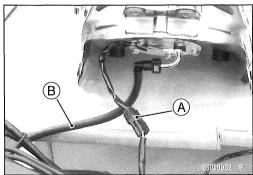
Special Tool - Vacuum Gauge: 57001-1369

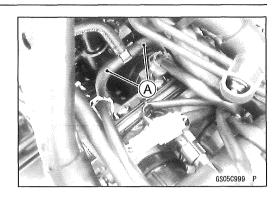
 Connect a highly accurate tachometer to one of the stick coil primary leads.



Connect the following parts temporarily.
 Fuel Pump Lead Connector [A]
 Extension Tube [B]

Special Tool - Extension Tube: 57001-1578





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

#### Idle Speed

Standard: 1 300 ±50 r/min (rpm)

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

#### 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 [A].

#### **Throttle Body Vacuum**

Standard: 24.7 ±1.33 kPa (185 ±10 mmHg) at idle speed

- ★If any vacuum is not within specifications, adjust the bypass screws #1 [A] and #2 [B].
- Adjust the each vacuum (#1, #2) to the standard value.
- Open and close the throttle valves after each measurement.
- Check the vacuums as before.
- ★ If all vacuums are within the specification range, finish the engine vacuum synchronization.
- ★ If any vacuum can not be adjusted within the specification, replace the bypass screws #1 and #2 with new ones, refer to the following procedure.
- 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]

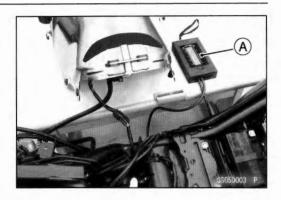
Washer [C]

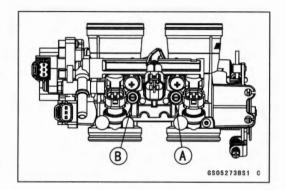
O-ring [D]

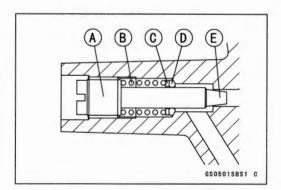
- Check the bypass screw hole in the throttle body for carbon deposits.
- ★ If any carbons accumulate, wipe the carbons off from the hole, using a cotton pad penetrated with a high flash-point solvent.
- Replace the bypass screw, spring, washer and O-ring as a set.
- Turn in the bypass screw until it seats fully but not tightly.

#### NOTICE

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







#### 2-18 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

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

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Main Throttle Sensor Output Voltage Connections to Adapter:

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

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

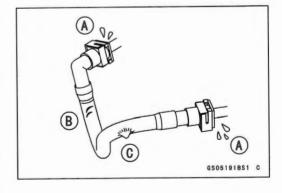
Standard: DC 1.02 ~ 1.05 V at idle throttle opening

- ★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 or vacuum hoses to the original position.
- OThe evaporative emission control system equipped models are equipped the vacuum hoses.
- ORun the vacuum hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the removed parts (see appropriate chapters).

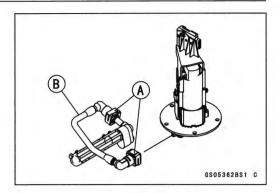
Fuel System

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

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



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



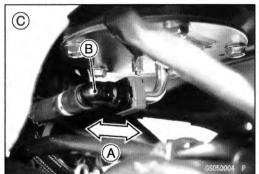
- Check that the hose joints are securely connected.
- OPush and pull [A] the hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

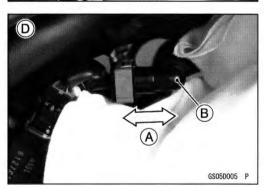
Fuel Pump Side [C]
Throttle Body Assy Side [D]

# **A** WARNING

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

★If it comes off, reinstall the hose joint.





# Fuel Filter Replacement

# **A** 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.

#### 2-20 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

Remove:

Fuel Pump (see Fuel Pump Removal in the Fuel System (DFI) chapter)

Fuel Pump Assy Screw [A]

Lead Terminal [B]

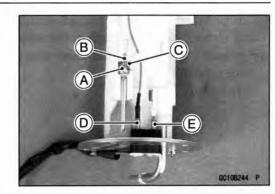
Plate Nut [C]

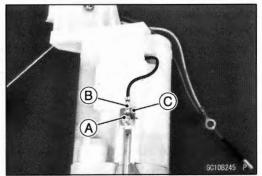
• Disconnect:

Lead Terminal (Red) [D] Lead Terminal (Blue) [E]

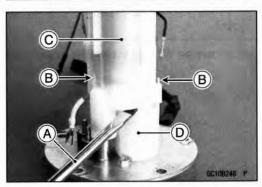


Fuel Pump Assy Screw [A] Lead Terminal [B] Plate Nut [C]

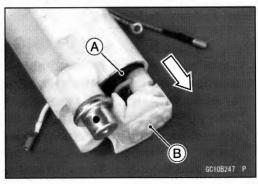




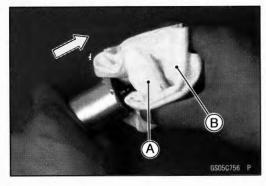
• Using the flat tip driver [A], clear the tabs [B], and remove the fuel pump fitting [C] from the case [D].



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



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



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

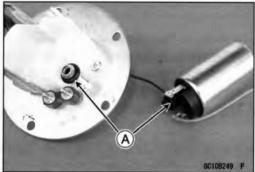


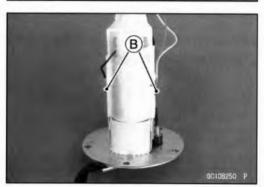
 Replace the following parts with new ones and install the removed parts in the reverse procedure.

O-rings [A] Fuel Pump Assy Screws [B]

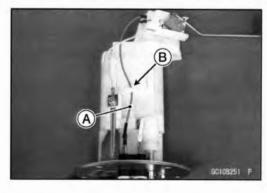
• Tighten:

Torque - Fuel Pump Assy Screws: 0.98 N·m (0.100 kgf·m, 8.7 in·lb)





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



#### Fuel Hose Replacement

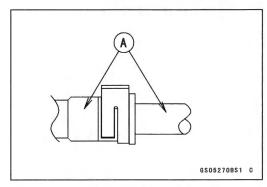
# **A** WARNING

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

#### NOTICE

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

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.



## When removing with flat tip screwdriver

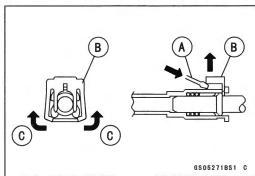
- Insert the flat tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

#### When removing with fingers

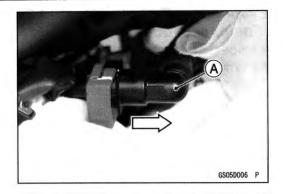
• Open and push up [C] the joint lock with your fingers.

#### NOTICE

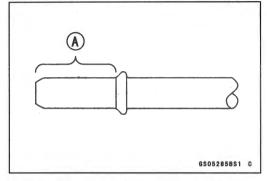
Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively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



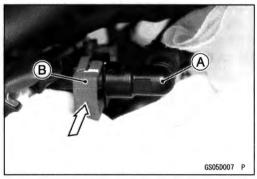
• Pull the fuel hose joint [A] out of the delivery pipe.



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



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

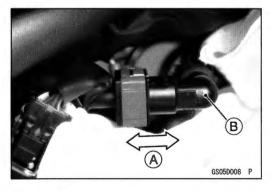


 Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

# **A** WARNING

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

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



#### 2-24 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

# Evaporative Emission Control System Inspection (Equipped Models)

- Inspect the canister as follows.
- Remove:
  - Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Slide the clamps [A].
- Disconnect the hoses [B].
- Remove:

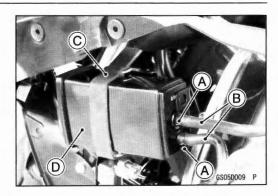
Band [C]

Canister [D]

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

#### NOTE

- The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.
- Inspect the purge valve (see Purge Valve Inspection in the Fuel System (DFI) chapter).
- OCheck that the hoses are securely connected and clips are in position.
- OReplace any kinked, deteriorated or damaged hoses.
- ORun the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- OWhen installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses with a minimum of bending so that the emission flow will not be obstructed.



# Cooling System Coolant Level Inspection

#### NOTE

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

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

"L": low

"F": full



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

#### Cooling System

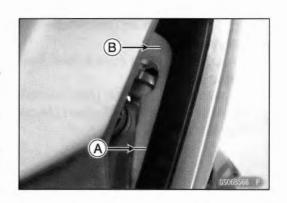
Water Hose and Pipe Inspection (coolant leak, damage, installation condition)

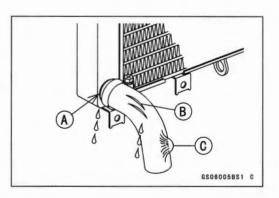
- OThe high pressure inside the radiator hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained.
- Visually inspect the hoses for signs of deterioration.
   Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.
- ★Replace the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

#### **Coolant Change**

# **A** 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:

Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)

Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)

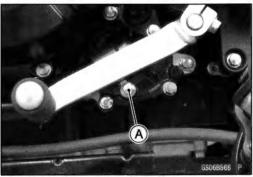
Coolant Reserve Tank (see Coolant Reserve Tank Removal in the Cooling System chapter)

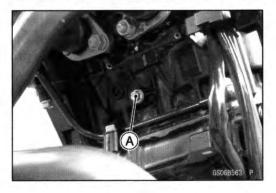
Radiator Cap [A]

- Place a container under the coolant drain bolts [A], then remove the drain bolts.
- OThe coolant will drain from the radiator and engine.
- Replace the drain bolt gaskets with new ones.
- Tighten the drain bolts with the gasket.

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







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

#### NOTICE

Soft or distilled water must be used with the antifreeze in the cooling system.

If hard water is used in the system, it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system.

Water and Coolant Mixture Ratio (Recommended)

Soft Water:

50%

Coolant:

50%

**Freezing Point:** 

-35°C (-31°F)

**Total Amount:** 

1.5 L (1.6 US qt)

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

#### NOTE

- OPour in the coolant slowly so that it can expel the air from the engine and radiator.
- Check the cooling system for leaks.
- Tap the radiator hoses to force any air bubbles caught inside.
- Fill the radiator up to the filler neck with coolant.
- Install the coolant reserve tank (see Coolant Reserve Tank Installation in the Cooling System chapter).
- Fill the reserve tank up to the "F" (full) level line [A] with coolant and install the cap [B].
- Install the radiator cap.
- Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank after the engine cools down.
- ★ If the coolant level is lower than the "L" (low) level line [C], add coolant to the "F" level line.

# NOTICE

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

#### Water Hose and O-ring Replacement

- Drain the coolant (see Coolant Change).
- Remove:

Thermostat Housing [A] (see Thermostat Housing Removal in the Cooling System chapter)

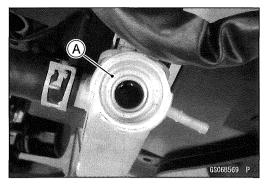
Water Pipe [B] (see Cylinder Head Cover Removal in the Engine Top End chapter)

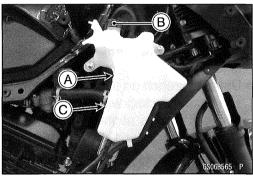
Water Pipes [C] (see Water Pump Cover Removal in the Cooling System chapter)

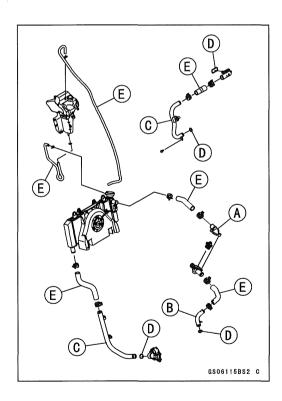
O-rings [D]

Hoses [E]

- Apply grease to the new O-rings and install them.
- Run the new hoses according to the Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Fill the coolant (see Coolant Change).
- Check the cooling system for leaks.







#### 2-28 PERIODIC MAINTENANCE

#### Periodic Maintenance Procedures

# Engine Top End Valve Clearance Inspection

#### NOTE

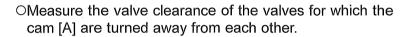
OValve clearance must be checked and adjusted when the engine is cold (at room temperature).

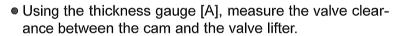
#### Remove:

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

Special Tool - Filler Cap Driver: 57001-1454

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







Standard:

Exhaust 0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)

Intake  $0.15 \sim 0.24 \text{ mm} (0.0059 \sim 0.0094 \text{ in.})$ 

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

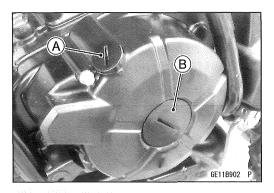
Valve Clearance Measuring Position
#1 Piston TDC at End of Compression Stroke:
Intake Valve Clearances of #1 Piston

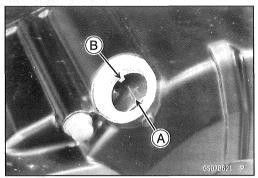
**Exhaust Valve Clearances of #1 Piston** 

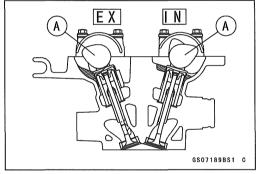
NO.

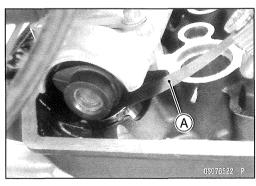
#### NOTE

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









**Valve Clearance Measuring Position** 

#2 Piston TDC at End of Compression Stroke:

Intake Valve Clearances of #2 Piston

**Exhaust Valve Clearances of #2 Piston** 

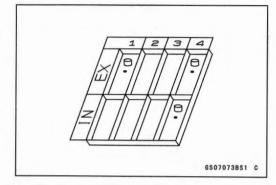
★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

### 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

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



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

$$a+b-c=d$$

- [a] Present Shim Thickness
- [b] Measured Valve Clearance
- [c] Specified Valve Clearance (Mean Value = 0.26 mm

(Exhaust), 0.20 mm (Intake))

[d] Replace Shim Thickness

#### Example (Intake):

2.90 + 0.45 - 0.20 = 3.15 mm

OExchange the shim for the 3.15 size shim.

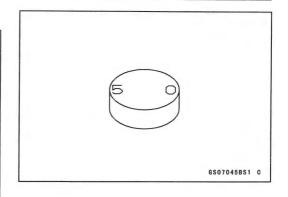


#### 2-30 PERIODIC MAINTENANCE

# **Periodic Maintenance Procedures**

#### **Adjustment Shims**

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



#### NOTICE

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

Olf there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

 When installing the shim, face the marked side toward the valve lifter. At this time, apply engine oil to the shim to keep the shim in place during camshaft installation.

#### NOTICE

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

Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

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

#### Air Suction System Damage Inspection

Remove:

Middle Fairings (see Middle Fairing Removal in the Frame chapter)

Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

- Disconnect the air switching valve hose [A] from the air cleaner housing.
- Install the fuel tank (see Fuel Tank Installation in the Fuel System (DFI) chapter).
- 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.

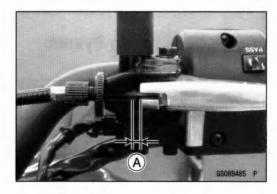
**Clutch Lever Free Play** 

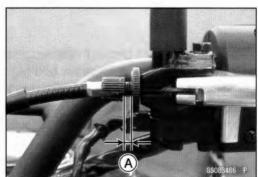
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)

# **A** WARNING

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

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





#### 2-32 PERIODIC MAINTENANCE

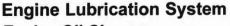
#### **Periodic Maintenance Procedures**

- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen both adjusting nuts [B] at the clutch cover as far as they will go.
- Pull the clutch outer cable tight and tighten the adjusting nuts against the clutch cover [C].
- Slip the dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.



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.

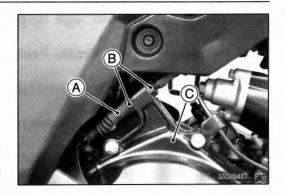
 After the adjustment, start the engine and check that the clutch does not slip and that it releases properly.

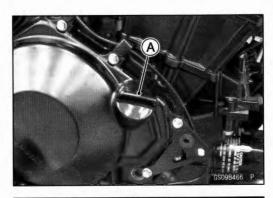


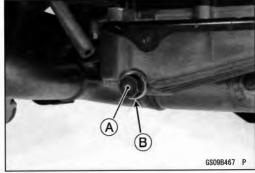
**Engine Oil Change** 

- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Situate the motorcycle so that it is vertical after warming up the engine.
- Unscrew the oil filler plug [A].
- Place the oil pan beneath the engine.
- Remove the engine oil drain bolt [A] to drain the oil.
- OThe oil in the oil filter can be drained by removing the filter (see Oil Filter Replacement).
- Replace the drain bolt gasket [B] with a new one.
- Tighten:

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







Pour in the specified type and amount of oil.

**Recommended Engine Oil** 

Type: API SG, SH, SJ, S

API SG, SH, SJ, SL or SM with JASO MA,

MA1 or MA2

Viscosity: SAE 10W-40

Capacity: 2.0 L (2.1 US qt) (when filter is not

removed)

2.2 L (2.3 US qt) (when filter is removed)

2.4 L (2.5 US qt) (when engine is

completely dry)

#### NOTE

- ODo 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.
- OAlthough 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.
- Check the oil level (see Oil Level Inspection in the Engine Lubrication System chapter).
- Install the removed parts (see appropriate chapters).

#### Oil Filter Replacement

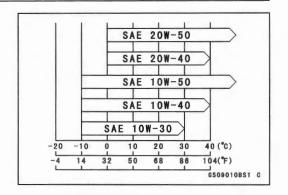
- Drain the engine oil (see Engine Oil Change).
- Remove the oil filter [A] with the oil filter wrench [B].
   Special Tool Oil Filter Wrench: 57001-1249
- A B GS098468 P

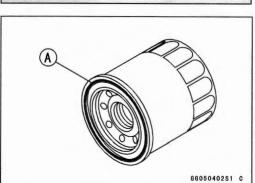
- Replace the filter with a new one.
- Apply engine oil to the O-ring [A] before installation.
- Tighten the filter with the oil filter wrench.

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

#### NOTE

- OHand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.
- Pour in the specified type and amount of oil (see Engine Oil Change).
- Install the removed parts (see appropriate chapters).





# 2-34 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).
- ★ Adjust the tire air pressure according to the specifications if necessary.

#### Air Pressure (when Cold)

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

• Install the air valve cap.

#### Wheels and Tires

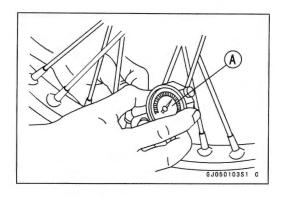
#### Wheel/Tire Damage Inspection

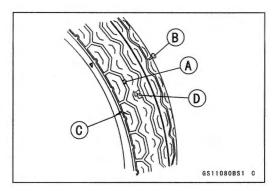
- Remove any imbedded stones [A] or other foreign particles [B] from tread.
- Visually inspect the tire for cracks [C] and cuts [D], and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents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

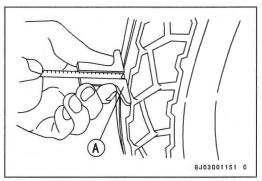
#### **Tire Tread Wear Inspection**

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

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







**Tread Depth** 

Standard:

Front 4.3 mm (0.17 in.)

Rear

6.7 mm (0.26 in.)

**Service Limit:** 

Front 1 mm (0.04 in.)

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

Rear 2 mm (0.08 in.)

(Up to 130 km/h (80 mph))

3 mm (0.12 in.)

(Over 130 km/h (80 mph))

# **WARNING**

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

#### NOTE

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

#### Wheel Bearing Damage Inspection

- Raise the front wheel off the ground with a suitable stand.
- Turn the handlebar all the way to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.
- ★If roughness, binding or noise is found, remove the front wheel and inspect the wheel bearing (see Front Wheel Removal, Hub Bearing Inspection in the Wheels/Tires chapter).
- Raise the rear wheel off the ground with a stand or the center stand (KLE300A).
- 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).





#### 2-36 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

#### Spoke Tightness and Rim Runout Inspection

- Check that all the spokes are tightened evenly.
- ★If spoke tightness is uneven or loose, tighten the spoke nipples evenly.

Torque - Spoke Nipples: 5.2 N·m (0.53 kgf·m, 46 in·lb)

Check the rim runout.

# **A** WARNING

A missing spoke places an additional load on the other spokes, which will eventually cause other spokes to break, creating the potential for an accident resulting in serious injury or death. Immediately replace any broken spoke(s).

- Raise the front/rear wheel off the ground with a suitable stand or the center stand (KLE300A).
- Inspect the rim for small cracks, dents, bending, or warping.
- ★If there is any damage to the rim, it must be replaced.
- Set a dial gauge against the side of the rim, and rotate the rim to measure the axial runout [A]. The difference between the highest and lowest dial readings is the amount of runout.
- Set a dial gauge against the outer circumference of the rim, and rotate the rim to measure radial runout [B]. The difference between the highest and lowest dial readings is the amount of runout.
- ★If rim runout exceeds the service limit, check the wheel bearings first. Replace them if they are damaged. If the problem is not due to the bearings, correct the rim warp (runout). A certain amount of rim warp can be corrected by recentering the rim. Loosen some spokes and tighten others within the standard torque to change the position of different parts of the rim. If the rim is badly bent, however, it must be replaced.

#### Rim Runout (with tire installed)

Standard:

Axial

TIR 1.0 mm (0.04 in.) or less

Radial

TIR 1.0 mm (0.04 in.) or less

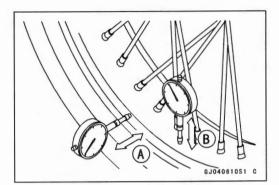
**Service Limit:** 

**Axial** 

TIR 2.0 mm (0.08 in.)

Radial

TIR 2.0 mm (0.08 in.)



#### **Final Drive**

# **Drive Chain Lubrication Condition Inspection**

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

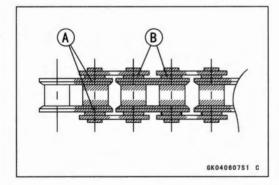
Use a lubricant for sealed chains to prevent deterioration of chain seals. If the chain is especially dirty, clean it using a cleaner for sealed chains following the instructions supplied by the chain cleaner manufacturer.

#### NOTICE

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

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

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



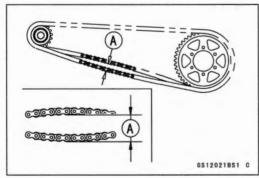
# **Drive Chain Slack Inspection**

#### NOTE

- OCheck the slack with the motorcycle setting on its sidestand.
- OClean 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.

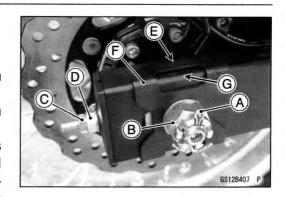
#### Chain Slack

Standard:  $25 \sim 35 \text{ mm} (1.0 \sim 1.4 \text{ in.})$ 



#### **Drive Chain Slack Adjustment**

- Remove the cotter pin [A], and loosen the axle nut [B].
- Loosen the both chain adjuster locknuts [C].
- ★If the chain is too loose, turn 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 right wheel alignment indicator [F] should align with the same swingarm mark or position [G] that the left indicator notch aligns with.



# **A** WARNING

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

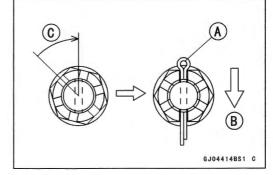
- Tighten both chain adjuster locknuts securely.
- Tighten:

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

- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Insert a new cotter pin [A] downward [B].

#### NOTE

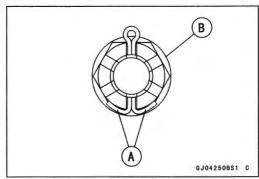
- OWhen inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [C] up to next alignment.
- Olt should be within 30 degrees.
- OLoosen once and tighten again when the slot goes past the nearest hole.



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

# **A** 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.



#### 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

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

# **A** WARNING

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

#### **Drive Chain Wear Inspection**

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

#### **Drive Chain 20-link Length**

Standard:

317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)

Service Limit:

319 mm (12.6 in.)

### **A** 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** 

L.G.B (when shipping)

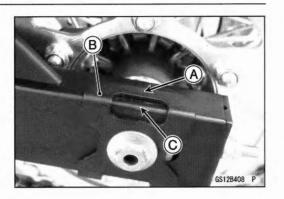
Type:

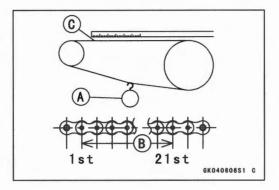
EK520RMX/3D

R520HPXR (when shipping)

Link:

112 links





#### 2-40 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

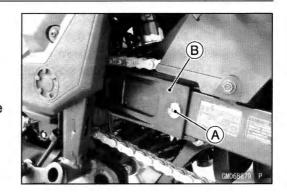
#### Chain Guide Wear Inspection

• Remove:

Bolt [A]

Chain Guide [B]

- Visually inspect the chain guide.
- ★ If it shows any signs of abnormal wear or damage, replace the chain guide.
- Install the chain guide, and tighten its bolt.

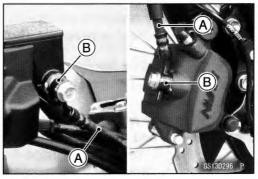


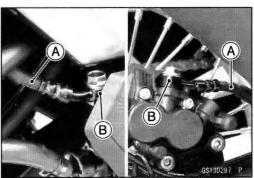
#### **Brakes**

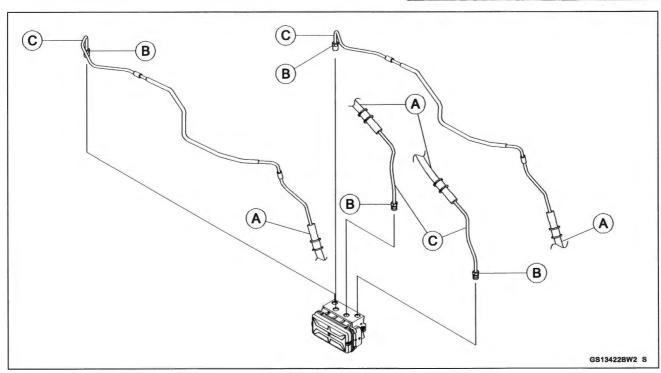
#### **Brake System Inspection**

#### Brake Fluid Leak (Brake Hose and Pipe) Inspection

- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- For ABS equipped models, remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A], fittings [B] and pipes [C] (ABS equipped models).
- ★If the brake fluid leaked from any position, inspect or replace the problem part.







# Brake Hose and Pipe Damage and Installation Condition Inspection

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

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

Brake Pipe Joint Nuts (ABS Equipped Models): 18 N·m (1.8 kgf·m, 13 ft·lb)

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

#### **Brake Operation Inspection**

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

# **A** WARNING

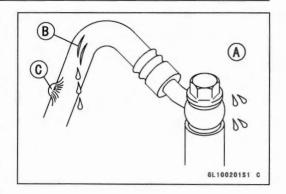
When test riding the vehicle, be aware of surrounding traffic for your safety.

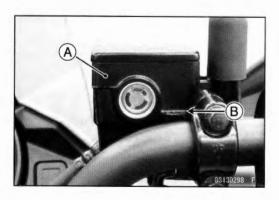
#### Brake Fluid Level Inspection

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

#### NOTE

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



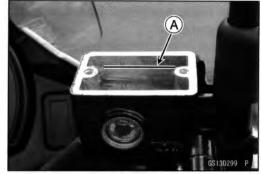


# 2-42 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

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

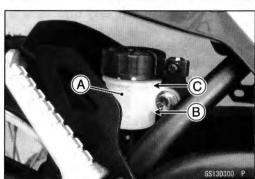
Torque - Front Brake Fluid Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)



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

## **A** WARNING

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



#### Recommended Disc Brake Fluid

Grade:

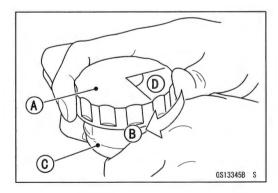
Front

**DOT3** or **DOT4** 

Rear

DOT4

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

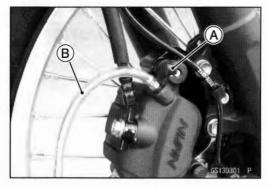


## Brake Fluid Change

#### NOTE

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

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

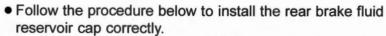


- Change the brake fluid.
- ORepeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.
  - 1. Open the bleed valve [A].
  - 2. Apply the brake and hold it [B].
  - 3. Close the bleed valve [C].
  - 4. Release the brake [D].

#### NOTE

- OThe fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.
- Remove the clear plastic hose.
- Install the diaphragm and reservoir cap.
- Tighten:

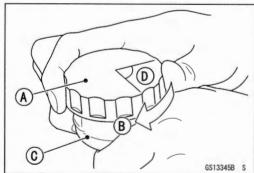
Torque - Front Brake Fluid Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)



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







- Tighten the bleed valve, and install the rubber cap.
  - Torque Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)
- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.
- ★If necessary, bleed the air from the lines.

#### 2-44 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

#### Brake Hose and Pipe Replacement

#### **NOTICE**

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

#### • Remove:

Right Side Cover (see Side Cover Removal in the Frame chapter)

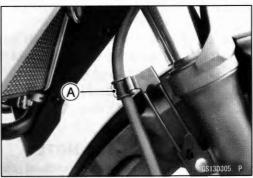
Mud Guard (see Mud Guard Removal in the Frame chapter)

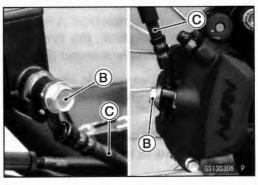
- Release the brake hoses from the clamps [A].
- Remove the brake hose banjo bolts [B].
- When removing the brake hoses [C], note the following.
- OTake care not to spill the brake fluid on the painted or plastic parts.
- OTemporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
- Olmmediately wash away any brake fluid that spills.
- When installing the brake hoses, note the following.
- OAvoid sharp bending, kinking, flatting or twisting, and run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- OThere are washers on each side of the brake hose fitting. Replace them with new ones.
- OTighten:

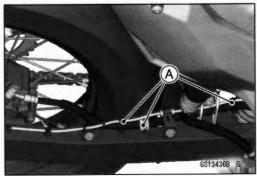
Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

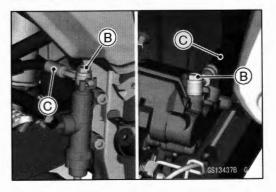
 Fill the brake line after installing the brake hose (see Brake Fluid Change).











# **PERIODIC MAINTENANCE 2-45**

# **Periodic Maintenance Procedures**

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#### 2-46 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

For ABS equipped models; note the following.

#### NOTE

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

#### Remove:

Mud Guard (see Mud Guard Removal in the Frame chapter)

Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

Brake Pipe Joint Nuts [A]

Brake Hose Banjo Bolts [B]

Bolts [C]

**Brackets** 

**Dampers** 

Clamps

- There are washers on each side of the brake hose and pipe fitting. Replace them with new ones when installing.
- Before installing the brake pipe, check to see that there is no damage on the threads of the brake pipe joint nut.
- ★If there is any damage, replace the damaged parts with new ones.

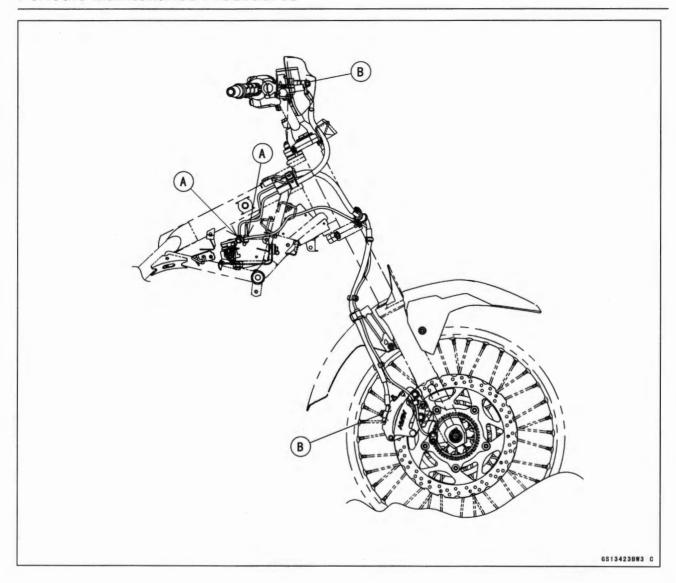
#### NOTE

- Tighten the brake pipe joint nut at both ends of the brake pipe temporarily and then tighten them to the specified torque.
- Install the brake pipes and brake hoses to the specified angle (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten the brake pipe joint nuts with the flare nut wrench.
- Tighten:

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

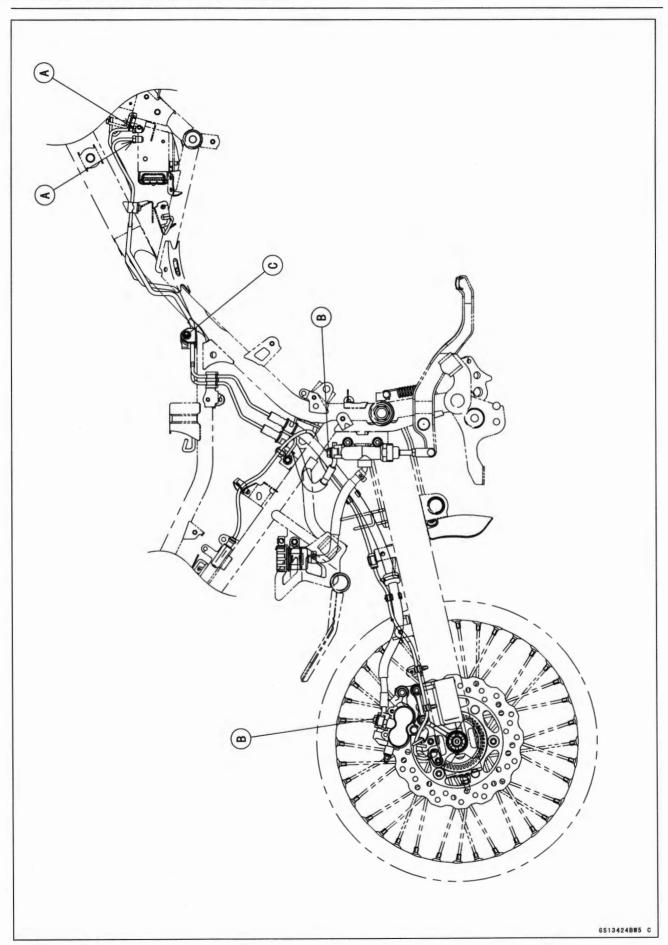
Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb)

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



# 2-48 PERIODIC MAINTENANCE

# **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 Brake Fluid Reservoir Cap Screws [A] Reservoir Cap [B] Diaphragm [C]

- Unscrew the locknut [D] and pivot bolt [E], and remove the brake lever.
- Remove the dust cover [F] and circlip [G].

Special Tool - Inside Circlip Pliers: 57001-143

• Pull out the piston assembly [H].

#### NOTICE

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

• Replace:

Diaphragm [C]
Dust Cover [F]

Circlip [G]

Piston Assembly [H]

### **Rear Master Cylinder Disassembly**

• Remove:

Rear Master Cylinder (see Rear Master Cylinder Removal in the Brakes chapter)

• Remove the circlip [A], connector [B] and O-ring [C].

Special Tool - Inside Circlip Pliers: 57001-143

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

#### NOTICE

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

• Replace:

Circlip [A]

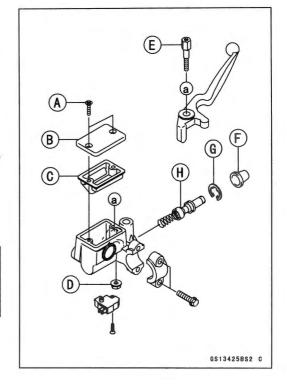
O-ring [C]

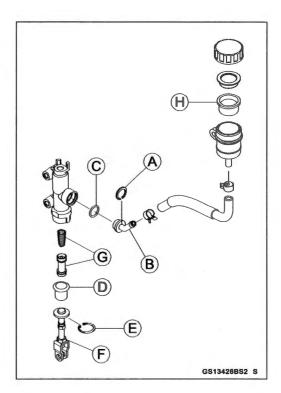
Circlip [E]

Push Rod Assembly [F]

Piston Assembly [G]

Diaphragm [H]





#### 2-50 PERIODIC MAINTENANCE

### **Periodic Maintenance Procedures**

#### **Master Cylinder Assembly**

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

#### NOTICE

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

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

Front: Brake Lever Pivot Bolt

Rear: Dust Cover of Push Rod Assembly

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

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

Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

# Caliper Rubber Parts Replacement Front Caliper Disassembly

Remove:

Front Caliper (see Front Caliper Removal in the Brakes chapter)

Brake Pads (see Front Brake Pad Removal in the Brakes chapter)

Front Caliper Holder [A]

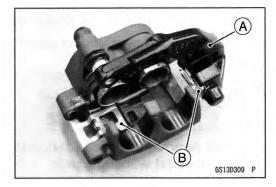
Pad Springs [B]

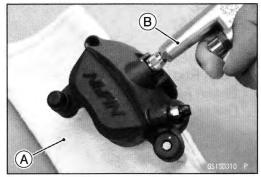
- Using compressed air, remove the pistons.
- OCover the piston area with a clean, thick cloth [A].
- OBlow compressed air [B] into the hole for the banjo bolt to remove the piston.

#### **A** WARNING

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

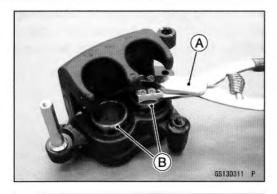
OPull out the piston by hand.



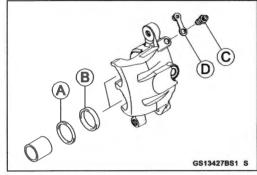


 When compressed air is not used, using the brake caliper piston pliers [A] remove the pistons [B].

Special Tool - Brake Caliper Piston Pliers ( $\phi$ 16 ~  $\phi$ 26): 57001-1861



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



### **Front Caliper Assembly**

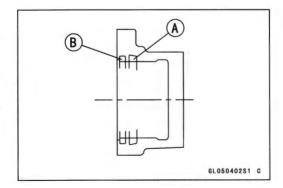
• Clean the caliper parts except for the pads.

#### NOTICE

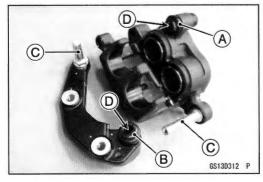
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

Install the bleed valve and rubber cap.
 Torque - Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)

- Replace the fluid seals [A] with new ones.
- OApply 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.
- OApply silicone grease to the dust seals, and install them into the cylinders by hand.



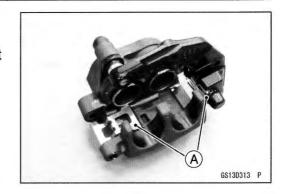
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the shaft rubber friction boot [A] and the dust cover
   [B] replace them with new ones if they are damaged.
- Apply a silicone grease to the caliper holder shafts [C] and the holes [D].



#### 2-52 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

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



#### **Rear Caliper Disassembly**

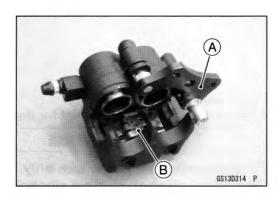
Remove:

Rear Caliper (see Rear Caliper Removal in the Brakes chapter)

Brake Pad (see Rear Brake Pad Removal in the Brakes chapter)

• Remove:

Rear Caliper Holder [A] Pad Spring [B]



Using compressed air, remove the pistons.
 Ocover the piston area with a clean, thick cloth [A].

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

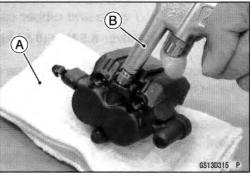
## **A** WARNING

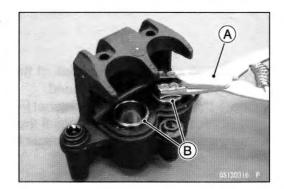
The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.

OPull out the piston by hand.

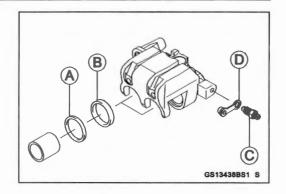
 When compressed air is not used, using the brake caliper piston pliers [A] remove the pistons [B].

Special Tool - Brake Caliper Piston Pliers ( $\phi$ 16 ~  $\phi$ 26): 57001-1861





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



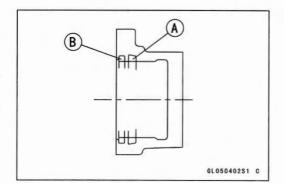
#### **Rear Caliper Assembly**

Clean the caliper parts except for the pads.

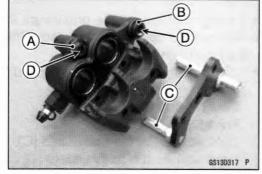
#### NOTICE

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

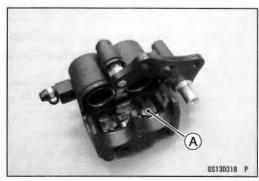
- Install the bleed valve and rubber cap.
   Torque Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)
- Replace the fluid seals [A] with new ones.
- OApply silicone grease to the fluid seals, and install them into the cylinders by hand.
- Replace the dust seals [B] with new ones if they are damaged.
- OApply silicone grease to the dust seals, and install them into the cylinders by hand.



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



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



#### 2-54 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]

Rear Brake Pad [D]

#### **Pad Lining Thickness**

Standard: Front

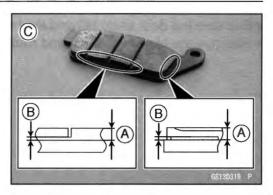
4.0 mm (0.16 in.)

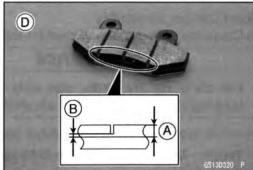
Rear

4.5 mm (0.18 in.)

**Service Limit:** 

1.5 mm (0.06 in.)





### **Brake Light Switch Operation Inspection**

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



- ★If it does not, adjust the brake light switch.
- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- While holding the switch body, turn the adjusting nut to adjust the switch.

Switch Body [A]

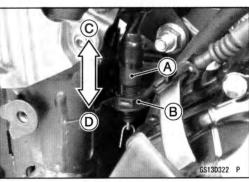
Adjusting Nut [B]

Light sooner as the body rises [C]

Light later as the body lowers [D]



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

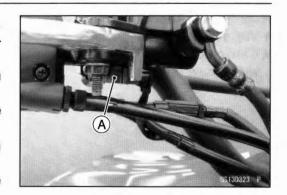
Brake Light (see Tail/Brake Light Removal/Installation in the Electrical System chapter)

Main Fuse 30 A and Brake Light/Horn 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)

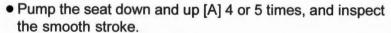


### Suspension

#### 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).



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





### Front Fork Oil Leak Inspection

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



#### 2-56 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

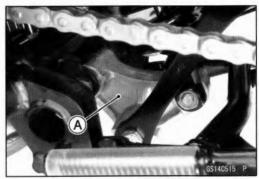
#### Rear Shock Absorber Oil Leak Inspection

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



#### **Rocker Arm Operation Inspection**

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



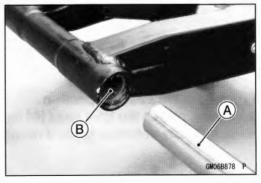
#### **Tie-Rod Operation Inspection**

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



### **Lubrication of Rear Suspension** Swingarm Pivot Lubrication

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



### **Steering**

### Steering Play Inspection

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

#### NOTE

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

### Steering Play Adjustment

Remove:

Inner Cover (see Inner Cover Removal in the Frame chapter)

Handlebars (see Handlebar Removal in the Steering chapter)

Loosen:

Lower Front Fork Clamp Bolt [A] (Both Sides)

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

Steering Stem Head Nut [B]

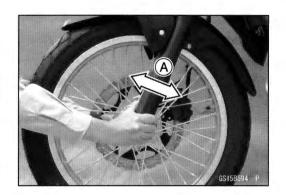
(S158596 P



- 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

OTurn the stem nut 1/8 turn at time maximum.





#### 2-58 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

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

Special Tool - Adjustable Hook Wrench: 57001-1863

Tighten:

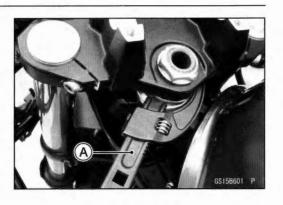
Torque - Steering Stem Head Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)

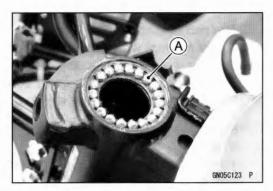
Lower Front Fork Clamp Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)

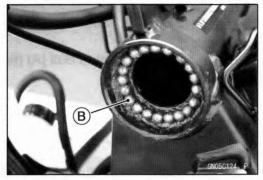
- Check the steering again.
- ★If the steering is still too tight or too loose, repeat the adiustment.
- Install the removed parts (see appropriate chapters).

#### Steering Stem Bearing Lubrication

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





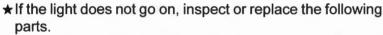


### **Electrical System**

# Lights and Switches Operation Inspection First Step

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

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



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

City Light (see City Light Removal/Installation in the Electrical System chapter)

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

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

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

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

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

Main Fuse 30 A, Meter Fuse 10 A and Brake Light/Horn Fuse 10 A (see Fuse Inspection in the Electrical System chapter)

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

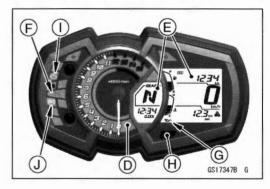
Oil Pressure Switch (see Switch Inspection in the Electrical System chapter)

Gear Position Sensor (see Gear Position Sensor Input Voltage Inspection in the Fuel System (DFI) chapter) Harness (see Wiring Inspection in the Electrical System chapter)

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







#### 2-60 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

#### **Second Step**

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

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

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

Turn Signal Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)

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

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

Harness (see Wiring Inspection in the Electrical System chapter)

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

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

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

#### Third Step

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

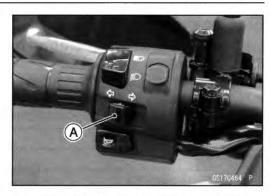
Headlight Bulb (see Headlight Bulb Replacement in the Electrical System chapter)

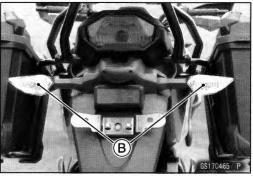
Headlight Fuse 15 A (see Fuse Inspection in the Electrical System chapter)

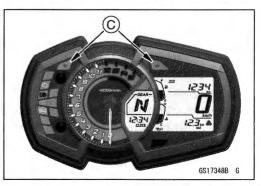
Dimmer Switch (see Switch Inspection in the Electrical System chapter)

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

Harness (see Wiring Inspection in the Electrical System chapter)









- Set the dimmer switch to high beam position.
- The high beam headlights should go on.
- The blue high beam indicator light (LED) [A] 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 Bulb (see Headlight Bulb Replacement in the Electrical System chapter)

Meter Unit (see Meter Unit Inspection in the Electrical System chapter)

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

- Turn the engine stop switch to stop position.
- The low beam and high beam headlights should stay going on.
- ★If the headlights and blue high beam indicator light (LED) does go off, inspect or replace the following item.

  Headlight Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
- Turn the ignition switch to off.
- The headlights and blue high beam indicator light (LED) should go off.

#### Fog Light (KLE300A)

- Turn the ignition switch on.
- Push the fog light switch [A] and check the fog lights [B] for lighting condition.

# When switch is pushed in: Fog Lights On When switch is pushed out: Fog Lights Off

OAlso check that the fog light indicator [C] goes on in accordance with the fog lights lighting condition.

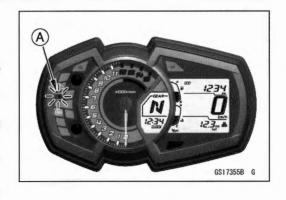
★ If the fog light does not go on, inspect the following items.

Accessory Fuse 5 A in the Fuse Box (2) (see Fuse Box Fuse Removal in the Electrical System chapter)

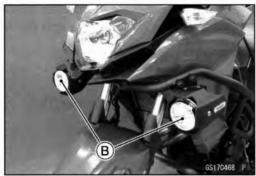
Fog Light Harness Circuit (see Fog Light Harness Circuit Inspection (KLE300A) in the Electrical System chapter)

Fog Light Switch (see Fog Light Switch Inspection (Equipped Model) in the Electrical System chapter)

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







#### Headlight Aiming Inspection

- Inspect the headlight beam for aiming.
- ★ If the headlight beam is off the point, adjust the headlight aiming as following.

#### 2-62 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

#### NOTE

OThe left adjuster [A] and right adjuster [B] can move the direction of the headlight beam to up, down, left and right by turning each adjuster itself as the below table. (In the photo, the headlight unit has been removed for clarity.)

Moving Direction of Headlight Beam [C] Up [D] Down [E] Left [F] Right [G]

- To move the headlight beam leftward, turn the left adjuster clockwise and turn the right adjuster counterclockwise same number as the left adjuster was turned until the beam points straight ahead.
- To move the headlight beam rightward, turn the left adjuster counterclockwise and turn the right adjuster clockwise same number as the left adjuster was turned until the beam points straight ahead.
- To move the headlight beam upward, turn the both adjusters clockwise same number.
- To move the headlight beam downward, turn the both adjusters counterclockwise same number.

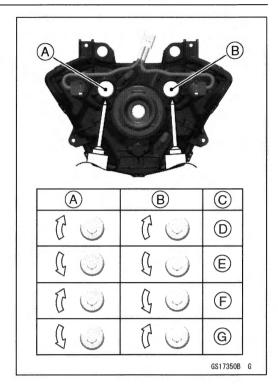
#### NOTE

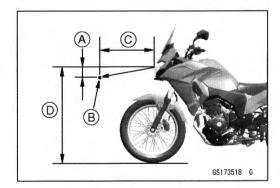
On high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.

#### NOTE

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

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



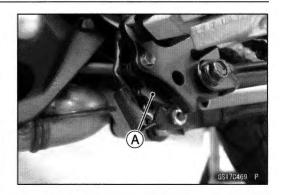


## Side Stand Switch Operation Inspection

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

#### **Side Stand Switch Operation**

| Side Stand Gear Clutch Position Lever |                                  | Engine<br>Start | Engine<br>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          |                  |  |



#### 2-64 PERIODIC MAINTENANCE

#### **Periodic Maintenance Procedures**

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

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

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

Ignition Fuse 10 A (see Fuse Inspection in the Electrical System chapter)

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

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

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

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

Gear Position Sensor (see Gear Position Sensor Input Voltage Inspection in the Fuel System (DFI) chapter)

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

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

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

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

Harness (see Wiring Inspection in the Electrical System chapter)

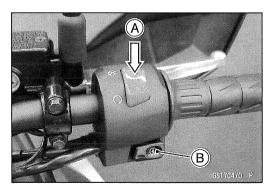
★If the all parts are good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

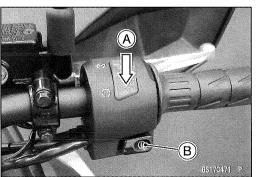
# Engine Stop Switch Operation Inspection First Step

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

#### **Second Step**

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





#### Spark Plug Replacement

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

## Standard Spark Plug

Type: NGK CR8E

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

#### NOTICE

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

• Tighten:

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

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

#### **Others**

#### Chassis Parts Lubrication

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

#### NOTE

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

Pivots: Lubricate with Grease.

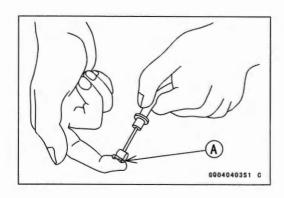
Brake Lever Brake Pedal Clutch Lever Rear Brake Joint Pin Sidestand

Points: Lubricate with Grease.

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







### 2-66 PERIODIC MAINTENANCE

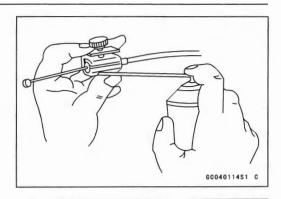
#### **Periodic Maintenance Procedures**

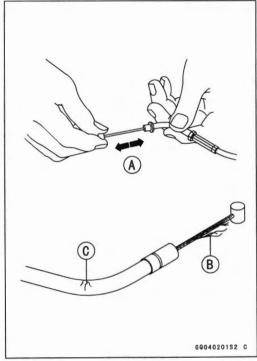
Cables: Lubricate with Rust Inhibitor.

Clutch Cable

**Throttle Cables** 

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





# 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

- OFor the engine fasteners, check the tightness of them when the engine is cold (at room temperature).
- ★ If there are loose fasteners, retighten them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.
- ★If cotter pins are damaged, replace them with new ones.

#### Bolt, Nut and Fastener to be checked

Engine:

Clutch Lever Pivot Bolt Locknut

**Engine Mounting Bracket Bolts and Nuts** 

**Engine Mounting Nuts** 

**Exhaust Pipe Holder Nuts** 

**Exhaust Pipe Mounting Bolt** 

Muffler Body Clamp Bolt

**Muffler Body Mounting Bolt** 

Radiator Bolts

Wheels:

Front Axle Nut

Front Axle Nut Cotter Pin

Rear Axle Nut

Rear Axle Nut Cotter Pin

Brakes:

Brake Lever Pivot Bolt Locknut

**Brake Pedal Bolt** 

Caliper Mounting Bolts

Front Master Cylinder Clamp Bolts

Rear Master Cylinder Mounting Bolts

Rear Master Cylinder Push Rod Joint Cotter Pin

Suspension:

Front Fork Clamp Bolts

Upper Rear Shock Absorber Nut

Lower Rear Shock Absorber Bolt

Swingarm Pivot Shaft Nut

Tie-Rod Bolts

Uni-Trak Rocker Arm Bolt

Steering:

**Handlebar Mounting Bolts** 

Steering Stem Head Bolt

Others

Footpeg Bracket Bolts

Sidestand Nut

CONTRACTOR SERVICE A

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to the processor of an electrical state of the contract of the

Handeuar Mounting Los J Zibanny Stem Head Cor Street

> Fedgeg Bricker Polis Sidestand Nut

# Fuel System (DFI)

## **Table of Contents**

| Exploded View  | 3-4          |
|--|--------------|
|  | 3-10         |
| DFI Components Naming  | 3-12         |
| DFI Parts Location   | 3-19         |
| Specifications   | 3-22         |
| Special Tools and Sealant  | 3-24         |
|  | 3-26         |
|  | 3-26         |
|  | 3-28         |
|  | 3-28         |
|  | 3-32         |
|  | 3-35         |
| ,  | 3-40         |
|  | 3-40         |
| Self-Diagnosis Procedures  | 3-40         |
|  | 3-43         |
|  | 3-43         |
|  | 3-44         |
| ·  | 3-47         |
|  | 3-47         |
|  | 3-47         |
| · · · · · · · · · · · · · · · · · · ·                            | 3-48         |
|  | 3-48         |
| 1  | 3-40         |
|  |              |
|  | 3-51         |
|  | 3-51<br>3-52 |
|  |              |
|  | 3-56         |
| ,  | 3-56         |
|  | 3-56         |
|  | 3-57         |
| ,                          | 3-59         |
| ·  | 3-59         |
|  | 3-60         |
| ·  | 3-60         |
| ,                          | 3-62         |
|  | 3-62         |
| · ·  | 3-62         |
| Crankshaft Sensor Peak Voltage Inspection                        | 3-62         |
| , , ,  | 3-63         |
| Rear Wheel Rotation Sensor Signal Inspection                     | 3-63         |
| Gear Position Sensor (Service Code 25) (DTC P0914, P0915, P0917) | 3-66         |
| Gear Position Sensor Removal/Installation                        | 3-66         |
| Gear Position Sensor Input Voltage Inspection                    | 3-66         |
| Gear Position Sensor Output Voltage Inspection                   | 3-67         |
| Vehicle-down Sensor (Service Code 31) (DTC C0064)                | 3-69         |
| Vehicle-down Sensor Removal                                      | 3-69         |
| Vehicle-down Sensor Installation                                 | 3-69         |
| Vehicle-down Sensor Input Voltage Inspection                     | 3-70         |
| Vehicle-down Sensor Output Voltage Inspection                    | 3-71         |
| , <del>e</del> ,   |              |

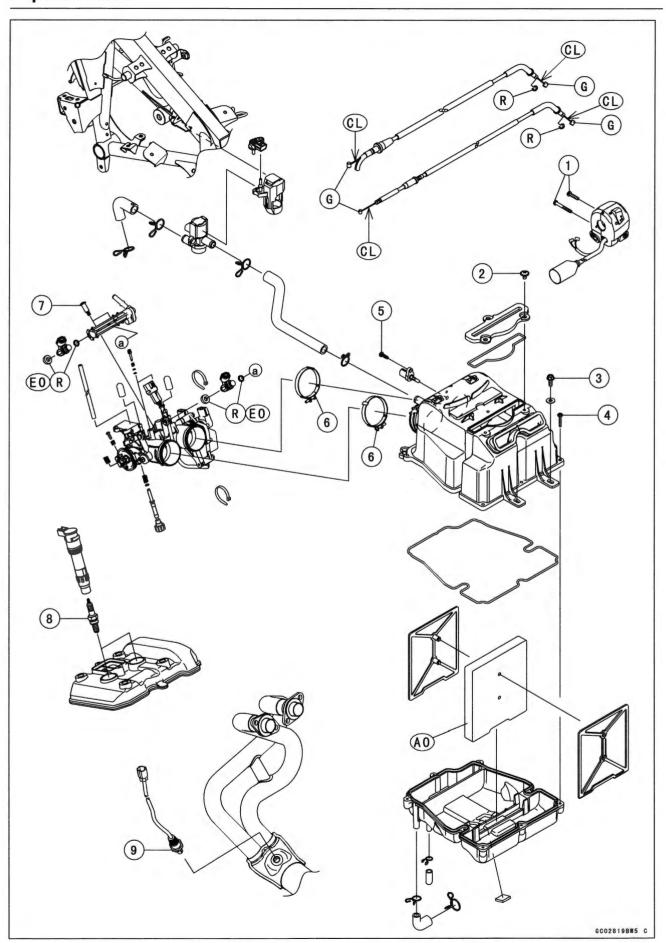
## 3-2 FUEL SYSTEM (DFI)

| Subthrottle Sensor (Service Code 32) (DTC P0220, P0223)            | 3-73         |
|--|--------------|
| Subthrottle Sensor Removal/Adjustment                              | 3-73         |
| Subthrottle Sensor Input Voltage Inspection                        | 3-73         |
| Subthrottle Sensor Output Voltage Inspection                       | 3-74         |
| Subthrottle Sensor Resistance Inspection                           | 3-76         |
| Oxygen Sensor - not activated (Service Code 33) (DTC P0130, P0132) | 3-77         |
| Oxygen Sensor Removal/Installation                                 | 3-77         |
| Oxygen Sensor Inspection   | 3-77         |
| ECU Communication Error (Service Code 39)                          | 3-80         |
| ECU Communication Line Inspection                                  | 3-80         |
| Fuel Injectors (Service Code 41, 42) (DTC P0201, P0202)            | 3-81         |
| Fuel Injector Removal/Installation                                 | 3-81         |
| Fuel Injector Audible Inspection                                   | 3-81         |
| Fuel Injector Resistance Inspection                                | 3-81         |
| Fuel Injector Power Source Voltage Inspection                      | 3-82         |
| Fuel Injector Output Voltage Inspection                            | 3-83         |
| Fuel Injector Fuel Line Inspection                                 | 3-84         |
| Stick Coils #1, #2 (Service Code 51, 52) (DTC P0351, P0352)        | 3-86         |
| Stick Coil Removal/Installation                                    | 3-86         |
| Stick Coil Primary Winding Resistance Inspection                   | 3-86         |
| Stick Coil Input Voltage Inspection                                | 3-86         |
| Radiator Fan Relay (Service Code 56) (DTC P0480)                   | 3-88         |
| Radiator Fan Relay Removal/Installation                            | 3-88         |
| Radiator Fan Relay Inspection                                      | 3-88         |
| Subthrottle Valve Actuator (Service Code 62) (DTC P2100)           | 3-89         |
| Subthrottle Valve Actuator Removal                                 | 3-89         |
| Subthrottle Valve Actuator Inspection                              | 3-89         |
| Subthrottle Valve Actuator Resistance Inspection                   | 3-89         |
| Subthrottle Valve Actuator Input Voltage Inspection                | 3-90         |
|  | 3-90         |
| Air Switching Valve (Service Code 64) (DTC P0410)                  | 3-92<br>3-92 |
| Air Switching Valve Removal/Installation                           |              |
| Air Switching Valve Inspection                                     | 3-92         |
| Oxygen Sensor Heater (Service Code 67) (DTC P0030)                 | 3-93         |
| Oxygen Sensor Heater Removal/Installation                          | 3-93         |
| Oxygen Sensor Heater Resistance Inspection                         | 3-93         |
| Oxygen Sensor Heater Power Source Voltage Inspection               | 3-94         |
| Fuel Supply System (Service Code 94) (DTC P0170)                   | 3-96         |
| Fuel Supply System Inspection                                      | 3-96         |
| Purge Valve (Service Code 3A) (DTC P0443) (Equipped Models)        | 3-97         |
| Purge Valve Removal/Installation                                   | 3-97         |
| Purge Valve Inspection   | 3-97         |
| Warning Indicator Light (LED)                                      | 3-99         |
| Yellow Engine Warning/Red Warning Indicator Light (LED) Inspection | 3-99         |
| ECU  | 3-100        |
| ECU Identification   | 3-100        |
| ECU Removal  | 3-100        |
| ECU Installation   | 3-101        |
| ECU Power Supply Inspection  | 3-102        |
| DFI Power Source   | 3-105        |
| ECU Fuse Removal   | 3-105        |
| ECU Fuse Installation  | 3-105        |
| ECU Fuse Inspection  | 3-105        |
| ECU Main Relay Removal/Installation                                | 3-105        |
| ECU Main Relay Inspection  | 3-105        |
| Fuel Line  | 3-106        |
| Fuel Pressure Inspection   | 3-106        |
| Fuel Flow Pate Inspection  | 3 107        |

| Fuel Pump   | 3-109 |
|---|-------|
| Fuel Pump Removal                                     | 3-109 |
| Fuel Pump Installation                                | 3-110 |
| Fuel Pump Operation Inspection                        | 3-110 |
| Fuel Pump Operating Voltage Inspection                | 3-110 |
| Pressure Regulator Removal                            | 3-111 |
| Fuel Pump Relay Removal/Installation                  | 3-112 |
| Fuel Pump Relay Inspection                            | 3-112 |
| Throttle Grip and Cables                              | 3-113 |
| Throttle Grip Free Play Inspection                    | 3-113 |
| Throttle Grip Free Play Adjustment                    | 3-113 |
| Throttle Cable Installation                           | 3-113 |
| Throttle Cable Lubrication                            | 3-113 |
| Throttle Body Assy                                    | 3-114 |
| Idle Speed Inspection/Adjustment                      | 3-114 |
| Throttle Bore Cleaning                                | 3-114 |
| Synchronization Inspection/Adjustment                 | 3-114 |
| Throttle Body Assy Removal                            | 3-114 |
| Throttle Body Assy Installation                       | 3-116 |
| Throttle Body Assy Disassembly                        | 3-117 |
| Throttle Body Assy Assembly                           | 3-118 |
| Air Cleaner   | 3-119 |
| Air Cleaner Element Removal/Installation              | 3-119 |
| Air Cleaner Element Inspection                        | 3-119 |
| Air Cleaner Oil Draining                              | 3-119 |
| Air Cleaner Housing Removal                           | 3-119 |
| Air Cleaner Housing Installation                      | 3-120 |
| Fuel Tank   | 3-121 |
| Fuel Tank Removal                                     | 3-121 |
| Fuel Tank Installation                                | 3-124 |
| Fuel Tank and Cap Inspection                          | 3-126 |
| Fuel Tank Cleaning                                    | 3-126 |
| Evaporative Emission Control System (Equipped Models) | 3-127 |
| Parts Removal/Installation                            | 3-127 |
| Hose Inspection                                       | 3-127 |
| Purge Valve Inspection                                | 3-127 |
| Canister Inspection                                   | 3-127 |

## 3-4 FUEL SYSTEM (DFI)

## **Exploded View**



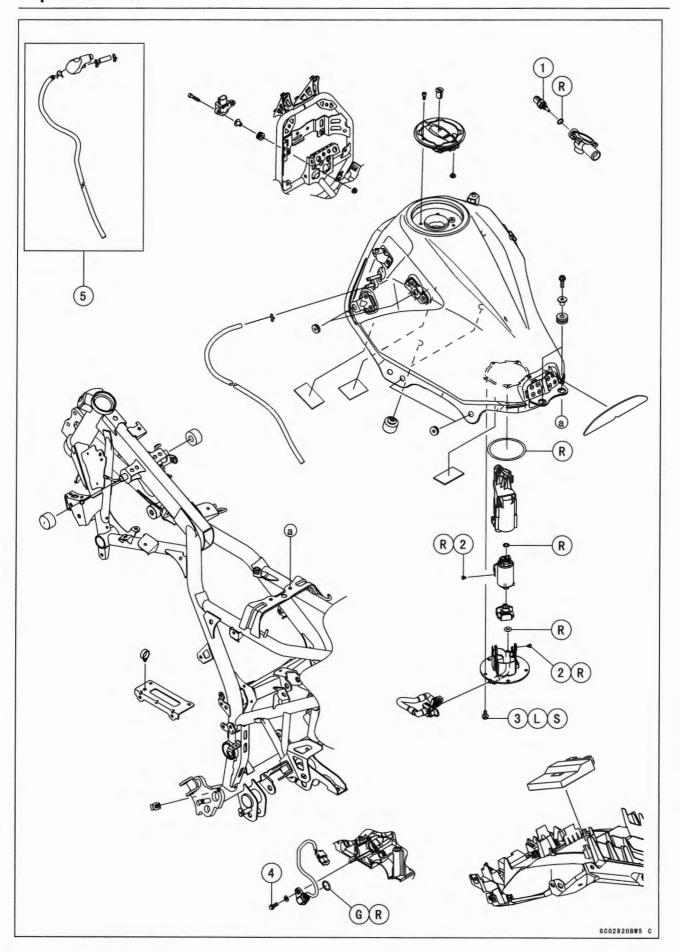
## **Exploded View**

| No. | Footonon                            |      |       |           |         |
|-----|-------------------------------------|------|-------|-----------|---------|
|     | Fastener                            | N·m  | kgf·m | ft·lb     | Remarks |
| 1   | Switch Housing Screws               | 2.5  | 0.25  | 22 in·lb  |         |
| 2   | Air Cleaner Element Cap Screws      | 4.2  | 0.43  | 37 in·lb  |         |
| 3   | Air Cleaner Housing Mounting Bolts  | 4.0  | 0.41  | 35 in·lb  |         |
| 4   | Air Cleaner Housing Screws          | 1.1  | 0.11  | 10 in·lb  |         |
| 5   | Intake Air Temperature Sensor Screw | 1.2  | 0.12  | 11 in·lb  |         |
| 6   | Air Cleaner Housing Clamp Screws    | 2.0  | 0.20  | 18 in·lb  |         |
| 7   | Delivery Pipe Assy Mounting Screws  | 3.4  | 0.35  | 30 in·lb  |         |
| 8   | Spark Plugs                         | 13   | 1.3   | 115 in·lb |         |
| 9   | Oxygen Sensor                       | 44.1 | 4.50  | 32.5      |         |

AO: Apply high-quality-form-air-filter oil.
CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
R: Replacement Parts

## 3-6 FUEL SYSTEM (DFI)

## **Exploded View**



## **Exploded View**

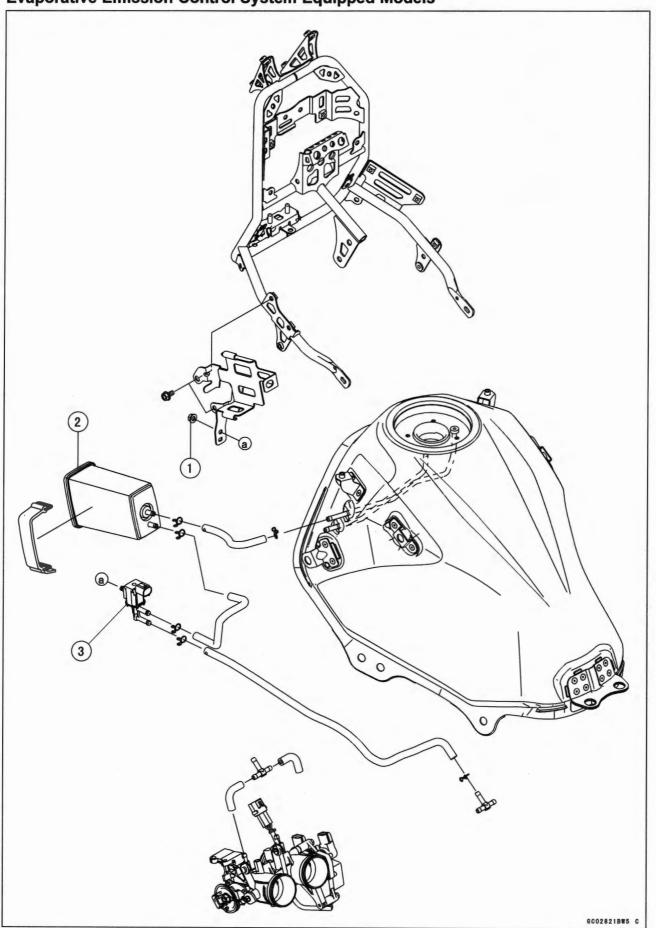
| No. | Factoria                  |      | B     |           |         |
|-----|---------------------------|------|-------|-----------|---------|
|     | Fastener                  | N·m  | kgf·m | ft·lb     | Remarks |
| 1   | Water Temperature Sensor  | 12   | 1.2   | 106 in·lb |         |
| 2   | Fuel Pump Assy Screws     | 0.98 | 0.100 | 8.7 in·lb | R       |
| 3   | Fuel Pump Bolts           | 9.8  | 1.0   | 87 in·lb  | L, S    |
| 4   | Gear Position Sensor Bolt | 9.8  | 1.0   | 87 in·lb  |         |

- 5. Other than BR, CAL, CN, SEA-B1, SEA-B3, TH and WVTA (FULL) Models
- G: Apply grease.
- L: Apply a non-permanent locking agent.
- R: Replacement Parts
- S: Follow the specified tightening sequence.

## 3-8 FUEL SYSTEM (DFI)

## **Exploded View**

## **Evaporative Emission Control System Equipped Models**



## **Exploded View**

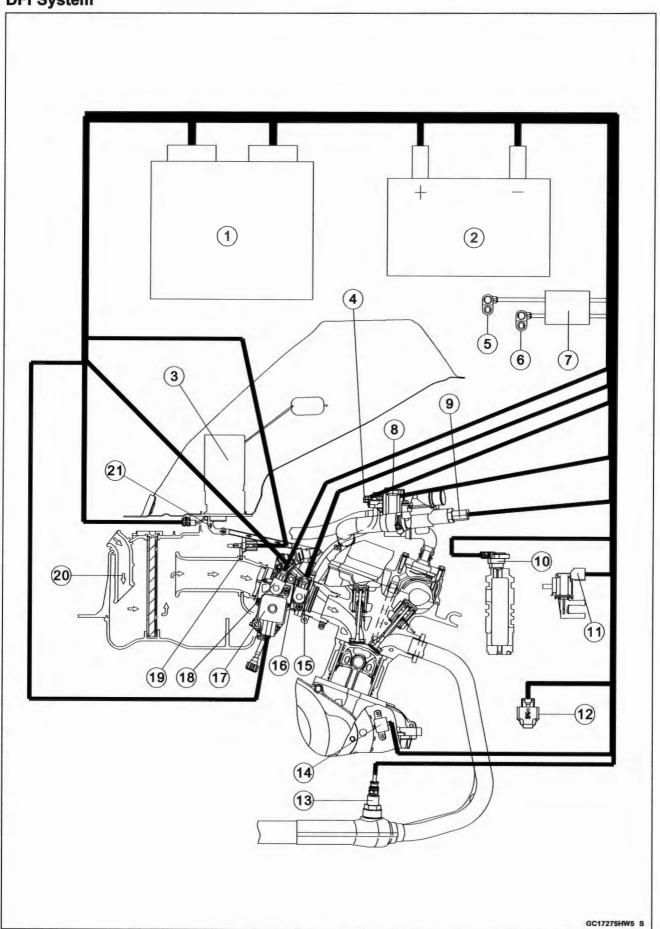
| No. | Factorer                 | Torque |       |          | Remarks |
|-----|--------------------------|--------|-------|----------|---------|
| NO. | Fastener                 | N·m    | kgf·m | ft·lb    | Remarks |
| 1   | Purge Valve Mounting Nut | 9.8    | 1.0   | 87 in·lb |         |

- 2. Canister
- 3. Purge Valve

## 3-10 FUEL SYSTEM (DFI)

## **DFI System**

## **DFI System**



## **DFI System**

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

## 3-12 FUEL SYSTEM (DFI)

## **DFI System**

### **DFI Components Naming**

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

| Sensors described in R44/2014 (Description per ISO 15031-6 in the parentheses)             | Kawasaki Name                     |
|--|-----------------------------------|
| Crankshaft position sensor (Crankshaft position sensor "A")                                | Crankshaft sensor                 |
| Engine coolant temperature sensor (Engine coolant temperature sensor 1)                    | Water (Engine) temperature sensor |
| Gear shift position sensor (Gear Shift Position Circuit)                                   | Gear position sensor              |
| Intake air temperature sensor (Intake air temperature sensor 1)                            | Intake air temperature sensor     |
| Manifold absolute pressure sensor (Manifold absolute pressure/barometric pressure circuit) | Intake air pressure sensor        |
| O <sub>2</sub> sensor (binary/linear) signals (O <sub>2</sub> sensor)                      | Oxygen sensor                     |
| Throttle position sensor (Throttle/Pedal position sensor/switch "A")                       | Main throttle sensor              |
| Throttle position sensor (Throttle/Pedal position sensor/switch "B")                       | Subthrottle sensor                |
| Vehicle speed sensor (Vehicle speed sensor "B")  | Rear wheel rotation sensor        |

| Actuators described in R44/2014 (Description per ISO 15031-6 in the parentheses)                  | Kawasaki Name                             |
|---|---|
| Evaporative emission system purge control valve (Evaporative emission system purge control valve) | Purge valve                               |
| Fuel injector (Injector - cylinder 1 ~ 2)   | Fuel injector                             |
| Ignition coil primary control circuits (Ignition coil "A ~ B" primary/secondary circuit)          | Ignition coil (Stick coil)                |
| O <sub>2</sub> sensor heater (HO <sub>2</sub> S heater control circuit)                           | Oxygen sensor heater                      |
| Secondary air injection system (Secondary air injection system)                                   | Air switching valve                       |
| Throttle by wire actuator (Throttle actuator control motor circuit)                               | Subthrottle valve actuator (ETV actuator) |

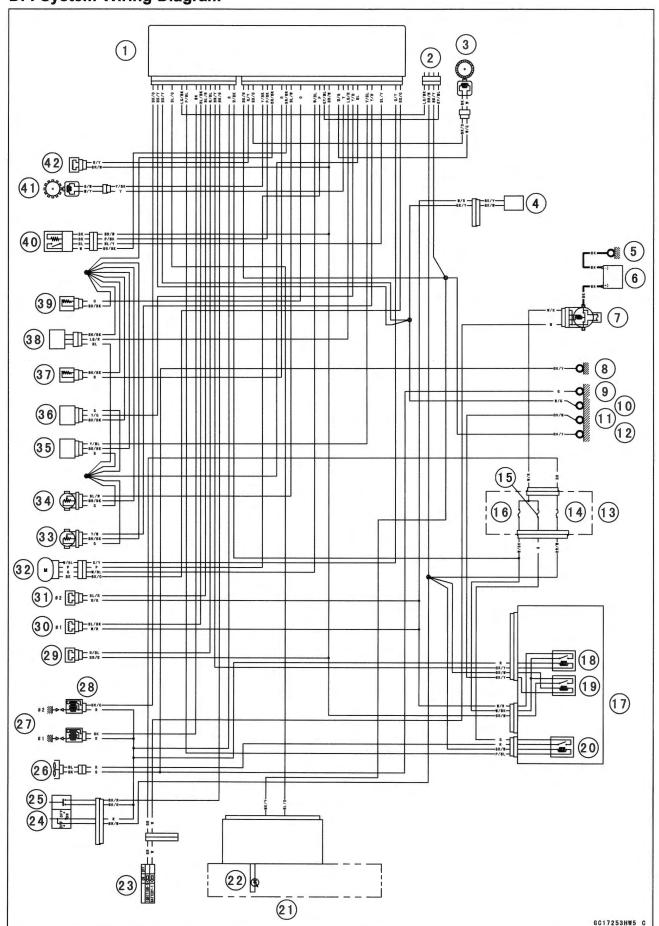
|  | D | F | S | VS | te | m |
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## 3-14 FUEL SYSTEM (DFI)

## **DFI System**

## **DFI System Wiring Diagram**



### **DFI System**

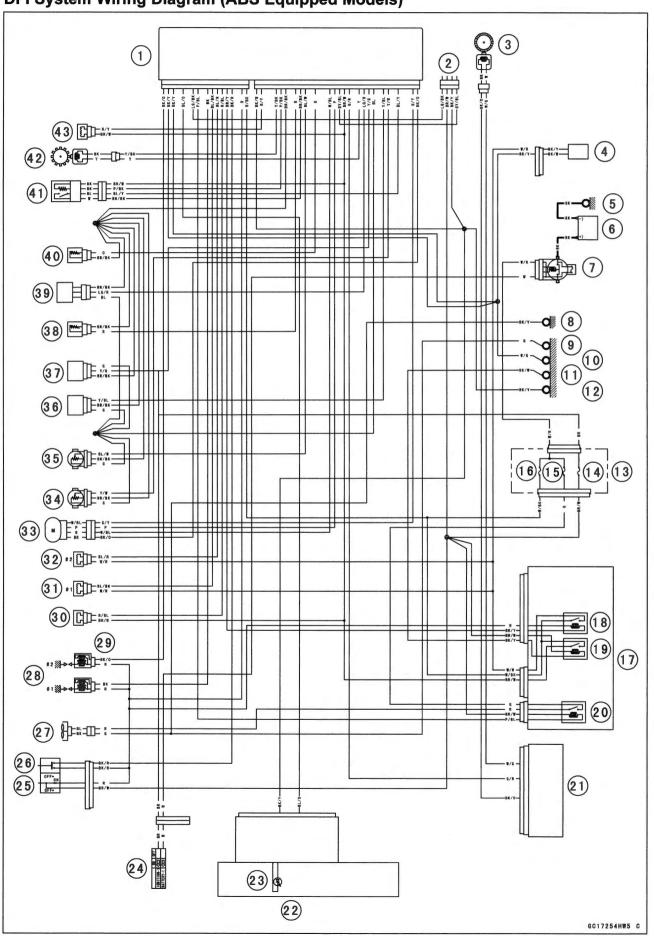
#### **Part Names**

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

## 3-16 FUEL SYSTEM (DFI)

## **DFI System**

## **DFI System Wiring Diagram (ABS Equipped Models)**



### **DFI System**

#### **Part Names**

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

#### OColor Codes:

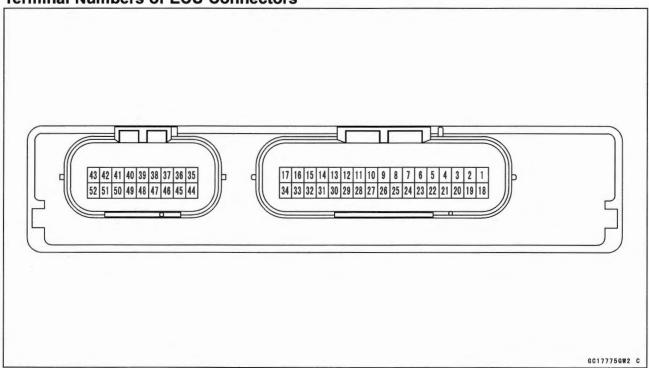
| rple |
|------|
| d    |
| let  |
| ite  |
| low  |
|      |

G: Green

## 3-18 FUEL SYSTEM (DFI)

### **DFI System**

#### **Terminal Numbers of ECU Connectors**



#### **Terminal Names**

- 1. Subthrottle Valve Actuator: BK/O
- 2. Subthrottle Valve Actuator: G/Y
- Unused
- 4. Green Neutral Indicator Light (LED): LG
- 5. Oxygen Sensor: BL/Y
- 6. Unused
- 7. Main Throttle Sensor: Y/W
- 8. Intake Air Pressure Sensor: Y/BL
- 9. Unused
- 10. Power Supply to Sensors: BL
- 11. Vehicle-down Sensor: Y/G
- 12. Gear Position Sensor: LG/R
- 13. Crankshaft Sensor (+): Y
- Power Supply to Rear Wheel Rotation Sensor (KLE300B): W/G
- Rear Wheel Rotation Sensor Signal (from ABS Hydraulic Unit, KLE300A/C): G/R
- Power Supply to ECU (from ECÚ Main Relay): BR/W
- 17. External Communication Line (\*KDS): GY/BL
- 18. Subthrottle Valve Actuator: P
- 19. Subthrottle Valve Actuator: W/BL
- 20. Unused
- 21. Unused
- 22. Water Temperature Sensor: O
- 23. Unused
- 24. Subthrottle Sensor: BL/W
- 25. Oxygen Sensor: BR/BK
- 26. Intake Air Temperature Sensor: R
- 27. Unused

- 28. Ground for Sensors: BR/BK
- 29. Oxygen Sensor Heater: P/BK
- 30. Crankshaft Sensor (-): Y/BK
- 31. Rear Wheel Rotation Sensor Signal: P
- 32. Rear Wheel Rotation Sensor (KLE300B): BK/O
- 33. Purge Valve (Equipped Models): R/Y
- 34. Ground for Control System: BK/W
- 35. Power Supply to ECU (from Battery): W/BK
- 36. Engine Stop Switch: R
- 37. Starter Lockout Switch: R/G
- 38. Starter Button: BK/R
- 39. Fuel Pump Relay: BR/Y
- 40. Air Switching Valve: R/BL
- 41. Fuel Injector #2: BL/R
- 42. Fuel Injector #1: BL/BK
- 43. Stick Coil #1: BK
- 44. Side Stand Switch: G/BK
- 45. Radiator Fan Relay: P/BL
- 46. External Communication Line (\*KDS): LG/BK
- 47. Meter Unit (Tachometer): LB
- 48. Meter Communication Line: BL/O
- 49. Unused
- 50. Ground: BK/Y
- 51. Ground for Ignition System: BK/Y
- 52. Stick Coil #2: BK/O
  - \*: KDS (Kawasaki Diagnostic System)

## **DFI Parts Location**

Battery [A]

Relay Box [B]

Fuse Box 1 [C]

Fuse Box 2 [D]

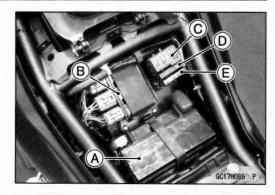
Fuse Box 3 [E]

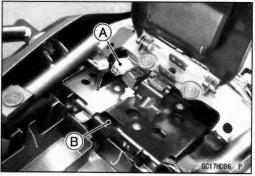
Kawasaki Diagnostic System Connector [A] ECU [B]

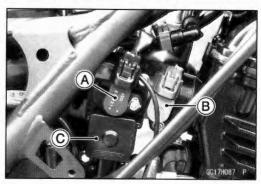
Subthrottle Sensor [A]
Main Throttle Sensor [B]
Subthrottle Valve Actuator [C]

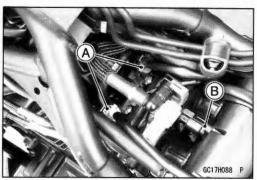
Fuel Injectors #1, #2 [A]
Intake Air Temperature Sensor [B]

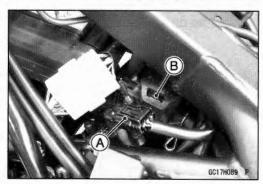
Intake Air Pressure Sensor [A] Air Switching Valve [B]











## 3-20 FUEL SYSTEM (DFI)

## **DFI Parts Location**

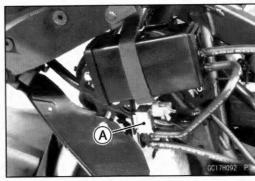
Yellow Engine Warning Indicator Light (LED) [A] Ignition Switch [B]

A B GC17H090 P

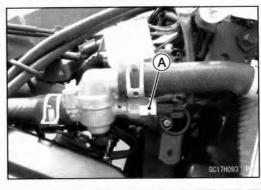
Stick Coils #1, #2 [A]



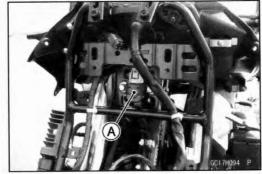
Purge Valve [A] (Equipped Models)



Water Temperature Sensor [A]



Vehicle-down Sensor [A]



## **DFI Parts Location**

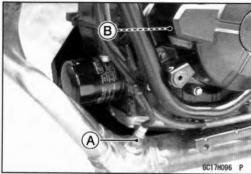
Fuel Pump [A]

Oxygen Sensor [A] Crankshaft Sensor [B]

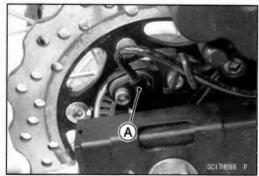
Gear Position Sensor [A]

Rear Wheel Rotation Sensor [A]









## 3-22 FUEL SYSTEM (DFI)

## Specifications

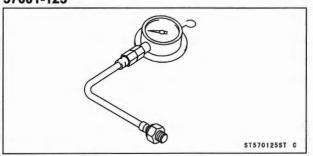
| Item                               | Standard  |
|------------------------------------|---|
| Digital Fuel Injection System      |   |
| Idle Speed                         | 1 300 ±50 r/min (rpm)   |
| Throttle Body Assy:                | ,   |
| Throttle Valve                     | Dual throttle valve   |
| Bore                               | $\phi$ 32 mm (1.3 in.)  |
| Throttle Body Vacuum               | 24.7 ±1.33 kPa (185 ±10 mmHg) at ilde speed                                   |
| Bypass Screws (Turn Out)           | 0 ~ 2 1/2 (for reference)   |
| ECU:                               |   |
| Make                               | DENSO   |
| Туре                               | Digital memory type, with built in IC igniter, sealed with resin              |
| Fuel Pressure (High Pressure Line) | 294 kPa (3.0 kgf/cm², 43 psi) with engine idling                              |
| Fuel Pump:                         |   |
| Type                               | In-tank pump (in fuel tank)   |
| Discharge                          | 50 mL (1.7 US oz.) or more for 3 seconds                                      |
| Fuel Injectors:                    |   |
| Type                               | EAT-811   |
| Nozzle Type                        | Fine atomizing type with 8 holes  |
| Resistance                         | About 9.6 ~ 14.4 Ω @20°C (68°F)   |
| Main Throttle Sensor:              |   |
| Input Voltage                      | DC 4.75 ~ 5.25 V  |
| Output Voltage                     | DC 1.02 ~ 1.05 V at idle throttle opening                                     |
|                                    | DC 4.23 ~ 4.34 V at full throttle opening (for reference)                     |
| Resistance                         | 4 ~ 6 kΩ  |
| Intake Air Pressure Sensor:        |   |
| Input Voltage                      | DC 4.75 ~ 5.25 V  |
| Output Voltage                     | DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)       |
| Intake Air Temperature Sensor:     |   |
| Output Voltage                     | About DC 2.25 ~ 2.50 V @20°C (68°F)   |
| Resistance                         | 5.4 ~ 6.6 kΩ @0°C (32°F)  |
|                                    | 0.29 ~ 0.39 kΩ @80°C (176°F)  |
| Water Temperature Sensor:          |   |
| Output Voltage                     | About DC 2.80 ~ 2.97 V @20°C (68°F)   |
| Gear Position Sensor:              |   |
| Input Voltage                      | DC 4.75 ~ 5.25 V  |
| Output Voltage                     | In the text   |
| Vehicle-down Sensor:               |   |
| Input Voltage                      | DC 4.75 ~ 5.25 V  |
| Output Voltage                     | With sensor tilted 60 $\sim$ 70° or more right or left: DC 0.65 $\sim$ 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  |

## Specifications

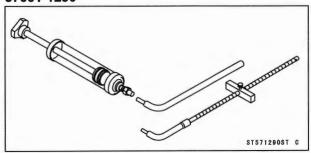
| Item                           | Standard   |
|--------------------------------|--|
| Output Voltage                 | DC 0.78 ~ 0.82 V at subthrottle valve full close position                |
|                                | DC 4.14 ~ 4.26 V at subthrottle valve full open position (for reference) |
| Resistance                     | $4 \sim 6 \text{ k}\Omega$   |
| Subthrottle Valve Actuator:    |  |
| Input Voltage                  | About DC 11.5 $\sim$ 13.5 V and then 0 V or About DC 11.5 $\sim$ 13.5 V  |
| Resistance                     | About 5.2 ~ 7.8 Ω  |
| Oxygen Sensor:                 |  |
| Output Voltage (Rich)          | DC 0.5 V or more   |
| Output Voltage (Lean)          | DC 0.2 V or less   |
| Heater Resistance              | 5.49 ~ 6.91 Ω @20°C (68°F)   |
| Purge Valve (Equipped Models): |  |
| Resistance                     | 30 ~ 34 Ω @20°C (68°F)   |
| Throttle Grip and Cables       |  |
| Throttle Grip Free Play        | 2 ~ 3 mm (0.08 ~ 0.12 in.)   |
| Air Cleaner                    |  |
| Air Cleaner Element            | Polyurethane foam  |

## **Special Tools and Sealant**

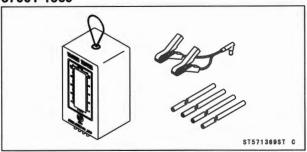
Oil Pressure Gauge, 5 kgf/cm<sup>2</sup>: 57001-125



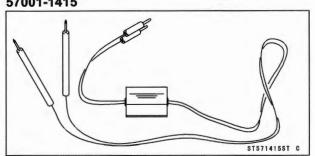
Fork Oil Level Gauge: 57001-1290



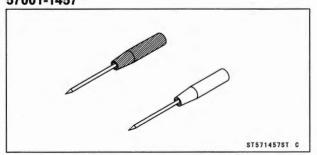
Vacuum Gauge: 57001-1369



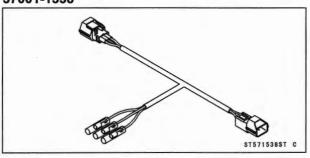
Peak Voltage Adapter: 57001-1415



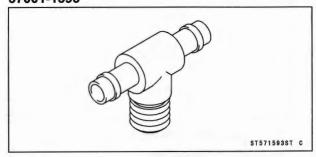
Needle Adapter Set: 57001-1457



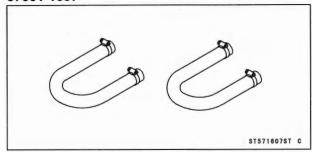
Throttle Sensor Setting Adapter: 57001-1538



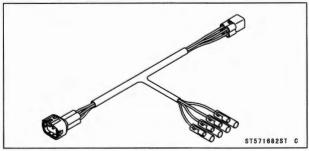
Fuel Pressure Gauge Adapter: 57001-1593



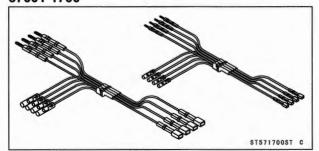
Fuel Hose: 57001-1607



Oxygen Sensor Measuring Adapter: 57001-1682

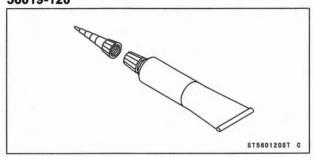


Measuring Adapter: 57001-1700



## **Special Tools and Sealant**

Liquid Gasket, TB1211: 56019-120



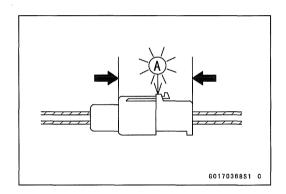
## 3-26 FUEL SYSTEM (DFI)

### **DFI Servicing Precautions**

### **DFI Servicing Precautions**

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

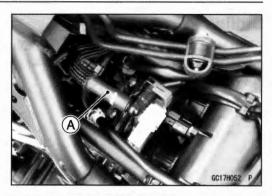
- OThis DFI system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- ODo not reverse the battery cable connections. This will damage the ECU.
- OTo prevent damage to the DFI parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- OTake care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- OWhen charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.
- OWhenever 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.
- OConnect these connectors until they click [A].



- ODo not turn the ignition switch on while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- ODo not spray water on the electrical parts, DFI parts, connectors, leads and wiring.
- Olf 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.
- OWhen any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- ODo not operate the fuel pump if the pump is completely dry. This is to prevent pump seizure.
- OBefore removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- OWhen 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.
- OWhen installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and run the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.
- ORun the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- OTo prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.

## **DFI Servicing Precautions**

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



OTo 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.



### 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] stays on after starting the engine to alert the rider.



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

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

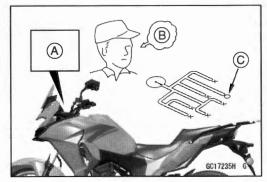
Fuel Pump Fuel Pump Relay ECU Main Relay



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

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

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



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

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

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

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

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

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

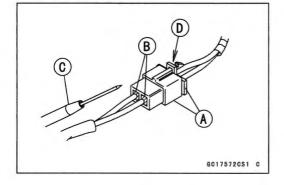
#### NOTICE

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.

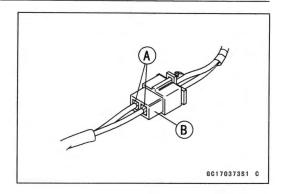
#### NOTICE

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

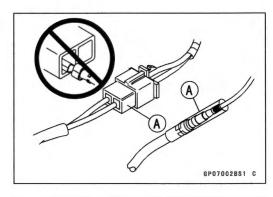


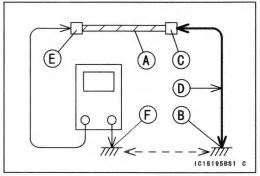
OAfter measurement, remove the needle adapters and apply silicone sealant to the seals [A] of the connector [B] for waterproofing.

Sealant - Liquid Gasket, TB1211: 56019-120

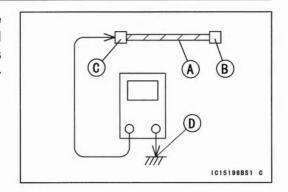


- Always check battery condition before replacing the DFI parts. A fully charged battery is a must for conducting accurate tests of the DFI system.
- Trouble may involve one or in some cases all items.
   Never replace a defective part without determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.
- Measure the coil winding resistance when the DFI part is cold (at room temperature).
- Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning, fraying, short, etc. Deteriorated leads and bad connections can cause reappearance of problems and unstable operation of the DFI system.
- ★ If any wiring is deteriorated, replace the wiring.
- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
- ★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.
- Check the wiring for continuity.
- OUse the wiring diagram to find the ends of the lead which is suspected of being a problem.
- OConnect a tester between the ends of the leads.
- $\star$  If the tester does not read about 0  $\Omega$ , the lead is defective. Replace the lead or the main harness.
- Olf 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.



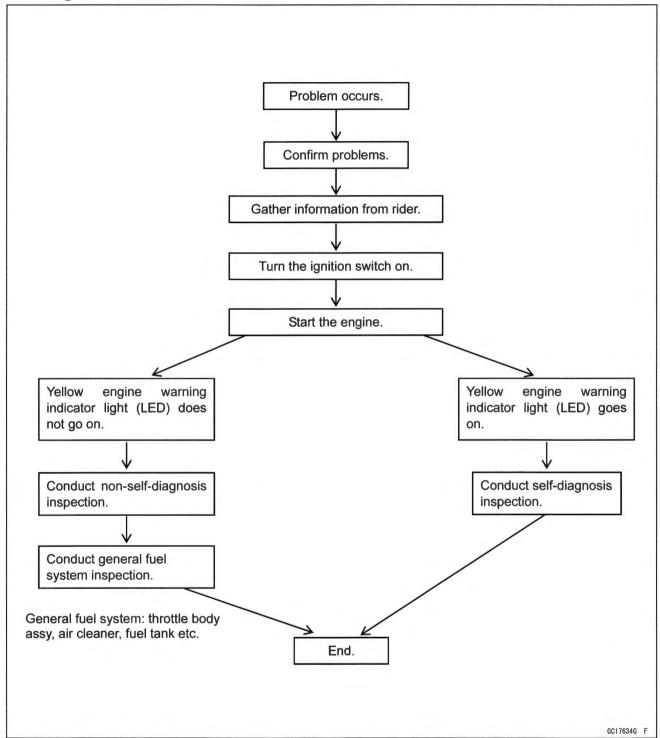


OWhen checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.



- 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.

### **DFI Diagnosis Flow Chart**



## Inquiries to Rider

- OEach rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.
- OTry to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.
- OThe 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.

## 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 probler  | n occurred.  |
| Weather               | □ fine, □ cloudy, □ rain, □ snow, □ alway                                   | rs, □ other:   |
| Temperature           | □ hot, □ warm, □ cold, □ very cold, □ alv                                   | vays, □ other:   |
| Problem frequency     | □ chronic, □ often, □once   |  |
| Road                  | □ street, □ highway, □ mountain road (□                                     | uphill, $\square$ downhill), $\square$ bumpy, $\square$ pebble |
| Altitude              | □ normal, □ high (about 1 000 m or more                                     | )  |
|                       | Motorcycle conditions when pr   | oblem occurred.  |
| Yellow engine warning | ☐ goes on immediately after turning the igstarting the engine (normal)      | nition switch on, and goes off after                           |
| indicator light (LED) | ☐ goes on immediately after turning the igstarting the engine (DFI problem) | nition switch on, and stays on after                           |
|                       | □ does not go on after turning the ignition unit fault)                     | switch on (indicator light (LED), meter                        |
| Red warning           | □ Does not go on about 1 second after igr                                   | nition switch on (ECU or meter unit fault).                    |
| indicator light (LED) | □ light up (battery, oil pressure, water tem                                | perature or meter unit problem)                                |
| Starting              | □ starter motor not rotating.   |  |
| difficulty            | □ starter motor rotating but engine do not                                  | turn over.   |
|                       | □ starter motor and engine do not turn ov                                   | er.  |
|                       | □ no fuel flow (□ no fuel in tank, □ no fue                                 | l pump sound).   |
|                       | □ no spark.   |  |
|                       | □ other:  |  |
| Engine stalls         | □ right after starting.   |  |
|                       | □ when opening throttle grip.   |  |
|                       | □ when closing throttle grip.   |  |
|                       | □ when moving off.  |  |
|                       | □ when stopping the motorcycle.   |  |
|                       | □ when cruising.  |  |
|                       | □ other:  |  |
| Poor running          | □ very low idle speed, □ very high idle sp                                  | eed, □ rough idle speed.                                       |
| at low speed          | □ battery voltage is low (charge the batter                                 | ·y).   |
|                       | □ spark plug loose (tighten it).  |  |
|                       | □ spark plug dirty, broken or gap maladju                                   | sted (remedy it).  |
|                       | □ backfiring.   |  |
|                       | □ afterfiring.  |  |
|                       | ☐ hesitation when acceleration.   |  |
|                       | □ engine oil viscosity too high.  |  |
|                       | □ brake dragging.   |  |
|                       | □ engine overheating.   |  |
|                       | ☐ clutch slipping.  |  |
|                       | □ other:  |  |
|                       |   | ······································                         |

## 3-34 FUEL SYSTEM (DFI)

# Troubleshooting the DFI System

| Poor running   | □ spark plug loose (tighten it).                           |
|----------------|--|
| or no power at | □ spark plug dirty, broken or gap maladjusted (remedy it). |
| high speed     | □ spark plug incorrect (replace it).                       |
|                | □ knocking (fuel poor quality or incorrect).               |
|                | □ brake dragging.  |
|                | □ clutch slipping.   |
|                | □ engine overheating.                                      |
|                | □ engine oil level too high.                               |
|                | □ engine oil viscosity too high.                           |
|                | □ other:   |

## **DFI System Troubleshooting Guide**

#### NOTE

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

### **Engine Won't Turn Over**

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

## Poor Running at Low Speed

| Symptoms or Possible Causes                    | Actions (chapter)                                 |
|--|---|
| Spark weak:                                    |   |
| Stick coil shorted or not in good contact      | Inspect or reinstall (see chapter 16).            |
| Stick coil trouble                             | Inspect (see chapter 16).                         |
| Spark plug dirty, broken or gap maladjusted    | Inspect and replace (see chapter 16).             |
| Spark plug incorrect                           | Replace it with the correct plug (see chapter 2). |
| ECU trouble                                    | Inspect (see chapter 3).                          |
| Fuel/air mixture incorrect:                    |   |
| Little fuel in tank                            | Supply fuel (see Owner's Manual).                 |
| Air cleaner clogged, poorly sealed, or missing | Clean element or inspect sealing (see chapter 2). |
| Air duct loose                                 | Reinstall (see chapter 3).                        |
| Throttle body assy holder loose                | Reinstall (see chapter 5).                        |
| Throttle body assy dust seal damage            | Replace (see chapter 3).                          |
| Fuel injector O-ring damage                    | Replace (see chapter 3).                          |
| Fuel filter clogged                            | Replace fuel filter (see chapter 2).              |

## 3-36 FUEL SYSTEM (DFI)

## **DFI System Troubleshooting Guide**

| Sumptomo or Possible Causes                 | Actions (chanter)  |
|---|--|
| Symptoms or Possible Causes                 | Actions (chapter)  |
| Fuel pressure regulator trouble             | Inspect fuel pressure and replace fuel pump (see chapter 3). |
| Fuel line clogged                           | Inspect and repair (see chapter 3).                          |
| Intake air pressure sensor trouble          | Inspect (see chapter 3).                                     |
| Water temperature sensor trouble            | Inspect (see chapter 3).                                     |
| Intake air temperature sensor trouble       | Inspect (see chapter 3).                                     |
| 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 trouble          | Inspect (see chapter 3).                                     |
| Water temperature sensor trouble            | Inspect (see chapter 3).                                     |
| Intake air temperature sensor trouble       | Inspect (see chapter 3).                                     |
| Engine stalls easily:                       |  |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16).                        |
| Stick coil trouble                          | Inspect (see chapter 16).                                    |
| Main throttle sensor trouble                | Inspect (see chapter 3).                                     |
| Subthrottle sensor trouble                  | Inspect (see chapter 3).                                     |
| Subthrottle valve actuator trouble          | Inspect (see chapter 3).                                     |
| Intake air pressure sensor trouble          | Inspect (see chapter 3).                                     |
| Water temperature sensor trouble            | Inspect (see chapter 3).                                     |
| Intake air temperature sensor trouble       | Inspect (see chapter 3).                                     |
| Fuel pump trouble                           | Inspect (see chapter 3).                                     |
| Fuel injector trouble                       | Inspect (see chapter 3).                                     |
| Fuel pressure too low or too high           | Inspect (see chapter 3).                                     |
| Fuel pressure regulator trouble             | Inspect fuel pressure and replace fuel pump (see chapter 3). |
| Fuel line clogged                           | Inspect and repair (see chapter 3).                          |
| Poor acceleration:                          |  |
| Fuel pressure too low                       | Inspect (see chapter 3).                                     |
| Water or foreign matter in fuel             | Change fuel. Inspect and clean fuel system (see chapter 3).  |
| Fuel filter clogged                         | Replace fuel filter (see chapter 2).                         |
| Fuel pump trouble                           | Inspect (see chapter 3).                                     |
| Fuel injector trouble                       | Inspect (see chapter 3).                                     |
| Main throttle sensor trouble                | Inspect (see chapter 3).                                     |
| Subthrottle sensor trouble                  | Inspect (see chapter 3).                                     |
| Subthrottle valve actuator trouble          | Inspect (see chapter 3).                                     |
| Intake air pressure sensor trouble          | Inspect (see chapter 3).                                     |

## **DFI System Troubleshooting Guide**

| Symptoms or Possible Causes                 | Actions (chapter)  |
|---|--|
| Water temperature sensor trouble            | Inspect (see chapter 3).   |
| Intake air temperature sensor trouble       | Inspect (see chapter 3).   |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16).  |
| Stick coil trouble                          | Inspect (see chapter 16).  |
| Stumble:                                    |  |
| Fuel pressure too low                       | Inspect (see chapter 3).   |
| Fuel injector trouble                       | Inspect (see chapter 3).   |
| Main throttle sensor trouble                | Inspect (see chapter 3).   |
| Subthrottle sensor trouble                  | Inspect (see chapter 3).   |
| Subthrottle valve actuator trouble          | Inspect (see chapter 3).   |
| Intake air pressure sensor trouble          | Inspect (see chapter 3).   |
| Water temperature sensor trouble            | Inspect (see chapter 3).   |
| Intake air temperature sensor trouble       | Inspect (see chapter 3).   |
| Surge:                                      |  |
| Unstable fuel pressure                      | Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and replace fuel line) (see chapter 3). |
| Fuel injector trouble                       | Inspect (see chapter 3).   |
| Water temperature sensor trouble            | Inspect (see chapter 3).   |
| Backfiring when deceleration:               |  |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16).  |
| Fuel pressure too low                       | Inspect (see chapter 3).   |
| Fuel pump trouble                           | Inspect (see chapter 3).   |
| 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 trouble          | Inspect (see chapter 3).   |
| Water temperature sensor trouble            | Inspect (see chapter 3).   |
| Intake air temperature sensor trouble       | Inspect (see chapter 3).   |
| Air switching valve trouble                 | Inspect and replace (see chapter 16).  |
| Air suction valve trouble                   | Inspect and replace (see chapter 5).   |
| After fire:                                 |  |
| Spark plug burned or gap maladjusted        | Replace (see chapter 2).   |
| Fuel injector trouble                       | Inspect (see chapter 3).   |
| Intake air pressure sensor trouble          | Inspect (see chapter 3).   |
| Water temperature sensor trouble            | Inspect (see chapter 3).   |
| Intake air temperature sensor trouble       | Inspect (see chapter 3).   |
| Other:                                      |  |
| Intermittent any DFI fault and its recovery | Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 3).                    |

## 3-38 FUEL SYSTEM (DFI)

## **DFI System Troubleshooting Guide**

## Poor Running or No Power at High Speed

| Symptoms or Possible Causes  | Actions (chapter)   |
|--|---|
| Firing incorrect:  | rionene (enapier)   |
| Stick coil shorted or not in good contact                                  | Inspect or reinstall (see chapter 16).                              |
| Stick coil trouble   | Inspect (see chapter 16).   |
| Spark plug dirty, broken or gap maladjusted                                | Inspect and replace (see chapter 16).                               |
| Spark plug incorrect   | Replace it with the correct plug (see chapter 2).                   |
| ECU trouble  | Inspect (see chapter 3).  |
| Fuel/air mixture incorrect:  | mopest (see shapter s).   |
| Air cleaner clogged, poorly sealed, or missing                             | Clean element or inspect sealing (see chapter 2).                   |
| Air duct loose   | Reinstall (see chapter 3).  |
| Throttle body assy holder loose  | Reinstall (see chapter 5).  |
| Throttle body assy dust seal damage  | Replace (see chapter 3).  |
| Water or foreign matter in fuel  | Change fuel. Inspect and clean fuel system (see chapter 3).         |
| Fuel injector O-ring damage  | Replace (see chapter 3).  |
| Fuel injector clogged  | Inspect and repair (see chapter 3).                                 |
| Fuel line clogged  | Inspect and repair (see chapter 3).                                 |
| Fuel pump operates intermittently and often DFI fuse blows.                | Fuel pump bearings may wear. Replace the fuel pump (see chapter 3). |
| Fuel pump trouble  | Inspect (see chapter 3).  |
| Intake air pressure sensor trouble   | Inspect (see chapter 3).  |
| Cracked or obstructed intake air pressure sensor vacuum hose               | Inspect and repair or replace (see chapter 3).                      |
| Water temperature sensor trouble   | Inspect (see chapter 3).  |
| Intake air temperature sensor trouble                                      | Inspect (see chapter 3).  |
| 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 trouble   | Inspect (see chapter 3).  |
| Water temperature sensor trouble   | Inspect (see chapter 3).  |
| Intake air temperature sensor trouble                                      | Inspect (see chapter 3).  |
| Miscellaneous:   |   |
| Subthrottle sensor trouble   | Inspect (see chapter 3).  |
| Subthrottle valve actuator trouble   | Inspect (see chapter 3).  |
| Throttle valves will not fully open  | Inspect throttle cables and lever linkage (see chapter 3).          |
| Engine overheating - Water temperature sensor or crankshaft sensor trouble | (see Overheating of Troubleshooting Guide in chapter 17)            |

## **DFI System Troubleshooting Guide**

| Symptoms or Possible Causes           | Actions (chapter)                     |
|---------------------------------------|---------------------------------------|
| Air switching valve trouble           | Inspect and replace (see chapter 16). |
| Air suction valve trouble             | Inspect and replace (see chapter 5).  |
| Exhaust Smokes Excessively:           |                                       |
| (Black smoke)                         |                                       |
| Air cleaner element clogged           | Clean element (see chapter 2).        |
| Fuel pressure too high                | Inspect (see chapter 3).              |
| Fuel injector trouble                 | Inspect (see chapter 3).              |
| Water temperature sensor trouble      | Inspect (see chapter 3).              |
| Intake air temperature sensor trouble | Inspect (see chapter 3).              |
| (Brown smoke)                         |                                       |
| Air duct loose                        | Reinstall (see chapter 3).            |
| Fuel pressure too low                 | Inspect (see chapter 3).              |
| Water temperature sensor trouble      | Inspect (see chapter 3).              |
| Intake air temperature sensor trouble | Inspect (see chapter 3).              |

## **Self-Diagnosis**

### Self-Diagnosis Outline

The self-diagnosis system is monitoring the following mechanisms.

**DFI System and Ignition System** 

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

| LED Color  | Warning Indicators                           |
|------------|--|
| Red [A]    | Oil Pressure<br>Battery<br>Water Temperature |
| 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 and ignition system by lighting or blinking the yellow engine warning indicator light (LED) [A] when DFI and ignition system parts are faulty, and initiates fail-safe function. In case of serious troubles, ECU stops the injection and ignition operations.





## Dealer Mode

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



## Self-Diagnosis Procedures

#### NOTE

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

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

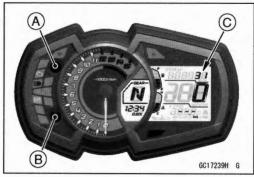


## **Self-Diagnosis**

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



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

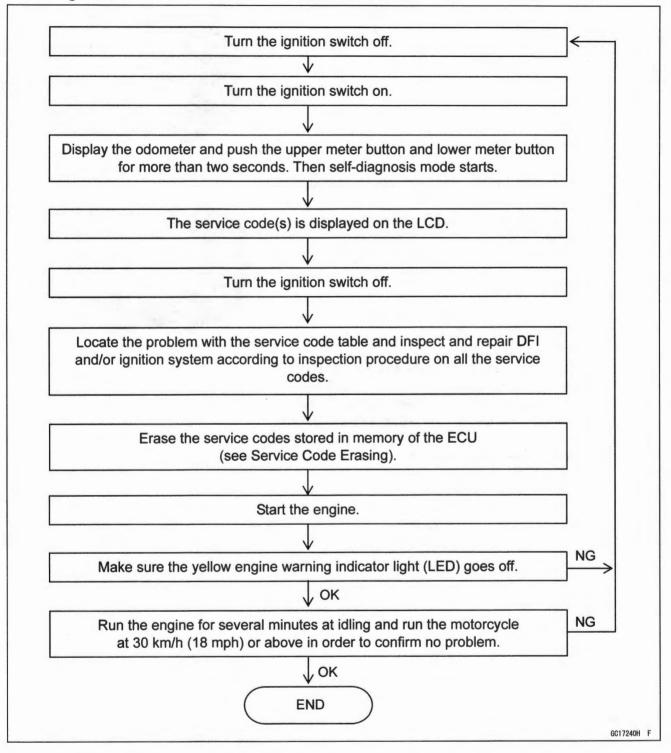


- Any of the following procedures ends self-diagnosis.
- OWhen the service code is displayed on the LCD, push the upper meter button and lower meter button for more than two seconds. The display will return to the previous display.
- OWhen the ignition switch is turned off.

## 3-42 FUEL SYSTEM (DFI)

### **Self-Diagnosis**

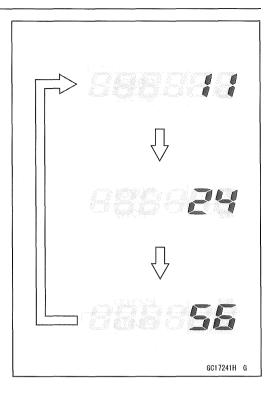
### **Self-Diagnosis Flow Chart**



### Self-Diagnosis

#### Service Code Reading

- OThe service code(s) is displayed on the LCD by the number of two digits.
- OWhen 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.
- OThen after completing all codes, the display is repeated until the ignition switch is turned off or upper meter button and lower meter button are pushed for more than two seconds.
- ○For example, if three problems occurred in the order of 56, 11, 24, the service codes are displayed (each two seconds) from the lowest number in the order listed as shown.  $(11\rightarrow24\rightarrow56)\rightarrow(11\rightarrow24\rightarrow56)\rightarrow\cdots$  (repeated)



### Service Code Erasing

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

#### Service Code Table

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

## 3-44 FUEL SYSTEM (DFI)

## Self-Diagnosis

| Service<br>Codes | DTC<br>(Diagnostic<br>Trouble Code) | Problems  |  |
|------------------|-------------------------------------|---|--|
| 32               | P0220                               | Subthrottle sensor malfunction, wiring open or short            |  |
|                  | P0223                               |   |  |
| 33               | P0130                               | Oxygen sensor malfunction or inactivate, wiring open or short   |  |
| 33               | P0132                               |   |  |
| 39               | _                                   | ECU communication error   |  |
| 41               | P0201                               | Fuel injector #1 malfunction, wiring open or short              |  |
| 42               | P0202                               | Fuel injector #2 malfunction, wiring open or short              |  |
| 51               | P0351                               | Stick coil #1 malfunction, wiring open or short                 |  |
| 52               | P0352                               | Stick coil #2 malfunction, wiring open or short                 |  |
| 56               | P0480                               | Radiator fan relay malfunction, wiring open or short            |  |
| 62               | P2100                               | Subthrottle valve actuator malfunction, wiring open or short    |  |
| 64               | P0410                               | Air switching valve malfunction, wiring open or short           |  |
| 67               | P0030                               | Oxygen sensor heater malfunction, wiring open or short          |  |
| 94               | P0170                               | Fuel supply system malfunction                                  |  |
| 3A               | P0443                               | Purge valve malfunction, wiring open or short (Equipped Models) |  |

#### Notes:

- OThe 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.
- OWhen 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.
- ODTC (Diagnostic Trouble Code) is displayed on the Kawasaki Diagnostic System (KDS Ver.3) and the Generic Scan Tool (GST).

#### **Backups**

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

| Service<br>Codes | Parts or Function                | Output Signal Usable<br>Range or Criteria                | Backups by ECU  |
|------------------|----------------------------------|--|---|
| 11               | Main Throttle<br>Sensor          | Output Voltage<br>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). The ECU stops oxygen sensor feedback mode. Also, the main throttle sensor system and intake air pressure fails, the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the $\alpha$ -N method (2). |
| 12               | Intake Air<br>Pressure<br>Sensor | Intake Air Pressure<br>(absolute)<br>Pv = 150 ~ 800 mmHg | If the intake air pressure sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets the DFI in the $\alpha$ -N method. The ECU stops oxygen sensor feedback mode.  |

## Self-Diagnosis

| Service<br>Codes | Parts or Function                   | Output Signal Usable<br>Range or Criteria  | Backups by ECU   |
|------------------|-------------------------------------|--|--|
| 13               | Intake Air<br>Temperature<br>Sensor | Intake Air Temperature<br>Ta = -30 ~ +120°C  | If the intake air temperature sensor fails (the signal is out of the usable range, wiring short or open), the ECU sets Ta at 40°C. The ECU stops oxygen sensor feedback mode.  |
| 14               | Water<br>Temperature<br>Sensor      | Water Temperature<br>Tw = −30 ~ +120°C   | If the water temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Tw at 80°C. The ECU stops oxygen sensor feedback mode.  |
| 21               | Crankshaft<br>Sensor                | Crankshaft sensor must send 22 signals to the ECU at the one cranking.                             | If the crankshaft sensor generates other than 22 signals, the engine stops by itself.  |
| 24               | Rear Wheel<br>Rotation<br>Sensor    | Rear wheel rotation sensor must send 50 signals to the ECU at the 1 rotation of the wheel.         | _  |
| 25               | Gear<br>Position<br>Sensor          | Output Voltage<br>0.2 ~ 4.8 V  | If the gear position sensor system fails (no signal, wiring short or open), the ECU set the top (6th) gear position.   |
| 31               | Vehicle<br>-down<br>Sensor          | Output Voltage<br>Vd = 0.1 ~ 4.8 V   | If the vehicle-down sensor system has failures (the output voltage Vd is more than usable range, wiring open), the ECU shuts off the fuel pump relay, the fuel injectors and the ignition system.  |
| 32               | Subthrottle<br>Sensor               | Output Voltage<br>0.15 ~ 4.85 V  | If the subthrottle sensor system fails (the signal 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 actuator.                           |
| 33               | Oxygen<br>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 oxygen sensor feedback mode.  |
| 39               | ECU                                 | The communication error between the ECU and meter unit.  | _  |
| 41               | Fuel Injector<br>#1*                | The injector must send signals continuously to the ECU.  | If the injector #1 fails (no signal, wiring short<br>or open), the ECU shuts off the signal to the<br>injector. Fuel is not supplied to the cylinder #1,<br>though the engine keeps running. The ECU<br>stops oxygen sensor feedback mode. |
| 42               | Fuel Injector<br>#2*                | The injector must send signals continuously to the ECU.  | If the injector #2 fails (no signal, wiring short or open), the ECU shuts off the signal to the injector. Fuel is not supplied to the cylinder #2, though the engine keeps running. The ECU stops oxygen sensor feedback mode.             |
| 51               | Stick Coil #1*                      | The ECU must send signals continuously to the stick coil primary winding.                          | If the stick coil #1 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #1 to stop fuel to the cylinder #1, though the engine keeps running. The ECU stops oxygen sensor feedback mode.        |

## 3-46 FUEL SYSTEM (DFI)

### **Self-Diagnosis**

| Service<br>Codes | Parts or Function                   | Output Signal Usable<br>Range or Criteria  | Backups by ECU  |
|------------------|-------------------------------------|--|---|
| 52               | Stick Coil #2*                      | The ECU must send signals continuously to the stick coil primary winding.                                  | If the stick coil #2 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #2 to stop fuel to the cylinder #2, though the engine keeps running. The ECU stops oxygen sensor feedback mode. |
| 56               | Radiator Fan<br>Relay               | When the radiator fan relay is OFF, the relay is opened.   | _   |
| 62               | Subthrottle<br>Valve<br>Actuator    | The actuator operates open and close of the subthrottle valve by the pulse signal from the ECU.            | If the subthrottle valve actuator fails (the signal is out of the usable range, wiring short or open), the ECU stops the current to the actuator.   |
| 64               | Air Switching<br>Valve              | The air switching valve controls the flow of the secondary air by opening and shutting the solenoid valve. | _   |
| 67               | Oxygen<br>Sensor<br>Heater          | The oxygen sensor heater raise temperature of the sensor for its earlier activation.                       | If the oxygen sensor heater fails (wiring short or open), the ECU stops the current to the heater.  |
| 94               | Fuel Supply<br>System               | Fuel correction value exceeds a threshold.   | · —   |
| 3A               | Purge Valve<br>(Equipped<br>Models) | The purge valve controls the flow of the purge air for the canister and shutting the solenoid valve.       | If the purge valve fails (wiring short or open), the ECU stops operating purge valve.   |

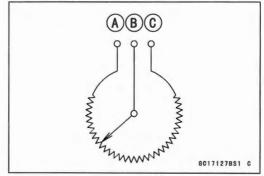
#### Note:

- (1): D-J Method: When the engine load is light like at idling or low speed, the ECU determines the injection quantity by calculating from the throttle vacuum (intake air pressure sensor output voltage) and engine speed (crankshaft sensor output voltage). This method is called D-J method (low-speed mode).
- (2):  $\alpha$ -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 (main throttle sensor output voltage) and the engine speed. This method is called  $\alpha$ -N method (high-speed mode).
- (\*): This depends on the number of stopped cylinders.

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

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

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



## 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

OBe sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Disconnect the main throttle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Connect a digital meter to the setting adapter leads.

Main Throttle Sensor Input Voltage Connections to Adapter:

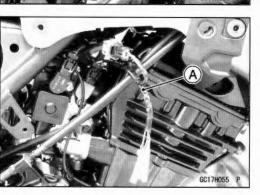
Digital Meter (+) → BK (sensor G) lead Digital Meter (–) → W (sensor BR/BK) lead

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

#### Input Voltage

Standard: DC 4.75 ~ 5.25 V

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



## 3-48 FUEL SYSTEM (DFI)

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

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

**Wiring Continuity Inspection** 

ECU Connector [A] ←→

Main Throttle Sensor Connector [B]

ECU Terminal 10 [C] ←→ Sensor Terminal [D]

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

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



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

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Measure the main throttle sensor resistance.

Main Throttle Sensor Resistance Connections to Adapter:

BK (sensor G) lead ←→ W (sensor BR/BK) lead

Standard:  $4 \sim 6 \text{ k}\Omega$ 

- ★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).
- ★ If the reading is within the standard, check the output voltage (see Main Throttle Sensor Output Voltage Inspection).

### Main Throttle Sensor Output Voltage Inspection

- Measure the output voltage at the main throttle sensor in the same way as input voltage inspection, note the following.
- ODisconnect the main throttle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001
-1538

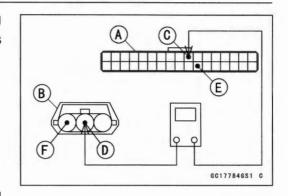
Main Throttle Sensor Output Voltage Connections to Adapter:

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

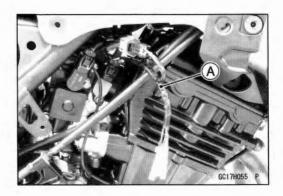
- Start the engine and warm it up thoroughly.
- Check idle speed to ensure the throttle opening is correct (see Idle Speed Inspection in the Periodic Maintenance chapter).

Idle Speed

Standard: 1 300 ±50 r/min (rpm)







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

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

#### **Output Voltage**

Standard: DC 1.02 ~ 1.05 V at idle throttle opening

DC 4.23 ~ 4.34 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.
- OWhen the input voltage reading shows other than 5 V, derive a voltage range as follows.

Example:

In the case of a input voltage of 4.75 V.

 $1.02 \times 4.75 \div 5.00 = 0.969 \text{ V}$ 

 $1.05 \times 4.75 \div 5.00 = 0.998 V$ 

Thus, the valid range is 0.969 ~ 0.998 V

- Turn the ignition switch off.
- ★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).
- ★ If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- ODisconnect the ECU and sensor connectors.

Wiring Continuity Inspection

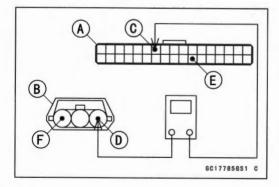
ECU Connector [A] ←→

Main Throttle Sensor Connector [B]

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

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

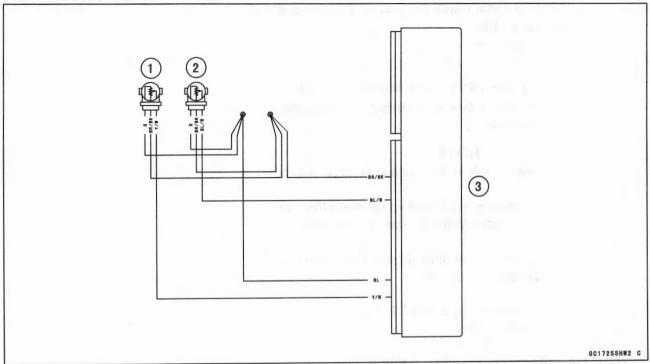
- ★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



## 3-50 FUEL SYSTEM (DFI)

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

## **Main Throttle Sensor Circuit**



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

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

#### Intake Air Pressure Sensor Removal/Installation

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

# Intake Air Pressure Sensor Input Voltage Inspection

#### NOTE

OBe 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 connector and connect the measuring adapter [A] between these connectors.

Main Harness [B]
Intake Air Pressure Sensor [C]

#### Special Tool - Measuring Adapter: 57001-1700

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

# Intake Air Pressure Sensor Input Voltage Connections to Adapter:

Digital Meter (+)  $\rightarrow$  R (sensor G) lead Digital Meter (-)  $\rightarrow$  BK (sensor BR/BK) lead

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

#### Input Voltage

Standard: DC 4.75 ~ 5.25 V

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

## Wiring Continuity Inspection

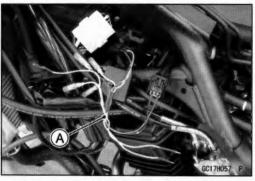
ECU Connector [A] ←→

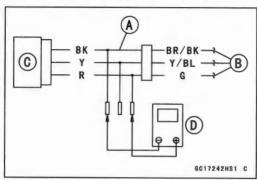
Intake Air Pressure Sensor Connector [B]

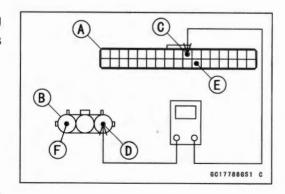
ECU Terminal 10 [C] ←→ Sensor Terminal [D]

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

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







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

# Intake Air Pressure Sensor Output Voltage Inspection

- Measure the output voltage at the intake air pressure sensor in the same way as input voltage inspection, note the following.
- ODisconnect the intake air pressure sensor connector and connect the measuring adapter [A] between these connectors.

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

Special Tool - Measuring Adapter: 57001-1700

Intake Air Pressure Sensor Output Voltage Connections to Adapter:

Digital Meter (+)  $\rightarrow$  Y (sensor Y/BL) lead Digital Meter (-)  $\rightarrow$  BK (sensor BR/BK) lead

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

**Output Voltage** 

**Usable Range:** 

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

#### NOTE

- OThe output voltage changes according to the local atmospheric pressure.
- Turn the ignition switch off.
- ★If the reading is out of the usable range, replace the sensor (see Intake Air Pressure Sensor Removal/Installation).
- ★If the reading is within the usable range, remove the ECU and check the wiring for continuity between main harness connectors.
- ODisconnect the ECU and sensor connectors.

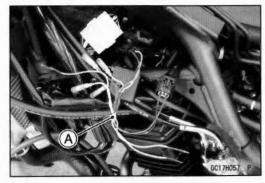
Wiring Continuity Inspection

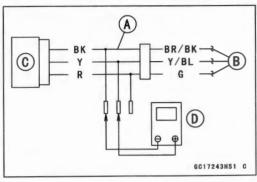
ECU Connector [A] ←→

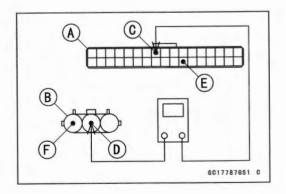
Intake Air Pressure Sensor Connector [B]

ECU Terminal 8 [C]  $\longleftrightarrow$  Sensor Terminal [D]

ECU Terminal 28 [E]  $\longleftrightarrow$  Sensor Terminal [F]







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

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

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

Intake Air Pressure Sensor Output Voltage Connections to Adapter:

Digital Meter (+)  $\rightarrow$  Y (sensor Y/BL) lead Digital Meter (-)  $\rightarrow$  BK (sensor BR/BK) lead

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

Suppose:

Pg: Vacuum Pressure (Gauge) of Throttle Body

PI: Local Atmospheric Pressure (Absolute) measured by a barometer

Pv: Vacuum Pressure (Absolute) of Throttle Body

Vv: Sensor Output Voltage (V)

then

Pv = Pl + Pq

For example, suppose the following data is obtained:

Pg = -8 cmHg (Vacuum Gauge Reading)

PI = 70 cmHg (Barometer Reading)

Vv = 3.2 V (Digital Meter Reading)

then

Pv = 70 + (-8) = 62 cmHg (Absolute)

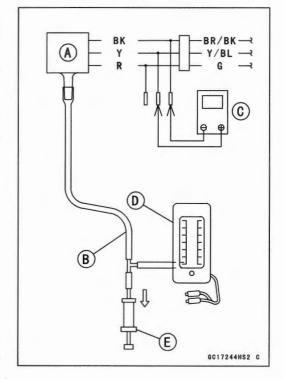
Plot this Pv (62 cmHg) at a point [1] on the chart and draw a vertical line through the point. Then, you can get the usable range [2] of the sensor output voltage.

Usable range = 3.08 ~ 3.48 V

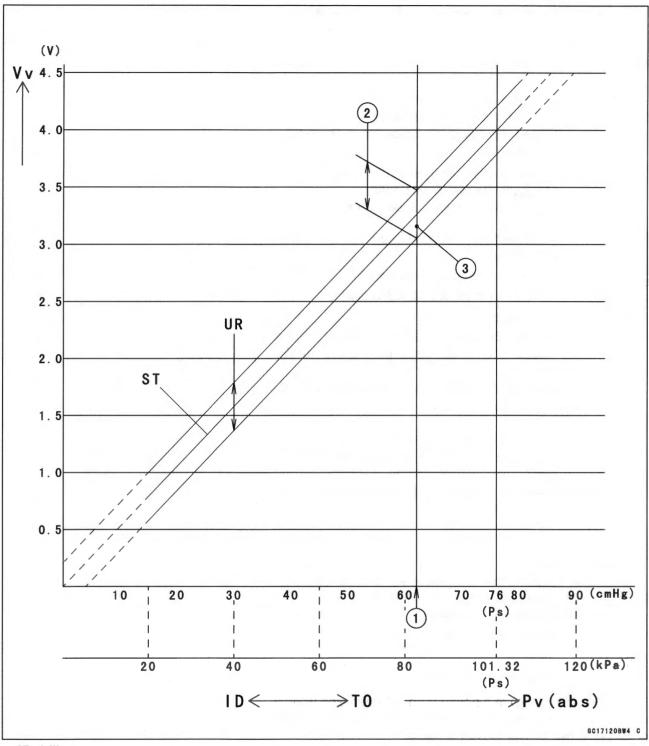
Plot Vv (3.2 V) on the vertical line.  $\rightarrow$  Point [3].

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

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



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



ID: Idling

Ps: Standard Atmospheric Pressure (Absolute)

Pv: Throttle Vacuum Pressure (Absolute)

ST: Standard of Sensor Output Voltage (V)

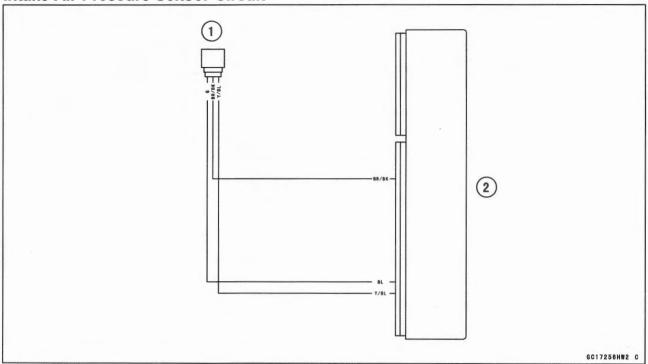
TO: Throttle Full Open

UR: Usable Range of Sensor Output Voltage (V)

Vv: Intake Air Pressure Sensor Output Voltage (V) (Digital Meter Reading)

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

# Intake Air Pressure Sensor Circuit



- 1. Intake Air Pressure Sensor
- 2. ECU

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

### Intake Air Temperature Sensor Removal/Installation

### NOTICE

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

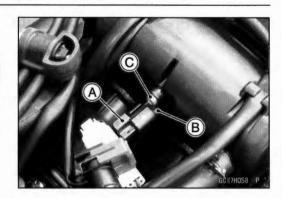
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the connector [A] from the intake air temperature sensor [B].
- Remove:

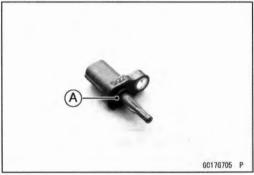
Intake Air Temperature Sensor Screw [C] Intake Air Temperature Sensor

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

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

- Connect the intake air temperature sensor connector.
- Install the removed parts (see appropriate chapters).





# Intake Air Temperature Sensor Output Voltage Inspection

### NOTE

OBe sure the battery is fully charged.

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

Main Harness [B]

Intake Air Temperature Sensor [C]

### Special Tool - Measuring Adapter: 57001-1700

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

# Intake Air Temperature Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → R (sensor R) lead

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

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

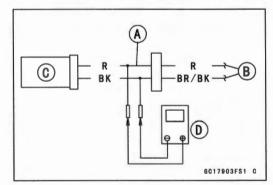
#### **Output Voltage**

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

### NOTE

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





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

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

Wiring Continuity Inspection ECU Connector [A]  $\longleftrightarrow$ 

Intake Air Temperature Sensor Connector [B]

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

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

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

# Intake Air Temperature Sensor Resistance Inspection

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

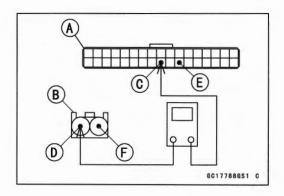
#### NOTE

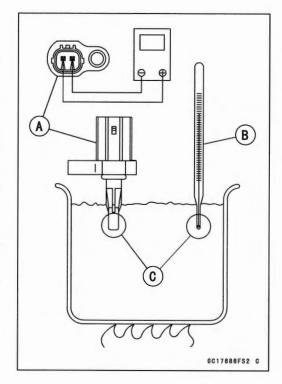
- The sensor and thermometer must not touch the container side or bottom.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently for even temperature.
- Using a digital meter, measure the internal resistance of the sensor across the terminals at the temperatures shown in the following.

Intake Air Temperature Sensor Resistance Standard:  $5.4 \sim 6.6 \text{ k}\Omega \text{ } @0^{\circ}\text{C} \text{ } (32^{\circ}\text{F})$ 

0.29 ~ 0.39 kΩ @80°C (176°F)

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

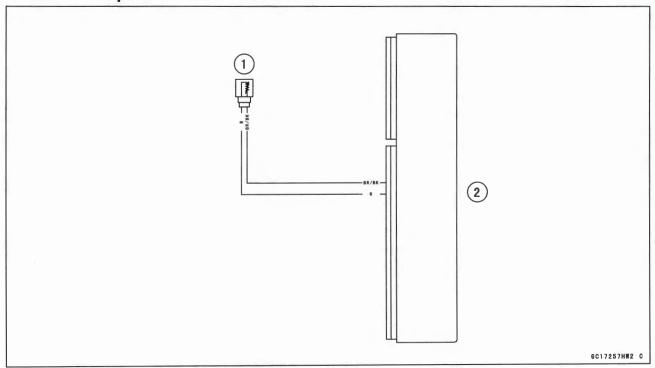




# 3-58 FUEL SYSTEM (DFI)

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

### Intake Air Temperature Sensor Circuit



- 1. Intake Air Temperature Sensor
- 2. ECU

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

### Water Temperature Sensor Removal/Installation

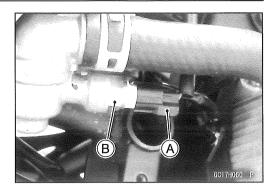
### NOTICE

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

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

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

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



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

# Water Temperature Sensor Output Voltage Inspection

#### NOTE

OBe sure the battery is fully charged.

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

Main Harness [B]

Water Temperature Sensor [C]

### Special Tool - Measuring Adapter: 57001-1700

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

# Water Temperature Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → R (sensor O) lead

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

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

### **Output Voltage**

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

### **NOTE**

- OThe output voltage changes according to the coolant temperature in the engine.
- Turn the ignition switch off.
- ★If the reading is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- ODisconnect the ECU and sensor connectors.

# Wiring Continuity Inspection

ECU Connector [A] ←→

Water Temperature Sensor Connector [B]

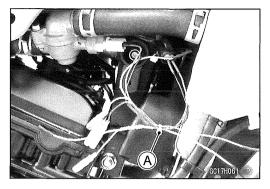
ECU Terminal 22 [C]  $\longleftrightarrow$  Sensor Terminal [D]

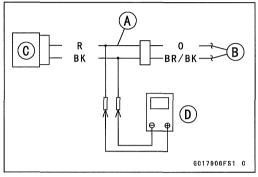
**ECU Terminal 28 [E]** ←→ Sensor Terminal [F]

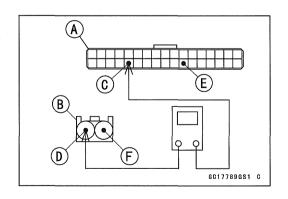
★If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

### Water Temperature Sensor Resistance Inspection

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

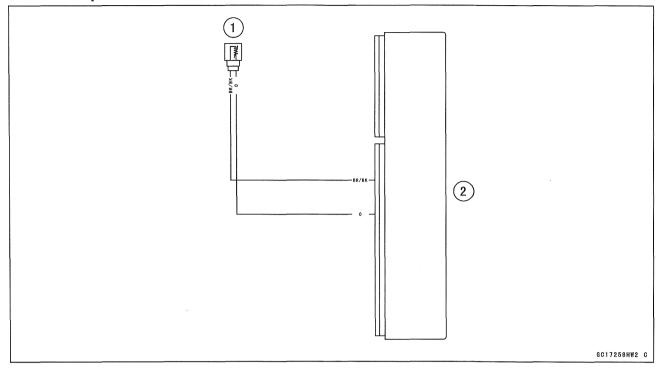






# Water Temperature Sensor (Service Code 14) (DTC P0115, P0117)

# **Water Temperature Sensor Circuit**



- 1. Water Temperature Sensor
- 2. ECU

### 3-62 FUEL SYSTEM (DFI)

### Crankshaft Sensor (Service Code 21) (DTC P0335)

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

### Crankshaft Sensor Removal/Installation

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

### Crankshaft Sensor Resistance Inspection

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

### Crankshaft Sensor Peak Voltage Inspection

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

# Wiring Continuity Inspection

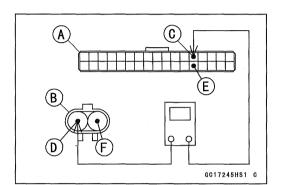
ECU Connector [A] ←→

Crankshaft Sensor Connector [B]

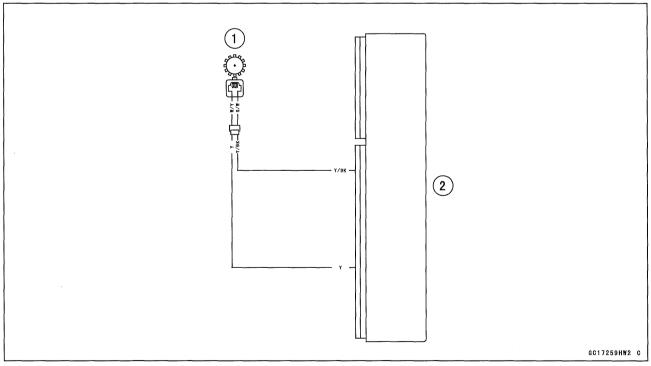
ECU Terminal 13 [C]  $\longleftrightarrow$  Sensor Terminal [D]

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

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



### **Crankshaft Sensor Circuit**



- 1. Crankshaft Sensor
- 2. ECU

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

### Rear Wheel Rotation Sensor Signal Inspection

- OThe rear wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit (ABS equipped models). For other than ABS equipped models, the signal is sent directly to the ECU.
- OThe ECU uses the rear wheel rotation sensor signal for motorcycle speed.
- OThe service code 24/DTC P2158 is detected with the ECU.
- Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection in the Brakes chapter).
- Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection in the Brakes chapter).
- When service code 24/DTC P2158 is displayed, do the following inspection procedures.
- Disconnect:

ECU Connectors (see ECU Removal)

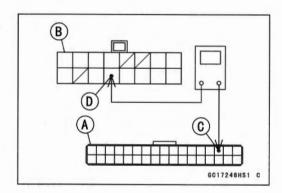
Rear Wheel Rotation Sensor Lead Connector (see Rear Wheel Rotation Sensor Removal in the Brakes chapter) ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)

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

Wiring Continuity Inspection ECU Connector [A]  $\leftarrow \rightarrow$ 

ABS Hydraulic Unit Connector [B]

ECU Terminal 15 [C]  $\leftarrow \rightarrow$  ABS Hydraulic Unit Terminal 12 [D]



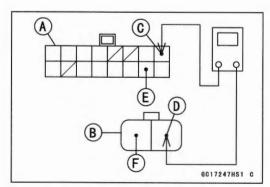
Wiring Continuity Inspection

ABS Hydraulic Unit Connector [A] ← →

Rear Wheel Rotation Sensor Connector [B]

ABS Hydraulic Unit Connector Terminal 8 [C]  $\longleftrightarrow$  Sensor Terminal [D]

ABS Hydraulic Unit Connector Terminal 15 [E]  $\longleftrightarrow$  Sensor Terminal [F]



### 3-64 FUEL SYSTEM (DFI)

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

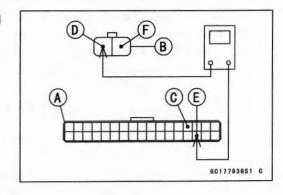
 For other than ABS equipped models, check the wiring for continuity between main harness connectors.

Wiring Continuity Inspection ECU Connector [A]  $\leftarrow \rightarrow$ 

Rear Wheel Rotation Sensor Connector [B]

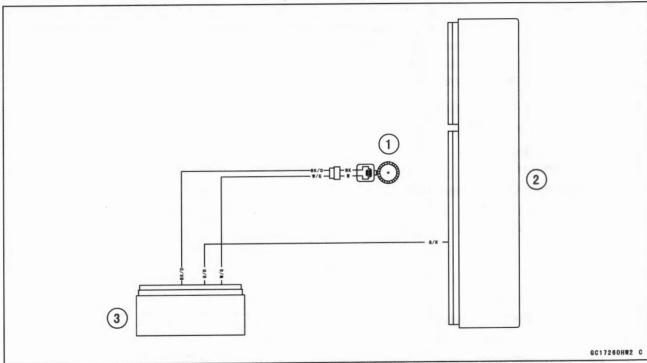
ECU Terminal 14 [C] ←→ Sensor Terminal [D]

ECU Terminal 32 [E] ←→ Sensor Terminal [F]



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

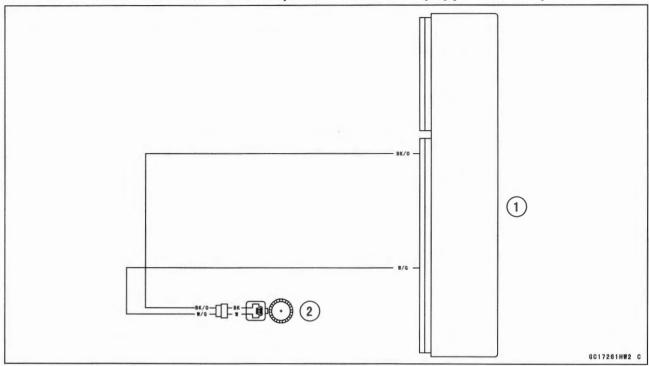
### Rear Wheel Rotation Sensor Circuit (ABS Equipped Models)



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

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

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



- 1. ECU
- 2. Rear Wheel Rotation Sensor

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

### Gear Position Sensor Removal/Installation

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

# Gear Position Sensor Input Voltage Inspection NOTE

OBe sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Open the clamp [A].
- Disconnect:

Gear Position Sensor Connector [B]

Connect the measuring adapter [A] between the main harness connector and gear position sensor connector.
 Main Harness [B]

Gear Position Sensor [C]

### Special Tool - Measuring Adapter: 57001-1700

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

# Gear Position Sensor Input Voltage Connections to Adapter:

Digital Meter (+)  $\rightarrow$  R (sensor Y/R) 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 Gear Position Sensor Output Voltage Inspection).
- ★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- ODisconnect the ECU and sensor connectors.

### **Wiring Continuity Inspection**

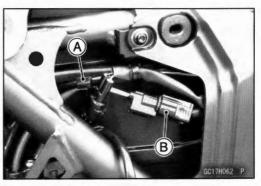
ECU Connector [A]  $\leftarrow \rightarrow$ 

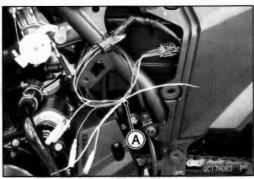
**Gear Position Sensor Connector [B]** 

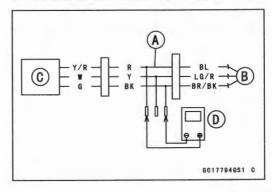
ECU Terminal 10 [C] ←→ Sensor Terminal [D]

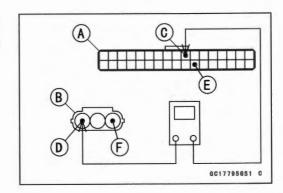
ECU Terminal 28 [E] ←→ Sensor Terminal [F]

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









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

### Gear Position Sensor Output Voltage Inspection

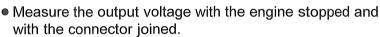
- Remove the gear position sensor (see Gear Position Sensor Removal in the Electrical System chapter).
- Measure the output voltage at the gear position sensor in the same way as input voltage inspection, note the following.
- OConnect the measuring adapter [A] between these connectors.

Main Harness [B] Gear Position Sensor [C] Digital Meter [D]

Special Tool - Measuring Adapter: 57001-1700

Gear Position Sensor Output Voltage Connections to Adapter:

Digital Meter (+)  $\rightarrow$  Y (sensor W) lead Digital Meter (–)  $\rightarrow$  BK (sensor G) lead



• Turn the ignition switch on.

### **Output Voltage**

| Angle | Output Voltage (V) |
|-------|--------------------|
| 0°    | 4.40 ~ 4.60        |
| 55°   | 3.82 ~ 3.92        |
| 295°  | 1.03 ~ 1.23        |
| 350°  | 0.40 ~ 0.60        |

### **NOTE**

- ○This figure shows 55°.
- Rotate the gear position sensor, confirm the output voltage will be raise or lower.
- Turn the ignition switch off.
- ★ If the reading is out of the standard, replace the gear position sensor (see Gear Position Sensor Removal/Installation in the Electrical System chapter).
- ★ If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.
- ODisconnect the ECU and sensor connectors.

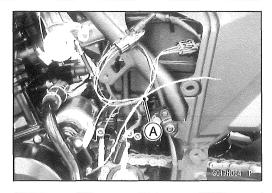
Wiring Continuity Inspection ECU Connector [A]  $\leftarrow \rightarrow$ 

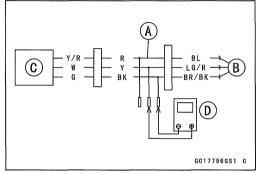
Gear Position Sensor Connector [B]

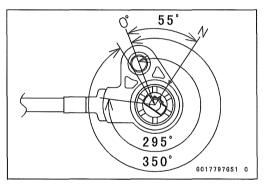
**ECU Terminal 12 [C]** ←→ Sensor Terminal [D]

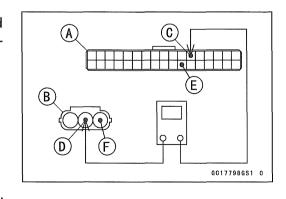
**ECU Terminal 28 [E]** ←→ Sensor Terminal [F]

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





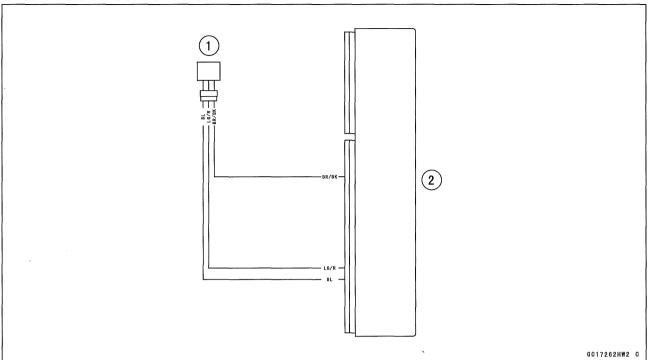




# 3-68 FUEL SYSTEM (DFI)

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

# **Gear Position Sensor Circuit**



- 1. Gear Position Sensor
- 2. ECU

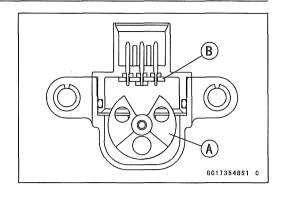
### Vehicle-down Sensor (Service Code 31) (DTC C0064)

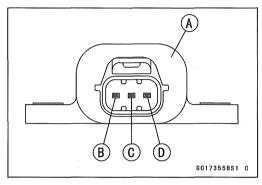
This sensor has a weight [A] with two magnets inside, and sends a signal to the ECU. But when the motorcycle banks  $60 \sim 70^{\circ}$  or more to either side (in fact falls down), the weight turns and the signal changes. The ECU senses this change, and stops the fuel pump relay, the fuel injectors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

Hall IC [B]

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

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





### Vehicle-down Sensor Removal

### NOTICE

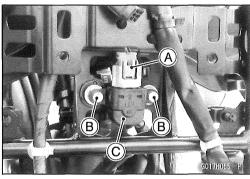
Never drop the vehicle-down sensor especially on a hard surface. Such a shock to the sensor can damage it.

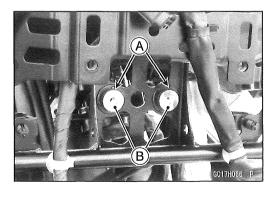
- Remove:
  - Headlight Unit (see Headlight Unit Removal in the Electrical System chapter)
- Disconnect the vehicle-down sensor connector [A].
- Remove:

Bolts [B] and Nuts Vehicle-down Sensor [C]

### Vehicle-down Sensor Installation

- Installation is the reverse of removal.
- Be sure to install the rubber dampers [A] and collars [B] on the bracket.





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

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

### **A** WARNING

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

# QC17356BS1 C

# Vehicle-down Sensor Input Voltage Inspection NOTE

OBe sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the vehicle-down sensor (see Vehicle-down Sensor Removal).
- Disconnect the vehicle-down sensor connector and connect the measuring adapter [A] between these connectors as shown.

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

### Special Tool - Measuring Adapter: 57001-1700

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

Vehicle-down Sensor Input Voltage Connections to Adapter:

Digital Meter (+)  $\rightarrow$  R (sensor G) lead Digital Meter (–)  $\rightarrow$  BK (sensor BR/BK) lead

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

### **Input Voltage**

Standard: DC 4.75 ~ 5.25 V

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

### Wiring Continuity Inspection

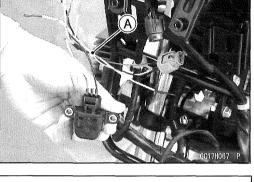
ECU Connector [A] ←→

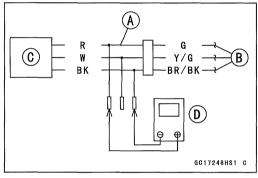
Vehicle-down Sensor Connector [B]

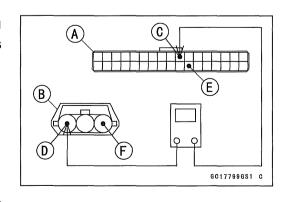
**ECU Terminal 10 [C]** ←→ Sensor Terminal [D]

ECU Terminal 28 [E]  $\longleftrightarrow$  Sensor Terminal [F]

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







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

### Vehicle-down Sensor Output Voltage Inspection

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

Main Harness [B]

Vehicle-down Sensor [C]

### Special Tool - Measuring Adapter: 57001-1700

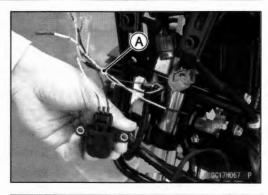
 Connect a digital meter [D] to the measuring adapter leads.

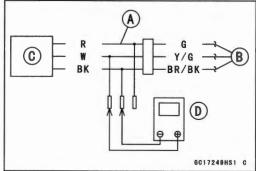
# Vehicle-down Sensor Output Voltage

Connections to Adapter:

Digital Meter (+)  $\rightarrow$  W (sensor Y/G) lead

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





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

#### **Output Voltage**

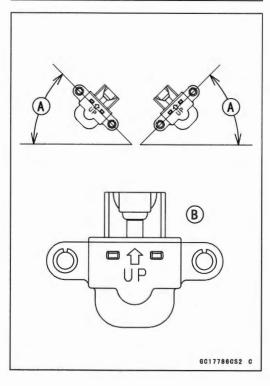
Standard: With sensor tilted 60 ~ 70° or more right or

left: DC 0.65 ~ 1.35 V

With sensor arrow mark pointed up: DC

3.55 ~ 4.45 V

- Turn the ignition switch off.
- ★If the reading is out of the standard, replace the sensor (see Vehicle-down Sensor Removal/Installation).



# 3-72 FUEL SYSTEM (DFI)

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

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

**Wiring Continuity Inspection** 

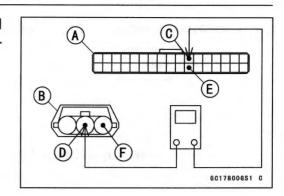
ECU Connector [A]  $\longleftrightarrow$ 

**Vehicle-down Sensor Connector [B]** 

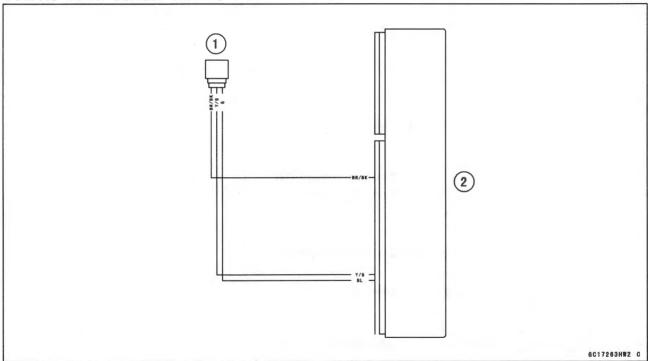
ECU Terminal 11 [C] ←→ Sensor Terminal [D]

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

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



### **Vehicle-down Sensor Circuit**

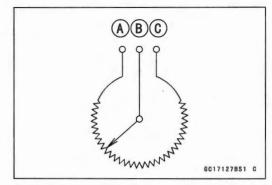


- 1. Vehicle-down Sensor
- 2. ECU

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

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

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

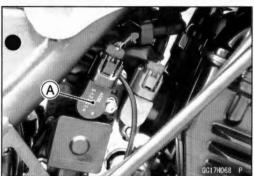


### Subthrottle Sensor Removal/Adjustment

### 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

OBe sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Disconnect the subthrottle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Connect a digital meter to the setting adapter leads.

# Subthrottle Sensor Input Voltage Connections to Adapter:

Digital Meter (+)  $\rightarrow$  BK (sensor G) lead

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

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

#### Input Voltage

Standard: DC 4.75 ~ 5.25 V

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



### 3-74 FUEL SYSTEM (DFI)

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

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

Wiring Continuity Inspection

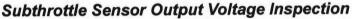
ECU Connector [A]  $\leftarrow \rightarrow$ 

Subthrottle Sensor Connector [B]

ECU Terminal 10 [C] ←→ Sensor Terminal [D]

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

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



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

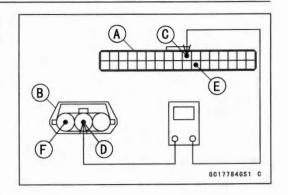
Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Subthrottle Sensor Output Voltage Connections to Adapter:

Digital Meter (+)  $\rightarrow$  R (sensor BL/W) lead

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

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







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

- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.
- Measure the output voltage when the subthrottle valves are completely closed by turning the lever [A] fully clockwise.

#### **Output Voltage**

Standard: DC 0.78 ~ 0.82 V at subthrottle valve full close position

DC 4.14 ~ 4.26 V at subthrottle valve full open position (for reference)

### NOTE

- Turn the lever counterclockwise, confirm the output voltage will be raise.
- OThe standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.
- OWhen the input voltage reading shows other than 5 V, derive a voltage range as follows.

### Example:

In the case of a input voltage of 4.75 V.

 $0.78 \times 4.75 \div 5.00 = 0.741 \text{ V}$ 

 $0.82 \times 4.75 \div 5.00 = 0.779 \text{ V}$ 

Thus, the valid range is 0.741 ~ 0.779 V

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

### **Wiring Continuity Inspection**

ECU Connector [A] ←→

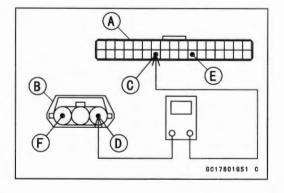
**Subthrottle Sensor Connector [B]** 

ECU Terminal 24 [C] ←→ Sensor Terminal [D]

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

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





### 3-76 FUEL SYSTEM (DFI)

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

### Subthrottle Sensor Resistance Inspection

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

# Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Measure the subthrottle sensor resistance.

# Subthrottle Sensor Resistance Connections to Adapter:

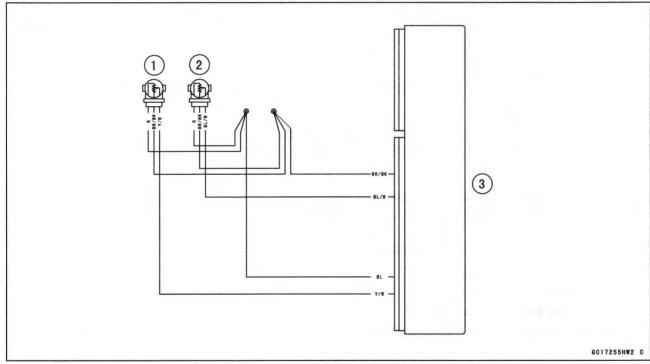
BK (sensor G) lead ←→ W (sensor BR/BK) lead

Standard:  $4 \sim 6 \text{ k}\Omega$ 

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



### **Subthrottle Sensor Circuit**



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

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

### Oxygen Sensor Removal/Installation

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

### Oxygen Sensor Inspection

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

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

Connect a digital meter to the measuring adapter leads.

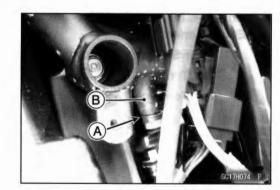
# Oxygen Sensor Output Voltage

Connections to Adapter:

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

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

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



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



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

Output Voltage (with Plug, Rich)

Standard: DC

DC 0.5 V or more



### 3-78 FUEL SYSTEM (DFI)

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

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

### **A** WARNING

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

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

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

- Turn the ignition switch off.
- ★If the reading is out of the standard (with plug: DC 0.5 V or more, without plug: DC 0.2 V or less), remove the ECU and check the wiring for continuity between main harness connectors.
- ODisconnect the ECU and sensor connectors.

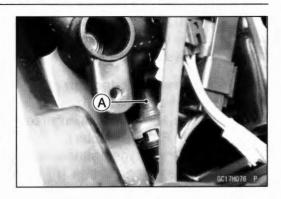
Wiring Continuity Inspection ECU Connector [A] ←→

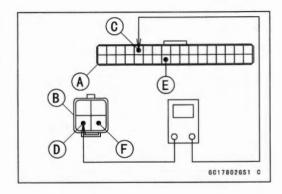
Oxygen Sensor Connector [B]

ECU Terminal 5 [C] ←→ Sensor Terminal [D]

ECU Terminal 25 [E] ←→ Sensor Terminal [F]

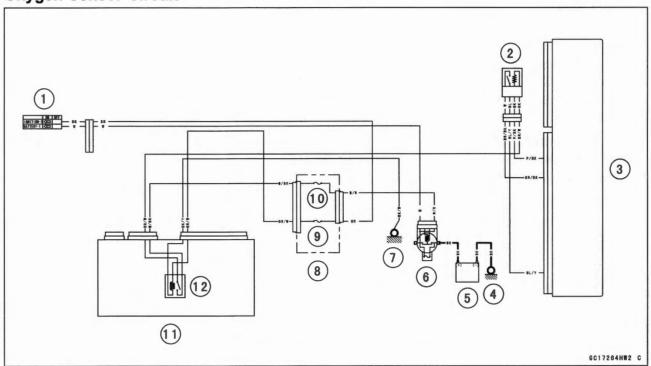
- ★ If the wiring is good, replace the sensor (see Oxygen Sensor Removal/Installation in the Electrical System chapter).
- ★If the reading is within the standard (with plug: DC 0.5 V or more, without plug: DC 0.2 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).





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

### **Oxygen Sensor Circuit**



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

### 3-80 FUEL SYSTEM (DFI)

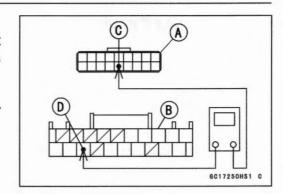
### **ECU Communication Error (Service Code 39)**

### **ECU Communication Line Inspection**

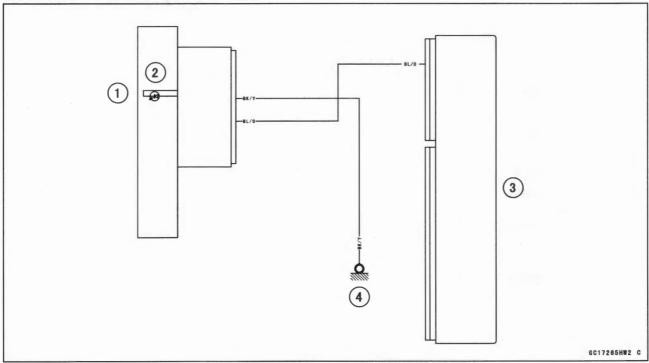
- OWhen the data is not sent from the ECU to the meter unit for more than about 10 seconds, the service code 39 is displayed.
- OThe service code 39 is detected with meter unit.
- Remove the ECU and meter unit, check the wiring for continuity between main harness connectors.
- ODisconnect the ECU and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

# Wiring Continuity Inspection ECU Connector [A] ←→ Meter Unit Connector [B] ECU Terminal 48 [C] ←→ Meter Terminal [D]

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



### **ECU Communication Line Circuit**



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

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

Service Code 41/DTC P0201 → Fuel Injector #1 Service Code 42/DTC P0202 → Fuel Injector #2

### Fuel Injector Removal/Installation

Refer to the Throttle Body Assy Disassembly/Assembly.

### Fuel Injector Audible Inspection

#### NOTE

OBe sure the battery is fully charged.

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

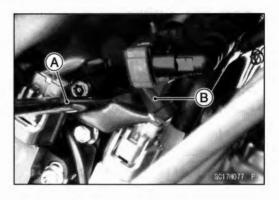
### Fuel Injector Resistance Inspection

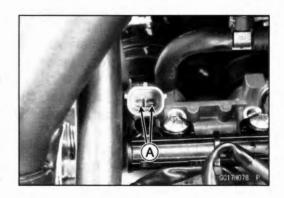
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the fuel injector connector.
- Connect a digital meter to the terminals [A] in each fuel injector.
- Measure the fuel injector resistance.

### **Fuel Injector Resistance**

Standard: About 9.6 ~ 14.4 Ω @20°C (68°F)

- ★ If the reading is out of the standard, replace the fuel injector (see Throttle Body Assy Disassembly/Assembly).
- ★If the reading is within the standard, check the power source voltage (see Fuel Injector Power Source Voltage Inspection).





# Fuel Injector Power Source Voltage Inspection

OBe sure the battery is fully charged.

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

Main Harness [B] Fuel Injector [C]

### Special Tool - Measuring Adapter: 57001-1700

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

# Fuel Injector Power Source Voltage Connections to Adapter:

For Fuel Injector #1, #2

or Fuel injector #1, #2

Digital Meter (+) → R (injector W/R) lead

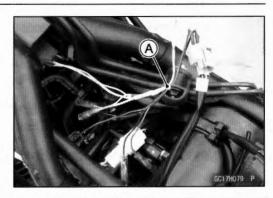
Digital Meter (−) → Battery (−) Terminal

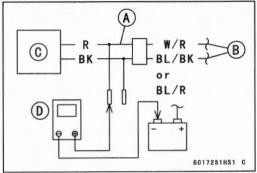
- Measure the power source voltage with the engine stopped and with the connector joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

#### **Power Source Voltage**

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

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





### Fuel Injector Output Voltage Inspection

#### NOTE

OBe sure the battery is fully charged.

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

ODo not disconnect the ECU connector.

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

Special Tool - Needle Adapter Set: 57001-1457

### **Fuel Injector Output Voltage**

**Connections to ECU Connector:** 

For Fuel Injector #1

Digital Meter (+) → BL/BK lead (ECU terminal 42)

Digital Meter (-) → Battery (-) Terminal

For Fuel Injector #2

Digital Meter (+) → BL/R lead (ECU terminal 41)

Digital Meter (-) → Battery (-) Terminal

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

### **Output Voltage**

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

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

### **Wiring Continuity Inspection**

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

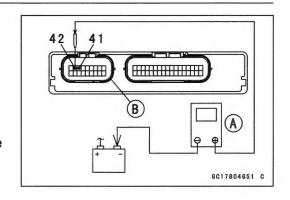
For Fuel Injector #1 [C]

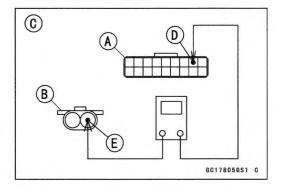
**ECU Terminal 42 [D]** ←→ Fuel Injector Terminal [E]

For Fuel Injector #2

**ECU Terminal 41** ←→ Fuel Injector Terminal

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





### 3-84 FUEL SYSTEM (DFI)

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

### Fuel Injector Fuel Line Inspection

• Remove:

Fuel Tank (see Fuel Tank Removal)

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

OBe 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.

### **A** WARNING

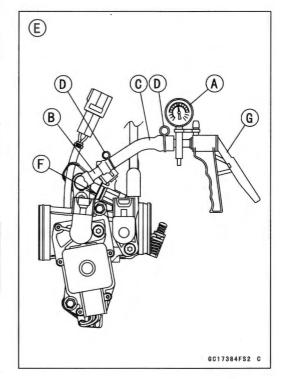
Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection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

- Check the fuel injector fuel line for leakage as follows.
- OConnect 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. Right Side View [E]
- OApply soap and water solution to the areas [F] as shown. OWatching 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.



OWatch the gauge for at least 6 seconds.

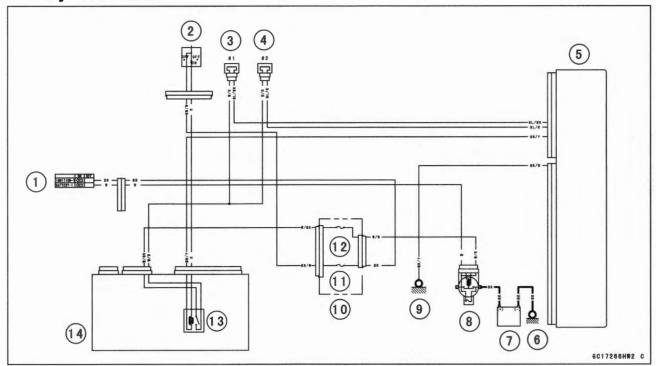
- ★If the pressure holds steady, the fuel line is good.
- ★ If the pressure drops at once or if bubbles are found in the area, the fuel line is leaking. Replace the delivery pipe, fuel injectors and related parts (see Throttle Body Assy Disassembly/Assembly).
- ORepeat the leak test, and check the fuel line for no leakage.
- Install:

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

Fuel Tank (see Fuel Tank Installation)

Start the engine and check for fuel leakage.

### **Fuel Injector Circuit**



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

### 3-86 FUEL SYSTEM (DFI)

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

Inspect the eligible stick coil according to the following service code or DTC.

Service Code 51/DTC P0351 → Stick Coil #1 Service Code 52/DTC P0352 → Stick Coil #2

#### Stick Coil Removal/Installation

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

### Stick Coil Primary Winding Resistance Inspection

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

### Stick Coil Input Voltage Inspection

### **NOTE**

OBe sure the battery is fully charged.

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

ODo 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 43)

Digital Meter (-) → Battery (-) Terminal

For Stick Coil #2

Digital Meter (+) → BK/O lead (terminal 52)

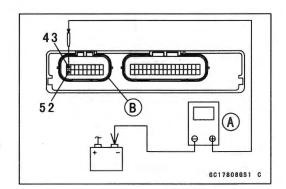
Digital Meter (-) → Battery (-) Terminal

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

### Input Voltage

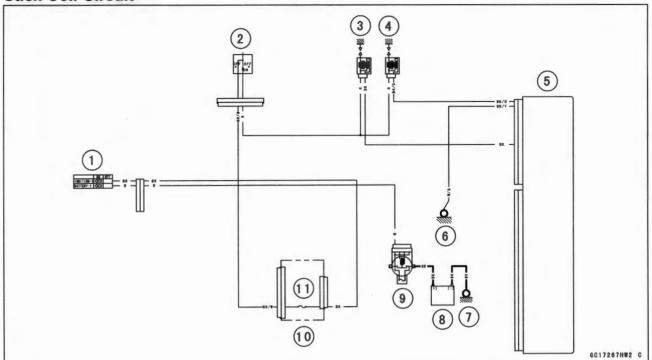
Standard: Battery Voltage

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



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

### Stick Coil Circuit



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

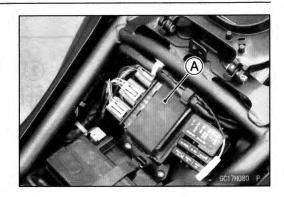
### 3-88 FUEL SYSTEM (DFI)

### Radiator Fan Relay (Service Code 56) (DTC P0480)

### Radiator Fan Relay Removal/Installation

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

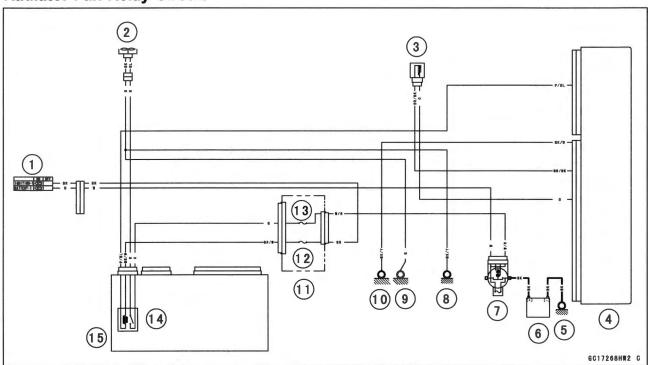
 Refer to the Relay Box Removal in the Electrical System chapter.



### Radiator Fan Relay Inspection

- Refer to the Relay Circuit Inspection in the Electrical System chapter.
- ★If the radiator fan relay is normal, check the wiring for continuity (see Radiator Fan Relay Circuit).
- ★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

### Radiator Fan Relay Circuit



- 1. Ignition Switch
- 2. Fan Motor
- 3. Water Temperature Sensor
- 4. ECU
- 5. Engine Ground
- 6. Battery
- 7. Main Fuse 30 A

- 8. Frame Ground (5)
- 9. Frame Ground (4)
- 10. Frame Ground (1)
- 11. Fuse Box (1)
- 12. Ignition Fuse 10 A
- 13. Fan Fuse 10 A
- 14. Fan Relay
- 15. Relay Box

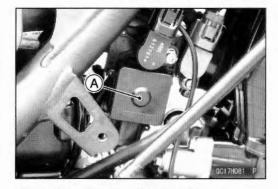
## Subthrottle Valve Actuator (Service Code 62) (DTC P2100)

#### Subthrottle Valve Actuator Removal

#### NOTICE

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

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

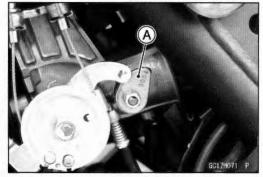


## Subthrottle Valve Actuator Inspection

#### NOTE

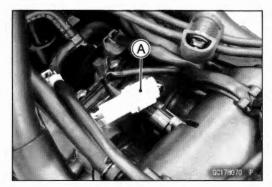
OBe sure the battery is fully charged.

- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Turn the ignition switch on, and then turn it off.
- Check to see that the subthrottle valves lever [A] open and close smoothly.
- ★If the subthrottle valves lever do not operate, check the subthrottle valve actuator resistance (see Subthrottle Valve Actuator Resistance Inspection).



#### Subthrottle Valve Actuator Resistance Inspection

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



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

#### **Subthrottle Valve Actuator Resistance**

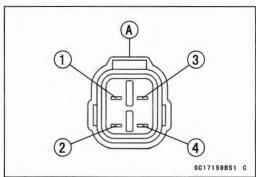
Connections: BK lead [1]  $\longleftrightarrow$  P lead [2]

G lead [3] ←→ W/BL lead [4]

Standard: About  $5.2 \sim 7.8 \Omega$ 

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

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



## **Subthrottle Valve Actuator (Service Code 62) (DTC P2100)**

# Subthrottle Valve Actuator Input Voltage Inspection

#### NOTE

OBe sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the subthrottle valve actuator connector and connect the measuring adapter [A] between these connectors as shown.

Main Harness [B]

Subthrottle Valve Actuator [C]

Special Tool - Measuring Adapter: 57001-1700

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

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

Subthrottle Valve Actuator Input Voltage Connections to Adapter:

(I) Digital Meter (+)  $\rightarrow$  R (actuator P) lead

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

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

Digital Meter (-) → W (actuator G) lead

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

**Input Voltage** 

Standard: About DC 11.5 ~ 13.5 V and then 0 V or About DC 11.5 ~ 13.5 V

- Turn the ignition switch off.
- ★ If the reading is in specification, but the actuator does not operate, replace the throttle body assy (see Throttle Body Assy Removal/Installation).
- ★If the reading is out of the specification, remove the ECU and check the wiring for continuity between main harness connectors.
- ODisconnect the ECU and actuator connectors.

Wiring Continuity Inspection

**ECU** Connector [A] ←→

**Subthrottle Valve Actuator Connector [B]** 

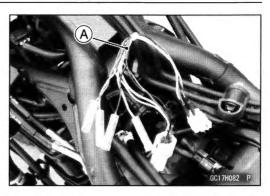
**ECU Terminal 1 [C]** ←→ **Actuator Terminal [D]** 

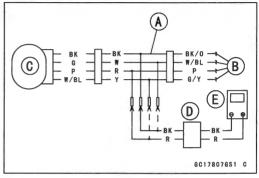
**ECU Terminal 2 [E]** ←→ Actuator Terminal [F]

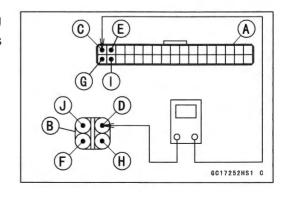
**ECU Terminal 18 [G]** ←→ Actuator Terminal [H]

ECU Terminal 19 [I] ←→ Actuator Terminal [J]

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

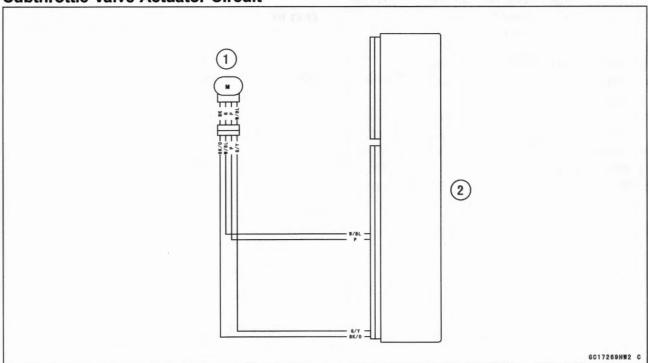






## Subthrottle Valve Actuator (Service Code 62) (DTC P2100)

## **Subthrottle Valve Actuator Circuit**



- 1. Subthrottle Valve Actuator
- 2. ECU

## 3-92 FUEL SYSTEM (DFI)

## Air Switching Valve (Service Code 64) (DTC P0410)

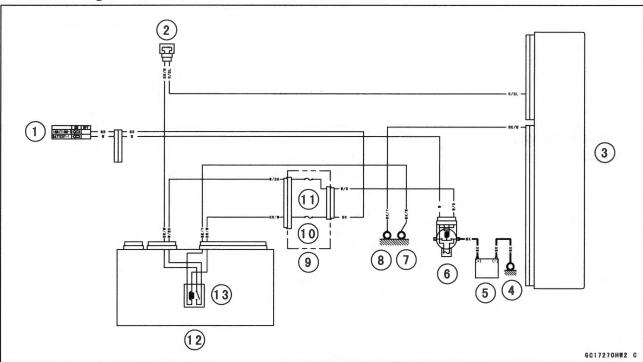
## Air Switching Valve Removal/Installation

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

#### Air Switching Valve Inspection

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

## **Air Switching Valve Circuit**



- 1. Ignition Switch
- 2. Air Switching Valve
- 3. ECU
- 4. Engine Ground
- 5. Battery
- 6. Main Fuse 30 A
- 7. Frame Ground (2)

- 8. Frame Ground (1)
- 9. Fuse Box (1)
- 10. Ignition Fuse 10 A
- 11. ECU Fuse 15 A
- 12. Relay Box
- 13. ECU Main Relay

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

#### Oxygen Sensor Heater Removal/Installation

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

#### Oxygen Sensor Heater Resistance Inspection

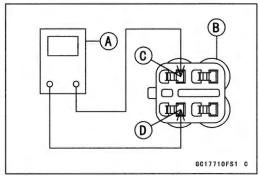
- Turn the ignition switch off.
- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector [A].



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

Oxygen Sensor Heaters Resistance Connections: BK lead [C]  $\longleftrightarrow$  BK lead [D] Standard: 5.49  $\sim$  6.91  $\Omega$  @20° C (68°F)

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



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

# Oxygen Sensor Heater Power Source Voltage Inspection

#### NOTE

OBe sure the battery is fully charged.

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

# Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

Connect a digital meter to the measuring adapter lead.

# Oxygen Sensor Power Source Voltage Connections to Adapter:

Digital Meter (+) → W (main harness BR/W) lead

Digital Meter (-) → Frame Ground Terminal

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

# Power Source Voltage Standard: Battery Voltage

- Turn the ignition switch off.
- ★If the reading is in specification, but the problem still exists, replace the ECU (see ECU Removal/Installation).
- ★If the reading is out of the standard, check the following. ECU Fuse 15 A (see Fuse Inspection in the Electrical System chapter)

Power Source Wiring (see Oxygen Sensor Circuit)

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

#### Wiring Continuity Inspection

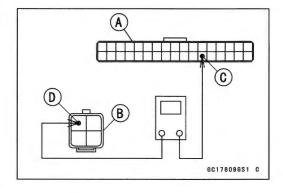
**ECU Connector [A]** ←→

Oxygen Sensor Connector [B]

ECU Terminal 29 [C] ←→ Sensor Terminal [D]

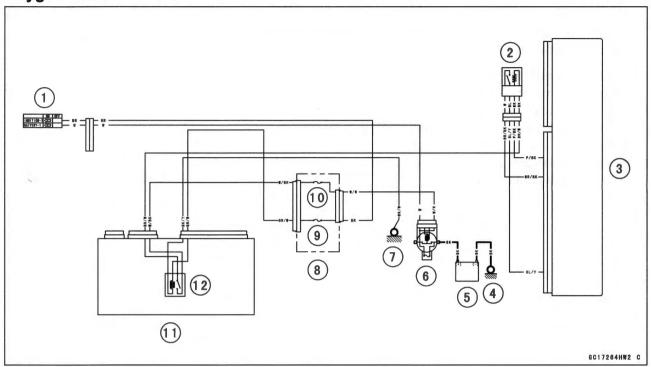
- ★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).





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

## **Oxygen Sensor Circuit**



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

## 3-96 FUEL SYSTEM (DFI)

## Fuel Supply System (Service Code 94) (DTC P0170)

## Fuel Supply System Inspection

#### NOTE

Olf the motorcycle has any other service code, first inspect the other service code.

- Inspect the General fuel system (throttle body assy, air cleaner, fuel tank etc.).
- ★If the General fuel system is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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

#### Purge Valve Removal/Installation

- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the purge valve connector [A].
- Remove the purge valve mounting nut [B].
- Remove the purge valve [C] form the bracket.
- Slide the clamps [D].
- Disconnect the hoses [E].
- Installation is the reverse of removal.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Purge Valve Mounting Nut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

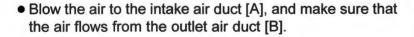
#### Purge Valve Inspection

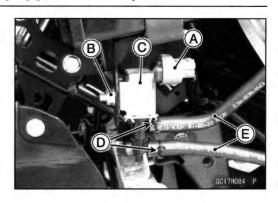
- Remove the purge valve (see Purge Valve Removal/Installation).
- Connect a digital meter [A] to the purge valve terminals as shown.

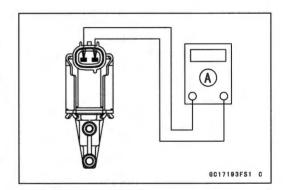
#### **Purge Valve Resistance**

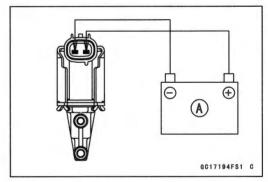
Standard: 30 ~ 34 Ω @20°C (68°F)

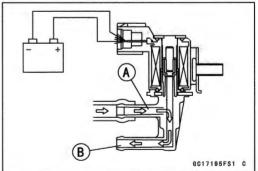
- ★If the resistance reading is out of the specified value, replace it with a new one.
- Connect the 12 V battery [A] to the purge valve terminals as shown.







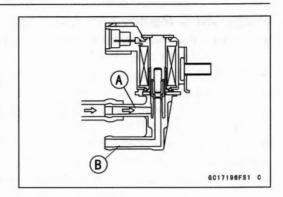




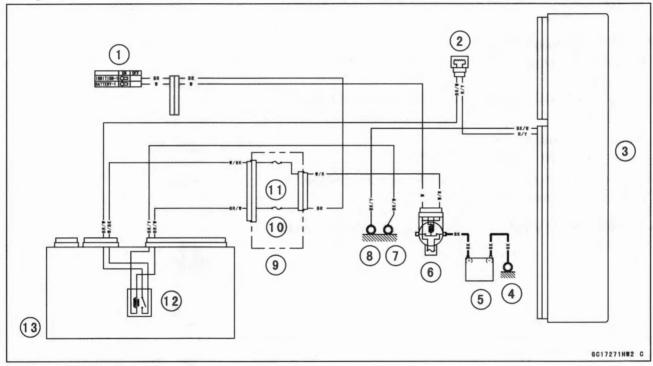
## 3-98 FUEL SYSTEM (DFI)

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

- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure that the air does not flow from the outlet air duct [B].
- ★ If the purge valve dose not operate as described, replace it with a new one.
- ★ If the purge valve is normal, check the wiring for continuity (see Purge Valve Circuit).
- ★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



## **Purge Valve Circuit**



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

## Warning Indicator Light (LED)

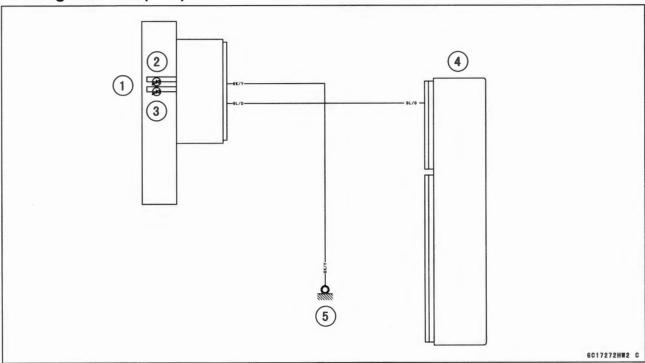
# Yellow Engine Warning/Red Warning Indicator Light (LED) Inspection

Red Warning Indicator Light (LED) [A]
Yellow Engine Warning Indicator Light (LED) [B]
OIn this model, the above mentioned warning indicator lights (LED) go on or blink by the data sent from the ECU.

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



## Warning Indicator (LED) Circuit



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

## 3-100 FUEL SYSTEM (DFI)

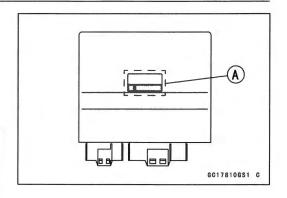
#### **ECU**

#### **ECU Identification**

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

#### **ECU Identification**

| Part Number [A] | Specification |
|-----------------|---------------|
|                 | SEA-B1        |
| 21175-1257      | SEA-B3        |
|                 | WVTA (FULL)   |
| 21175-1262      | US            |
|                 | CA            |
| 21175-1263      | CAL           |
| 21175-1265      | PH            |
| 21175-1266      | IN            |
|                 | TH            |
| 21175-1298      | BR            |
| 21175-1301      | CN            |
| 21175-1306      | AU            |

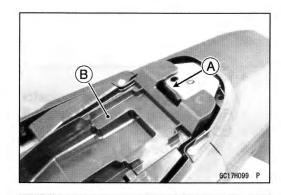


#### ECU Removal

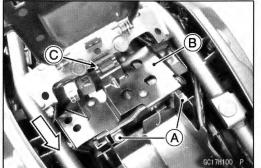
#### **NOTICE**

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

- Remove:
  - Seat (see Seat Removal in the Frame chapter)
- Push the tab [A] to open the compartment cover [B].

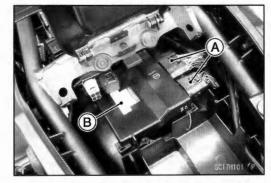


- Remove: Screws [A]
- Pull the bracket [B] rearward and remove it from the tab [C].



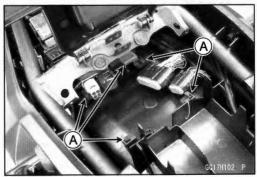
## **ECU**

- Disconnect the ECU Connectors [A].
- Remove the ECU [B].

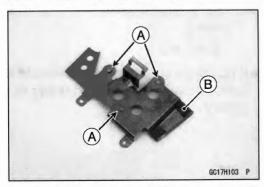


#### **ECU Installation**

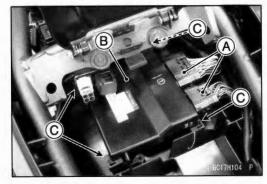
 Check that the dampers [A] are in place on the rear fender and frame.



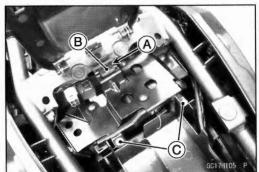
 Check that the dampers [A] and pad [B] are in place on the bracket.



- Connect the ECU connectors [A].
- Fit the ECU [B] to the dampers [C].



- Insert the slit [A] of the bracket to the tab [B] of the frame.
- Tighten the screws [C].
- Install the seat (see Seat Installation in the Frame chapter).



## 3-102 FUEL SYSTEM (DFI)

#### **ECU**

#### **ECU Power Supply Inspection**

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

#### **ECU Grounding Inspection**

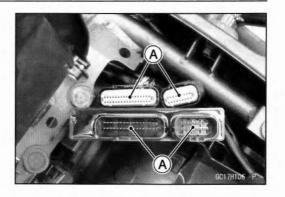
#### **Connections:**

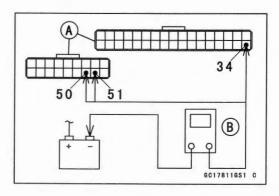
- (I) ECU Terminal 50 or 51 ←→ Battery (–) Terminal ECU Terminal 34
- (II) Engine Ground  $\longleftrightarrow$  Battery (–) Terminal

#### Criteria:

Both: 0 Ω

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





#### **ECU**

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

#### NOTE

OBe sure the battery is fully charged.

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

Special Tool - Needle Adapter Set: 57001-1457

## **ECU Power Supply Inspection**

#### **Connections:**

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

Digital Meter (−) → Battery (−) Terminal

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

Digital Meter (-) → Battery (-) Terminal

**Ignition Switch off:** 

Terminal 16 (BR/W): 0 V

Terminal 35 (W/BK): Battery Voltage

**Ignition Switch on:** 

**Both: Battery Voltage** 

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

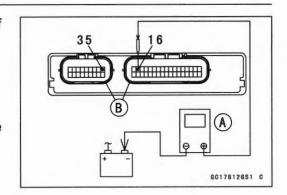
Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)

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

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

Power Source Wiring (see ECU Power Source Circuit)

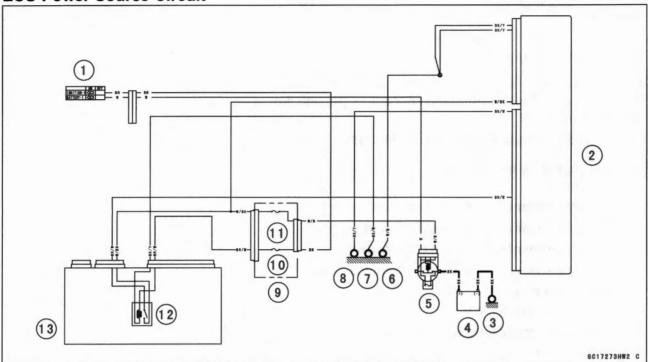
★If the fuse, wiring and relay are good, replace the ECU (see ECU Removal/Installation).



## 3-104 FUEL SYSTEM (DFI)

## ECU

## **ECU Power Source Circuit**



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

#### **DFI Power Source**

#### ECU Fuse Removal

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

#### ECU Fuse Installation

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

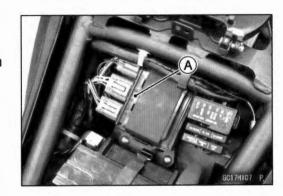
## ECU Fuse Inspection

 Refer to the Fuse Inspection in the Electrical System chapter.

## ECU Main Relay Removal/Installation

OThe 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.

## 3-106 FUEL SYSTEM (DFI)

#### **Fuel Line**

#### Fuel Pressure Inspection

#### NOTE

OBe sure the battery is fully charged.

Remove:

Fuel Tank (see Fuel Tank Removal)

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

OBe 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.

## **A** 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/cm<sup>2</sup>: 57001-125 Fuel Pressure Gauge Adapter: 57001-1593 Fuel Hose: 57001-1607

## **A** WARNING

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

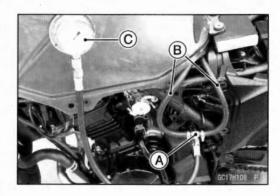
- Connect the fuel pump lead connector.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.
- OThe fuel pump should operate for 3 seconds, and then should stop.

#### NOTE

OAfter 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

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

• Turn the ignition switch off.

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

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

the following.

Fuel Line Leakage (see Fuel Injector Fuel Line Inspection)

Amount of Fuel Flow (see Fuel Flow Rate Inspection)

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

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

Fuel Tank (see Fuel Tank Installation)

Start the engine and check for fuel leakage.

## Fuel Flow Rate Inspection

## **A** 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

OBe 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:

Fuel Tank Bolts (see Fuel Tank Removal)

## 3-108 FUEL SYSTEM (DFI)

#### **Fuel Line**

- Open the fuel tank cap [A] to lower the pressure in the tank.
- Disconnect the fuel hose from the fuel pump (see Fuel Tank Removal).
- OBe sure to place a piece of cloth around the fuel outlet pipe of the fuel pump.

## **A** 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].

## **A** 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.
- OThe 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.

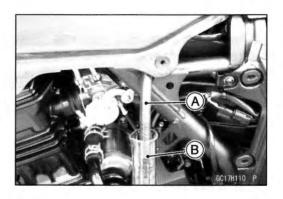
- Measure the discharge for 3 seconds.
- ORepeat this operation several times.

#### **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

## **A** 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

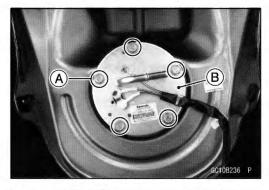
Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

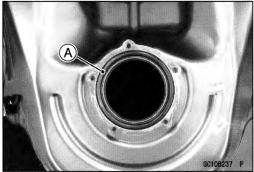
- Draw the fuel out from the fuel tank with a commercially available electric pump.
- Remove the fuel tank (see Fuel Tank Removal).
- OBe careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.
- Turn the fuel tank upside down.
- Remove the fuel pump bolts [A], and take out the fuel pump [B].

#### NOTICE

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

• Discard the fuel pump gasket [A].





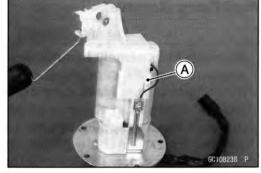
#### **Fuel Pump**

#### Fuel Pump Installation

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

#### NOTE

OBe careful not to bend the fuel level sensor arm.



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

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

• Tighten the pump bolts again to check the tightness.

## Fuel Pump Operation Inspection

#### NOTE

OBe sure the battery is fully charged.

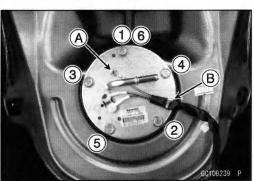
- Turn the engine stop switch to run position.
- Turn the ignition switch on and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch off.
- ★ If the pump does not operate as described above, check the operating voltage (see Fuel Pump Operating Voltage Inspection).

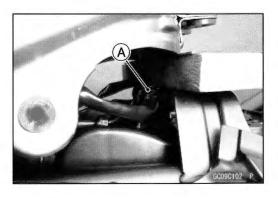
## Fuel Pump Operating Voltage Inspection

#### NOTE

OBe sure the battery is fully charged.

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





## **Fuel Pump**

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

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

Connect a digital meter to the measuring adapter leads.

Fuel Pump Operating Voltage Connections to Adapter:

Digital Meter (+) → BR (pump BK/Y) lead Digital Meter (–) → W (pump BK/W) lead

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

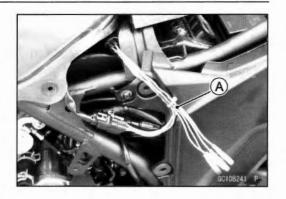
#### **Operating Voltage**

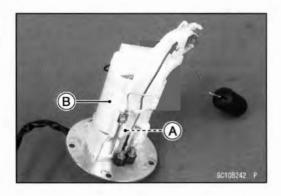
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch off.
- ★ If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
- ★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
- ★If the fuel pump relay is normal, check the wiring for continuity (see Fuel Pump Circuit).
- ★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
- ★ If the reading is in specification, but the pump does not operate, replace the fuel pump (see Fuel Pump Removal/Installation).

#### Pressure Regulator Removal

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





## 3-112 FUEL SYSTEM (DFI)

## **Fuel Pump**

## Fuel Pump Relay Removal/Installation

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

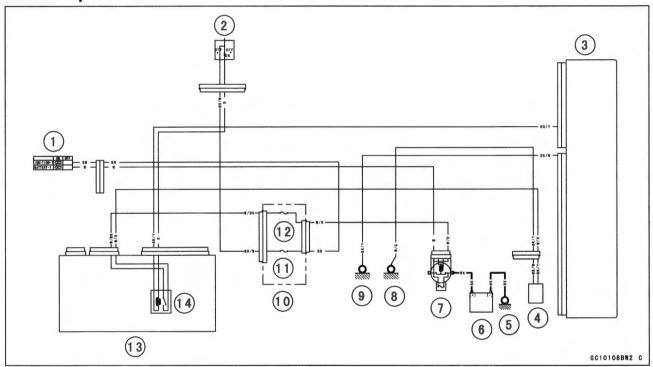
 Refer to the Relay Box Removal in the Electrical System chapter.



#### Fuel Pump Relay Inspection

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

## **Fuel Pump Circuit**



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

## **Throttle Grip and Cables**

## Throttle Grip Free Play Inspection

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

## Throttle Grip Free Play Adjustment

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

#### Throttle Cable Installation

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

## **A** WARNING

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

#### Throttle Cable Lubrication

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

## 3-114 FUEL SYSTEM (DFI)

## **Throttle Body Assy**

#### Idle Speed Inspection/Adjustment

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

#### Throttle Bore Cleaning

- Check the throttle bore for cleanliness as follows.
- ORemove the throttle body assy (see Throttle Body Assy Removal).
- OCheck the main throttle valves and throttle bores for carbon deposits by opening the main throttle valves.
- ★ If any carbon accumulates, wipe the carbon off the throttle bores around the throttle bores and the throttle valves, using a cotton pad penetrated with a high flash-point solvent.

### Synchronization Inspection/Adjustment

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

## Throttle Body Assy Removal

## **A** 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.

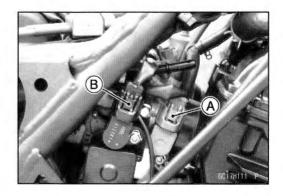
#### • Remove:

Fuel Tank (see Fuel Tank Removal)
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
Battery (see Battery Removal in the Electrical System

chapter)

Disconnect:

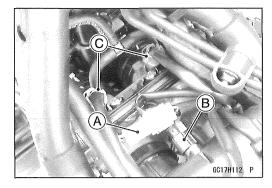
Main Throttle Sensor Connector [A] Subthrottle Sensor Connector [B]



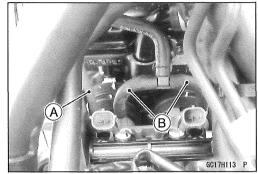
## **Throttle Body Assy**

Disconnect:

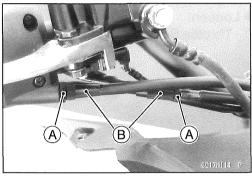
Subthrottle Valve Actuator Connector [A]
Intake Air Temperature Sensor Connector [B]
Fuel Injector Connectors [C]



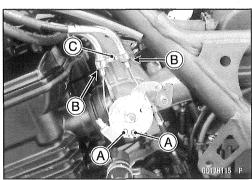
- Disconnect the vacuum hose [A].
- For evaporative emission control system equipped models, disconnect the vacuum hoses [B].



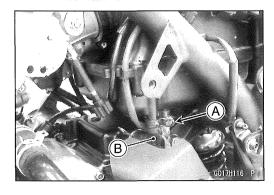
- Loosen the locknuts [A].
- Turn the adjusters [B] to give the more free play.



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



• Slide the clamp [A] and disconnect the breather hose [B].

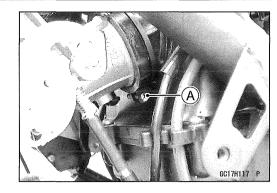


## 3-116 FUEL SYSTEM (DFI)

#### **Throttle Body Assy**

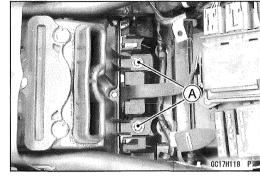
Loosen:

Air Cleaner Housing Clamp Screw [A] (Both Sides)



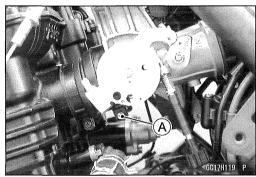
• Remove:

Air Cleaner Housing Mounting Bolts [A]



Loosen:

Throttle Body Assy Holder Clamp Screw [A] (Both Sides)



- Remove the throttle body assy [A] from the throttle body assy holders and air cleaner housing [B] as shown.
- OPull the air cleaner housing rearward to clear the throttle body assy.
- After removing the throttle body assy, stuff pieces of lint -free, clean cloth into the throttle body assy holders

#### NOTICE

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



# Throttle Body Assy Installation ● Be sure to position the throttle body assy holder clamp in

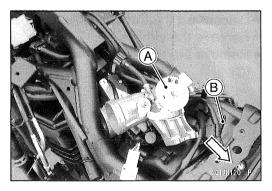
original position (see Throttle Body Assy Holder Installation in the Engine Top End chapter).

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

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

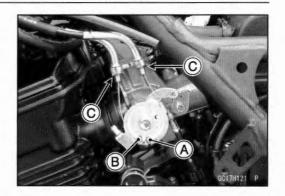
Air Cleaner Housing Clamp Screws: 2.0 N·m (0.20 kgf·m, 18 in·lb)

Air Cleaner Housing Mounting Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)



## **Throttle Body Assy**

- Apply a thin coat of grease to the throttle cable lower ends.
- Fit the accelerator cable end [A] and the decelerator cable end [B] into the throttle pulley.
- Replace the circlips [C] with new ones.



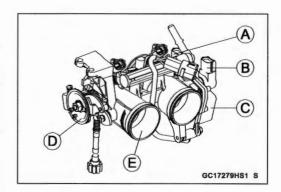
- Turn the throttle grip and make sure that the throttle pulley moves smoothly and return by spring force.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:

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

## Throttle Body Assy Disassembly

#### NOTICE

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



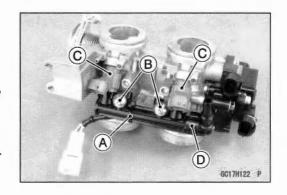
#### NOTICE

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

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

#### NOTE

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



## 3-118 FUEL SYSTEM (DFI)

## **Throttle Body Assy**

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

#### NOTE

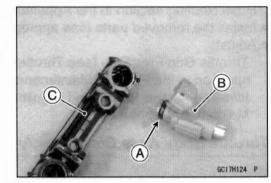
ODo not damage the insertion portions of the fuel injectors when they are pulled out from the delivery pipe.

#### NOTICE

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

#### Throttle Body Assy Assembly

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

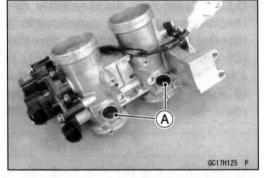


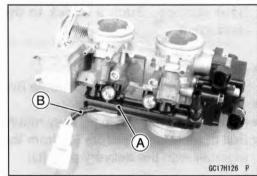
- Replace the dust seals [A] with new ones.
- Apply engine oil to the new dust seals.
- Install the fuel injectors along with the delivery pipe to the throttle body.
- Tighten:

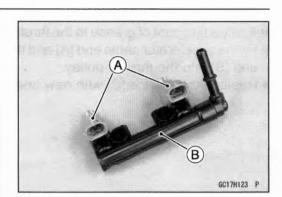
Torque - Delivery Pipe Assy Mounting Screws: 3.4 N·m (0.35 kgf·m, 30 in·lb)

- Replace the band [A] with a new one.
- Hold the lead [B] with the band.
- Install:

Throttle Body Assy (see Throttle Body Assy Installation)







#### Air Cleaner

#### Air Cleaner Element Removal/Installation

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

#### Air Cleaner Element Inspection

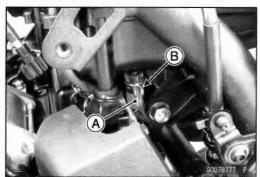
- Remove the air cleaner element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
- Visually check the element [A] for tears or breaks.
- ★If the element has any tears or breaks, replace the element.



#### Air Cleaner Oil Draining

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

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



## **A** WARNING

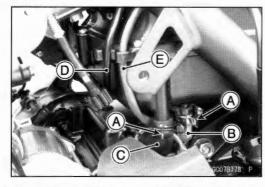
Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the cap in the air cleaner housing after draining.

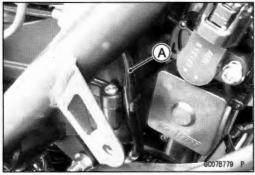
#### Air Cleaner Housing Removal

Remove:

Fuel Tank (see Fuel Tank Removal)
Rear Fender (see Rear Fender Removal in the Frame chapter)

- Slide the clamps [A] and remove the cap [B].
- Disconnect the breather hose [C].
- Free the starter motor cable [D] and the gear position switch lead [E] from the air cleaner housing.
- Free the battery negative (–) cable [A] from the air cleaner housing.





## 3-120 FUEL SYSTEM (DFI)

#### Air Cleaner

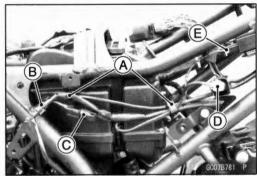
· Loosen:

Air Cleaner Housing Clamp Screw [A] (Both Sides)



- Open the clamps [A].
- Disconnect:

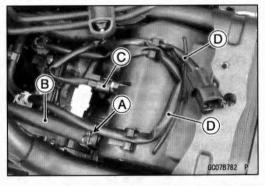
Side Stand Switch Lead Connector [B] Gear Position Sensor Lead Connector [C] Battery Positive (+) Lead Connector [D] Turn Signal Relay Connector [E]



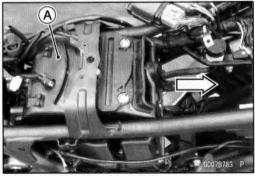
- Slide the clamp [A].
- Disconnect:

Air Switching Valve Hose [B]
Intake Air Temperature Sensor Connector [C]

Free the lead [D] from the air cleaner housing.



• Pull the air cleaner housing [A] rearward and remove it.



## Air Cleaner Housing Installation

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

Torque - Air Cleaner Housing Clamp Screw: 2.0 N·m (0.20 kgf·m, 18 in·lb)

Air Cleaner Housing Mounting Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)

• Install the removed parts (see appropriate chapters).

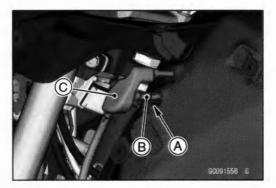
#### **Fuel Tank**

#### Fuel Tank Removal

## **A** WARNING

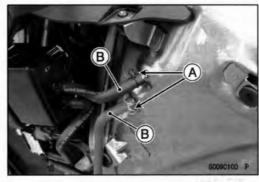
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect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

- Turn the ignition switch off.
- Wait until the engine cools down.
- Disconnect the battery (–) terminal (see Battery Removal in the Electrical System chapter).
- Remove: Seat (Seat Removal in the Frame chapter) Middle Fairings (see Middle Fairing Removal in the Frame chapter)
- Slide the clamp [A].
- Disconnect the hose [B] and tank [C].



# For Evaporative Emission Control System Equipped Models

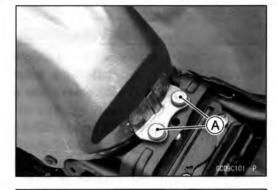
- Slide the clamps [A].
- Disconnect the hoses [B].



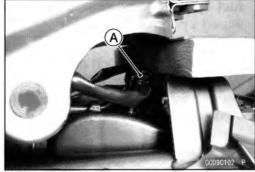
## 3-122 FUEL SYSTEM (DFI)

#### **Fuel Tank**

Remove: Fuel Tank Bolts [A]



• Disconnect the fuel pump lead connector [A].



- Open the fuel tank cap [A] to lower the pressure in the tank.
- ODuring tank removal, keep the tank cap open to release pressure in the tank. This makes fuel spillage less.

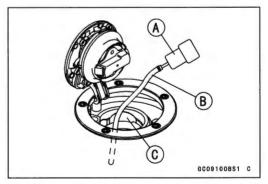


- Draw the fuel out from the fuel tank with a commercially available pump [A].
- OUse a soft plastic hose [B] as a pump intake hose in order to insert the hose smoothly.
- OPut the hose through the fill opening [C] into the tank and draw the fuel out.

## **A** 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.



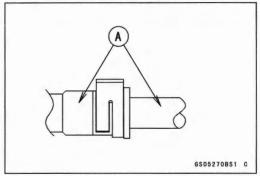


#### **Fuel Tank**

• Clear the inner covers [A] from the fuel tank.



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



#### When removing with flat tip screwdriver

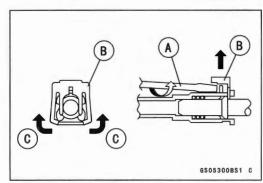
- Insert the flat tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

#### When removing with fingers

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

#### NOTICE

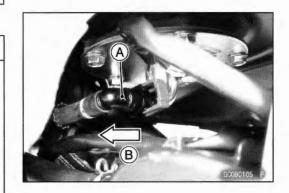
Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively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



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

## **A** WARNING

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

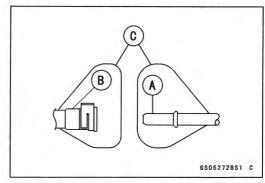


- Remove the fuel tank rearward, and place it on a flat surface.
- ODo not apply the load to the fuel pipe of the fuel pump.

## 3-124 FUEL SYSTEM (DFI)

## **Fuel Tank**

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



#### Fuel Tank Installation

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

83 mm (3.3 in.) [C]

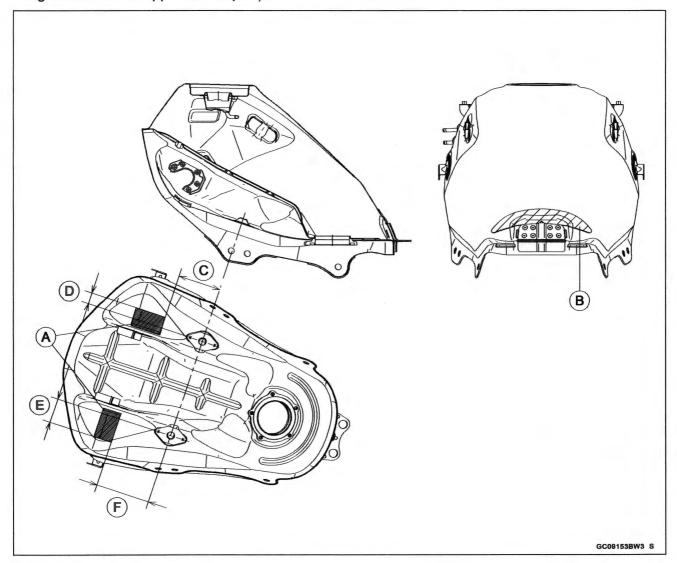
21.7 mm (0.854 in.) [D]

49 mm (1.9 in.) [E]

105.1 mm (4.138 in.) [F]

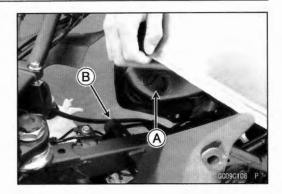
- ★If the dampers and pad are damaged or deteriorated, replace them.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



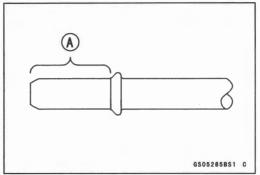


#### **Fuel Tank**

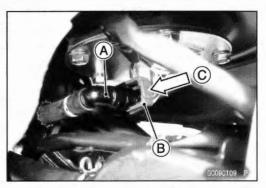
 Insert the groove [A] of the fuel tank to the damper [B] on both sides.



- Remove the vinyl bag on the pipe and fuel hose joint.
- Check the joint lock for deformation and wear.
- ★If the joint lock is deformed, replace the fuel hose with a new one.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the pipe [A].
- Apply engine oil to the pipe.



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

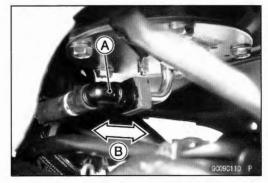


 Push and pull [A] the hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

# **A** WARNING

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

- ★If it comes off, reinstall the hose joint.
- Connect the fuel pump lead connector and the battery (–) terminal (see Battery Installation in the Electrical System chapter).
- Install the removed parts (see appropriate chapters).



## 3-126 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 tank cap if gasket is damaged.
- Check to see if the water drain pipe [B] and fuel breather pipe [C] in the tank are not clogged. Check the tank cap breather also.
- ★ If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.

#### NOTICE

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

#### Fuel Tank Cleaning

# **A** WARNING

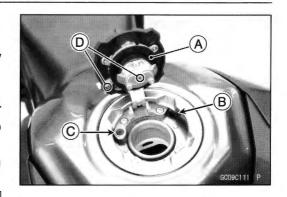
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Do not use gasoline or low flash-point solvents to clean the tank.

#### Remove:

Fuel Tank (see Fuel Tank Removal)
Fuel Pump (see Fuel Pump Removal)

- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Draw the solvent out of the fuel tank.
- Dry the tank with compressed air.
- Install:

Fuel Pump (see Fuel Pump Installation)
Fuel Tank (see Fuel Tank Installation)



#### **Evaporative Emission Control System (Equipped Models)**

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the Periodic Maintenance Chart.

#### Parts Removal/Installation

#### **A WARNING**

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

#### NOTICE

If gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated, replace it with a new one.

Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter). Make sure they do not get pinched or kinked.

#### Hose Inspection

 Refer to the Evaporative Emission Control System Inspection (Equipped Models) in the Periodic Maintenance chapter.

## Purge Valve Inspection

Refer to the Purge Valve Inspection.

#### **Canister Inspection**

 Refer to the Evaporative Emission Control System Inspection (Equipped Models) in the Periodic Maintenance chapter. The second of th

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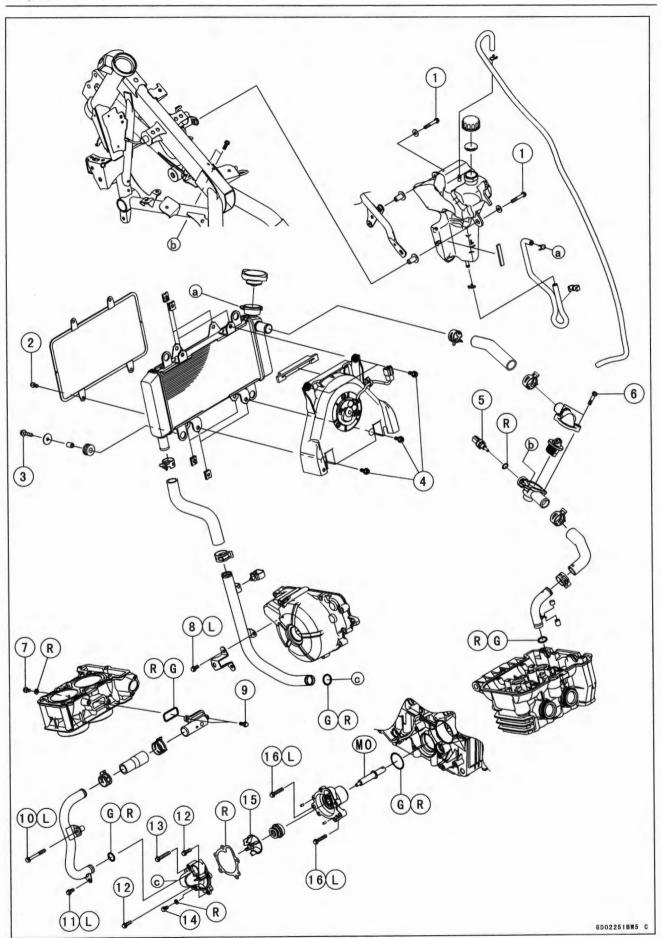
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# **Cooling System**

# **Table of Contents**

| Exploded View                                 | 4-2  |
|---|------|
| Coolant Flow Chart                            | 4-4  |
| Specifications                                | 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                  | 4-9  |
| Coolant Reserve Tank Installation             | 4-10 |
| Water Pump                                    | 4-11 |
| Water Pump Cover Removal                      | 4-11 |
| Water Pump Cover Installation                 | 4-11 |
| Water Pump Removal                            | 4-12 |
| Water Pump Installation                       | 4-12 |
| Water Pump Inspection                         | 4-12 |
| Mechanical Seal Inspection                    | 4-12 |
| Mechanical Seal Removal                       | 4-13 |
| Mechanical Seal Installation                  | 4-13 |
| Impeller Assembly                             | 4-13 |
| Water Pump Impeller Inspection                | 4-13 |
| Radiator                                      | 4-14 |
| Radiator and Radiator Fan Removal             | 4-14 |
| Radiator and Radiator Fan Installation        | 4-14 |
| Radiator Inspection                           | 4-15 |
| Radiator Cap Inspection                       | 4-16 |
| Radiator Filler Neck Inspection               | 4-16 |
| Thermostat                                    | 4-17 |
| Thermostat Removal                            | 4-17 |
| Thermostat Installation                       | 4-17 |
| Thermostat Housing Removal                    | 4-17 |
| Thermostat Housing Installation               | 4-17 |
| Thermostat Inspection                         | 4-18 |
| Water Hoses and Pipes                         | 4-19 |
| Water Hose Installation                       | 4-19 |
| Water Hose Inspection                         | 4-19 |
| Water Hose and O-ring Replacement             | 4-19 |
| Water Temperature Sensor                      | 4-20 |
| Water Temperature Sensor Removal/Installation | 4-20 |
| Water Temperature Sensor Inspection           | 4-20 |

# **Exploded View**



# **Exploded View**

| NI- | Footonon                                    |     | Damarka |           |         |
|-----|---|-----|---------|-----------|---------|
| No. | Fastener                                    | N·m | kgf⋅m   | ft·lb     | Remarks |
| 1   | Reserve Tank Bolts                          | 4.0 | 0.41    | 35 in·lb  |         |
| 2   | Radiator Guard Bolts                        | 9.8 | 1.0     | 87 in·lb  |         |
| 3   | Radiator Bolts                              | 9.8 | 1.0     | 87 in·lb  |         |
| 4   | Radiator Fan Assy Mounting Bolts            | 8.4 | 0.86    | 74 in·lb  |         |
| 5   | Water Temperature Sensor                    | 12  | 1.2     | 106 in·lb |         |
| 6   | Thermostat Cover Bolts                      | 9.8 | 1.0     | 87 in·lb  |         |
| 7   | Coolant Drain Bolt (Cylinder)               | 5.9 | 0.60    | 52 in·lb  |         |
| 8   | Left Lower Fairing Bracket Bolts            | 9.8 | 1.0     | 87 in·lb  | L       |
| 9   | Water Hose Fitting Bolts                    | 9.8 | 1.0     | 87 in·lb  |         |
| 10  | Alternator Cover Bolt                       | 9.8 | 1.0     | 87 in·lb  | L       |
| 11  | Water Pipe Bolt                             | 9.8 | 1.0     | 87 in·lb  | L       |
| 12  | Water Pump Cover Bolts, L = 18 mm (0.7 in.) | 9.8 | 1.0     | 87 in·lb  |         |
| 13  | Water Pump Cover Bolt, L = 35 mm (1.4 in.)  | 9.8 | 1.0     | 87 in·lb  |         |
| 14  | Coolant Drain Bolt                          | 9.8 | 1.0     | 87 in·lb  |         |
| 15  | Water Pump Impeller                         | 9.8 | 1.0     | 87 in·lb  |         |
| 16  | Water Pump Bolts                            | 9.8 | 1.0     | 87 in·lb  | L       |

G: Apply grease.

L: Apply non-permanent locking agent.

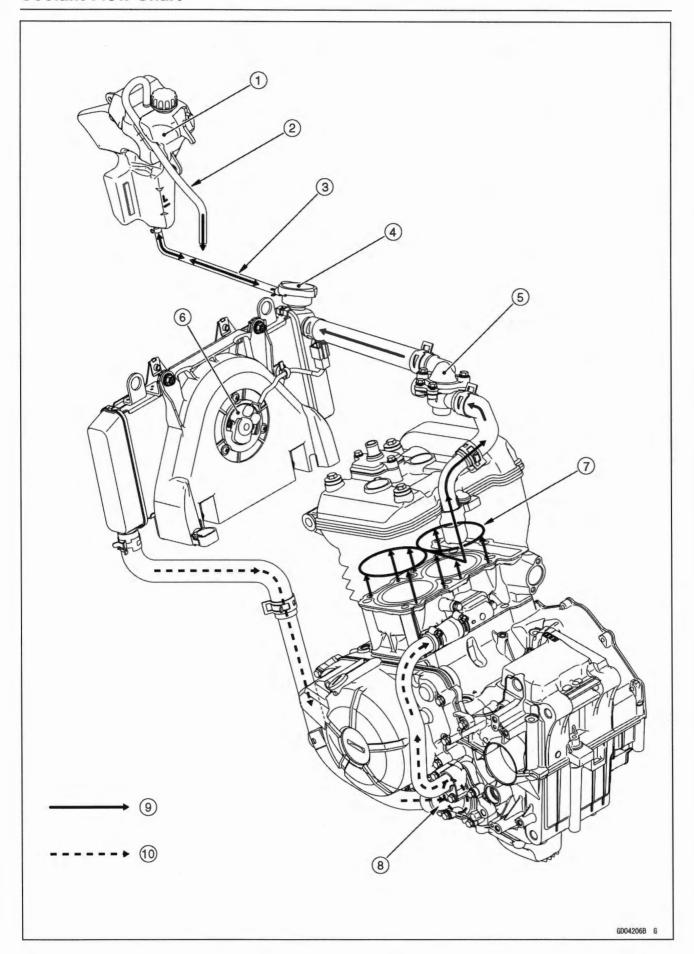
MO: Apply molybdenum disulfide oil solution.

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

R: Replacement Parts

# **4-4 COOLING SYSTEM**

# **Coolant Flow Chart**



#### **Coolant Flow Chart**

- 1. Reserve Tank
- 2. Reserve Tank Overflow Hose
- 3. Radiator Overflow Hose
- 4. Radiator Cap
- 5. Thermostat Housing
- 6. Radiator Fan
- 7. Cylinder Head Water Jacket
- 8. Water Pump
- 9. Hot Coolant
- 10. Cold Coolant

#### **4-6 COOLING SYSTEM**

#### **Coolant Flow Chart**

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is less than  $63.5 \sim 66.5^{\circ}$ C ( $146 \sim 152^{\circ}$ F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than  $63.5 \sim 66.5^{\circ}$ C ( $146 \sim 152^{\circ}$ F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 104°C (219°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature is below 99°C (210°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds  $107.9 \sim 137.3$  kPa  $(1.10 \sim 1.40 \text{ kgf/cm}^2, 15.6 \sim 19.9 \text{ psi})$ , the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at  $107.9 \sim 137.3$  kPa  $(1.10 \sim 1.40 \text{ kgf/cm}^2, 15.6 \sim 19.9 \text{ psi})$ . When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

# Specifications

| Item                           | Standard   |  |  |
|--------------------------------|--|--|--|
| Coolant Provided when Shipping | 100  |  |  |
| Type (Recommended)             | Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators) |  |  |
| Color                          | Green  |  |  |
| Mixed Ratio                    | Soft water 50%, coolant 50%  |  |  |
| Freezing Point                 | −35°C (−31°F)  |  |  |
| Total Amount                   | 1.5 L (1.6 US qt) (reserve tank full level, including radiator and engine)   |  |  |
| Radiator Cap                   |  |  |  |
| Relief Pressure                | 107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 psi)   |  |  |
| Thermostat                     |  |  |  |
| Valve Opening Temperature      | 63.5 ~ 66.5°C (146 ~ 152°F)  |  |  |
| Valve Full Opening Lift        | 6 mm (0.24 in.) or more @80°C (176°F)  |  |  |

#### Coolant

#### **Coolant Deterioration Inspection**

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



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

#### **Coolant Draining**

 Refer to the Coolant Change in the Periodic Maintenance chapter.

#### **Coolant Filling**

 Refer to the Coolant Change in the Periodic Maintenance chapter.

#### **Pressure Testing**

- Remove the coolant reserve tank (see Coolant Reserve Tank Removal).
- Remove the radiator cap, and install a cooling system pressure tester [A] on the filler neck.

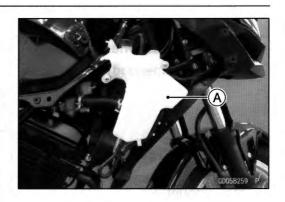
#### NOTE

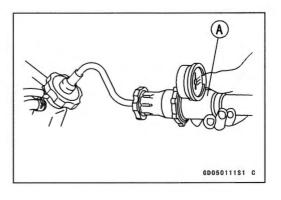
- OWet the cap sealing surfaces with water or coolant to prevent pressure leaks.
- Build up pressure in the system carefully until the pressure reaches 137.3 kPa (1.40 kgf/cm², 15.6 ~ 19.9 psi).

#### NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 137.3 kPa (1.40 kgf/cm $^2$ , 15.6 ~ 19.9 psi).

- Watch the gauge for at least 6 seconds.
- ★ If the pressure holds steady, the system is all right.
- ★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.
- Remove the pressure tester, replenish the coolant, and install the radiator cap.





#### Coolant

#### **Cooling System Flushing**

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

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

#### NOTICE

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

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

#### Coolant Reserve Tank Removal

- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Slide the clamp and disconnect the hose [A].
- Remove the clamp [B] and free the hose [C] from the coolant reserve tank [D].
- Remove:

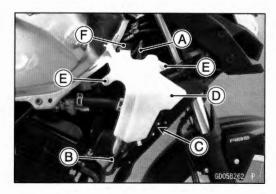
Coolant Reserve Tank Bolts [E]

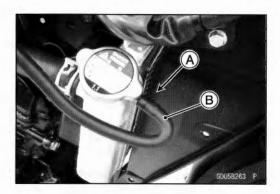
Washers

Collars

Cap [F]

- Pour the coolant into a container.
- Slide the clamp [A] and disconnect the hose [B].
- Remove the coolant reserve tank.





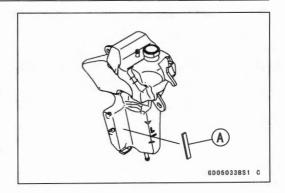
## **4-10 COOLING SYSTEM**

#### Coolant

#### **Coolant Reserve Tank Installation**

- Installation is the reverse of removal.
- Stick the damper [A] to the coolant reserve tank, if removed.
- Run the cable and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Torque - Reserve Tank Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)



#### **Water Pump**

#### Water Pump Cover Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:

Shift Pedal (see Shift Pedal Removal in the Crank-shaft/Transmission chapter)

Water Pipe Bolt [A]

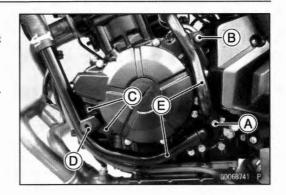
Alternator Cover Bolt [B]

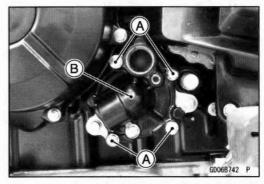
Left Lower Fairing Bracket Bolt [C]

Bracket [D]

- Disconnect the water pipes [E].
- Remove:

Water Pump Cover Bolts [A] Water Pump Cover [B]





#### Water Pump Cover Installation

- Be sure that the dowel pins [A] is in position.
- Replace the water pump cover gasket [B] with a new one.



- Install the water pump cover.
- Tighten:

L = 18 mm (0.7 in.) [A]

L = 35 mm (1.4 in.) [B]

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

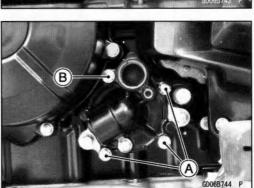
- Replace the O-rings with new ones.
- Apply grease to the O-rings.
- Connect the water pipe.
- Apply a non-permanent locking agent to the threads of the water pipe bolt and alternator cover bolt.
- Tighten:

# Torque - Water Pipe Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb) Alternator Cover Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Apply a non-permanent locking agent (High Strength) to the threads of the left lower fairing bracket bolt.
- Install the bracket, and tighten the bolt.

Torque - Left Lower Fairing Bracket Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

• Install the removed parts (see appropriate chapters).



#### **Water Pump**

#### Water Pump Removal

- Shift the transmission into 1st gear.
- Remove the water pump cover (see Water Pump Cover Removal).
- While applying the rear brake, remove the water pump impeller [A].
- Remove:

Water Pump Bolts [B]
Water Pump Housing [C]

#### Water Pump Installation

- Replace the O-ring [A] with a new one.
- Apply grease to a O-ring.
- Install the water pump aligning the slot [B] of the water pump shaft with the oil pump shaft [C].
- Apply a non-permanent locking agent to the threads of the water pump bolts.
- Tighten:

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

Install the removal parts (see appropriate chapters).

#### Water Pump Inspection

- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Check the drainage outlet passage [A] at the bottom of the water pump housing for coolant leaks.
- If a coolant leak or ooze is found, start the engine and check if the coolant leaks continuously.
- OWhen coolant does not continuously leak, it is normal.
- ★If the mechanical seal is damaged, the coolant continuously leaks through the drainage outlet passage. Replace the mechanical seal unit.
- ★If the oil seal is damaged, engine oil leaks through the drainage outlet passage. Replace the water pump.

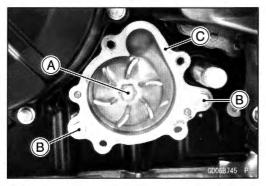
#### Mechanical Seal Inspection

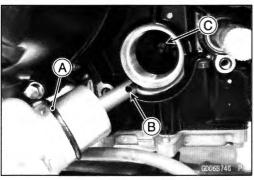
- Remove the impeller (see Water Pump Removal).
- Visually inspect the mechanical seal.
- ★If any of the parts is damaged, replace the mechanical seal with a new one (see Mechanical Seal Removal/Installation).
- OThe sealing seat and rubber seal may be removed easily by hand.

Impeller Sealing Seat Surface [A]

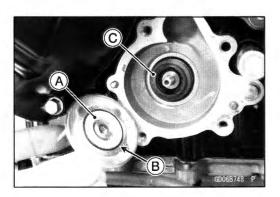
Rubber Seal [B]

Mechanical Seal Diaphragm [C]









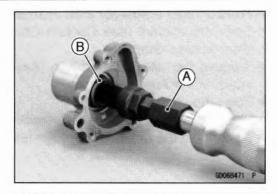
#### **Water Pump**

#### Mechanical Seal Removal

Remove:

Water Pump (see Water Pump Removal) Water Pump Shaft

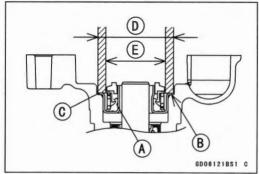
 Using a suitable tool [A], remove the mechanical seal [B] from the water pump housing.



#### Mechanical Seal Installation

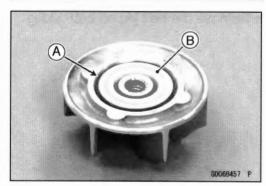
 Using a suitable tool or pipe with the dimension as shown, install the mechanical seal [A] to the water pump housing [B] until the flange [C] on the mechanical seal bottomed to the water pump housing.

 $30 \sim 33$  mm (1.2 ~ 1.3 in.) [D]  $26 \sim 29$  mm (1.0 ~ 1.1 in.) [E]



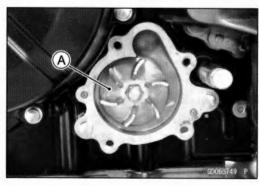
#### Impeller Assembly

- Clean the sliding surface of the mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rubber seal [A] and sealing seat [B], and install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.



## Water Pump Impeller Inspection

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



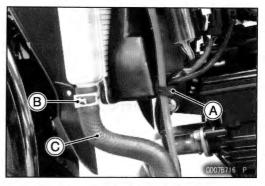
# **4-14 COOLING SYSTEM**

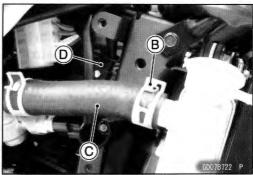
#### Radiator

#### Radiator and Radiator Fan Removal

• Remove the bolt [A] on both sides.

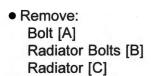
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- Open the clamp [A].
- Slide the clamps [B] and disconnect the water hoses [C].
- Disconnect the radiator fun motor lead connector [D].







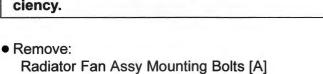


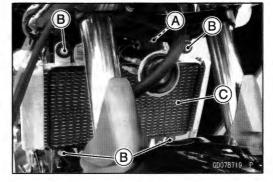


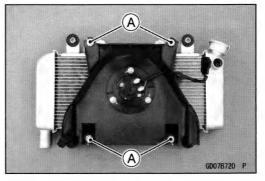
Radiator Fan Assy

#### NOTICE

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







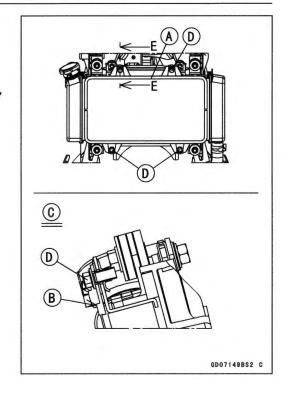
#### Radiator and Radiator Fan Installation

Installation is the reverse of removal.

#### **Radiator**

- Install the radiator guard [A] to the radiator, if removed.
   Step Side [B]
   Section E-E [C]
- Tighten:

Torque - Radiator Guard Bolts [D]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



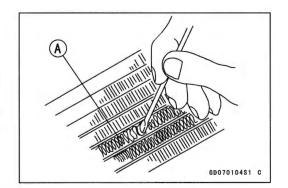
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Torque - Radiator Fan Assy Mounting Bolts: 8.4 N·m (0.86 kgf·m, 74 in·lb)

Radiator Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

#### Radiator Inspection

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

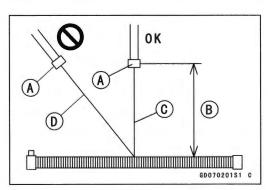


#### NOTICE

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage: Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core.

Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.

Run the steam gun, following the core fin direction.



#### Radiator

#### Radiator Cap Inspection

- Remove:
  - Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  - Coolant Reserve Tank (see Coolant Reserve Tank Removal)
  - Radiator Cap
- Check the condition of the bottom [A] and top [B] valve seals.
- ★ If any one of them shows visible damage, replace the cap with a new one.
- Install the cap [A] on a cooling system pressure tester [B].

#### NOTE

- OWet 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.

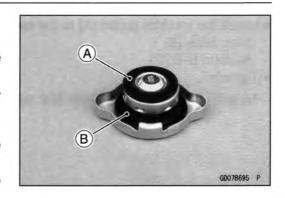


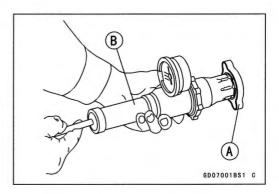
Standard: 107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 psi)

★ If the cap can not hold the specified pressure or if it holds too much pressure, replace it with a new one.

#### Radiator Filler Neck Inspection

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







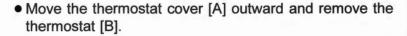
#### **Thermostat**

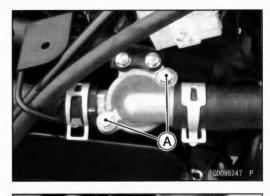
#### Thermostat Removal

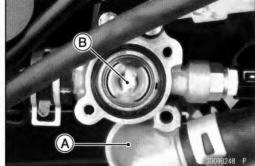
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:

Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

Thermostat Cover Bolts [A]







#### Thermostat Installation

- Install the thermostat [A] in the housing so that the air bleeder hole [B] faces as shown.
- Tighten:

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

Install the removed parts (see appropriate chapters).

# B (GD095249 P

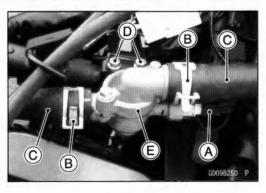
#### Thermostat Housing Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the water temperature sensor connector [A].
- Slide the clamps [B].
- Disconnect the hoses [C].
- Remove:

Thermostat Housing Mounting Bolts [D] Thermostat Housing [E]



Install the removed parts (see appropriate chapters).

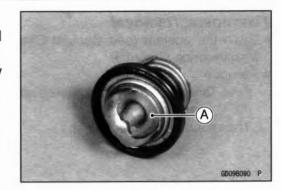


#### **4-18 COOLING SYSTEM**

#### **Thermostat**

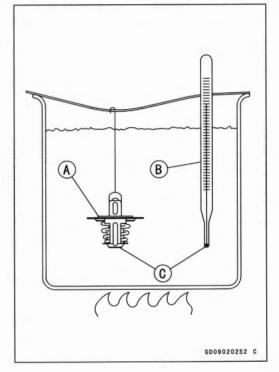
#### Thermostat Inspection

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

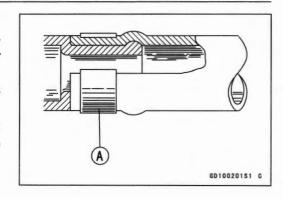
Thermostat Valve Opening Temperature 63.5 ~ 66.5°C (146 ~ 152°F)



#### **Water Hoses and Pipes**

#### Water Hose Installation

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



#### Water Hose Inspection

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

# Water Hose and O-ring Replacement

 Refer to the Water Hose and O-ring Replacement in the Periodic Maintenance chapter.

#### **4-20 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.

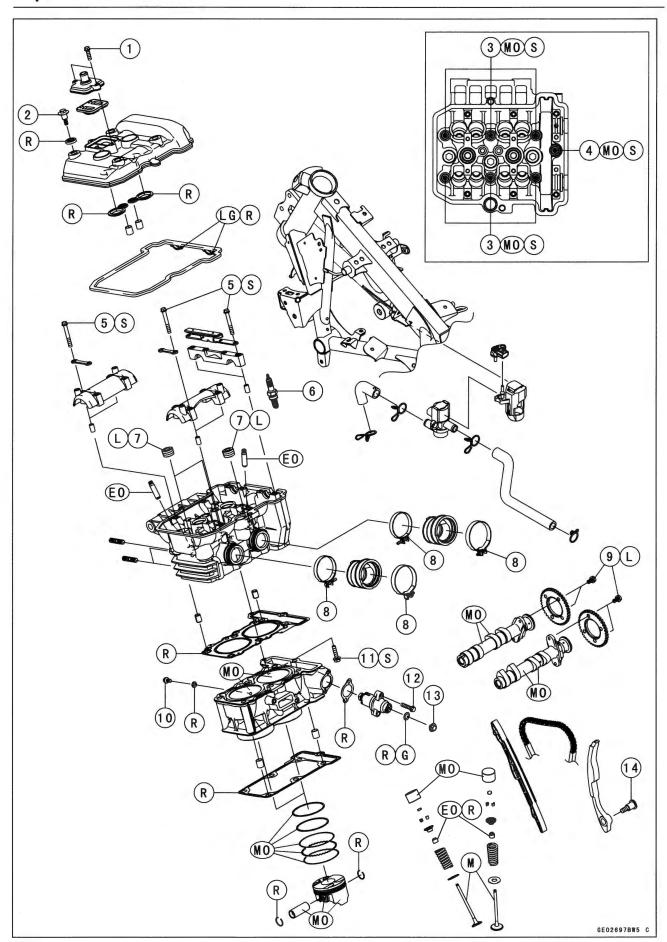
# **Engine Top End**

# **Table of Contents**

| Exploded View                      | 5-2  | Cylinder Head Installation       | 5-25 |
|------------------------------------|------|----------------------------------|------|
| Exhaust System Identification      | 5-6  | Cylinder Head Warp Inspection    | 5-26 |
| Specifications                     | 5-8  | Valves                           | 5-27 |
| Special Tools and Sealant          | 5-10 | Valve Clearance Inspection       | 5-27 |
| Clean Air System                   | 5-12 | Valve Clearance Adjustment       | 5-27 |
| Air Suction Valve Removal          | 5-12 | Valve Removal                    | 5-27 |
| Air Suction Valve Installation     | 5-12 | Valve Installation               | 5-27 |
| Air Suction Valve Inspection       | 5-12 | Valve Guide Removal              | 5-27 |
| Air Switching Valve Removal        | 5-13 | Valve Guide Installation         | 5-28 |
| Air Switching Valve Installation   | 5-13 | Valve-to-Guide Clearance         |      |
| Air Switching Valve Operation      |      | Measurement (Wobble              |      |
| Test                               | 5-13 | Method)                          | 5-28 |
| Air Switching Valve Unit Test      | 5-13 | Valve Seat Inspection            | 5-29 |
| Clean Air System Hose              |      | Valve Seat Repair                | 5-30 |
| Inspection                         | 5-13 | Cylinder, Pistons                | 5-35 |
| Cylinder Head Cover                | 5-14 | Cylinder Removal                 | 5-35 |
| Cylinder Head Cover Removal        | 5-14 | Cylinder Installation            | 5-35 |
| Cylinder Head Cover Installation . | 5-14 | Piston Removal                   | 5-36 |
| Camshaft Chain Tensioner           | 5-16 | Piston Installation              | 5-36 |
| Camshaft Chain Tensioner           |      | Cylinder Wear Inspection         | 5-37 |
| Removal                            | 5-16 | Piston Wear Inspection           | 5-37 |
| Camshaft Chain Tensioner           |      | Piston Ring, Piston Ring Groove  |      |
| Installation                       | 5-16 | Wear Inspection                  | 5-38 |
| Camshaft, Camshaft Chain           | 5-18 | Piston Ring Groove Width         |      |
| Camshaft Removal                   | 5-18 | Inspection                       | 5-38 |
| Camshaft Installation              | 5-19 | Piston Ring Thickness Inspection | 5-38 |
| Camshaft, Camshaft Cap Wear        |      | Piston Ring End Gap Inspection   | 5-39 |
| Inspection                         | 5-21 | Throttle Body Assy Holder        | 5-40 |
| Camshaft Runout Inspection         | 5-21 | Throttle Body Assy Holder        |      |
| Cam Wear Inspection                | 5-22 | Installation                     | 5-40 |
| Camshaft Chain Removal             | 5-22 | Muffler                          | 5-41 |
| Cylinder Head                      | 5-23 | Muffler Body Removal             | 5-41 |
| Cylinder Compression               |      | Muffler Body Installation        | 5-41 |
| Measurement                        | 5-23 | Exhaust Pipe Removal             | 5-42 |
| Cylinder Head Removal              | 5-24 | Exhaust Pipe Installation        | 5-43 |

# **5-2 ENGINE TOP END**

# **Exploded View**



#### **Exploded View**

| N. Fastanas |   | Torque       |       |           | Damarka |  |
|-------------|---|--------------|-------|-----------|---------|--|
| No.         | Fastener  | N·m          | kgf⋅m | ft·lb     | Remarks |  |
| 1           | Air Suction Valve Cover Bolts                   | 9.8          | 1.0   | 87 in·lb  |         |  |
| 2           | Cylinder Head Cover Bolts                       | 9.8          | 1.0   | 87 in·lb  |         |  |
| 3           | Cylinder Head Bolts (M8), L = 146 mm (5.75 in.) | see the text | -     | _         | MO, S   |  |
| 4           | Cylinder Head Bolts (M8), L = 115 mm (4.53 in.) | 32           | 3.3   | 24        | MO, S   |  |
| 5           | Camshaft Cap Bolts                              | 12           | 1.2   | 106 in·lb | S       |  |
| 6           | Spark Plugs                                     | 13           | 1.3   | 115 in·lb |         |  |
| 7           | Cylinder Head Jacket Plugs                      | 22           | 2.2   | 16        | L       |  |
| 8           | Throttle Body Assy Holder Clamp Screws          | 2.0          | 0.20  | 18 in·lb  |         |  |
| 9           | Camshaft Sprocket Bolts                         | 15           | 1.5   | 11        | L       |  |
| 10          | Coolant Drain Bolt (Cylinder)                   | 5.9          | 0.60  | 52 in·lb  |         |  |
| 11          | Cylinder Head Bolt (M6)                         | 12           | 1.2   | 106 in·lb | S       |  |
| 12          | Camshaft Chain Tensioner Mounting Bolts         | 9.8          | 1.0   | 87 in·lb  |         |  |
| 13          | Camshaft Chain Tensioner Cap Bolt               | 5.0          | 0.51  | 44 in·lb  |         |  |
| 14          | Rear Camshaft Chain Guide Bolt                  | 17           | 1.7   | 13        |         |  |

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.

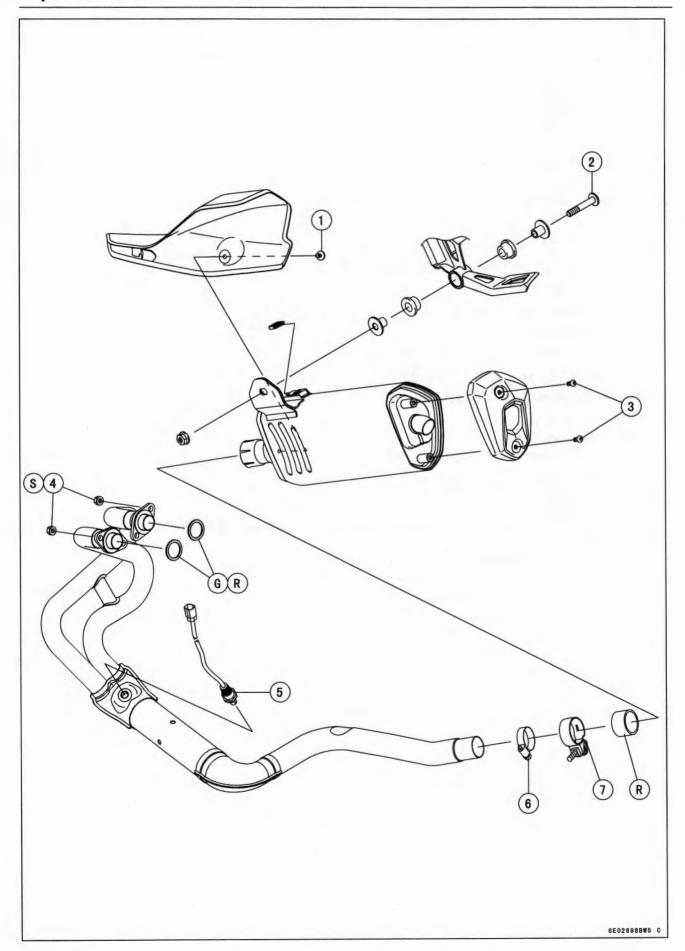
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

R: Replacement Parts

S: Follow the specified tightening sequence.

# **5-4 ENGINE TOP END**

# **Exploded View**



# **Exploded View**

| NI- | Footoner                   | Torque |       |           | Damania |
|-----|----------------------------|--------|-------|-----------|---------|
| No. | p. Fastener                | N·m    | kgf·m | ft·lb     | Remarks |
| 1   | Muffler Cover Bolts        | 9.8    | 1.0   | 87 in·lb  |         |
| 2   | Muffler Body Mounting Bolt | 30     | 3.1   | 22        |         |
| 3   | Muffler End Cover Bolts    | 4.4    | 0.45  | 39 in·lb  |         |
| 4   | Exhaust Pipe Holder Nuts   | 12     | 1.2   | 106 in·lb | S       |
| 5   | Oxygen Sensor              | 44.1   | 4.50  | 32.5      |         |
| 6   | Muffler Cover Clamp Bolt   | 6.9    | 0.70  | 61 in·lb  |         |
| 7   | Muffler Body Clamp Bolt    | 10     | 1.0   | 89 in·lb  |         |

G: Apply grease. R: Replacement Parts

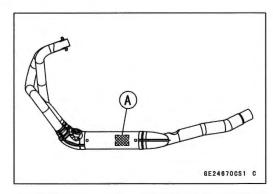
# 5-6 ENGINE TOP END

# **Exhaust System Identification**

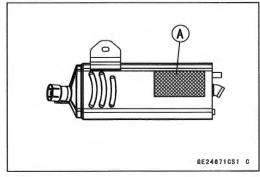
# **Exhaust System**

| MANIFOLD                               | MUFFLER             | SPECIFICATION    | MODEL                              |
|--|---------------------|------------------|------------------------------------|
| Honeycomb Type<br>Catalyst with Oxygen | Non-Catalyst        | BR<br>054 B4     | KLE300AJ/BJ/CJ                     |
| Sensor                                 | P/No. 49069-0825    | SEA-B1<br>SEA-B3 | KLE300AH ~/CH ~<br>KLE300AH ~/CH ~ |
| P/No. 39178-0275                       | Mark: KHI K 660     | WVTA (FULL)      | KLE300CH ~                         |
| Mark: KHI M 181                        | EPA Noise Emission  | ,                | 112000011                          |
|  | Control Information |                  |                                    |
| Honeycomb Type                         | Non-Catalyst        | CA               | KLE300CH ~                         |
| Catalyst with Oxygen Sensor            |                     | - CAL            | KLE300CH ~ KLE300BH ~/CH ~         |
|  | P/No. 49069-0825    | US               | KLE300BH ~/CH ~                    |
| P/No. 39178-0276<br>Mark: KHI M 184    | Mark: KHI K 660     |                  |                                    |
| Wark. Kill W 104                       | EPA Noise Emission  |                  |                                    |
|  | Control Information |                  |                                    |
| Honeycomb Type Catalyst with Oxygen    | Non-Catalyst        | AU<br>CO         | KLE300CH ~<br>KLE300BJ             |
| Sensor —                               | P/No. 49069-0825    | - IN<br>PH       | KLE300AJ                           |
| P/No. 39178-0278                       | Mark: KHI K 660     | TH               | KLE300BH ~/CH ~<br>KLE300AH ~/CH ~ |
| Mark: KHI M 185                        | EPA Noise Emission  |                  | KLLSOOAIT ~/OIT ~                  |
|  | Control Information |                  |                                    |
| Honeycomb Type<br>Catalyst with Oxygen | Non-Catalyst        |                  |                                    |
| Sensor —                               | P/No. 49069-0825    | - CN             | KLE300AJ/CJ                        |
| P/No. 39178-0298                       | Mark: KHI K 660     |                  |                                    |
| Mark: KHI M 190                        | EPA Noise Emission  |                  |                                    |
|  | Control Information |                  |                                    |

Manifold Mark Position [A]

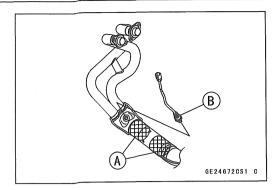


Muffler Body Mark Position [A]

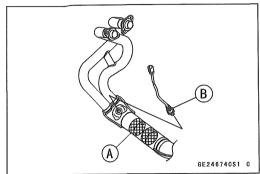


# **Exhaust System Identification**

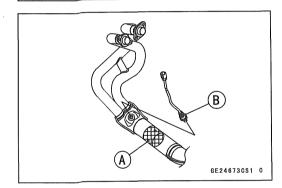
Honeycomb Type Catalyst Positions [A] (BR, SEA-B1, SEA-B3 and WVTA (FULL)) Models)
Oxygen Sensor [B]



Honeycomb Type Catalyst Position [A] (CA, CAL and US Models)
Oxygen Sensor [B]



Honeycomb Type Catalyst Position [A] (AU, CN, PH and TH Models)
Oxygen Sensor [B]



# 5-8 ENGINE TOP END

# Specifications

| Item  | Standard   | Service Limit           |  |
|---|--|-------------------------|--|
| amshafts  |  |                         |  |
| Cam Height:                                     |  |                         |  |
| Exhaust   | 32.843 ~ 32.957 mm (1.2930 ~ 1.2975 in.)   | 32.74 mm (1.289 in.)    |  |
| Intake  | 33.843 ~ 33.957 mm (1.3324 ~ 1.3369 in.)   | 33.74 mm (1.328 in.)    |  |
| Camshaft Journal/Cap<br>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 (0.94291 ~ 0.94378 in.)   | 23.92 mm (0.9417 in.)   |  |
| Camshaft Bearing Inside<br>Diameter             | 24.000 ~ 24.021 mm (0.94488 ~ 0.94571 in.)   | 24.08 mm (0.9480 in.)   |  |
| Camshaft Runout                                 | TIR 0.02 mm (0.0008 in.) or less   | TIR 0.1 mm (0.004 in.)  |  |
| Cylinder Head                                   |  |                         |  |
| Cylinder Compression                            | Usable Range 1 120 ~ 1 698 kPa (11.42 ~ 17.32 kgf/cm², 162.4 ~ 246.2 psi) @500 r/min (rpm) |                         |  |
| Cylinder Head Warp                              |  | 0.05 mm (0.002 in.)     |  |
| Valves  |  |                         |  |
| Valve Clearance:                                |  |                         |  |
| Exhaust   | 0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)   |                         |  |
| Intake  | 0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)   |                         |  |
| Valve Head Thickness:                           |  |                         |  |
| Exhaust   | 0.8 mm (0.03 in.)  | 0.5 mm (0.02 in.)       |  |
| Intake  | 0.5 mm (0.02 in.)  | 0.3 mm (0.01 in.)       |  |
| Valve Stem Bend                                 | TIR 0.01 mm (0.0004 in.) or less   | TIR 0.05 mm (0.002 in.) |  |
| Valve Stem Diameter:                            |  |                         |  |
| Exhaust   | 4.455 ~ 4.470 mm (0.1754 ~ 0.1760 in.)   | 4.44 mm (0.175 in.)     |  |
| Intake  | 4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in.)   | 4.46 mm (0.176 in.)     |  |
| Valve Guide Inside Diameter:                    | , ,  | ,                       |  |
| Exhaust   | 4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)   | 4.58 mm (0.180 in.)     |  |
| Intake  | 4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)   | 4.58 mm (0.180 in.)     |  |
| Valve/Valve Guide<br>Clearance (Wobble Method): | , ,  |                         |  |
| Exhaust   | 0.08 ~ 0.15 mm (0.0031 ~ 0.0059 in.)   | 0.33 mm (0.013 in.)     |  |
| Intake  | 0.03 ~ 0.09 mm (0.0012 ~ 0.0035 in.)   | 0.27 mm (0.011 in.)     |  |
| Valve Seat Cutting Angle                        | 45°, 32°, 67.5°  |                         |  |
| Valve Seating Surface:                          |  |                         |  |
| Outside Diameter:                               |  |                         |  |
| Exhaust   | 19.3 ~ 19.5 mm (0.760 ~ 0.778 in.)   |                         |  |
| Intake  | ,  |                         |  |
| (Other than CN<br>Model)                        | 22.9 ~ 23.1 mm (0.902 ~ 0.909 in.)   |                         |  |
| (CN Model)<br>Width:                            | 21.9 ~ 22.1 mm (0.862 ~ 0.870 in.)   |                         |  |
| Exhaust   | 0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)   |                         |  |
| Intake  | 0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)   |                         |  |

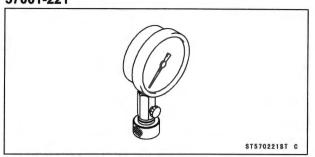
# Specifications

| Item                          | Standard                                 | Service Limit        |
|-------------------------------|--|----------------------|
| Valve Spring Free Length:     |  |                      |
| Exhaust                       | 39.5 mm (1.56 in.)                       | 38.0 mm (1.50 in.)   |
| Intake                        | 39.5 mm (1.56 in.)                       | 38.0 mm (1.50 in.)   |
| Cylinders, Pistons            |  |                      |
| Cylinder Inside Diameter      | 61.994 ~ 62.010 mm (2.4407 ~ 2.4413 in.) | 62.09 mm (2.444 in.) |
| Piston Diameter               | 61.969 ~ 61.984 mm (2.4397 ~ 2.4403 in.) | 61.82 mm (2.434 in.) |
| Piston/Cylinder Clearance     | 0.010 ~ 0.041 mm (0.0004 ~ 0.0016 in.)   |                      |
| Piston Ring/Groove Clearance: |  |                      |
| Тор                           | 0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in.)   | 0.17 mm (0.0067 in.) |
| Second                        | 0.020 ~ 0.060 mm (0.0008 ~ 0.0024 in.)   | 0.16 mm (0.0063 in.) |
| Piston Ring Groove Width:     |  |                      |
| Тор                           | 0.82 ~ 0.84 mm (0.032 ~ 0.033 in.)       | 0.92 mm (0.0362 in.) |
| Second                        | 0.81 ~ 0.83 mm (0.032 ~ 0.033 in.)       | 0.91 mm (0.0358 in.) |
| Piston Ring Thickness:        |  |                      |
| Тор                           | 0.77 ~ 0.79 mm (0.030 ~ 0.031 in.)       | 0.70 mm (0.028 in.)  |
| Second                        | 0.77 ~ 0.79 mm (0.030 ~ 0.031 in.)       | 0.70 mm (0.028 in.)  |
| Piston Ring End Gap:          |  | ,                    |
| Тор                           | 0.15 ~ 0.30 mm (0.006 ~ 0.012 in.)       | 0.6 mm (0.02 in.)    |
| Second                        | 0.40 ~ 0.55 mm (0.016 ~ 0.022 in.)       | 0.9 mm (0.04 in.)    |

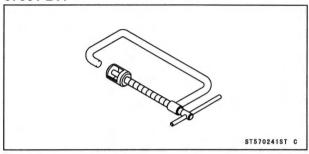
#### 5-10 ENGINE TOP END

## **Special Tools and Sealant**

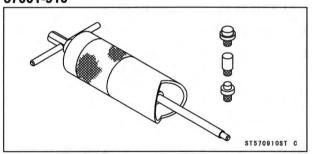
Compression Gauge, 20 kgf/cm<sup>2</sup>: 57001-221



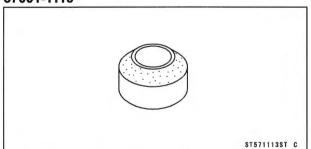
Valve Spring Compressor Assembly: 57001-241



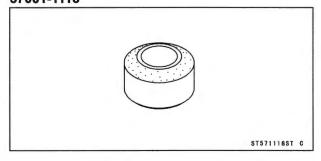
Piston Pin Puller Assembly: 57001-910



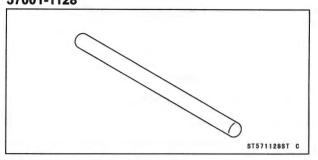
Valve Seat Cutter, 45° -  $\phi$ 24.5: 57001-1113



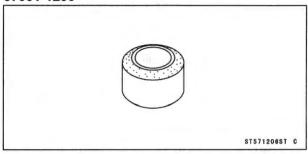
Valve Seat Cutter, 32 $^{\circ}$  -  $\phi$ 25: 57001-1118



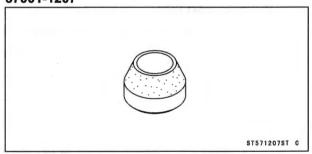
Valve Seat Cutter Holder Bar: 57001-1128



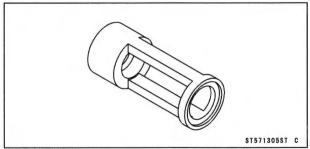
Valve Seat Cutter, 32° -  $\phi$ 22: 57001-1206



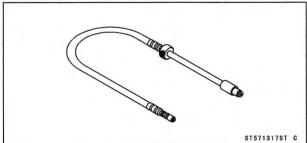
Valve Seat Cutter, 67.5° -  $\phi$ 22: 57001-1207



Valve Spring Compressor Adapter,  $\phi$ 16: 57001-1305

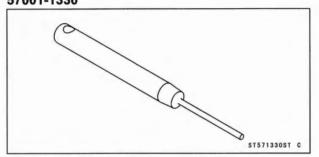


Compression Gauge Adapter, M10 × 1.0: 57001-1317

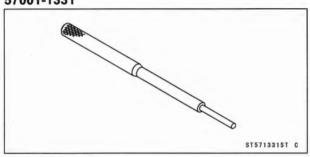


# **Special Tools and Sealant**

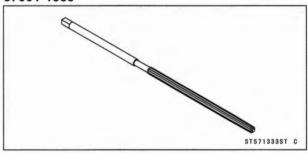
Valve Seat Cutter Holder,  $\phi$ 4.5: 57001-1330



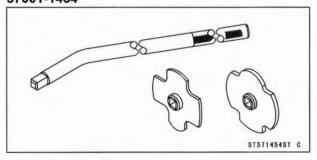
Valve Guide Arbor,  $\phi$ 4.5: 57001-1331



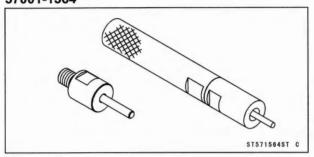
Valve Guide Reamer,  $\phi$ 4.5: 57001-1333



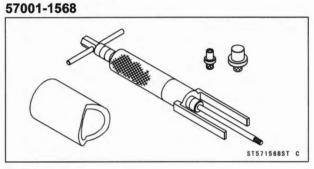
Filler Cap Driver: 57001-1454



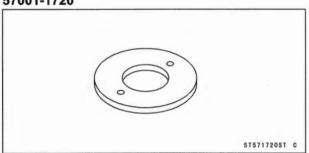
Valve Guide Driver: 57001-1564



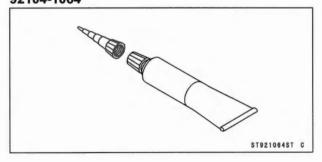
Piston Pin Puller:



Washer: 57001-1720



Liquid Gasket, TB1216B: 92104-1064



#### 5-12 ENGINE TOP END

#### **Clean Air System**

#### Air Suction Valve Removal

Remove:

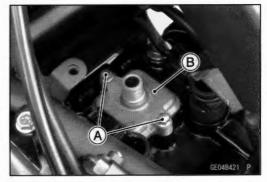
Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

Air Switching Valve (see Air Switching Valve Removal)

Air Suction Valve Cover Bolts [A]

Air Suction Valve Cover [B]

Air Suction Valve

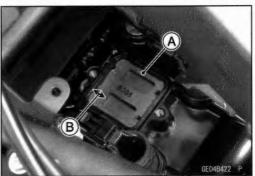


#### Air Suction Valve Installation

- Install the air suction valve [A] so that its wider side [B] of the reed valve case faces the front.
- Tighten:

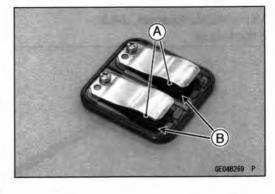
Torque - Air Suction Valve Cover Bolts : 9.8 N·m (1.0 kgf·m, 87 in·lb)

• Install the removed parts (see appropriate chapters).



#### Air Suction Valve Inspection

- Remove the air suction valve (see Air Suction Valve Removal).
- Visually inspect the reeds for cracks, folds, warps, heat damage or other damage.
- ★If there is any doubt as to the condition of the reeds [A], replace the air suction valve as an assembly.
- Check the reed contact areas [B] of the valve holder for grooves, scratches, any signs of separation from the holder or heat damage.
- If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.
- If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high flash-point solvent.



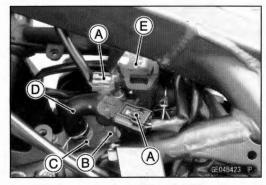
#### NOTICE

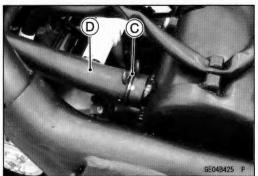
Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.

## Clean Air System

## Air Switching Valve Removal

- Remove:
  - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the connectors [A].
- Disconnect the hose [B] from the intake air pressure sensor.
- Slide the clamps [C].
- Disconnect the hoses [D] from the air suction valve cover and air cleaner housing fitting, and remove the air switching valve assembly [E].



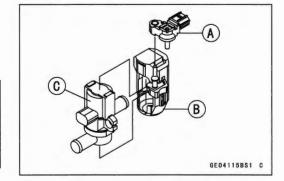


#### Remove:

Intake Air Pressure Sensor [A]
Damper [B]
Air Switching Valve [C]

#### NOTICE

Never drop the air switching valve especially on a hardsurface. Such a shock to the air switching valve can damaged it.



#### Air Switching Valve Installation

- Installation is the reverse of removal.
- Run the lead and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

#### Air Switching Valve Operation Test

 Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

#### Air Switching Valve Unit Test

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

#### Clean Air System Hose Inspection

- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, air switching valve and air suction valve cover
- ★If they are not, correct them. Replace them if they are damaged.

#### 5-14 ENGINE TOP END

## **Cylinder Head Cover**

#### Cylinder Head Cover Removal

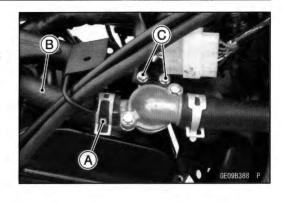
Remove:

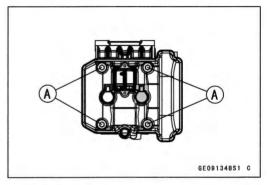
Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)

Air Switching Valve (see Air Switching Valve Removal)
Air Suction Valve (see Air Suction Valve Removal)
Stick Coils (see Stick Coil Removal in the Electrical System chapter)

- Slide the clamp [A].
- Disconnect the water hose [B].
- Remove the thermostat housing mounting bolts [C].
- Remove:

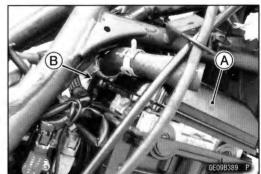
Cylinder Head Cover Bolts [A] Washers





- Pull up the cylinder head cover [A].
- Remove:

Water Pipe [B] Cylinder Head Cover

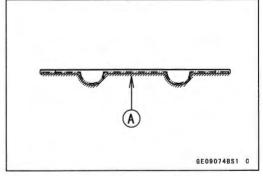


## Cylinder Head Cover Installation

- Replace the head cover gasket with a new one.
- Clean off any oil or dirt and apply liquid gasket [A] to the head cover gasket as shown.

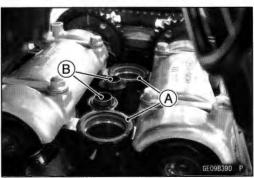
Sealant - Liquid Gasket, TB1216B: 92104-1064

• Install the head cover gasket.



- Replace the plug hole gaskets [A] with new ones.
- Install:

Dowel Pins [B]
Plug Hole Gaskets



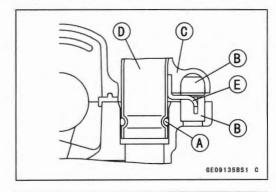
## **Cylinder Head Cover**

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

Dampers [B]
Cylinder Head Cover [C]

Water Pipe [D]

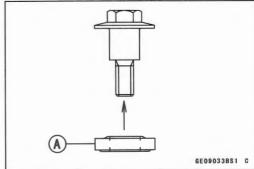
• Insert the hook [E] of the water pipe in the groove of the damper as shown.



- Replace the washers [A] with new ones.
- Install the washers with metal side faces upward.
- Tighten:

Torque - Cylinder Head Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

• Install the removed parts (see appropriate chapters).



#### **Camshaft Chain Tensioner**

#### Camshaft Chain Tensioner Removal

#### NOTICE

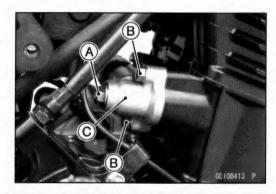
This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.

When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation".

Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing and damage the valves.

#### Remove:

Right Side Cover (see Side Cover Removal in the Frame chapter)
Cap Bolt [A]
O-ring
Mounting Bolts [B]
Camshaft Chain Tensioner [C]



#### Camshaft Chain Tensioner Installation

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

#### NOTICE

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

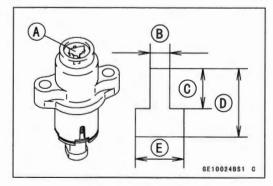
- Replace the camshaft chain tensioner gasket with a new one.
- While holding the rod in position with a suitable push rod holder plate [A] install the tensioner on the cylinder block.

3.5 mm (0.14 in.) [B] 7 mm (0.28 in.) [C]

12 mm (0.47 in.) [D]

8.5 mm (0.33 in.) [E]





## **Camshaft Chain Tensioner**

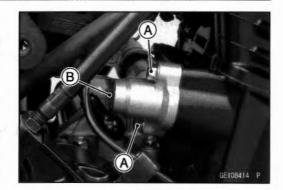
• Tighten:

Torque - Camshaft Chain Tensioner Mounting Bolts [A]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Take out the holder plate [B].
- Replace the O-ring with a new one and apply grease to it.
- Tighten the cap bolt.

Torque - Camshaft Chain Tensioner Cap Bolt: 5.0 N·m (0.51 kgf·m, 44 in·lb)

 Install the right side cover (see Side Cover Installation in the Frame chapter).



## Camshaft, Camshaft Chain

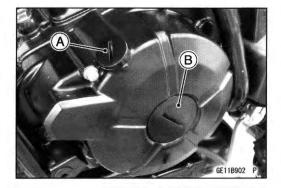
#### Camshaft Removal

• Remove:

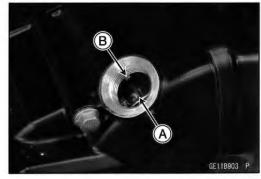
Cylinder Head Cover (see Cylinder Head Cover Removal)

Timing Inspection Cap [A]
Alternator Rotor Bolt Cap [B]

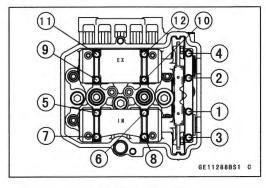
Special Tool - Filler Cap Driver: 57001-1454



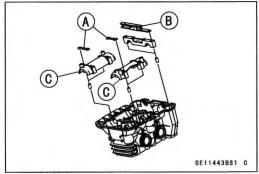
- Position the crankshaft at #2 piston TDC.
- OUsing a wrench on the alternator rotor bolt, turn the crankshaft counterclockwise until the "2T" mark [A] on the alternator rotor is aligned with the projection [B] in the inspection window on the alternator cover.



- Remove:
  - Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
- Loosen the camshaft cap bolts gradually and evenly as shown sequence [1 ~ 12] and remove them.



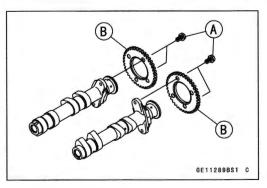
- Remove:
  - Plates [A]
    Upper Chain Guide [B]
    Camshaft Caps [C]
    Camshafts
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.



- Remove:
  - Camshaft Sprocket Bolts [A] Camshaft Sprockets [B]

## NOTICE

The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.



## Camshaft, Camshaft Chain

#### Camshaft Installation

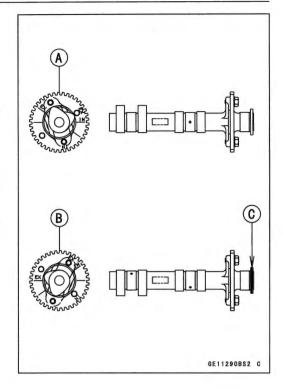
Install the camshaft sprockets as shown.
 Intake Camshaft Sprocket [A]
 Exhaust Camshaft Sprocket [B]

OThe exhaust camshaft has the groove [C].

 Apply a non-permanent locking agent to the threads of the camshaft sprocket bolts and tighten them.

Torque - Camshaft Sprocket Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Apply molybdenum disulfide oil solution to all cam parts and journals.
- ★ If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.



 Position the crankshaft at #2 piston TDC (see Camshaft Removal).

#### NOTICE

The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

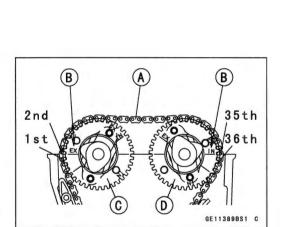
- Engage the camshaft chain [A] with the camshaft sprockets.
- Pull the tension side (exhaust side) of the chain taut to install the chain on the sprockets.
- OTiming marks [B] align with the cylinder head upper surface.

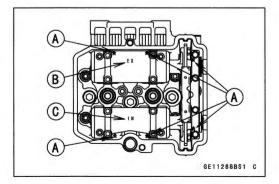
Exhaust Camshaft Sprocket [C] Intake Camshaft Sprocket [D]

- OCount the camshaft chain link pins as shown to verify that the sprocket are positioned correctly.
- Install the six dowel pins on the ★ marks [A].
- Install the camshaft caps as shown, noting the "EX" [B] and "IN" [C] marks.

#### NOTICE

The camshaft caps are machined with the cylinder head. So, if a cap is installed in a wrong location, the camshaft may seize because of improper oil clearance in the bearings.

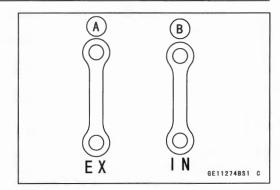




#### 5-20 ENGINE TOP END

## Camshaft, Camshaft Chain

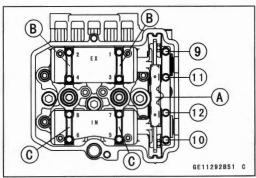
- Install the plates on the camshaft caps.
- OThe exhaust side plates [A] are longer than the intake side plates [B].

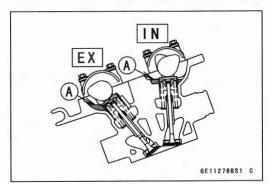


- Install the upper chain guide [A].
- First tighten the all camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence [1 ~ 12].

Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)
Plates (EX) [B]
Plates (IN) [C]

- Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).
- Finally, inject [A] the engine oil into 8 places on the cylinder head as shown.
- Install the cylinder head cover (see Cylinder Head Cover Installation).





## Camshaft, Camshaft Chain

#### Camshaft, Camshaft Cap Wear Inspection

Remove:

Upper Chain Guide (see Camshaft Removal) Camshaft Caps (see Camshaft Removal)

- Cut the strips of plastigauge to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Measure each clearance between the camshaft journal and the camshaft cap using the plastigauge (press gauge) [A].
- Tighten the camshaft cap bolts (see Camshaft Installation).

#### NOTE

ODo not turn the camshaft when the plastigauge is between the journal and camshaft cap.

#### Camshaft Journal, Camshaft Cap Clearance

Standard: 0.028

0.028 ~ 0.071 mm (0.0011 ~ 0.0028 in.)

Service Limit: 0.16 mm (0.0063 in.)

★If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

#### **Camshaft Journal Diameter**

Standard:

23.950 ~ 23.972 mm (0.94291 ~ 0.94378

in.)

Service Limit: 23.92 mm (0.9417 in.)

- ★If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.
- ★If the clearance still remains out of the service limit, replace the cylinder head unit.

#### **Camshaft Runout Inspection**

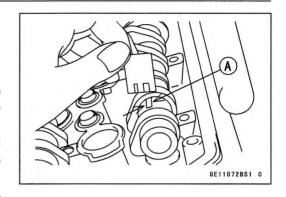
- Remove the camshafts (see Camshaft Removal).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure the runout with a dial gauge at the specified place as shown.
- ★If the runout exceeds the service limit, replace the camshaft.

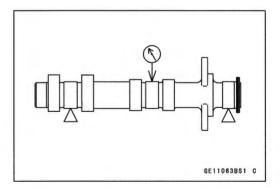
#### **Camshaft Runout**

Standard:

TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.1 mm (0.004 in.)





## 5-22 ENGINE TOP END

## Camshaft, Camshaft Chain

#### Cam Wear Inspection

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

## **Cam Height**

## Standard:

Exhaust 32.843 ~ 32.957 mm

(1.2930 ~ 1.2975 in.)

Intake 33.843 ~ 33.957 mm

(1.3324 ~ 1.3369 in.)

**Service Limit:** 

**Exhaust** 

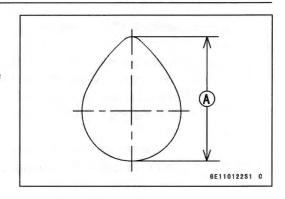
32.74 mm (1.289 in.)

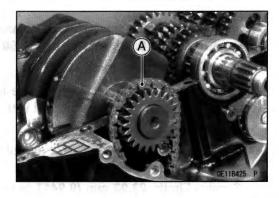
Intake

33.74 mm (1.328 in.)

#### Camshaft Chain Removal

- Split the crankcase (see Crankcase Splitting in the Crankshaft/Transmission chapter).
- Remove the camshaft chain [A] from the crankshaft sprocket.





## Cylinder Head

## **Cylinder Compression Measurement**

#### NOTE

OUse 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.

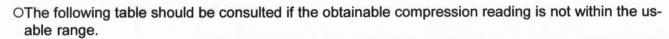
Special Tools - Compression Gauge, 20 kgf/cm<sup>2</sup>: 57001-221 Compression Gauge Adapter, M10 × 1.0: 57001-1317



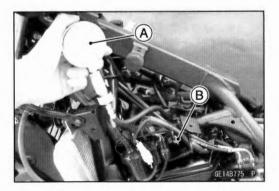
Usable Range: 1 120 ~ 1 698 kPa (11.42 ~ 17.32 kgf/cm², 162.4 ~ 246.2 psi) @500 r/min (rpm)

- Repeat the measurement for the other cylinder.
- Install the spark plugs.

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



| 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         | Gas leakage around cylinder head  | Replace damaged check gasket and cylinder head warp.                             |
| range.  | 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

• Drain:

Coolant (see Coolant Change in the Periodic Maintenance chapter)

Remove:

Cylinder Head Cover (see Cylinder Head Cover Removal)

Camshafts (see Camshaft Removal)

Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)

Thermostat Housing (see Thermostat Housing Removal in the Cooling System chapter)

Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)

Exhaust Pipe (see Exhaust Pipe Removal)

Front Camshaft Chain Guide [A]



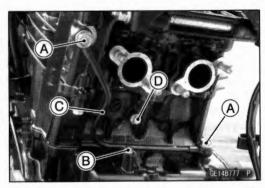
Oil Pipe Banjo Bolts (Outside) [A] Washers Oil Pipe Bolt [B] Oil Pipe [C]

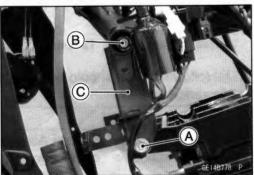
 Remove the coolant drain bolt (cylinder) [D] to drain the coolant from the cylinder.



Front Engine Mounting Bolt [A] and Nut Engine Bracket Bolt [B] and Nut Engine Bracket [C]



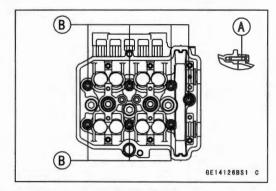




## **Cylinder Head**

• Remove:

M6 Cylinder Head Bolt [A] M8 Cylinder Head Bolts [B] Cylinder Head

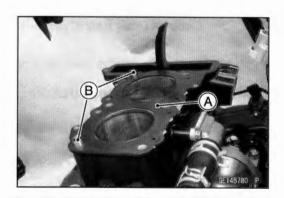




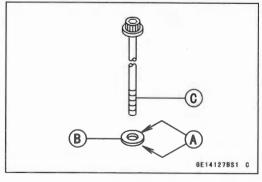
## Cylinder Head Installation

#### NOTE

- OThe camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.
- Replace the cylinder head gasket [A] with a new one.
- Install the dowel pins [B] and cylinder head gasket.



- Replace the cylinder head bolt washers with new ones.
- Apply molybdenum disulfide oil solution to both sides [A] of the cylinder head bolt washers [B] and the threads of the head bolts [C].



#### 5-26 ENGINE TOP END

## Cylinder Head

Temporarily tighten the cylinder head bolts (M8), L = 146 mm (5.75 in.) [1 ~ 6].

Torque - Cylinder Head Bolts (M8), L = 146 mm (5.75 in.): 25 N·m (2.5 kgf·m, 18 ft·lb)

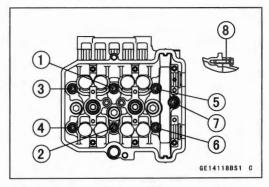
 Tighten the cylinder head bolts following the tightening sequence [1 ~ 8].

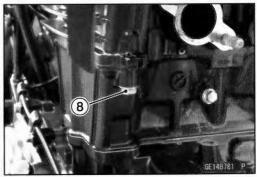
115 mm (4.53 in.) [7]

Torque - Cylinder Head Bolts (M8), L = 146 mm (5.75 in.): 32 N·m (3.3 kgf·m, 24 ft·lb)

Cylinder Head Bolt (M8), L = 115 mm (4.53 in.): 32 N·m (3.3 kgf·m, 24 ft·lb)

Cylinder Head Bolt (M6) [8]: 12 N·m (1.2 kgf·m, 106 in·lb)





- Replace the gasket and washer with new ones.
- Install the oil pipe.
- Tighten:

Torque - Oil Pipe Banjo Bolts (Outside): 19.6 N·m (2.00 kgf·m, 14.5 ft·lb)

Oil Pipe Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Coolant Drain Bolt (Cylinder): 5.9 N·m (0.60 kgf·m, 52 in·lb)

Install the removed parts (see appropriate chapters).

## Cylinder Head Warp Inspection

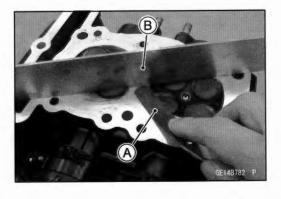
- Clean the cylinder head.
- Lay a straightedge across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

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).



#### 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

- OMark 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,  $\phi$ 16 [B]: 57001-1305

#### Valve Installation

- Replace the oil seal with a new one.
- Apply engine oil to the lip of the oil seal.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the spring so that the closed coil end faces downwards.

Valve Stem [A]

Spring Seat [B]

Valve Spring [C]

Oil Seal [D]

Retainer [E]

Split Keepers [F]

Closed Coil End [G]

#### Valve Guide Removal

Remove:

Valve (see Valve Removal)

Oil Seal

Spring Seat

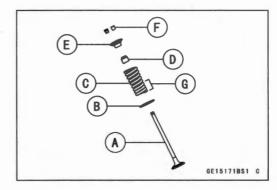
Heat the area around the valve guide to 120 ~ 150°C (248 ~ 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

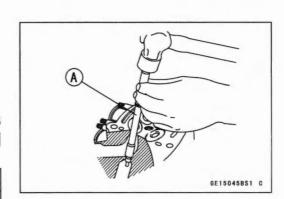
#### NOTICE

Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head in oil and heat the oil.

Special Tool - Valve Guide Arbor,  $\phi$ 4.5: 57001-1331







#### Valve Guide Installation

- Apply engine oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).

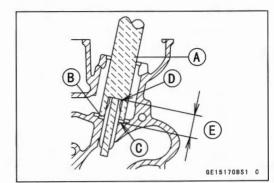
#### NOTICE

Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head and heat the oil.

 Using the valve guide driver [A] and washer [B], press and insert the valve guide in until the washer surface [C] touches the head surface [D].

15.3 ~ 15.5 mm (0.60 ~ 0.61 in.) [E]

Special Tools - Valve Guide Driver: 57001-1564 Washer: 57001-1720



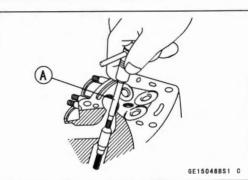
- Wait until the cylinder head cools down and then ream the valve guide with the valve guide reamer [A] even if the old guide is reused.
- OTurn the reamer in a clockwise direction until the reamer turns freely in the guide. Never turn the reamer counterclockwise or it will be dulled.
- Once the guides are reamed they must be cleaned thoroughly.

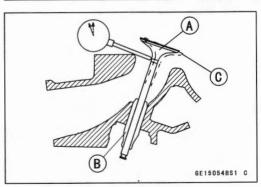
Special Tool - Valve Guide Reamer,  $\phi$ 4.5: 57001-1333

# Valve-to-Guide Clearance Measurement (Wobble Method)

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.
- ★ If the reading exceeds the service limit, replace the guide.





#### NOTE

OThe reading is not actual valve/valve guide clearance because the measuring point is above the guide.

#### Valve/Valve Guide Clearance (Wobble Method)

Standard:

Exhaust 0.08 ~ 0.15 mm (0.0031 ~ 0.0059 in.)

Intake 0.03 ~ 0.09 mm (0.0012 ~ 0.0035 in.)

**Service Limit:** 

Exhaust 0.33 mm (0.013 in.)

Intake 0.27 mm (0.011 in.)

#### Valve Seat Inspection

Remove the valve (see Valve Removal).

 Check the valve seating surface [A] between the valve [B] and valve seat [C].

OMeasure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter is too large or too small, repair the seat (see Seat Repair).

## Valve Seating Surface Outside Diameter Standard:

Exhaust 19.3 ~ 19.5 mm (0.760 ~

0.778 in.)

Intake (Other than 22.9 ~ 23.1 mm (0.902 ~

CN Model) 0.909 in.)

(CN Model) 21.9 ~ 22.1 mm (0.862 ~

0.870 in.)

OMeasure 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]

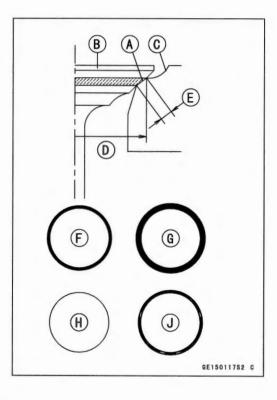
★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

#### 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,  $\phi$ 4.5 [C]: 57001 -1330

#### [For Exhaust Valve Seat]

Valve Seat Cutter, 45° -  $\phi$ 24.5: 57001-1113 Valve Seat Cutter, 32° -  $\phi$ 22: 57001-1206

Valve Seat Cutter,  $67.5^{\circ} - \phi 22$ : 57001-1207

[For Intake Valve Seat]

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

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

Valve Seat Cutter,  $67.5^{\circ}$  -  $\phi$ 22: 57001-1207

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

#### **Seat Cutter Operation Care**

- 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.
- Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
- 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

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

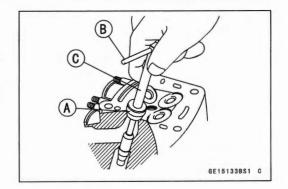
- OPrior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.
- After use, wash it with washing oil and apply thin layer of engine oil before storing.

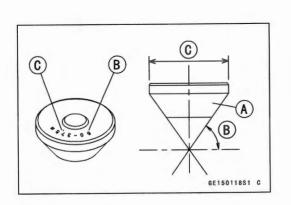
#### Marks Stamped on the Cutter

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

60° ...... Cutter angle [B]

 $37.5\phi$  ...... Outer diameter of cutter [C]





#### **Operating Procedures**

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

#### NOTICE

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

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

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

Ground Volume [B] by 32° cutter

32° [C]

Correct Width [D]

Ground Volume [E] by 67.5° cutter

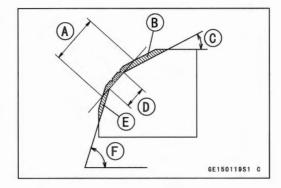
67.5° [F]

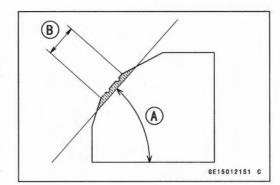
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.

Original Seating Surface [B]

#### NOTE

- ORemove all pittings of flaws from 45° ground surface.
- OAfter grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 67.5° grinding operation easier.
- OWhen the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.

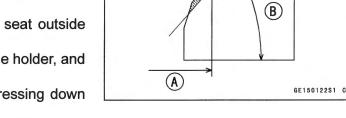




#### 5-32 ENGINE TOP END

#### **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.
- OTo make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.
- OTurn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

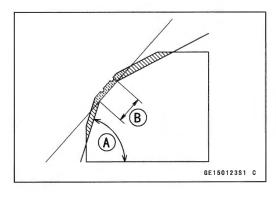


#### NOTICE

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

- OAfter 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 67.5° [A] grind described below.
- ★ If the seat width is within the specified range, lap the valve to the seat as described below.
- Grind the seat at a 67.5° angle until the seat width is within the specified range.
- OTo make the 67.5° grind, fit 67.5° cutter into the holder, and slide it into the valve guide.
- OTurn the holder, while pressing down lightly.
- OAfter making the 67.5° grind, return to the seat width measurement step above.

Correct Width [B]



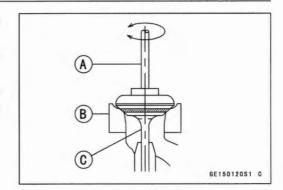
- Lap the valve to the seat, once the seat width and outside diameter are within the ranges specified above.
- OPut a little coarse grinding compound on the face of the valve in a number of places around the valve head.
- OSpin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
- ORepeat the process with a fine grinding compound.

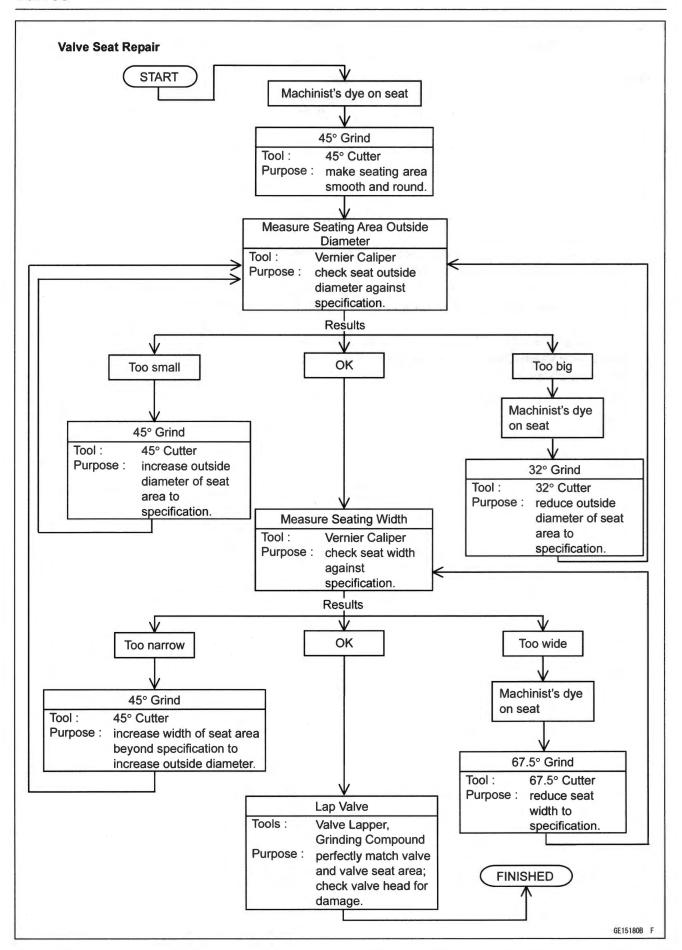
Lapper [A]

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).



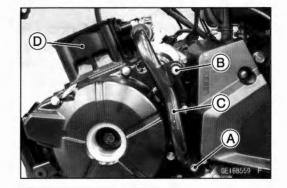


## Cylinder Removal

Remove:

Cylinder Head (see Cylinder Head Removal) Water Pipe Bolt [A] Alternator Cover Bolt [B]

- Disconnect the water pipe [C].
- Remove the cylinder [D].

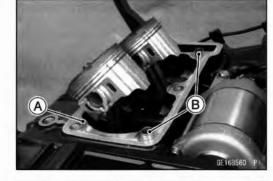


#### Cylinder Installation

#### NOTE

Olf a new cylinder is used, use a new piston ring.

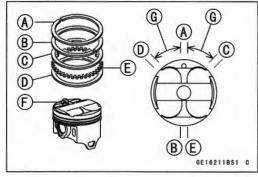
- Replace the cylinder gasket [A] with a new one.
- Install the dowel pins [B] and new cylinder gasket.

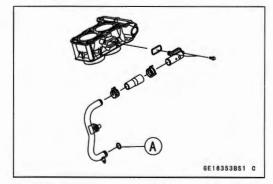


The piston ring openings must be positioned as shown.
 The openings of the oil ring steel rails must be about 30
 40° of angle from the opening of the top ring.

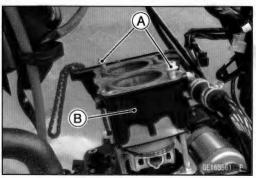
Top Ring [A]
Second Ring [B]
Upper Oil Ring Steel Rail [C]
Lower Oil Ring Steel Rail [D]
Oil Ring Expander [E]
Dent [F]
30 ~ 40° [G]

 Replace the O-ring [A] with a new one and apply grease to it.





- Apply molybdenum disulfide oil solution to the cylinder bore, piston rings and piston skirt.
- Prepare two auxiliary head bolts [A] with their head cut.
   OInstall the two bolts diagonally in the crankcase.
- Position the crankshaft so that the piston heads are almost level.
- Install the cylinder block [B].
- Olnsert the piston rings with your thumbs.
- Install the removed parts (see appropriate chapters).



#### Piston Removal

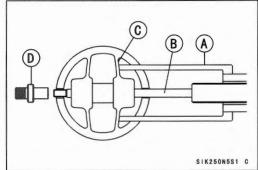
- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the pistons and remove the piston pin snap ring [A] from the outside of each piston.



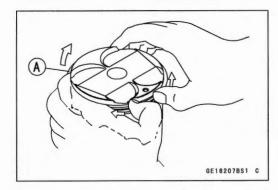
Remove the piston pins with the piston pin puller [A].
 Center Bolt [B]
 Shell of piston [C]

Special Tool - Piston Pin Puller Assembly [D]: 57001-910
Piston Pin Puller: 57001-1568

Remove the pistons.



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

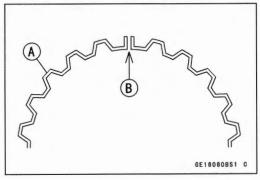


#### Piston Installation

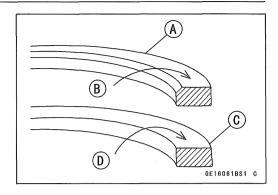
- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.
- OSpread the rail with your thumbs, but only enough to fit the rail over the piston.
- ORelease the rail into the bottom piston ring groove.



OThe oil ring rails have no "top" or "bottom".



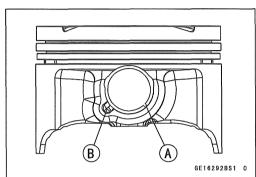
- Do not mix up the top and second ring.
- Install the top ring [A] so that the "1R" mark [B] faces up.
- Install the second ring [C] so that the "RN" mark [D] faces
- OApply molybdenum disulfide oil solution to the piston rings.



#### NOTE

Olf 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.
- OApply molybdenum disulfide oil solution to the piston pins and piston journals.
- OWhen 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]

Standard:

61.994 ~ 62.010 mm (2.4407 ~ 2.4413 in.)

Service Limit: 62.09 mm (2.444 in.)

#### Cylinder Inside Diameter

Piston Wear Inspection

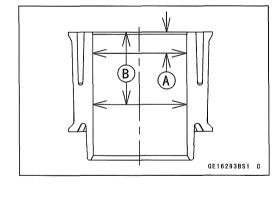
- Measure the outside diameter [A] of each piston 5 mm (0.20 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.
- ★ If the measurement is under service limit, replace the piston.

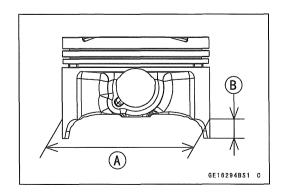
#### **Piston Diameter**

Standard:

61.969 ~ 61.984 mm (2.4397 ~ 2.4403 in.)

Service Limit: 61.82 mm (2.434 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.



Standard:

Top

0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in.)

Second

 $0.020 \sim 0.060 \text{ mm} (0.0008 \sim 0.0024 \text{ in.})$ 

Service Limit:

Top

0.17 mm (0.0067 in.)

Second

0.16 mm (0.0063 in.)

## Piston Ring Groove Width Inspection

Measure the piston ring groove width.

OUse a vernier caliper at several points around the piston.

#### **Piston Ring Groove Width**

Standard:

Top [A]

0.82 ~ 0.84 mm (0.032 ~ 0.033 in.)

Second [B] 0.81 ~ 0.83 mm (0.032 ~ 0.033 in.)

Service Limit:

Top

0.92 mm (0.0362 in.)

Second

0.91 mm (0.0358 in.)

★If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

#### Piston Ring Thickness Inspection

• Measure the piston ring thickness.

OUse the micrometer to measure at several points around the ring.

#### **Piston Ring Thickness**

Standard:

Top [A]

0.77 ~ 0.79 mm (0.030 ~ 0.031 in.)

Second [B]  $0.77 \sim 0.79 \text{ mm} (0.030 \sim 0.031 \text{ in.})$ 

**Service Limit:** 

Top

0.70 mm (0.028 in.)

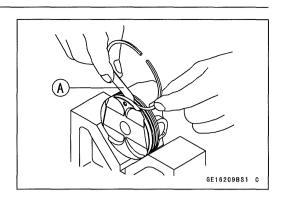
Second

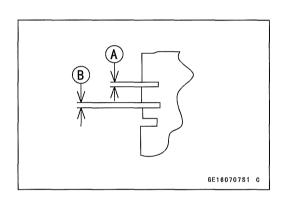
0.70 mm (0.028 in.)

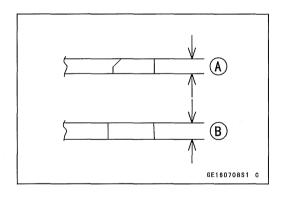
★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

#### NOTE

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







#### Piston Ring End Gap Inspection

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

#### **Piston Ring End Gap**

#### Standard:

Top

0.15 ~ 0.30 mm (0.006 ~ 0.012 in.)

Second

0.40 ~ 0.55 mm (0.016 ~ 0.022 in.)

#### **Service Limit:**

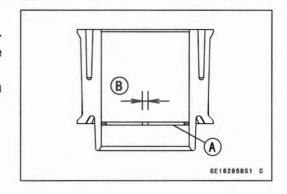
Top

0.6 mm (0.02 in.)

Second

0.9 mm (0.04 in.)

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



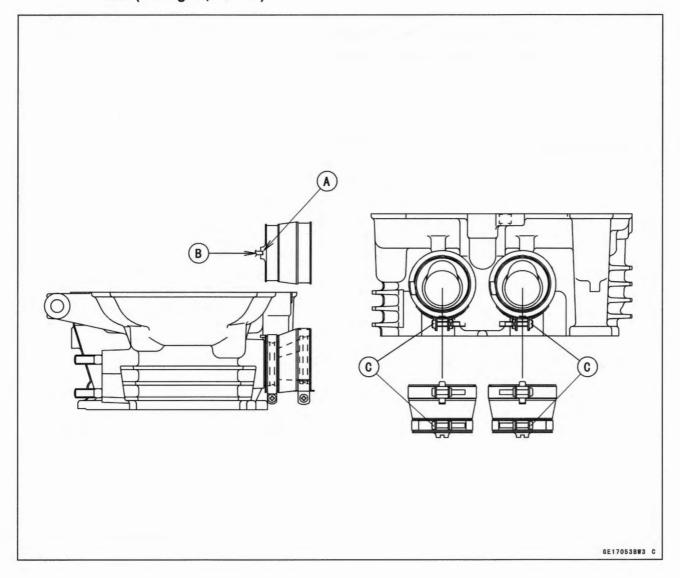
## 5-40 ENGINE TOP END

## **Throttle Body Assy Holder**

## Throttle Body Assy Holder Installation

- Fit the groove [A] of the throttle body holder to the projection [B] of the cylinder head.
- Install the clamps [C] as shown.
- Tighten:

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



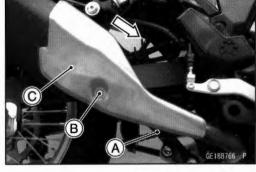
#### Muffler

## **A** WARNING

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

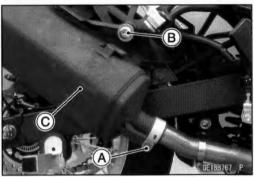
#### Muffler Body Removal

- Loosen the muffler cover clamp bolt [A].
- Remove the muffler cover bolt [B].
- Remove the muffler cover [C] forward.



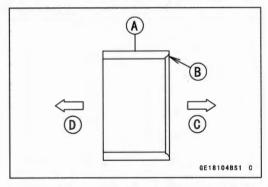
- Loosen the muffler body clamp bolt [A].
- Remove:

Muffler Body Mounting Nut and Bolt [B] Muffler Body [C]



## **Muffler Body Installation**

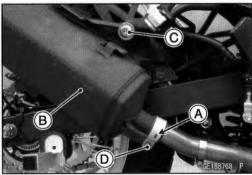
- Replace the muffler body gasket [A] with a new one.
- Install the muffler body gasket so that its chamfer side [B] faces front [C].
   Rear [D]



- Fit the muffler body tooth and the muffler body clamp hole [A].
- Install the muffler body [B].
- Tighten:

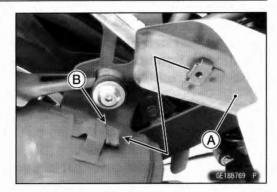
Torque - Muffler Body Mounting Bolt [C]: 30 N·m (3.1 kgf·m, 22 ft·lb)

Muffler Body Clamp Bolt [D]: 10 N·m (1.0 kgf·m, 89 in·lb)



#### Muffler

 Insert the muffler cover [A] into the muffler body claw (grommet) [B].



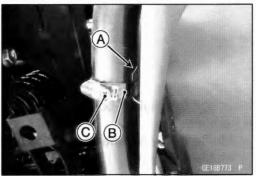
 Insert the claw [A] into the cover clamp [B] and tighten the clamp bolt [C] as shown.
 45 ~ 55° [D]

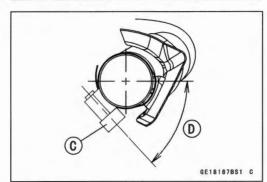
Torque - Muffler Cover Clamp Bolt: 6.9 N·m (0.70 kgf·m, 61 in·lb)

• Tighten:

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

- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and screw.
- Install the removed parts (see appropriate chapters).





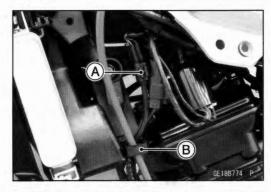
## Exhaust Pipe Removal

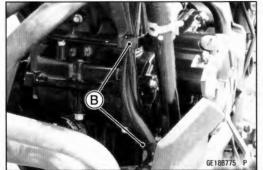
Remove:

Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)

Muffler Body (see Muffler Body Removal)

- Disconnect the oxygen sensor connector [A].
- Open the clamps [B].

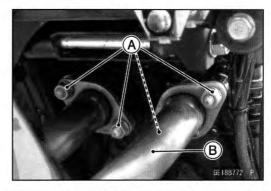




## Muffler

• Remove:

Exhaust Pipe Holder Nuts [A] Exhaust Pipe [B]

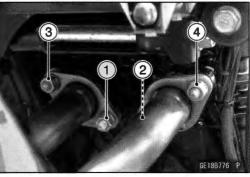


#### **Exhaust Pipe Installation**

- Replace the exhaust pipe gaskets and muffler body gasket with new ones.
- Apply grease to the exhaust pipe gaskets.
- Install the exhaust pipe.
- Tighten the exhaust pipe holder nuts following the tightening sequence [1 ~ 4].

Torque - Exhaust Pipe Holder Nuts: 12 N·m (1.2 kgf·m, 106 in·lb)

• Install the removed parts (see appropriate chapters).



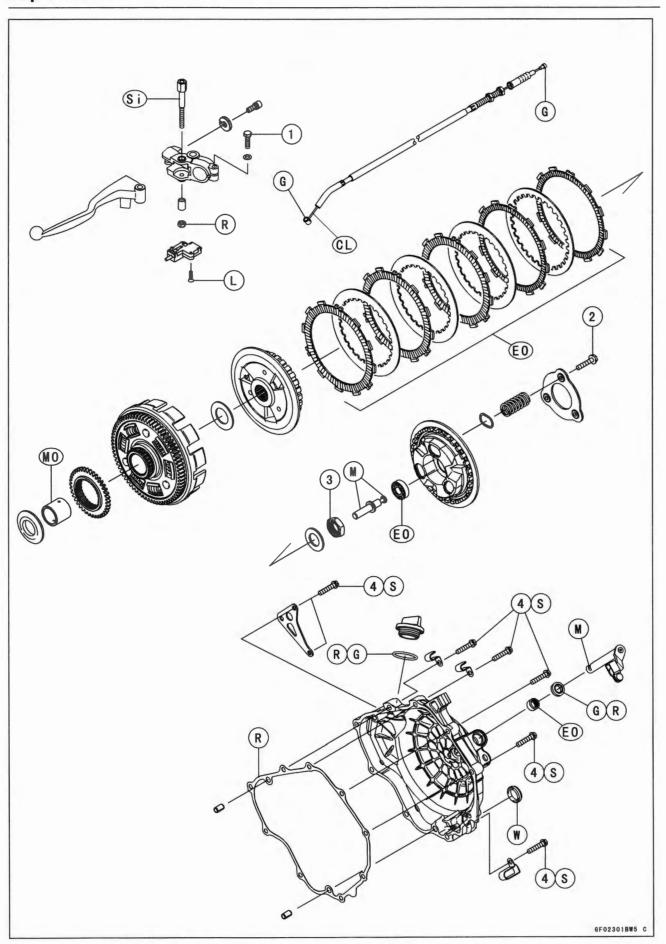
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## Clutch

## **Table of Contents**

| Exploded View                                   |   |
|---|---|
| Specifications                                  |   |
| Special Tool and Sealant                        |   |
| Clutch Lever and Cable                          |   |
| Clutch Lever Free Play Inspection               |   |
| Clutch Lever Free Play Adjustment               |   |
| Clutch Cable Removal                            |   |
| Clutch Cable Installation                       |   |
| Clutch Cable Lubrication                        |   |
| Clutch Lever Holder Installation                |   |
| Clutch Lever Removal.                           |   |
| Clutch Lever Installation.                      |   |
| Clutch Cover                                    |   |
| Clutch Cover Removal                            |   |
| Clutch Cover Installation                       |   |
| Release Shaft Removal                           |   |
| Release Shaft Installation                      |   |
| Clutch Cover Disassembly                        |   |
| Clutch Cover Assembly                           |   |
| Clutch  | ( |
| Clutch Removal                                  | ( |
| Clutch Installation.                            | 6 |
| Clutch Plate Wear and Damage Inspection         | e |
| Clutch Plate Warp Inspection                    | è |
| Clutch Housing Finger Inspection                | è |
| Clutch Housing Spline Inspection                | é |
| Clutch Pressure Plate and Clutch Hub Inspection | 6 |
| Clutch Spring Inspection                        | 6 |
| Ciutori Spring mspection                        | , |

## **Exploded View**



## **Exploded View**

| No. | Footoner                       | Torque |       |          | Damida  |
|-----|--------------------------------|--------|-------|----------|---------|
| NO. | Fastener                       | N⋅m    | kgf⋅m | ft·lb    | Remarks |
| 1   | Clutch Lever Holder Clamp Bolt | 8.8    | 0.90  | 78 in·lb |         |
| 2   | Clutch Stopper Bolts           | 8.8    | 0.90  | 78 in·lb |         |
| 3   | Clutch Hub Nut                 | 132    | 13.5  | 97.4     |         |
| 4   | Clutch Cover Bolts             | 9.8    | 1.0   | 87 in·lb | S       |

CL: Apply cable lubricant.

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

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.

W: Apply water.

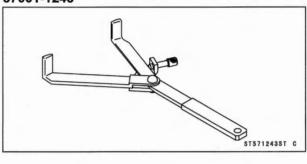
## 6-4 CLUTCH

## Specifications

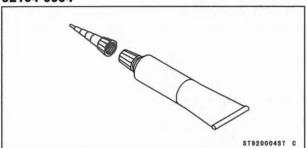
| Item                         | Standard                           | Service Limit     |
|------------------------------|------------------------------------|-------------------|
| Clutch Lever and Cable       | 100                                |                   |
| Clutch Lever Free Play       | 2 ~ 3 mm (0.08 ~ 0.12 in.)         |                   |
| Clutch                       |                                    |                   |
| Clutch Plate Assembly Length | (Reference)                        |                   |
|                              | 22.42 ~ 23.42 mm (0.88 ~ 0.92 in.) |                   |
| Friction Plate Thickness     | 2.92 ~ 3.08 mm (0.115 ~ 0.121 in.) | 2.5 mm (0.10 in.) |
| Friction Plate Warp          | 0.15 mm (0.0059 in.) or less       | 0.3 mm (0.01 in.) |
| Steel Plate Warp             | 0.15 mm (0.0059 in.) or less       | 0.3 mm (0.01 in.) |

# **Special Tool and Sealant**

Clutch Holder: 57001-1243



Liquid Gasket, TB1211F: 92104-0004



# **Clutch Lever and Cable**

# Clutch Lever Free Play Inspection

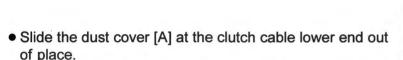
 Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

# Clutch Lever Free Play Adjustment

 Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

# Clutch Cable Removal

- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Loosen the locknut [A] at the clutch lever, and screw in the adjuster [B].
- Line up the slots [C] in the clutch lever, locknut and adjuster, and then free the cable from the lever.



- Remove the clutch cable lower from the clutch cover [B] loosening the locknuts [C].
- Free the clutch inner cable tip from the clutch release
- Pull the clutch cable out of the frame.

# Clutch Cable Installation

- Run the clutch cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).

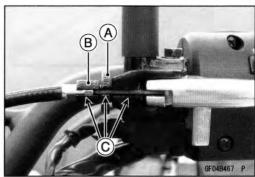
#### Clutch Cable Lubrication

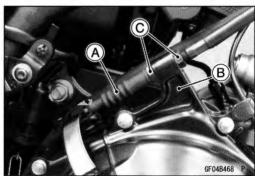
 Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

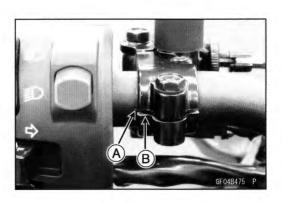
#### Clutch Lever Holder Installation

- Install the clutch lever holder so that the punch mark [A] to the center to the slit [B] of the clutch lever holder.
- Tighten:

Torque - Clutch Lever Holder Clamp Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)







#### Clutch Lever and Cable

## Clutch Lever Removal

- Remove the upper end of the clutch cable (see Clutch Cable Removal).
- Remove:

Left Switch Housing [A]

Starter Lockout Switch Screws [B]

Starter Lockout Switch [C]

Clutch Lever Pivot Locknut [D]

Clutch Lever Pivot Bolt

Clutch Lever [E]

# Clutch Lever Installation

# **A** WARNING

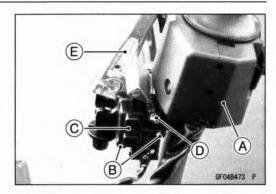
If the starter lockout switch pin has been damaged the starter lockout system will not work properly. This allows the motorcycle to be started in gear with the clutch lever released (clutch engaged), creating sudden forward movement that can result in an accident or injury.

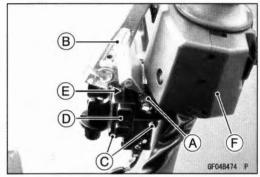
Check that the starter lockout switch operates properly when installing the clutch lever.

- Replace the clutch lever pivot locknut [A] with a new one.
- Apply silicone grease to the clutch lever pivot bolt.
- Install the clutch lever [B] and clutch lever pivot bolt.
- Tighten the clutch lever locknut securely.
- Apply a non-permanent locking agent to the starter lockout switch screws [C].
- Install the starter lockout switch [D].
- OTake care not to damage a pin [E] when installing the starter lockout switch.
- Tighten the starter lockout switch screws securely.
- Install the left switch housing [F] (see Handlebar Installation in the steering chapter).
- Install the upper end of the clutch cable (see Clutch Cable Installation).
- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).
- Check that the pin of the starter lockout switch moves smoothly.

# **A** WARNING

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





#### **Clutch Cover**

## Clutch Cover Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Disconnect the clutch cover lower end.
- Remove:

Rear Master Cylinder Mounting Bolts [A] Rear Brake Light Switch Spring [B] Return Spring [C]

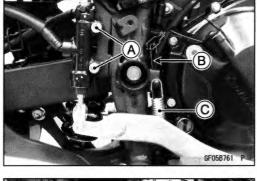


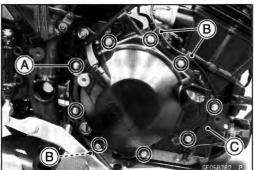
Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)

Clutch Cover Bolts[A]

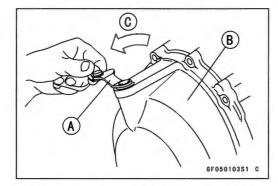
Clamps [B]

Bracket [C]





• Turn the release lever [A] toward the rear as shown, and remove the clutch cover [B]. About 90° [C]



#### Clutch Cover Installation

- Be sure to dowel pins [A].
- Clean off any oil or dirt and apply liquid gasket to the area [B] where the mating surface of the crankcase touches the clutch cover gasket.

#### Sealant - Liquid Gasket, TB1211F: 92104-0004

 Replace the clutch cover gasket with a new one and install it.





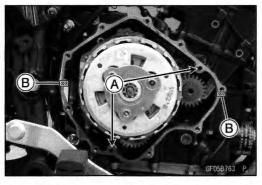
Clutch Cover [A] Clamps [B]

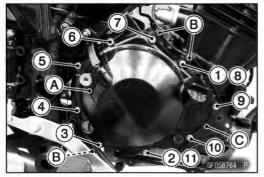
Bracket [C]

• Tighten the clutch cover bolts following the specified tightening [1 ~ 11].

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

• Install the removed parts (see appropriate chapters).





#### **Clutch Cover**

# Release Shaft Removal

## NOTICE

Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.

- Remove the clutch cover (see Clutch Cover Removal).
- Pull the lever and shaft assembly straight out of the clutch cover.

#### Release Shaft Installation

- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine oil to the needle bearing in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Insert the release shaft straight into the upper hole of the clutch cover.

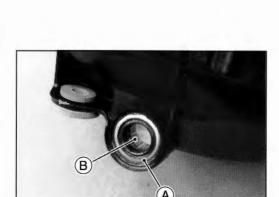


When inserting the release shaft, be careful not to remove the spring of the oil seal.

# Clutch Cover Disassembly

Remove:

Oil Seal [A]
Needle Bearing [B]
Oil Level Inspection Window

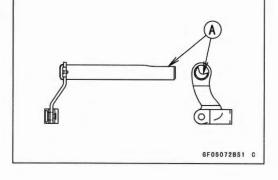


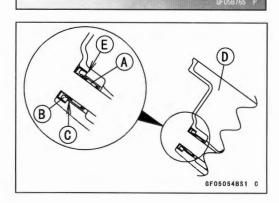
# Clutch Cover Assembly

• Replace the needle bearing and oil seal with new ones.

#### NOTE

- Oinstall the needle bearing so that the manufacture's mark face out.
- Install the needle bearing [A] and oil seal [B] position as shown.
- OPress the needle bearing so that the bearing surface [C] is flush with the housing end of clutch cover [D].
- OPress the oil seal until the bottom [E].
- Apply grease to the oil seal lips.

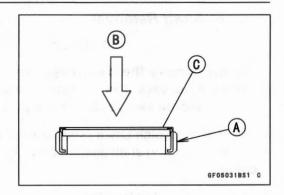




# 6-10 CLUTCH

# **Clutch Cover**

Apply water to the rubber of the oil level inspection window [A] and press [B] it so that the ring [C] faces outside.



## Clutch Removal

Remove:

Clutch Cover (see Clutch Cover Removal)
Clutch Stopper Bolts [A]

OLoosen the clutch stopper bolts evenly with little by little to prevent tilting the clutch stopper plate.

#### NOTICE

Do not loosen the one or two clutch stopper plate bolt at once to prevent clutch stopper plate warpage by the spring force.

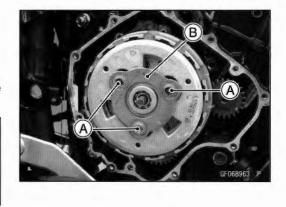


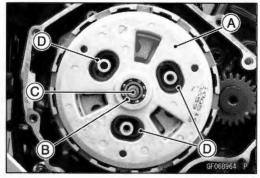
Clutch Stopper Plate [B] Clutch Springs

Remove:

Clutch Pressure Plate [A] (with Bearing [B] and Pusher [C])

Spring Seats [D]





#### • Remove:

Friction Plates and Steel Plates Clutch Hub Nut [A]

OHolding the clutch hub [B], remove the nut and washer.

Special Tool - Clutch Holder [C]: 57001-1243

Remove:

Clutch Hub

Spacer

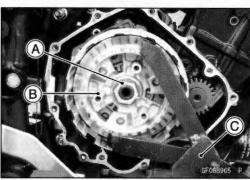
**Bushing** 

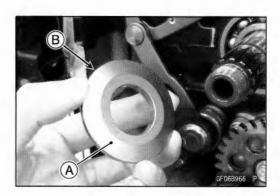
Clutch Housing

**Thrust Spacer** 

# Clutch Installation

 Install the thrust spacer [A] so that the chamfer side [B] faces inward.





- Apply molybdenum disulfide oil solution to the bushing [A].
- Install:

Bushing

Clutch Housing [B]

Spacer [C]

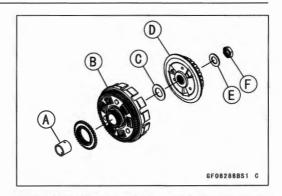
Clutch Hub [D]

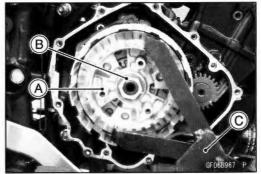
Washer [E]

Clutch Hub Nut [F]

Holding the clutch hub [A], tighten the clutch hub nut [B].
 Special Tool - Clutch Holder [C]: 57001-1243

Torque - Clutch Hub Nut: 132 N·m (13.5 kgf·m, 97.4 ft·lb)



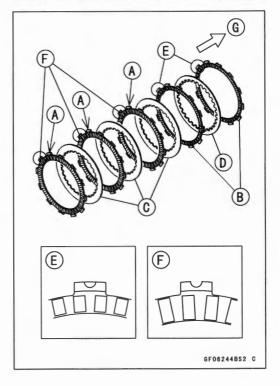


- Make sure the friction plates [A] [B] and steel plates [C] [D] in relations to the differences and installation positions.
- OThe friction plates [B] are no cutout [E] on the tangs and the friction plates [A] have the cutout [F] on the tangs. The steel plate [D] has the larger inner diameter than others.

# 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.

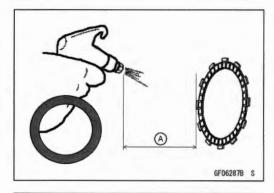
- Install the three friction plates [A] and three steel plates
   [C] alternately, and then install the one friction plate [B] to the outside [G] position as shown.
- OThe one friction plate [B] and steel plate [D] positioned to the outside should be install later together with the clutch pressure plate.

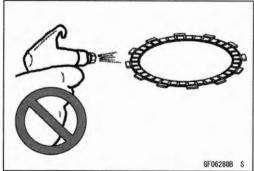


## NOTICE

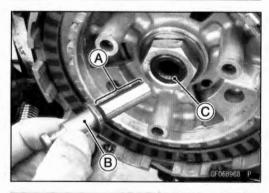
High pressure air blasts may detach clutch friction material from the friction plate. To prevent material detachment, set air pressure lower than 0.5 MPa (5 kgf/cm², 73 psi), do not place air nozzle closer than 30 cm (12 in.) to friction plate and only blow air at a right angle to the plate, facing the friction material. Do not blow air from the side (horizontally) of the plate since it is more likely to detach the friction material.

more than 30 cm (12 in.) [A]

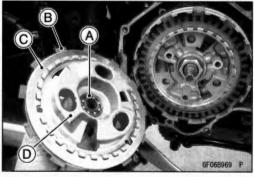




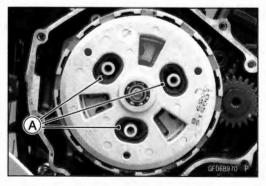
- Apply molybdenum disulfide grease to the pusher end [A].
- Install the pusher [B] into the drive shaft [C].



- Apply engine oil to the sliding surfaces of the bearing [A].
- Put the friction plate [B] (no cutout) and steel plate [C] (larger inner diameter) on the clutch pressure plate [D], and install them.



Install: Spring Seats [A]



Install:

Clutch Springs

Clutch Stopper Plate [A]

Clutch Stopper Bolts [B]

 Tighten the clutch stopper bolts evenly with little by little to prevent tilting the clutch stopper plate.

#### NOTICE

Do not tighten the one or two clutch stopper bolt at once to prevent clutch stopper plate warp age by the spring force.

• Tighten:

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

• Install the clutch cover (see Clutch Cover Installation).

# Clutch Plate Wear and Damage Inspection

- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.
- ★If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

#### **Friction Plate Thickness**

Standard: 2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)

Service Limit: 2.5 mm (0.10 in.)

#### Clutch Plate Warp Inspection

- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.
- ★ If any plate is warped over the service limit, replace it with a new one.

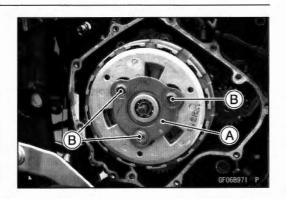
## Friction and Steel Plate Warp

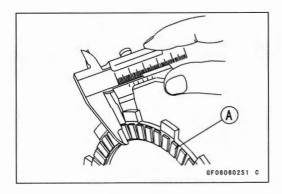
Standard: 0.15 mm (0.0059 in.) or less

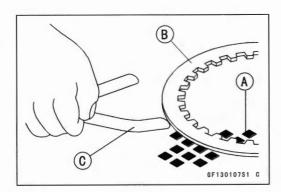
Service Limit: 0.3 mm (0.01 in.)

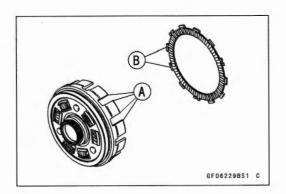
# Clutch Housing Finger Inspection

- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit.
- ★ If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



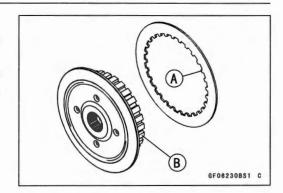






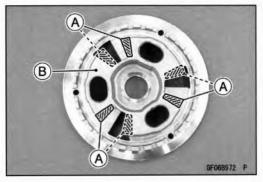
# **Clutch Housing Spline Inspection**

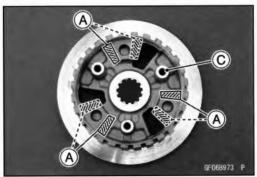
- Visually inspect where the teeth [A] on the steel plates wear against the clutch hub splines [B].
- ★If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



# Clutch Pressure Plate and Clutch Hub Inspection

- Visually inspect the contact areas [A] of the clutch pressure plate [B] and clutch hub [C] for damage.
- ★ If the contact areas are damaged replace them with new ones.





## **Clutch Spring Inspection**

★If all the components are good, but the problem still exists, replace the clutch springs (see Clutch Removal and Clutch Installation).

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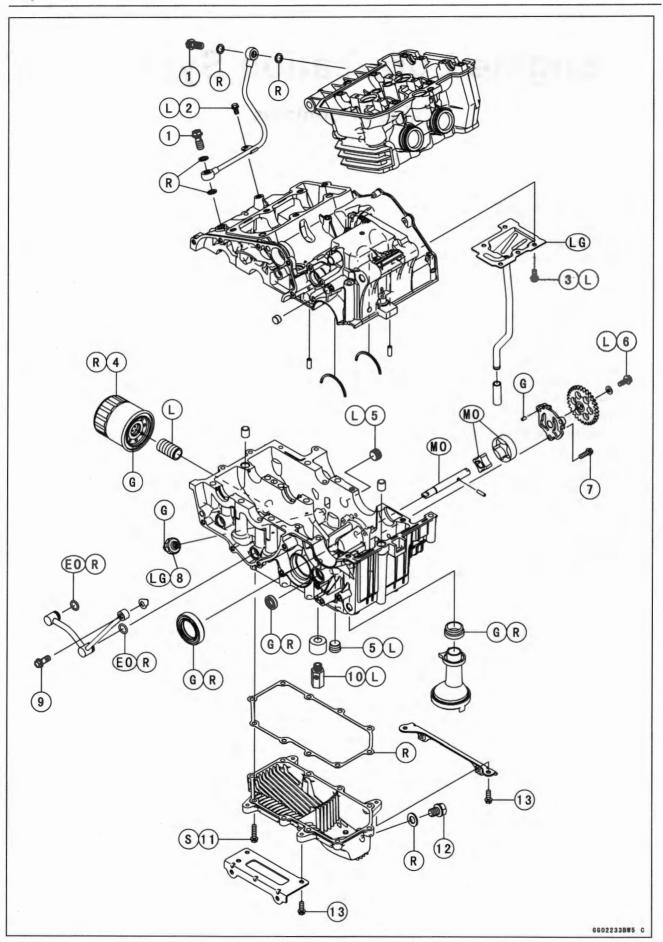
# **Engine Lubrication System**

# **Table of Contents**

| Exploded View                          |   |
|--|---|
| Engine Oil Flow Chart                  |   |
| Specifications                         |   |
| Special Tools and Sealant              |   |
| Engine Oil and Oil Filter              |   |
| Oil Level Inspection                   |   |
| Engine Oil Change                      |   |
| Oil Filter Replacement                 |   |
| Oil Pan Removal                        |   |
| Oil Pan Installation                   |   |
| Oil Screen Removal                     | 7 |
| Oil Screen Installation                | 7 |
| Oil Screen Cleaning                    | 7 |
| Oil Pressure Relief Valve              | 7 |
| Oil Pressure Relief Valve Removal      | 7 |
| Oil Pressure Relief Valve Installation | 7 |
| Oil Pressure Relief Valve Inspection   | 7 |
| Oil Pump                               | 7 |
| Oil Pump Removal                       | 7 |
| Oil Pump Installation                  | 7 |
| Oil Pressure Measurement               | 7 |
| Oil Pressure Measurement               | 7 |
| Oil Pressure Switch                    | 7 |
| Oil Pressure Switch Removal            | 7 |
| Oil Pressure Switch Installation       | 7 |

# 7-2 ENGINE LUBRICATION SYSTEM

# **Exploded View**



# **ENGINE LUBRICATION SYSTEM 7-3**

# **Exploded View**

| No. | F-4                            |      | Torque |           |         |
|-----|--------------------------------|------|--------|-----------|---------|
|     | Fastener                       | N·m  | kgf·m  | ft·lb     | Remarks |
| 1   | Oil Pipe Banjo Bolts (Outside) | 19.6 | 2.00   | 14.5      |         |
| 2   | Oil Pipe Bolt                  | 9.8  | 1.0    | 87 in·lb  | L       |
| 3   | Breather Plate Bolts           | 9.8  | 1.0    | 87 in·lb  | L       |
| 4   | Oil Filter                     | 17.5 | 1.78   | 12.9      | R       |
| 5   | Crankcase Oil Passage Plugs    | 20   | 2.0    | 15        | L       |
| 6   | Oil Pump Driven Gear Bolt      | 9.8  | 1.0    | 87 in·lb  | L       |
| 7   | Oil Pump Mounting Bolts        | 9.8  | 1.0    | 87 in·lb  |         |
| 8   | Oil Pressure Switch            | 15   | 1.5    | 11        | LG      |
| 9   | Oil Pipe Banjo Bolt (Inside)   | 12   | 1.2    | 106 in·lb |         |
| 10  | Oil Pressure Relief Valve      | 15   | 1.5    | 11        | L       |
| 11  | Oil Pan Bolts                  | 9.8  | 1.0    | 87 in·lb  | S       |
| 12  | Engine Oil Drain Bolt          | 30   | 3.1    | 22        |         |
| 13  | Lower Fairing Bracket Bolts    | 9.8  | 1.0    | 87 in·lb  |         |

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket.

MO: Apply molybdenum disulfide grease oil solution.

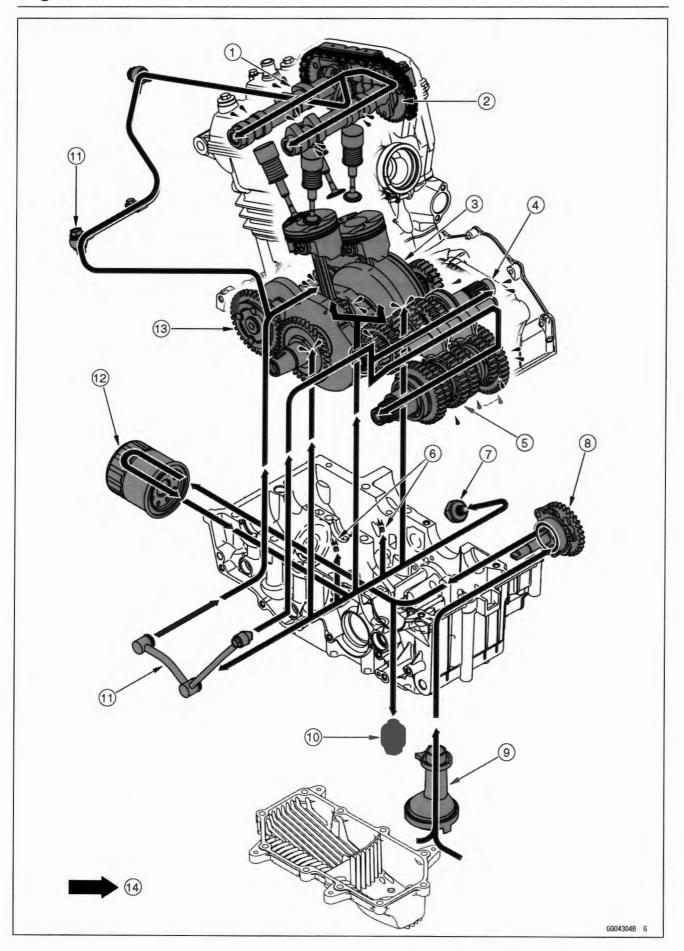
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

R: Replacement Parts

S: Follow the specified tightening sequence.

# 7-4 ENGINE LUBRICATION SYSTEM

# **Engine Oil Flow Chart**



# **ENGINE LUBRICATION SYSTEM 7-5**

# **Engine Oil Flow Chart**

- 1. Exhaust Camshaft
- 2. Intake Camshaft
- 3. Crankshaft
- 4. Drive Shaft
- 5. Output Shaft
- 6. Oil Jet Nozzles
- 7. Oil Pressure Switch
- 8. Oil Pump
- 9. Oil Screen
- 10. Relief Valve
- 11. Oil Pipes
- 12. Oil Filter
- 13. Balancer Shaft
- 14. Engine Oil

# 7-6 ENGINE LUBRICATION SYSTEM

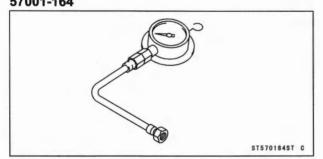
# Specifications

| Item                     | Standard   |  |  |  |
|--------------------------|--|--|--|--|
| Engine Oil               |  |  |  |  |
| Туре                     | API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2  |  |  |  |
| Viscosity                | SAE 10W-40   |  |  |  |
| Capacity                 | 2.0 L (2.1 US qt) (When filter is not removed.) 2.2 L (2.3 US qt) (When filter is removed.) 2.4 L (2.5 US qt) (When engine is completely dry.) |  |  |  |
| Level                    | Between upper and lower level lines (Wait several minutes after idling or running)   |  |  |  |
| Oil Pressure Measurement |  |  |  |  |
| Oil Pressure             | 98 ~ 147 kPa (1.00 ~ 1.50 kgf/cm², 14 ~ 21.3 psi) at 4 000 r/min (rpm), Oil Temperature 90°C (194°F)   |  |  |  |

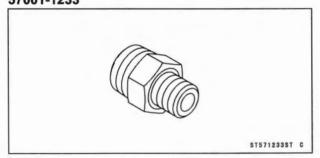
# **ENGINE LUBRICATION SYSTEM 7-7**

# **Special Tools and Sealant**

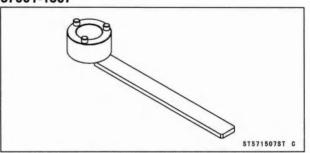
Oil Pressure Gauge, 10 kgf/cm<sup>2</sup>: 57001-164



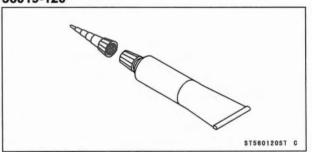
Oil Pressure Gauge Adapter, PT3/8: 57001-1233



Clutch Holder 1: 57001-1507



Liquid Gasket, TB1211: 56019-120



# 7-8 ENGINE LUBRICATION SYSTEM

# **Engine Oil and Oil Filter**

# **A** WARNING

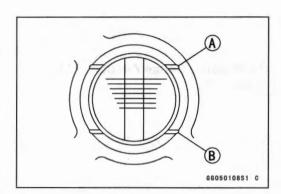
Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

# 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

- OSituate the motorcycle so that it is perpendicular to the ground.
- Olf the motorcycle has just been used, wait several minutes for all the oil to drain down.
- Olf the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.



#### NOTICE

Racing the engine before the oil reaches every part can cause engine seizure.

If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the oil pressure warning indicator light will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

- ★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- ★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

#### NOTE

Off the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.

## Engine Oil Change

 Refer to the Engine Oil Change in the Periodic Maintenance chapter.

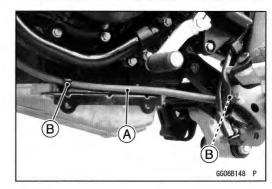
# Oil Filter Replacement

 Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

# **Engine Oil and Oil Filter**

## Oil Pan Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the exhaust pipe (see Exhaust Pipe Removal in the Engine Top End chapter).
- Free the hose [A] from the clamps [B].



Remove:

Oil Pan Bolts [A]

Oil Pan [B]

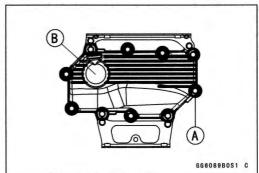
Gasket

• Remove the following parts if necessary.

Oil Screen (see Oil Screen Removal)

Oil Pressure Relief Valve (see Oil Pressure Relief Valve

Removal)



#### Oil Pan Installation

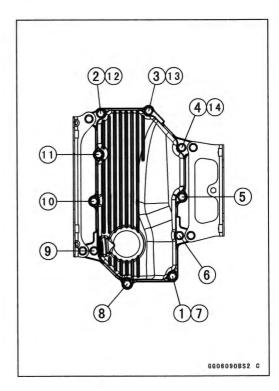
Install the following parts if removed.
 Oil Pressure Relief Valve (see Oil Pressure Relief Valve Installation)

Oil Screen (see Oil Screen Installation)

- Replace the oil pan gasket with a new one.
- Tighten the oil pan bolts following the specified tightening sequence [1 ~ 14].

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

• Install the removed parts (see appropriate chapters).



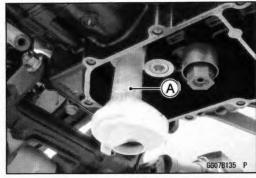
# 7-10 ENGINE LUBRICATION SYSTEM

# **Engine Oil and Oil Filter**

#### Oil Screen Removal

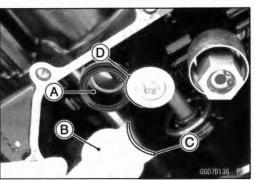
Remove:

Oil Pan (see Oil Pan Removal)
Oil Screen [A]



#### Oil Screen Installation

- Clean the oil screen (see Oil Screen Cleaning).
- Replace the O-ring [A] with a new one, and install it.
- Apply grease to the O-ring.
- Install the oil screen [B] so that its guide portion [C] fits the crankcase rib [D].

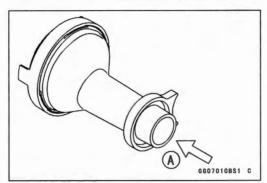


# Oil Screen Cleaning

- Remove the oil screen (see Oil Screen Removal).
- Clean the oil screen with a high flash-point solvent and remove the particles stuck.
- Blow away the particles by applying compressed air [A] from the inside to the outside (from the clean side to the dirty side).



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



#### NOTE

OWhile cleaning the screen, check for any metal particles that might indicate internal engine damage.

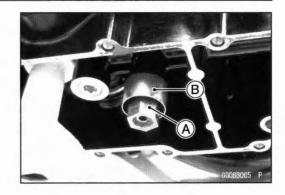
- Check the screens carefully for any damage.
- ★If the screen is damaged, replace the oil screen.

## Oil Pressure Relief Valve

#### Oil Pressure Relief Valve Removal

Remove:

Oil Pan (see Oil Pan Removal)
Oil Pressure Relief Valve [A]
Cover [B]



#### Oil Pressure Relief Valve Installation

 Apply a non-permanent locking agent to the threads of the oil pressure relief valve, and tighten it.

#### NOTICE

Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

Install the removed parts (see appropriate chapters).

# Oil Pressure Relief Valve Inspection

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.

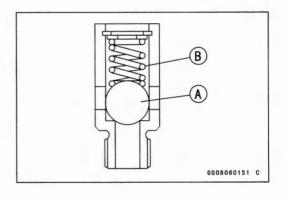
#### NOTE

- ODo not try to disassemble the pressure relief valve. The pressure relief valve inspection should be checked in its assembled condition.
- ★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.

# **A** WARNING

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

★If any problem does not improve, replace the pressure relief valve as an assembly.



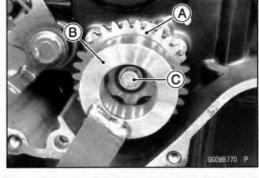
# 7-12 ENGINE LUBRICATION SYSTEM

# Oil Pump

# Oil Pump Removal

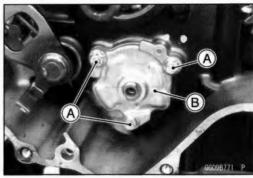
- Remove the clutch (see Clutch Removal in the Clutch chapter).
- Hold the oil pump driven gear [A] steady with the clutch holder [B], and remove the oil pump driven gear bolt [C] and oil pump driven gear.

Special Tool - Clutch Holder 1: 57001-1507



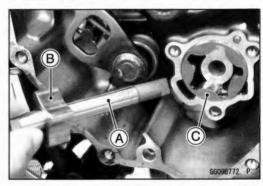
#### • Remove:

Oil Pump Mounting Bolts [A]
Oil Pump Cover [B]



#### Remove:

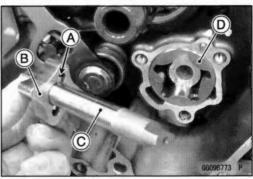
Oil Pump Shaft [A] with Inner Rotor [B] Outer Rotor [C]

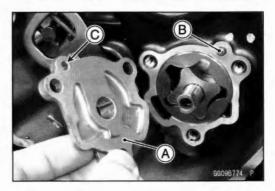


# Oil Pump Installation

- Assemble the pin [A] and rotor [B] to the oil pump shaft [C], aligning the pin with the grooves on the rotor.
- Apply molybdenum disulfide oil solution to the sliding surfaces of the oil pump shaft.
- Install the outer rotor [D] into the crankcase.
- Turn the oil pump shaft so that the projection in its shaft fits into the slot of the water pump shaft.
- After installation, apply molybdenum disulfide oil solution to the outer rotor and inner rotor.
- Install the oil pump cover [A] so that the dowel pin [B] fits into the hole [C].
- Tighten:

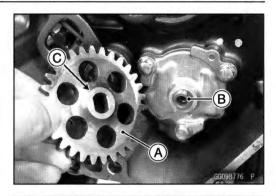
Torque - Oil Pump Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)





# Oil Pump

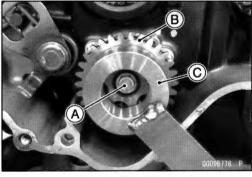
Install the oil pump driven gear [A] onto the oil pump shaft
 [B] with its projecting side [C] facing to the oil pump.



- Apply a non-permanent locking agent to the threads of the oil pump driven gear mounting bolt [A].
- Hold the oil pump driven gear [B] steady with the clutch holder [C], and tighten the oil pump driven gear bolt.

Special Tool - Clutch Holder 1: 57001-1507

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

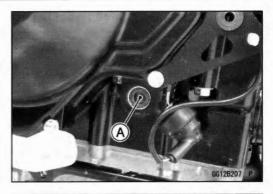


# 7-14 ENGINE LUBRICATION SYSTEM

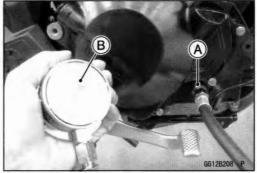
## **Oil Pressure Measurement**

#### Oil Pressure Measurement

- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the crankcase oil passage plug [A].



Attach the adapter [A] and gauge [B] to the plug hole.
 Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
 Oil Pressure Gauge Adapter, PT 3/8: 57001-1233



- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.
- ★If the reading is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.
- ★ If the reading is much higher than the standard, check the oil passages for clogging.

#### Oil Pressure

Standard: 98 ~ 147 kPa (1.00 ~ 1.50 kgf/cm², 14 ~ 21.3 psi) at 4 000 r/min (rpm), Oil Temperature

90°C (194°F)

- Stop the engine.
- Remove the oil pressure gauge and adapter.

# **A** 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 crankcase oil passage plug, and install it.
- Tighten:

Torque - Crankcase Oil Passage Plug: 20 N·m (2.0 kgf·m, 15 ft·lb)

 Install the right lower fairing (see Lower Fairing Installation in the Frame chapter).

## Oil Pressure Switch

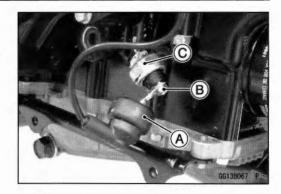
## Oil Pressure Switch Removal

Drain:

Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)

Remove:

Switch Cover [A] Switch Terminal Bolt [B] Oil Pressure Switch [C]



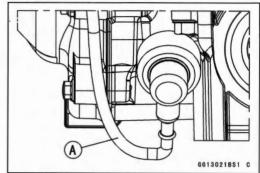
# Oil Pressure Switch Installation

 Clean off any oil or dirt and apply silicone sealant to the threads of the oil pressure switch and tighten it.

Sealant - Liquid Gasket, TB1211: 56019-120

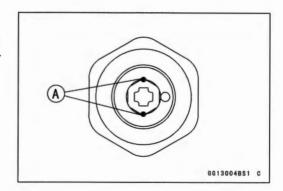
Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Apply grease to the both sides of the switch lead terminal.
- Connect the switch lead [A] to the switch terminal as shown.



#### NOTE

OApply a small amount of grease to the terminal so that grease should not close two breather holes [A] for switch diaphragm.



- Install:
  - Right Lower Fairing (see Lower Fairing Installation in the Frame chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).

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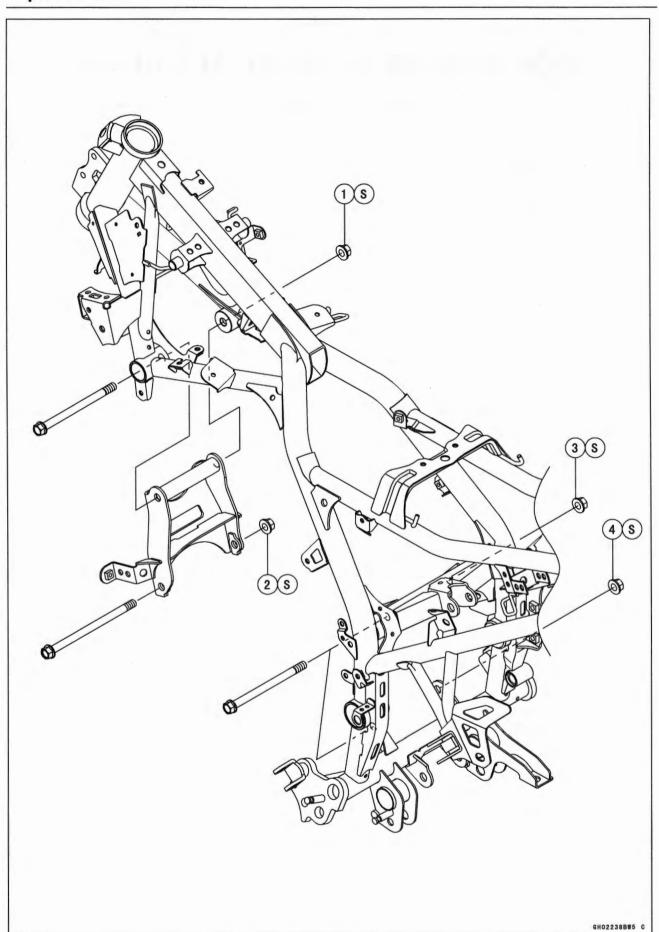
# **Engine Removal/Installation**

# **Table of Contents**

| Exploded View               | 8-2 |
|-----------------------------|-----|
| Engine Removal/Installation | 8-4 |
| Engine Removal              | 8-4 |
| Engine Installation         | 8-6 |

# 8-2 ENGINE REMOVAL/INSTALLATION

# **Exploded View**



# **ENGINE REMOVAL/INSTALLATION 8-3**

# **Exploded View**

| No. | Factoria                  |     | Torque |       | Domonko |
|-----|---------------------------|-----|--------|-------|---------|
|     | Fastener                  | N·m | kgf·m  | ft·lb | Remarks |
| 1   | Engine Bracket Nut        | 69  | 7.0    | 51    | S       |
| 2   | Front Engine Mounting Nut | 69  | 7.0    | 51    | S       |
| 3   | Upper Engine Mounting Nut | 69  | 7.0    | 51    | S       |
| 4   | Lower Engine Mounting Nut | 69  | 7.0    | 51    | S       |

S: Follow the specified tightening sequence.

# 8-4 ENGINE REMOVAL/INSTALLATION

# **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].

# **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:

Middle Fairings (see Middle Fairing Removal in the Frame chapter)

Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)

Thermostat Housing (see Thermostat Housing Removal in the Cooling System chapter)

Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)

Air Switching Valve (see Air Switching Valve Removal in the Engine Top End chapter)

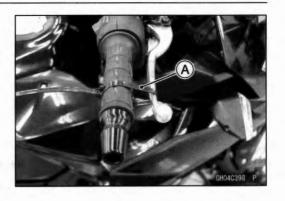
Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)

Shift Lever (see Shift Pedal Removal in the Crank-shaft/Transmission chapter)

Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)

#### Disconnect:

Crankshaft Sensor Lead Connector [A] Alternator Lead Connector [B]



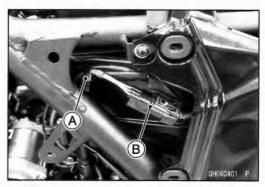


# **Engine Removal/Installation**

• Disconnect the stick coil connectors [A].

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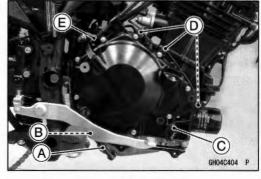
- Remove the band [A].
- Disconnect the gear position sensor connector [B].



• Free the hose from the clamps [A].

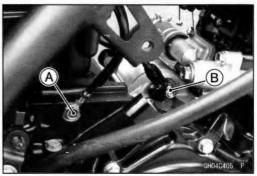


- Free the hose [A] from the clamp [B].
- Slide the switch cover [C].
- Disconnect the oil pressure switch lead.
- Open the clamps [D].
- Disconnect the clutch cable lower end [E] (see Clutch Cable Removal in the Clutch chapter).



• Remove:

Engine Ground Cable Terminal Bolt [A] Starter Motor Cable Terminal Nut [B]

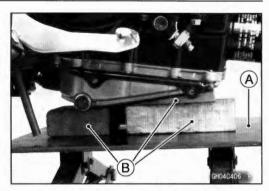


# 8-6 ENGINE REMOVAL/INSTALLATION

# **Engine Removal/Installation**

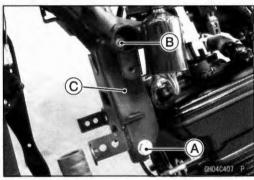
• Support the engine with a suitable stand [A].

OPut planks [B] onto the suitable stand for engine balance.



#### Remove:

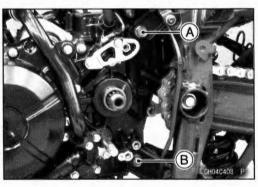
Front Engine Mounting Bolt [A] and Nut Engine Bracket Bolt [B] and Nut Engine Bracket [C]



#### Remove:

Upper Engine Mounting Bolt [A] and Nut Lower Engine Mounting Bolt [B] and Nut

• Using the suitable stand, take out the engine.



# Engine Installation

- Support the engine with a suitable stand.
   OPut planks onto the suitable stand for engine balance.
- Install the engine to the frame.

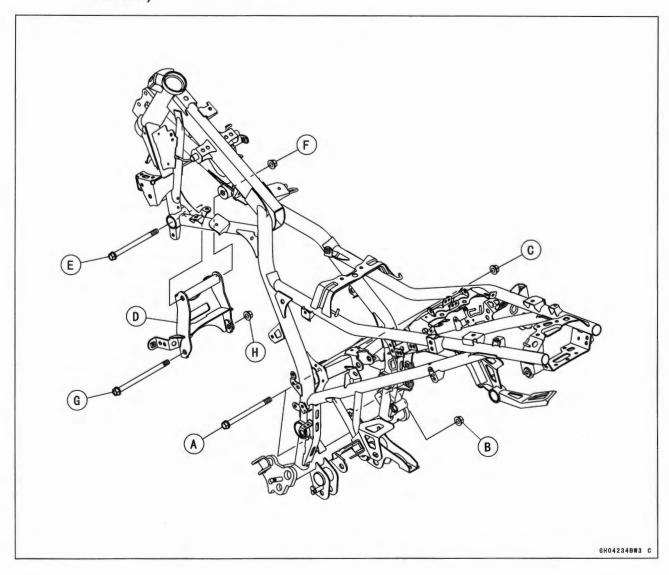
# **Engine Removal/Installation**

- Install the engine mounting bolts and nuts, following the specified installing sequence.
- OFirst, temporarily install the engine mounting bolts [A] and nuts [B], [C].
- OSecond, install the engine bracket [D].
- OThird, temporarily install the engine bracket bolt [E] and nut [F].
- OFourth, temporary install the front engine mounting bolt [G] and nut [H].
- OFifth, by the following specified sequence, tighten the nuts.

Torque - Lower Engine Mounting Nut [B]: 69 N·m (7.0 kgf·m, 51 ft·lb)

Upper Engine Mounting Nut [C]: 69 N·m (7.0 kgf·m, 51 ft·lb)

Engine Bracket Nut [F]: 69 N·m (7.0 kgf·m, 51 ft·lb) Front Engine Mounting Nut [H]: 69 N·m (7.0 kgf·m, 51 ft·lb)



# 8-8 ENGINE REMOVAL/INSTALLATION

# **Engine Removal/Installation**

- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:

Throttle Cables (see Throttle Control System Inspection in the Periodic Maintenance chapter)

Clutch Cable (see Clutch Operation Inspection in the Periodic Maintenance chapter)

Drive Chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)

- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).

## 9

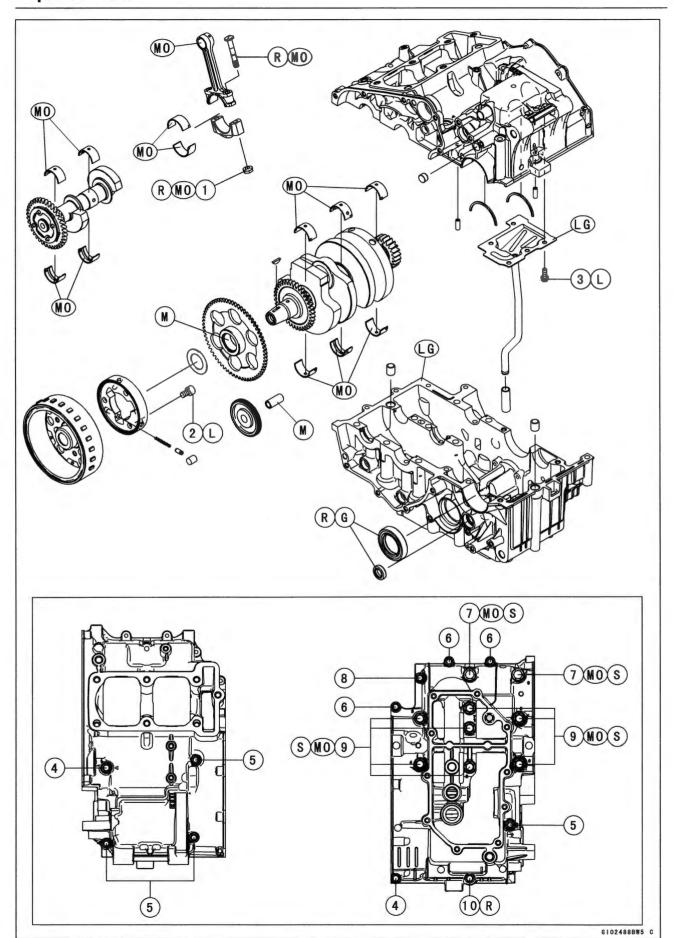
# **Crankshaft/Transmission**

## **Table of Contents**

| Exploded View                    | 9-2  | Balancer Installation                 | 9-26 |
|----------------------------------|------|---------------------------------------|------|
| Specifications                   | 9-6  | Balancer Shaft Bearing                |      |
| Special Tools and Sealant        | 9-9  | Insert/Journal Wear Inspection .      | 9-26 |
| Crankcase                        | 9-10 | Transmission                          | 9-28 |
| Crankcase Splitting              | 9-10 | Shift Pedal Removal                   | 9-28 |
| Crankcase Assembly               | 9-11 | Shift Pedal Installation              | 9-28 |
| Crankshaft and Connecting Rods   | 9-15 | External Shift Mechanism              |      |
| Crankshaft Removal               | 9-15 | Removal                               | 9-28 |
| Crankshaft Installation          | 9-15 | External Shift Mechanism              |      |
| Connecting Rod Removal           | 9-15 | Installation                          | 9-28 |
| Connecting Rod Installation      | 9-16 | External Shift Mechanism              |      |
| Crankshaft/Connecting Rod        |      | Inspection                            | 9-28 |
| Cleaning                         | 9-19 | Transmission Shaft Removal            | 9-29 |
| Connecting Rod Bend Inspection   | 9-20 | Transmission Shaft Installation       | 9-29 |
| Connecting Rod Twist Inspection. | 9-20 | Transmission Shaft Disassembly.       | 9-30 |
| Connecting Rod Big End Side      |      | Transmission Shaft Assembly           | 9-30 |
| Clearance Inspection             | 9-20 | Shift Drum and Fork Removal           | 9-32 |
| Connecting Rod Big End           |      | Shift Drum and Fork Installation      | 9-33 |
| Bearing Insert/Crankpin Wear     |      | Shift Drum Disassembly                | 9-34 |
| Inspection                       | 9-21 | Shift Drum Assembly                   | 9-34 |
| Crankshaft Side Clearance        |      | Shift Fork Bending Inspection         | 9-34 |
| Inspection                       | 9-22 | Shift Fork/Gear Groove Wear           |      |
| Crankshaft Runout Inspection     | 9-23 | Inspection                            | 9-35 |
| Crankshaft Main Bearing          |      | Shift Fork Guide Pin/Drum             |      |
| Insert/Journal Wear Inspection . | 9-23 | Groove Wear Inspection                | 9-35 |
| Starter Motor Clutch             | 9-25 | Gear Dog and Gear Dog Hole            |      |
| Starter Motor Clutch             |      | Damage Inspection                     | 9-35 |
| Removal/Installation             | 9-25 | Ball Bearing, Needle Bearing, and Oil |      |
| Starter Motor Clutch Inspection  | 9-25 | Seal                                  | 9-36 |
| Starter Motor Clutch Disassembly | 9-25 | Ball and Needle Bearing Wear          |      |
| Starter Motor Clutch Assembly    | 9-25 | Inspection                            | 9-36 |
| Balancer                         | 9-26 | Oil Seal Inspection                   | 9-36 |
| Balancar Pemoval                 | 0.26 |                                       |      |

## 9-2 CRANKSHAFT/TRANSMISSION

## **Exploded View**



## **CRANKSHAFT/TRANSMISSION 9-3**

## **Exploded View**

|     | F4   | Torque       |       |          | Domonico |
|-----|--|--------------|-------|----------|----------|
| No. | Fastener                                   | N·m          | kgf·m | ft·lb    | Remarks  |
| 1   | Connecting Rod Nuts                        | see the text | -     | _        | MO, R    |
| 2   | Starter Motor Clutch Bolts                 | 34.3         | 3.50  | 25.3     | L        |
| 3   | Breather Plate Bolts                       | 9.8          | 1.0   | 87 in·lb | L        |
| 4   | Crankcase Bolts (M6), L = 60 mm (2.4 in.)  | 11           | 1.1   | 97 in·lb |          |
| 5   | Crankcase Bolts (M6), L = 85 mm (3.3 in.)  | 11           | 1.1   | 97 in·lb |          |
| 6   | Crankcase Bolts (M6), L = 22 mm (0.87 in.) | 11           | 1.1   | 97 in·lb |          |
| 7   | Crankcase Bolts (M8), L = 73 mm (2.9 in.)  | 23.5         | 2.40  | 17.3     | MO, S    |
| 8   | Crankcase Bolts (M6), L = 38 mm (1.5 in.)  | 11           | 1.1   | 97 in·lb |          |
| 9   | Crankcase Bolts (M8), L = 90 mm (3.5 in.)  | 27.5         | 2.80  | 20.3     | MO, S    |
| 10  | Crankcase Bolts (M6), L = 135 mm (5.3 in.) | 11           | 1.1   | 97 in·lb | R        |

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.

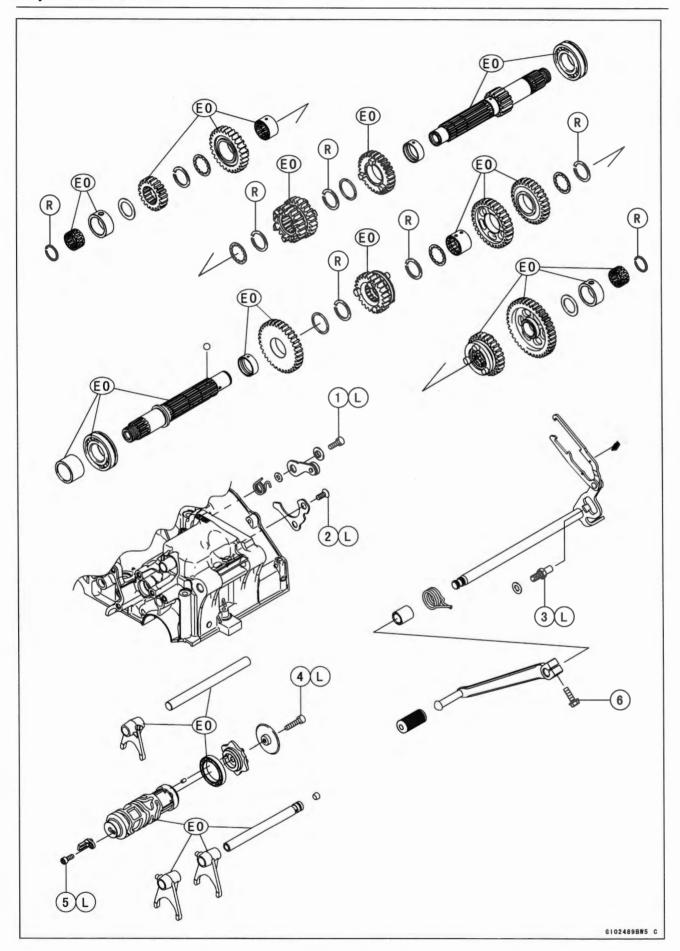
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

R: Replacement Parts

S: Follow the specified tightening sequence.

## 9-4 CRANKSHAFT/TRANSMISSION

## **Exploded View**



## **CRANKSHAFT/TRANSMISSION 9-5**

## **Exploded View**

| NI. | Easterier                        | Torque |       |           | Damarka |
|-----|----------------------------------|--------|-------|-----------|---------|
| No. | Fastener                         | N·m    | kgf·m | ft·lb     | Remarks |
| 1   | Gear Positioning Lever Bolt      | 12     | 1.2   | 106 in·lb | L       |
| 2   | Shift Drum Bearing Holder Screws | 4.4    | 0.45  | 39 in·lb  | L       |
| 3   | Shift Shaft Return Spring Pin    | 19.6   | 2.00  | 14.5      | L       |
| 4   | Shift Drum Cam Bolt              | 9.0    | 0.92  | 80 in·lb  | L       |
| 5   | Gear Position Sensor Shaft Bolt  | 5.9    | 0.60  | 52 in·lb  | L       |
| 6   | Shift Pedal Bolt                 | 12     | 1.2   | 106 in·lb |         |

EO: Apply engine oil.
L: Apply a non-permanent locking agent.
R: Replacement Parts

## 9-6 CRANKSHAFT/TRANSMISSION

## Specifications

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## Specifications

| Item                                      | Standard                                     | Service Limit        |
|---|--|----------------------|
| Crankcase Main Bearing Inside Diameter:   | 31.000 ~ 31.016 mm                           |                      |
| g   | (1.2205 ~ 1.2211 in.)                        |                      |
| Marking:                                  |  |                      |
| 0   | 31.000 ~ 31.008 mm                           |                      |
|   | (1.2205 ~ 1.22078 in.)                       |                      |
| None                                      | 31.009 ~ 31.016 mm                           |                      |
|   | (1.22082 ~ 1.2211 in.)                       |                      |
| Crankshaft Main Bearing Insert Thickness: |  |                      |
| Black                                     | 1.495 ~ 1.499 mm                             |                      |
|   | (0.05886 ~ 0.05902 in.)                      |                      |
| Blue                                      | 1.499 ~ 1.503 mm                             |                      |
| Valler                                    | (0.05902 ~ 0.05917 in.)<br>1.503 ~ 1.507 mm  |                      |
| Yellow                                    | (0.05917 ~ 0.05933 in.)                      | <del></del>          |
| Balancer                                  | (0.0000 11.)                                 |                      |
| Balancer Shaft Bearing Insert/Journal     | 0.024 ~ 0.048 mm                             | 0.08 mm              |
| Clearance                                 | (0.0009 ~ 0.0019 in.)                        | (0.0031 in.)         |
| Balancer Shaft Journal Diameter:          | 25.984 ~ 26.000 mm                           | 25.96 mm             |
|   | (1.0230 ~ 1.0236 in.)                        | (1.022 in.)          |
| Marking:                                  |  |                      |
| None                                      | 25.984 ~ 25.994 mm                           |                      |
|   | (1.0230 ~ 1.02338 in.)                       |                      |
| 0   | 25.995 ~ 26.000 mm                           |                      |
|   | (1.02342 ~ 1.0236 in.)                       |                      |
| Balancer Shaft Bearing Inside Diameter:   | 29.000 ~ 29.016 mm                           |                      |
| NA 1500                                   | (1.1417 ~ 1.1424 in.)                        |                      |
| Marking:                                  | 00 000 00 000                                |                      |
| 0   | 29.000 ~ 29.008 mm<br> (1.1417 ~ 1.1420 in.) |                      |
| None                                      | 29.009 ~ 29.016 mm                           |                      |
| None                                      | (1.1421 ~ 1.1424 in.)                        |                      |
| Balancer Shaft Bearing Insert Thickness:  | ,  |                      |
| Brown                                     | 1.495 ~ 1.499 mm                             |                      |
|   | (0.05886 ~ 0.05902 in.)                      | ·                    |
| Black                                     | 1.499 ~ 1.503 mm                             |                      |
|   | (0.05902 ~ 0.05917 in.)                      |                      |
| Blue                                      | 1.503 ~ 1.507 mm                             |                      |
|   | (0.05917 ~ 0.05933 in.)                      |                      |
| Transmission                              |  |                      |
| Shift Fork Ear Thickness                  | 4.9 ~ 5.0 mm                                 | 4.8 mm               |
| O - au Ous anns Mississe                  | (0.19 ~ 0.20 in.)                            | (0.19 in.)           |
| Gear Groove Width                         | 5.05 ~ 5.15 mm<br>(0.199 ~ 0.203 in.)        | 5.3 mm<br>(0.21 in.) |
| Shift Fork Guide Pin Diameter             | 5.9 ~ 6.0 mm                                 | 5.8 mm               |
| Shint Fork Guide Fill Diameter            | (0.23 ~ 0.24 in.)                            | (0.23 in.)           |
| Shift Drum Groove Width                   | 6.05 ~ 6.20 mm                               | 6.3 mm               |
|   | (0.238 ~ 0.244 in.)                          | (0.25 in.)           |

## 9-8 CRANKSHAFT/TRANSMISSION

## Specifications

**Connecting Rod Big End Bearing Insert Selection** 

| Con-rod Big End            | Crankpin Diameter | Bearing    | g Insert    |
|----------------------------|-------------------|------------|-------------|
| Inside Diameter<br>Marking | Marking           | Size Color | Part Number |
| None                       | 0                 | Brown      | 92139-0784  |
| None                       | None              | Dlook      | 02420 0702  |
| 0                          | 0                 | Black      | 92139-0783  |
| 0                          | None              | Blue       | 92139-0782  |

**Crankshaft Main Bearing Insert Selection** 

| Crankcase Main                  | Crankshaft Main             | Bearing Insert* |             |              |  |
|---------------------------------|-----------------------------|-----------------|-------------|--------------|--|
| Bearing Inside Diameter Marking | Journal Diameter<br>Marking | Size Color      | Part Number | Journal Nos. |  |
| 0                               | 1                           | Black           | 92139-0787  | 1, 3         |  |
|                                 |                             | DIACK           | 92139-0791  | 2            |  |
| None                            | 1                           | Divis           | 92139-0786  | 1, 3         |  |
| 0                               | None                        | Blue            | 92139-0790  | 2            |  |
| None                            | None                        | Vallow          | 92139-0788  | 1, 3         |  |
| None No                         | None                        | Yellow          | 92139-0792  | 2            |  |

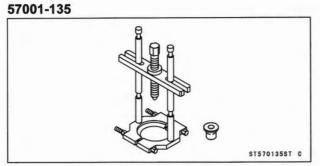
<sup>\*:</sup> The bearing insert for Nos. 2 journal have an oil groove.

**Balancer Shaft Bearing Insert Selection** 

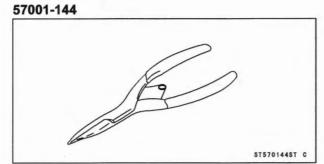
| Balancer Shaft              | Balancer Shaft                  | Bearing    | g Insert    |  |
|-----------------------------|---------------------------------|------------|-------------|--|
| Journal Diameter<br>Marking | Bearing Inside Diameter Marking | Size Color | Part Number |  |
| 0                           | 0                               | Brown      | 92028-1424  |  |
| 0                           | None                            | Dlook      | 92028-1423  |  |
| None                        | 0                               | Black      | 92028-1423  |  |
| None                        | None                            | Blue       | 92028-1422  |  |

## **Special Tools and Sealant**

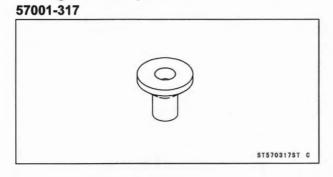
## Bearing Puller:



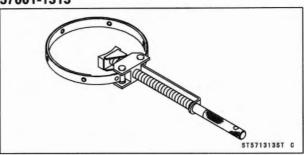
**Outside Circlip Pliers:** 



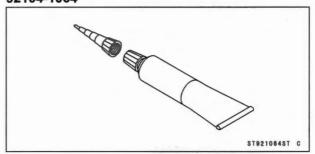
**Bearing Puller Adapter:** 



Flywheel Holder: 57001-1313



Liquid Gasket, TB1216B: 92104-1064



#### 9-10 CRANKSHAFT/TRANSMISSION

#### Crankcase

#### Crankcase Splitting

- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:

Cylinder (see Cylinder Removal in the Engine Top End chapter)

Clutch (see Clutch Removal in the Clutch chapter)

External Shift Mechanism (see External Shift Mechanism Removal)

Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)

Starter Motor (see Starter Motor Removal in the Electrical System chapter)

Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)

Water Pump (see Water Pump Removal in the Cooling System chapter)

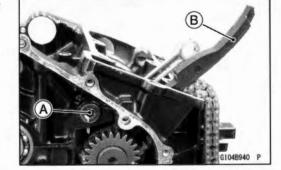
Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)

Oil Pressure Switch (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)

Gear Position Sensor (see Gear Position Sensor Removal in the Electrical System chapter)

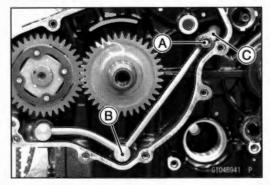
- ★If the crankshaft is to be removed, remove the pistons (see Piston Removal in the Engine Top End chapter).
- ★If the rear camshaft chain guide is to be removed, follow the next procedure.
- Remove:

Rear Camshaft Chain Guide Bolt [A] Rear Camshaft Chain Guide [B]



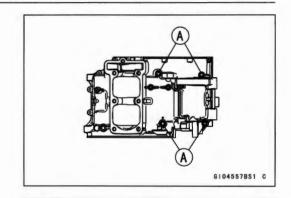
#### Remove:

Oil Pipe Banjo Bolt (Inside) [A] Oil Pipe [B] Plate [C]



#### Crankcase

Remove the upper crankcase bolts [A].



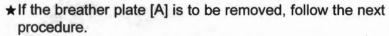
#### Remove:

Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)

Oil Screen (see Oil Pan Removal in the Engine Lubrication System chapter)

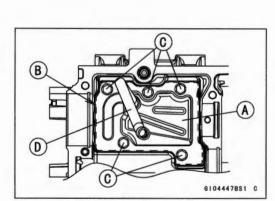
Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal in the Engine Lubrication System chapter)

- Remove the lower crankcase bolts.
- OFirst, loosen the M6 bolts [A].
- OLastly, loosen the M8 bolts [B].
- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.
- OTake care not to damage the crankcase.



- Remove the transmission shafts (see Transmission Shaft Removal).
- Cut the gasket [B] around the plate.
- Remove:

Breather Plate Bolts [C]
Breather Plate with Pipe [D]



G104558BS1 C

#### Crankcase Assembly

#### NOTICE

The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

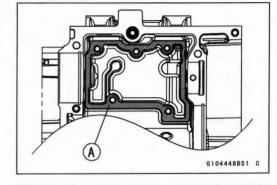
- With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
- Using compressed air, blow out the oil passages in the crankcase halves.

#### 9-12 CRANKSHAFT/TRANSMISSION

#### Crankcase

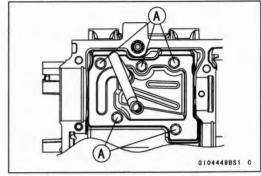
- ★ If the breather plate was removed, install it in the following procedure.
- OClean off any oil or dirt and apply liquid gasket to the breather plate mating surface [A], and then install the breather plate.

Sealant - Liquid Gasket, TB1216B: 92104-1064



 Apply a non-permanent locking agent to the threads of the breather plate bolts [A] and tighten them.

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



#### • Install:

Shift Drum (see Shift Drum and Fork Installation) Shift Forks and Shift Rods (see Shift Drum and Fork Installation)

Crankshaft (see Crankshaft Installation)

Balancer Shaft (see Balancer Installation)

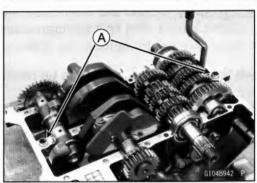
Connecting Rods (see Connecting Rod Installation)

Camshaft Chain

Transmission Shafts and Gears (see Transmission Shaft Installation)

Dowel Pins [A]

- Before fitting the lower case on the upper case, check the following.
- OBe sure to hang the camshaft chain on the crankshaft.
- OCheck to see that the shift drum and transmission gears are in the neutral position.



#### Crankcase

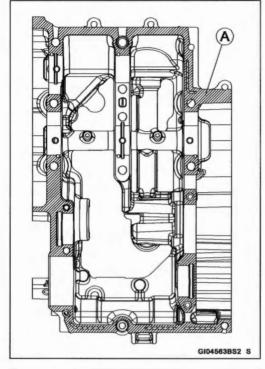
 Apply liquid gasket [A] to the mating surface of the lower crankcase half.

Sealant - Liquid Gasket, TB1216B: 92104-1064

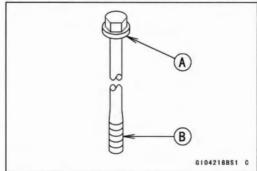
#### NOTICE

Do not apply liquid gasket around the crankshaft main bearing inserts, and oil passage holes.

• Fit the lower crankcase to the upper crankcase.

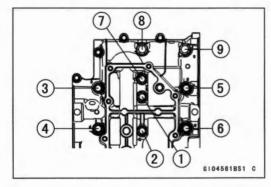


Apply molybdenum disulfide oil solution to the seating surface [A] and threads [B] of the M8 bolts.



 Tighten the crankcase bolts (M8) following the specified tightening sequence [1 ~ 9].

Torque - Crankcase Bolts (M8), L = 90 mm (3.5 in.) [1 ~ 7]: 27.5 N·m (2.80 kgf·m, 20.3 ft·lb) Crankcase Bolts (M8), L = 73 mm (2.9 in.) [8 ~ 9]: 23.5 N·m (2.40 kgf·m, 17.3 ft·lb)



- Replace the crankcase bolt (M6), L = 135 mm (5.3 in.) and copper washer with new ones.
- Tighten:

Torque - Crankcase Bolts (M6): 11 N·m (1.1 kgf·m, 97 in·lb)

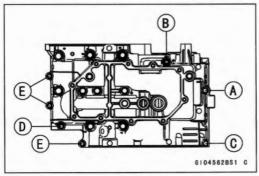
L = 135 mm (5.3 in.) [A]

L = 85 mm (3.3 in.) [B] (with Copper Washer)

L = 60 mm (2.4 in.) [C]

L = 38 mm (1.5 in.) [D]

L = 22 mm (0.87 in.) [E]



#### 9-14 CRANKSHAFT/TRANSMISSION

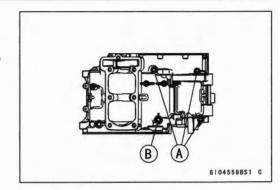
#### Crankcase

- Replace the copper washer with a new one.
- Tighten:

Torque - Crankcase Bolts (M6): 11 N·m (1.1 kgf·m, 97 in·lb)

L= 85 mm (3.3 in.) [A]

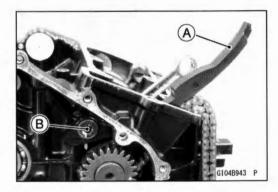
L= 60 mm (2.4 in.) [B] (with Copper Washer)



- After tightening all crankcase bolts, check the following.
- OWipe up the liquid gasket that seeps out around the crankcase mating surface.
- OCrankshaft and transmission shafts turn freely.
- OWhile spinning the output shaft, gears shift smoothly from the 1st to 6th gear, and 6th to 1st.
- OWhen the output shaft stays still, the gear can not be shifted to 2nd gear or other higher gear positions.
- ★If the rear camshaft chain guide [A] was removed, install it.
- Tighten:

Torque - Rear Camshaft Chain Guide Bolt [B]: 17 N·m (1.7 kgf·m, 13 ft·lb)

• Install the removed parts (see appropriate chapters).

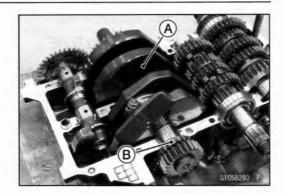


## **Crankshaft and Connecting Rods**

#### Crankshaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove:

Crankshaft [A] Camshaft Chain [B]



#### Crankshaft Installation

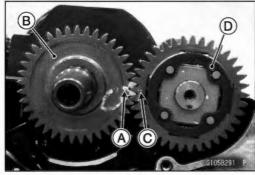
#### NOTE

Olf the crankshaft is replaced with a new one, refer to the Connecting Rod Big End Bearing Insert Selection in the Specifications.

#### NOTICE

If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.
- Align the timing mark [A] on the balancer drive gear [B] with the timing mark [C] on the balancer gear [D].
- Install the crankshaft with the camshaft chain hanging on it.



## **Connecting Rod Removal**

- Split the crankcase (see Crankcase Splitting).
- Remove:

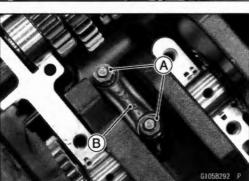
Connecting Rod Big End Nuts [A]

#### NOTE

- OMark and record the locations of the connecting rods and their big end caps [B] so that they can be reassembled in their original positions.
- Remove the connecting rods from the crankshaft.



Discard the connecting rod bolts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.



#### 9-16 CRANKSHAFT/TRANSMISSION

## **Crankshaft and Connecting Rods**

#### Connecting Rod Installation

#### NOTICE

To minimize vibration, the connecting rods should have the same weight mark.

Big End Cap [A] Connecting Rod [B] Weight Mark, Alphabet [C]

Diameter Mark (Around Weight Mark) [D]: "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.

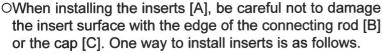
#### NOTICE

The connecting rod bolts are designed to stretch when tightened. Never reuse them.

- Replace the connecting rod big end bolts and nuts with new ones.
- Apply molybdenum disulfide oil solution to the inner surfaces of upper and lower bearing inserts [A].
- ODo not apply any grease or oil to the cap inside and cap insert outside [B].
- Olnstall 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.



Installation [D] to Cap

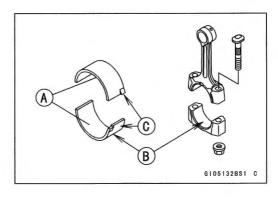
Installation [E] to Connecting Rod

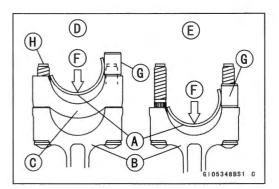
Push [F]

Spare Dowel Pin [G]

Connecting Rod Bolts [H]

- Install the cap on the connecting rod, aligning the weight and diameter marks.
- Remove debris and clean the surface of inserts.





## **Crankshaft and Connecting Rods**

- Install each connecting rod on its original crankpin.
- OThe connecting rod big end is bolted using the "plastic region fastening method".
- OThis method precisely achieves the needed clamping force without exceeding it unnecessarily, allowing the use of thinner, lighter bolts further decreasing connecting rod weight.
- OThere are two types of the plastic region fastening. One is a bolt length measurement method and other is a rotation angle method. Observe one of the following two, but the bolt length measurement method is preferable because this is a more reliable way to tighten the big end nuts.

#### NOTICE

The connecting rod bolts are designed to stretch when tightened. Never reuse the connecting rod bolts. See the table below for correct bolt and nut usage.

#### NOTICE

Be careful not to overtighten the nuts.

The bolts must be positioned on the seating surface correctly to prevent the bolt heads from hitting the crankcase.

- (1) Bolt Length Measurement Method
- Be sure to clean the bolts, nuts, and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts, and nuts are treated with an anti-rust solution.

## **A** 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.

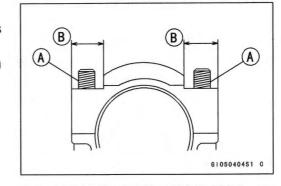
#### 9-18 CRANKSHAFT/TRANSMISSION

## **Crankshaft and Connecting Rods**

- Install new bolts and nuts in reused connecting rod.
- ★ If the connecting rod assy was replaced, use the new bolts and nuts attached to the new connecting rod assy.
- Apply a small amount of molybdenum disulfide oil solution to the following portions.

Threads [A] of Nuts and Bolts

Seating Surfaces [B] of Nuts and Connecting Rods



- Dent both bolt head and bolt tip with a punch as shown.
- Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values to find the bolt stretch.

Connecting Rod [A]

Dent here with a punch [B].

Nuts [C]

Fit micrometer pins into dents [D].

 Tighten the big end nuts until the bolt elongation reaches the length specified as follows.

Bolt Length after tightening Bolt Length before tightening Bolt Stretch

#### **Connecting Rod Bolt Stretch**

Usable Range: 0.15 ~ 0.25 mm (0.0059 ~ 0.0098 in.)

- Check the length of the connecting rod bolts.
- ★If the stretch is more than the usable range, the bolt has stretched too much. An overelongated bolt may break in use.

#### (2) Rotation Angle Method

- ★If you do not have a point micrometer, you may tighten the nuts using the "Rotation Angle Method".
- Be sure to clean the bolts, nuts and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts and nuts are treated with an anti-rust solution.

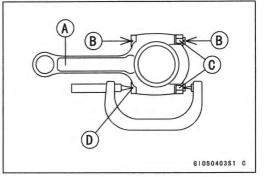
## **A** WARNING

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

#### NOTICE

Immediately dry the bolts and nuts with compressed air after cleaning.

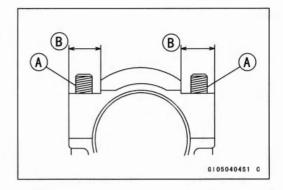
Clean and dry the bolts and nuts completely.



## **Crankshaft and Connecting Rods**

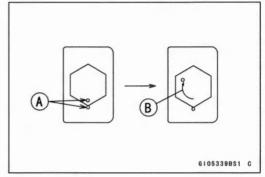
- Install new bolts and nuts in reused connecting rod.
- ★ If the connecting rod assy was replaced, use the new bolts and nuts attached to the new connecting rod assy.
- Apply a small amount of molybdenum disulfide oil solution to the following portions.

Threads [A] of Nuts and Bolts Seating Surfaces [B] of Nuts and Connecting Rods

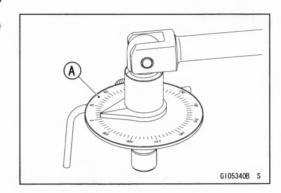


- First, tighten the nuts with 10.0 N·m (1.02 kgf·m, 89 in·lb) of torque.
- Next, tighten the nuts 120°.
- OMark [A] the connecting rod big end caps and nuts so that nuts can be turned 120° [B] properly.

| Connecting<br>Rod Assy | Bolt                            | Nut                            | Torque + Angle<br>N·m (kgf·m, in·lb) |  |
|------------------------|---------------------------------|--------------------------------|--------------------------------------|--|
| New                    | Attached to new con-rod         | Attached to new con-rod        | 10.0 (1.02, 89)<br>+ 120°            |  |
|                        | New                             | New                            | + 120                                |  |
| Used                   | Replace the bolts with new ones | Replace the nuts with new ones | 10.0 (1.02, 89)<br>+ 120°            |  |



OThe nuts can be tightened by using a torque angle gauge [A].



## Crankshaft/Connecting Rod Cleaning

- After removing the connecting rods from the crankshaft, clean them with a high flash-point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

#### 9-20 CRANKSHAFT/TRANSMISSION

## **Crankshaft and Connecting Rods**

#### **Connecting Rod Bend Inspection**

- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.
- ★If the connecting rod bend exceeds the service limit, the connecting rod must be replaced.



Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

### Connecting Rod Twist Inspection

- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.
- ★ If the connecting rod twist exceeds the service limit, the connecting rod must be replaced.

#### **Connecting Rod Twist**

Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

# Connecting Rod Big End Side Clearance Inspection

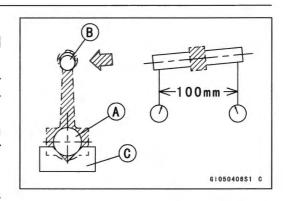
- Measure the connecting rod big end side clearance.
- Olnsert a thickness gauge [A] between the big end and either crank web to determine clearance.

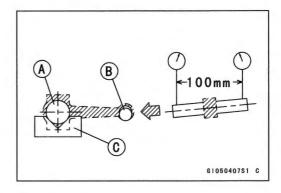
#### **Connecting Rod Big End Side Clearance**

Standard:  $0.13 \sim 0.38 \text{ mm} (0.0051 \sim 0.0150 \text{ in.})$ 

Service Limit: 0.6 mm (0.02 in.)

★ If the clearance exceeds the service limit, replace the connecting rod with new one and then check the clearance again. If the clearance is too large after connecting rod replacement, the crankshaft also must be replaced.







## **Crankshaft and Connecting Rods**

# Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection

- Measure the bearing insert/crankpin [A] clearance with plastigage [B].
- Tighten the big end nuts to the specified torque (see Connecting Rod Installation).

#### NOTE

ODo not move the connecting rod and crankshaft during clearance measurement.

# Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: 0.031 ~ 0.059 mm (0.0012 ~ 0.0023 in.)

Service Limit: 0.10 mm (0.0039 in.)

- ★ If the clearance is within the standard, no bearing replacement is required.
- ★ If the clearance is between 0.059 mm (0.0023 in.) and the service limit 0.10 mm (0.0039 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check the insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★If the clearance exceeds the service limit, measure the diameter of the crankpins.

#### **Crankpin Diameter**

Standard: 29.984 ~ 30.000 mm (1.1805 ~ 1.1811 in.)

Service Limit: 29.97 mm (1.180 in.)

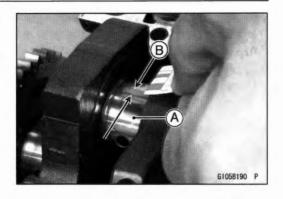
- ★ If any crankpin has worn past the service limit, replace the crankshaft with a new one.
- ★ If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

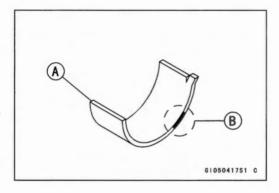
#### **Crankpin Diameter Marks**

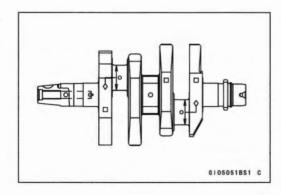
None: 29.984 ~ 29.994 mm (1.1805 ~ 1.18086 in.)

O: 29.995 ~ 30.000 mm (1.18090 ~ 1.1811 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

OThe mark already on the big end should almost coincide with the measurement.

## Connecting Rod Big End Inside Diameter Marks

None: 33.000 ~ 33.008 mm (1.2992 ~ 1.29952 in.)

O: 33.009 ~ 33.016 mm (1.29956 ~ 1.2998 in.)

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]

Diameter Mark (Around Weight Mark) [D]: "O" or no mark

 Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding.
 Size Color [B]

| 0120 00101                        | 1                   |            |             |  |
|-----------------------------------|---------------------|------------|-------------|--|
| Con-rod Big                       | Cranknin            |            | ng Insert   |  |
| End Inside<br>Diameter<br>Marking | Diameter<br>Marking | Size Color | Part Number |  |
| None                              | 0                   | Brown      | 92139-0784  |  |
| None                              | None                | Dlack      | 00400 0700  |  |
| 0                                 | 0                   | Black      | 92139-0783  |  |
| 0                                 | None                | Blue       | 92139-0782  |  |

• Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

## Crankshaft Side Clearance Inspection

- Insert a thickness gauge [A] between the crankcase main bearing and the crank web at the No. 2 journal to determine clearance.
- ★If the clearance exceeds the service limit, replace the crankcase halves as a set.

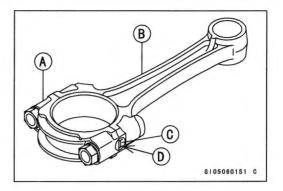
#### NOTE

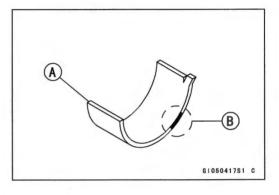
OThe upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

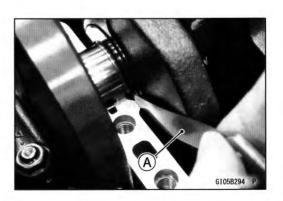
#### **Crankshaft Side Clearance**

Standard:  $0.05 \sim 0.20 \text{ mm} (0.0020 \sim 0.0079 \text{ in.})$ 

Service Limit: 0.40 mm (0.016 in.)







## **Crankshaft and Connecting Rods**

#### Crankshaft Runout Inspection

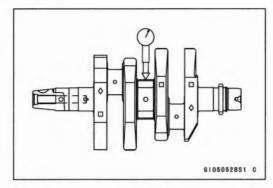
- Measure the crankshaft runout.
- ★ If the measurement exceeds the service limit, replace the crankshaft.

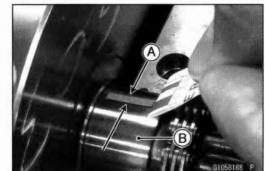
#### **Crankshaft Runout**

Standard:

TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.05 mm (0.0020 in.)





# Crankshaft Main Bearing Insert/Journal Wear Inspection

Using a plastigage (press gauge) [A], measure the bearing insert/journal [B] clearance.

#### NOTE

- O Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).
- ODo not turn the crankshaft during clearance measurement.
- OJournal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.

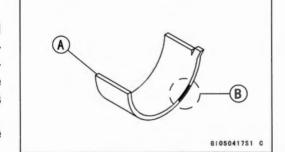
#### Crankshaft Main Bearing Insert/Journal Clearance

Standard:

0.006 ~ 0.030 mm (0.0002 ~ 0.0012 in.)

Service Limit: 0.06 mm (0.0024 in.)

- ★ If the clearance is within the standard, no bearing replacement is required.
- ★If the clearance is between 0.030 mm (0.0012 in.) and the service limit 0.06 mm (0.0024 in.), replace the bearing inserts [A] with inserts painted yellow [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



#### **Crankshaft Main Journal Diameter**

Standard:

27.984 ~ 28.000 mm (1.1017 ~ 1.1024 in.)

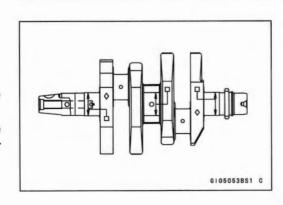
Service Limit: 27.96 mm (1.101 in.)

- ★If any journal has worn past the service limit, replace the crankshaft with a new one.
- ★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

#### **Crankshaft Main Journal Diameter Marks**

None: 27.984 ~ 27.992 mm (1.1017 ~ 1.10205 in.)

- 1: 27.993 ~ 28.000 mm (1.10208 ~ 1.1024 in.)
- □: Crankshaft Main Journal Diameter Marks, "1" or no mark.



#### 9-24 CRANKSHAFT/TRANSMISSION

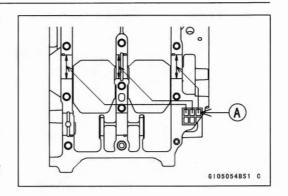
## **Crankshaft and Connecting Rods**

 Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.

[A]: Crankcase Main Bearing Inside Diameter Marks, "O" or no mark.

#### NOTE

- O Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).
- OThe mark already on the upper crankcase half should almost coincide with the measurement.

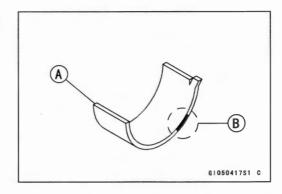


#### Crankcase Main Bearing Inside Diameter Marks

O: 31.000 ~ 31.008 mm (1.2205 ~ 1.22078 in.)

None: 31.009 ~ 31.016 mm (1.22082 ~ 1.2211 in.)

 Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
 Size Color [B]



| Crankcase Main                     | Crankshaft Main             | Bearing Insert* |             |              |  |  |
|------------------------------------|-----------------------------|-----------------|-------------|--------------|--|--|
| Bearing Inside<br>Diameter Marking | Journal Diameter<br>Marking | Size Color      | Part Number | Journal Nos. |  |  |
| 0                                  | 1                           | Black           | 92139-0787  | 1, 3         |  |  |
|                                    |                             |                 | 92139-0791  | 2            |  |  |
| None                               | 1                           | 5.              | 92139-0786  | 1, 3         |  |  |
| 0                                  | None                        | Blue            | 92139-0790  | 2            |  |  |
| None                               | None                        | Vallani         | 92139-0788  | 1, 3         |  |  |
| None                               | None                        | Yellow          | 92139-0792  | 2            |  |  |

<sup>\*:</sup> The bearing insert for Nos. 2 journal have an oil groove.

 Install the new inserts in the crankcase halves and check insert/journal clearance with the plastigage.

#### Starter Motor Clutch

#### Starter Motor Clutch Removal/Installation

 Refer to the Alternator Rotor Removal/Installation in the Electrical System chapter.

#### Starter Motor Clutch Inspection

Remove:

Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)

Starter Idle Gear and shaft

- Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].
- ★ If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.
- Disassemble the starter motor clutch, and visually inspect the clutch parts.
- ★ If there is any worn or damaged part, replace it.



OExamine the starter motor clutch gear as well. Replace it if it worn or damaged.

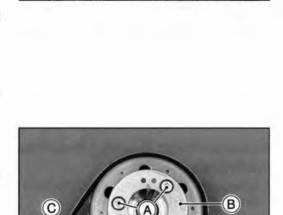
#### Starter Motor Clutch Disassembly

Remove:

Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
Starter Motor Clutch Bolts [A]

Starter Motor Clutch [B]

Special Tool - Flywheel Holder [C]: 57001-1313



#### Starter Motor Clutch Assembly

 Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

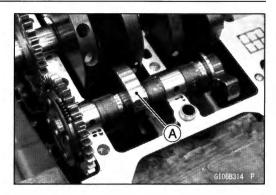
Special Tool - Flywheel Holder: 57001-1313

Torque - Starter Motor Clutch Bolts: 34.3 N·m (3.50 kgf·m, 25.3 ft·lb)

#### Balancer

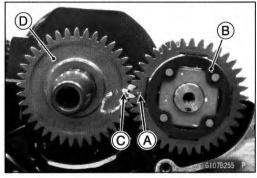
#### Balancer Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the balancer shaft [A] with the balancer gear.



#### Balancer Installation

- Apply molybdenum disulfide oil solution to the balancer shaft bearing inserts.
- Align the timing mark [A] on the balancer gear [B] with the timing mark [C] on the balancer drive gear [D].
- Install the balancer shaft.
- Assemble the crankcase (see Crankcase Assembly).

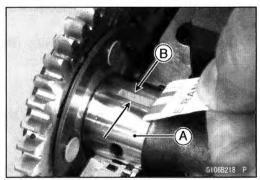


# Balancer Shaft Bearing Insert/Journal Wear Inspection

 Measure the bearing insert/journal [A] clearance with plastigage [B].

#### NOTE

- O Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).
- ODo not turn the balancer shaft during clearance measurement.
- OJournal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.



#### **Balancer Shaft Bearing Insert/Journal Clearance**

Standard:  $0.024 \sim 0.048 \text{ mm} (0.0009 \sim 0.0019 \text{ in.})$ 

Service Limit: 0.08 mm (0.0031 in.)

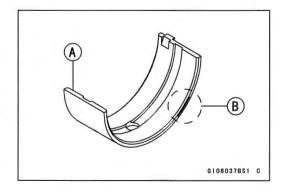
- ★ If the clearance is within the standard, no bearing replacement is required.
- ★ If the clearance is between 0.048 mm (0.0019 in.) and the service limit 0.08 mm (0.0031 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★If the clearance exceeds the service limit, measure the diameter of the balancer shaft journal.



Standard:

25.984 ~ 26.000 mm (1.0230 ~ 1.0236 in.)

Service Limit: 25.96 mm (1.022 in.)



#### **Balancer**

- ★If any journal has worn past the service limit, replace the balancer shaft with a new one.
- ★ If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings [A] on the balancer shaft, make new marks on it.



None: 25.984 ~ 25.994 mm (1.0230 ~ 1.02338 in.)

O: 25.995 ~ 26.000 mm (1.02342 ~ 1.0236 in.)

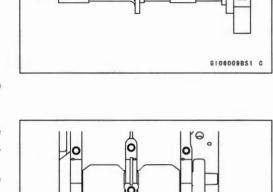
∆: Balancer Shaft Journal Diameter Marks, "○" or no mark.

 Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.

[A]: Balancer Shaft Bearing Inside Diameter Marks, "O" or no mark.

#### NOTE

- O Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).
- OThe mark already on the upper crankcase half should almost coincide with the measurement.



#### **Balancer Shaft Bearing Inside Diameter Marks**

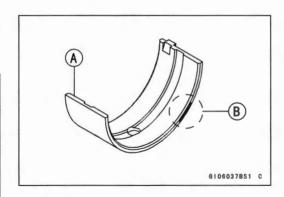
O: 29.000 ~ 29.008 mm (1.1417 ~ 1.1420 in.)

None: 29.009 ~ 29.016 mm (1.1421 ~ 1.1424 in.)

 Select the proper bearing insert [A] in accordance with the combination of the crankcase and balancer shaft coding.
 Size Color [B]

| Balancer                             | Balancer Shaft                  | Bearing    | g Insert    |  |
|--------------------------------------|---------------------------------|------------|-------------|--|
| Shaft Journal<br>Diameter<br>Marking | Bearing Inside Diameter Marking | Size Color | Part Number |  |
| 0                                    | 0                               | Brown      | 92028-1424  |  |
| 0                                    | None                            | Black      | 92028-1423  |  |
| None                                 | 0                               | DIACK      | 92028-1423  |  |
| None                                 | None                            | Blue       | 92028-1422  |  |

 Install the new inserts in the crankcase and check insert/journal clearance with the plastigage.



GIOGOORRS1 C

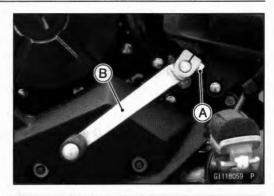
#### 9-28 CRANKSHAFT/TRANSMISSION

#### **Transmission**

#### Shift Pedal Removal

Remove:

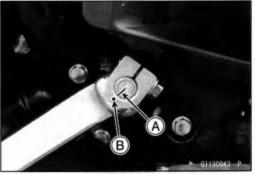
Shift Pedal Bolt [A] Shift Pedal [B]



#### Shift Pedal Installation

- Align the mark [A] on the shift shaft with the mark [B] on the shift pedal.
- Tighten:

Torque - Shift Pedal Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)



#### External Shift Mechanism Removal

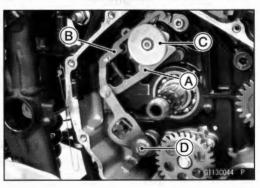
Drain:

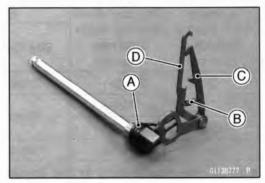
Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)

- Remove:
  - Shift Pedal (see Shift Pedal Removal)
    Clutch (see Clutch Removal in the Clutch chapter)
- Spread the shift mechanism arm [A] and over shift limiter
   [B] out of the shift drum [C], and pull out the shift shaft assembly [D].

## External Shift Mechanism Installation

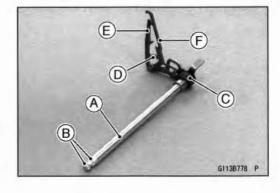
- Check that the return spring [A] and pawl spring [B] are properly fitted on the mechanism.
- Install the shift shaft assembly.
- Place the shift mechanism arm [C] and over shift limiter
   [D] on the shift drum pins.
- Install the removed parts (see appropriate chapters).





## External Shift Mechanism Inspection

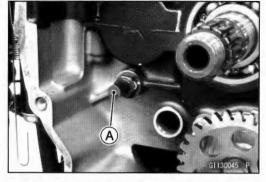
- Examine the shift shaft [A] for any damage.
- ★If the shaft is bent, straighten or replace it.
- ★If the splines [B] are damaged, replace the shaft.
- ★If the return spring [C] or pawl spring [D] is damaged in any way, replace them.
- ★If the shift mechanism arm [E] or over shift limiter [F] is damaged in any way, replace the shaft.



#### **Transmission**

- Check the return spring pin [A] is not loose.
- ★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

Torque - Shift Shaft Return Spring Pin: 19.6 N·m (2.0 kgf·m, 14.5 ft·lb)

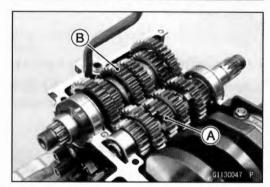


- Check the gear positioning lever [A] and its spring for breaks or distortion.
- ★If the lever or spring are damaged in any way, replace them.
- Visually inspect the shift drum cam [B].
- ★ If they are badly worn or if they show any damage, replace it.



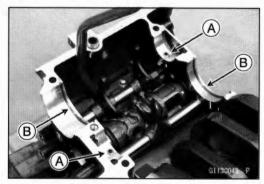
#### Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the drive shaft [A] and output shaft [B].

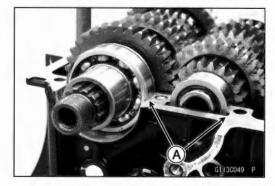


#### Transmission Shaft Installation

 Check to see that the set pins [A] and set rings [B] are in place.



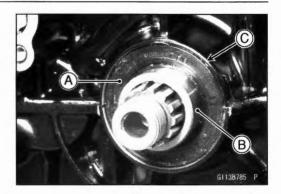
- Apply engine oil to the bearings and transmission gears.
   OThe bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly metched, there is no clearance [A] be
  - they are properly matched, there is no clearance [A] between the crankcase and the bearing outer races.



#### 9-30 CRANKSHAFT/TRANSMISSION

#### **Transmission**

- Assemble the crankcase (see Crankcase Assembly).
- Replace the oil seal [A] with a new one.
- Apply grease to the oil seal lips.
- Press in the oil seal onto collar [B] so that the surface of the oil seal is flush with the surface [C] of the crankcase.



#### Transmission Shaft Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips, disassemble the transmission shafts.

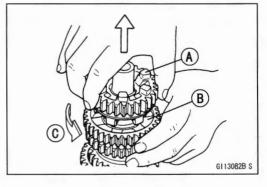
#### Special Tool - Outside Circlip Pliers: 57001-144

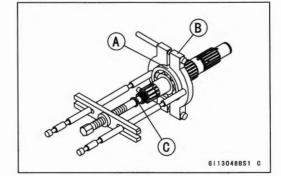
- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.
- OSet the output shaft in a vertical position holding the 3rd gear [B].
- OSpin the 5th gear quickly [C] and pull it off upward.
- Remove the ball bearing [A] from each shafts.

Special Tools - Bearing Puller [B]: 57001-135

Bearing Puller Adapter [C]: 57001-317

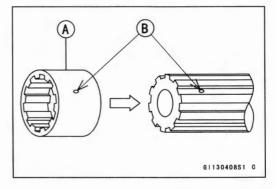
Discard the bearing.





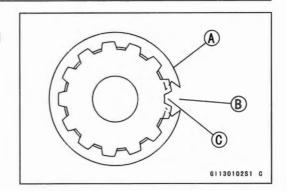
#### Transmission Shaft Assembly

- Apply engine oil to the bushings, ball bearings and shafts.
- Install the ball bearings on the shafts with the groove toward the clutch side.
- Install the gear bushings [A] on the shaft with their holes
   [B] aligned.



#### **Transmission**

- Replace any circlips removed with new ones.
- Install the circlips [A] so that the opening [B] is aligned with a spline groove [C].



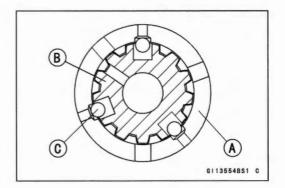
- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 6th gear bushing onto the drive shaft with their oil holes aligned.
- The output shaft gears can be recognized by size: the gear with the largest diameter is 1st gear, and the smallest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 6th gear onto the output shaft with their oil holes aligned.
- Install the 2nd and 3rd/4th gear bushings onto the output shaft with their oil holes aligned.
- Fit the steel balls into the 5th gear holes in the output shaft, aligning oil hole as shown.

5th Gear [A]
Output Shaft [B]
Steel Balls [C]

#### NOTICE

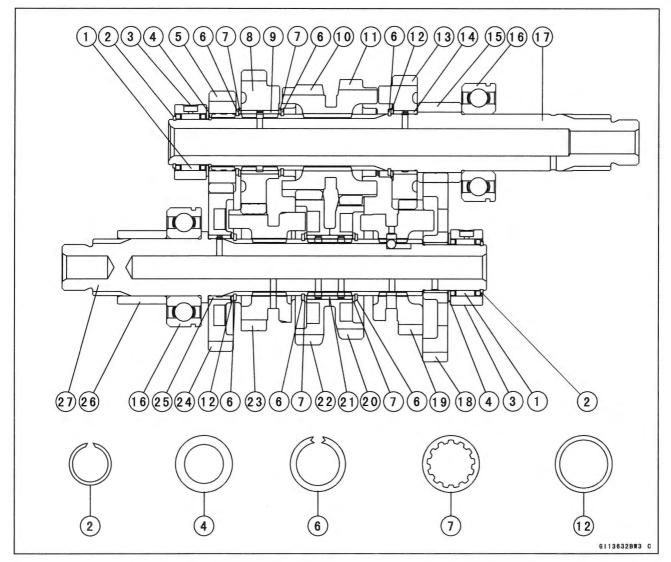
Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

- OAfter 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**



- 1. Needle Bearing
- 2. Circlip
- 3. Bearing Outer Race
- 4. Thrust Washer,  $\phi$ 30 mm (1.18 in.) (Inside Diameter:  $\phi$ 20.5 mm (0.807 in.))
- 5. 2nd Gear
- 6. Circlip,  $\phi$ 29 mm (1.14 in.)
- 7. Toothed Washer,  $\phi$ 30 mm (1.18 in.)
- 8. 6th (Top) Gear
- 9. Bushing
- 10. 3rd Gear
- 11.4th Gear
- 12. Thrust Washer,  $\phi$ 30 mm (1.18 in.) (Inside Diameter:  $\phi$ 25.3 mm (0.996 in.))
- 13.5th Gear
- 14. Bushing

#### Shift Drum and Fork Removal

• Remove:

Lower Crankcase Half (see Crankcase Splitting)
Transmission Shafts (see Transmission Shaft Removal)

- 15. 1st Gear
- 16. Ball Bearing
- 17. Drive Shaft
- 18. 1st Gear
- 19.5th Gear
- 20. 4th Gear
- 21. Bushing
- 22. 3rd Gear
- 23. 6th (Top) Gear
- 24. 2nd Gear
- 25. Bushing
- 26. Collar
- 27. Output Shaft

#### **Transmission**

Remove:

Gear Positioning Lever Bolt [A]

Spacer [B]

Gear Positioning Lever [C]

Washer

Spring [D]

Shift Drum Bearing Holder Screws [E]

Shift Drum Bearing Holder [F]

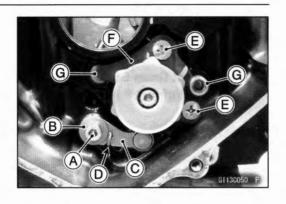
Shift Rods [G]

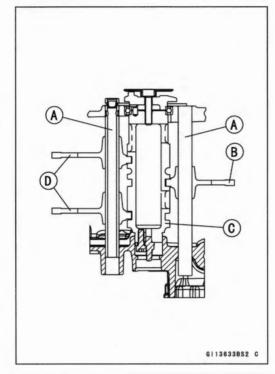
Shift Forks

• Remove the shift drum from the upper crankcase.

#### Shift Drum and Fork Installation

- Apply molybdenum disulfide oil solution to the shift drum, forks and rods.
- Insert the shift drum into the upper crankcase half.
- Install the shift rods [A], noting the groove position.
- OPosition the one with shorter ears [B] on the drive shaft and place the pin in the center groove in the shift drum [C].
- OThe two forks [D] on the output shaft are identical.





Install:

Spring [A]

Washer [B]

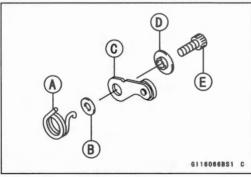
Gear Positioning Lever [C]

Spacer [D]

 Apply a non-permanent locking agent to the threads of the gear positioning lever bolt [E], and tighten them.

Torque - Gear Positioning Lever Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

 Check the gear positioning lever and spring for smooth operation.

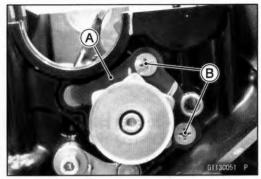


#### 9-34 CRANKSHAFT/TRANSMISSION

#### **Transmission**

- Install the shift drum bearing holder [A].
- Apply a non-permanent locking agent to the threads of the shift drum bearing holder screws [B], and tighten them.

Torque - Shift Drum Bearing Holder Screws: 4.4 N·m (0.45 kgf·m, 39 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 bolt [A].
- Remove:

Shift Drum Cam Holder [B]

Shift Drum Cam [C]

Shift Drum Bearing [D]

Dowel Pin [E]

Gear Position Sensor Shaft Bolt [F]

Gear Position Sensor Shaft [G]

Shift Drum [H]

## Shift Drum Assembly

- Be sure to install the dowel pin [A].
- Install:

Shift Drum Bearing [B]

Shift Drum Cam [C]

Shift Drum Cam Holder [D]

 Apply a non-permanent locking agent to the threads of the shift drum cam bolt [E], and tighten it.

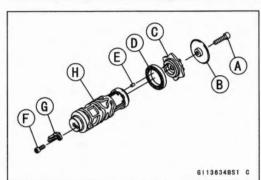
Torque - Shift Drum Cam Bolt: 9.0 N·m (0.92 kgf·m, 80 in·lb)

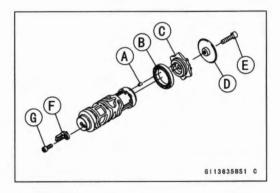
- Install the gear position sensor shaft [F].
- Apply a non-permanent locking agent to the threads of the gear position sensor shaft bolt [G], and tighten it.

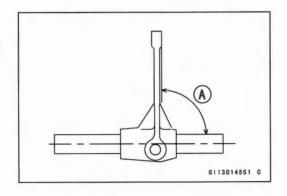
Torque - Gear Position Sensor Shaft Bolt: 5.9 N·m (0.60 kgf·m, 52 in·lb)



 Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
 90° [A]







#### **Transmission**

#### Shift Fork/Gear Groove Wear Inspection

- Measure the thickness of the shift fork ears [A], and measure the width of the gear grooves [B].
- ★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

#### **Shift Fork Ear Thickness**

Standard:

4.9 ~ 5.0 mm (0.19 ~ 0.20 in.)

Service Limit: 4.8 mm (0.19 in.)

★If the gear groove is worn over the service limit, the gear must be replaced.

#### **Gear Groove Width**

Standard:

5.05 ~ 5.15 mm (0.199 ~ 0.203 in.)

Service Limit: 5.3 mm (0.21 in.)

# Shift Fork Guide Pin/Drum Groove Wear Inspection

- Measure the diameter of each shift fork guide pins [A], and measure the width of each shift drum grooves [B].
- ★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

#### Shift Fork Guide Pin Diameter

Standard:

5.9 ~ 6.0 mm (0.23 ~ 0.24 in.)

Service Limit: 5.8 mm (0.23 in.)

★ If any shift drum groove is worn over the service limit, the drum must be replaced.

#### **Shift Drum Groove Width**

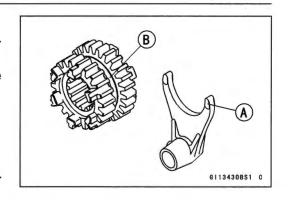
Standard:

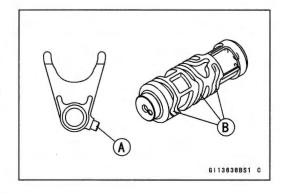
6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)

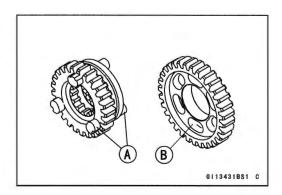
Service Limit: 6.3 mm (0.25 in.)

## Gear Dog and Gear Dog Hole Damage Inspection

- Visually inspect the gear dogs [A] and gear dog holes [B].
- ★Replace any damaged gears or gears with excessively worn dogs or dog holes.







## 9-36 CRANKSHAFT/TRANSMISSION

## Ball Bearing, Needle Bearing, and Oil Seal

## Ball and Needle Bearing Wear Inspection

#### NOTICE

Do not remove the bearings for inspection. Removal may damage them.

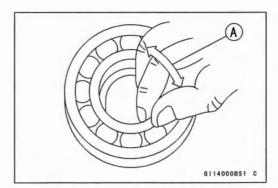
- Check the ball bearings.
- OSince the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

OSpin [A] the bearing by hand to check its condition.

- ★ If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.
- Check the needle bearings.
- OThe rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
- ★ If there is any doubt as to the condition of a needle bearing, replace it.

#### Oil Seal Inspection

- Inspect the oil seals.
- ★ Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.



# 10

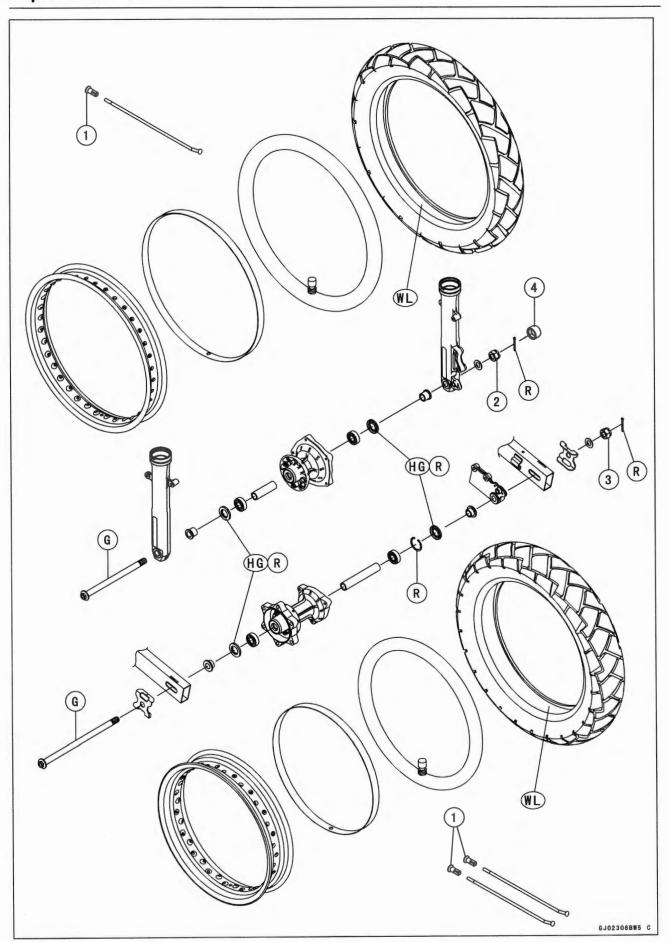
# Wheels/Tires

# **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           | 10-6  |
| Rear Wheel Removal                 | 10-7  |
| Rear Wheel Installation            | 10-8  |
| Wheel Inspection                   | 10-9  |
| Spoke Inspection                   | 10-9  |
| Rim Inspection                     | 10-9  |
| Rim Installation Position          | 10-10 |
| Axle Inspection                    | 10-11 |
| Tires                              | 10-12 |
| Air Pressure Inspection/Adjustment | 10-12 |
| Tire Inspection                    | 10-12 |
| Tire Removal                       | 10-12 |
| Tire Installation                  | 10-13 |
| Hub Bearing                        | 10-15 |
| Hub Bearing Removal                | 10-15 |
| Hub Bearing Installation           | 10-15 |
| Hub Bearing Inspection             | 10-16 |
| Hub Bearing Lubrication            | 10-16 |
|                                    |       |

# **10-2 WHEELS/TIRES**

# **Exploded View**



# **Exploded View**

| No. |                |     |       | Torque   |         | Damarka |
|-----|----------------|-----|-------|----------|---------|---------|
|     | Fastener       | N⋅m | kgf·m | ft·lb    | Remarks |         |
| 1   | Spoke Nipples  | 5.2 | 0.53  | 46 in·lb |         |         |
| 2   | Front Axle Nut | 98  | 10    | 72       |         |         |
| 3   | Rear Axle Nut  | 98  | 10    | 72       |         |         |

4. EUR and CN 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**

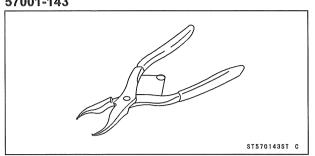
| Item                          | Standard  | Service Limit   |
|-------------------------------|---|---|
| Wheels (Rims)                 |   |   |
| Rim Runout:                   |   |   |
| Axial                         | TIR 1.0 mm (0.04 in.) or less                                 | TIR 2.0 mm (0.08 in.)   |
| Radial                        | TIR 1.0 mm (0.04 in.) or less                                 | TIR 2.0 mm (0.08 in.)   |
| Axle Runout/100 mm (3.94 in.) | TIR 0.03 mm (0.001 in.) or less                               | TIR 0.2 mm (0.008 in.)  |
| Rim Size:                     |   |   |
| Front                         | 19 × 2.15   |   |
| Rear                          | 17M/C × MT3.00  |   |
| Tires                         |   |   |
| Air Pressure (when cold):     |   |   |
| Front                         | Up to 180 kg (397 lb) load:<br>200 kPa (2.00 kgf/cm², 28 psi) | 5   |
| Rear                          | Up to 180 kg (397 lb) load:<br>225 kPa (2.25 kgf/cm², 32 psi) |   |
| Tread Depth:                  |   |   |
| Front                         | 4.3 mm (0.17 in.)   | 1 mm (0.04 in.)<br>(AT, CH, DE)<br>1.6 mm (0.06 in.)                                    |
| Rear                          | 6.7 mm (0.26 in.)   | Up to 130 km/h (80 mph)<br>2 mm (0.08 in.)<br>Over 130 km/h (80 mph)<br>3 mm (0.12 in.) |
| Standard Tires:               |   | (0.12)  |
| Front:                        |   |   |
| Make                          | IRC<br>(BR) PIRELLI   | <u>-</u>  |
| Туре                          | GP-210F<br>(BR) MT-60   |   |
| Size                          | 100/90-19M/C 57S<br>(BR) 100/90-19M/C 57H TL                  |   |
| Rear:                         |   |   |
| Make                          | IRC<br>(BR) PIRELLI   |   |
| Туре                          | GP-210R<br>(BR) MT-60   |   |
| Size                          | 130/80-17M/C 65S<br>(BR) 130/80-17M/C 65H TL                  |   |

## **A** WARNING

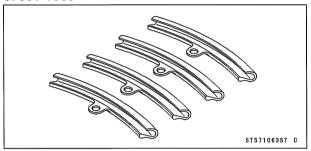
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

# Special Tools

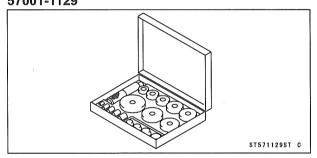
# Inside Circlip Pliers: 57001-143



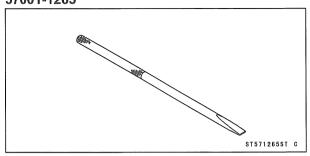
**Rim Protector: 57001-1063** 



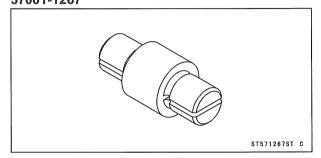
Bearing Driver Set: 57001-1129



Bearing Remover Shaft,  $\phi$ 9: 57001-1265



Bearing Remover Head,  $\phi$ 15 ×  $\phi$ 17: 57001-1267



### 10-6 WHEELS/TIRES

### Wheels (Rims)

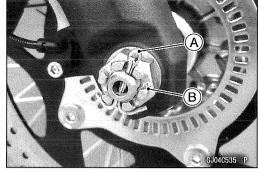
### Front Wheel Removal

• Remove:

Cap (EUR and CN Models) Cotter Pin [A]

Loosen:

Front Axle Nut [B]



- Remove:
  - Front Fender (see Front Fender Removal in the Frame chapter)
- For the ABS equipped models, remove the bolt [A] and front wheel rotation sensor [B], and clear the front wheel sensor lead from the clamp [C].
- Remove:

Front Caliper Mounting Bolts [D] Front Caliper [E]

- Raise the front wheel off the ground with a suitable stand.
- Remove the front axle nut.
- Pull out the axle to the left and drop the front wheel out of the forks.

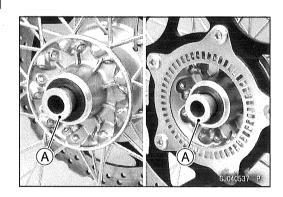


Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



- Apply high-temperature grease to the grease seal lips.
- Fit the collars [A] on the both sides of the hub.

OThe collars are identical.

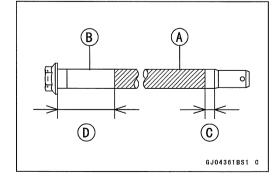


• Apply a thin coat of grease [A] to the front axle [B] for rust prevention.

About 10 mm (0.4 in.) [C] About 70 mm (2.8 in.) [D]

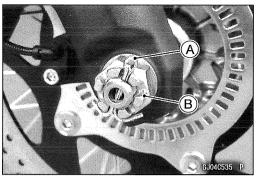
### NOTE

ODo not apply grease to the threads of the axle.



- Insert the front axle from the left side.
- ★Wipe off excess grease if necessary.
- Install the front axle nut temporarily and remove the stand.
- Tighten:

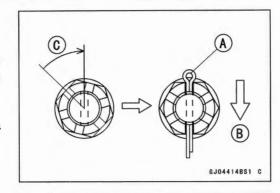
Torque - Front Axle Nut: 98 N·m (10 kgf·m, 72 ft·lb)



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

#### NOTE

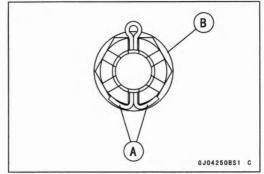
- OWhen inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [C] up to next alignment.
- Olt should be within 30 degrees.
- OLoosen once and tighten again when the slot goes past the nearest hole.



• Bend the cotter pin ends [A] along the nut [B].

### **A** WARNING

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



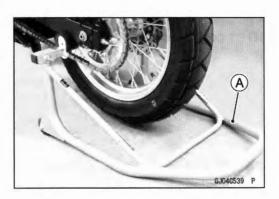
- Install the removed parts (see appropriate chapters).
- Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

### **A** 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 a stand [A] or the center stand (KLE300A).

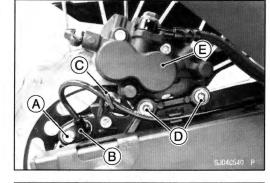


### 10-8 WHEELS/TIRES

### Wheels (Rims)

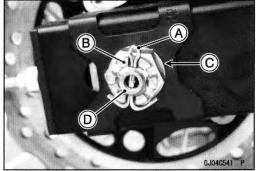
- Remove the bolt [A] and rear wheel rotation sensor [B], and clear the rear wheel rotation sensor lead from the clamp [C].
- Remove:

Rear Caliper Mounting Bolts [D] Rear Caliper [E]



• Remove:

Cotter Pin [A]
Axle Nut [B]
Washer [C]
Rear Axle [D] (from Left Side)



- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel backward and remove it.

### NOTICE

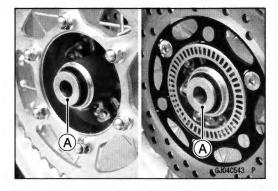
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



### Rear Wheel Installation

- Apply high-temperature grease to the grease seal lips.
- Fit the collar [A] on the both sides of the hub.

OThe collars are identical.

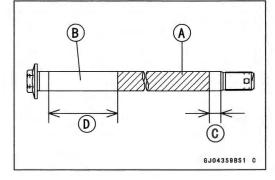


 Apply a thin coat of grease [A] to the rear axle [B] for rust prevention.

About 10 mm (0.4 in.) [C] About 70 mm (2.8 in.) [D]

### NOTE

ODo not apply grease to the threads of the axle.



- Engage the drive chain with the rear sprocket.
- Install the caliper bracket [A] onto the stopper [B] of the swingarm.
- Insert the rear axle from the left side.
- ★Wipe off excess grease if necessary.
- Adjust the drive chain slack before tightening the axle nut (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- Tighten:

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

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

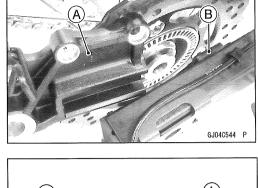
#### NOTE

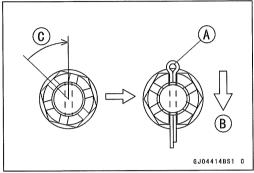
- OWhen inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [C] up to next alignment.
- Olt should be within 30 degrees.
- OLoosen once and tighten again when the slot goes past the nearest hole.

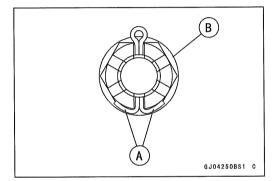


### **A** WARNING

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







- Install the removed parts (see appropriate chapters).
- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

### **WARNING**

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

### Wheel Inspection

Refer to the Wheel Bearing Damage Inspection in the Periodic Maintenance chapter.

### Spoke Inspection

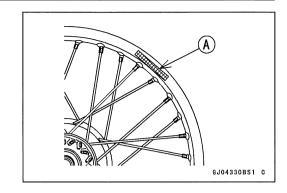
 Refer to the Spoke Tightness and Rim Runout Inspection in the Periodic Maintenance chapter.

### Rim Inspection

 Refer to the Spoke Tightness and Rim Runout Inspection in the Periodic Maintenance chapter.

# Rim Installation Position Front Rim

• Install the rim so that marked side [A] faces leftward.

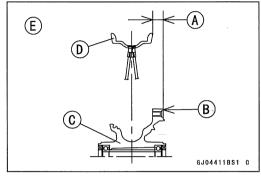


• Set the rim following position.

OThe distance [A] from the right side surface [B] of the front hub [C] to right end of the front rim [D] should be as follows.

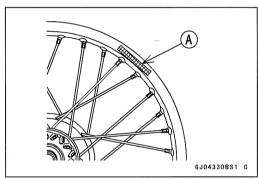
View from Rear [E]

Distance: 18.5 ±0.5 mm (0.73 ±0.020 in.)



### Rear Rim

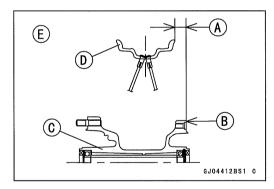
• Install the rim so that marked side [A] faces leftward.



• Set the rim following position.

OThe distance [A] from the right side surface [B] of the rear hub [C] to right end of the rear rim [D] should be as follows. View from Rear [E]

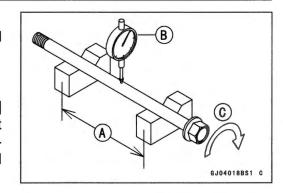
Distance: 19.0 ±0.5 mm (0.75 ±0.020 in.)



• Check the rim runout (see Spoke Tightness and Rim Runout Inspection in the Periodic Maintenance chapter).

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: T

TIR 0.03 mm (0.001 in.) or less

Service Limit: TIR 0.2 mm (0.008 in.)

### **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 the wheel (see Front/Rear Wheel Removal).

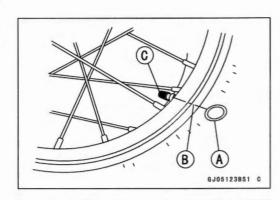
### NOTICE

Do not lay the front 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.

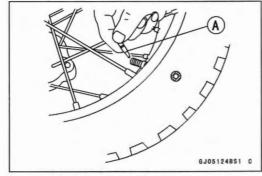
 To maintain wheel balance, mark the air valve position on the tire with chalk so that the tire can be reinstalled in the same position.

Chalk Mark or Yellow Mark [A] Align [B]

• Remove the air valve cap [C].



Take out the valve core [A] to let out the air.



- Remove the air valve nut.
- 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.

#### **Tires**

- Break the beads away from both sides of the rim with a commercially available the bead breaker.
- Lubricate a commercially available tire irons [A] and rim protectors [B] with soap and water solution or rubber lubricant.

### Special Tool - Rim Protector: 57001-1063

 Step on the side of the tire opposite air valve, and pry the tire off the rim with the tire irons protecting the rim with rim protectors.

### NOTICE

Take care not to insert the tire irons so deeply that the tube gets damaged.

- Remove the tube when one side of the tire is pried off.
- Pry the other side of the tire off the rim.

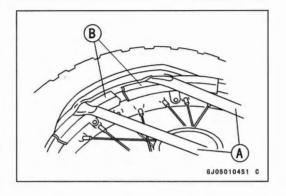
### Tire Installation

### **A** 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. Use the same manufacturer's tires on both front and rear wheels.

#### NOTE

- OReplace the rim band with a new one whenever the tire is replaced.
- Inspect the rim and the tire before installing the tire, and replace them if necessary.
- Apply a soap and water solution or rubber lubricant to both the tire bead and the rim flange.
- Check the tire rotation mark [A] on the front and rear tires and install them on the rim accordingly.





### 10-14 WHEELS/TIRES

### **Tires**

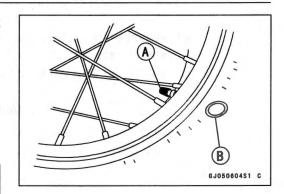
- Position the tire on the rim so that the air valve [A] is at the tire balance mark [B] (the chalk mark made during removal, or the paint mark on a new tire).
- Insert the valve stem into the rim, and screw the nut on loosely.
- Fit the rim protectors and use a commercially available tire irons to install the tire bead.

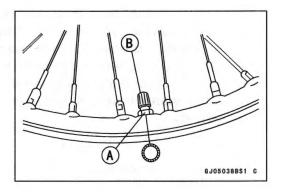
Special Tool - Rim Protector: 57001-1063

### NOTICE

To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.

- Install the tire on the rim from the air valve side.
- OFit the rim protectors and insert the tire irons so deeply that the tube is not damaged.
- Similarly, slip the tire bead over the rim on the other side.
- Check that the tube is not pinched between the tire and rim.
- Tighten the air valve nut [A] and air valve cap [B].
- Adjust the tire air pressure to the specified pressure (see Air Pressure Inspection in the Periodic Maintenance chapter).





### **Hub Bearing**

### Hub Bearing Removal

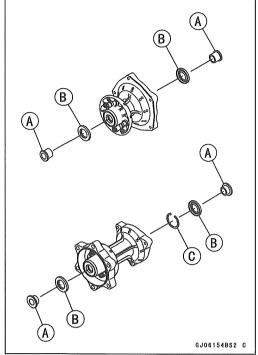
• Remove the wheels (see Front/Rear Wheel Removal), and take out the following.

Collars [A]

Grease Seals [B]

Circlip [C]

Special Tool - Inside Circlip Pliers: 57001-143



• Use the bearing remover to remove the hub bearings [A].

### NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Special Tools - Bearing Remover Shaft,  $\phi$ 9 [B]: 57001-1265 Bearing Remover Head,  $\phi$ 15 ×  $\phi$ 17 [C]: 57001-1267

### Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.

#### NOTE

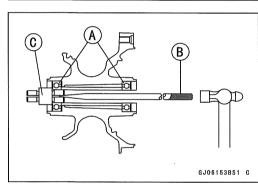
OInstall the bearings so that the marked side faces out.

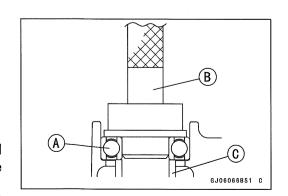
- Press in each right bearing [A] until it is bottomed.
   Special Tool Bearing Driver Set [B]: 57001-1129
- Install the collar [C].
- Press in each left bearing until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129

- Confirm that the axle can be inserted smoothly.
- Confirm that the each bearing inner race can be turned smoothly. Then visually inspect that the inner race of the opposite side turns.
- ★If they do not turn smoothly, remove the bearings and sleeve and visually inspect the wheel and sleeve.
- Replace the circlip with a new one.

Special Tool - Inside Circlip Pliers: 57001-143





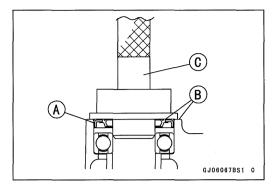
### 10-16 WHEELS/TIRES

### **Hub Bearing**

- Replace the grease seals with new ones.
- Apply high-temperature grease to the grease seal lips.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.

### 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.

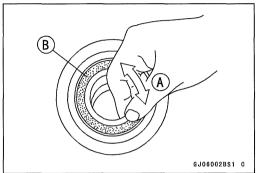
#### NOTE

- ODo 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

OSince the hub bearings are packed with grease and sealed, lubrication is not required.

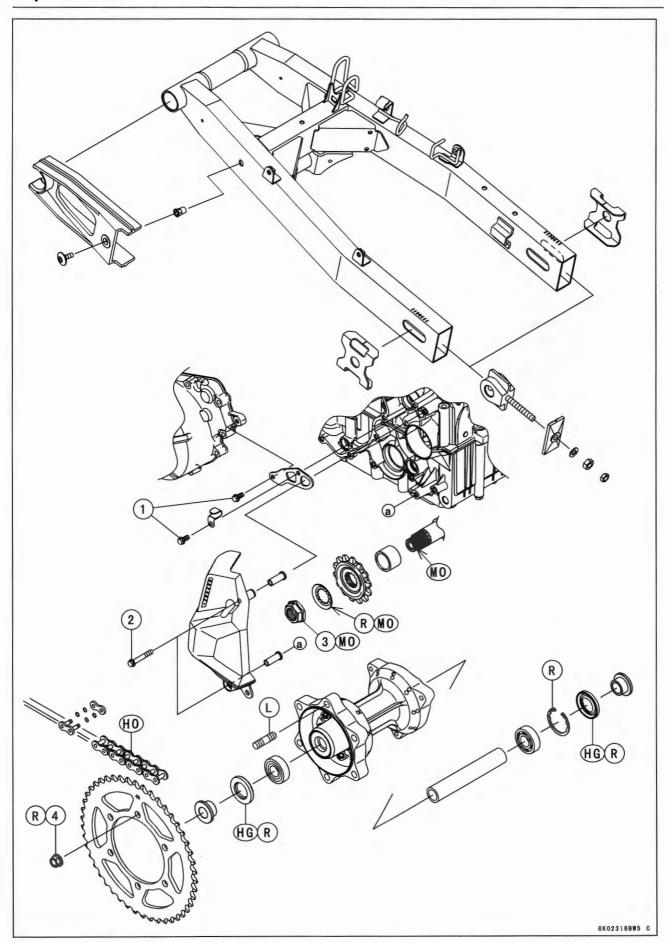


# **Final Drive**

# **Table of Contents**

| Exploded View                         |
|---------------------------------------|
| Specifications                        |
| Drive Chain                           |
| Drive Chain Slack Inspection          |
| Drive Chain Slack Adjustment          |
| Wheel Alignment Inspection/Adjustment |
| Drive Chain Wear Inspection           |
| Drive Chain Lubrication               |
| Drive Chain Guide Wear Inspection     |
| Drive Chain Removal                   |
| Drive Chain Installation              |
| Drive Chain Replacement               |
| Sprocket, Coupling                    |
| Engine Sprocket Removal               |
| Engine Sprocket Installation          |
| Rear Sprocket Removal                 |
| Rear Sprocket Installation            |
| Sprocket Wear Inspection              |
| Rear Sprocket Warp Inspection         |

# **Exploded View**



# **Exploded View**

| No. Fastener | o. Fastener N               |     | Torque |          |         |
|--------------|-----------------------------|-----|--------|----------|---------|
|              |                             | N·m | kgf·m  | ft·lb    | Remarks |
| 1            | Chain Guide Bolts           | 9.8 | 1.0    | 87 in·lb |         |
| 2            | Engine Sprocket Cover Bolts | 9.8 | 1.0    | 87 in·lb |         |
| 3            | Engine Sprocket Nut         | 127 | 13.0   | 93.7     | МО      |
| 4            | 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                                      | 25 ~ 35 mm (1.0 ~ 1.4 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   |                        |
|  | L.G.B (when shipping) (BR) DAIDO (when shipping)  |                        |
| Туре   | EK520RMX/3D<br>(CN) EK520SRO<br>R520HPXR (when shipping)<br>(BR) DID 520VD2 (when shipping) |                        |
| Link   | 112 links<br>(CN) 108 links   | 111                    |
| Link Pin Outside Diameter (When drive chain replacing) | 5.6 ~ 6.0 mm (0.22 ~ 0.24 in.)  |                        |
| Link Plates Outside Width (When drive chain replacing) | 16.40 ~ 16.55 mm (0.646 ~ 0.652 in.)  |                        |
| Sprockets  |   |                        |
| Rear Sprocket Warp                                     | TIR 0.4 mm (0.016 in.) or less  | TIR 0.5 mm (0.020 in.) |

### **Drive Chain**

### **Drive Chain Slack Inspection**

 Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter.

### **Drive Chain Slack Adjustment**

 Refer to the Drive Chain Slack Adjustment in the Periodic Maintenance chapter.

### Wheel Alignment Inspection/Adjustment

 Refer to the Wheel Alignment Inspection in the Periodic Maintenance chapter.

### **Drive Chain Wear Inspection**

 Refer to the Drive Chain Wear Inspection in the Periodic Maintenance chapter.

#### **Drive Chain Lubrication**

Refer to the Drive Chain Lubrication Condition in the Periodic Maintenance chapter.

### **Drive Chain Guide Wear Inspection**

 Refer to the Chain Guide Wear Inspection in the Periodic Maintenance chapter.

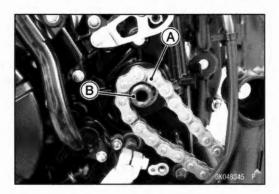
### **Drive Chain Removal**

Remove:

Swingarm (see Swingarm Removal in the Suspension chapter)

Engine Sprocket (see Engine Sprocket Removal)

Remove the drive chain [A] from the output shaft [B].



### **Drive Chain Installation**

- Installation is the reverse of removal (see appropriate chapters).
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

### **Drive Chain Replacement**

Remove:

Mud Guard (see Mud Guard Removal in the Frame chapter)

Engine Sprocket Cover (see Engine Sprocket Removal)

### **Drive Chain**

### NOTICE

For safety, if the drive chain shall be replaced, replace it using a recommended tool.

### **Recommended Tool**

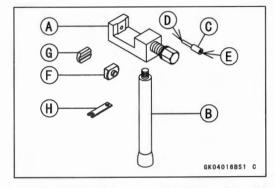
Type:

**EK Joint Tool #50** 

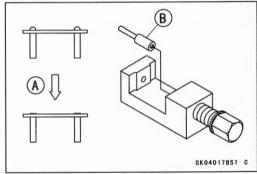
**Brand:** 

**ENUMA** 

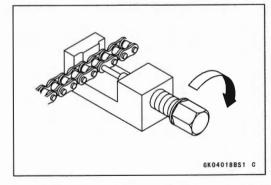
Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
For Riveting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]



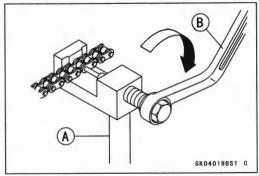
- Grind [A] the pin head to make it flat.
- Set the cutting and riveting pin [B] as shown.



- Screw the pin holder until it touches the link pin.
- Be sure that the cutting pin hits center of the link pin.

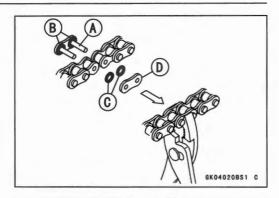


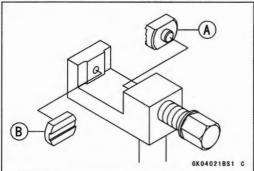
- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the link pin.
- Remove the drive chain from the motorcycle.



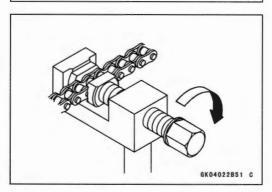
### **Drive Chain**

- Replace the link pin, link plate and grease seals with new ones.
- Apply grease to the link pins [A] and grease seals [B] [C].
- Engage the new drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals.
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.
- Set the plate holder (A) [A] and plate holder (B) [B] on the body.

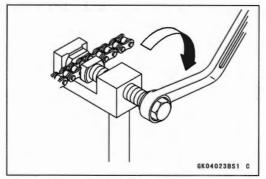




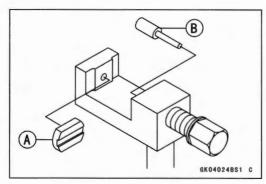
- Fit the plate holder (A) to the link plate.
- Turn the pin holder by hand until the plate holder (B) touches the other link plate.



- Turn the pin holder by a wrench clockwise until two pins of link come into groove of the plate holder (A).
- Take off the plate holder.



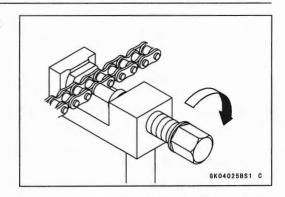
 Set the plate holder (B) [A] and cutting and riveting pin [B] as shown.



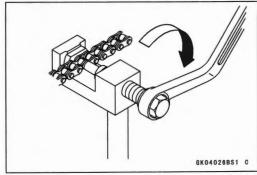
### 11-8 FINAL DRIVE

### **Drive Chain**

 Turn the pin holder until the riveting pin touches the link pin.



- Turn the wrench clockwise until the tip of riveting pin hits of the link pin.
- Rivet it.
- · Same work for the other link pin.



- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

### Link Pin Outside Diameter

Standard:

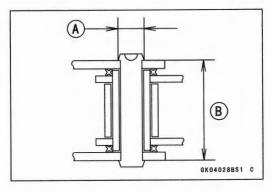
5.6 ~ 6.0 mm (0.22 ~ 0.24 in.)

### **Link Plates Outside Width**

Standard:

16.40 ~ 16.55 mm (0.646 ~ 0.652 in.)

- ★If the reading exceeds the specified length, cut and rejoin the chain again.
- Check the movement of the rollers.
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).



### Sprocket, Coupling

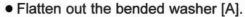
### Engine Sprocket Removal

• Remove:

Left Side Cover (see Side Cover Removal in the Frame chapter)

- Open the clamp [A], free the side stand switch lead.
- Remove:

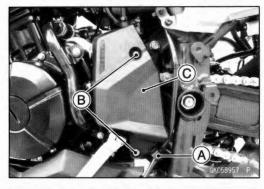
Engine Sprocket Cover Bolts [B] Engine Sprocket Cover [C]

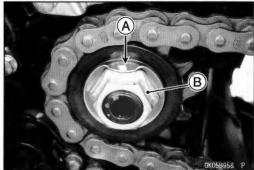


Remove the engine sprocket nut [B] and washer.

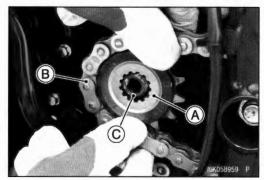
### NOTE

OWhen loosening the engine sprocket nut, hold the rear brake on.





- Raise the rear wheel off the ground with a suitable stand or the center stand (KLE300A).
- Loosen the drive chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Pull the engine sprocket [A] with drive chain [B] off the output shaft [C].
- Disengage the drive chain from the engine sprocket.



### **Engine Sprocket Installation**

- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket so that protruding side [A] faces inside.
- Apply molybdenum disulfide oil solution to the threads of the output shaft and the engine sprocket nut, and the surface of the washer.
- Tighten:

Torque - Engine Sprocket Nut: 127 N·m (13.0 kgf·m, 93.7 ft·lb)

#### NOTE

OTighten the nut while applying the rear brake.

- Bend the one side of the washer over the nut.
- Install the engine sprocket cover.
- Tighten:

# Torque - Engine Sprocket Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Adjust the drive chain slack after installing the engine sprocket (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).



### Sprocket, Coupling

### Rear Sprocket Removal

 Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

### NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Remove:

Rear Sprocket Nuts [A] Rear Sprocket [B]

### Rear Sprocket Installation

- Install the sprocket facing the tooth number marking [A] outward.
- Replace the rear sprocket nuts with new ones.
- Tighten:

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).



- 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

Olf a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.

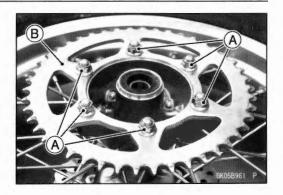
### Rear Sprocket Warp Inspection

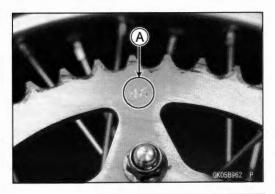
- Raise the rear wheel off the ground with a suitable stand or the center stand (KLE300A) so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).
- ★If the runout exceeds the service limit, replace the rear sprocket.

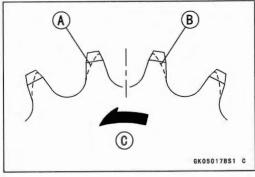
#### Rear Sprocket Warp

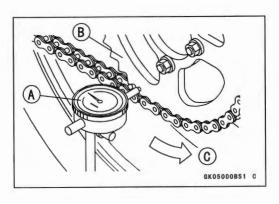
Standard: TIR 0.4 mm (0.016 in.) or less

Service Limit: TIR 0.5 mm (0.020 in.)









# **Brakes**

# **Table of Contents**

| Exploded View                          | 2-4          |
|--|--------------|
| Specifications                         | -12          |
| Special Tool                           | -13          |
| Brake Pedal                            | -14          |
| Brake Pedal Position Inspection        | -14          |
| Brake Pedal Position Adjustment        | -14          |
|  | -14          |
|  | -15          |
|  | -16          |
|  | 2-16         |
| ·                                      | 2-16         |
|  | 2-16         |
|  | 2-17         |
|  | 2-17         |
| · · · · · · · · · · · · · · · · · · ·  | 2-17         |
| , , , , , , , , , , , , , , , , , , ,  | <br>2-17     |
| · · · · · · · · · · · · · · · · · · ·  | <br>2-17     |
| γy                                     | ,<br>2-18    |
| · · · · · · · · · · · · · · · · · · ·  | . 10<br>2-18 |
|  | 10<br>2-19   |
|  | 13<br>2-19   |
| · ·                                    | 2-13         |
|  | 2-21         |
|  | 2-21         |
|  | 2-21<br>2-22 |
|  | 2-22<br>2-22 |
|  | 2-22<br>2-23 |
|  |              |
|  | 2-24         |
| · · · · · · · · · · · · · · · · · · ·  | 2-24         |
| · · · · · · · · · · · · · · · · · · ·  | 2-24         |
| · · · · · · · · · · · · · · · · · · ·  | 2-24         |
| · · · · · · · · · · · · · · · · · · ·  | 2-25         |
| · · · · · · · · · · · · · · · · · · ·  | 2-26         |
| · · · · · · · · · · · · · · · · · · ·  | 2-26         |
| ······································ | 2-26         |
|  | 2-27         |
|  | 2-28         |
|  | 2-28         |
|  | 2-28         |
|  | 2-28         |
|  | 2-29         |
|  | 2-30         |
| Brake Fluid Level Inspection           | 2-30         |
|  | 2-30         |
|  | 2-30         |
|  | 2-33         |
|  | 2-33         |
|  | 2-33         |
|  | 2-34         |
|  | 2-34         |

## **12-2 BRAKES**

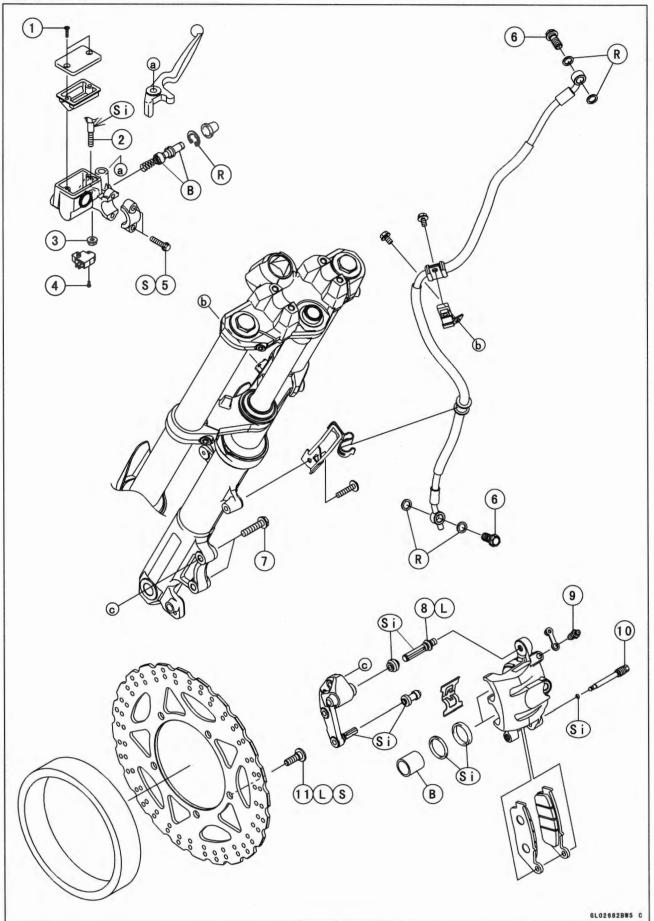
| ABS Servicing Precautions   | 12-38 |
|---|-------|
| ABS Troubleshooting Outline   | 12-40 |
| Inquiries to Rider  | 12-43 |
| Self-diagnosis Outline  | 12-47 |
| Self-diagnosis Procedures   | 12-47 |
| Service Code Clearing Procedures  | 12-48 |
| How to Read Service Codes   | 12-51 |
| How to Erase Service Codes  | 12-51 |
| Yellow ABS Indicator Light (LED) Inspection   | 12-53 |
| Solenoid Valve Inspection (Service Code 13, 14, 17, 18)                             | 12-53 |
| ABS Solenoid Valve Relay Inspection (Service Code 19)                               | 12-53 |
| Front, Rear Tire Abnormal (Service Code 25)   | 12-54 |
| ABS Motor Relay Inspection (Service Code 35)  | 12-54 |
| Front Wheel Rotation Sensor Signal Abnormal (Service Code 42)                       | 12-55 |
| Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)                     | 12-56 |
| Rear Wheel Rotation Sensor Signal Abnormal (Service Code 44)                        | 12-56 |
| Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)                      | 12-57 |
| Power Supply Voltage Abnormal [Low-Voltage] (Service Code 52)                       | 12-57 |
| Power Supply Voltage Abnormal [Over-Voltage] (Service Code 53)                      | 12-58 |
| ABS Solenoid Valve Relay Supply Voltage Inspection [Low-Voltage] (Service Code 54). | 12-58 |
| ECU Inspection (Service Code 55)  | 12-58 |
| ABS Hydraulic Unit Removal  | 12-59 |
| ABS Hydraulic Unit Installation   | 12-60 |
| ABS Hydraulic Unit Inspection   | 12-61 |
| Front Wheel Rotation Sensor Removal   | 12-61 |
| Front Wheel Rotation Sensor Installation  | 12-62 |
| Rear Wheel Rotation Sensor Removal  | 12-62 |
| Rear Wheel Rotation Sensor Installation   | 12-63 |
| Wheel Rotation Sensor Inspection  | 12-64 |
| Wheel Rotation Sensor Air Gap Inspection  | 12-64 |
| Wheel Rotation Sensor Rotor Inspection  | 12-64 |
| ABS Solenoid Valve Relay Fuse (15 A) Removal  | 12-64 |
| ABS Motor Relay Fuse (25 A) Removal   | 12-65 |
| Fuse Installation   | 12-65 |
| Fuse Inspection   | 12-65 |

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## **12-4 BRAKES**

# **Exploded View**

# KLE300B Model



# **Exploded View**

| No. | Footomor                               | Torque |       |          | Domonto |
|-----|--|--------|-------|----------|---------|
|     | Fastener                               | N·m    | kgf⋅m | ft·lb    | Remarks |
| 1   | Front Brake Fluid Reservoir Cap Screws | 1.5    | 0.15  | 13 in·lb |         |
| 2   | Brake Lever Pivot Bolt                 | 5.9    | 0.60  | 52 in·lb | Si      |
| 3   | Brake Lever Pivot Bolt Locknut         | 5.9    | 0.60  | 52 in·lb |         |
| 4   | Front Brake Light Switch Screw         | 1.2    | 0.12  | 11 in·lb |         |
| 5   | Front Master Cylinder Clamp Bolts      | 8.8    | 0.90  | 78 in·lb | S       |
| 6   | Brake Hose Banjo Bolts                 | 25     | 2.5   | 18       |         |
| 7   | Front Caliper Mounting Bolts           | 25     | 2.5   | 18       |         |
| 8   | Front Caliper Holder Pin Bolt          | 22     | 2.2   | 16       | L, Si   |
| 9   | Bleed Valve                            | 5.5    | 0.56  | 49 in·lb |         |
| 10  | Front Brake Pad Pin                    | 17     | 1.7   | 13       |         |
| 11  | Front Brake Disc Mounting Bolts        | 27     | 2.8   | 20       | L, S    |

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

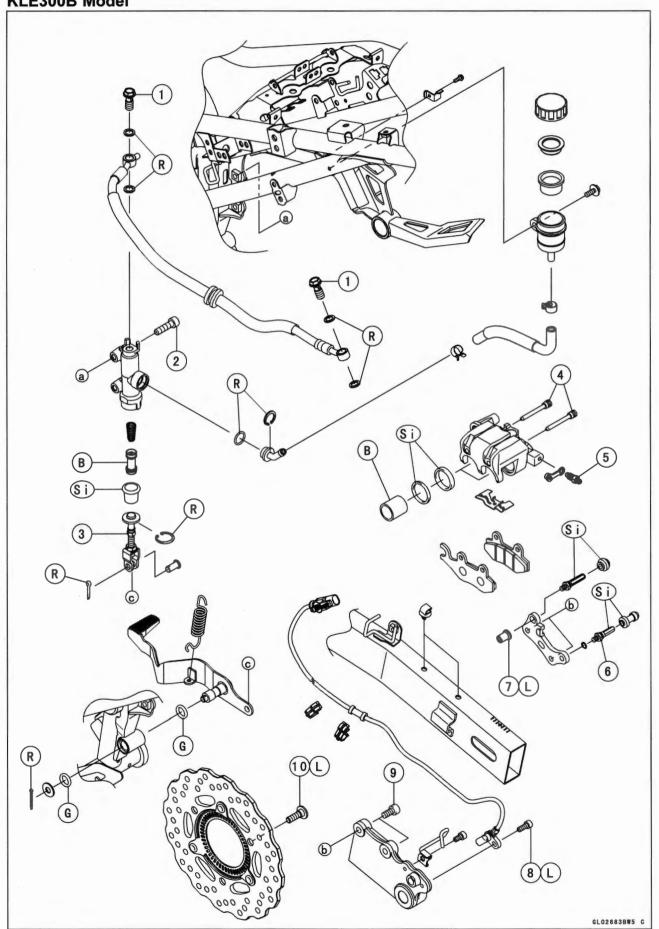
R: Replacement Parts

S: Follow the specified tightening sequence. Si: Apply silicone grease (ex. PBC grease).

# **12-6 BRAKES**

# **Exploded View**

# KLE300B Model



# **Exploded View**

| No. | Footoner                              | То  | Torque |          | Domonko |
|-----|---------------------------------------|-----|--------|----------|---------|
|     | Fastener                              | N·m | kgf·m  | ft·lb    | Remarks |
| 1   | Brake Hose Banjo Bolts                | 25  | 2.5    | 18       |         |
| 2   | Rear Master Cylinder Mounting Bolts   | 25  | 2.5    | 18       |         |
| 3   | Rear Master Cylinder Push Rod Locknut | 17  | 1.7    | 13       |         |
| 4   | Rear Brake Pad Pins                   | 17  | 1.7    | 13       |         |
| 5   | Bleed Valve                           | 5.5 | 0.56   | 49 in·lb |         |
| 6   | Rear Caliper Holder Pin Bolt          | 17  | 1.7    | 13       | Si      |
| 7   | Rear Caliper Holder Pin Nut           | 22  | 2.2    | 16       | L       |
| 8   | Rear Wheel Rotation Sensor Bolt       | 8.0 | 0.82   | 71 in·lb | L       |
| 9   | Rear Caliper Mounting Bolts           | 25  | 2.5    | 18       |         |
| 10  | Rear Brake Disc Mounting Bolts        | 27  | 2.8    | 20       | L       |

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

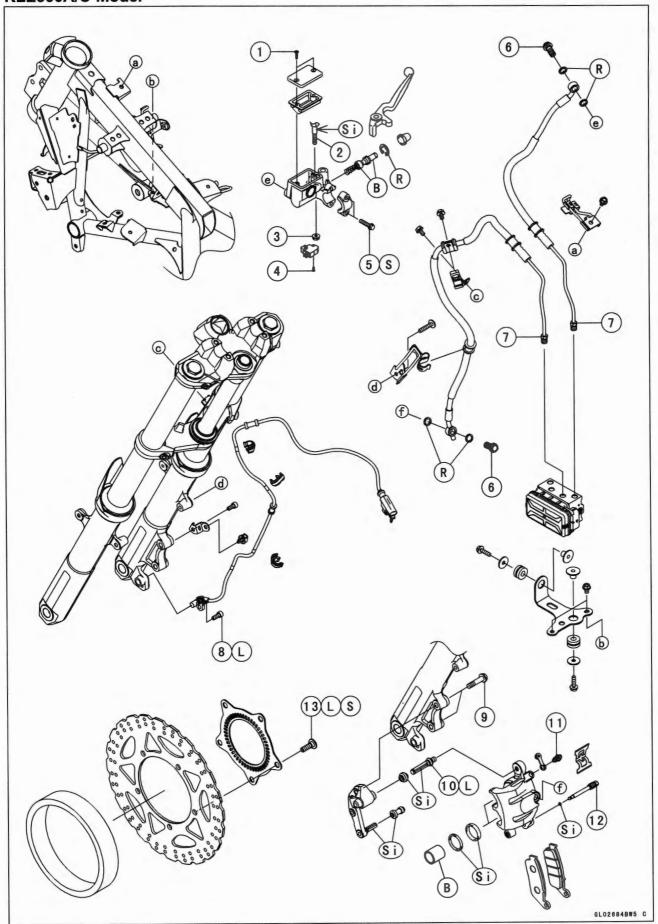
R: Replacement Parts

Si: Apply silicone grease (ex. PBC grease).

## **12-8 BRAKES**

# **Exploded View**

# KLE300A/C Model



### **Exploded View**

|     | Footoon                                | Torque |       | Torque   |         | Domarka |
|-----|--|--------|-------|----------|---------|---------|
| No. | Fastener                               | N·m    | kgf·m | ft·lb    | Remarks |         |
| 1   | Front Brake Fluid Reservoir Cap Screws | 1.5    | 0.15  | 13 in·lb |         |         |
| 2   | Brake Lever Pivot Bolt                 | 5.9    | 0.60  | 52 in·lb | Si      |         |
| 3   | Brake Lever Pivot Bolt Locknut         | 5.9    | 0.60  | 52 in·lb |         |         |
| 4   | Front Brake Light Switch Screw         | 1.2    | 0.12  | 11 in·lb |         |         |
| 5   | Front Master Cylinder Clamp Bolts      | 8.8    | 0.90  | 78 in·lb | S       |         |
| 6   | Brake Hose Banjo Bolts                 | 25     | 2.5   | 18       |         |         |
| 7   | Brake Pipe Joint Nuts                  | 18     | 1.8   | 13       |         |         |
| 8   | Front Wheel Rotation Sensor Bolt       | 8.0    | 0.82  | 71 in·lb | L       |         |
| 9   | Front Caliper Mounting Bolts           | 25     | 2.5   | 18       |         |         |
| 10  | Front Caliper Holder Pin Bolt          | 22     | 2.2   | 16       | L, Si   |         |
| 11  | Bleed Valve                            | 5.5    | 0.56  | 49 in·lb |         |         |
| 12  | Front Brake Pad Pins                   | 17     | 1.7   | 13       |         |         |
| 13  | Front Brake Disc Mounting Bolts        | 27     | 2.8   | 20       | L, S    |         |

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

R: Replacement Parts

S: Follow the specified tightening sequence.

Si: Apply silicone grease (ex. PBC grease).

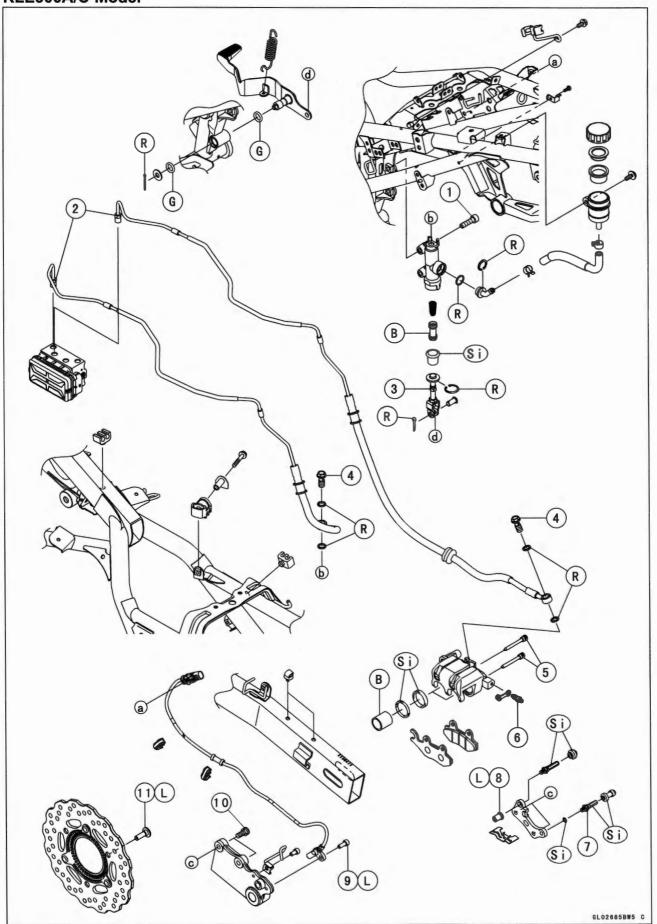
### NOTE

OWhen disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.

# **12-10 BRAKES**

# **Exploded View**

# KLE300A/C Model



## **Exploded View**

|                                | Factoria                              | Torque |       |          | Damarka |
|--------------------------------|---------------------------------------|--------|-------|----------|---------|
| No.                            | Fastener                              | N·m    | kgf·m | ft·lb    | Remarks |
| 1                              | Rear Master Cylinder Mounting Bolts   | 25     | 2.5   | 18       |         |
| 2                              | Brake Pipe Joint Nuts                 | 18     | 1.8   | 13       |         |
| 3                              | Rear Master Cylinder Push Rod Locknut | 17     | 1.7   | 13       |         |
| 4 Brake Hose Banjo Bolts       |                                       | 25     | 2.5   | 18       |         |
| 5 Rear Brake Pad Pins          |                                       | 17     | 1.7   | 13       |         |
| 6 Bleed Valve                  |                                       | 5.5    | 0.56  | 49 in·lb |         |
| 7 Rear Caliper Holder Pin Bolt |                                       | 17     | 1.7   | 13       | Si      |
| 8                              | 8 Rear Caliper Holder Pin Nut         |        | 2.2   | 16       | L       |
| 9                              | 9 Rear Wheel Rotation Sensor Bolt     |        | 0.82  | 71 in·lb | L       |
| 10                             | Rear Caliper Mounting Bolts           | 25     | 2.5   | 18       |         |
| 11                             | Rear Brake Disc Mounting Bolts        | 27     | 2.8   | 20       | L       |

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

R: Replacement Parts

Si: Apply silicone grease (ex. PBC grease).

#### NOTE

OWhen disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.

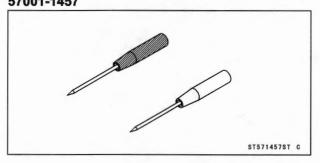
#### **12-12 BRAKES**

## Specifications

| Item                              | Standard                                    | Service Limit          |
|-----------------------------------|---|------------------------|
| Brake Fluid                       | T :   |                        |
| Grade:                            |   |                        |
| Front                             | DOT3 or DOT4                                |                        |
| Rear                              | DOT4  |                        |
| Brake Lever                       |   | 10/1                   |
| <b>Brake Lever Position</b>       | Non-adjustable                              |                        |
| Brake Lever Free Play             | Non-adjustable                              |                        |
| Pedal Position                    | About 33 mm (1.30 in.) below top of footpeg | Janaan Aleman          |
| Brake Pads                        |   |                        |
| Lining Thickness:                 |   |                        |
| Front                             | 4.0 mm (0.16 in.)                           | 1.5 mm (0.06 in.)      |
| Rear                              | 4.5 mm (0.18 in.)                           | 1.5 mm (0.06 in.)      |
| Brake Discs                       |   | 1000                   |
| Thickness:                        |   |                        |
| Front                             | 4.3 ~ 4.7 mm (0.17 ~ 0.19 in.)              | 4.0 mm (0.16 in.)      |
| Rear                              | 5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)              | 5.0 mm (0.20 in.)      |
| Runout                            | TIR 0.1 mm (0.004 in.) or less              | TIR 0.3 mm (0.013 in.) |
| ABS (Equipped Models)             |   |                        |
| ABS Hydraulic Unit:               |   |                        |
| Make                              | BOSCH                                       |                        |
| Wheel Rotation Sensor<br>Air Gap: |   |                        |
| Front                             | 0.31 ~ 2.02 mm (0.01 ~ 0.08 in.)            |                        |
| Rear                              | 0.53 ~ 1.70 mm (0.02 ~ 0.07 in.)            |                        |

#### **Special Tool**

Needle Adapter Set: 57001-1457



#### **Brake Pedal**

#### **Brake Pedal Position Inspection**

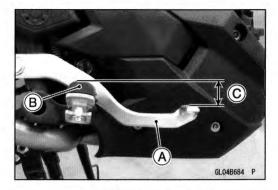
Check that the brake pedal [A] is in the correct position.
 Footpeg [B]

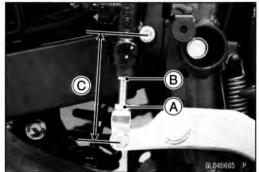
#### **Pedal Position**

Standard: About 33 mm (1.30 in.) [C] below top of

footpeg

★ If it is incorrect, adjust the brake pedal position.





#### **Brake Pedal Position Adjustment**

#### NOTE

OUsually it is not necessary to adjust the pedal position, but always adjust it when the push rod locknut has been loosened.

#### • Remove:

Right Side Cover (see Side Cover Removal in the Frame chapter)

- 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 88 ±1 mm (3.46 ±0.04 in.), the pedal position will be within the standard range.
- Tighten:

## Torque - Rear Master Cylinder Push Rod Locknut: 17 N·m (1.7 kgf·m, 13 ft·lb)

 Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).

#### Brake Pedal Removal

Remove:

Right Side Cover (see Side Cover Removal in the Frame chapter)

Cotter Pin [A]

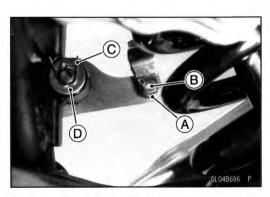
Joint Pin [B]

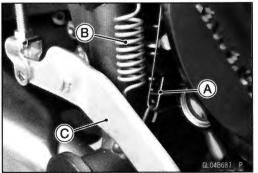
Cotter Pin [C]

Washer [D]



Rear Brake Light Switch Spring [A] Return Spring [B] Brake Pedal [C]

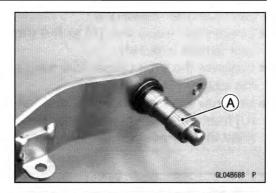




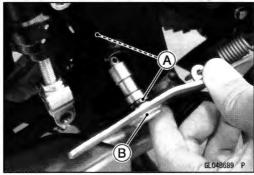
#### **Brake Pedal**

#### **Brake Pedal Installation**

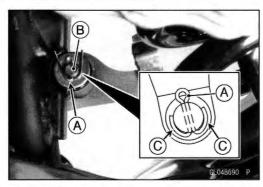
- Replace the O-rings with new ones.
- Apply grease to the pivot shaft [A] and the O-rings.



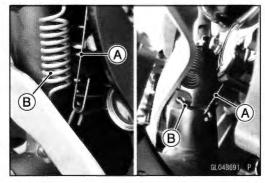
Install:
 O-ring [A]
 Brake Pedal [B]
 O-ring
 Washer



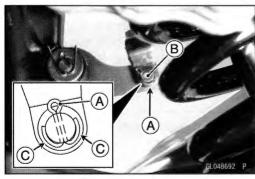
- Replace the cotter pin [A] with a new one.
- Insert the cotter pin into the pivot shaft [B] and bend the pin ends [C].



 Hook the rear brake light switch spring [A] and return spring [B] to the brake pedal as shown.



- Replace the cotter pin [A] with a new one.
- Insert the joint pin [B] from the outside.
- Insert the cotter pin into the joint pin and bend the pin ends
- Check the brake pedal position (see Brake Pedal Position Inspection).



#### Front Caliper Removal

- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the front caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and disconnect the brake hoses
   [D] from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

#### NOTICE

Immediately wash away any brake fluid that spills.

#### Front Caliper Installation

- Installation is the reverse of removal.
- Replace the washers on each side of hose fitting with new ones.
- Connect the brake hose [A] to the caliper [B] with the new washers [C] and banjo bolt [D].
- OPosition the brake hose fitting to the stopper on the caliper.
- OFit the brake hose fitting [E] into the groove on the caliper.
- Install the front caliper mounting bolts [F].
- Tighten:

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

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

#### **A** WARNING

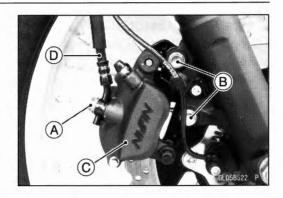
After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

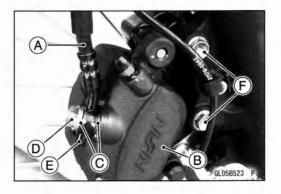
#### Rear Caliper Removal

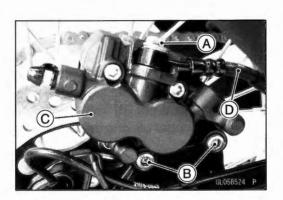
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the rear caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and disconnect the brake hose [D] from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

#### NOTICE

Immediately wash away any brake fluid that spills.







#### Rear Caliper Installation

- Installation is the reverse of removal.
- Replace the washers on each side of hose fitting with new ones.
- Connect the brake hose [A] to the caliper [B] with the new washers [C] and banjo bolt [D].
- OPosition the brake hose fitting to the stopper on the caliper.
- OFit the brake hose fitting [E] into the groove on the caliper.
- Install the rear caliper mounting bolts [F].
- Tighten:

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

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.



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.

#### Front Caliper Disassembly

Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

#### Front Caliper Assembly

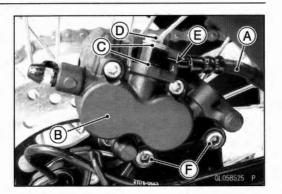
Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

#### Rear Caliper Disassembly

Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

#### Rear Caliper Assembly

Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.



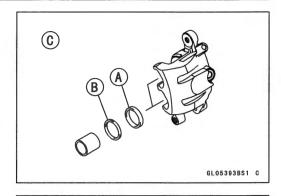
#### Caliper Fluid Seal Damage Inspection

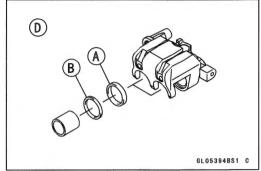
The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- Replace the fluid seal if it exhibits any of the conditions listed below.
- OBrake fluid leakage around the pad.
- OBrakes overheat.
- OConsiderable difference in inner and outer pad wear.
- OSeal 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.

Front Caliper [C]

Rear Caliper [D]



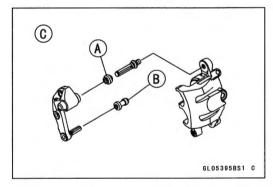


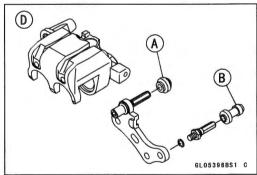
## Caliper Dust Boot and Friction Boot Damage Inspection

- 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.

Front Caliper [C]

Rear Caliper [D]

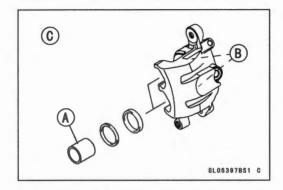


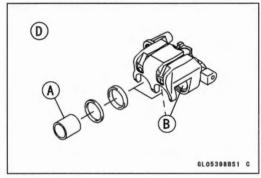


#### Caliper Piston and Cylinder Damage Inspection

- Visually inspect the pistons [A] and cylinder surfaces [B].
- ★Replace the caliper if the cylinder and piston are badly scores or rusty.

Front Caliper [C] Rear Caliper [D]



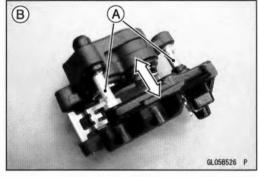


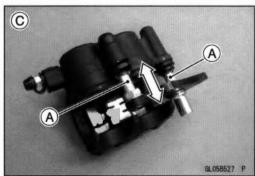
#### Caliper Holder Pin Inspection

The caliper body must slide smoothly on the caliper holder pins [A]. If the caliper body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder pins are not badly worn or stepped, and that the rubber friction boots are not damaged.
- ★If the rubber friction boot is damaged, replace the rubber friction boot. To replace the friction boot, remove the pads and caliper holder.

Front Caliper [B] Rear Caliper [C]





★ If the caliper holder pin bolt is damage, inspect the caliper holder for warp or deformation. If the caliper holder is in good condition, replace the caliper holder pin bolts [A] [B].

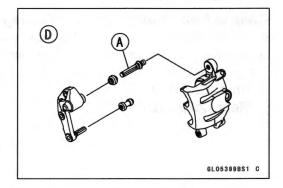
Torque - Front Caliper Holder Pin Bolt: 22 N·m (2.2 kgf·m, 16 ft·lb)

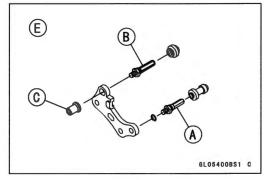
Rear Caliper Holder Pin Bolt: 17 N·m (1.7 kgf·m, 13 ft·lb)

OApply a non-permanent locking agent to the threads of the caliper holder pin nut [C].

Torque - Rear Caliper Holder Pin Nut: 22 N·m (2.2 kgf·m, 16 ft·lb)

Front Caliper [D] Rear Caliper [E]

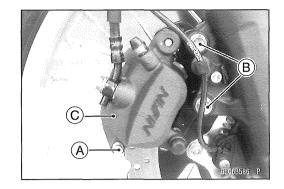




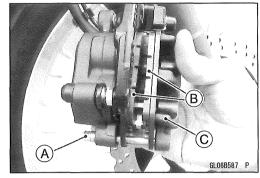
#### **Brake Pads**

#### Front Brake Pad Removal

- Loosen the pad pin [A].
- Remove:
  - Front Caliper Mounting Bolts [B]
- Remove the front caliper [C] with the hose connected.

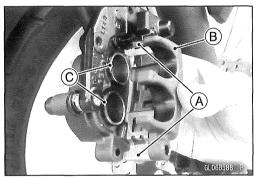


• Pull out the pad pin [A] and remove the brake pads [B] from the caliper [C].



#### Front Brake Pad Installation

- Check that the pad springs [A] are in place on the caliper [B].
- Push the caliper pistons [C] in by hand as far as they will go.

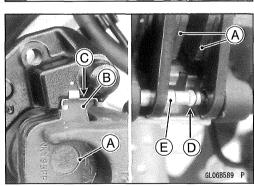


- Install the brake pads [A] to the caliper.
- OFit the tabs [B] of the brake pads on the step [C] of the caliper holder.
- Apply a silicone grease to the O-ring [D] on the pad pin.
- Insert the pad pin [E] through the brake pads and tighten the pad pin temporarily.
- Install the front caliper (see Caliper Installation).
- Tighten:

Torque - Front Brake Pad Pin: 17 N·m (1.7 kgf·m, 13 ft·lb)



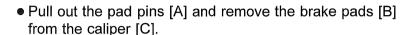
After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

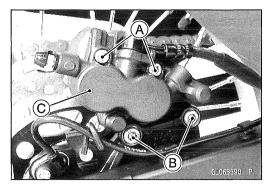


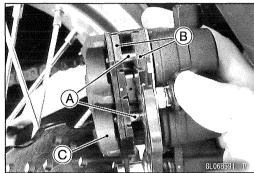
#### **Brake Pads**

#### Rear Brake Pad Removal

- Loosen the pad pins [A].
- Remove:
  - Rear Caliper Mounting Bolts [B]
- Remove the rear caliper [C] with the hose installed.

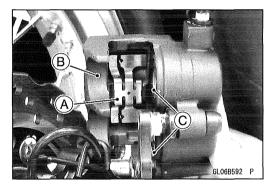




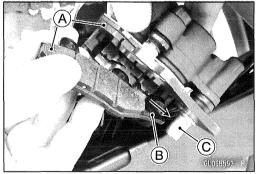


#### Rear Brake Pad Installation

- Check that the pad spring [A] is in place on the caliper [B].
- Push the caliper pistons [C] in by hand as far as they will go.



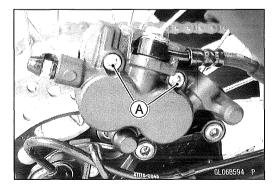
- Install the brake pads [A] to the caliper.
- OFit the tab [B] of the brake pads on the pin [C] of the caliper holder.
- Insert the pad pins through the brake pads and tighten the pad pins temporarily.



- Install the rear caliper (see Rear Caliper Installation).
- Tighten:
  - Torque Rear Brake Pad Pins [A]: 17 N·m (1.7 kgf·m, 13 ft·lb)
- Secure the brake hose to the clamp on the swingarm.

#### **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 Pads**

**Brake Pad Wear Inspection**• Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

#### **Master Cylinder**

#### Front Master Cylinder Removal

- Remove the rear view mirror (see Rear View Mirror Removal in the Frame chapter).
- Loosen the banjo bolt [A] to disconnect the brake hose from the master cylinder [B] (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).
- Disconnect the front brake light switch connectors [C].
- Remove the clamp bolts [D] and front master cylinder clamp [E] to remove the master cylinder assembly.

#### NOTICE

Immediately wash away any brake fluid that spills.

#### Front Master Cylinder Installation

- Install the front master cylinder so that the punch mark [A] of the handlebar is aligned with the mating surface [B] of the master cylinder and clamp.
- The master cylinder clamp must be installed with the arrow mark [C] upward.
- Tighten the upper clamp bolt [D] first, and then the lower clamp bolt [E].
- OThere will be a gap at the lower part of the clamp after tightening.

## Torque - Front Master Cylinder Clamp Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

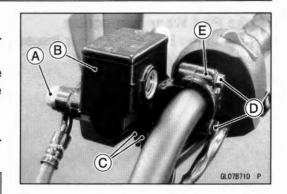
- Connect the front brake light switch connectors.
- Replace the washers that are on each side of the hose fitting with new ones.
- Install the brake hose.
- OTouch the brake hose to the stopper of the front master cylinder.
- Tighten:

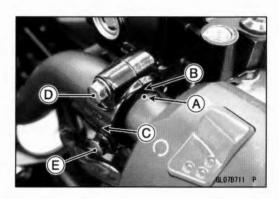
#### Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

#### Rear Master Cylinder Removal

- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.

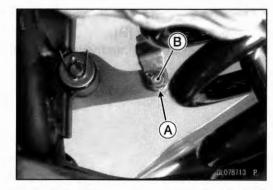




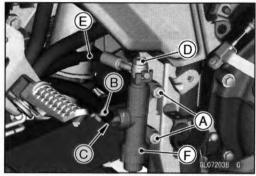


#### **Master Cylinder**

Remove: Cotter Pin [A] Joint Pin [B]

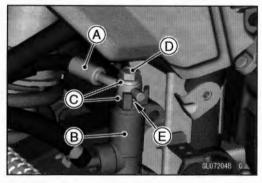


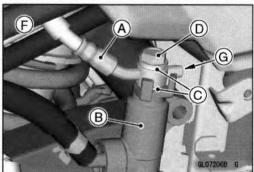
- Remove:
  - Rear Master Cylinder Mounting Bolts [A]
- Slide the reservoir hose lower end clamp [B].
- Pull off the reservoir hose lower end [C], and drain the brake fluid into a container.
- Remove the brake hose banjo bolt [D] to disconnect the brake hose [E] from the rear master cylinder [F].



#### Rear Master Cylinder Installation

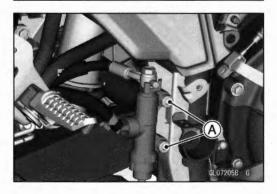
- Installation is the reverse of removal.
- Replace the washers on each side of the hose fitting with new ones.
- Connect the brake hose [A] to the rear master cylinder [B] with the new washers [C] and banjo bolt [D].
- OFit the brake hose fitting [E] into the groove on the rear master cylinder.
- OFor ABS equipped models [F], the brake hose fitting [G] faces forward.
- Run the brake hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).





• Tighten:

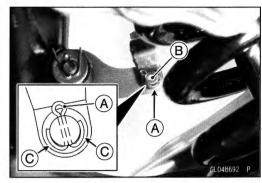
Torque - Rear Master Cylinder Mounting Bolts [A]: 25 N·m (2.5 kgf·m, 18 ft·lb)



#### **12-26 BRAKES**

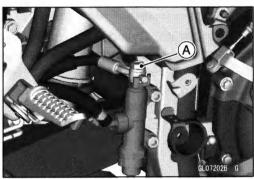
#### **Master Cylinder**

- Replace the cotter pin [A] with a new one.
- Install the joint pin [B].
- Insert the cotter pin into the joint pin and bend the pin ends [C].



• Tighten:

Torque - Brake Hose Banjo Bolt [A]: 25 N·m (2.5 kgf·m, 18 ft·lb)



#### Front Master Cylinder Disassembly

 Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

#### Rear Master Cylinder Disassembly

 Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

#### Master Cylinder Assembly

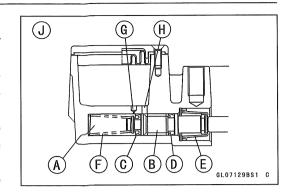
 Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

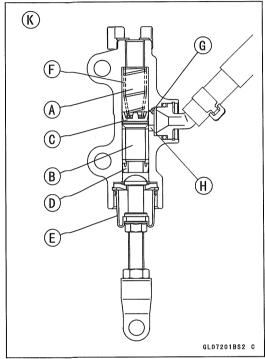
#### **Master Cylinder**

#### Master Cylinder Inspection

- Remove the master cylinders (see Front/Rear Master Cylinder Removal).
- Disassemble the front and rear master cy linders (see Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter).
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].
- ★ If a master cylinder or piston shows any damage, replace them.
- Inspect the primary cup [C] and secondary cup [D].
- ★If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.
- ★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.
- Check the dust covers [E] for damage.
- ★If they are damaged, replace them.
- Check the piston return springs [F] for any damage.
- ★ If the springs are damaged, replace them.
- Check that relief port [G] and supply port [H] are not plugged.
- ★If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Front Master Cylinder [J] Rear Master Cylinder [K]



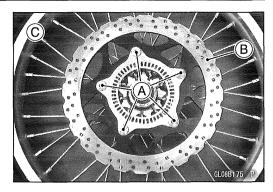


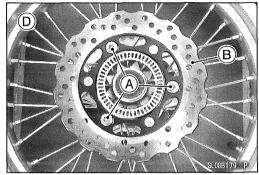
#### **Brake Disc**

#### Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the brake disc mounting bolts [A] and brake disc [B].

Front Brake Disc [C] Rear Brake Disc [D]





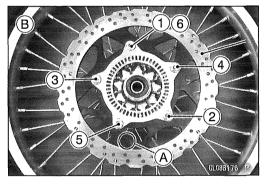
#### Brake Disc Installation

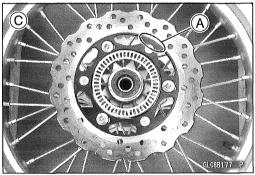
- Install the brake disc on the wheel so that the marked side [A] faces out.
- Apply a non-permanent locking agent to the threads of the front and rear brake disc mounting bolts.
- Tighten the brake disc mounting bolt. Front Brake Disc [B]

Rear Brake Disc [C]

OTighten the front brake disc mounting bolts following the specified tightening sequence [1  $\sim$  6].

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 at the point where it has worn the most.

Measuring Area [A]

#### **Brake Discs Thickness**

Standard: Front

4.3 ~ 4.7 mm (0.17 ~ 0.19 in.)

Rear

5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)

**Service Limit:** 

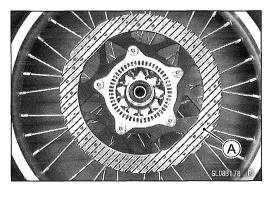
Front

4.0 mm (0.16 in.)

Rear

5.0 mm (0.20 in.)

★ If the disc has worn past the service limit, replace it.



#### **Brake Disc**

#### **Brake Disc Warp Inspection**

- Raise the front/rear wheel off the ground a suitable stand.
   OFor front disc inspection, turn the handlebar fully to one side
- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.
- ★If runout exceeds the service limit, replace the disc.

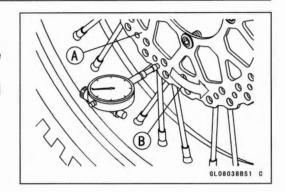
#### **Disc Runout**

Standard:

TIR 0.1 mm (0.004 in.) or less

**Service Limit:** 

TIR 0.3 mm (0.013 in.)



#### **Brake Fluid**

#### **Brake Fluid Level Inspection**

 Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

#### **Brake Fluid Change**

 Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

#### **Brake Line Bleeding**

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

#### **A** 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

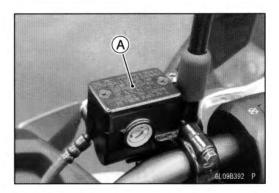
- OThe procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.
- Remove the reservoir cap [A] and diaphragm.
- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.

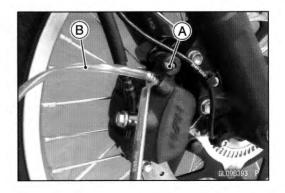
#### **Brake Fluid Grade**

Front: DOT3 or DOT4

Rear: DOT4

- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.
- OBleed 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 master cylinder.
- ORepeat this operation until no more air can be seen coming out into the plastic hose.
- 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 lever [C].

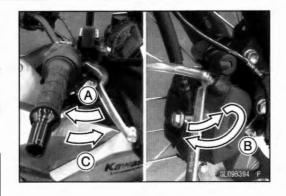
#### NOTICE

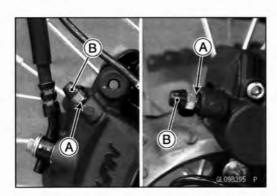
After pumping the brake lever several times, releasing it without opening and closing of the bleed valve may cause brake fluid to be blown back from the master cylinder reservoir. Brake fluid spilt on painted surfaces and plastic parts will quickly damage them. Be sure to open and close the bleed valve.

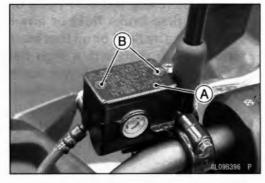
#### NOTE

- OThe 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.
- O Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.
- Remove the clear plastic hose.
- Tighten the bleed valve [A], and install the rubber cap [B].
   Torque Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)
- Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
- Install the diaphragm and reservoir cap [A].
- Tighten:

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

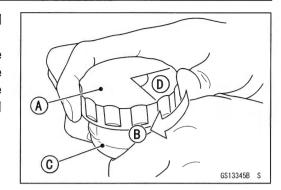






#### **Brake Fluid**

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



 After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

### **A** WARNING

When working with the disc brake, observe the precautions listed below.

- Never reuse old brake fluid.
- Do not use fluid from a container that has been left unsealed or that has been open for a long time.
- Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
- Do not leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
- Do not change the fluid in the rain or when a strong wind is blowing.
- Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning of the brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
- When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
- Brake fluid quickly damages painted surfaces; any spilled fluid should be completely wiped up immediately.
- If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE LINE.

#### **Brake Hose**

#### Brake Hose Removal/Installation

 Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

#### **Brake Hose Inspection**

 Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

#### **12-34 BRAKES**

#### **Anti-Lock Brake System (Equipped Models)**

#### Parts Location

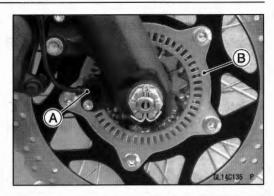
Front Wheel Rotation Sensor [A]
Front Wheel Rotation Sensor Rotor [B]

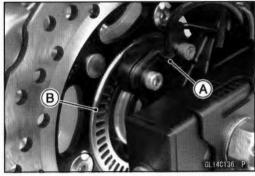
Rear Wheel Rotation Sensor [A]
Rear Wheel Rotation Sensor Rotor [B]

Yellow ABS Indicator Light (LED) [A]

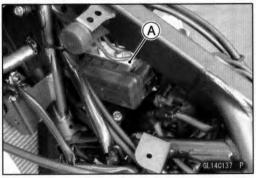
ABS Hydraulic Unit [A]

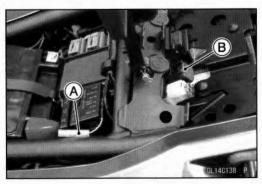
ABS Self-diagnosis Terminal [A]
ABS Kawasaki Diagnostic System Connector [B]







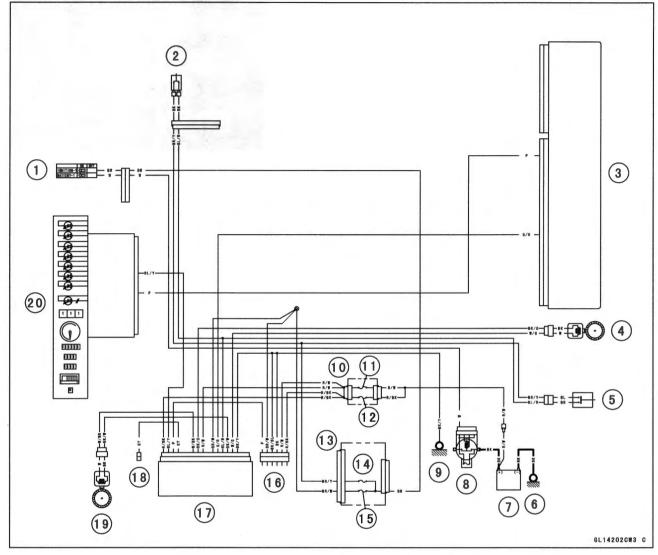




Fuse Box (3) [A]



#### **ABS System Wiring Diagram**



- 1. Ignition Switch
- 2. Front Brake Light Switch
- 3. ECU
- 4. Rear Wheel Rotation Sensor
- 5. Rear Brake Light Switch
- 6. Engine Ground
- 7. Battery
- 8. Main Fuse 30 A
- 9. Frame Ground (4)
- 10. Fuse Box (3)
- OColor Codes:

BK: Black

BL: Blue

LB: Light Blue

BR: Brown

LG: Light Green

CH: Chocolate

O: Orange

DG: Dark Green

GY: Gray

P: Pink

- 11. ABS Motor Relay Fuse 25 A
- 12. ABS Solenoid Valve Relay Fuse 15 A
- 13. Fuse Box (1)
- 14. Brake Light/Horn Fuse 10 A
- 15. Ignition Fuse 10 A
- 16. ABS Kawasaki Diagnostic System Connector
- 17. ABS Hydraulic Unit
- 18. ABS Self-diagnosis Terminal
- 19. Front Wheel Rotation Sensor
- 20. Meter Unit

PU: Purple

R: Red

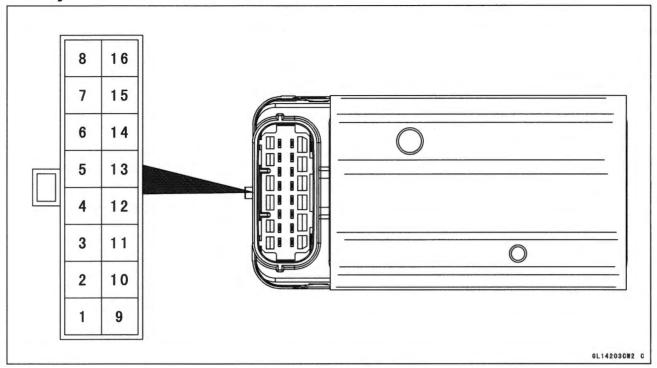
V: Violet

W: White

Y: Yellow

G: Green

#### **ABS Hydraulic Unit Terminal Names**



- 1. Power Supply to ABS Solenoid Valve Relay: R/BK
- 2. Yellow ABS Indicator Light (LED): BL/Y
- 3. ABS Kawasaki Diagnostic System Terminal: P
- 4. ABS Self-diagnosis Terminal: GY
- 5. Unused
- 6. Unused
- 7. Power Supply to Front Wheel Rotation Sensor: W/BK
- 8. Rear Wheel Rotation Sensor Signal Input: BK/O
- 9. Power Supply to ABS Motor Relay: R/W
- 10. Unused
- 11. Power Supply: BR/W
- 12. Rear Wheel Rotation Sensor Signal Output: G/R
- 13. Front and Rear Brake Light Switch Signal: BL/R
- 14. Front Wheel Rotation Sensor Signal Input: BK/W
- 15. Power Supply to Rear Wheel Rotation Sensor: W/G
- 16. Ground: BK/Y

#### **ABS Servicing Precautions**

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

- OThis 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.
- ODo not reverse the battery cable connections. This will damage the ABS hydraulic unit.
- OTo 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.
- OTake care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- ODo not turn the ignition switch on while any of the ABS electrical connectors are disconnected. The ABS hydraulic unit memorizes service codes.
- ODo not spray water on the electrical parts, ABS parts, connectors, leads and wiring.
- Olf 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.
- OWhenever the ABS electrical connections are to be disconnected, first turn off the ignition switch.
- OThe 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.
- OThe ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the ABS parts, replace it.
- OThe 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.

#### **A** 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.

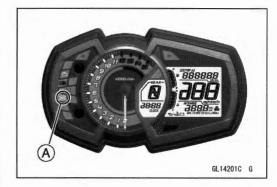
#### NOTICE

Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.

OThe yellow ABS indicator light (LED) [A] may come on if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light comes on, remedy the problem and clear the service code.

#### **A** WARNING

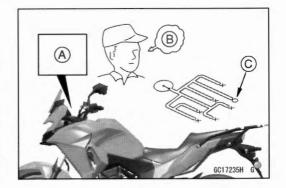
Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.



- OThe 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."
- OWhen 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.
- OService 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.
- OBefore 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) function. A fully charged battery is a must for conducting reliable self-diagnosis. Test run the motorcycle at a speed of more than 20 km/h (12 mph) to see that the yellow ABS indicator light (LED) does not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (20 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (The reaction force generated is felt in the brake lever and pedal.). This completes the final inspection.

#### ABS Troubleshooting Outline

When an abnormality in the system occurs, the yellow ABS indicator light (LED) comes on 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 vellow 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 on, get a thorough understanding of the background before starting the repair work. Ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C]. Do not rely solely on the ABS self-diagnosis function, use common sense; check the brakes for proper braking power, and brake fluid level, search for leaks, etc.



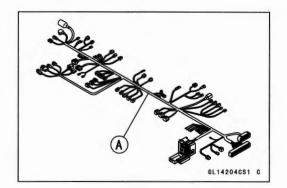
Even when the ABS is operating normally, the yellow ABS indicator light (LED) may come on under the conditions listed below. Turn the ignition switch off to stop the indicator light. If the motorcycle runs without erasing the service code, the indicator light may come on again.

- OAfter continuous riding on a rough road.
- OWhen the engine is started with the stand raised and the transmission engaged, and the rear wheel turns.
- OWhen accelerating so abruptly that the front wheel leaves the ground.
- OWhen the ABS has been subjected to strong electrical interference.
- OWhen tire pressure is abnormal. Adjust tire pressure.
- OWhen a tire different in size from the standard size is being used. Replace with standard size.
- OWhen the wheel is deformed. Replace the wheel.

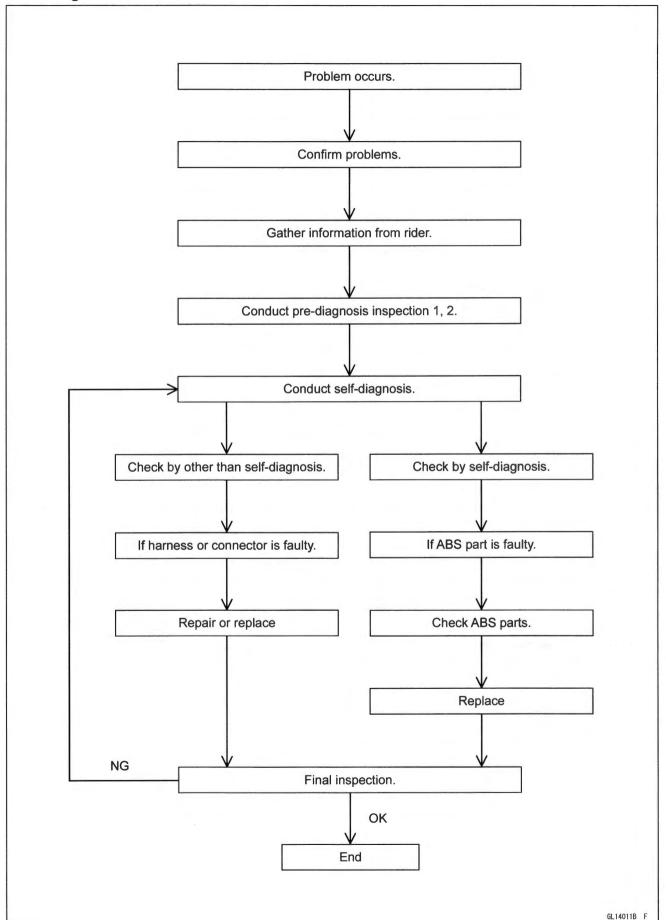
Much of the ABS troubleshooting work consists of confirming continuity of the wiring. The ABS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the ABS hydraulic unit.

The basic troubleshooting procedures are listed below.

- Carry out pre-diagnosis inspections as a preliminary inspection.
- Determine the fault using the self-diagnosis function.
- Check wiring and connections from the ABS hydraulic unit connector to the suspected faulty ABS part, using a tester.
- Visually inspect the wiring for signs of burning or fraying.
- ★If any wiring is poor, replace the damaged wiring.
- Pull each connector apart and inspect it for corrosion, dirt and damage.
- ★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- Check the wiring for continuity.
- OUse the wiring diagram to find the ends of the lead which is suspected of being a problem.
- OConnect a tester between the ends of the leads.
- ★ If the tester does not read about 0 Ω, the lead is defective. Replace the main harness [A] if necessary.
- Narrow down suspicious parts and close in on the faulty ABS part by repeating the continuity tests.
- ★If no abnormality is found in the wiring or connectors, the ABS parts are the next likely suspects. Check each part one by one.
- ★ If an abnormality is found, replace the affected ABS part.



#### **ABS Diagnosis Flow Chart**



#### Inquiries to Rider

## Inquiries to Rider

o Each rider reacts to problems in different ways, so it is important to confirm what kind of problem the rider is experiencing.
○Try to find out exactly what problem occurs under exactly what conditions by asking the rider, knowing this information may help you reproduce the problem in the workshop. The diagnosis sheet will help prevent you from overlooking any key information, so always use it.

# Sample Diagnosis Sheet 1

km or miles Registration No. (license plate No.): ...
Model: Odometer reading: Date of registration: Rider Name: .... Engine No.: Vin No.:

| Engine No.:                      |  | Odometer reading who                  | Odometer reading when problem first occured: km or miles | km or miles  |                 |
|----------------------------------|--|---------------------------------------|--|--|-----------------|
| Question                         | Description  |                                       | Answer   | Advice to customer   |                 |
|                                  | Volley ABS indicatoring light ( ED)                          | Flashing                              |  |  |                 |
|                                  | Winningtod?  | Continuous                            |  | A fault has been detected with the ABS system.   |                 |
| Which                            | morninateo :   | Not working                           |  |  |                 |
| statement/s best ABS not working | ABS not working  |                                       |  | Further inspection by technician required.   |                 |
| describes the                    | ABS operates too frequently                                  |                                       |  | Continuous riding on rough or un-even surfaces can cause the AE  | ause the AE     |
| fault with the                   | Stopping distance too long                                   |                                       |  | operate more frequently.   |                 |
| ABS system?                      | Does the wheel lock when you ap                              | you apply the brakes                  |  |  |                 |
|                                  | Brake can't be released                                      |                                       |  | Further inspection by technician required.   |                 |
|                                  | Other  |                                       |  |  |                 |
|                                  | Normal   |                                       |  | Further inspection by technician required.   |                 |
| Do the front and                 |  | Long stroke (lever feels soft and     | soft and   |  |                 |
| rear brake levers                |  | moves back close to the handle bar)   | nandie   | This indicates a probable fault with the braking system and should   | and should      |
| feel normal                      | Abnormal   | I jmited stroke (lever feels hard and | sis hard and   | inspected immediately  |                 |
| during                           |  | has little movement)                  |  |  |                 |
| application?                     |  | Pulsing/vibrating                     |  |  |                 |
|                                  | Which lever? (front, rear or both)                           |                                       |  |  |                 |
|                                  |  |                                       |  | If the motorcycle engine is left running whilst on its centre or servi   | ntre or servi   |
|                                  |  |                                       |  | mechanical drag can cause the rear wheel to rotate. If the rear wh   | f the rear wh   |
|                                  | Occupation of any property                                   | (Is a centre stand or service stand   | vice stand   | rotates the ABS system may detect a fault. Turning off the ignition  | If the ignition |
|                                  | During start up / stationary                                 | (pesn)                                |  | and restarting should reset the yellow ABS indicator light (LED) if  | ght (LED) if    |
|                                  |  |                                       |  | problems are detected. However the service code will be stored in  | be stored ir    |
|                                  |  |                                       |  | ECU and should be reset by the dealer.   |                 |
|                                  | Driving below 6 km/h (4mph) (Speeds vary depending on model) | eds vary depending on I               | model)   | The ABS system is not active at these speeds.  |                 |
|                                  | Driving above 6 km/h (4mph) (Speeds vary depending on model) | seds vary depending on                | (indeal)   |  |                 |
| when does the                    |  | 7                                     | front only   |  |                 |
| fault occur?                     |  | Gradual braking                       | rear only  | This may be normal AbS operation if the road conditions are poor   | ons are poor    |
|                                  |  | 7                                     | both brakes  |  |                 |
|                                  | When slowing or stopping                                     | 7                                     | front only   | A continue of the COA continue of the COA continue of the CoA  | ,               |
|                                  | (Rate of brake application)                                  | During abrupt braking rear only       | ear only   | not be to be a cause the ABS to initiating as the suspension beauty ast | edens aus si    |
|                                  |  | 7                                     | both brakes  | יוסנ ומעם וומע פווסטפון ווווופ נס ופמטו נס מופ אותמווסון.  |                 |
|                                  |  | There is no specific pattern          | lem  |  |                 |
|                                  | Other  |                                       |  |  |                 |

in the ABS

rice stand, n switch

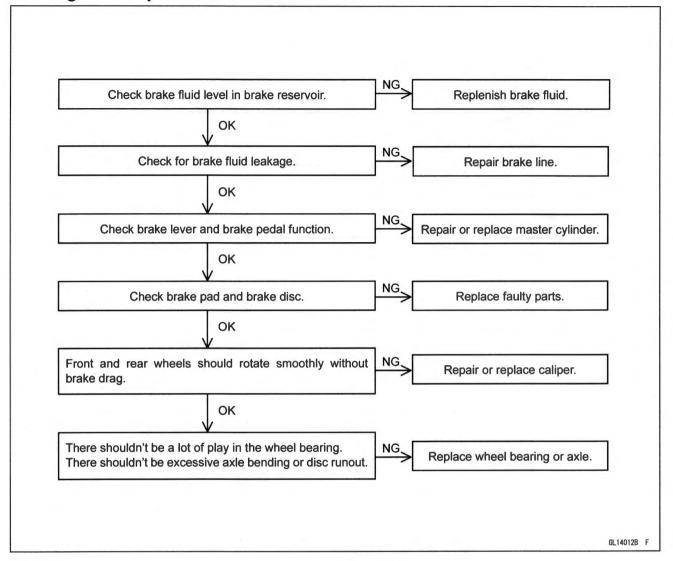
| Question          | Description   |   | Answer | Advice to customer   |
|-------------------|---|---|--------|--|
|                   | Every time ignition is switched on                        | 7   |        |  |
| How often does    | Every time the brakes are used (Continually)              | (Continually)   |        |  |
| the fault occur?  | No regularity (Intermittent)                              |   |        | Further inspection by technician required.   |
|                   | Other   |   |        |  |
|                   | Highway riding  |   |        | Braking and handling characteristics can vary with vehicle speed, therefore ABS operation during braking at highway speed may be more frequent.  |
|                   | City riding   |   |        | Accelerating abruptly between traffic signals so that the front wheel leaves the ground can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically. |
| riding conditions | Minor/country roads riding                                | Any comment on riding style   |        | Continuous riding on rough or uneven surfaces can cause the ABS to operate more frequently.  |
| occur?            | Cross country riding                                      | тауре арріпсаріе.   |        | Continuous riding on loose or off road surfaces can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.   |
|                   | Track/closed circuit riding                               |   |        | Excessive use of the ABS system due to continuous fast riding can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.                           |
|                   | All   |   |        | Further inspection by technician required.   |
| In what road      | Dry   |   |        | Further inspection by technician required.   |
| conditions does   | Wet   |   |        | In wet conditions it is possible that the ABS is operating normally  |
| the problem       | Snow/Ice  |   |        | In snow/icy conditions it is possible that the ABS is operating normally   |
| occur?            | Loose/rough surface (gravel)                              |   |        | On loose/rough surfaces it is possible that the ABS is operating normally  |
|                   | Has the machine been regularly amaintenance schedule?     | Has the machine been regularly serviced according to the periodic maintenance schedule? |        | If the service history is incomplete it is possible that a fault may become apparent. For example, failure to replace the brake fluid during periodic maintenance can cause the hydraulic unit to become internally damaged.                   |
| Motorcycle        | Have there been any previous braking problems?            | aking problems?   |        | Any previous braking problems may be related to the ABS complaint. It is important that the customer provides as much information as possible so that diagnosis can be made as quickly as possible.  |
|                   | Have any aftermarket parts been fitted?                   | OE Tires and brakes?  |        | Further inspection by technician required.   |
|                   | Have the daily safety checks been carried condition etc.) | an carried out? (tire pressures /   |        | Worn tires or tires with incorrect pressures can cause an ABS fault. It is important to regularly check both tire condition and pressure.  |

#### Dealer Findings

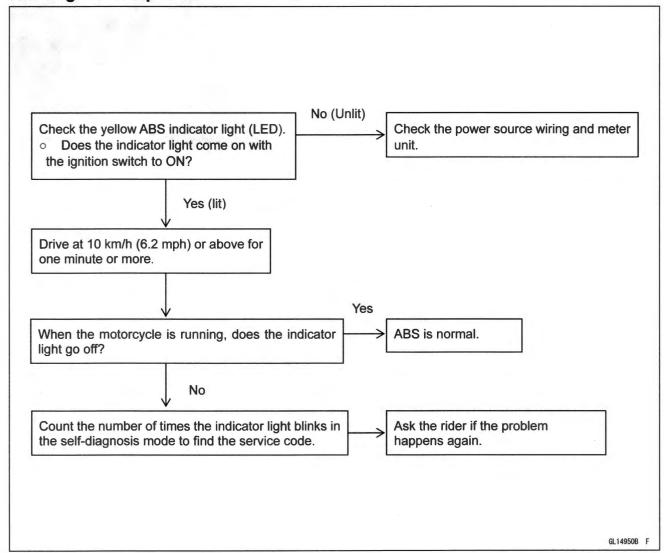
#### Sample Diagnosis Sheet 2

| Question/Action                  |  |   | Answer       | Advice to technician  |  |
|----------------------------------|--|---|--------------|---|--|
| Review customer                  |  | alyze the information that                      |              |   |  |
| feedback                         |  | lected from the customer.                       |              |   |  |
| nformation                       |  | mation to help you                              |              |   |  |
| mormation                        | perform your                                 | initial diagnosis.                              |              |   |  |
|                                  |  | 1   |              |   |  |
| Check to see if                  |  | 2   |              |   |  |
| any diagnostic                   |  | 3   |              | If codes are present refer to service manual.   |  |
| codes are present                |  | 4   |              |   |  |
|                                  |  | 5   |              |   |  |
|                                  | Battery volta                                | ge  |              | The ABS is designed to be used with a 12 V sealed battery as its power source. Only use the battery specified by the service manual as a power source. If low battery voltage is detected service codes: B52 or B53 will be displayed.            |  |
|                                  | Tires type/siz                               | ze  | Front        |   |  |
|                                  | Tire pressures                               |   | Front        | Refer to service manual.  |  |
|                                  |  |   | Rear         |   |  |
| Inspect the                      |  |   |              | Excessive or abnormal wear can be recognize   |  |
| following                        | Tire condition                               | 7   | Front        | Excessive or abnormal wear can be recognized as an ABS fault.   |  |
| .cc.                             | THE CONTRACT                                 |   | Rear         | . as an ABS fault.  |  |
|                                  | Wheel rotation sensor air gap                |   | Front        | Refer to service manual. Also check that the  |  |
|                                  | VVIIGEI TOtatio                              | in sensor all gap                               | Rear         | wheel orientation is correct.   |  |
|                                  | Wheel condit                                 | tion (damaged or                                | Front        |   |  |
|                                  | deformed)                                    |   | Rear         | Refer to service manual.  |  |
|                                  |  |   | Front        | Pad was /Fresh and year anothing /Condition of  |  |
|                                  | Brake system                                 | n general condition                             | Front        | <ul> <li>Pad wear/Front and rear operation/Condition of<br/>hoses etc.</li> </ul>   |  |
|                                  |  |   |              | . 110363 610.   |  |
|                                  | Brake disc ru                                | in-out  | Front        | Refer to service manual.  |  |
|                                  |  | Stays on all the time while ignition on         |              |   |  |
|                                  | Continuous moving off to again and s         | Turns off when first<br>moving off but turns on |              | Check for diagnostic trouble codes.  Test the operation of the light by turning on the ignition. If the light fails to illuminate ensure the the bike is equipped with ABS before inspectin the meter panel for faults as per the service manual. |  |
|                                  |  | Turns on when brake(s)                          |              |   |  |
| Additional                       |  |   |              |   |  |
| Additional                       |  |   |              |   |  |
| information on the<br>yellow ABS | Not working                                  | Turns off soon after moving off                 |              |   |  |
| indicator light                  |  | Turns off after riding for a                    |              |   |  |
| (LED)                            |  | while   |              |   |  |
|                                  |  | Other:  |              | manual.   |  |
|                                  | How many times does it flash per 10 seconds? |   | 5, 15, or 20 | By flashing the ABS unit is indicating additional fault codes that may not be listed in the service manual. Please carefully count the number of  |  |
|                                  |  |   | Other: times | manual. Please carefully count the number of<br>flashes per 10 seconds before contacting<br>Kawasaki. (Kawasaki may request a video of<br>the flashing sequence)  |  |

#### **Pre-Diagnosis Inspection 1**



#### **Pre-Diagnosis Inspection 2**



#### Self-diagnosis Outline

When the indicator light has blinked or come on, the ABS hydraulic unit memorizes and stores the service code (16 codes including "Normal Code") for the service person to troubleshoot easily. The service code memory is powered directly by the battery and cannot be canceled by the ignition switch.

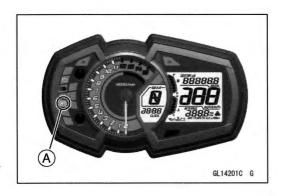
The ABS hydraulic unit can memorize up to six service codes. Further service codes are memorized after erasing the preceding six service codes. If there is no fault, only the start code 12 is shown, indicating that "The ABS is normal."

#### Self-diagnosis Procedures

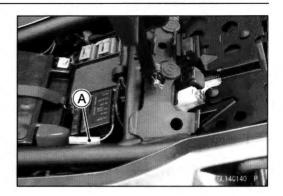
OWhen a problem occurs with the ABS system, the yellow ABS indicator light (LED) [A] come on.

#### NOTE

- OUse a fully charged battery when conducting self-diagnosis. Otherwise, the indicator light blinks very slowly or doesn't blink.
- OThe motorcycle is stopped.
- OKeep the self-diagnosis terminal grounded during self -diagnosis, with an auxiliary lead.

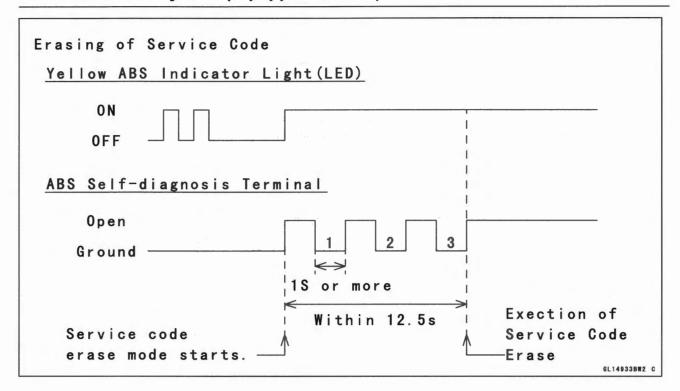


- Remove the seat (see Seat Removal in the Frame chapter).
- Ground the self-diagnosis terminal [A] (Gray) to the battery (–) terminal, using a suitable lead.
- Turn the ignition switch on.
- OCount the blinks of the indicator light to read the service code. Keep the auxiliary lead ground until you finish reading the service code.

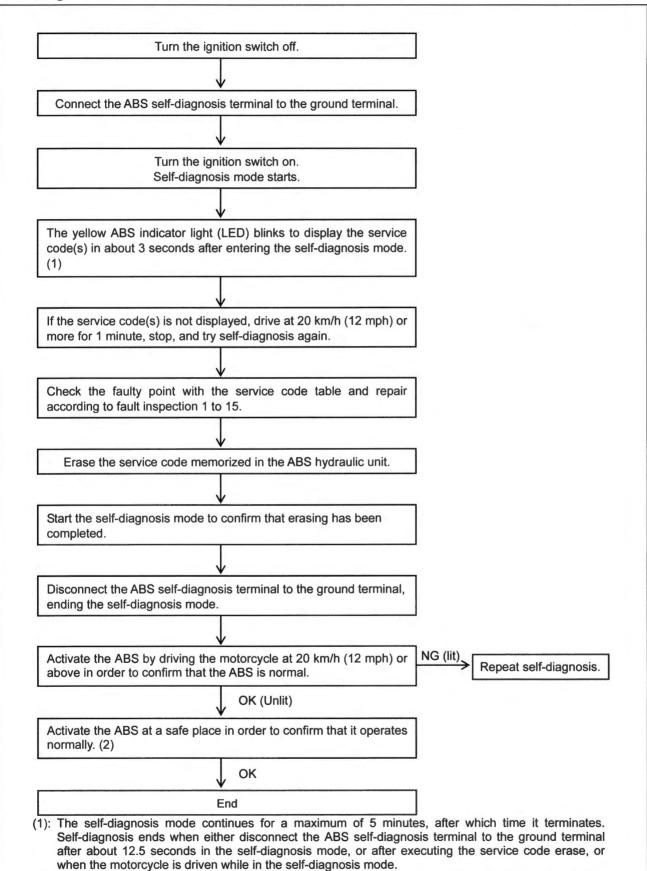


#### Service Code Clearing Procedures

- Start the service code erase mode with the following procedure.
- OThe erase mode starts when the ABS self-diagnosis terminal is disconnected from the battery (–) terminal after starting the self-diagnosis mode.
- OThe service code can be erased by grounding and ungrounding (each time for at least one second) the ABS self-diagnosis terminal three times within about 12.5 seconds after starting the erase mode.
- OThe yellow ABS indicator light (LED) remains on during the erase mode.
- Once erasing is finished, enter the self-diagnosis mode again to confirm that the service codes have been erased. If the ABS has been reset and all codes have been erased, only start code 12 will be shown.



#### Self-diagnosis Flow Chart



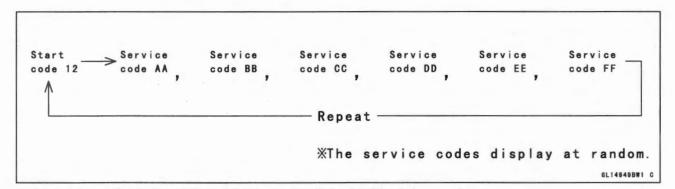
(2): Apply brake suddenly at 30 km/h (19 mph) or more to confirm that the motorcycle stops smoothly and

steady with pulsation on the brake lever and pedal.

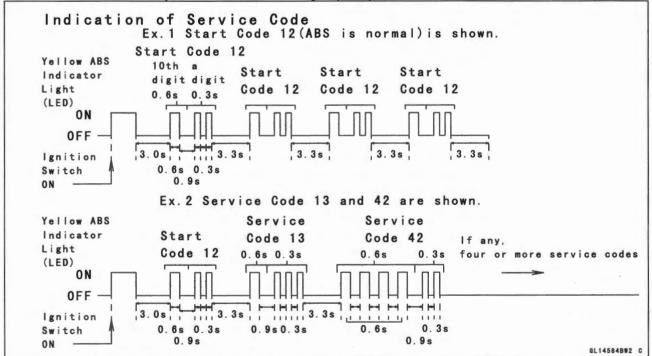
GL14932B

#### How to Read Service Codes

- OService codes are shown by a series of long and short blinks of the yellow ABS indicator light (LED) as shown below.
- ORead 10th digit and unit digit as the ABS indicator light (LED) blinks.
- OWhen there are a number of faults, a maximum of 6 service codes can be stored and the display will begin starting from the last service code entered.
- OFor the display pattern, first, the start code 12 is shown, next up to 6 service codes then the display is repeated from the start code once again.



Olf there is no fault, the yellow ABS indicator light (LED) blinks as shown.



#### How to Erase Service Codes

- OEven 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.
- ORefer to the Service Code Clearing Procedure for the service code erasure.

### **12-52 BRAKES**

## Anti-Lock Brake System (Equipped Models)

## **Service Code Table**

| Service<br>Code | Yellow ABS Indicator Light (LED) | Problems  | Light State            |
|-----------------|----------------------------------|---|------------------------|
| 12              |                                  | Start code (not fault)  | After starts, turn off |
| 13              |                                  | Rear intake solenoid valve trouble (shorted or open, stuck valve)   | ON                     |
| 14              |                                  | Rear outlet solenoid valve trouble (shorted or open, stuck valve)   | ON                     |
| 17              |                                  | Front intake solenoid valve trouble (shorted or open, stuck valve)  | ON                     |
| 18              |                                  | Front outlet solenoid valve trouble (shorted or open, stuck valve)  | ON                     |
| 19              |                                  | ABS solenoid valve relay trouble (wiring shorted or open, stuck relay)  | ON                     |
| 25              |                                  | Front, rear tire abnormal (substandard tire, deformation wheel, sensor rotor teeth number wrong)                        | ON                     |
| 35              |                                  | ABS motor relay trouble (wiring shorted, open or lock, stuck relay)   | ON                     |
| 42              |                                  | Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing) | ON                     |
| 43              |                                  | Front wheel rotation sensor wiring abnormal (wiring shorted or open)  | 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 abnormal (wiring shorted or open)   | ON                     |
| 52              |                                  | Power supply voltage abnormal (low-voltage)   | ON                     |
| 53              |                                  | Power supply voltage abnormal (over-voltage)  | ON                     |
| 54              |                                  | ABS solenoid valve relay supply voltage abnormal (low voltage)  | ON                     |
| 55              |                                  | ECU trouble (ECU operation abnormal)  | ON                     |

#### Yellow ABS Indicator Light (LED) Inspection

- OIn this model, the yellow ABS indicator light (LED) [A] goes on or blinks by the control of the ABS hydraulic unit.
- Turn the ignition switch on.
- ★If the yellow ABS indicator light (LED) comes on, it is normal.
- ★If the yellow ABS indicator light (LED) does not come on, refer to the Meter Unit Inspection in the Electrical System chapter.
- ★ If the meter is good, check the wiring continuity of the BL/Y lead in the main harness.

Special Tool - Needle Adapter Set: 57001-1457

**Wiring Continuity Inspection** 

Meter Connector [A] ← → ABS Hydraulic Unit Connector [B]

Meter Terminal 8 [C]  $\leftarrow \rightarrow$  ABS Hydraulic Unit Terminal 2 [D]

- ★If there is not the continuity in the lead, replace or repair the main harness.
- ★If there is the continuity in the lead, replace the ABS hydraulic unit.

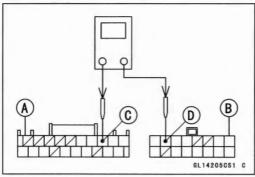
## Solenoid Valve Inspection (Service Code 13, 14, 17, 18)

- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the solenoid valve in the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).

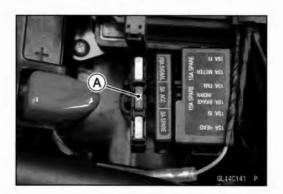
# ABS Solenoid Valve Relay Inspection (Service Code 19)

- Remove:
  - Seat (see Seat Removal in the Frame chapter)
- Check the ABS solenoid valve relay fuse (15 A) [A] (see Fuse Inspection in the Electrical System chapter).

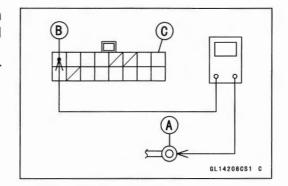








- ★If the fuse is good, check the wiring continuity between the positive (+) terminal [A] of the battery and R/BK lead terminal [B] in the ABS hydraulic unit lead connector [C].
- ★If there is not the continuity in the lead, replace or repair the main harness.
- ★ If there is the continuity in the lead, go to next step.



- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).



#### Front, Rear Tire Abnormal (Service Code 25)

Check the following and correct the faulty part.

**Incorrect Tire Pressure** 

Tires not recommended for the motorcycle were installed (incorrect tire size).

Deformation of Wheel or Tire

Missing Teeth and Clogging with Foreign Matter of Sensor Rotor (see Wheel Rotation Sensor Inspection)

- ★If the all parts correct, recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).

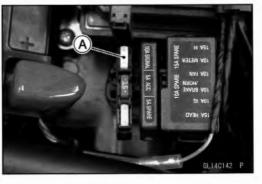


#### ABS Motor Relay Inspection (Service Code 35)

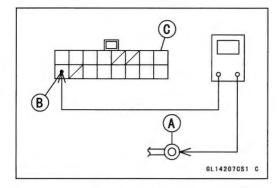
• Remove:

Seat (see Seat Removal in the Frame chapter)

 Check the ABS motor relay fuse (25 A) [A] (see Fuse Inspection in the Electrical System chapter).



- ★If the fuse is good, check the wiring continuity between the positive (+) terminal [A] of the battery and R/W lead terminal [B] in the ABS hydraulic unit lead connector [C].
- ★If there is not the continuity in the lead, replace or repair the main harness.
- ★ If there is the continuity in the lead, go to next step.

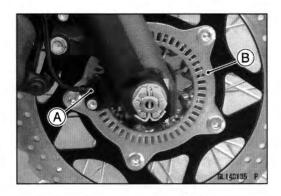


- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).



# Front Wheel Rotation Sensor Signal Abnormal (Service Code 42)

- Measure the air gap between the front wheel rotation sensor and sensor rotor (see Wheel Rotation Sensor Air Gap Inspection).
- Check the front wheel rotation sensor (see Wheel Rotation Sensor Inspection).
- ★If both inspections are good, go to next step.
- Check that there is iron or other magnetic deposits between the sensor [A] and sensor rotor [B], and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).
- ★If the sensor rotor in bad condition, remove the any deposits. Install the proper part or replace faulty part.
- ★ If the all items are good, go to next step.
- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).





# Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)

Disconnect:

ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal)

Front Wheel Rotation Sensor Connector (see Front Wheel Rotation Sensor Removal)

 Check the wiring continuity of the BK/W lead and W/BK lead.

#### **Wiring Continuity Inspection**

ABS Hydraulic Unit Connector [A]

Front Wheel Rotation Sensor Connector [B]

ABS Hydraulic Unit Terminal 14 [C]

→ Sensor Terminal 1 [D]

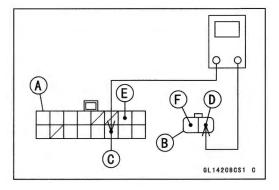
ABS Hydraulic Unit Terminal 7 [E]

→ Sensor Terminal 2 [F]

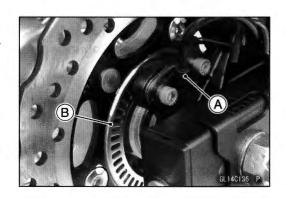
- ★If there is not the continuity in the lead, replace or repair the main harness.
- ★If the wiring is good, go to next step.
- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, replace the front wheel rotation sensor (see Front Wheel Rotation Sensor Removal).
- ★Still, when it is not good, replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).

# Rear Wheel Rotation Sensor Signal Abnormal (Service Code 44)

- Measure the air gap between the rear wheel rotation sensor and sensor rotor (see Wheel Rotation Sensor Air Gap Inspection).
- Check the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Inspection).
- ★If both inspections are good, go to next step.
- Check that there is iron or other magnetic deposits between the sensor [A] and sensor rotor [B], and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).
- ★If the sensor rotor in bad condition, remove the any deposits. Install the proper part or replace faulty part.
- ★If the all items are good, go to next step.







- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★ If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).



## Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)

• Disconnect:

ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal)

Rear Wheel Rotation Sensor Connector (see Rear Wheel Rotation Sensor Removal)

 Check the wiring continuity of the BK/O lead and W/G lead.

#### Wiring Continuity Inspection

ABS Hydraulic Unit Connector [A] Rear Wheel Rotation Sensor Connector [B]

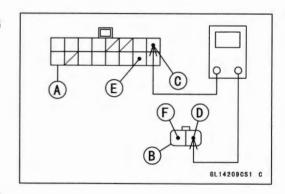
ABS Hydraulic Unit Terminal 8 [C] ←→ Sensor Terminal 1 [D]

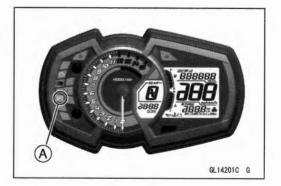
ABS Hydraulic Unit Terminal 15 [E] ←→ Sensor Terminal 2 [F]

- ★If there is not the continuity in the lead, replace or repair the main harness.
- ★If the wiring is good, go to next step.
- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, replace the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Removal).
- ★Still, when it is not good, replace the ABS hydraulic unit.
- ★ If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).

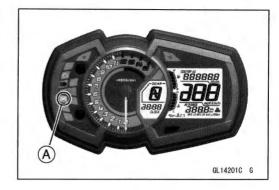
# Power Supply Voltage Abnormal [Low-Voltage] (Service Code 52)

- Check the battery condition (see Charging Condition Inspection in the Electrical System chapter).
- ★ If the battery is good condition, go to next step.





- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).



# Power Supply Voltage Abnormal [Over-Voltage] (Service Code 53)

- Check the charging voltage (see Charging Voltage Inspection in the Electrical System chapter).
- ★If the charging voltage is good, go to next step.
- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).



# ABS Solenoid Valve Relay Supply Voltage Inspection [Low-Voltage] (Service Code 54)

- Check the charging voltage (see Charging Voltage Inspection in the Electrical System chapter).
- ★If the charging voltage is good, go to next step.
- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★ If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).

#### ECU Inspection (Service Code 55)

- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
- ★If the yellow ABS indicator light (LED) [A] comes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
- ★If the yellow ABS indicator light (LED) does not come on, ABS system is normal (service code is not stored; temporary failure.).





#### ABS Hydraulic Unit Removal

#### NOTICE

The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface.

Be careful not to get water or mud on the ABS hydraulic unit.

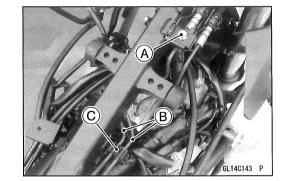
- Drain the brake fluid from the front and rear brake lines.
   Obrain the brake fluid through the bleed valve by pumping the brake lever and pedal.
- Remove:
   Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Clean the ABS hydraulic unit thoroughly.



Clean all fittings on the ABS hydraulic unit and the rear master cylinder because dirt around the banjo bolts could contaminate the brake fluid in the line during removal/installation.

Spread over a shop towel around the ABS hydraulic unit before removing the brake line so that brake fluid does not leak on the parts.

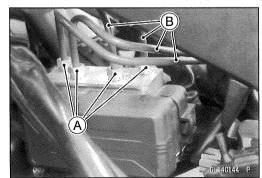
- Remove:
  Bolt [A]
- Clear the brake pipes [B] from the clamp [C].



• Using the flare nut wrench, loosen the brake pipe joint nuts [A] fully and disconnect the brake pipes [B].

#### NOTICE

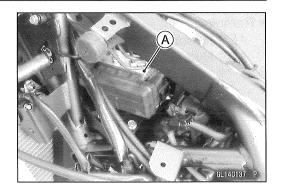
Brake fluid quickly damages painted plastic surface; any spilled fluid should be completely washed away immediately.



• Make sure that the ignition switch has been turned off.

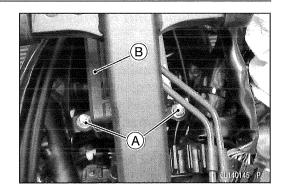
#### NOTICE

To protect the ABS hydraulic unit from the electrical surge, always disconnect the ABS hydraulic unit connector while the ignition switch is turned off.



Remove:

ABS Hydraulic Unit Mounting Bolts [A] ABS Hydraulic Unit [B] with Bracket



- Plug the ports on the ABS hydraulic unit to prevent entering a foreign matter into the unit.
- Wrap the brake pipe openings with a vinyl bag to prevent brake fluid leakage and entering a foreign matter into the hydraulic system.

#### **NOTICE**

Do not allow entering a foreign matter into the hydraulic system while disconnecting the hydraulic lines.

• Remove:

Bolts [A] Washers [B] Bracket [C] ABS Hydraulic Unit [D]

#### NOTICE

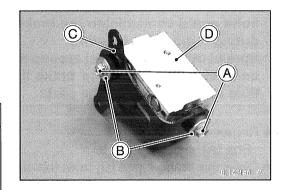
The ABS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the ABS hydraulic unit.

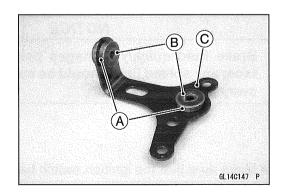


#### **NOTICE**

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

- Installation is the reverse of removal.
- Be sure to install the dampers [A] and flanged collars [B] on the bracket [C].





 Connect the brake pipes to the ABS hydraulic unit [A] and tighten the brake pipe joint nuts.

To Rear Master Cylinder [1]

To Rear Caliper [2]

To Front Caliper [3]

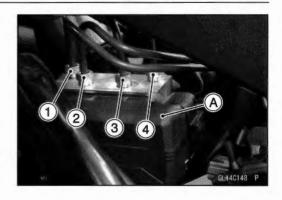
To Front Master Cylinder [4]

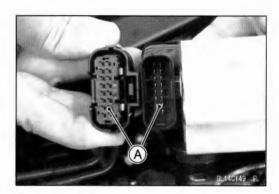
#### Torque - Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb)

- Run the brake pipes and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

#### ABS Hydraulic Unit Inspection

- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal).
- Visually inspect the ABS hydraulic unit.
- ★ Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.
- Visually inspect the connector terminals [A].
- ★Replace the ABS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.
- ★If the ABS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.





#### Front Wheel Rotation Sensor Removal

#### NOTICE

The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor.

Do not try to disassemble or repair the wheel rotation sensor.

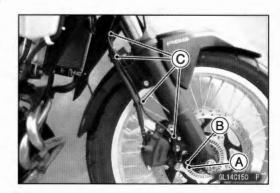
#### Remove:

Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

Front Wheel Rotation Sensor Bolt [A]

Front Wheel Rotation Sensor [B]

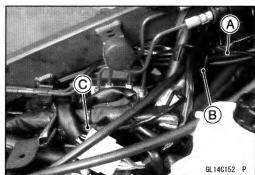
• Clear the sensor lead from the clamps [C].



• Clear the sensor lead from the clamps [A].



- Clear the sensor lead [A] from the guide [B].
- Disconnect the front wheel rotation sensor lead connector [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).
- Apply a non-permanent locking agent to the threads of the front wheel rotation sensor bolt, and tighten it.
- Tighten:

## Torque - Front Wheel Rotation Sensor Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)

OWhen installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

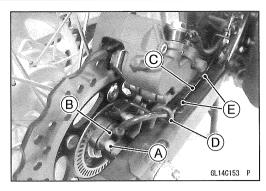
#### Rear Wheel Rotation Sensor Removal

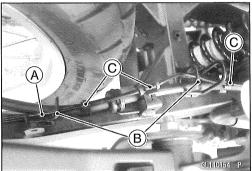
#### NOTICE

The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor.

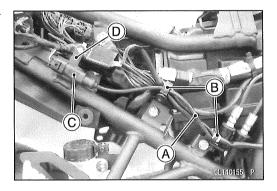
Do not try to disassemble or repair the wheel rotation sensor.

- Remove:
  - Right Side Seat Cover (see Seat Cover Removal in the Frame chapter)
  - Mud Guard (see Mud Guard Removal in the Frame chapter)
  - Rear Wheel Rotation Sensor Bolt [A]
  - Rear Wheel Rotation Sensor [B]
- Clear the sensor lead [C] from the guide [D] and clamps [E].
- Clear the sensor lead [A] from the guides [B] and clamps [C].





- Clear the sensor lead [A] from the clamps [B].
- Disconnect the rear wheel rotation sensor lead connector [C].
- Remove the rear wheel rotation sensor lead connector from the bracket [D] on the frame.



#### Rear Wheel Rotation Sensor Installation

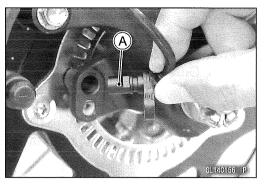
- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Apply a non-permanent locking agent to the threads of the rear wheel rotation sensor bolt, and tighten it.
- Tighten:

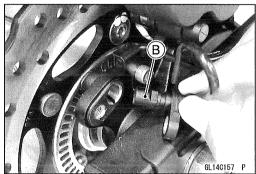
# Torque - Rear Wheel Rotation Sensor Bolt: 8.0 N·m (0.82 kgf·m,71 in·lb)

OWhen installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

#### 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

0.31 ~ 2.02 mm (0.01 ~ 0.08 in.)

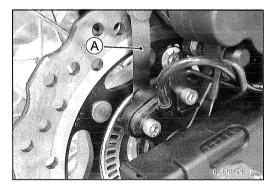
Rear

0.53 ~ 1.70 mm (0.02 ~ 0.07 in.)

#### **NOTE**

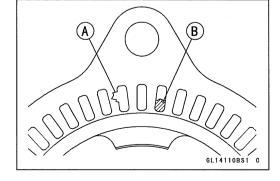
- O The sensor air gap cannot be adjusted.
- ★ If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection in the Wheels/Tires chapter), sensor installation condition and sensor (see Wheel Rotation Sensor Inspection).

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#### Wheel Rotation Sensor Rotor Inspection

- Visually inspect the wheel rotation sensor rotor.
- ★If the rotor is deformed or damaged (chipped teeth [A]), replace the sensor rotor with a new one.
- ★If there is iron or other magnetic deposits [B], remove the deposits.



#### ABS Solenoid Valve Relay Fuse (15 A) Removal

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

#### ABS Motor Relay Fuse (25 A) Removal

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

#### Fuse Installation

 If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage (see Fuse Installation in the Electrical System chapter).

#### **Fuse Inspection**

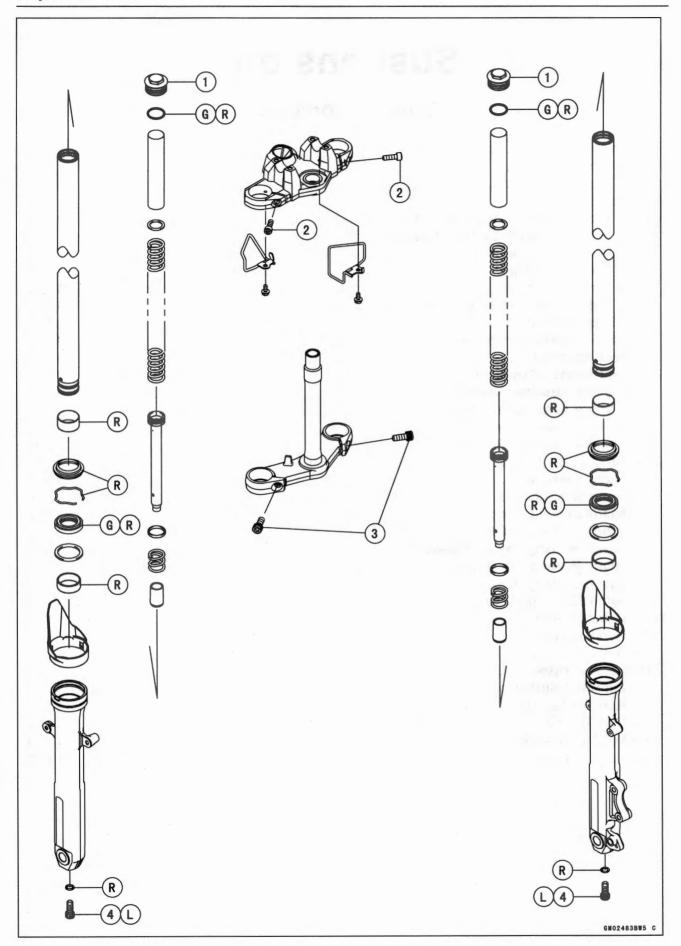
- Remove the fuses (see ABS Solenoid Valve Relay Fuse (15 A)/ABS Motor Relay Fuse (25 A) Removal).
- Refer to the Fuse Inspection in the Electrical System chapter.

#### 13

# Suspension

## **Table of Contents**

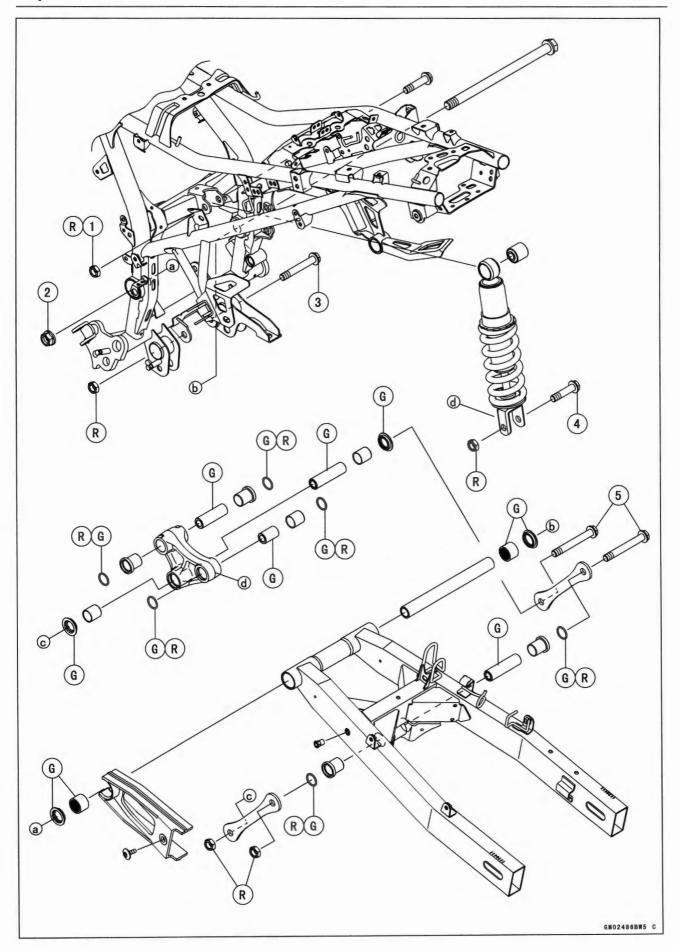
| Exploded View                           | 13-2  |
|---|-------|
| Specifications                          | 13-6  |
| Special Tools                           | 13-7  |
| Front Fork                              | 13-8  |
| Front Fork Removal (Each Fork Leg)      | 13-8  |
| Front Fork Installation (Each Fork Leg) | 13-8  |
| Front Fork Oil Change                   | 13-9  |
| Front Fork Disassembly                  | 13-10 |
| Front Fork Assembly                     | 13-12 |
| Inner Tube, Outer Tube Inspection       | 13-13 |
| Dust Seal Inspection                    | 13-14 |
| Fork Spring Tension Inspection          | 13-14 |
| Rear Shock Absorber                     | 13-15 |
| Spring Preload Adjustment               | 13-15 |
| Rear Shock Absorber Removal             | 13-15 |
| Rear Shock Absorber Installation        | 13-16 |
| Rear Shock Absorber Inspection          | 13-16 |
| Rear Shock Absorber Scrapping           | 13-16 |
| Swingarm                                | 13-17 |
| Swingarm Removal                        | 13-17 |
| Swingarm Installation                   | 13-18 |
| Swingarm Bearing Removal                | 13-19 |
| Swingarm Bearing Installation           | 13-19 |
| Swingarm Bearing, Sleeve Inspection     | 13-20 |
| Swingarm Bearing Lubrication            | 13-20 |
| Swingarm Bushing Removal                | 13-20 |
| Swingarm Bushing Installation           | 13-20 |
| Tie-Rod, Rocker Arm                     | 13-21 |
| Tie-Rod Removal                         | 13-21 |
| Tie-Rod Installation                    | 13-21 |
| Rocker Arm Removal                      | 13-21 |
| Rocker Arm Installation                 | 13-22 |
| Tie-Rod, Rocker Arm Bushing Inspection  | 13-22 |
| Tie-Rod, Rocker Arm Sleeve Inspection   | 13-22 |
| Rocker Arm Bushing Removal              | 13-22 |
| Rocker Arm Bushing Installation         | 13-23 |



| No. | Fastener                      | Torque |       |       | Domonico |
|-----|-------------------------------|--------|-------|-------|----------|
|     |                               | N·m    | kgf·m | ft·lb | Remarks  |
| 1   | Front Fork Top Plugs          | 22     | 2.2   | 16    |          |
| 2   | Upper Front Fork Clamp Bolts  | 20     | 2.0   | 15    |          |
| 3   | Lower Front Fork Clamp Bolts  | 30     | 3.1   | 22    |          |
| 4   | Front Fork Bottom Allen Bolts | 20     | 2.0   | 15    | L        |

G: Apply grease.

L: Apply a non-permanent locking agent. R: Replacement Parts



| No. | Fastener                       |     | Torque |       |         |
|-----|--------------------------------|-----|--------|-------|---------|
|     |                                | N·m | kgf·m  | ft·lb | Remarks |
| 1   | Upper Rear Shock Absorber Nut  | 59  | 6.0    | 44    | R       |
| 2   | Swingarm Pivot Shaft Nut       | 98  | 10     | 72    |         |
| 3   | Rocker Arm Bolt                | 59  | 6.0    | 44    | R       |
| 4   | Lower Rear Shock Absorber Bolt | 59  | 6.0    | 44    | R       |
| 5   | Tie-Rod Bolts                  | 59  | 6.0    | 44    | R       |

G: Apply grease. R: Replacement Parts

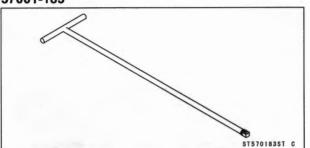
## **13-6 SUSPENSION**

## Specifications

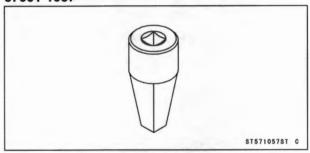
| Item                                 | Standard  |  |  |
|--------------------------------------|---|--|--|
| Front Fork (Per One Unit)            |   |  |  |
| Fork Inner Tube Diameter             | φ41 mm (1.6 in.)  |  |  |
| Air Pressure                         | Atmospheric pressure (non-adjustable)   |  |  |
| Suspension Oil                       | Kawasaki SS-8 or equivalent   |  |  |
| Amount :                             |   |  |  |
| After Disassembly and Completely Dry | 523 ±2.5 mL (17.7 ±0.085 US oz.)  |  |  |
| When Changing Oil                    | Approx. 445 mL (15.0 US oz.)  |  |  |
| Fork Oil Level                       | 92 ±2 mm (3.6 ±0.08 in.) (Fully Compressed, without Spring, below from the Top of the Inner Tube) |  |  |
| Fork Spring Free Length              | 394 mm (15.5 in.) (Service Limit: 387 mm (15.2 in.))  |  |  |
| Rear Shock Absorber                  |   |  |  |
| Spring Preload Setting Position      | 3rd position (Adjustable Range: 1st ← → 5th position)   |  |  |
| Gas Pressure                         | 980 kPa (10 kgf/cm², 142 psi, Non-adjustable)   |  |  |

#### **Special Tools**

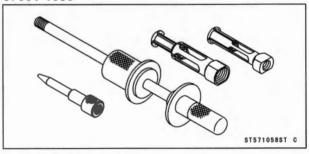
Fork Cylinder Holder Handle: 57001-183



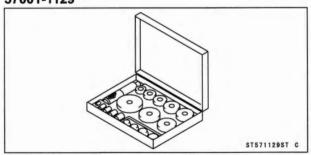
Fork Cylinder Holder Adapter: 57001-1057



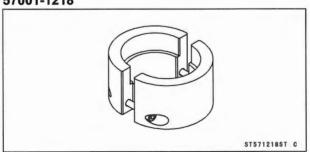
Oil Seal & Bearing Remover: 57001-1058



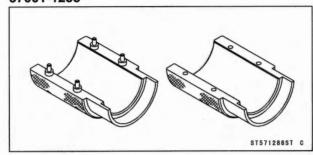
Bearing Driver Set: 57001-1129



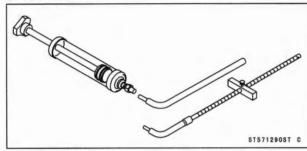
Fork Outer Tube Weight: 57001-1218



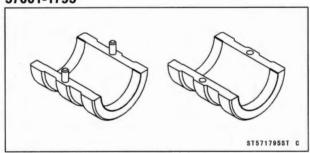
Fork Oil Seal Driver,  $\phi$ 41: 57001-1288



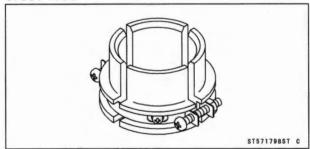
Fork Oil Level Gauge: 57001-1290



Fork Oil Seal Driver Weight,  $\phi$ 26 ~  $\phi$ 46: 57001-1795



Fork Oil Seal Driver Attachment,  $\phi$ 36 ~  $\phi$ 46: 57001-1798



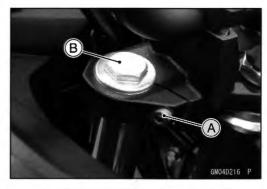
#### Front Fork Removal (Each Fork Leg)

• Remove:

Middle Fairings (see Middle Fairing Removal in the Frame chapter)

Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)

- ★ If fork leg is to be disassembled, remove the handlebar to loosen the upper front fork clamp bolt [A] and the front fork top plug [B] beforehand.
- Loosen the lower front fork clamp bolt [C].
- With a twisting motion, remove the fork leg down and out.





#### Front Fork Installation (Each Fork Leg)

- Install the fork with the upper end of inner tube flush [A] against the top surface of the stem head [B].
- ★ Tighten the front fork top plug to the specified torque if the front fork top plug is removed.

Torque - Front Fork Top Plugs: 22 N·m (2.2 kgf·m, 16 ft·lb)

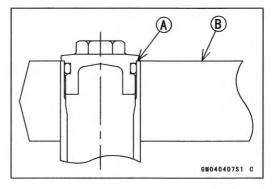
#### NOTE

- OTighten the top plug before tightening the upper front fork clamp bolt.
- Tighten:

Torque - Lower Front Fork Clamp Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)

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

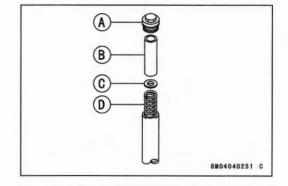
• Install the removed parts (see appropriate chapters).



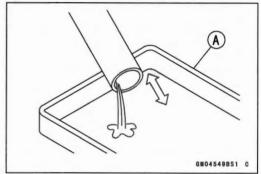
#### Front Fork Oil Change

• Remove:

Front Fork (see Front Fork Removal)
Front Fork Top Plug [A] with O-ring
Spacer [B]
Fork Spring Seat [C]
Fork Spring [D]



Drain the fork oil into a suitable container [A].
 OPump the inner tube up and down at least 10 times to expel the oil from the fork.



 Hold the fork tube upright, pour in the type and amount of fork oil specified.

Suspension Oil - SS-8 (1 L): 44091-0007

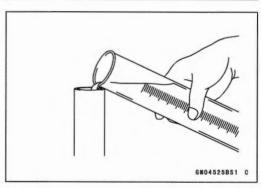
Amount (Per Side):

When changing oil:

Approx. 445 mL (15.0 US oz.)

After disassembly and completely dry:

523 ±2.5 mL (17.7 ±0.085 US oz.)



#### NOTE

OMove the outer tube up and down a few times to remove the air that is trapped in the fork oil in order to stabilize the oil level.

#### 13-10 SUSPENSION

#### Front Fork

- Hold the outer tube vertically in a vise and compress the fork completely.
- Wait until the oil level stabilizes.
- Use the fork oil level gauge [A] to measure the distance between the top of the inner tube to the oil level.

#### Special Tool - Fork Oil Level Gauge: 57001-1290

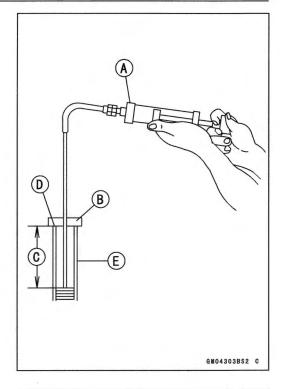
- OSet the oil level gauge stopper [B] so that the distance [C] from the bottom of the stopper to the lower end of the pipe is the standard oil level distance.
- OA correct measurement can not be obtained unless the level gauge pipe is placed in the center of the inner tube.

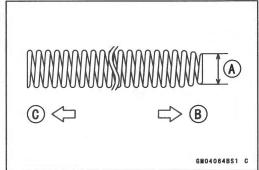
## Fork Oil Level (fully compressed, without fork spring) Standard: 92 ±2 mm (3.6 ±0.08 in.)

- OPlace the stopper of the level gauge at the top [D] of the inner tube [E] and pull the handle slowly to draw out the excess oil from fork into the gauge, thus attaining the standard level.
- ★If not oil is drawn out, there is not enough oil in the fork.

  Pour in some more oil and measure again.
- Repeat the same procedure for adjusting the other fork.
- Install the fork spring with its tapered end [A] facing downward [B].

Upward [C]







Fork Spring Seat [A] Spacer [B]

- Replace the top plug O-ring with a new one.
- Apply grease to the top plug O-ring.
- Install:

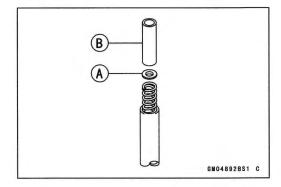
Front Fork Top Plug Front Fork (see Front Fork Installation)

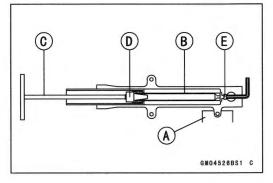
#### Front Fork Disassembly

- Drain the fork oil (see Front Fork Oil Change).
- Hold the fork leg horizontally in a vise [A].
- Hold the cylinder unit [B] by using the special tools.

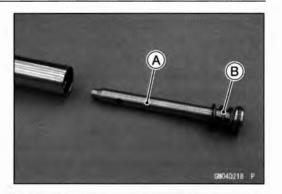
Special Tools - Fork Cylinder Holder Handle [C]: 57001-183
Fork Cylinder Holder Adapter [D]: 57001
-1057

 Remove the Allen bolt [E] and gasket from the bottom of the outer tube.

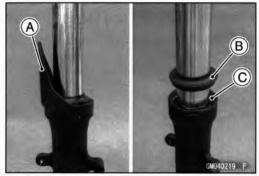




 Remove the cylinder unit [A] and spring [B] from the inner tube.

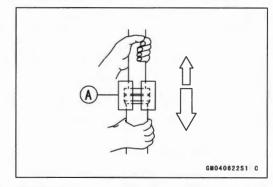


Remove the following parts from the top of the outer tube.
 Fork Guard [A]
 Dust Seal [B]
 Retaining Ring [C]



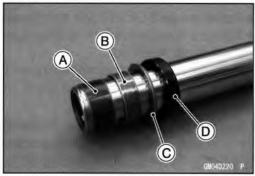
 Use the fork outer tube weight [A] to separate the inner tube from the outer tube. Holding the inner tube by hand in a vertical position, pull down the outer tube several times to pull out the inner tube.

Special Tool - Fork Outer Tube Weight: 57001-1218



Remove:

 Inner Guide Bushing [A]
 Outer Guide Bushing [B]
 Washer [C]
 Oil Seal [D]



 Remove the cylinder base [A] from the bottom of the outer tube.



#### Front Fork Assembly

• Replace the following parts with new ones.

Inner Guide Bushing [A]

Dust Seal [B]

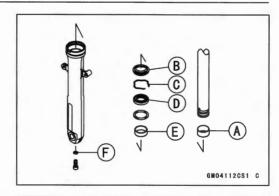
Retaining Ring [C]

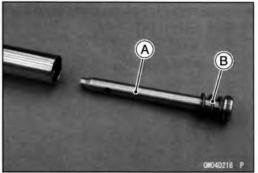
Oil Seal [D]

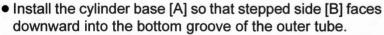
Outer Guide Bushing [E]

Front Fork Bottom Allen Bolt Gasket [F]

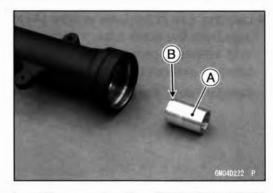
- Install the new inner guide bushing to the groove on the inner tube.
- Insert the cylinder unit [A] and the spring [B] into the inner tube.







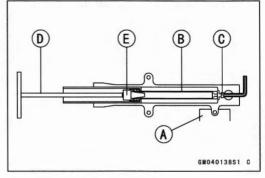
 Install the inner tube and cylinder unit as a set into the outer tube.



- Install a new bottom Allen bolt gasket.
- Apply a non-permanent locking agent to the threads of the bottom Allen bolt.
- Hold the outer tube horizontally in a vise [A], stop the cylinder unit [B] with the special tools, then tighten the Allen bolt [C].

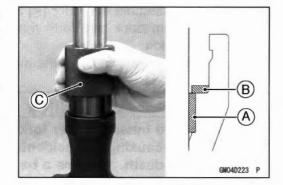
Special Tools - Fork Cylinder Holder Handle [D]: 57001-183
Fork Cylinder Holder Adapter [E]: 57001
-1057

Torque - Front Fork Bottom Allen Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)



 Install the outer guide bushing [A] and washer [B] into the outer tube using the fork oil seal driver [C], until the washer is bottomed.

Special Tools - Fork Oil Seal Driver,  $\phi$ 41: 57001-1288 or Fork Oil Seal Driver Weight,  $\phi$ 26  $\sim \phi$ 46: 57001-1795 Fork Oil Seal Driver Attachment,  $\phi$ 36  $\sim \phi$ 46:



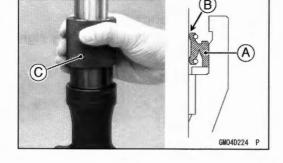
 Apply grease to the oil seal lips, and install the oil seal [A] to the outer tube from the top.

57001-1798

Olnstall the oil seal with its lip side (marked side) [B] facing up.

 Install the oil seal into the outer tube using the fork oil seal driver [C] until the oil seal is bottomed.

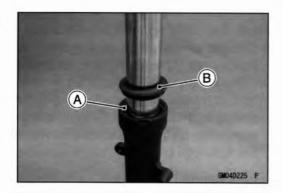
Special Tools - Fork Oil Seal Driver,  $\phi$ 41: 57001-1288 or Fork Oil Seal Driver Weight,  $\phi$ 26  $\sim$  $\phi$ 46: 57001-1795 Fork Oil Seal Driver Attachment,  $\phi$ 36  $\sim$  $\phi$ 46:



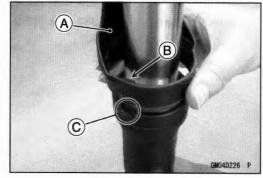
• Install the retaining ring [A] to the groove in the outer tube.

57001-1798

Install the dust seal [B].



- Install the fork guard [A] to the outer tube aligning the tab
   [B] with the groove [C] on the outer tube.
- Pour in the specified type of oil (see Front Fork Oil Change).
- Install the front fork (see Front Fork Installation).



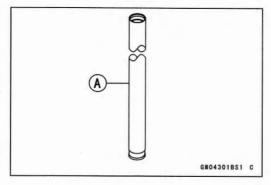
#### Inner Tube, Outer Tube Inspection

Visually inspect the inner tube [A].

★ If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.



If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.



#### 13-14 SUSPENSION

#### **Front Fork**

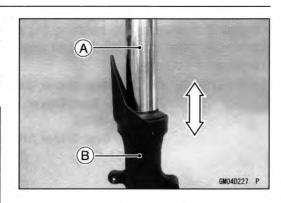
- Temporarily assemble the inner [A] and outer [B] tubes, and pump them back and forth manually to check for smooth operation.
- ★If you feel binding or catching, the inner and outer tubes must be replaced.

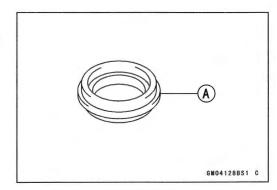
#### **A** WARNING

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.





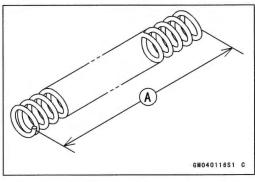
#### Fork Spring Tension Inspection

- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.
- ★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

#### Fork Spring Free Length

 Standard:
 394 mm (15.5 in.)

 Service Limit:
 387 mm (15.2 in.)



#### Rear Shock Absorber

#### Spring Preload Adjustment

Remove:

Left Frame Cover (see Frame Cover Removal in the Frame chapter)

- Using the wrench [A] from the tool kit, turn the adjusting nut to adjust the spring preload.
- OThe standard adjuster setting is 3rd position.

**Spring Preload Setting** 

Standard Position: 3rd position

Adjustable Range: 1st ~ 5th position

★If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.



| Adjuster<br>Position | Shock<br>Absorber<br>Hardness | Load  | Road<br>Conditions | Driving<br>Speed |
|----------------------|-------------------------------|-------|--------------------|------------------|
| 1st                  | Soft                          | Light | Good               | Low              |
| <b>↑</b>             | 1                             | 1     | 1                  | 1                |
| <b>1</b>             | <b>↓</b>                      | ↓     | ↓                  | <b>↓</b>         |
| 5th                  | Hard                          | Heavy | Bad                | Highway          |



 Squeeze the brake lever slowly and hold it with a band [A].

#### **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.

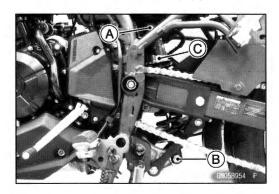
- Remove:
  - Seat Covers (see Seat Cover Removal in the Frame chapter)
- Raise the rear wheel off the ground with a suitable jack or the center stand (KLE300A).
- Remove:

Upper Rear Shock Absorber Nut [A] and Bolt Lower Rear Shock Absorber Nut [B] and Bolt

• Remove the shock absorber [C] from upside.







#### 13-16 SUSPENSION

#### Rear Shock Absorber

#### Rear Shock Absorber Installation

- Replace:
  - Rear Shock Absorber Nuts
- Install the rear shock absorber [A] so that the label side faces rearward.
- Tighten:
  - Torque Upper Rear Shock Absorber Nut: 59 N⋅m (6.0 kgf⋅m, 44 ft⋅lb)
    - Lower Rear Shock Absorber Bolt: 59 N·m (6.0 kgf·m, 44 ft·lb)
- Install the removed parts (see appropriate chapters).

#### Rear Shock Absorber Inspection

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
   Oil Leakage
   Crack or Dent
- ★ If there is any damage to the rear shock absorber, replace it.
- Visually inspect the rubber bushing [A].
- ★If it show any signs of damage, replace it.

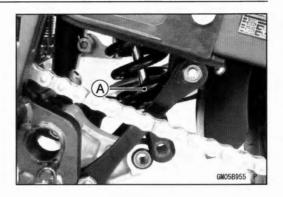


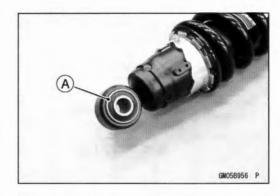
#### **A** WARNING

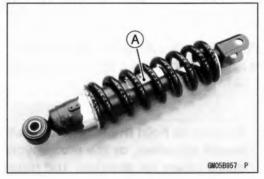
Since the rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode.

Before a rear shock absorber is scrapped, drill a hole at the point [A] shown to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may below out bits of drilled metal when the hole opens.

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Drill the cylinder of the shock absorber using about 2 mm (0.08 in.) drillbit.







#### Swingarm Removal

- Loosen the rear brake hose banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove:

Side Covers (see Side Cover Removal in the Frame chapter)

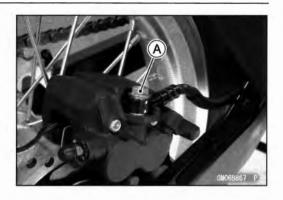
Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)

Mud Guard (see Mud Guard Removal in the Frame chapter)

Rear Shock Absorber (see Rear Shock Absorber Removal)

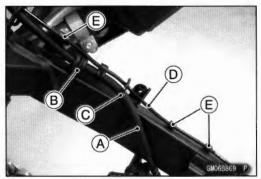


Upper Tie-Rod Nut [A] and Bolt





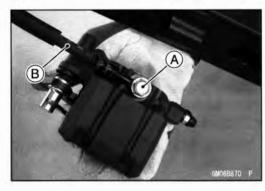
- Free the brake hose [A] from the clamp [B] and guide [C].
- Free the rear wheel rotation sensor lead [D] from the clamps [E].



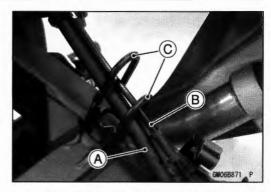
Remove the banjo bolt [A] and disconnect the brake hose
 [B] from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

#### NOTICE

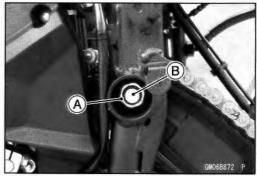
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.



 Clear the brake hose [A] and rear wheel rotation sensor lead [B] from the guides [C].

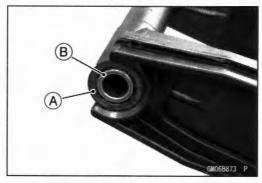


- Remove the swingarm pivot shaft nut [A].
- Pull out the swingarm pivot shaft [B] to the right side, and remove the swingarm.



#### Swingarm Installation

- Apply grease to the lips of the grease seals [A].
- Be sure to install the grease seals and sleeve [B] to the swingarm.



- Install the swingarm and insert the swingarm pivot shaft
   [A] from the right side.
- Replace:

Upper Tie-Rod Nut [B]

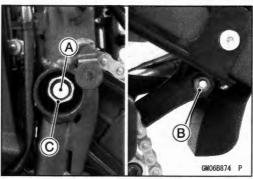
O-rings

- Apply grease to the O-rings.
- Apply grease to the threads of the swingarm pivot shaft and seating surface of the swingarm.
- Tighten:

Torque - Swingarm Pivot Shaft Nut [C]: 98 N·m (10 kgf·m, 72 ft·lb)

Tie-Rod Bolt: 59 N·m (6.0 kgf·m, 44 ft·lb)

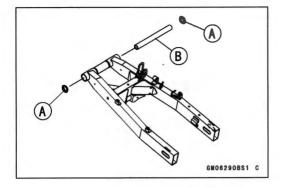
- Move the swingarm up and down to check for abnormal friction
- Install the removed parts (see appropriate chapters).



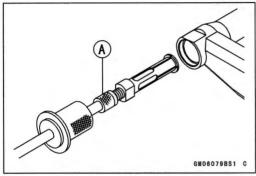
## Swingarm Bearing Removal

• Remove:

Swingarm (see Swingarm Removal) Grease Seals [A] Sleeve [B]



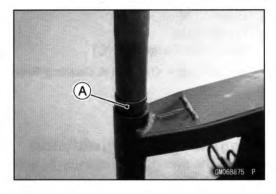
Remove the needle bearings.
 Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



#### Swingarm Bearing Installation

- Apply plenty of grease to the needle bearings.
- Press the needle bearings so that the manufacturer's marks face out.

Special Tool - Bearing Driver Set [A]: 57001-1129

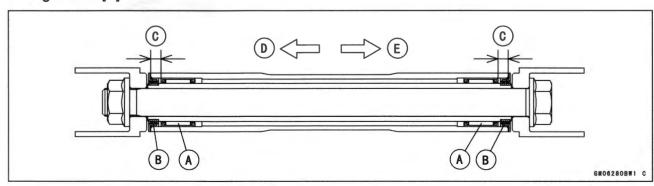


• Install the needle bearings [A] and grease seals [B] position as shown.

6 mm (0.24 in.) [C]

Left Side [D]

Right Side [E]



#### Swingarm Bearing, Sleeve Inspection

#### NOTICE

Do not remove the bearings for inspection. Removal may damage them.

- Inspect the needle bearings [A] installed in the swingarm.
- OThe rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.
- ★If the needle bearing and sleeve [B] show any signs of abnormal wear, discoloration, or damage, replace them as a set.



 Refer to the Swingarm Pivot Lubrication in the Periodic Maintenance chapter.

## Swingarm Bushing Removal

Remove:

Swingarm (see Swingarm Removal)

Sleeve [A]

O-rings [B]

Swingarm Bushings [C]

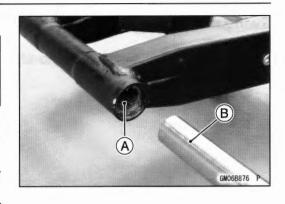
Special Tool - Oil Seal & Bearing Remover: 57001-1058

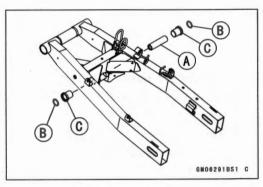
## Swingarm Bushing Installation

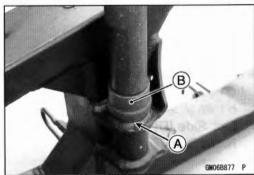
Press the swingarm bushings [A] until they are bottomed.

 Press the swingarm bushings [A] until they are bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129







## Tie-Rod, Rocker Arm

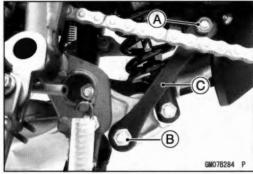
#### Tie-Rod Removal

 Squeeze the brake lever slowly and hold it with a band [A].



- Raise the rear wheel off the ground with a suitable jack or the center stand (KLE300A).
- Remove:

Upper Tie-Rod Nut [A] and Bolt Lower Tie-Rod Nut [B] and Bolt Tie-Rod [C] (Both Sides)



#### Tie-Rod Installation

- Replace the tie-rod nuts with new ones.
- Apply grease to the inside of the grease seals.
- Tighten:

Torque - Tie-Rod Bolts: 59 N·m (6.0 kgf·m, 44 ft·lb)

#### Rocker Arm Removal

- Squeeze the brake lever slowly and hold it with a band [A].
- Raise the rear wheel off the ground with a suitable jack or the center stand (KLE300A).



Remove the muffler mounting bolt [A] and move the exhaust pipe downward.

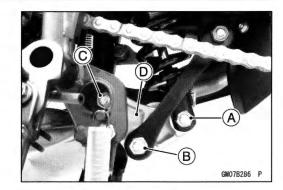


#### 13-22 SUSPENSION

#### Tie-Rod, Rocker Arm

#### • Remove:

Lower Rear Shock Absorber Nut [A] and Bolt Lower Tie-Rod Nut [B] and Bolt Rocker Arm Nut [C] and Bolt Rocker Arm [D]



#### Rocker Arm Installation

#### Replace:

Rocker Arm Nut Lower Tie-Rod Nut Lower Rear Shock Absorber Nut O-rings [A]

- Apply grease to the sliding surface of the sleeves [B], grease seals [C] and O-rings.
- Tighten:

Torque - Rocker Arm Bolt: 59 N·m (6.0 kgf·m, 44 ft·lb)
Tie-Rod Bolt: 59 N·m (6.0 kgf·m, 44 ft·lb)
Lower Rear Shock Absorber Bolt: 59 N·m (6.0 kgf·m, 44 ft·lb)

• Install the removed parts (see appropriate chapters).

## Tie-Rod, Rocker Arm Bushing Inspection

- The bushings wear so little that the wear is difficult to measure. Instead, inspect the bushings for abrasion, color change, or other damage.
- ★ If there is any doubt as to the condition of either bushings, replace the bushing with a new one.

## Tie-Rod, Rocker Arm Sleeve Inspection

- Visually inspect the sleeves.
- ★If there is visible damage, replace the sleeve with a new one.

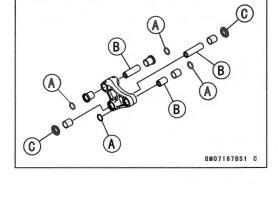
## Rocker Arm Bushing Removal

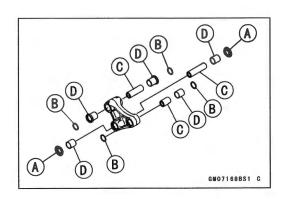
• Remove:

Rocker Arm (see Rocker Arm Removal) Grease Seals [A] O-rings [B]

Sleeves [C]

• Remove the bushings [D], using a suitable tool.





## Tie-Rod, Rocker Arm

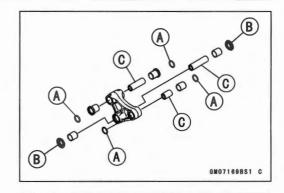
## Rocker Arm Bushing Installation

• Replace:

O-rings [A]

Grease Seals [B]

 Apply grease to the sliding surfaces of the sleeves [C], grease seals and O-rings.



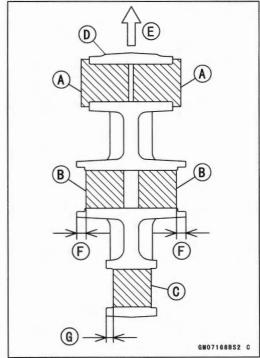
 Press the bushings [A], [B], [C] into the rocker arm [D] as shown, using a suitable tool.

Front Side [E]

5.0 mm (0.20 in.) [F]

3.5 mm (0.14 in.) [G]

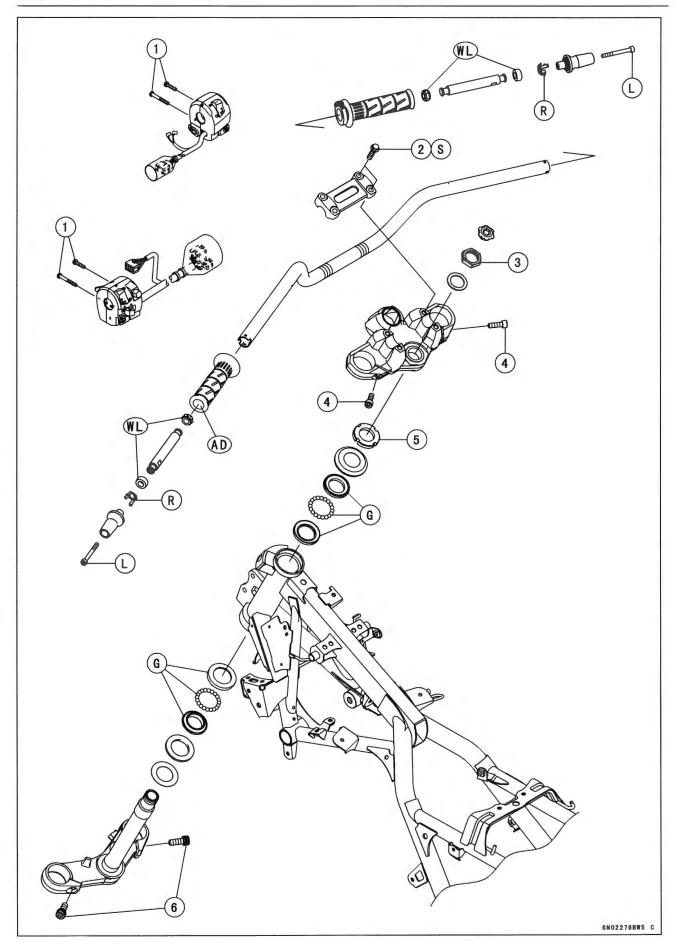
• Install the removed parts (see appropriate chapters).



# **Steering**

# **Table of Contents**

| Exploded View                     | 1  |
|-----------------------------------|----|
| Special Tools                     |    |
| Steering                          | 1  |
| Steering Inspection               |    |
| Steering Adjustment               |    |
| Steering Stem                     | 1  |
| Stem, Stem Bearing Removal        |    |
| Stem, Stem Bearing Installation   |    |
| Steering Stem Bearing Lubrication |    |
| Steering Stem Warp Inspection     | 14 |
| Handlebar                         |    |
| Handlebar Removal                 |    |
| Handlebar Installation            |    |



| No. |                              | Torque |       |          | Damada  |
|-----|------------------------------|--------|-------|----------|---------|
|     | Fastener                     | N·m    | kgf·m | ft·lb    | Remarks |
| 1   | Switch Housing Screws        | 2.5    | 0.25  | 22 in·lb |         |
| 2   | Handlebar Holder Bolts       | 25     | 2.5   | 18       | S       |
| 3   | Steering Stem Head Nut       | 54     | 5.5   | 40       |         |
| 4   | Upper Front Fork Clamp Bolts | 20     | 2.0   | 15       |         |
| 5   | Steering Stem Nut            | 4.9    | 0.50  | 43 in·lb |         |
| 6   | Lower Front Fork Clamp Bolts | 30     | 3.1   | 22       |         |

AD: Apply adhesive.

G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

S: Follow the specified tightening sequence.

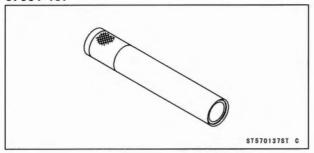
WL: Apply soap and water solution or rubber lubricant.

## **Special Tools**

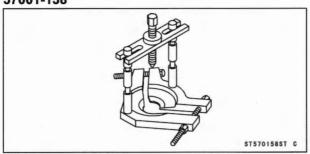
Bearing Puller Adapter: 57001-136



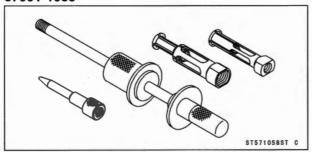
Steering Stem Bearing Driver: 57001-137



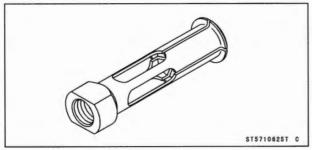
Bearing Puller: 57001-158



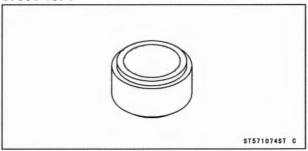
Oil Seal & Bearing Remover: 57001-1058



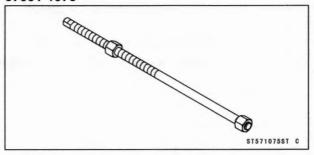
Oil Seal & Bearing Remover, Adapter B: 57001-1062



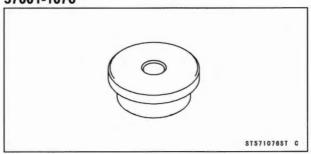
Steering Stem Bearing Driver Adapter,  $\phi$ 34.5: 57001-1074



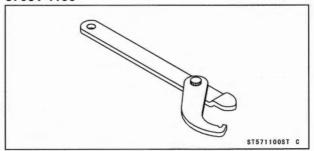
Head Pipe Outer Race Press Shaft: 57001-1075



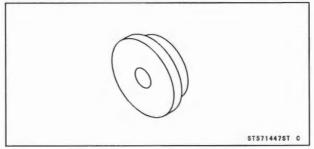
Head Pipe Outer Race Driver,  $\phi$ 51.5: 57001-1076



Steering Stem Nut Wrench: 57001-1100

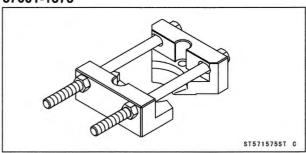


Head Pipe Outer Race Driver,  $\phi$ 47: 57001-1447

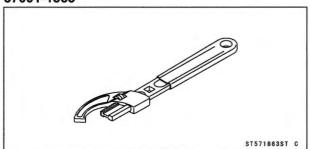


## **Special Tools**

# Bearing Puller: 57001-1575



# Adjustable Hook Wrench: 57001-1863



## 14-6 STEERING

## **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.

#### Stem, Stem Bearing Removal

• Remove:

Front Forks (see Front Fork Removal in the Suspension chapter)

Inner Cover (see Inner Cover Removal in the Frame chapter)

Handlebars (see Handlebar Removal)

Upper Harness Bracket Bolts [A]

Left Side [B]

Right Side [C]

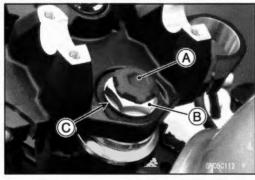




• Remove the brake hose bracket bolts [A].



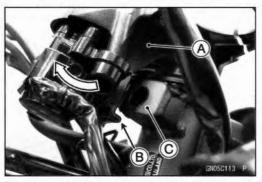
 Remove: Steering Stem Head Nut Plug [A] Steering Stem Head Nut [B] Washer [C]



Move the steering stem head [A] aside.

#### NOTE

OWhen pulling up the steering stem head, turn the steering stem head right to clear the projection [B] from the frame bracket [C].



 Pushing up the stem base, and remove the steering stem nut [A] and stem cap [B].

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

Remove:

Steering Stem [D]

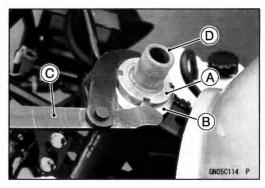
Upper Ball Bearing Inner Race and Ball Bearings

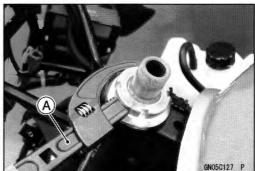
#### NOTE

OBe aware of removing the steering stem so that the stem bearing steel balls are not lost.

OYou may remove the steering stem nut using the adjustable hook wrench [A].

Special Tool - Adjustable Hook Wrench: 57001-1863





Remove the upper and lower outer races using the remover [A].

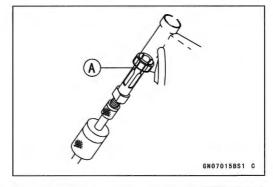
Special Tool - Oil Seal & Bearing Remover: 57001-1058
Oil Seal & Bearing Remover, Adapter B: 57001-1062

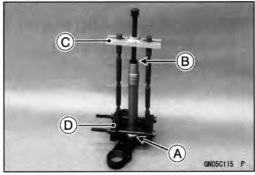
#### NOTE

Olf either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.

 Remove the lower ball bearing inner race [A] (with its oil seal) which is pressed onto the steering stem using the bearing puller and adapter.

Special Tools - Bearing Puller Adapter [B]: 57001-136
Bearing Puller [C]: 57001-158
Bearing Puller [D]: 57001-1575





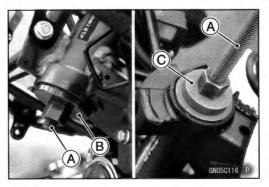
## Stem, Stem Bearing Installation

- Replace the bearing outer races with new ones.
- Drive them into the head pipe at the same time.

Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075

Head Pipe Outer Race Driver,  $\phi$ 51.5 [B]: 57001-1076

Head Pipe Outer Race Driver,  $\phi$ 47 [C]: 57001 -1447

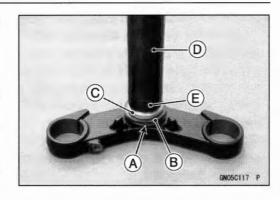


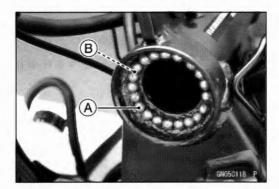
- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Install the washer [A] and oil seal [B] on the steering stem, and drive the ball bearing inner race [C] applied grease onto the stem.

Special Tools - Steering Stem Bearing Driver [D]: 57001
-137

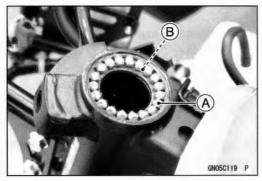
Steering Stem Bearing Driver Adapter,  $\phi$ 34.5 [E]: 57001-1074

- Apply grease to the inner races.
- Apply grease to the lower ball bearings (20) [A] and outer race [B] and install the ball bearings onto the outer race.

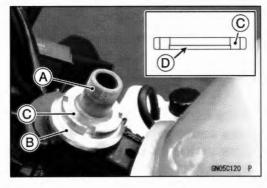




 Apply grease to the upper ball bearings (19) [A] and outer race [B], and install the ball bearings onto the outer race.



- Install the steering stem [A] carefully through the head pipe so that the steel balls on the head pipe does not fall.
- Apply grease to the upper ball bearing inner race and install it.
- Install the stem cap [B] and steering stem nut [C], and tighten it by hand.
- Olnstall the steering stem nut with stepped side [D] facing down.



- Settle the bearings in place as follows.
- OTighten the steering stem nut with 35 N·m (3.6 kgf·m, 26 ft·lb) of torque first (Pull the steering stem nut wrench [A] at the hole by 194 N (19.8 kgf) force [B] in the direction shown), and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using the steering stem nut wrench.
- OCheck that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.
- OYou may tighten the steering stem nut using the adjustable hook wrench.

Special Tool - Steering Stem Nut Wrench: 57001-1100 or Adjustable Hook Wrench: 57001-1863

Torque - Steering Stem Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb)

- Install the stem head [A].
- Install the washer [B], and tighten the stem head nut [C] temporarily.
- OInstall the stem nut with the chamfer side [D] facing up.
- Temporarily install the front forks [E] (see Front Fork Installation in the Suspension chapter).

#### NOTE

- O Tighten the lower front fork bolts loosely. Do not tighten the upper front bolts at this time.
- Tighten the stem head nut [A].
  - Torque Steering Stem Head Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)
- Reinstall the front forks (see Front Fork Installation in the Suspension chapter).
  - Torque Upper Front Fork Clamp Bolts [B]: 20 N·m (2.0 kgf·m, 15 ft·lb)
    - Lower Front Fork Clamp Bolts [C]: 30 N·m (3.1 kgf·m, 22 ft·lb)

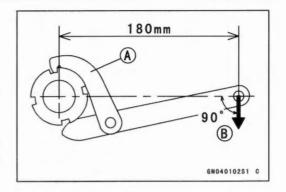
## **A** WARNING

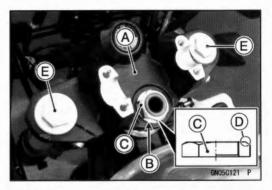
If the handlebar does not turn to the steering stop it may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

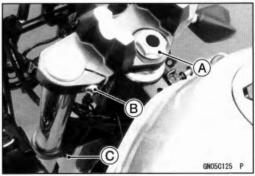
- Run the leads, wire harness and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

#### Steering Stem Bearing Lubrication

Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

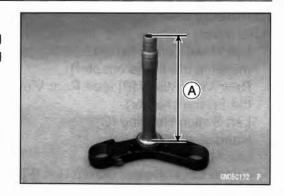






## Steering Stem Warp Inspection

- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness [A].
- ★ If the steering stem is bent, replace it with a new one.



#### 14-12 STEERING

#### Handlebar

#### Handlebar Removal

#### Remove:

Left Hand Guard [A] (KLE300A) (see Hand Guard Removal in the frame chapter)

Rear View Mirror [B] (see Rear View Mirror Removal in the Frame chapter)

Left Switch Housing [C]

Handlebar Weight [D]

Left Handlebar Grip [E]

Clutch Lever Holder Clamp Bolt [F]

Clutch Lever Assembly [G]

#### Remove:

Right Hand Guard [A] (KLE300A) (see Hand Guard Removal in the frame chapter)

Rear View Mirror [B] (see Rear View Mirror Removal in the Frame chapter)

Front Master Cylinder [C] (see Front Master Cylinder Removal in the Brakes chapter)

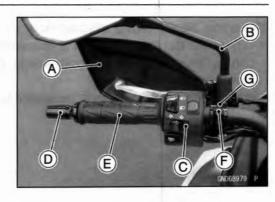
Right Switch Housing [D]

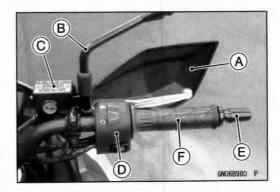
Handlebar Weight [E]

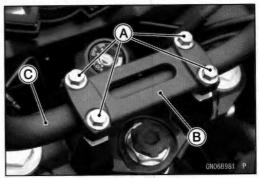
Throttle Grip [F]

#### Remove:

Handlebar Holder Bolts [A] Handlebar Holder [B] Handlebars [C]





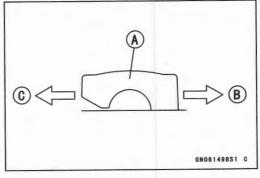


#### Handlebar Installation

 Align the punch mark [A] on the handlebars and the corner edge [B] of the steering stem head.



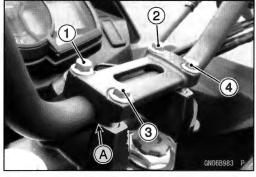
Install the handlebar holder [A] direction as shown.
 Front [B]
 Rear [C]



#### Handlebar

- Tighten the handlebar holder bolts following tightening sequence [1 ~ 4].
- OThere 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)



- Install the clutch lever holder (see Clutch Lever Holder Installation in the Clutch chapter).
- Using a high flash point solvent, clean off any oil or dirt that may be on the adhesive coating area. Dry them with a clean cloth.
- Apply adhesive cement to the handlebar, and install the left handlebar grip.
- Install the left switch housing.

OFit the projection [A] into a hole [B] in the handlebar.

• Tighten:

Torque - Switch Housing Screws: 2.5 N·m (0.25 kgf·m, 22 in·lb)

- Install the left handlebar weight.
- Install:

Throttle Grip
Throttle Cable Tips [A]
Right Switch Housing

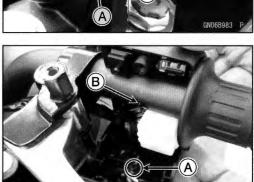
OFit the projection [B] into a hole [C] in the handlebar.

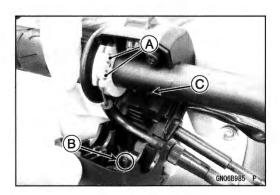
Tighten:

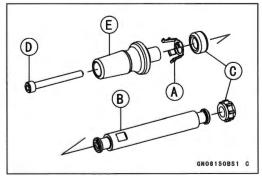
Torque - Switch Housing Screws: 2.5 N·m (0.25 kgf·m, 22 in·lb)

- Install the right handlebar weight.
- When installing the handlebar weight shaft, note the following.
- Prepare a new clamp [A] and handlebar weight shaft [B] with dampers [C].
- Apply a non-permanent locking agent to the threads of the handlebar weight bolt [D].
- Assemble:

Clamp Handlebar Weight [E] Handlebar Weight Bolt



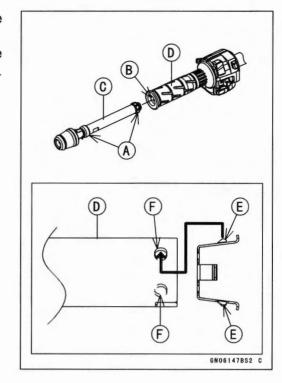




## 14-14 STEERING

#### Handlebar

- Apply soap and water solution or rubber lubricant to the handlebar dampers [A] and inside [B] of the handlebars.
- Insert the handlebar weight shaft assembly [C] into the handlebar [D] until it stops at the stoppers [E] of the clamp.
   Holes [F] of the Handlebar
- Tighten the bolt securely.



- Install:
  - Front Master Cylinder (see Front Master Cylinder Installation in the Brakes chapter)
- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust the throttle grip free play (see Throttle Control System Inspection in the Periodic Maintenance chapter).

# **Frame**

# **Table of Contents**

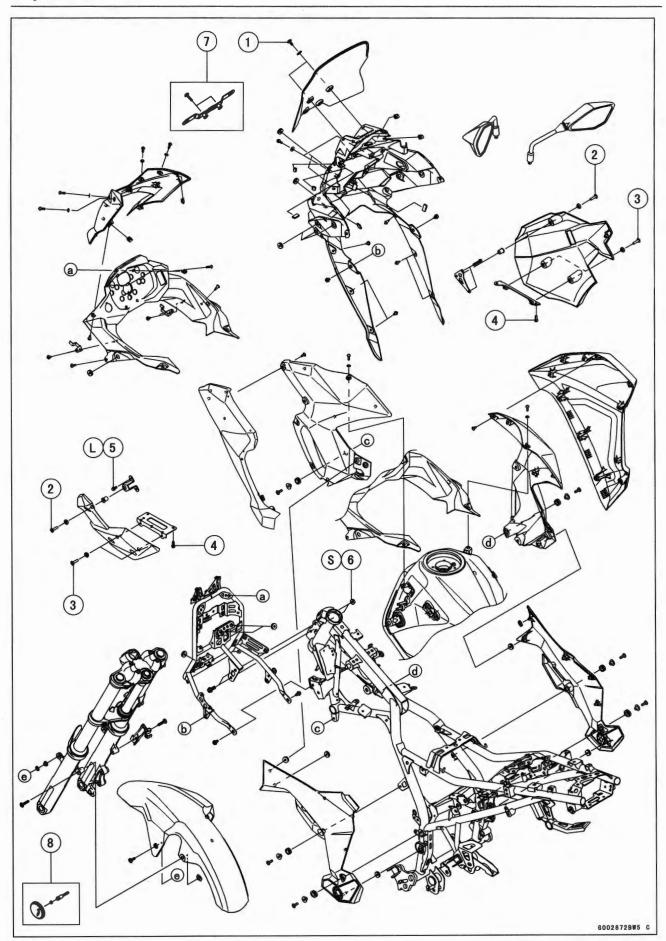
| Exploded View                       | 15-3    |
|-------------------------------------|---------|
| Seats                               | 15-10   |
| Seat Removal                        | 15-10   |
| Seat Installation                   | 15-10   |
| Fairings                            | 15-11   |
| Lower Fairing Removal               | 15-11   |
| Lower Fairing Installation          | 15-11   |
| Middle Fairing Removal              | 15-11   |
| Middle Fairing Installation         | 15-12   |
| Middle Fairing Disassembly          | 15-12   |
| Middle Fairing Assembly             | 15-12   |
| Upper Fairing Removal               | 15-13   |
| Upper Fairing Installation          | 15-13   |
| Middle Inner Fairing Removal        | 15-14   |
| Middle Inner Fairing Installation   | 15-15   |
| Inner Cover Removal                 | 15-16   |
|                                     | 15-16   |
| Inner Cover Installation            | 15-16   |
| Side Covers                         |         |
| Side Cover Removal                  | 15-18   |
| Side Cover Installation             | 15-18   |
| Seat Covers                         | 15-19   |
| Seat Cover Removal                  | 15-19   |
| Seat Cover Installation             | 15-20   |
| Fenders                             | 15-22   |
| Front Fender Removal                | 15-22   |
| Front Fender Installation           | 15-22   |
| Rear Fender Removal                 | 15-22   |
| Rear Fender Installation            | 15-23   |
| Flap Removal                        | 15-23   |
| Flap Installation                   | 15-24   |
| Flap Disassembly                    | 15-24 L |
| Flap Assembly                       | 15-24   |
| Frame                               | 15-26   |
| Frame Inspection                    | 15-26   |
| Windshield                          | 15-27   |
| Windshield Removal                  | 15-27   |
| Windshield Installation             | 15-27   |
| Guard                               | 15-28   |
| Engine Guard Removal (KLE300A)      | 15-28   |
| Engine Guard Installation (KLE300A) | 15-29   |
| Mud Guard Removal                   | 15-30   |
| Mud Guard Installation              | 15-30   |
| Guard                               | 15-31   |
| Hand Guard Removal (KLE300A)        | 15-31   |
| Hand Guard Installation (KLE300A)   | 15-31   |
| Center Stand, Side Stand            | 15-32   |
| Center Stand Removal (KLE300A)      | 15-32   |
| Center Stand Installation (KLE300A) | 15-32   |
| Side Stand Removal                  | 15-32   |
| Side Stand Installation             | 15-34   |
| SIND SIGHE HICKHICKETH              |         |

15

# **15-2 FRAME**

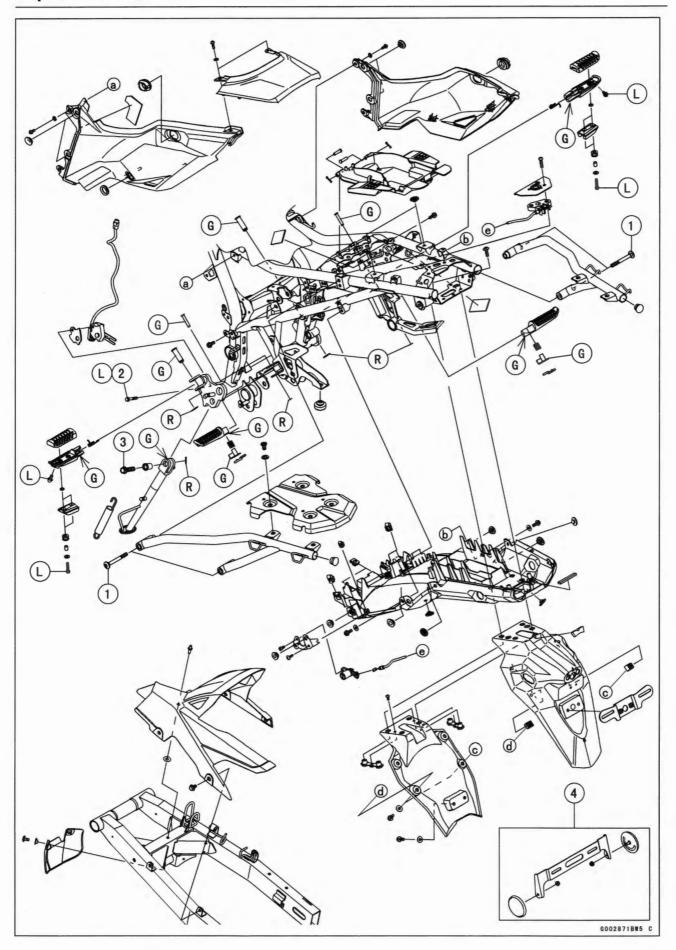
| Saddlebag                                | 15-35 |
|--|-------|
| Saddlebag Removal (KLE300A)              | 15-35 |
| Saddlebag Installation (KLE300A)         | 15-35 |
| Saddlebag Disassembly (KLE300A)          | 15-35 |
| Saddlebag Assembly (KLE300A)             | 15-35 |
| Carrier                                  | 15-36 |
| Carrier Plate Removal                    | 15-36 |
| Carrier Plate Installation               | 15-36 |
| Grab Rails                               | 15-37 |
| Grab Rail Removal                        | 15-37 |
| Grab Rail Installation                   | 15-37 |
| Saddlebag Bracket Removal (KLE300A)      | 15-37 |
| Saddlebag Bracket Installation (KLE300A) | 15-38 |
| Rear View Mirrors                        | 15-39 |
| Rear View Mirror Removal                 | 15-39 |
| Rear View Mirror Installation            | 15-39 |

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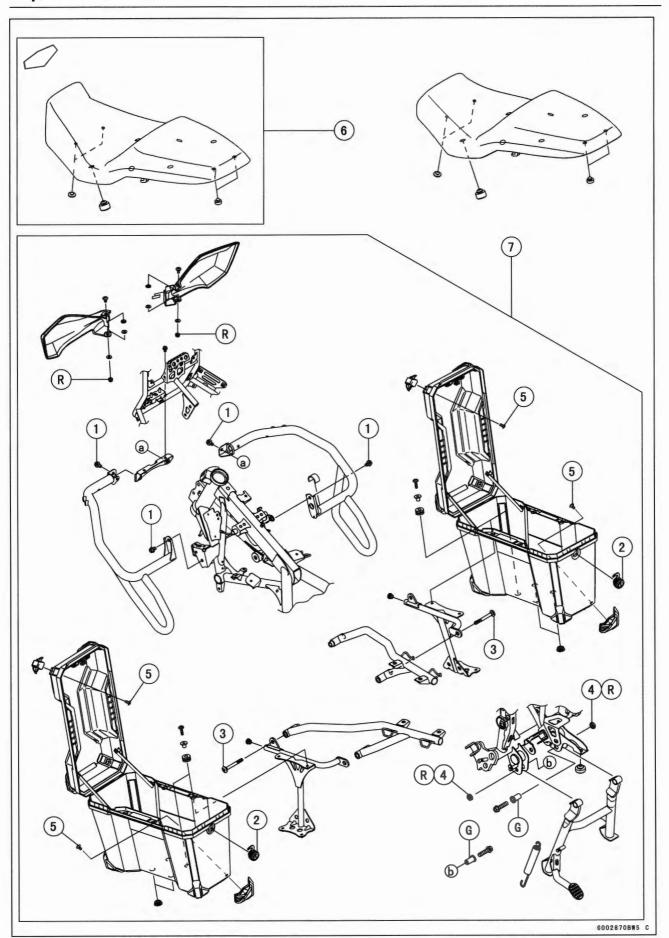
| No. | Fastener                         | Torque |       |          | D       |
|-----|----------------------------------|--------|-------|----------|---------|
|     |                                  | N·m    | kgf·m | ft·lb    | Remarks |
| 1   | Windshield Bolts                 | 3.3    | 0.34  | 29 in·lb |         |
| 2   | Lower Fairing Bolt (Upper)       | 4.4    | 0.45  | 39 in·lb |         |
| 3   | Lower Fairing Bolts (Lower)      | 8.8    | 0.90  | 78 in·lb |         |
| 4   | Lower Fairing Bracket Bolts      | 9.8    | 1.0   | 87 in·lb |         |
| 5   | Left Lower Fairing Bracket Bolts | 9.8    | 1.0   | 87 in·lb | L       |
| 6   | Upper Fairing Bracket Nuts       | 25     | 2.5   | 18       | S       |

- 7. IN Model
- 8. US, CA and CAL Models
- L: Apply a non-permanent locking agent. S: Follow the specified tightening sequence.



| No. | Fastener               | Torque |       |          | Damada  |
|-----|------------------------|--------|-------|----------|---------|
|     |                        | N·m    | kgf·m | ft·lb    | Remarks |
| 1   | Grab Rail Bolts        | 25     | 2.5   | 18       |         |
| 2   | Side Stand Switch Bolt | 8.8    | 0.90  | 78 in·lb | L       |
| 3   | Side Stand Bolt        | 44     | 4.5   | 32       |         |

- 4. US, CA, CAL, CN, AU, SEA-B1, SEA-B3 and WVTA (FULL) Models
- G: Apply grease.
- L: Apply a non-permanent locking agent.
- R: Replacement Parts



| No. | Fastener               | Torque |       |          | Damada  |
|-----|------------------------|--------|-------|----------|---------|
|     |                        | N·m    | kgf·m | ft·lb    | Remarks |
| 1   | Engine Guard Bolts     | 17     | 1.7   | 13       |         |
| 2   | Saddlebag Lock Nut     | 3.0    | 0.31  | 27 in·lb |         |
| 3   | Grab Rail Bolts        | 25     | 2.5   | 18       |         |
| 4   | Center Stand Nuts      | 44     | 4.5   | 32       | R       |
| 5   | Saddlebag Guard Screws | 1.5    | 0.15  | 13 in·lb |         |

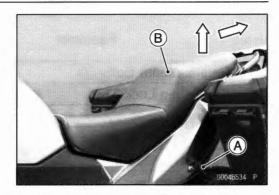
- 6. EUR Model
- 7. KLE300A
- G: Apply grease. R: Replacement Parts

## 15-10 FRAME

#### Seats

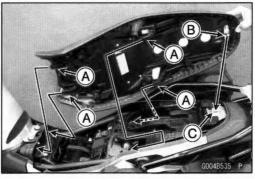
#### Seat Removal

- Insert the ignition switch key [A] into the seat lock.
- While turning the ignition switch key clockwise, pull the rear part of the seat [B] upward to clear the seat hook from the latch.
- Pull the seat rearward and clear the seat hooks, and remove it.



#### Seat Installation

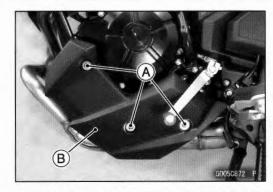
- Insert the seat hooks [A] into the brackets on the frame.
- Insert the seat hook [B] into the latch hole [C] on the frame.
- Push down the rear part of the seat until the lock clicks.



## **Fairings**

## Lower Fairing Removal

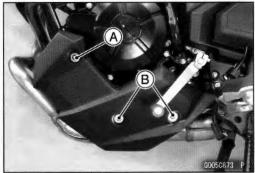
Remove: Bolts [A] and Collars Lower Fairing [B]



## Lower Fairing Installation

- Installation is the reverse of removal.
- Tighten:

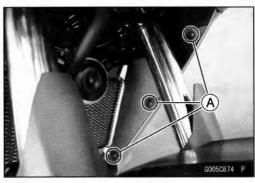
Torque - Lower Fairing Bolt (Upper) [A]: 4.4 N·m (0.45 kgf·m, 39 in·lb) Lower Fairing Bolts (Lower) [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)



## Middle Fairing Removal

• Remove:

Side Cover (see Side Cover Removal) Quick Rivets [A]



- Remove:
- Bolt [A] and Washer



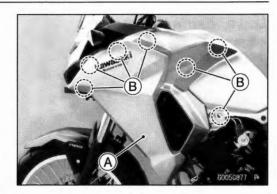
• Remove: Bolt [A] and Collar



#### **15-12 FRAME**

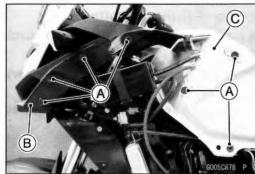
## **Fairings**

Pull the middle fairing [A] outward to clear the projections
 [B], and remove it.

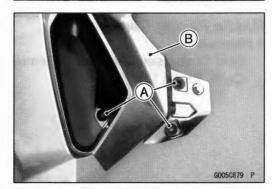


#### Middle Fairing Installation

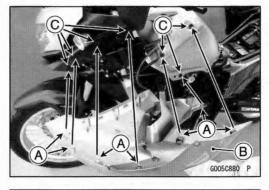
- Installation is the reverse of removal.
- Check that the grommets [A] are in place on the middle inner fairing [B] and fuel tank [C].



 Check that the grommets [A] are in place on the middle fairing [B].



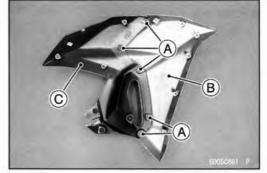
 Insert the projections [A] on the middle fairing [B] into the grommets [C] on the middle inner fairing, inner cover and fuel tank.



## Middle Fairing Disassembly

• Remove:

Middle Fairing (see Middle Fairing Removal) Screws [A] Front Middle Fairing [B] Rear Middle Fairing [C]



## Middle Fairing Assembly

Assembly is the reverse of disassembly.

## **Fairings**

## **Upper Fairing Removal**

• Remove:

Middle Fairings (see Middle Fairing Removal) Windshield (see Windshield Removal) Bolts [A]



Remove:

Bolts [A] and Washers

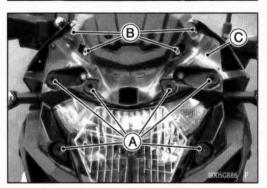
 Pull the upper fairing [B] forward to clear the projections [C], and remove it.



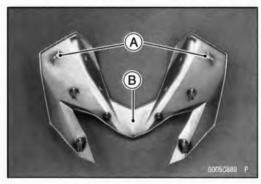
## **Upper Fairing Installation**

• Installation is the reverse of removal.

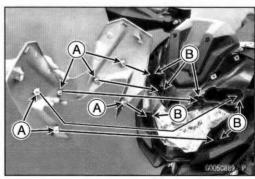
 Check that the grommets [A] and clip nuts [B] are in place on the middle inner fairing [C].



 Check that the clip nuts [A] are in place on the upper fairing [B].



 Insert the projections [A] on the upper fairing into the grommets [B] of the middle inner fairing.

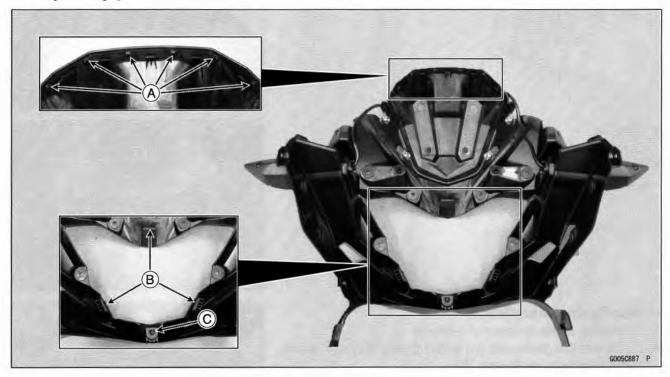


## **15-14 FRAME**

## **Fairings**

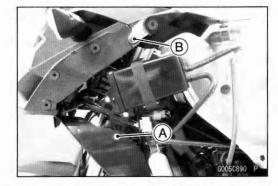
## Middle Inner Fairing Removal

Hooks [A] Tabs [B] Projection [C]



#### • Remove:

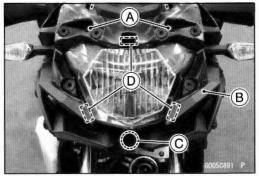
Upper Fairing (see Upper Fairing Removal)
Bolt [A] (Both Sides)
Quick Rivet [B] (Both Sides)



#### • Remove:

Bolts [A]

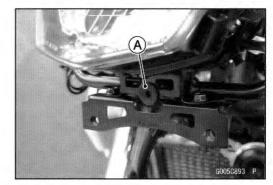
Pull the middle inner fairing [B] forward to clear the projection [C] and tabs [D], and remove it.



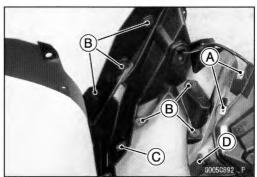
#### **Fairings**

#### Middle Inner Fairing Installation

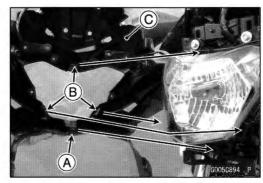
- Installation is the reverse of removal.
- Check that the grommet [A] is in place on the fairing bracket.



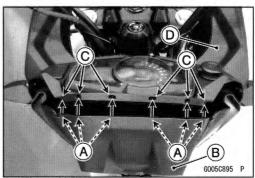
- Check that the clip nuts [A], grommets [B] and damper [C] are in place on the middle inner fairing (both sides).
- Check that the damper [D] is in place on the middle inner fairing.



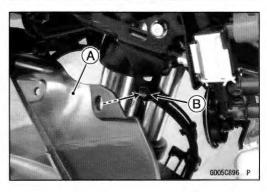
 Insert the projection [A] and tabs [B] on the middle inner fairing [C] into the grommets.



 Insert the hooks [A] on the middle inner fairing [B] into the holes [C] of the inner cover [D].



Insert the hole on the middle inner fairing [A] onto the tab
 [B] (both sides).



#### **Fairings**

#### Inner Cover Removal

Remove:

Meter Unit (see Meter Unit Removal in the Electrical System chapter)

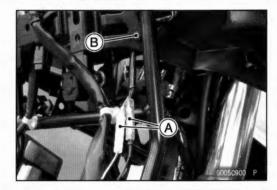
Disconnect:

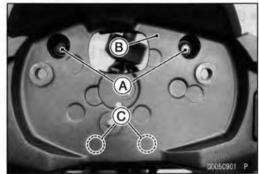
Connectors [A]

Remove: Clamp [B]



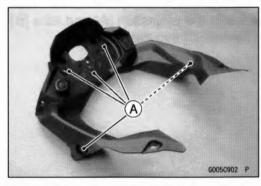
 Pull the inner cover [B] rearward to clear the projections [C], and remove it.



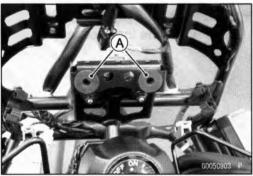


#### Inner Cover Installation

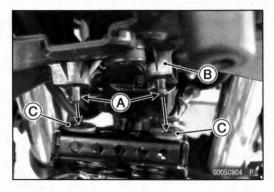
- Installation is the reverse of removal.
- Check that the grommets [A] are in place on the inner cover.



 Check that the grommets [A] are in place on the fairing bracket.

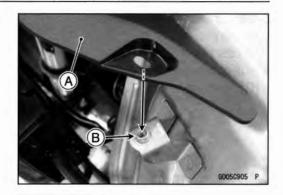


 Insert the projections [A] on the inner cover [B] into the grommets [C] on the fairing bracket.



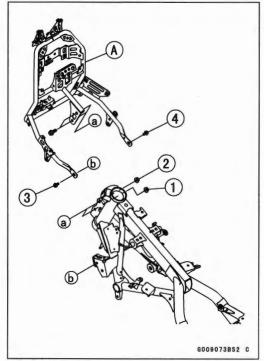
# **Fairings**

• Insert the hole on the inner cover [A] onto the tab [B] (both sides).



 When removing the upper fairing bracket [A], install it and tighten the upper fairing bracket nuts and bolts following specified sequence [1 ~ 4].

Torque - Upper Fairing Bracket Nuts: 25 N·m (2.5 kgf·m, 18 ft·lb)

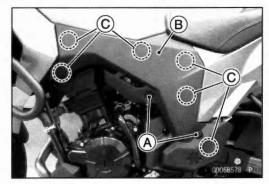


#### **15-18 FRAME**

#### **Side Covers**

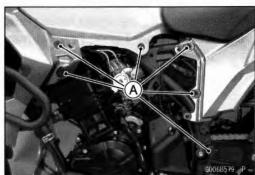
#### Side Cover Removal

- Remove:
  - Bolts [A]
- Pull out the side cover [B] outward to clear the projections [C], and remove it.

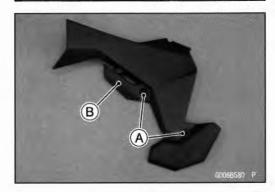


#### Side Cover Installation

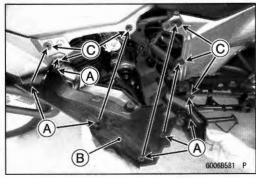
- Installation is the reverse of removal.
- Check that the grommets [A] are in place on the middle fairing, fuel tank, side seat cover and frame.



 Check that the grommets [A] are in place on the side cover [B].



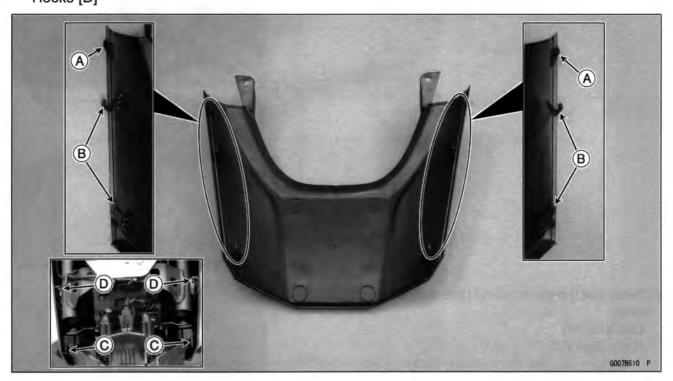
 Insert the projections [A] on the side cover [B] into the grommets [C].



#### **Seat Covers**

#### Seat Cover Removal

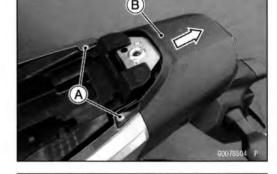
Tabs [A] Hooks [B] Slits [C] Hooks [D]



#### • Remove:

Seat (see Seat Removal)
Side Cover (see Side Cover Removal)
Grab Rail (see Grab Rail Removal)
Bolts [A] and Washers

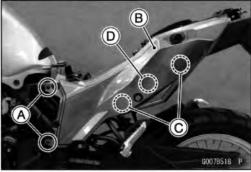
• Slide the center seat cover [B] rearward to remove it.



#### • Remove:

Bolts [A] and Washers

Pull out the side seat cover [B] outward to clear the projections [C], [D] (left side only), and remove it.



#### **15-20 FRAME**

#### **Seat Covers**

#### Seat Cover Installation

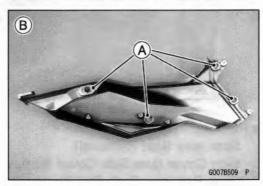
- Installation is the reverse of removal.
- Check that the grommets [A] are in place on the frame.
   Left Side [B]
   Right Side [C]

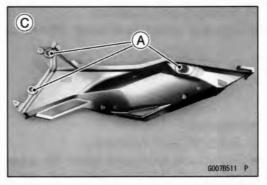




 Check that the grommets [A] are in place on the side seat cover.

Left Side [B] Right Side [C]



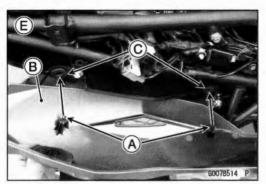


#### **Seat Covers**

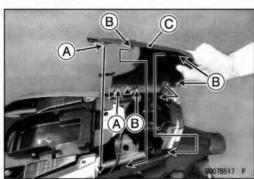
Right Side [E]

 Insert the projections [A] on the side seat cover [B] into the grommets [C].
 Left Side [D]

D B B



Insert the tabs [A] and hooks [B] on the center seat cover
 [C] into the rear fender.



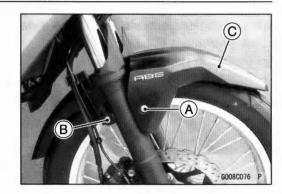
#### **15-22 FRAME**

#### **Fenders**

#### Front Fender Removal

Remove:

Bolt [A], Washers and Collar (Both Sides)
Bolt [B] (Both Sides)
Front Fender [C]



#### Front Fender Installation

• Installation is the reverse of removal.

#### Rear Fender Removal

• Remove:

Flap (see Flap Removal)

Side Seat Covers (see Seat Cover Removal)

Tool

Battery (see Battery Removal in the Electrical System chapter)

Relay Box (see Relay Box Removal in the Electrical System chapter)

ECU (see ECU Removal in the Fuel System (DFI) chapter)

Screws [A]

Clamp [B]

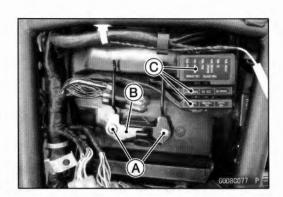
Fuse Boxes [C]

#### Remove:

Clamp [A]

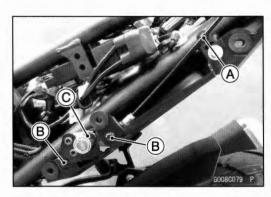
Screws [B]

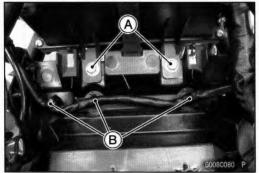
Seat Lock [C]





Bolts [A] and Washers Clamps [B]

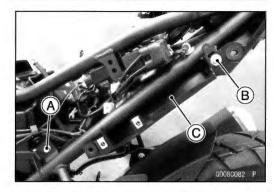




#### **Fenders**

Remove:

Bolt [A] (Both Sides)
Bolt [B] and Washer (Both Sides)
Rear Fender [C]



#### Rear Fender Installation

- Installation is the reverse of removal.
- Check that the following parts are in place on the rear fender.

Clip Nuts [A]

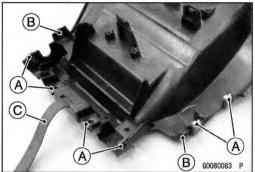
Grommets [B]

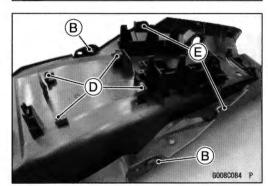
Band [C]

Dampers [D]

Dampers [E]

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





#### Flap Removal

Remove:

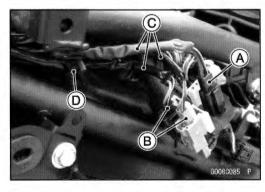
Right Side Seat Cover (see Seat Cover Removal)
Tail/Brake Light Unit (see Tail/Brake Light Unit Removal
in the Electrical System chapter)

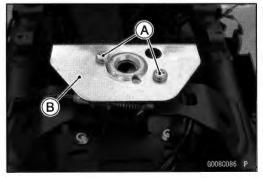
• Disconnect:

License Plate Light Lead Connector [A] Turn Signal Light Lead Connectors [B]

- Clear the license plate light and turn signal light leads [C] from the guide [D].
- Remove:

Seat Lock Guard Screws [A] Seat Lock Guard [B]

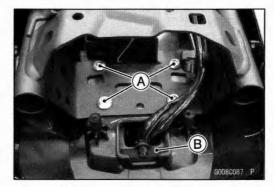




#### **15-24 FRAME**

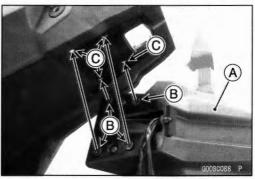
#### **Fenders**

- Remove: Bolts [A]
- Remove the flap [B] with an assembly.



#### Flap Installation

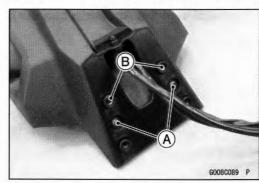
- Installation is the reverse of removal.
- Install the flap [A] so that the projections [B] fit into the holes [C] on the rear fender.
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



#### Flap Disassembly

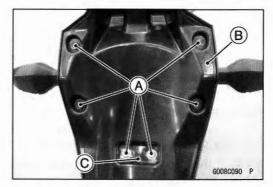
• Remove:

Flap (see Flap Removal) Bolts [A] Brackets [B]



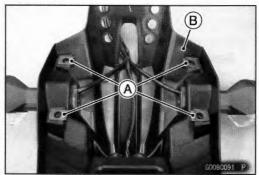
#### Remove:

Bolts [A] and Washers License Plate Bracket Cover [B] Flap [C]



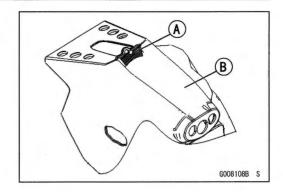
#### Flap Assembly

- Assembly is the reverse of disassembly.
- Check that the clip nuts [A] are in place on the flap [B].



#### **Fenders**

- Check that the pad [A] is in place on the flap [B].
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



#### **15-26 FRAME**

#### **Frame**

#### Frame Inspection

- Visually inspect the frame for cracks, dents, bending or warp.
- ★ If there is any damage to the frame, replace it.

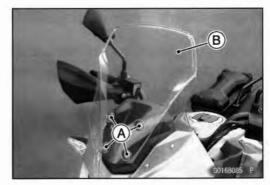
#### **A** WARNING

A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

#### Windshield

#### Windshield Removal

 Remove: Bolts [A] and Washers Windshield [B]



#### Windshield Installation

- Installation is the reverse of removal.
- Tighten:

Torque - Windshield Bolts [A]: 3.3 N·m (0.34 kgf·m, 29 in·lb)



#### **15-28 FRAME**

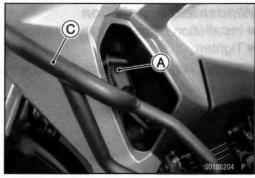
#### Guard

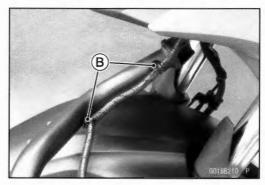
# Engine Guard Removal (KLE300A)

• Remove:

Fog Light (see Fog Light Removal in the Electrical System chapter)
Engine Guard Bolts [A]
Clamps [B]
Engine Guard [C]





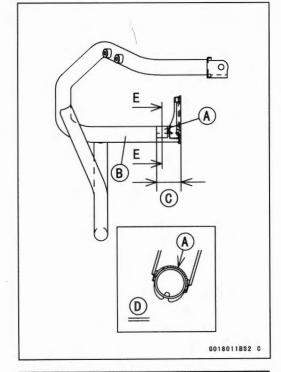


#### Guard

#### Engine Guard Installation (KLE300A)

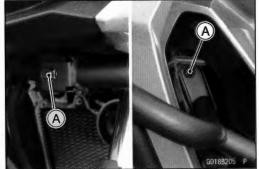
- Installation is the reverse of removal.
- Check that the pad [A] is in place on the engine guard [B] as shown (right side only).

40 mm (1.6 in.) [C] Section E-E [D]



• Tighten:

Torque - Engine Guard Bolts [A]: 17 N·m (1.7 kgf·m, 13 ft·lb)



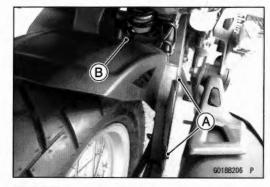
#### 15-30 FRAME

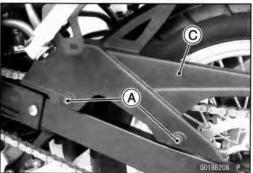
#### Guard

#### **Mud Guard Removal**

• Remove:

Bolts [A] Quick Rivet [B] Mud Guard [C]





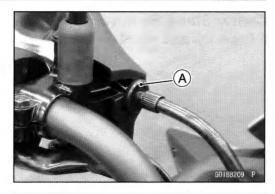
#### **Mud Guard Installation**

• Installation is the reverse of removal.

#### Guard

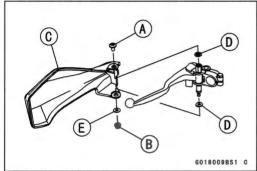
#### Hand Guard Removal (KLE300A)

• Loosen the locknut [A] (left side only).



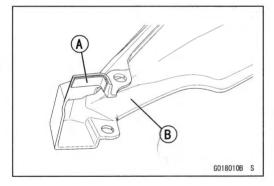
#### • Remove:

Hand Guard Bolt [A] Hand Guard Nut [B] Hand Guard [C] Collars [D] Washer [E]



#### Hand Guard Installation (KLE300A)

- Installation is the reverse of removal.
- Replace the hand guard nut with a new one.
- Check that the damper [A] is in place on the hand guard [B] (right side only).

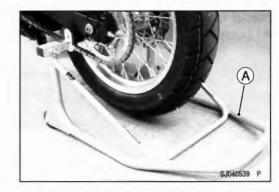


#### **15-32 FRAME**

# Center Stand, Side Stand

#### Center Stand Removal (KLE300A)

• Raise the rear wheel off the ground using a stand [A].



#### • Remove:

Spring Assy [A]
Center Stand Nut [B] (Both Sides)
Center Stand Bolt [C] (Both Sides)
Collar [D] (Both Sides)
Center Stand [E]



# G0208220 P

# Center Stand Installation (KLE300A)

• Check that the damper [A] is in place on the frame.



#### Center Stand, Side Stand

- Replace the center stand nuts [A] with new ones.
- Apply grease to the sliding area [B] of the center stand [C].
- Install:

Center Stand

Collars [D]

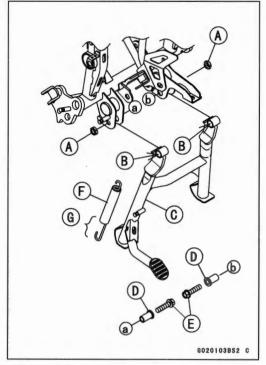
Center Stand Bolts [E] and Nuts

• Tighten:

Torque - Center Stand Nuts: 44 N·m (4.5 kgf·m, 32 ft·lb)

 Hook the spring assy [F] so that the long spring end [G] faces downward.

Olnstall the spring hook direction as shown.



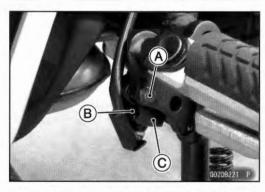
#### Side Stand Removal

• Raise the rear wheel off the ground using a stand [A].



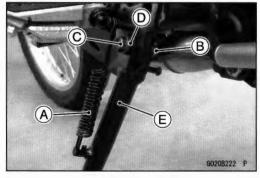
Remove:

Side Stand Switch Bolt [A] Side Stand Switch [B] Plate [C]



Remove:

Spring Assy [A]
Cotter Pin [B]
Side Stand Bolt [C]
Collar [D]
Side Stand [E]



#### Center Stand, Side Stand

#### Side Stand Installation

- Apply grease to the sliding area [A] of the side stand [B].
- Install:

Side Stand

Collar [C]

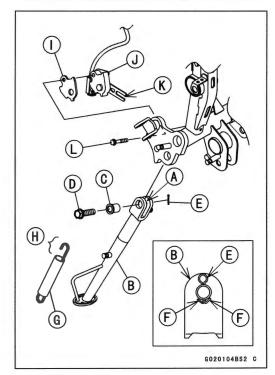
Side Stand Bolt [D]

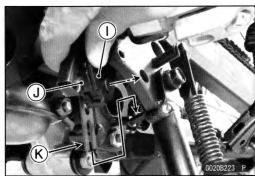
• Tighten:

#### Torque - Side Stand Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)

- Replace the cotter pin [E] with a new one.
- Insert the cotter pin into the side stand bolt and bend the pin ends [F].
- Hook the spring assy [G] so that the long spring end [H] faces upward.
- Olnstall the spring assy hook direction as shown.
- Install the plate [I] and side stand switch [J].
- Olnsert the side stand switch arm [K] to the pin on the side stand.
- Apply a non-permanent locking agent to the threads of the side stand switch bolt [L], and tighten it.

Torque - Side Stand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

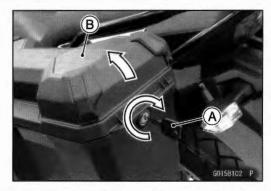




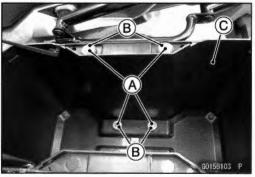
#### Saddlebag

#### Saddlebag Removal (KLE300A)

- Insert the ignition switch key [A] into the saddlebag lid
- Turn the ignition switch key clockwise, and open the saddlebag lid [B] while pulling the lid downward.



Remove: Bolts [A] Collars [B] Saddlebag Assy [C]



#### Saddlebag Installation (KLE300A)

Installation is the reverse of removal.

#### Saddlebag Disassembly (KLE300A)

Remove:

Saddlebag Guard Screws [A]

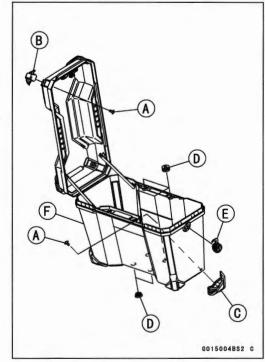
Upper Guards [B]

Lower Guards [C]

Dampers [D]

Saddlebag Lock [E]

Saddlebag [F]



#### Saddlebag Assembly (KLE300A)

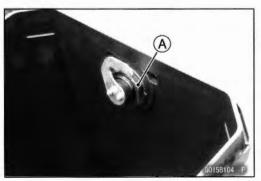
- Assembly is the reverse of disassembly.
- Tighten:

Torque - Saddlebag Lock Nut [A]: 3.0 N·m (0.31 kgf·m, 27

in·lb)

Saddlebag Guard Screws: 1.5 N·m (0.15 kgf·m, 13

in·lb)

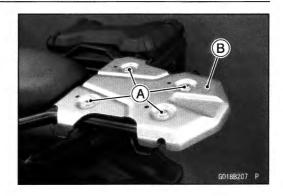


#### **15-36 FRAME**

#### Carrier

#### Carrier Plate Removal

Remove: Bolts [A] and Washers Carrier Plate [B]



#### **Carrier Plate Installation**

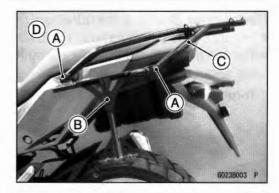
• Installation is the reverse of removal.

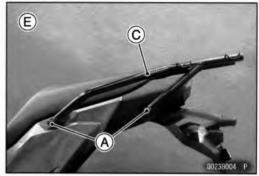
#### **Grab Rails**

#### Grab Rail Removal

Remove:

Carrier Plate (see Carrier Plate Removal)
Saddlebag (KLE300A) (see Saddlebag Removal)
Bolts [A]
Saddlebag Bracket [B] (KLE300A)
Grab Rail [C]
KLE300A [D]
KLE300B/C [E]



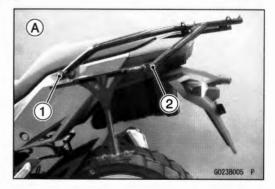


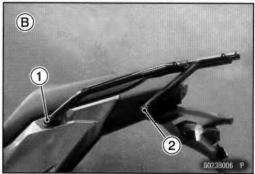
#### Grab Rail Installation

- Installation is the reverse of removal.
- Tighten the grab rail bolts following the specified tightening sequence [1 ~ 2].

KLE300A [A] KLE300B/C [B]

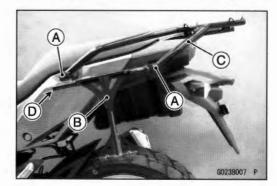
Torque - Grab Rail Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)





# Saddlebag Bracket Removal (KLE300A) ● Remove:

Carrier Plate (see Carrier Plate Removal)
Saddlebag (see Saddlebag Removal)
Bolts [A]
Saddlebag Bracket [B]
Grab Rail [C]
Plug [D]



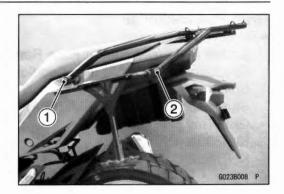
#### 15-38 FRAME

# **Grab Rails**

#### Saddlebag Bracket Installation (KLE300A)

- Installation is the reverse of removal.
- Tighten the grab rail bolts following the specified tightening sequence [1 ~ 2].

Torque - Grab Rail Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



#### **Rear View Mirrors**

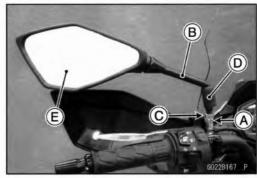
#### Rear View Mirror Removal

- Slide out the dust cover [A].
- Loosen the lower hexagonal area [B], and remove the rear view mirror [C] from the holder.
- OThe upper hexagonal area has left-hand threads.



#### Rear View Mirror Installation

- Screw the lower hexagonal area [A] of the rear view mirror into the holder all the way, and tighten the lower hexagonal area securely.
- Turn the stay [B] to assure the safe conditions of the rear with the rider sitting on the motorcycle by loosening the upper hexagonal area [C] clockwise.
- OThe upper hexagonal area has left-hand threads.
- While holding the lower hexagonal area, tighten the upper hexagonal area (locknut).
- Install the dust cover [D].
- Adjust the rear view mirror [E] by slightly moving only the mirror portion of the assembly.
- OInstallation and adjustment of the right side mirror is common with the left side. Follow the procedure specified for the left side.



# **Electrical System**

# **Table of Contents**

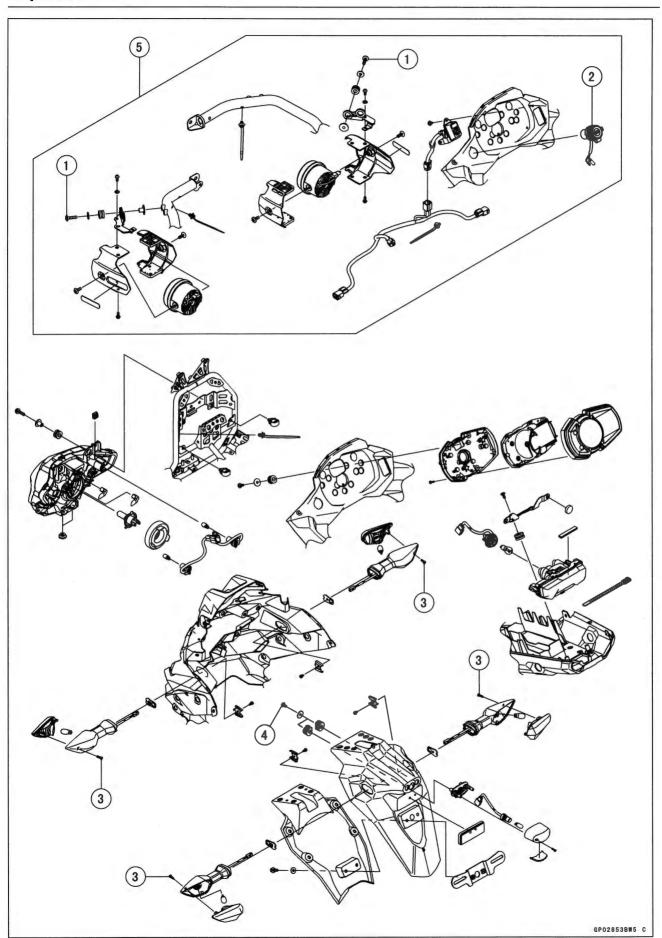
| Exploded View                              | 16-3               |
|--|--------------------|
| Specifications                             | 16-10              |
| Special Tools and Sealant                  | 16-11              |
| Parts Location                             | 16-12              |
| Wiring Diagram                             | 16-14              |
| Wiring Diagram (ABS Equipped Models)       | 16-16              |
| Precautions                                | 16-18              |
| Electrical Wiring                          | 16-19              |
| Wiring Inspection                          | 16-19              |
| Battery                                    | 16-20              |
| Battery Removal                            | 16-20              |
| Battery Installation                       | 16-20              |
| Battery Activation                         | 16-20              |
| Precautions                                | 16-23              |
| Interchange                                | 16-24              |
| Charging Condition Inspection              | 16-24              |
| · ·  | 16-24              |
| Refreshing Charge                          |                    |
| Charging System                            | 16-26              |
| Alternator Cover Removal                   | 16-26              |
| Alternator Cover Installation              | 16-27              |
| Stator Coil Removal                        | 16-28              |
| Stator Coil Installation                   | 16-28              |
| Alternator Rotor Removal                   | 16-28              |
| Alternator Rotor Installation              | 16-29              |
| Charging Voltage Inspection                | 16-31              |
| Alternator Inspection                      | 16-31              |
| Regulator/Rectifier Removal                | 16-33              |
| Regulator/Rectifier Installation           | 16-33              |
| Regulator/Rectifier Inspection             | 16-33              |
| Ignition System                            | 16-36              |
| Crankshaft Sensor Removal                  | 16-36_             |
| Crankshaft Sensor Installation             | 16-36              |
| Crankshaft Sensor Inspection               | 16-36 <sup>L</sup> |
| Crankshaft Sensor Peak Voltage Inspection  | 16-37              |
| Stick Coil Removal                         | 16-37              |
| Stick Coil Installation                    | 16-38              |
| Stick Coil Inspection                      | 16-38              |
| Stick Coil Primary Peak Voltage Inspection | 16-38              |
| Spark Plug Removal                         | 16-39              |
| Spark Plug Installation                    | 16-39              |
| Spark Plug Condition Inspection            | 16-39              |
| · · · · · · · · · · · · · · · · · · ·      | 16-40              |
| Interlock Operation Inspection             |                    |
| IC Igniter Inspection                      | 16-41              |
| Electric Starter System                    | 16-44              |
| Starter Motor Removal                      | 16-44              |
| Starter Motor Installation                 | 16-44              |
| Starter Motor Disassembly                  | 16-45              |
| Starter Motor Assembly                     | 16-46              |
| Brush Inspection                           | 16-47              |
| Commutator Cleaning and Inspection         | 16-48              |

16

# **16-2 ELECTRICAL SYSTEM**

| Armature Inspection                                   | 16-48 |
|---|-------|
| Brush Lead Inspection                                 | 16-48 |
| End Cover Inspection                                  | 16-48 |
| Starter Relay Inspection                              | 16-49 |
| Lighting System                                       | 16-51 |
| Headlight Beam Horizontal Adjustment                  | 16-51 |
| Headlight Beam Vertical Adjustment                    | 16-51 |
| Headlight Bulb Replacement                            | 16-51 |
| Headlight Removal/Installation                        | 16-52 |
| Fog Light Removal/Installation (KLE300A)              | 16-53 |
| Fog Light Harness Circuit Inspection                  | 16-54 |
| City Light Bulb Replacement                           | 16-54 |
| Tail/Brake Light Bulb Replacement                     | 16-55 |
| Tail/Brake Light Removal                              | 16-56 |
| Tail/Brake Light Installation                         | 16-56 |
| License Plate Light Bulb Replacement                  | 16-56 |
| Turn Signal Light Bulb Replacement                    | 16-58 |
| Turn Signal Relay Inspection                          | 16-58 |
| Air Switching Valve                                   | 16-61 |
| Air Switching Valve Operation Test                    | 16-61 |
| Air Switching Valve Unit Test                         | 16-61 |
| Radiator Fan System                                   | 16-63 |
| Fan Motor Inspection                                  | 16-63 |
| Meter, Gauge, Indicator Unit                          | 16-64 |
| Meter Unit Removal                                    | 16-64 |
| Meter Unit Installation                               | 16-64 |
| Meter Unit Disassembly/Assembly                       | 16-64 |
| Meter Operation Inspection                            | 16-65 |
| Meter System Inspection                               | 16-66 |
| Meter Unit Inspection                                 | 16-67 |
| Fuel Level Sensor Line Self-Diagnosis Mode Inspection | 16-74 |
| Switches and Sensors                                  | 16-77 |
| Brake Light Timing Inspection                         | 16-77 |
| Brake Light Timing Adjustment                         | 16-77 |
| Switch Inspection                                     | 16-77 |
| Water Temperature Sensor Inspection                   | 16-78 |
| Rear Wheel Rotation Sensor Removal                    | 16-78 |
| Rear Wheel Rotation Sensor Installation               | 16-78 |
| Rear Wheel Rotation Sensor Inspection                 | 16-78 |
| Oxygen Sensor Removal                                 | 16-78 |
| Oxygen Sensor Installation                            | 16-79 |
| Oxygen Sensor Inspection                              | 16-79 |
| Fuel Level Sensor Inspection                          | 16-79 |
| Gear Position Sensor Removal                          | 16-80 |
| Gear Position Sensor Installation                     | 16-80 |
| Accessory Socket Removal/Installation (KLE300A)       | 16-81 |
| Accessory Relay Inspection (KLE300A)                  | 16-81 |
| Relay Box   | 16-83 |
| Relay Box Removal                                     | 16-83 |
| Relay Box Installation                                | 16-83 |
| Relay Circuit Inspection                              | 16-83 |
| Diode Circuit Inspection                              | 16-84 |
| Fuse  | 16-86 |
| 30 A Main Fuse Removal                                | 16-86 |
| Fuse Box Fuse Removal                                 | 16-86 |
| Fuse Installation                                     | 16-86 |
| Fund Industrials                                      | 40.07 |

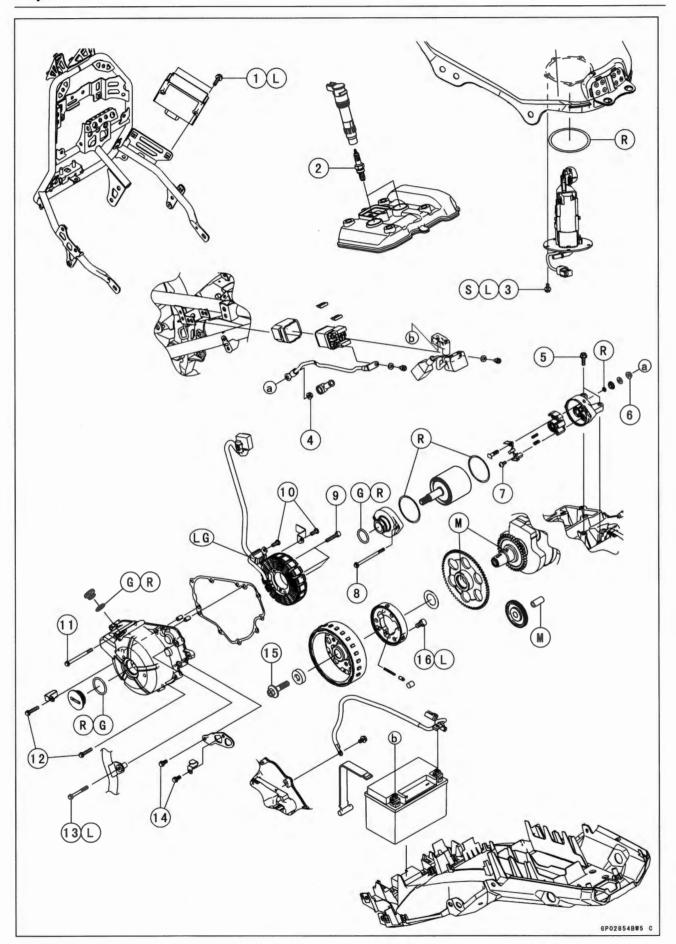
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# **ELECTRICAL SYSTEM 16-5**

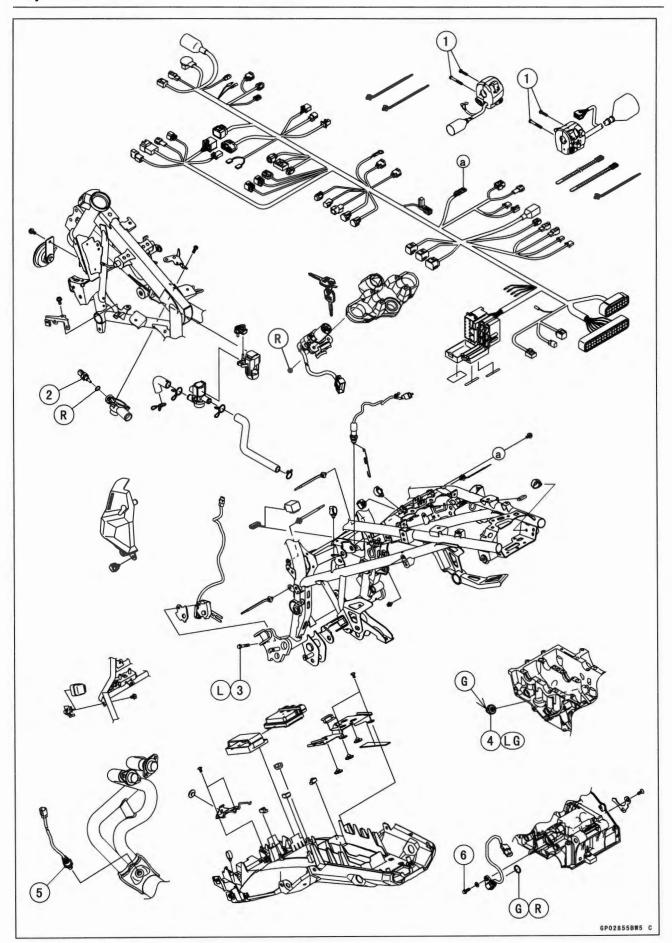
| No. | Fastener                      | Torque |       |           | Damada  |
|-----|-------------------------------|--------|-------|-----------|---------|
|     |                               | N·m    | kgf·m | ft·lb     | Remarks |
| 1   | Fog Light Mounting Bolts      | 9.8    | 1.0   | 87 in·lb  |         |
| 2   | Accessory Socket Ring Nut     | 2.8    | 0.29  | 25 in·lb  |         |
| 3   | Turn Signal Light Lens Screws | 1.0    | 0.10  | 8.9 in·lb |         |
| 4   | License Plate Light Screws    | 1.2    | 0.12  | 11 in·lb  |         |

<sup>5.</sup> KLE300A



|     | Fastener                                    |       | Torque |           |         |
|-----|---|-------|--------|-----------|---------|
| No. |   | N·m   | kgf·m  | ft·lb     | Remarks |
| 1   | Regulator/Rectifier Bolts                   | 9.8   | 1.0    | 87 in·lb  | L       |
| 2   | Spark Plugs                                 | 13    | 1.3    | 115 in·lb |         |
| 3   | Fuel Pump Bolts                             | 9.8   | 1.0    | 87 in·lb  | L, S    |
| 4   | Starter Motor Cable Terminal Nut            | 9.8   | 1.0    | 87 in·lb  |         |
| 5   | Starter Motor Mounting Bolts                | 9.8   | 1.0    | 87 in·lb  |         |
| 6   | Starter Motor Terminal Locknut              | 11    | 1.1    | 97 in·lb  |         |
| 7   | Starter Motor Brush Holder Screw            | 3.8   | 0.39   | 34 in·lb  |         |
| 8   | Starter Motor Through Bolts                 | 5.0   | 0.51   | 44 in·lb  |         |
| 9   | Stator Coil Bolts                           | 12    | 1.2    | 106 in·lb |         |
| 10  | Crankshaft Sensor Screws                    | 5.2   | 0.53   | 46 in·lb  |         |
| 11  | Alternator Cover Bolts, L = 75 mm (3.0 in.) | 9.8   | 1.0    | 87 in·lb  |         |
| 12  | Alternator Cover Bolts, L = 30 mm (1.2 in.) | 9.8   | 1.0    | 87 in·lb  |         |
| 13  | Alternator Cover Bolts, L = 50 mm (2.0 in.) | 9.8   | 1.0    | 87 in·lb  | L       |
| 14  | Chain Guide Bolts                           | 9.8   | 1.0    | 87 in·lb  |         |
| 15  | Alternator Rotor Bolt                       | 107.8 | 10.99  | 79.51     |         |
| 16  | Starter Motor Clutch Bolts                  | 34.3  | 3.50   | 25.3      | L       |

G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
R: Replacement Parts



| No. | Fastener                  | Torque |       |           | D       |
|-----|---------------------------|--------|-------|-----------|---------|
|     |                           | N·m    | kgf·m | ft·lb     | Remarks |
| 1   | Switch Housing Screws     | 2.5    | 0.25  | 22 in·lb  |         |
| 2   | Water Temperature Sensor  | 12     | 1.2   | 106 in·lb |         |
| 3   | Side Stand Switch Bolt    | 8.8    | 0.90  | 78 in·lb  | L       |
| 4   | Oil Pressure Switch       | 15     | 1.5   | 11        | LG      |
| 5   | Oxygen Sensor             | 44.1   | 4.50  | 32.5      |         |
| 6   | Gear Position Sensor Bolt | 9.8    | 1.0   | 87 in·lb  |         |

G: Apply grease.

L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
R: Replacement Parts

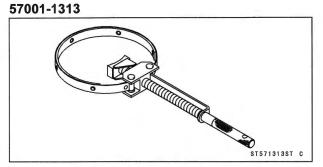
# **16-10 ELECTRICAL SYSTEM**

# Specifications

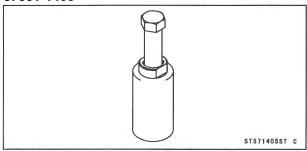
| Item                                   | Standard  |  |  |
|--|---|--|--|
| Battery                                |   |  |  |
| Туре                                   | Sealed Battery                                      |  |  |
|  | FTX9-BS   |  |  |
| Model Name                             | (CO) YTX9-BS  |  |  |
| Capacity                               | 12 V 8 Ah (10 HR)                                   |  |  |
| Voltage                                | 12.6 V or more<br>(CO) 12.8 V or more               |  |  |
| Gross Weight                           | 3 kg (6.6 lb)                                       |  |  |
| Electrolyte Volume                     | 0.41 L (25 cu in.)                                  |  |  |
| Charging System                        |   |  |  |
| Туре                                   | Three-phase AC                                      |  |  |
| Alternator Output Voltage              | 35 V or more at 4 000 r/min (rpm)                   |  |  |
| Stator Coil Resistance                 | 0.05 ~ 0.6 Ω @20°C (68°F)                           |  |  |
| Charging Voltage                       | 14.5 ~ 14.9 V @25°C (77°F)                          |  |  |
| (Regulator/Rectifier Output Voltage)   |   |  |  |
| Ignition System                        |   |  |  |
| Crankshaft Sensor Resistance           | 180 ~ 280 Ω   |  |  |
| Crankshaft Sensor Peak Voltage         | 5 V or more   |  |  |
| Stick Coil:                            |   |  |  |
| Primary Winding Resistance             | 1.11 ~ 1.50 Ω @20°C (68°F)                          |  |  |
| Secondary Winding Resistance           | 6.4 ~ 9.6 kΩ @20°C (68°F)                           |  |  |
| Primary Peak Voltage                   | 125 V or more                                       |  |  |
| Spark Plug:                            |   |  |  |
| Туре                                   | NGK CR8E  |  |  |
| 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: 6.5 mm (0.26 in.)) |  |  |
| Air Switching Valve                    |   |  |  |
| Resistance                             | 20 ~ 24 Ω @20°C (68°F)                              |  |  |
| Switches and Sensors                   |   |  |  |
| Rear Brake Light Switch Timing         | ON after about 10 mm (0.39 in.) of pedal travel     |  |  |
| Engine Oil Pressure Switch Connections | When engine is stopped: ON                          |  |  |
|  | When engine is running: OFF                         |  |  |
| Water Temperature Sensor Resistance    | In the text   |  |  |
| Fuel Level Sensor Resistance:          |   |  |  |
| Full Position                          | 9.6 ~ 12.4 Ω  |  |  |
| Empty Position                         | 222 ~ 228 Ω   |  |  |

# **Special Tools and Sealant**

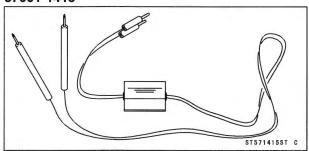
Flywheel Holder:



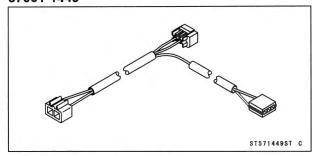
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405



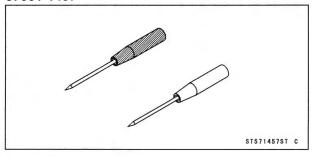
Peak Voltage Adapter: 57001-1415



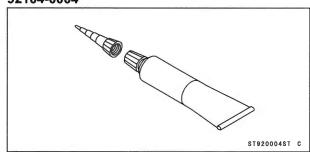
Lead Wire - Peak Voltage Adapter: 57001-1449



Needle Adapter Set: 57001-1457



Liquid Gasket, TB1211F: 92104-0004



# **16-12 ELECTRICAL SYSTEM**

# **Parts Location**

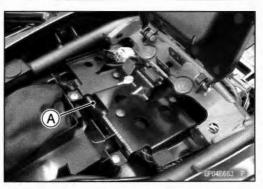
ECU [A]

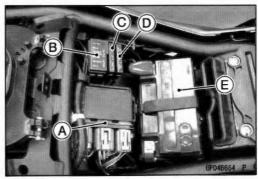
Relay Box [A]
Fuse Box (1) [B]
Fuse Box (2) [C]
Fuse Box (3) [D] (ABS Equipped Models)
Battery 12 V 8 Ah [E]

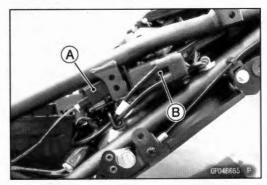


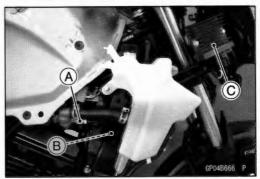
Water Temperature Sensor [A] Radiator Fan Motor [B] Regulator/Rectifier [C]

Accessory Relay [A]











# **Parts Location**

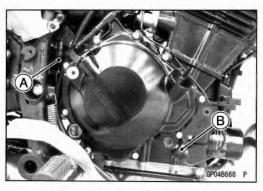
Rear Brake Light Switch [A] Oil Pressure Switch [B]

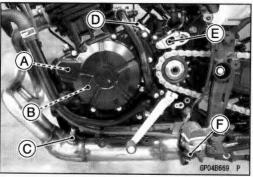
Crankshaft Sensor [A]
Alternator [B]
Oxygen Sensor [C]
Starter Motor [D]
Gear Position Sensor [E]
Side Stand Switch [F]

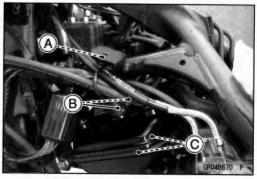
Air Switching Valve [A] Stick Coils [B] Spark Plugs [C]

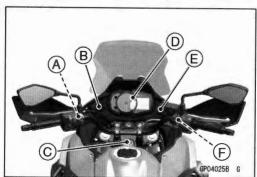
Starter Lockout Switch [A]
Accessory Socket (KLE300A) [B]
Ignition Switch [C]
Meter Unit [D]
Fog Light Switch (KLE300A) [E]
Front Brake Light Switch [F]

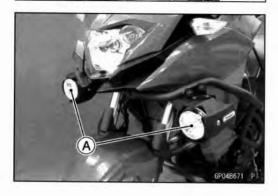
Fog Lights (KLE300A) [A]



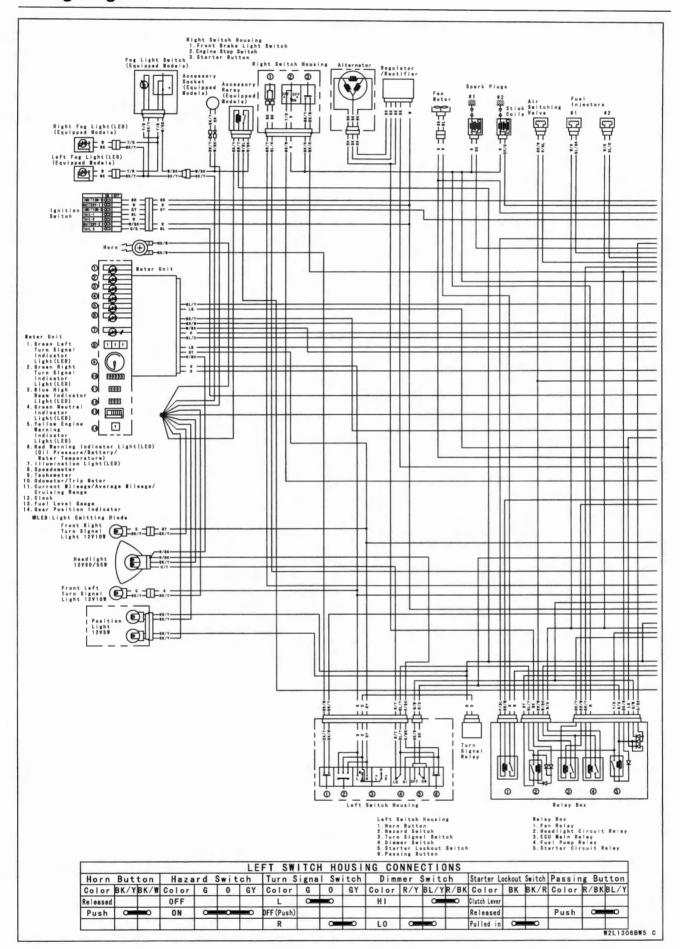




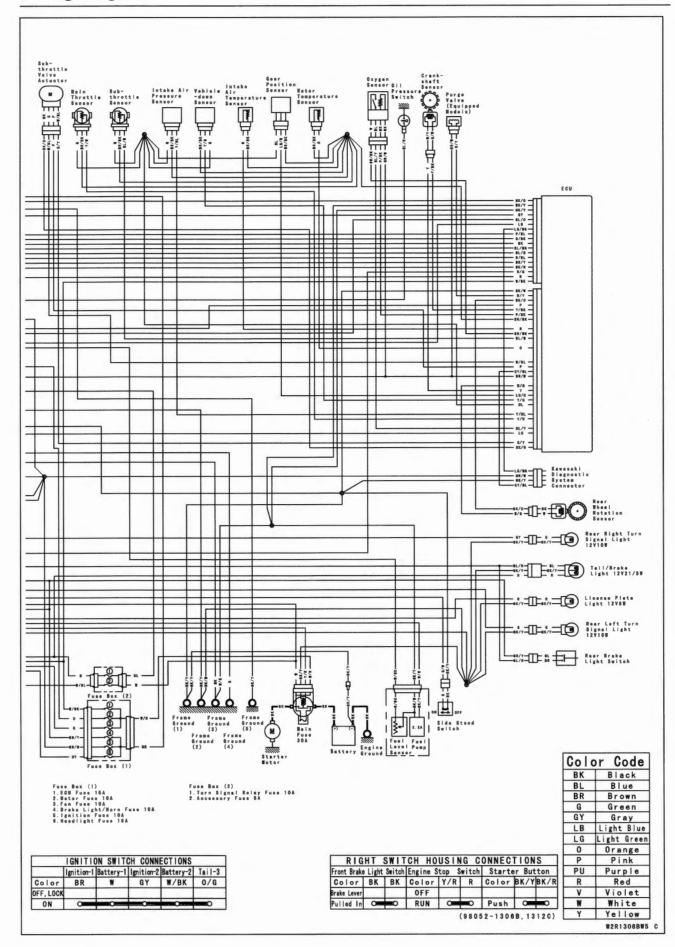




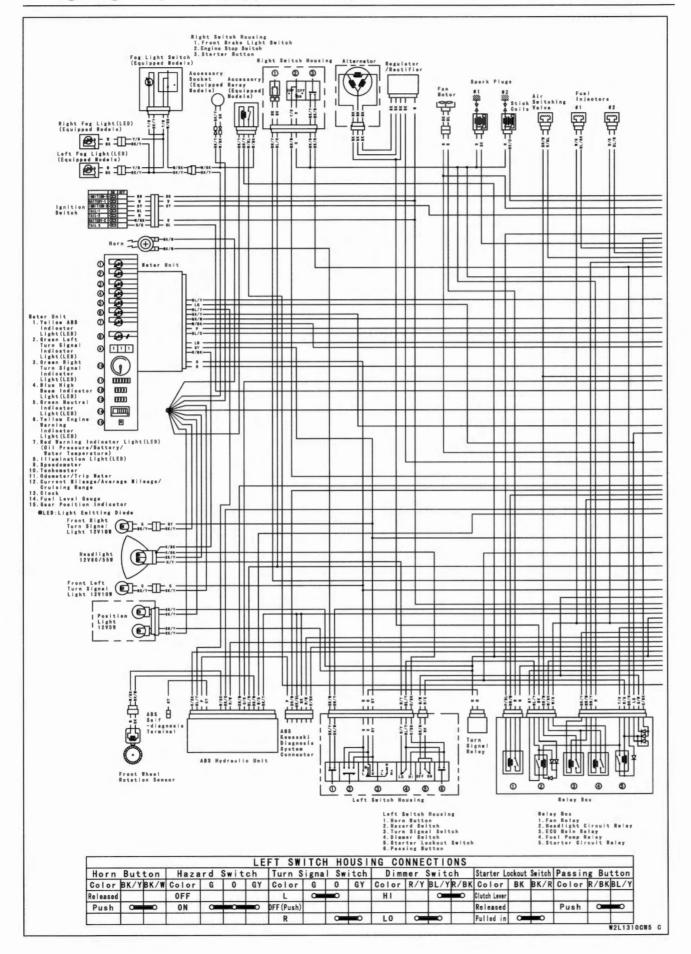
# Wiring Diagram



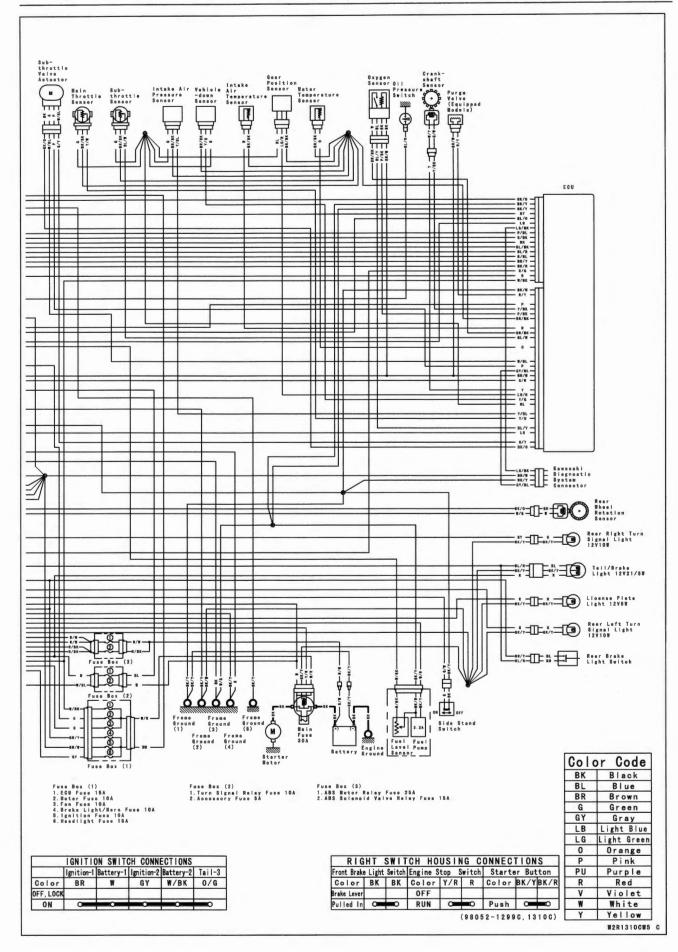
# **Wiring Diagram**



# Wiring Diagram (ABS Equipped Models)



# Wiring Diagram (ABS Equipped Models)



# 16-18 ELECTRICAL SYSTEM

## **Precautions**

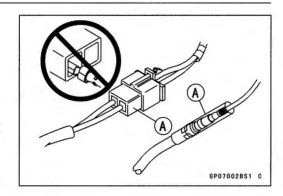
There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

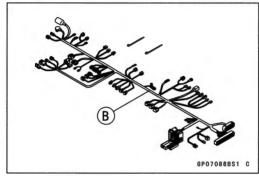
- ODo not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- OAlways check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- OThe electrical parts should 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.
- OTo prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- OBecause 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.
- OTake care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- OTroubles 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.
- OMake 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.
- OMeasure 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.
- OUse the wiring diagram to find the ends of the lead which is suspected of being a problem.
- OConnect a tester between the ends of the leads.
- ★ If the tester does not read about 0 Ω, the lead is defective. Replace the lead or the wiring harness [B] if necessary.





# 16-20 ELECTRICAL SYSTEM

# **Battery**

# **Battery Removal**

- Turn the ignition switch off.
- Remove:

Seat (see Seat Removal in the Frame chapter)

Disconnect the negative (–) cable [A].

#### NOTICE

# Be sure to disconnect the negative (-) cable first.

- Slide out the positive (+) terminal cap [B] and disconnect the positive (+) cable [C].
- Unhook the band [D] and remove the battery [E].

# **Battery Installation**

- Turn the ignition switch off.
- Put the battery [A] into the battery case and hold it with the band [B].
- Connect the battery positive (+) terminal [C] first.
- Connect the negative (–) cable [D] to the battery.
- Apply a light coat of grease on the battery terminals to prevent corrosion.
- Cover the (+) terminal with the red cap [E].
- Install the removed parts (see appropriate chapters).

# Battery Activation Electrolyte Filling

Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

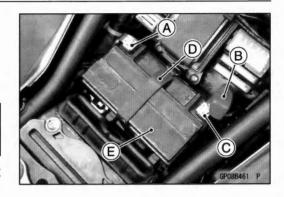
#### **Battery Model Name**

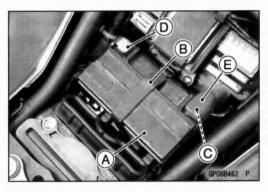
KLE300A/B (except Colombia model)/C: FTX9-BS

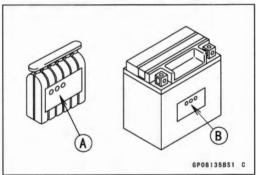
KLE300B (Colombia model): YTX9-BS

#### NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.







#### 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.

# A 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

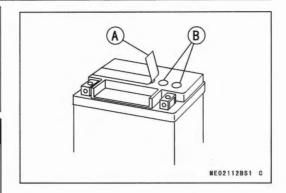
- The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.
- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

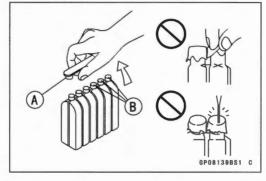
#### NOTE

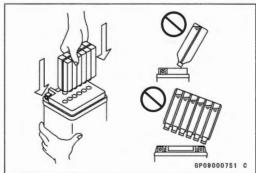
- ODo not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.
- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

#### NOTE

ODo not tilt the electrolyte container.







## 16-22 ELECTRICAL SYSTEM

# **Battery**

- Check the electrolyte flow.
- ★ If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.

#### NOTE

- OBe 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.

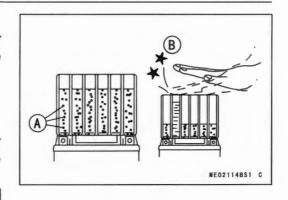
- After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.
- Make sure that the container cells have emptied completely, and remove the container from the battery.
- Place the strip of 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.

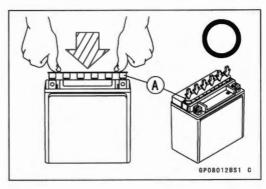
#### NOTICE

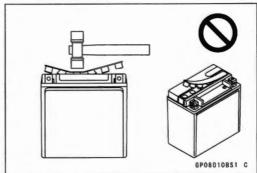
Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.

#### NOTE

OCharging the battery immediately after filling can shorten service life.







#### **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

- OCharging 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 (except Colombia model) or 12.8 V (Colombia model), repeat charging cycle.
- OTo 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 (except Colombia model) or 12.8 V (Colombia model) repeat the charging cycle and load test. If still below 12.6 V (except Colombia model) or 12.8 V (Colombia model) the battery is defective.

#### **Precautions**

1) No need of topping-up

No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

2) Refreshing charge.

If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).

When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

# NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.

If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

3) When you do not use the motorcycle for months.

Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge **once a month** during storage.

4) Battery life.

If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

# A 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**

- OBattery charging condition can be checked by measuring battery terminal voltage with a digital meter [A].
- Remove:
  - Battery (see Battery Removal)
- Measure the battery terminal voltage.

#### NOTE

- OMeasure with a digital voltmeter which can be read one decimal place voltage.
- ★If the reading is 12.6 V (except Colombia model) or 12.8 V (Colombia model) or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.



Standard: 12.6 V or more (except Colombia model)

12.8 V or more (Colombia model)

Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Refresh charge is required [C]
Note [D]
Good [E]

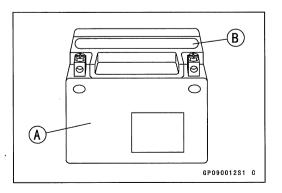
# 13.0 A 12.5 V) 12.0 11.5 0 25 50 75 100(%) -> B | S18007B\$1 0

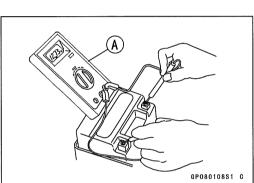
#### Refreshing Charge

- 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 (except

Colombia model)

11.5 ~ less than 12.8 V (Colombia

model)

Standard

**Quick Charge:** 

0.9 A × 5 ~ 10 h (see following

Charge: chart)

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

Olncrease 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]

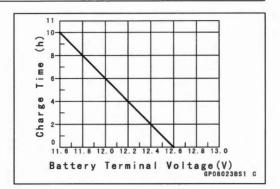
- Determine the battery condition after refresh charge.
- ODetermine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

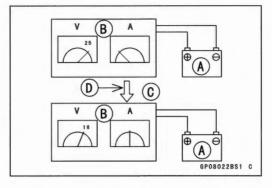
#### **Except Colombia model**

| 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        |  |

#### Colombia model

| Criteria                 | Judgement                      |  |
|--------------------------|--------------------------------|--|
| 12.8 V or higher         | Good                           |  |
| 12.0 ~ lower than 12.8 V | Charge insufficient → Recharge |  |
| lower than 12.0 V        | Unserviceable → Replace        |  |





# **16-26 ELECTRICAL SYSTEM**

# **Charging System**

# Alternator Cover Removal

• Drain:

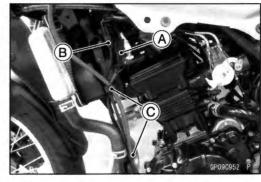
Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)

Coolant (see Coolant Change in the Periodic Maintenance chapter)

• Remove:

Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)

- Disconnect the alternator connector [A] and crankshaft sensor lead connector [B].
- Open the clamps [C] to release the alternator lead.



• Remove:

Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
Chain Guide Bolts [A]
Chain Guide [B]
Clamp [C]



• Remove:

Bracket [A]

Alternator Cover Bolt, L = 50 mm (2.0 in.) [B]

Water Pipes [C] (see Water Pump Cover Removal in the Cooling System chapter)

Olt is not necessary to remove the water pipes from the hoses.

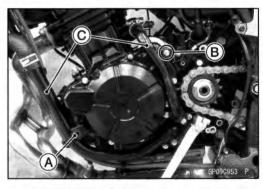
- Move the water pipes aside during alternator cover removal.
- Place a suitable container under the alternator cover [A].
- Release the lead and hose [B] from the clamp [C].
- Remove:

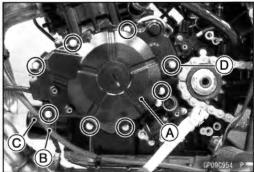
Alternator Cover Bolts [D]

**Alternator Cover** 

Gasket

**Dowel Pins** 

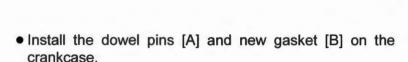


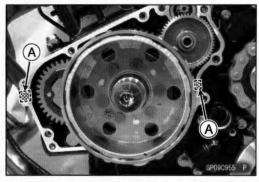


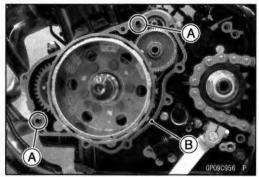
#### **Alternator Cover Installation**

 Clean off any oil or dirt and apply liquid gasket to the crankshaft sensor lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

Sealant - Liquid Gasket, TB1211F: 92104-0004







- Install the alternator cover [A] and clamp [B].
- Install the alternator cover bolts [1 ~ 10].

L = 75 mm (3.0 in.): [4]

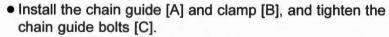
L = 30 mm (1.2 in.): except [4]

 Tighten the alternator cover bolts following the specified sequence [1 ~ 10].

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

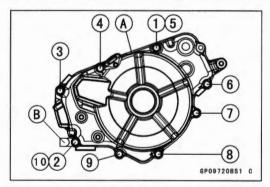
- Connect the water pipes [A] to the water pump (see Water Pump Cover Installation in the Cooling System chapter).
- Apply a non-permanent locking agent to the alternator cover bolt (L = 50 mm/2.0 in.) [B].
- Tighten the alternator cover bolt.

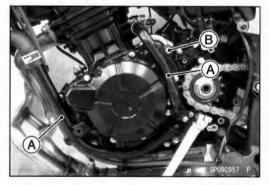
Torque - Alternator Cover Bolts, L = 50 mm (2.0 in.): 9.8 N·m (1.0 kgf·m, 87 in·lb)



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

- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).







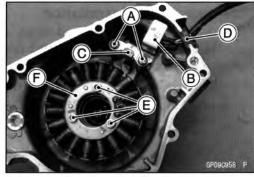
#### 16-28 ELECTRICAL SYSTEM

# **Charging System**

#### Stator Coil Removal

Remove:

Alternator Cover (see Alternator Cover Removal)
Screws [A] and Clamp [B]
Crankshaft Sensor [C]
Lead Grommet [D]
Stator Coil Bolts [E]
Stator Coil [F]



# Stator Coil Installation

• Install the stator coil [A] and tighten the bolts.

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

- Install the crankshaft sensor [B] and clamp [C].
- Tighten:

Torque - Crankshaft Sensor Screws [D]: 5.2 N·m (0.53 kgf·m, 46 in·lb)

Clean off any oil or dirt and apply liquid gasket to the circumference of the crankshaft sensor lead grommet [E].

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Install the grommet into the groove of the alternator cover.
- Install the alternator cover (see Alternator Cover Installation).



Remove:

Alternator Cover (see Alternator Cover Removal) Shaft [A] Starter Idle Gear [B]

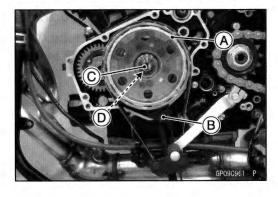


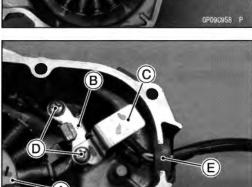
- Hold the alternator rotor [A] firmly with the flywheel holder [B].
- Remove the rotor bolt [C] and washer [D].

Special Tool - Flywheel Holder: 57001-1313

#### NOTICE

Do not hold the alternator rotor using the projections at outside of the rotor.





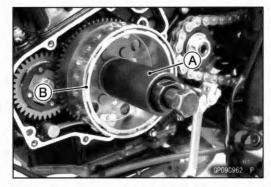
Using the flywheel puller [A], remove the alternator rotor
 [B] from the crankshaft.

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405

#### NOTICE

Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

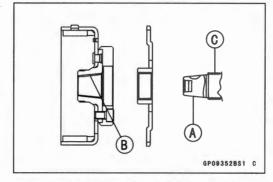
Remove:
 Woodruff Key [A]
 Washer [B]
 Starter Clutch Gear [C]

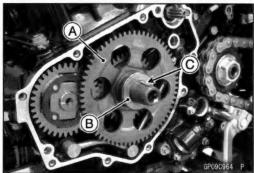




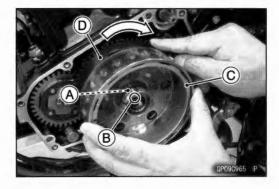
#### Alternator Rotor Installation

- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
   Crankshaft Tapered Portion [A]
   Alternator Rotor Tapered Portion [B]
- Apply a thin coat of molybdenum disulfide grease to the crankshaft [C].
- Install the starter clutch gear [A] and washer [B].
- Again, clean the crankshaft tapered portion and dry there.
- Fit the woodruff key [C] securely in the slot in the crankshaft before installing the alternator rotor.





- Align the woodruff key [A] on the crankshaft with the key way [B] in the alternator rotor [C].
- Install the alternator rotor while turning the starter clutch gear [D] clockwise until it engaged into the starter clutch case.



### 16-30 ELECTRICAL SYSTEM

# **Charging System**

• Using a cleaning fluid, clean off any oil or dirt on the following areas and dry them with a clean cloth.

Both Sides of the Washer [A]

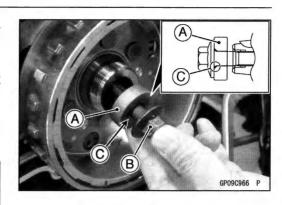
Threads and Seating Area of the Alternator Rotor Bolt [B]

Threads in the Crankshaft End

- Install the washer with its chamfer [C] side facing out.
- Install the rotor bolt and tighten it lightly.

#### NOTICE

To avoid damaging the components by improperly fitting, make sure that the starter clutch gear turns clockwise freely with the rotor bolt tightened lightly. If the starter clutch gear becomes binding or turns hardly, reinstall it.



#### NOTE

- OConfirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.
- Tighten the rotor bolt [A] with 55 N·m (5.6 kgf·m, 41 ft·lb) of torque.

Special Tool - Flywheel Holder [B]: 57001-1313

#### NOTICE

Do not hold the alternator rotor using the projections at outside of the rotor.

- Remove the rotor bolt and washer.
- Check the tightening torque with flywheel puller [A].

Special Tool - Flywheel Puller Assembly, M38  $\times$  1.5/M35  $\times$  1.5: 57001-1405

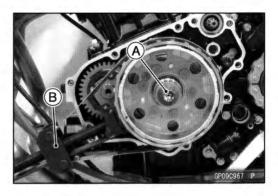
- ★If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.
- ★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.
- Tighten the alternator rotor bolt while holding the alternator rotor firmly with the flywheel holder.

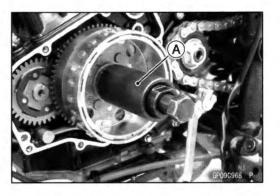
Special Tool - Flywheel Holder: 57001-1313

#### NOTICE

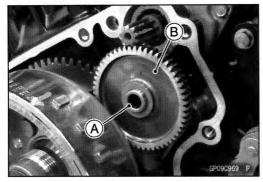
Do not hold the alternator rotor using the projections at outside of the rotor.

Torque - Alternator Rotor Bolt: 107.8 N·m (10.99 kgf·m, 79.51 ft·lb)



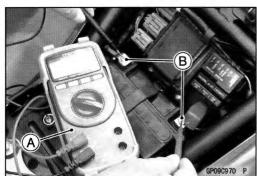


- Apply a thin coat of molybdenum disulfide grease to the shaft [A], and install it and starter idle gear [B].
- Install the alternator cover (see Alternator Cover Installation).



# **Charging Voltage Inspection**

- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the seat (see Seat Removal in the Frame chapter).
- Check that the ignition switch is turned off, and connect a tester [A] to the battery terminals [B].
- Start the engine, and note the voltage readings at various engine speeds (except idling engine speed) with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector on the headlight unit.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.



#### **Charging Voltage**

@25°C (77°F)

| Connections   |               | Dooding          |  |
|---------------|---------------|------------------|--|
| Tester (+) to | Tester (-) to | Reading          |  |
| Battery (+)   | Battery (-)   | DC 14.5 ~ 14.9 V |  |

- Turn off the ignition switch to stop the engine, and disconnect a tester.
- ★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

# **Alternator Inspection**

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

# **16-32 ELECTRICAL SYSTEM**

# **Charging System**

- To check the alternator output voltage, do the following procedures.
- OTurn the ignition switch off.
- ORemove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- ODisconnect the alternator lead connector [A].
- OConnect a tester as shown in the table 1.
- OStart the engine.
- ORun it at the rpm given in the table 1.
- ONote the voltage readings (total 3 measurements).



@4 000 r/min (rpm)

| Connections    |                    | Donding         |  |
|----------------|--------------------|-----------------|--|
| Tester (+) to  | Tester (-) to      | Reading         |  |
| One Black Lead | Another Black Lead | AC 35 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.
- OStop the engine.
- ODisconnect the alternator lead connector [A].
- OConnect a tester [B] as shown in the table 2.
- ONote the readings (total 3 measurements).

**Table 2 Stator Coil Resistance** 

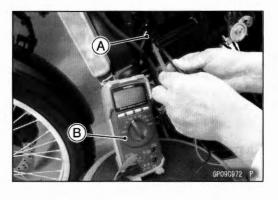
@20°C (68°F)

| Connections    |                    | Dooding                |  |
|----------------|--------------------|------------------------|--|
| Tester (+) to  | Tester (-) to      | Reading                |  |
| One Black Lead | Another Black Lead | $0.05 \sim 0.6 \Omega$ |  |

When measuring the resistance, use a tester that can measure the standard value.

- ★If there is more resistance than shown in the table, or no tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
- Measure the resistance between each of the black lead and chassis ground.
- ★Any tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
- ★ If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.





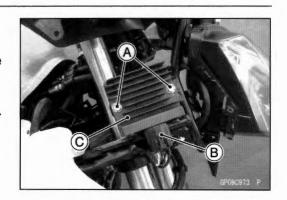
# Regulator/Rectifier Removal

Remove:

Upper Fairing (see Upper Fairing Removal in the Frame chapter)

Regulator/Rectifier Bolts [A]

 Disconnect the connector [B] and remove the regulator/rectifier [C].



# Regulator/Rectifier Installation

- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the regulator/rectifier bolts.
- Tighten:

Torque - Regulator/Rectifier Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Install the removed parts (see appropriate chapters).

# Regulator/Rectifier Inspection

 Refer to the Charging System Troubleshooting for the Regulator/Rectifier Inspection.

# **Charging System Troubleshooting**

 Before inspection, remove all accessories that consume electrical power.

#### NOTE

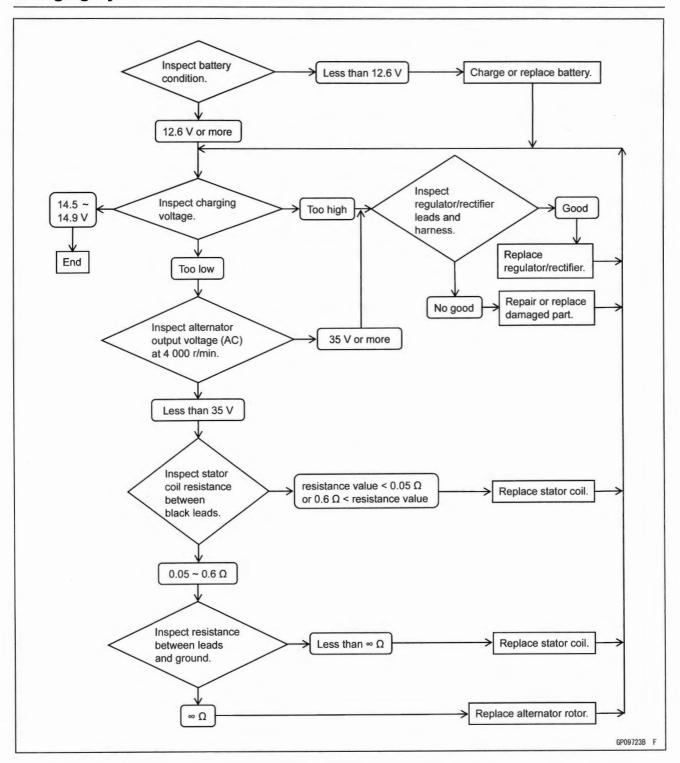
- OEven when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.
- Pay attention to riding conditions and the customer's riding habits which could affect the charging system such as:

Frequent use at low engine speed

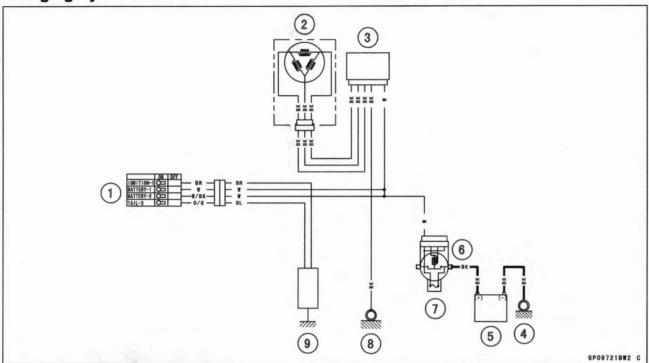
Frequent and unnecessary brake pedal dragging

→ Battery Discharged

Recharge the battery if it is discharged.



# **Charging System Circuit**



- 1. Ignition Switch
- 2. Alternator
- 3. Regulator/Rectifier
- 4. Engine Ground
- 5. Battery 12 V 8 Ah
- 6. Starter Relay
- 7. Main Fuse 30 A
- 8. Frame Ground (3)
- 9. Load

# **16-36 ELECTRICAL SYSTEM**

# **Ignition System**

# **A** WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, stick coil or stick coil lead while the engine is running, or you could receive a severe electrical shock.

#### NOTICE

Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent ECU damage.

Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.

## Crankshaft Sensor Removal

Refer to the Stator Coil Removal.

#### Crankshaft Sensor Installation

Refer to the Stator Coil Installation.

# Crankshaft Sensor Inspection

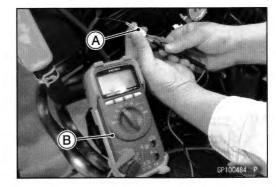
• Remove:

Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)

- Disconnect the crankshaft sensor lead connector [A].
- Using a tester [B], measure resistance between the white/yellow lead and green/white lead terminals in the connector.

#### Crankshaft Sensor Resistance: 180 ~ 280 Ω

- ★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.
- Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads and chassis ground.
- ★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor and stator coil as an assembly.



# Crankshaft Sensor Peak Voltage Inspection

OBe sure the battery is fully charged.

Remove:

Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)

- Disconnect the crankshaft sensor lead connector [A].
- Using a tester [B] and peak voltage adapter [C], measure crankshaft sensor peak voltage at the connector.

Special Tools - Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

Needle Adapter Set [D]: 57001-1457

#### Connections:

| Crankshaft<br>Sensor Lead |              | Peak Voltage<br>Adapter |               | Tester |  |
|---------------------------|--------------|-------------------------|---------------|--------|--|
| White/Yellow              | <del>-</del> | Red                     | $\rightarrow$ | (+)    |  |
| Green/White               | <del></del>  | Black                   | $\rightarrow$ | (-)    |  |

- Turn the ignition switch and engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.

# Crankshaft Sensor Peak Voltage Standard: 5 V or more

★ If the tester reading is not specified one, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

#### Stick Coil Removal

#### NOTICE

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

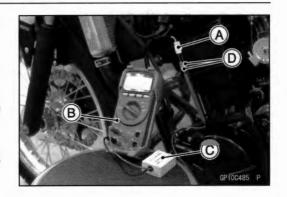
Remove:

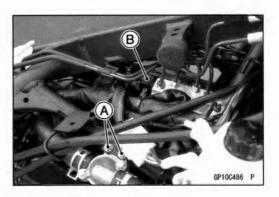
Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

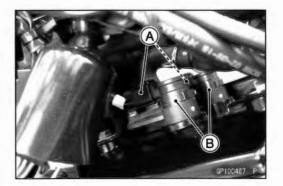
- Remove the thermostat housing mounting bolts [A] and disconnect the ABS hydraulic unit connector [B] before removing the #2 stick coil.
- Disconnect the stick coil connectors [A].
- Pull the stick coils [B] off the spark plugs.

### NOTICE

Do not pry the connector part of the coil while removing the coil.







# **16-38 ELECTRICAL SYSTEM**

# **Ignition System**

### Stick Coil Installation

- Insert the coil as shown being careful of the coil heads [A] direction.
- Be sure the stick coils are installed by pulling up it lightly.
- Connect the connectors.

#### NOTICE

## Do not tap the coil head while installing the coil.

- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

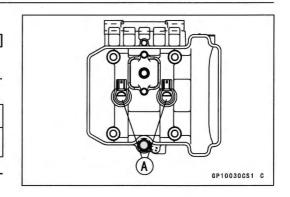
# Stick Coil Inspection

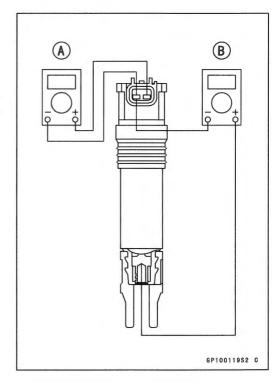
- Remove the stick coils (see Stick Coil Removal).
- Measure the primary winding resistance [A] as follows.
- OConnect a tester between the coil terminals.
- Measure the secondary winding resistance [B] as follows.
- OConnect the tester between the plug terminal and (–) coil terminal.

# **Stick Coil Winding Resistance**

Primary Windings:  $1.11 \sim 1.50 \ \Omega \ @20^{\circ}C \ (68^{\circ}F)$ Secondary Windings:  $6.4 \sim 9.6 \ k\Omega \ @20^{\circ}C \ (68^{\circ}F)$ 

★If the tester does not read as specified, replace the coil.



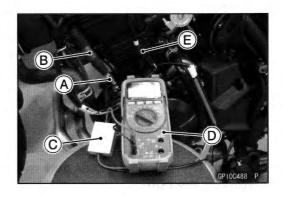


# Stick Coil Primary Peak Voltage Inspection NOTE

OBe 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.
- Olnstall the new spark plug [A] into each stick coil [B], and ground them onto the engine.
- OConnect the peak voltage adapter [C] into a tester [D].
- OConnect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.

ECU [F]
Battery [G]



Special Tools - Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

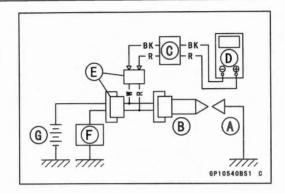
Lead Wire - Peak Voltage Adapter: 57001

-1449

**Primary Lead Connection** 

Adapter (R, +) to lead wire-peak voltage adapter (R)

Adapter (BK, -) to lead wire-peak voltage adapter (W)



# **A** 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: 125 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.

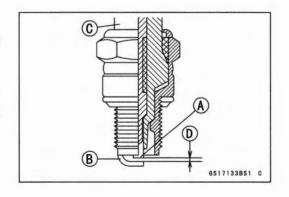
Spark Plug Condition Inspection

- Remove the spark plugs (see Spark Plug Replacement in the Periodic Maintenance chapter).
- Visually inspect the spark plugs.
- ★If the spark plug center electrode [A] and/or side electrode [B] are corroded or damaged, or if the insulator [C] is cracked, replace the plug.
- ★If the spark plug is dirtied or the carbon is accumulated, replace the spark plug.
- Measure the gap [D] with a wire-type thickness gauge.
- ★If the gap is incorrect, replace the spark plug.

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

• Use the standard spark plug or its equivalent.

Spark Plug: NGK CR8E



# **16-40 ELECTRICAL SYSTEM**

# **Ignition System**

# Interlock Operation Inspection

- Raise the rear wheel off the ground using the stand (see Rear Wheel Removal in the Wheels/Tires chapter).
- Turn the engine stop switch on (run position).

#### 1st Check

Start the engine to the following conditions.

#### Condition:

Transmission Gear → 1st Position

Clutch Lever → Release

Sidestand → Down or Up

OTurn the ignition switch on and push the starter button.

OThen the starter motor should not turn when the starter system circuit is normality.

★If the engine is start, inspect the starter lockout switch, gear position sensor and relay box.

★If their parts are normality, replace the ECU.

#### 2nd Check

Start the engine to the following conditions.

#### Condition:

Transmission Gear → 1st Position

Clutch Lever → Pulled in

Sidestand → Up

- OTurn the ignition switch on and push the starter button.
- OThen the starter motor should turn when the starter system circuit is normality.
- ★If the starter motor is not turn, inspect the starter lockout switch, gear position sensor, sidestand switch and relay box.
- ★If their parts are normality, replace the ECU.

#### 3rd Check

- Inspect the engine for its secure stop after the following operations are completed.
- Run the engine to the following conditions.

#### Condition:

Transmission Gear → 1st Position

Clutch Lever → Pulled in

Sidestand → Up

- Set the sidestand on the ground, then the engine will stop.
- ★ If the engine does not stop, inspect the gear position sensor, sidestand switch and relay box.
- ★If their parts are normality, replace the ECU.

# IC Igniter Inspection

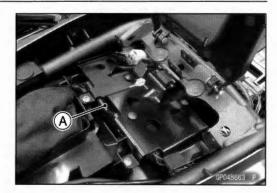
OThe IC igniter is built in the ECU [A].

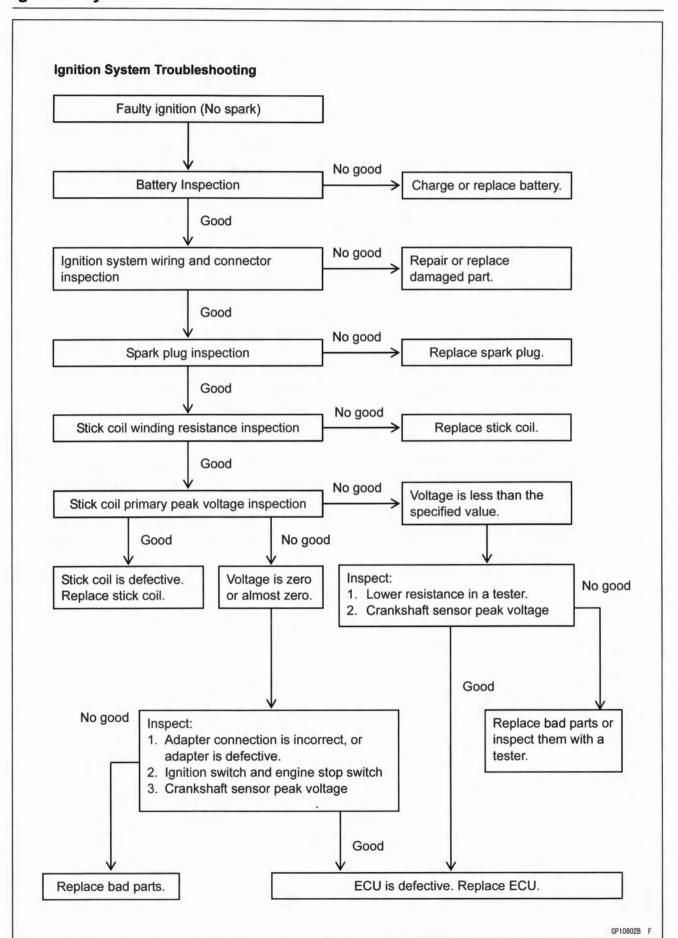
• Refer to the following items.

Interlock Operation Inspection (see Interlock Operation Inspection)

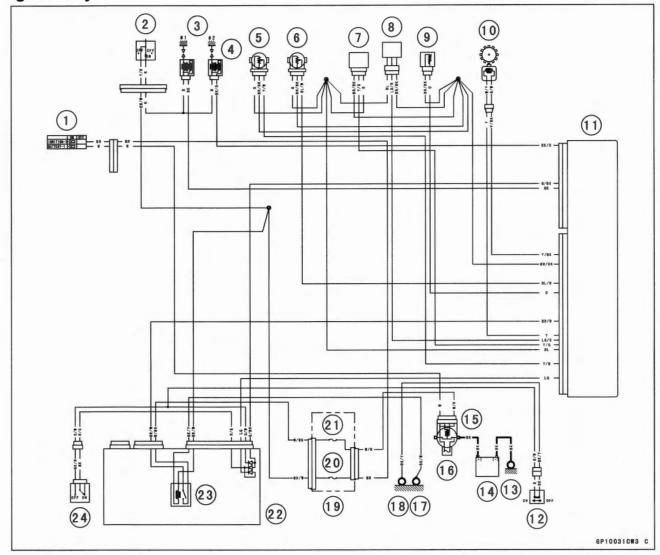
Ignition System Troubleshooting (see Ignition System section)

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





# **Ignition System Circuit**



- 1. Ignition Switch
- 2. Engine Stop Switch
- 3. Spark Plugs
- 4. Stick Coils
- 5. Main Throttle Sensor
- 6. Subthrottle Sensor
- 7. Vehicle-down Sensor
- 8. Gear Position Sensor
- 9. Water Temperature Sensor
- 10. Crankshaft Sensor
- 11. ECU
- 12. Side Stand Switch

- 13. Engine Ground
- 14. Battery 12 V 8 Ah
- 15. Starter Relay
- 16. Main Fuse 30 A
- 17. Frame Ground (2)
- 18. Frame Ground (1)
- 19. Fuse Box (1)
- 20. Ignition Fuse 10 A
- 21. ECU Fuse 15 A
- 22. Relay Box
- 23. ECU Main Relay
- 24. Starter Lockout Switch

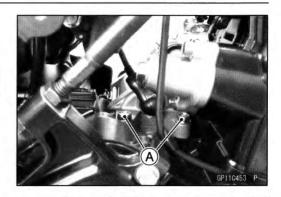
# **Electric Starter System**

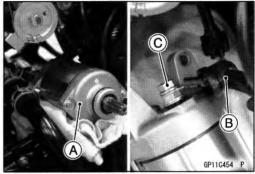
#### Starter Motor Removal

#### NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Remove the side covers (see Side Cover Removal in the Frame chapter).
- Remove the starter motor mounting bolts [A].
- Push the starter motor [A] to the right side then pull out it from the left side.
- Slide back the rubber cap [B] and remove the starter motor cable terminal nut [C].
- Remove the starter motor.





# 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.
- Connect the starter motor cable [A] to the starter motor [B].
- Position the starter motor cable as shown.

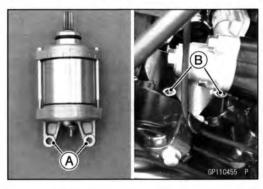
Vertical Line [C]

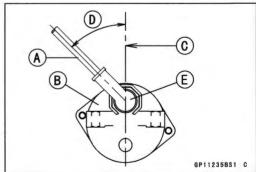
Approx. 45° [D]

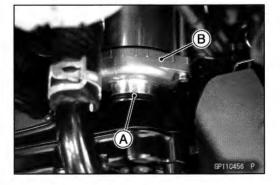
Torque - Starter Motor Cable Terminal Nut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Slide the rubber cap [E] to the original position.
- Replace the O-ring [A] with a new one and apply grease to the O-ring.
- Position the starter motor [B] on the crankcase and tighten the starter motor mounting bolts.

Torque - Starter Motor Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)





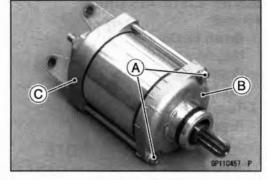


# **Electric Starter System**

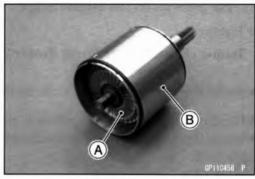
# Starter Motor Disassembly

- Remove the starter motor (see Starter Motor Removal).
- Remove:

Starter Motor Through Bolts [A] Left End Cover [B] Right End Cover [C]

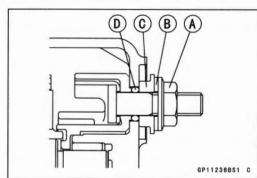


• Remove the armature [A] from the yoke [B].



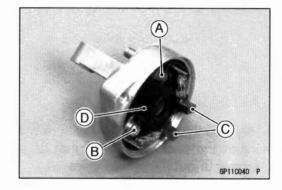
Remove:

Starter Motor Terminal Locknut [A] Washer [B] Insulator [C] O-ring [D]



• Remove:

Terminal [A]
Brush Holder Screw [B]
Brushes [C]
Brush Springs
Brush Holder [D]



# 16-46 ELECTRICAL SYSTEM

# **Electric Starter System**

# Starter Motor Assembly

• Install:

Brush Holder [A]
Negative Brush [B]
Brush Holder Screw [C]
Positive brush [D]
Terminal [E]
Brush Springs [F]

#### NOTE

OMake sure the brush base plates are properly fitted into the grooves on the brush holder.

• Tighten:

Torque - Starter Motor Brush Holder Screw: 3.8 N·m (0.39 kgf·m, 34 in·lb)

- Install the brushes on the brush springs.
- Replace the O-ring [A] with a new one.
- Install the following parts to the starter motor terminal [B].

O-ring

Insulator [C]

Washer [D]

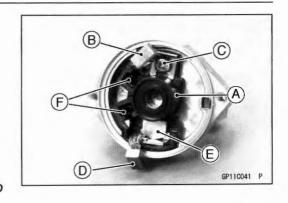
Starter Motor Terminal Locknut [E]

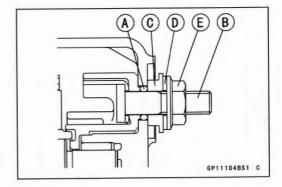
Oinstall the insulator so that stepped side faces outward.

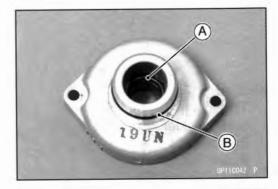
• Tighten:

Torque - Starter Motor Terminal Locknut: 11 N·m (1.1 kgf·m, 97 in·lb)

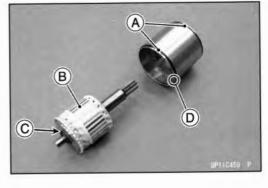
- Apply thin coat of grease to the oil seal [A].
- Replace the O-ring [B] with a new one.





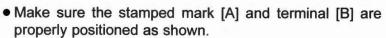


- Replace the seal rings [A] with new ones.
- Insert the armature [B] so that its commutator side [C] faces cut-out [D] on the yoke.

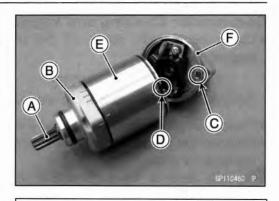


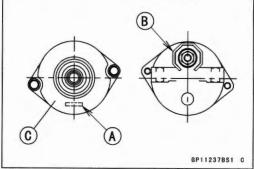
# **Electric Starter System**

- OWrap the pinion gear [A] with the vinyl tape to prevent the oil seal in the left end cover [B] from damaging during installation.
- Insert the left end cover on the armature.
- OMake sure the brush springs and brushes are installed in place.
- Align the tab [C] with the cut-out [D] on the yoke [E] to install the right end cover [F] to the yoke.

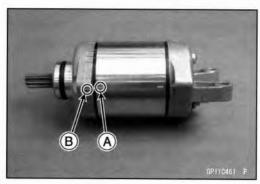


• Turn the left end cover [C] if necessary.



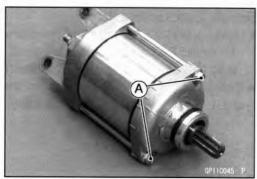


 Align the index mark [A] on the yoke with the mark [B] on the left end cover.



Tighten:

Torque - Starter Motor Through Bolts [A]: 5.0 N·m (0.51 kgf·m, 44 in·lb)



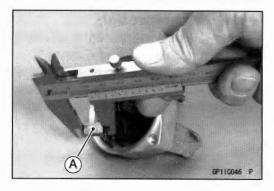
#### **Brush Inspection**

Measure the length of each brush [A].

★If any is worn down to the service limit, replace the brush assy.

Starter Motor Brush Length

Standard: 12 mm (0.47 in.)
Service Limit: 6.5 mm (0.26 in.)



# **Electric Starter System**

## Commutator Cleaning and Inspection

 Clean the metallic debris off the between commutator segments [A].

#### NOTE

ODo not use emery or sand paper on the commutator.

- Check the commutator for damage or abnormal wear.
- ★Replace the starter motor with a new one if there is any damage or wear.
- Visually inspect the commutator segments for discoloration.
- ★ Replace the starter motor with a new one if discoloration is noticed.

# Armature Inspection

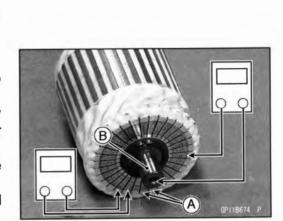
- Using a tester, measure the resistance between any two commutator segments [A].
- ★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.
- Using the tester, measure the resistance between the segments and the shaft [B].
- ★ If there is any reading at all, the armature has a short and the starter motor must be replaced.

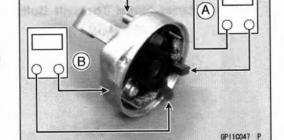
#### NOTE

OEven if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

#### **Brush Lead Inspection**

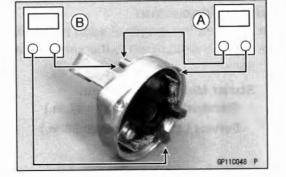
- Using a tester, measure the resistance as shown.
   Terminal Bolt and Positive Brushes [A]
   End Cover and Negative Brushes [B]
- ★If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assy.

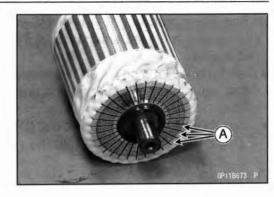




# **End Cover Inspection**

- Using a tester, measure the resistance as shown.
   Terminal Bolt and End Cover [A]
   Terminal Bolt and Negative Brushes [B]
- ★ If there is any reading, the brush assy and/or terminal bolt assy have a short. Replace the starter motor.

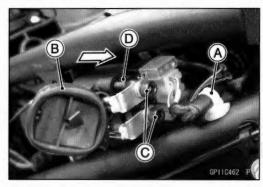


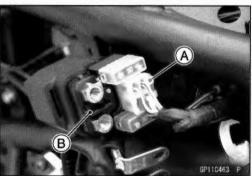


# **Electric Starter System**

### Starter Relay Inspection

- Disconnect the negative (–) cable (see Battery Removal) from the battery.
- Remove the left seat cover (see Seat Cover Removal in the Frame chapter).
- Release the lead from the clamp [A].
- Slide the dust cover [B] and remove the cable terminal bolts [C].
- Pull the starter relay [D] rearward to remove it from the bracket.
- Disconnect the connector [A] and remove the starter relay [B].





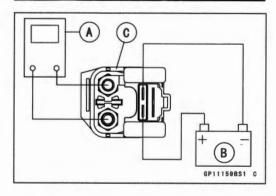
- Connect a tester [A] and 12 V battery [B] to the starter relay [C] as shown.
- ★If the relay does not work as specified, the relay is defective. Replace the relay.

#### **Testing Relay**

Criteria:

When battery is connected  $\rightarrow$  0  $\Omega$ 

When battery is disconnected  $\rightarrow \infty \Omega$ 

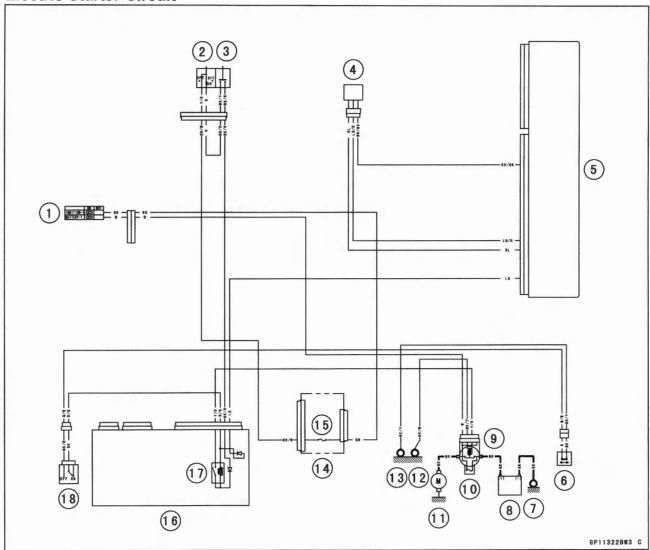


Installation is reverse of removal.

## **16-50 ELECTRICAL SYSTEM**

# **Electric Starter System**

## **Electric Starter Circuit**



- 1. Ignition Switch
- 2. Engine Stop Switch
- 3. Starter Button
- 4. Gear Position Sensor
- 5. ECU
- 6. Side Stand Switch
- 7. Engine Ground
- 8. Battery 12 V 8 Ah
- 9. Starter Relay
- 10. Main Fuse 30 A
- 11. Starter Motor
- 12. Frame Ground (2)
- 13. Frame Ground (1)
- 14. Fuse Box (1)
- 15. Ignition Fuse 10 A
- 16. Relay Box
- 17. Starter Circuit Relay
- 18. Starter Lockout Switch

This motorcycle adopt the daylight system and have a headlight relay circuit 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 Unit (see Headlight Unit Removal)

Dust Cover [A]



- Clear the hook [A] from the stopper [B].
- Remove:

Headlight Bulb [C]

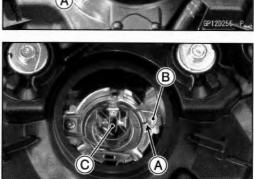
#### NOTICE

When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode. Use the correct type of headlight bulb with specified voltage and wattage only.

OClean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.

NOTE

- Replace the headlight bulb.
- Fit the projection [A] on the bulb in the cutout [B] on the headlight.

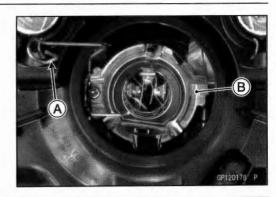




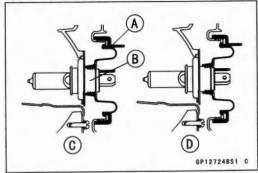
## **16-52 ELECTRICAL SYSTEM**

# **Lighting System**

• Install the hook [A] to the stopper [B].



- Fit the dust cover [A] onto the bulb [B] firmly as shown.
   Good [C]
   Bad [D]
- Install the headlight unit (see Headlight Unit Installation).
- 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)

• Remove:

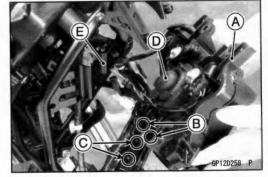
Bolts [A] and Collar



- Pull the headlight unit [A] upward to clear the grommets
   [B] from the projections [C] on the bracket.
- Disconnect:

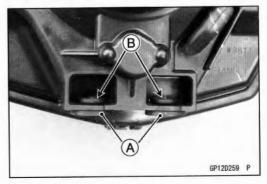
Headlight Connector [D]
City Light Lead Connector [E]

• Installation is the reverse of removal.



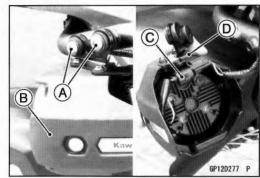
Olf removed, install the grommets [A] with its smaller diameter side [B] facing upward.

- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).



## Fog Light Removal/Installation (KLE300A)

- Remove the fog light mounting bolts [A] while holding the fog light assembly [B].
- Disconnect the fog lights lead connector [C] and remove it from the bracket [D].
- Remove the fog light assembly from the engine guard.



Remove:

Bolts (M6) [A]

Bolts (M5) [B]

Bracket [C]

Outer Guard [D]

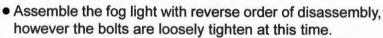
Inner Guard [E]

Fog Light Unit [F]

Mark [G] (if necessary)

#### NOTE

ODo not try to disassemble the fog light unit.



Inner Guards [A]

Outer Guards [B]

Fog Light Unit [C]

Bracket [D]

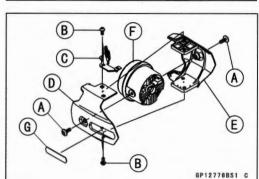
Bolts (M6) [E]

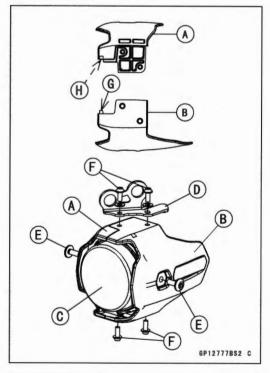
Bolts (M5) [F]

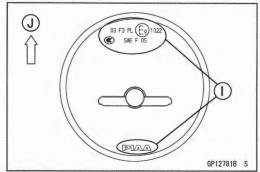
#### NOTE

- OAlign the projections [G] on the outer guard with the groove [H] on the inner guard.
- OLoosely tighten the bolts in levels which the fog light unit can be moved without excess play.
- OUsing the letters [I] on the lens, make sure that the fog light unit does not install with upside down.

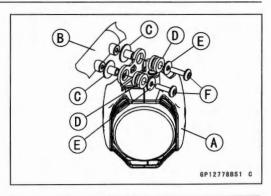
Up [J]

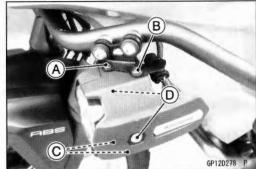






- Install the fog light assembly [A] to the engine guard [B] with the collars[C], dampers [D], washers [E] and fog light mounting bolts [F].
- Tighten:
  - Torque Fog Light Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Connect the fog light lead connector and secure it to the bracket.
- Adjust the fog light aim in compliance with applicable local laws or regulations.
- Tighten the bolts (M5) on the bracket at the pivot side [A] first, and then tighten the adjust side [B].
- Tighten the bolts (M5) [C] at the bottom and bolts (M6) [D] at both sides.







 Disconnect the fog light lead connector [A] and measure the voltage between the connector lead terminals at the harness side.

Connection: Y/R (+) ~ BK/Y (-)

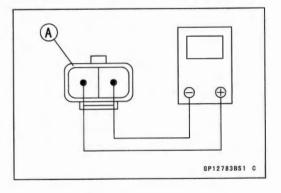
- Check that the battery voltage on the terminals should appears when the ignition switch and fog light switch turns on.
- ★ If the battery voltage does not appear, check the followings.

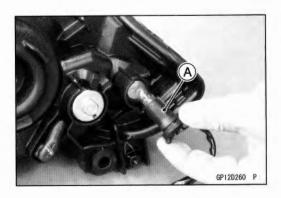
Accessory Fuse 5 A (see Fuse Inspection)
Fog Light Switch (see Switch Inspection)
Accessory Relay (see Accessory Relay Inspection)
Open or Short Circuit in the Fog Light Sub Harness or
Main Harness

★If the battery voltage appears, however the fog light does not turned on with the connector connected, check that the fog light connector does not loose or poorly connection and then replace the fog light.



- Remove the headlight (see Headlight Removal/Installation).
- Pull out the socket [A] from the headlight housing.



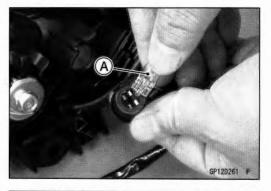


• Pull out the bulb [A] straight from the socket.

#### NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified value.

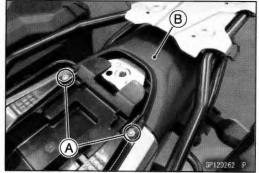
Replace the bulb with a new one.



# Tail/Brake Light Bulb Replacement

Remove:

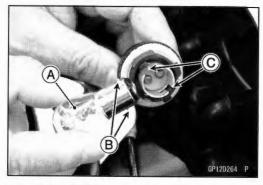
Seat (see Seat Removal in the Frame chapter). Bolts [A] and Washers Center Seat Cover [B]



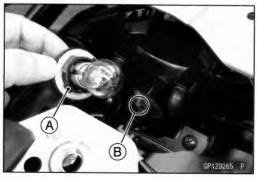
• Turn the socket [A] counterclockwise to remove it.



- Push the bulb [A] in the socket, turn it counterclockwise and pull it out.
- Insert the new bulb by aligning its pins [B] with the grooves
   [C] in the socket, and turn the bulb clockwise until it stops.



- Fit the projections [A] of the socket into the grooves [B] of the tail/brake light.
- Turn the socket clockwise until it stops.

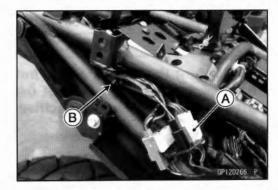


### 16-56 ELECTRICAL SYSTEM

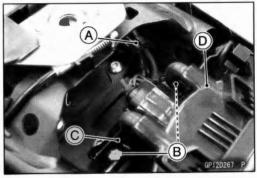
# **Lighting System**

## Tail/Brake Light Removal

- Right Side Seat Cover (see Side Seat Cover Removal in the Frame chapter).
- Disconnect the tail/brake light lead connector [A].
- Release the tail/brake light lead from the guide [B].

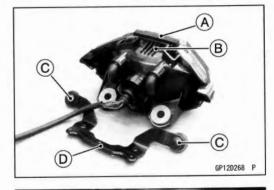


- Release the tail/brake light lead from the clamp [A].
- Remove the screws [B].
- Remove the bracket [C] and tail/brake light [D].

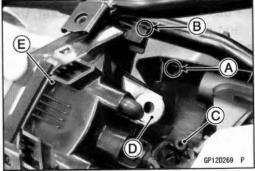


# Tail/Brake Light Installation

- Installation is the reverse of removal.
- If necessary, attach the pad [A] at center of the housing IRI
- Install the rubber pads [C] to the bracket [D], if it has been removed.



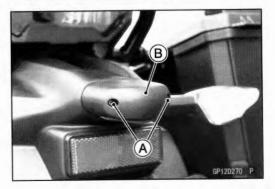
- Insert the tab [A] into the groove [B] on the housing at both sides.
- Insert the projection [C] into the rubber damper [D] at both sides to fit the tail/brake light [E] on the rear fender.
- Install the bracket and tighten the screws.
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter)
- Install the removed parts (see appropriate chapters).



# License Plate Light Bulb Replacement

• Remove:

License Plate Light Screws [A]
License Plate Light Cover [B] and Lens

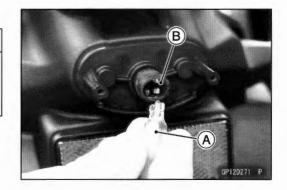


• Pull the bulb [A] out of the socket [B].

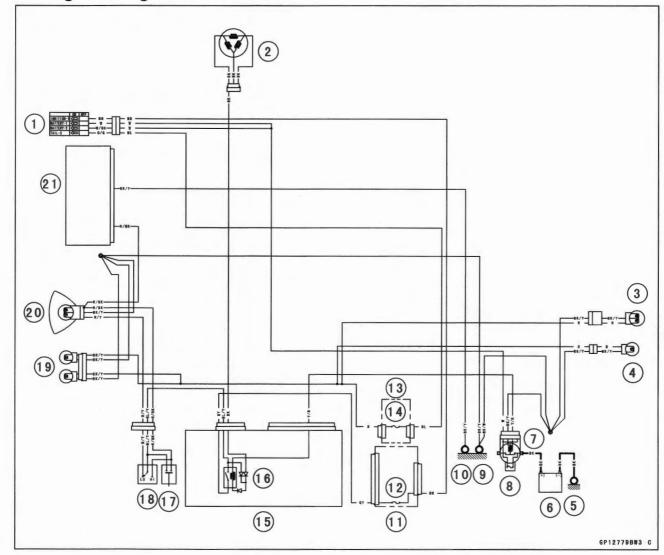
#### NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified valve.

- Replace the bulb with a new one.
- Insert the bulb into the socket.
- Install the license plate light cover.
- Tighten the license plate light cover screws securely.



# Headlight/Tail Light Circuit



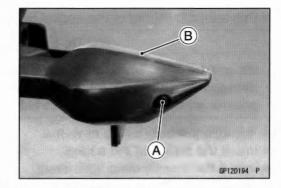
- 1. Ignition Switch
- 2. Alternator
- 3. Tail/Brake Light 12 V 21/5 W
- 4. License Plate Light 12 V 5 W
- 5. Engine Ground
- 6. Battery 12 V 8 Ah
- 7. Starter Relay

- 8. Main Fuse 30 A
- 9. Frame Ground (2)
- 10. Frame Ground (1)
- 11. Fuse Box (1)
- 12. Headlight Fuse 15 A
- 13. Fuse Box (2)
- 14. Turn Signal Relay Fuse 10 A
- 15. Relay Box
- 16. Headlight Circuit Relay
- 17. Passing Button
- 18. Dimmer Switch
- 19. City Lights 12 V 5 W
- 20. Headlight 12 V 60/55 W
- 21. Meter Unit

#### Turn Signal Light Bulb Replacement

Remove:

Turn Signal Light Lens Screw [A]
Turn Signal Light Lens Housing [B]



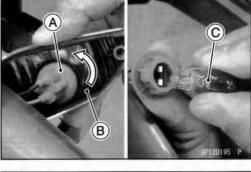
- Turn the socket [A] counterclockwise and remove it from the lens housing [B].
- Pull out the bulb [C] straight from the socket.

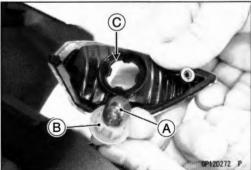
#### NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified valve.



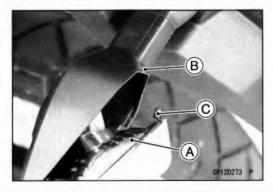
- Insert the new bulb into the socket.
- Insert the socket by aligning its tabs [B] with the cutouts
   [C] of the lens housing.
- Turn the socket clockwise until it stops.





- Fit the lens housing [A] to the light case [B] by inserting the projection [C] on the lens housing to the inside of the light case.
- Tighten:

Torque - Turn Signal Light Lens Screw: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)

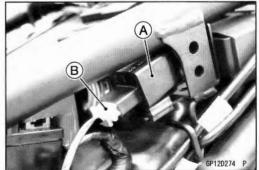


# Turn Signal Relay Inspection

Remove:

Left Seat Cover (see Seat Cover Removal in the Frame chapter)

- Remove the turn signal relay [A].
- Disconnect the turn signal relay connector [B].



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]

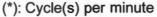
Turn Signal Lights [B]

12 V Battery [C]

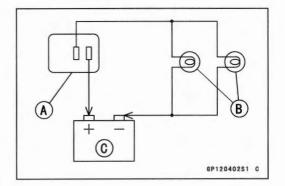
★ If the lights do not blink as specified, replace the turn signal relay.

**Testing Turn Signal Relay** 

| Load                                |    | Dlinking Times           |
|-------------------------------------|----|--------------------------|
| The Number of Turn<br>Signal Lights |    | Blinking Times<br>(c/m*) |
| 1**                                 | 10 | 140 ~ 250                |
| 2                                   | 20 | 75 ~ 95                  |



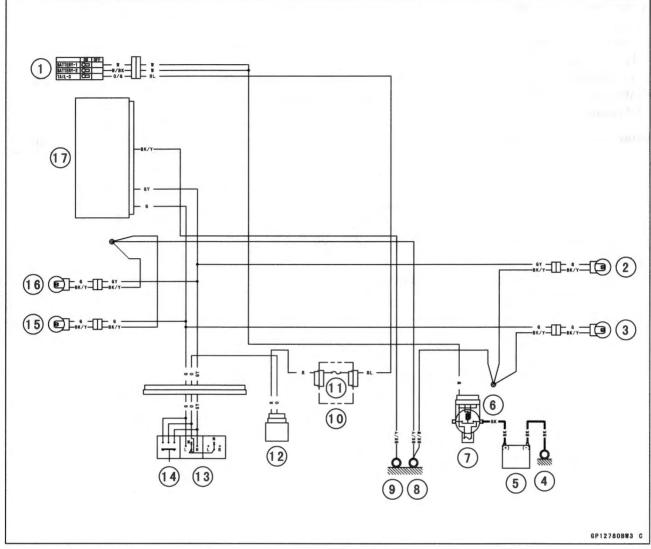
<sup>(\*\*):</sup> Correspond to "one light burned out."



# **16-60 ELECTRICAL SYSTEM**

# **Lighting System**

# **Turn Signal Light Circuit**



- 1. Ignition Switch
- 2. Rear Right Turn Signal Light 12 V 10 W
- 3. Rear Left Turn Signal Light 12 V 10 W
- 4. Engine Ground
- 5. Battery 12 V 8 Ah
- 6. Starter Relay
- 7. Main Fuse 30 A
- 8. Frame Ground (2)
- 9. Frame Ground (1)
- 10. Fuse Box (2)
- 11. Turn Signal Relay Fuse 10 A
- 12. Turn Signal Relay
- 13. Turn Signal Switch
- 14. Hazard Button
- 15. Front Left Turn Signal Light 12 V 10 W
- 16. Front Right Turn Signal Light 12 V 10 W
- 17. Meter Unit

# Air Switching Valve

# Air Switching Valve Operation Test

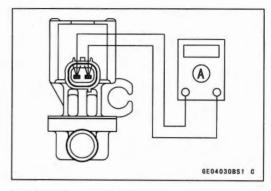
 Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

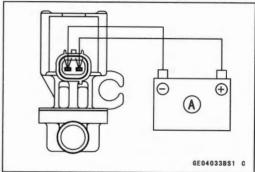
## Air Switching Valve Unit Test

- Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).
- Connect a digital meter [A] to the air switching valve terminals as shown.

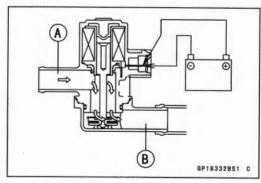
## Air Switching Valve Resistance Standard: $20 \sim 24 \Omega @20^{\circ}C (68^{\circ}F)$

- ★If the digital meter does not read as specified value, replace it with a new one.
- Connect the 12 V battery [A] to the air switching valve terminals as shown.





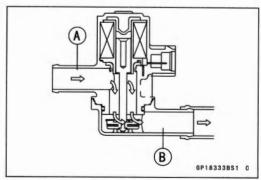
 Blow the air to the intake air duct [A], and make sure does not flow the blown air from the outlet air duct [B].



- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air duct [B].
- ★If the air switching valve does not operate as described, replace it with a new one.

### NOTE

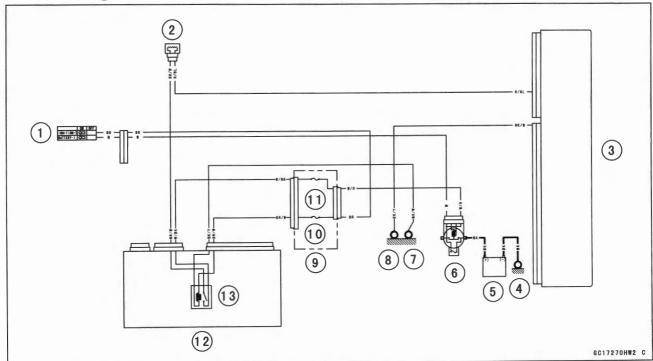
OTo check air flow through the air switching valve, just blow through the air switching valve hose (intake side).



# **16-62 ELECTRICAL SYSTEM**

# Air Switching Valve

# **Air Switching Valve Circuit**



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

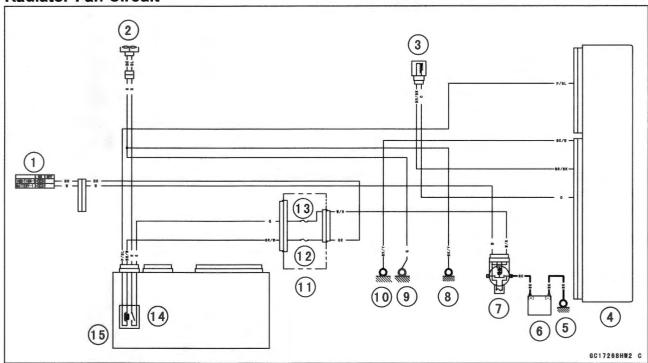
# **Radiator Fan System**

## Fan Motor Inspection

- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the connector [A].
- Using an auxiliary leads, supply battery power to the fan motor.
- ★If the fan does not rotate, the fan motor is defective and must be replaced.



## **Radiator Fan Circuit**



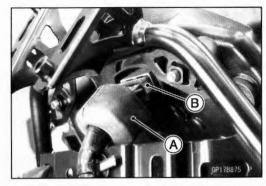
- 1. Ignition Switch
- 2. Fan Motor
- 3. Water Temperature Sensor
- 4. ECU
- 5. Engine Ground
- 6. Battery 12 V 8 Ah
- 7. Main Fuse 30 A
- 8. Frame Ground (5)
- 9. Frame Ground (4)
- 10. Frame Ground (1)
- 11. Fuse Box (1)
- 12. Ignition Fuse 10 A
- 13. Fan Fuse 10 A
- 14. Fan Relay
- 15. Relay Box

# 16-64 ELECTRICAL SYSTEM

# Meter, Gauge, Indicator Unit

#### Meter Unit Removal

- Remove the headlight (see Headlight Removal/Installation).
- Slide the dust cover [A], and disconnect the meter connector [B].



Remove:

Meter Mounting Screws [A] and Washers Meter [B]



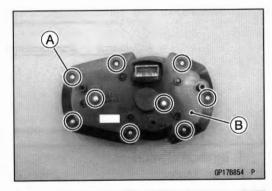
## Meter Unit Installation

- Installation is the reverse of removal.
- Install the removed parts (see appropriate chapters).

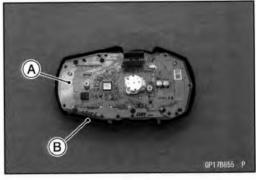
# Meter Unit Disassembly/Assembly

• Remove:

Meter Unit (see Meter Unit Removal) Meter Assembly Screws [A] Lower Meter Cover [B]



- Separate the meter assembly [A] and upper meter cover [B].
- Assembly is the reverse of removal.



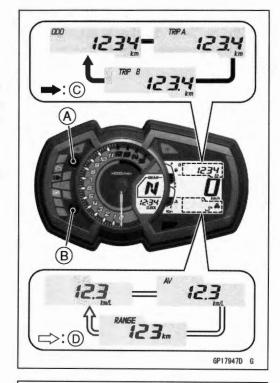
#### Meter Operation Inspection

Check 1: Meter Unit Switching Inspection Display Mode Setting

- Turn the ignition switch on and check the following.
- By pushing the upper meter button [A] or lower meter button [B] each time, check that the display changes as shown.

Pushing Upper Meter Button [C] Pushing Lower Meter Button [D]

★If the display function does not work, replace the meter assembly.



#### **Unit Setting**

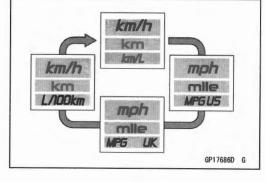
- Set the ODO mode by pushing the upper meter button.
- By pushing the lower meter button each time while the upper meter button pushed in, check that the display changes as shown.

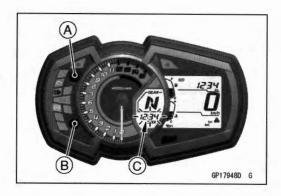
## NOTE

- OMile/Km Display can alternate between English and metric modes (mile and km) in the digital meter. Make sure that km or mile according to local regulations is correctly displayed before riding.
- ★If the display function does not work, replace the meter assembly.

#### **Clock Setting**

- Push the upper meter button [A] and lower meter button
   [B] and hold it.
- OThe clock setting menu (hour and minute) should blink [C].

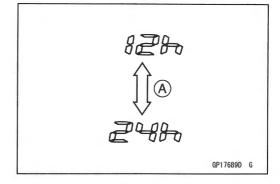




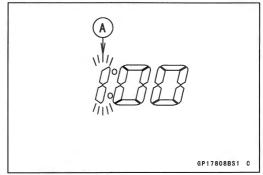
### 16-66 ELECTRICAL SYSTEM

# Meter, Gauge, Indicator Unit

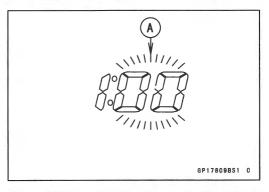
- Push the lower meter button and hold it.
  0"12h" or "24h" display is appeared.
- Push the upper meter button to select "12h" or "24h" [A].



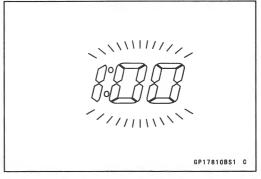
- Push the lower meter button.
- OThe hour display [A] starts blinking.
- By pushing the upper meter button each time, check that the hour display changes.



- By pushing the lower meter button, check that the hour display decides and minute display [A] starts blinking.
- By pushing the upper meter button each time, check that the minute display changes.



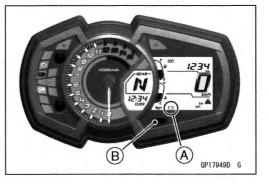
- By pushing the lower meter button, check that the hour and minute display start blinking.
- By pushing the upper meter button, check that the hour and minute display decide.
- When both hour and minute display is blinking, by pushing the lower meter button, check that the hour display start blinking. This blinking returns the hour setting display.
- ★If the display function does not work, replace the meter assembly.



# Meter System Inspection

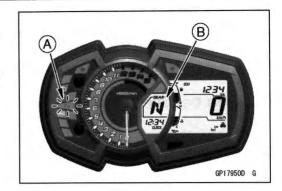
#### Check 2-1: Battery Warning Indicator Inspection

- When the battery condition is low voltage ( $10.8 \sim 11.2 \text{ V}$  or less) or high voltage ( $15.5 \sim 16.5 \text{ V}$  or more), the battery warning indicator [A] and red warning indicator light (LED) [B] go on.
- ★If the battery warning indicator and red warning indicator light (LED) go on, inspect the charging voltage (see Charging Voltage Inspection).
- ★ If the charging voltage is good, replace the meter assembly.



#### **Check 2-2: Gear Position Indication Inspection**

- Turn the ignition switch on and shift the transmission gear into neutral position.
- OThe green neutral indicator light (LED) [A] goes on, and the gear position indicator is display the "N" position [B].



- Set the low gear position, and check that the display changes to "1" mark [A] and the green neutral indicator light (LED) [B] goes off.
- Using the rear stand, raise the rear wheel off the ground.
- Rotate the rear wheel by hand and change the gear position
- Check that the display corresponding to each gear position (1, N, 2, 3, 4, 5 or 6) appears.
- ★If the display function does not work, check the following parts.

Gear Position Sensor (see Gear Position Sensor Input Voltage Inspection in the Fuel System (DFI) chapter) Wiring (see Meter Unit Circuit)

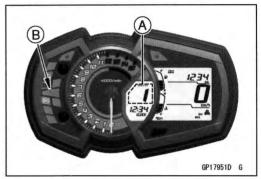
★If the above parts are good, replace the meter assembly and/or ECU.

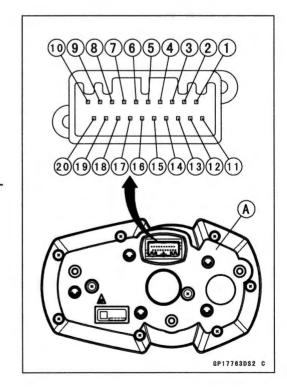


- Remove the meter unit [A] (see Meter Unit Removal).
  - [1] Unused
  - [2] Unused
  - [3] Unused
  - [4] Unused
  - [5] Unused
  - [6] Red Warning Indicator Light (LED) (-)
  - [7] Green Neutral Indicator Light (LED) (-)
  - [8] Yellow ABS Indicator Light (LED) (–) [Equipped Models]
  - [9] Ground (-)
  - [10] Ignition (+)
  - [11] Fuel Level Sensor
  - [12] Rear Wheel Rotation Sensor Pulse
  - [13] ECU Communication Line
  - [14] Unused
  - [15] Tachometer Pulse
  - [16] Green Right Turn Signal Indicator Light (LED) (+)
  - [17] Blue High Beam Indicator Light (LED) (+)
  - [18] Unused
- [19] Green Left Turn Signal Indicator Light (LED) (+)
- [20] Battery (+)

### NOTICE

Do not drop the meter unit. Do not short each terminal.

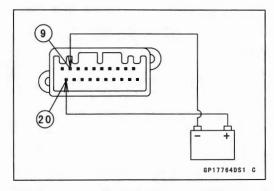


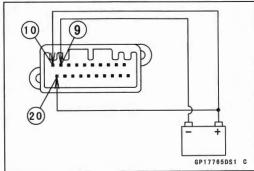


#### Check 3-1: Meter Unit Primary Operation Check

- Using the auxiliary leads, connect the 12 V battery to the meter unit connector as follows.
- OConnect the battery positive (+) terminal to the terminal [20].
- OConnect the battery negative (–) terminal to the terminal [9].







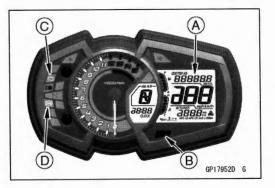
- Check the following items.
- The tachometer needle sweeps to the maximum reading, then sweeps back to the minimum reading.
- OThe LCD display and meter illuminations should turn on.
- OAll the LCD segments [A] appear for few seconds.
- OThe red warning indicator light (LED) [B] is goes on for few seconds.
- OFollowing indicators are remains on.
  Yellow Engine Warning Indicator Light (LED) [C]
  Yellow ABS Warning Indicator Light (LED) [D] (if equipped)
- ★ If the meter unit does not work properly, replace the meter assembly.

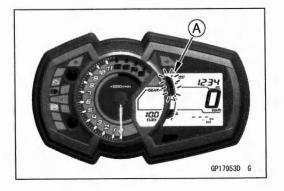
#### NOTE

- OThis 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.
- OMake sure that the fuel level gauge segments [A] and indicator on the LCD start blinking approx. 5 seconds after turning on the meter unit.
- ★ If the meter unit does not work properly, replace the meter assembly.

#### NOTE

OThis 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 blink in the display.





 Make sure that the following indicators on the LCD start blinking approx. 10 seconds after turning on the meter unit.

Gear Position Indicator with "--" Message [A]

All Segments of Water Temperature Gauge [B] and Indicator

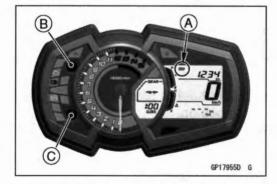
Multifunction Display with "- -.-" Message [C]

#### NOTE

- OThis meter unit has a failure detection function (for open or short) of the water temperature gauge. When the water temperature gauge is open or short, the meter unit alerts the rider by the all water temperature gauge segments blink in the display.
- ★ If the meter unit does not work properly, replace the meter assembly.

# Check 3-2: Meter Communication Line (Service Code 39) Check

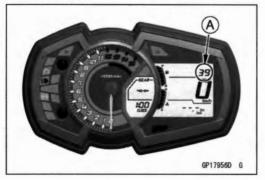
- Connect the leads in the same circuit as Check 3-1.
- The yellow engine warning indicator light (LED) should remains on.
- 10 9 20 8P17765DS1 C
- Set the ODO mode [A] by pushing the upper meter button [B].
- Push the upper meter button and lower meter button [C] simultaneously for more than 2 seconds.

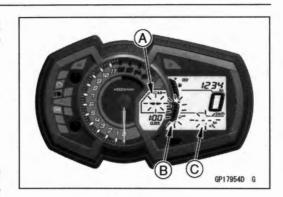


- Check the following items.
- OThe number "39" [A] in the display appears.
- Push the upper meter button and lower meter button again for more than 2 seconds.
- Check the following items.
- OThe display returns ODO mode from number "39."
- ★ If the meter unit does not work, replace the meter assembly.

#### NOTE

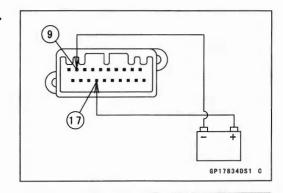
- The number "39" is service code of Self-Diagnosis (see Fuel System (DFI) chapter). It is the service code of the meter communication line error.
- The number "39" in the display disappear when the meter unit is connected to main harness of the normal motorcycle.



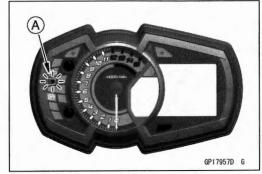


# Check 3-3: Blue High Beam Indicator Light (LED) Inspection

- Connect the terminal [9] to the battery (-) terminal.
- Connect the terminal [17] to the battery (+) terminal.

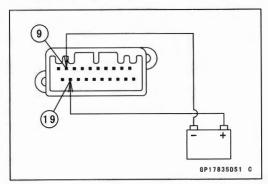


- Check that the blue high beam indicator light (LED) [A] goes on.
- ★If the indicator light (LED) does not go on, replace the meter assembly.

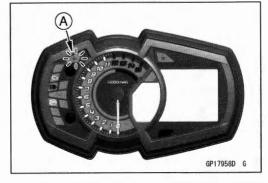


# Check 3-4: Green Left Turn Signal Indicator Light (LED) Inspection

- Connect the terminal [9] to the battery (–) terminal.
- Connect the terminal [19] to the battery (+) terminal.

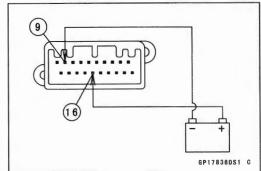


- Check that the green left turn signal indicator light (LED)
   [A] goes on.
- ★If the indicator light (LED) does not go on, replace the meter assembly.

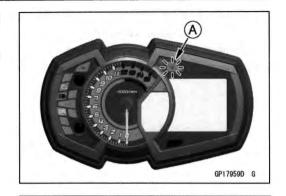


# Check 3-5: Green Right Turn Signal Indicator Light (LED) Inspection

- Connect the terminal [9] to the battery (-) terminal.
- Connect the terminal [16] to the battery (+) terminal.

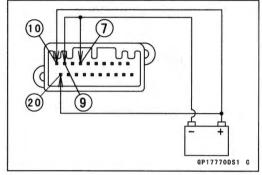


- Check that the green right turn signal indicator light (LED)
   [A] goes on.
- ★If the indicator light (LED) does not go on, replace the meter assembly.

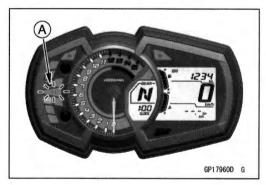


# Check 3-6: Green Neutral Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [7] to the battery (-) terminal.

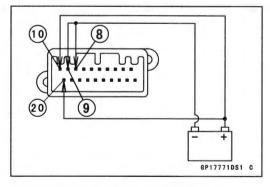


- Check that the green neutral indicator light (LED) [A] goes on.
- ★If the indicator light (LED) does not go on, replace the meter assembly.

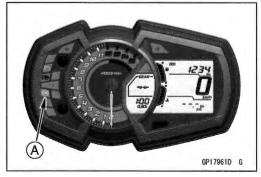


# Check 3-7: Yellow ABS Indicator Light (LED) Inspection (Equipped Model)

- Connect the leads in the same circuit as Check 3-1.
- OThe yellow ABS indicator light (LED) goes on.
- Connect the terminal [8] to the battery (-) terminal.

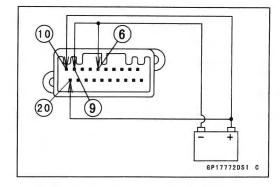


- Check that the yellow ABS indicator light (LED) [A] goes
- ★If the indicator light (LED) does not go off, replace the meter assembly.

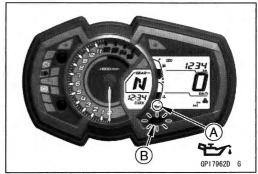


# Check 3-8: Red Warning Indicator Light (LED) Inspection (Oil Pressure Warning)

- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [6] to the battery (-) terminal.

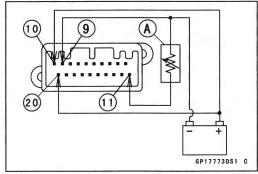


- Check that the oil pressure warning indicator [A] and red warning indicator light (LED) [B] goes on approx. 5 seconds later.
- ★If the oil pressure warning indicator and indicator light (LED) does not go on, replace the meter assembly.



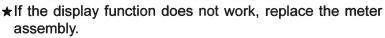
### Check 3-9: Fuel Gauge Inspection

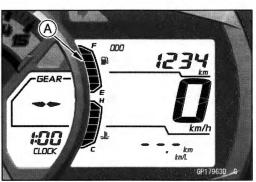
- Connect the leads in the same circuit as Check 3-1.
- OThe all segments of the fuel gauge in the display will blink.
- Connect the variable rheostat [A] to the terminal [11] and the battery (–) terminal.



- Check that the number of segments on the fuel level gauge [A] matches the resistance value of the variable rheostat.
- OAfter changing the resistance between the terminal [11] and ground, the segment(s) in the fuel level gauge should change after 15 seconds.

| •                                |   |
|----------------------------------|---|
| Variable Rheostat Resistance (Ω) | Display Segments                                  |
| 20                               | 6 segments go on                                  |
| 40                               | 5 segments go on                                  |
| 70                               | 4 segments go on                                  |
| 100                              | 3 segments go on                                  |
| 130                              | 2 segments go on                                  |
| 170                              | 1 segment goes on                                 |
| 210                              | 1 segment and fuel level warning indicator blinks |



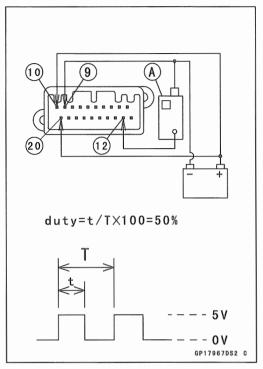


#### Check 3-10: Speedometer Inspection

- Connect the leads in the same circuit as Check 3-1.
- The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [12].
- Olndicates approximately 60 km/h if the input frequency is approximately 430 Hz.
- Olndicates approximately 60 mph if the input frequency is approximately 680 Hz.
- ★If the meter function does not work, replace the meter assembly.

#### NOTE

- OThe input frequency of the oscillator adds the integrated value of the odometer.
- OThe integrated value of the odometer cannot be reset.



#### Check 3-11: Odometer Check

- Check the odometer with the speedometer check in the same way.
- ★If value indicated in the odometer is not added, replace the meter assembly.

#### NOTE

- OWhen the figures come to 999999, they are stopped and locked.
- OThe integrated value of the odometer cannot be reset.

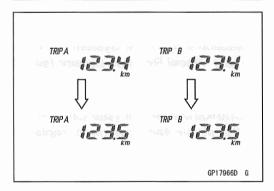
#### Check 3-12: Trip A/B Meter Check

- Check the trip meter with the speedometer in the same way.
- ★If value indicated in the trip meter is not added, replace the meter unit.
- Check that when the lower meter button is pushed for more than two seconds, the figure display turns to 0.0.
- ★ If the figure display does not indicate 0.0, replace the meter assembly.

### **NOTE**

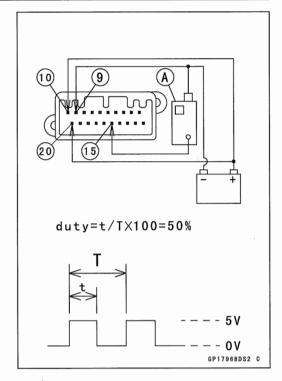
OThe data of the trip meters are maintained even if the battery is disconnected.





## Check 3-13: Tachometer Inspection

- Connect the leads in the same circuit as Check 3-1.
- The engine speed (rpm) equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [15].
- OIndicates approximately 6 000 rpm if the input frequency is approximately 200 Hz.
- ★If the meter function does not work, replace the meter assembly.



## Check 3-14: Other Inspection

OThe following items are displayed while running.

**AVERAGE** 

CURRENT

**RANGE** 

ECO Mark

When the above item is faulty indication check the following items.

Wiring (see Wiring Inspection)

ECU Communication Line (see ECU Communication Line Inspection in the Fuel System (DFI) chapter)

Fuel Injectors (see Fuel Injectors (Service Code 41, 42) section in the Fuel System (DFI) chapter)

Rear Wheel Rotation Sensor (see Rear Wheel Rotation Sensor Signal (Service Code 24) section in the Fuel System (DFI) chapter)

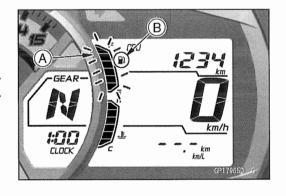
Crankshaft Sensor (see Crankshaft Sensor Inspection)

★If the above items are good, replace the meter assembly and/or ECU.

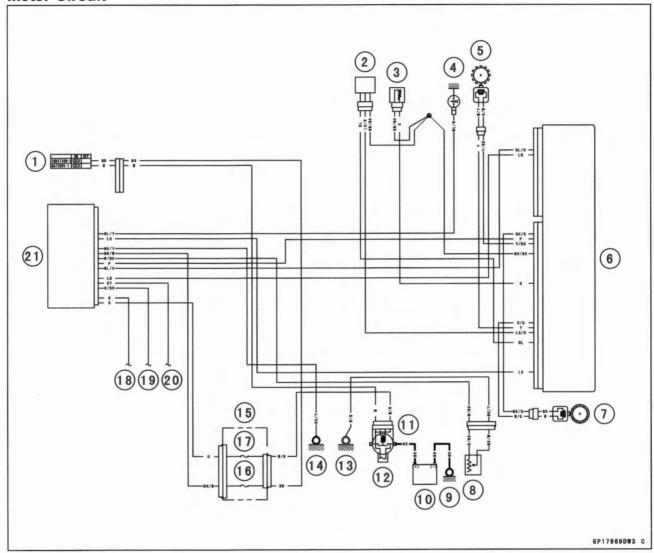
# Fuel Level Sensor Line Self-Diagnosis Mode Inspection

#### NOTE

- OUsually when the open or short of the fuel level sensor circuit is detected, it becomes the Fuel Level Sensor Line Self-Diagnosis Mode.
- OThe all segments [A] of the fuel level gauge and fuel level warning indicator [B] in the display will blink. (This function is Fuel Level Sensor Line Self-Diagnosis Mode.)
- ★ If the meter enters the self-diagnosis mode when the meter is installed in the motorcycle, check the fuel level sensor (see Fuel Level Sensor Inspection) and wiring.
- ★If the fuel level sensor and wiring are good, replace the meter assembly.



## **Meter Circuit**



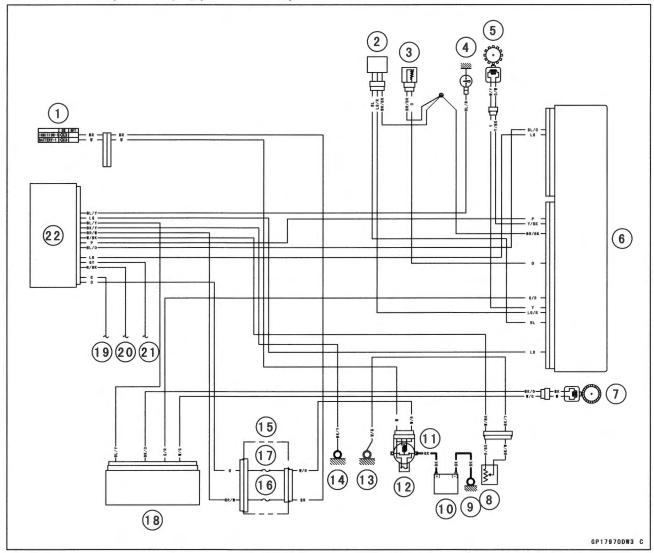
- 1. Ignition Switch
- 2. Gear Position Sensor
- 3. Water Temperature Sensor
- 4. Oil Pressure Switch
- 5. Crankshaft Sensor
- 6. ECU
- 7. Rear Wheel Rotation Sensor
- 8. Fuel Level Sensor
- 9. Engine Ground
- 10. Battery 12 V 8 Ah
- 11. Starter Relay

- 12. Main Fuse 30 A
- 13. Frame Ground (3)
- 14. Frame Ground (1)
- 15. Fuse Box (1)
- 16. Ignition Fuse 10 A
- 17. Meter Fuse 10 A
- 18. to Turn Signal Switch (Left)
- 19. to Headlight Hi Beam
- 20. to Turn Signal Switch (Right)
- 21. Meter Unit

# **16-76 ELECTRICAL SYSTEM**

# Meter, Gauge, Indicator Unit

# **Meter Circuit (ABS Equipped Models)**



- 1. Ignition Switch
- 2. Gear Position Sensor
- 3. Water Temperature Sensor
- 4. Oil Pressure Switch
- 5. Crankshaft Sensor
- 6. ECU
- 7. Rear Wheel Rotation Sensor
- 8. Fuel Level Sensor
- 9. Engine Ground
- 10. Battery 12 V 8 Ah
- 11. Starter Relay

- 12. Main Fuse 30 A
- 13. Frame Ground (3)
- 14. Frame Ground (1)
- 15. Fuse Box (1)
- 16. Ignition Fuse 10 A
- 17. Meter Fuse 10 A
- 18. ABS Hydraulic Unit
- 19. to Turn Signal Switch (Left)
- 20. to Headlight Hi Beam
- 21. to Turn Signal Switch (Right)
- 22. Meter Unit

## **Brake Light Timing Inspection**

 Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

## Brake Light Timing Adjustment

• Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

## Switch Inspection

- Using a digital meter, check to see that only the connections shown in the table have continuity.
- OFor the switch housings and the ignition switch, refer to the tables in the Wiring Diagram.
- ★If the switch has an open or short, repair it or replace it with a new one.

#### **Rear Brake Light Switch Connections**

| Rear Brake Light Swit           | ch Conne | ections  |
|---------------------------------|----------|----------|
| Color                           | BR       | BL       |
| When brake pedal is pushed down | 0        | <u> </u> |
| When brake pedal is released    |          |          |

#### **Sidestand Switch Connections**

| Sidestand Switch       | Connect | ions |
|------------------------|---------|------|
| Color                  | BK      | G    |
| When sidestand is down |         |      |
| When sidestand is up   | 0       |      |

## Fog Light Switch Connections (KLE300A)

| Fog Light Switch Connections |    |    |
|------------------------------|----|----|
| Color                        | R  | BR |
| When switch is pulled in     | 0- |    |
| When switch is released      |    |    |

GP18770B S

#### **Oil Pressure Switch Connections\***

| Oil Pressure Switch Connections * |              |               |
|-----------------------------------|--------------|---------------|
| Color                             | SW. Terminal | Ground        |
| When engine is stopped            | 0-           | $\overline{}$ |
| When engine is running            |              |               |

<sup>\*:</sup> Engine lubrication system is in good condition.

#### Water Temperature Sensor Inspection

- Remove the water temperature sensor (see Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter).
- Suspend the sensor [A] in a container of coolant so that the temperature-sensing projection [C] is submerged.
- Suspend an accurate thermometer [B] with temperature -sensing projection located in almost the same depth with the sensor.

#### NOTE

- OThe sensor and thermometer must not touch the container side or bottom.
- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using a digital meter, measure the internal resistance of the sensor.
- ★If the digital meter does not show the specified values, replace the sensor.

## Water Temperature Sensor Resistance

| Temperature   | Resistance (kΩ) |
|---------------|-----------------|
| -20°C (-4°F)  | *18.80 ±2.37    |
| 0°C (32°F)    | *(about 6.544)  |
| 40°C (104°F)  | 1.136 ±0.095    |
| 100°C (212°F) | 0.1553 ±0.0070  |

<sup>\*:</sup> Reference Information

#### Rear Wheel Rotation Sensor Removal

 Refer to the Rear Wheel Rotation Sensor Removal/Installation in the Fuel System (DFI) chapter.

#### Rear Wheel Rotation Sensor Installation

 Refer to the Rear Wheel Rotation Sensor Removal/Installation in the Fuel System (DFI) chapter.

#### Rear Wheel Rotation Sensor Inspection

 Refer to the Rear Wheel Rotation Sensor Inspection in the Fuel System (DFI) chapter.

#### Oxygen Sensor Removal

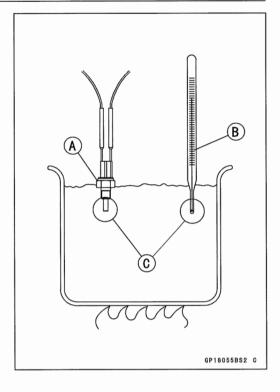
### **NOTICE**

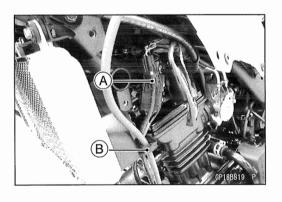
Never drop the sensor especially on a hard surface. Such a shock to the sensor can damage it.

#### **NOTICE**

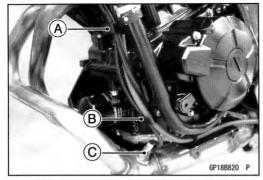
Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.

- Remove:
  - Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the oxygen sensor lead connector [A].
- Open the clamp [B].





- Open the clamps [A] and [B] to release the lead.
- Remove the oxygen sensor [C].



## 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.

- Apply a silicone grease to the threads of the sensor, and install it to the exhaust pipe.
- Tighten:

Torque - Oxygen Sensor: 44.1 N·m (4.50 kgf·m, 32.5 ft·lb)

- Run the oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

## Oxygen Sensor Inspection

 Refer to the Oxygen Sensor Inspection in the Fuel System (DFI) chapter.

#### Fuel Level Sensor Inspection

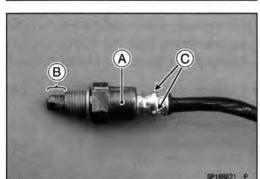
Remove:

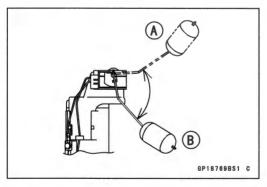
Fuel Pump (see Fuel Pump Removal in the Fuel System (DFI) chapter)

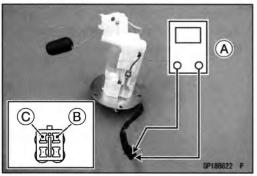
- Check that the float moves up and down smoothly without binding. It should go down under its own weight.
- ★ If the float does not move smoothly, replace the fuel pump.
  Float in Full Position [A]
  Float in Empty Position [B]
- Using a digital meter [A], measure the resistance between the R/BK lead [B] and BK/W lead [C] terminals.
- ★ If the digital meter readings are not as specified, or do not change smoothly according as the float moves up and down, replace the fuel pump.

**Fuel Level Sensor Resistance** 

Standard: Full position:  $9.6 \sim 12.4 \Omega$ Empty position:  $222 \sim 228 \Omega$ 







#### 16-80 ELECTRICAL SYSTEM

#### Switches and Sensors

#### Gear Position Sensor Removal

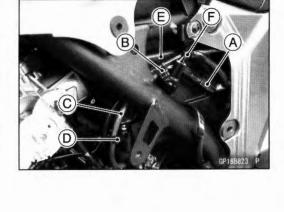
Remove:

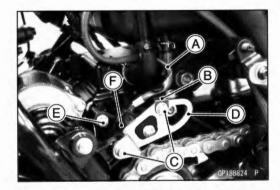
Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)

Left Side Cover (see Side Cover Removal in the Frame chapter)

- Disconnect the gear position sensor connector [A].
- Open the clamp [B] and slide the gear position sensor lead [C] forward through the clearance behind the frame pipe.
- Release the lead from the clip [D].
- Olf the gear position sensor lead is difficult to sliding forward by interfering with the starter motor cable [E], open the clamp [F] to loose the starter motor cable.
- Release the gear position sensor lead [A] from the clamp [B].
- Remove:

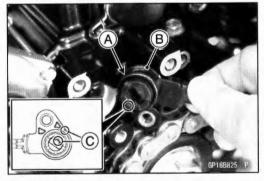
Chain Guide Bolts [C]
Chain Guide [D]
Gear Position Sensor Bolt [E] and Washer
Gear Position Sensor [F]





### Gear Position Sensor Installation

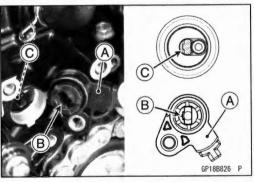
- Replace the O-ring [A] with a new one and apply grease to the O-ring.
- Slide the O-ring on the gear position sensor [B].
- Align the two "△" marks [C] embossed on the sensor rotor and sensor body.



- Make sure that the transmission is shifted into the neutral.
- Install the gear position sensor [A] so that the cut-out [B] in the slit of the sensor fits to the small ridge [C] on the flat area of the shaft.

#### NOTICE

Incorrect installation of the gear position sensor may cause damage the sensor or detection error of the gear position.



- Install the washer and gear position sensor bolt [A].
  - Torque Gear Position Sensor Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Install the chain guide [B], clamp [C] and tighten the chain guide bolts [D].
  - Torque Chain Guide Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Connect the gear position sensor connector.
- Install the removed parts (see appropriate chapters).

# Accessory Socket Removal/Installation (KLE300A)

- Remove:
  - Upper Fairing (see Upper Fairing Removal in the Frame chapter).
- Disconnect the accessory socket connectors [A].



Remove:

Accessory Socket Ring Nut [B]. Accessory Socket [C]

- Installation is the reverse of removal.
- Insert the accessory socket [A] to the middle inner cover.
   OAlign the tab [B] with the cut-out [C].
- Tighten:

Torque - Accessory Socket Ring Nut: 2.8 N·m (0.29 kgf·m, 25 in·lb)

• Install:

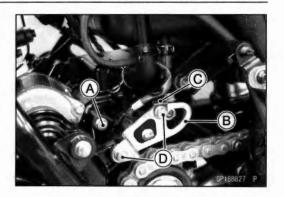
Middle Inner Cover (see Middle Inner Cover Installation in the Frame chapter).

## Accessory Relay Inspection (KLE300A)

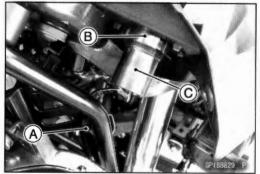
Remove:

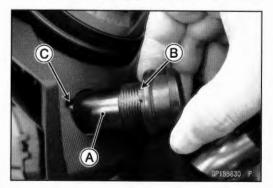
Upper Fairing (see Upper Fairing Removal in the Frame chapter)

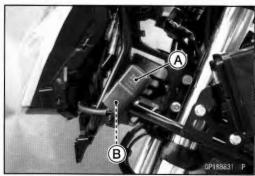
- Remove the accessory relay [A].
- Disconnect the accessory relay connector [B].











# **16-82 ELECTRICAL SYSTEM**

# **Switches and Sensors**

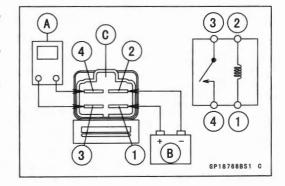
- Connect a digital meter [A] between the relay terminals [3] and [4].
- Connect a 12 V battery [B] between the relay terminals
   [1] and [2] as shown.
- ★If the relay [C] does not work as specified, the relay is defective. Replace the relay.

## **Testing Relay**

Criteria:

When battery is connected  $\rightarrow$  0  $\Omega$ 

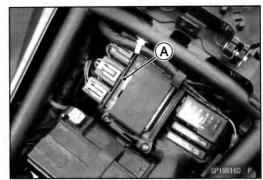
When battery is disconnected  $\to \infty~\Omega$ 



### **Relay Box**

#### NOTE

OThe relay box [A] has relays and diodes. The relays and diodes can not be removed.

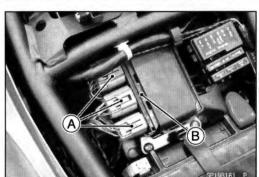


#### Relay Box Removal

#### NOTICE

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

- Remove:
   Seat (see Seat Removal in the Frame chapter)
- Disconnect the connectors [A] and remove the relay box [B].



#### Relay Box Installation

- Installation is the reverse of removal.
- ORun the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

#### Relay Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following numbered terminals by connecting a tester and one 12 V battery to the relay box as shown in the figure (see Relay Box Internal Circuit in this section).
- ★ If the tester does not read as specified, replace the relay box.

#### Relay Circuit Inspection (with the battery disconnected)

|                            | <b>Tester Connection</b> | Tester Reading (Ω) |
|----------------------------|--------------------------|--------------------|
| Headlight Circuit<br>Relay | 1-3                      | 00                 |
| ECU Main Relay             | 7-6                      | ∞                  |
|                            | 4-5                      | Not ∞*             |
| Fuel Pump Relay            | 7-8                      | ∞                  |
|                            | 9-10                     | Not ∞*             |
| Starter Circuit Relay      | 11-16                    | ∞                  |
|                            | 11-12                    | ∞                  |
| Fan Dalau                  | 17-20                    | ∞                  |
| Fan Relay                  | 18-19                    | Not ∞*             |

<sup>\*:</sup> The actual reading varies with the tester used.

#### 16-84 ELECTRICAL SYSTEM

### **Relay Box**

### Relay Circuit Inspection (with the battery connected)

|                            | Battery<br>Connection<br>(+) (-) | Tester<br>Connection | Tester<br>Reading (Ω) |
|----------------------------|----------------------------------|----------------------|-----------------------|
| Headlight Circuit<br>Relay | 2-11                             | 1-3                  | 0                     |
| ECU Main Relay             | 4-5                              | 7-6                  | 0                     |
| Fuel Pump Relay            | 9-10                             | 7-8                  | 0                     |
| Fan Relay                  | 18-19                            | 17-20                | 0                     |

|                          | Battery<br>Connection<br>(+) (-) | Tester Connection<br>DC 25 V Range<br>(+) (-) | Tester<br>Reading (V) |
|--------------------------|----------------------------------|---|-----------------------|
| Starter<br>Circuit Relay | 16-12                            | 11-12   | Battery<br>Voltage    |

<sup>(+):</sup> Apply positive 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.

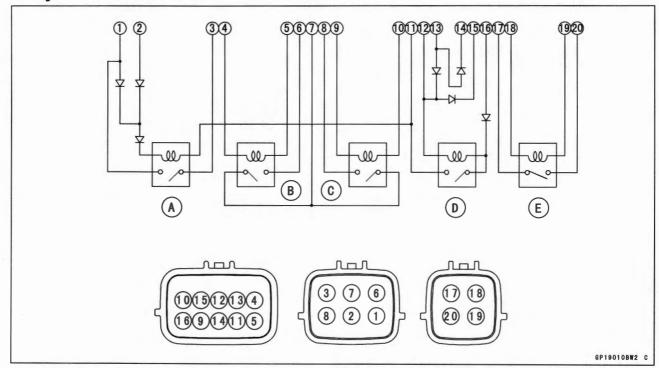
#### NOTE

• 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.

<sup>(-):</sup> Apply negative lead.

# **Relay Box**

### **Relay Box Internal Circuit**



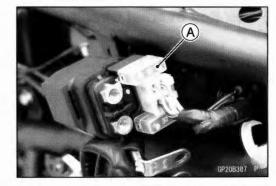
- A: Headlight Circuit Relay
- B: ECU Main Relay
- C: Fuel Pump Relay
- D: Starter Circuit Relay
- E: Fan Relay

### 16-86 ELECTRICAL SYSTEM

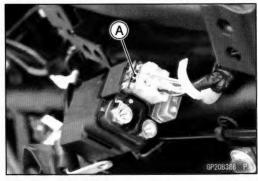
#### **Fuse**

#### 30 A Main Fuse Removal

- Pull out the starter relay from the bracket (see Starter Relay Inspection).
- Remove: 30 A Main Fuse Cover [A]

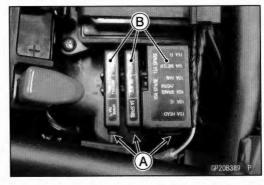


 Pull out the main fuse [A] from the starter relay with a needle nose pliers.

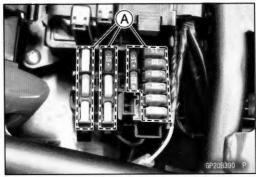


#### Fuse Box Fuse Removal

- Remove:
  - Seat (see Seat Removal in the Frame chapter)
- Unlock the hooks [A] to lift up the lids [B].



 Pull the sub fuses [A] straight out from the fuse box with a needle nose pliers.



#### Fuse Installation

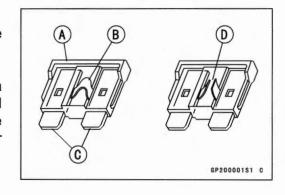
- ★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.
- Install the fuse box fuses on the original position as specified on the lid.

#### **Fuse**

#### **Fuse Inspection**

- Remove the fuse (see 30 A Main Fuse Removal or Fuse Box Fuse Removal).
- Inspect the fuse element.
- ★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]



#### NOTICE

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

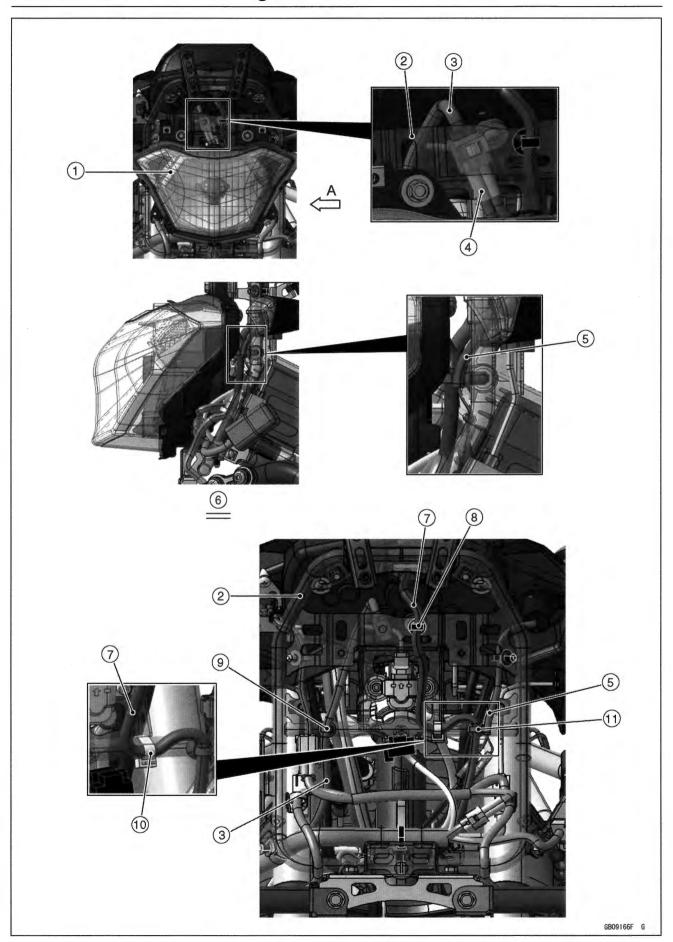
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# **Appendix**

# **Table of Contents**

| Cable, Wire, and Hose Routing | 17-2  |
|-------------------------------|-------|
| Troubleshooting Guide         | 17-58 |

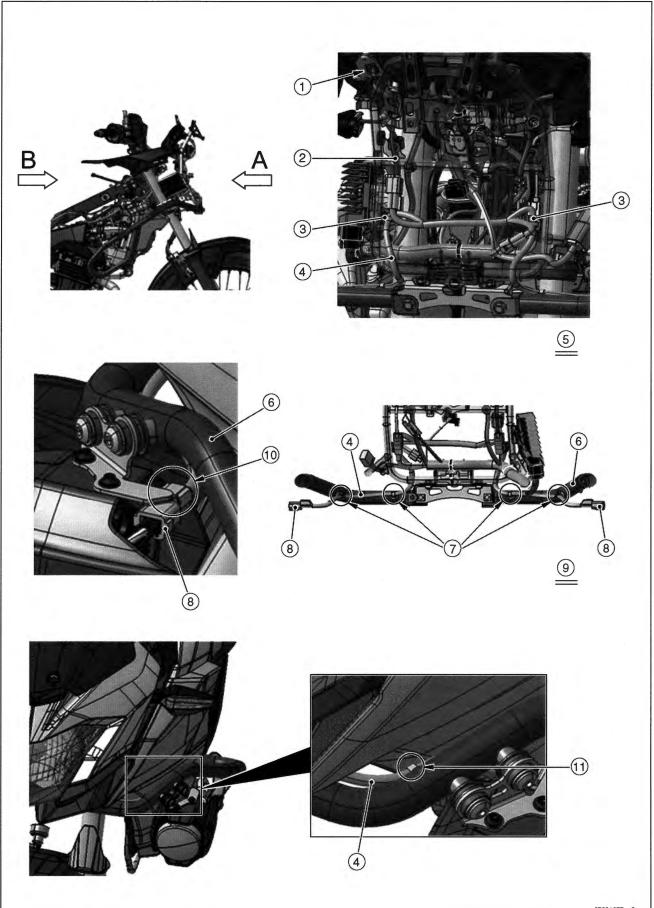


- 1. Headlight Unit
- 2. Upper Fairing Bracket
- 3. Headlight Lead
- 4. City Light Lead Connector (Insert the city light lead connector to the upper fairing bracket.)
- 5. Accessory Socket Lead (KLE300A) (Run the accessory socket lead in front of the upper fairing bracket.)
- 6. Viewed from A
- 7. Meter Unit Lead
- 8. Clamp (Hold the meter unit lead, and insert the clamp to the upper fairing bracket.)
- 9. Clamp (Hold the headlight lead, and insert the clamp to the upper fairing bracket.)
- 10. Band (Hold the meter unit lead. Install the band at the end of the bracket.)
- 11. Clamp (Hold the meter unit lead, and insert the clamp to the upper fairing bracket.)

# **17-4 APPENDIX**

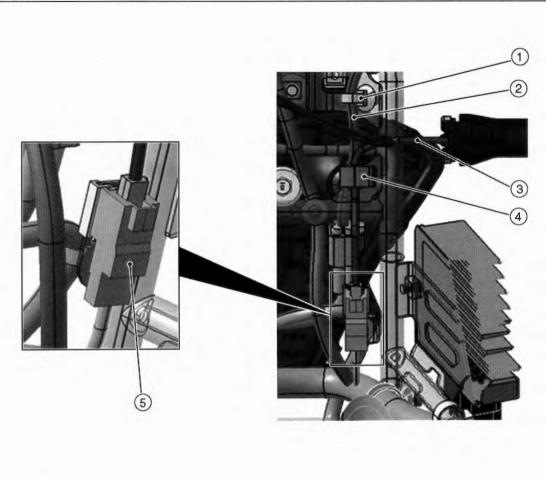
# Cable, Wire, and Hose Routing

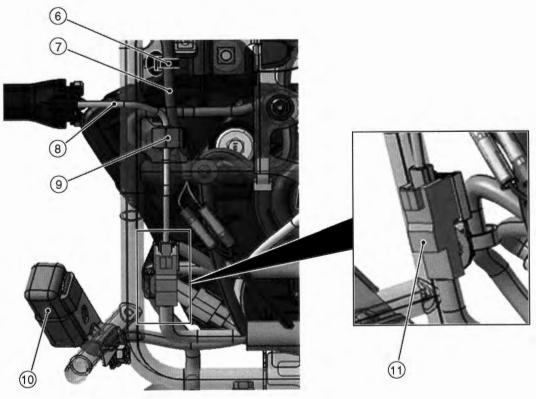
# KLE300A



- 1. Fog Light Switch
- 2. Fog Light Switch Lead
- 3. Clamps (Hold the fog light lead, and insert the clamps to the upper fairing bracket.)
- 4. Fog Light Lead
- 5. Viewed from A
- 6. Engine Guard
- 7. Clamps (Hold the fog light lead, and insert the clamps to the engine guard.)
- 8. Fog Light Lead Connectors
- 9. Viewed from B
- 10. Install the fog light lead connector to the bracket.
- 11. Hold the fog light lead so that the fog light lead does not touch the middle fairing.)

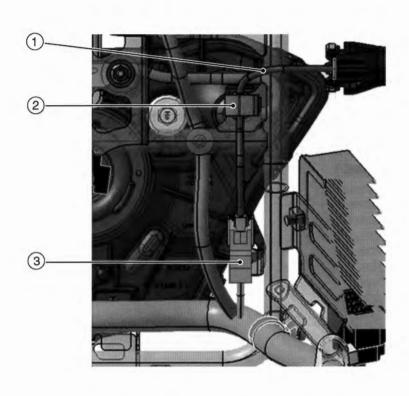
# KLE300A

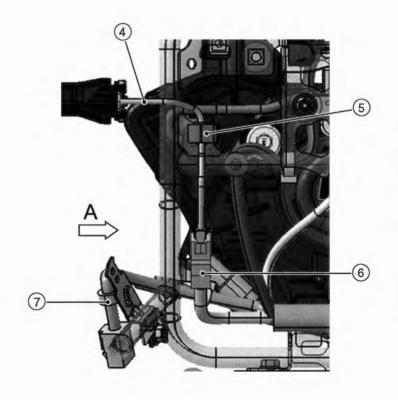


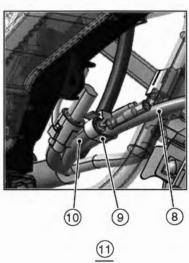


- 1. Clamp (Hold the fog light switch lead.)
- 2. Fog Light Switch Lead
- 3. Front Right Turn Signal Light Lead
- 4. Clamp (Hold the front right turn signal light lead. The open side of the clamp faces leftward.)
- 5. Front Right Turn Signal Light Lead Connector (Insert the front right turn signal light lead connector to the upper fairing bracket.)
- 6. Clamp (Hold the accessory socket lead. The tip of the clamp faces leftward.)
- 7. Accessory Socket Lead
- 8. Front Left Turn Signal Light Lead
- 9. Clamp (Hold the front left turn signal light lead. The open side of the clamp faces rightward.)
- 10. Accessory Relay (Insert the accessory relay to the upper fairing bracket.)
- 11. Front Left Turn Signal Light Lead Connector (Insert the front left turn signal light lead connector to the upper fairing bracket.)

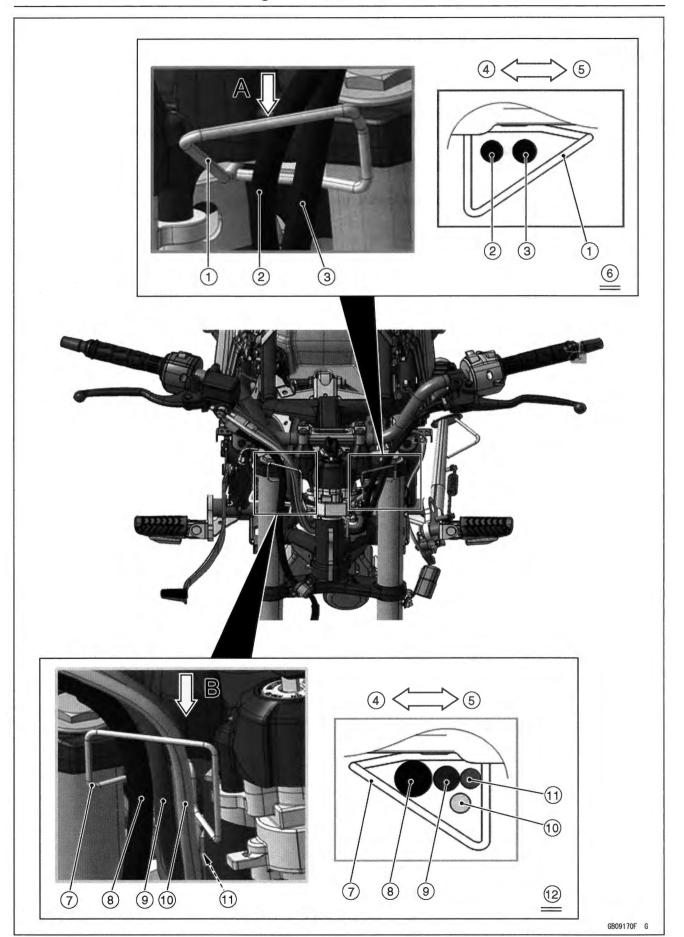
# KLE300B/C



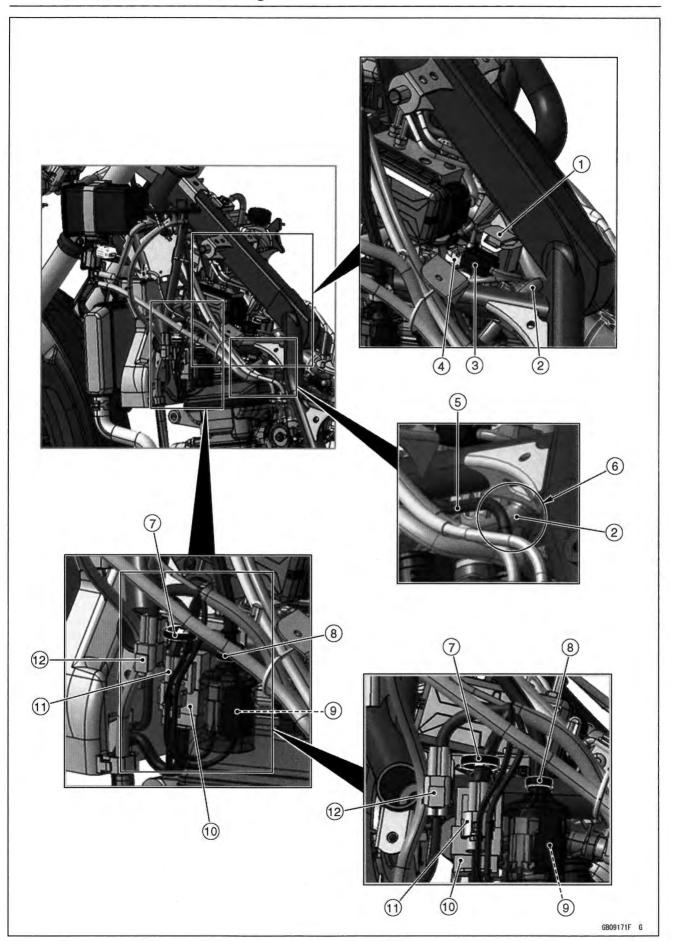




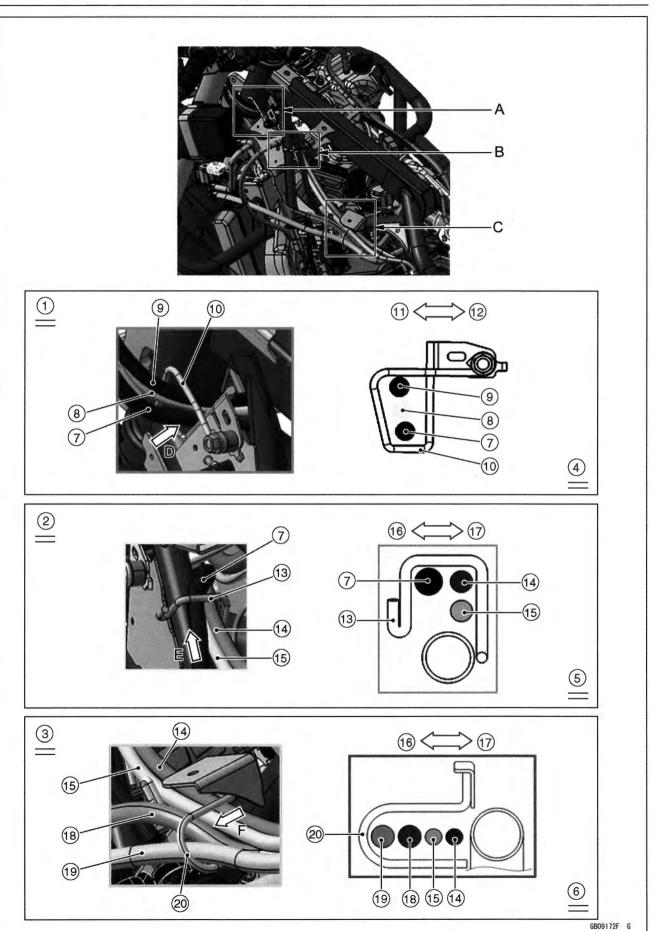
- 1. Front Right Turn Signal Light Lead
- 2. Clamp (Hold the front right turn signal light lead.)
- 3. Front Right Turn Signal Light Lead Connector (Insert the front right turn signal light lead connector to the upper fairing bracket.)
- 4. Front Left Turn Signal Light Lead
- 5. Clamp (Hold the front left turn signal light lead.)
- 6. Front Left Turn Signal Light Lead Connector (Insert the front left turn signal light lead connector to the upper fairing bracket.)
- 7. Clamp (Hold the main harness. Insert the clamp to the meter bracket.)
- 8. Main Harness
- 9. Clamp (Hold the accessory socket lead to the main harness.)
- 10. Accessory Socket Lead
- 11. Viewed from A



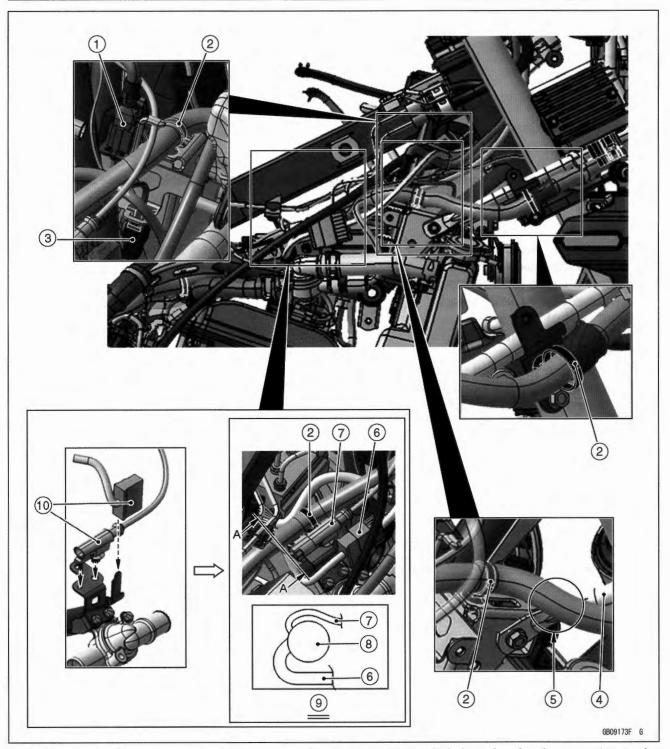
- 1. Run the clutch cable and left switch housing lead through the clamp as shown.
- 2. Clutch Cable
- 3. Left Switch Housing Lead
- 4. Right Side of Vehicle
- 5. Left Side of Vehicle
- 6. Viewed from A
- 7. Run the front brake hose, right switch housing lead, throttle cable (decelerator) and throttle cable (accelerator) through the clamp as shown.
- 8. Front Brake Hose
- 9. Right Switch Housing Lead
- 10. Throttle Cable (Decelerator)
- 11. Throttle Cable (Accelerator)
- 12. Viewed from B



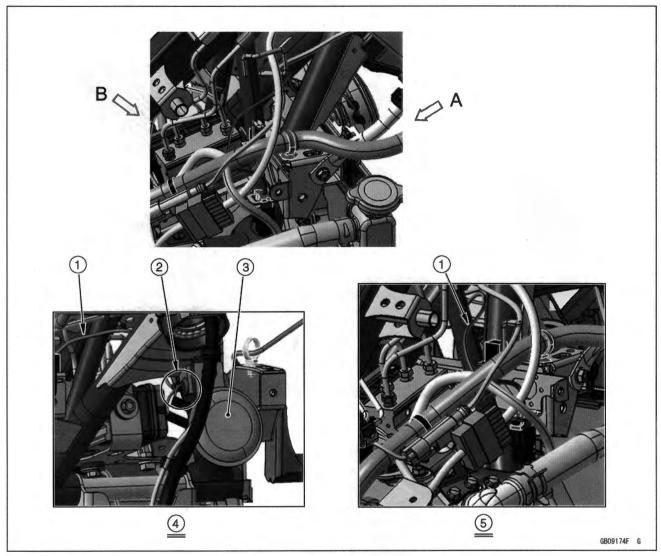
- 1. Air Switching Valve (Insert the air switching valve to the frame.)
- 2. Main Harness
- 3. Intake Air Pressure Sensor Connector
- 4. Intake Air Pressure Sensor
- 5. Intake Air Pressure Sensor Vacuum Hose
- 6. Run the intake air pressure sensor vacuum hose above the main harness.
- 7. Clamp (Hold the white tape portions of the crankshaft sensor lead and alternator lead.)
- 8. Clamp (Hold the left switch housing lead.)
- 9. Left Switch Housing Lead
- 10. Alternator Lead Connector
- 11. Crankshaft Sensor Lead Connector
- 12. Oxygen Sensor Lead Connector (Insert the oxygen sensor connector lead to the bracket.)



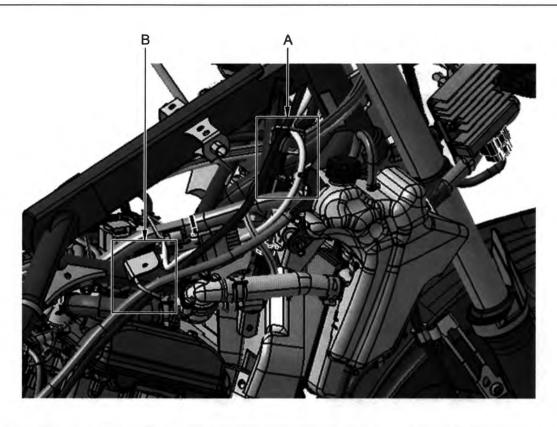
- 1. Detail A
- 2. Detail B
- 3. Detail C
- 4. Viewed from D
- 5. Viewed from E
- 6. Viewed from F
- 7. Left Switch Housing Lead
- 8. Ignition Switch Lead
- 9. Clutch Cable
- 10. Run the left switch housing lead, ignition switch lead and clutch cable through the clamp as shown.
- 11. Front Side of Vehicle
- 12. Rear Side of Vehicle
- 13. Run the left switch housing lead, throttle cable (accelerator) and throttle cable (decelerator) through the guide as shown.
- 14. Throttle Cable (Decelerator)
- 15. Throttle Cable (Accelerator)
- 16. Left Side of Vehicle
- 17. Right Side of Vehicle
- 18. Main Harness
- 19. Purge Hose (Equipped Models)
- 20. Run the throttle cable (accelerator), throttle cable (decelerator), main harness and purge hose (equipped models) through the guide as shown.

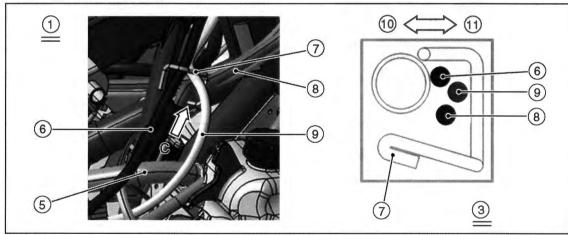


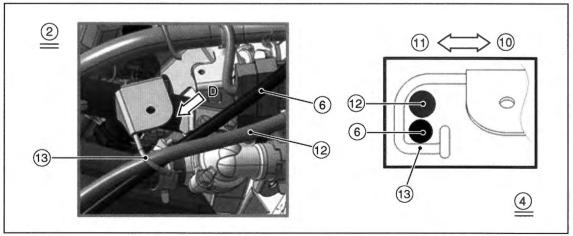
- 1. Right Switch Housing Lead Connector (Insert the right switch housing lead connector to the bracket.)
- 2. Clamps (Hold the main harness. Insert the clamp to the bracket.)
- 3. Fan Motor Lead Connector (Insert the fan motor lead connector to the bracket.)
- 4. Upper Fairing Bracket
- 5. Run the main harness to the outside of the upper fairing bracket.
- 6. Ignition Switch Lead Connector (Run the lead of the main harness side under the main harness.)
- 7. Front Wheel Rotation Sensor Lead Connector (ABS Equipped Models) (Run the lead of the main harness side above the main harness.)
- 8. Main Harness
- 9. Section A-A
- Install the ignition switch lead connector and front wheel rotation sensor lead connector (ABS
  equipped models) to the bracket.



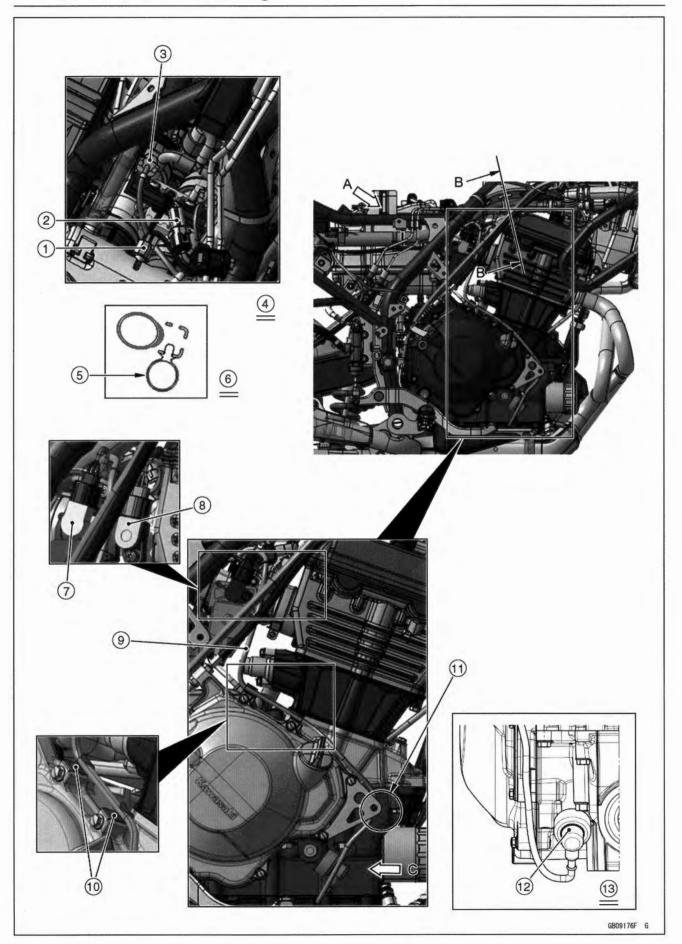
- 1. Horn Lead
- 2. Clamp (Hold the horn lead, and fit the clamp to the frame bracket.)
- 3. Horn
- 4. Viewed from A
- 5. Viewed from B



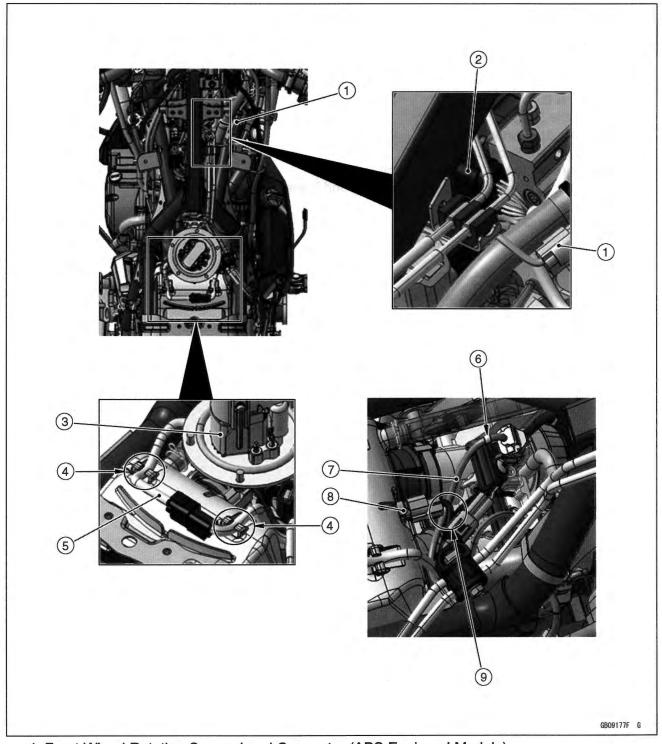




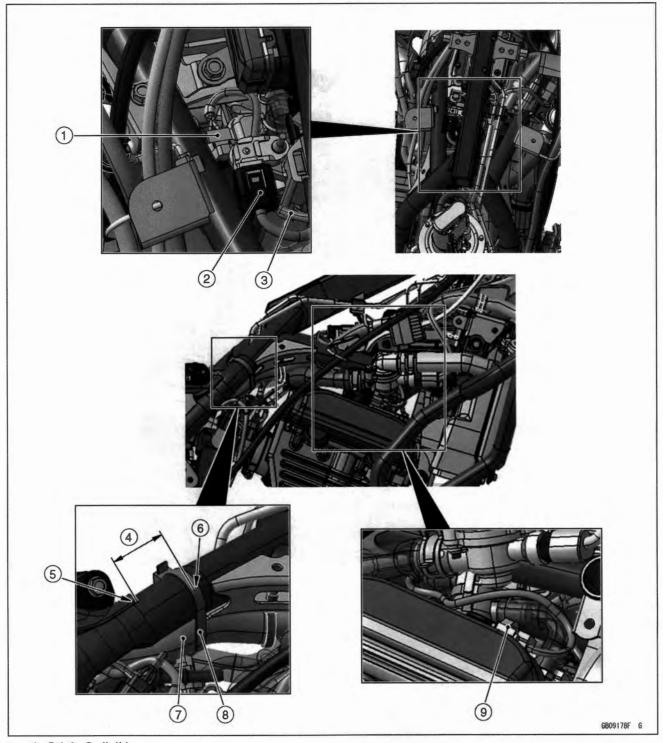
- 1. Detail A
- 2. Detail B
- 3. Viewed from C
- 4. Viewed from D
- 5. Main Harness
- 6. Clutch Cable
- 7. Run the clutch cable, right switch housing lead and ignition switch lead through the guide as shown.
- 8. Right Switch Housing Lead
- 9. Ignition Switch Lead
- 10. Left Side of Vehicle
- 11. Right Side of Vehicle
- 12. Reserve Tank Overflow Hose
- 13. Run the clutch cable and reserve tank overflow hose through the guide as shown.



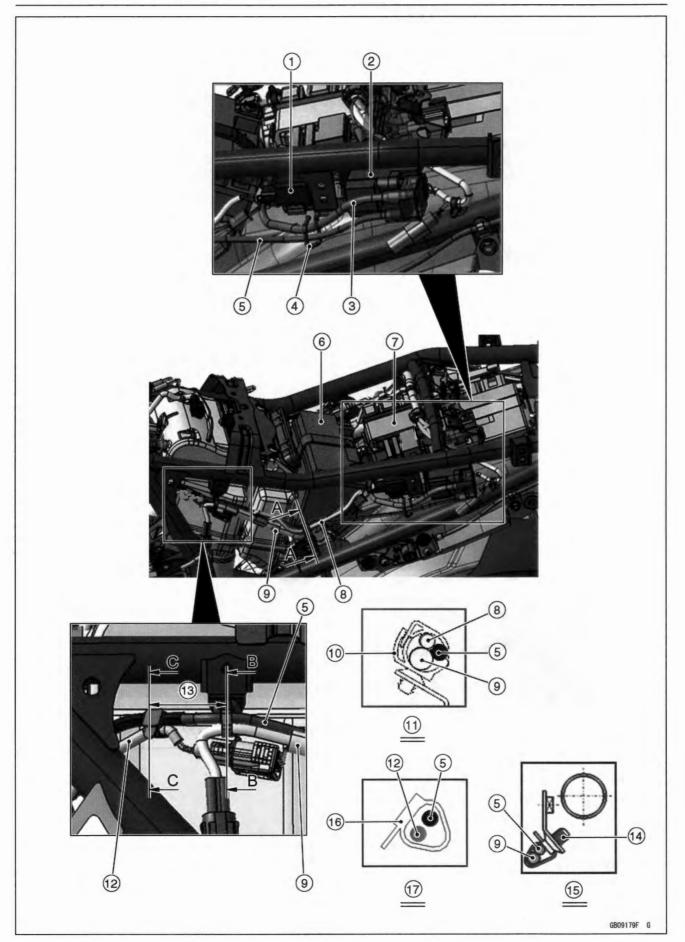
- 1. Intake Air Temperature Sensor Lead Connector
- 2. Subthrottle Valve Actuator Lead Connector
- 3. Fuel Injector #2 Lead Connector
- 4. Viewed from A
- 5. Clamp (Hold the main harness. Insert the clamp to the frame bracket.)
- 6. Section B-B
- 7. Subthrottle Sensor
- 8. Main Throttle Sensor
- 9. Oil Pressure Switch Lead
- 10. Clamps (Hold the oil pressure switch lead.)
- 11. Clamp (Hold the oil pressure switch lead, and insert the clamp to the bracket.)
- 12. Oil Pressure Switch
- 13. Viewed from C



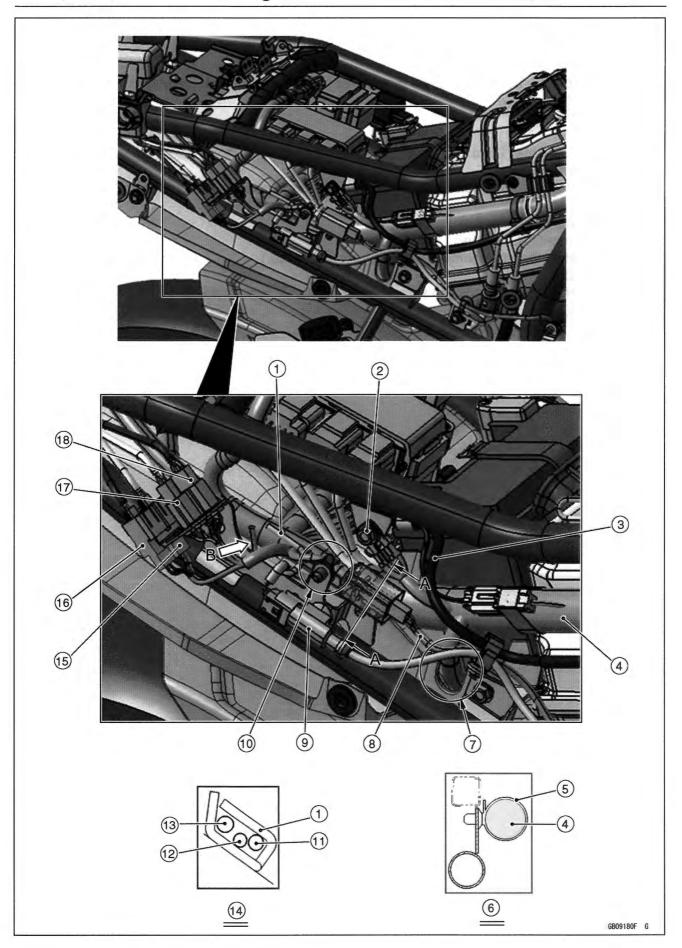
- 1. Front Wheel Rotation Sensor Lead Connector (ABS Equipped Models)
- 2. ABS ECU Lead Connector (ABS Equipped Models)
- 3. Fuel Pump
- 4. Run the fuel pump lead to the hook of air cleaner housing.
- 5. Fuel Pump Lead
- 6. White Tape
- 7. Fuel Injector #1 Lead
- 8. Intake Air Temperature Sensor
- 9. Run the fuel injector #1 lead under the intake air temperature sensor lead.



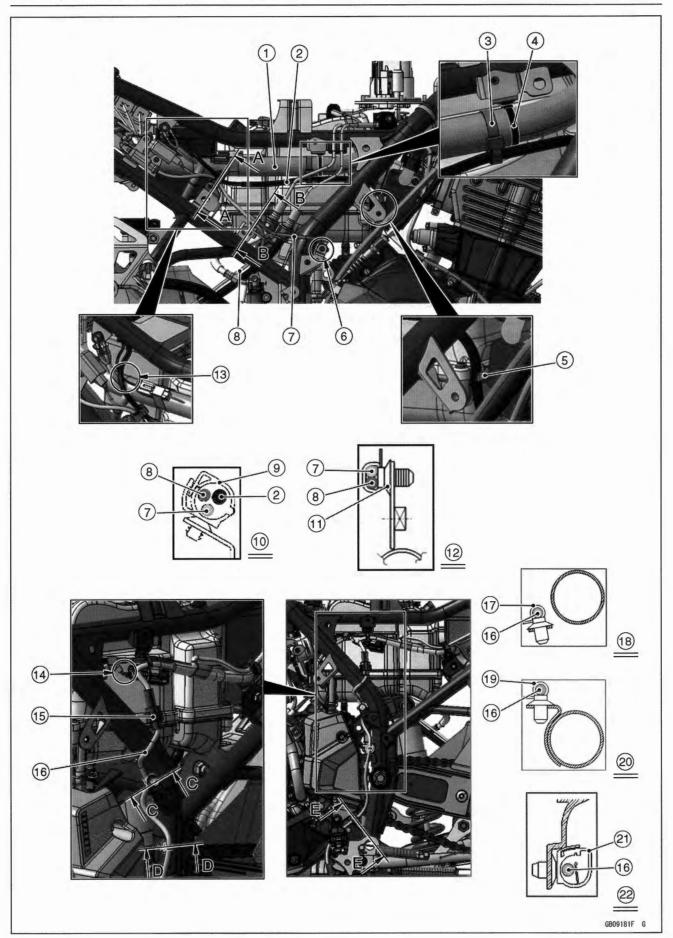
- 1. Stick Coil #1
- 2. Intake Air Pressure Sensor Connector
- 3. Stick Coil #1 Lead
- 4. 30 mm (1.2 in.)
- 5. Seat Frame End
- 6. Center of Band
- 7. Main Harness
- 8. Band (Hold the main harness so that the main harness does not touch the fuel injector connector. The tip faces upward.)
- 9. Stick Coil #2



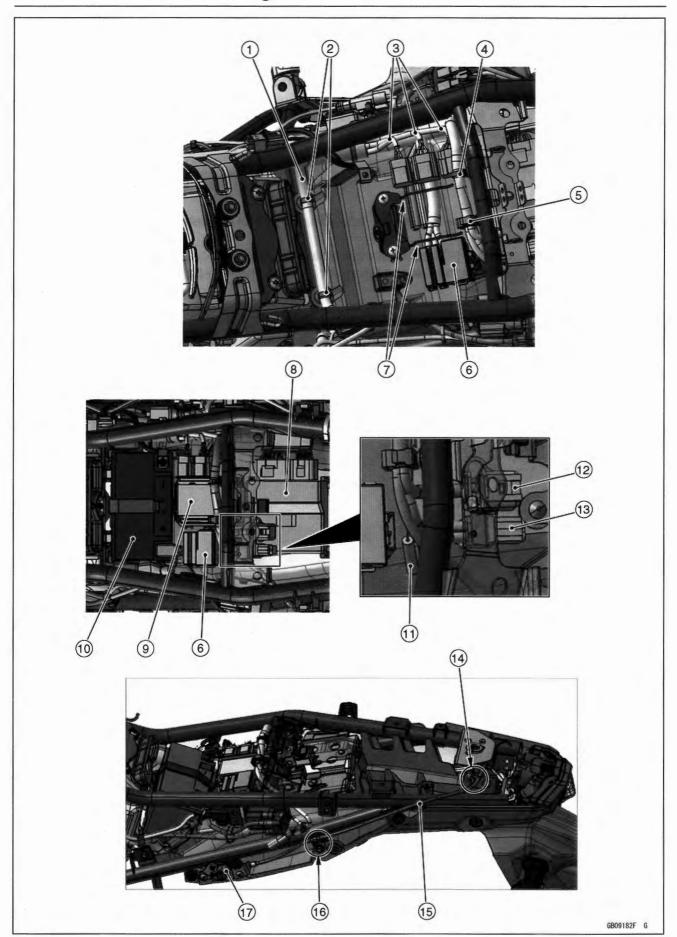
- 1. Turn Signal Relay
- 2. Starter Relay
- 3. Battery Positive (+) Cable
- 4. Run the battery positive (+) cable and starter motor cable through the guide.
- 5. Starter Motor Cable
- 6. Battery
- 7. Relay Box
- 8. Turn Signal Relay Lead
- 9. Main Harness
- 10. Clamp (Hold the main harness, turn signal relay lead and starter motor cable.)
- 11. Section A-A
- 12. Gear Position Sensor Lead
- 13.  $30 \sim 40 \text{ mm} (1.2 \sim 1.6 \text{ in.})$
- 14. Clamp (Hold the main harness and starter motor cable.)
- 15. Section B-B
- 16. Clamp (Hold the gear position sensor lead and starter motor cable.)
- 17. Section C-C



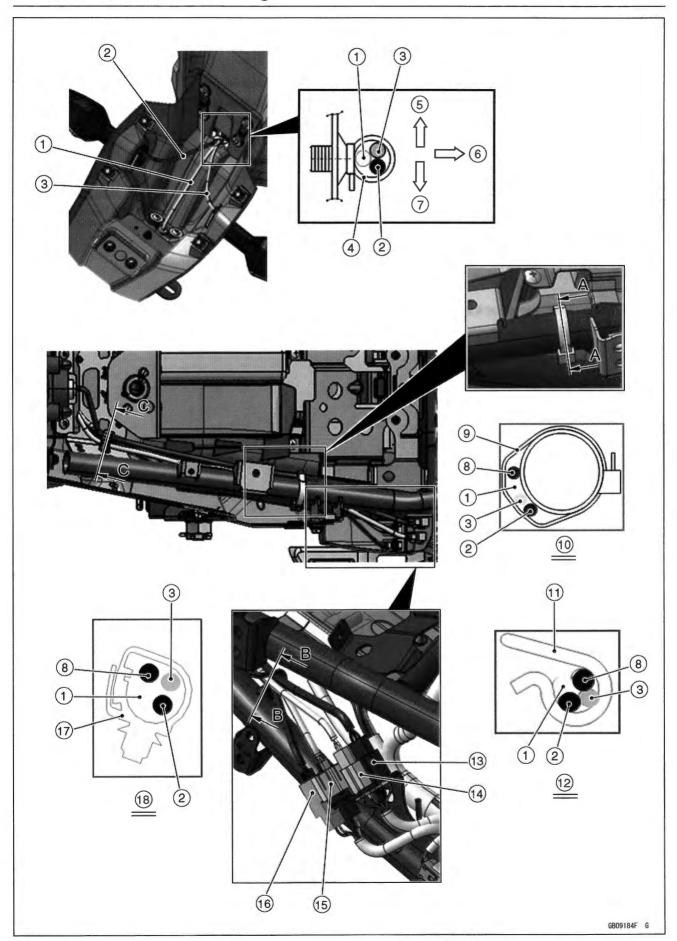
- 1. Run the rear brake light switch lead, rear wheel rotation sensor lead and harness (rear turn signal light lead, license plate light lead, tail/brake light lead) through the guide.
- 2. Install the frame ground lead to bracket.
- 3. Battery Negative (-) Cable
- 4. Main Harness
- 5. Clamp (Hold the main harness, and install the clamp to the bracket.)
- 6. Section A-A
- 7. Run the main harness through the guide of rear fender.
- 8. Do not slack the rear brake light switch lead in this position.
- 9. Rear Wheel Rotation Sensor Lead Connector
- 10. Clamp (Hold the rear brake light switch lead, and install the clamp to the bracket.)
- 11. Rear Brake Light Switch Lead
- 12. Rear Wheel Rotation Sensor Lead
- 13. Harness (Rear Turn Signal Light Lead (Left and Right), License Plate Light Lead and Tail/Brake Light Lead)
- 14. Viewed from B
- 15. Rear Left Turn Signal Light Lead Connector
- 16. Rear Right Turn Signal Light Lead Connector
- 17. License Plate Light Lead Connector
- 18. Tail/Brake Light Lead Connector



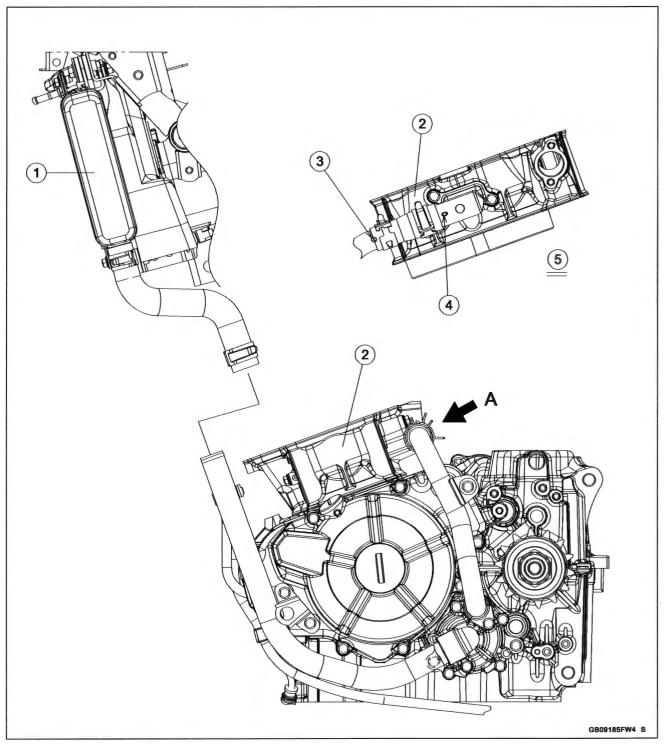
- 1. Main Harness
- 2. Battery Negative (-) Cable
- 3. Clamp (Hold the main harness and battery negative (–) cable.)
- 4. Clamp (Hold the main harness, and install the clamp to the bracket.)
- 5. Air Cleaner Housing Guide (Hold the battery negative (–) cable.)
- 6. Clamp (Hold the rear brake light switch lead, and install the clamp to the bracket.)
- 7. Rear Brake Light Switch Lead
- 8. Rear Wheel Rotation Sensor Lead
- 9. Clamp (Hold the rear brake light switch lead, rear wheel rotation sensor lead and battery negative (–) cable.)
- 10. Section A-A
- 11. Clamp (Hold the rear brake light switch lead and rear wheel rotation sensor lead.)
- 12. Section B-B
- 13. Run the battery negative (–) lead under the battery negative (–) cable.
- 14. Be careful not to touch the bare lead of the gear position sensor lead and side stand switch lead connector.
- 15. Side Stand Switch Lead Connector
- 16. Side Stand Switch Lead
- 17. Clamp (Hold the side stand switch lead. Install the clamp from the inside of the frame.)
- 18. Section C-C
- 19. Clamp (Hold the side stand switch lead. Install the clamp from the outside of the frame.)
- 20. Section D-D
- 21. Clamp (Hold the side stand switch lead.)
- 22. Section E-E



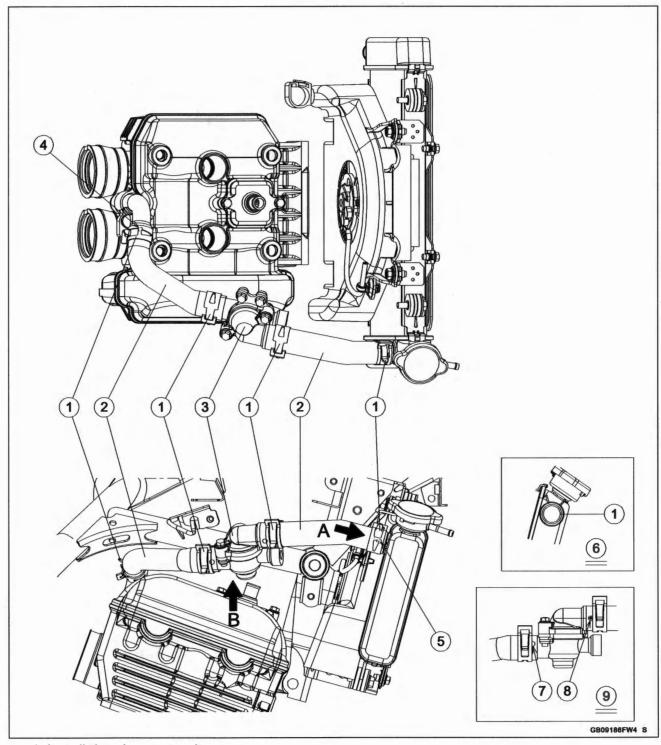
- 1. Main Harness
- 2. Clamps (Hold the main harness, and install the clamps to the rear fender.)
- 3. Relay Box Leads
- 4. Clamp (Hold the main harness, and install the clamp to the frame.)
- 5. Clamp (Hold the main harness and ABS self-diagnosis terminal (ABS equipped models), and install the clamp to the frame.)
- 6. Fuse Box
- 7. Run the fuse box lead under the guides of bracket.
- 8. ECU
- 9. Relay Box
- 10. Battery
- 11. ABS Self-diagnosis Terminal (ABS Equipped Models)
- 12. ABS Kawasaki Diagnostic System Connector (ABS Equipped Models)
- 13. Kawasaki Diagnostic System Connector
- 14. Run the seat lock cable through the guide.
- 15. Seat Lock Cable
- 16. Clamp (Hold the seat lock cable.)
- 17. Seat Lock



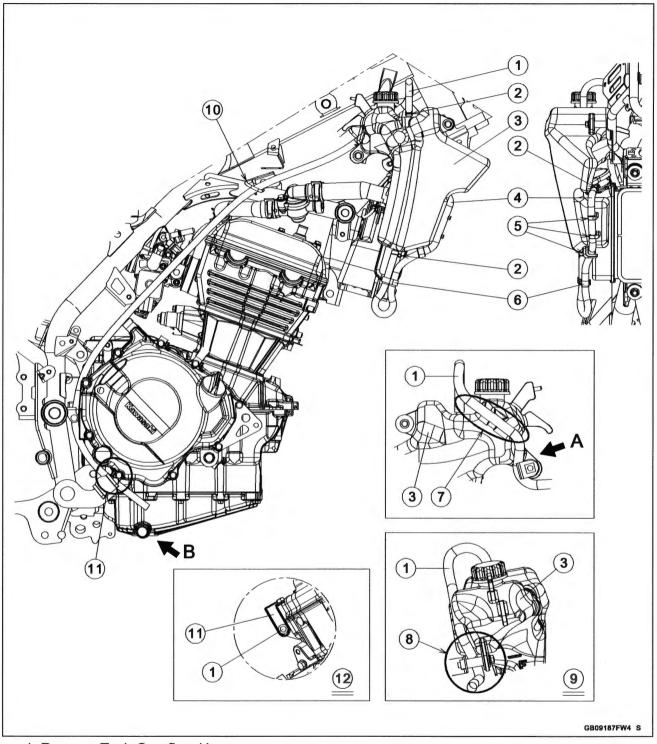
- 1. License Plate Light Lead
- 2. Rear Right Turn Signal Light Lead
- 3. Rear Left Turn Signal Light Lead
- 4. Clamp (Hold the rear right turn signal light lead, rear left turn signal light lead and license plate light lead.)
- 5. Left Side of Vehicle
- 6. Front Side of Vehicle
- 7. Right Side of Vehicle
- 8. Tail/Brake Light Lead
- 9. Clamp (Hold the rear right turn signal light lead, rear left turn signal light lead, license plate light lead and tail/brake light lead.)
- 10. Section A-A
- 11. Run the rear right turn signal light lead, rear left turn signal light lead, license plate light lead and tail/brake light lead through the guide.
- 12. Section B-B
- 13. Tail/Brake Light Lead Connector
- 14. License Plate Light Lead Connector
- 15. Rear Left Turn Signal Light Lead Connector
- 16. Rear Right Turn Signal Light Lead Connector
- 17. Clamp (Hold the rear right turn signal light lead, rear left turn signal light lead, license plate light lead and tail/brake light lead.)
- 18. Section C-C



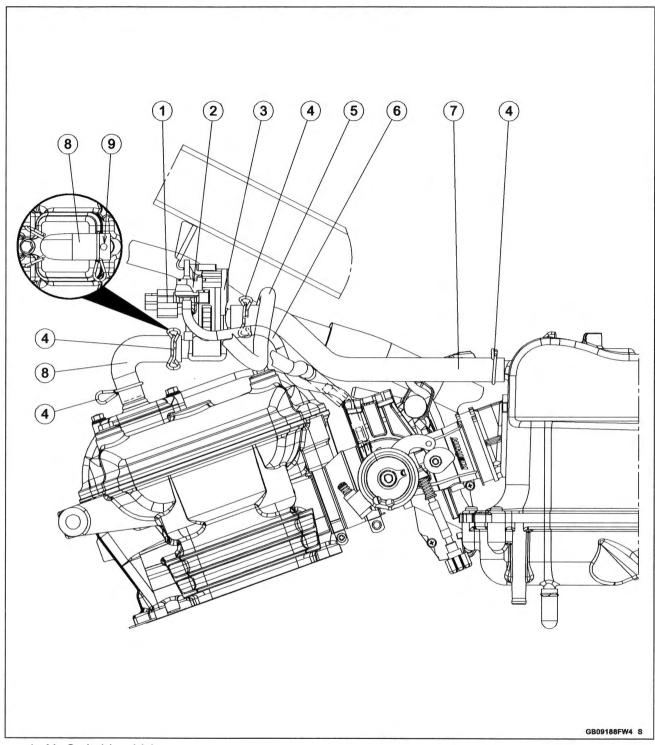
- 1. Radiator
- 2. Cylinder
- 3. Install the hose until the half of the white paint mark on the pipe is hidden.
- 4. Align the white paint mark on the hose with the projection mark on the fitting.
- 5. Viewed from A



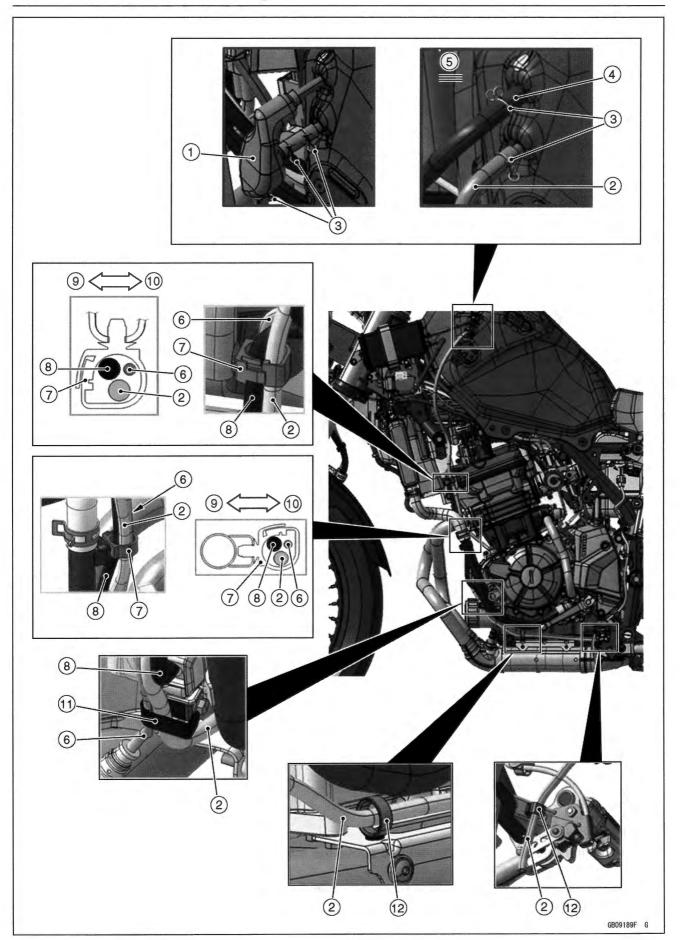
- 1. Install the clamps as shown.
- 2. Water Hoses
- 3. Thermostat Housing
- 4. Install the water hose so that the white paint mark faces upward of vehicle.
- 5. Install the water hose so that the white paint mark faces right side of vehicle.
- 6. Viewed from A
- 7. Align the white paint mark on the hose with the lower end of the thermostat housing boss.
- 8. Align the white paint mark on the hose with the parting line of the thermostat housing cover.
- 9. Viewed from B



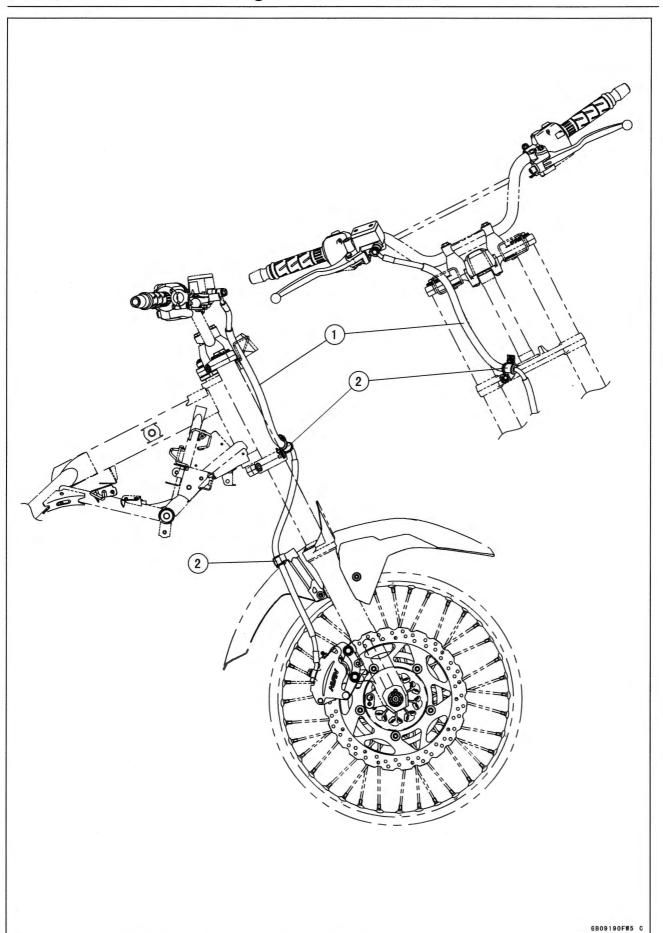
- 1. Reserve Tank Overflow Hose
- 2. Install the clamps as shown.
- 3. Coolant Reserve Tank
- 4. Radiator Overflow Hose
- 5. Run the radiator overflow hose through the hooks of the coolant reserve tank.
- 6. Clamp (Hold the radiator overflow hose.)
- 7. Run the reserve tank overflow hose along the shape of the coolant reserve tank.
- 8. Run the reserve tank overflow hose under the reserve tank bolt.
- 9. Viewed from A
- 10. Run the reserve tank overflow hose through the guide.
- 11. Clamp (Hold the reserve tank overflow hose.)
- 12. Viewed from B



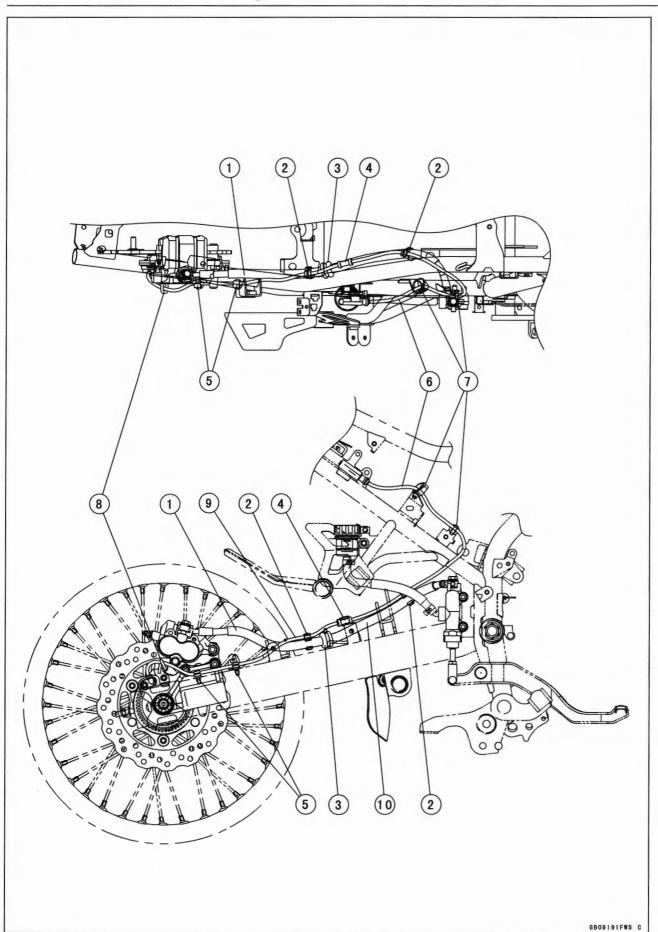
- 1. Air Switching Valve
- 2. Intake Air Pressure Sensor
- 3. Damper
- 4. Install the clamps as shown.
- 5. Main Harness
- 6. Vacuum Hose (Run the vacuum hose above the main harness.)
- 7. Air Switching Valve Hose
- 8. Install the hose so that its yellow paint mark side faces the air switching valve.
- 9. Yellow Paint Mark



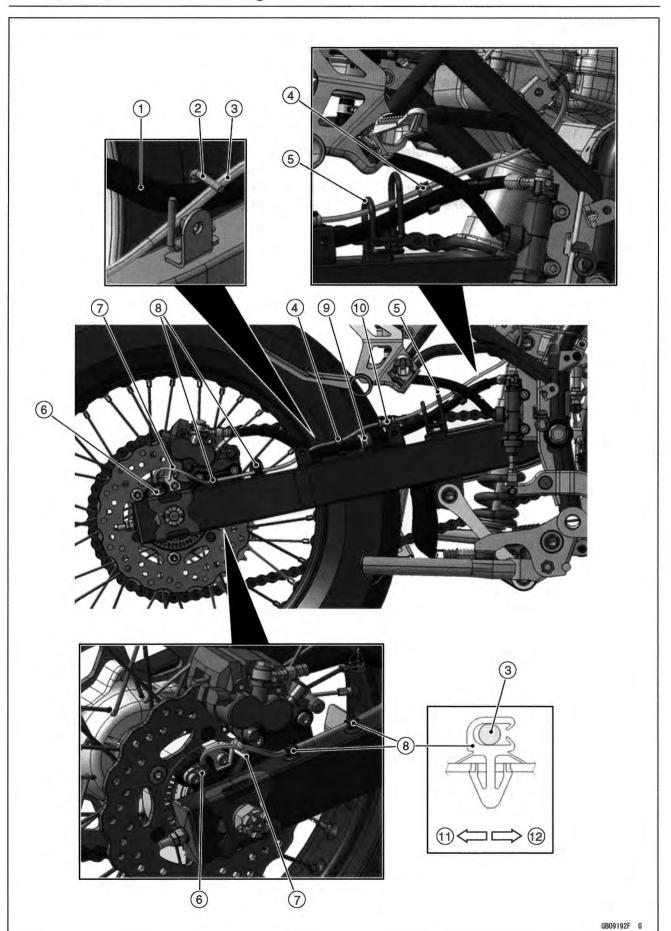
- 1. Breather Tank
- 2. Fuel Tank Drain Hose
- 3. Install the clamps as shown.
- 4. Fuel Tank Breather Hose
- 5. Evaporative Emission Control System Equipped Models
- 6. Oxygen Sensor Lead
- 7. Clamps (Hold the oxygen sensor lead, alternator lead and fuel tank drain hose.)
- 8. Alternator Lead
- 9. Left Side of Vehicle
- 10. Right Side of Vehicle
- 11. Clamp (Hold the oxygen sensor lead and fuel tank drain hose.)
- 12. Clamps (Hold the fuel tank drain hose.)



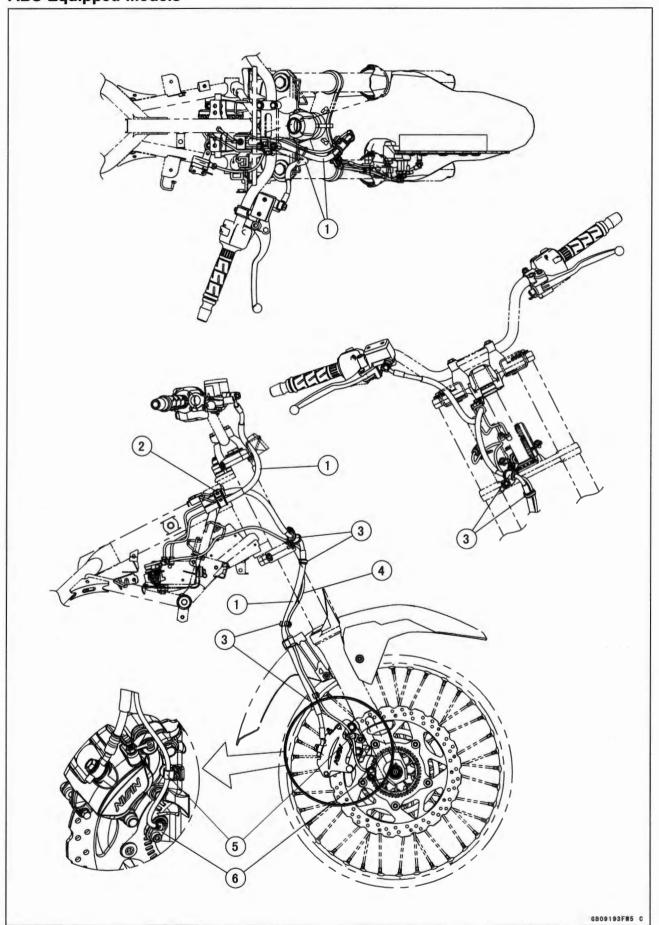
- 1. Front Brake Hose
- 2. Clamps (Hold the front brake hose.)



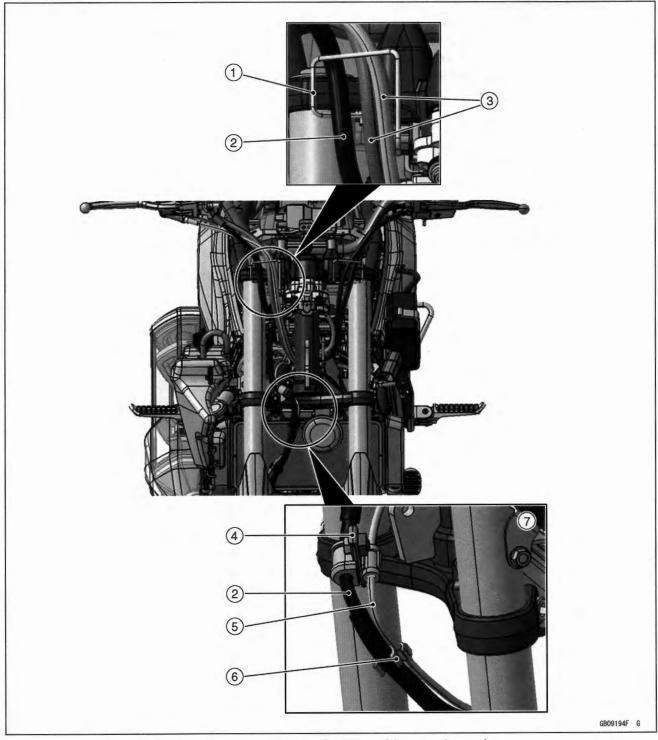
- 1. Rear Brake Hose
- 2. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead at the white tape of the sensor lead. Position the clamps so that the open side faces rightward.)
- 3. Clamp (Hold the rear brake hose.)
- 4. Clamp (Hold the rear wheel rotation sensor lead.)
- 5. Clamps (Hold the rear wheel rotation sensor lead.)
- 6. Rear Wheel Rotation Sensor Lead
- 7. Clamps (Hold the rear wheel rotation sensor lead.)
- 8. Clamp (Hold the rear wheel rotation sensor lead.)
- 9. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead.)
- 10. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead.)



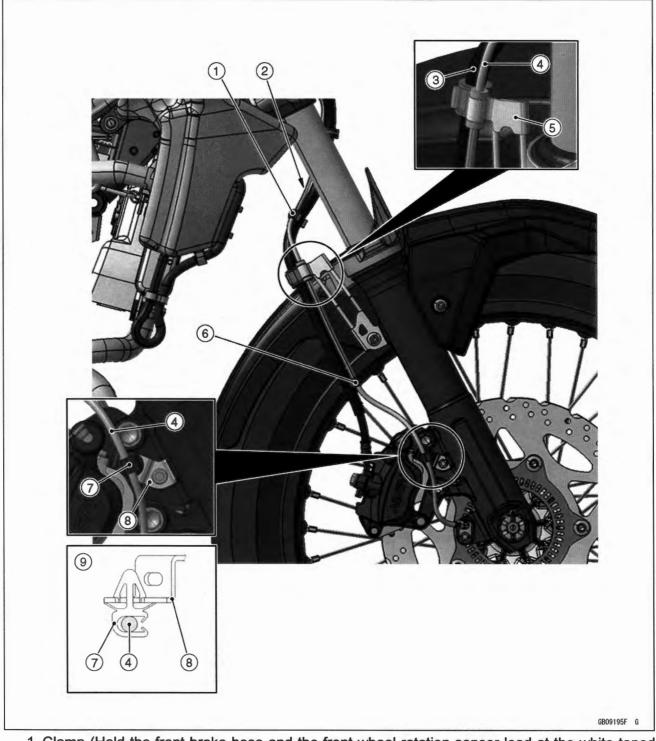
- 1. Rear Brake Hose
- 2. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead as shown.)
- 3. Rear Wheel Rotation Sensor Lead
- 4. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead at the white tape of the sensor lead. Position the clamps so that the open side faces rightward.)
- 5. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead as shown.)
- 6. Rear Wheel Rotation Sensor
- 7. Clamp (Hold the rear wheel rotation sensor lead.)
- 8. Clamps (Hold the rear wheel rotation sensor lead as shown.)
- 9. Clamp (Hold the rear brake hose.)
- 10. Clamp (Hold the rear wheel rotation sensor lead.)
- 11. Left Side of Vehicle
- 12. Right Side of Vehicle



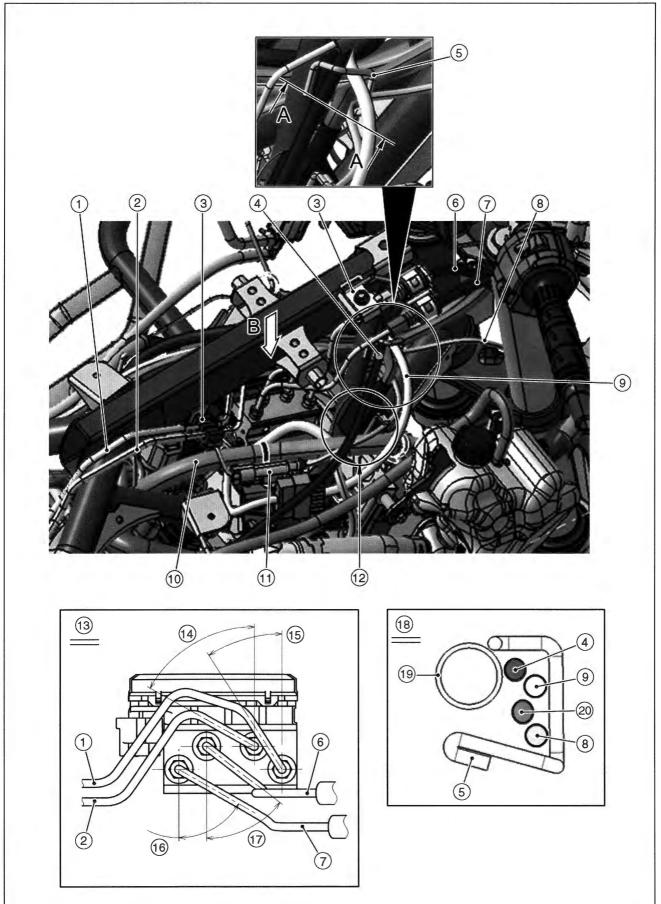
- 1. Front Brake Hoses
- 2. Clamp (Hold the front brake hoses.)
- 3. Clamps (Hold the front brake hose and front wheel rotation sensor lead.)
- 4. Front Wheel Rotation Sensor Lead
- 5. Clamp (Hold the front wheel rotation sensor lead.)
- 6. Front Wheel Rotation Sensor



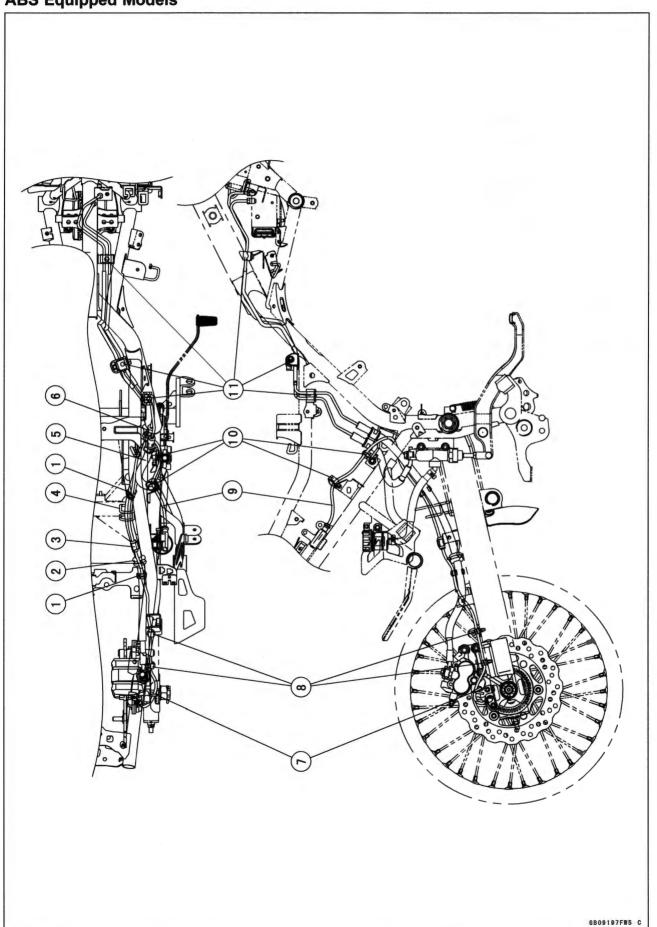
- 1. Clamp (Hold the front brake hose and the throttle cables as shown.)
- 2. Front Brake Hose
- 3. Throttle Cables
- 4. Bracket (Hold the front brake hose and the front wheel rotation sensor lead.)
- 5. Front Wheel Rotation Sensor Lead
- 6. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white taped portion. Install it from the right side as shown.)
- 7. Viewed from Left Side



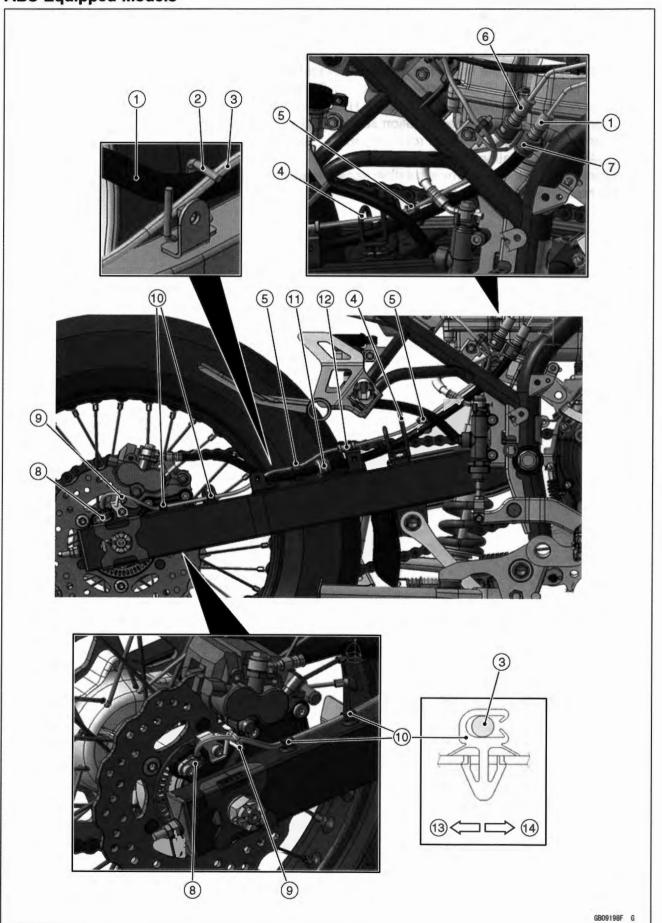
- 1. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white taped portion. Install it from the rear side as shown.)
- 2. Run the front wheel rotation sensor lead along the front brake hose.
- 3. Front Brake Hose
- 4. Front Wheel Rotation Sensor Lead
- 5. Clamp (Hold the front brake hose and the front wheel rotation sensor lead.)
- 6. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white taped portion. Install it from the inside as shown.)
- 7. Clamp (Hold the front wheel rotation sensor lead as shown.)
- 8. Bracket
- 9. Viewed from Top



- 1. Rear Brake Pipe (Rear Master Cylinder ~ ABS Hydraulic Unit)
- 2. Rear Brake Pipe (Rear Caliper ~ ABS Hydraulic Unit)
- 3. Clamps (Hold the rear brake pipes.)
- 4. Clutch Cable
- 5. Guide
- 6. Front Brake Pipe (Front Caliper ~ ABS Hydraulic Unit)
- 7. Front Brake Pipe (Front Master Cylinder ~ ABS Hydraulic Unit)
- 8. Front Wheel Rotation Sensor Lead
- 9. Ignition Switch Lead
- 10. Main Harness
- 11. Front Wheel Rotation Sensor Lead Connector (Insert the front wheel rotation sensor lead connector to the bracket.)
- 12. Run the front wheel rotation sensor lead above the main harness.
- 13. Viewed from B
- 14. About 60.9°
- 15. About 32.8°
- 16. About 59.7°
- 17. About 52.4°
- 18. Section A-A
- 19. Frame Pipe
- 20. Right Switch Housing Lead



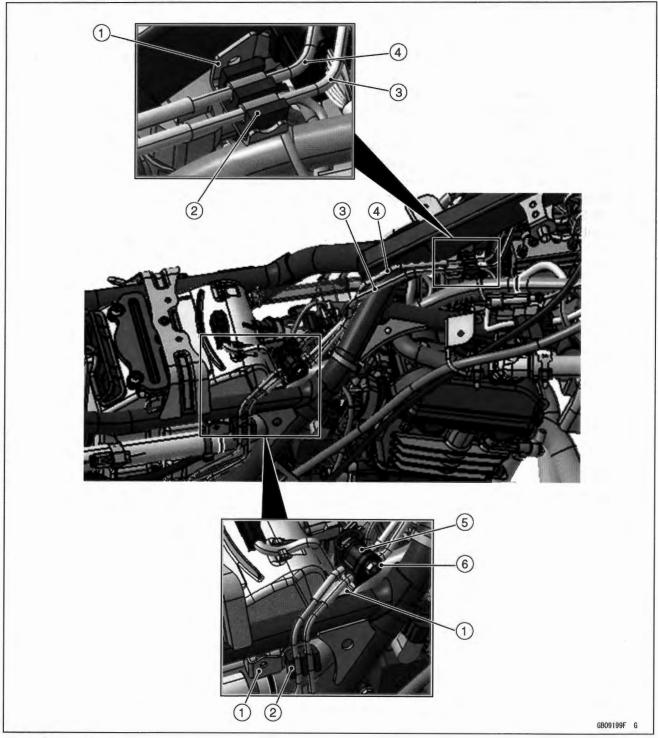
- 1. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead at the white tape of the sensor lead. Position the clamps so that the open side faces rightward.)
- 2. Clamp (Hold the rear brake hose.)
- 3. Clamp (Hold the rear wheel rotation sensor lead.)
- 4. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead.)
- 5. Rear Brake Hose (Rear Master Cylinder ~ ABS Hydraulic Unit)
- 6. Rear Brake Hose (Rear Caliper ~ ABS Hydraulic Unit)
- 7. Clamp (Hold the rear wheel rotation sensor lead.)
- 8. Clamps (Hold the rear wheel rotation sensor lead.)
- 9. Rear Wheel Rotation Sensor Lead
- 10. Clamps (Hold the rear wheel rotation sensor lead.)
- 11. Clamps (Hold the rear brake pipes.)



- 1. Rear Brake Hose (ABS Hydraulic Unit ~ Rear Caliper)
- 2. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead as shown.)
- 3. Rear Wheel Rotation Sensor Lead
- 4. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead as shown.)
- 5. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead at the white tape of the sensor lead. Position the clamps so that the open side faces rightward.)
- 6. Rear Brake Hose (Rear Master Cylinder ~ ABS Hydraulic Unit)
- 7. Clamp (Hold the rear brake hoses.)
- 8. Rear Wheel Rotation Sensor
- 9. Clamp (Hold the rear wheel rotation sensor lead.)
- 10. Clamps (Hold the rear wheel rotation sensor lead as shown.)
- 11. Clamp (Hold the rear brake hose.)
- 12. Clamp (Hold the rear wheel rotation sensor lead.)
- 13. Left Side of Vehicle
- 14. Right Side of Vehicle

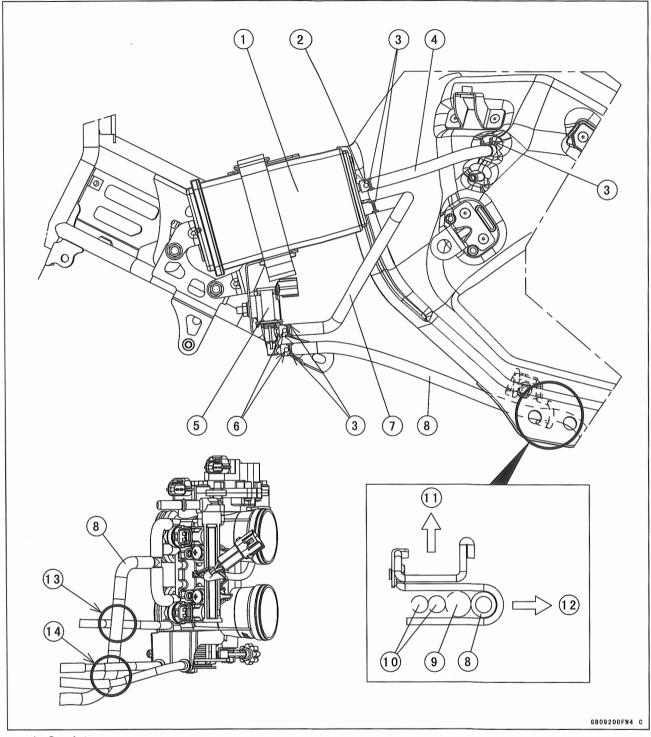
# 17-56 APPENDIX

# Cable, Wire, and Hose Routing



- 1. Brackets
- 2. Clamps (Hold the brake pipes. Install the clamp to the bracket.)
- 3. Rear Brake Pipe (Rear Master Cylinder ~ ABS Hydraulic Unit)
- 4. Rear Brake Pipe (ABS Hydraulic Unit ~ Rear Caliper)
- 5. Damper (Hold the brake pipes. Install the damper to the bracket.)
- 6. Collar

# **Evaporative Emission Control System Equipped Models**



- 1. Canister
- 2. Blue Paint
- 3. Install the clamps as shown.
- 4. Fuel Tank Breather Hose (Fuel Tank ~ Canister)
- 5. Purge Valve
- 6. Green Paint
- 7. Purge Hose (Canister ~ Purge Valve)
- 8. Purge Hose
- 9. Main Harness
- 10. Throttle Cables
- 11. Upside
- 12. Left Side
- 13. Run the purge hose upside the hose.
- 14. Run the purge hose under the cables.

#### NOTE

- ORefer to the Fuel System (DFI) chapter for most of DFI trouble shooting guide.
- OThis is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.

# Engine Doesn't Start, Starting Difficulty:

### Starter motor not rotating:

Ignition and engine stop switch not on Starter lockout switch or gear position sensor trouble

Starter motor trouble

Battery voltage low

Starter relay not contacting or operating

Starter button not contacting

Starter system wiring shorted or open

Ignition switch trouble

Engine stop switch trouble

Main 30 A or ignition fuse blown

# Starter motor rotating but engine doesn't turn over:

Vehicle-down sensor (DFI) coming off

Starter clutch trouble

Starter idle gear trouble

# Engine won't turn over:

Valve seizure

Valve lifter seizure

Cylinder, piston seizure

Crankshaft seizure

Connecting rod small end seizure

Connecting rod big end seizure

Transmission gear or bearing seizure

Camshaft seizure

Starter idle gear seizure

Balancer bearing seizure

#### No fuel flow:

No fuel in tank

Fuel pump trouble

Fuel tank air vent obstructed

Fuel filter clogged

Fuel line clogged

#### **Engine flooded:**

Clean spark plug and adjust plug gap

Starting technique faulty

(When flooded, do not crank the engine with the throttle fully opened. This promotes engine flood because more fuel is supplied automatically by DFI.)

## No spark; spark weak:

Vehicle-down sensor (DFI) coming off Ignition switch not on

Engine stop switch turned to stop position

Clutch lever not pulled in or gear not in neutral

Battery voltage low

Spark plug dirty, broken, or gap maladiusted

Spark plug incorrect

Stick coil shorted or not in good contact

Stick coil trouble

ECU trouble

Gear position sensor, starter lockout, or side stand switch trouble

Crankshaft sensor trouble

Ignition switch or engine stop switch shorted

Starter system wiring shorted or open

Main 30 A or ignition fuse blown

#### Fuel/air mixture incorrect:

Bypass screw maladjusted

Air passage clogged

Air cleaner clogged, poorly sealed, or missing

Leak from oil filler cap, crankcase breather hose or air cleaner drain hose.

### Compression Low:

Spark plug loose

Cylinder head not sufficiently tightened down

Cylinder, piston worn

Piston ring bad (worn, weak, broken, or sticking)

Piston ring/groove clearance excessive

Cylinder head gasket damaged

Cylinder head warped

Valve spring broken or weak

No valve clearance

Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

# Poor Running at Low Speed:

## Spark weak:

Battery voltage low

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 miss-

ina

Fuel tank air vent obstructed

Fuel pump trouble

Fuel to injector insufficient

Fuel line clogged

Throttle body assy holder loose

Air cleaner housing holder loose

## **Compression low:**

Spark plug loose

Cylinder head not sufficiently tightened

down

No valve clearance

Cylinder, piston worn

Piston ring bad (worn, weak, broken, or

Piston ring/groove clearance excessive

Cylinder head gasket damaged

Cylinder head warped

Valve spring broken or weak

Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Camshaft cam worn

### Run-on (dieseling):

Ignition switch trouble

Engine stop switch trouble

Fuel injector trouble

Carbon accumulating on valve seating surface

**Engine** overheating

#### Other:

ECU trouble

Throttle body assy not synchronizing

Engine oil viscosity too high

Drive train trouble

Brake dragging

Clutch slipping

Engine overheating

Air suction valve trouble

Air switching valve trouble

# Poor Running or No Power at High Speed:

#### Firing incorrect:

Spark plug dirty, broken, or maladjusted

Spark plug incorrect

Stick coil shorted or not in good contact trouble

Stick coil trouble

ECU trouble

Crankshaft sensor trouble

#### Fuel/air mixture incorrect:

Air cleaner clogged, poorly sealed, or miss-

Air cleaner housing holder loose

Water or foreign matter in fuel

Throttle body assy holder loose

Fuel to injector insufficient Fuel tank air vent obstructed

Fuel line clogged

Fuel pump trouble

#### **Compression low:**

Spark plug loose

Cylinder head not sufficiently tightened

No valve clearance

Cylinder, piston worn

Piston ring bad (worn, weak, broken, or sticking)

Piston ring/groove clearance excessive

Cylinder head gasket damaged

Cylinder head warped

Valve spring broken or weak

Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

## Knocking:

Carbon built up in combustion chamber

Fuel poor quality or incorrect

Spark plug incorrect

ECU trouble

Crankshaft sensor trouble

#### Miscellaneous:

Throttle valve won't fully open

Brake dragging

Clutch slipping

Engine overheating

Engine oil level too high

Engine oil viscosity too high

Drive train trouble

Camshaft cam worn

Air suction valve trouble

Air switching valve trouble

Catalytic converter melt down due to muffler overheating (KLEEN)

## Overheating:

#### Firing incorrect:

Spark plug dirty, broken, or maladjusted

Spark plug incorrect ECU trouble

# Muffler overheating:

For KLEEN, do not run the engine even if with only one cylinder misfiring or poor running (Request the nearest service facility to correct it)

For KLEEN, do not push-start with a dead battery (Connect another full-charged battery with jumper cables, and start the engine using the electric starter)

For KLEEN, do not start the engine under misfire due to spark plug fouling or poor connection of the stick coil

For KLEEN, do not coast the motorcycle with the ignition switch off (Turn the ignition switch on and run the engine)

ECU trouble

#### Fuel/air mixture incorrect:

Throttle body assy holder loose

Air cleaner housing holder loose

Air cleaner poorly sealed, or missing

Air cleaner clogged

## Compression high:

Carbon built up in combustion chamber

#### Engine load faulty:

Clutch slipping

Engine oil level too high

Engine oil viscosity too high

Drive train trouble

Brake dragging

#### Lubrication inadequate:

Engine oil level too low

Engine oil poor quality or incorrect

### **Coolant incorrect:**

Coolant level too low

Coolant deteriorated

Wrong coolant mixed ratio

### Cooling system component incorrect:

Radiator fin damaged

Radiator clogged

Thermostat trouble

Radiator cap trouble

Radiator fan relay trouble

Fan motor broken

Fan blade damaged

Water pump not turning

Water pump impeller damaged

### Over Cooling:

## **Cooling system component incorrect:**

Thermostat trouble

Radiator fan relay trouble

Water Temperature sensor broken

### **Clutch Operation Faulty:**

#### Clutch slipping:

Friction plate worn or warped

Steel plate worn or warped

Clutch spring broken or weak

Clutch hub or housing unevenly worn

No clutch lever play

Clutch inner cable trouble

Clutch release mechanism trouble

#### Clutch not disengaging properly:

Clutch plate warped or too rough

Clutch spring compression uneven

Engine oil deteriorated

Engine oil viscosity too high

Engine oil level too high

Clutch housing frozen on drive shaft

Clutch hub nut loose

Clutch hub spline damaged

Clutch friction plate installed wrong

Clutch lever play excessive

Clutch release mechanism trouble

# Gear Shifting Faulty:

# Doesn't go into gear; shift pedal doesn't return:

Clutch not disengaging

Shift fork bent or seized

Gear stuck on the shaft

Gear positioning lever binding

Shift return spring weak or broken

Shift return spring pin loose

Shift mechanism arm spring broken

Shift mechanism arm broken

Shift pawl broken

## Jumps out of gear:

Shift fork ear worn, bent

Gear groove worn

Gear dogs and/or dog holes worn

Shift drum groove worn

Gear positioning lever spring weak or bro-

ken

Shift fork guide pin worn

Drive shaft, output shaft, and/or gear splines worn

Overshifts:

Gear positioning lever spring weak or bro-

ken

Shift mechanism arm spring broken

# **Abnormal Engine Noise:**

### Knocking:

ECU trouble

Carbon built up in combustion chamber

Fuel poor quality or incorrect

Spark plug incorrect

Overheating

#### Piston slap:

Cylinder/piston clearance excessive

Cylinder, piston worn

Connecting rod bent

Piston pin, piston pin hole worn

#### Valve noise:

Valve clearance incorrect

Valve spring broken or weak

Camshaft bearing worn

Valve lifter worn

#### Other noise:

Connecting rod small end clearance excessive

Connecting rod big end clearance exces-

Piston ring/groove clearance excessive

Piston ring worn, broken, or stuck

Piston ring groove worn

Piston seizure, damage

Cylinder head gasket leaking

Exhaust pipe leaking at cylinder head connection

Crankshaft runout excessive

Engine mount loose

Crankshaft bearing worn

Primary gear worn or chipped

Camshaft chain tensioner trouble

Camshaft chain, sprocket, guide worn

Air suction valve damaged

Air switching valve damaged

Alternator rotor loose

Catalytic converter melt down due to muffler overheating (KLEEN)

Balancer gear worn or chipped

Balancer shaft position maladjusted

Balancer bearing worn

### **Abnormal Drive Train Noise:**

#### Clutch noise:

Clutch housing/friction plate clearance excessive

Clutch housing gear worn

Wrong installation of outside friction plate

#### Transmission noise:

Bearings worn

Transmission gear worn or chipped

Metal chips jammed in gear teeth

Engine oil insufficient

#### **Drive line noise:**

Drive chain adjusted improperly

Drive chain worn

Rear and/or engine sprocket worn

Chain lubrication insufficient

Rear wheel misaligned

#### **Abnormal Frame Noise:**

#### Front fork noise:

Oil insufficient or too thin

Spring weak or broken

#### Rear shock absorber noise:

Shock absorber damaged

#### Disc brake noise:

Pad installed incorrectly

Pad surface glazed

Disc warped

Caliper trouble

#### Other noise:

Bracket, nut, bolt, etc. n

not properly

mounted or tightened

# Warning Indicator (LED) (Oil Pressure Warning) Doesn't Go OFF:

Engine oil pump damaged

Engine oil screen clogged

Engine oil filter clogged

Engine oil level too low

Engine oil viscosity too low

Camshaft bearing worn

Crankshaft bearing worn

Oil pressure switch damaged

Wiring faulty

Relief valve stuck open

O-ring at the oil passage in the crankcase

damaged

## **Exhaust Smokes Excessively:**

### White smoke:

Piston oil ring worn

Cylinder worn

Valve oil seal damaged

Valve guide worn

Engine oil level too high

#### Black smoke:

Air cleaner clogged

#### Brown smoke:

Air cleaner housing holder loose

Air cleaner poorly sealed or missing

# Handling and/or Stability Unsatisfactory:

### Handlebars hard to turn:

Cable routing incorrect

Hose routing incorrect

Wiring routing incorrect

Steering stem nut too tight

Steering stem bearing damaged

Steering stem bearing lubrication inadequate

Steering stem bent

Tire air pressure too low

# Handlebars shakes or excessively vibrates:

Tire worn

Swingarm pivot bearing worn

Rim warped, or not balanced

Wheel bearing worn

Handlebar holder bolt loose

Steering stem nut loose

Front, rear axle runout excessive

Engine mounting bolt loose

#### Handlebars pulls to one side:

Frame bent

Wheel misalignment

Swingarm bent or twisted

Swingarm pivot shaft runout excessive

Steering maladjusted

Front fork bent

Right and left front fork oil level incorrect

#### Shock absorption unsatisfactory:

(Too hard)

Front fork oil excessive

Front fork oil viscosity too high

Rear shock absorber adjustment too hard

#### 17-62 APPENDIX

# **Troubleshooting Guide**

Tire air pressure too high
Front fork bent
(Too soft)
Tire air pressure too low
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low
Rear shock adjustment too soft
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking

### Brake Doesn't Hold:

Air in the brake line
Pad or disc worn
Brake fluid leakage
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged in master cylinder

Master cylinder scratched inside

# **Battery Trouble:**

# Battery discharged:

Charge insufficient

Battery faulty (too low terminal voltage)

Battery cable making poor contact

Load excessive (e.g., bulb of excessive

wattage)

Ignition switch trouble

Alternator trouble

Wiring faulty

Regulator/rectifier trouble

## Battery overcharged:

Alternator trouble

Regulator/rectifier trouble

Battery faulty



# **MODEL APPLICATION**

| Year | Model    | Beginning Frame No.                    |
|------|----------|--|
| 2017 | KLE300AH | JKALE8A1□HDA00001<br>JKALE300AADA00001 |
| 2017 | KLE300BH | JKALE8B1□HDA00001                      |
| 2017 | KLE300CH | JKALE8C1□HDA00001<br>JKALE300CCDA00001 |
| 2018 | KLE300AJ | 1                                      |
| 2018 | KLE300BJ | JKALE8B1□JDA01031                      |
| 2018 | KLE300CJ | JKALE8C1□JDA04161<br>JKALE300CCDA04191 |

□:This digit in the frame number changes from one machine to another.