

Kawasaki

W650



Motorcycle Service Manual

Quick Reference Guide

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

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



W650

Motorcycle Service Manual

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

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

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

LIST OF ABBREVIATIONS

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

Read OWNER'S MANUAL before operating.

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 carburetion 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 and ignition systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

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. Liquid fuel is caught by a vapor separator and returned to the fuel tank.

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."

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

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

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

NOTE

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

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

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

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

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

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

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

Foreword

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

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

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

To get the longest life out of your vehicle:

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

How to Use This Manual

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

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

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

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

WARNING

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

CAUTION

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

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

NOTE

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

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

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

General Information

1

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1-2 GENERAL INFORMATION

Before Servicing

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

Especially note the following

(1) **Dirt**

Before removal and disassembly, clean the motorcycle. Any dirt entering the engine will shorten the life of the motorcycle. For the same reason, before installing a new part, clean off any dust or metal filings.

(2) **Battery Ground**

Disconnect the ground (–) wire from the battery before performing any disassembly operations on the motorcycle. This prevents the engine from accidentally turning over while work is being carried out, sparks from being generated while disconnecting the wires from electrical parts, as well as damage to the electrical parts themselves. For reinstallation, first connect the positive wire to the positive (+) terminal of the battery.

(3) **Installation, Assembly**

Generally, installation or assembly is the reverse of removal or disassembly. However, if installation or assembly sequence is given in this Service Manual, follow it. Note parts locations and cable, wire, and hose routing during removal or disassembly so they can be installed or assembled in the same way. It is preferable to mark and record the locations and routing whenever possible.

(4) **Tightening Sequence**

When installing bolts, nuts, or screws for which a tightening sequence is given in this Service Manual, make sure to follow the sequence. When installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit, thus ensuring that the part has been installed in its proper location. Then, tighten them to the specified torque in the tightening sequence and method indicated. If tightening sequence instructions are not given, tighten them evenly in a cross pattern. Conversely, to remove a part, first loosen all the bolts, nuts, or screws that are retaining the part a 1/4-turn before removing them.

(5) **Torque**

When torque values are given in this Service Manual, use them. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(6) **Force**

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for loosening screws (particularly for removing screws held by non-permanent locking agent) in order to avoid damaging the screw heads.

(7) **Edges**

Watch for sharp edges, as they could cause injury through careless handling, especially during major engine disassembly and assembly. Use a clean piece of thick cloth when lifting the engine or turning it over.

(8) **High-Flash Point Solvent**

A high-flash point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Stoddard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

(9) **Gasket, O-ring**

Replace a gasket or an O-ring with a new part when disassembling. Remove any foreign matter from the mating surface of the gasket or O-ring to ensure a perfectly smooth surface to prevent oil or compression leaks.

Before Servicing

(10)Liquid Gasket, Locking Agent

Clean and prepare surfaces where liquid gasket or non-permanent locking agent will be used. Apply them sparingly. Excessive amounts may block engine oil passages and cause serious damage.

(11)Press

When using a press or driver to install a part such as a wheel bearing, apply a small amount of oil to the area where the two parts come in contact to ensure a smooth fit.

(12)Ball Bearing and Needle Bearing

Do not remove a ball bearing or a needle bearing unless it is absolutely necessary. Replace any ball or needle bearings that were removed with new ones. Install bearings with the manufacturer and size marks facing out, applying pressure evenly with a suitable driver. Apply force only to the end of the race that contacts the press fit portion, and press it evenly over the base component.

(13)Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals. Oil or grease seals should be pressed into place using a suitable driver, applying a force uniformly to the end of seal until the face of the seal is even with the end of the hole, unless instructed otherwise. When pressing in an oil or grease seal which has manufacturer's marks, press it in with the marks facing out.

(14)Circlip, Retaining Ring, and Cotter Pin

When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more. Install the circlip with its chamfered side facing load side as well.

Replace any circlips, retaining rings, and cotter pins that were removed with new ones, as removal weakens and deforms them. If old ones are reused, they could become detached while the motorcycle is driven, leading to a major problem.

(15)Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the sliding surfaces have an adequate lubricative film. During assembly, make sure to apply oil to any sliding surface or bearing that has been cleaned. Old grease or dirty oil could have lost its lubricative quality and may contain foreign particles that act as abrasives; therefore, make sure to wipe it off and apply fresh grease or oil. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended.

(16)Direction of Engine Rotation

To rotate the crankshaft manually, make sure to do so in the direction of positive rotation. Positive rotation is counterclockwise as viewed from the left side of the engine. To carry out proper adjustments, it is furthermore necessary to rotate the engine in the direction of positive rotation as well.

(17)Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. Replacement parts will be damaged or lose their original function once they are removed. Therefore, always replace these parts with new ones every time they are removed. Although the previously mentioned gasket, O-ring, ball bearing, needle bearing, grease seal, oil seal, circlip, and cotter pin have not been so designated in their respective text, they are replacement parts.

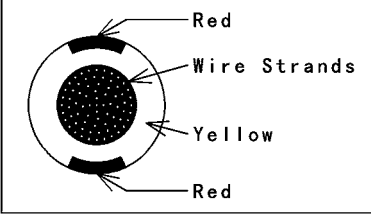

(18)Electrical Wires

All the electrical wires are either one-color or two-color. A two-color wire is identified first by the primary color and then the stripe color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a red/yellow" wire if the colors were reversed. Unless instructed otherwise, electrical wires must be connected to wires of the same color.

1-4 GENERAL INFORMATION

Before Servicing

Two-Color Electrical

Wire (cross-section)	Color Indicated on the Wire	Color Indicated on the Wiring Diagram
	Yellow/Red	

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(19) Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

Abrasion	Crack	Hardening	Warp
Bent	Dent	Scratch	Wear
Color change	Deterioration	Seizure	

(20) Specifications

Specification terms are defined as follows:
“Standards” : show dimensions or performances which brand-new parts or systems have
“Service Limits” : indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

Model Identification

EJ650-A1 Left Side View



EJ650-A1 Right Side View



1-6 GENERAL INFORMATION

Model Identification

EJ650-A2 (U.S.A & Canada) Left Side View



EJ650-A2 (U.S.A & Canada) Right Side View



Model Identification

EJ650-A3 Left Side View



EJ650-C3 Right Side View



1-8 GENERAL INFORMATION

General Specifications

Items	EJ650-A1 ~ A2	EJ650-A3 ~ A4	EJ650-A5
Dimensions			
Overall Length	2 185 mm (86.0 in.)	2 190 mm (86.2 in.)	
Overall Width	905 mm (35.6 in.)		
Overall Height	1 140 mm (44.9 in.)		
Wheelbase	1 450 mm (57.1 in.)	1 455 mm (57.3 in.)	
Road Clearance	125 mm (4.9 in.)		
Seat Height	800 mm (31.5 in.)		
Dry Mass	195 kg (43.0 lb) (CAL) 197 kg (434.4 lb)		
Curb Mass:			
Front	97 kg (213.9 lb) (CAL) 98 kg (216.1 lb)		
Rear	115 kg (253.6 lb) (CAL) 116 kg (255.8 lb)		
Fuel Tank Capacity	15 L (4.0 US gal)		
Performance			
Minimum Turning Radius	2.7 m (8.9 ft)		
Engine			
Type	4-stroke, 2-cylinder, SOHC, 4-valve		
Cooling System	Air-cooled		
Bore and Stroke	72.0 × 83.0 mm (2.83 × 3.27 in.)		
Displacement	675 cm ³ (41.2 cu in.)		
Compression Ratio	8.6 : 1		
Maximum Horsepower	37.0 kW (50 PS) @7 000 r/min (rpm)		
	(US) –		
Maximum Torque	56 N·m (5.7 kgf·m, 41 ft·lb) @5 500 r/min (rpm)		
	(US) –		
Carburetion System	Carburetors, Keihin CVK 34 × 2		
Starting System	Both starter motor and kick starter		
Ignition System	Battery and coil (transistorized)		
Timing Advance System	Electronically advance (digital)		
Ignition Timing	BTDC 10° @900 r/min (rpm) ~ BTDC 35° @5 000 r/min (rpm)		
Spark Plugs	NGK CR8E or ND U24ESR-N		
Cylinder Numbering Method	Left to right, 1-2		
Firing Order	1-2		
Valve Timing:			
Inlet Open	BTDC25°		
Inlet Close	ABDC55°		
Inlet Duration	260°		
Exhaust Open	BBDC55°		
Exhaust Close	ATDC25°		
Exhaust Duration	260°		
Lubrication System	Force lubrication (Wet sump)		
Engine Oil:			
Type	API SE, SF, or SG	API SE, SF or SG API SH or SJ with JASO MA	

General Specifications

Items	EJ650-A1 ~ A2	EJ650-A3 ~ A4	EJ650-A5
Viscosity	SAE10W-40, 10W-50, 20W-40,or 20W-50		
Capacity ADR 39/00 Stationary Level	3.0 L (3.2 US qt) (when engine is completely dry) (AU) 92 dB @3 500 rpm		
Drive Train			
Primary Reduction System:			
Type	Gear drive		
Reduction Ratio	2.095 (88/42)		
Clutch Type	Wet multi disc		
Transmission:			
Type	5-speed constant mesh, return shift		
Gear Ratios:			
1st	2.294 (39/17)		
2nd	1.590 (35/22)		
3rd	1.240 (31/25)		
4th	1.000 (28/28)		
5th	0.851 (23/27)		
Final Drive System:			
Type	Chain drive		
Reduction Ratio	2.600 (39/15)		
Overall Drive Ratio	4.640 @Top gear		
Frame			
Type	Tubular, Double cradle		
Caster	26.5°	27°	
Trail	105 mm (4.1 in.)	108 mm (4.3 in.)	
Front Tire:			
Type	Tube type		
Size	100/90-19 57H	100/90-19 M/C 57H	
Rear Tire:			
Type	Tube type		
Size	130/80-18 66H	130/80-18 M/C 66H	
Rim Size:			
Front	19 × 2.15		
Rear	18 × 2.75		
Front Suspension:			
Type	Telescopic fork		
Wheel Travel	130 mm (5.1 in.)		
Rear Suspension:			
Type	Swing arm		
Wheel Travel	105 mm (4.1 in.)		
Brake Type:			
Front	Single disc brake		
Rear	Drum brake		

1-10 GENERAL INFORMATION

General Specifications

Items	EJ650-A1 ~ A2	EJ650-A3 ~ A4	EJ650-A5
Electrical System			
Battery	12 V 12 Ah sealed battery		12 V 10 Ah sealed battery
Headlight:			
Type	Semi-sealed beam		
Bulb	12 V 60/55 W (quartz-halogen)		
Tail/Brake Lights	12 V 5/21 W		
Alternator:			
Type	Three-phase AC		
Rated Output	18 A-14 V @7 500 r/min (rpm)		

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

AU: Australia Model

CAL: California Model

US: United States Model

General Specifications

Items	EJ650-C3 ~ C4	EJ650-C5	EJ650-C6P ~ C7, C6F
Dimensions			
Overall Length	2 190 mm (86.2 in.)		
Overall Width	780 mm (30.7 in.)		
Overall Height	1 075 mm (42.3 in.)		
Wheelbase	1 455 mm (57.3 in.)		1 465 mm (57.7 in.)
Road Clearance	125 mm (4.9 in.)		
Seat Height	800 mm (31.5 in.)		
Dry Mass	195 kg (430.0 lb)		
Curb Mass:			
Front	97 kg (213.9 lb)		
Rear	115 kg (253.6 in.)		
Fuel Tank Capacity	15 L (4.0 US gal)		
Performance			
Minimum Turning Radius	2.7 m (8.9 ft)		
Engine			
Type	4-stroke, 2-cylinder, SOHC, 4-valve		
Cooling System	Air-cooled		
Bore And Stroke	72.0 × 83.0 mm (2.83 × 3.27 in.)		
Displacement	675 cm ³ (41.2 cu in.)		
Compression Ratio	8.6 : 1		
Maximum Horsepower	37.0 kW (50 PS) @7 000 r/min (rpm)		35 kW (47.6 PS) @6 500 r/min (rpm)
Maximum Torque	56 N·m (5.7 kgf·m, 41 ft·lb) @5 500 r/min (rpm)		54 N·m (5.5 kgf·m, 40 ft·lb) @4 500 r/min (rpm)
Carburetion System	(FR) – Carburetors, Keihin CVK 34 × 2		
Starting System	Both starter motor and kick starter		
Ignition System	Battery and coil (transistorized)		
Timing Advance System	Electronically advance (digital)		
Ignition Timing	BTDC 10° @900 r/min (rpm) ~ BTDC 35° @5 000 r/min (rpm)		
Spark Plugs	NGK CR8E or ND U24ESR-N		
Cylinder Numbering Method	Left to right, 1-2		
Firing Order	1-2		
Valve Timing:			
Inlet Open	BTDC25°		
Inlet Close	ABDC55°		
Inlet Duration	260°		
Exhaust Open	BBDC55°		
Exhaust Close	ATDC25°		
Exhaust Duration	260°		
Lubrication System	Force lubrication (Wet sump)		
Engine Oil:			
Type	API SE, SF, or SG API SH or SJ with JASO MA		

1-12 GENERAL INFORMATION

General Specifications

Items	EJ650-C3 ~ C4	EJ650-C5	EJ650-C6P ~ C7, C6F
Viscosity	SAE10W-40		
Capacity	3.0 L (3.2 US qt) (when engine is completely dry)		
Drive Train			
Primary Reduction System:			
Type	Gear drive		
Reduction Ratio	2.095 (88/42)		
Clutch Type	Wet multi disc		
Transmission:			
Type	5-speed constant mesh, return shift		
Gear Ratios:			
1st	2.294 (39/17)		
2nd	1.590 (35/22)		
3rd	1.240 (31/25)		
4th	1.000 (28/28)		
5th	0.851 (23/27)		
Final Drive System:			
Type	Chain drive		
Reduction Ratio	2.600 (39/15)		
Overall Drive Ratio	4.640 @Top gear		
Frame			
Type	Tubular, Double cradle		
Caster	27°		
Trail	108 mm (4.3 in.)		
Front Tire:			
Type	Tube type		
Size	100/90-19 57H	100/90-19 M/C 57H	
Rear Tire:			
Type	Tube type		
Size	130/80-18 66H	130/80-18 M/C 66H	
Rim Size:			
Front	19 × 2.15		
Rear	18 × 2.75		
Front Suspension:			
Type	Telescopic fork		
Wheel Travel	130 mm (5.1 in.)		
Rear Suspension:			
Type	Swing arm		
Wheel Travel	105 mm (4.1 in.)		
Brake Type:			
Front	Single disc brake		
Rear	Drum brake		
Electrical System			
Battery	12 V 12 Ah Sealed battery	12 V 10 Ah Sealed battery	

General Specifications

Items	EJ650-C3 ~ C4	EJ650-C5	EJ650-C6P ~ C7, C6F
Headlight:			
Type	Semi-sealed beam		
Bulb	12 V 60/55 W (quartz-halogen)		
Tail/Brake Lights	12 V 5/21 W		
Alternator:			
Type	Three-phase AC		
Rated Output	18 A-14 V @7 500 r/min (rpm)		

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

FR: France Model

1-14 GENERAL INFORMATION

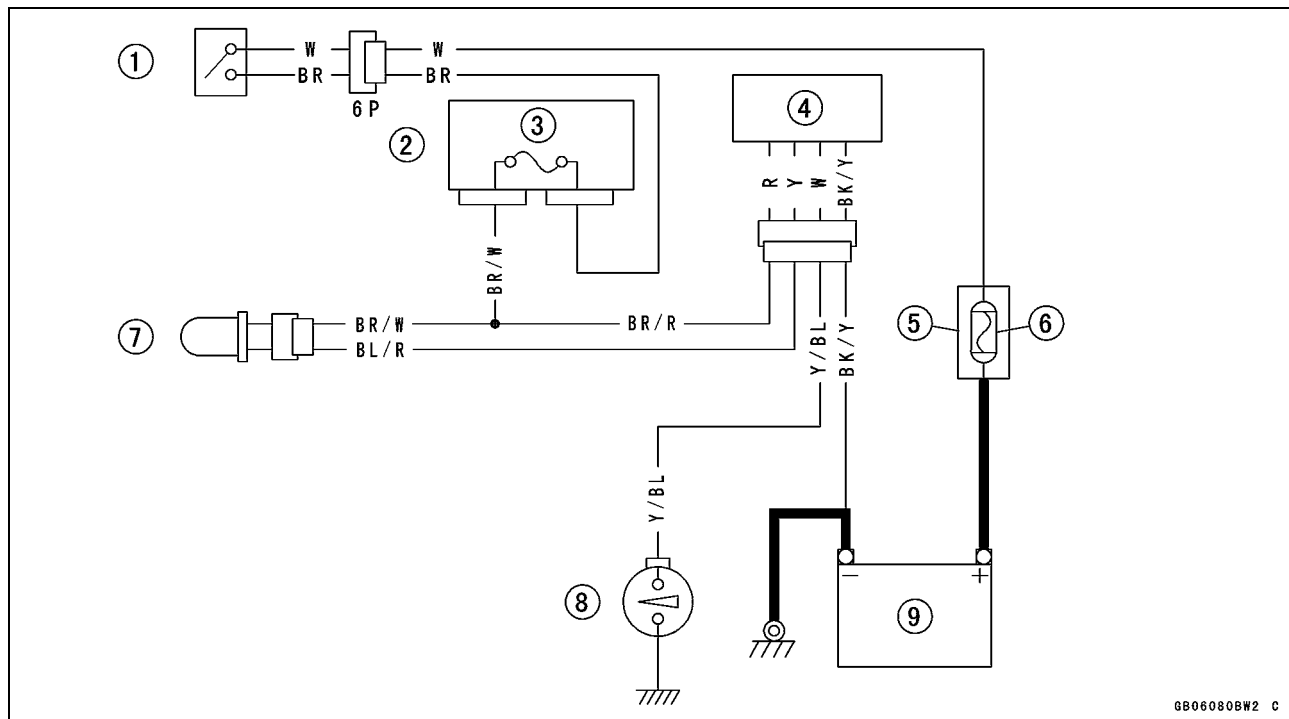
Technical Information

Oil Pressure Warning Light Delay Illumination System

Occasionally, the oil pressure warning light might illuminate while the motorcycle is in operation, even though the engine contains the specified amount of oil. This symptom could occur if the level of the oil in the engine changes or if the oil is stirred through a change in the behavior of the motorcycle such as sudden acceleration or deceleration, which momentarily introduces air into the oil passage. As a result, the oil pressure drops, and the oil pressure sensor sensitively detects the change in oil pressure, thus causing the warning light to illuminate.

To prevent the oil pressure warning light from illuminating unnecessarily, a lagged illumination system has been adopted. The oil pressure warning light does illuminate as normal, however, when the ignition switch is initially turned ON to start the engine.

Oil Pressure Warning Light Delay Illumination System

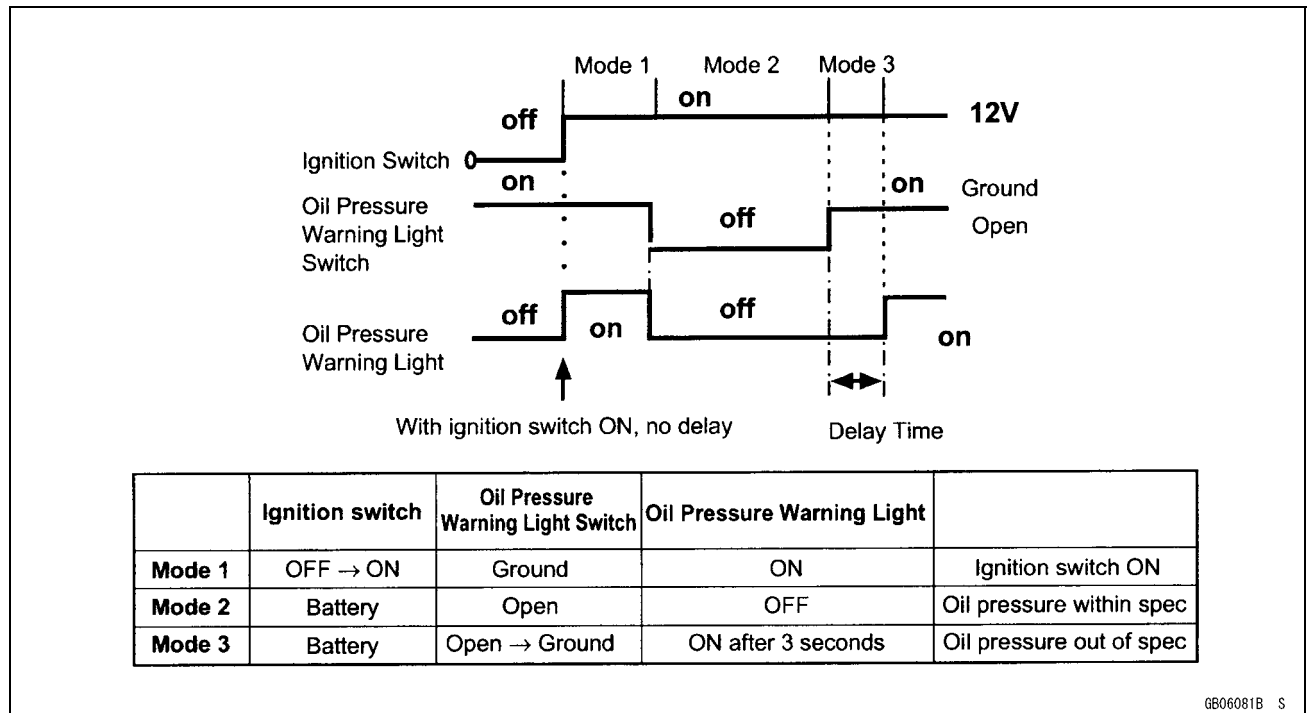


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1. Ignition Switch
2. Junction Box
3. Ignition Fuse 10 A
4. Oil Pressure Warning Light Delay Illumination Unit
5. Starter Relay
6. Main Fuse 30 A
7. Oil Pressure Warning Light
8. Oil Pressure Warning Light Switch
9. Battery

Technical Information

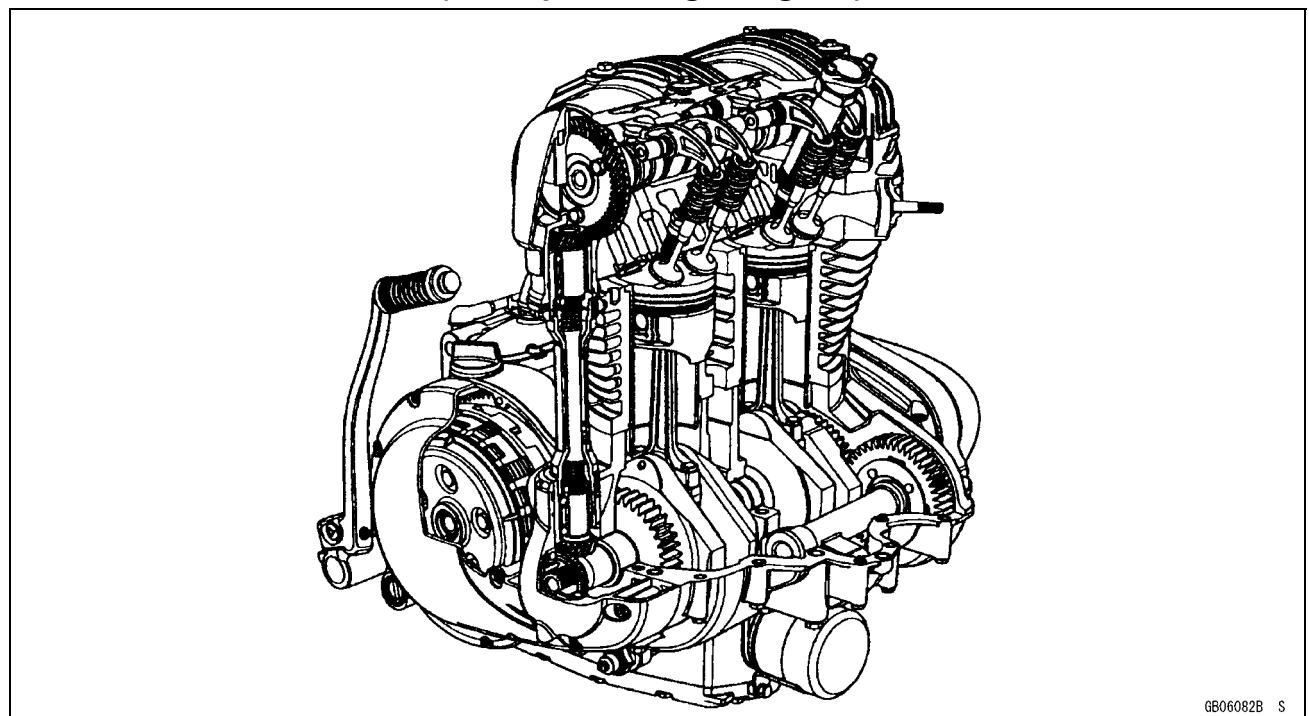
Delay Unit Operation



Bevel Gear (Hypoid Gear) Drive System

To ensure the smooth rotation and the proper transmission of power to the camshaft, the EJ650-A/C have adopted a bevel gear drive system. This system consists of two sets of spiral type hypoid gears that mesh on two staggered shafts, and a shaft that connects them. The hypoid gears are made of chrome molybdenum steel, a tough material that excels in wear resistance, realizing a longterm maintenance-free operation.

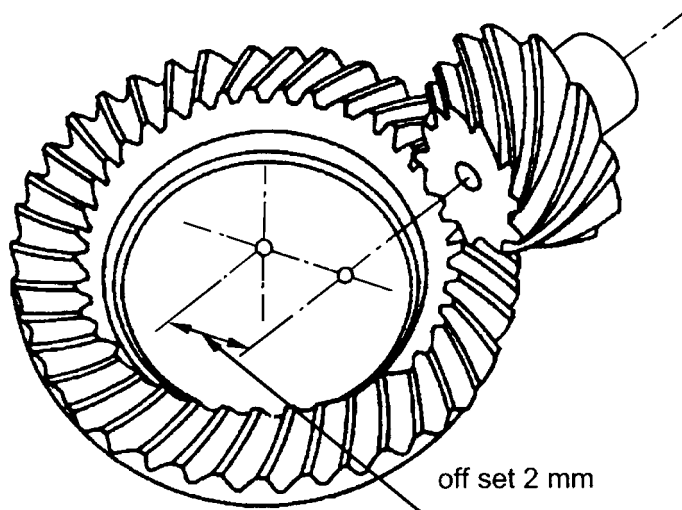
Camshaft Drive Mechanism (conceptual image diagram)



1-16 GENERAL INFORMATION

Technical Information

Bevel Gears (Hypoid Gears)



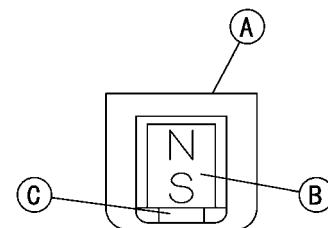
GB06083B S

Non-Contact Hall IC Type Speed Sensor

The EJ650-A/C use a thin profile electrical combination meter unit. Accordingly, the previous cable-driven speedometer has been changed to a pulse-driven speedometer. The non-contact Hall IC type speed sensor generates the pulses that are needed.

Construction and Operation

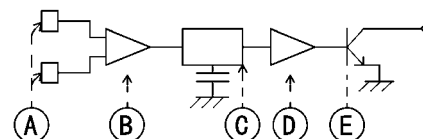
- The speed sensor [A] consists of a magnet [B] and a Hall IC [C].



- The Hall IC consists of a Hall element [A], differential amplifier [B], high pass filter [C], comparator [D], and output transistor [E].

Hall Element

A Hall element is a semiconductor comprising CaAs (gallium arsenide), InAs (indium arsenide), and InSb (indium antimonide). The magnetic flux density that is applied to the two Hall elements is converted and output in the form of voltage.



Technical Information

Differential Amplifier

Outputs the difference of the outputs from the two Hall elements

High Pass Filter

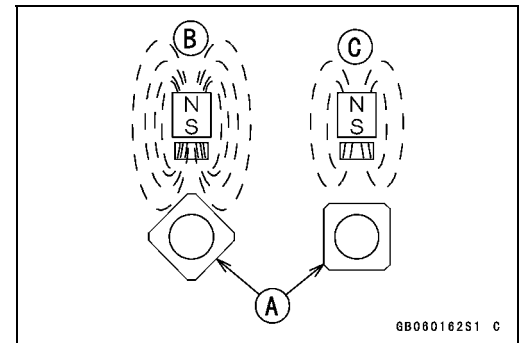
Sensitivity of two Hall elements
Surface magnetic flux density of magnet
Positional relationship between Hall IC, magnet, and detection gear

Cancels the DC offset of the differential output resulting from variances.
(Unable to perform "0" speed detection.)

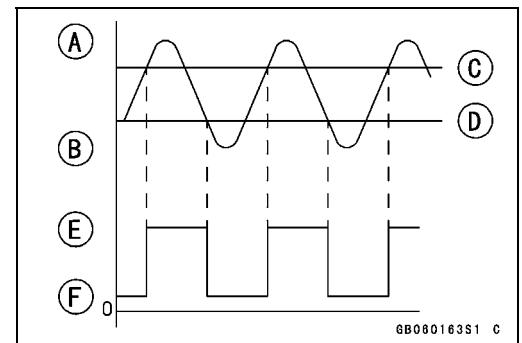
Comparator and Output Transistor

The transistor is turned ON/OFF in accordance with the changes in the magnetic flux, thus outputting square waves (open collector output).

- The magnetic flux density that passes through the Hall elements changes with the positional relationship between the nut and the sensor, along with the rotation of the engine sprocket rotor nut [A].
Large magnetic flux density [B]
Small magnetic flux density [C]



- In accordance with the changes in the density of the magnetic flux, a switch movement (magnetic changes → voltage) and the square waves (pulse voltage) that are equal to the number of angles of the rotor nut are output internally in the Hall IC.
Large magnetic flux density [A]
Small magnetic flux density [B]
Movement point [C]
Returning point [D]
High voltage [E]
Low voltage [F]



- These square waves (pulse voltage) are input into the speedometer in order to display the vehicle speed.

1-18 GENERAL INFORMATION

Unit Conversion Table

Prefixes for Units

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

Units of Mass

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume

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

Units of Force

N	×	0.1020	=	kg
N	×	0.2248	=	lb

kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length

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

Units of Torque

N·m	×	0.1020	=	kg·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb

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

Units of Pressure

kPa	×	0.01020	=	kgf/cm²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg

kgf/cm²	×	98.07	=	kPa
kgf/cm²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

Units of Speed

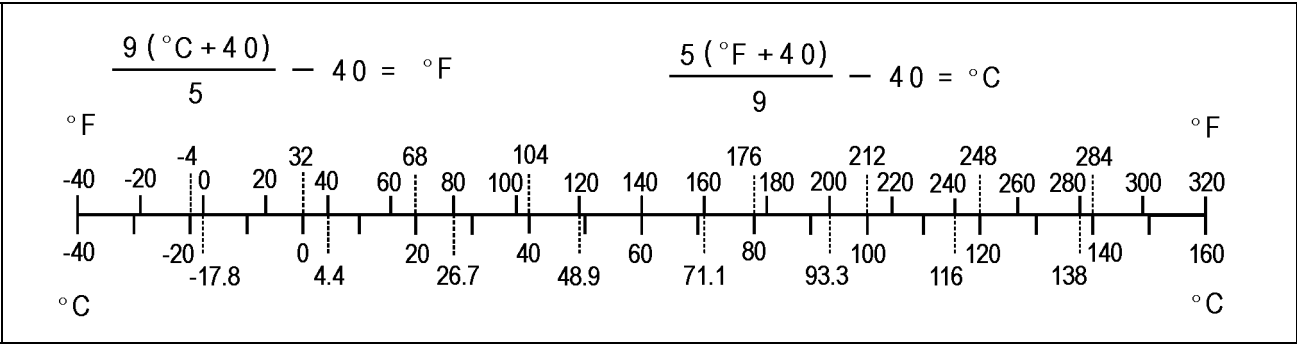
km/h	×	0.6214	=	mph
------	---	--------	---	-----

Units of Power

kW	×	1.360	=	PS
kW	×	1.341	=	HP

PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

Units of Temperature



Periodic Maintenance

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2-2 PERIODIC MAINTENANCE

Periodic Maintenance Chart (United States and Canada Model)

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.**

OPERATION	FREQUENCY	* ODOMETER READING × 1 000 km (× 1 000 mile)							
	Whichever comes first ↓ Every	1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	See Page
Throttle cable-inspect †		•	•	•	•	•	•	•	2-13
Fuel hoses, connections-inspect †			•	•	•	•	•	•	2-13
Idle speed-inspect †		•		•		•		•	2-14
Carburetor synchronization-inspect †				•		•		•	2-14
Air cleaner element-clean † #				•		•		•	2-15
Evaporative emission control system (CAL)-inspect †		•	•	•	•	•	•	•	2-16
Valve clearance-inspect †				•		•		•	2-17
Air suction valve-inspect †			•	•	•	•	•	•	2-17
Clutch-inspect		•	•	•	•	•	•	•	2-21
Engine oil-change #	year	•	•	•	•	•	•	•	2-22
Oil filter-replace		•		•		•		•	2-23
Spoke tightness and rim runout-inspect †		•	•	•	•	•	•	•	2-24
Tire wear-inspect †			•	•	•	•	•	•	2-25
Drive chain slack-inspect #	1 000 km								2-25
Drive chain wear-inspect †#			•	•	•	•	•	•	2-27
Drive chain-lubricate #	600 km								2-27
Brake fluid level-inspect †	month	•	•	•	•	•	•	•	2-28
Brake fluid-change	2 years					•			2-28
Brake lining or pad wear-inspect †#			•	•	•	•	•	•	2-29
Brake master cylinder cup and dust cover-replace	4 years								2-30
Caliper fluid seal and dust seal-replace	4 years								2-30
Brake hoses, connections-inspect †			•	•	•	•	•	•	2-30
Brake play-inspect †		•	•	•	•	•	•	•	2-30
Brake light switch-inspect †		•	•	•	•	•	•	•	2-31
Front fork oil-change	2 years					•			2-32
Front fork oil leak-inspect †				•		•		•	2-33
Rear shock absorber oil leak-inspect †				•		•		•	2-34
Swingarm pivot-lubricate		•		•		•		•	2-34
Steering-inspect †		•	•	•	•	•	•	•	2-34
Steering stem bearing-lubricate	2 years					•			2-35
Spark plug-clean and gap †			•	•	•	•	•	•	2-35
General lubrication-perform				•		•		•	2-36
Nut, bolts, and fasteners tightness-inspect †		•		•		•		•	2-37

PERIODIC MAINTENANCE 2-3

Periodic Maintenance Chart (Other than United States and Canada Model)

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.**

OPERATION	FREQUENCY	Whichever comes first ↓ Every	* ODOMETER READING × 1 000 km (× 1 000 mile) →							See Page
			1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	
Throttle cable-inspect †			•	•	•	•	•	•	•	2-13
Fuel hoses, connections-inspect †				•	•	•	•	•	•	2-13
Idle speed-inspect †			•		•		•		•	2-14
Carburetor synchronization-inspect †					•		•		•	2-14
Air cleaner element-clean † #					•		•		•	2-15
Valve clearance-inspect †							•			2-17
Air suction valve-inspect †				•	•	•	•	•	•	2-17
Clutch-inspect			•	•	•	•	•	•	•	2-21
Engine oil-change #	year		•	•	•	•	•	•	•	2-22
Oil filter-replace			•		•		•		•	2-23
Spoke tightness and rim runout-inspect †			•	•	•	•	•	•	•	2-24
Tire wear-inspect †				•	•	•	•	•	•	2-25
Drive chain slack-inspect #	1 000 km									2-25
Drive chain wear-inspect †#				•	•	•	•	•	•	2-27
Drive chain-lubricate #	600 km									2-27
Brake fluid level-inspect †	month		•	•	•	•	•	•	•	2-28
Brake fluid-change	2 years						•			2-28
Brake lining or pad wear-inspect †#				•	•	•	•	•	•	2-29
Brake master cylinder cup and dust cover-replace	4 years									2-30
Caliper fluid seal and dust seal-replace	4 years									2-30
Brake hoses, connections-inspect †				•	•	•	•	•	•	2-30
Brake play-inspect †			•	•	•	•	•	•	•	2-30
Brake light switch-inspect †			•	•	•	•	•	•	•	2-31
Front fork oil-change	2 years						•			2-32
Front fork oil leak-inspect †					•		•		•	2-33
Rear shock absorber oil leak-inspect †					•		•		•	2-34
Swingarm pivot-lubricate			•		•		•		•	2-34
Steering-inspect †			•	•	•	•	•	•	•	2-34
Steering stem bearing-lubricate	2 years						•			2-35
Spark plug-clean and gap †				•	•	•	•	•	•	2-35
General lubrication-perform					•		•		•	2-36
Nut, bolts, and fasteners tightness-inspect †			•		•		•		•	2-37

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart (Other than United States and Canada Model)

- #: Service more frequently when operating in severe conditions; dusty, wet, muddy, high speed, or frequent starting/stopping.
 - *: For higher odometer readings, repeat at the frequency interval established here.
 - †: Replace, add, adjust, clean, or torque if necessary.
- CAL: California Model

Torque and Locking Agent

Use a torque wrench to torque bolts and nuts to their appropriate torque values. If too little torque is applied, the bolts and nuts could loosen and fall out. If too much torque is applied, the thread crests of the bolts and nuts could collapse or the threaded portion could be sheared off.

To retorque a bolt or a nut, or to check their torque, loosen the bolt or nut one-half turn before tightening it to the specified torque.

Letters used in the table mean:

EO: Apply engine oil to the thread and the seating surface.

G: Apply grease to the threads.

HL: Apply a high locking agent (high-adhesion locking agent with medium strength) to the treads.

L: Apply a non-permanent locking agent to the threads.

MO: Apply molybdenum disulfide oil (mixture of engine oil and molybdenum disulfide grease in a weight ratio is 10 : 1).

R: Replacement parts.

S: Tighten the fasteners following the specified sequence.

St: Stake the fasteners to prevent loosening.

SS: Apply silicon sealant.

Item	Tightening Torque			Re- marks
	N·m	kgf·m	ft·lb	
Fuel System				
Fuel Tap Bolts	4.9	0.5	43 in·lb	with black washer
	2.5	0.25	22 in·lb	with white washer
Engine Top End				
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
Spark Plugs	13	1.3	113 in·lb	
Spark Plug Hole Holder Cover Bolts	7.8	0.8	69 in·lb	
Spark Plug Hole Pipes	118	12	87	L
Cylinder Head Cover Damper Bolts	12	1.2	104 in·lb	L
Cylinder Head Bolts:				
(new)	49	5.0	36	EO, S
(old)	47	4.8	35	EO, S
Camshaft Cap Bolts:				
8 mm	25	2.5	18	S
6 mm	12	1.2	104 in	S
Bevel Gear Cover Bolts	3.9	0.4	35 in·lb	L
Bevel Gear Case Bolts	12	1.2	104 in·lb	
Bevel Gear Oil Passage Nozzle	3.4	0.35	30 in·lb	
Driven Bevel Gear Bolts	20	2.0	14	L
Bevel Gear Case Locknuts	20	2.0	14	
Locknut Stop Screws	—	—	—	L
Bearing Holder Allen Bolts (crankshaft side)	7.8	0.8	69 in·lb	L
Bevel Gear Holder Screws	4.9	0.5	43 in·lb	L
Gear Cases	98	10	72	L
Bevel Gear Mounting Nuts	59	6.0	43	
Camshaft Locating Plate Bolts	12	1.2	104 in·lb	
Rocker Shaft Bolts	12	1.2	104 in·lb	L
Oil Fitting Bracket Bolts	12	1.2	104 in·lb	L

2-6 PERIODIC MAINTENANCE

Torque and Locking Agent

Item	Tightening Torque			Re- marks
	N·m	kgf·m	ft·lb	
Air Suction Valve Cover Allen Bolts	12	1.2	104 in·lb	L
Exhaust Pipe Holder Nuts	17	1.7	12	
Muffler Mounting Bolts	21	2.1	15	
Clutch				
Clutch Cable Lower Holder Bolts	12	1.2	104 in·lb	L
Clutch Hub Nut	132	13.5	98	R
Clutch Spring Bolts	9.8	1.0	87 in·lb	
Clutch Cover Damper Plate Bolts	12	1.2	104 in·lb	L
Clutch Cover Bolts	12	1.2	104 in·lb	(1, L)
Chain Guide Plate Bolt	9.8	1.0	87 in·lb	
Release Shaft Locating Bolt	9.8	1.0	87 in·lb	
Release Lever Clamp Bolt	12	1.2	104 in·lb	
Clutch Release Case Mounting Bolts	12	1.2	104 in·lb	
Engine Lubricant System				
Oil Pipe Plate Bolt	9.8	1.0	87 in·lb	L
Oil Pressure Warning Light Plug	20	2.0	14	
Oil Pressure Warning Light Switch	15	1.5	11	SS
Oil Pump Gear Bolt	12	1.2	104 in·lb	L
Oil Pump Cover Bolts	9.8	1.0	87 in·lb	L
Oil Pressure Relief Valve	15	1.5	11	HL
Oil Filler Cap	1.5 (hand tighten)	0.15 (hand tighten)	13 in·lb	
Oil Drain Plug	20	2.0	14	
Oil Pan Bolts	12	1.2	104 in·lb	(2, L)
Oil Pan Damper Bolts	12	1.2	104 in·lb	L
Oil Filter	9.8	1.0	87 in·lb	
(On and after EJ650-A5/C5)	18	1.8	13	
Oil Filter Cap Bolts	11	1.1	95 in·lb	L
Oil Filter Passage Pipe	25	2.5	18	SS
Oil Fitting Bracket Bolts	12	1.2	104 in·lb	L
Oil Passage Nozzle	3.4	0.35	30 in·lb	
Engine Removal/Installation				
Engine Bracket Bolts	25	2.5	18	
Engine Mounting Nuts	44	4.5	33	
Crankshaft/Transmission				
Crankcase Upper Retaining Bolts:				
6 mm	20	2.0	14	
8 mm	29	3.0	22	
Crankcase Lower Retaining Bolts:				
9 mm	41	4.2	30	S
8 mm	29	3.0	22	S
6 mm	20	2.0	14	

Torque and Locking Agent

Item	Tightening Torque			Re- marks
	N·m	kgf·m	ft·lb	
Connecting Rod Big End Cap Nuts	—	—	—	Refer to the text.
Return Spring Pin	42	4.3	31	L
External Shift Mechanism Cover Bolts	12	1.2	104 in·lb	
Kick Pedal Mounting Bolt	69	7.0	51	
Kick Shaft Cover Bolts	12	1.2	104 in·lb	
Kick Shaft Return Spring Bracket Bolts	12	1.2	104 in·lb	L
Breather Cap Bolts	12	1.2	104 in·lb	
Breather Plate Screws	4.9	0.5	43 in·lb	L
Shift Pedal Bolt	12	1.2	104 in·lb	
Gear Positioning Lever Bolt	12	1.2	104 in·lb	L
Shift Drum Cam Bolt	12	1.2	104 in·lb	L
Shift Drum Bearing Holder Bolt	12	1.2	104 in·lb	S, L
Shift Drum Bearing Holder Screw	4.9	0.5	43 in·lb	S, L
Wheels/Tires				
Front Axle Clamp Bolts	20	2.0	14	
Front Axle Nut	88	9.0	65	
(On and after EJ650-A3/C3)	98	10	72	
Rear Axle Nut	98	10	72	
Spoke Nipples	3.0	0.3	26 in·lb	
(On and after EJ650-A3/C3)	5.1	0.52	45 in·lb	
Final Drive				
Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
Engine Sprocket Nut	127	13	94	MO
Engine Sprocket Cover Bolts	12	1.2	104 in·lb	
Engine Sprocket Cover Damper Plate Bolts	12	1.2	104 in·lb	L
Rear Sprocket Studs	—	—	—	HL(depth of cut)
Rear Sprocket Nuts	74	7.5	54	
(On and after EJ650-A3/C3)	59	6.0	43	
Brakes				
Brake Lever Pivot Bolt	1.0	0.1	9 in·lb	
Brake Lever Pivot Bolt Locknut	5.9	0.6	52 in·lb	
Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
Master Cylinder Clamp Bolts	8.8	0.9	78 in·lb	S
Front Brake Light Switch Screw	1.2	0.12	10 in·lb	
Brake Hose Banjo Bolts	34	3.5	25	
Caliper Mounting Bolts	34	3.5	25	
Caliper Bleed Valve	7.8	0.8	69 in·lb	
Brake Disc Bolts	23	2.3	17	
Brake Pedal Mounting Bolt	25	2.5	18	
Cam Lever Bolt	19	1.9	14	
Torque Link Nut, Bolts	34	3.5	25	

2-8 PERIODIC MAINTENANCE

Torque and Locking Agent

Item	Tightening Torque			Re- marks
	N·m	kgf·m	ft·lb	
Suspension				
Front Fork Top Plugs	23	2.3	17	
Front Fork Clamp Bolts:				
(upper)	20	2.0	14	
(lower)	29	3.0	22	
Front Axle Clamp Bolts	20	2.0	14	
Front Fork Bottom Allen Bolts	29	3.0	22	L
Swing Arm Pivot Nut	98	10	72	
Rear Shock Absorber Mounting Nuts (Upper)	59	6.0	43	
Rear Shock Absorber Mounting Nuts (Lower)	34	3.5	25	
Steering				
Handlebar Holder Bolts	25	2.5	18	S
Handlebar Switch Housing Screws	3.4	0.35	30 in·lb	
Steering Stem Head Nut	44	4.5	33	
Front Fork Clamp Bolts:				
(upper)	20	2.0	14	
(lower)	29	3.0	22	
Steering Stem Nut	4.9	0.5	43 in·lb	
Frame				
Front footpeg Mounting Bolts	59	6.0	43	
Center Stand Mounting Bolt	44	4.5	33	
Side Stand Mounting Bolt	44	4.5	33	
Grab Rail Bolts	25	2.5	18	
Electrical System				
Speed Sensor Mounting Bolt	7.8	0.8	69 in·lb	L
Front Brake Light Switch Screw	1.2	0.12	10 in·lb	
Spark Plugs	13	1.3	113 in·lb	
Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	L
Starter Motor Thru-Bolts	4.9	0.5	43 in·lb	
Starter Motor Terminal Nut	11	1.1	95 in·lb	
Starter Motor Cable Nut	4.9	0.5	43 in·lb	
One-Way Clutch Mounting Allen Bolts	34	3.5	25	L
Alternator Cover Bolts	12	1.2	104 in·lb	(2, L)
Alternator Stator Mounting Bolts	12	1.2	104 in·lb	L
Alternator Stator Wire Clamp Bolts	7.8	0.8	69 in·lb	L
Alternator Rotor Bolt	157	16	116	
Gear Position Sensor Screws	3.9	0.4	35 in·lb	L
Oil Pressure Warning Light Switch	15	1.5	11	SS
Oil Pressure Warning Light Switch Lead Wire Bolt	1.6	0.16	14 in·lb	
Crankshaft Sensor Wire Guard Plate Bolts	9.8	1.0	87 in·lb	L
Crankshaft Sensor Mounting Bolts	7.8	0.8	69 in·lb	L
Crankshaft Sensor Mounting Bracket Bolts	12	1.2	104 in·lb	L

Torque and Locking Agent

Item	Tightening Torque			Re- marks
	N·m	kgf·m	ft·lb	
Side Stand Switch Mounting Bolt	8.8	0.9	78 in·lb	L
Tail Light Mounting Nuts	5.9	0.6	52	

The table on the right lists the basic torque for the bolts and nuts, which are determined by their thread diameter. Use this table for the bolts and nuts that are not listed in the table below according to their thread diameter. All of the tightening torque values are for use with dry threads that have been cleaned with solvent.

Basic Torque for General Fasteners

Threads dia. (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in·lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in·lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

2-10 PERIODIC MAINTENANCE

Specifications

Item	Standard	Service Limit
Fuel System Throttle Grip or Choke Lever Free Play Idle Speed Carburetor Synchronization Vacuum	2 ~ 3 mm (0.08 ~ 0.12 in.) 900 ±50 r/min (rpm) 2.7 kPa (2 cmHg, 0.39 psi) or less difference between any two carburetors	— — —
Engine Top End Valve Clearance Exhaust Inlet	0.14 ~ 0.19 mm (0.0055 ~ 0.0075 in.) 0.08 ~ 0.13 mm (0.0031 ~ 0.0051 in.)	— — —
Clutch Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	— — —
Engine Lubrication System Engine Oil: Type Viscosity Capacity	API SE, SF or SG API SH or SJ with JASO MA SAE 10W-40 2.5 L (2.6 US qt, when filter is not removed) 2.8 L (3.0 US qt, when filter is removed) 3.0 L (3.2 US qt, when engine is completely disassembled and dry)	— — —
Wheels/Tires Tire Tread Depth: Front: BRIDGESTONE DUNLOP 100/90-19 M/C 57H Rear: BRIDGESTONE DUNLOP 130/80-18 M/C 66H Rim Runout (with tire installed): Axial Radial	4.3 mm (0.17 in.) 4.4 mm (0.17 in.) 6.2 mm (0.24 in.) 7.4 mm (0.29 in.) TIR 0.8 mm (0.03 in.) or less TIR 1.0 mm (0.04 in.) or less	1 mm (0.04 in.) Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.) TIR 2.0 mm (0.08 in.) TIR 2.0 mm (0.08 in.)
Final Drive Drive Chain Slack Drive Chain Wear (20-link length)	25 ~ 35 mm (0.98 ~ 1.34 in.) 317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	— — — 323 mm (12.7 in.)

Specifications

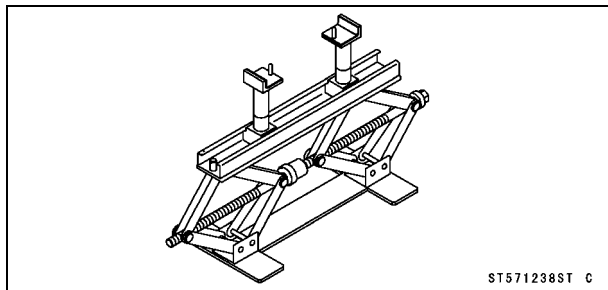
Item	Standard	Service Limit
Brakes		
Brake Fluid:		
Grade	DOT4	— — —
Brake Pad lining Thickness:		
Front	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Brake Shoe Lining Thickness:		
Rear	3.35 ~ 3.65 mm (0.132 ~ 0.144 in.)	1.8 mm (0.07 in.)
Brake Pedal Position	About 0 ~ 30 mm (1.2 in.) below front step top	— — —
Brake Pedal Free Play	20 ~ 30 mm (0.8 ~ 1.2 in.)	
Brake Light Timing:		
Front	Pulled ON	— — —
Rear	ON after about 10 mm (0.39 in.) of pedal travel	
Suspension		
Fork Oil:		
Viscosity	KHL 34-G10 (KAYABA) or equivalent	— — —
When Changing Oil:	Approx. 322 mL (10.9 US oz.)	— — —
(On and after EJ650-A3/C3)	Approx. 343 mL (11.6 US oz.)	
After Disassembly and Completely Dry	379 ±4 mL (12.8 ±0.14 US oz.)	— — —
(On and after EJ650-A3/C3)	400 ±4 mL (13.5 ±0.14 US oz.)	
Fork Oil Level: (fully compressed, without spring)	137 ±2 mm (5.39 ±0.08 in.)	
(On and after EJ650-A3/C3)	112 ±2 mm (4.41 ±0.08 in.)	
Electrical System		
Spark Plug Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	— — —

2-12 PERIODIC MAINTENANCE

Special Tools

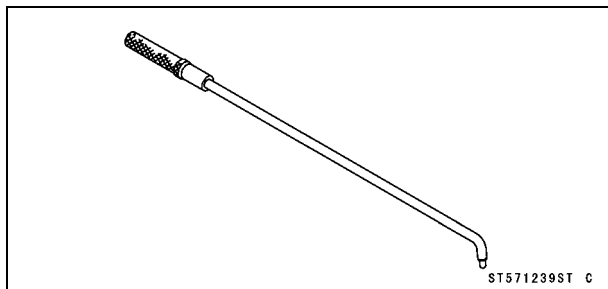
Jack:

57001-1238



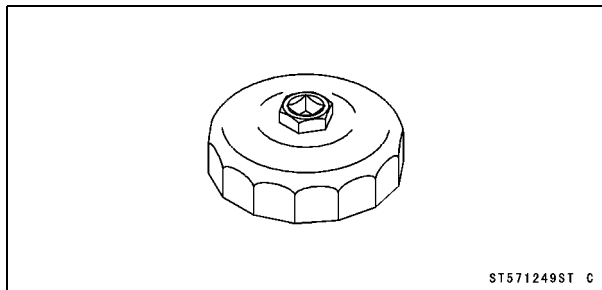
Pilot Screw Adjuster, A:

57001-1239



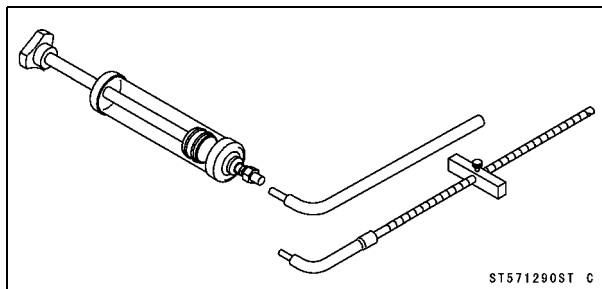
Oil Filter Wrench:

57001-1249



Fork Oil Level Gauge:

57001-1290



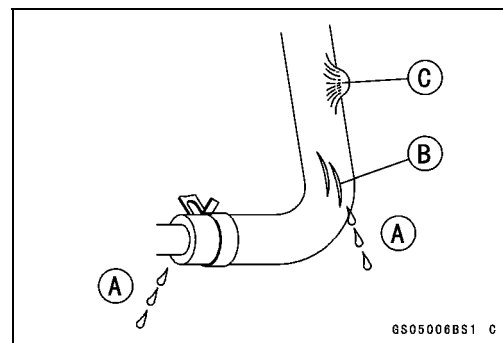
Periodic Maintenance Procedures

Fuel System

Fuel Hoses and Connections Inspection

○ The fuel hoses are designed to be used throughout the motorcycle's life without any maintenance, however, if the motorcycle is not properly handled, the pressure inside the fuel line can cause fuel to leak [A] or the hose to burst. Remove the fuel tank (see Fuel System chapter) and check the fuel hose.

- ★ Replace the fuel hose if any fraying, cracks [B] or bulges [C] are noticed.
- Check that the hoses are securely connected and clamps are installed correctly.
- When installing, route the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and route the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.
- ★ Replace the hose if it has been sharply bent or kinked.



Throttle Cable Inspection

Throttle Grip Free Play Inspection

- Inspect the free play [A] of the throttle grip.

Throttle Grip Free Play

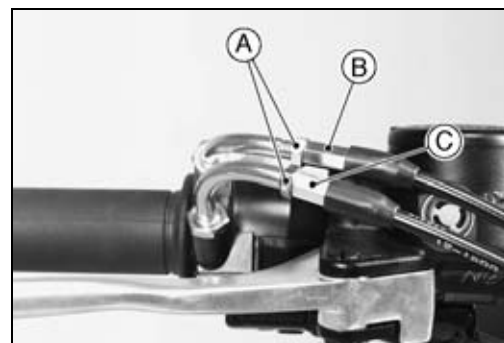
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)

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



Throttle Grip Free Play Adjustment

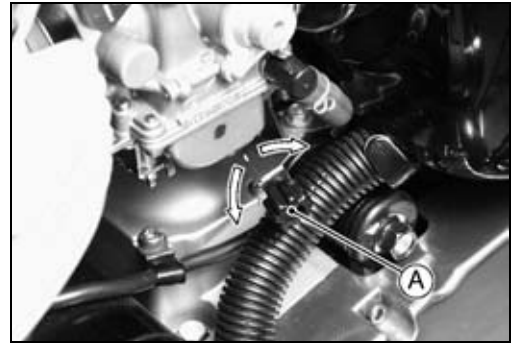
- Loosen the locknut [A].
- Completely close the throttle grip, turn the deceleration adjuster [C] to eliminate any cable free play, and tighten the locknut on the adjuster.
- Turn the acceleration adjuster [B] to adjust the throttle grip free play to 2 ~ 3 mm (0.08 ~ 0.12 in.), and tighten the locknut on the adjuster.
- ★ If the free play cannot be adjusted with the adjusters, replace the cable.



2-14 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Make sure that the idle adjusting screw [A] of the carburetor and the throttle pulley are making contact.
- Turn the adjusting screw clockwise and counterclockwise to verify that the idle speed changes.
- Set the idle to the specified speed.



Idle Speed Inspection

Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides to check for any changes in the idle speed.
- ★ If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted, incorrectly routed, or damaged. Be sure to correct any of these conditions before riding.

⚠ WARNING

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

- Check the idle speed.

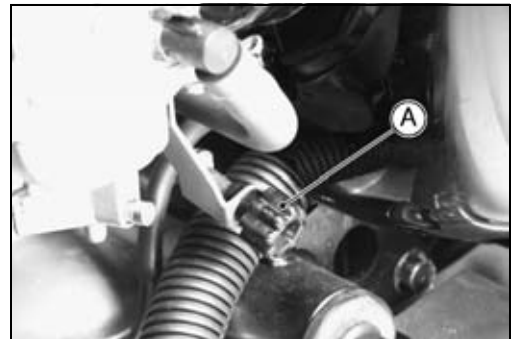
Idle Speed

Standard: 900 ±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 idle 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.



Carburetor Synchronization Inspection

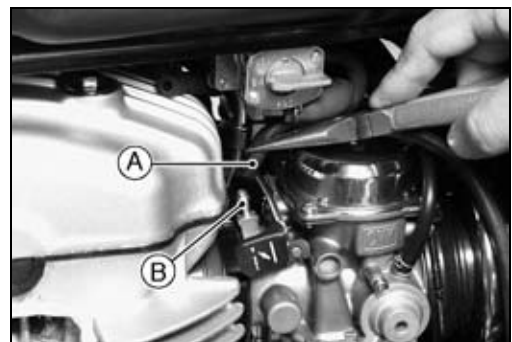
Carburetor Synchronization Inspection

- Check the idle speed.
- Remove the inlet pipe.
- Attach the hoses of the vacuum gauge [A] to the fittings [B].
- Start the engine and read the intake vacuum of each carburetor at idle.

Carburetor Synchronization

Standard: 2.7 kPa (2 cmHg, 0.39 psi) or less pressure difference between cylinders

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



Periodic Maintenance Procedures

Carburetor Synchronization Adjustment

- While the engine is idling, turn the adjuster [A] to synchronize the right and left carburetors.



- ★ If the carburetors cannot be synchronized by using the adjusting screws, use the pilot screw adjuster [A] to check the number of back out turns of the pilot screw.

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

- Recheck the synchronization.



CAUTION

Do not adjust the synchronization by turning the pilot screw unnecessarily, as this could cause the engine to run poorly in the low speed range.

- Check the idle speed.

Air Cleaner Element Cleaning and Inspection

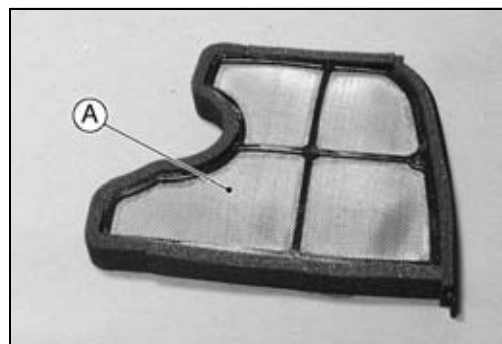
NOTE

- In dusty areas, the element should be cleaned more frequently than the recommended interval.
- After riding through rain or on muddy roads, the element should be cleaned immediately.

⚠ WARNING

Clean the element 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. Because of the danger of highly flammable liquids, do not use gasoline or a low flash-point solvent to clean the element.

- Remove the element [A] (see Fuel System chapter).
- Clean the element in cleaning solvent, and then dry it with compressed air or by shaking it.
- After immersing the element in SAE-30 oil, carefully squeeze out any excess oil, so as not to damage the element.
- Wrap the element with a clean, lint-free towel to squeeze out the oil.
- Inspect the element before installing it.
- ★ If the element is broken, or the frame is damaged or bent, replace the element.



2-16 PERIODIC MAINTENANCE

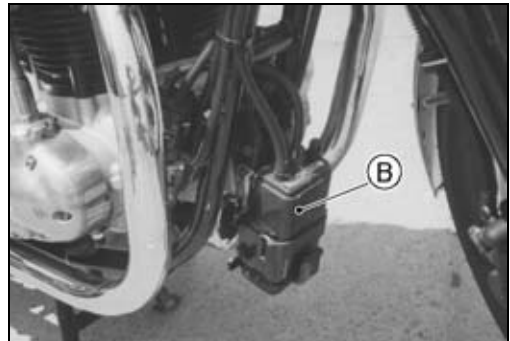
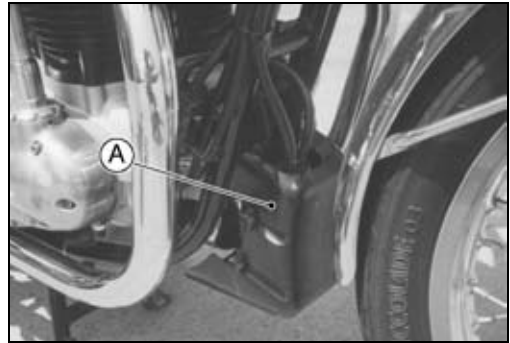
Periodic Maintenance Procedures

Evaporative Emission Control System Inspection

- Inspect the California canister as follows:
 - Remove the canister cover [A].
 - Remove the canister [B], and disconnect the hoses from the canister.
 - Visually inspect the canister for cracks and 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 California liquid separator as follows:
 - Disconnect the hoses from the liquid/vapor separator [A], and remove the separator from the motorcycle.
 - Visually inspect the separator for cracks and other damage.
 - ★ If the separator has any cracks or is badly damaged, replace it with a new one.



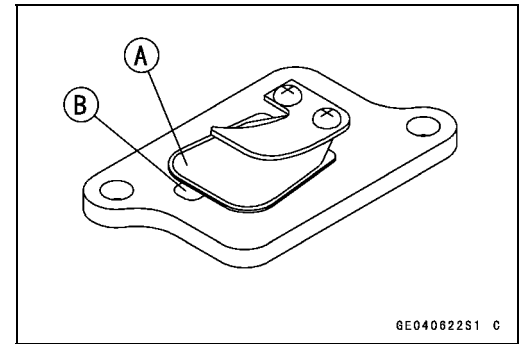
- Check the hoses of California evaporative emission control system as follows:
 - Check that the hoses are securely connected and clips are in position.
 - Replace any kinked, deteriorated or damaged hoses.
 - Route the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
 - When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and route the hoses with a minimum of bending so that the emission flow will not be obstructed.

Periodic Maintenance Procedures

Engine Top End

Air Suction Valve Inspection

- Visually inspect the reeds [A] for cracks, folds, warps, heat damage, or other damage.
- ★ If there is any doubt as to the condition of the reed, 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 with a high-flash-point solvent.



CAUTION

Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of suction valve assembly.

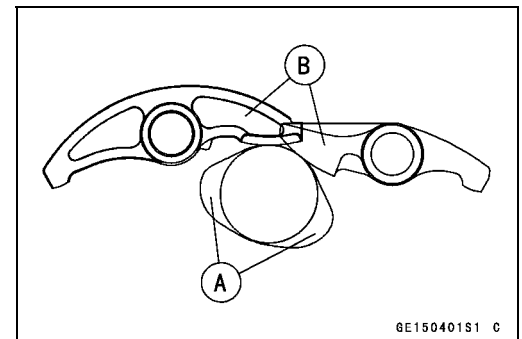
Valve Clearance Inspection

Valve Clearance Inspection

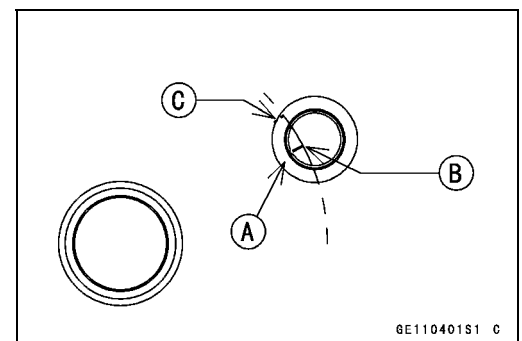
NOTE

○ *Inspect and adjust the valve clearance when the engine is cold (room temperature).*

- Remove:
 - Cylinder Head Cover (see Engine Top End chapter)
 - Timing Inspection Plug
 - Rotor Bolt Plug
- Bring the piston to the top-dead-center of its compression stroke to inspect the valve clearance (the position at the end of the compression stroke, with the cam lobes [A] facing in the direction opposite the rocker arm [B]).



- Place a wrench over the rotor bolt and turn it counterclockwise to align the TDC mark [B] with the timing notch [A]. Ignition mark [C]



2-18 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

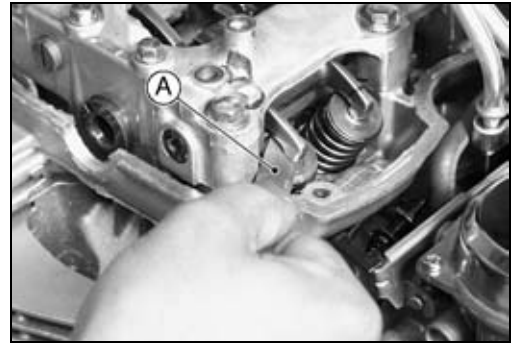
- Using a thickness gauge [A], measure the clearance between each rocker arm and shim.
- For the purpose of adjusting the valve clearances, record the measured values.

Valve Clearance: Between Rocker Arm and Shim

Standard:

Exhaust 0.14 ~ 0.19 mm (0.0055 ~ 0.0075 in.)

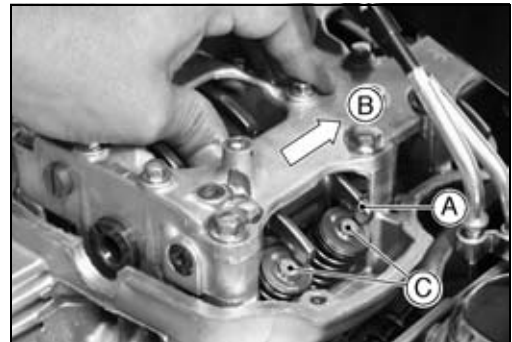
Inlet 0.08 ~ 0.13 mm (0.0031 ~ 0.0051 in.)



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

Valve Clearance Adjustment

- Slide the rocker arm [A] for the valve that requires adjustment to the spring side [B].
- To slide a rocker arm on the inlet side, first move the rocker arm on the exhaust side.
- Remove the shim [C] from the top of the spring retainer.



CAUTION

When returning the rocker arm to its original position after adjusting the valve clearance on the inlet side, make sure to also return the rocker arm on the exhaust side to its original position.

- Measure the thickness of the removed shim. Select a new shim based on the previously measured valve clearance and the Valve Clearance Adjustment Chart.
- Install the shim.

CAUTION

Use only one shim at each location, without stacking them. Do not perform additional work on the shim, such as grinding.

CAUTION

When returning the rocker arm to its original position after adjusting the valve clearance on the inlet side, make sure to also return the rocker arm on the exhaust side to its original position.

- Apply engine oil to the shim surfaces.
- Return the rocker arm to its original position.
- Recheck the valve clearance and readjust if necessary.
- Install the cylinder head cover (see Engine Top End chapter), timing inspection plug, and the rotor bolt plug.

Periodic Maintenance Procedures

VALVE CLEARANCE ADJUSTMENT CHART EXHAUST VALVE

		Present shim															Example									
Part No. (92180-)		1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054				
Mark		50	55	60	65	70	75	80	85	90	95	00	5	10	15	20	25	30	35	40	45	50				
Thickness (mm)		2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				

Valve clearance measurement (mm)	0.00~0.04	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35		
	0.05~0.08	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40		
	0.10~0.13	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45		
	0.14~0.19		Specified Valve Clearance/No change required																					
	0.20~0.24	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
	0.25~0.29	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
	0.30~0.34	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
	0.35~0.39	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
	0.40~0.44	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
	0.45~0.49	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
	0.50~0.54	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
	0.55~0.59	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
	0.60~0.64	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
	0.65~0.69	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
	0.70~0.74	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
	0.75~0.79	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
	0.80~0.84	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50															
	0.85~0.89	3.20	3.25	3.30	3.35	3.40	3.45	3.50																
	0.90~0.94	3.25	3.30	3.35	3.40	3.45	3.50																	
	0.95~0.99	3.30	3.35	3.40	3.45	3.50																		
	1.00~1.04	3.35	3.40	3.45	3.50																			
	1.05~1.09	3.40	3.45	3.50																				
	2.00~2.04	3.45	3.50																					
	2.05~2.09	3.50																						

Install the shim of this thickness (mm).

GE15024BW3 C

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

Example

Present shim is 2.95 mm (0.116 in.).

Measured clearance is 0.38 mm (0.015 in.).

Replace with the shim where the lines intersect, which is the 3.15 mm (0.124 in.) shim.

5. After selecting a shim, make sure to remeasure the clearance because the clearance could be out of standard due to shim thickness variances.
6. If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

2-20 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

VALVE CLEARANCE ADJUSTMENT CHART INLET VALVE

	Present shim																Example							
Part No. (92180-)	1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054			
Mark	50	55	60	65	70	75	80	85	90	95	00	5	10	15	20	25	30	35	40	45	50			
Thickness (mm)	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			

Valve clearance measurement (mm)	0.00~0.03	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
	0.04~0.07	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
	0.08~0.13			Specified Valve Clearance/No change required																		
	0.14~0.18	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
	0.19~0.23	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
	0.24~0.28	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
	0.29~0.33	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
	0.34~0.38	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
	0.39~0.43	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
	0.44~0.48	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
	0.49~0.53	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
	0.54~0.58	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
	0.59~0.63	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
	0.64~0.68	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
	0.69~0.73	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
	0.74~0.78	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
	0.79~0.83	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
	0.84~0.88	3.25	3.30	3.35	3.40	3.45	3.50															
	0.89~0.93	3.30	3.35	3.40	3.45	3.50																
	0.94~0.98	3.35	3.40	3.45	3.50																	
	0.99~1.03	3.40	3.45	3.50																		
	1.04~1.08	3.45	3.50																			
	1.09~1.13	3.50																				

Install the shim of this thickness (mm).

GE15025B#3 C

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

Example

Present shim is 2.95 mm (0.116 in.).

Measured clearance is 0.35 mm (0.014 in.).

Replace with the shim where the lines intersect, which is the 3.20 mm (0.126 in.) shim.

5. After selecting a shim, make sure to remeasure the clearance because the clearance could be out of standard due to shim thickness variances.
6. If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

Periodic Maintenance Procedures

Clutch

Clutch Inspection

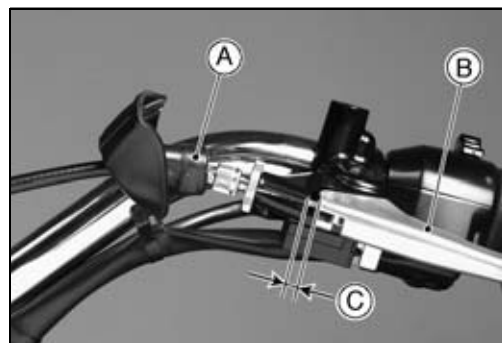
The standard clutch lever free play is 2 ~ 3 mm (0.08 ~ 0.12 in.) at its base. The free play must be adjusted if it has increased due to the stretching of the cable or the wear of the friction plate.

Clutch Lever Free Play Inspection

- Slide the dust cover [A] of the clutch lever.
- Check that the outer cable is fitted correctly in the adjuster.
- Lightly pull on the clutch lever [B] to inspect the free play [C].

Clutch Lever Free Play

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

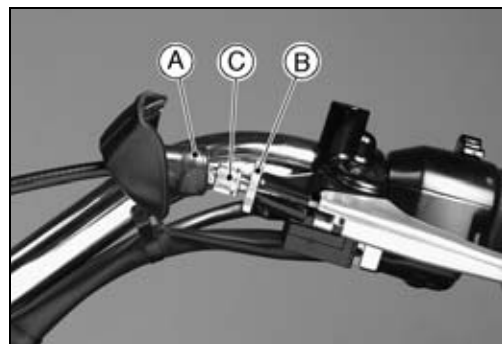


Clutch Lever Free Play Adjustment

⚠ WARNING

To prevent burns during clutch lever free play adjustment, do not touch the engine or the muffler, which could be hot.

- Slide the dust cover [A] of the clutch lever, and loosen the locknut [B].
- Turn the adjuster [C] to create a lever free play of 2 ~ 3 mm (0.08 ~ 0.12 in.).
- Check that the upper end of the cable is fitted correctly in the adjuster.



⚠ WARNING

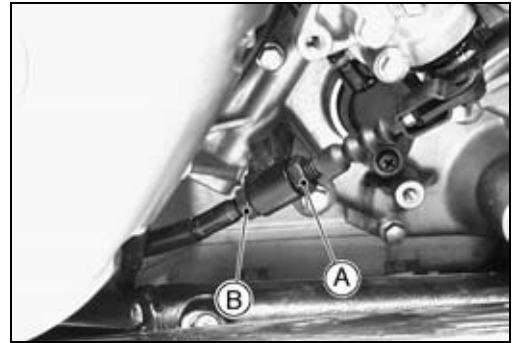
Be sure that the outer cable end at the clutch lever is fully seated in the adjuster at the clutch lever, or it could slip into the place later, creating enough cable play to prevent clutch disengagement.

- Tighten the locknut.
- Return the dust cover to its original position.
- ★ If the free play cannot be adjusted at the adjuster on the clutch lever, adjust at the adjusting nut located on the bottom of the clutch cable.
- Loosen the locknut on the clutch lever, screw in the adjuster entirely, and tighten the locknut.
- Remove:
 - Left Front Step
 - Shift Pedal
 - Engine Sprocket Cover (see Final Drive chapter)

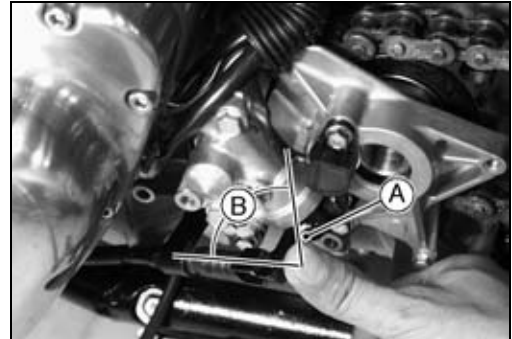
2-22 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Loosen the rear locknut [A] at the lower end of the clutch cable and turn the front locknut [B] to create a clutch lever free play of 2 ~ 3 mm (0.08 ~ 0.12 in.).
- Tighten the locknut.



- Push the release lever [A] firmly forward to inspect whether the angle to the cable [B] is approximately 83°.
- ★ If the angle is not approximately 83°, inspect the clutch plate.
- Install the removed parts.
- Place the dust cover in its original position.
- After adjusting the free play, start the engine to check for any clutch slippage or if the clutch disengages properly.



Engine Lubrication System

Engine Oil Change

WARNING

Do not touch the hot exhaust pipe.

- Stop the engine after it has been warmed up thoroughly.
- Place a drain pan under the engine, remove the drain plug [A] and drain the oil.
- Remove the (cartridge type) oil filter to drain the residual oil from the inside of the engine.
- Replace the removed oil filter.
- After draining the oil, tighten the drain plug.
- ★ Replace the drain plug gasket with a new part if it is damaged.

Torque - Drain Plug: 20 N·m (2.0 kgf·m, 14 ft·lb)

Oil Filter:

9.8 N·m (1.0 kgf·m, 87 in·lb)

18 N·m (1.8 kgf·m, 13 ft·lb) (On and after EJ650 -A5/C5)

Oil Filler Cap: 1.5 N·m (0.15 kgf·m, 13 in·lb) (Hand tighten)

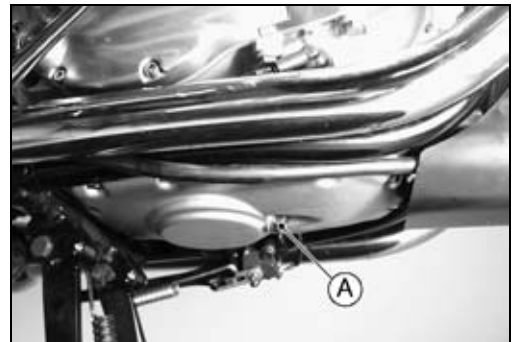
- Pour in the specified type of engine oil and check the oil level (see Engine Lubrication System chapter).

Recommended Engine Oil

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

Viscosity: SAE 10W-40

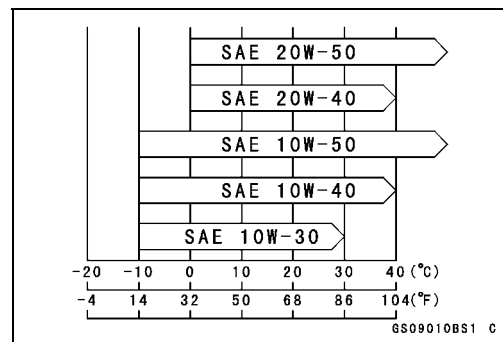
Capacity: 2.5 L (2.6 US qt) when filter is not removed
2.8 L (3.0 US qt) when filter is removed
3.0 L (3.2 US qt) when engine is complete dry



Periodic Maintenance Procedures

NOTE

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

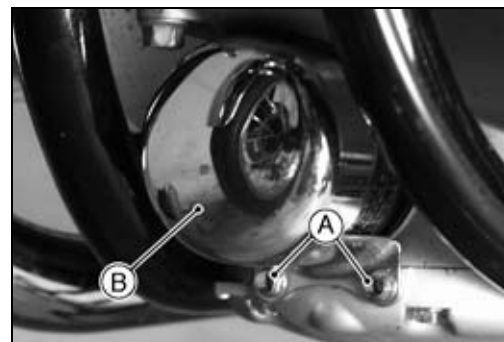


Oil Filter Replacement

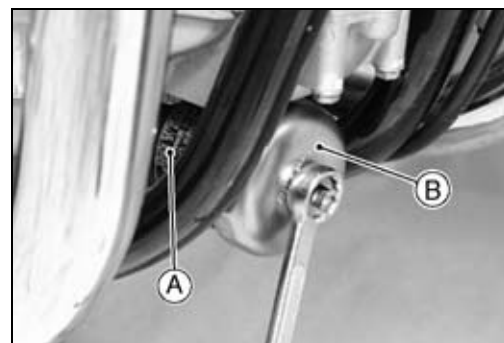
⚠ WARNING

Do not touch the hot exhaust pipe.

- Drain the engine oil.
- Remove the oil filter cover bolts [A] and remove the filter cap [B].
- Remove the oil filter damper together with the cap.



- Using the oil filter wrench [B], remove the oil filter [A].
- Special Tool - Oil Filter Wrench: 57001-1249**



- Apply engine oil to the oil filter O-ring [A], install the oil filter, and tighten it to the specified torque or hand-tighten it firmly.

Torque - Oil Filter:

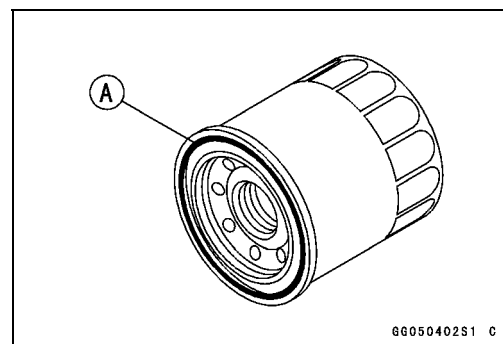
9.8 N·m (1.0 kgf·m, 87 in·lb)

18 N·m (1.8 kgf·m, 13 ft·lb) (On and after EJ650-A5/C5)

- Apply a non-permanent locking agent to the oil filter cap bolts and tighten them.

Torque - Oil Filter Cap Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)

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



2-24 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Wheels/Tires

Spoke Tightness Inspection

- Check whether all the spokes are uniformly tightened.
- ★ Uniformly tighten the spokes if any spoke is loose or unevenly tightened.

Torque - Spoke Nipple:

3.0 N·m (0.3 kgf·m, 26 in·lb)

5.1 N·m (0.52 kgf·m, 45 in·lb) (On and after EJ650-A3/C3)

- Inspect the rims.

⚠ WARNING

If any spoke breaks, it should be replaced immediately. A missing spoke places an additional load on the other spokes, which will eventually cause other spokes to break.

Rim Runout Inspection

- Raise the front/rear wheel of the ground.
- Special Tool - Jack: 57001-1238**
- Check the rim for damage or warpage.
- ★ If there is any damage to the rim, replace the rim.
- Measure the radial [A] and axial [B] rim runout by placing a dial gauge against the sides and the outer circumference of the rim, and slowly rotating the wheel.

Rim Runout (with tire installed)

Standard:

Axial **TIR 0.8 mm (0.03 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.)**

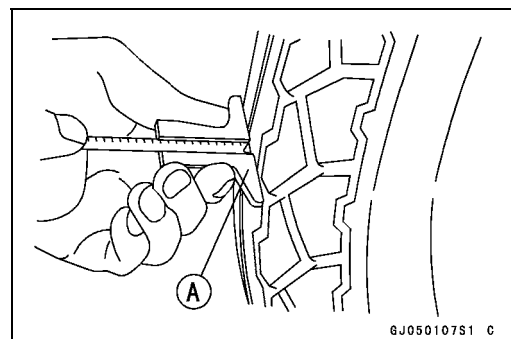
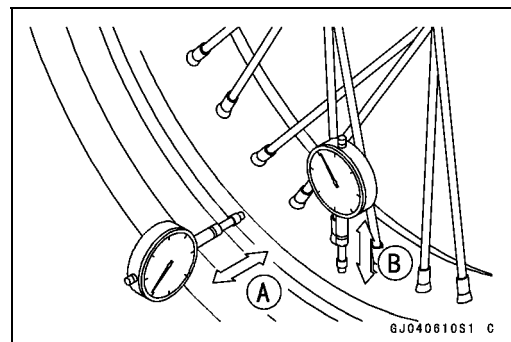
- ★ If rim runout exceeds the service limit, inspect the hub bearings. If the problem is not due to the bearings, retighten the spokes.

⚠ WARNING

Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new part.

Tire Wear Inspection

- Using a depth gauge [A], measure the tread depth at several places.
 - Wear Indicator [B]
 - Wear Indicator Position Mark [C]



Periodic Maintenance Procedures

Tread Depth

Standard:

Front	4.3 mm (0.17 in.) (BRIDGESTONE)
	4.4 mm (0.29 in.) (DUNLOP)
Rear	6.2 mm (0.24 in.) (BRIDGESTONE)
	7.4 mm (0.29 in.) (DUNLOP)

Service Limit:

Front	1 mm (0.04 in.)
Rear	2 mm (0.08 in.) (Up to 130 km/h (80 mph))
	3 mm (0.12 in.) (Over to 130 km/h (80 mph))

★ If any measurement indicates that the tire is worn beyond its service limit, replace the tire.

⚠ WARNING

To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure. The front and rear tires must be made by the same manufacturer.

NOTE

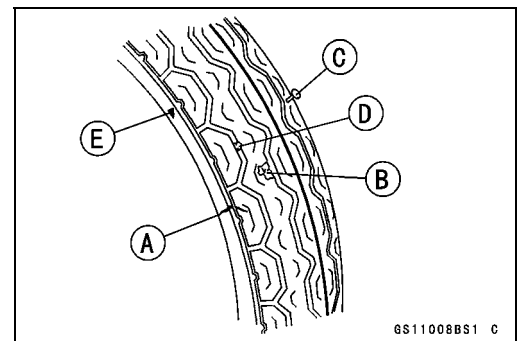
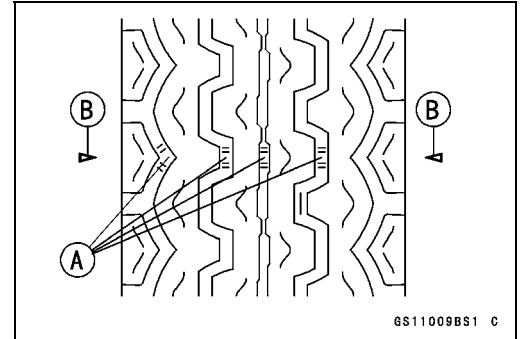
○ Check and balance the wheel when a tire is replaced with a new one.

Tire Damage Inspection

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

Wear Indicator Position Mark [E]

★ If any damage is found, replace the tire with a new one.



Final Drive

Drive Chain Slack Inspection

Drive Chain Slack Inspection

NOTE

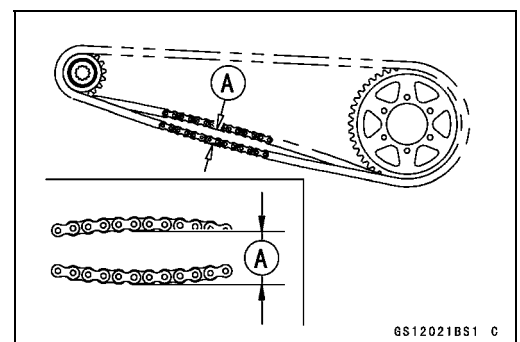
○ Set the motorcycle up on its center stand for drive chain inspection. Clean the drive chain if it is dirty and lubricate it if it appears dry.

- Inspect the wheel alignment (see Final Drive chapter).
- Turn the rear wheel and stop it at the position in which the chain has the least amount of slack.
- Measure the chain slack (runout) [A] midway between the front and rear sprockets.

Drive Chain Slack

Standard: 25 ~ 35 mm (0.98 ~ 1.34 in.)

★ If the chain is out of the service range, adjust it.



2-26 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Drive Chain Slack Adjustment

- Remove:
 - Clip [A]
 - Cotter Pin [B]
- Loosen:
 - Rear Torque Link Nut [C]
 - Rear Axle Nut [D]
 - Chain Adjuster Locknuts [E]
- Turn both chain adjusting bolts [A] evenly until the drive chain has the correct amount of slack.
- Align the alignment indicator notches [B] on both sides to be in the same relative position in relation to the graduation [C] of the swingarm.

⚠ WARNING

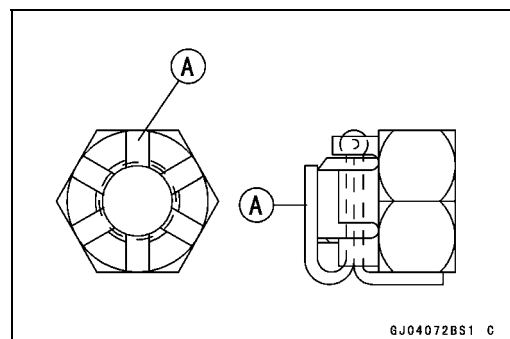
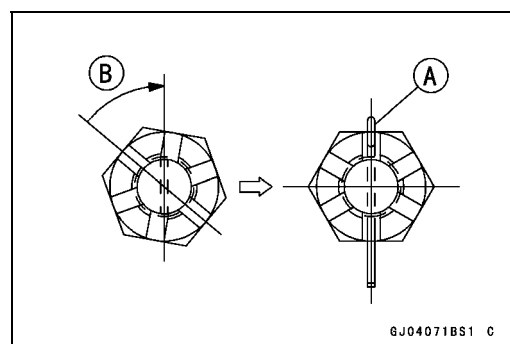
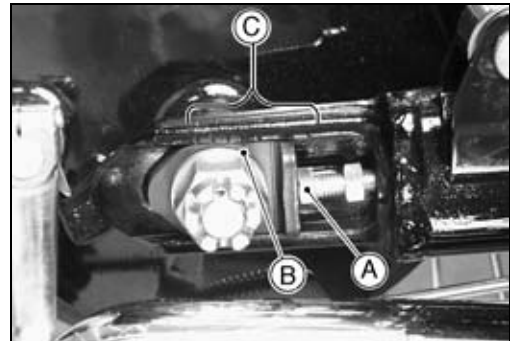
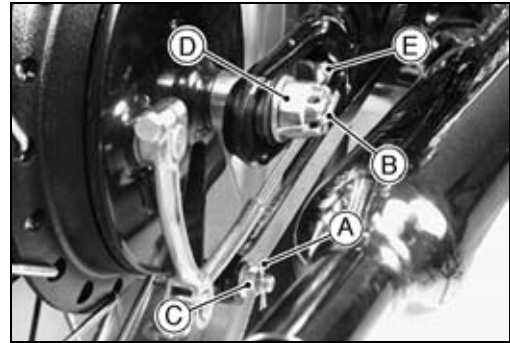
Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition.

- Tighten:
 - Chain Adjuster Locknuts
 - Rear Axle Nut
- Torque - Rear Axle Nut: 98 N·m (10 kgf·m, 72 ft·lb)**
- Check the slack again and readjust if necessary.
- Tighten the torque link nut.
- Torque - Torque Link Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)**
- Install the cotter pin [A] and clip.

NOTE

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

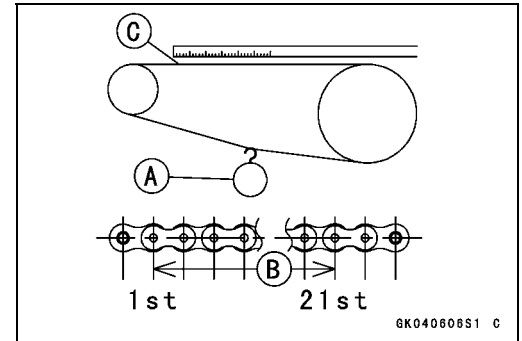
- Bend the cotter pin [A] over the nut.
- Adjust the rear brake.



Periodic Maintenance Procedures

Drive Chain Wear Inspection

- Remove the chain cover.
- Rotate the wheel to inspect the drive chain for damaged rollers or links, or loose pins.
- ★ If there is any irregularity, replace the drive chain.
- ★ Lubricate the drive chain if it appears dry.
- Stretch the chain taut by hanging a 98 N (10 kg, 20 lb) weight [A] on the chain.
- Measure the length of 20 links [B] on the straight part [C] of the chain.



Drive Chain Length-20 Links

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

Service Limit: 323 mm (12.7 in.)

- ★ If any measurements exceed the service limit, make sure to replace the chain.

⚠ WARNING

If the drive chain wear exceeds the service limit, replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. For safety, use only the standard chain.

Standard Chain

Make: Enuma Chain

Type: EK525MV-0, Endless

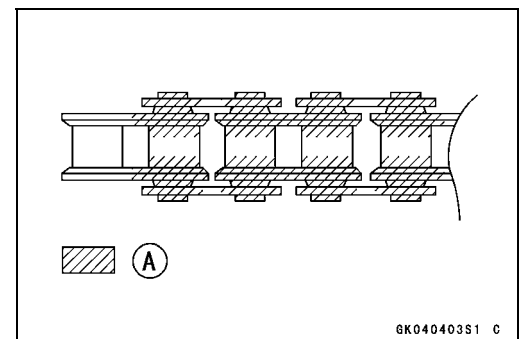
EK525MV-X, Joint (EJ650-C6P ~ C7, C6F)

Links: 104

Drive Chain Lubrication

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

Apply Oil [A]



2-28 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

CAUTION

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

Use only kerosene or diesel oil for cleaning an O-ring drive chain.

Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-ring.

Immediately blow the chain dry with compressed air after cleaning.

Complete cleaning and drying the chain within 10 minutes.

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

Brakes

Brake Fluid Level Inspection

- Check that the brake fluid level in the brake reservoir [A] is between the upper [B] and the lower [C] level lines.

NOTE

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

- ★ If the fluid level is lower than the lower level line, fill the reservoir to the upper level line.

⚠ WARNING

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

Recommended Disc Brake Fluid

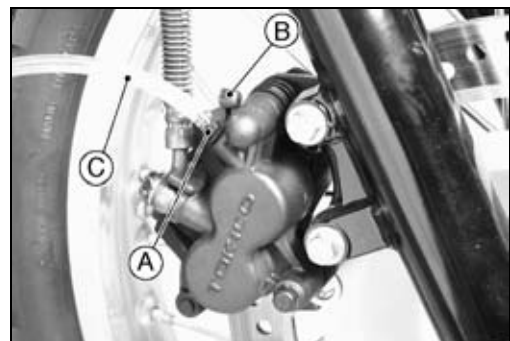
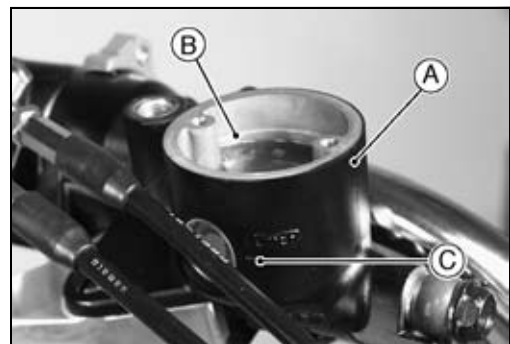
Grade: DOT4

Brake Fluid Change

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

NOTE

○ The fluid level must be checked often during the changing operation and replenished with specified brake fluid to the upper level line. 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.



Periodic Maintenance Procedures

- Repeat the operation described below until fresh brake fluid comes out from the bleed valve or the color of the fluid changes.

- Open the bleed valve [A].
- Pump the brake lever several times and hold it [B].
- Close the bleed valve [C] while holding the brake lever.
- Release the brake lever [D].



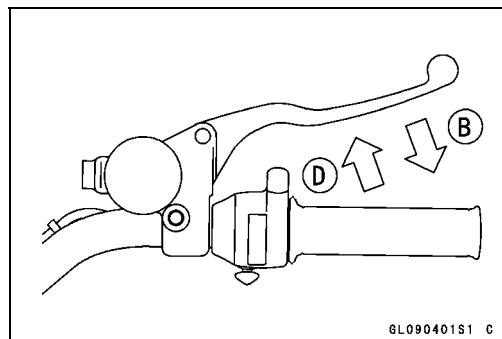
- Remove the clear plastic hose.
- Reinstall the reservoir cap.
- Tighten the bleed valve, and install the rubber cap.

Torque - Caliper Bleed Valve: 7.8 N·m (0.8 kgf·m, 69 in·lb)

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

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

★ If necessary, bleed the air from the lines.



Brake Pad Wear Inspection

- In accordance with the periodic inspection method, inspect the brake pads for wear [A].

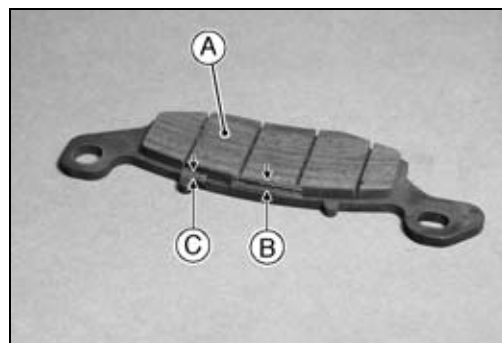
- Remove the pads.
- Check the lining thickness [B] of the pads in the caliper.

Brake Pad Lining Thickness

Standard: 4.5 mm (0.18 in.)

Service Limit: 1 mm (0.04 in.)

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



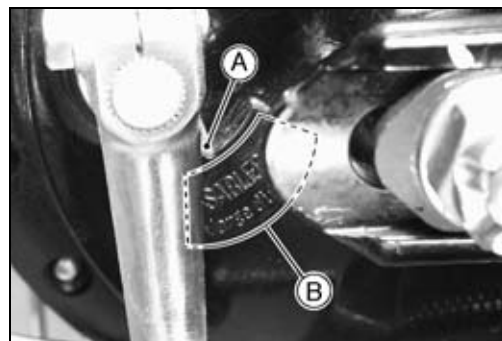
Brake Shoe Lining Wear Inspection

- Check whether the brake lining wear indicator [A] points within the USABLE RANGE [B] when the brakes are firmly applied, or remove the brake shoes and inspect the lining thickness [C] at few locations.

- ★ If the lining thickness is out of the range, or beyond the service limit, replace the brake shoes as a set and inspect other brake parts.

- ★ If the lining thickness is greater than the service limit, do the following before installing the shoes.

- File or sand down any high spots on the surface of the lining.
- Use a wire brush to remove any foreign particles from the lining. Use a wire brush to remove any foreign particles from the lining.



2-30 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Brake Shoe Lining Thickness

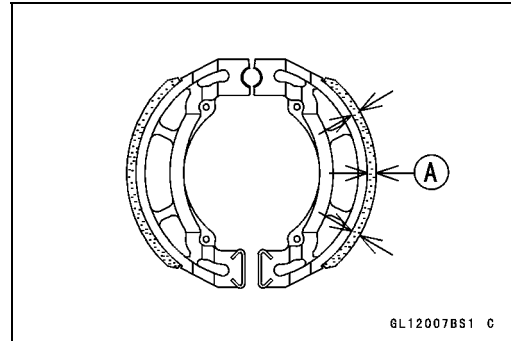
Standard: 3.35 ~ 3.65 mm (0.132 ~ 0.144 in.)
(When the wear indicator is within the
USABLE RANGE.)

Service limit: 1.8 mm (0.07 in.)
(When the wear indicator is out of the
USABLE RANGE.)

- Wash off any oil or grease with an oilless cleaning fluid such as trichloroethylene or acetone.

WARNING

These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.



Brake/Master Cylinder Cup and Dust Cover Replacement

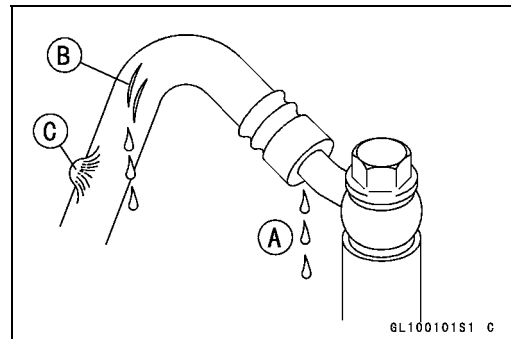
- Refer to the Master Cylinder section in the Brakes chapter for Brake/Master Cylinder Cup and Dust Seal Replacement.

Caliper Fluid/Dust Seals Replacement

- Refer to the Calipers section in the Brakes chapter for Caliper Fluid/Dust Seals Replacement.

Brake Hoses and Connections Check

- Inspect the brake hose and fittings for deteriorations, cracks and signs of leakage.
- The high pressure inside the brake line can cause fluid to leak [A] or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.
- ★ Replace the hose if any cracks [B] or bulges [C] are noticed.
- ★ Tighten any loose fitting.



Brake Play Inspection

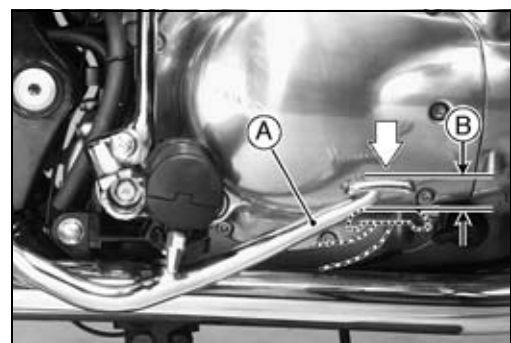
Brake Pedal Free Play Inspection

- Press the brake pedal [A] to inspect its free play [B].

Brake Pedal Free Play

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

- ★ Adjust the free play if it is out of standard.



Periodic Maintenance Procedures

Brake Pedal Free Play Adjustment

- Turn the adjusting nut [A] to adjust the free play to the standard.
- Inspect:
 - Turn the rear wheel by hand and check that the brake does not drag.
 - Press the brake pedal a few times to check if the pedal returns promptly to its original position.
 - Check the brake effectiveness.
 - Check the brake light engagement timing.
- ★ If any abnormal condition is shown, inspect the rear brake parts for wear or damage.



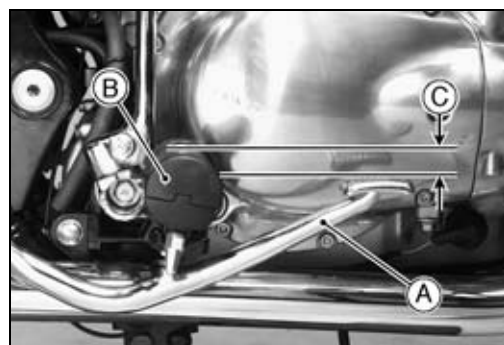
Brake Pedal Position Inspection

- Inspect the brake pedal position [C] by measuring the distance between the brake pedal [A] and the front step top [B].

Brake Pedal Position

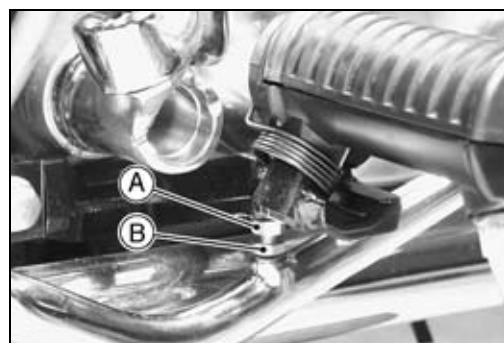
Standard: About 0 ~ 30 mm (1.2 in.) below front step top

- ★ Adjust the position if it is out of standard.



Brake Pedal Position Adjustment

- Loosen the locknut [A] and turn the adjuster [B] to adjust the pedal to the standard position.
- After adjusting, tighten the locknut.
- Inspect:
 - Brake Light Engagement Timing
 - Brake Pedal Free Play



Brake Light Switch Inspection

Front Brake Light Switch Inspection

- Turn the ignition switch ON.
- The brake light should turn ON when the brake lever is applied.
- ★ If it does not, replace the switch.

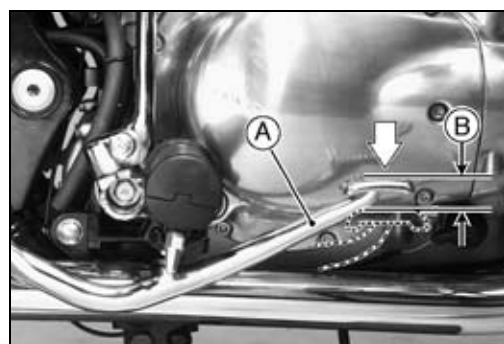
Rear Brake Light Timing Inspection

- Turn the ignition switch ON.
- Depress the brake pedal [A] to check the timing of the brake light operation.

Brake Light Timing

Standard: Turns ON when the brake pedal is depressed approximately 10 mm (0.39 in.) [B]

- ★ If the brake light does not turn ON as specified, adjust the brake light switch.

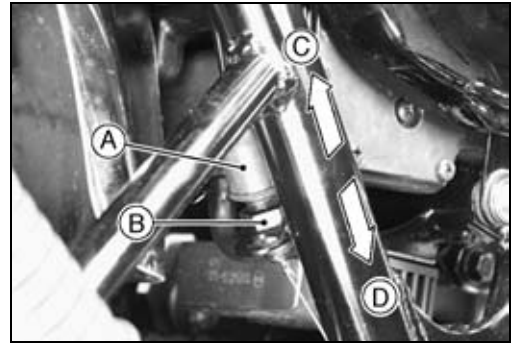


2-32 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Rear Brake Light Timing Adjustment

- Turn the adjusting nut to adjust the switch.
 - Switch [A]
 - Adjusting Nut [B]
 - Lights sooner as the switch rises [C]
 - Lights later as the switch lowers [D]



CAUTION

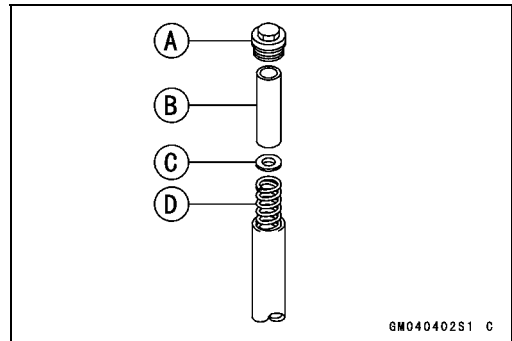
To avoid damaging the electrical connections inside the switch, make sure to hold the switch body while turning the adjusting nut.

Suspension

Front Fork Oil Change

Front Fork Oil Change

- Remove the front fork (see Suspension chapter).
- Loosen the top plug [A] when loosening the fork upper damp bolt.
- Remove:
 - Top Plug
 - Collar [B]
 - Fork Spring Seat [C]
 - Fork Spring [D]
- Compress [B] the fork [A] upside down to draw out the oil into the container [C].
- Fill the front fork with the specified oil.



Fork Oil

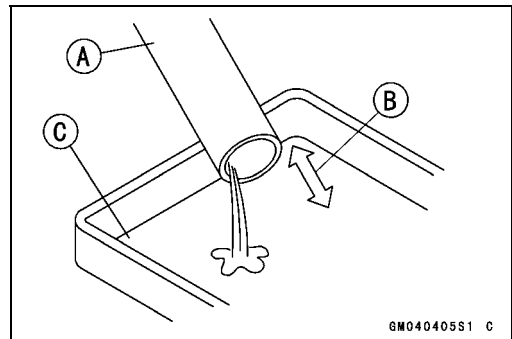
Viscosity: KHL34-G10 (KAYABA) or equivalent

Capacity (one side):

approx. 322 mL (10.9 US oz.) when changing oil

approx. 343 mL (11.6 US oz.) when changing oil (On and after EJ650-A3/C3)

- Measure the oil level for verification (see Fork Oil Level Adjustment).
- With the fork tube placed upright, push the inner tube all the way down, and measure the oil level in the compressed state.



Fork Oil Level Adjustment

- Remove the front fork.
- Loosen the top plug when loosening the fork upper clamp bolt.
- Remove:
 - Top Plug
 - Collar
 - Fork Spring Seat
 - Fork Spring

Periodic Maintenance Procedures

- Hold the outer tube vertically in a vise and compress the fork completely.
- Wait until the oil level stabilizes.
- Use the fork oil level gauge [A] to measure the distance between the top of the inner tube to the oil level.

Special Tool - Fork Oil Level Gauge: 57001-1290

- Set the oil level gauge stopper [B] so that the distance [C] from the bottom of the stopper to the lower end of the pipe is the standard oil level distance.
- A correct measurement cannot be obtained unless the level gauge pipe is placed in the center of the inner tube.

Oil Level (Fully compressed, without fork spring)

Standard: 137 ±2 mm (5.39 ±0.08 in.)

112 ±2 mm (4.41 ±0.08 in.) (On and after EJ650-A3 ~ A5/C3)

- Place the stopper of the level gauge at the top [E] of the inner tube [D] and pull the handle slowly to draw out the excess oil from the fork into the gauge, thus attaining the standard level.
- If no oil is drawn out, there is not enough oil in the fork. Pour in some more oil and measure again.

Fork Oil

Viscosity: KHL34-G10 (KAYABA) or equivalent

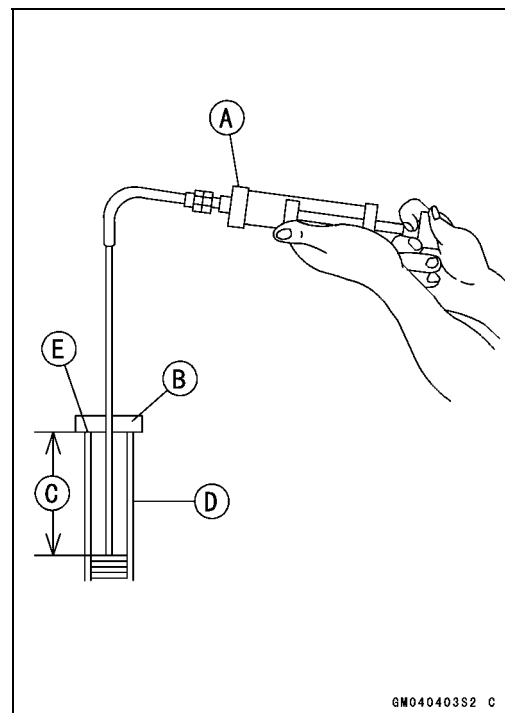
- Repeat the same procedure for adjusting the other fork.
- Install the fork spring [A], fork spring seat [B], and collar [C].
- Check the top plug O-ring and replace it with a new one if it is damaged.

Torque - Front Fork Top Plug: 23 N·m (2.3 kgf·m, 17 ft·lb)

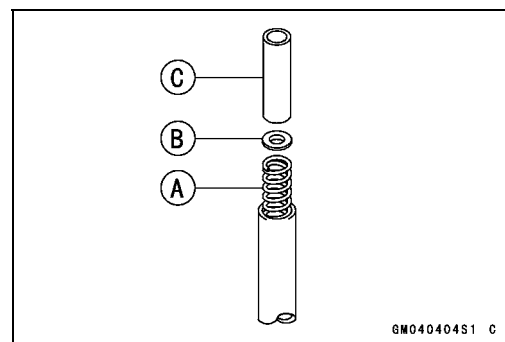
- Install the front fork.

Front Fork Oil Leak Inspection

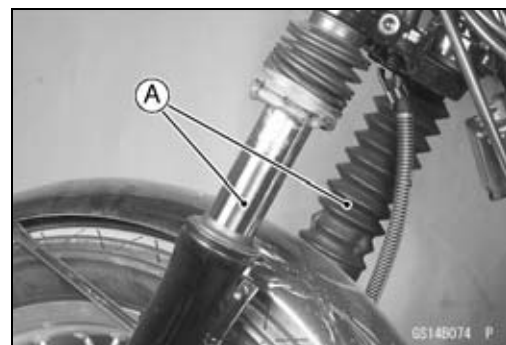
- Remove the front fork (see Suspension chapter).
- Visually inspect the front forks [A] for oil leakage, scoring or scratches on the outer surface of the inner tubes.
- ★ Replace or repair any defective parts, if necessary.



GM040403S2 C



GM040404S1 C



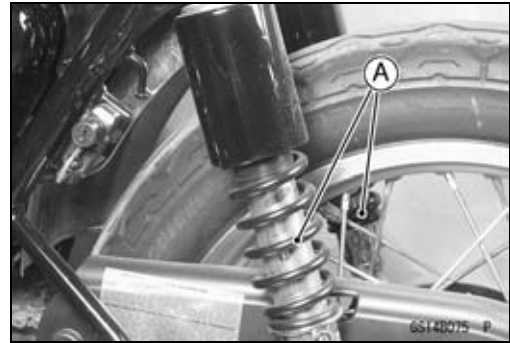
GS145074 P

2-34 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Rear Shock Absorber Oil Leak Inspection

- Visually inspect the shock absorbers [A] for oil leakage.
- ★ If they are oil leaked, replace shock absorber.



Swingarm Pivot Lubrication

- Apply grease to the inner surface of the needle bearings in accordance with the Periodic Maintenance Chart.
- Apply a thin coat of grease to the lips of the grease seals.

Steering

Steering Inspection

Steering Inspection

- Raise the front wheel.

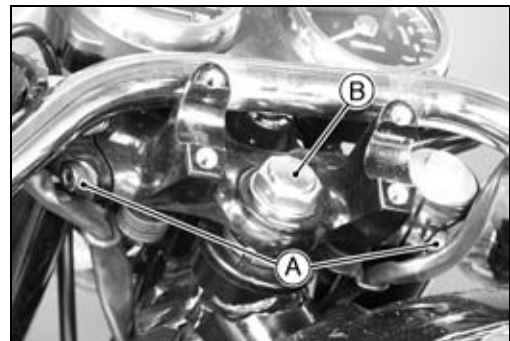
Special Tool - Jack: 57001-1238

- Check to see if the handlebar moves smoothly right and left.
- ★ If there is any binding, check if the cables and wiring harnesses are routed properly.
- ★ If the steering feels tight, adjust or lubricate it.
- Move the bottom of the front fork back and forth [A] to check for any looseness in the steering.
- ★ Adjust the steering if it feels loose.



Steering Adjustment

- Remove:
 - Handlebar (from the holder)
- Loosen:
 - Front Fork Clamp Bolts (Upper) [A] (both sides)
 - Stem Head Nut [B]



Periodic Maintenance Procedures

- Using the jack, raise the front wheel.
- Lift the steering stem head [A], remove the lock washer [B], and adjust the steering.
- ★ Loosen the stem nut [C] if the steering is too tight, and tighten the stem nut if the steering is too loose.

Special Tools - Jack: 57001-1238

Steering Stem Nut Wrench: 57001-1100 [D]

Torque - Steering Stem Nut: 4.9 N·m (0.5 kgf·m, 43 in·lb)

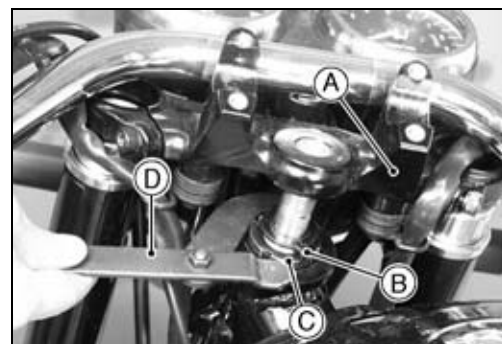
NOTE

○ Turn the stem nut only 1/8 of a turn at a time.

- Tighten:
 - Torque - Steering Stem Head Nut: 44 N·m (4.5 kgf·m, 33 in·lb)**
 - Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 14 in·lb)**
- Reinspect the steering.
- ★ If it still feels tight or loose, inspect every part of the steering.
- Install the removed parts and perform a vertical of the headlight.

Steering Stem Bearing Lubrication

- Remove the steering stem.
- Using a high-flash point solvent, wash the upper and lower tapered roller bearings.
- Wipe off the old grease from the upper and lower outer races.
- Visually inspect the outer races and the tapered roller bearings.
- ★ If either the races or the tapered roller bearings show any wear or damage, replace both as a set.
- Apply grease to the rollers [A], spin them a few times by hand, and thoroughly pack the inside with grease. Apply a thin coat of grease also to the outer race.
- Install the steering stem and adjust the steering.



Electrical System

Spark Plug Cleaning/Inspection

- Remove the spark plugs and inspect them visually.
- ★ If there is carbon accumulation on the spark plug, use a spark plug cleaner or a wire brush to remove it.
- ★ If there is oil on it, clean it with cleaning solvent.
- ★ If the spark plug's center electrode is corroded or burnt, or if the insulator is damaged, replace the spark plug.

2-36 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

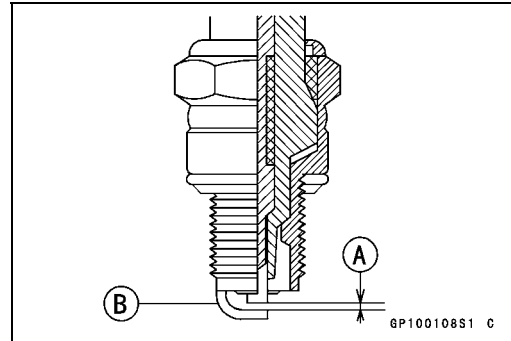
Spark Plug Gap Inspection

- Using a wire type spark plug gap gauge, measure the gap [A].

Spark Plug Gap

Standard: 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)

- ★ If the gap is out of standard, carefully bend the side electrode [B] with a suitable tool to obtain the correct gap.



General Lubrication

Lubrication

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

NOTE

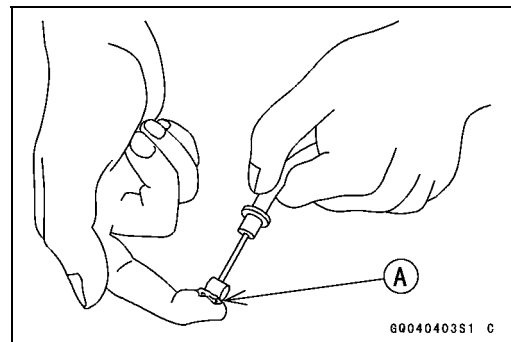
○ Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.

Lubricate with engine oil

Rear Brake Rod Joint
Drive Chain (SAE 90 oil or chain oil)

Lubricate with grease

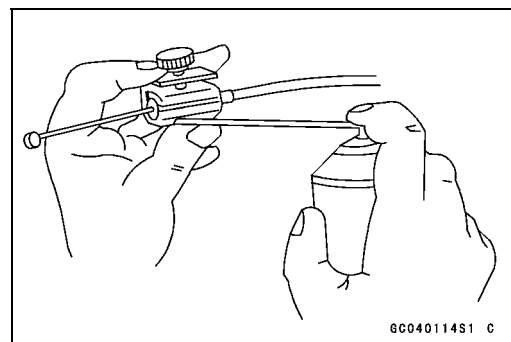
Throttle Inner Cable Upper End [A]
Clutch Inner Cable Lower End [A]
Brake Pedal Shaft
Clutch Lever Pivot Bolt
Brake Lever Pivot Bolt (silicon grease)
Side Stand Bolt
Center Stand Bolt



Lubricate with cable lubricant

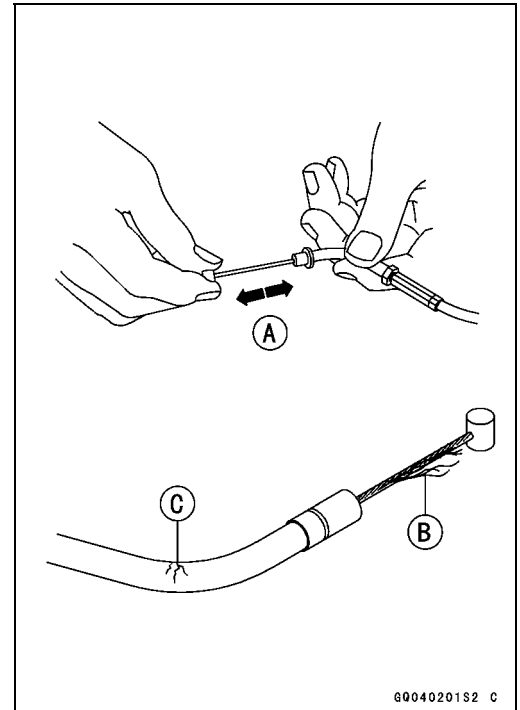
Throttle Cables
Clutch Cable

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



Periodic Maintenance Procedures

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



Nut, Bolt, and Fastener Tightness

Tightness Inspection

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

NOTE

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

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

[Nut, Bolt, and Fastener to be checked]

Wheels:

- Front Axle Nut
- Front Axle Clamp Bolts
- Rear Axle Nut Cotter Pin
- Rear Axle Nut
- Chain Adjuster Lock Nuts

Final Drive:

- Rear Sprocket Nuts

Brakes:

- Master Cylinder Clamp Bolts
- Brake Lever Pivot Bolt Locknut

2-38 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Caliper Mounting Bolts
- Brake Rod Joint Cotter Pin
- Cam Lever Clamp Bolt
- Brake Pedal Mounting Bolt
- Torque Link Nuts, Bolts
- Torque Link Nut Clips

Suspension:

- Front Fork Clamp Bolts
- Rear Shock Absorber Mounting Bolts, Nuts
- Swingarm Pivot Nut

Steering:

- Steering Stem Head Nut
- Handlebar Holder Bolts

Engine:

- Engine Mounting Bolts, Nuts
- Shift Pedal Bolt
- Muffler Mounting Bolts
- Exhaust Pipe Holder Nuts
- Muffler Clamp Bolt
- Clutch Cable Adjuster Lock Nuts
- Clutch Lever Pivot Nut

Others:

- Side Stand Mounting Bolt, Nut
- Front Footpeg Mounting Bolts
- Rear Footpeg Mounting Pin E-Clip
- Center Stand Mounting Bolts, Nuts
- Front Fender Bolts

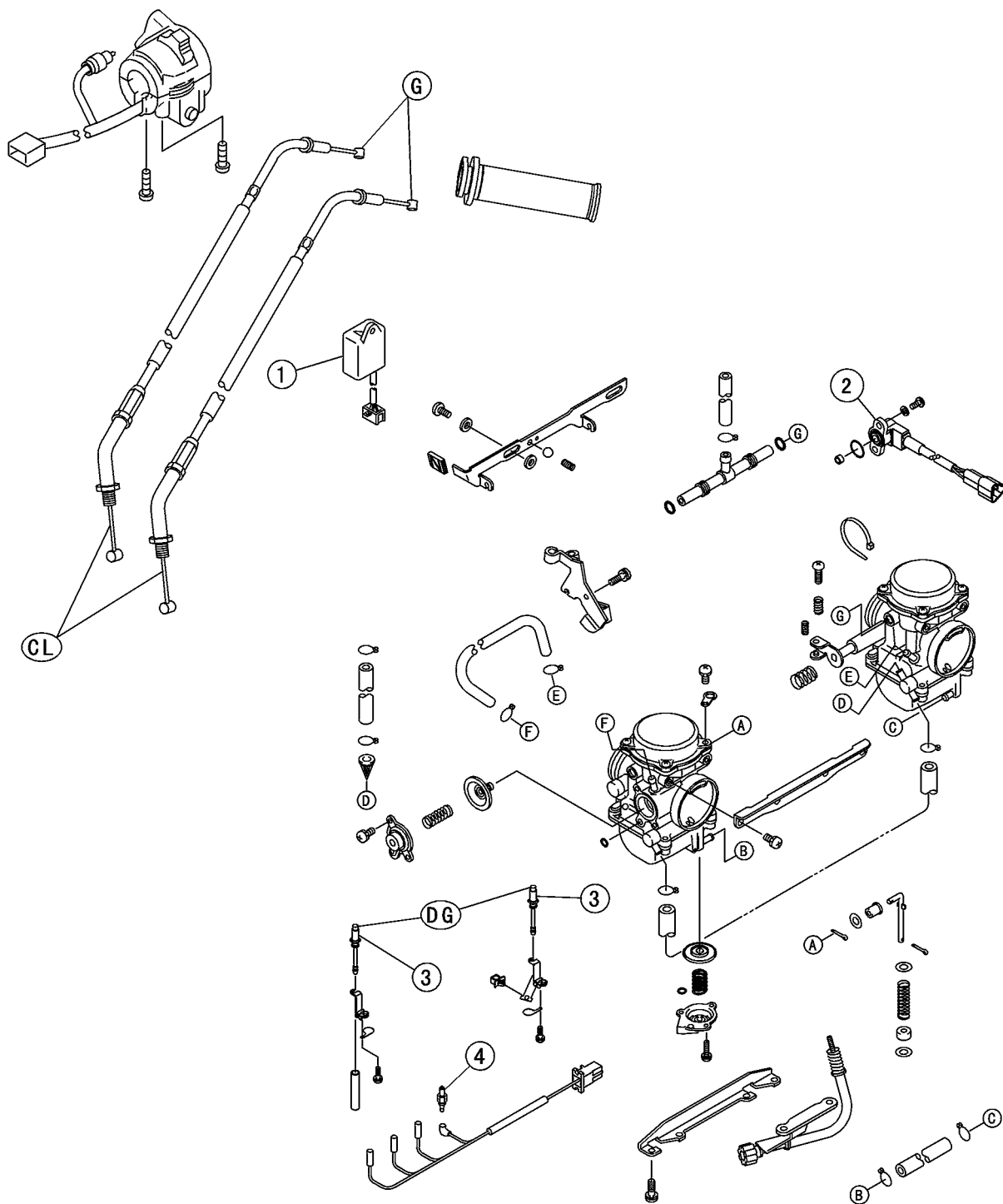
Fuel System

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3-2 FUEL SYSTEM

Exploded View



Exploded View

1. Carburetor Heater Control Unit (Other than United States, Canada and Taiwan Model)
(EJ650-A1, Except for Europe, Norway and Spain Model)
2. Throttle Sensor
3. Carburetor Heater (Other than United States, Canada and Taiwan Model)
(EJ650-A1, Except for Europe, Norway and Spain Model)
4. Carburetor Temperature Sensor (Other than United States, Canada and Taiwan Model)
(EJ650-A1, Except for Europe, Norway and Spain Model)

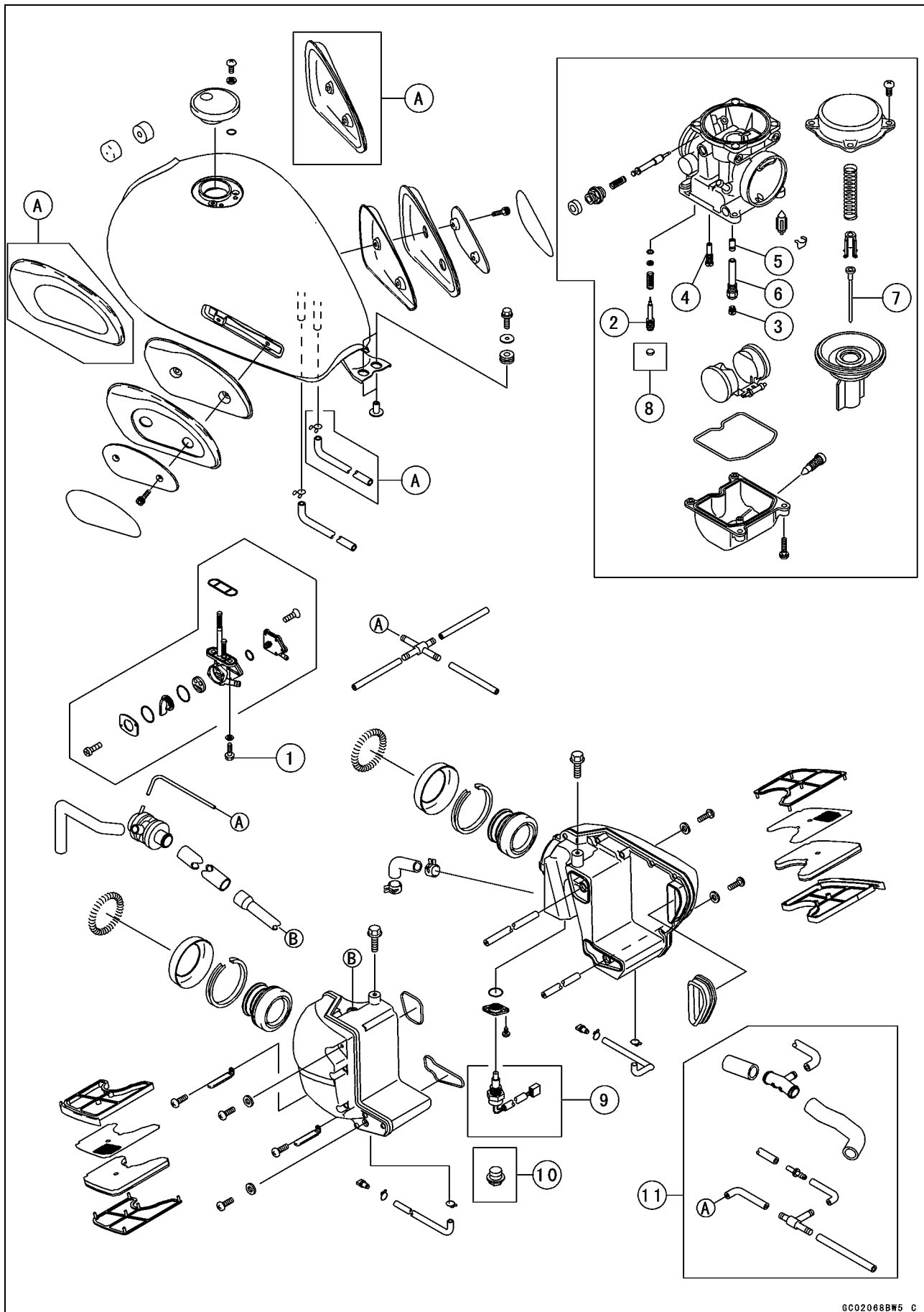
CL: Apply cable lubricant

DG: Apply heat transfer grease.

G: Apply grease

3-4 FUEL SYSTEM

Exploded View



Exploded View

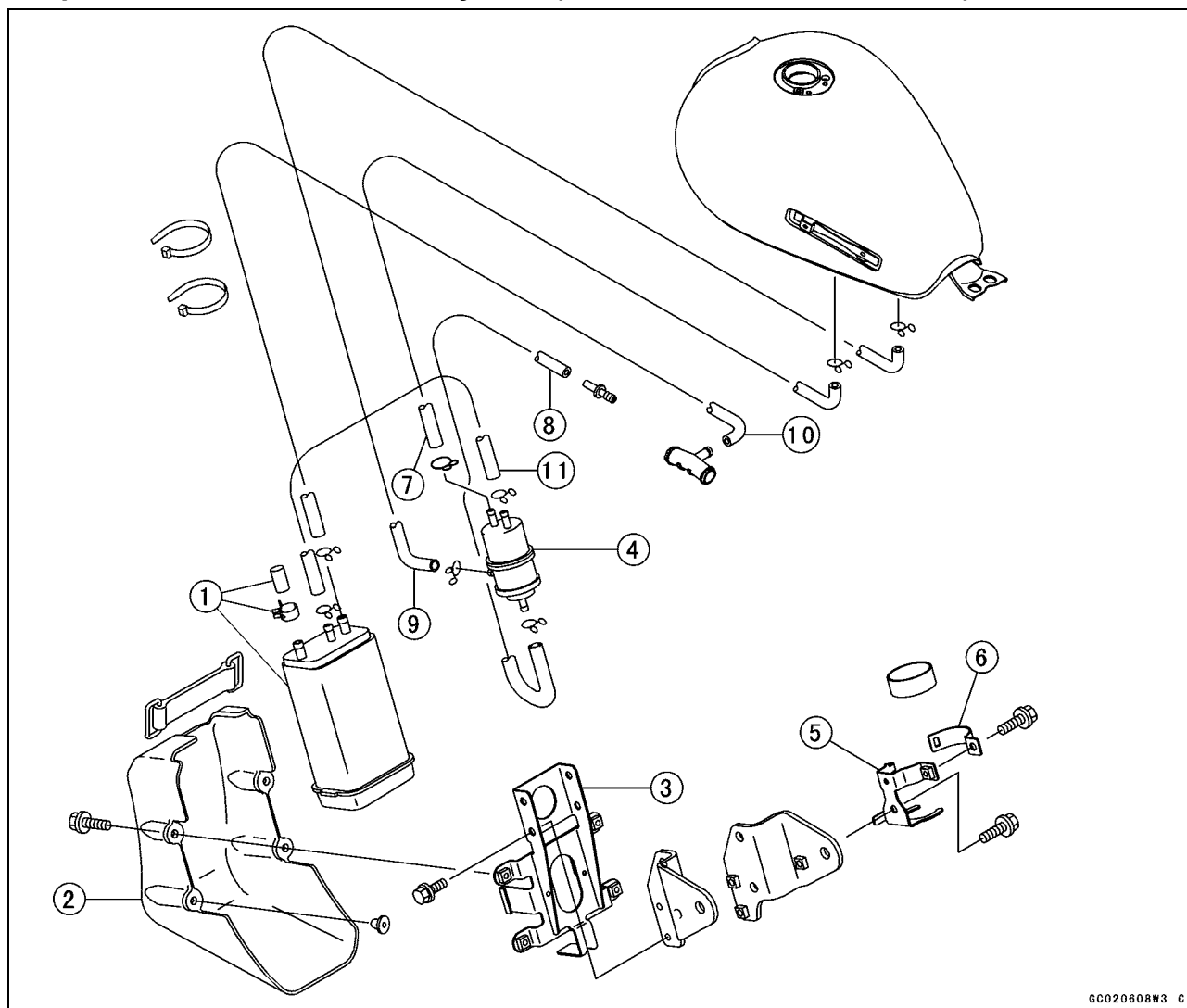
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Tap Bolts	2.5	0.25	22 in·lb	with white washer
		4.9	0.5	43 in·lb	with black washer

2. Pilot Screw
 3. Main Jet
 4. Pilot Jet
 5. Needle Jet
 6. Needle Jet Holder
 7. Jet Needle
 8. Plug (United States, Canada and Taiwan Model)
 9. Atmospheric Temperature Sensor (Other than United States, Canada and Taiwan Model)
(EJ650-A1, Except for Europe, Norway and Spain Model)
 10. Plug (United States, Canada and Taiwan Model) (EJ650-A1, Europe, Norway and Spain Model)
 11. Vacuum Hoses (California and Taiwan Model)
- A: On and after EJ650-A3/C3

3-6 FUEL SYSTEM

Exploded View

Evaporative Emission Control System (California and Taiwan Model)



6C020608W3 C

1. Canister
2. Canister Cover
3. Canister Bracket
4. Separator
5. Separator Bracket
6. Separator Bracket
7. Tube (Blue)
8. Tube (White)
9. Tube (Red)
10. Tube (Green)
11. Tube (Blue)

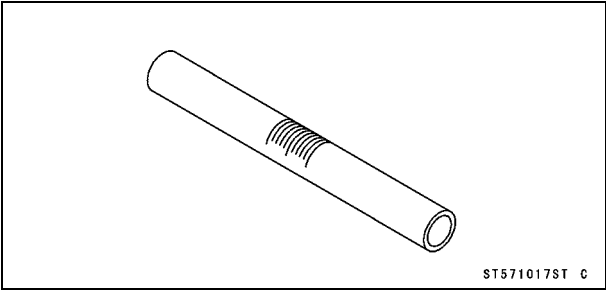
Specifications

Item	Standard	
	EJ650-A1/C1 ~ A5/C5	EJ650-C6P ~ C7, C6F
Throttle Grip and Cables		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	
Carburetors		
Make, Type	KEIHIN CVK34	
Main Jet	#118	
Main Air Jet	#100	
Jet Needle		
#1 Cylinder:	N8GJ	NAZN
#2 Cylinder:	N8GN	NAZM
Pilot Jet (Slow Jet)	#35	
Pilot Air Jet (Slow Air Jet)	#85	#65
Pilot Screw (Turns Out)	2-1/8	2-3/8
Starter Jet	#62	
Service Fluid Level (from Mating Surface)	0.5 mm (0.02 in.) (below) ~ 1.5 mm (0.06 in.) (above)	
Float Height	17 ±2 mm (0.67 ±0.08 in.)	
Idle Speed	900 ±50 r/min (rpm)	
Synchronization	2.7 kPa (2 cmHg, 0.39 psi) or less pressure difference between cylinders	

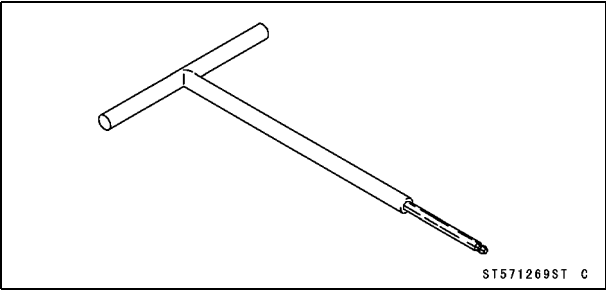
3-8 FUEL SYSTEM

Special Tools

Fuel Level Gauge:
57001-1017



Carburetor Drain Plug Wrench, Hex 3:
57001-1269



Throttle Cables and Grip

Throttle Grip Free Play Inspection

- Refer to the Throttle Grip Free Play Inspection in the Periodic Maintenance chapter.

Throttle Grip Free Play Adjustment

- Refer to the Throttle Grip Free Play Adjustment in the Periodic Maintenance chapter.

Throttle Cable Installation

- Properly install the throttle cables (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the upper ends of the throttle cables in the grip; then, install the lower ends of the throttle cables in the cable bracket on the carburetor.

WARNING

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

Throttle Cable Inspection and Lubrication

- Lubricate and inspect the cables during a periodic inspection or whenever the cables are removed (see General Lubrication in the Periodic Maintenance chapter).

3-10 FUEL SYSTEM

Carburetors

Idle Speed Inspection

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

Idle Speed Adjustment

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

Carburetor Synchronization Inspection

- Refer to the Carburetor Synchronization Inspection in the Periodic Maintenance chapter.

Carburetor Synchronization Adjustment

- Refer to the Carburetor Synchronization Adjustment in the Periodic Maintenance chapter.

Service Fuel Level Inspection

⚠ 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.

- Secure the motorcycle upright.
- Connect a hose that is 6 mm (0.24 in.) in diameter and about 300 mm (11.8 in.) long to the fuel level gauge [A] and the float bowl of the carburetors.

Special Tool - Fuel Level Gauge: 57001-1017

- Place the center graduation [B] of the level gauge slightly higher than the mating surface [C] of the carburetor body and the float chamber.
- Turn the fuel tap and loosen the carburetor drain screw [D].

Special Tool - Carburetor Drain Plug Wrench, Hex 3: 57001-1269

- Wait until the fuel level in the gauge settles.
- Hold the gauge vertically and lower it slowly so that the center graduation of the level gauge aligns with the mating surface of the carburetor body and the float bowl.

NOTE

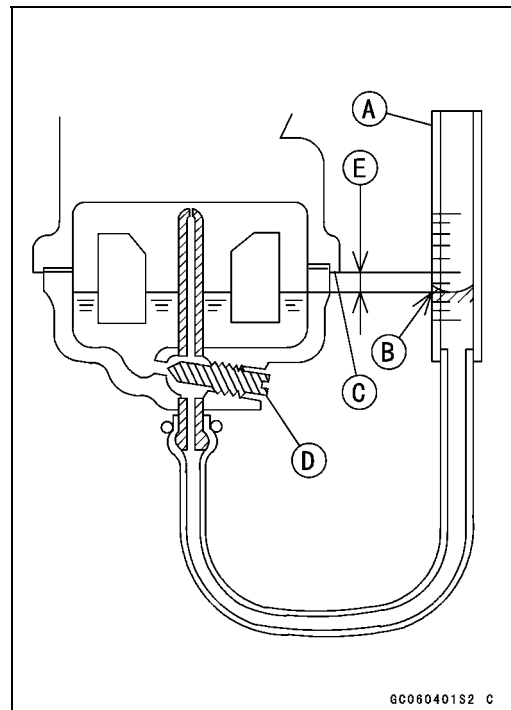
○ Do not align the graduation lower than the mating surface of the carburetor body and the float bowl. If it is lowered and then raised, the gauge will show a fluid level that is higher than the actual level, which will require a remeasurement.

- Read the fuel level [E].

Service Fuel Level

Standard: 0.5 mm (0.02 in.) (below) ~ 1.5 mm (0.06 in.) (above) from the mating surface

- ★ If it is out of standard, adjust the level.
- Tighten the drain screw.
- Close the fuel tap and remove the gauge.
- Repeat the same procedure for the other carburetor.



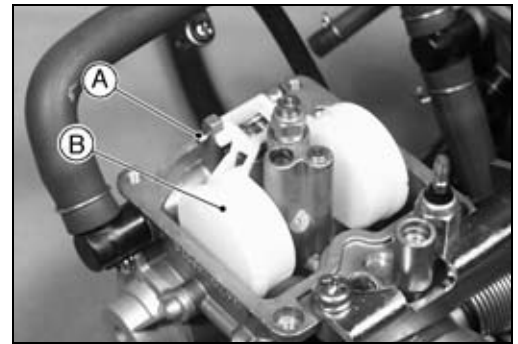
Carburetors

Service Fuel Level Adjustment

⚠ 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.

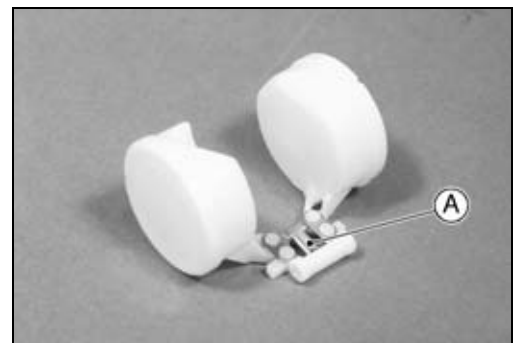
- Remove the carburetors, and drain the fuel.
- Remove the float bowl.
- Slide out the pin [A] and remove the floats [B].



- Bend the adjustment tang [A] to change the float height, in order to adjust the fuel level.

Float Height

Standard: 17 ±2 mm (0.67 ±0.08 in.)

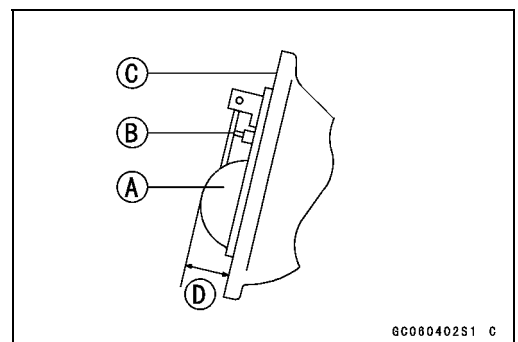


- Increasing the float height [A] lowers the fuel level and decreasing the float height raises the fuel level.
- Carburetor Body [C]

NOTE

- When measuring the float height [D], do not press on the needle rod [B].

- Assemble the carburetor and recheck the fuel level.
- ★If the fuel level cannot be adjusted by this method, the float or the float valve is damaged.



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Fuel System Cleaning and Inspection

⚠ 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.

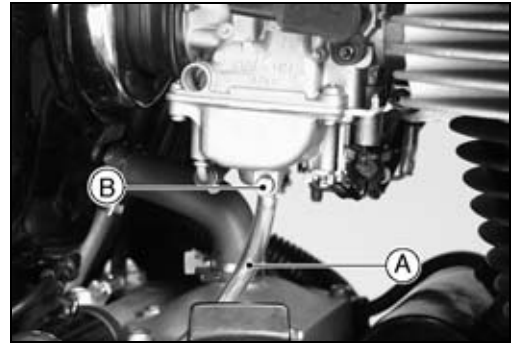
3-12 FUEL SYSTEM

Carburetors

- Connect a hose [A] to the fitting at the bottom of the float bowl and run its lower end into a suitable container.
- Turn the fuel tap to the PRI position.
- Turn out the carburetor drain plugs [B] and check to see if water or dirt comes out.

Special Tool - Carburetor Drain Plug Wrench, Hex 3: 57001-1269

- ★ If any water or dirt appears during the above inspection, clean the fuel system (see Carburetor Cleaning and Fuel Tank Cleaning).

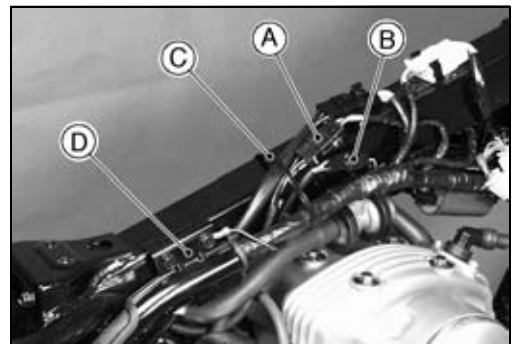


Carburetor Removal

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.

- Remove:
 - Seat
 - Right and Left Side Covers
 - Fuel Tank (see Fuel Tank Removal)
 - Air Cleaner Housing (see Air Cleaner Housing Removal)
 - Carburetor Heater Connector [A]
 - Throttle Sensor Connector [B]
 - Strap [C]
 - Main Wiring Harness Cover [D]
- Loosen the carburetor holder clamp [A] and remove the carburetors.
- Remove the throttle cables [B].
- Stuff a clean cloth into the carburetor holder and the air cleaner duct to keep any foreign objects from entering.



WARNING

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

CAUTION

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

Carburetors

Carburetor Installation

- Install the carburetor clamp [A] on the holder, ensuring the proper position and orientation [B] of the screw head.
Top [C]
Bottom [D]
- Turn the throttle grip to make sure that the throttle linkage does not come in contact with the holder screws or hoses.

⚠ WARNING

Operation with the throttle linkage catching on the holder screws or hoses could result in an unsafe riding condition.

- Check fuel leakage from the carburetors.

⚠ WARNING

Fuel spilled from the carburetors is hazardous.

- Adjust:
Throttle Grip Free Play
Idle Speed

Carburetor Disassembly

- Remove the carburetor assembly.

⚠ WARNING

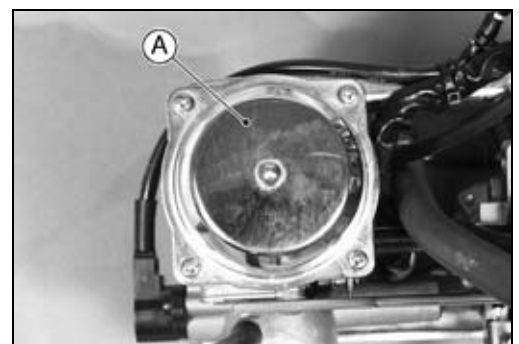
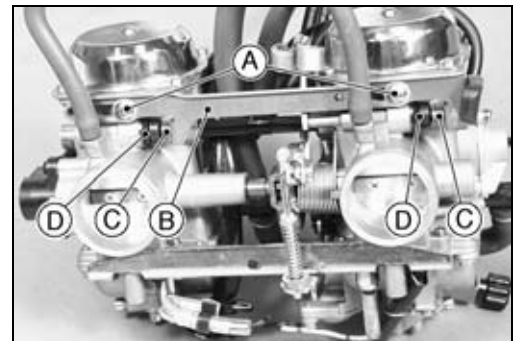
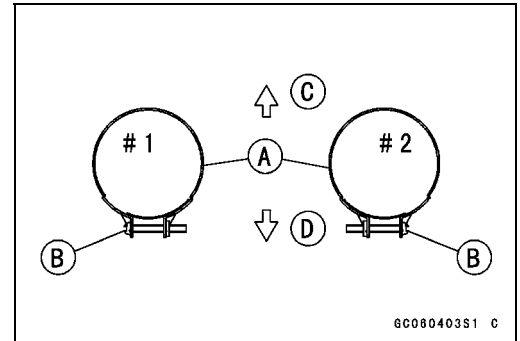
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the screws [A] and remove the choke lever plate [B].
- Remove the springs [C] and the choke plunger assembly [D].

- Remove:
Upper Chamber Cover [A]
Spring
Vacuum Piston and Diaphragm

CAUTION

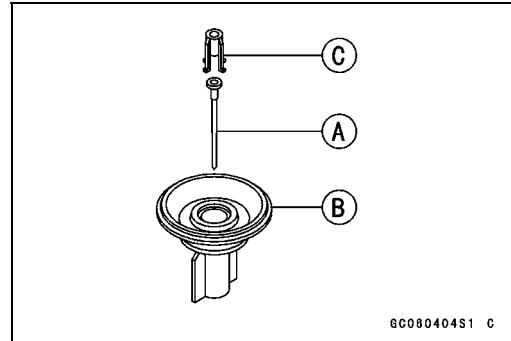
During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp edge to remove the diaphragm.



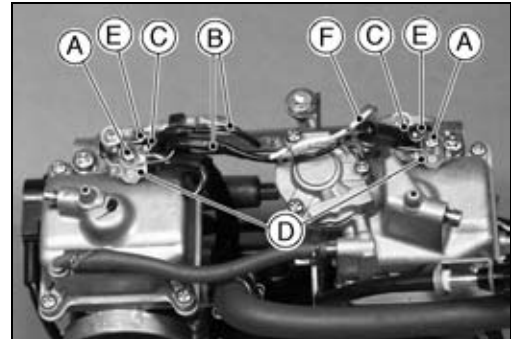
3-14 FUEL SYSTEM

Carburetors

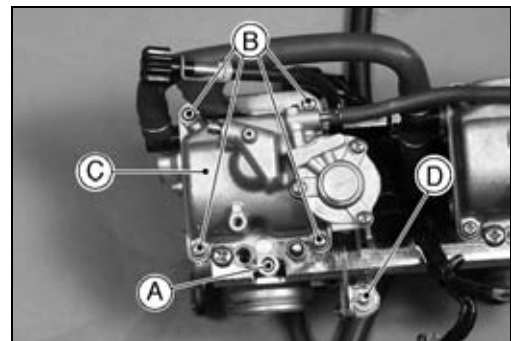
- Remove the jet needle [A] from the vacuum piston [B]. These are detached together with the spring seat [C].



- Remove the screws [A], cut the strap, and remove the heater lead [B] together with the clamps [C].
- Remove the plates [D].
- Remove the carburetor heaters [E] and the sensor [F] if necessary.



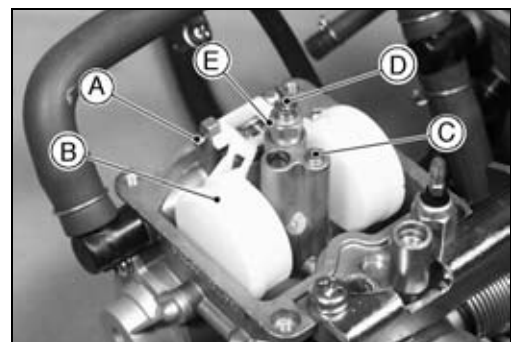
- Do not remove the pilot screw [A] if possible.
- Remove the float bowl screws [B], the float bowl [C], and the O-ring.
- Remove the cotter pin [D] from the acceleration pump.



- On the #1 float bowl, remove the cotter pin [A] from the acceleration pump.
- Remove the acceleration pump assembly and the float bowl together.

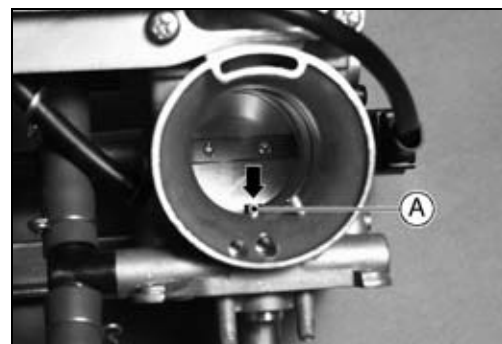


- Remove the float pivot pin [A], and remove the float [B]. The float needle valve comes out together (see Service Fuel Level Adjustment).
- Remove the pilot jet [C].
- Remove the main jet [D].
- Remove the needle jet holder [E].

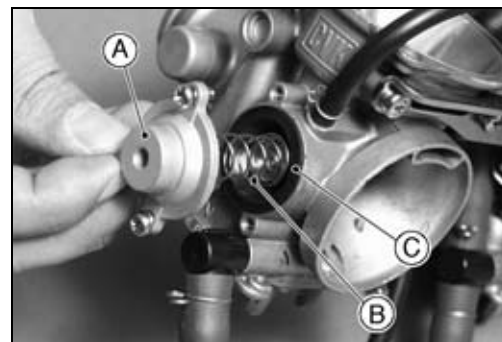


Carburetors

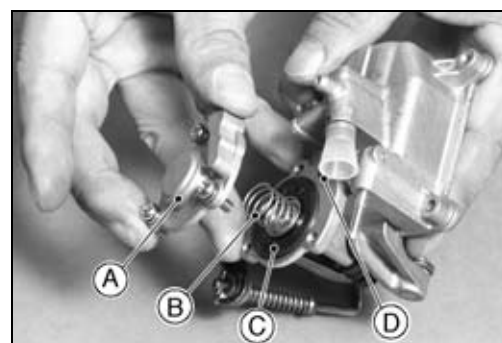
○ Push the needle jet [A] down from the carburetor bore.



- Remove the coasting enricher cover [A].
- Remove the spring [B], diaphragm [C], and the O-ring.

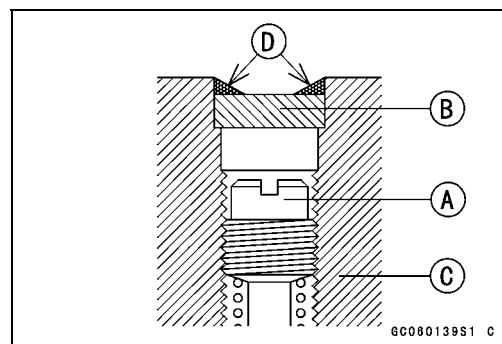


- Remove the acceleration pump cover [A].
- Remove the spring [B], the diaphragm [C], and the O-ring [D].



Carburetor Assembly

- Turn in the pilot screw [A] fully but not tightly, and then back it out the same number of turns counted during disassembly.
- For the United States, Canada and Taiwan models, install the pilot screw plug as follows:
 - Install a new plug [B] in the pilot screw hole of the carburetor body [C], and apply a small amount of a bonding agent [D] to the circumference of the plug to fix the plug.



CAUTION

Do not apply too much bonding agent to the plug or the pilot screw itself may be fixed.

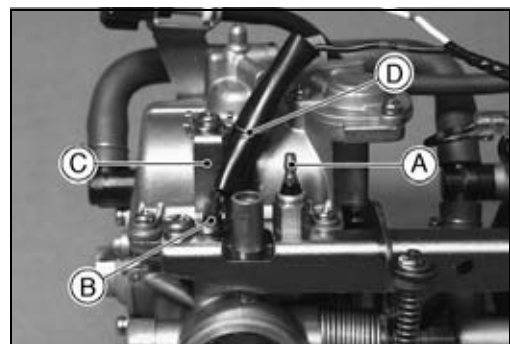
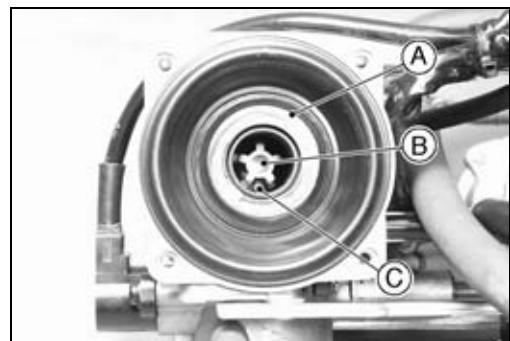
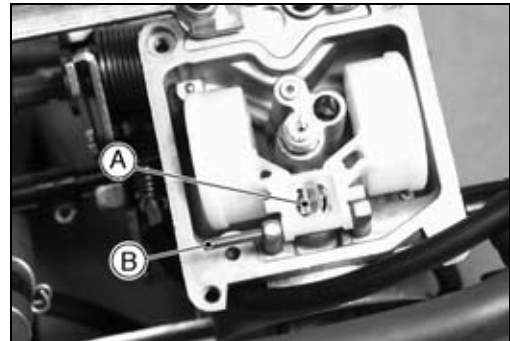
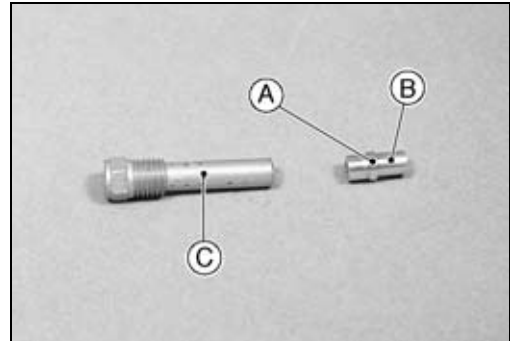
3-16 FUEL SYSTEM

Carburetors

CAUTION

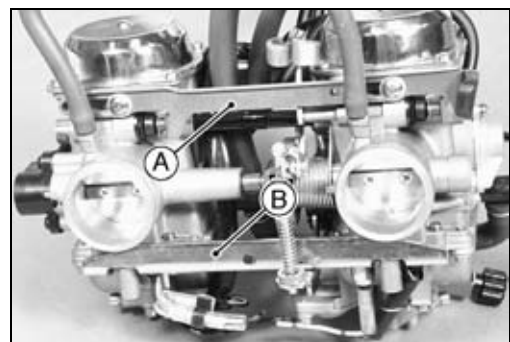
Do not apply force to the jets and needle jet holder or overtighten them, as this could damage the jets or the carburetor body, requiring replacement.

- First insert the smaller end [B] of the needle jet [A].
 - Then, screw in the needle jet holder [C].
-
- Install the float valve needle in the valve seat and hook the needle hanger [A] onto the float tang.
 - Insert the float pivot pin [B] into the pivot post and the float (see Service Fuel Level Adjustment).
-
- Set the float to the standard height (see Service Fuel Level Adjustment).
 - Insert the needle into the hole in the center of the vacuum piston [A], and place the spring seat [B] over the needle.
 - The spring seat must be installed without blocking the hole [C].
 - After installing the upper chamber cover, check to make sure that the vacuum piston moves smoothly in the carburetor body.
-
- Apply heat transfer grease, and install the sensor [A] and the heater [B] into the carburetor.
 - Install the sensor lead, and tighten the plate [C] and the clamp [D] with screw.



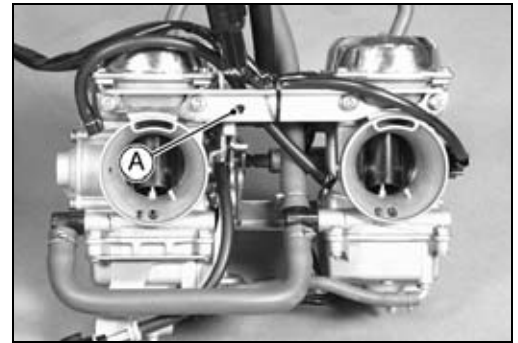
Carburetor Separation

- Read the WARNING in the Carburetor Removal.
- Remove the carburetors (see Carburetor Removal).
- Disconnect the pipe and the lead, leaving them connected to either side.
- Remove:
 - Choke Lever Plate [A]
 - Cylinder Side Connecting Plate [B]



Carburetors

- Remove:
 - Air Cleaner Side Connecting Plate [A]
- Separate the carburetors.



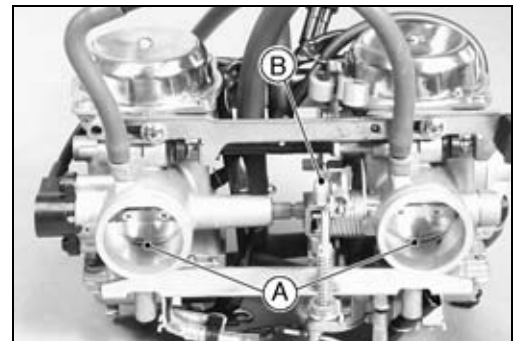
Carburetor Joining

- With the mounting screws loosened, locate the carburetors by facing their front downward.
- Tighten the mounting screws.
- Make sure that the choke plunger lever moves smoothly side-to-side.

CAUTION

Fuel mixture trouble could result if the starter plunger does not seat properly in its rest position after the choke lever is returned.

- Inspect the clearance [A] between the throttle valve and the carburetor bore bottom.
- ★ If there is a variance in the clearance between the carburetors, adjust the synchronization screw [B] to attain uniform clearance.
- Install the carburetors.
- Perform a synchronization adjustment.



3-18 FUEL SYSTEM

Carburetors

Carburetor Cleaning

WARNING

Clean the carburetors in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the carburetors.

CAUTION

Do not use compressed air on an assembled carburetor, or the floats may be crushed by the pressure, and the vacuum piston diaphragms may be damaged.

Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution.

This will prevent damage to or deterioration of the parts.

The carburetor body has plastic parts that cannot be removed. Do not use a strong carburetor cleaning solution which could attack these parts; instead, use a mild, high-flash-point cleaning solution safe for plastic parts.

Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.

- Remove the carburetors and drain the fuel.
- Disassemble the carburetors.
- Clean all the metal parts and rinse them in water.
- Dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Assemble the carburetors.

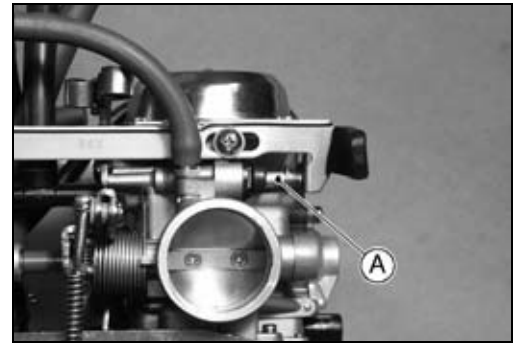
Carburetor Inspection

WARNING

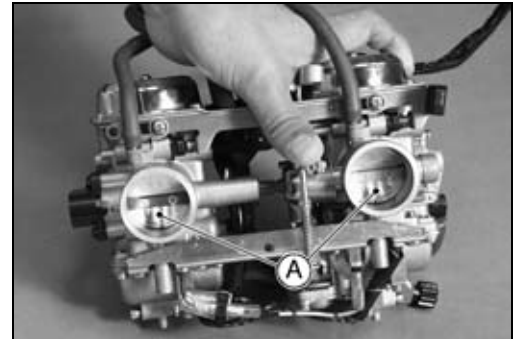
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

Carburetors

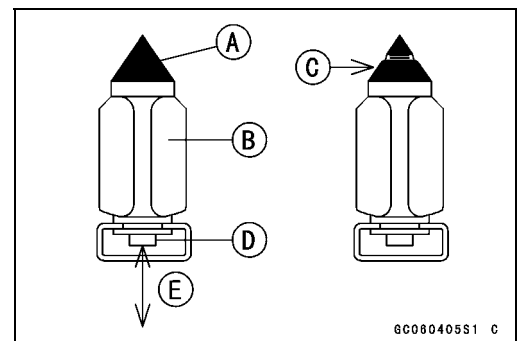
- Remove the carburetors.
- Before disassembling the carburetors, check the service fuel level (see Service Fuel Level Inspection).
- Move the choke lever [A] to check that it moves smoothly.
- ★ If the plunger does not move properly, replace the plunger or the carburetors.



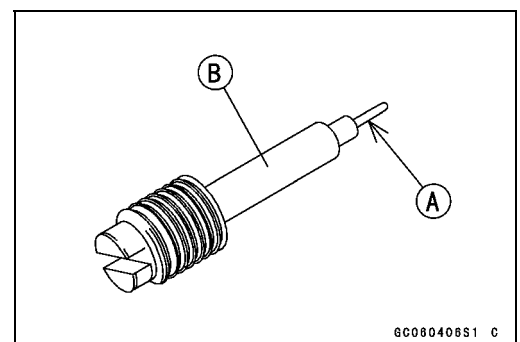
- Turn the throttle cable pulley to check that the throttle valve [A] moves smoothly and returns by spring force.
- ★ If the throttle valve does not move smoothly, replace the carburetors.
- Disassemble the carburetors (see Carburetor Disassembly).
- Clean the carburetors (see Carburetor Cleaning).
- Check that the carburetor's O-ring, vacuum piston, acceleration pump, and the diaphragm of the air suction valves are in good condition.
- ★ If the O-ring or the diaphragm is not in good condition, replace it.



- Check the plastic tip [A] of the float valve needle [B]. It should be smooth, without any grooves, scratches, or tears.
- ★ If the plastic tip is damaged [C], replace the needle.
- With your finger, push the rod [D] into the valve needle, and then release it [E].
- ★ If the rod does not spring out, replace the valve needle.



- Check the tapered portion [A] of the pilot screw [B] for wear or damage.
- ★ Replace the pilot screw if it is worn or damaged on the tapered portion, as it will prevent the engine from idling smoothly.



- Check that the vacuum piston [A] moves smoothly in the carburetor body.
- ★ If the vacuum piston does not move smoothly, or if it is very loose in the carburetor body, replace the piston or the carburetor.
- For sensor and heater inspection, see the Electrical System chapter.



3-20 FUEL SYSTEM

Air Cleaner

Air Cleaner Element Removal

- Remove:
 - Both Side Covers
- Take out the air cleaner element [A].



Air Cleaner Element Installation

- Install the element [A] with its metal mesh portion facing up.



Air Cleaner Element Cleaning and Inspection

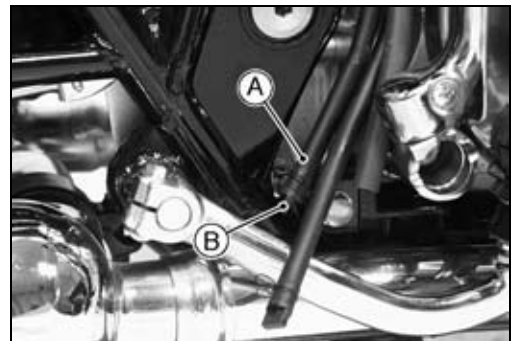
- Refer to the Air Cleaner Element Cleaning and Inspection in the Periodic Maintenance chapter.

Air Cleaner Drain Hose Inspection

- Inspect the air cleaner drain hoses [A] periodically by removing the plugs [B] at the bottom of the hoses.
- Replace the plugs where they are original position.

⚠ WARNING

Be sure to install the plug in the drain hose after draining. Oil could drain from the open hose and get on the tires, which could make them slippery and cause an accident and injury .



Air Cleaner Housing Removal

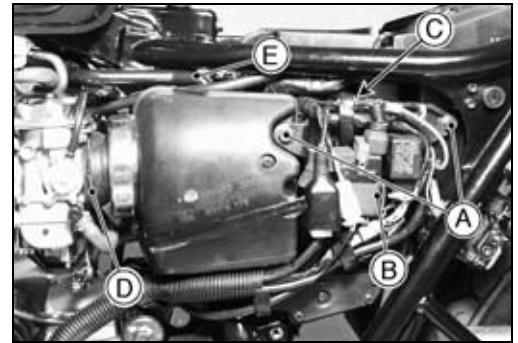
- Remove:
 - Seat (see Frame chapter)
 - Both Side Covers (see Frame chapter)
 - Bolts [A]



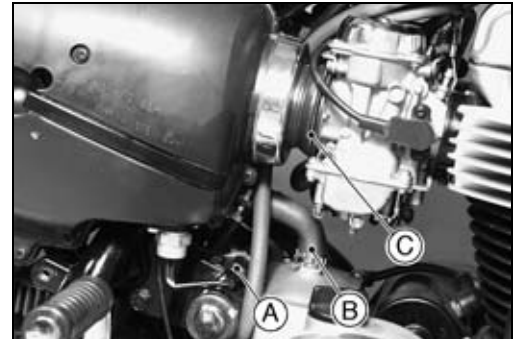
Air Cleaner

- Bolts [A]
- Battery Holder [B]
- Battery [C]
- Carburetor Holder Spring [D]

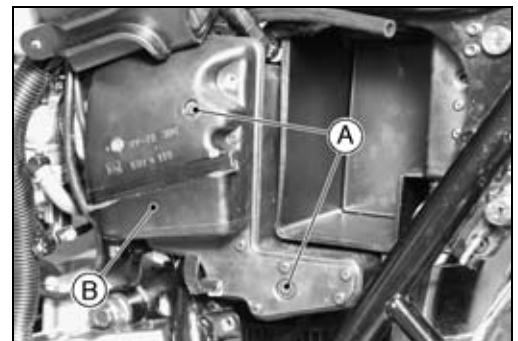
- Pull out the tube from the pipe [E].



- Remove:
 - Atmospheric Temperature Sensor Connector [A]
 - Engine Breather Hose [B]
 - Drain Hoses
 - Carburetor Holder Spring [C]

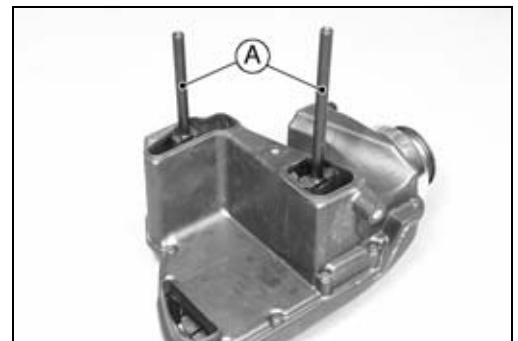


- Left Connecting Pipe Screws [A]
- Right Air Cleaner Housing
- Left Air Cleaner Housing [B]

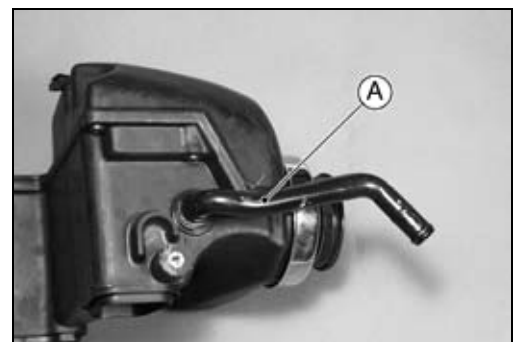


Air Cleaner Housing Installation

- Make sure that the connecting pipe [A] is secured to the right air cleaner.



- Make sure that the pipe [A] is secured to the left air cleaner.
- Install the removed parts in the reverse order.

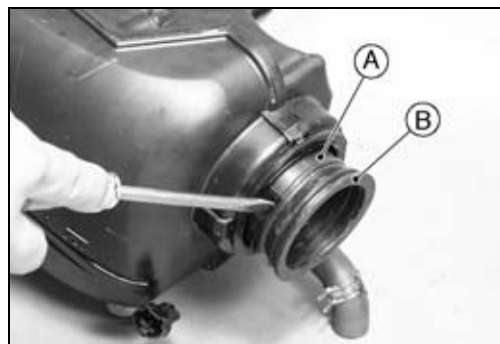


3-22 FUEL SYSTEM

Air Cleaner

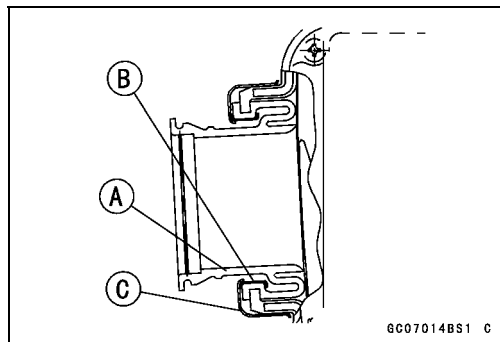
Intake Duct Removal

- Remove the air cleaner housing.
- Pull out the duct cover.
- Using a regular tip screwdriver, remove the duct clamp [A].
- Remove the intake duct [B] from the air cleaner housing.



Intake Duct Installation

- Assemble as illustrated on the right:
 - Intake Duct [A]
 - Duct Clamp [B]
 - Duct Cover [C]



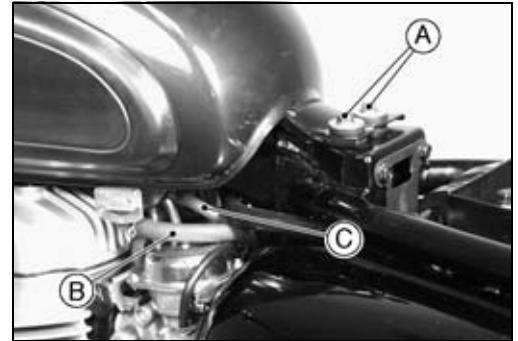
Fuel Tank

Fuel Tank Removal

⚠ 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.

- Turn the fuel tap to the ON or RES position.
- Remove:
 - Seat (see Frame chapter)
 - Mounting Bolts [A]
 - Fuel Hose [B]
 - Vacuum Hose [C]
 - Drain Hose (right bottom of fuel tank)
 - Fuel Tank

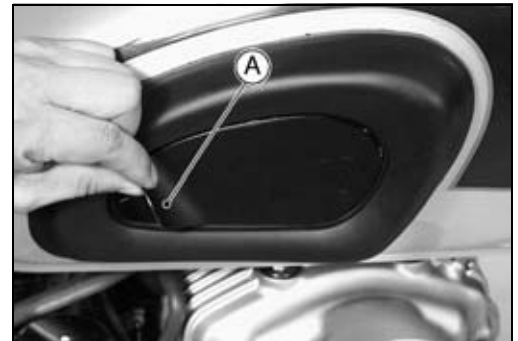


Fuel Tank Installation

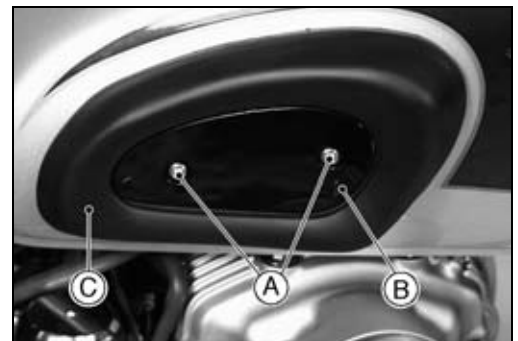
- Read the WARNING in the Fuel Tank Removal section.
- Make sure that the damper is installed.
- Properly route the hose (see Appendix chapter).

Knee Grip Removal

- Remove the sticker [A].



- Remove the bolts [A], and remove the holder plate [B] and the knee grip rubber [C].
- Remove the knee grip rubber pad from the bracket.



Knee Grip Installation

- Completely insert the protrusions of the knee grip rubber pad along the bracket.

3-24 FUEL SYSTEM

Fuel Tank

Fuel Tank Cleaning

WARNING

Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the tank.

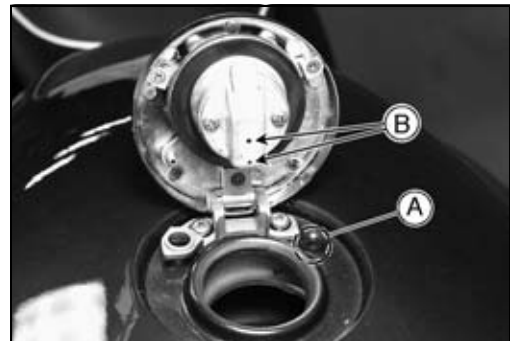
- Remove the fuel tank and drain the gasoline into an appropriate container.
- Pour some cleaning solvent into the fuel tank and shake the tank to remove dirt and fuel deposits together with the solvent.
- Pour cleaning solvent through the tap in all lever positions.
- Remove the fuel tap and clean the filter screen in cleaning solvent.
- Dry the tank and the fuel tap with compressed air.
- Install the tap on the tank and install the tank in the frame.

Fuel Tank Inspection

- Open the tank cap.
- Check to see if the water drain pipe [A] is clogged.
- ★ If it is clogged, use compressed air to clean the pipe.

CAUTION

Do not apply compressed air to clean the air vent holes [B] in the tank cap. This could cause damage to the labyrinth in the cap.



Fuel Tap Removal

- Remove the fuel tank and drain the gasoline into an appropriate container.
- Remove the fuel tap bolts [A] and the nylon washer to remove the fuel tap.



Fuel Tap Installation

- Check to make sure that the O-ring is not damaged.
- Place the fuel hose over the fuel tap and securely clamp it in place.
- Check to make sure that the nylon washer is not damaged.
- Do not use steel washers in place of the nylon washers, because fuel will leak.

Torque - Fuel Tap Bolts:

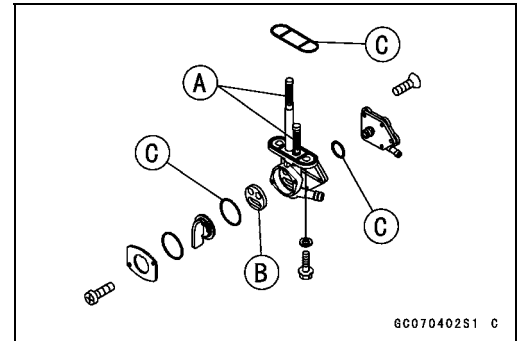
2.5 N·m (0.25 kgf·m, 22 in·lb) (with white washer)

4.9 N·m (0.5 kgf·m, 43 in·lb) (with black washer)

Fuel Tank

Fuel Tap Inspection

- Remove the fuel tap.
- Visually inspect the filter [A].
- ★ If the filter has any breaks or is deteriorated, replace the fuel tap.
- ★ If fuel leaks from the fuel tap, or from the ON or RES position of the tap when the engine is stopped, replace the gasket [B] or the O-rings [C] inside the tap that could be damaged.



3-26 FUEL SYSTEM

Evaporative Emission Control System (California and Taiwan Model Only)

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the Periodic Maintenance Chart.

Parts Removal/Installation

WARNING

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

CAUTION

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.

- To prevent the gasoline from flowing into or out of the canister, hold the separator perpendicular to the ground.
- Connect the hoses according to the diagram of the system. Make sure they do not get pinched or kinked.
- Route hoses with a minimum of bending so that the air or vapor will not be obstructed.
- Be sure to plug the return hose to prevent fuel spilling before fuel tank removal.

WARNING

When removing the fuel tank, be careful not to spill the gasoline through the return hose. Spilled fuel is hazardous.

- ★ If liquid gasoline flows into the breather hose, remove the hose and blow it clean with compressed air.

Hose Inspection

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

Separator Inspection

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

Evaporative Emission Control System (California and Taiwan Model Only)

Separator Operation Test

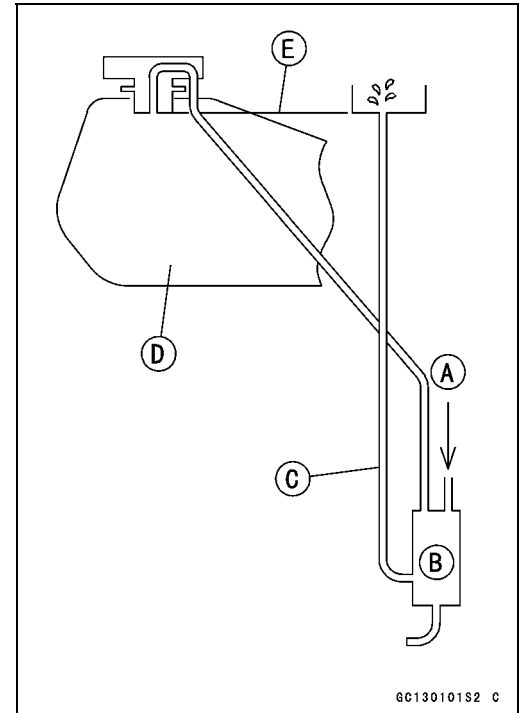
⚠ WARNING

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.

- Connect the hoses to the separator, and install the separator on the motorcycle.
- Disconnect the breather hose from the separator, and inject about 20 mL (0.68 US oz.) of gasoline [A] into the separator [B] through the hose fitting.
- Disconnect the fuel return hose [C] from the fuel tank [D].
- Place the open end of the return hose into the container and hold it with the same level of the tank top [E].
- Start the engine, and let it idle.
- ★ If the gasoline in the separator comes out of the hose, the separator works well. If it does not, replace the separator with a new one.

Canister Inspection

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



Engine Top End

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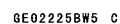
4-2 ENGINE TOP END

Muffler Installation.....	4-61
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Exploded View

Dummy Page

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Spark Plug Hole Holder Cover Bolts	7.8	0.8	69 in·lb	
2	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
3	Bevel Gear Cover Bolts	3.9	0.4	35 in·lb	L
4	Spark Plug Hole Pipes	118	12	87	L
5	Spark Plugs	13	1.3	113 in·lb	
6	Cylinder Head Cover Damper Bolts	12	1.2	104 in·lb	L
7	Oil Fitting Bracket Bolts	12	1.2	104 in·lb	L
8	Air Suction Valve Cover Allen Bolts	12	1.2	104 in·lb	L
9	Camshaft Cap Bolts (8 mm)	25	2.5	18	S
10	Camshaft Cap Bolts (6 mm)	12	1.2	104 in·lb	S
11	Cylinder Head Bolts: (unused)	49	5.0	36	EO, S
		47	4.8	35	EO, S
12	Exhaust Pipe Holder Nuts	17	1.7	12	
13	Muffler Mounting Bolts	21	2.1	15	

14. Vacuum Switch Valve

15. Triangular mark faces front

16. "R" mark faces up

17. "RN" mark faces up

18. Muffler Clamp Bolt

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

MO: Apply molybdenum disulfide oil (mixture of engine oil and molybdenum disulfide grease in a weight ratio is 10 : 1).

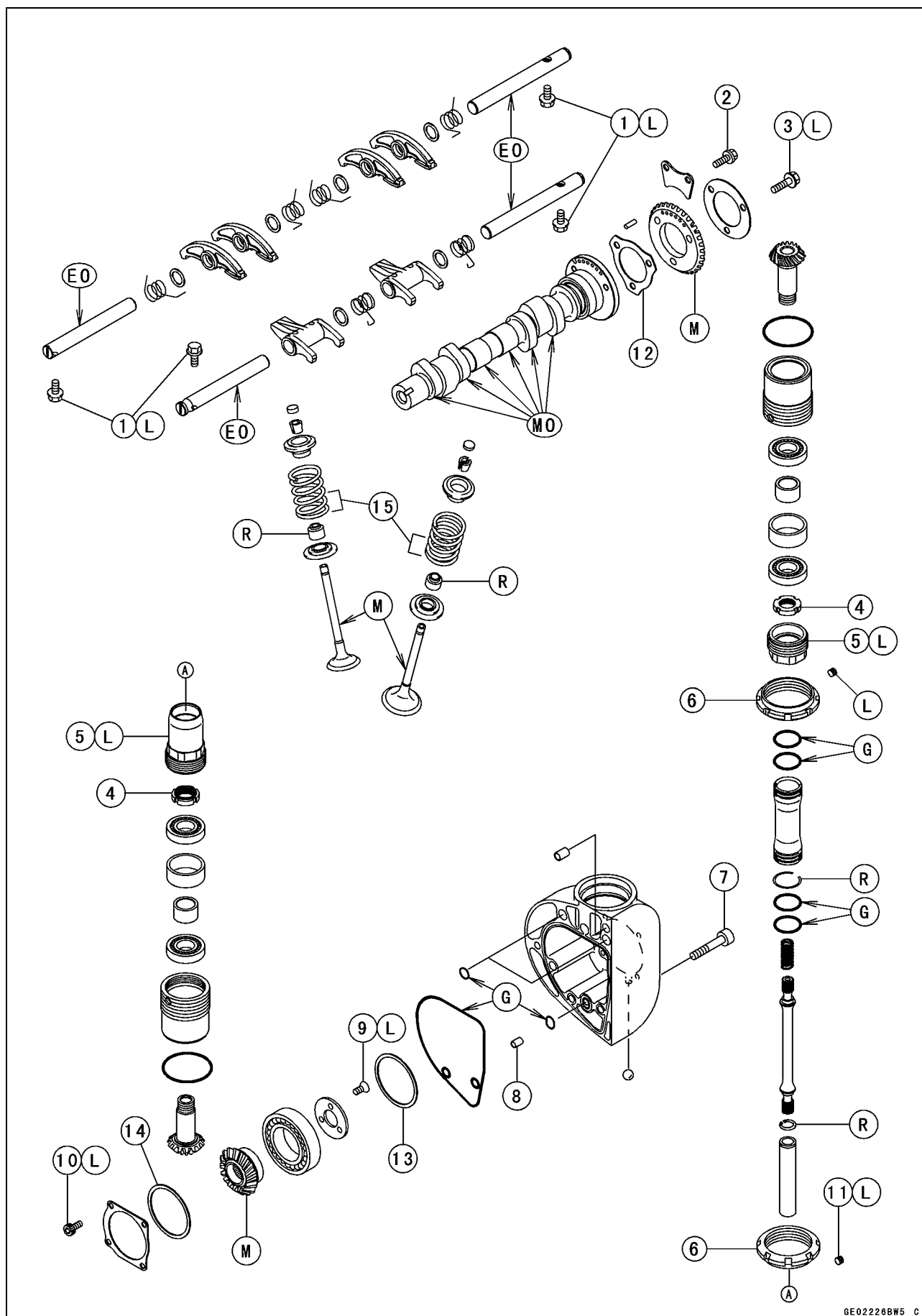
R: Replacement parts

S: Follow the specific tightening sequence.

SS: Apply silicon sealant (Kawasaki Bond: 56019-120)

4-6 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rocker Shaft Bolts	12	1.2	104 in·lb	L
2	Camshaft Locating Plate Bolts	12	1.2	104 in·lb	
3	Driven Bevel Gear Bolts	20	2.0	14	L
4	Bevel Gear Mounting Nuts	59	6.0	43	
5	Gear Case	98	10	72	L
6	Bevel Gear Case Locknuts	20	2.0	14	
7	Bevel Gear Case Bolts	12	1.2	104 in·lb	
8	Bevel Gear Oil Passage Nozzle	3.4	0.35	30 in·lb	
9	Bevel Gear Holder Screws	4.9	0.5	43 in·lb	L
10	Bearing Holder Allen Bolts (crankshaft side)	7.8	0.8	69 in·lb	L
11	Locknut Stop Screws	—	—	—	L

12. Camshaft side shim

13. Crankshaft side primary shim

14. Crankshaft side secondary shim

15. Closed coil end faces down.

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

MO: Apply molybdenum disulfide oil.

R: Replacement parts

4-8 ENGINE TOP END

Specifications

Item	Standard	Service Limit
Clean Air System		
vacuum Switch Valve Closing Pressure	Open → Close 49 ~ 57 kPa (370 ~ 430 mmHg)	—
Camshaft		
Cam Height:		
Inlet	36.241 ~ 36.349 mm (1.4268 ~ 1.4311 in.)	36.14 mm (1.423 in.)
Exhaust	36.394 ~ 36.502 mm (1.4328 ~ 1.4371 in.)	36.29 mm (1.429 in.)
Camshaft Journal/Camshaft Cap Clearance	0.048 ~ 0.091 mm (0.0019 ~ 0.0036 in.)	0.18 mm (0.007 in.)
Camshaft Journal Diameter	24.930 ~ 24.952 mm (0.9815 ~ 0.9824 in.)	24.90 mm (0.980 in.)
Camshaft Bearing Inside Diameter	25.000 ~ 25.021 mm (0.9844 ~ 0.9851 in.)	25.08 mm (0.987 in.)
Camshaft Runout (Dial Gauge Runout)	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.004 in.)
Rocker Arm Inside Diameter	13.000 ~ 13.018 mm (0.5118 ~ 0.5125 in.)	13.05 mm (0.514 in.)
Rocker Arm Shaft Diameter	12.976 ~ 12.994 mm (0.5109 ~ 0.5116 in.)	12.96 mm (0.510 in.)
Cylinder Head		
Cylinder Compression:		
Electric Starter	(Usable range) 825 ~ 1 280 kPa (8.4 ~ 13.0 kgf/cm ² , 119 ~ 185 psi) @410 rpm	—
Kick Starter	(Usable range) 785 ~ 1 230 kPa (8.0 ~ 12.5 kgf/cm ² , 114 ~ 178 psi) @5 kicks.	—
Cylinder Head Warp	—	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Inlet	0.08 ~ 0.13 mm (0.0031 ~ 0.0051 in.)	—
Exhaust	0.14 ~ 0.19 mm (0.0055 ~ 0.0075 in.)	—
Valve Head Thickness:		
Inlet	0.5 mm (0.020 in.)	0.3 mm (0.012 in.)
Exhaust	0.8 mm (0.031 in.)	0.7 mm (0.028 in.)
Valve Stem Bend (Dial Gauge Runout)	TIR 0.015 mm (0.0006 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Inlet	4.475 ~ 4.990 mm (0.1762 ~ 0.1965 in.)	4.46 mm (0.176 in.)
Exhaust	4.455 ~ 4.470 mm (0.1754 ~ 0.1760 in.)	4.44 mm (0.175 in.)
Valve Guide Inside Diameter	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.58 mm (0.180 in.)

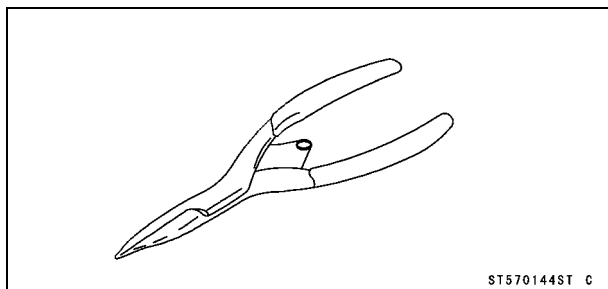
Specifications

Item	Standard	Service Limit
Valve/Valve Guide Clearance (Wobble method):		
Inlet	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)	0.32 mm (0.013 in.)
Exhaust	0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in.)	0.38 mm (0.015 in.)
Valve Seating Surface:		
Outside Diameter:		
Inlet	28.4 ~ 28.6 mm (1.118 ~ 1.126 in.)	—
Exhaust	24.4 ~ 24.6 mm (0.961 ~ 0.969 in.)	—
Width	0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)	—
Valve Seat Cutting Angle	32°, 45°, 60°	—
Valve Spring Free Length	47.27 mm (1.861 in.)	35.5 mm (1.398 in.)
Cylinders and Pistons		
Cylinder Inside Diameter	72.000 ~ 72.012 mm (2.8346 ~ 2.8351 in.)	72.10 mm (2.839 in.)
Piston Diameter (11 mm (0.43 in.) from piston bottom)	71.960 ~ 71.970 mm (2.8331 ~ 2.8335 in.)	71.71 mm (2.823 in.)
Piston/Cylinder Clearance	0.030 ~ 0.052 mm (0.0012 ~ 0.0020 in.)	—
Piston Ring/Ring Groove Clearance:		
Top	0.05 ~ 0.09 mm (0.0020 ~ 0.0035 in.)	0.19 mm (0.0075 in.)
Second	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Piston Ring Groove Width:		
Top	1.04 ~ 1.06 mm (0.0409 ~ 0.0417 in.)	1.14 mm (0.045 in.)
Second	1.02 ~ 1.04 mm (0.0402 ~ 0.0409 in.)	1.12 mm (0.044 in.)
Oil	2.01 ~ 2.03 mm (0.0791 ~ 0.0799 in.)	2.11 mm (0.083 in.)
Piston Ring Thickness: Top and Second	0.97 ~ 0.99 mm (0.0381 ~ 0.0390 in.)	0.90 mm (0.035 in.)
Piston Ring End Gap:		
Top	0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)	0.65 mm (0.026 in.)
Second	0.40 ~ 0.55 mm (0.0157 ~ 0.0217 in.)	0.85 mm (0.033 in.)
Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	1.0 mm (0.040 in.)

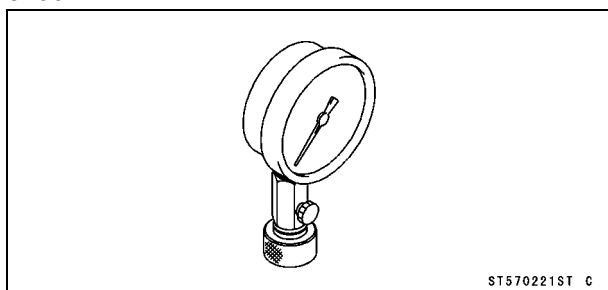
4-10 ENGINE TOP END

Special Tools and Sealant

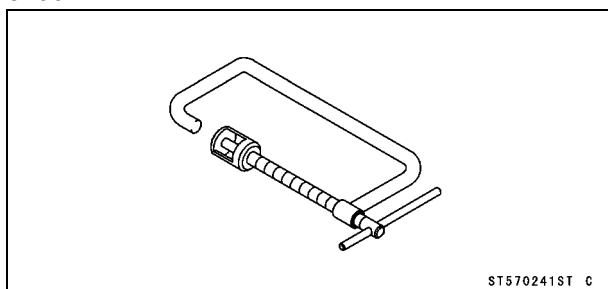
Outside Circlip Pliers:
57001-144



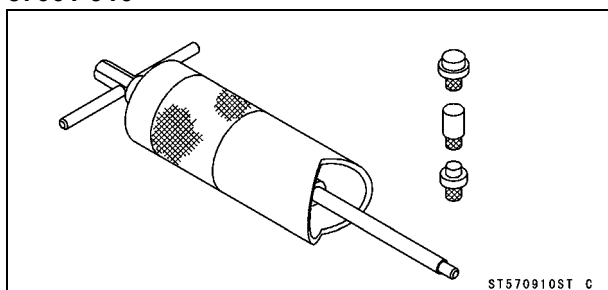
Compression Gauge, 20 kgf/cm²:
57001-221



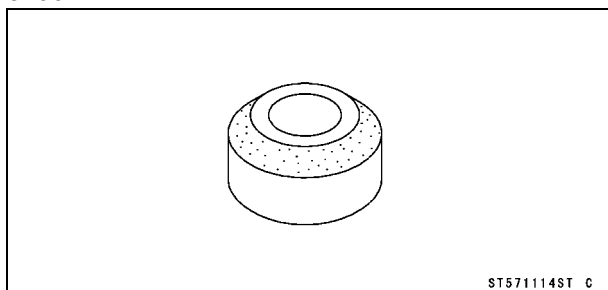
Valve Spring Compressor Assembly:
57001-241



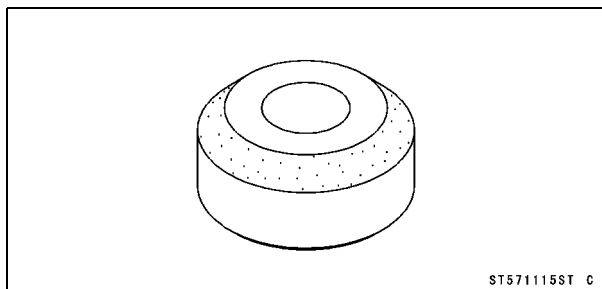
Piston Pin Puller Assembly:
57001-910



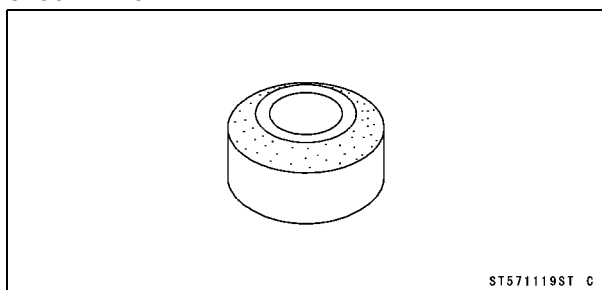
Valve Seat Cutter, 45° - ϕ 27.5:
57001-1114



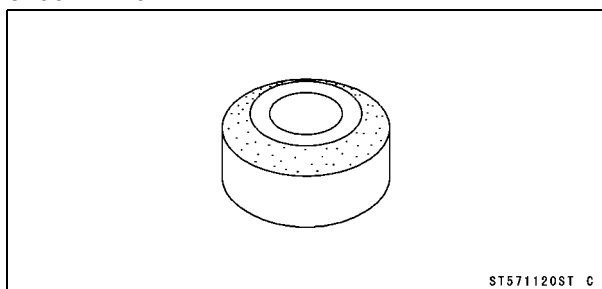
Valve Seat Cutter, 45° - ϕ 32:
57001-1115



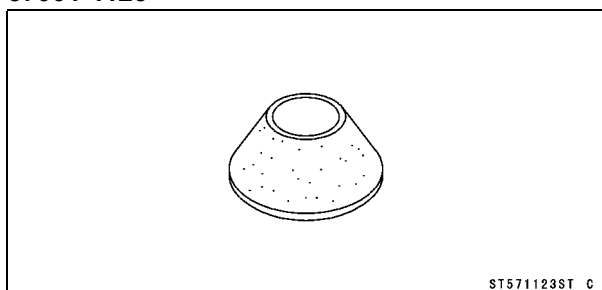
Valve Seat Cutter, 32° - ϕ 28:
57001-1119



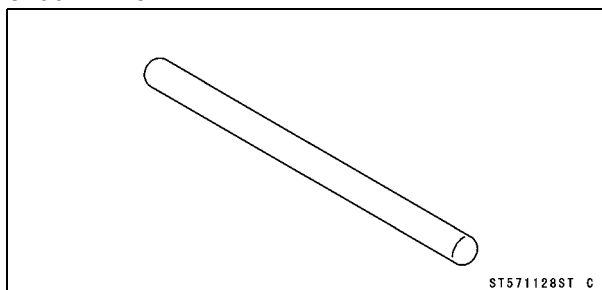
Valve Seat Cutter, 32° - ϕ 30:
57001-1120



Valve Seat Cutter, 60° - ϕ 30:
57001-1123



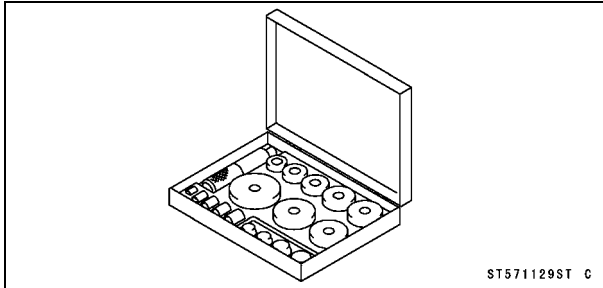
Valve Seat Cutter Holder Bar:
57001-1128



Special Tools and Sealant

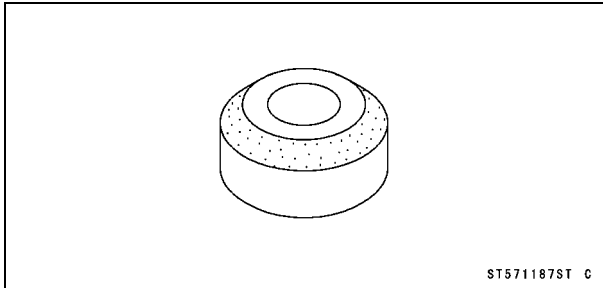
Bearing Driver Set:

57001-1129



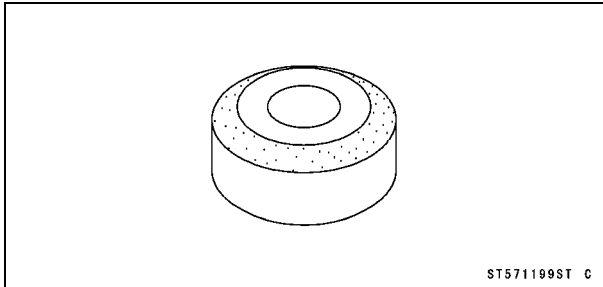
Valve Seat Cutter, 45° - $\phi 30$:

57001-1187



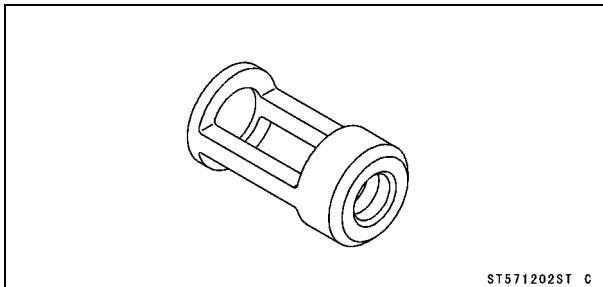
Valve Seat Cutter, 32° - $\phi 33$:

57001-1199



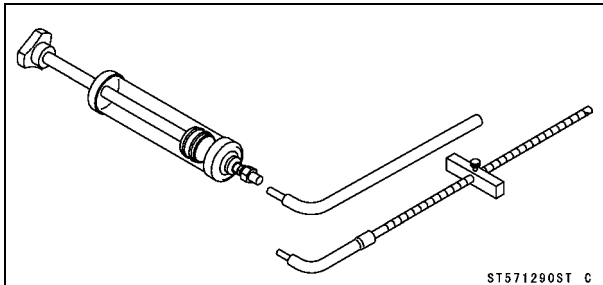
Valve Spring Compressor Adapter, $\phi 22$:

57001-1202



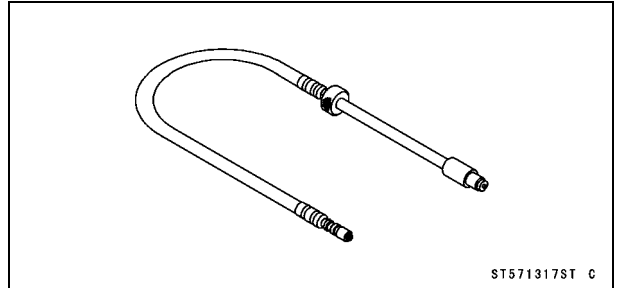
Fork Oil Level Gauge:

57001-1290



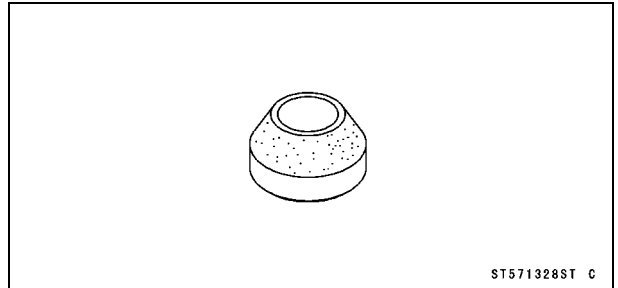
Compression Gauge Adapter, M10 \times 1.0:

57001-1317



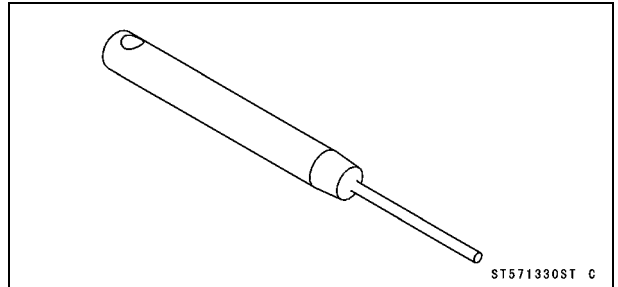
Valve Seat Cutter, 60° - $\phi 25$:

57001-1328



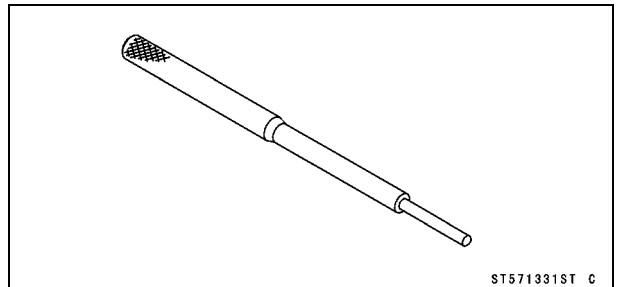
Valve Seat Cutter Holder, $\phi 4.5$:

57001-1330



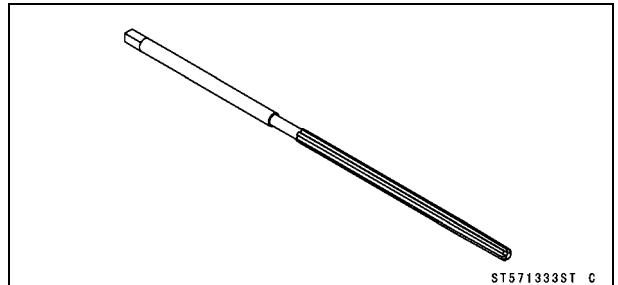
Valve Guide Arbor, $\phi 4.5$:

57001-1331



Valve Guide Reamer, $\phi 4.5$:

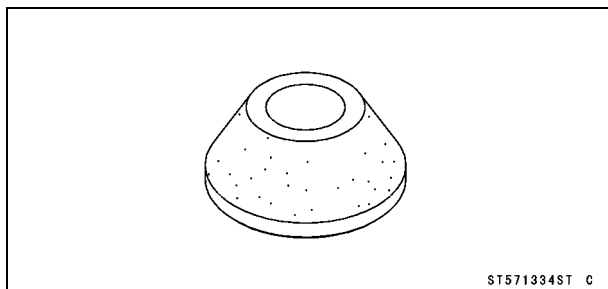
57001-1333



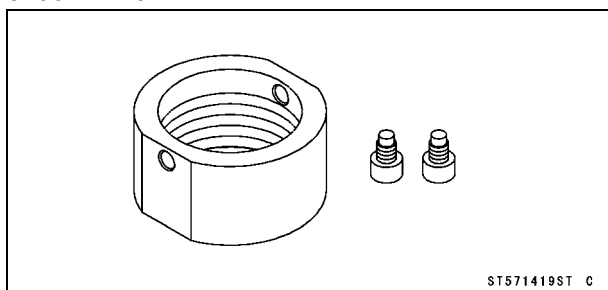
4-12 ENGINE TOP END

Special Tools and Sealant

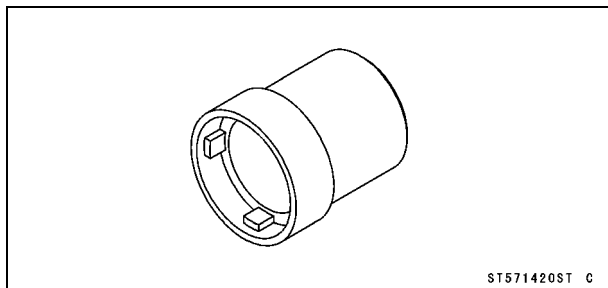
Valve Seat Cutter, 60° - ϕ 33:
57001-1334



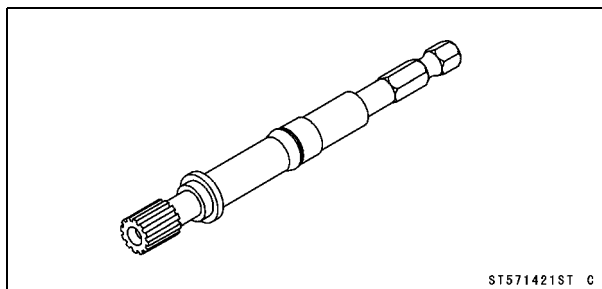
Bearing Housing Jig, M45 × 1.0:
57001-1419



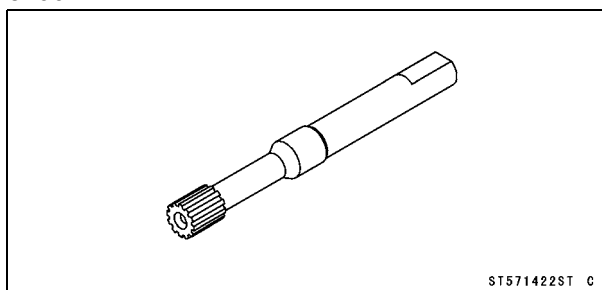
Socket Wrench:
57001-1420



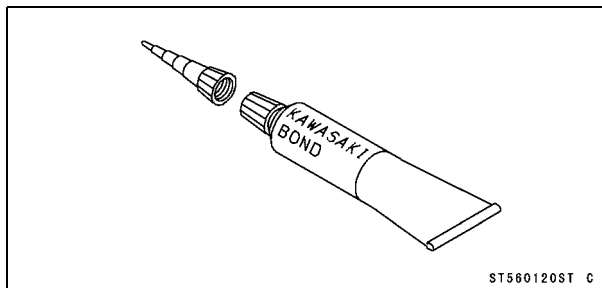
Bevel Gear Drive Bit m0.75:
57001-1421



Bevel Gear Holder m0.75:
57001-1422



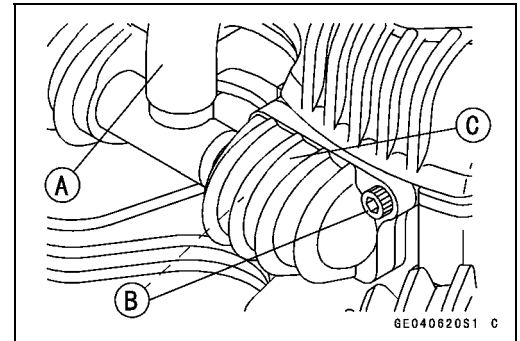
Kawasaki Bond (Silicone Sealant):
56019-120



Clean Air System

Air Suction Valve Assembly Removal

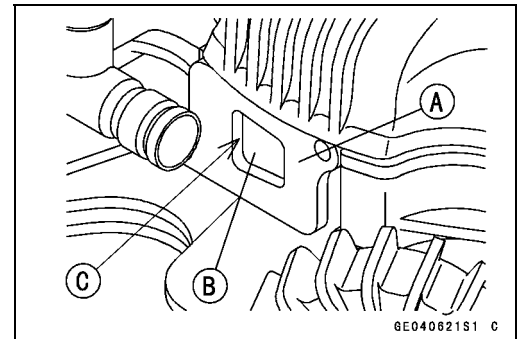
- Remove:
 - Tube [A]
 - Bolts [B]
 - Air Suction Valve Cover [C]
- Remove the air suction valve assembly.



Air Suction Valve Assembly Installation

- Apply grease to the O-ring of the pipe.
- Install the valve assembly [A] so that its read [B] side faces inside and its opening [C] side faces inward.
- Install the air suction valve cover.

Torque - Air Suction Valve Cover Allen Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

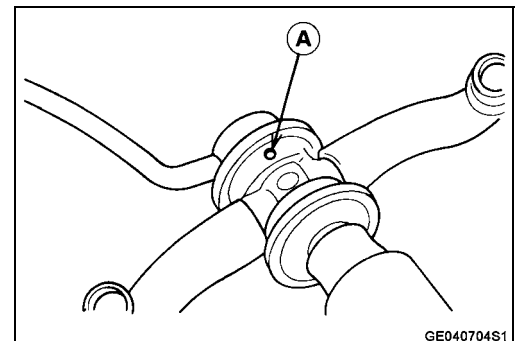


Air Suction Valve Inspection

- Refer to the Air Suction Valve Inspection in the Periodic Maintenance chapter.

Vacuum Switch Valve Installation

- Install the vacuum switch valve so that the air hole [A] faces downwards.
- Route the hoses correctly (see Appendix chapter).

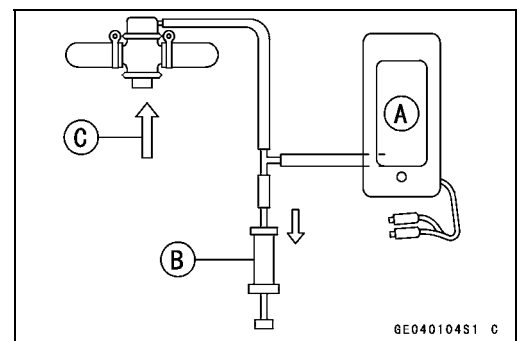


Vacuum Switch Valve Test

- Remove:
 - Fuel Tank (see Fuel System chapter)
 - Vacuum Switch Valve
- Connect the vacuum gauge [A] and syringe [B] or fork oil level gauge to the vacuum hoses as shown.

Special Tool - Fork Oil Level Gauge: 57001-1290

Air Flow [C]



4-14 ENGINE TOP END

Clean Air System

- Gradually raise the vacuum (lower the pressure) applied to the vacuum switch valve, and check the valve operation. When the vacuum is low, the vacuum switch valve should permit air to flow. When the vacuum raises to 49 ~ 57 kPa (370 ~ 430 mmHg), it should stop air flow.

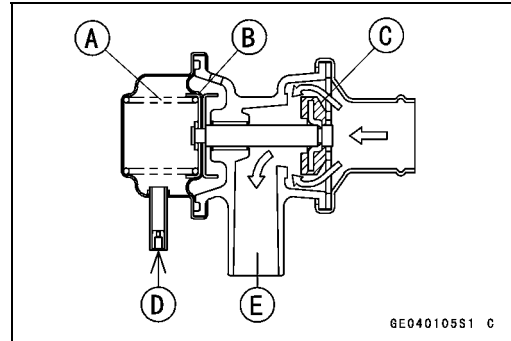
Spring [A]

Diaphragm [B]

Valve [C]

Low Vacuum [D]

Second Air Flow [E]



- ★ If the vacuum switch valve does not operate as described, replace it with a new one.

NOTE

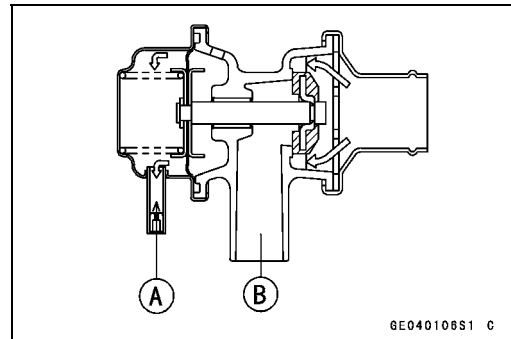
- To check air flow through the vacuum switch valve, just blow through the air cleaner hose.

Vacuum Switch Valve Closing Pressure (Open → Close)

Standard: 49 ~ 57 kPa (370 ~ 430 mmHg)

High Vacuum [A]

Secondary air cannot flow [B]



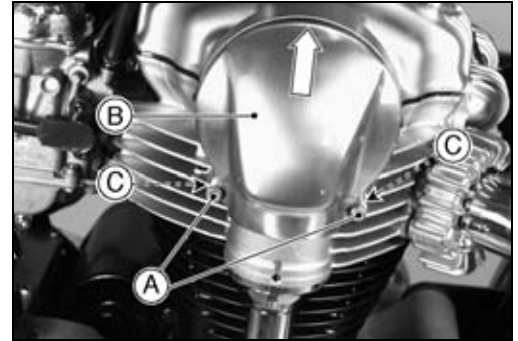
Clean Air System Tube, Hose and Inspection

- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to air cleaner housing, vacuum switch valve, #1 and #2 carburetor holders and air suction valve covers.
- ★ If they are not, correct them. Replace them if they are damaged.

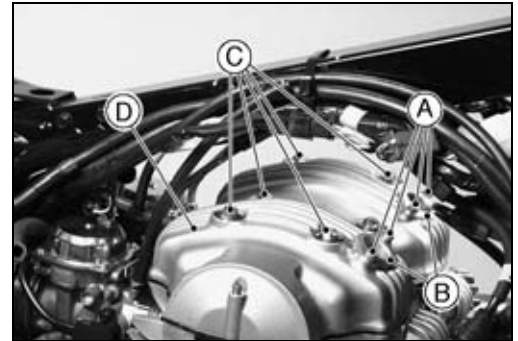
Cylinder Head Cover

Cylinder Head Cover Removal

- Remove:
 - Fuel Tank (see Fuel System chapter)
 - Spark Plug Caps
 - Vacuum Switch Valve with Rubber Hoses
- Remove the bolts [A] and pull the bevel gear cover [B] upward.
- Make sure not to lose the nylon washers [C].



- Remove the bolts [A] and remove the spark plug hole holder covers [B].
- Remove the bolts [C] and remove the cylinder head cover [D].



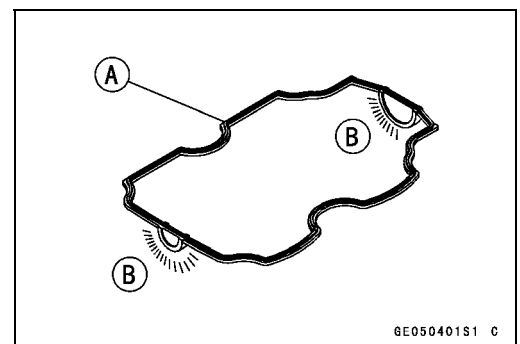
- If the cylinder head cover does not come out easily, pry the points [A].



Cylinder Head Cover Installation

- Inspect the head cover gasket [A] and replace it if it is damaged.
- Install the head cover gasket on the head cover.
- Apply silicon sealant [B] to the locations shown.

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



- Make sure that the knock pins are on the cylinder head.
- Install the head cover.
- Install the head cover bolt washers [A] with their metal portion [B] facing up.

Torque - Cylinder Head Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

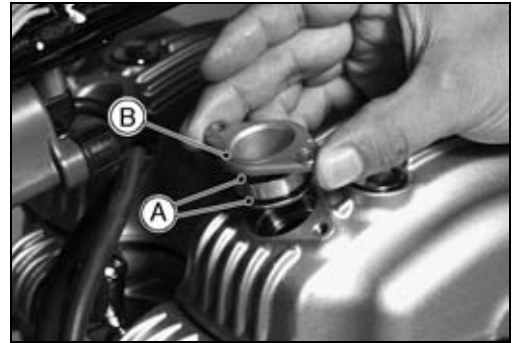


4-16 ENGINE TOP END

Cylinder Head Cover

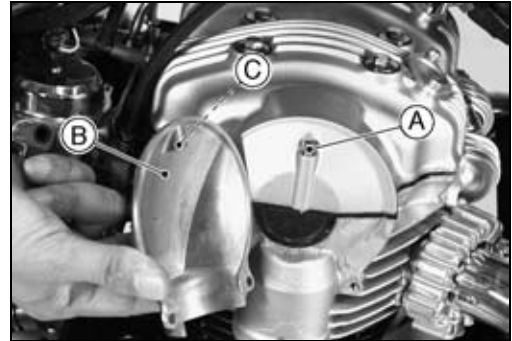
- Inspect the O-rings [A], and replace it if it is damaged.
- Apply grease to the O-rings, and install them in the spark plug hole holder cover [B].
- Insert the spark plug hole cover into the plug hole.
- Apply a non-permanent locking agent to the bolt threads, and tighten the bolts.

Torque - Spark Plug Hole Holder Cover Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)



- Align and insert the cylinder head cover pin [A] into the hole [C] of the bevel gear cover [B].
- Apply a non-permanent locking agent to the bevel gear cover bolt threads.
- Place the nylon washers in the bolt holes between the cylinder head and the bevel gear cover, and tighten the bolts.

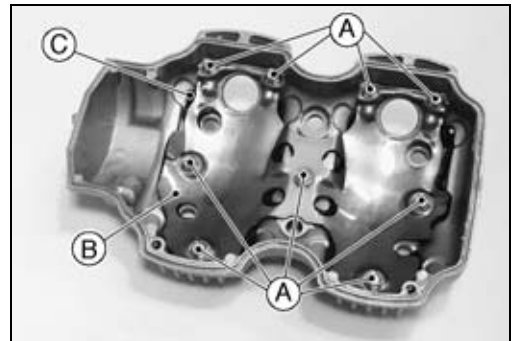
Torque - Bevel Gear Cover Bolts: 3.9 N·m (0.4 kgf·m, 35 in·lb)



- Install the spark plug caps, vacuum switch valve and the fuel tank.

Cylinder Head Cover Damper Removal

- Remove the cylinder head cover.
- Remove the damper bolts [A] and remove the damper holder [B] and the damper [C].



Cylinder Head Cover Damper Installation

- Apply a non-permanent locking agent to the damper bolt threads and tighten the bolts.

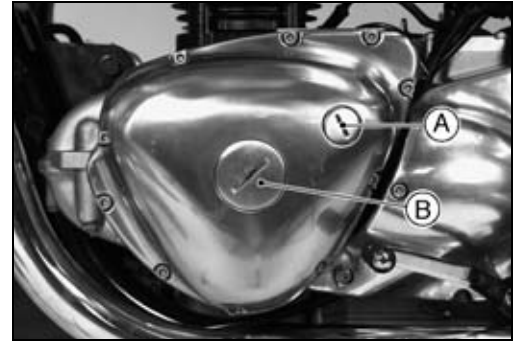
Torque - Cylinder Head Cover Damper Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

- Install the cylinder head cover.

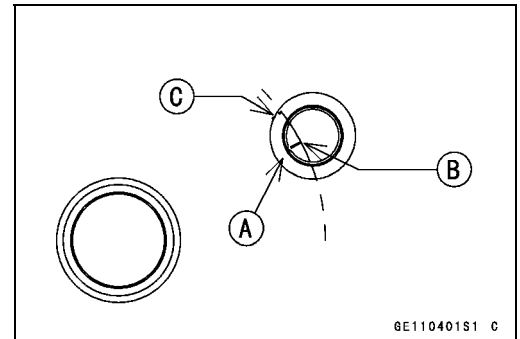
Camshaft

Camshaft Removal

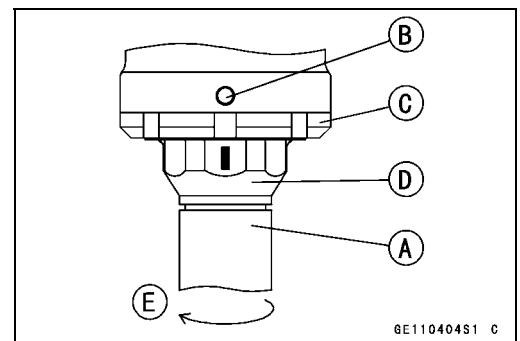
- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Timing Inspection Plug [A]
 - Rotor Bolt Plug [B]



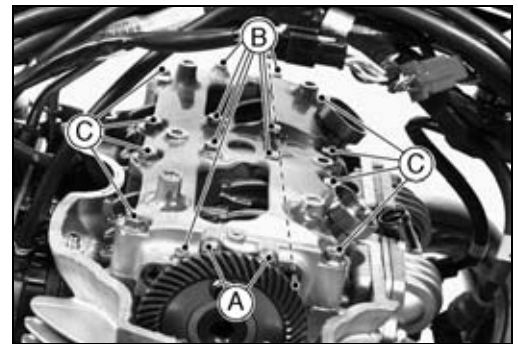
- Bring the piston to the TDC.
- Place a wrench over the rotor bolt and turn it counterclockwise to align the TDC mark [B] with the timing notch [A]. Ignition mark [C]



- Pull down:
 - Outer Pipe [A] (see Bevel Gear Case Removal)
 - Driveshaft (see Bevel Gear Case Removal)
- Remove:
 - Locknut Stop Screw [B]
- Loosen the bevel gear case locknut [C].
- Rotate the gear case unit [D] approximately one turn in the direction of the arrow [E] to lower the position of the drive bevel gear.



- Loosen the camshaft locating plate bolts [A].
- First remove the 6 mm camshaft cap bolts [B] (16 → 9); then, remove the 8 mm camshaft cap bolts (8 → 1) [C].
- Remove:
 - Camshaft Cap
 - Camshaft



Camshaft Installation

CAUTION

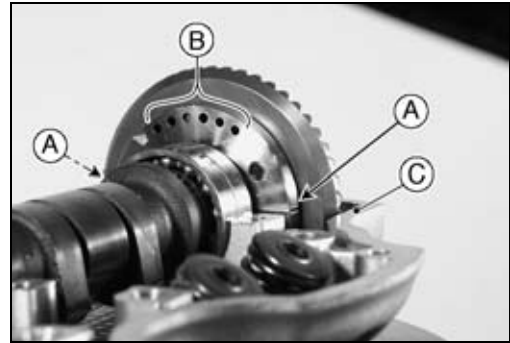
If the camshaft is replaced with a new part, make sure to adjust the bevel gear tooth contact.

- Apply molybdenum disulfide oil to all the cam and journal surfaces of the camshaft.
- If the camshaft is replaced with a new part, apply a thin coat of molybdenum disulfide grease to the cam and journal surfaces.

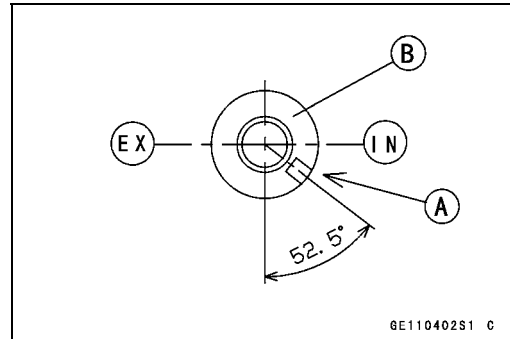
4-18 ENGINE TOP END

Camshaft

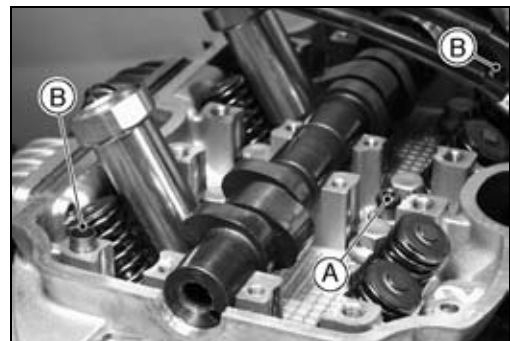
- Face the six holes [B] in the bevel gear holder of the camshaft upward. Then, mesh the drive bevel gear and the driven bevel gear together so that the right and left timing marks [A] on the side of the bevel gear holder parallel the cylinder head top surface [C].



- Verify that the groove [A] of the camshaft end [B] is as shown.



- Verify that the oil pipe [A] and the knock pins [B] are attached.



- Install the camshaft cap and tighten the bolts following the specified sequence.

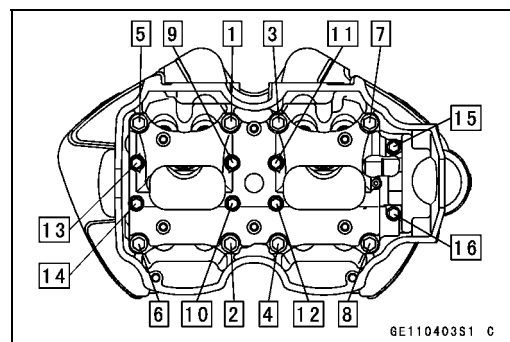
Torque - Camshaft Cap Bolts:

M8 mm: 25 N·m (2.5 kgf·m, 18 ft·lb)

M6 mm: 12 N·m (1.2 kgf·m, 104 in·lb)

- Tighten the camshaft locating plate bolts.

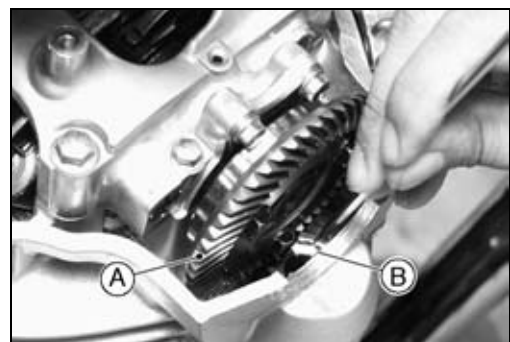
Torque - Camshaft Locating Plate Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)



- Tighten the gear case unit until the gear backlash is 0 mm (0 in.).
- Tighten the locknut to the specified torque to adjust the backlash.
- Push one of the gears with the screwdriver. A backlash of 0 mm (0 in.) is reached when there is no play.

NOTE

- A backlash or a gear lash is the amount of relative movement [B] of a given gear, with the other gear remaining stationary [A].

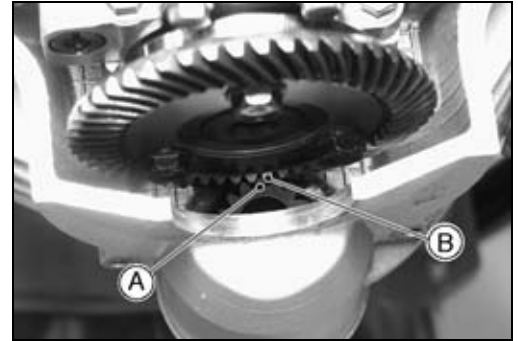


Torque - Bevel Gear Case Locknut: 20 N·m (2.0 kgf·m, 14 ft·lb)

Camshaft

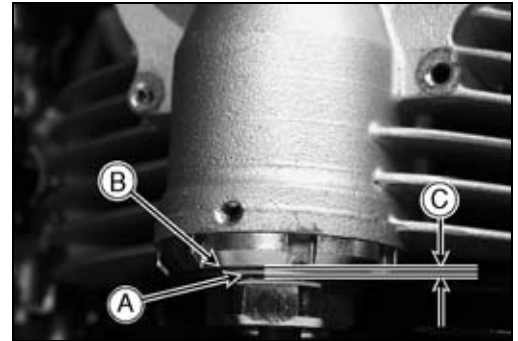
- With a backlash of 0 mm (0 in.), the cross section [A] of the driven bevel gear and the cross section [B] of the drive bevel gear should be practically even.

★ If there is a considerable amount of step, the backlash could be improperly adjusted or the bevel gear tooth contact could be improper.

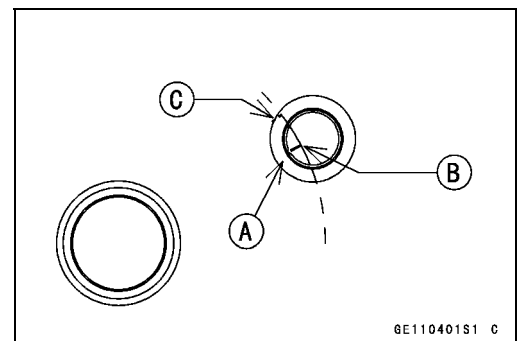


- Make sure that the bottom surface [A] of the locknut is (approximately 0.5 mm (0.020 in.)) [C] higher than the outer surface [B] of the bearing housing.

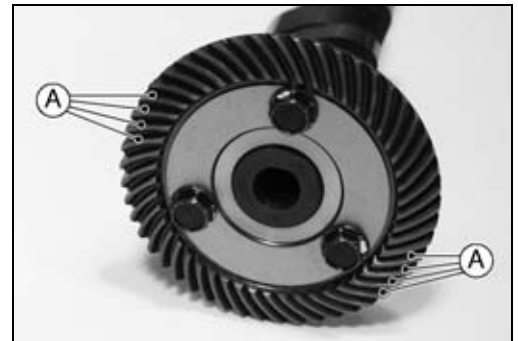
★ If there is a considerable amount of step, the backlash could be improperly adjusted or the bevel gear tooth contact could be improper.



- Bring the piston to the TDC.
- Place a wrench over the rotor bolt and turn it counterclockwise to align the TDC mark [B] with the timing notch [A]. Ignition mark [C]
- Install:
 - Drive Shaft (see Bevel Gear Case Installation)
 - Outer Pipe (see Bevel Gear Case Installation)
- Turn the rotor bolt counterclockwise and make sure that the cam is timed correctly.



- Apply molybdenum disulfide grease to all the tooth flanks [A] of the driven bevel gear.
- Install the removed parts.
- Adjust the bevel gears.
- Apply a non-permanent locking agent to the threads of the locknut stop screw. Tighten the stop screw until its tip comes in contact with the locknut; then, tighten it an additional half turn.



NOTE

○ If the tip of the used stop screw is rounded, or if the stop screw is to be tightened to the same position of the locknut that exhibits the traces of a previously tightened screw, tightening the stop screw an additional half turn could be excessive.

4-20 ENGINE TOP END

Camshaft

Camshaft and Camshaft Cap Wear Inspection

- Using a strip of commercially available plastigage [A], measure the clearance.

NOTE

- *Tighten the camshaft cap bolts to the specified torque.*

Torque - Camshaft Cap Bolts:

M8 mm: 25 N·m (2.5 kgf·m, 18 ft·lb)

M6 mm: 12 N·m (1.2 kgf·m, 104 in·lb)

NOTE

- *Do not turn the camshaft during the measurement.*

Camshaft Journal/Camshaft Cap Clearance

Standard: 0.048 ~ 0.091 mm (0.0019 ~ 0.0036 in.)

Service Limit: 0.18 mm (0.007 in.)

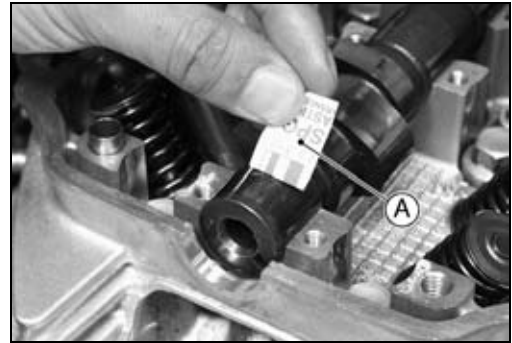
- ★ If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

Camshaft Journal Diameter

Standard: 24.930 ~ 24.952 mm (0.9815 ~ 0.9824 in.)

Service Limit: 24.90 mm (0.980 in.)

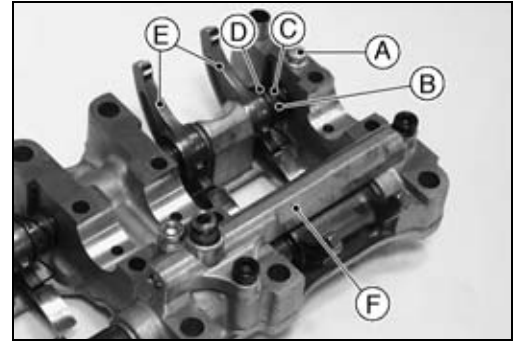
- ★ If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.
- ★ If the clearance still remains out of the limit, replace the cylinder head unit.



Rocker Arm and Rocker Shaft

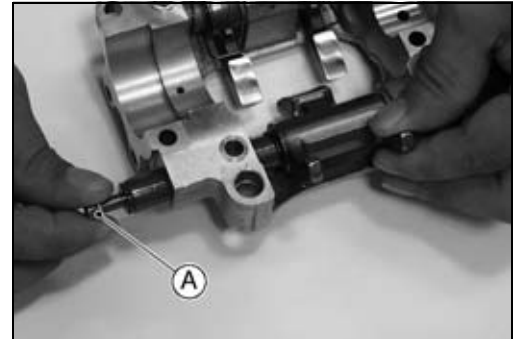
Rocker Arm and Rocker Shaft Removal

- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Camshaft Cap (see Camshaft Removal)
- Remove the rocker shaft bolt [A], and remove the rocker shaft [B], spring [C], washer [D], and rocker arm [E].
- From the inlet side of the #1 cylinder, first remove the oil fitting bracket [F]. Then, remove the rocker shaft bolt, rocker shaft, spring, washer, and rocker arm.



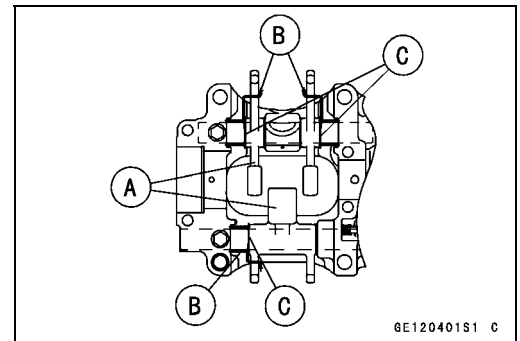
NOTE

- Mark and record the rocker shafts and the rocker arms so that they can be reinstalled in their original positions. If the rocker shaft does not pull out easily, pull it out by tightening the removed rocker shaft bolt [A] into the shaft.



Rocker Arm and Rocker Shaft Installation

- Blow through the oil passages of the rocker arm, rocker shaft, camshaft cap, and the oil fitting bracket with compressed air.
- Apply molybdenum disulfide oil to the sliding surfaces of the rocker arm and the rocker shaft.
- Install the rocker arm [A], washer [C], and spring [B], and insert the rocker shaft.
- Apply a non-permanent locking agent to the bolt threads, and tighten the bolt.

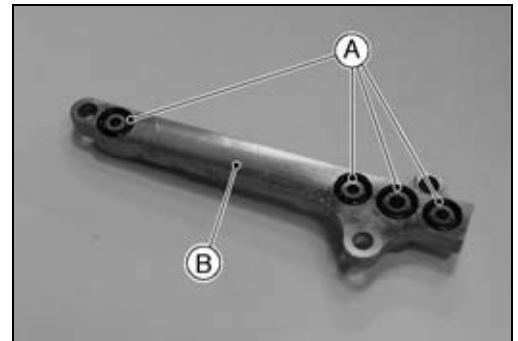


Torque - Rocker Shaft Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

- Make sure that the O-rings [A] are installed in the specified position and install the oil fitting bracket [B].
- Apply a non-permanent locking agent to the bolt threads, and tighten the bolts.

Torque - Oil Fitting Bracket Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

- Install the camshaft cap (see Camshaft Installation).



4-22 ENGINE TOP END

Cylinder Head

Cylinder Compression measurement

- Warm up the engine thoroughly, and stop the engine.
- Remove:
 - Fuel Tank (see Fuel System chapter)
 - Spark Plugs (see Electrical System chapter)
- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole to prevent compression leaks.
- With the throttle fully open, use the kick starter or the starter motor to turn the engine over to read the highest reading on the compression gauge.



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

NOTE

- To obtain a measurement using the kick starter, firmly kick it five times consecutively.
- To obtain a measurement using the starter motor, use a battery that is fully charged.

Cylinder Compression

Usable Range: 785 ~ 1 230 kPa (8.0 ~ 12.5 kgf/cm², 114 ~ 178 psi) @5 kicks (kick starter)

825 ~ 1 280 kPa (8.4 ~ 13.0 kgf/cm², 119 ~ 185 psi) @410 rpm (starter motor)

- Repeat the measurement for the other cylinder.
- ★ If the cylinder compression is out of the usable range, take an appropriate action, using the table below as a reference.
- Install the spark plugs.

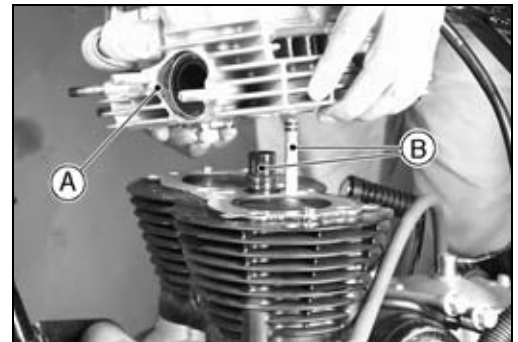
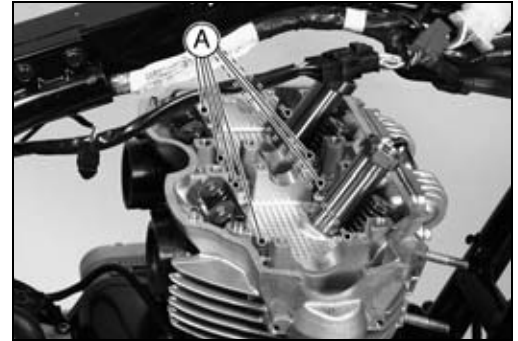
Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 113 in·lb)

Problem	Symptom	Action
The cylinder compression is higher than the usable range.	Carbon accumulation on the pistons and in the cylinder head (combustion chamber) possibly due to damaged valve stem oil seal or piston oil ring.	Remove the carbon deposits and replace the damaged parts if necessary.
	Incorrect cylinder head gasket thickness.	Replace the gasket with a standard part.
The cylinder compression is lower than the usable range.	Exhaust gas leakage around the cylinder head.	Replace the damaged gasket and check cylinder head warp.
	Bad condition of valve seating.	Repair if possible.
	Valve clearance is too small.	Adjust the valve clearance.
	The piston/cylinder clearance is too large.	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and piston and repair or replace them as necessary.
	Bad condition of the piston ring and/or piston ring grooves.	Replace the piston and/or the piston rings.

Cylinder Head

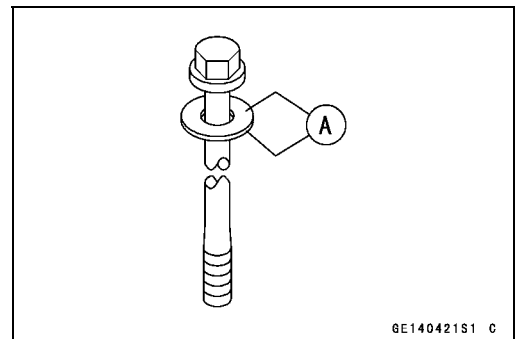
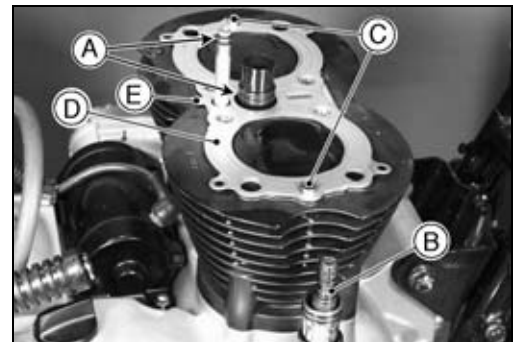
Cylinder Head Removal

- Remove:
 - Fuel Tank (see Fuel System chapter)
 - Carburetors (see Fuel System chapter)
 - Mufflers (see Muffler Removal)
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Camshaft (see Camshaft Removal)
- Remove the cylinder head bolts [A].
- To remove the inner four cylinder head bolts, alternately tilt the cylinder head sideways, removing two bolts at a time.
- Slightly raise the cylinder head [A] to remove it.
- Clear the tips of the two oil pipes [B].



Cylinder Head Installation

- Make sure that the O-rings [A] of the oil pipes are not damaged, and apply high-temperature grease to them.
- Verify that the oil pipes are installed properly.
- Verify that the spring [B] is attached to the bevel gear drive shaft.
- Install the knock pins [C] and a new gasket [D].
- Install the gasket with its "1" mark [E] facing up.
- Apply molybdenum disulfide oil to both surfaces [A] of the washers for the cylinder head bolts and engine oil to the cylinder head bolts.



4-24 ENGINE TOP END

Cylinder Head

- Insert the four inner cylinder head bolts [A] before fitting the cylinder head to the drive shaft and the oil pipes.



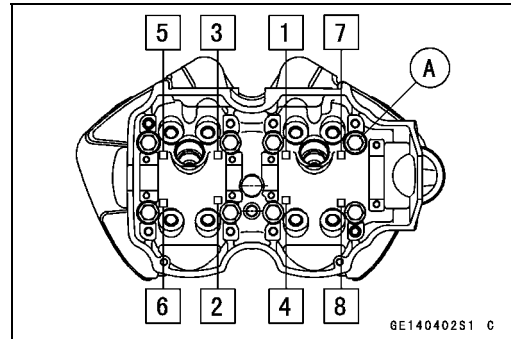
- Tighten the cylinder head bolts [A] to their temporary torque value in the sequence indicated by the raised lettering.

Temporary Torque- Cylinder Head Bolts:
25 N·m (2.5 kgf·m, 18 ft·lb)

- Tighten the cylinder head bolts to their final torque value in the sequence indicated by the raised lettering.

Final Torque- Unused Cylinder Head Bolts:
49.0 N·m (5.0 kgf·m, 36 ft·lb)

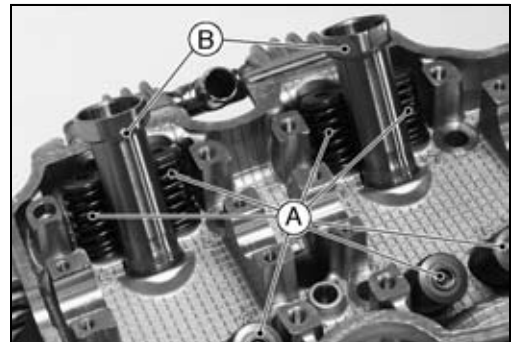
Reused Cylinder Head Bolts:
47.0 N·m (4.8 kgf·m, 35 ft·lb)



- Install:
 - Camshaft (see Camshaft Installation)
 - Cylinder Head Cover (see Cylinder Head Cover Installation)
 - Mufflers (see Muffler Installation)
 - Carburetors (See Fuel System chapter)
 - Fuel Tank (see Fuel System chapter)
- Start the engine and adjust the bevel gear sound as necessary.

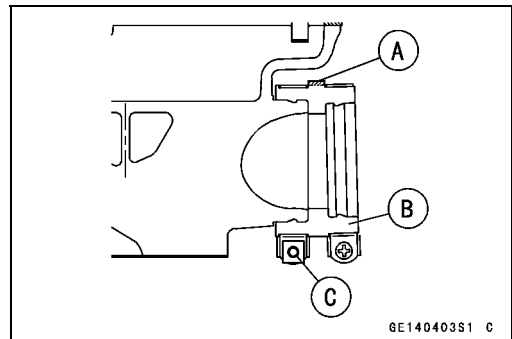
Cylinder Head Disassembly

- Remove:
 - Camshaft Valves [A] (see Valve Removal)
 - Spark Plug Hole Pipes [B]
 - Camshaft Side Drive Bevel Gear Case Unit (see Drive Bevel Gear Case Unit Removal)
 - Carburetor Holders
 - Air Suction Valve Covers (see Air Suction Valve Assembly Removal)



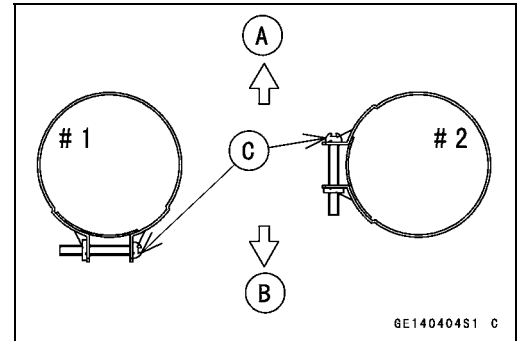
Cylinder Head Assembly

- Install the clamps [C], and install the cap holders [B] on the cylinder head, with the protrusion [A] facing upward.



Cylinder Head

- The clamp tightening positions are as shown.
 - Cylinder Head Cover Side [A]
 - Cylinder Side [B]
 - Clamp Bolt Heads [C]



- Apply a non-permanent locking agent to the spark plug hole pipes, and tighten them.

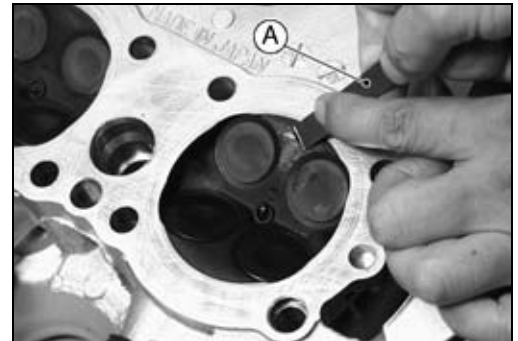
Torque - Spark Plug Hole Pipes: 118 N·m (12 kgf·m, 87 ft·lb)

- Apply a non-permanent locking agent to the air suction valve cover bolts, and tighten them.

Torque - Air Suction Valve Cover Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

Cylinder Head Cleaning

- Remove the cylinder head (see Cylinder Head Removal).
- Disassemble the cylinder head (see Cylinder Head Disassembly).
- Scrape the carbon out of the combustion chamber and exhaust port with a scraper [A] or a suitable tool.
- Using high-flash point solvent, clean the cylinder head.
- Assemble the cylinder head (see Cylinder Head Assembly).

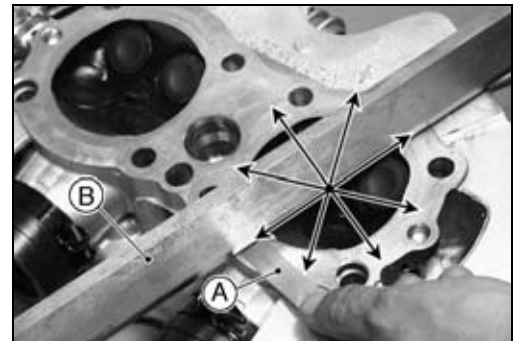


Cylinder Head Warp Inspection

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

Cylinder Head Warp

Standard: 0.05 mm (0.002 in.)



- ★ If the cylinder head is warped more than the service limit, repair the mating surface.
- Replace the cylinder head if the mating surface is badly damaged.

4-26 ENGINE TOP END

Valve

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:
 - Camshaft Cap (see Camshaft Removal)
 - Camshaft (see Camshaft Removal)
 - Cylinder Head (see Cylinder Head Removal)
- Remove the shims from the valves.

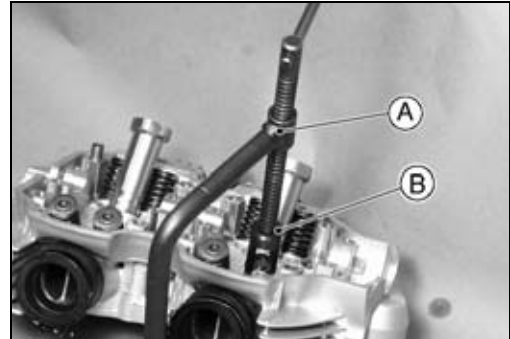
NOTE

○ Mark and record the locations of the shims so that they can be installed in their original positions.

- Using the special tool, remove the valves.

Special Tools - Valve Spring Compressor Set: 57001-241 [A]

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



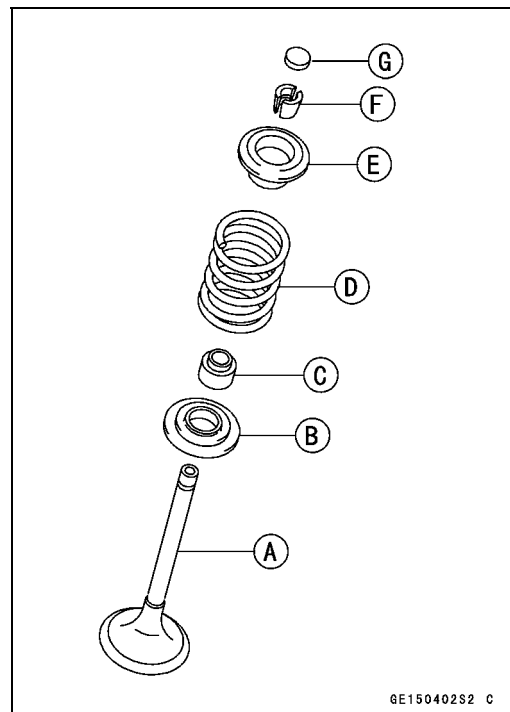
Valve Installation

- Replace the oil seal [C] with a new part.
- Apply molybdenum disulfide grease to the valve stem [A] before installing the valve.
- Check to make sure that the valve moves up and down smoothly.
- Check to make sure that the valve and the valve seat are making proper contact.
- Install the valve spring [D] so that the closed coil end faces the spring seat [B].
- Compress the valve spring to install the split keepers [F] in order to secure the spring retainer [E] in place.

Special Tools - Valve Spring Compressor Set: 57001-241

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

- The shim [G] must be installed with its thickness indication facing the retainer.
- Install the shims in their original positions as recorded.
- Apply engine oil to the shims.



GE150402S2 C

Valve

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).

CAUTION

Do not heat the cylinder head with a torch, as this will warp the head. Instead, soak the head in oil, and heat the oil.

- Use the valve guide arbor [A] to hammer out the guide.
- Special Tool - Valve Guide Arbor, $\phi 4.5$: 57001-1331**



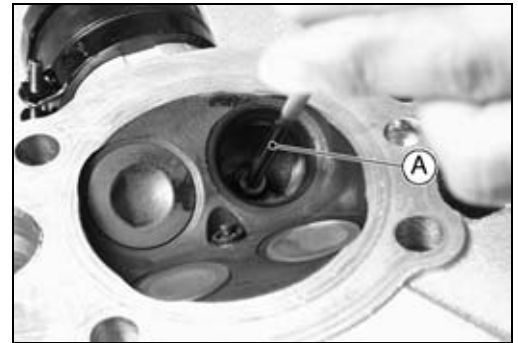
Valve Guide Installation

- Apply a thin coat of oil to the outer surface of the valve guide.
- Heat the area around the valve guide hole to 120 ~ 150° C (248 ~ 302°F).

CAUTION

Do not heat the cylinder head with a torch, as this will warp the head. Instead, soak the head in oil, and heat the oil.

- Using the valve guide arbor, drive the valve guide in until its snap ring comes in contact with the head surface.
- Special Tool - Valve Guide Arbor, $\phi 4.5$: 57001-1331**
- Ream the valve guide bore with the valve guide reamer [A], even if the old guide is being reused.
- Special Tool - Valve Guide Reamer, $\phi 4.5$: 57001-1333**



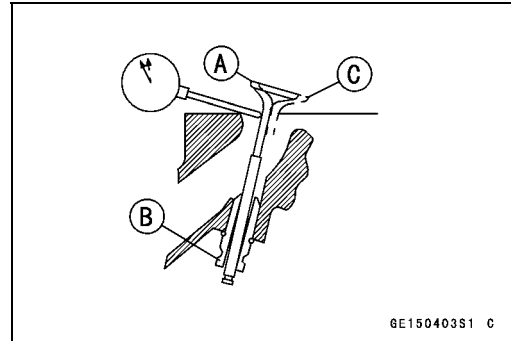
4-28 ENGINE TOP END

Valve

Valve/Valve Guide Clearance Measurement (Wobble Method)

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve/valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge perpendicular against the stem, as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure the valve wobble.
- Repeat the measurement in a direction at a 90° angle to the first measurement.



Valve/Valve Guide Clearance Measurement-Wobble Method

Standard:

Inlet 0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)

Exhaust 0.09 ~ 0.17 mm (0.0035~0.0067 in.)

Service Limit:

Inlet 0.32 mm (0.013 in.)

Exhaust 0.38 mm (0.015 in.)

- ★ If the wobble reading exceeds the service limit, replace the valve guide.

NOTE

- The wobble measurement is greater than the actual valve/valve guide clearance because the measurement is taken outside of the guide.

Valve Seat Inspection

- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].
- Measure the outside diameter [D] of the seating pattern on the valve seat.

Valve Seating Surface outside Diameter

Inlet: 28.4 ~ 28.6 mm (1.118 ~ 1.126 in.)

Exhaust: 24.4 ~ 24.6 mm (0.961 ~ 0.969 in.)

- ★ If the diameter is too large or too small, repair the seat.
- Check the seating surface width of the valve seat.
- Measure the seat width [E] (the white, shiny portion where there is no carbon build-up) of the valve seat with a vernier caliper.

Valve Seating Surface Width

Standard: 0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)

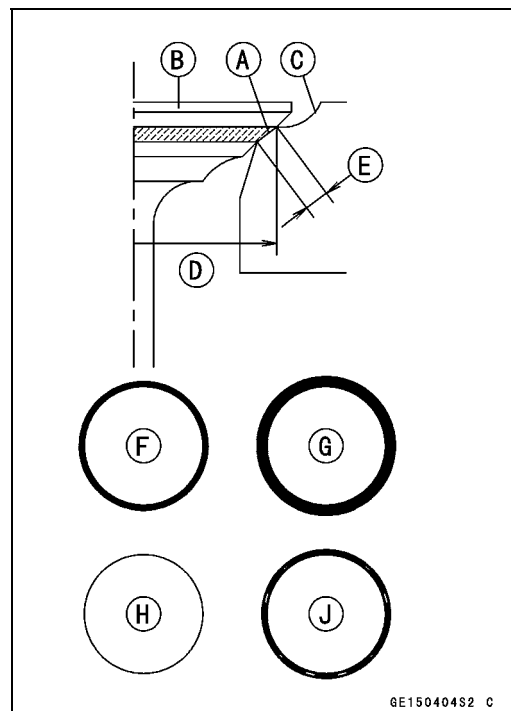
Good [F]

Too Wide [G]

Too Narrow [H]

Uneven [J]

- ★ If the seating surface width of the valve seat is out of standard, repair the seat.



Valve

Valve Seat Repair

- For instructions on how to use the valve seat cutter [A], follow the operation manual provided by the tool manufacturer.

Special Tools - Valve Seat Cutter Holder, $\phi 4.5$: 57001-1330 [B]

Valve Seat Cutter Holder Bar: 57001-1128 [C]

Inlet: Valve Seat Cutter, 45° - $\phi 30$: 57001-1187 (or 1115)

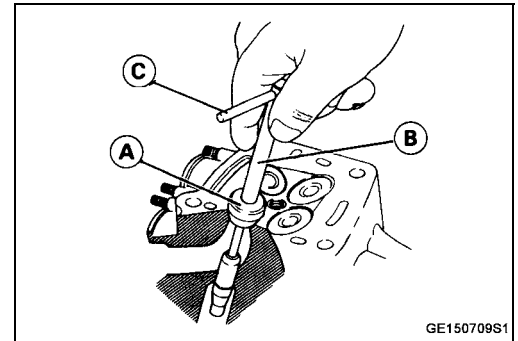
Valve Seat Cutter, 60° - $\phi 33$: 57001-1334

Valve Seat Cutter, 32° - $\phi 33$: 57001-1199

Exhaust: Valve Seat Cutter, 45° - $\phi 27.5$: 57001-1114 (or 1115)

Valve Seat Cutter, 32° - $\phi 28$: 57001-1119 (or 1120)

Valve Seat Cutter, 60° - $\phi 25$: 57001-1328 (or 1123)



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

Seat Cutter Operation Care

- This valve seat cutter has been designed only for grinding the valve for repair, and it must not be used for purposes other than seat repair.
- Do not drop or apply shock to the valve seat cutter, as this could cause the diamond particles to fall off.
- Make sure to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with cleaning solvent.

CAUTION

Do not use a wire brush to remove the metal particles from the cutter, as this will remove the diamond particles.

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

NOTE

- Prior to grinding, apply engine oil to the cutter, and during the operation, wash off any ground particles sticking to the cutter with cleaning solvent.
- After use, wash the cutter with high-flash point solvent, and apply a thin layer of engine oil.

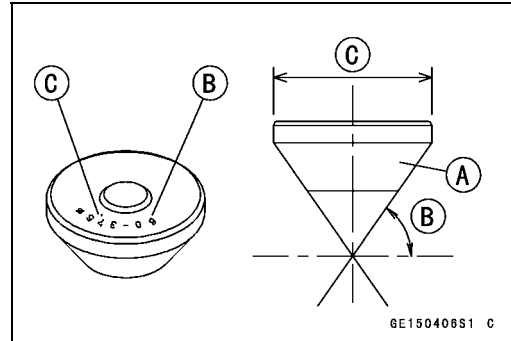
4-30 ENGINE TOP END

Valve

Marks Stamped on the Cutter

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

- 60° Cutter angle [B]
37.5φ Cutter diameter [C]



Repair Operation Procedure

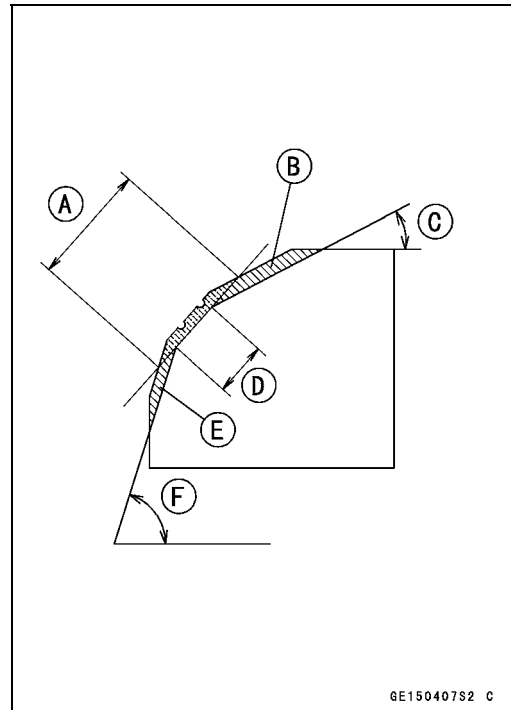
- Carefully clean the seat area.
- Coat the seat with machinist's dye.
- Place a 45° cutter on the holder and insert it into the valve guide.
- Lightly press down on the handle and turn it right and left. Grind the seating surface until it is smooth.

CAUTION

Do not grind the seat too much. Overgrinding will reduce the valve clearance and cause the valve to be recessed into the head. If the valve is recessed too far into the head, it will be impossible to adjust the clearance, and it will be necessary to replace the cylinder head.

Grind the seat at a 45° angle to enlarge the width of the seating surface [A].

- 32° cut [B]
32° [C]
Specified seating surface width [D]
60° cut [E]
60° [F]



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

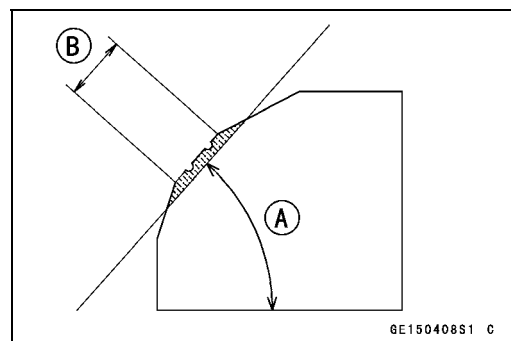
Seating surface before repair [B]

NOTE

- If the 45° seat surface has cuts or pin holes, it must be ground until it is smooth.

After grinding, apply machinist's dye on the 45° seat surface. This will clearly show the 45° pattern line when the 32° and 60° surfaces are ground later.

If the valve guide has been replaced, make sure to grind first with a 45° cutter to ensure the concentricity of the seating surface and the sealing performance.



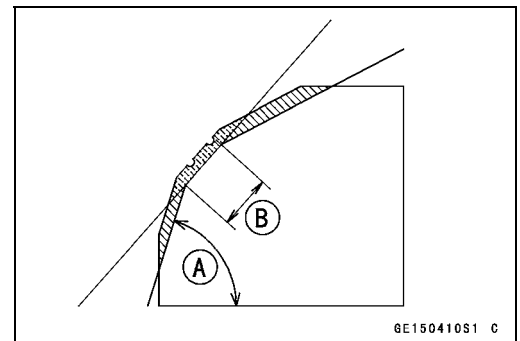
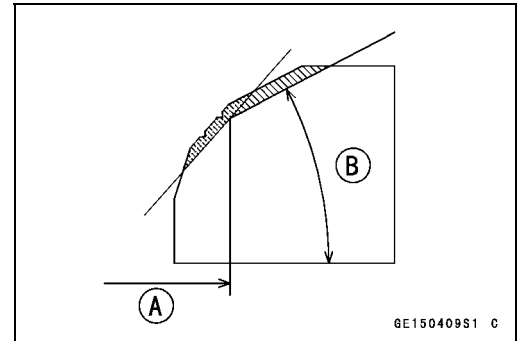
Valve

- ★ If the diameter of the seating surface is too large, make a 32° cut as described below.
- Grind the seat at a 32° [B] angle until the seating outside diameter is within the specified range [A].
- To make the 32° cut, attach a 32° cutter to the holder and insert it into the valve guide.
- Push the holder down very lightly and make one complete turn. Inspect the seating outside diameter after making each complete turn.

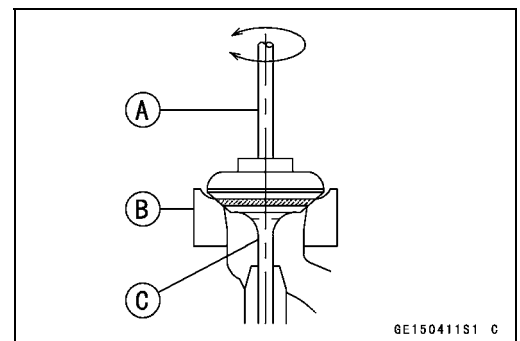
CAUTION

The 32° cutter removes material very quickly. To prevent overgrinding, check the seating outside diameter frequently.

- After making the 32° cut, return to the seating outside diameter measurement step.
- To measure the seating surface width, measure the width of the 45° angle portion of the seat at several places around the seat.
- ★ If the seating surface width is too narrow, repeat the 45° grind until the seat is only slightly wider, and then return to the seating outside diameter measurement step.
- ★ If the seating surface width [B] is too wide, make a 60° cut as described below.
- Grind the seat at a 60° [A] angle until the seat width is within the specified range.
- To make the 60° cut, use a 60° cutter and lightly push the holder to grind the seat surface.
- After making the 60° cut, return to the seating surface width measurement step.



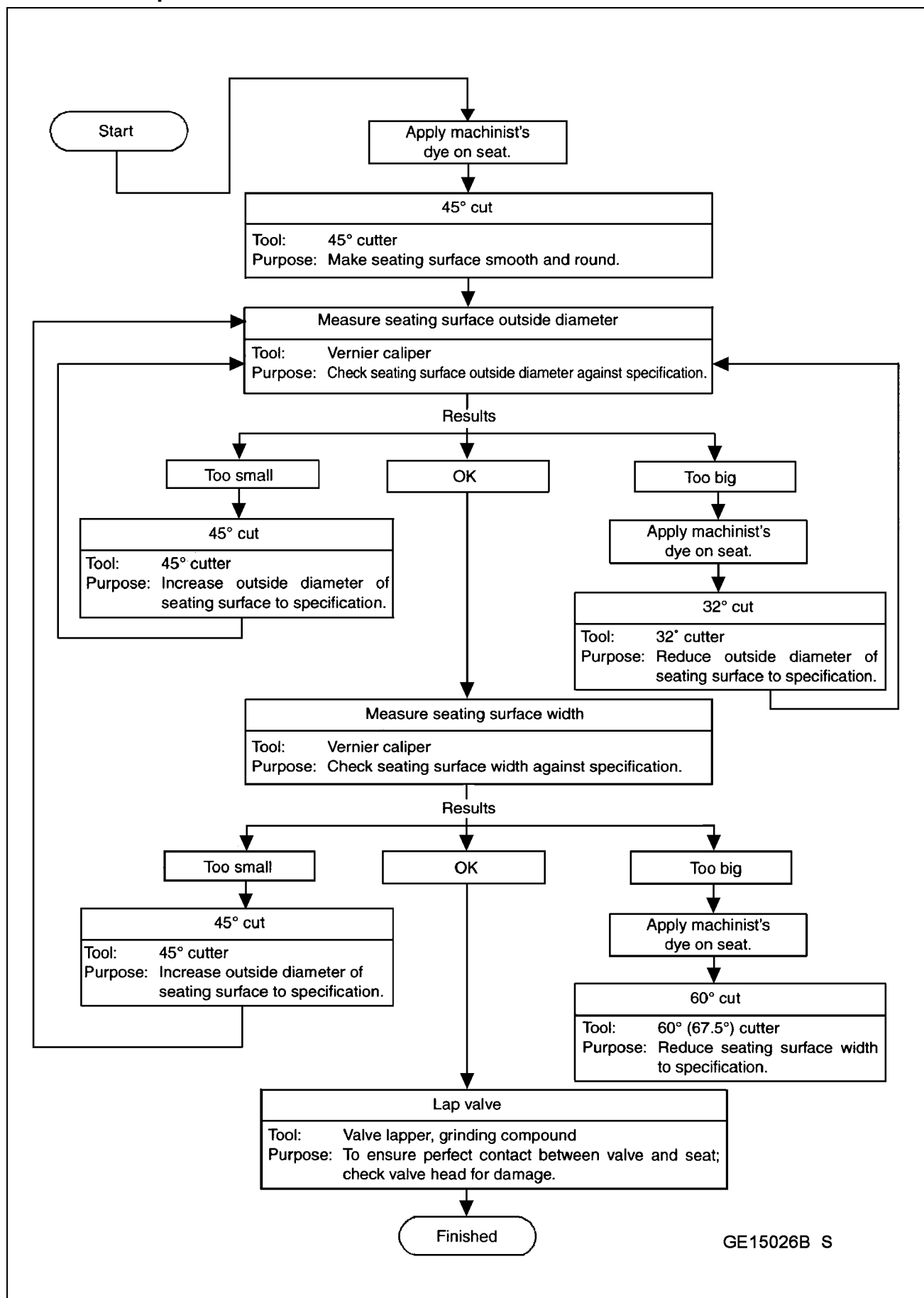
- Once the seating surface width and the diameter are within the specified ranges, use the lapper [A] to lap the valve [C] against the seat [B].
- Put a slightly coarse grinding compound on the face of the valve in several places around the valve head.
- Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
- Repeat this process with a fine grinding compound.
- Bring the seating surface to approximately the middle of the valve surface.
- ★ If the seating surface is not created in the proper area of the valve, make sure that the valve is the correct part and that it is not deformed. If it is the correct part, the valve may have been ground excessively, and it must be replaced.
- Be sure to remove all grinding compound before assembly.



4-32 ENGINE TOP END

Valve

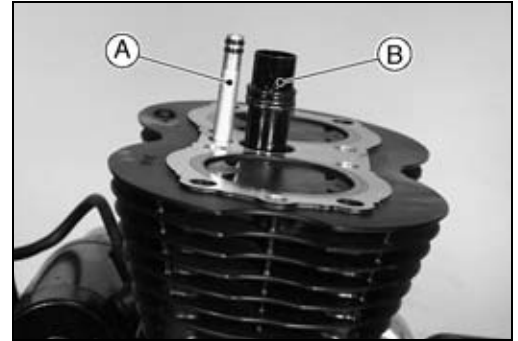
Valve Seat Repair



Cylinders and Pistons

Cylinder Removal

- Remove:
 - Cylinder Head (see Cylinder Head Removal)
 - Pressure Oil Pipe [A]
 - Return Oil Pipe [B]
- Tap lightly with a plastic mallet to separate the cylinder.
- Remove the cylinder base gasket.



Piston Removal

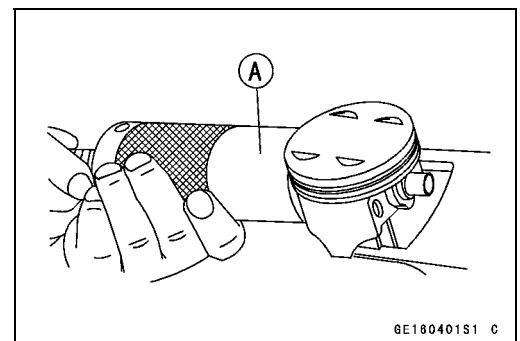
- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the piston and remove the piston snap ring [A] from one end of the piston pin.

CAUTION

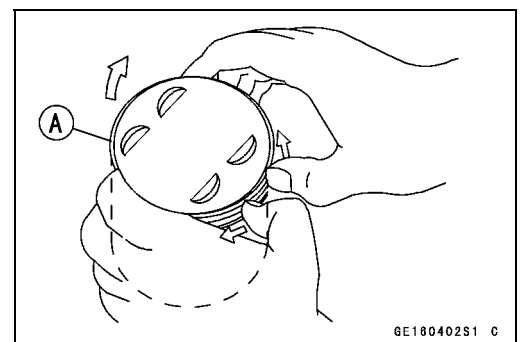
Do not reuse the snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.



- Using a piston pin puller, remove the piston pin.
 - Special Tool - Piston Pin Puller Assembly: 57001-910 [A]**
- Remove the piston.



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

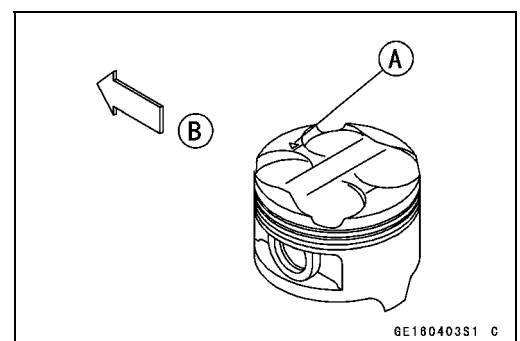


Cylinder and Piston Installation

NOTE

○ If a new piston or cylinder is used, check the piston to cylinder clearance (see Piston/Cylinder Clearance), and use new piston rings.

- Apply molybdenum disulfide oil to the inside wall of the small end of the connecting rod.
- Face the triangular mark [A] on the top of the piston to the front of the engine [B].



4-34 ENGINE TOP END

Cylinders and Pistons

- Install a new snap ring on the piston making sure that the ring end gap [A] does not line up with the slit [B] in the piston pin hole.

CAUTION

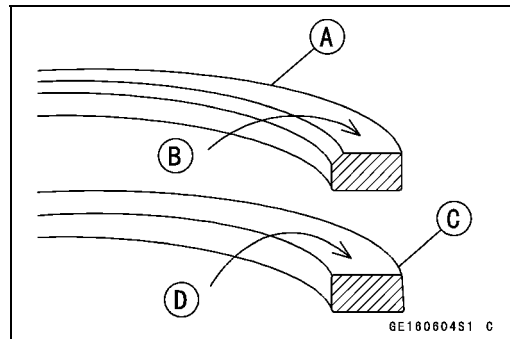
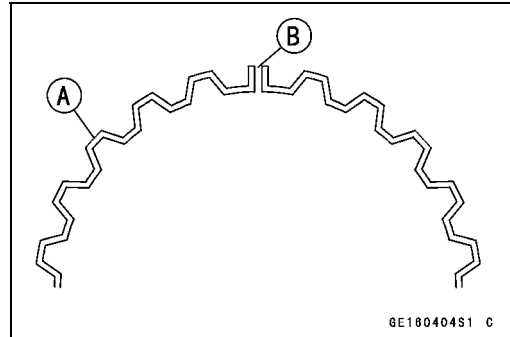
Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.



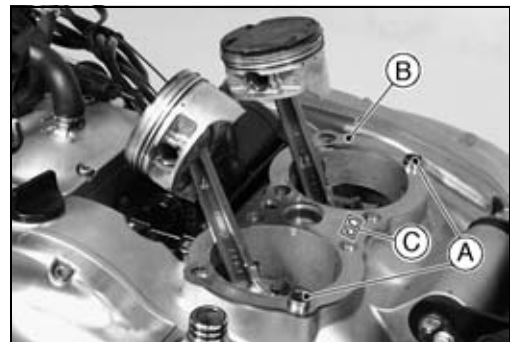
NOTE

○ The oil ring steel rails have no "top" or "bottom".

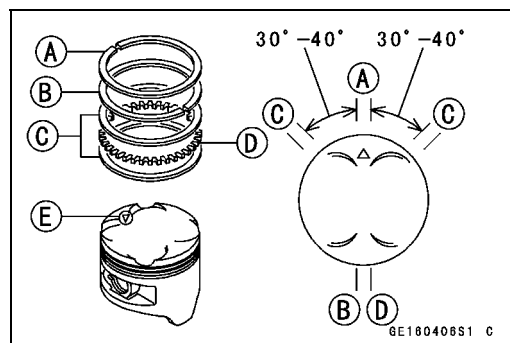
- Install the oil ring expander [A] in the piston ring groove so the ends [B] butt together.
 - Install the oil ring steel rails, one above the expander and one below it.
 - Spread the rail with your thumbs to fit the rail in the piston ring groove.
-
- Install the second ring [C] so that the "RN" mark [D] faces up, and install the top ring [A] so that the "R" mark [B] faces up.
 - Install the oil ring, second ring, and the top ring, in that order.



- Install:
 - Knock Pins [A]
- Install the new cylinder base gasket [B] with its "UP" mark [C] facing up.



- The piston ring ends must be positioned as shown.
 - Top Ring [A]
 - Second Ring [B]
 - Oil Ring Steel Rails [C]
 - Oil Ring Expander [D]
 - Triangular Mark [E]



Cylinders and Pistons

- Apply engine oil to the cylinder bore.
- Determine the position of the piston ring end.
- Insert the cylinder while compressing the piston rings with your fingers.
- Install the removed parts.

Cylinder Wear Inspection

- Take a side-to-side and a front-to-back cylinder inside diameter measurement at each of the three locations (total of six measurements), using the cylinder bore gauge as shown.

10 mm (0.4 in.) [A]

40 mm (1.6 in.) [B]

25 mm (1.0 in.) [C]

Cylinder Inside Diameter

Standard: 72.000 ~ 72.012 mm (2.8346 ~ 2.8351 in.) (less than 0.01 mm (0.0004 in.) difference between any two measurements)

Service Limit: 72.10 mm (2.839 in.) (less than 0.05 mm (0.002 in.) difference between any two measurements)

- ★ If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

Piston Wear Inspection

- Using a micrometer, measure the (front/back) diameter [A] of each piston 11 mm (0.43 in.) [B] up from the bottom of the piston.

Piston Diameter

Standard: 71.96 ~ 71.97 mm (2.8331 ~ 2.8335 in.)

Service Limit: 71.71 mm (2.823 in.)

- ★ If the piston's diameter is smaller than the service limit, replace the piston.

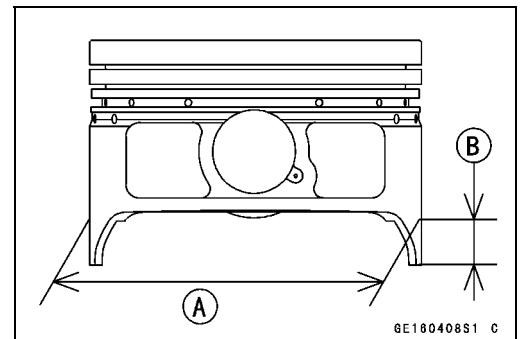
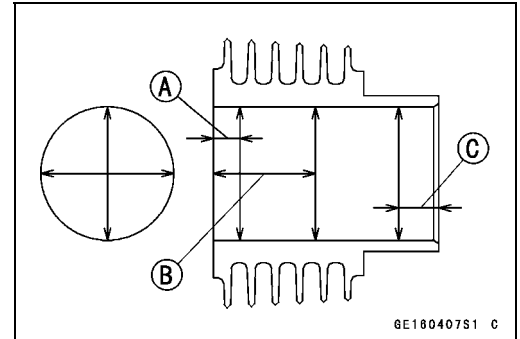
Piston/Cylinder Clearance Inspection

- Subtract the piston diameter from the cylinder bore to obtain the piston/cylinder clearance.

Piston/Cylinder Clearance

Standard: 0.030 ~ 0.052 mm (0.0012 ~ 0.0020 in.)

- ★ If the piston/cylinder clearance is less than the specified range, use a smaller piston or increase the cylinder bore by honing.
- ★ If the piston/cylinder clearance is greater than the specified range use a larger piston.
- ★ If only a piston is replaced, the clearance may exceed the standard slightly, but it must not be less than the minimum limit in order to avoid piston seizure.



4-36 ENGINE TOP END

Cylinders and Pistons

Piston Ring/Ring Groove Clearance inspection

- Visually inspect the piston rings and ring grooves.
- ★ If the piston rings or ring grooves are deformed or damaged, replace the piston and the piston rings.
- Place a piston ring in its groove, and using a thickness gauge [A], measure the piston ring/ring groove clearance at several locations.

Piston Ring/Ring Groove Clearance

Standard:

Top **0.05 ~ 0.09 mm (0.0020 ~ 0.0035 in.)**

Second **0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)**

Service Limit:

Top **0.19 mm (0.0075 in.)**

Second **0.17 mm (0.0067 in.)**

- ★ If the clearance exceeds the service limit, measure the piston ring thickness and the piston ring groove width to determine whether to replace the ring, the piston, or both.

Piston Ring Groove Wear Inspection

- Using a vernier caliper, measure the groove width at several locations around the piston.

Piston Ring Groove Width

Standard:

Top **1.04 ~ 1.06 mm (0.0409 ~ 0.0417 in.)**

Second **1.02 ~ 1.04 mm (0.0402 ~ 0.0409 in.)**

Oil **2.01 ~ 2.03 mm (0.0791 ~ 0.0799 in.)**

Service Limit:

Top **1.14 mm (0.045 in.)**

Second **1.12 mm (0.044 in.)**

Oil **2.11 mm (0.083 in.)**

- ★ If any of the groove widths is wider than the service limit, replace the piston.

Piston Ring Thickness Inspection

- Using a micrometer, measure the thickness at several locations around the ring.

Piston Ring Thickness-Top, Second

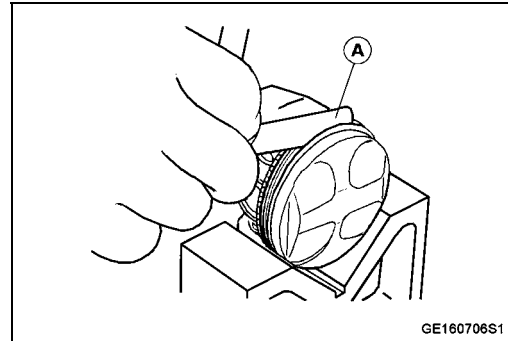
Standard: **0.97 ~ 0.99 mm (0.0381 ~ 0.0390 in.)**

Service Limit: **0.90 mm (0.035 in.)**

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

NOTE

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



Cylinders and Pistons

Piston Ring End Gap Measurement

- Place the piston ring [A] inside the cylinder, using the piston to locate the ring squarely in place. Place the piston ring close to the bottom of the cylinder, where cylinder wear is minimal.
- Using a thickness gauge, measure the gap [B] between the ends of the ring.

Piston Ring End Gap

Standard:

Top **0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)**

Second **0.40 ~ 0.55 mm (0.0157 ~ 0.0217 in.)**

Oil **0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)**

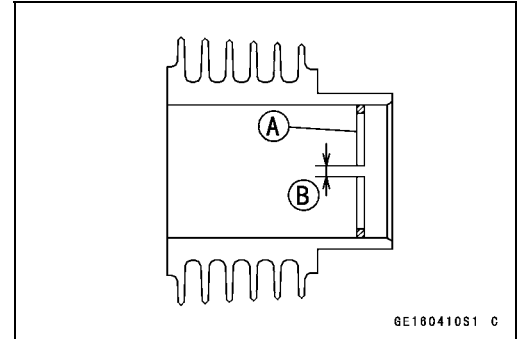
Service Limit:

Top **0.65 mm (0.026 in.)**

Second **0.85 mm (0.033 in.)**

Oil **1.0 mm (0.040 in.)**

- ★ If the ring end gap exceeds the service limit, replace the ring.



4-38 ENGINE TOP END

Bevel Gears (Hypoid Gears)

Bevel Gear Sound Adjustment

A bevel gear sound adjustment must be performed only by a properly trained service technician. The standard factory setting for adjusting the bevel gears is described on page 4-59. Ordinarily, the bevel gears do not require adjustments. However, in case the customer strongly requests a reduction in the whining sound when the engine is cold, it is possible to do so to a certain extent. When this is done, the gear lash sound increases after the engine has warmed up. This section explains how to change the factory setting upon the request of the customer.

Common Preparation for Both the Camshaft and Crankshaft Sides

- Mark [C] the hexagonal portion [A] of the gear case to align with the locknut stop screw hole [B]. (Although the right drawing shows the camshaft side, the crankshaft side is also similar.)

Locknut [D]

- Start the engine and warm it up thoroughly.

NOTE

○ Perform the gear adjustment when the oil temperature in the oil pan is at 80°C (176°F) (and the oil pan outside surface temperature is 73°C (163°F)).

⚠ WARNING

During adjustment, do not touch the exhaust pipe, which could be hot.

- Remove the locknut stop screw. While holding the gear case [A] with the wrench [B], use the hook wrench [C] to loosen the locknut [D].

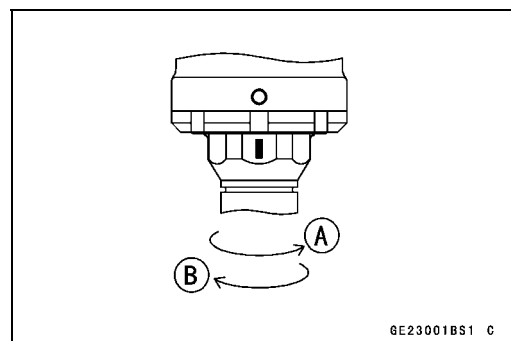
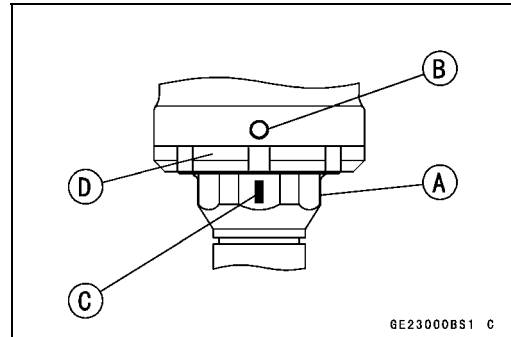
Camshaft Side Bevel Gear

- To eliminate the gear lash sound, turn the gear case in direction [A].
- ★ This increases the gear whining sound when the engine is cold.

CAUTION

When turning the gear case in direction [A], it must not be turned more than 70° from the locknut stop screw hole (factory standard setting), as doing so could damage the bevel gears.

- To eliminate the gear whining sound, turn the gear case slowly in direction [B].
- ★ This decreases the gear whining sound when the engine is cold.



Bevel Gears (Hypoid Gears)

Crankshaft Side Bevel Gear

- To eliminate the gear lash sound, turn the gear case in direction [C].
- ★ This increases the gear whining sound when the engine is cold.

CAUTION

When turning the gear case in direction [C], it must not be turned more than 20° from the locknut stop screw hole (factory standard setting), as doing so could damage the bevel gears.

- To eliminate the gear whining sound, turn the gear case slowly in direction [D].
- ★ This decreases the gear whining sound when the engine is cold.

After the adjustment

- Hold the gear case with a wrench, and tighten the locknut to the specified torque.

Torque - Bevel Gear Case Locknut: 20 N·m (2.0 kgf·m, 14 ft·lb)

- Apply a non-permanent locking agent to the threads of the locknut stop screw. Tighten the stop screw until its tip comes in contact with the locknut; then, tighten it an additional half turn.

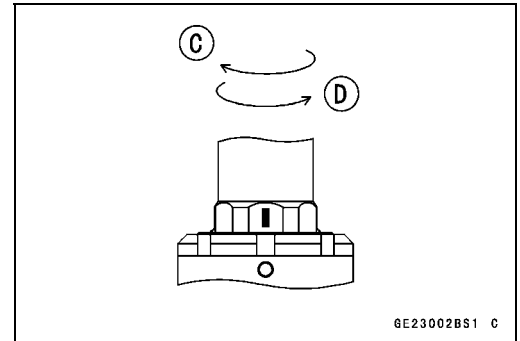
NOTE

○ If the tip of the used stop screw is rounded, or if the stop screw is to be tightened to the same position of the locknut that exhibits the traces of a previously tightened screw, tightening the stop screw an additional half turn could be excessive.

- Stop the engine, and after the engine has cooled sufficiently, check the gear sound.

Camshaft Side Driven Bevel Gear Removal

- Remove:
Camshaft (see Camshaft Removal)
- Wrap a cloth [B] around the cam portion of the camshaft [A]. Then, holding it on a vise with aluminum plates [C] placed in between, remove the bevel gear holder bolts [D].
- Remove:
Bevel Gear Holder



4-40 ENGINE TOP END

Bevel Gears (Hypoid Gears)

- Remove:
Pin [A]

NOTE

○ Make sure to mark [B] the hole into which the pin is inserted to ensure the proper cam timing when reusing the removed driven bevel gear.

- Remove:
Camshaft Side Driven Bevel Gear [C]
Shim(s) [D]

NOTE

○ After removing the shim(s), measure their thicknesses with a micrometer and record the results.

Camshaft Side Driven Bevel Gear Installation

- Wrap a cloth around the cam portion of the camshaft. Then, hold it on a vise with aluminum plates placed in between.
- Install:
Removed Shim(s)
Driven Bevel Gear
- Insert the pin into the hole that was marked during removal.
- Attach a bevel gear holder.
- Apply a non-permanent locking agent to the bolts and tighten them.

Torque - Driven Bevel Gear Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)

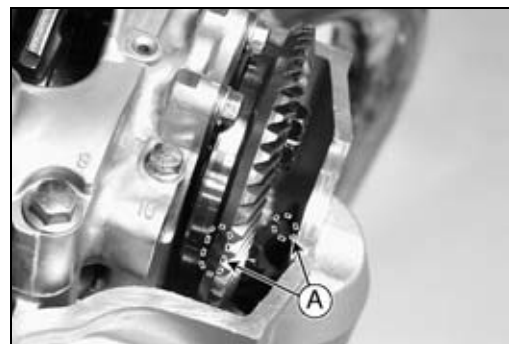
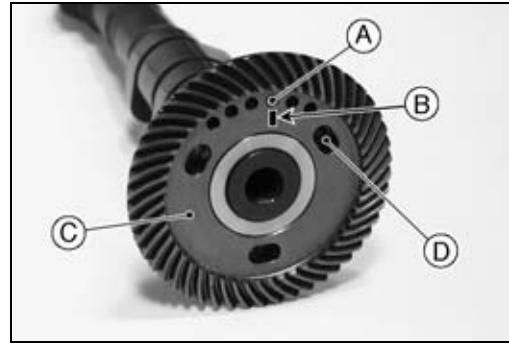
- Install the camshaft on the cylinder head (see Camshaft Installation).

Camshaft Side Driven Bevel Gear Replacement

CAUTION

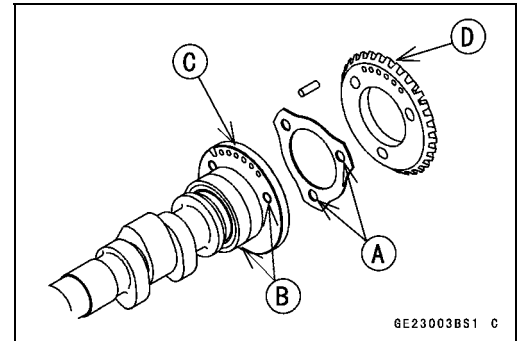
To ensure optimal tooth contact, the camshaft side drive and driven bevel gears are machine-lapped together. To replace the gears, they must be replaced as a set. The two gears are marked [A] with matching numbers.

- Remove:
Camshaft (see Camshaft Removal)
- Replace the drive bevel gear (see Drive/Driven Bevel Gear Case Unit Disassembly).
- Remove the driven bevel gear from the camshaft (see Camshaft Side Driven Bevel Gear Removal).



Bevel Gears (Hypoid Gears)

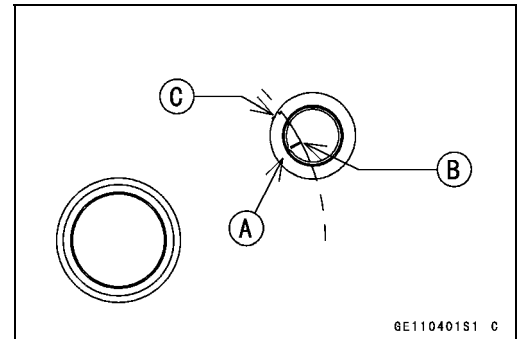
- Install a shim(s) that is 0.15 mm (0.006 in.) thinner than the old shim(s) on the camshaft.
- Align the shim holes [A] with the bevel gear holder bolt holes [B].
- Approximately align the six holes [C] of the bevel gear holder with the six holes [D] of the driven bevel gear, and install the driven bevel gear.



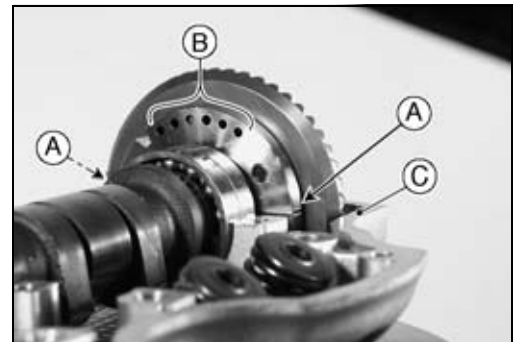
- Bring the piston to the TDC.
Timing Notch [A]
TDC Mark [B]
Ignition Mark [C]

NOTE

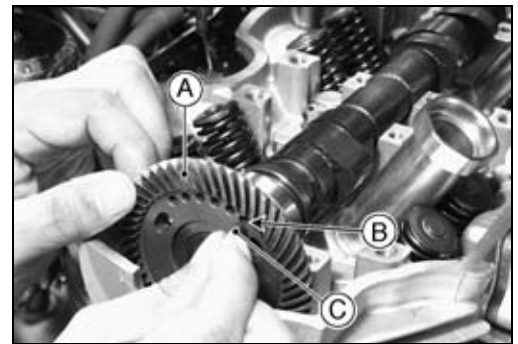
○ Install the removed parts so that the camshaft side drive bevel gear rotates in unison with the crankshaft.



- With the six holes [B] facing up, mesh the driven gear and the drive gear (so that the right and left timing marks [A] on the side of the bevel gear holder is parallel with the outer surface [C] of the cylinder head) and install the camshaft on the cylinder head.



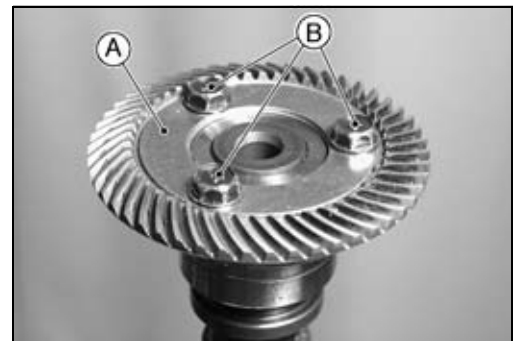
- At this time, one of the six holes of the bevel gear holder [A] and one [B] of the six holes of the driven bevel gear should align perfectly [C]. Insert the pin into the perfectly aligned holes.
- Remove the camshaft from the cylinder head without removing the pin or the driven bevel gear.



- Install the bevel gear holder [A], and tighten the bevel gear bolts [B].

Torque - Driven Bevel Gear Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)

- Check the camshaft timing.
- Adjust the tooth contact of the camshaft side bevel gear (see Bevel Gear Tooth Contact Adjustment).

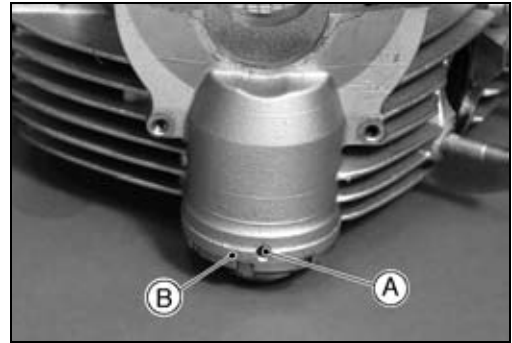


4-42 ENGINE TOP END

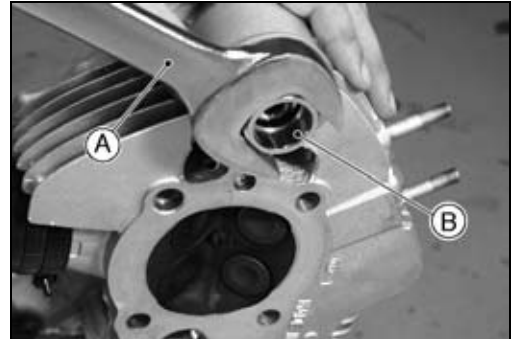
Bevel Gears (Hypoid Gears)

Camshaft Side Drive Bevel Gear Case Unit Removal

- Remove:
 - Cylinder Head Assembly (see Cylinder Head Removal)
 - Locknut Stop Screw [A]
 - Bevel Gear Case Locknut [B]

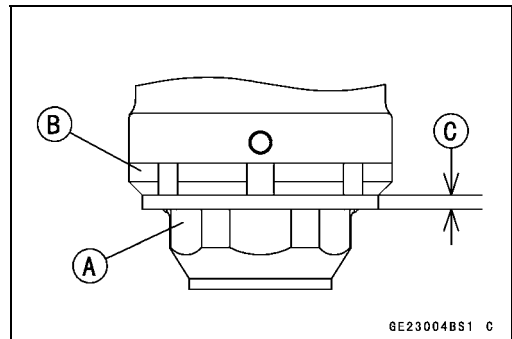


- Using the wrench [A], remove the camshaft side drive bevel gear case unit [B].



Camshaft Side Drive Bevel Gear Case Unit Installation

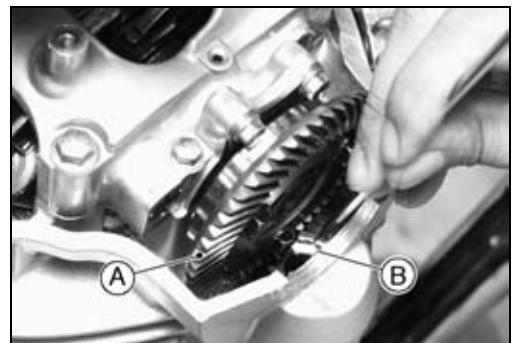
- Tighten the drive bevel gear case unit [A] onto the cylinder head at the position shown.
 - Bevel Gear Case Locknut [B]
 - Approximately 1.5 mm (0.06 in.) [C]
- Install:
 - Cylinder Head (see Cylinder Head Installation)
 - Camshaft (see Camshaft Installation)
 - Camshaft Cap (see Camshaft Installation)



- Tighten the drive bevel gear case until the gear backlash is 0 mm (0 in.).
- Tighten the locknut to the specified torque to adjust the backlash.
- Push one of the gears with the screwdriver. A backlash of 0 mm (0 in.) is reached when there is no play.

NOTE

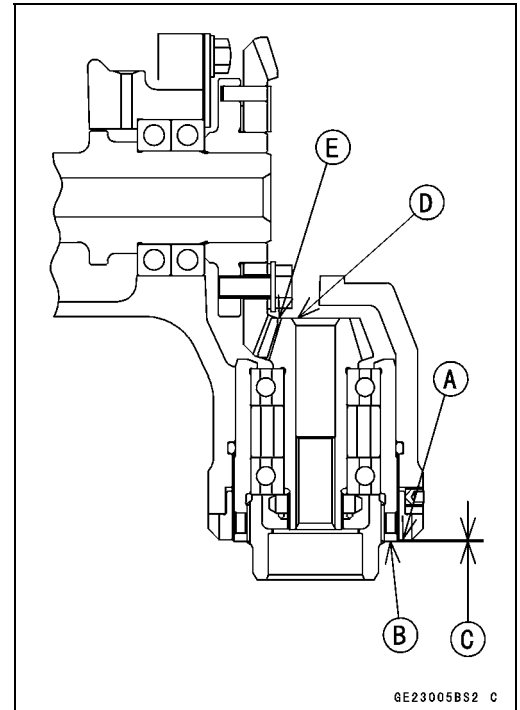
- A backlash or a gear lash is the amount of relative movement [B] of a given gear, with the other gear remaining stationary [A].



Torque - Bevel Gear Case Locknut: 20 N·m (2.0 kgf·m, 14 ft·lb)

Bevel Gears (Hypoid Gears)

- Make sure that the bottom surface [A] of the lock nut is (approximately 0.5 mm (0.02 in.)) higher than [C] the outer surface [B] of the bearing housing.
- Make sure that the cross section [D] of the drive bevel gear and the teeth cross section [E] of the driven bevel gear are practically on the same plane.
- ★ If it is not as illustrated, the gear backlash could be improperly adjusted or the tooth contact could be improper.
- Apply molybdenum disulfide grease on all the tooth flanks of the driven bevel gear.
- Install the removed parts and adjust the bevel gears.



Drive/Driven Bevel Gear Case Unit Disassembly

- Remove the drive/driven bevel gear case units.

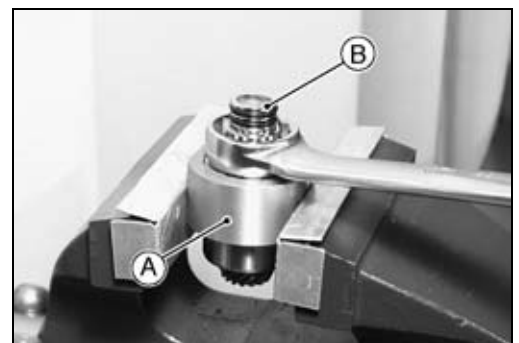
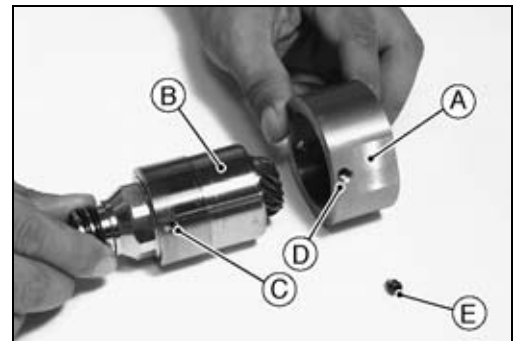
NOTE

○ The construction of the camshaft side drive bevel gear case unit is the same as that of the crankshaft side driven bevel gear case unit.

- Install the bearing housing jig [A] on the case unit [B].
- Align the hole [C] of the case unit with the hole [D] of the bearing housing.
- Tighten the stop screw [E].

Special Tool - Bearing Housing Jig: 57001-1419

- Place the bearing housing jig [A] on a vise with the gear case vertical.
- Remove the gear case [B].



4-44 ENGINE TOP END

Bevel Gears (Hypoid Gears)

- Insert the bevel gear holder [A] into the bevel gear splines.

Special Tool - Bevel Gear Holder: 57001-1422



- Place the bevel gear holder on a vise.
- Using the socket wrench [B], loosen the bevel gear nut [A].

Special Tool - Socket Wrench: 57001-1420

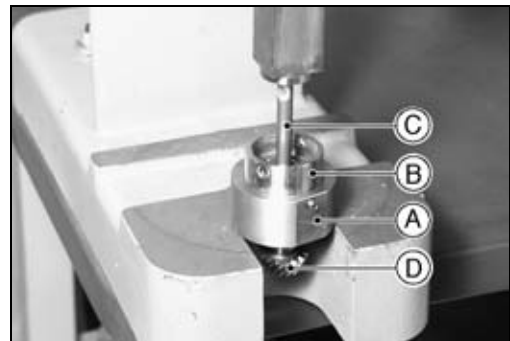


- Install the bearing housing jig [A] on the bearing housing [B].
- Insert the bevel gear drive bit [C] into the bevel gear splines.

Special Tool - Bevel Gear Drive Bit: 57001-1421

- Using a press, remove the bevel gear [D] from the bearing housing.
- Using a press, remove the bearing and the outer collar from the bearing housing.

Special Tool - Bearing Driver Set: 57001-1129



Drive/Driven Bevel Gear Case Unit Assembly

CAUTION

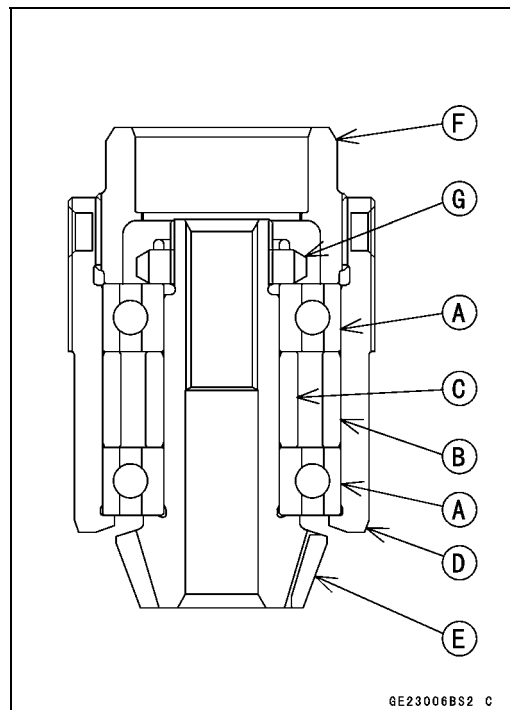
To ensure optimal tooth contact, the drive and driven bevel gears are machined together. To replace the gears, they must be replaced as a set. The two gears are marked with matching numbers.

- Replace the bearings and the nut with new parts.
- Using a press, drive the bearing and the collar on the bevel gear shaft until they bottom.
 - Bearings [A]
 - Outer Collar [B]
 - Inner Collar [C]
 - Bearing Housing [D]
- Drive the assembled bevel gear [E] into the bearing housing [D].
- Tighten the bevel gear mounting nut [G].
- Apply a non-permanent locking agent to the gear case [F], and tighten it onto the bearing housing [D].

Torque - Bevel Gear Mounting Nut: 59 N·m (6.0 kgf·m, 43 ft·lb)

Gear Case: 98 N·m (10 kgf·m, 72 ft·lb)

- Make sure that the bevel gear turns freely.

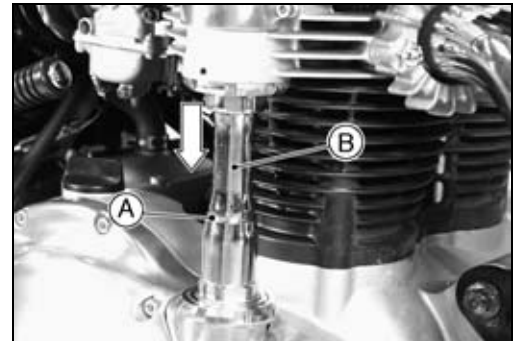
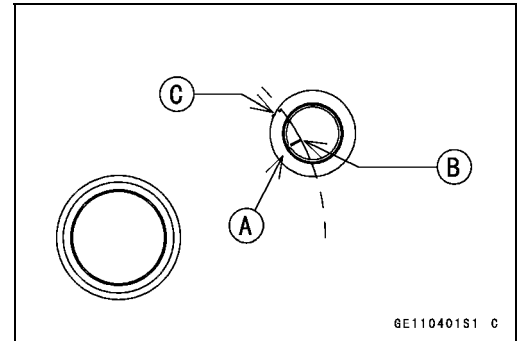


6E23006BS2 C

Bevel Gears (Hypoid Gears)

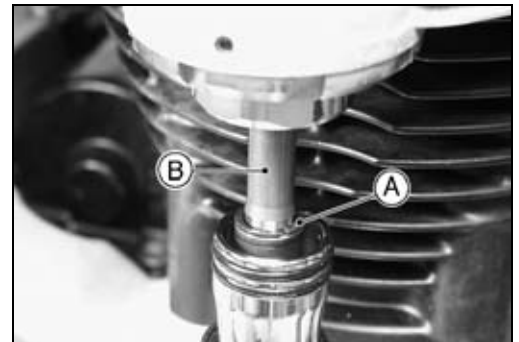
Bevel Gear Case Removal

- Drain the engine oil.
- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Rotor Plug (see Camshaft Removal)
 - Timing Inspection Plug (see Camshaft Removal)
- Bring the piston to the TDC.
 - Timing Notch [A]
 - TDC Mark [B]
 - Ignition Mark [C]
- Remove the snap ring [A].
- Pull the outer pipe [B] down.

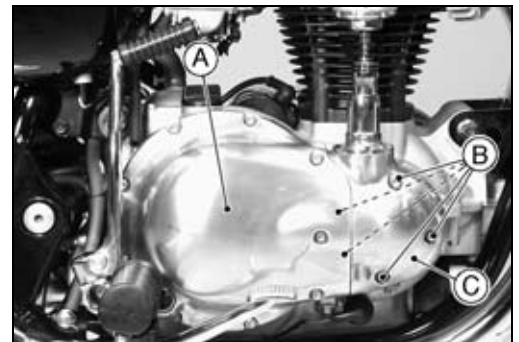


- Remove the E-clip [A]
- Pull the driveshaft [B] down until the tip of the shaft is visible.

Special Tool - Outside Circlip Pliers: 57001-144

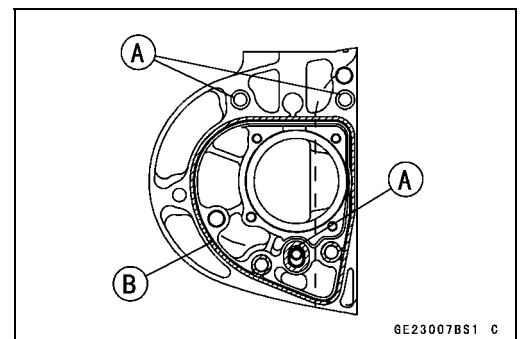


- Remove the clutch cover [A] (see Clutch chapter).
- Remove the bolts [B].
- Remove the bevel gear case [C].



Bevel Gear Case Installation

- Replace the E-clip and the snap ring with new parts, and fit them in place.
 - Make sure that there is one knock pin on the crankcase.
 - Make sure that a spring is installed on the tip of the driveshaft.
 - Apply high-temperature grease to the O-rings [A] and the rubber gasket [B], and install them on the bevel gear case.
 - Install the bevel gear case.
- If the bevel gear case cannot be installed easily, turn the driveshaft while installing the bevel gear case.

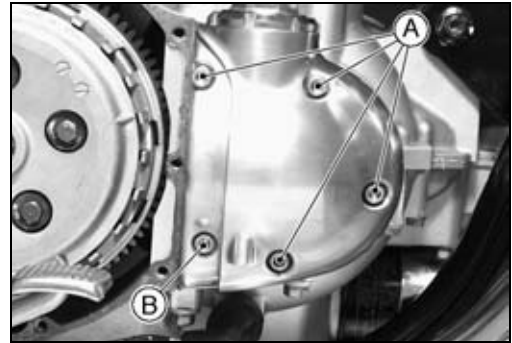


4-46 ENGINE TOP END

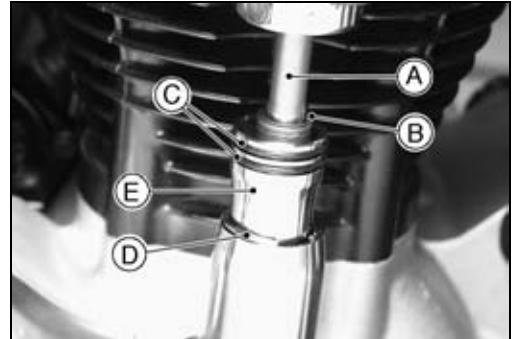
Bevel Gears (Hypoid Gears)

- Tighten the bevel gear case bolts.
Bolt with Copper-Plated Washers [A]
Bolt [B]

Torque - Bevel Gear Case Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)



- Bring the piston to the TDC.
- Insert the driveshaft [A] into the camshaft side drive bevel gear splines, and fit the E-clip [B] in the groove of the driveshaft.
- If the driveshaft cannot be inserted, move the driveshaft down for the time being. Then, slightly rotate the crankshaft clockwise or counterclockwise and attempt to insert the driveshaft again.
- Apply high-temperature grease to the O-rings [C], and insert the outer pipe [D] into the bevel gear case.
- Fit the snap ring [E] in the groove of the outer pipe, with the gap of the snap ring facing the cylinder.



CAUTION

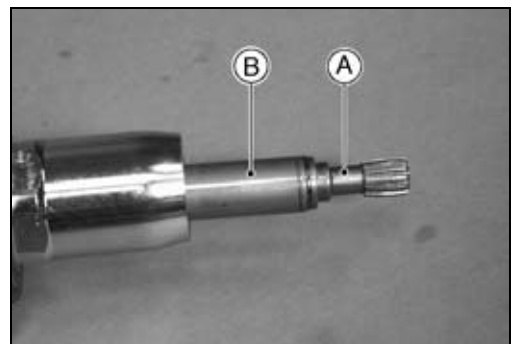
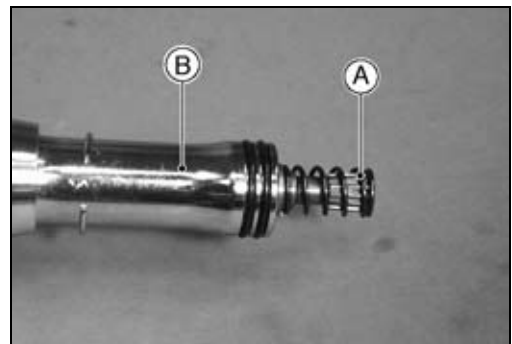
Do not rotate the camshaft side bevel gear after the bevel gear case has been removed. Make sure to check the camshaft timing if the camshaft side bevel gear has been rotated.

★ Adjust the backlash of the bevel gear as necessary.

Bevel Gear Case Disassembly

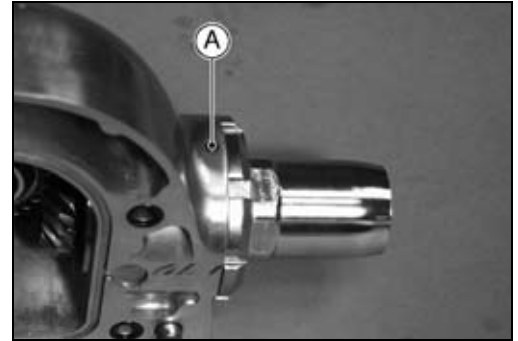
- Remove:
Bevel Gear Case (see Bevel Gear Case Removal)
Spring [A]
Outer Pipe [B]

Driveshaft [A]
Inner Pipe [B]

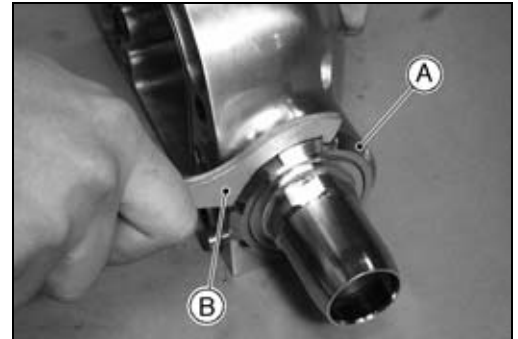


Bevel Gears (Hypoid Gears)

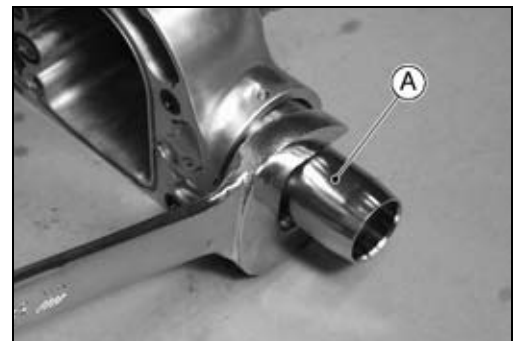
- Remove:
Locknut Stop Screw [A]



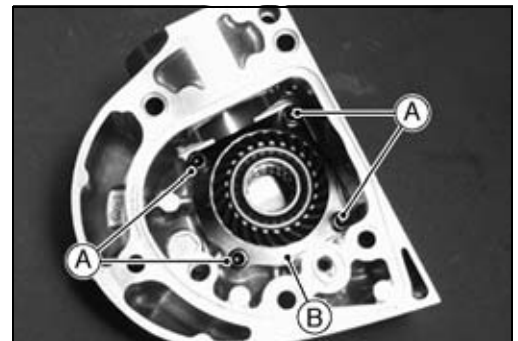
- Using the hook wrench [B], loosen the locknut [A].



- Remove the driven gear case unit [A].
- Disassemble the driven gear case unit (see Drive/Driven Bevel Gear Case Unit Disassembly).



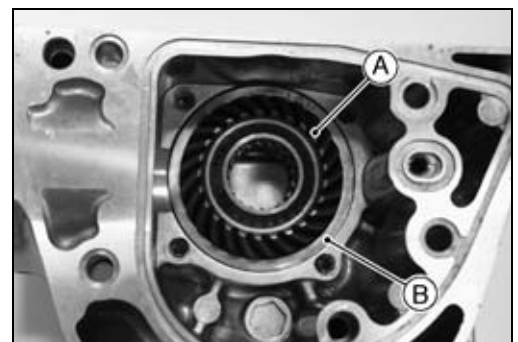
- Remove the bearing holder Allen bolts [A].
- Remove the bearing holder [B].



- Pull out the drive gear assembly [A] together with the secondary shim(s) [B].
- Remove the primary shim(s).

NOTE

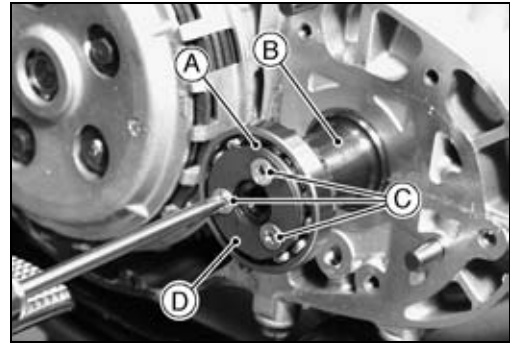
○Mark the shims or record their thicknesses so that the primary and secondary shims can be reinstalled in their original positions.



4-48 ENGINE TOP END

Bevel Gears (Hypoid Gears)

- Fit the drive gear assembly [A] on the crankshaft [B].
- Remove the mounting screws [C] to remove the bearing support plate [D].
- Using a press, remove the bevel gear from the bearing.



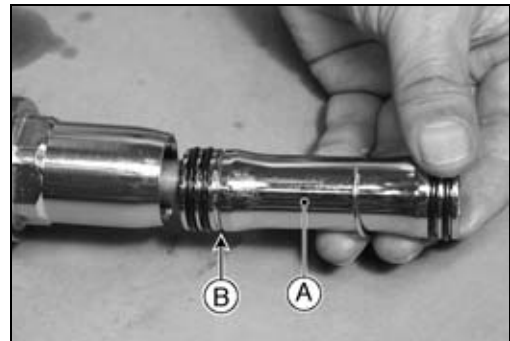
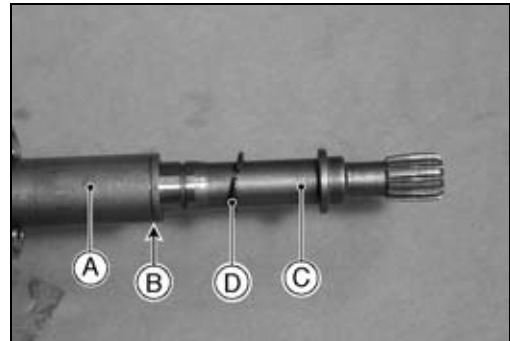
Bevel Gear Case Assembly

CAUTION

To ensure optimal tooth contact, the crankshaft side drive and driven bevel gears are machined together. To replace the gears, they must be replaced as a set. The two gears are marked [A] with matching numbers.



- Inspect the bevel gear for damage.
- Replace the ball bearing with a new part.
- To assemble the driven and drive bevel gears, refer to the instructions for adjusting the crankshaft bevel gear tooth contact in the Bevel Gear Tooth Contact Adjustment section.
- Install the inner pipe [A] so that the end with the groove [B] faces up.
- Install a new E-clip [D] on the driveshaft.
- Insert the driveshaft [C] via the inner pipe into the driven bevel gear.
- Apply grease to the O-rings and install it in the outer pipe.
- Insert the outer pipe [A] into the gear case so that the snap ring groove [B] faces down.
- Install the bevel gear case.
- Adjust the bevel gears.



Bevel Gears (Hypoid Gears)

Bevel Gear/Driveshaft Inspection

- Visually inspect the gears for cuts, peeling, or other damage on the tooth flank [A].
- ★ If a gear is damaged, the drive and driven bevel gears must be replaced as a set.
- Visually inspect the driveshaft splines for cuts, peeling, or other damage.
- ★ If the driveshaft splines are damaged, replace the drive-shaft, and visually inspect the bevel gear splines.
- ★ If the bevel gear splines are damaged, replace the bevel gears as a set.



Bevel Gear Bearing Inspection

CAUTION

Do not remove the bearings for inspection. Removal may damage them.

- Remove:
 - Bevel Gear Case (see Bevel Gear Case Removal)
 - Drive/Driven Bevel Gear Case Unit
- Inspect the ball bearings [A].
- Visually inspect the bearings for discoloration.
- Because the ball bearings are produced with extreme precision, they must be inspected for wear by spinning them by hand, instead of measuring them.
- Turn the bevel gear by hand to inspect its condition.
- ★ Replace a bearing that is noisy, does not spin smoothly, or catches.



Bevel Gear Tooth Contact Adjustment

An improperly adjusted bevel gear tooth contact could lead to gear noise and damage. Therefore, when replacing a part that could affect the tooth contact, make sure to adjust the bevel gear tooth contact. Listed below are parts that could alter the tooth contact.

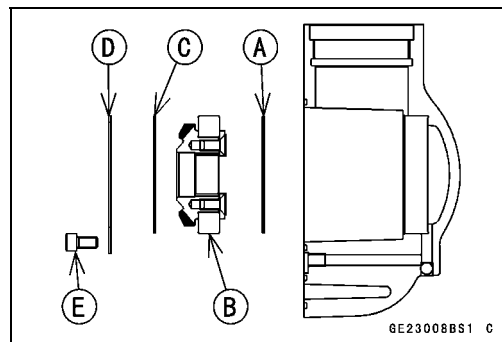
- Bevel Gear Case
- Drive/Driven Bevel Gear
- Bearing Housing
- Camshaft
- Cylinder Head

4-50 ENGINE TOP END

Bevel Gears (Hypoid Gears)

Crankshaft Side Bevel Gear Tooth Contact Check

- Remove:
 - Bevel Gear Case (see Bevel Gear Case Removal)
 - Driven Bevel Gear Case (see Bevel Gear Case Disassembly)
 - Drive Bevel Gear Assembly (see Bevel Gear Case Disassembly)
- Install:
 - Primary Shim (s) [A] to install = (old primary shim thickness-0.15 mm (0.006 in.))
 - Drive Bevel Gear Assembly [B]
 - Old Secondary Shim(s) [C]
 - Bearing Holder Plate [D]
 - Tighten the Allen bolts [E]



NOTE

○ Install a primary shim(s) with a thickness that is 0.15 mm (0.006 in.) less than the old primary shim(s).

Torque - Bearing Holder Allen Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)

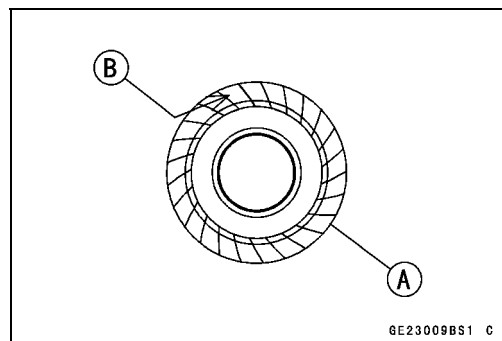
Crankshaft Side Bevel Gear Adjustment Shims

Thickness (mm) (in.)	Part Number
0.08 (0.003)	92180-1306
0.1 (0.004)	92180-1285
0.15 (0.006)	92180-1286
0.2 (0.008)	92180-1287
0.3 (0.012)	92180-1288
0.4 (0.016)	92180-1289
0.5 (0.020)	92180-1290
0.6 (0.024)	92180-1291
0.7 (0.028)	92180-1292
0.8 (0.031)	92180-1293
0.9 (0.035)	92180-1294
1.0 (0.039)	92180-1284
1.2 (0.047)	92180-1296
0.13 (0.005)	92180-1324

- Clean the bevel gears to remove any dust or oil.
- Apply machinist's dye to the contact surface (concave area) of approximately five tooth flanks of the drive bevel gear [A].

NOTE

○ Using a brush with firm bristles, apply a thin and uniform coat of machinist's dye to the tooth flank (so that the tooth flank is faintly colored with the machinist's dye). The extent of the tooth contact cannot be properly discerned if you apply a thick coat. The machinist's dye must have the smooth and firm consistency of ordinary toothpaste.



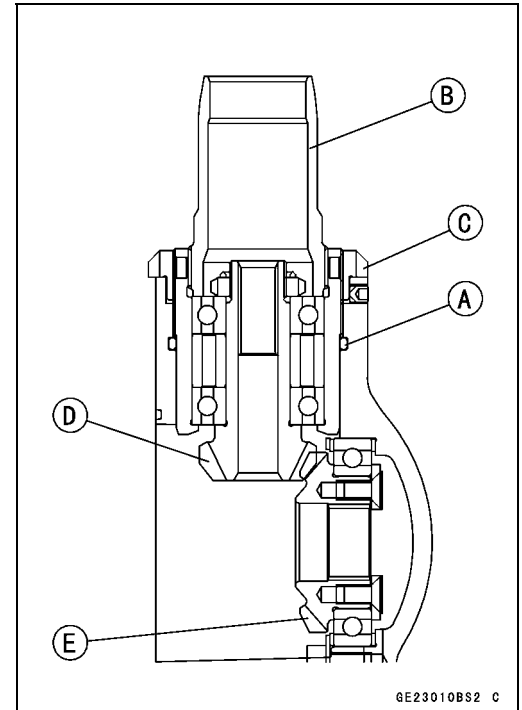
Bevel Gears (Hypoid Gears)

- Apply grease to the O-ring [A].
- Tighten the driven bevel gear case unit [B] until the bevel gear backlash is 0 mm (0 in.).
- Tighten the locknut [C] to the specified torque to adjust the backlash.
- Push one of the gears with your fingers. A backlash of 0 mm (0 in.) is reached when there is no play.

NOTE

○ A *backlash* or a *gear lash* is the amount of relative movement [E] of a given gear, with the other gear remaining stationary [D].

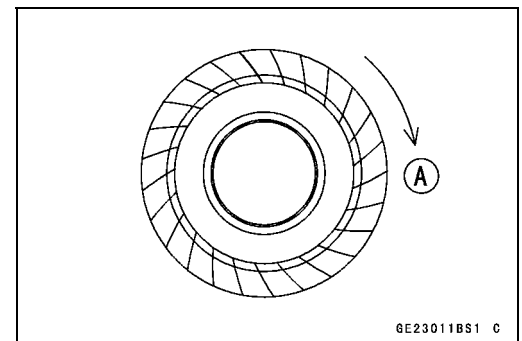
Torque - Bevel Gear Case Locknut: 20 N·m (2.0 kgf·m, 14 ft·lb)



- Attach the bevel gear drive bit to the driven bevel gear, and use an air or electric drill to rotate it clockwise with a light pressure for 20 seconds.

Drive Bevel Gear Rotation Direction [A]

Special Tool - Bevel Gear Drive Bit: 57001-1421



- Inspect the tooth contact on the concave portion of the drive gear. Good contact is achieved when the pattern of tooth contact is visible in the center of the tooth flank.

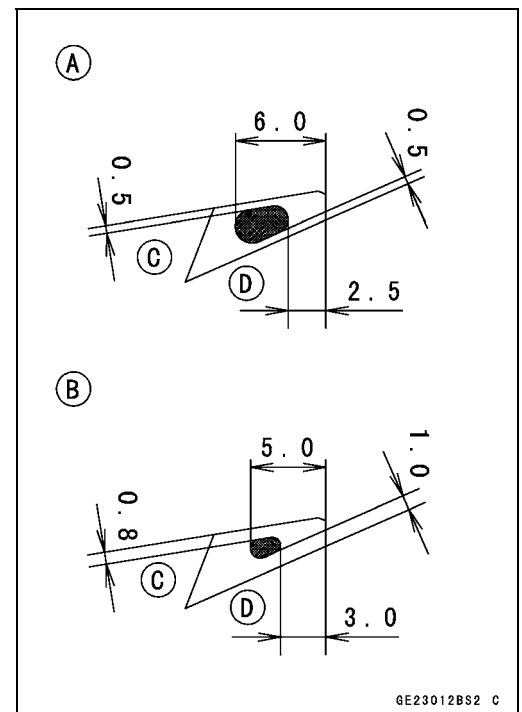
Good tooth contact pattern, upper limit [A]

Good tooth contact pattern, lower limit [B]

Diameter side [C]

Tooth bottom side [D]

- ★ Proceed to the operation that follows the tooth contact pattern adjustment if a good tooth contact pattern has been achieved.



4-52 ENGINE TOP END

Bevel Gears (Hypoid Gears)

- ★ If the tooth contact pattern is improper, adjust the shim(s) following the procedure given below.

Example 1

- Decrease the thickness of the primary shim and increase the thickness of the secondary shim.

NOTE

- The thickness of the secondary shim is determined by the thickness of the primary shim. However, if the figure of the second digit below the decimal point is 2 or 7, apply a correction value to determine the ultimate thickness of the secondary shim.

Secondary Shim Thickness Calculation

2.0 mm – (primary shim thickness)

= (secondary shim thickness)

Second digit below decimal point → Correction value

2 → 3

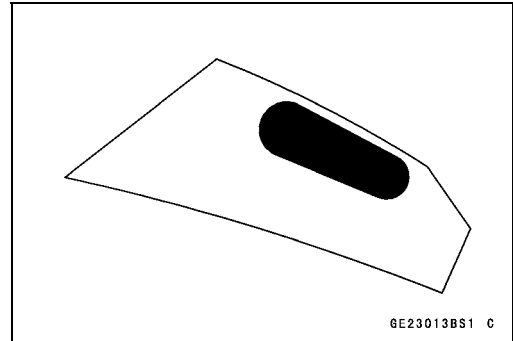
7 → 8

Calculation example:

$$2 - 1.08 = 0.92 \rightarrow 0.93$$

$$2 - 1.03 = 0.97 \rightarrow 0.98$$

- Recheck the tooth contact of the crankshaft side bevel gear.



Bevel Gears (Hypoid Gears)

Example 2

- Increase the thickness of the primary shim and decrease the thickness of the secondary shim.

NOTE

- The thickness of the secondary shim is determined by the thickness of the primary shim. However, if the figure of the second digit below the decimal point is 2 or 7, apply a correction value to determine the ultimate thickness of the secondary shim.

Secondary Shim Thickness Calculation

2.0 mm – (primary shim thickness)

= (secondary shim thickness)

Second digit below decimal point → Correction value

2 → 3

7 → 8

Calculation example:

$$2 - 1.08 = 0.92 \rightarrow 0.93$$

$$2 - 1.03 = 0.97 \rightarrow 0.98$$

- Recheck the tooth contact of the crankshaft side bevel gear.

After adjusting the tooth contact pattern

- Remove the drive bevel gear assembly.
- Increase the primary shim thickness by 0.15 mm (0.006 in.).

○ Do not increase the thickness of the secondary shim.

- Install:

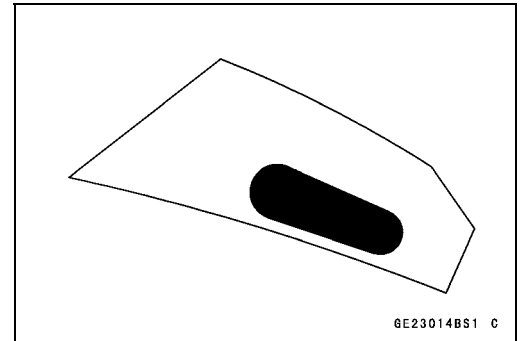
Drive Bevel Gear Assembly

Secondary Shim(s)

Bearing Holder Plate

- Apply a non-permanent locking agent to the bearing holder Allen bolts and tighten the bolt.

Torque - Bearing Holder Allen Bolt: 7.8 N·m (0.8 kgf·m, 69 in·lb)



4-54 ENGINE TOP END

Bevel Gears (Hypoid Gears)

- Tighten the locknut [B] to the specified torque to tighten the drive side bevel gear case unit [A] until the gear backlash is 0 mm (0 in.).

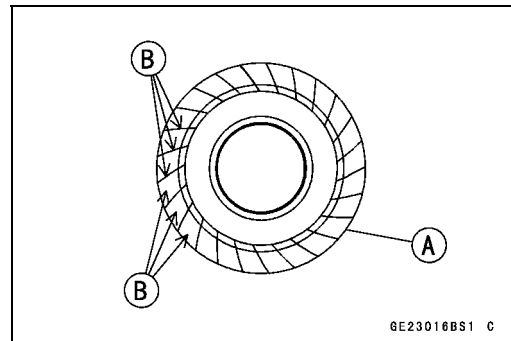
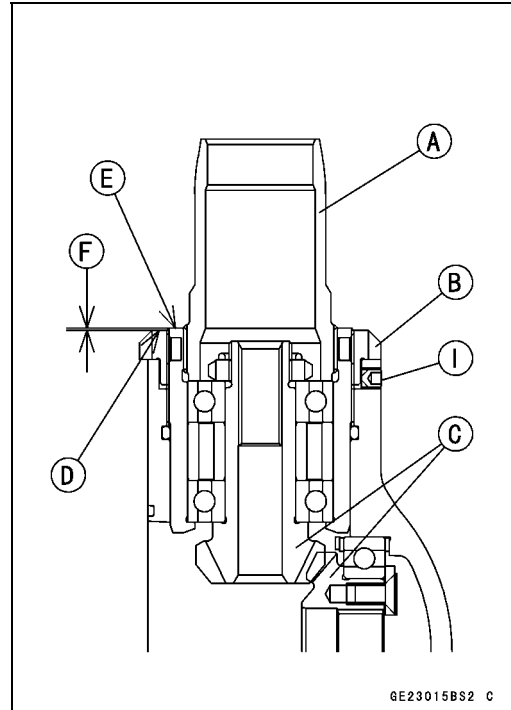
Torque - Bevel Gear Case Locknut: 20 N·m (2.0 kgf·m, 14 ft·lb)

- Make sure that the bevel gear [C] turns freely.
- Make sure that the top surface [D] of the lock nut is (approximately 0.5 mm (0.02 in.)) [F] lower than the top surface [E] of the bearing housing.
- ★ If it is not as illustrated, the gear backlash could be improperly adjusted or the tooth contact could be improper.
- Apply a non-permanent locking agent to the threads of the stop screw [I]. Tighten the stop screw until its tip comes in contact with the locknut; then, tighten it an additional half turn.

NOTE

○ If the tip of the used stop screw is rounded, or if the stop screw is to be tightened to the same position of the locknut that exhibits the traces of a previously tightened screw, tightening the stop screw an additional half turn could be excessive.

- Apply a thin coat of molybdenum disulfide grease to all the tooth flanks [B] of the crankshaft side drive bevel gear [A].
- Install the bevel gear case and adjust the bevel gears.



Camshaft Side Bevel Gear Tooth Contact Check

- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Camshaft (see Camshaft Removal)
 - Driven Bevel Gear (see Camshaft Side Driven Bevel Gear Removal)
 - Bevel Gear Case (see Bevel Gear Case Removal)

- Assemble:

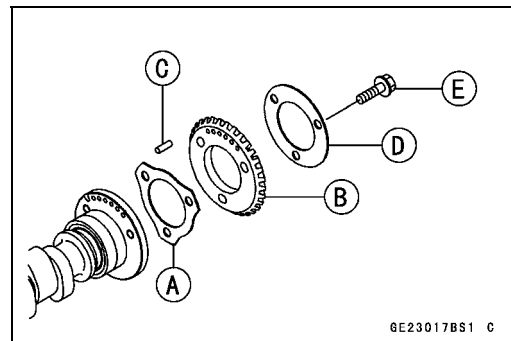
- See Camshaft Side Driven Bevel Gear Installation.
 - Shim [A] to install = (old shim thickness - 0.15 mm (0.006 in.))
 - Driven Bevel Gear [B]
 - Pin [C]
 - Bevel Gear Holder [D]

NOTE

○ Install a shim(s) with a thickness that is 0.15 mm (0.006 in.) less than the old shim(s).

- Tighten the bevel gear bolts [E].

Torque - Driven Bevel Gear Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)

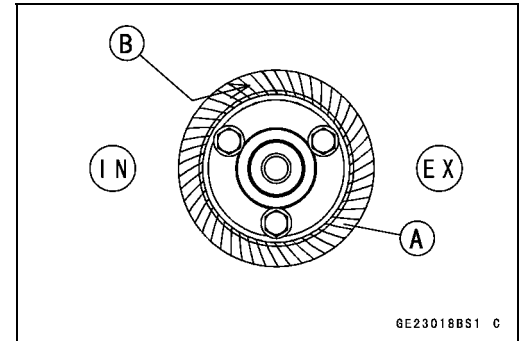


Bevel Gears (Hypoid Gears)

- Clean the bevel gears to remove any dust or oil.
- Apply machinist's dye to the contact surface (concave area) [B] of approximately ten tooth flanks of the driven bevel gear [A].

NOTE

○ Using a brush with firm bristles, apply a thin and uniform coat of machinist's dye to the tooth flank (so that the tooth flank is faintly colored with the machinist's dye). The extent of the tooth contact cannot be properly discerned if you apply a thick coat. The machinist's dye must have the smooth and moist consistency of ordinary toothpaste.

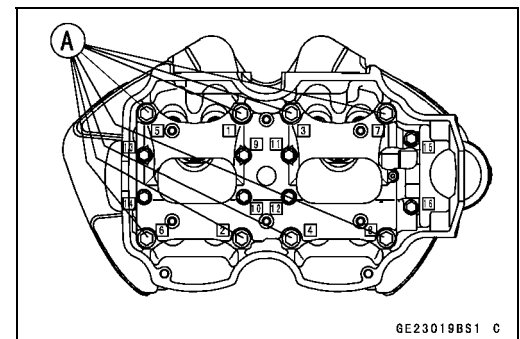


Crankshaft Side Bevel Gear Adjustment Shims

Thickness (mm) (in.)	Part Number
0.08 (0.003)	92180-1305
0.1 (0.004)	92180-1280
0.15 (0.006)	92180-1281
0.2 (0.008)	92180-1282
0.3 (0.012)	92180-1283
0.4 (0.016)	92180-1299
0.5 (0.020)	92180-1300
0.6 (0.024)	92180-1301
0.7 (0.028)	92180-1279
0.8 (0.031)	92180-1302
0.9 (0.035)	92180-1303
1.0 (0.039)	92180-1304
0.13 (0.005)	92180-1323

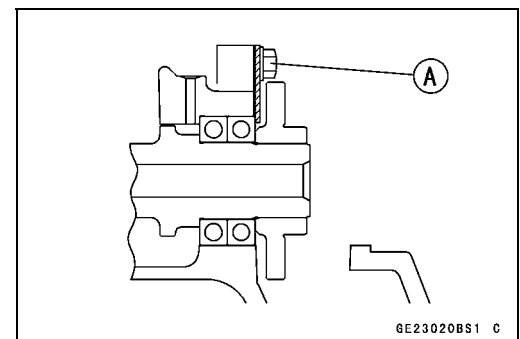
- Remove the rocker arm shafts, rocker arms, washers, and springs from the camshaft cap.
- Apply engine oil to the sliding surfaces of the camshaft and install the camshaft on the cylinder head.
- Install the camshaft cap and tighten the 8 mm cap bolts [A] in the specified sequence.

Torque - Camshaft Cap Bolts 8 mm: 25 N·m (2.5 kgf·m, 18 ft·lb)



- Tighten the locating plate bolts at the camshaft position.

Torque - Camshaft Position Locating Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



4-56 ENGINE TOP END

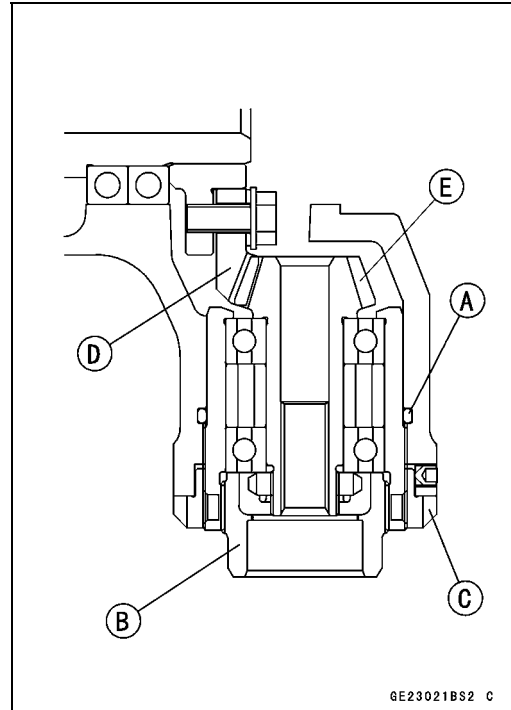
Bevel Gears (Hypoid Gears)

- Apply grease to the O-ring [A].
- Tighten the drive bevel gear case unit [B] until the bevel gear backlash is 0 mm (0 in.).
- Tighten the locknut [C] to the specified torque to adjust the backlash.
- Push one of the gears with your fingers. A backlash of 0 mm (0 in.) is reached when there is no play.

Torque - Bevel Gear Case Locknut: 20 N·m (2.0 kgf·m, 14 ft·lb)

NOTE

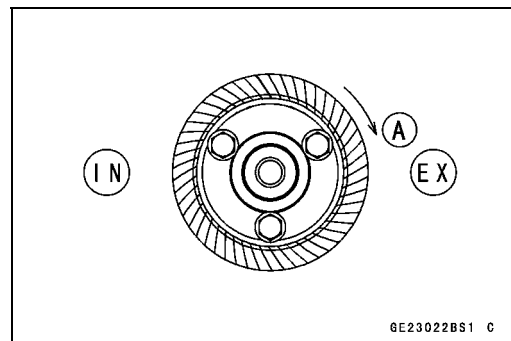
- A backlash or a gear lash is the amount of relative movement [E] of a given gear, with the other gear remaining stationary [D].



- Attach the bevel gear drive bit to the drive bevel gear, and use an air or electric drill to rotate it clockwise with a light pressure for 20 seconds.

Driven Bevel Gear Rotation Direction [A]

Special Tool - Bevel Gear Drive Bit: 57001-1421

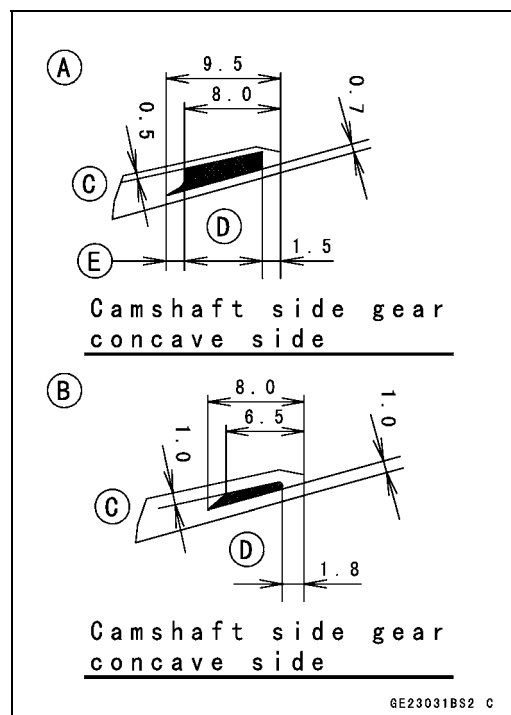


- Inspect the tooth contact on the concave portion of the driven gear. Good contact is achieved when the pattern of tooth contact is visible in the center of the tooth flank.
 - Good tooth contact pattern, upper limit [A]
 - Good tooth contact pattern, lower limit [B]
 - Diameter side [C]
 - Tooth bottom side [D]
 - None also OK [E]

- ★ Proceed to the operation that follows the tooth contact pattern adjustment if a good tooth contact pattern has been achieved.

NOTE

- An optimal tooth contact pattern is similar to [A]. Thus, to adjust the tooth contact, aim for pattern [A].

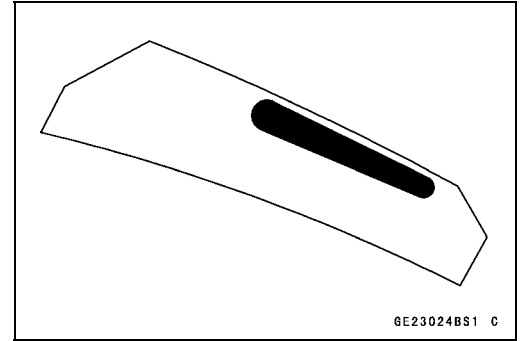


Bevel Gears (Hypoid Gears)

★ If the tooth contact pattern is improper, replace the shim(s) following the procedure given below.

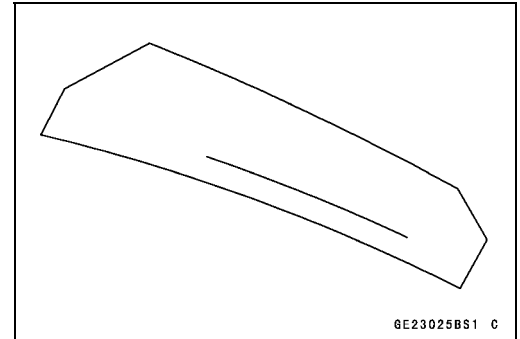
Example 1

- Decrease the thickness of the shim(s).
- Recheck the tooth contact of the camshaft side bevel gear.



Example 2

- Increase the thickness of the shim(s).
- Recheck the tooth contact of the camshaft side bevel gear.



After adjusting the tooth contact pattern

- Remove:
 - Camshaft
 - Driven Bevel Gear
 - Adjust the camshaft timing (Refer to Camshaft Side Driven Bevel Gear Replacement in this chapter).
 - Increase the shim thickness by 0.15 mm (0.006 in.).
 - Install:
 - Driven Bevel Gear
 - Pin
 - Bevel Gear Holder
 - Apply a non-permanent locking agent to the gear bolt and tighten them.
- Torque - Driven Bevel Gear Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)**
- Install
 - Camshaft Cap Assembly (see Rocker Arm and Rocker Shaft Installation)
 - Camshaft (see Camshaft Installation)

4-58 ENGINE TOP END

Bevel Gears (Hypoid Gears)

- Tighten the locknut [B] to the specified torque to tighten the drive side bevel gear case unit [A] until the gear backlash is 0 mm (0 in.).

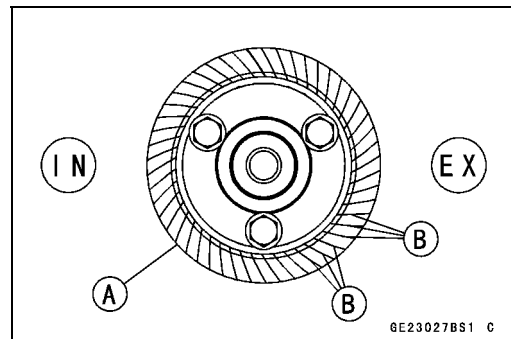
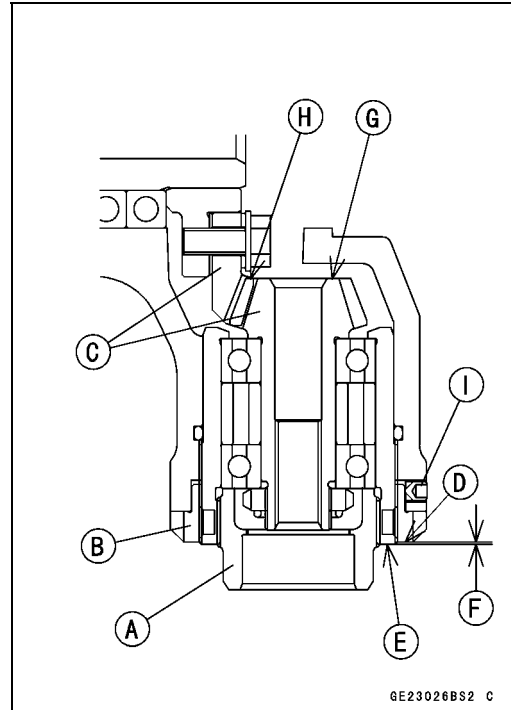
Torque - Bevel Gear Case Locknut: 20 N·m (2.0 kgf·m, 14 ft·lb)

- Make sure that the bevel gear [C] turns freely.
- Make sure that the bottom surface [D] of the lock nut is (approximately 0.5 mm (0.02 in.)) [F] higher than the outer surface [E] of the bearing housing.
- Make sure that the top end [G] of the drive bevel gear and the cross section [H] of the driven bevel gear are practically on the same plane.
- ★ If it is not as illustrated, the backlash could be improperly adjusted or the tooth contact could be improper.
- Apply a non-permanent locking agent to the threads of the locknut stop screw [I]. Tighten the stop screw until its tip comes in contact with the locknut; then, tighten it an additional half turn.

NOTE

○ If the tip of the used stop screw is rounded, or if the stop screw is to be tightened to the same position of the locknut that exhibits the traces of a previously tightened screw, tightening the stop screw an additional half turn could be excessive.

- Apply a thin coat of molybdenum disulfide grease to all the tooth flanks [B] of the camshaft side driven bevel gear [A].
- Install the removed parts and adjust the bevel gears.



Bevel Gear Adjustment

An improperly adjusted bevel gear could lead to gear noise and damage. Therefore, when replacing a part that could affect the bevel gear backlash, make sure to perform an inspection and adjustment.

- Remove the stop screw [A].
- Start the engine and warm it up thoroughly.

NOTE

○ Perform the bevel gear backlash adjustment when the oil temperature in the oil pan is at 80°C (176°F) (and the oil pan outside surface temperature is 73°C (163°F)). The standard factory setting for the bevel gear adjustment is designed to eliminate the gear lash sound and to practically eliminate any whining during the operating temperature indicated above. However, this setting has a tendency to generate a whining sound when the engine is cold.

Refer to page 4-37 if the factory setting must be changed upon the customer's request.

A bevel gear adjustment must be performed only by a properly trained service technician.



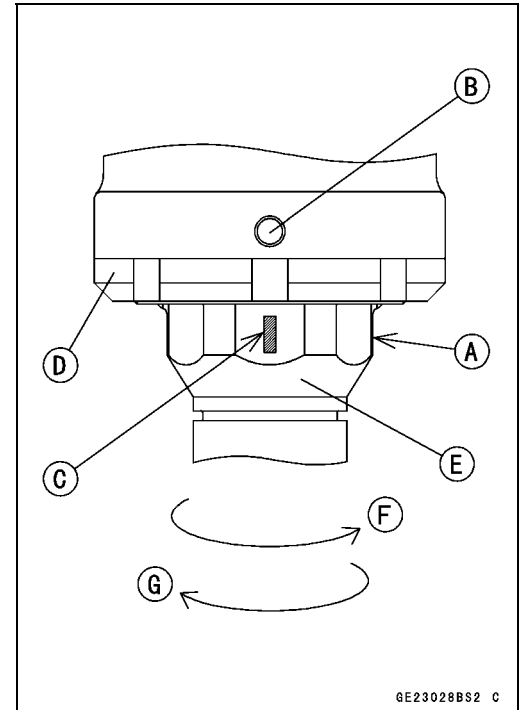
Bevel Gears (Hypoid Gears)

Camshaft Side Bevel Gear

NOTE

○Mark [C] the hexagonal portion [A] of the bevel gear case to align with the stop screw hole [B].

- Loosen the locknut [D].
 - Rotate the drive side bevel gear case unit [E] clockwise [F]. Stop the rotation when the gear lash sound disappears and the whining sound appears.
 - Rotate the drive side bevel gear case unit approximately 40° counterclockwise [G]. Verify that the gear lash sound can be heard.
 - Slowly rotate the drive side bevel gear case unit clockwise again. Stop the rotation when the gear lash sound can no longer be heard and tighten the locknut.
- Hold the gear case with a wrench to tighten the locknut.
- Apply a non-permanent locking agent to the threads of the locknut stop screw. Tighten the stop screw until its tip comes in contact with the locknut; then, tighten it an additional half turn.



NOTE

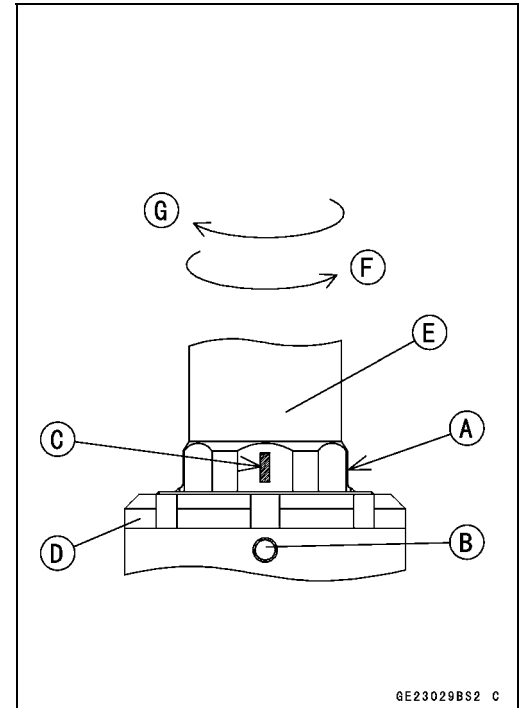
○If the tip of the used stop screw is rounded, or if the stop screw is to be tightened to the same position of the locknut that exhibits the traces of a previously tightened screw, tightening the stop screw an additional half turn could be excessive.

Crankshaft Side Bevel Gear

NOTE

○Mark [C] the hexagonal portion [A] of the bevel gear case to align with the stop screw hole [B].

- Loosen the locknut [D].
 - Rotate the driven side bevel gear case [E] approximately 45° counterclockwise [F]. Verify that the gear lash sound can be heard.
 - Rotate the driven side bevel gear case unit clockwise [G]. Stop the rotation when the gear lash disappears and the whining sound appears.
 - Slowly rotate the driven side bevel gear case unit counterclockwise again. Stop the rotation when the whining sound disappears and the gear lash sound can no longer be heard and tighten the locknut.
- Hold the gear case with a wrench to tighten the locknut.
- Apply a non-permanent locking agent to the threads of the locknut stop screw. Tighten the stop screw until its tip comes in contact with the locknut; then, tighten it an additional half turn.



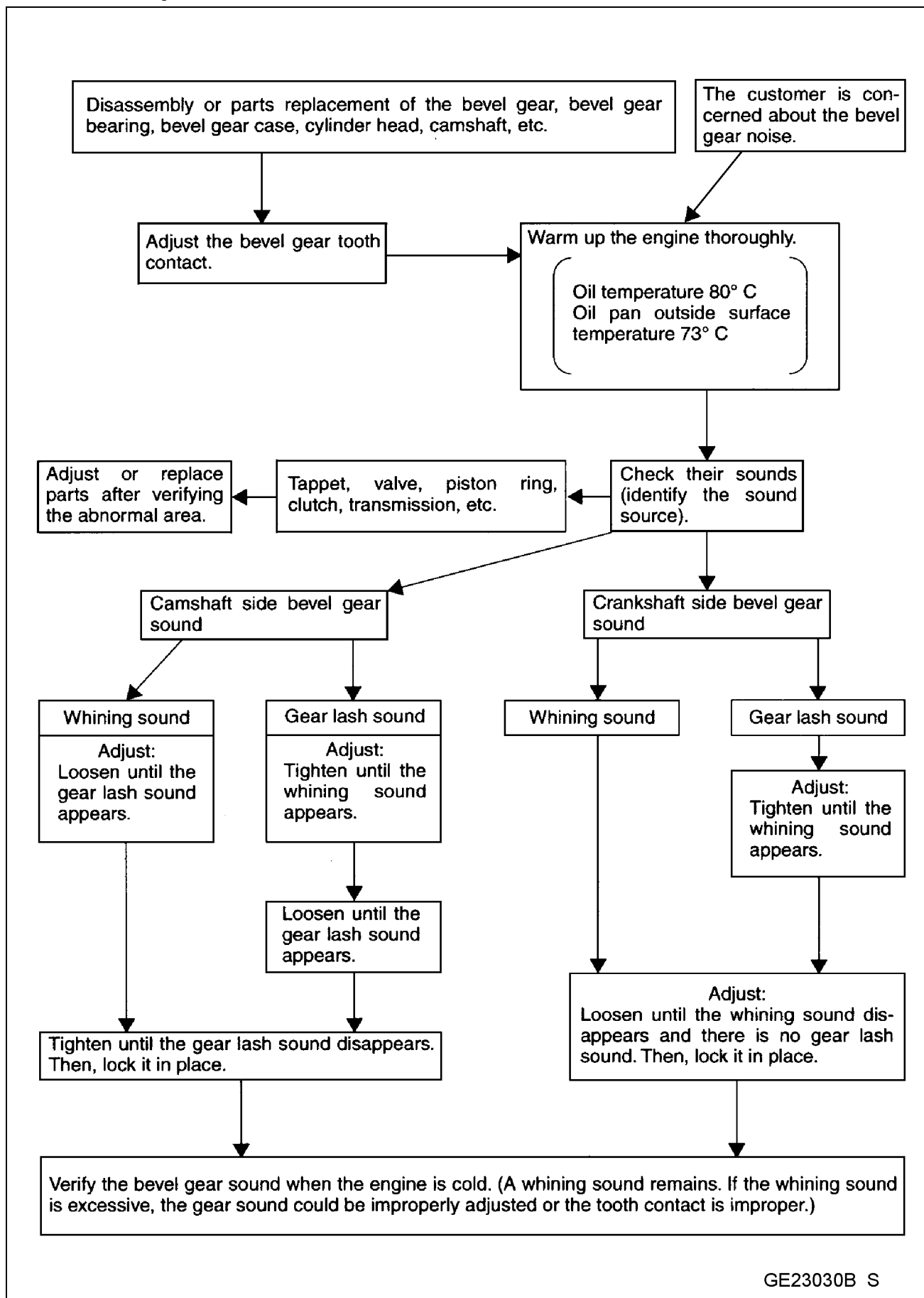
NOTE

○If the tip of the used stop screw is rounded, or if the stop screw is to be tightened to the same position of the locknut that exhibits the traces of a previously tightened screw, tightening the stop screw an additional half turn could be excessive.

4-60 ENGINE TOP END

Bevel Gears (Hypoid Gears)

Bevel Gear Adjustment Flowchart



Muffler

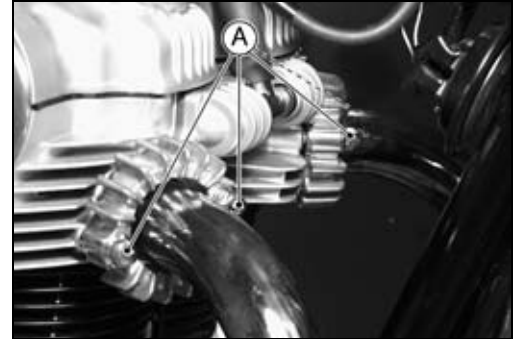
Muffler Removal

⚠ WARNING

To prevent burns, remove the muffler only after the engine has cooled down.

- Loosen the connecting pipe clamp bolt [A]
- Remove the right and left muffler mounting bolts [B].

- Remove the right and left exhaust pipe holder nuts [A].
- Remove the right and left mufflers at the same time.



Muffler Installation

- Replace the exhaust pipe gasket with a new part.
- Inspect the connecting pipe gasket and replace it if it is damaged.
- Connect the right and left mufflers.
- Install the right and left exhaust pipes on the cylinder head and install the exhaust pipe holders.
- Temporarily tighten the exhaust pipe holder nuts.
- Temporarily tighten the right and left muffler mounting bolts.
- Tighten the pipe holder nuts, bracket bolts, and the connecting pipe bolts, in that order.

Torque - Exhaust Pipe Holder Nuts: 17 N·m (1.7 kgf·m, 12 ft·lb)

Muffler Mounting Bolts: 21 N·m (2.1 kgf·m, 15 ft·lb)

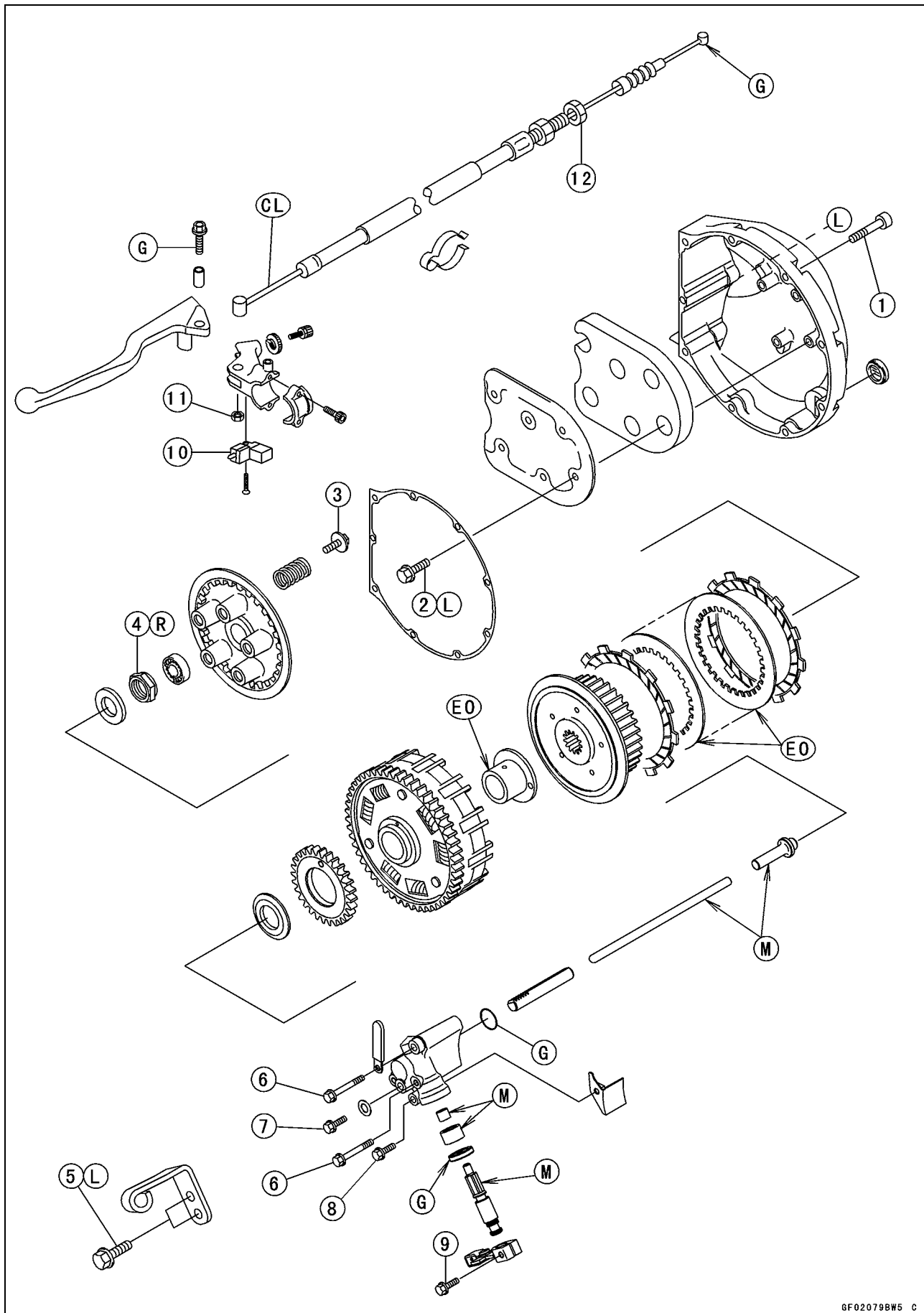
Clutch

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5-2 CLUTCH

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Cover Bolts	12	1.2	104 in·lb	(1, L)
2	Clutch Cover Damper Plate Bolts	12	1.2	104 in·lb	L
3	Clutch Spring Bolts	9.8	1.0	87 in·lb	
4	Clutch Hub Nut	132	13.5	98	R
5	Clutch Cable Lower Holder Bolts	12	1.2	104 in·lb	L
6	Clutch Release Case Mounting Bolts	12	1.2	104 in·lb	
7	Release Shaft Locating Bolt	9.8	1.0	87 in·lb	
8	Chain Guide Plate Bolt	9.8	1.0	87 in·lb	
9	Release Lever Clamp Bolt	12	1.2	104 in·lb	

10. Starter Lockout Switch

11. Clutch Lever Pivot Nut

12. Clutch Cable Adjuster Locknut

CL: Apply cable lubricant.

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent to the threads.

M: Apply molybdenum disulfide grease.

R: Replacement parts

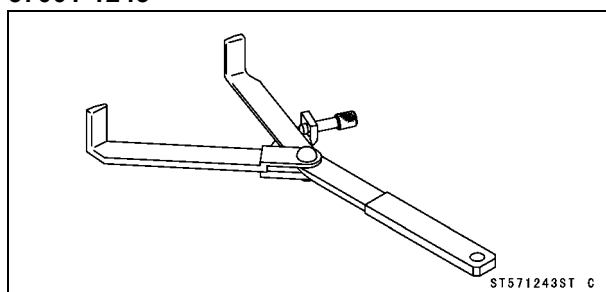
5-4 CLUTCH

Specifications

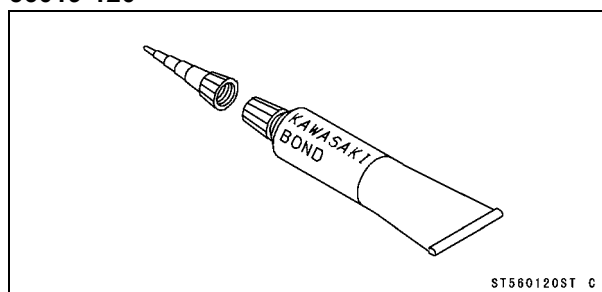
Item	Standard	Service Limit
Clutch Lever		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	—
Clutch		
Friction Plate Thickness	2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)	2.8 mm (0.11 in.)
Steel Plate Thickness	1.46 ~ 1.74 mm (0.057 ~ 0.069 in.)	1.36 mm (0.054 in.)
Friction Plate Warp	0.15 mm (0.006 in.) or less	0.3 mm (0.012 in.)
Steel Plate Warp	0.2 mm (0.008 in.) or less	0.3 mm (0.012 in.)
Clutch Spring Free Length	34.2 mm (1.35 in.)	33.1 mm (1.30 in.)

Special Tool and Sealant

Clutch Holder:
57001-1243



Kawasaki Bond (Silicone Sealant):
56019-120



5-6 CLUTCH

Clutch Cable and Release Lever

The standard clutch lever free play is 2 ~ 3 mm (0.08 ~ 0.12 in.) at its base. The free play must be adjusted if it has increased due to the stretching of the cable or the wear of the friction plate.

Clutch Lever Free Play Inspection

- Refer to the Clutch Lever Free Play Inspection in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment

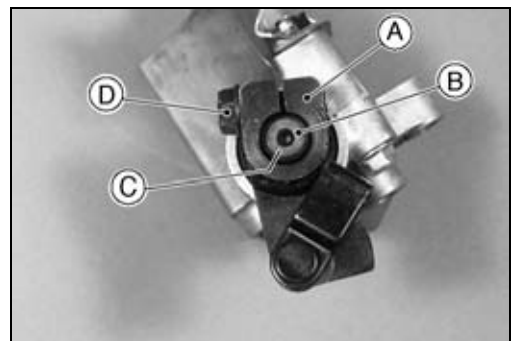
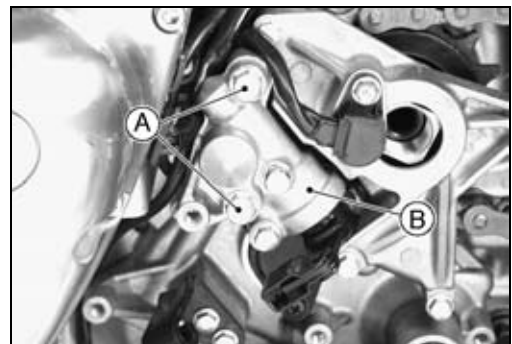
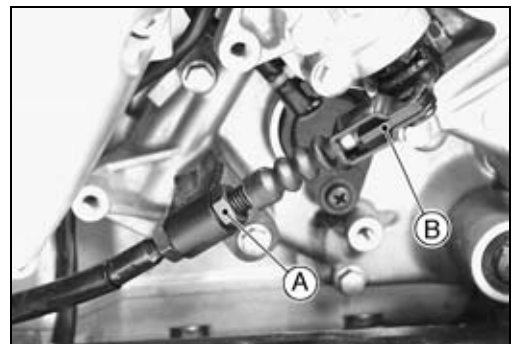
- Refer to the Clutch Lever Free Play Adjustment in the Periodic Maintenance chapter.

Clutch Cable Inspection and Lubrication

- During a periodic inspection or when the cable has been removed, inspect and lubricate the cable (see the General Lubrication in the Periodic Maintenance chapter).

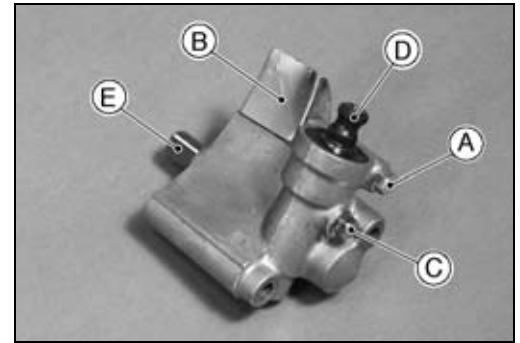
Clutch Release Case Disassembly

- Place an oil drain pan under the engine.
- Remove:
 - Left Front Step
 - Shift Pedal
 - Engine Sprocket Cover (see Final Drive chapter)
- Screw in the adjuster on the clutch lever entirely to increase the free play.
- Remove the rear locknut [A] at the lower end of the clutch cable, and remove the clutch cable from the clutch release lever [B].
- Remove the clutch release case mounting bolts [A] and remove the release case [B].
- Place matching marks [C] on the release lever [A] and on the release shaft [B].
- Remove the lever clamp bolt [D] and pull out the release lever.

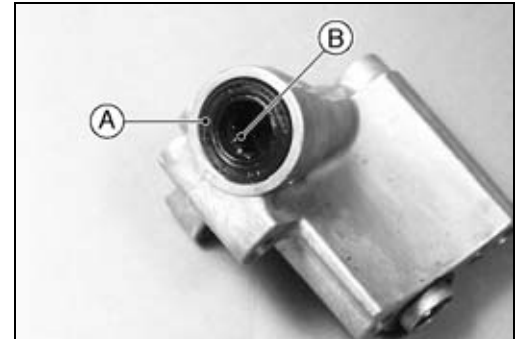


Clutch Cable and Release Lever

- Remove the bolt [A] and remove the chain guide plate [B].
- Remove the locating bolt [C] and pull out the release shaft [D].
- Pull out the rod [E].

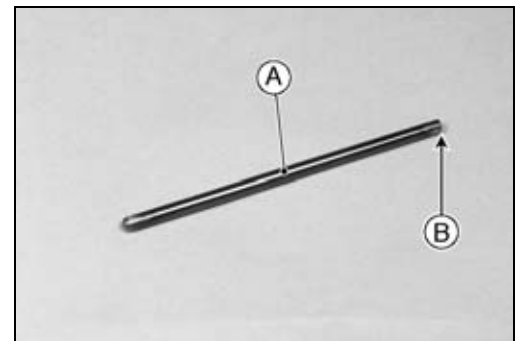


- Remove the oil seal [A] and remove the needle bearing [B].
- Replace the removed oil seal and needle bearing with new parts.

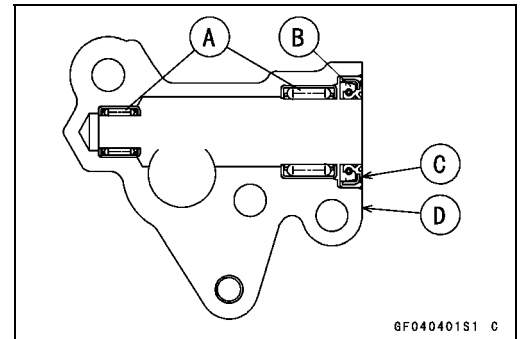


Clutch Release Case Assembly

- Apply molybdenum disulfide grease to both ends of the pushrod.
- When inserting the pushrod [A], make sure to insert the flat end [B] facing the clutch housing.



- Drive the new needle bearings [A] into the case until it bottoms out.
- Apply water around the periphery of the new oil seal [B]. Drive the oil seal into the case so that the oil seal outer surface [C] is flush with the release case outer surface [D].
- Apply high-temperature grease to the oil seal lip.



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5-8 CLUTCH

Clutch Cable and Release Lever

- Apply molybdenum disulfide grease to the pinion [A], and insert the release shaft into the case.
- Align the locating groove [B] with the bolt hole [C], and tighten the bolt.

Torque - Release Shaft Locating Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Insert the rod into the case until it stops moving.
- Rotate the shaft to check whether the rack portion of the rod is meshed with the pinion portion of the shaft.
- Install the chain guide plate.

Torque - Chain Guide Plate Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

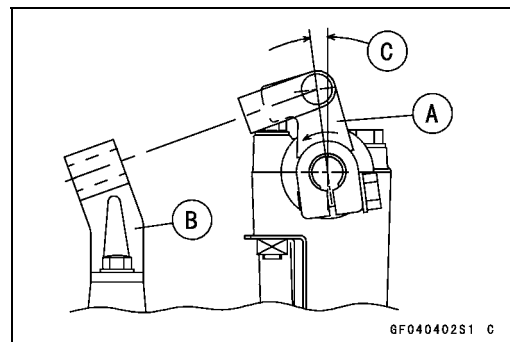
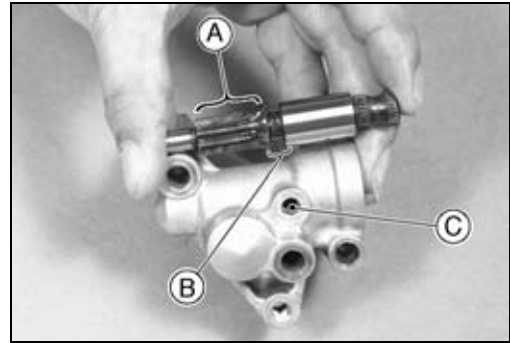
- Install the release lever on the release shaft.
- To install, align the matching marks that were made during removal.

Torque - Release Lever Clamp Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

- Install the release case.

Torque - Clutch Release Case Mounting Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

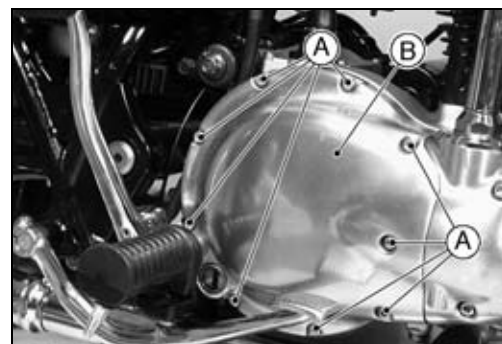
- Push the release lever [A] towards the clutch cable holder [B] so that when it stops moving, the angle of the release lever is as shown (viewed from the bottom).
Approximately 7° [C]
- Install the clutch cable on the release lever.
- Adjust the clutch free play.



Clutch Cover

Clutch Cover Removal

- Remove:
 - Clutch Cover Bolts [A]
 - Clutch Cover [B]

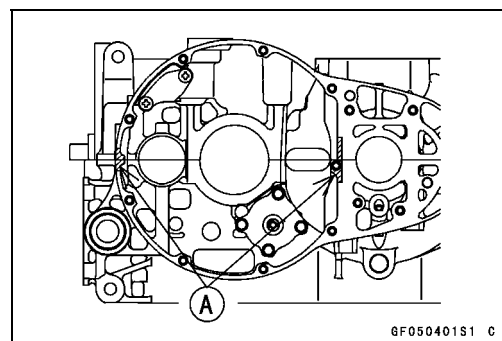


Clutch Cover Installation

- Apply silicon sealant [A] to the mating surface of the crankcase.
- Install:
 - Gasket
 - Clutch Cover
 - Clutch Cover Bolts

Torque - Clutch Cover Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

Sealant - Kawasaki Bond (Silicon Sealant): 56014-120



Clutch Cover Damper Removal

- Remove:
 - Clutch Cover (see Clutch Cover Removal)
 - Clutch Cover Damper Plate Bolts [A]
 - Clutch Cover Damper Plate [B]
 - Clutch Cover Damper [C]



Clutch Cover Damper Installation

- Apply a non-permanent locking agent to the clutch cover damper plate bolts and tighten the bolts.

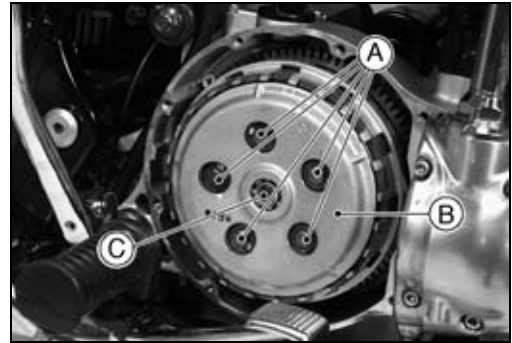
Torque - Clutch Cover Damper Plate Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

5-10 CLUTCH

Clutch

Clutch Removal

- Drain the engine oil (see Periodic Maintenance chapter).
- Remove:
 - Clutch Cover (see Clutch Cover Removal)
 - Clutch Spring Bolts [A]
 - Clutch Springs
 - Clutch Spring Plate [B]
 - Pusher and Bearing [C]

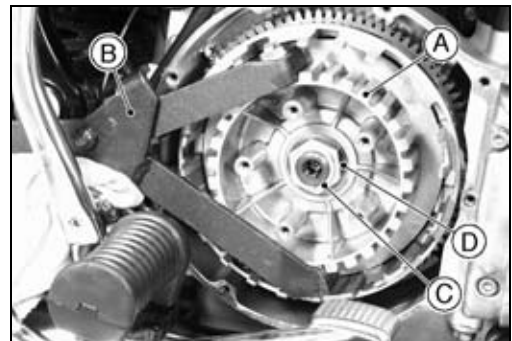


Friction Plates [A]
Steel Plates



- Using the clutch holder [B] to hold the clutch hub [A], remove the clutch hub nut [C] and washer [D].

Special Tool - Clutch Holder: 57001-1243

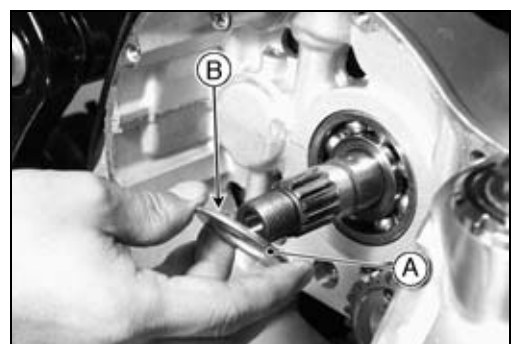


- Pull out the collar [A] from the clutch housing [B], and remove the housing.
- If the collar does not pull out easily, insert a 5 mm bolts [C] into the threaded hole of the collar, and pull out the collar.
- Remove the thrust washer.



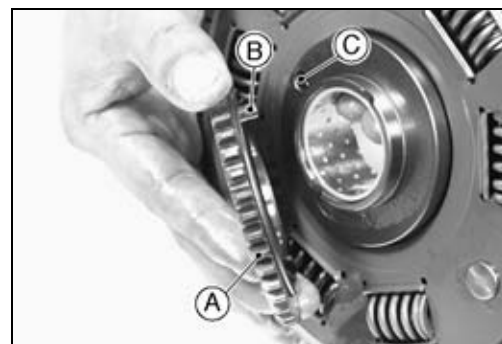
Clutch Installation

- Install the thrust washer [A] by facing its chamfered side [B] towards the crankcase.



Clutch

- Install the oil pump drive gear [A] in the clutch housing.
- Insert the pin [B] of the drive gear into the hole [C] of the clutch housing.
- Apply engine oil to the sliding surface of the clutch housing.
- Install the clutch housing and insert the collar.



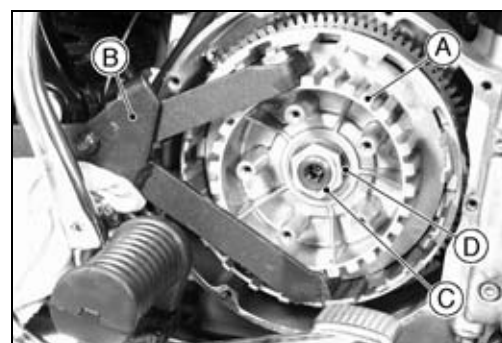
- Insert the clutch hub.
- Install the washer [A] by facing the surface marked OUT-SIDE towards outside.



- Replace the clutch hub nut with new one.
- Using the clutch holder [B] to hold the clutch hub [A], tighten the clutch hub nut [C]. Washer [D]

Special Tool - Clutch Holder: 57001-1243

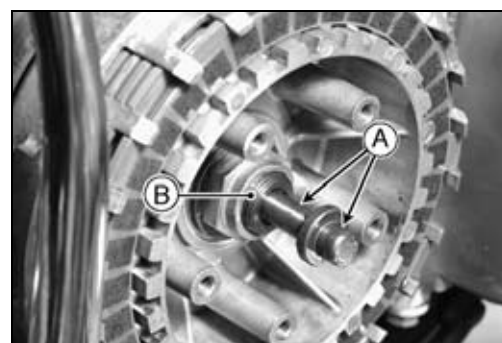
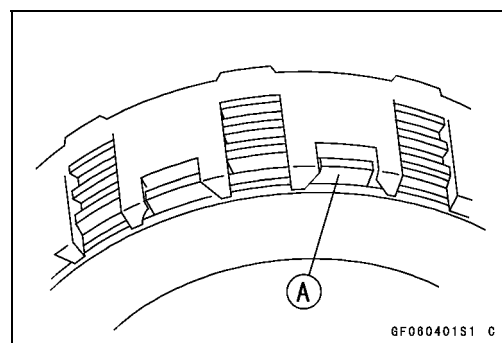
Torque - Clutch Hub Nut: 132 N·m (13.5 kgf·m, 98 ft·lb)



CAUTION

If new dry friction plates and steel plates are used, apply engine oil to the surfaces of each plate before installing them.

- Install the plates alternately in the following order: first the cork-base friction plate, then the steel plate.
- Install the last friction plate [A] by aligning its protrusions with the shallow grooves.
- Apply molybdenum disulfide grease to the pusher [A], and insert the pusher into the output shaft [B].



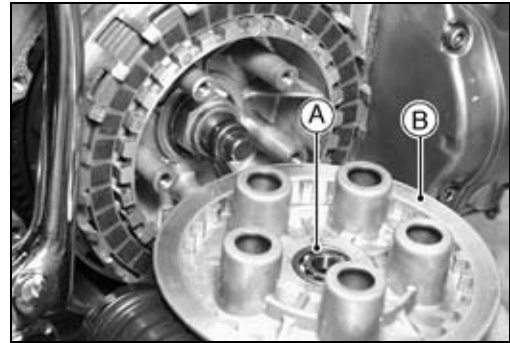
5-12 CLUTCH

Clutch

- Install the spring holder plate after making sure that the bearing [A] is attached to the spring holder plate [B].
- Install the springs and tighten the spring bolts.

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

- Install the clutch cover.



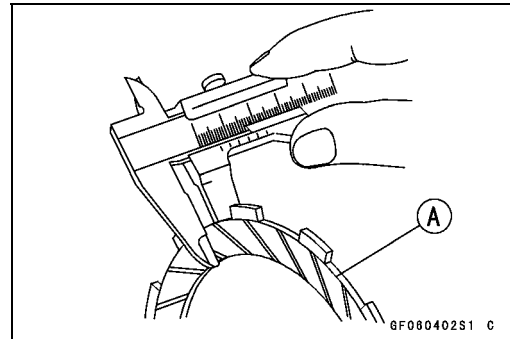
Clutch Plate Wear and Damage Inspection

- Visually inspect the friction and steel plates for signs of wear, discoloration, peeled friction material, or other types of damage.
- ★ If any friction plates show signs of damage, replace the friction plates and steel plates as a set.
- Measure the thickness of the friction plate [A] and steel plate [B] at several places.

Friction Plate Thickness

Standard: 2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)

Service Limit: 2.8 mm (0.11 in.)

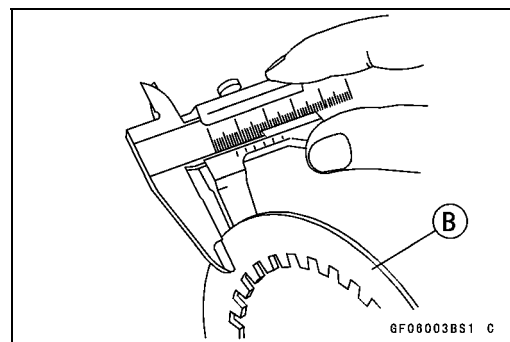


Steel Plate Thickness

Standard: 1.46 ~ 1.74 mm (0.057 ~ 0.069 in.)

Service Limit: 1.36 mm (0.054 in.)

- ★ If the thickness of any plate is smaller than the service limit, replace it with a new one.



Clutch Plate Warp Inspection

- Place each friction plate or steel plate [B] on a surface plate [A].
- Holding the plate, measure the gap between the surface plate and each friction plate or steel plate with a thickness gauge [C].

Friction Plate Warp

Standard: 0.15 mm (0.006 in.) or less

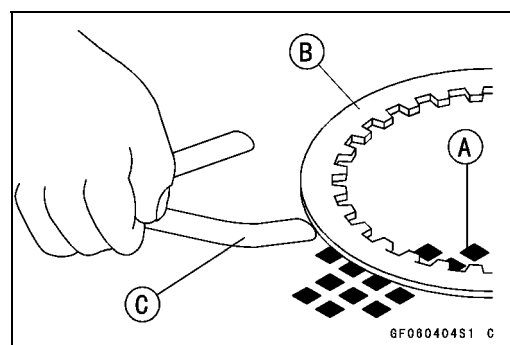
Service Limit: 0.3 mm (0.012 in.)

Steel Plate Warp

Standard: 0.2 mm (0.008 in.) or less

Service Limit: 0.3 mm (0.012 in.)

- ★ If any plate is warped over the service limit, replace it with a new one.



Clutch

Clutch Spring Free Length Inspection

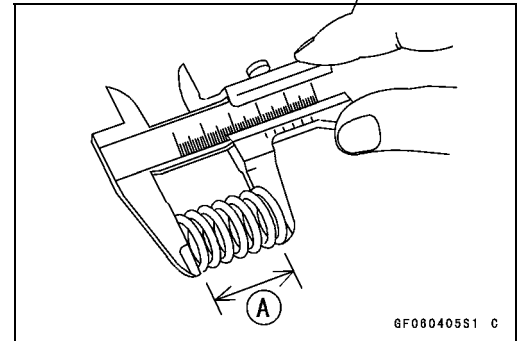
- Measure the free length [A] of the clutch springs.

Clutch Spring Free Length

Standard: 34.2 mm (1.35 in.)

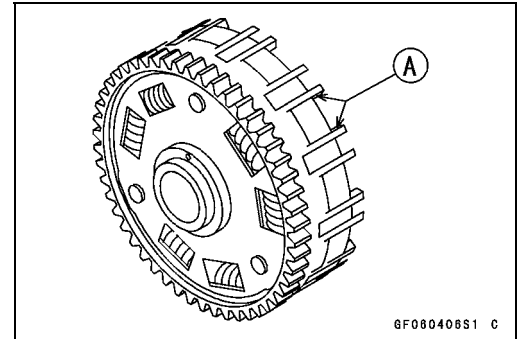
Service Limit: 33.1 (1.30 in.)

- ★ If any clutch spring is shorter than the service limit, it must be replaced.



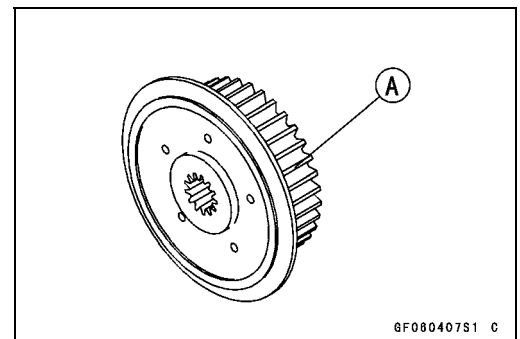
Clutch Housing Finger Damage Inspection

- Visually inspect the clutch housing fingers [A] that come in contact with the friction plate tangs.
- ★ If they are damaged or if there are groove cuts in the areas that come in contact with the tangs, replace the housing. Also, replace the friction plates if their tangs are damaged.



Clutch Hub Spline Damage Inspection

- Visually inspect the areas of the clutch hub splines that come in contact with the teeth of the steel plates.
- ★ If there are notches worn into the clutch hub splines [A], replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



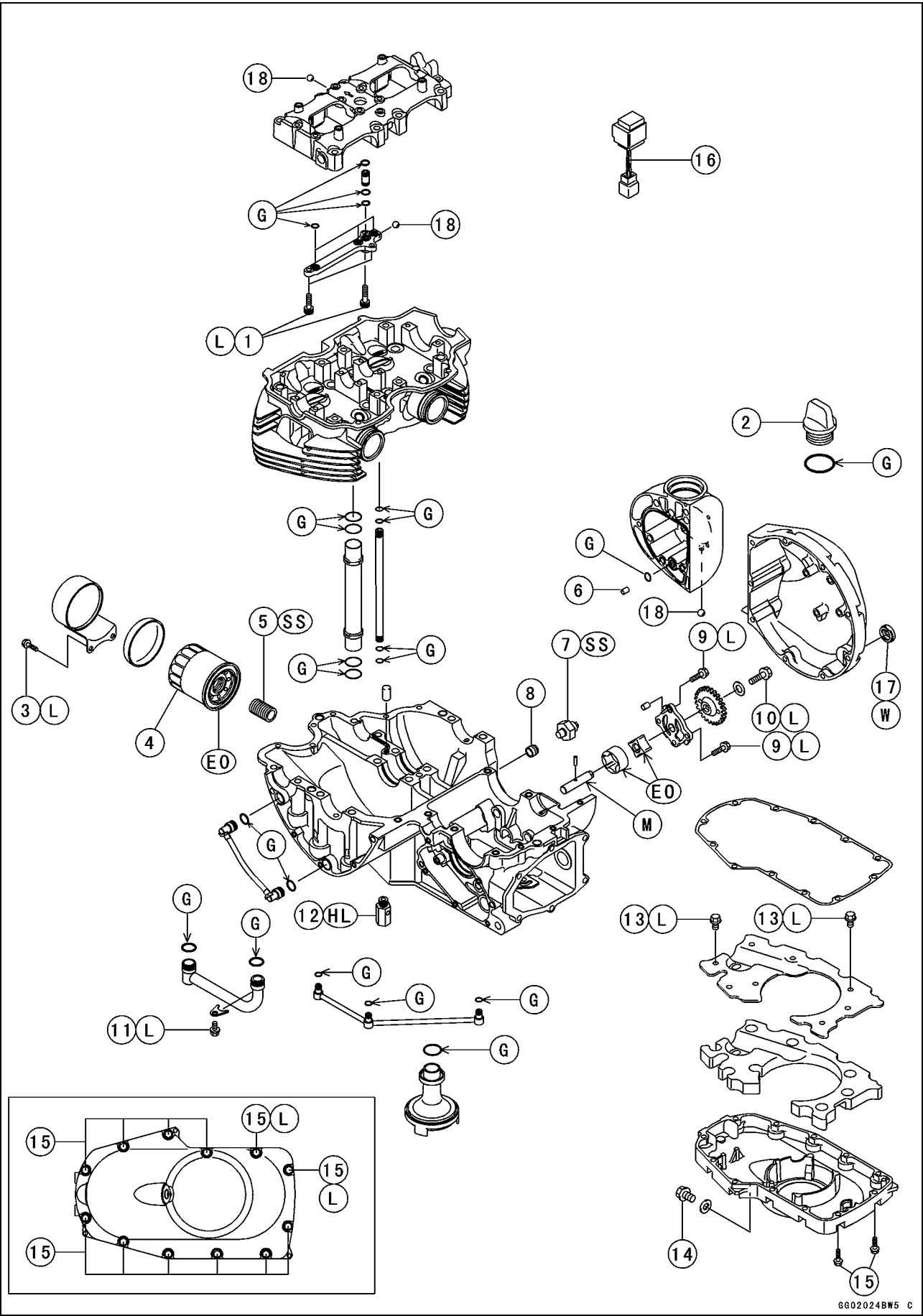
Engine Lubrication System

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6-2 ENGINE LUBRICATION SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Fitting Bracket Bolts	12	1.2	104 in·lb	L
2	Oil Filler Cap	1.5	0.15	13 in·lb	(hand tighten)
3	Oil Filter Cap Bolts	11	1.1	95 in·lb	L
4	Oil Filter (On and after EJ650-A5/C5)	9.8	1.0	87 in·lb	
		18	1.8	13	
5	Oil Filter Passage Pipe	25	2.5	18	SS
6	Oil Passage Nozzle	3.4	0.35	30 in·lb	
7	Oil Pressure Warning Light Switch	15	1.5	11	SS
8	Oil Pressure Warning Light Plug	20	2.0	14	
9	Oil Pump Cover Bolts	9.8	1.0	87 in·lb	L
10	Oil Pump Gear Bolt	12	1.2	104 in·lb	L
11	Oil Pipe Plate Bolt	9.8	1.0	87 in·lb	L
12	Oil Pressure Relief Valve	15	1.5	11	HL
13	Oil Pan Damper Bolts	12	1.2	104 in·lb	L
14	Oil Drain Plug	20	2.0	14	
15	Oil Pan Bolts	12	1.2	104 in·lb	(2, L)

16. Oil Pressure Warning Light Delay Unit

17. Oil Level Gauge

18. Steel Ball

EO: Apply engine oil.

G: Apply grease to the threads.

HL: Apply a high locking agent to the threads.

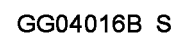
L: Apply a non-permanent locking agent to the threads.

M: Apply molybdenum disulfide grease.

SS: Apply silicon sealant (Kawasaki Bond: 56019-120).

W: Apply water.

Lubrication System Chart



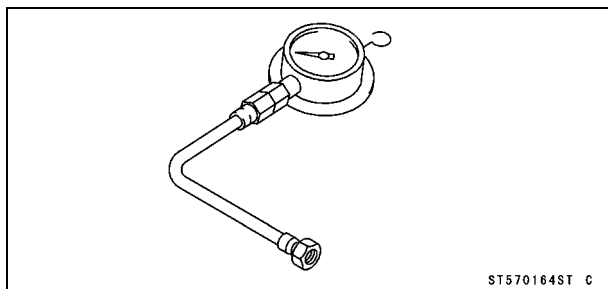
Specifications

Item	Standard
Engine Oil	
Type	API SE, SF, or SG API SH or SJ with JASO MA
Viscosity	SAE 10W-40
Capacity	2.5 L (2.6 US qt) (when filter is not removed) 2.8 L (3.0 US qt) (when filter is removed) 3.0 L (3.2 US qt) (when engine is completely dry)
Level	Between upper and lower level lines
Oil Pressure Measurement	
Oil pressure @4 000 r/min (rpm), oil temperature 135 ~ 140°C (275 ~ 284°F)	127 ~ 183 kPa (1.29 ~1.87 kgf/cm ² , 18 ~ 26 psi)

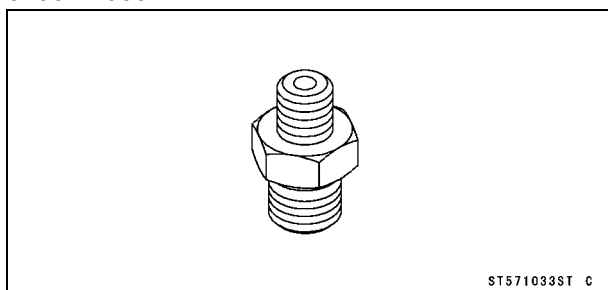
6-6 ENGINE LUBRICATION SYSTEM

Special Tools and Sealant

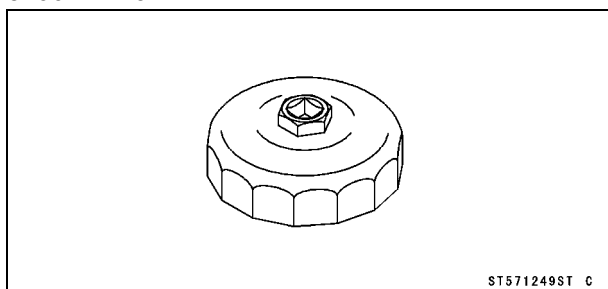
Oil Pressure Gauge, 10 kgf/cm²:
57001-164



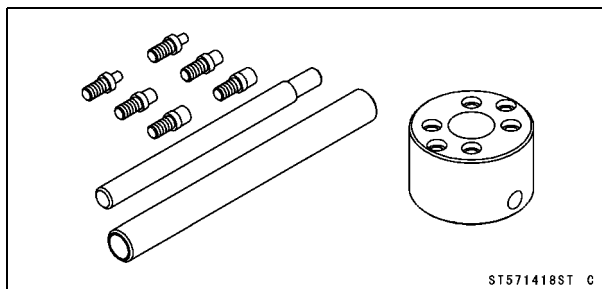
Oil Pressure Gauge Adapter, PT 1/8:
57001-1033



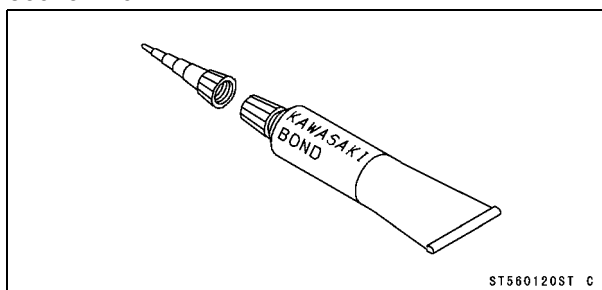
Oil Filter Wrench:
57001-1249



Holder:
57001-1418



Kawasaki Bond (Silicone Sealant):
56019-120



Engine Oil and Oil Filter

⚠ WARNING

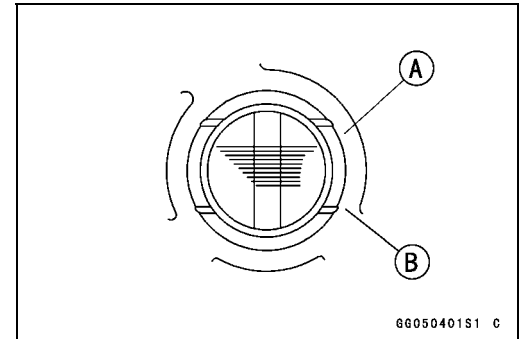
Operating the motorcycle with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, accident, and injury.

Engine Oil Level Inspection

- Set the motorcycle upright.
- Check that the engine oil level is between the upper [A] and lower [B] levels on the gauge.

NOTE

○ If the motorcycle has just been used, wait several minutes to allow the oil level to stabilize. After the oil has been changed, start and warm up the engine for several minutes. Stop the engine, then wait several minutes until the oil level stabilizes.



CAUTION

Warm up the engine at idle. Increasing the engine speed before the oil reaches every part of the engine can lead to engine seizure.

- ★ If the oil level is too high, drain the oil from the filler neck.
- ★ If the oil level is too low, fill with the specified type of oil to the upper level.

Engine Oil Change

- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

Oil Filter Change

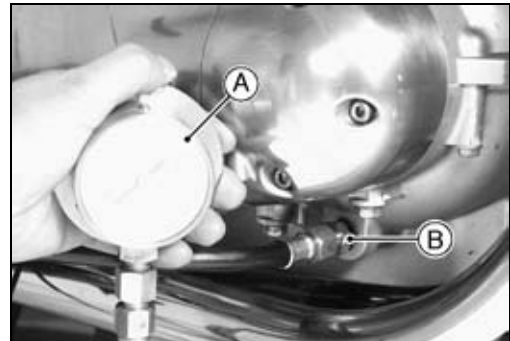
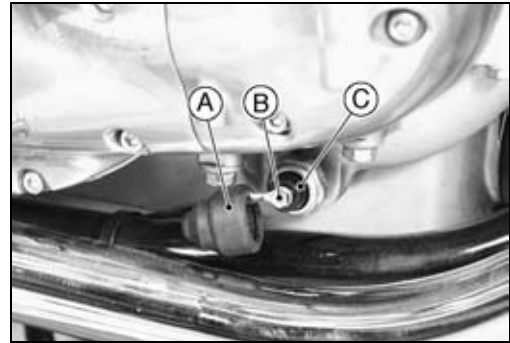
- Refer to the Oil Filter Change in the Periodic Maintenance chapter.

6-8 ENGINE LUBRICATION SYSTEM

Oil Pressure Measurement

Oil Pressure Measurement

- Remove:
 - Rubber Boot [A]
 - Oil Pressure Warning Light Switch Bolt [B]
 - Oil Pressure Warning Light Switch [C]
- Install the oil pressure gauge [A] and the oil pressure gauge adapter [B].
Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164 [A]
Oil Pressure Gauge Adapter, PT 1/8: 57001-1033 [B]
- After fully warming up the engine, read the pressure at an engine speed of 4 000 rpm.



⚠ WARNING

Take care against burns from hot engine oil that will drain through the oil passage.

NOTE

○Fully warm up the engine before measuring the oil pressure.

Oil Pump Discharge Pressure

(engine speed 4 000 rpm, oil temperature 135 ~ 140°C)

Standard: 127 ~ 183 kPa (1.29 ~ 1.87 kgf/cm², 18 ~ 26 psi)

- ★ If the measured oil pressure is considerably lower than the standard, inspect the oil pump and the relief valve. If the oil pump and the relief valve do not exhibit any abnormal conditions, inspect the remaining areas of the lubrication system.
- ★ If the measured oil pressure is considerably higher than the standard, inspect the oil filter and other areas of the lubrication system for contamination or clogging.
- Stop the engine and remove the gauge. Apply silicon sealant to the threaded portion of the oil pressure warning light switch, and tighten the switch.

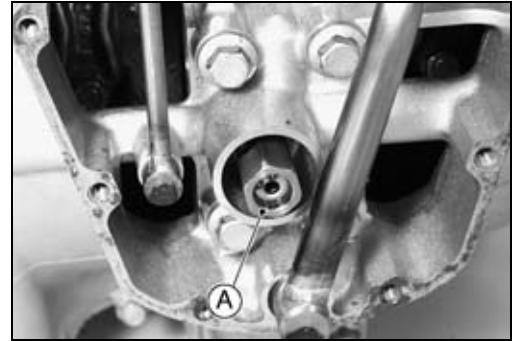
Sealant - Kawasaki Bond (Silicon Sealant): 56019-120

Torque - Oil Pressure Warning Light Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

Oil Pressure Measurement

Relief Valve Inspection

- Remove:
 - Oil Pan (see Oil Pan Removal)
 - Relief Valve [A]



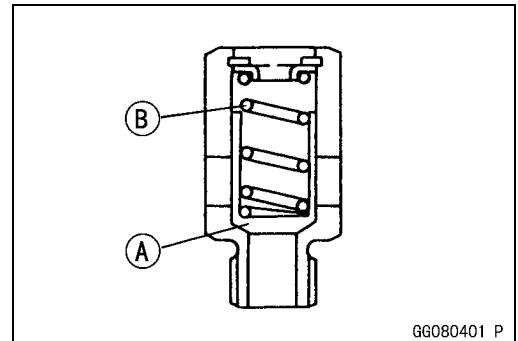
- Using a wooden stick, push the inner valve to make sure that the valve [A] moves smoothly and that it returns to its original position by the force of the spring [B].

NOTE

○ *The relief valve cannot be disassembled and it must be inspected in the assembled state.*

- ★ If the valve movement is not smooth, wash the relief valve with high-flashpoint solvent, and use compressed air to remove any foreign particles from it.
- ★ If the valve does not move smoothly even after washing it, replace the relief valve.
- Apply a high locking agent to the threads of relief valve, and install it with the specified torque.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)



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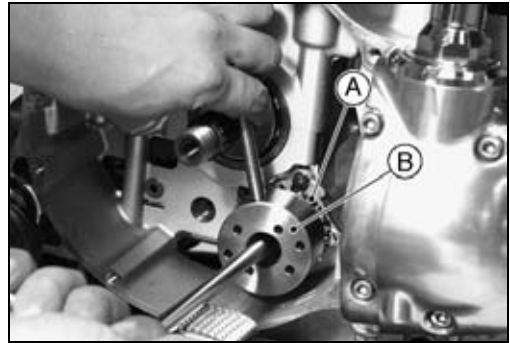
6-10 ENGINE LUBRICATION SYSTEM

Oil Pump

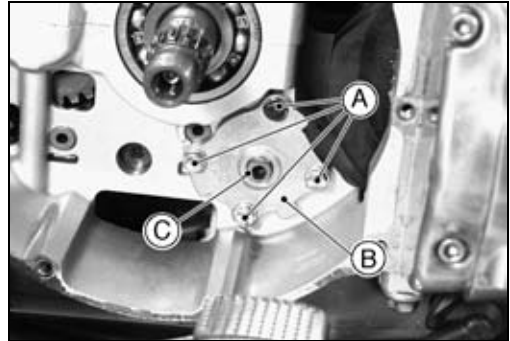
Oil Pump Removal

- Remove:
 - Clutch Cover (see Clutch chapter)
 - Clutch Housing (see Clutch chapter)
- Using the holder [B] to hold the oil pump gear [A], remove the bolt.

Special Tool - Holder: 57001-1418



- Remove the oil pump cover bolts [A], and remove the oil pump cover [B].
- Remove:
 - Oil Pump Shaft [C]
 - Oil Pump Body
 - Rotor



Oil Pump Installation

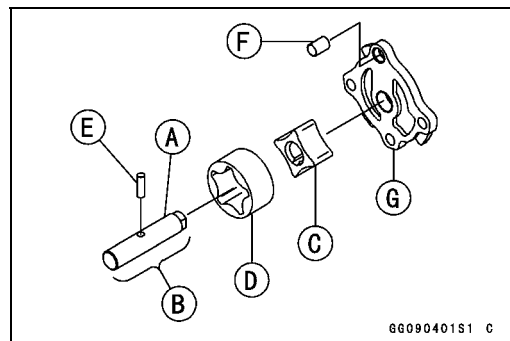
- Apply molybdenum disulfide grease [B] to the oil pump shaft [A].
- Install the rotor [C] and the pump body [D] on the pump shaft.
- Install the pin [E] in the pin hole of the pump shaft, and fit it into the rotor groove.
- Install the pump assembly.
- Install the knock pin [F].
- Install the pump cover [G].
- Apply a non-permanent locking agent to the pump cover bolts and tighten them.

Torque - Oil Pump Cover bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the oil pump gear.
- Place a washer on the oil pump gear bolt and apply a non-permanent locking agent to the bolt.
- Using the holder to hold the oil pump gear, tighten the gear bolt.

Special Tool - Holder: 57001-1418

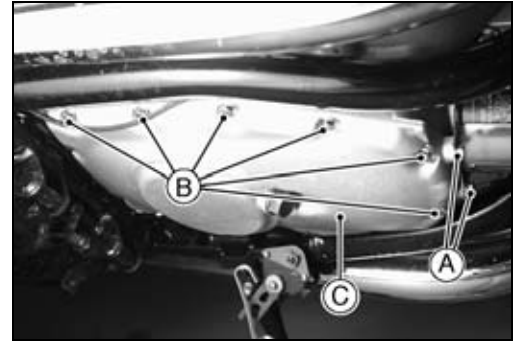
Torque - Oil Pump Gear Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)



Oil Pan

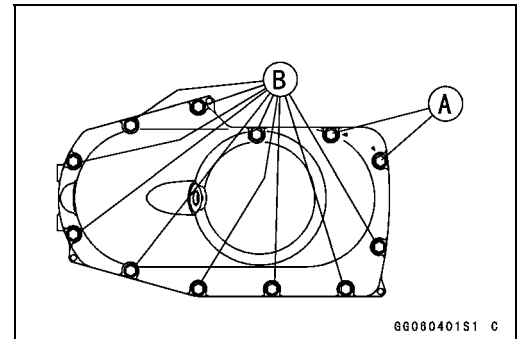
Oil Pan Removal

- Drain:
Engine Oil (see Periodic Maintenance chapter)
- Remove:
Oil Filter Cap Bolts [A]
Bolts [B]
Oil Pan [C]



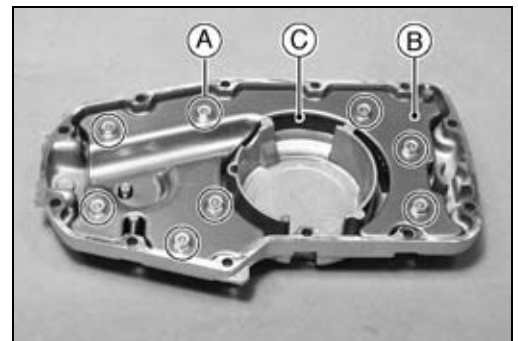
Oil Pan Installation

- Replace the oil pan gasket with a new part.
- Apply a non-permanent locking agent to the two of the oil pan bolts [A].
- Tighten the oil pan bolts [A] [B].
Torque - Oil Pan bolts: 12 N·m (1.2 kgf·m, 104 in·lb)
- Install the oil filter cap bolts (see Oil Filter Change).



Oil Pan Damper Removal

- Remove the oil pan.
- Remove:
Bolts [A]
Plate [B]
Damper [C]



Oil Pan Damper Installation

- Install the removed parts in the reverse order.
- Apply a non-permanent locking agent to the oil pan damper bolts and tighten them.

Torque - Oil Pan Damper Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

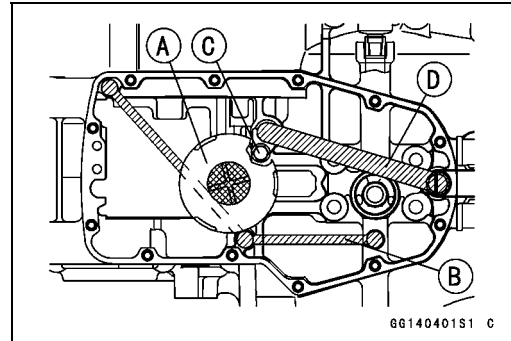
6-12 ENGINE LUBRICATION SYSTEM

Oil Pipes and Oil Fittings

Oil Pipe and Fitting Removal

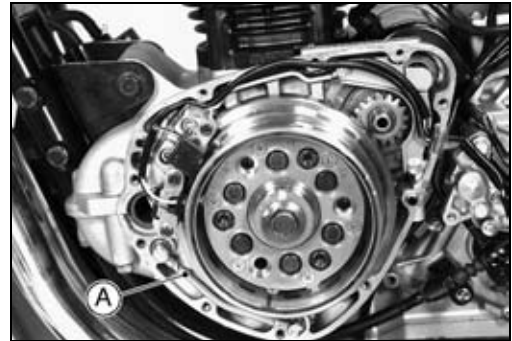
Oil Pipe at Engine Bottom

- Remove:
 - Oil Pan (see Oil Pan Removal)
 - Oil Screen [A]
 - Oil Pipe [B]
 - Oil Pipe Plate Bolt [C]
 - Oil Pipe [D]



Oil Pipe at Alternator

- Remove:
 - Alternator Cover (see Electrical System chapter)
 - Oil Pipe [A]



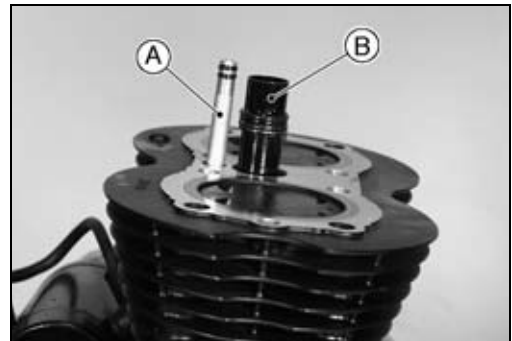
Oil Fitting Pin at Outer Shift Mechanism

- Remove:
 - External Shift Mechanism Cover (see Crankshaft/Transmission chapter)
 - Oil Fitting Pins [A]



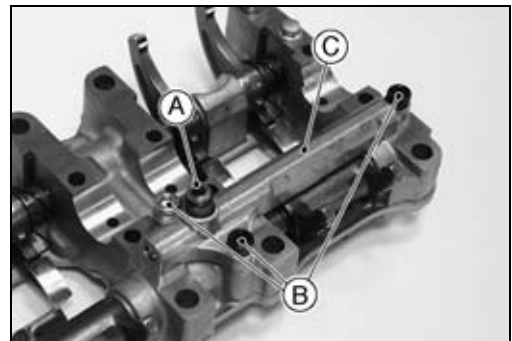
Oil Pump at Cylinder

- Remove:
 - Cylinder Head (see Engine Top End chapter)
 - Pressure Side Oil Pipe [A]
 - Return Side Oil Pipe [B]



Oil Fitting Bracket and Pin at Camshaft Cap

- Remove:
 - Camshaft Cap (see Engine Top End chapter)
 - Oil Fitting Pin [A]
 - Bolts [B]
 - Oil fitting Bracket [C]



Oil Pipes and Oil Fittings

Oil Pipe and Fitting Installation

- Visually inspect the O-rings and replace it if it is damaged.
- Apply grease to the O-rings and install the O-rings.
- Clean the oil screen in solvent.
- Check the oil screen for any damage, holes, or torn mesh.
- Apply a non-permanent locking agent to the oil pipe bolt and oil fitting bracket bolts, and tighten them.

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

Oil Fitting Bracket Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

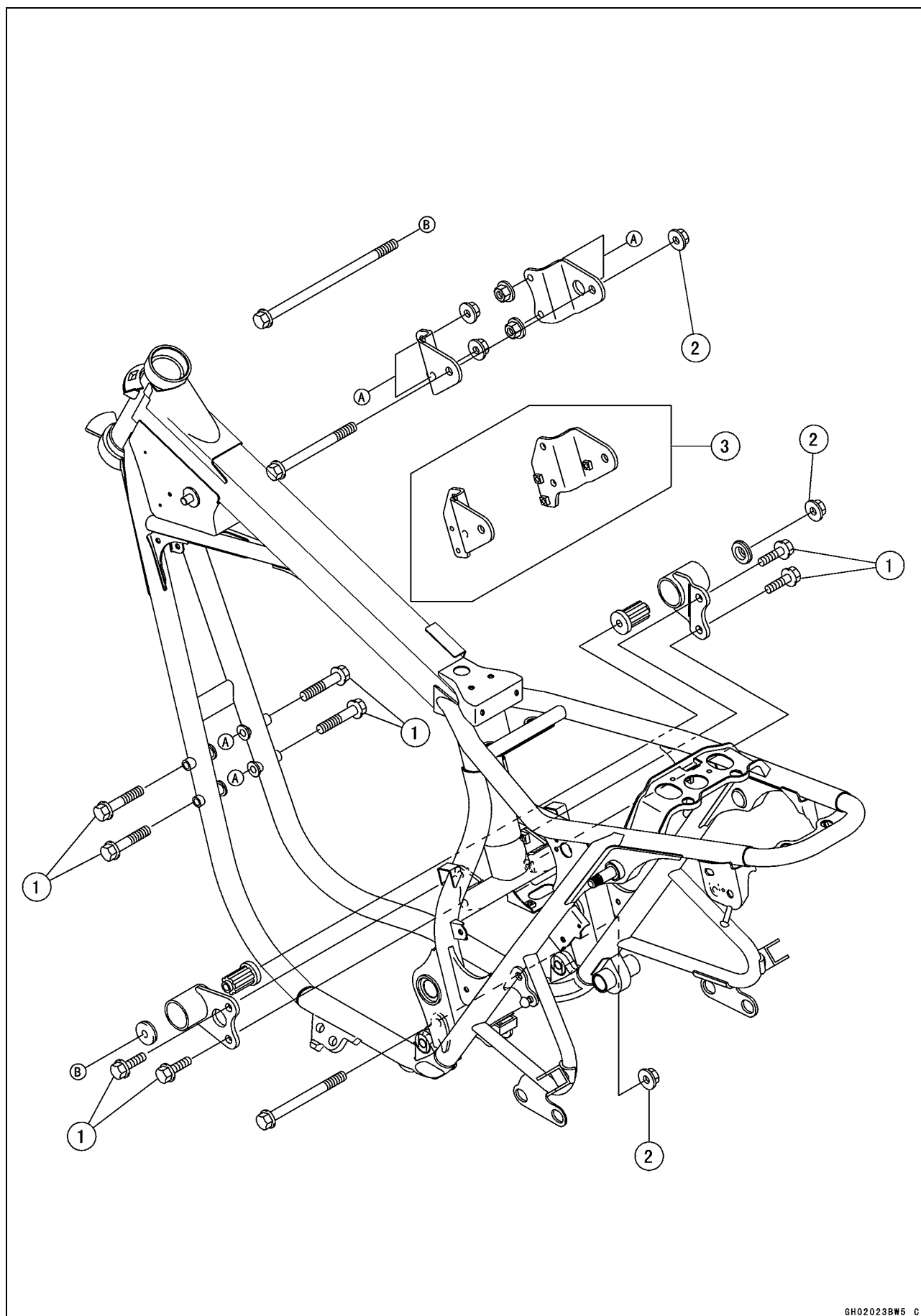
Engine Removal/Installation

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7-2 ENGINE REMOVAL/INSTALLATION

Exploded View



ENGINE REMOVAL/INSTALLATION 7-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Bracket Bolts	25	2.5	18	
2	Engine Mounting Nuts	44	4.5	33	

3. Engine Mounting Bracket (California Model)

7-4 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

Engine Removal

- Set the motorcycle on its center stand, squeeze the front brake lever, and hold it with a band [A] to prevent the motorcycle from lunging forward.

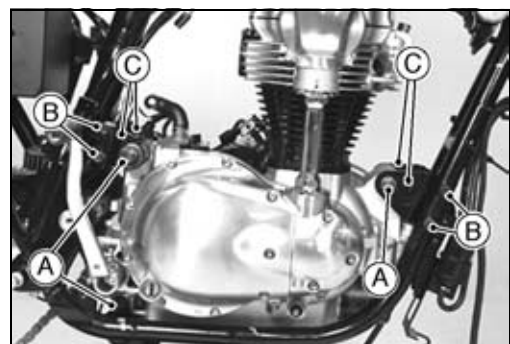
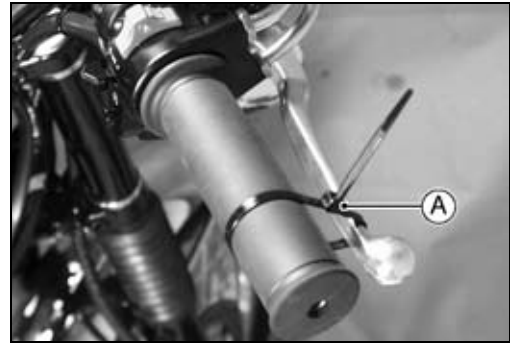
⚠ WARNING

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. It could cause an accident and injury.

CAUTION

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

- Drain the engine oil (see Engine Lubrication System in the Periodic Maintenance chapter).
 - Remove:
 - Seat (see Frame chapter)
 - Fuel Tank (see Fuel System chapter)
 - Muffler (see Engine Top End chapter)
 - Air Cleaner Housing (see Fuel System chapter)
 - Carburetor (see Fuel System chapter)
 - Ignition Coil and Horn (see Electrical System chapter)
 - Right Front Step
 - Brake Pedal (see Brake chapter)
 - Shift Pedal (see Crankshaft/Transmission chapter)
 - Engine Sprocket (see Final Drive chapter)
 - Disconnect the cables and wires that are connected to the engine.
 - Clutch Cable Lower End (see Clutch chapter)
 - Oil Pressure Warning Light Switch Wire
 - Crankshaft Sensor Wire Connector
 - Alternator Wire Connector
 - Speed Sensor Wire Connector
 - Gear Position Switch Wire connector
 - Side Stand Switch Wire Connector
 - Battery Ground Wire (at battery)
 - Starter Motor Wire
 - Remove:
 - Engine Mounting Nut [A]
 - Engine Bracket Bolt [B]
 - Engine Bracket [C]
- While raising the engine, pull out the engine mounting bolts.
- Raise the engine so that the rear bottom area of the engine is higher than the frame bracket (bracket for engine bolt), turn it to the right, and pull out the engine.



Engine Removal/Installation

Engine Installation

- Install the engine from the right side of the frame.
- Place the drive chain on the output shaft before placing the engine in the prescribed position.
- Insert the rear engine mounting bolt from the left.
- Install the engine bracket.
- Temporarily tighten the bolts.
- Tighten the engine mounting bolts.
- Tighten the engine bracket bolts.

Torque - Engine Bracket Bolts: 25 N·m (2.5 kgf·m, 17 ft·lb)

Engine Mounting Bolts, Nuts: 44 N·m (4.5 kgf·m, 33 ft·lb)

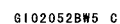
- Refer to the Cable, Wire, and Hose Routing in the Appendix chapter.
- Install the removed parts (see the respective chapters).
- Adjust:
 - Throttle Cables (see Fuel System chapter)
 - Clutch Cable (see Clutch chapter)
 - Drive Chain (see Final Drive chapter)

Crankshaft/Transmission

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Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Connecting Rod Big End Cap Nuts	see the text			
2	Breather Cap Bolts	12	1.2	104 in·lb	
3	Breather Plate Screws	4.9	0.5	43 in·lb	L
4	Return Spring Pin	42	4.3	31	L
5	Kick Shaft Cover Bolts	12	1.2	104 in·lb	
6	External Shift Mechanism Cover Bolts	12	1.2	104 in·lb	
7	Crankcase Upper Retaining Bolt 6 mm	20	2.0	14	
8	Crankcase Upper Retaining Bolt 8 mm	29	3.0	22	
9	Crankcase Lower Retaining Bolts 6 mm	20	2.0	14	
10	Crankcase Lower Retaining Bolts 8 mm	29	3.0	22	S
11	Crankcase Lower Retaining Bolts 9 mm	41	4.2	30	S

CP: Bolt with copper-plated washer.

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent to the threads.

LG: Apply liquid gasket.

M: Apply molybdenum disulfide grease.

MO: Apply molybdenum disulfide oil

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

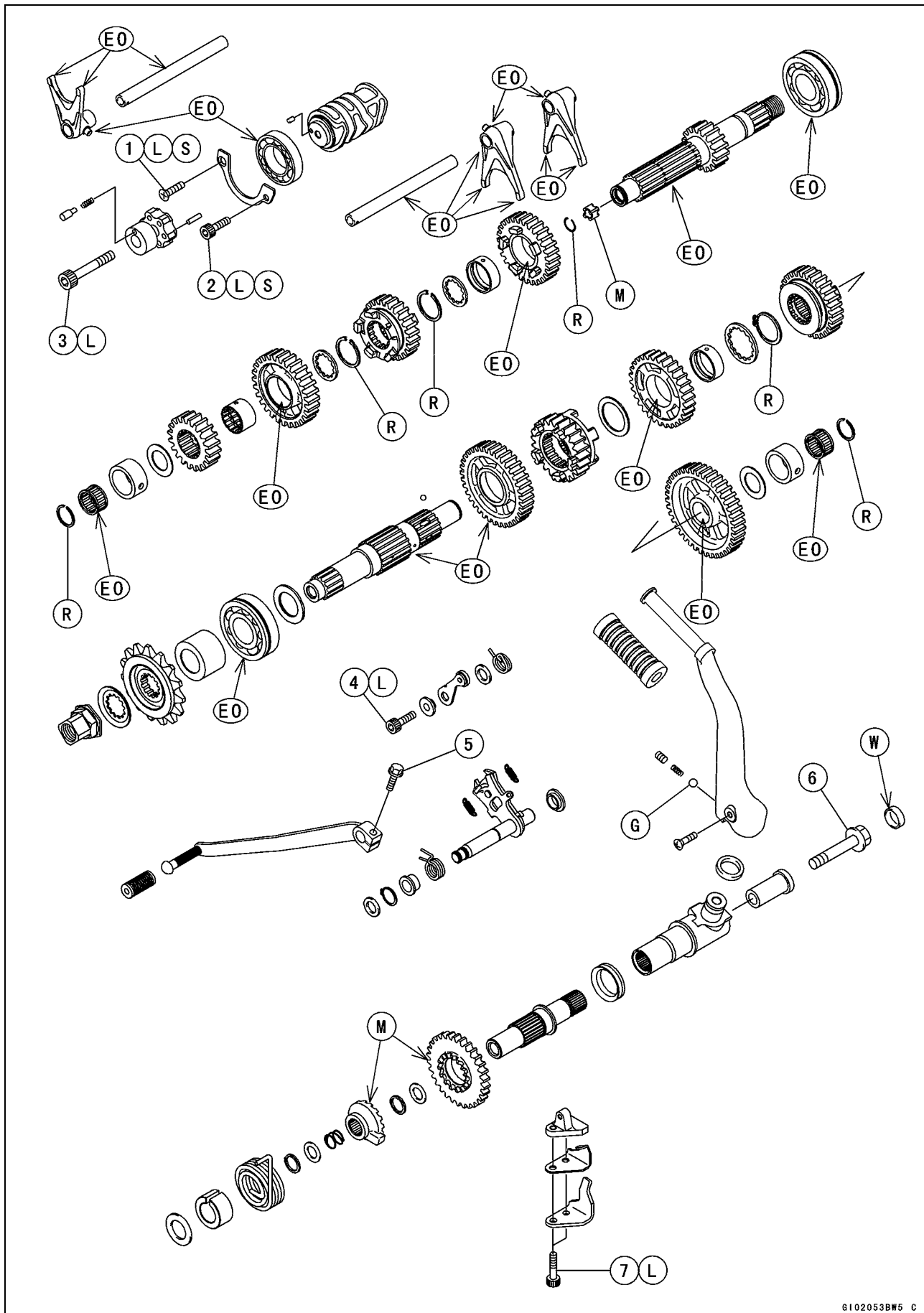
R: Replacement parts

S: Tighten the fasteners following the specified sequence.

W: Apply water.

8-4 CRANKSHAFT/TRANSMISSION

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Shift Drum Bearing Holder Screw	4.9	0.5	43 in·lb	S, L
2	Shift Drum Bearing Holder Bolt	12	1.2	104 in·lb	S, L
3	Shift Drum Cam Bolt	12	1.2	104 in·lb	L
4	Gear Positioning Lever Bolt	12	1.2	104 in·lb	L
5	Shift Pedal Bolt	12	1.2	104 in·lb	
6	Kick Pedal Mounting Bolt	69	7.0	51	
7	Kick Shaft Return Spring Bracket Bolts	12	1.2	104 in·lb	L

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent to the threads.

M: Apply molybdenum disulfide grease.

R: Replacement parts

S: Tighten the fasteners following the specified sequence.

W: Apply water.

8-6 CRANKSHAFT/TRANSMISSION

Specification

Item	Standard	Service Limit																					
Crankshaft, Connecting Rods																							
Connecting Rod Bend	—	0.2/100 mm (0.008/3.937 in.)																					
Connecting Rod Twist	—	0.2/100 mm (0.008/3.937 in.)																					
Connecting Rod Big End Side Clearance	0.03 ~ 0.38 mm (0.0012 ~ 0.0150 in.)	0.50 mm (0.020 in.)																					
Connecting Rod Big End Bearing Insert/Crankpin Clearance	0.017 ~ 0.041 mm (0.0007 ~ 0.0016 in.)	0.08 mm (0.003 in.)																					
Crankpin Diameter:	37.984 ~ 38.000 mm (1.4954 ~ 1.4960 in.)	37.97 mm (1.495 in.)																					
Marking:																							
None	37.984 ~ 37.992 mm (1.4954 ~ 1.4957 in.)	—																					
○	37.993 ~ 38.000 mm (1.4958 ~ 1.4960 in.)	—																					
Connecting Rod Big End Bore Diameter:	41.000 ~ 41.106 mm (1.6142 ~ 1.6183 in.)	—																					
Marking:																							
None	41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)	—																					
○	41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)	—																					
Connecting Rod Big End Bearing Insert Thickness:																							
Brown	1.475 ~ 1.480 mm (0.0580 ~ 0.0583 in.)	—																					
Black	1.480 ~ 1.485 mm (0.0583 ~ 0.0585 in.)	—																					
Blue	1.485 ~ 1.490 mm (0.0585 ~ 0.0587 in.)	—																					
Connecting rod big end bearing insert selection:																							
<table><tr><th rowspan="2">Con-Rod Big End Bore Diameter Marking</th><th rowspan="2">Crankpin Diameter Marking</th><th colspan="2">Bearing Insert</th></tr><tr><th>Size Color</th><th>Part Number</th></tr><tr><td>○</td><td>○</td><td>Black</td><td>92028-1907</td></tr><tr><td>None</td><td>None</td><td rowspan="2">Blue</td><td rowspan="2">92028-1906</td></tr><tr><td>○</td><td>None</td></tr><tr><td>None</td><td>○</td><td>Brown</td><td>92028-1908</td></tr></table>				Con-Rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert		Size Color	Part Number	○	○	Black	92028-1907	None	None	Blue	92028-1906	○	None	None	○	Brown	92028-1908
Con-Rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert																					
		Size Color	Part Number																				
○	○	Black	92028-1907																				
None	None	Blue	92028-1906																				
○	None																						
None	○	Brown	92028-1908																				
Crankshaft Side Clearance	0.05 ~ 0.20 mm (0.002 ~ 0.008 in.)	0.40 mm (0.016 in.)																					
Crankshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.05 mm (0.002 in.)																					
Crankshaft Main Bearing Insert/Journal Clearance	0.016 ~ 0.040 mm (0.0006 ~ 0.0016 in.)	0.07 mm (0.003 in.)																					
Crankshaft Main Journal Diameter:	37.984 ~ 38.000 mm (1.4954 ~ 1.4960 in.)	37.96 mm (1.494 in.)																					

Specification

Item	Standard	Service Limit	
Marking: None	37.984 ~ 37.992 mm (1.4954 ~ 1.4957 in.)	—	
1	37.993 ~ 38.000 mm (1.4958 ~ 1.4960 in.)	—	
Crankshaft Main Bearing Bore Diameter:	41.000 ~ 41.016 mm (1.6142 ~ 1.6148 in.)	—	
Marking: ○	41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)	—	
None	41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)	—	
Crankshaft Main Bearing Insert Thickness:			
Brown	1.490 ~ 1.494 mm (0.0587 ~ 0.0588 in.)	—	
Black	1.494 ~ 1.498 mm (0.0588 ~ 0.0590 in.)	—	
Blue	1.498 ~ 1.502 mm (0.0590 ~ 0.0591 in.)	—	
Crankshaft Main Bearing Insert Selection:			
Crankcase Main Bearing Bore Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	1	Brown	92028-1905
None	None	Blue	92028-1903
None	1		
○	None	Black	92028-1904
Balancer shaft			
Balancer Shaft Bearing Insert/Journal Clearance	0.016 ~ 0.038 mm (0.0006 ~ 0.0015 in.)	0.07 mm (0.003 in.)	
Balancer Shaft Journal Diameter:	27.987 ~ 28.000 mm (1.1018 ~ 1.1024 in.)	27.96 mm (1.101 in.)	
Marking: None	27.987 ~ 27.993 mm (1.1018 ~ 1.1021 in.)	—	
○	27.994 ~ 28.000 mm (1.1021 ~ 1.1024 in.)	—	
Crankcase Bearing Bore Diameter:	31.000 ~ 31.016 mm (1.2205 ~ 1.2211 in.)	—	
Marking: ○	31.000 ~ 31.008 mm (1.2205 ~ 1.2208 in.)	—	
None	31.009 ~ 31.016 mm (1.2208 ~ 1.2211 in.)	—	

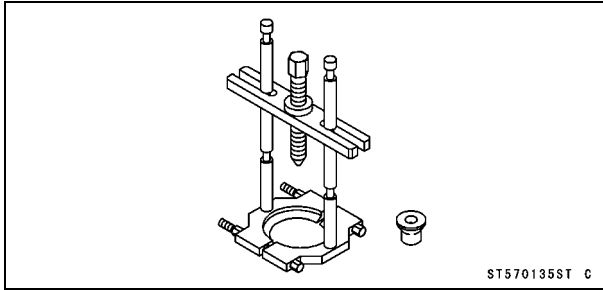
8-8 CRANKSHAFT/TRANSMISSION

Specification

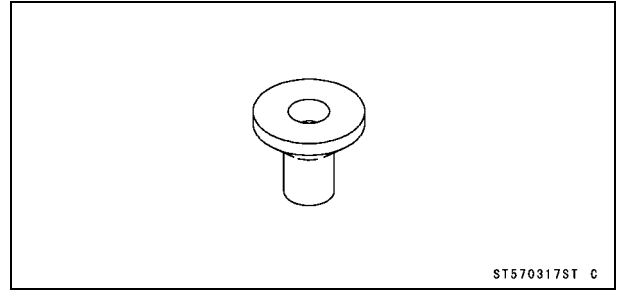
Item	Standard	Service Limit	
Balancer Shaft Bearing Insert Thickness:			
Brown	1.490 ~ 1.494 mm (0.0587 ~ 0.0588 in.)	—	
Black	1.494 ~ 1.498 mm (0.0588 ~ 0.0590 in.)	—	
Blue	1.498 ~ 1.502 mm (0.0590 ~ 0.0591 in.)	—	
Balancer Shaft Bearing Insert Selection:			
Crankshaft Bearing Bore Diameter Marking	Balancer shaft Journal Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1911
None	None	Blue	92028-1909
None	○	Black	92028-1910
○	None		
Transmission			
Shift Fork Ear Thickness	5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)	5.8 mm (0.23 in.)	
Gear Groove Width	6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)	6.3 mm (0.25 in.)	
Shift Fork Guide Pin Diameter	5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)	5.8 mm (0.23 in.)	
Shift Drum Groove Width	6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)	6.3 mm (0.25 in.)	

Special Tools and Sealant

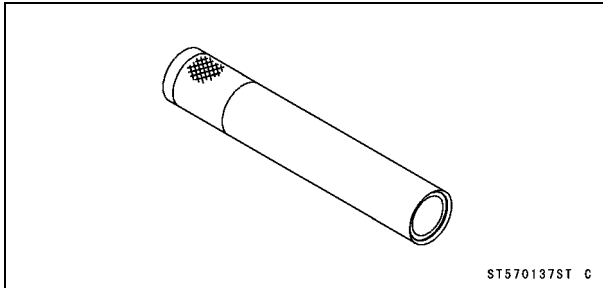
Bearing Puller:
57001-135



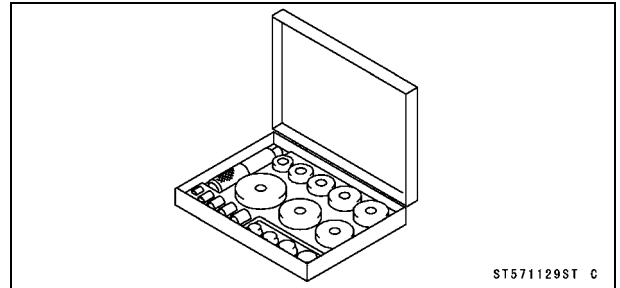
Bearing Puller Adapter:
57001-317



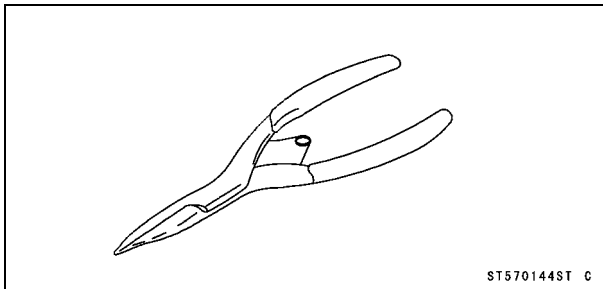
Steering Stem Bearing Driver:
57001-137



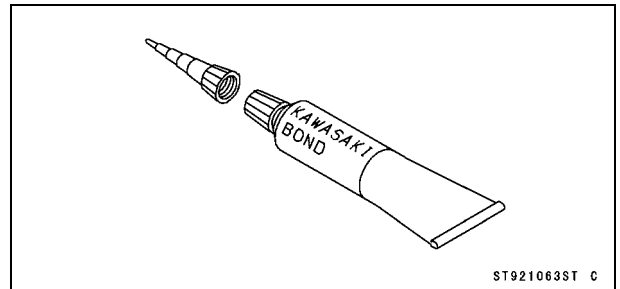
Bearing Driver Set:
57001-1129



Outside Circlip Pliers:
57001-144



Kawasaki Bond (Liquid Gasket - Gray):
92104-1063

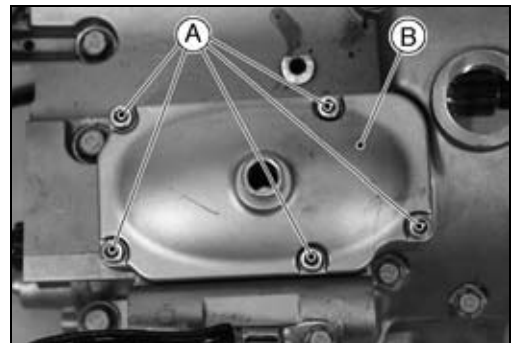


8-10 CRANKSHAFT/TRANSMISSION

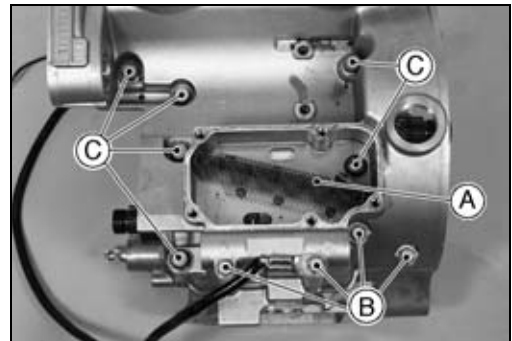
Crankcase

Crankcase Disassembly

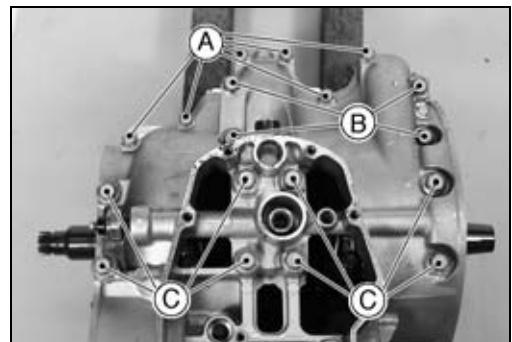
- Remove the engine (see Engine Removal/Installation chapter).
- Place the engine securely on a clean work bench, and remove the following parts:
 - Starter Motor, Alternator, Crankshaft Sensor (see Electrical System chapter)
 - Clutch Cover (see Clutch chapter)
 - Bevel Gear Case (see Engine Top End chapter)
 - Kick Shaft Cover (see Kick Shaft Assembly Removal)
- ★ To remove the crankshaft, remove the pistons (see Engine Top End chapter).
- ★ To remove the driveshaft, remove the clutch (see Clutch chapter).
- Remove the breather cap bolts [A] and remove the breather cap [B].



- Pull out the breather separator [A].
- Remove the upper crankcase bolts in the following order:
 - 6 mm bolts [B]
 - 8 mm bolts [C]
- Turn the engine upside down and remove the following parts:
 - Oil Pan (see Engine Lubrication System chapter)
 - Oil Pipes (see Engine Lubrication System chapter)
 - Oil Screen (see Engine Lubrication System chapter)



- Remove the lower crankcase bolts in the following order:
 - 6 mm bolts [A]
 - 8 mm bolts [B] (12 → 9)
 - 9 mm bolts [C] (8 → 1)



- Using a plastic hammer, lightly tap on the bosses near the mating surface of the crankcase to separate the lower crankcase half.

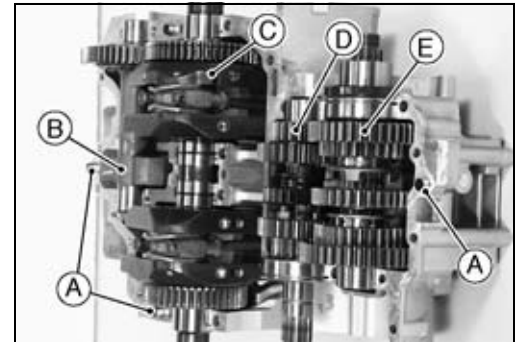
Crankcase

Crankcase Assembly

CAUTION

The upper and lower halves of the crankcase are machined together, so they must be replaced as a set.

- Remove the liquid gasket from the crankcase mating surfaces and wash it off with high-flash-point solvent.
- Use compressed air to clean the oil passages.
- Apply engine oil to the sliding areas of the crankcase.
- Make sure that the following parts are correctly installed in the upper crankcase half:
 - Knock Pins [A]
 - Crankshaft Assembly [B]
 - Balancer Shaft Assembly [C]
 - Driveshaft Assembly [D]
 - Output Shaft Assembly [E]



- Make sure that the punch mark [A] on the crankshaft balancer drive gear is aligned with the punch mark [A] on the balancer gear.

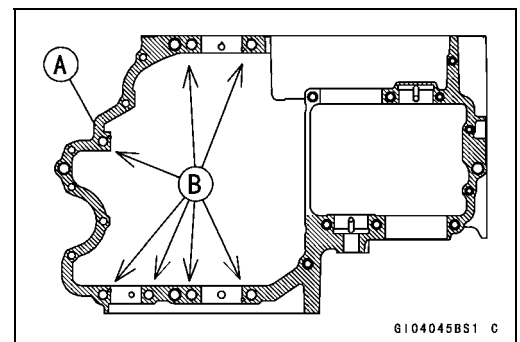


- Place the shift drum in neutral.
- Apply liquid gasket [A] to the mating surface of the lower crankcase half.

Sealant - Kawasaki Bond (Liquid Gasket): 92014-1063

CAUTION

Do not apply liquid gasket to the areas indicated [B], such as the mating surfaces near the crankshaft main bearing or the balancer shaft bearing.



- Apply molybdenum disulfide grease to the crankshaft thrust surface (see Crankshaft Installation).
- Attach the lower and upper crankcase halves together.
- Fit the shift fork ears into the grooves of the respective gears.

8-12 CRANKSHAFT/TRANSMISSION

Crankcase

- Tighten the lower crankcase bolts in the following sequence:
 - Dry the seat surfaces for the 6 mm bolts.
 - Temporarily tighten all bolts. Place copper-plated washers on the nine bolts shown.

NOTE

○ Insert the bolts into the holes with appropriate lengths.

- Tighten the 9 mm bolts to the specified torque in sequence 1 ~ 8.

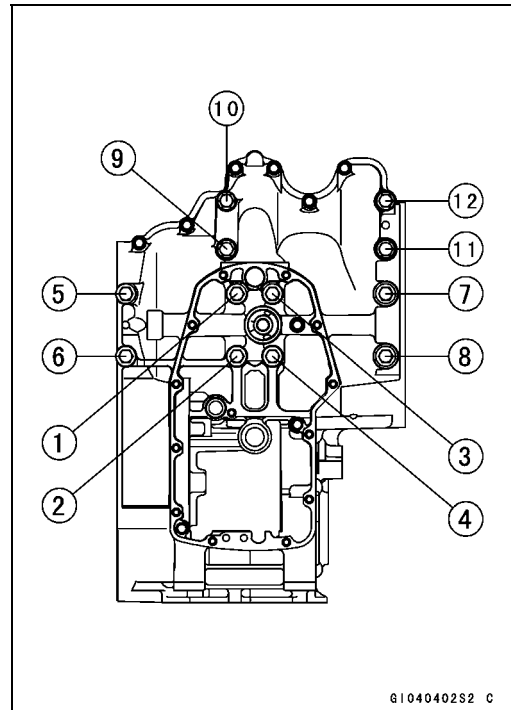
Torque - Crankcase Lower Retaining Bolts (9 mm): 41 N·m (4.2 kgf·m, 30 ft·lb)

- Tighten the 8 mm bolts to the specified torque in sequence 9 ~ 12.

Torque - Crankcase Lower Retaining Bolts (8 mm): 29 N·m (3.0 kgf·m, 22 ft·lb)

- Tighten the 6 mm bolts to the specified torque.

Torque - Crankcase Lower Retaining Bolts (6 mm): 20 N·m (2.0 kgf·m, 14 ft·lb)



- Tighten the upper crankcase bolts in the following sequence:
 - 8 mm bolts [A, B]
 - 6 mm bolts [C]
- The 8 mm bolts [A] have copper-plated washers.
- Dry the bolt seat surfaces.
- Tighten the 6 mm bolt [D] together with the engine ground cable.
- Tighten the 6 mm bolt [E] together with the clamp.

Torque - Crankcase Upper Retaining Bolts (8 mm): 29 N·m (3.0 kgf·m, 22 ft·lb)

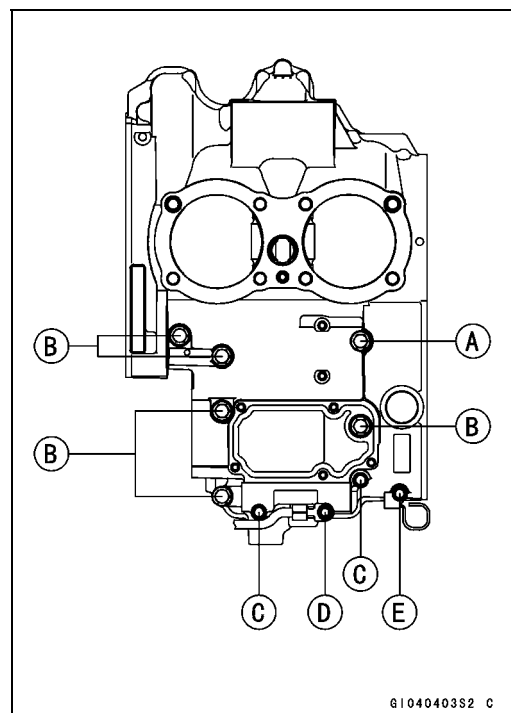
Crankcase Upper Retaining Bolts (6 mm): 20 N·m (2.0 kgf·m, 14 ft·lb)

- After tightening all the crankcase bolts, check the following:
 - The shift drum is in neutral.
 - The drive shaft and the output shaft rotate smoothly.
 - The gears shift smoothly from 1st to 5th, and from 5th to 1st, while the output shaft is being rotated. When the output shaft is stationary, the gears can be shifted to 1st and neutral, but not to 2nd and higher gears.
 - The crankshaft and the balancer shaft rotate smoothly.

- Install the breather separator and install the breather cap.

Torque - Breather Cap Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

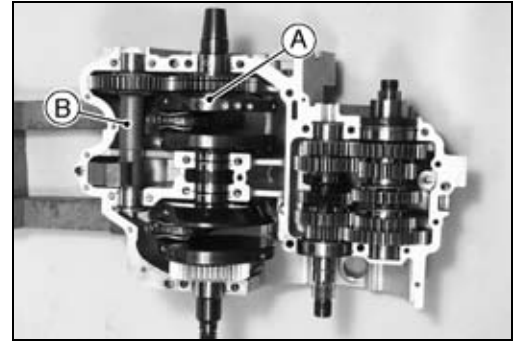
- Install the removed parts.



Crankshaft/Connecting Rod

Crankshaft Removal

- Separate the crankcase halves (see Crankcase Disassembly).
- Remove:
 - Crankshaft [A]
 - Balancer Shaft [B]

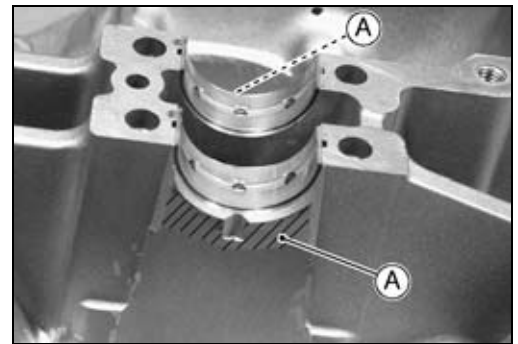


Crankshaft Installation

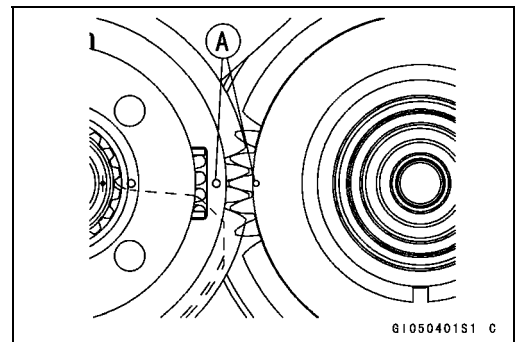
CAUTION

If the crankshaft, main bearing inserts, or the crankcase is replaced with a new parts, select the main bearing inserts and check clearance with plastigage before assembling engine to be sure the correct bearing inserts are installed.

- Apply engine oil to the sliding areas of the crankshaft.
- Apply molybdenum disulfide grease to the crankshaft thrust surfaces [A] of the crankcase.



- Align the punch mark [A] on the crankshaft balancer drive gear with the punch mark [A] on the balancer gear.
- Install the crankcase (see Crankcase Assembly).



8-14 CRANKSHAFT/TRANSMISSION

Crankshaft/Connecting Rod

Connecting Rod Removal

- Separate the crankcase halves (see Crankcase Disassembly).
- Remove the nuts from the big end of the connecting rod, and remove the connecting rod, cap, and the big end bearing inserts.
- Remove the crankshaft (see this chapter).

NOTE

○ *Mark and record the locations of the connecting rods and their caps so that they can be reassembled in their original positions.*

CAUTION

Replace the connecting rod bolts with new ones. Do not allow the connecting rod bolts to scratch the crankpin surface by coming in contact with the crankpin.

Connecting Rod Installation

CAUTION

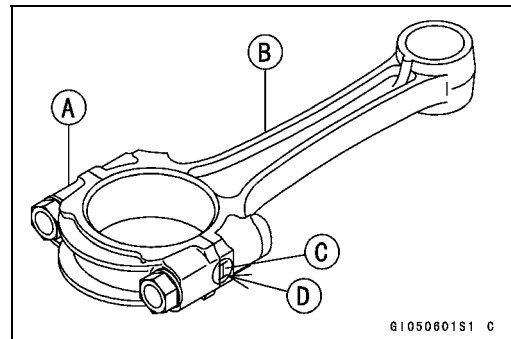
Use two connecting rods from the same weight classification.

Big End Cap [A]

Connecting Rod [B]

Weight Classification mark [C]: A letter of the alphabet

Bore Mark [D]: "○" or no mark



CAUTION

If a connecting rod, big end bearing inserts, or the crankshaft are replaced with a new parts, select the big end bearing inserts and check clearance with a plastigage before assembling engine to be sure the correct bearing inserts are installed.

⚠ WARNING

Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. This includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvents to clean them.

- Thoroughly wash the new connecting rods, bolts, and nuts to remove the rust-preventive oil from them.
- Immediately dry the bolts and nuts with compressed air after cleaning.

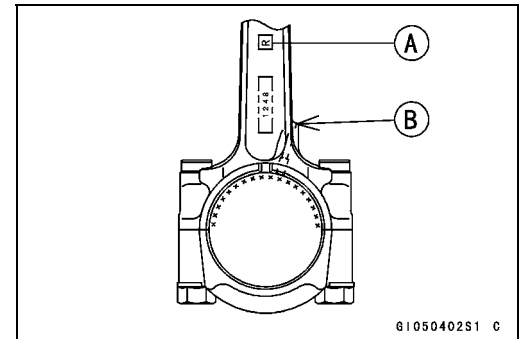
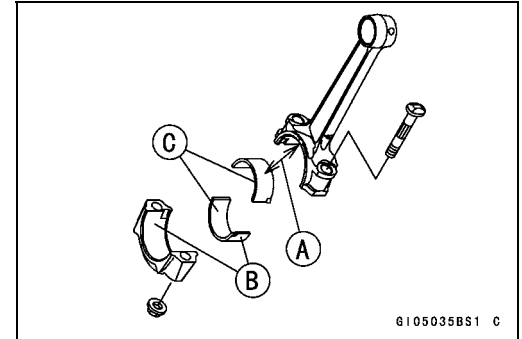
Crankshaft/Connecting Rod

Apply molybdenum disulfide grease [A].
Do not apply grease or oil to this area [B].
Apply molybdenum disulfide oil [C].

CAUTION

Do not apply grease to the inner surface of the upper or lower bearing inserts or to the outer surface of the lower bearing insert.

- Install the connecting rod with its "R" [A] facing the right side of the engine, on the crankpin.
- The oil injection hole [B] faces the exhaust.



- There are two methods for tightening the big end nuts of a connecting rod: **the bolt length measuring method** and **the tightening torque method**.

CAUTION

The connecting rod bolts must not be reused because they undergo a permanent elongation once they have been tightened to a specified torque. Make sure to replace the bolts with new ones. The bolts must also be replaced if the nuts have been overtightened.

8-16 CRANKSHAFT/TRANSMISSION

Crankshaft/Connecting Rod

(1) Bolt length Measurement Method (point-type micrometer necessary)

- Using a punch, make a depression on both ends of the connecting rod bolt.
- Apply molybdenum desulfide oil to the threads and seating surface of the connecting rod nuts.
- Using the point-type micrometer, measure the bolt length before tightening it.

Connecting Rod [A]

Use a punch to make a depression [B].

Nuts [C]

Place the micrometer against the depression [D].

- Tighten the nuts so that the bolts stretch will be within the service limit shown in the table below.

(Bolt length after tightening)-(bolt length before tightening)

= bolt stretch

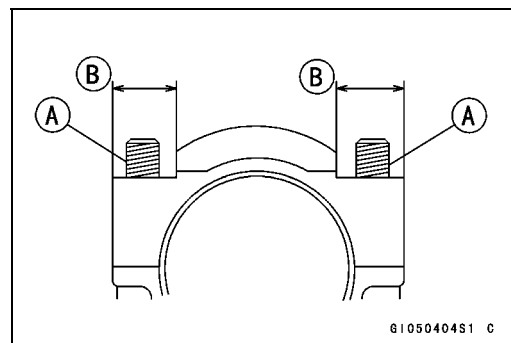
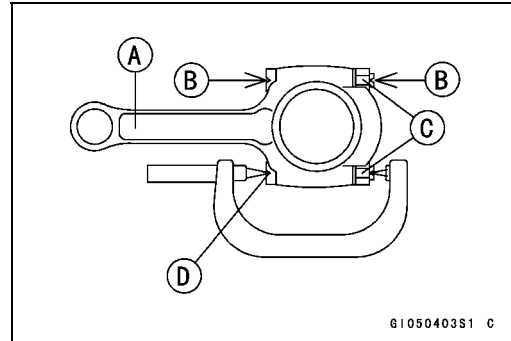
- ★ Replace the bolts that have stretched over the service limit.

Connecting Rod Bolt Stretch

Connecting Rod Assembly	Bolt	Nut	Bolt Stretch (service limit)
New Part	Bolts provided with new connecting rod assembly	Nuts provided with new connecting rod assembly	0.20 ~ 0.32 mm (0.008 ~ 0.013 in.)
		New Part (unused part)	
Reused Part	New Part (unused part)	Reused Part	0.24 ~ 0.36 mm (0.009 ~ 0.014 in.)
		New Part (unused part)	

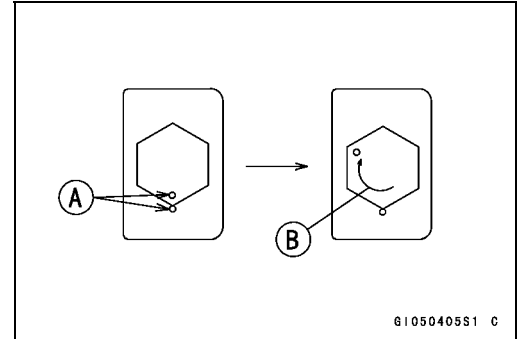
(2) Tightening Torque Method (point-type micrometer unnecessary)

- Apply molybdenum desulfide oil to the following:
Connecting Rod Bolt Threads [A]
Nut Seating Surfaces [B]



Crankshaft/Connecting Rod

- Tighten the connecting rod big end nuts to the specified torque shown in the following table.
- Place a mark [A] on one corner of the nut and on the big end cap.
- After tightening the nut, tighten it two additional corners (120°) [B].



Connecting Rod Big End Nut Tightening Torque and Angle

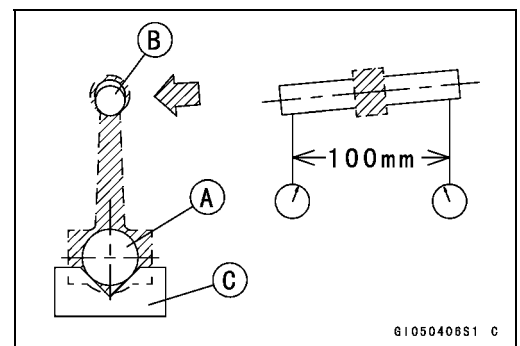
Connecting Rod Assembly	Bolt	Nut	Tightening Torque + Tightening Angle
New Part	Bolts provided with new connecting rod assembly	Nuts provided with new connecting rod assembly	18 N·m (1.8 kgf·m, 13 ft·lb) +120°
		New Part (unused part)	20 N·m (2.0 kgf·m, 15 ft·lb) +120°
Reused Part	New Part (unused part)	Reused Part	24 N·m (2.4 kgf·m, 17 ft·lb) +120°
		New Part (unused part)	25 N·m (2.6 kgf·m, 19 ft·lb) +120°

CAUTION

Since the friction force of the seating surface and thread portion of new nuts is different from that of used ones, the nut tightening torque should be changed as specified in the above table.
Be careful not to overtighten the nuts.

Connecting Rod Bend Inspection

- Remove the connecting rod big end bearing inserts, and install the 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 (3.937 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on the V blocks [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the small end arbor above the surface plate over a distance of 100 mm (3.937 in.) to determine the amount of the connecting rod bend.



Connecting Rod Bend

Standard: 0.2/100 mm (0.008/3.937 in.)

- ★ If the connecting rod bend exceeds the service limit, the connecting rod must be replaced.

8-18 CRANKSHAFT/TRANSMISSION

Crankshaft/Connecting Rod

Connecting Rod Twist Inspection

- With the big-end arbor [A] still on V blocks [C], hold the connecting rod horizontally. Measure the amount that the small end arbor [B] varies from being parallel with the surface plate over a 100 mm (3.937 in.) length of the arbor, to determine the amount of the connecting rod twist.

Connecting Rod Twist

Standard: 0.2/100 mm (0.008/3.937 in.)

- ★ If the connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Big End Side Clearance Inspection

- Measure the connecting rod big end side clearance [A].
- Insert a thickness gauge [B] between the big end and the crank web to determine clearance.

Connecting Rod Big End Side Clearance

Standard: 0.03 mm ~ 0.38 mm (0.0012 ~ 0.0150 in.)

Service Limit: 0.50 mm (0.020 in.)

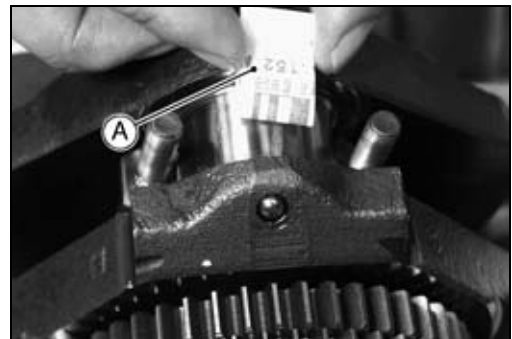
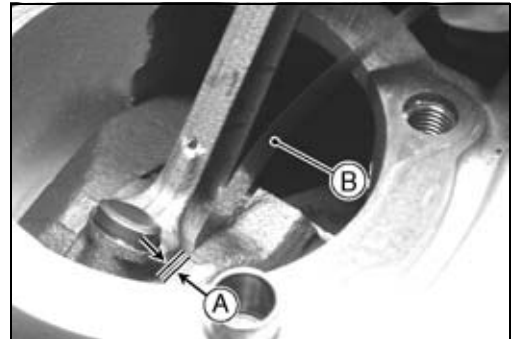
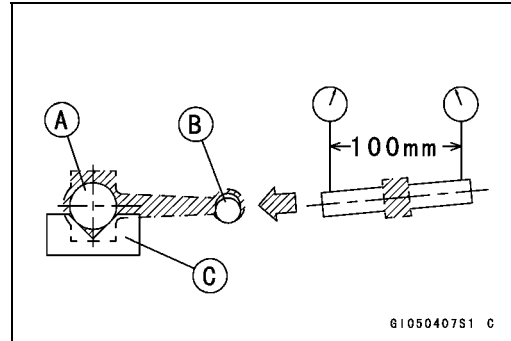
- ★ If the clearance exceeds the service limit, replace the connecting rod with a new one and then check the clearance again. If the clearance is too large after replacing the connecting rod, the crankshaft also must be replaced.

Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection

- Using a plastigage [A], measure the clearance between the big end bearing insert and the crankpin.

NOTE

- Tighten the connecting rod big end nuts to the specified torque. During measurement, do not turn the connecting rod or the crankshaft.



CAUTION

After the measurement, replace the connecting rod bolts.

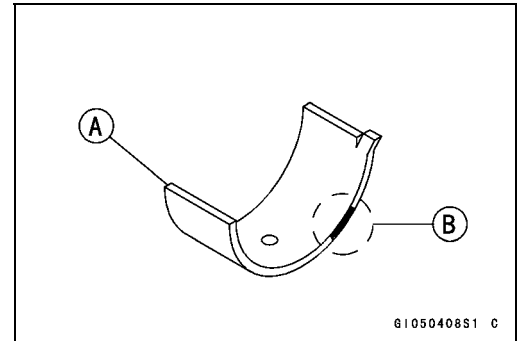
Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: 0.017 ~ 0.041 mm (0.0007 ~ 0.0016 in.)

Service Limit: 0.08 mm (0.003 in.)

Crankshaft/Connecting Rod

- ★ If the clearance is within the standard, it is not necessary to replace the bearing insert.
- ★ If the clearance is between the upper standard limit (0.042 mm (0.0016 in.)) and the service limit (0.08 mm (0.003 in.)), replace the bearing inserts [A] with inserts painted blue [B], and remeasure the clearance. 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: 37.984 ~ 38.000 mm (1.4954 ~ 1.4960 in.)

Service Limit: 37.97 mm (1.495 in.)

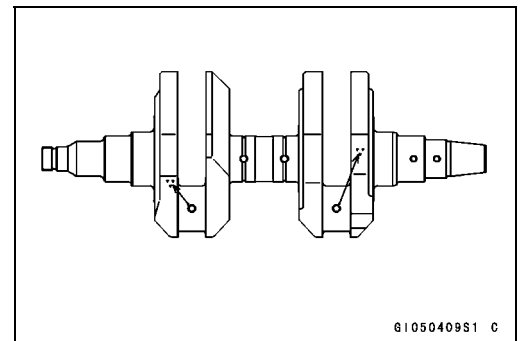
- ★ If any crankpin has worn past the service limit, replace the crankshaft with a new one.
- ★ If the measured crankpin diameters are within the service limit, but have worn to the extent that they do not coincide with the original diameter markings on the crankshaft, make new marks.

Crankpin Diameter Marks

None: 37.984 ~ 37.992 mm (1.4954 ~ 1.4957 in.)

○: 37.993 ~ 38.000 mm (1.4958 ~ 1.4960 in.)

△: Crankpin diameter mark (or no mark)



- Measure the connecting rod big end bore, and mark each connecting rod big end in accordance with the bore diameter.

Big End Cap [A]

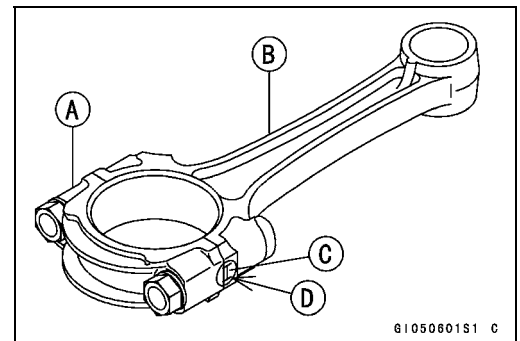
Connecting Rod [B]

Weight Classification mark [C]: A letter of the alphabet

Bore Mark [D]: "○" or no mark

NOTE

- Tighten the connecting rod big end nuts to the specified torque. The big end bore of the connecting rod should be barely worn.



Connecting Rod Big End Bore Mark

None: 41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)

○: 41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)

- Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft markings.

8-20 CRANKSHAFT/TRANSMISSION

Crankshaft/Connecting Rod

- Install a new bearing inserts in the connecting rod and measure the clearance between the bearing and the crankpin.

Connecting Rod Big End Bore Mark	Crankpin Diameter Mark	Connecting Rod Big End Bearing Insert	
		Thickness Mark (color-coded)	Part Number
○	○	Black	9208-1907
None	None		
○	None	Blue	9208-1906
None	○	Brown	9208-1908

Crankshaft Side Clearance Measurement

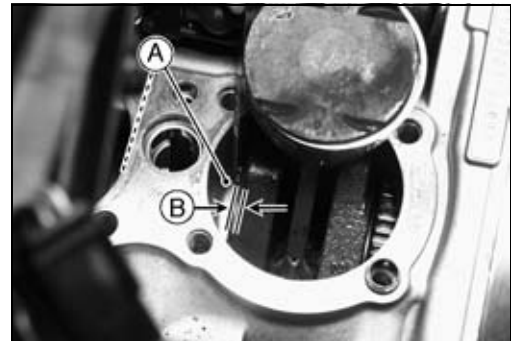
- Insert a thickness gauge between the crank web and the crankcase end at the center journal [A] to measure their clearance [B].

Crankshaft Side Clearance

Standard: 0.05 ~ 0.20 mm (0.002 ~ 0.008 in.)

Service Limit: 0.40 mm (0.016 in.)

- ★ If the clearance exceeds the service limit, replace the crankcase halves as a set.



Crankshaft Runout Inspection

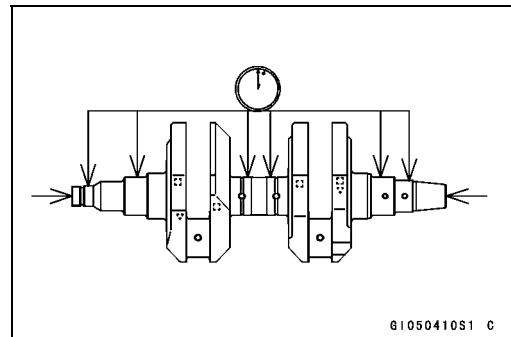
- Place the crankshaft on a flywheel alignment jig.
- Set a dial gauge on the bearing journal.
- Turn the crankshaft slowly to measure the runout. The difference (TIR) between the maximum and minimum values read on the dial gauges is the amount of runout.

Crankshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.05 mm (0.002 in.)

- ★ If the runout exceeds the service limit, replace the crankshaft.



Crankshaft Main Bearing Insert/Journal Wear Inspection

- Using a plastigage [A], measure the clearance between the main bearing insert and the journal [B].

NOTE

- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).
- Do not move the crankshaft during clearance measurement.
- Although a journal clearance of less than 0.025 mm (0.0010 in.) cannot be measured with plastigage, the standard value can be ensured by installing the bearing in accordance with the crankshaft main bearing selection chart.



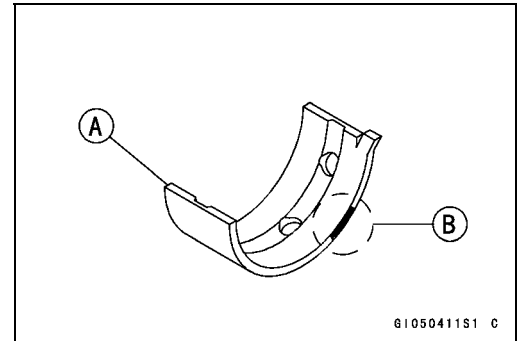
Crankshaft Main Bearing Insert/Journal Clearance

Standard: 0.016 mm ~ 0.040 mm (0.0006 ~ 0.0016 in.)

Service Limit: 0.07 mm (0.003 in.)

Crankshaft/Connecting Rod

- ★ If the clearance is within the standard, no bearing insert replacement is required.
- ★ If the clearance is between the upper standard limit (0.041 mm (0.0016 in.)) and the service limit (0.07 mm (0.003 in.)), replace the bearing inserts [A] with bearing inserts painted blue [B], and remeasure the clearance. 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: 37.984 ~ 38.000 mm (1.4954 ~ 1.4960 in.)

Service Limit: 37.96 mm (1.494 in.)

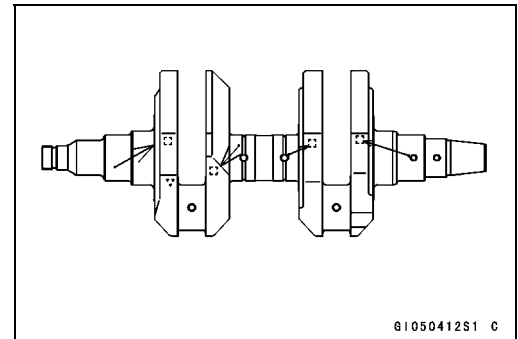
- ★ If the main journal is worn beyond the service limit, replace the crankshaft with a new part.
- ★ If the measured main journal diameters are within the service limit, but have worn to the extent that they do not coincide with the original diameter markings on the crankshaft, make new marks.

Crankshaft Main Journal Diameter Marks

None: 37.984 ~ 37.992 mm (1.4954 ~ 1.4957 in.)

1: 37.993 ~ 38.000 mm (1.4958 ~ 1.4960)

□: Crankshaft main journal diameter mark: none, or [1]



- Measure the crankcase main bearing bore and mark [A] the upper crankcase half in accordance with the measured bore.

Bore mark: "○" or none

NOTE

- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).

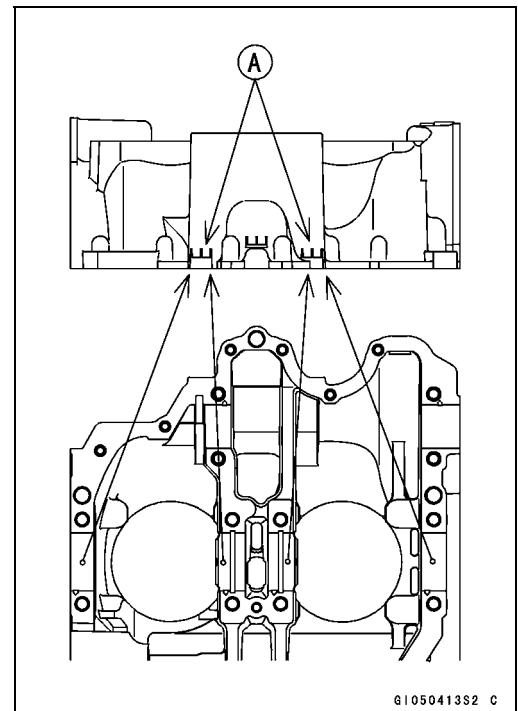
The main bearing bore should be barely worn.

Crankcase Main Bearing Bore Mark

○: 41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)

None: 41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)

- Select the proper bearing inserts in accordance with the combination of the crankcase and crankshaft markings.
- Install new bearing inserts in the crankcase and measure the clearance between the journal and the bearing insert.
- When installing the bearing inserts, make sure not to scrape the back of the insert with the edge of the crankcase bearing.



8-22 CRANKSHAFT/TRANSMISSION

Crankshaft/Connecting Rod

Crankshaft Main Bearing Selection

Crankcase Main Bearing Bore Mark	Crankshaft Main Journal Diameter Mark	Crankshaft Main Bearing Insert	
		Thickness Mark (color -coded)	Part Number
○	1	Brown	9208-1905
None	None	Blue	9208-1903
None	1	Black	9208-1904
○	None		

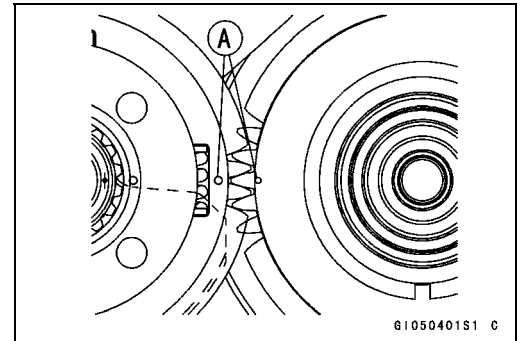
Balancer

Balancer Removal

- Separate the crankcase halves.
- Pull the balancer shaft, together with the balancer gears, upward from the crankcase.

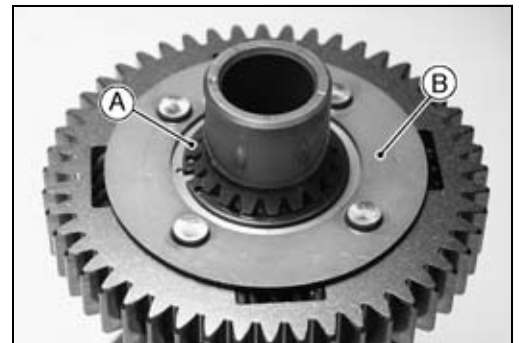
Balancer Installation

- Apply molybdenum disulfide oil to the inside of the bearing insert of the balancer shaft.
- Align the punch mark [A] of the balancer drive gear and the punch mark [A] of the balancer gear and install the gears.
- Assemble the crankcase (see Crankcase Assembly).



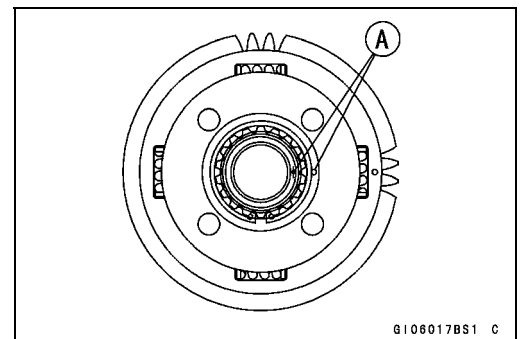
Balancer Gear Removal

- Remove the balancer shaft.
- Remove the circlip [A].
- Remove the balancer gear [B].



Balancer Gear Installation

- Align the punch mark [A] of the balancer shaft with the punch mark [A] of the balancer gear and assemble them.

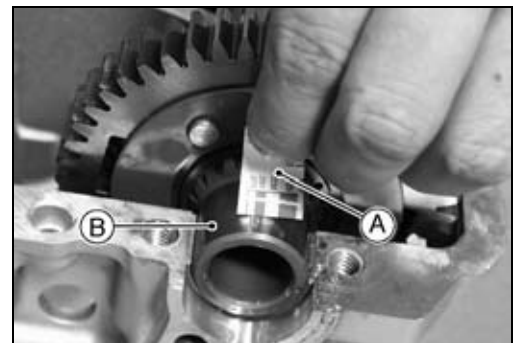


Balancer Shaft Bearing Insert/Journal Wear Inspection

- Using a plastigage [A], measure the clearance between the bearing insert and the journal [B].

NOTE

- Tighten the crankcase bolts to the specified torque. Do not turn the crankshaft during measurement.



Balancer Shaft Bearing Insert/Journal Clearance

Standard: 0.016 ~ 0.038 mm (0.0006 ~ 0.0015 in.)

Service Limit: 0.07 mm (0.003 in.)

8-24 CRANKSHAFT/TRANSMISSION

Balancer

- ★ If the clearance is within the standard, it is not necessary to replace the bearing inserts.
- ★ If the clearance is between the upper standard limit (0.039 mm (0.0015 in.)) and the service limit (0.07 mm (0.003 in.)), replace the bearing inserts [A] with the bearing inserts painted blue [B], and remeasure the clearance. 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.

Balancer Shaft Journal Diameter

Standard: 27.987 ~ 28.000 mm (1.1018 ~ 1.1024 in.)

Service Limit: 27.96 mm (1.101 in.)

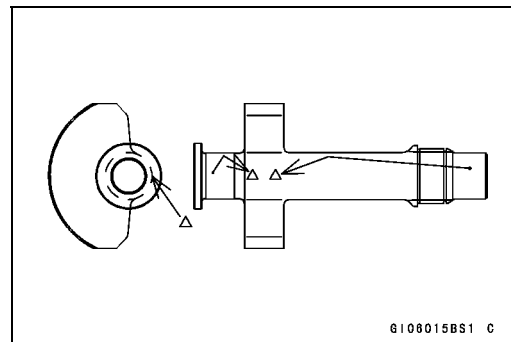
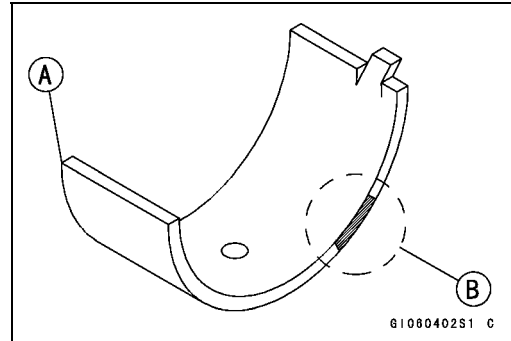
- ★ If the journal is worn beyond the service limit, replace the balancer shaft with a new part.
- ★ If the measured journal diameter is within the service limit, but has worn to the extent that it does not coincide with the original diameter marking, make a new mark.

Balancer Shaft Journal Diameter Mark

None: 27.987 ~ 27.993 mm (1.1018 ~ 1.1021 in.)

○: 27.994 ~ 28.000 mm (1.1021 ~ 1.1024 in.)

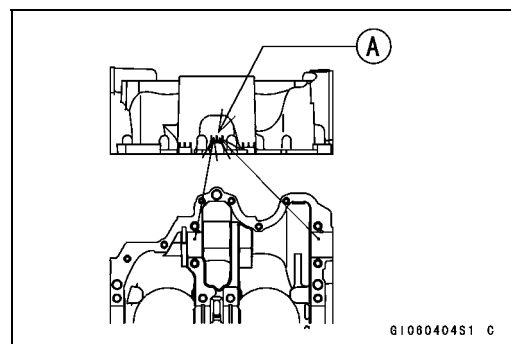
△: Balancer shaft journal diameter mark: no mark or "○"



- Measure the bearing bore diameter of the crankcase, and mark [A] the upper crankcase half in accordance with the measured bore.
Bore: "○" or no mark

NOTE

- Tighten the crankcase bolts to the specified torque. There should be practically no difference between the mark indicated on the upper crankcase half and the measured value.



Crankcase Bearing Bore Diameter Mark

○: 31.000 ~ 31.008 mm (1.2205 ~ 1.2208 in.)

None: 31.009 ~ 31.016 mm (1.2208 ~ 1.2211 in.)

Balancer

- Select the proper bearing inserts in accordance with the combination of the crankcase and balancer shaft markings.
 - Install new bearing inserts in the crankcase and measure the clearance between the journal and the bearing insert.
- When installing the bearing inserts, make sure not to scrape the back of the insert with the edge of the crankcase bearing.

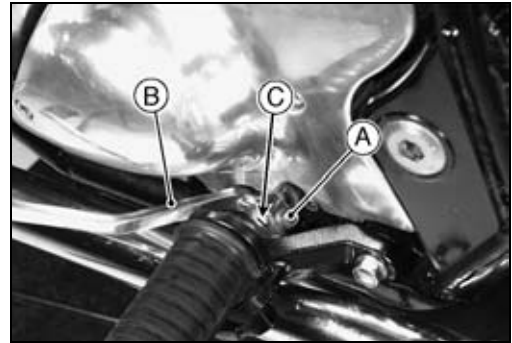
Balancer Shaft Diameter Mark	Crankcase Bore Mark	Balancer Shaft Bearing Insert	
		Thickness Mark (color-coded)	Part Number
○	○	Brown	9208-1911
None	None		
○	None	Blue	9208-1909
None	○	Black	9208-1910

8-26 CRANKSHAFT/TRANSMISSION

Transmission

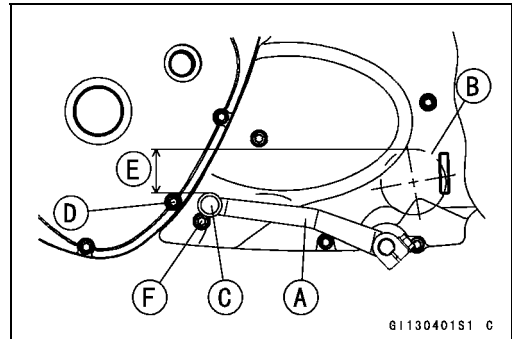
Shift Pedal Removal

- Remove the bolt [A] and take out the shift pedal [B].
- Mark [C] the shift shaft so that the shift pedal can be re-installed in its original position.



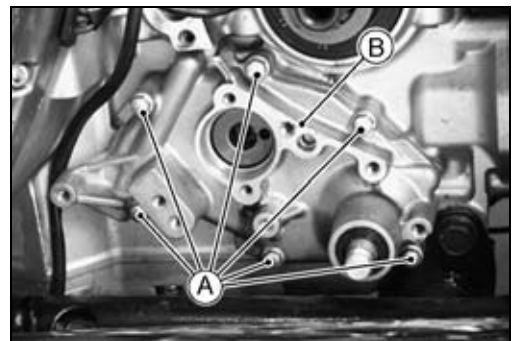
Shift Pedal Installation

- Install the shift pedal [A] at the position shown.
 - Left, Front Footpeg [B]
 - Shift Pedal Front Footpeg [C]
 - Alternator Bolt [D]
 - 31 mm (1.22 in.) [E]
 - Sprocket Cover Bolt [F]
- Tighten:
 - Torque - Shift Pedal Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)**

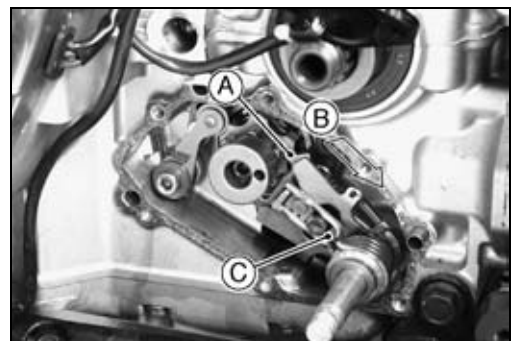


External Shift Mechanism Removal

- Remove:
 - Engine Sprocket Cover (see Final Drive chapter)
 - Speed Sensor Bracket (see Electrical System chapter)
 - Clutch Release Case Assembly (see Clutch chapter)
 - Engine Sprocket (see Final Drive chapter)
 - Gear Position Sensor (see Electrical System chapter)
- Place an oil drain pan under the engine.
- Remove the external shift mechanism cover bolts [A] and remove the external shift mechanism cover [B].

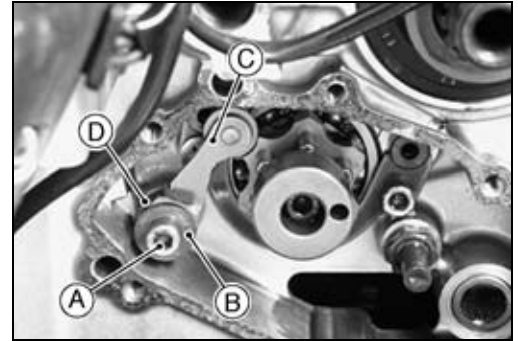


- Push the shift arm [A] in the direction of the shift shaft [B], and remove the shift shaft assembly [C].



Transmission

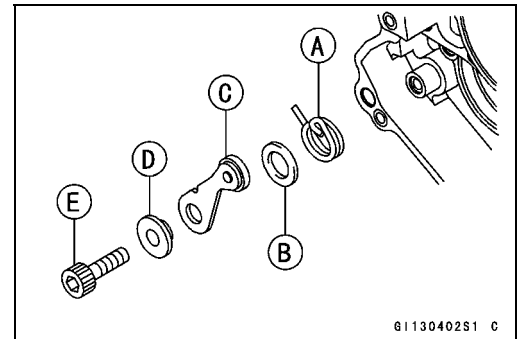
- Remove:
 - Bolt [A]
 - Spacer [B]
 - Gear Positioning Lever [C]
 - Flat Washer
 - Gear Positioning Lever Spring [D]



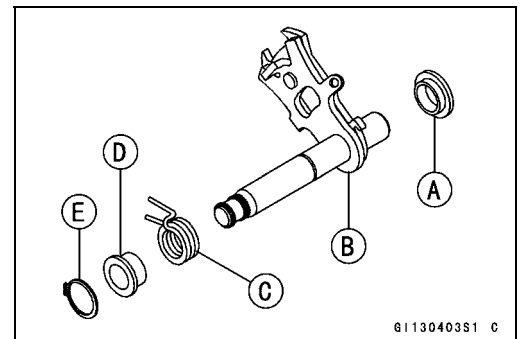
External Shift Mechanism Installation

- Apply a non-permanent locking agent to the gear positioning lever bolt.
- Install:
 - Gear Positioning Lever Spring [A]
 - Flat Washer [B]
 - Gear Positioning Lever [C]
 - Spacer [D]
 - Bolt [E]

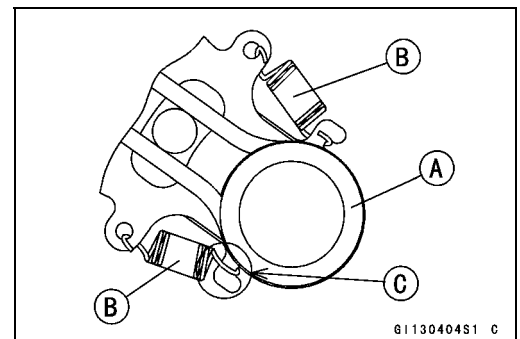
Torque - Gear Positioning Lever Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)



- If the shift shaft assembly has been disassembled, re-assemble as follows:
 - Collar [A]
 - Shift Shaft [B]
 - Return Spring [C]
 - Return Spring Collar [D]
 - Circlip [E]



- Install the shift lever position spring as shown.
 - Return Spring [A]
 - Shift Lever Position Spring [B]
 - Reverse Installation [C]



8-28 CRANKSHAFT/TRANSMISSION

Transmission

- Install the shift shaft assembly [A].
- Make sure that the washer [B] is in place.
- Install the oil fitting pins [C] and the knock pin [D].



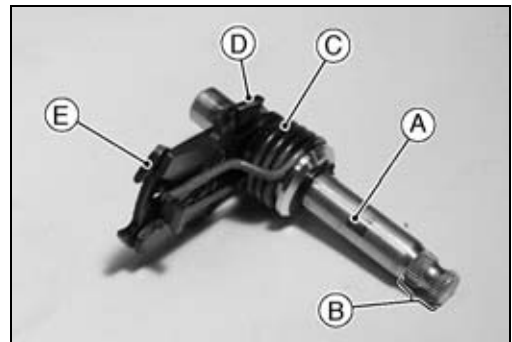
- Replace the cover gasket with a new part.
- Apply high-temperature grease to the oil seal lip.
- Install the cover and tighten the bolts.

**Torque - External Shift Mechanism Cover Bolts: 12 N·m
(1.2 kgf·m, 104 in·lb)**

- Install the removed parts.
- Check the engine oil level.

External Shift Mechanism Inspection

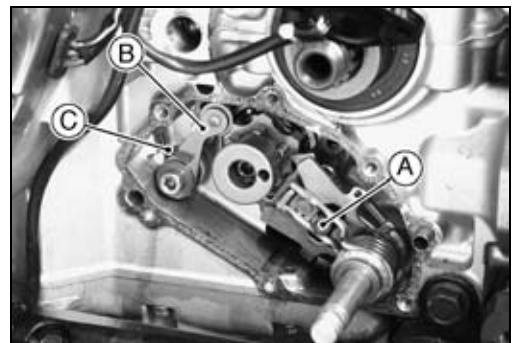
- Inspect the shift shaft [A].
- ★ If the shaft is bent, repair or replace it.
- ★ If the serration [B] is damaged, replace the shaft.
- ★ If the return spring [C] and shift lever position springs [D] are damaged, replace the springs.
- ★ If the shift arm [E] is damaged, replace the shift shaft assembly.



- Inspect the return spring pin [A].
- ★ Remove it if it is loose, apply high-lock agent to the threads, and tighten it.

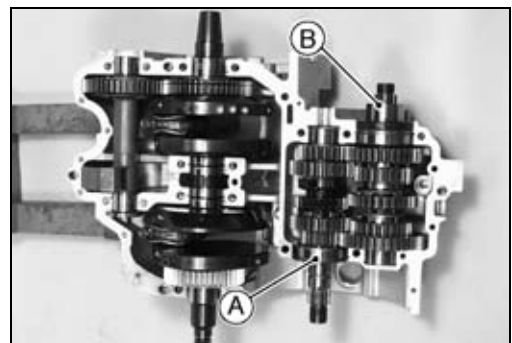
Torque - Return Spring Pin: 42 N·m (4.3 kgf·m, 31 ft·lb)

- Check the gear positioning lever [B] and the spring [C] for damage or deformation.
- ★ If the lever or the spring is damaged, replace it.
- Inspect the shift drum pin and pin holder.
- ★ Replace them if they are significantly worn or damaged.



Transmission Shaft Removal

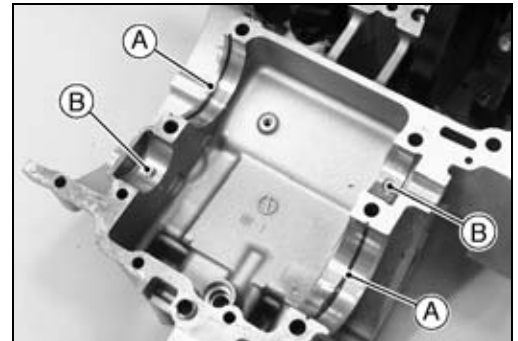
- Remove the engine (see Engine Removal/Installation chapter).
- Separate the crankcase halves (see Crankcase Disassembly).
- Take out the drive shaft [A] and the output shaft [B].



Transmission

Transmission Shaft Installation

- Blow the oil passage of the lower crankcase half clean with compressed air.
- Install the set rings [A] and the set pins [B] in the upper crankcase half.



- Apply engine oil to the transmission gears and bearings.
- Install the drive shaft and output shaft in the upper crankcase half.
- The crankcase and the bearing outer race will come in contact [A] once the shaft is properly installed.
- Assemble the crankcase.
- Install the engine.

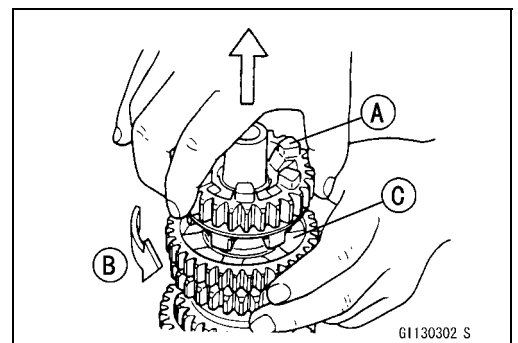


Transmission Shaft Disassembly

- Remove the transmission shaft (see Transmission Shaft Removal).
- Remove the circlip and the washer and take out the gears.

Special Tool - Outside Circlip Pliers: 57001-144

- Remove the output shaft shifter as follows:
 - Hold the 4th gear [C] with one hand, and place the output shaft upright.
 - Quickly spin [B] the shifter [A] and pull it upward while the internal steel balls move outward by the centrifugal force.

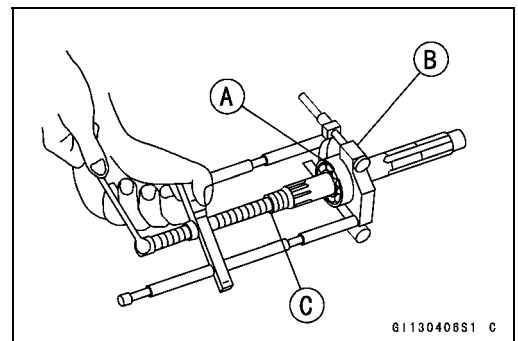


- Remove the ball bearing [A].

Special Tools - Bearing Puller: 57001-135 [B]

Bearing Puller Adapter: 57001-317 [C]

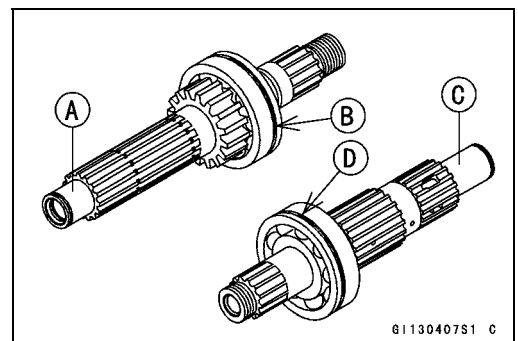
- Discard the removed bearings.



Transmission Assembly

- Apply engine oil to the ball bearing and the shaft.
- Drive the ball bearing onto the driveshaft [A], with the groove [B] facing the clutch.
- Drive the ball bearing onto the output shaft [C], with the groove [D] facing the engine sprocket.

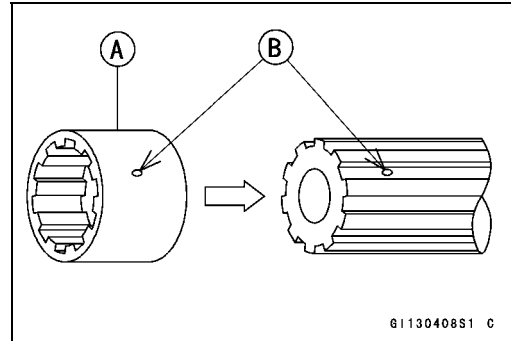
Special Tool - Tool-Steering Stem Bearing Driver: 57001-137



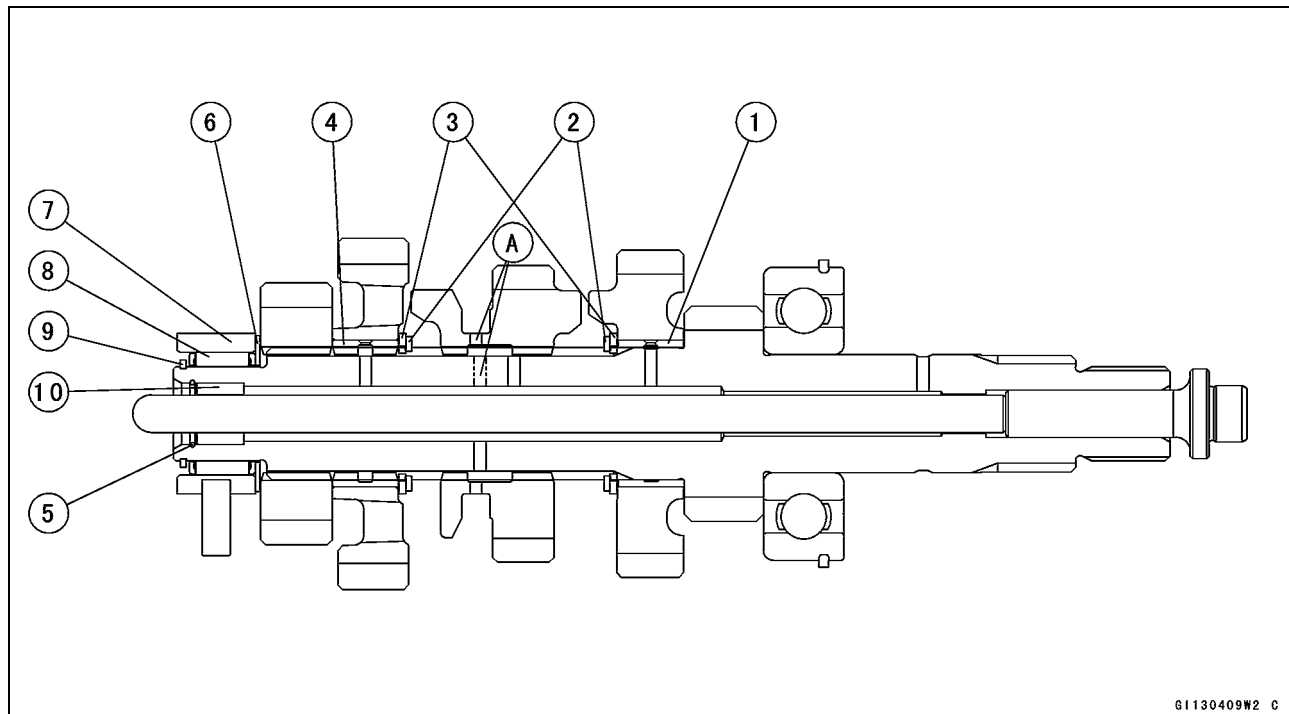
8-30 CRANKSHAFT/TRANSMISSION

Transmission

- Install the 5th gear bushing [A] on the driveshaft. Align the oil holes [B].



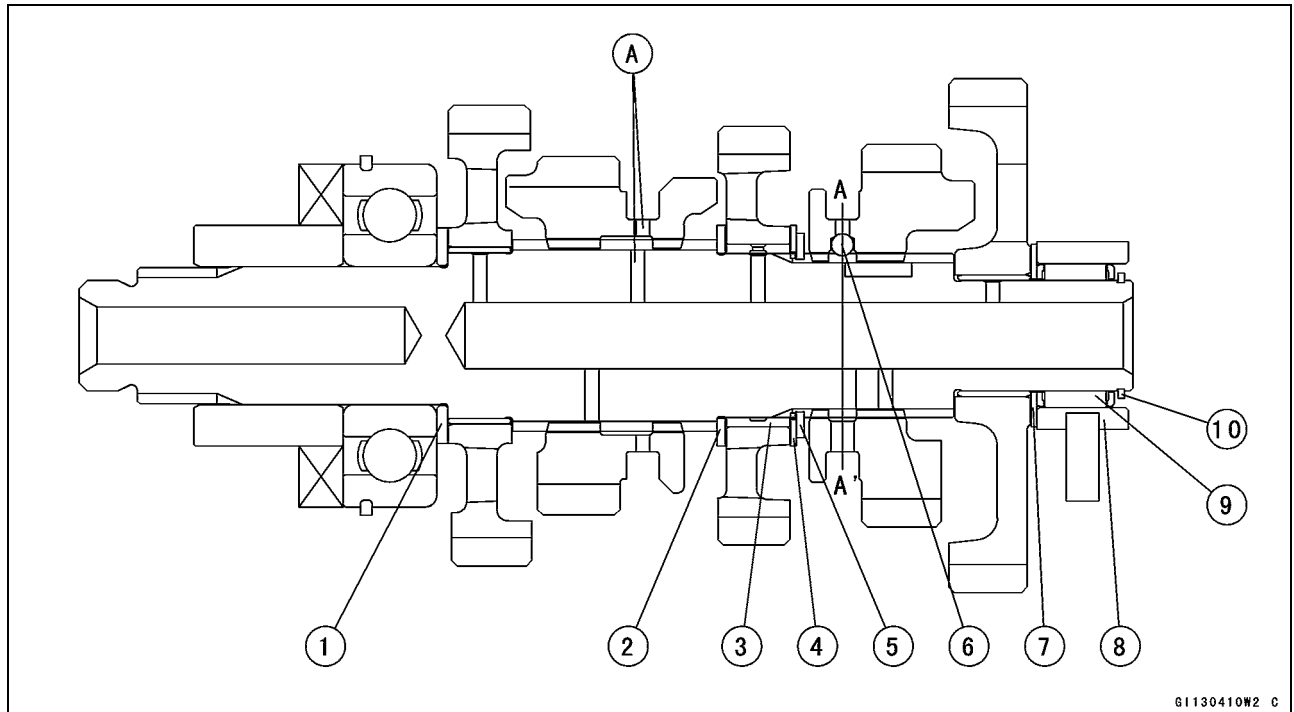
- The drive shaft gears are from the 1st to the 5th gears, from the smallest to the largest diameter. Be aware of their orientation during assembly.
- When assembling the 3rd gear onto the shaft, make sure that the oil hole [A] in the gear and the oil hole [A] in the shaft are aligned with the same spline groove.



1. Bushing
2. Circlip
3. Toothed Washer
4. Bushing
5. Circlip
6. Toothed Washer
7. Bushing
8. Needle Bearing
9. Circlip
10. Bushing

Transmission

- The output shaft gears are from the 1st to the 5th gears, from the largest to the smallest diameter. Be aware of their orientation during assembly.
- When assembling the 5th gear onto the output shaft, make sure that the oil hole [A] in the gear and the oil hole [A] in the shaft are aligned on the same spline groove.



1. Spacer
2. Washer
3. Bushing
4. Toothed Washer
5. Circlip
6. Steel Balls
7. Spacer
8. Bushing
9. Needle Bearing
10. Circlip

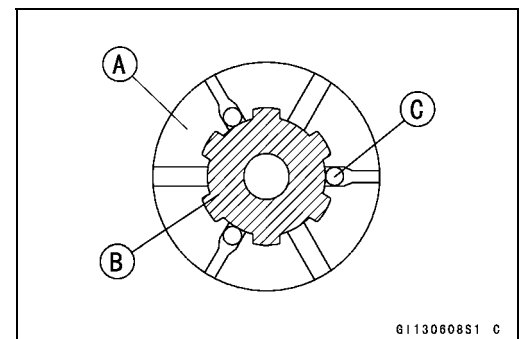
- Place the three steel balls in the holes of the shifter, and align them with the shaft groove to install (see cross section AA' in the above diagram).

4th Gear [A]
Output Shaft [B]
Steel Balls [C]

CAUTION

Do not apply grease to the steel balls to hold them in place during assembly. This will prevent the steel balls from moving and cause the positive neutral finder mechanism to malfunction.

- After assembling the 4th gear, move the gear in the direction of the shaft to check the ball-locking effect (so that the gear does not come out of the shaft).



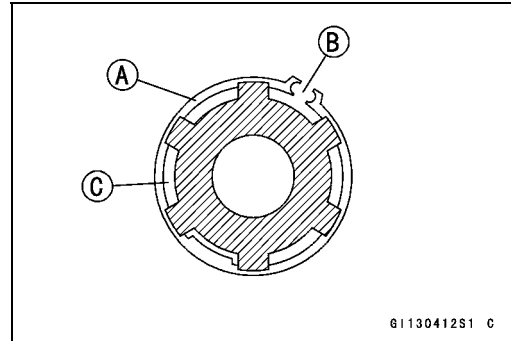
8-32 CRANKSHAFT/TRANSMISSION

Transmission

- Make sure to replace the removed circlip with a new one.
- Align the gap [B] of the circlip with the groove [C] of the spline.

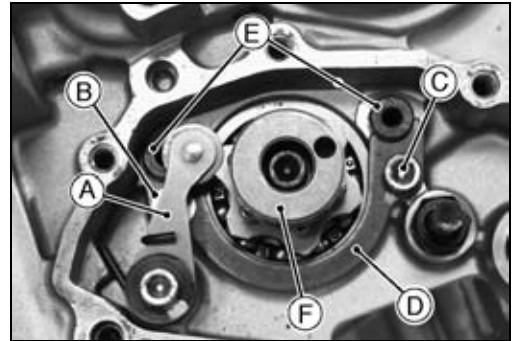
Special Tool - Outside Circlip Pliers: 57001-144

- After make sure that the gears spin and slide properly.



Shift Fork/Shift Drum Removal

- Remove:
 - Lower Crankcase Half (see Crankcase Disassembly)
 - Shift Shaft Assembly (see External Shift Mechanism Removal)
 - Gear Positioning Lever [A]
 - Screw [B]
 - Bolt [C]
 - Shift Drum Bearing Holder [D]
- Pull out the shift rod [E] and remove the shift fork.
- Pull out the shift drum [F] from the crankcase.

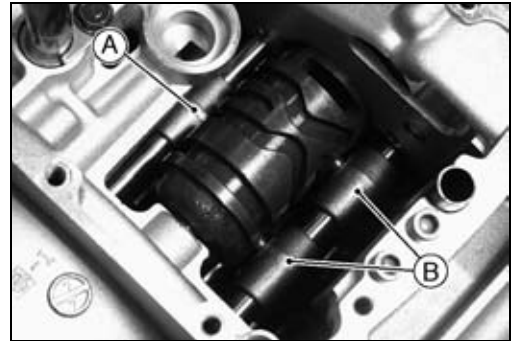


Shift Fork/Shift Drum Installation

- The shift forks can be recognized by their shape.
- Install the following parts, in proper direction:
 - Drive Shaft Shift Fork [A]
 - Output Shift Forks with same shape and size [B]
- Apply a non-permanent locking agent to the shift drum bearing holder bolt and screw.
- Before installing the shift drum bearing holder, first tighten the screw, and then the bolt.

Torque - Shift Drum Bearing Holder Screw: 4.9 N·m (0.5 kgf·m, 43 in·lb)

Shift Drum Bearing Holder Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)



Shift Drum Disassembly

- Remove the shift drum (see Shift Fork/Shift Drum Removal).
- Hold the shift drum in a vise and remove the shift drum cam bolt [A].



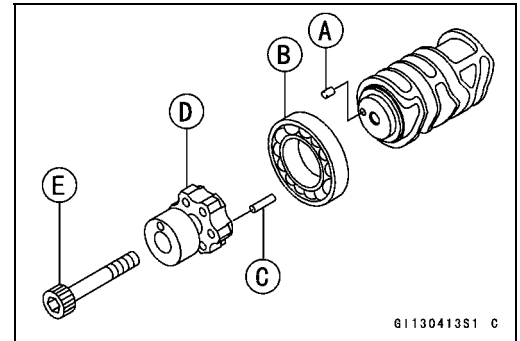
Transmission

Shift Drum Assembly

- Install:
 - Pin [A]
 - Ball Bearing [B]
- Verify that the pins [C] are properly placed in the shift drum cam [D], and install the cam.
- Apply a non-permanent locking agent to the shift drum cam bolt [E] and tighten the bolt.

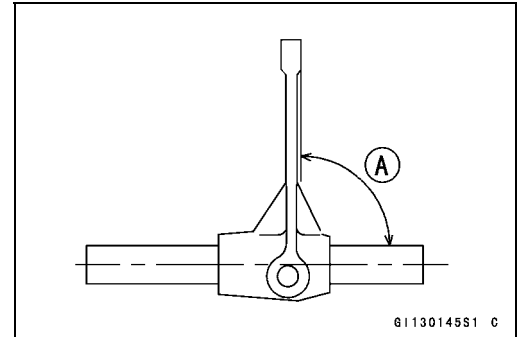
Torque - Shift Drum Cam Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

- Insert the shift drum into the lower crankcase half.



Shift Fork Bend Inspection

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power. 90° [A]



Shift Fork/Gear Groove Wear Inspection

- Measure the thickness of the shift fork ears [A], and measure the width [B] of the transmission gear grooves (with which the fork engages).

Shift Fork Ear Thickness

Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)

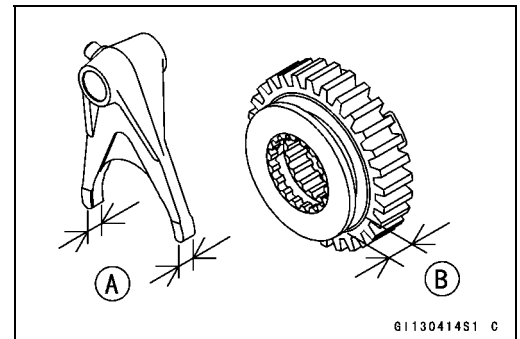
Service Limit: 5.8 mm (0.23 in.)

Gear Groove Width

Standard: 6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)

Service Limit: 6.3 mm (0.25 in.)

- ★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.
- ★ If the gear groove is worn beyond the service limit, the gear must be replaced.



Shift Fork Guide Pin/Shift Drum Groove Wear Inspection

- Measure the diameter of each shift fork guide pin [A], and measure the width [B] of each shift drum groove.

Shift Fork Guide Pin Diameter

Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)

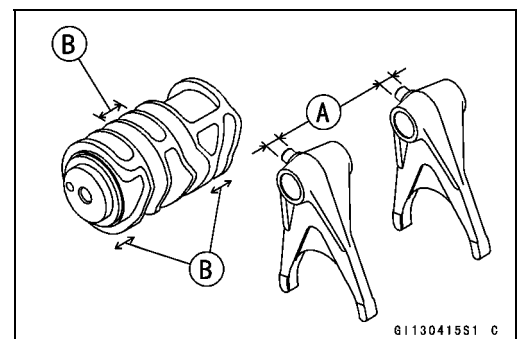
Service Limit: 5.8 mm (0.23 in.)

Shift Drum Groove Width

Standard: 6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)

Service Limit: 6.30 mm (0.25 in.)

- ★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.
- ★ If any shift drum groove is worn beyond the service limit, the drum must be replaced.

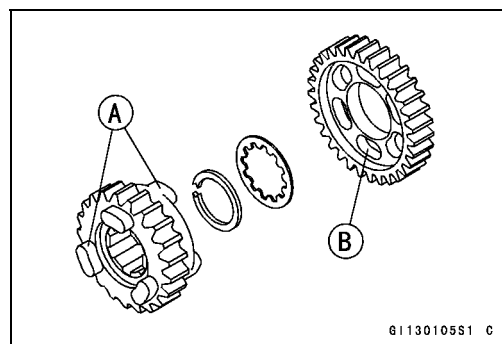


8-34 CRANKSHAFT/TRANSMISSION

Transmission

Gear Dog and Gear Dog Hole Damage Inspection

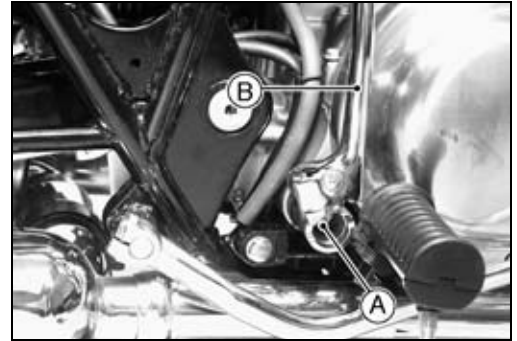
- Visually inspect the gear dogs [A] and gear dog holes [B].
- ★ Replace any gears with damaged or excessively worn dogs or dog holes.



Kick Starter

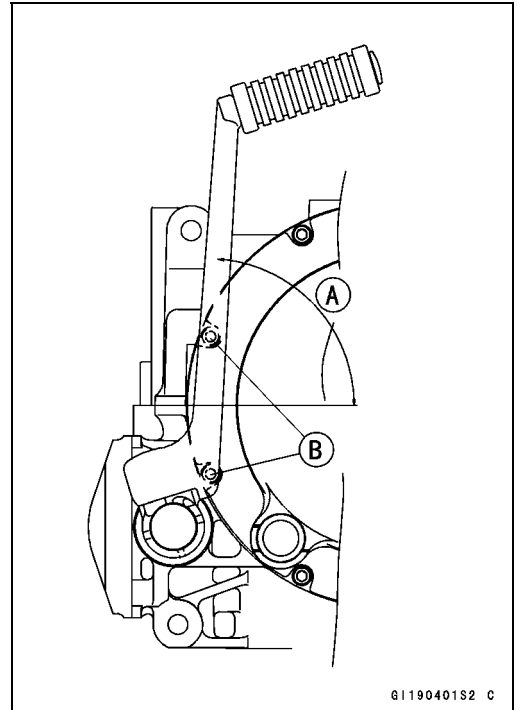
Kick Pedal Assembly Removal

- Remove:
 - Cap
 - Mounting Bolt [A]
 - Kick Pedal Assembly [B]

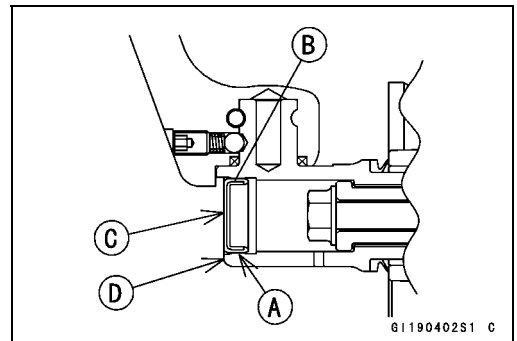


Kick Pedal Assembly Installation

- Install the kick pedal assembly at the angle shown.
 - Approx. 85° [A]
 - Clutch Cover Bolts [B]
 - Insert the collar into the kick pedal hole and tighten the mounting bolt.
- Torque - Kick Pedal Mounting bolt: 69 N·m (7.0 kgf·m, 51 ft·lb)**

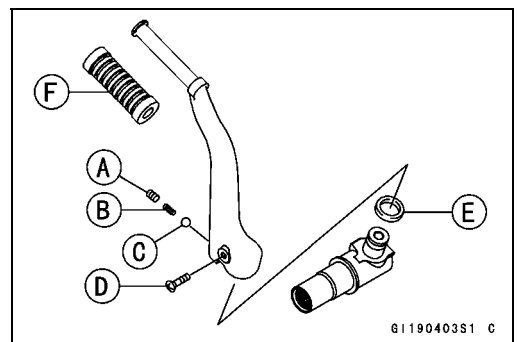


- Apply water to the inside of the cap [A] and drive the cap [B] in.
- The cap outer surface [C] should be flush with the pedal outer surface [D].



Kick Pedal Assy Disassembly

- Remove the kick pedal assy.
- Remove:
 - Plug Screw [A]
 - Spring [B]
 - Steel Ball [C]
 - Detent Screw [D]
 - Oil Seal [E]
 - Kick Pedal Rubber [F]



Kick Pedal Assy Assembly

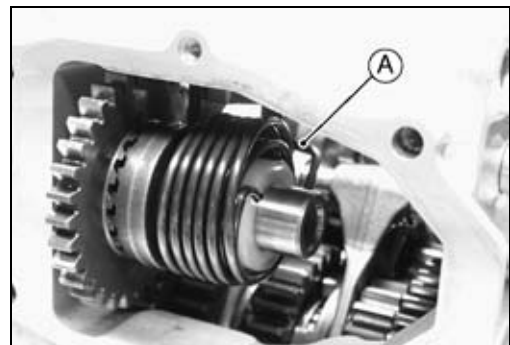
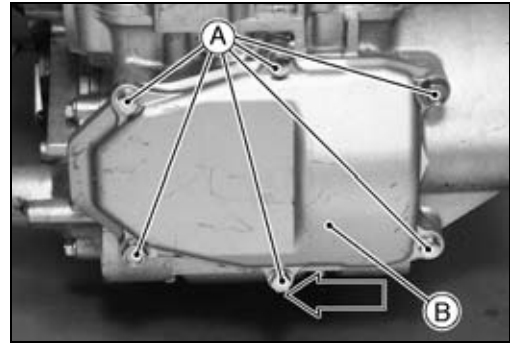
- Apply high-temperature grease to the steel ball, oil seal lip, and the sliding portion of the lever.
- After tightening the screw, stake it with a punch.

8-36 CRANKSHAFT/TRANSMISSION

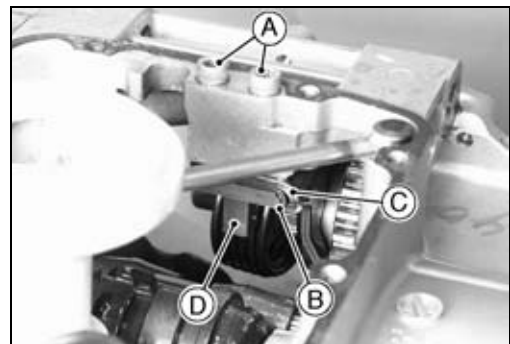
Kick Starter

Kick Shaft Assembly Removal

- Drain the engine oil (see Periodic Maintenance chapter).
- Remove the engine from the frame (see Engine Removal/Installation chapter).
- Remove:
 - Kick Pedal Assembly (see Kick Pedal Assembly Removal)
 - Oil Pan (see Engine Lubrication System chapter)
 - Breather Return Pipe
 - Kick Shaft Cover Bolts [A]
- Remove the kick shaft cover [B] by sliding it towards the engine sprocket.
- Pull out the spring end [A] from the return spring bracket.



- Remove the mounting bolts [A], and remove the stopper [B], ratchet guide [C], and return spring bracket [D].
- Pull out the kick shaft assembly from the crankcase.

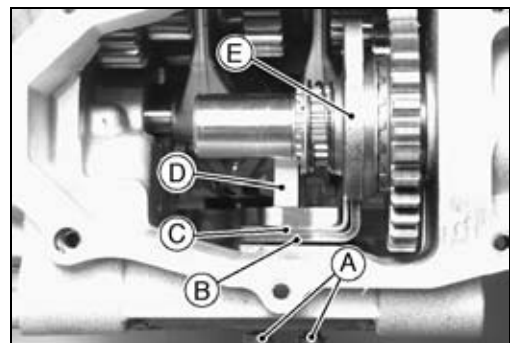


Kick Shaft Assembly Installation

- Apply a non-permanent locking agent to the mounting bolts [A] and tighten the ratchet guide [B], stopper [C], and return spring bracket [D].

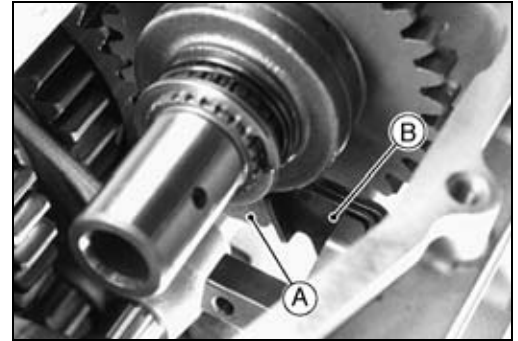
**Torque - Kick Shaft Return Spring Bracket Bolts: 12 N·m
(1.2 kgf·m, 104 in·lb)**

- Insert the kick shaft assembly [E] into the crankcase.



Kick Starter

- Securely engage the stopper portion [A] of the ratchet gear with the stopper [B].
- Install the return spring.
- Using needle-nose pliers from the oil pan side, insert the spring end into the return spring holding bracket hole.
- Apply grease to the breather return pipe O-ring, and insert the pipe.



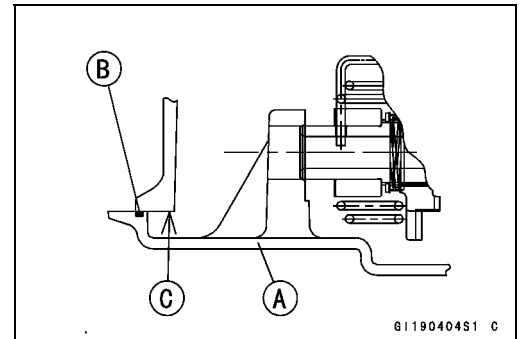
- Install the kick shaft cover [A].

NOTE

○ To prevent the rubber gasket [B] from damage, install the cover by sliding it from a position in which the rubber gasket aligns with the mating surface [C] of the crankcase.

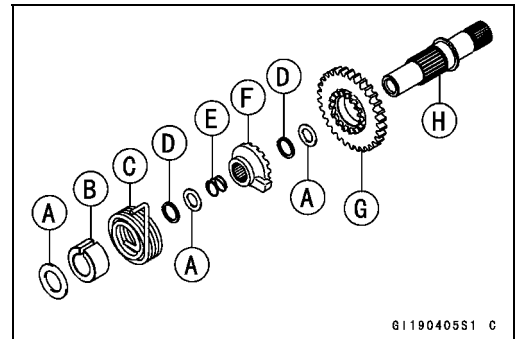
Torque - Kick Shaft Cover Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

- Insert the rubber damper into the breather return pipe.
- Install the oil pan.



Kick Shaft Assembly Disassembly/Assembly

- The kick shaft assembly consists of the following parts:
 - Washers [A]
 - Spring Guide [B]
 - Return Spring [C]
 - Circlips [D]
 - Spring [E]
 - Ratchet Gear [F]
 - Kick Gear [G]
 - Kick Shaft [H]

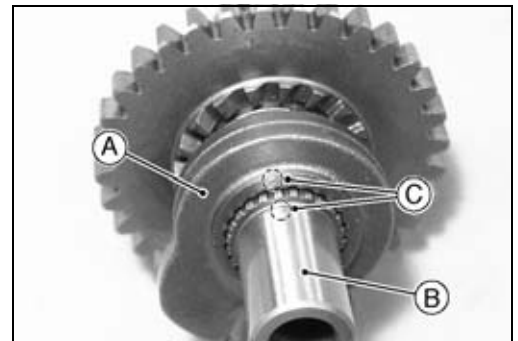


CAUTION

Align the punch mark [C] of the kick shaft to the punch mark [C] of the ratchet gear to install the ratchet gear [A] on the kick shaft [B].

- Apply molybdenum disulfide grease on the inside of the kick gear and the ratchet gear.
- Once a circlip has been removed, it must be replaced with a new one.

Special Tool - Outside Circlip Pliers: 57001-144



8-38 CRANKSHAFT/TRANSMISSION

Bearing/Oil Seal

Bearing Replacement

CAUTION

Do not remove the ball bearings and needle bearings unless it is necessary. Removal may damage them.

- Using a press or puller, remove the ball bearing or the needle bearing.

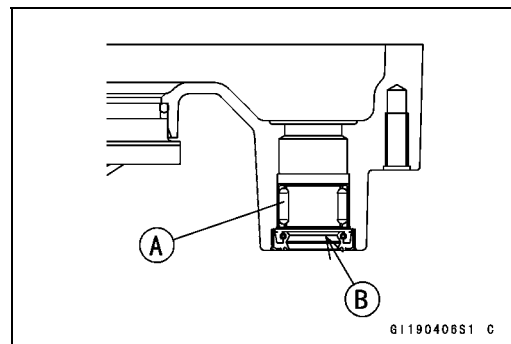
NOTE

○ *In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 100°C (212°F), and tapping the bearing to remove it.*

CAUTION

Do not heat the case with a torch, as this will warp the case. Instead, soak the case in oil and heat the oil.

- Using a press and the bearing driver set, drive the bearing until its inner race stops at the bottom of the case.
Output Shaft/Driveshaft
 - Drive the bearings in until flush.
Lower Crankcase Shift Shaft Hole Needle Bearing [A]
External Shift Mechanism Cover Needle Bearing [B]
(flush with counterbore bottom surface [B])
- Special Tools - Bearing Driver Set: 57001-1129 [A]
Steering Stem Bearing Driver: 57001-137**

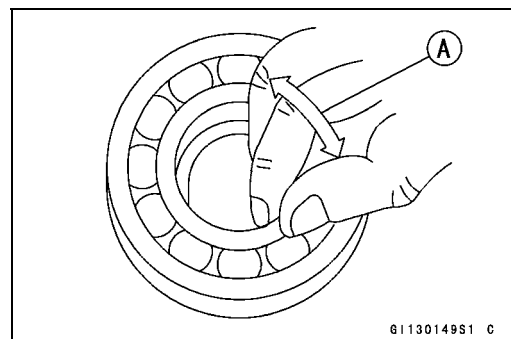


Bearing Wear Inspection

CAUTION

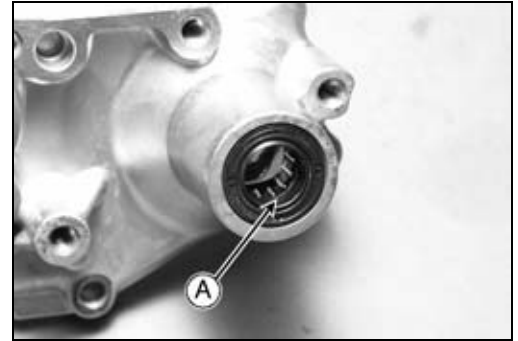
Do not remove the bearings for inspection. Removal may damage them.

- Inspect the ball bearings.
- Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in high-flash-point solvent, dry it (do not dry it by spinning the bearing), and oil it with engine oil.
- Spin [A] the bearing by hand to check its condition.
- ★ If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.



Bearing/Oil Seal

- Inspect the needle bearing [A].
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.
- ★ If the needle bearing shows any signs of damage, replace it.



Oil Seal Inspection

- ★ Replace the oil seal if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

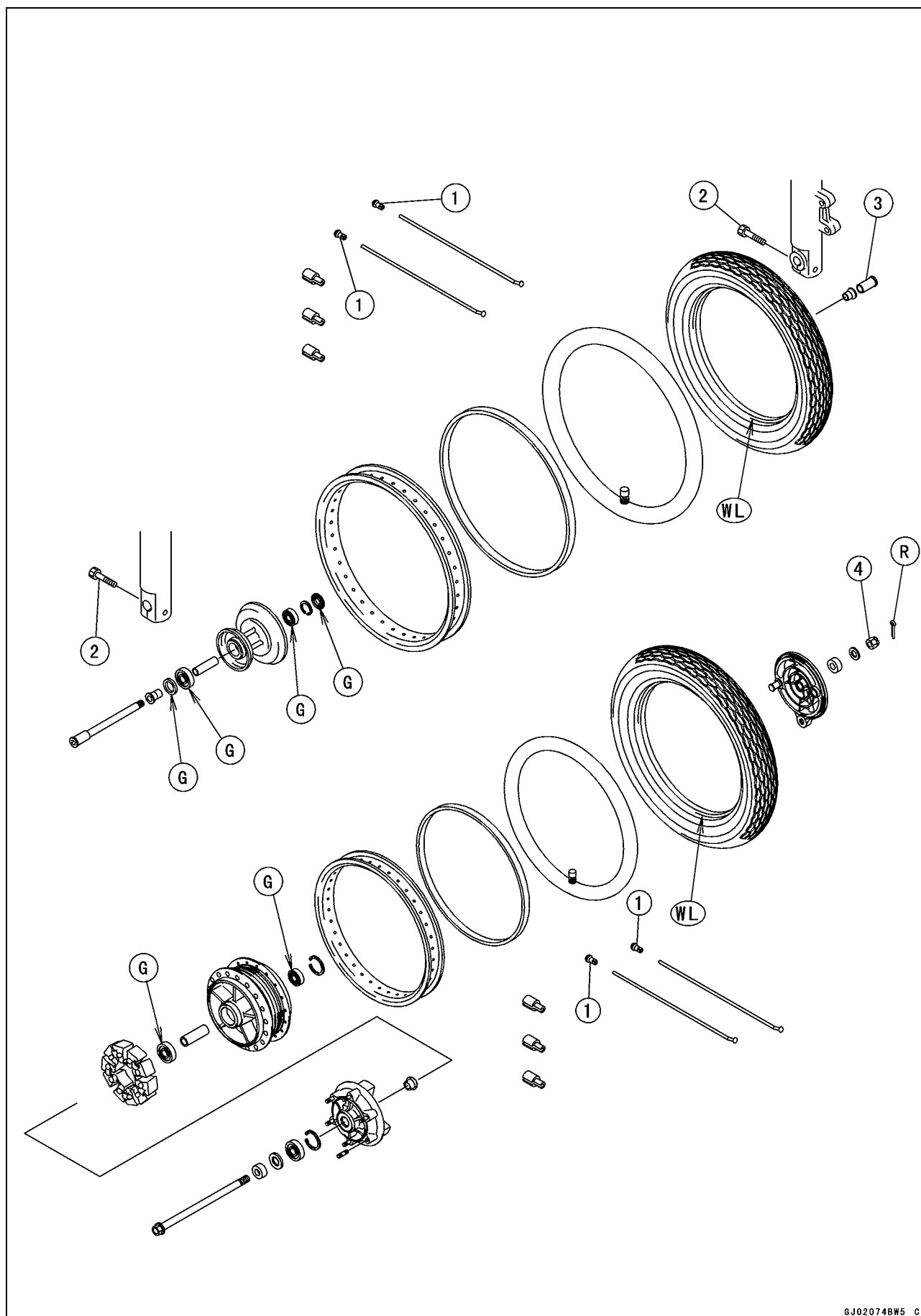
Wheels/Tires

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9-2 WHEELS/TIRES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Spoke Nipples (On and after EJ650-A3/C3)	3.0	0.3	26 in·lb	
		5.1	0.52	45 in·lb	
2	Front Axle Clamp Bolts	20	2.0	14	
3	Front Axle Nut (On and after EJ650-A3/C3)	88	9.0	65	
		98	10	72	
4	Rear Axle Nut	98	10	72	

G: Apply high-temperature grease.

R: Replacement Parts

WL: Apply soap and water solution or rubber lubricant.

9-4 WHEELS/TIRES

Specifications

Item	Standard		Service Limit
Wheels (Rims)			
Rim Size:			
Front	19 × 2.15		—
Rear	18 × 2.75		—
Rim Runout:			
Axial	TIR 0.8 mm (0.03 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 0.05 mm (0.002 in.)		TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less		—
Balance Weight	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.10 oz.)		—
Tires	Up to 97.5 kg (215 lb) load	Over 97.5 kg (215 lb) load	
Air Pressure (when cold):			
Front	200 kPa (2.00 kgf/cm ² , 28 psi)	200 kPa (2.00 kgf/cm ² , 28 psi)	—
Rear	225 kPa (2.25 kgf/cm ² , 32 psi)	250 kPa (2.50 kgf/cm ² , 36 psi)	—
Tread Depth			
Front	4.3 mm (0.17 in.) (BRIDGESTONE) 4.4 mm (0.17 in.) (DUNLOP)		up to 130 km/h (80 mph): 2 mm (0.08 in.)
Rear	6.2 mm (0.24 in.) (BRIDGESTONE) 7.4 mm (0.29 in.) (DUNLOP)		over 130 km/h (80 mph): 3 mm (0.12 in.)
Standard Tires	Make, Type		Size
Front	BRIDGESTONE ACCOLADE AC03, tube (EJ650-A1) BRIDGESTONE ACCOLADE AC03G, tube (EJ650-A2 ~ A4/C3 ~ C4) (EJ650-A5/C5 ~ C7, C6F) DUNLOP TT100GP G (EJ650-A1 ~ A4/C3 ~ C4) (EJ650-A5/C5 ~ C7, C6F)		100/90-19 57 H 100/90-19 57 H 100/90-19 M/C 57H
Rear	BRIDGESTONE ACCOLADE AC04, tube (EJ650-A1) BRIDGESTONE ACCOLADE AC04G, tube (EJ650-A2 ~ A4/C3 ~ C4) (EJ650-A5/C5 ~ C7, C6F) DUNLOP TT100GP GP (EJ650-A1 ~ A4/C3 ~ C4) (EJ650-A5/C5 ~ C7, C6F)		130/80/18 66 H 130/80/18 66 H 130/80/18 M/C 66 H 130/80/18 66 H 130/80/18 M/C 66 H

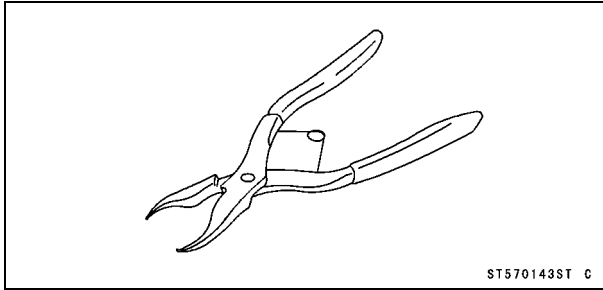
WARNING

Use the same manufacturer's tires on both front and rear wheels.

Special Tools

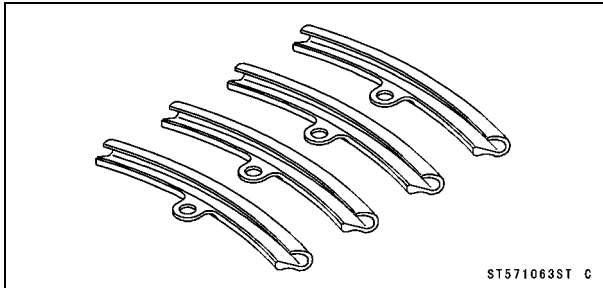
Inside Circlip Pliers:

57001-143



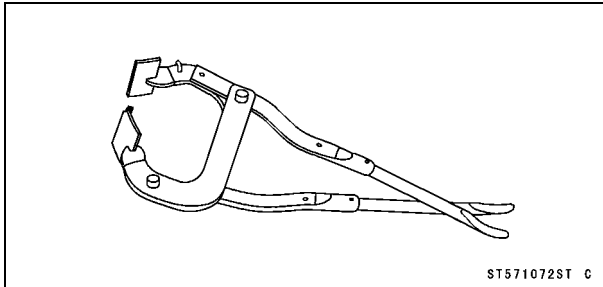
Rim Protector:

57001-1063



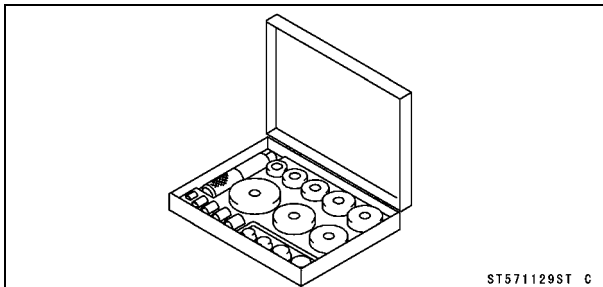
Bead Breaker Assembly:

57001-1072



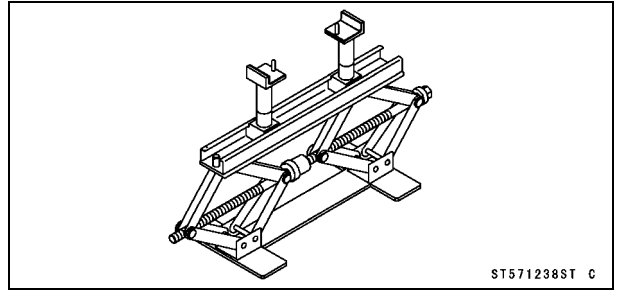
Bearing Driver Set:

57001-1129



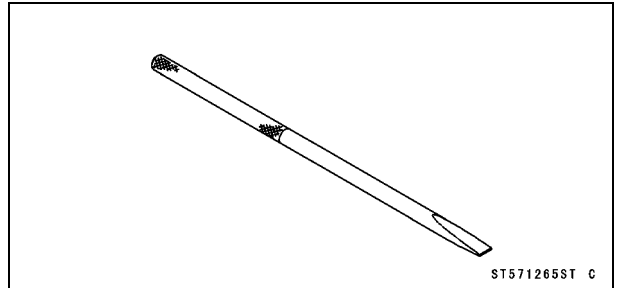
Jack:

57001-1238



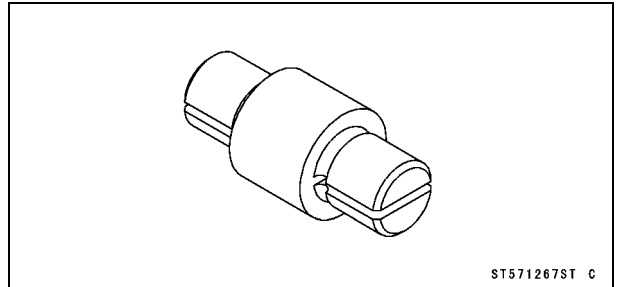
Bearing Remover Shaft, $\phi 9$:

57001-1265



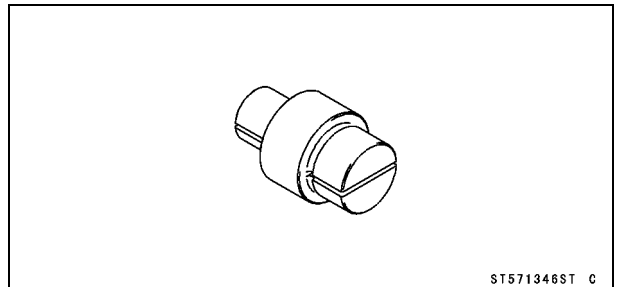
Bearing Remover Head, $\phi 15 \times \phi 17$:

57001-1267



Bearing Remover Head, $\phi 25 \times \phi 28$:

57001-1346

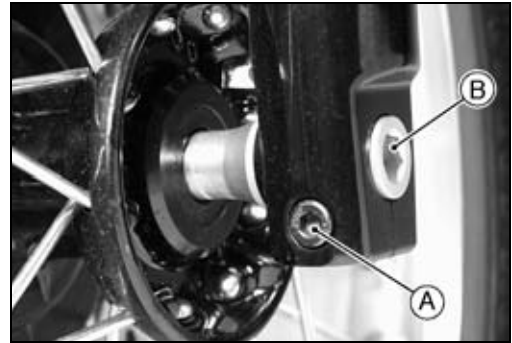


9-6 WHEELS/TIRES

Wheels

Front Wheel Removal

- Loosen:
 - Left Axle Clamp Bolt [A]
 - Axle [B]



- Raise the front wheel off the ground.
Special Tool - Jack: 57001-1238
- Pull out the axle and remove the front wheel.

CAUTION

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place wooden blocks under the wheel so that the disc does not touch the ground.

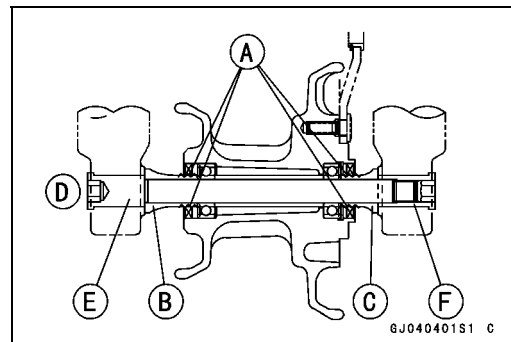
- Remove the right axle clamp bolt and remove the axle nut.

Front Wheel Installation

- Apply grease to both grease seal lips [A].
- Fit the collars on both hubs.
 - Left Collar: Long [B]
 - Right Collar: Short [C]
- Install the wheel and insert the axle [E] from the left side [D].
- Tighten the axle nut [F].
- Tighten the axle clamp bolts.

Torque - Front Axle Nut: 88 N·m (9.0 kgf·m, 65ft·lb)
(On and after EJ650-A3/C3) 98 N·m (10 kgf·m, 72 ft·lb)
Front Axle Clamp Bolt: 20 N·m (2.0 kgf·m, 14 ft·lb)

- Check the effectiveness of the brake.



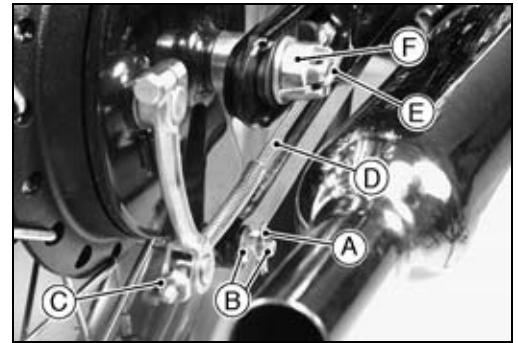
⚠ WARNING

Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

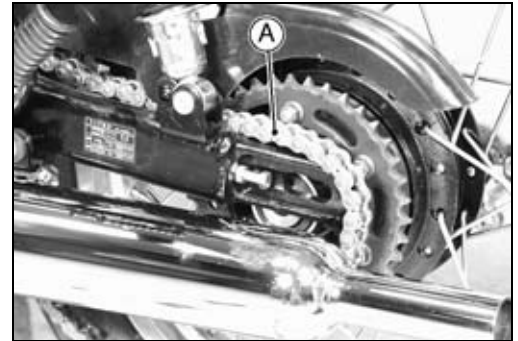
Wheels

Rear Wheel Removal

- Use the center stand to support the motorcycle upright.
- Remove:
 - Clip [A]
 - Torque Link Nut and Bolt [B]
 - Brake Adjusting Nut [C]
 - Cotter Pin [E]
 - Axle Nut [F]
- Depress the brake pedal and remove the brake rod [D].

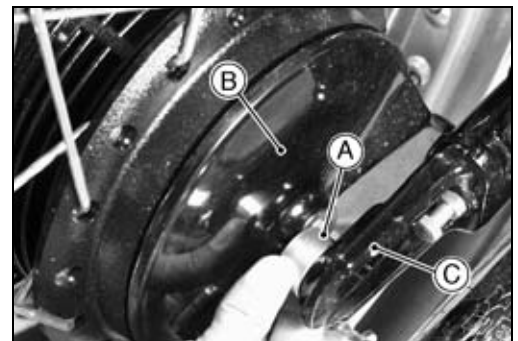


- Pull out the axle from the left side.
- Remove the drive chain [A], and place it on the swing arm.
- Remove the rear wheel.



Rear Wheel Installation

- Place the drive chain on the sprocket and install the wheel.
- Insert the axle from the left side.
- Insert the right collar [A] between the brake panel [B] and the swing arm [C].
- Install the brake panel in the center of the brake.
- Lightly tighten the axle nut.
- Install the torque link nut and bolt.
- Spin the rear wheel and apply the rear brake.
- Tighten the axle nut.



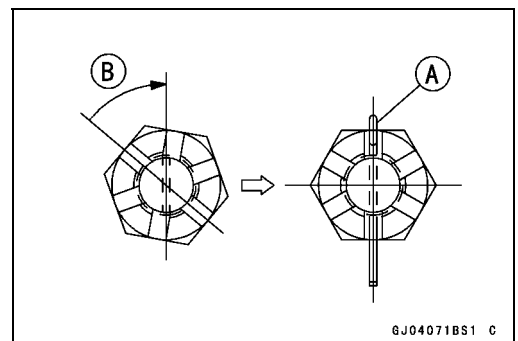
Torque - Rear Axle Nut: 98 N·m (10 kgf·m, 72 ft·lb)

Torque Link Nuts, Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Adjust the drive chain slack (see Periodic Maintenance chapter).
- Insert a new cotter pin [A].

NOTE

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



GJ04071BS1 C

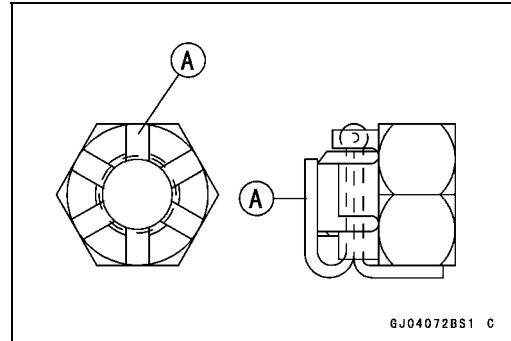
9-8 WHEELS/TIRES

Wheels

- Bend the cotter pin [A] over the nut.
- Tighten the torque link nut and insert the clip into the bolt hole.

Torque - Torque Link Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Install the removed parts.
- Check the effectiveness of the rear brake.



Wheel Inspection

- Raise the front or rear wheel and turn it by hand to check that it turns smoothly without making a noise.
- ★ If any abnormal condition is found, replace the hub bearings.

Spoke Inspection

- Refer to the Spoke Tightness Inspection in the Periodic Maintenance chapter.

Rim Inspection

- Refer to the Rim Runout Inspection in the Periodic Maintenance chapter.

Axle Inspection

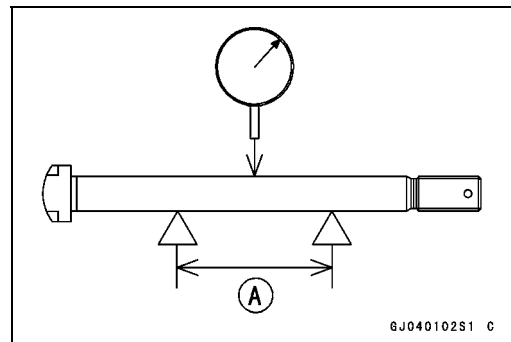
- Visually inspect the front or rear axle for damage.
- ★ If the axle is cracked, damaged, or bent, replace it.
- Use a dial gauge to measure the axle runout.

Axle Runout/100 mm (3.94 in.) [A]

Standard: TIR 0.05 mm (0.002 in.) or less

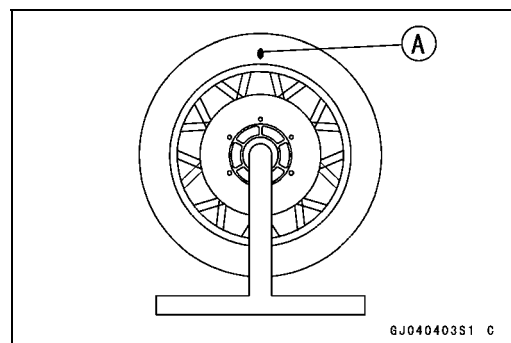
Service Limit: TIR 0.2 mm (0.008 in.)

- ★ If axle runout exceeds the service limit, replace the axle.



Balance Inspection

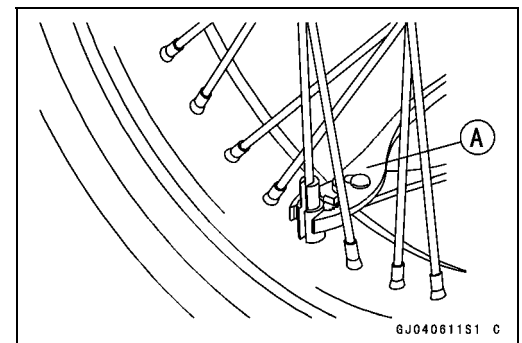
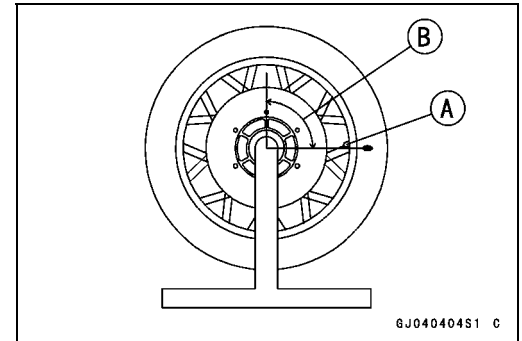
- Remove the wheel and place it on a wheel balancer.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.
- Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.
- ★ If the wheel always stops in one particular position, adjust the wheel balance.



Wheels

Balance Adjustment

- Tentatively attach a balance weight [A] on the spoke under the marking.
- Rotate the wheel a 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the tentatively attached weight is of the proper size.
- ★ If the wheel does not stop in this position and the weight goes up, replace the weight with the next heavier size. If the weight goes down, replace the weight with the next lighter size.
- Repeat these steps until the wheel remains at rest after being rotated a 1/4 turn.
- Rotate the wheel another 1/2 turn and then another 3/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure described above as many times as necessary to achieve correct wheel balance. Once proper balance has been achieved, use the pliers [A] to permanently secure the balance weight.



Balance Weight	
Part Number	Weight (mass)
41075-1007	10 g (0.35 oz.)
41075-1008	20 g (0.71 oz.)
41075-1009	30 g (1.1 oz.)

9-10 WHEELS/TIRES

Tires

Air Pressure Inspection

- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold.
- ★ Adjust the tire air pressure according to the specifications if necessary.

Air Pressure (when cold)

Unit: kPa (kgf/cm², psi)

Operating Conditions	Front	Rear
Up to 97.5 kg (215 lb) load	200 (2.0, 28)	225 (2.25, 32)
Over 97.5 kg (215 lb) load	200 (2.0, 28)	250 (2.50, 36)

- Install the air valve cap certainly after air pressure inspection.

Tire Wear Inspection

- Refer to the Tire Wear Inspection in the Periodic Maintenance chapter.

Tire Damage Inspection

- Refer to the Tire Damage Inspection in the Periodic Maintenance chapter.

Tire Removal

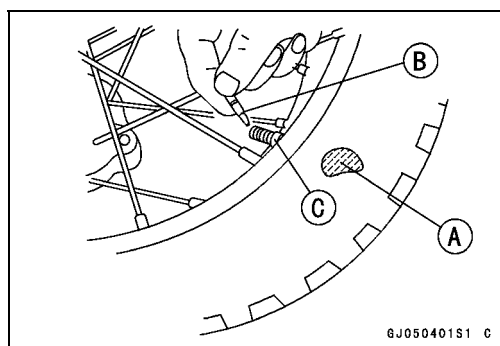
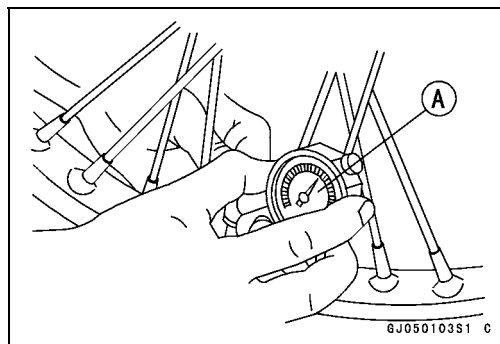
CAUTION

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.

- Remove:
 - Wheel (see Wheel Removal)
 - Valve Core (let out the air) [B]
- To maintain wheel balance, mark [A] the air valve position [C] on the tire with chalk so that the tire can be reinstalled in the same position.
- Remove the valve stem 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.

CAUTION

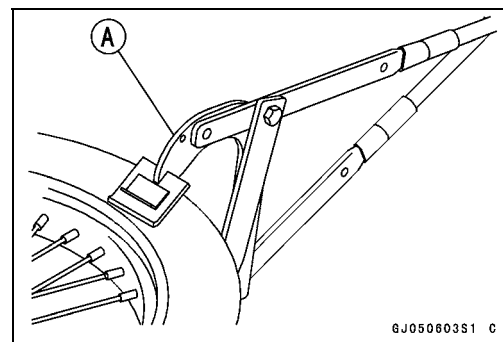
Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.



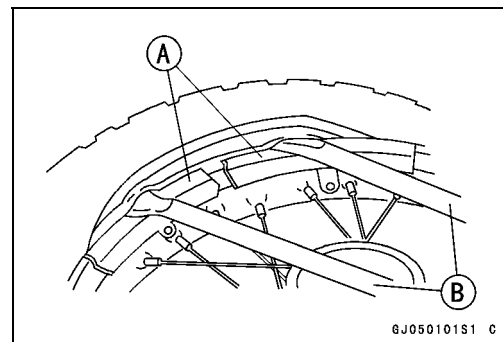
Tires

- Using the bead breaker [A], break the tire bead.

Special Tool - Bead Breaker Set: 57001-1072



- Install the rim protector [A] near the valve stem to prevent the rim flange from damage. Apply a soap and water solution or rubber lubricant to the tire bead, the entire rim flange, rim protector, and the tire iron [B].
- Remove the tire bead from the rim, starting near the valve stem. At this time, completely drop the tire bead opposite of the valve stem into the rim well, and gradually remove the tire bead.



CAUTION

Do not insert the tire iron too deeply as this could damage the tube.

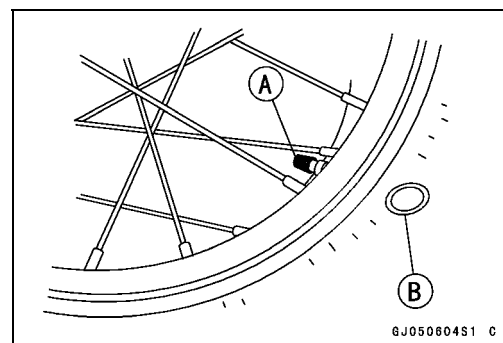
Special Tools - Rim Protector: 57001-1063

Tire Iron (included in Bead Breaker Set: 57001-1072)

- First pull out the valve stem of the tire tube and then the entire tube.
- Remove the opposite tire bead in the same way and remove the tire off the rim.
- Remove the rim protector.

Tire Installation

- Check the tire and the rim before installing the tire, and replace them if they are damaged.
- Apply a soap and water solution or rubber lubricant to both the tire bead and the rim flange.
- Check the tire rotation mark on the front/rear tire and install the rim accordingly.
- Install the tire in the reverse order of removal.
- 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 factory yellow paint mark on a new tire).
- Check the air pressure and adjust it if necessary.
- Tighten the valve stem nut securely.
- Install the air valve cap securely.



9-12 WHEELS/TIRES

Hub Bearing

Hub Bearing Removal

- Remove the wheel, and take out the following.

CAUTION

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.

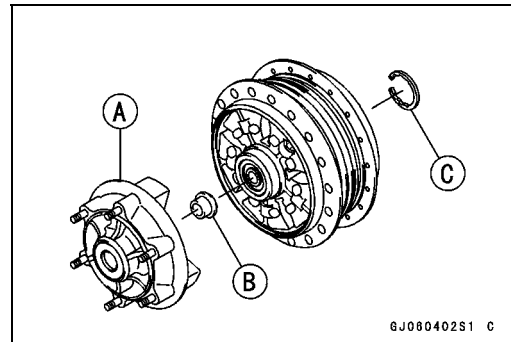
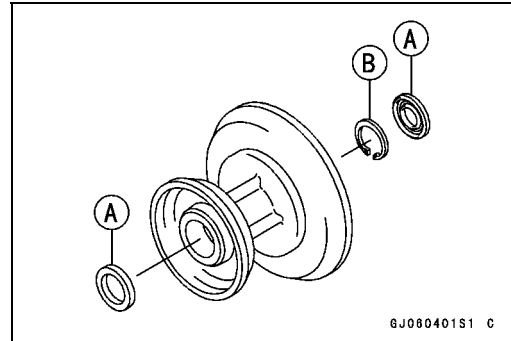
Front Hub

- Remove:
 - Grease Seals [A]
 - Circlip [B]

Special Tool - Inside Circlip Pliers: 57001-143

Rear Hub

- Remove:
 - Coupling [A]
 - Collar [B]
 - Brake Panel
 - Circlip [C]

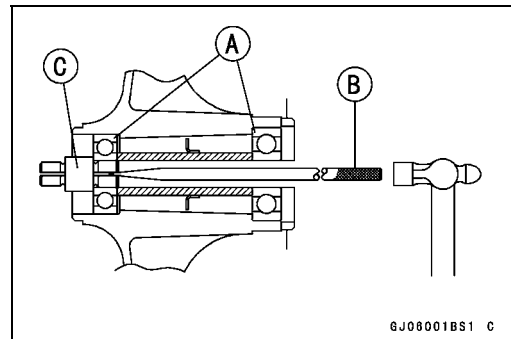


- Remove the bearings [A].
- Select a remover head [C] that matches the bearing bore and insert it.
- Pass the remover shaft [B] from the opposite end and engage its tip into the groove of the head.
- Tap the shaft with a hammer and remove the bearing.

Special Tools - Bearing Remover Shaft: 57001-1265

Bearing Remover Head, $\phi 15 \times \phi 17$: 57001-1267

Bearing Remover Head, $\phi 25 \times \phi 28$: 57001-1346

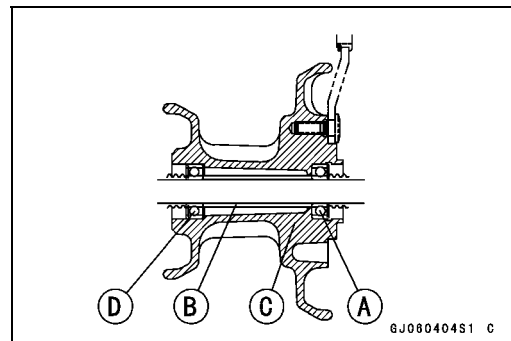


Hub Bearing Installation

- Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air.
- Replace the bearings with new ones, installing them so that the seal or the lettering side faces out.
- Replace the front hub bearings in the following sequence:
 - Drive the right bearing [A] in until it bottoms out.

Special Tool - Bearing Driver Set: 57001-1129

- Insert the collar [B] into the hub [C].
- Drive the left bearing [D] until it bottoms out.

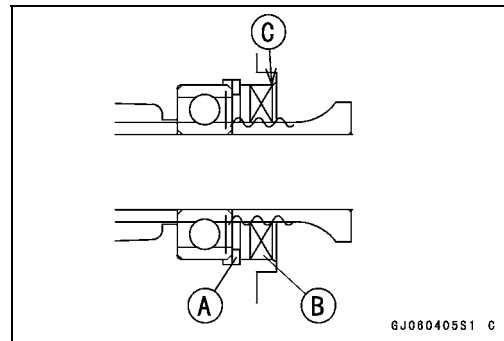


Hub Bearing

- Replace the circlip with a new one and install the circlip [A].

Special Tool - Inside Circlip Pliers: 57001-143

- Install the grease seal [B] flush against the countersunk surface [C].
- Install the grease seal on the opposite side in the same way.



- Drive the rear hub bearing in until it bottoms out.
- Refer to the procedure for installing the front hub bearing.

Special Tool - Bearing Driver Set: 57001-1129

- Replace the circlip with a new one.

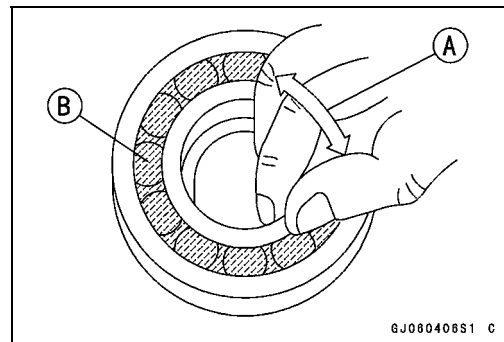
Special Tool - Inside Circlip Pliers: 57001-143

Hub Bearing Inspection

NOTE

○ It is not necessary to remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.

- Check if the bearing spins [A] smoothly when it is spun by hand.
- ★ If the bearing has any rough spots, does not spin smoothly, has grease leaks, or if its seal or shield [B] is damaged, replace the bearing.



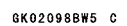
Final Drive

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Exploded View

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Cover Bolts	12	1.2	104 in·lb	
2	Engine Sprocket Cover Damper Plate Bolts	12	1.2	104 in·lb	L
3	Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
4	Engine Sprocket Nut	127	13	94	MO
5	Rear Sprocket Nuts (On and after EJ650-A3/C3)	74	7.5	54	
		59	6.0	43	
6	Rear Sprocket Studs	—	—	—	HL (depth of cut)

7. Rear Sprocket

8. Chain Adjuster Locknuts

CO: Apply chain oil.

G: Apply high-temperature grease.

HL: Apply a high-lock agent to the threads (embedded side).

L: Apply a non-permanent locking agent to the threads.

MO: Apply molybdenum disulfide oil

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

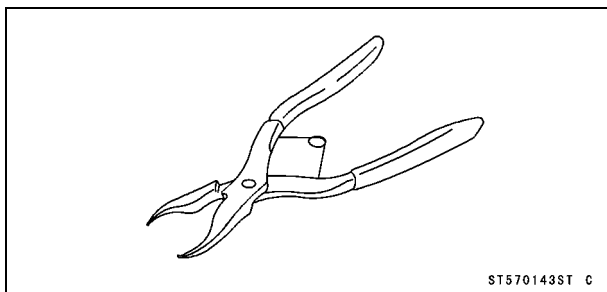
10-4 FINAL DRIVE

Specifications

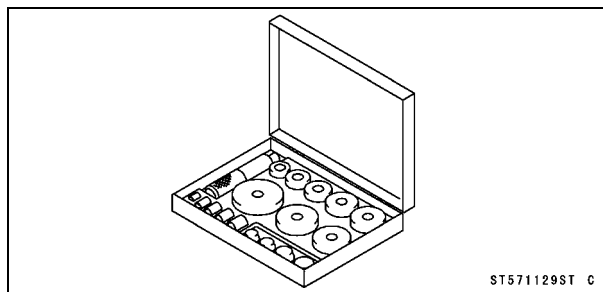
Item	Standard	Service Limit
Drive Chain		
Standard Chain:		
Make	ENUMA	
Type	EK525MV-0, Endless	
(EJ650-C6P ~ C7, C6F)	EK525MV-X, Joint	
Link	104 links	
Link Pin Outside Diameter	5.6 ~ 6.0 mm (0.22 ~ 0.24 in.)	
Link Plate Outside Width	19.85 ~ 20.00 mm (0.78 ~ 0.79 in.)	
Chain Slack	25 ~ 35 mm (0.98 ~ 1.34 in.)	— — —
Chain 20-link Length	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tools

Inside Circlip Pliers:
57001-143



Bearing Driver Set:
57001-1129



10-6 FINAL DRIVE

Drive Chain

Drive Chain Slack Inspection

- Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter.

Drive Chain Slack Adjustment

- Refer to the Drive Chain Slack Adjustment in the Periodic Maintenance chapter.

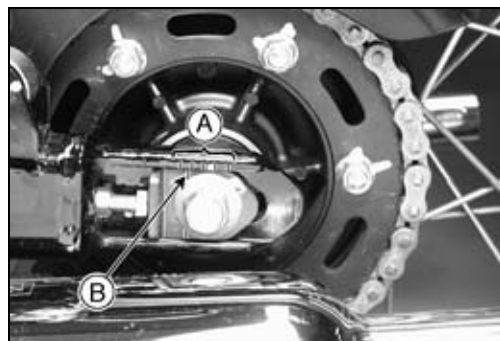
Wheel Alignment Inspection/Adjustment

- Check to see that the graduation [A] of the swingarm and the chain adjuster notches [B] of both sides are in the same relative position.

★ If they are not, adjust the chain slack.

⚠ WARNING

Misalignment of both alignment indicators will result in abnormal wear of the drive chain and the sprocket and may result in an unsafe riding condition.



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 in the Periodic Maintenance chapter.

Drive Chain Removal

- Remove:
 - Rear Wheel (see Wheels/Tires chapter)
 - Swingarm (see Suspension chapter)
 - Engine Sprocket Cover (see Engine Sprocket Cover Removal)
 - Speed Sensor Bracket (see Engine Sprocket Cover Removal)
- Take out the chain [A] from the sprocket [B].



Drive Chain Installation

- Place the chain on the engine sprocket and the swingarm, and install the swingarm (see Suspension chapter).
- Install the removed parts.
- Adjust the drive chain slack (see Final Drive in the Periodic Maintenance chapter).

Drive Chain Replacement (EJ650-C6P ~ C7, C6F)

CAUTION

For safety, if the drive chain shall be replaced, replace it using a recommended tool.

**Recommended Tool - Type: EK JOINT Tool #50
Brand: ENUMA CHAIN**

Drive Chain

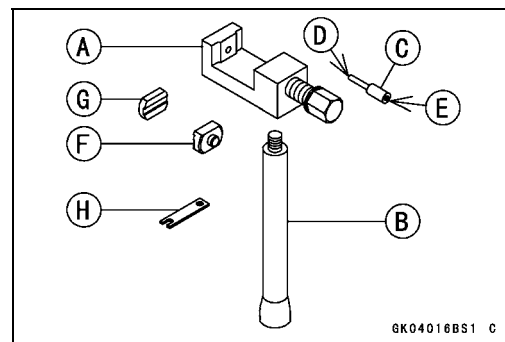
Body [A]
 Handlebar [B]
 Cutting and Rivetting Pin [C]
 For Cutting [D]
 For Rivetting [E]
 Plate Holder (A) [F]
 Plate Holder (B) [G]
 Gauge [H]

Drive Chain Specifications

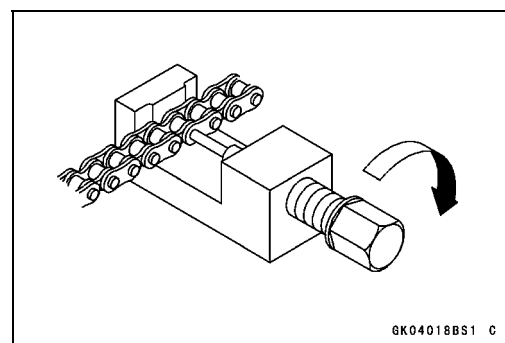
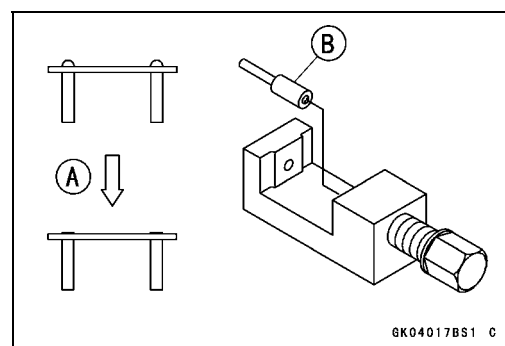
Type: EX525MV-X, Joint

Link: 104 links

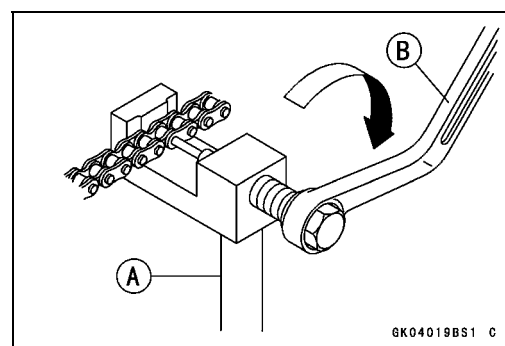
- Remove:
Chain Cover
Engine Sprocket Cover (see Engine Sprocket Removal)
- Grind [A] the pin head to make it flat.
- Set the cutting and rivetting pin [B] as shown.



- Screw the pin holder until it touches the link pin.
- Be sure that the cutting pin hits center of the link pin.



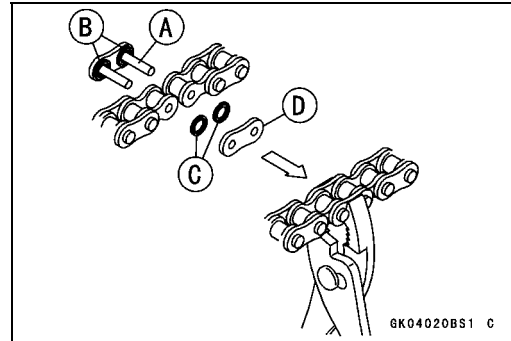
- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the link pin.



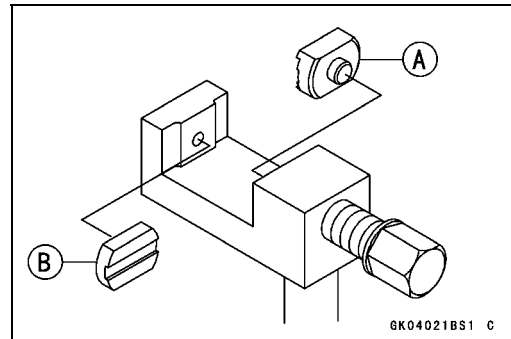
10-8 FINAL DRIVE

Drive Chain

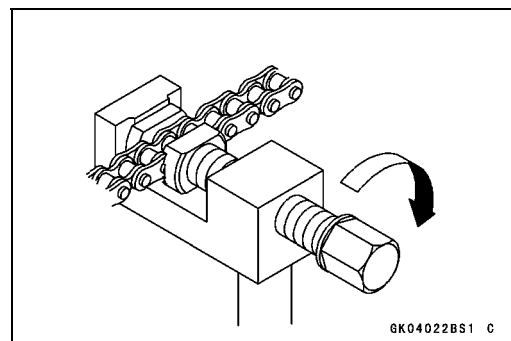
- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease the seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals [C].
- Install the link plate [D] so that the mark faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.



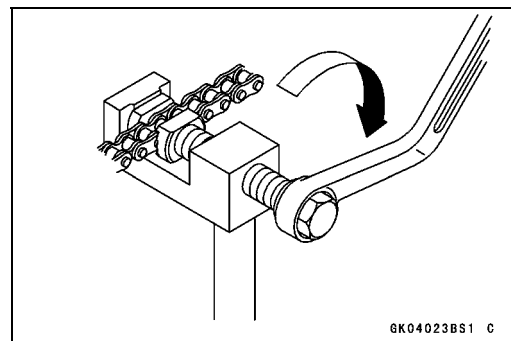
- Set the plate holder (A) [A] and plate holder (B) [B] on the body.



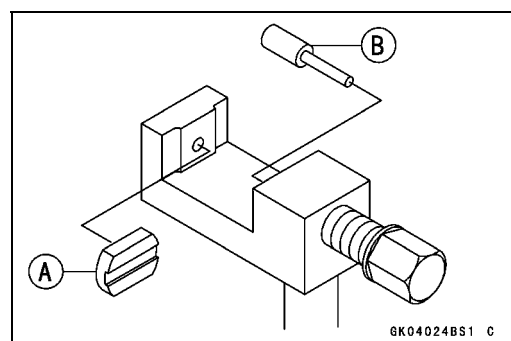
- Fit the plate holder (A) to the link plate.
- Turn the pin holder by hand until the plate holder (B) touches the other link plate.



- 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.

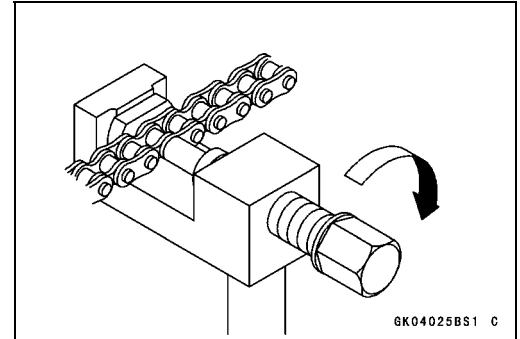


- Set the plate holder (B) [A] and the cutting and rivetting pin [B] as shown.

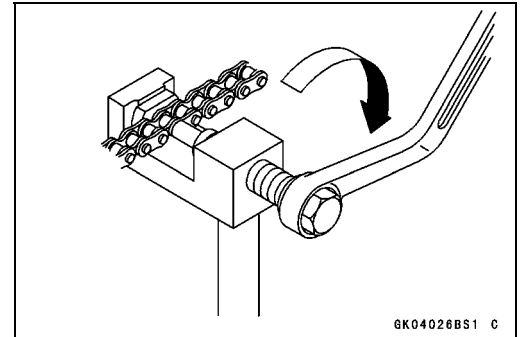


Drive Chain

- Turn the pin holder until the rivetting pin touches the link pin.



- Turn the wrench clockwise until the tip of rivetting pin contact with the link pin.
- Rivet it.
- Repeat the same procedure 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

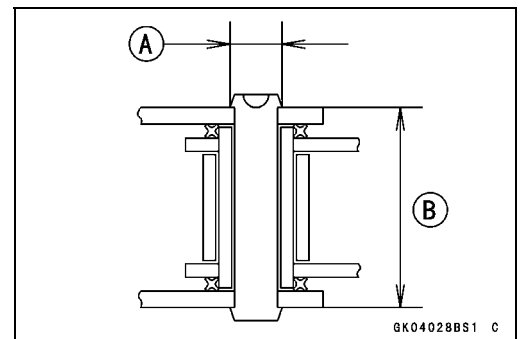
Standard: 19.85 ~ 20.00 mm (0.78 ~ 0.79 in.)

- ★ If the reading exceeds the specified length, cut and rejoin the chain again.

- Check:

Movement of the Rollers

- Adjust the drive chain slack after installing the chain.

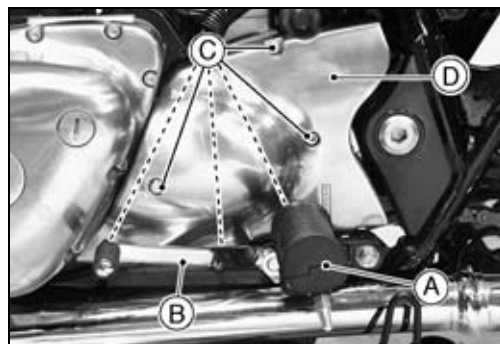


10-10 FINAL DRIVE

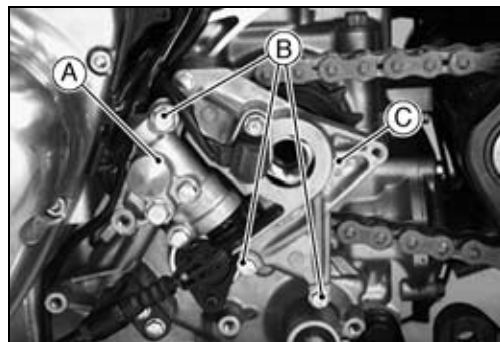
Sprocket, Sprocket Coupling

Engine Sprocket Removal

- Remove:
 - Left, Front Footpeg [A]
 - Shift Pedal [B]
 - Engine Sprocket Cover Bolts [C]
 - Engine Sprocket Cover [D]



- Clutch Release Case [A] (see Clutch chapter)
- Speed Sensor Bracket Bolts [B]
- Speed Sensor Bracket [C]

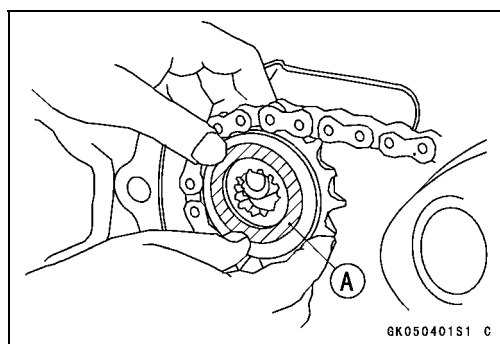
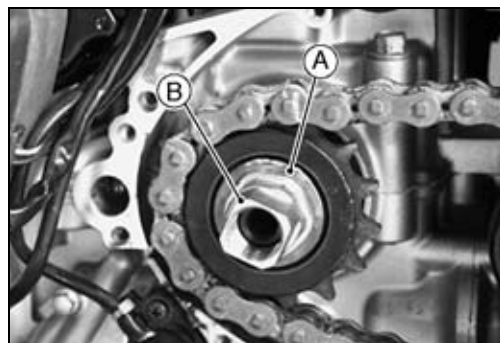


- Flatten the lock washer [A].
- Remove:
 - Engine Sprocket Nut [B]

NOTE

○Apply the rear brake to loosen the sprocket nut.

- Slacken the drive chain all the way (see Periodic Maintenance chapter).
- Set the motorcycle on its center stand and raise the rear wheel.
- Remove the drive chain from the rear sprocket to the right.
- Remove the engine sprocket [A] together with the chain, from the output shaft.
- Remove the engine sprocket from the chain.



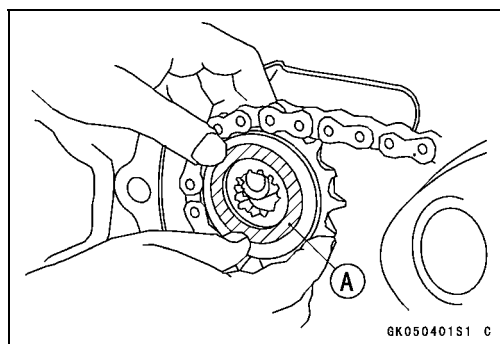
Engine Sprocket Installation

- Replace the rear axle cotter pin with a new one.
- Install the engine sprocket [A].
- Apply molybdenum disulfide oil to the threads of the engine sprocket nut and to the nut seating surface and tighten the nut.

Torque - Engine Sprocket Nut: 127 N·m (13.0 kgf·m, 94 ft·lb)

NOTE

○Apply the rear brake to tighten the nut.



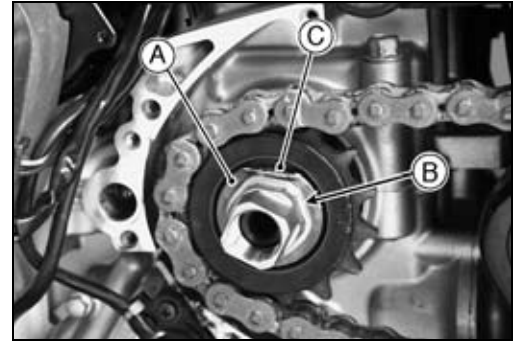
Sprocket, Sprocket Coupling

- Direct the tab [A] of the washer to the side [B] of the nut and bend the tab [C].
- Adjust the drive chain slack (see Periodic Maintenance chapter).
- Install the removed parts.

Torque - Speed Sensor Bracket Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Clutch Release Case Mounting Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

Engine Sprocket Cover Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)



Rear Sprocket Removal

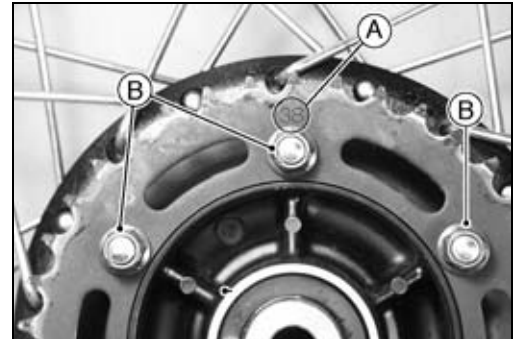
- Remove:
 - Rear Wheel (see Wheels/Tires chapter)
 - Rear Sprocket Nuts [A]
 - Rear Sprocket [B]



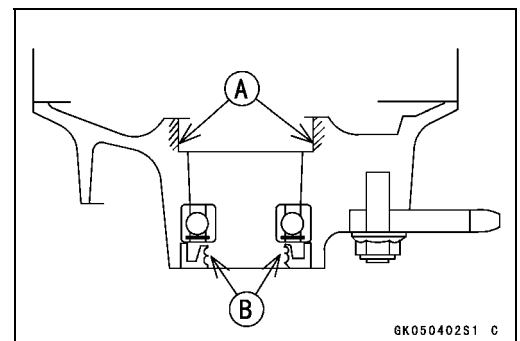
Rear Sprocket and Coupling Installation

- Install the rear sprocket with the marked [A] side facing out.
- Tighten the sprocket nuts [B].

Torque - Rear Sprocket Nuts: 74 N·m (7.5 kgf·m, 54 ft·lb)
(On and after EJ650-A3/C3) 59 N·m (6.0 kgf·m, 43 ft·lb)

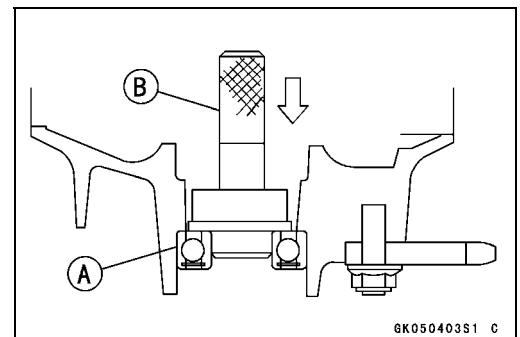


- Apply grease:
 - Coupling Inner Wall [A]
 - Grease Seal Lip [B]
- Install the rear wheel (see Wheels/Tires chapter).



Coupling Bearing Removal

- Remove the coupling, collar, grease seal, and circlip.
 - Special Tool - Inside Circlip Pliers: 57001-143**
- Remove the bearing [A].
 - Special Tool - Bearing Driver Set: 57001-1129 [B]**



10-12 FINAL DRIVE

Sprocket, Sprocket Coupling

Coupling Bearing Installation

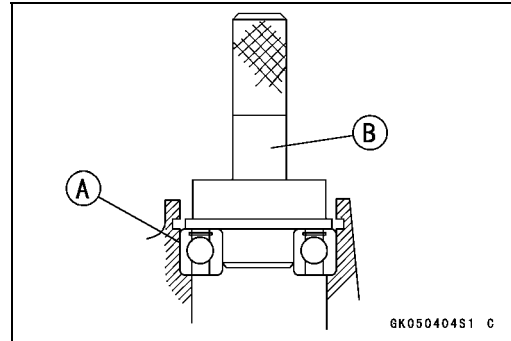
- Replace the bearing with a new part.
- Install the bearing [A] until it bottoms out.
- Install the bearing with its seal facing out.

Special Tool - Bearing Driver Set: 57001-1129 [B]

- Install a new circlip.

Special Tool - Inside Circlip Pliers: 57001-143

- Install the grease seal so that the grease seal surface and the outer end of the coupling hole will be parallel.
- Apply grease to the grease seal lip.

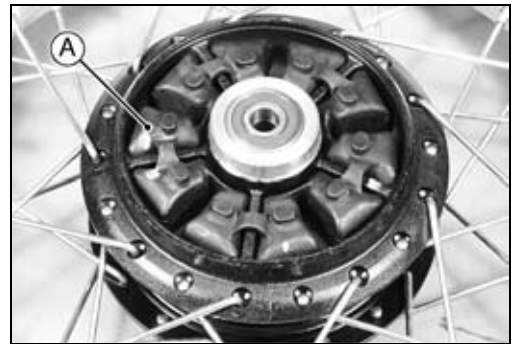


Coupling Bearing Wear and Lubrication

○ See Hub Bearing Inspection (see Wheels/Tires chapter).

Damper Inspection

- Remove the coupling and inspect the rubber damper [A].
- ★ Replace the damper if it is damaged or deteriorated.



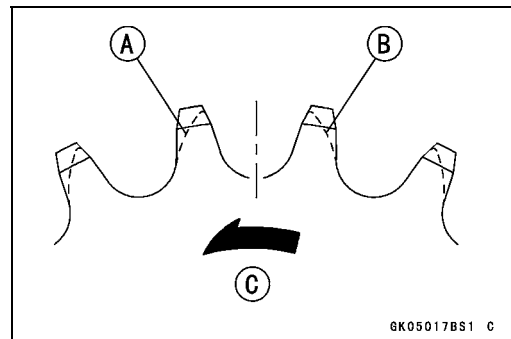
Sprocket Wear Inspection

- Check the sprocket for uneven wear, abnormal wear, or damaged teeth.
- ★ If the teeth are worn or damaged, replace the sprocket, and inspect the drive chain for wear.

Worn Teeth (Engine Sprocket) [A]

Worn Teeth (Rear Sprocket) [B]

Direction of Rotation [C]

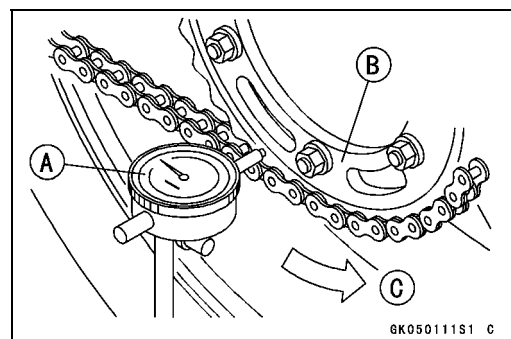


NOTE

○ If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.

Rear Sprocket Runout Inspection

- Raise the rear wheel.
- Set a dial gauge [A] perpendicularly against the rear sprocket [B] near the teeth as shown.
- Turn [C] the rear wheel slowly to measure the sprocket runout (Warp).
- The difference between the highest and lowest dial gauge readings is amount of runout (Warp).
- ★ If the runout exceeds the service limit, replace the sprocket.



Rear Sprocket Warp

Standard: TIR 0.4 mm (0.016 in.) or less

Service Limit: TIR 0.5 mm (0.020 in.)

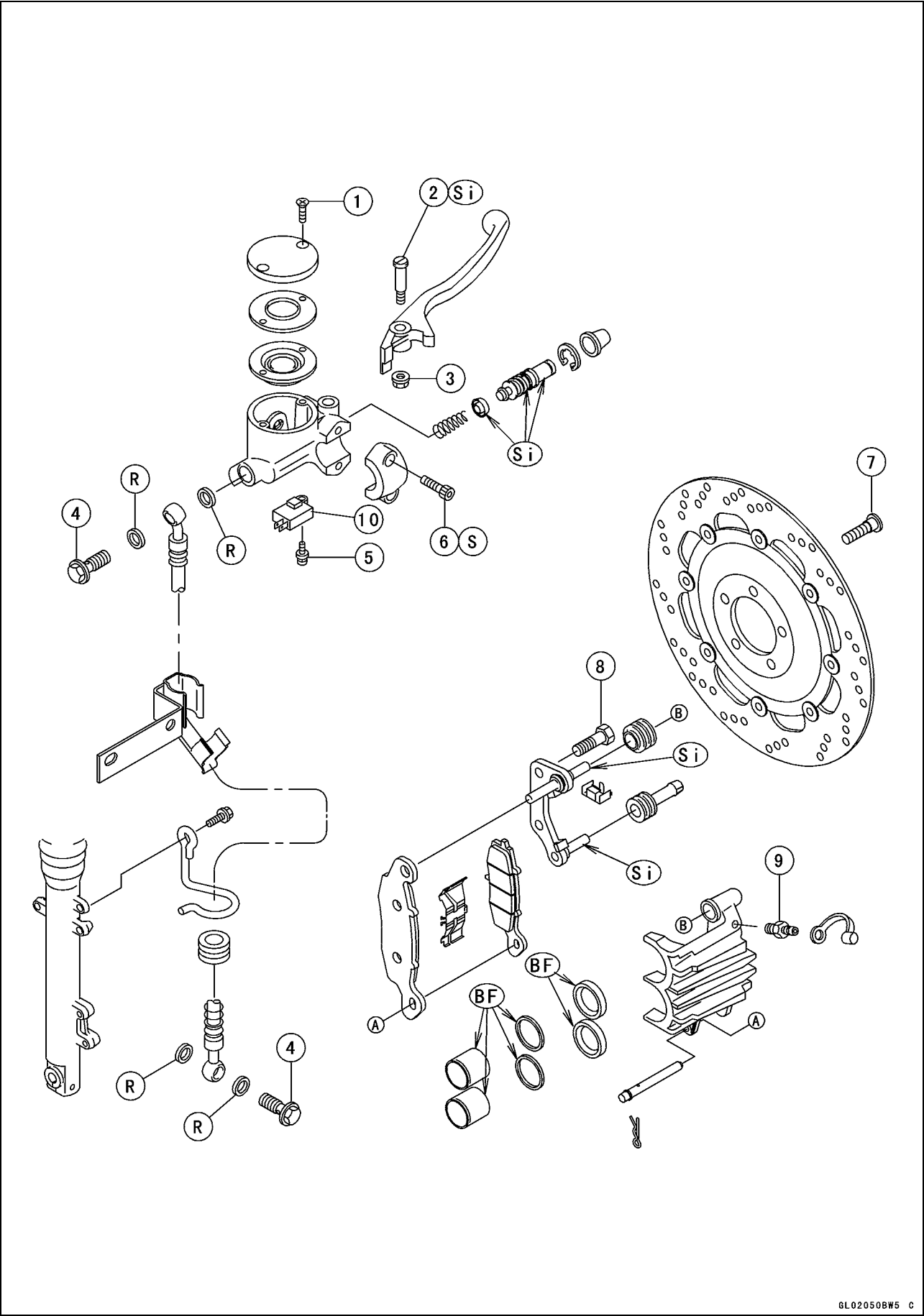
Brakes

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Master Cylinder	11-14	Brake Shoe Lining Wear	
Master Cylinder Removal.....	11-14	Inspection.....	11-23
Master Cylinder Installation.....	11-14	Brake Camshaft/Camshaft Hole	
Master Cylinder Disassembly	11-15	Wear Inspection	11-23
Master Cylinder Assembly	11-16	Brake Shoe Spring Inspection	11-23
Master Cylinder Inspection	11-16		

11-2 BRAKES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
2	Brake Lever Pivot Bolt	1.0	0.1	9 in·lb	
3	Brake Lever Pivot Bolt Locknut	5.9	0.6	52 in·lb	
4	Brake Hose Banjo Bolts	34	3.5	25	
5	Front Brake Light Switch Screw	1.2	0.12	10 in·lb	
6	Master Cylinder Clamp Bolts	8.8	0.9	78 in·lb	S
7	Brake Disc Bolts	23	2.3	17	
8	Caliper Mounting Bolts	34	3.5	25	
9	Caliper Bleed Valve	7.8	0.8	69 in·lb	

10. Front Brake Light Switch

BF: Apply brake fluid.

G: Apply high-temperature grease.

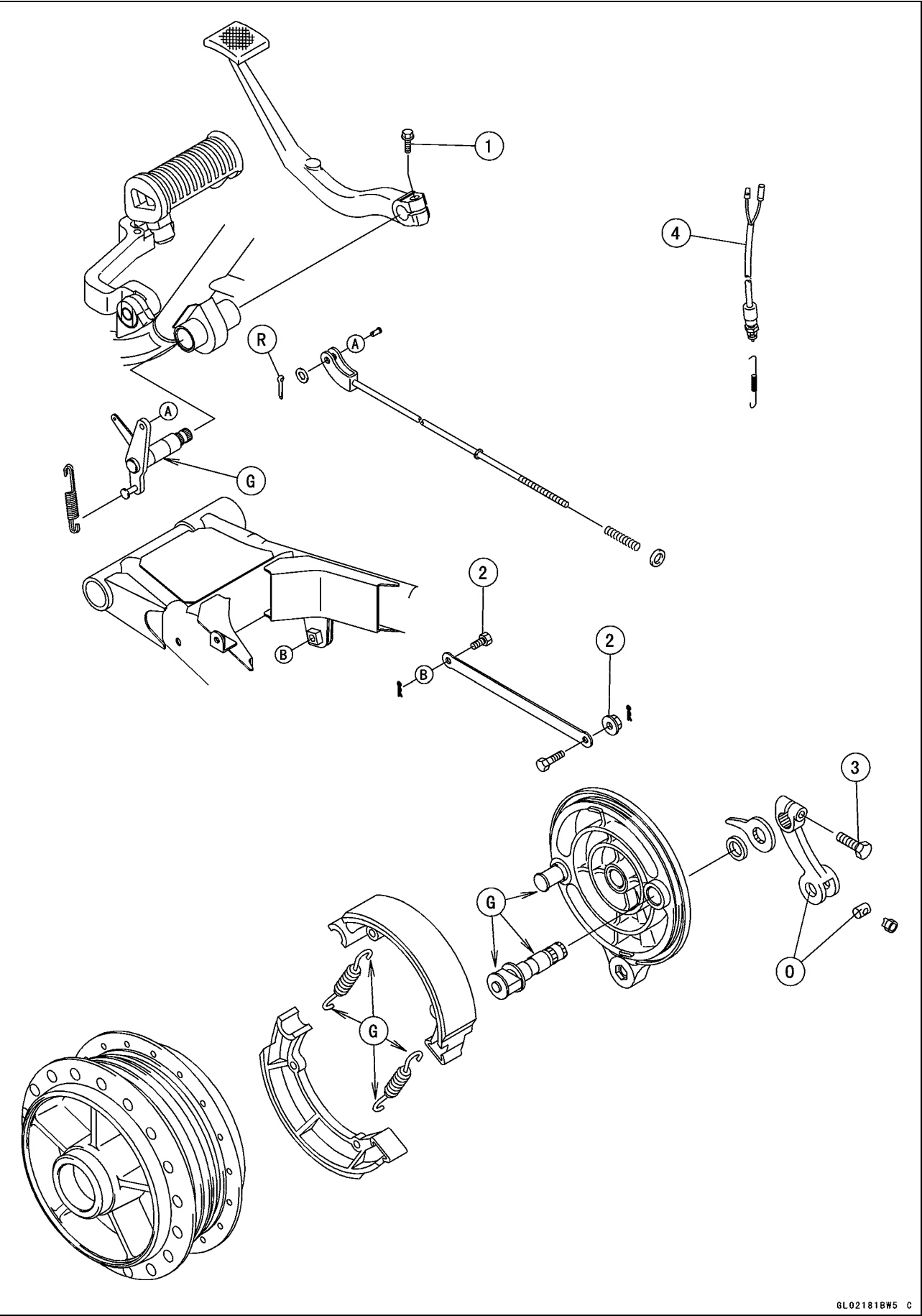
R: Replacement parts

S: Tighten the fasteners following the specified sequence.

Si: Apply silicon grease or PBC grease.

11-4 BRAKES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Pedal Mounting Bolt	25	2.5	18	
2	Torque Link Nuts, Bolts	34	3.5	25	
3	Cam Lever Bolt	19	1.9	14	

4. Rear Brake Light Switch

G: Apply high-temperature grease.

O: Apply engine oil.

R: Replacement Parts

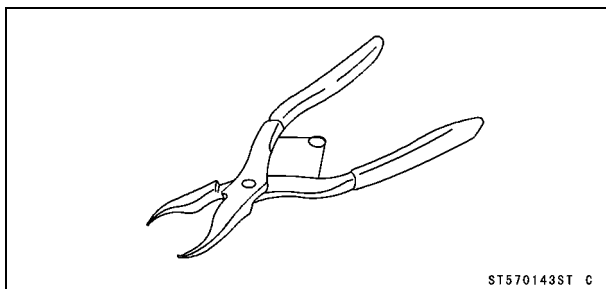
11-6 BRAKES

Specifications

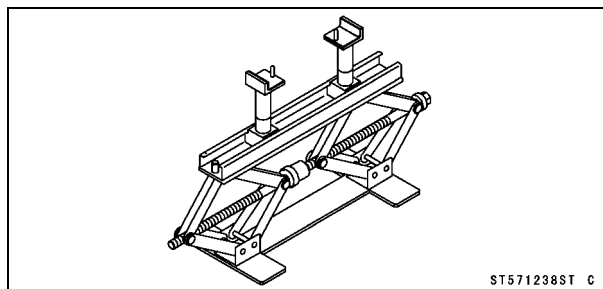
Item	Standard	Service Limit
Front Brake		
Pad Lining Thickness	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Disk Thickness	4.8 ~ 5.1 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Disc Runout	TIR 0.15 mm (0.006 in.) or less	TIR 0.3 mm (0.01 in.)
Brake Fluid: Grade	DOT4	—
Rear Brake		
Brake Pedal Position	About 0 ~ 30 mm (1.2 in.) above footpeg (from top of footpeg to top of brake pedal)	—
Cam Lever Angle	80 ~ 90°	—
Brake Pedal Free Play	20 ~ 30 mm (0.8 ~ 1.2 in.)	—
Brake Maintenance		
Brake Drum Inside Diameter	160 ~ 160.16 mm (6.299 ~ 6.305 in.)	160.75 mm (6.33 in.)
Brake Shoe Lining Thickness	3.35 ~ 3.65 mm (0.132 ~ 0.144 in.)	1.8 mm (0.07 in.)
Brake Camshaft Diameter	16.957 ~ 16.984 mm (0.6676 ~ 0.6687 in.)	16.88 mm (0.665 in.)
Brake Camshaft Hole Diameter	17.000 ~ 17.027 mm (0.6693 ~ 0.6704 in.)	17.15 mm (0.675 in.)

Special Tools

Inside Circlip Pliers:
57001-143



Jack:
57001-1238



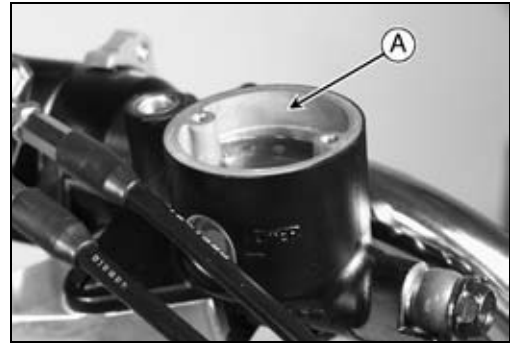
11-8 BRAKES

Brake Fluid

WARNING

When working with the disk brake, observe the precautions listed below.

1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave [A] the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
7. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high-flash point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
8. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE LINE.**



Brake 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 Fluid

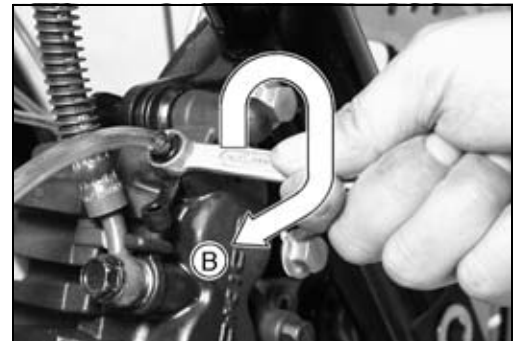
Brake Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever movement will be partially used in compressing the air. This will make the lever feel spongy, and there will be a loss in braking power.

⚠ WARNING

Be sure to bleed the air from the brake line whenever brake lever action feels soft or spongy after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

- Remove the reservoir cap and fill the reservoir with fresh brake fluid to the upper level line.
- Slowly pump the brake lever several times to completely eliminate the air in the master cylinder, until no air bubbles can be seen rising up through the fluid from the small holes at the bottom of the reservoir.
- Remove the rubber cap from the bleed valve on the caliper.
- Attach a clear plastic hose to the caliper bleed valve, and run the other end of the hose into a suitable container.
- Repeat the operation described below 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 lever and hold it [A].
- Quickly open and close [B] the bleed valve while holding the brake lever applied.
- Release the brake lever [C].



NOTE

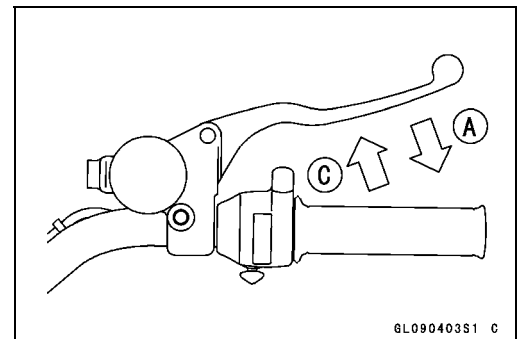
- *The fluid level must be checked often during the bleeding operation and replenished with specified brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the brake line. Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*

- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.
- Install the reservoir cap.

Torque - Caliper Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

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

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



11-10 BRAKES

Caliper

Caliper Removal

- Remove:
 - Banjo Bolt [A] (loosen only to the extent that the brake fluid would not leak)
 - Caliper Mounting Bolts [B]
 - Caliper [C]
 - Brake Hose [D]



CAUTION

Immediately wash away any brake fluid that spills.

NOTE

○If compressed air will not be available for disassembling the caliper, remove the piston before detaching the brake hose (see Caliper Disassembly).

Caliper Installation

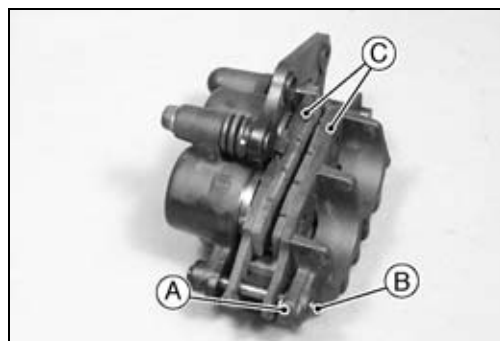
- Replace the flat washers on each side of the hose fitting with new ones.
- Tighten:
 - Torque - Caliper Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**
 - Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**
- Bleed the brake line.
- Check the fluid level in the brake reservoir.
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

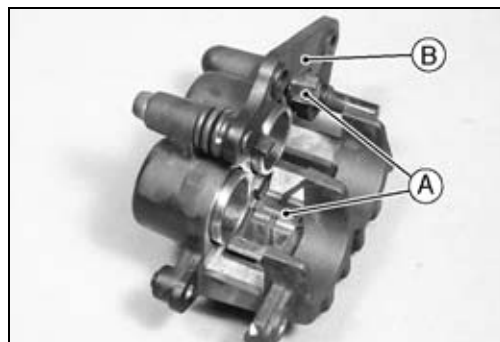
Do not attempt to drive the motorcycle until a full brake is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

Caliper Disassembly

- Remove:
 - Caliper (see Caliper Removal)
 - Cotter Pin [A]
 - Pin [B]
 - Pads [C]
- Push the piston in.



- Remove:
 - Pad Springs [A]
 - Caliper Holder [B]
- Using compressed air, remove the piston.

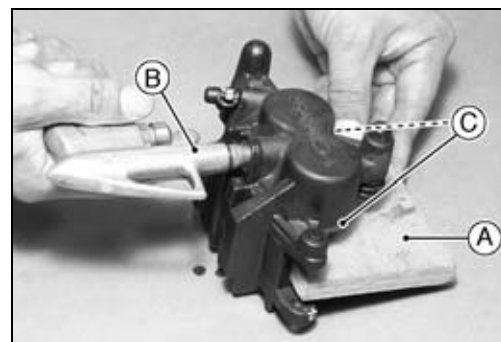


⚠ WARNING

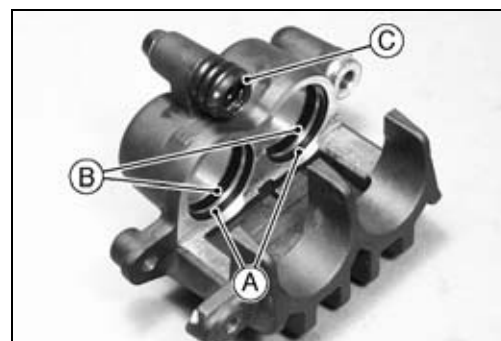
To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

Caliper

- Insert a wooden board [A] 5 mm (0.2 in.) thick inside the caliper opening.
- Apply compressed air [B] to the banjo bolt hole to allow the pistons [C] to protrude and stop at the wooden board.
- Remove the wooden board and pull out the piston by hand.
- ★ If compressed air is not available, with the brake hose still attached, apply the brake lever to remove the pistons. The remaining process is as described above.



- Remove:
 - Dust Seals [A]
 - Fluid Seals (piston seals) [B]
 - Friction Boot [C]
 - Bleed Valve



CAUTION

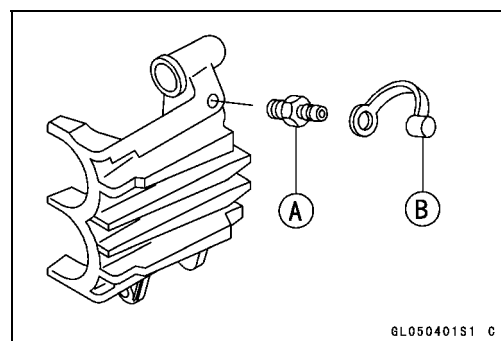
Immediately wash away any brake fluid that spills.

Caliper Assembly

- Clean all parts other than the outer and inner pads.

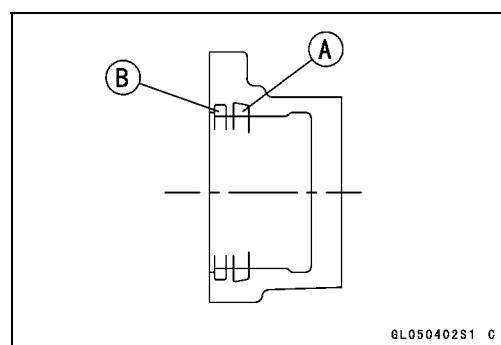
CAUTION

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

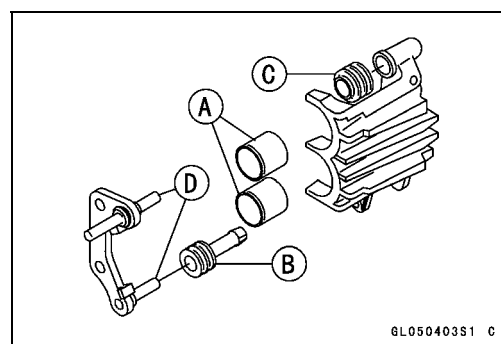


- Install the bleed valve [A] and the rubber cap [B].
 Torque - Caliper Bleed Valve: 7.8 N·m (0.8 kgf·m, 69 in·lb)

- Replace the fluid seals [A] with new ones, apply brake fluid to them, and install them in the caliper body. Either side of the fluid seal may face outboard.
- Check the dust seals [B] and replace them with new ones if they are damaged.



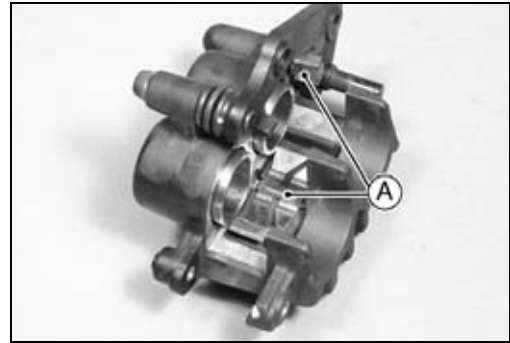
- Apply brake fluid to the inside of the cylinders and to the outside of the pistons and push the pistons [A] into the cylinders.
- Check the rubber boot [B] and dust boot [C] and replace them with new ones if they are damaged.
- Apply a thin coat of silicon grease to the holder shafts [D] and the holder holes.



11-12 BRAKES

Caliper

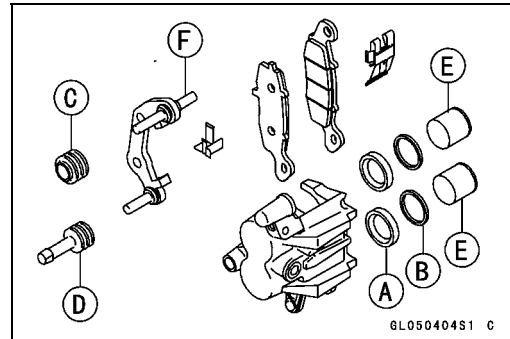
- Install the pad springs [A].
- Install the pads.
- Wash the caliper with water to remove brake fluid and wipe it off.



Caliper Fluid Seal Damage Inspection

The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- Replace the fluid seal if it exhibits any of the conditions listed below.
 - Brake fluid leakage around the pad.
 - Brakes overheat.
 - Considerable difference in inner and outer pad wear.
 - Seal and piston are stuck together.
- ★ If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.



Caliper Dust Boot and Rubber Boot Damage Inspection

- Check that the dust boot [C] and rubber boot [D] are not cracked, worn, swollen, or otherwise damaged.
- If they show any damage, replace it.

Caliper Piston and Cylinder Damage Inspection

- Visually inspect the piston [E] and cylinder surfaces.
- ★ Replace the caliper if the cylinder and piston are badly scored or rusty.

Caliper Holder Shaft Wear Inspection

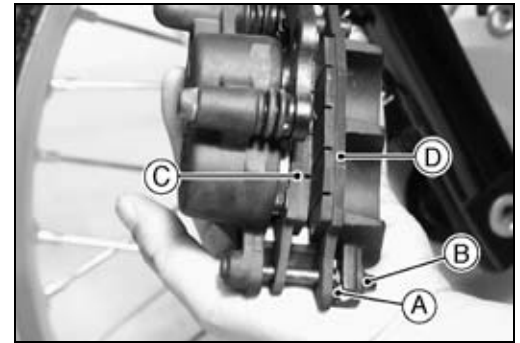
The caliper body must slide smoothly on the caliper holder shafts. If the body does not slide smoothly, one pad will wear more than the other, and constant drag on the disc may cause the temperature of the discs or the brake fluid to increase.

- Visually inspect that the caliper holder shafts [F] are not badly worn or bent.
- ★ If the caliper holder shafts are damaged, replace the entire caliper assembly.

Brake Pads

Brake Pad Removal

- Remove the caliper with the hose attached.
- Remove:
 - Clip [A]
 - Pad Pin [B]
 - Holder Side Pad [D]
- Remove the pad from the opposite side [C].



Brake Pad Installation

- Before installation, clean the pads with high-flash-point solvent.
- Push the caliper pistons in by hand as far as they will go.
- Be sure to install the pad pin clip.

⚠ WARNING

Do not attempt to drive the motorcycle until a full brake is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

Brake Pad Wear Inspection

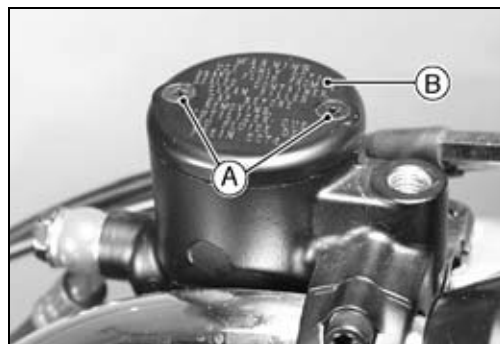
- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance

11-14 BRAKES

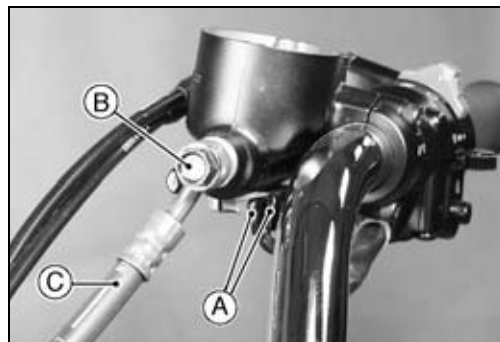
Master Cylinder

Master Cylinder Removal

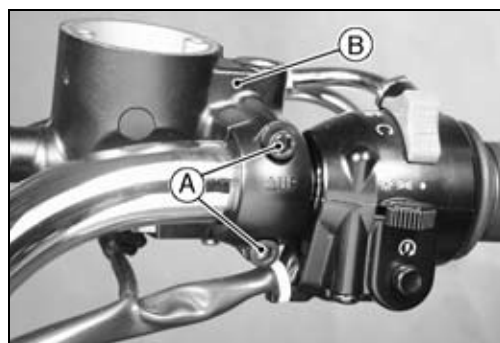
- Remove:
 - Reservoir Cap Screws [A]
 - Reservoir Cap [B]
 - Diaphragm Plate
 - Diaphragm
- Using a fork oil level gauge, drain the brake fluid from the reservoir.



- Remove:
 - Front Brake Light Switch Leads [A]
 - Brake Hose Banjo Bolt [B]
 - Brake Hose [C]



- Remove:
 - Master Cylinder Clamp Bolts [A]
 - Master Cylinder [B]



CAUTION

Brake fluid damages a paint surface or a plastic part upon contact by peeling, discoloring, or cracking. Therefore, immediately wash the affected area with water and wipe it off if it comes in contact with brake fluid.

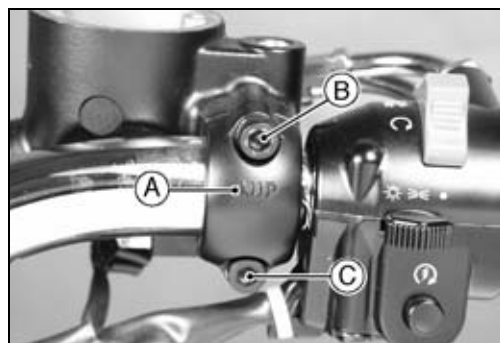
Master Cylinder Installation

- Align the clamp mating surface with the punch mark [A] on the handlebar.



- Install the clamp so that the arrow [A] points upward.
- Tighten the upper clamp bolt [B] first, and then the lower clamp bolt [C]. There will be a gap at the lower part of the clamp after tightening.

Torque - Master Cylinder Clamp Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)



Master Cylinder

- Replace the flat washer on each side of the brake hose fitting with new ones.
- Tighten the brake hose banjo bolt.

Torque - Brake Hose Banjo Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)

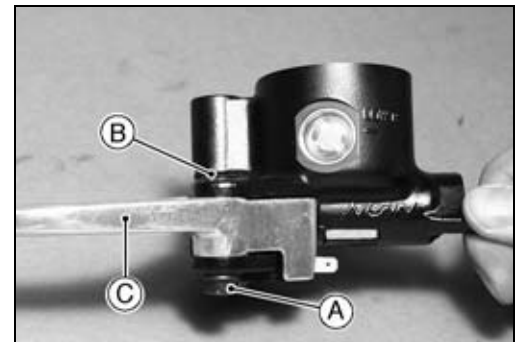
- Fill the reservoir with brake fluid and bleed the brake line (see Brake Fluid Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

Do not attempt to drive the motorcycle until a full brake is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

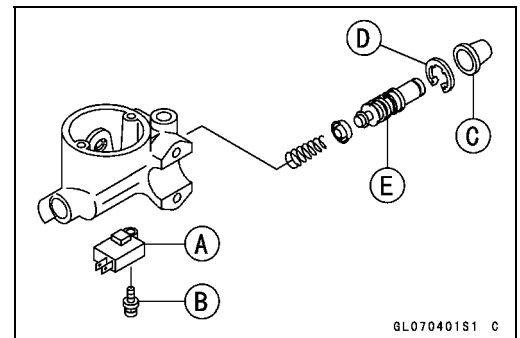
Master Cylinder Disassembly

- Remove:
Master Cylinder (see Master Cylinder Removal)
Locknut [A]
Pivot Bolt [B]
Brake Lever [C]



- Remove:
Screw [A]
Brake Light Switch [B]
Dust Cover [C]
Circlip [D]
Piston Assembly [E]

Special Tool - Inside Circlip Pliers: 57001-143



CAUTION

Do not remove the primary or the secondary cups from the piston since removal will damage it.

11-16 BRAKES

Master Cylinder

Master Cylinder Assembly

- Take care not to scratch the piston or the inner wall of the cylinder.
- Before assembly, clean all parts with brake fluid or alcohol, and apply brake fluid to the inner wall of the cylinder.

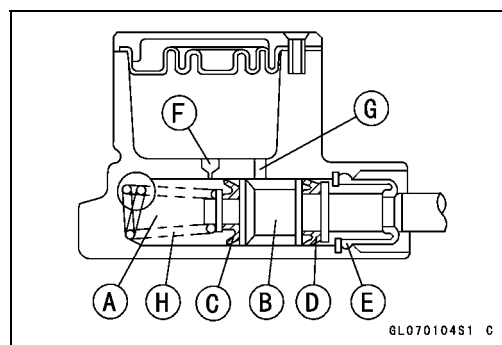
CAUTION

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

- Apply a small amount of silicon grease:
 - Brake Lever Pivot Bolt
 - Brake Lever Pivot Contact
 - Dust Cover
- Tighten:
 - Torque - Front Brake Light Switch Screw: 1.2 N·m (0.12 kgf·m, 10 in·lb)**
 - Brake Lever Pivot Bolt: 1.0 N·m (0.1 kgf·m, 9 in·lb)**
 - Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.6 kgf·m, 52 in·lb)**

Master Cylinder Inspection

- Disassemble the master cylinder.
- Check that there are no scratches, rust or pitting on the inner wall of the master cylinder [A] and on the outside of each piston [B].
- ★ If a master cylinder or piston shows any damage, replace them.
- Inspect the primary [C] and secondary [D] cups.
- ★ If a cup is worn, damaged, deteriorated, or swollen, replace the piston assembly.
- ★ If there is a brake fluid leak, also replace the piston assembly.
- Check the dust cover [E] for any damage.
- ★ If the dust cover show any damage, replace it.
- Check that relief [F] and supply [G] ports are not plugged.
- ★ If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.
- Check the piston return spring [H] for any damage.
- ★ If the spring is damaged, replace it.



Brake Discs

Brake Disc Removal

- Remove the wheel (see Wheels/Tires chapter).
- Unscrew the disc bolts [A], and remove the disc [B].



Brake Disc Installation

- Install the brake disc on the wheel so that the side with the wear thickness limit mark [A] faces out.
- Tighten the disc bolts.

Torque - Brake Disc Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)



Brake Disc Wear Inspection

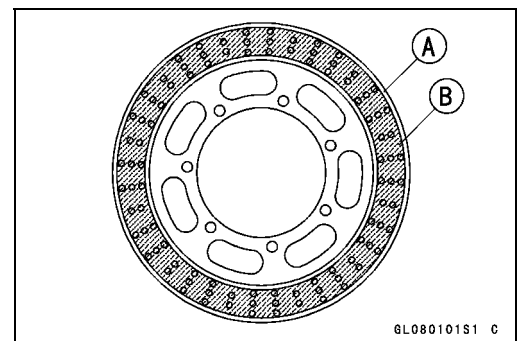
- Visually inspect the disc.
- ★ Replace the disc if it shows any damage or crack.
- Measure the thickness of the disc sliding surface [A].
Measuring Area [B]

Brake Disc Thickness

Standard: 4.8 ~ 5.1 mm (0.19 ~ 0.20 in.)

Service Limit: 4.5 mm (0.18 in.)

- ★ Replace the disc if the sliding surface has worn past the service limit.



Brake Disc Runout Inspection

- Raise the wheel (see Wheels/Tires chapter).
- Raise the front wheel and turn the handlebar fully to either right or left.

Special Tool - Jack: 57001-1238

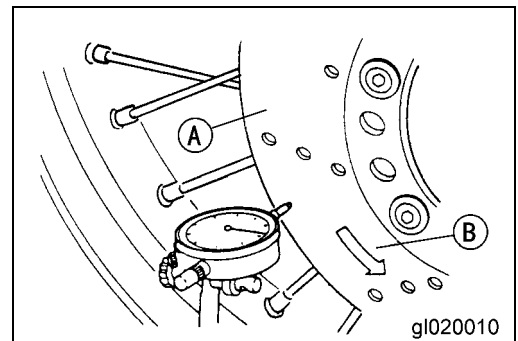
- Set up a dial gauge perpendicularly against the disc surface.
- Slowly turn [B] the wheel by hand and measure the disc [A] runout. The measurement should be taken 5 mm (0.20 in.) inside from the outer perimeter.

Brake Disc Runout

Standard: TIR 0.15 mm (0.006 in.) or less

Service Limit: TIR 0.3 mm (0.01 in.)

- ★ Replace the disc if it has worn past the service limit.



11-18 BRAKES

Brake Hoses

Brake Hose Removal/Installation

CAUTION

Brake fluid damages a paint surface or a plastic part upon contact by peeling, discoloring, or cracking. Therefore, immediately wash the affected area with water and wipe it off if it comes in contact with brake fluid.

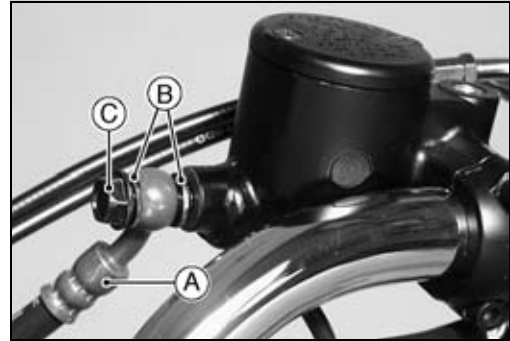
- When removing the brake hose [A], temporarily secure the end of the brake hose to some high place to keep brake fluid loss to a minimum.
- Replace the flat washers [B] on each side of the brake hose fitting with new ones.
- Beware of their bending direction when installing the hoses. Avoid sharp bending, kinking, flattening or twisting, and route the hoses properly (see Appendix chapter).
- Tighten the banjo bolt [C].

Torque - Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

- After the installation, replenish the brake fluid (see Brake Fluid Bleeding).

Brake Hose Inspection

- Refer to the Brake Hose and Connection Check in the Periodic Maintenance chapter.



Brake Pedal/Rod

Brake Pedal Position Inspection

- Refer to the Brake Pedal Position Inspection in the Periodic Maintenance chapter.

Brake Pedal Position Adjustment

- Refer to the Brake Pedal Position Adjustment in the Periodic Maintenance chapter.

Brake Pedal Free Play Inspection

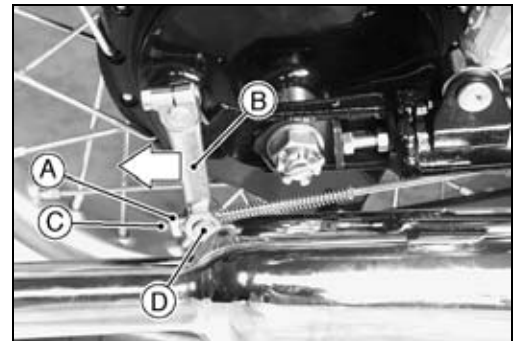
- Refer to the Brake Pedal Free Play Inspection in the Periodic Maintenance chapter.

Brake Pedal Free Play Adjustment

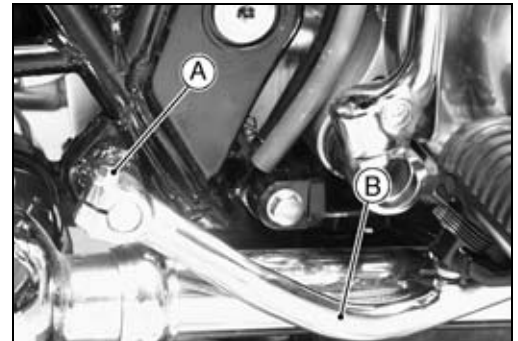
- Refer to the Brake Pedal Free Play Adjustment in the Periodic Maintenance chapter.

Brake Pedal Removal

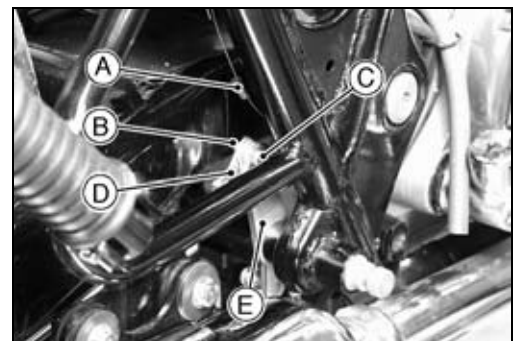
- Remove:
Adjusting Nut [A]
- Pull the brake cam lever [B] towards the back, press the brake pedal, and remove the brake rod [C] from the clevis pin [D].



- Remove:
Brake Pedal Bolt [A]
Brake Pedal [B]



- Remove:
Return Spring
Brake Switch Spring [A]
Cotter Pin [B]
Joint Pin [C]
Brake Rod [D]
Brake Pedal Lever [E]

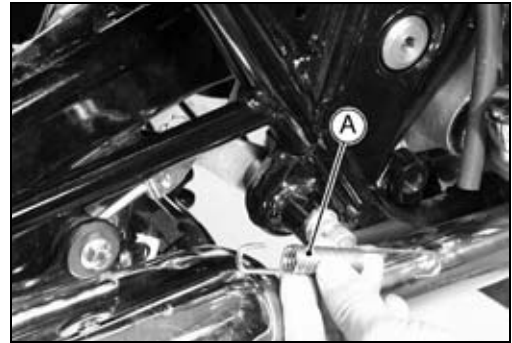


11-20 BRAKES

Brake Pedal/Rod

Brake Pedal Installation

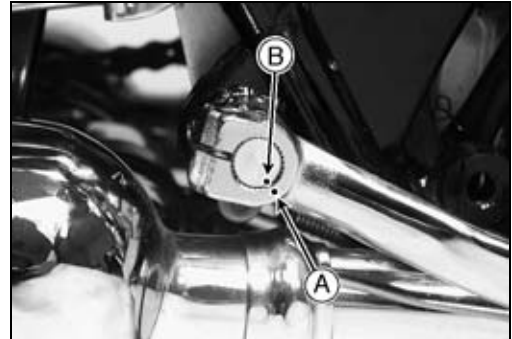
- Apply high-temperature grease to the sliding portion of the brake pedal lever shaft.
- Install the removed parts in the reverse order of removal.
- Install the return spring in the proper direction [A].



- Align the punch marks on the brake pedal [A] and on the brake pedal lever shaft [B].
- Tighten the brake pedal mounting bolt.

Torque - Brake Pedal Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Adjust the brake pedal free play.



Brake Panel/Drum

Cam Lever Angle Inspection

- Inspect the angle [A] between the cam lever and the brake rod when the rear brake is firmly applied.

Cam Lever Angle

Standard: 80 ~ 90°

★ Adjust if the angle is out of standard.

⚠ WARNING

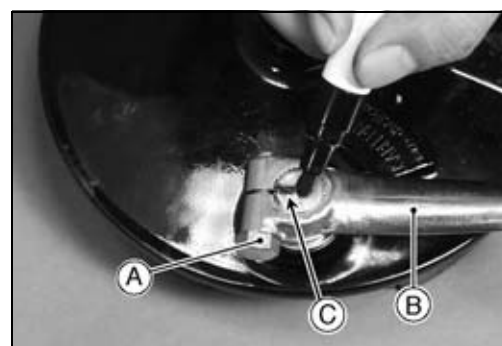
Since a cam lever angle greater than 90° reduces braking effectiveness, cam lever angle adjustment should not be neglected.



Cam Lever Angle Adjustment

- Remove:
 - Rear Wheel (see Wheels/Tires chapter)
 - Brake Panel
 - Cam Lever Bolt [A]
- Before removing the cam lever [B], mark [C] the position of the cam lever on the camshaft.
- Remove the cam lever, and move it by one crest of the threads to reinstall.
- Tighten the cam lever bolt.

Torque - Cam Lever Bolt: 19 N·m (1.9 kgf·m, 14 ft·lb)



⚠ WARNING

When remounting the cam lever, be sure that the position of the wear indicator on the serrated shaft is not altered.

A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper operation, taking particular note of the brake lining wear indicator position.

In case of doubt as to braking effectiveness, disassemble and inspect all internal brake parts. Worn parts could cause the brake to lock or fail.

- Adjust the brake pedal free play (see Periodic Maintenance chapter).

Brake Panel Removal

- Remove:
 - Rear Wheel (see Wheels/Tires chapter)
 - Brake Panel [A]



Brake Panel Installation

- Place the brake panel in the drum and install the rear wheel (see Wheels/Tires chapter).

11-22 BRAKES

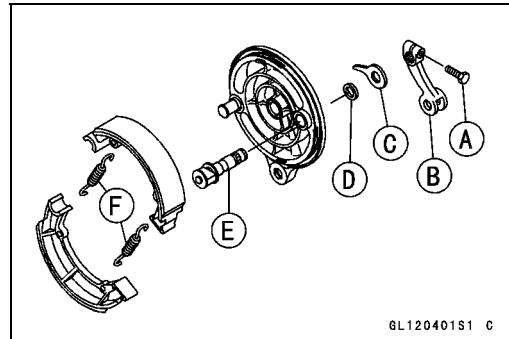
Brake Panel/Drum

Brake Panel Disassembly

- Remove the brake panel.
- Wrap the brake shoes [A] with a clean cloth to prevent the lining from coming into contact with grease or oil, and remove the brake shoes.

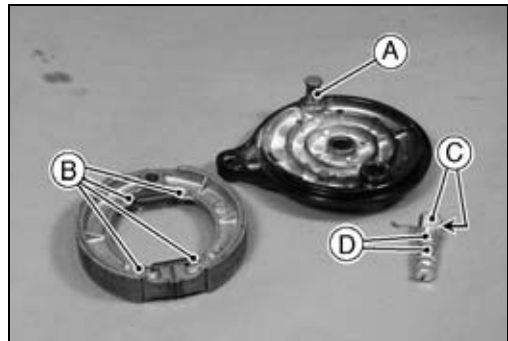


- To enable the cam lever to be placed back in its original position, punch a mark on the camshaft.
- See Cam Lever Angle Adjustment.
- Remove:
 - Cam Lever Bolt [A]
 - Cam Lever [B]
 - Wear Indicator [C]
 - Dust Seal [D]
 - Camshaft [E]
 - Brake Shoe Spring [F]



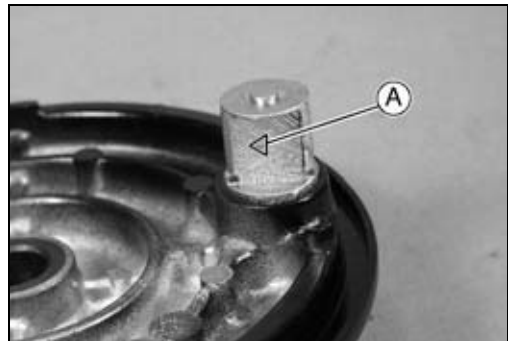
Brake Panel assembly

- Wipe off any old grease from the various areas of the brake panel.
- Apply a thin coat of grease:
 - Anchor Pin [A]
 - Shoe Spring, both ends [B]
 - Camshaft cam face [C]
 - Camshaft shaft portion [D]
- Do not allow grease to come in contact with the lining of the brake shoes.
- Wipe off any excess grease.
- Face the triangle mark [A] on the cam surface towards the center of the panel and install the camshaft in the panel.

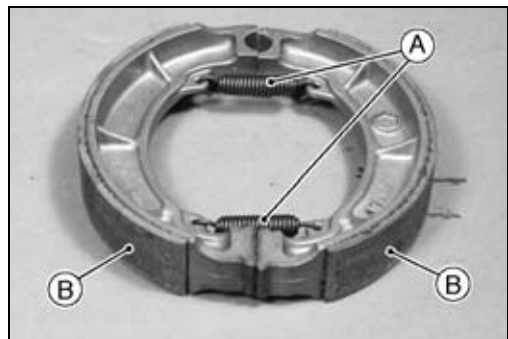


⚠ WARNING

Face the triangle mark [A] on the cam surface towards the center of the panel and install the camshaft in the panel.



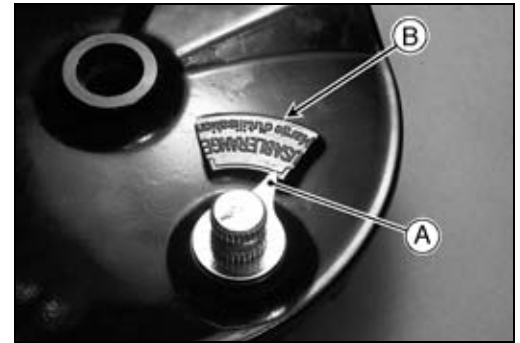
- Install the shoe springs [A] as shown in the photograph.
- Install the brake shoes, making sure that grease does not come in contact with the lining [B].



Brake Panel/Drum

- Install the dust seal and the return spring.
- Install the wear indicator to point [A] the left side of the USABLE RANGE box [B].
- Install the cam lever in its original position by aligning it with the mark and tighten the cam lever bolt.

Torque - Cam Lever Bolt: 19 N·m (1.9 kgf·m, 14 ft·lb)



Brake Drum Wear Inspection

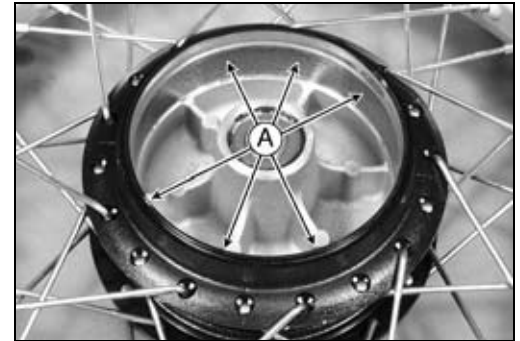
- Remove the brake panel from the rear wheel.
- Measure the drum bore at a few places [A].

Brake Drum Bore

Standard: 160.00 ~ 160.16 mm (6.299 ~ 6.305 in.)

Service Limit: 160.75 mm (6.33 in.)

- ★ Replace the wheel hub if any one of the measurements exceeds the service limit.



Brake Shoe Lining Wear Inspection

- Refer to the Brake Shoe Lining Wear Inspection in the Periodic Maintenance chapter.

Brake Camshaft/Camshaft Hole Wear Inspection

- Remove the camshaft and measure its diameter [A].

Brake Camshaft Diameter

Standard: 16.957 ~ 16.984 mm (0.6676 ~ 0.6687 in.)

Service Limit: 16.88 mm (0.665 in.)

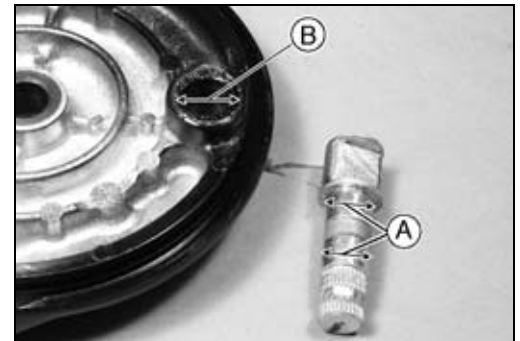
- ★ If it is smaller than the service limit, replace the camshaft.
- Measure the inside diameter [B] of the camshaft hole.

Brake Camshaft Hole Diameter

Standard: 17.000 ~ 17.027 mm (0.6693 ~ 0.6704 in.)

Service Limit: 17.15 mm (0.675 in.)

- ★ If it exceeds the service limit, replace the brake panel.



Brake Shoe Spring Inspection

- Visually inspect the brake shoe springs for breaks or distortion.
- ★ If the springs are damaged in any way, replace them.

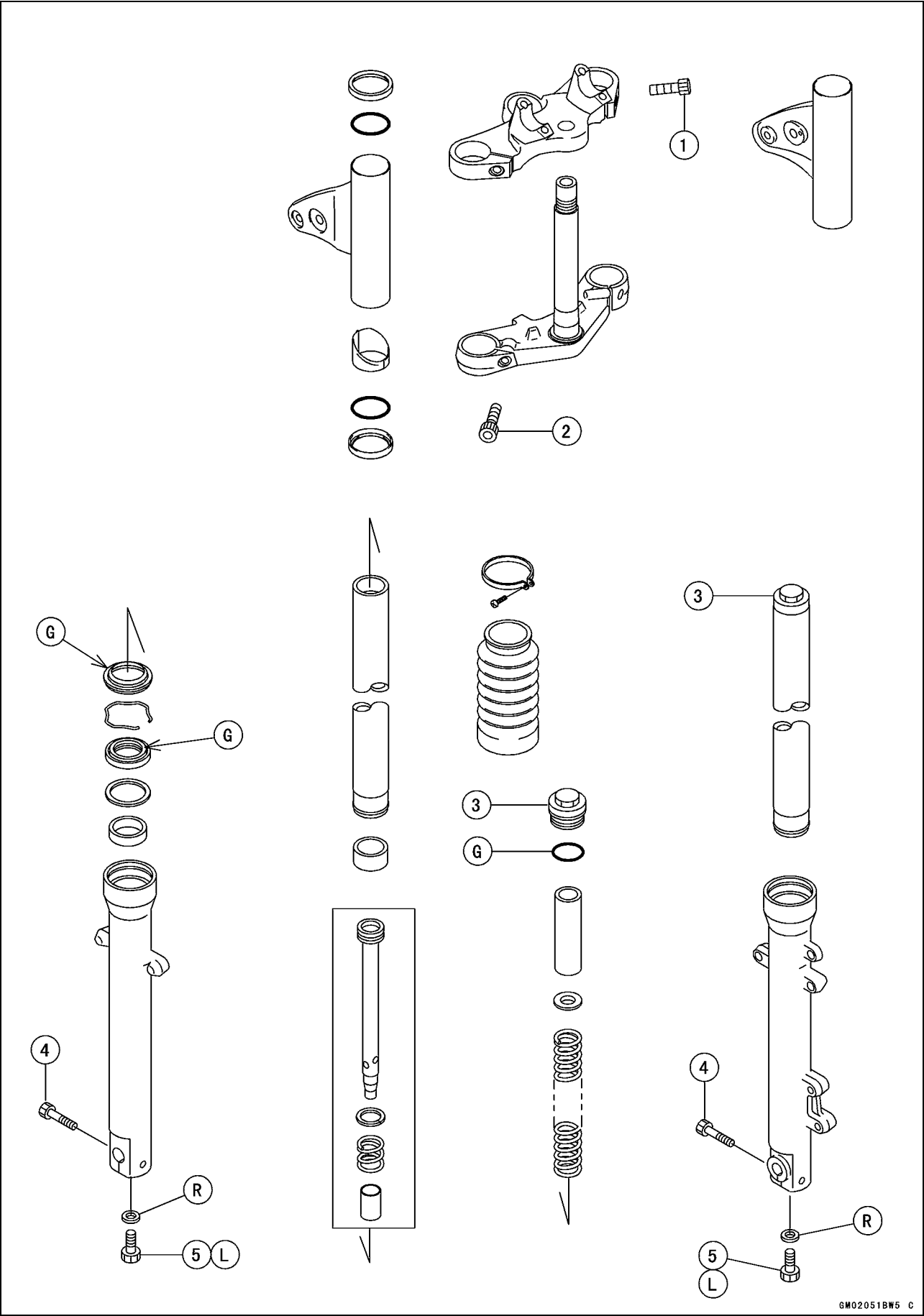
Suspension

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12-2 SUSPENSION

Exploded View



Exploded View

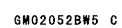
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Clamp Bolts (upper)	20	2.0	14	
2	Front Fork Clamp Bolts (lower)	29	3.0	22	
3	Front Fork Top Plugs	23	2.3	17	
4	Front Axle Clamp Bolts	20	2.0	14	
5	Front Fork Bottom Allen Bolts	29	3.0	22	L

G: Apply grease.

L: Apply a non-permanent locking agent to the threads.

R: Replacement parts.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Shock Absorber Mounting Nuts (upper)	59	6.0	43	
2	Rear Shock Absorber Mounting Bolts (lower)	34	3.5	25	
3	Swing Arm Pivot Nut	98	10	72	

G: Apply grease.

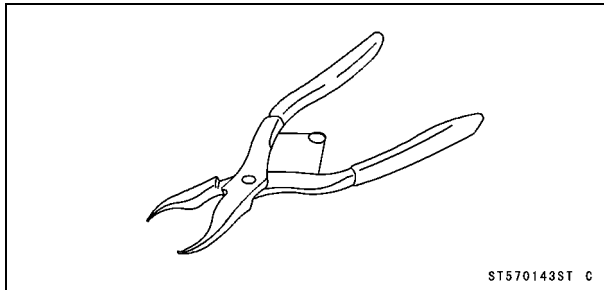
12-6 SUSPENSION

Specifications

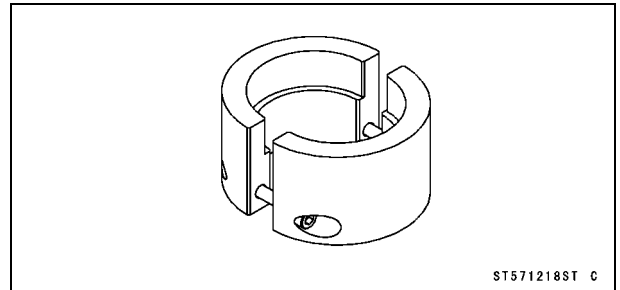
Item	Standard	Service Limit
Front Fork		
Fork Inner Tube Diameter	$\phi 39$ mm (1.5 in.)	
Front Fork Oil:		
Viscosity	KHL34-G10 (KAYABA) or equivalent	—
Capacity (one side):		
When Changing Oil	Approx. 322 mL (10.9 US oz.), Approx. 343 mL (11.6 US oz.) (On and after EJ650-A3/C3)	—
After Fork Disassembly, Completely Dry	379 \pm 4 mL (12.8 \pm 0.14 US oz.), 400 \pm 4 mL (13.5 \pm 0.14 US oz.) (On and after EJ650-A3/C3)	—
Oil Level (fully compressed, without fork spring)	137 \pm 2 mm (5.39 \pm 0.08 in.), 112 \pm 2 mm (4.41 \pm 0.08 in.) (On and after EJ650-A3/C3)	—
Fork Spring Free Length	404.4 mm (15.92 in.), 409.4 mm (16.12 in.) (On and after EJ650-A3/C3)	397 mm (15.63 in.), 402 mm (15.83 in.)
Rear Shock Absorber		(Adjustment Range)
Spring Preload Setting	2nd position from the weakest position	1st to 5th positions

Special Tools

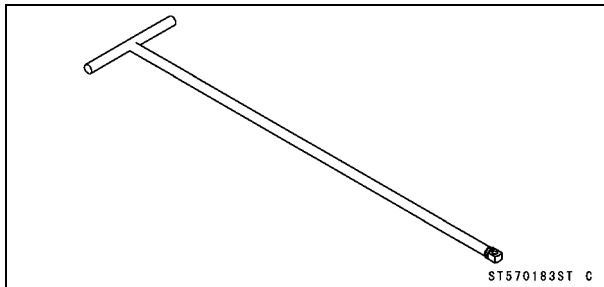
Inside Circlip Pliers:
57001-143



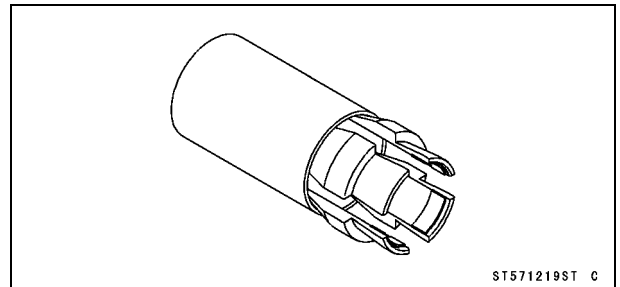
Fork Outer Tube Weight:
57001-1218



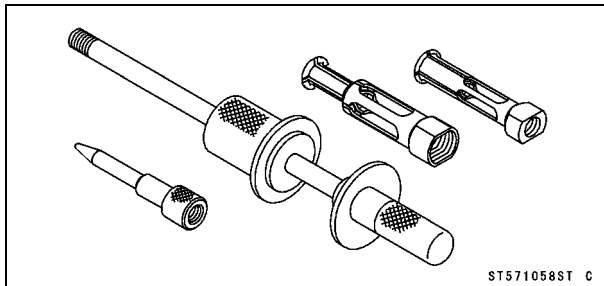
Fork Cylinder Holder Handle:
57001-183



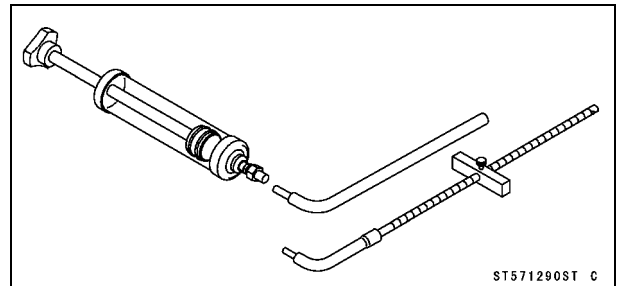
Front Fork Oil Seal Driver:
57001-1219



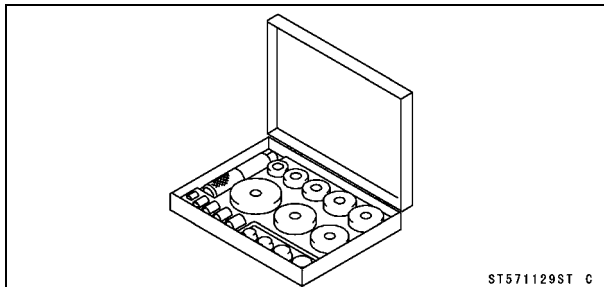
Oil Seal & Bearing Remover:
57001-1058



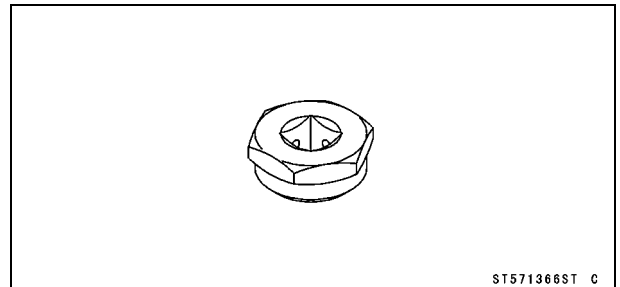
Fork Oil Level Gauge:
57001-1290



Bearing Driver Set:
57001-1129



Hexagon Wrench, Hex 24:
57001-1366

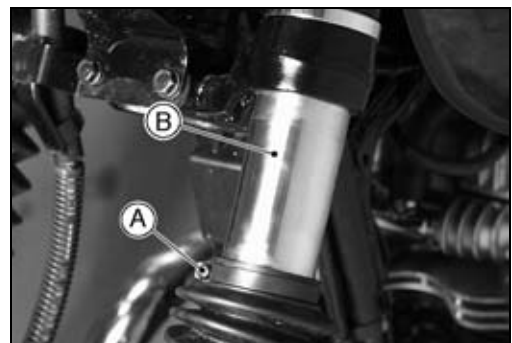
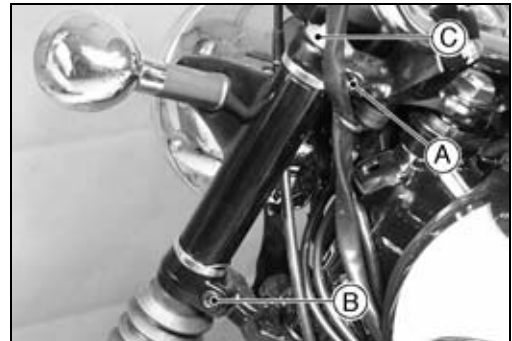


12-8 SUSPENSION

Front Fork

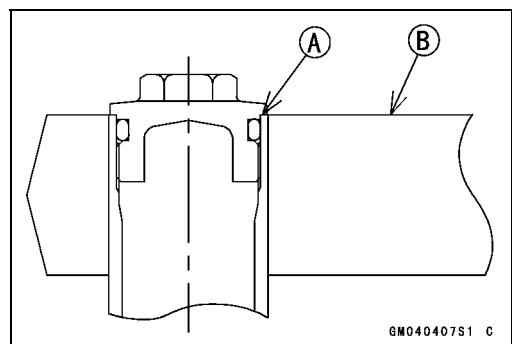
Front Fork Removal

- Remove:
 - Front Wheel (see Wheels/Tires chapter)
 - Brake Caliper [A] (see Brakes chapter)
 - Brake Hose Clamp [B]
 - Front Fender [C]
- Loosen the upper [A] and lower [B] fork clamp bolts.
- To disassemble the fork later, loosen the top plug [C] when loosening the fork upper clamp bolt.
- Loosen the cover boot clamp screw [A] to expose the inner tube [B].
- With a twisting motion of the inner tube, work the fork down and out.



Front Fork Installation

- Install the front fork by placing the inner tube top [A] and the stem head top [B] flush.
- Torque - Front Fork Clamp Bolt (Upper): 20 N·m (2.0 kgf·m, 14 ft·lb)**
Front Fork Clamp Bolt (Lower): 29 N·m (3.0 kgf·m, 22 ft·lb)
Front Fork Top Plugs: 23 N·m (2.3 kgf·m, 17 ft·lb)



WARNING

Run the cable, wiring harnesses, and hoses properly so as not to obstruct the movement of the handlebar (see Appendix chapter).

Front Fork

- Secure the cover boot [A] to the steering stem bottom [B], and tighten the clamp screw [C].
- Tighten the clamp screw on the inside of the fork.
- Install the front wheel (see Wheels/Tires chapter).
- Check the effectiveness of the front brake.

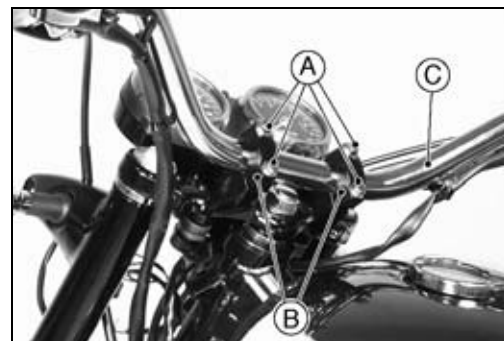
⚠ WARNING

Do not attempt to drive the motorcycle until a full brake effectiveness is obtained by squeezing the brake lever several times until the pads are seated against the disc.

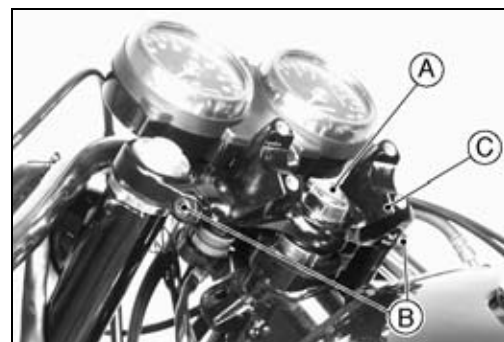


Front Fork Cover Removal

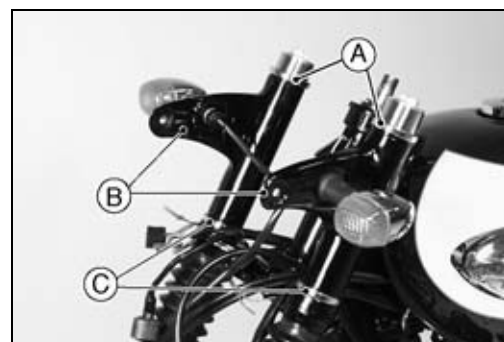
- Remove:
 - Headlight Assembly (see Electrical System chapter)
 - Headlight Body (see Electrical System chapter)
- Remove the handlebar clamp bolts [A] and remove the handlebar clamps [B].
- Remove the handlebar assembly [C].
- Suspend the handlebar assembly.



- Remove the steering stem head nut [A].
- Loosen the front fork clamp bolts (upper) [B].
- Remove and suspend the steering stem head [C].

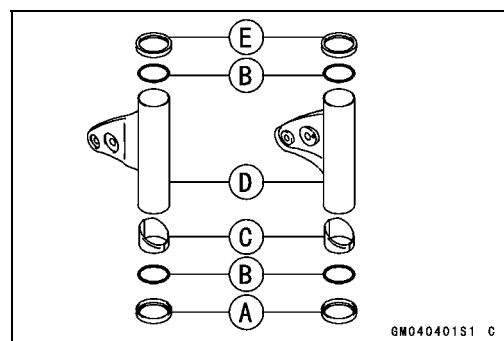


- Remove:
 - Top Fork Cover Caps [A]
 - Rubber Dampers
 - Fork Covers [B] (with Turn Signal)
 - Fork Cover Spacers
 - Bottom Fork Cover Caps [C]



Front Fork Cover Installation

- Install:
 - Bottom Fork Cover Caps [A]
 - Rubber Dampers [B]
 - Fork Cover Spacers [C]
 - Fork Covers [D]
 - Rubber Dampers [B]
 - Top Fork Cover Caps [E]
- Install the removed parts.



Fork Oil Level Adjustment

- Refer to the Fork Oil Level Adjustment in the Periodic Maintenance chapter.

12-10 SUSPENSION

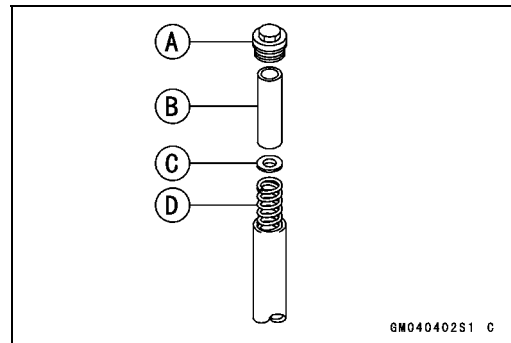
Front Fork

Fork Oil Change

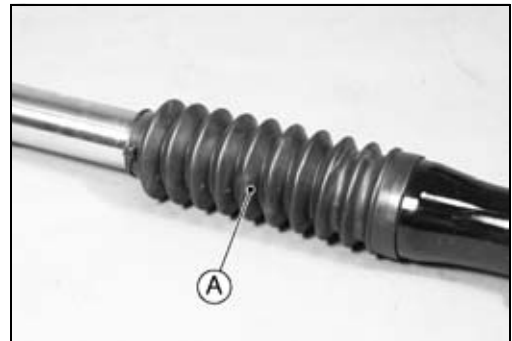
- Refer to the Fork Oil Change in the Periodic Maintenance chapter.

Front Fork Disassembly

- Remove the front fork (see Front Fork Removal).
- Remove:
 - Top Plug [A]
 - Collar [B]
 - Fork Spring Seat [C]
 - Fork Spring [D]
- Pour out the fork oil.

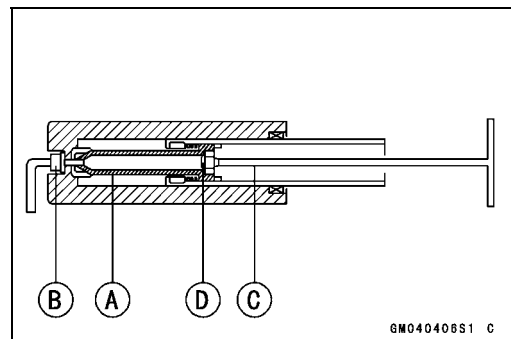


- Remove the cover boot [A].

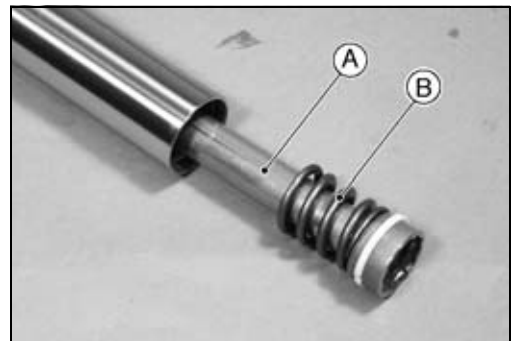


- Hold the outer tube in a vise, stop the cylinder unit [A] from turning by using the special tools, and unscrew the Allen bolt [B].

Special Tools - Fork Cylinder Holder Handle: 57001-183 [C]
Hexagon Wrench, Hex 24: 57001-1366 [D]



- Remove the cylinder unit [A] and spring [B] from the inner tube.



Front Fork

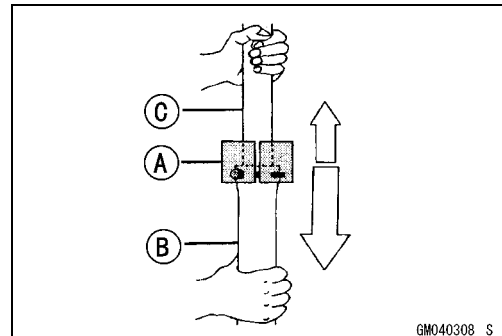
- Using a regular tip screwdriver, pry out the dust seal.
- Remove the retaining ring [A].



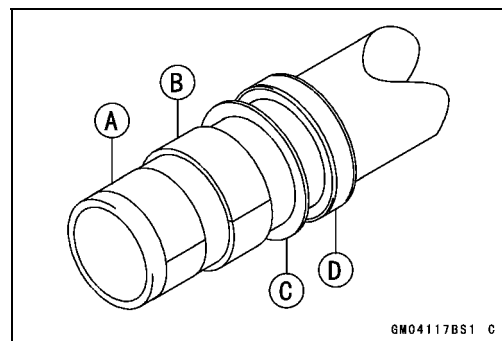
- Separate the inner tube [C] from the outer tube [B].
- If the inner tube does not come out easily, use the (special tool) weight [A] to separate the inner tube from the outer tube.

Special Tool - Outer Tube Weight: 57001-1218

- Firmly pull down the outer tube.
- Take out the cylinder base from the outer tube bottom.

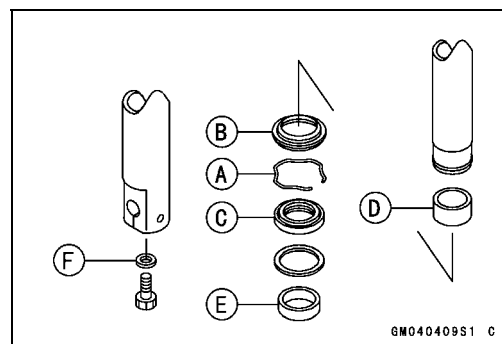


- Remove from the inner tube:
Guide Bushing, Inner [A]
Guide Bushing, Outer [B]
Washer [C]
Oil Seal [D]

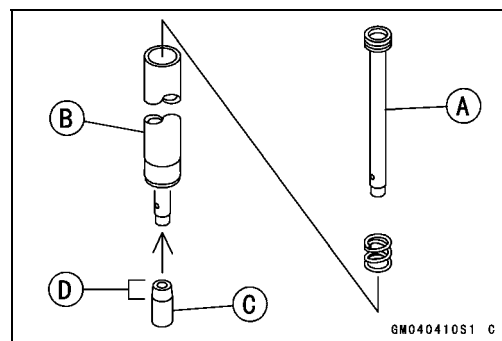


Front Fork Assembly

- Check the top plug O-ring and replace it with a new one if it is damaged.
- Replace the following parts with new ones:
Retaining Ring [A]
Dust Seal [B]
Oil Seal [C]
Inner Guide Bushing [D]
Outer Guide Bushing [E]
Bottom Allen Bolt Gasket [F]



- Place the cylinder unit [A] and the spring into the inner tube [B], and install the cylinder base [C] onto the bottom end of the cylinder unit that protrudes from the inner tube.
- Install the cylinder base with the tapered end [D] up.
- Install the inner tube, cylinder unit, and cylinder base as a set into the outer tube.

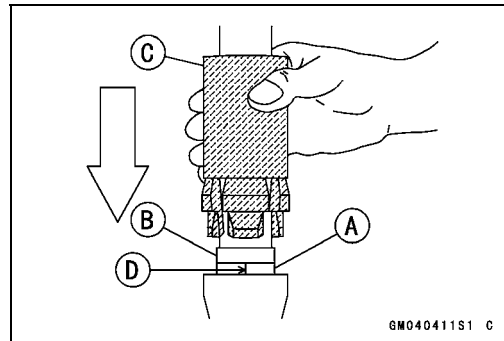


12-12 SUSPENSION

Front Fork

- Install the new guide bushing [A] with a used guide bushing [B] on it by tapping the used guide bushing with the fork oil seal driver [C].
- The split [D] of the guide bushing should face the side of the vehicle.

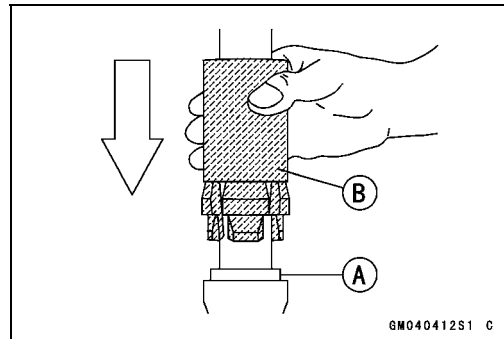
Special Tool - Front Fork Oil Seal Driver: 57001-1219



- After installing the washer, drive the oil seal [A] into place.
- Apply high-temperature grease to the oil seal lips.

Special Tool - Front Fork Oil Seal Driver: 57001-1219 [B]

- Install the retaining ring into the outer tube.
- Drive the dust seal into the outer tube in the same way as the oil seal.

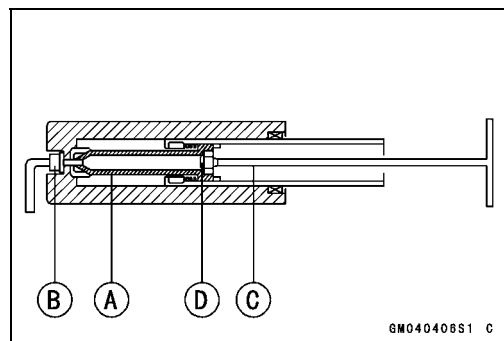


- Install a new bottom Allen bolt gasket.
- Apply a non-permanent locking agent to the threads of the bottom Allen bolt.
- Place the outer tube in a vise [A], hold the cylinder unit [A] with the special tools, and tighten the Allen bolt [B].

**Special Tools - Fork Cylinder Holder Handle: 57001-183 [C]
Hexagon Wrench, Hex 24: 57001-1366 [D]**

Torque - Bottom Allen Bolt: 29 N·m (3.0 kgf·m, 22 ft·lb)

- Pour in the specified type of oil and install the removed parts (see Fork Oil Change in the Periodic Maintenance chapter).



Fork Oil

Viscosity: KHL34-G10 (KAYABA) or equivalent

Capacity (one side):

(after fork disassembly, completely dry)

379 ±4 mL (12.8 ±0.14 US oz.)

**400 ±4 mL (13.5 ±0.14 US oz.) (On and after
EJ650-A3/C3)**

Special Tool - Fork Oil Level Gauge: 57001-1290

- Install the boot.
- Install the front fork.

Front Fork

Inner Tube/Outer Tube Inspection

- Visually inspect the inner tube [A] and repair any nicks or rust by using an oil stone.
- ★ If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal slip, replace the oil seal whenever the inner tube is repaired or replaced.

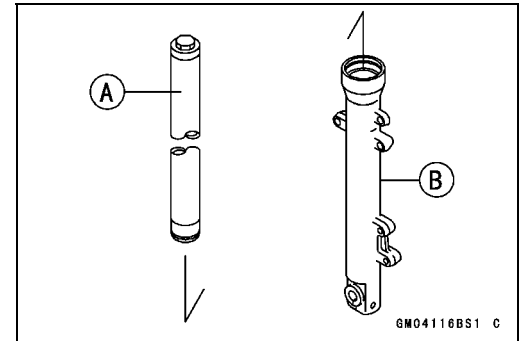
CAUTION

If the inner tube is badly nicked or bent, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

- Place the inner tube in the outer tube [B] and pump them back and forth manually to check for smooth operation.
- ★ If the movement is not smooth, replace both the inner tube and the outer tube.

⚠ WARNING

**Replace the inner and outer tubes with new ones if they are bent because it is dangerous to use them by repairing them.
Make sure to inspect the inner and outer tubes of the other side.**



Fork Spring Inspection

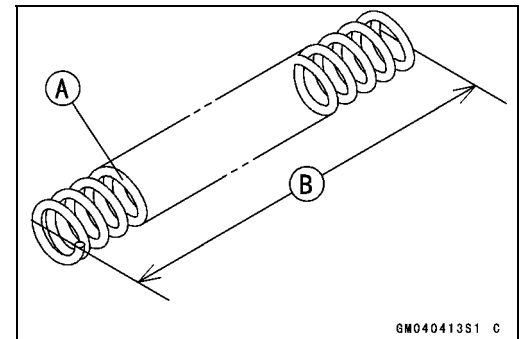
- Measure the free length [B] of the fork spring [A].

Fork Spring Free Length

Standard: 404.4 mm (15.92 in.)
409.4 mm (16.12 in.)
(On and after EJ650-A3/C3)

Service Limit: 397 mm (15.63 in.)
402 mm (15.83 in.)
(On and after EJ650-A3/C3)

- ★ If the measured length is shorter than the service limit, the spring must be replaced. If the free length of the 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 to ensure stability.



12-14 SUSPENSION

Shock Absorbers

Spring Preload Adjustment

The spring preload adjuster on each rear shock absorber has 5 positions so that the spring tension can be adjusted for different road and loading conditions.

- Using the suitable bar, turn the adjusting sleeve [A] to adjust the spring preload.

* The standard adjuster position for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is 2nd step from the weakest position.



Spring Preload Adjustment

Adjusting Sleeve Position	1	*2	3	4	5
Damping Force					→ Hard

WARNING

Set the adjuster sleeve of both the right and left shock absorbers to the same position to prevent the loss of driving stability.

Rear Shock Absorber Removal

- Set the motorcycle on its center stand and raise the rear wheel.
- Remove the lower mounting bolt [A] and detach the shock absorber from the swingarm.

NOTE

○ Pull out the bolt by lifting the swingarm to lighten the load on the bolt.

- Remove the upper mounting nut [B] to remove the shock absorber [C].



Rear Shock Absorber Installation

- Install the shock absorber on the frame and the swingarm.

Torque - Rear Shock Absorber Mounting Nuts (Upper): 59 N·m (6.0 kgf·m, 43 ft·lb)

Rear Shock Absorber Mounting Bolts (Lower): 34 N·m (3.5 kgf·m, 25 ft·lb)

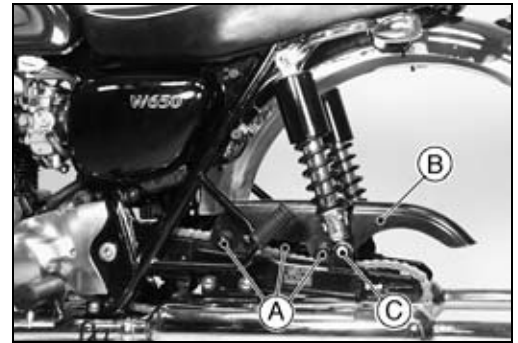
Rear Shock Absorber Wear Inspection

- Visually inspect the rubber bushing.
- ★ If they show any signs of damage, replace them.
- Remove the rear shock absorbers (see Rear Shock Absorber Removal).
- Compress each rear shock absorber.
- Visually inspect the following items.
 - Compression stroke
 - Oil leakage
 - Other damage
- ★ If there is any damage to the rear shock absorber, or one unit feels weaker than the other, replace both shock absorbers as a set.

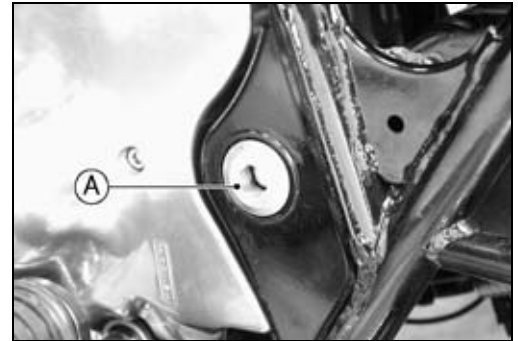
Swingarm

Swingarm Removal

- Remove:
 - Rear Wheel (see Wheels/Tires chapter)
 - Chain Cover Screws, Bolt [A]
 - Chain Cover [B]
 - Rear Shock Absorber Lower Mounting Bolt [C]



- Remove the swingarm pivot nut [A].
- Pull out the pivot shaft and pull out the swingarm towards the back.



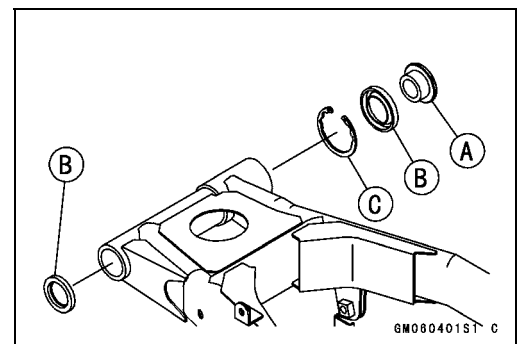
Swingarm Installation

- Apply grease to the needle bearings and the inside of the oil seal.
- Install the swingarm.
 - Torque - Swingarm Pivot Nut: 98 N·m (10 kgf·m, 72 ft·lb)**
- Install the removed parts (see the respective chapters).

Swingarm Bearing Removal

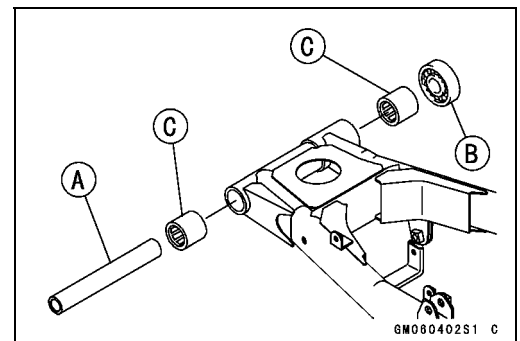
- Remove:
 - Swingarm (see Swingarm Removal)
 - Collar [A]
 - Oil Seals [B]
 - Circlip [C]

Special Tool - Inside Circlip Pliers: 57001-143



- Remove the sleeve [A], ball bearing [B], and needle bearings [C].

Special Tool - Oil Seal & Bearing Remover: 57001-1058



12-16 SUSPENSION

Swingarm

Swingarm Bearing Installation

- Apply grease to the needle bearings, ball bearing, and the inside of the oil seals.
- Drive the needle bearings, ball bearing, and oil seals to the respective positions.
- Be sure to install the bearings so that the manufacturer's marks face out.

Special Tool - Bearing Driver Set: 57001-1129 [A]

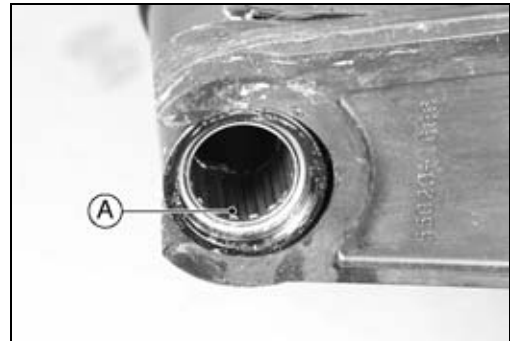


Swingarm Bearing, Sleeve Inspection

CAUTION

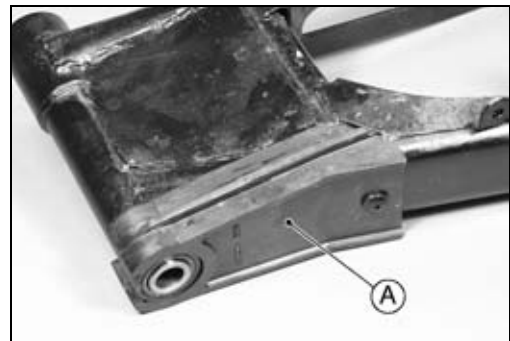
Do not remove the bearings for inspection. Removal may damage them.

- Inspect the needle bearings [A] installed in the swingarm.
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.
- ★ If the needle bearing, ball bearing, and sleeve show any signs of abnormal wear, discoloration, or damage, replace them as a set.



Chain Slider Inspection

- Visually inspect the chain slider [A].
- ★ Replace the chain slider if it shows any signs of abnormal wear or damage.

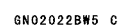


Steering

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Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Switch Housing Screws	3.4	0.35	30 in·lb	
2	Handlebar Holder Bolts	25	2.5	18	S
3	Steering Stem Head Nut	44	4.5	33	
4	Front Fork Clamp Bolts (upper)	20	2.0	14	
5	Steering Stem Nut	4.9	0.5	43 in·lb	
6	Front Fork Clamp Bolts (lower)	29	3.0	22	

7. Align punch mark with clearance between holder and clamp.

AD: Apply adhesive.

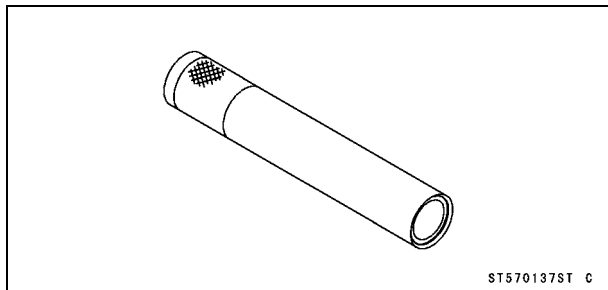
G: Apply grease.

S: Tighten the fasteners following the specified sequence.

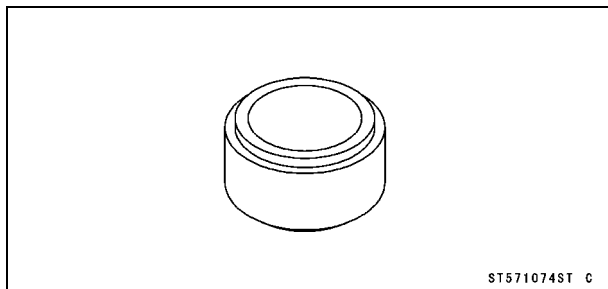
13-4 STEERING

Special Tools

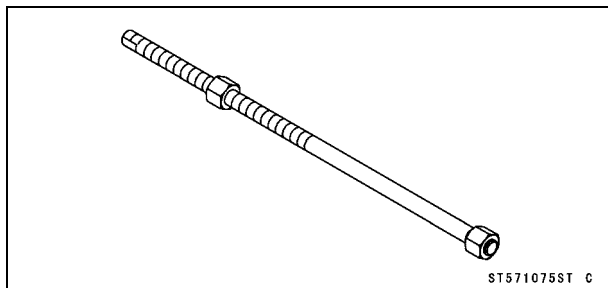
Steering Stem Bearing Driver:
57001-137



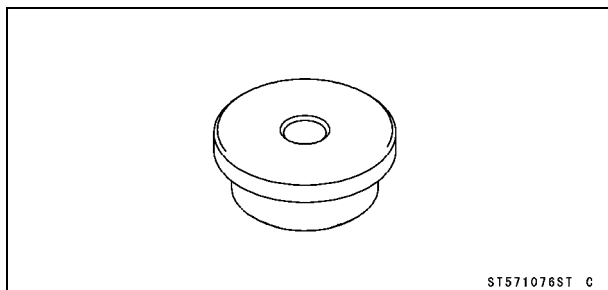
Steering Stem Bearing Driver Adapter, $\phi 34.5$:
57001-1074



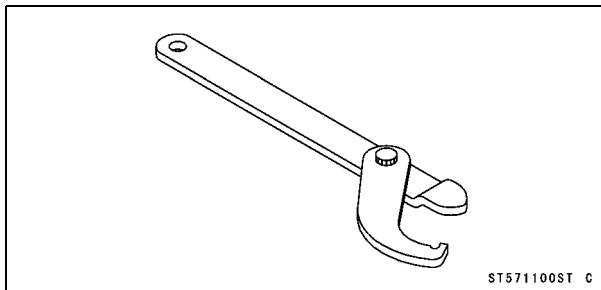
Head Pipe Outer Race Press Shaft:
57001-1075



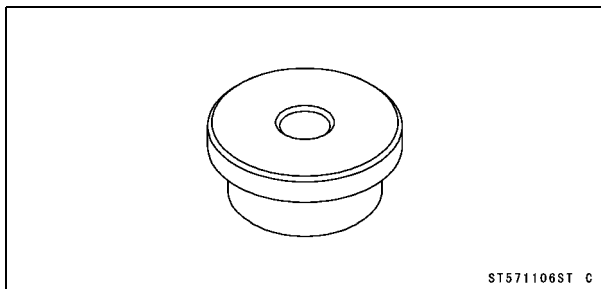
Head Pipe Outer Race Driver, $\phi 51.5$:
57001-1076



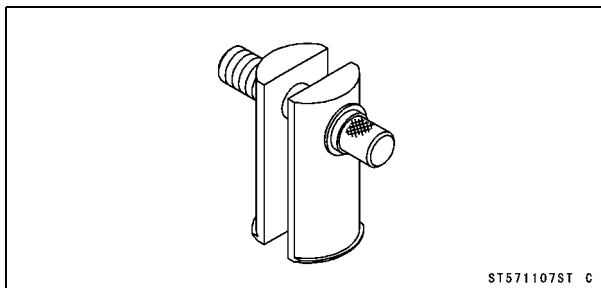
Steering Stem Nut Wrench:
57001-1100



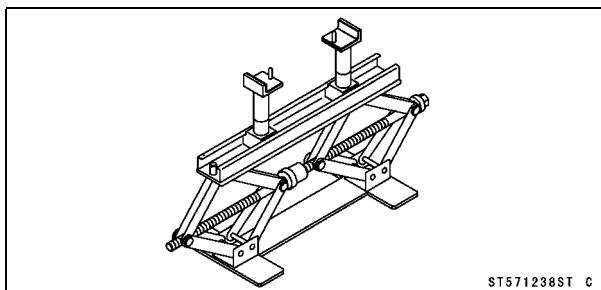
Head Pipe Outer Race Driver, $\phi 46.5$:
57001-1106



Head Pipe Outer Race Remover ID > 37 mm:
57001-1107



Jack:
57001-1238



Steering

Steering Inspection

- Refer to the Steering Inspection in the Periodic Maintenance chapter.

Steering Adjustment

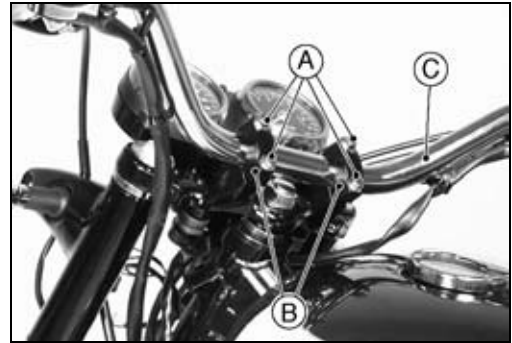
- Refer to the Steering Adjustment in the Periodic Maintenance chapter.

13-6 STEERING

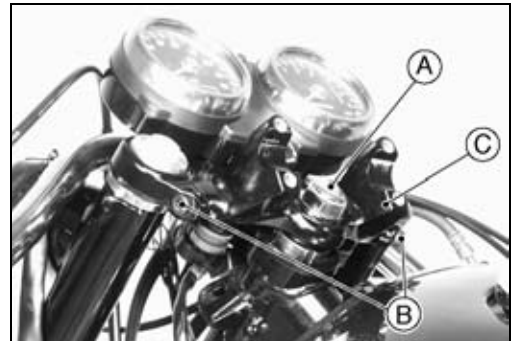
Steering Stem

Steering Stem, Stem Bearing Removal

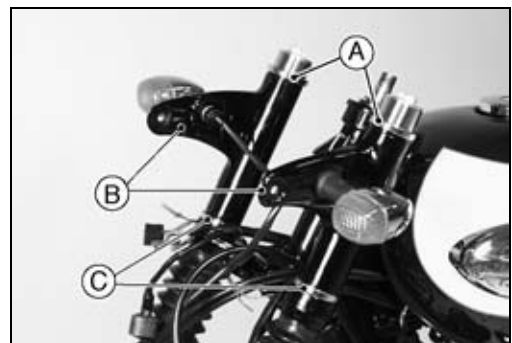
- Remove:
 - Headlight (see Electrical System chapter)
 - Headlight Body (see Electrical System chapter)
 - Handlebar Holder Bolts [A]
 - Handlebar Holders [B]
 - Handlebar Assembly [C]



- Remove:
 - Meter Connector
 - Steering Stem Head Nut [A]
 - Front Fork Clamp Bolts (Upper) [B] (loosen)
- Pull out the steering stem head assembly [C].



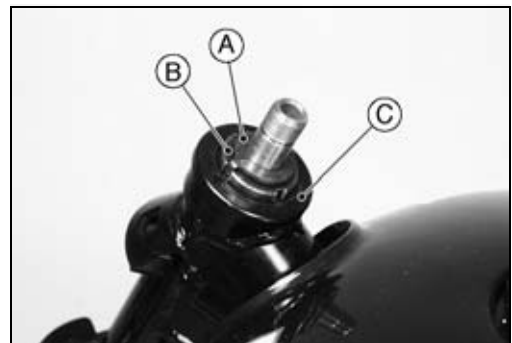
- Remove:
 - Top Fork Cover Caps [A]
 - Rubber Dampers
 - Right and Left Fork Covers [B] (with Turn Signal)
 - Fork Cover Spacers
 - Bottom Fork Cover Caps [C]
 - Front Wheel (see Wheels/Tires chapter)
 - Front Fork (see Suspension chapter)



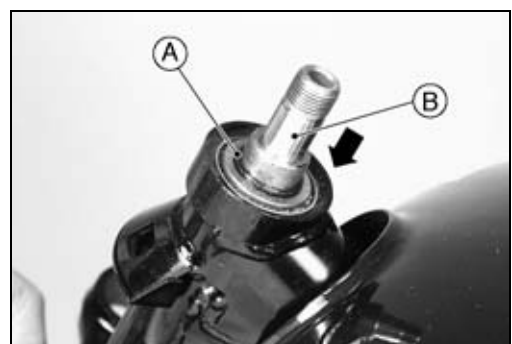
Special Tool - Jack: 57001-1238

- While supporting the stem base, remove the following parts:
 - Lock Washer [A]
 - Stem Nut [B]
 - Stem Cap [C]

Special Tool - Steering Stem Nut Wrench: 57001-1100



- Remove:
 - O-ring [A]
- Pull out the steering stem [B] from the bottom.



Steering Stem

- Remove the upper tapered roller bearing.
- Using the outer race remover [A], remove the upper and lower outer races.

Special Tool - Head Pipe Outer Race Remover ID > 37 mm: 57001-1107

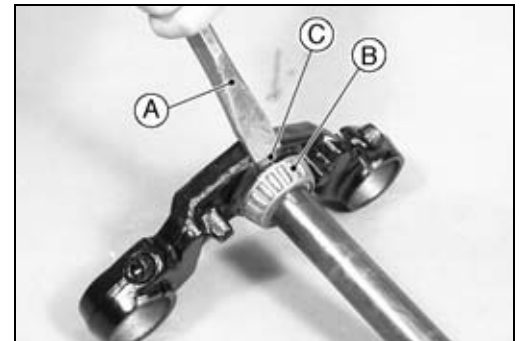
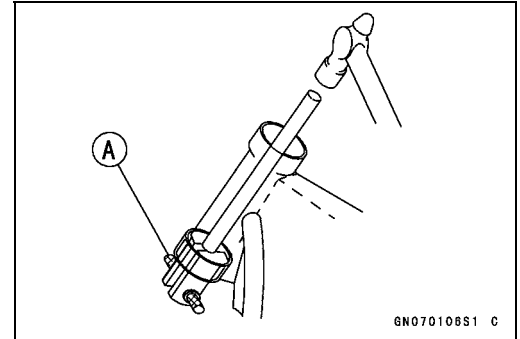
NOTE

○ If the stem bearing is damaged, replace the upper and lower bearings (together with the outer races) as a set.

- Using a chisel [A], remove the lower inner race [B] together with the grease seal [C] from the stem.
- Replace the removed bearing and grease seal.

CAUTION

Do not damage the steering stem with the tip of the chisel.



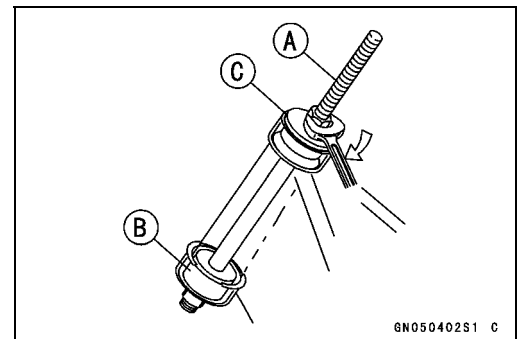
Steering Stem, Stem Bearing Installation

- Apply grease to the new outer race.
- Using a driver and the press shaft [A], drive the upper and lower outer races simultaneously into the head pipe.

Special Tools - Outer Race Press Shaft: 57001-1075

Outer Race Driver, $\phi 51.5$: 57001-1076 [B]

Outer Race Driver, $\phi 46.5$: 57001-1106 [C]

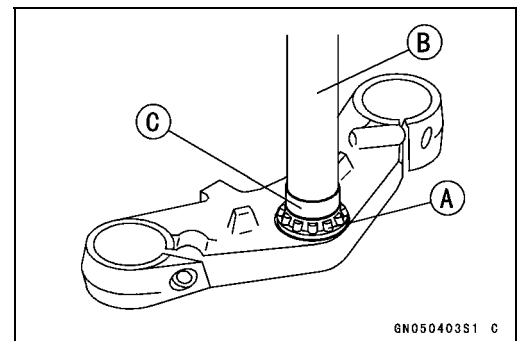


- Replace the stem bearing inner race with a new one.
- Apply grease to the lower inner race [A]. Using the stem bearing driver [B] and adapter [C], drive the race into the stem.

Special Tools - Steering Stem Bearing Driver: 57001-137

Steering Stem Bearing Driver Adapter, $\phi 34.5$: 57001-1074

- Apply grease to the upper bearing and install it in the head pipe.
- Apply grease to the O-ring.
- Insert the stem shaft through the head pipe and the upper bearing. While supporting the stem base, install the O-ring on the shaft.
- Install the stem cap and hand-tighten the stem nut.



NOTE

○ The stepped side of the stem nut faces down.

- Install:
 - Lock Washer
 - Stem Head
 - Washer
- Lightly tighten the stem head nut.

13-8 STEERING

Steering Stem

- Preload the bearing.
- Using the stem nut wrench [A], tighten the stem lock nut to a torque 39 N·m (4.0 kgf·m, 29 ft·lb) (see the diagram).
180 mm (7.1 in.) [B]
22.2 kg [C]

Special Tool - Stem Nut Wrench: 57001-1100

- Check that the stem turns smoothly without being loose. If it feels tight or is loose, the bearing could be damaged.
- Gradually loosen the stem nut until the stem turns smoothly.
- Retighten the stem nut, and stop it when it feels tight.

Torque - Steering Stem Nut: 4.9 N·m (0.5 kgf·m, 43 in·lb)

- Install the front fork (see Suspension chapter).

NOTE

- Align the mounting position of the fork and tighten the fork upper clamp bolts. Then, tighten the stem head nut, and finally the fork lower clamp bolts.

Torque - Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 14 ft·lb)

Steering Stem Head Nut: 44 N·m (4.5 kgf·m, 33 ft·lb)

Front Fork Clamp Bolts (Lower): 29 N·m (3.0 kgf·m, 22 ft·lb)

- Install the removed parts (see Suspension chapter).

⚠ WARNING

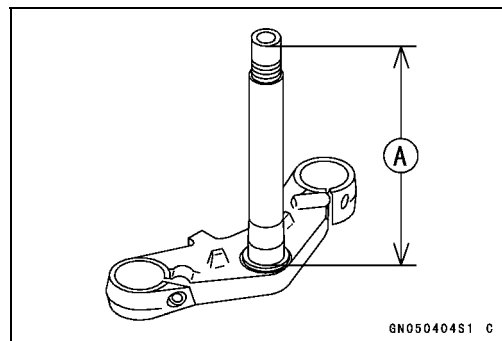
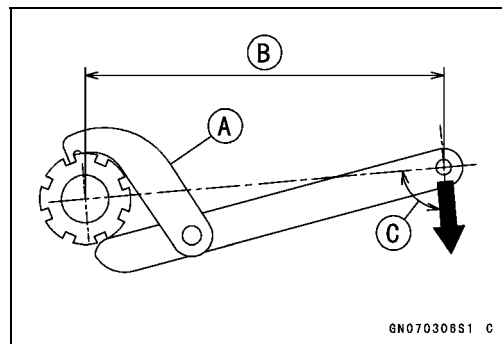
Run the cables, wiring harnesses, and hoses as specified (see Appendix chapter) to prevent them from obstructing the movement of the handlebar.

Steering Stem Bearing Lubrication

- Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem Bend Inspection

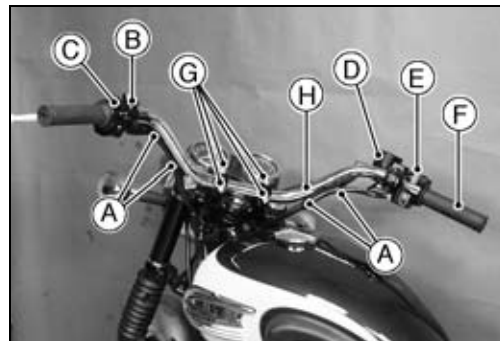
- If the steering does not move smoothly, check the steering stem for bend.
- ★ If the steering stem [A] is bent, replace it.



Handlebar

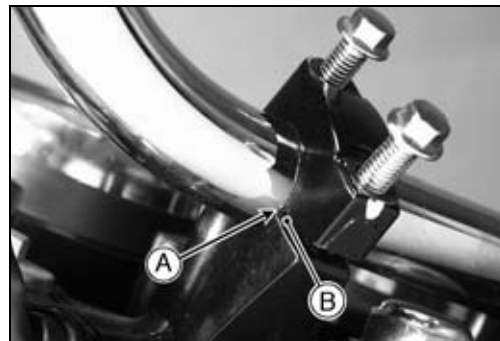
Handlebar Removal

- Pull out:
Clamp [A]
- Remove:
Clutch Lever [B]
Left Handlebar Switch Housing [C]
Front Brake Master Cylinder [D]
Right Handlebar Switch Housing [E]
Throttle Grip [F]
Handlebar Holder Bolts [G]
Handlebar [H] from the stem head.



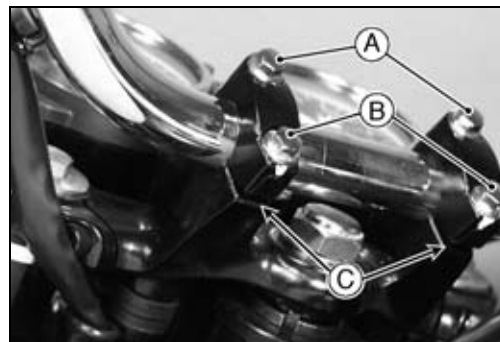
Handlebar Installation

- Align the punch mark [A] on the handlebar with the bottom [B] of the back of the left handlebar holder.



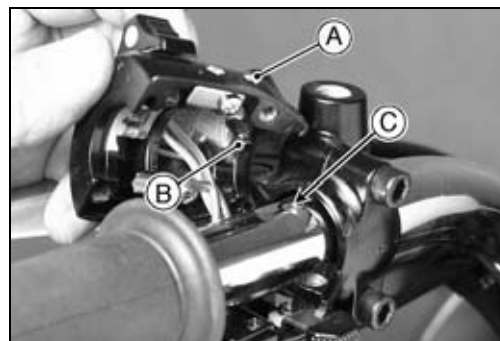
- First tighten the front holder bolts [A]. Then, tighten the rear holder bolts [B]. After tightening the bolts, a clearance [C] will be created behind the clamps.

Torque - Handlebar Holder Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

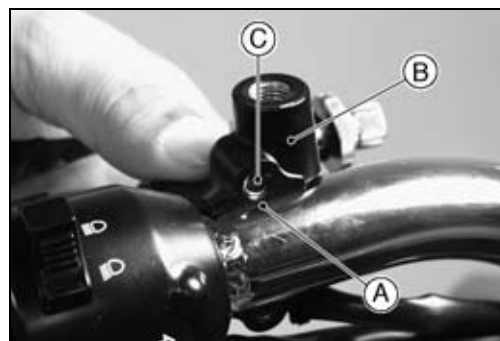


- The front half of the right and left switch housings [A] has a small protrusion [B]. Engage this protrusion with the hole [C] in the handlebar.
- Install the handlebar switch housings.

Torque - Handlebar Switch Housing Screws: 3.4 N·m (0.35 kgf·m, 30 in·lb)



- Align the punch mark [A] on the handlebar with the mating surface [B] between the clutch lever holder [B] and the clamp.
- Align the punch mark to the center of the bolt hole [C].



- Install the front master cylinder (see Brake chapter).
- Install the clamps.

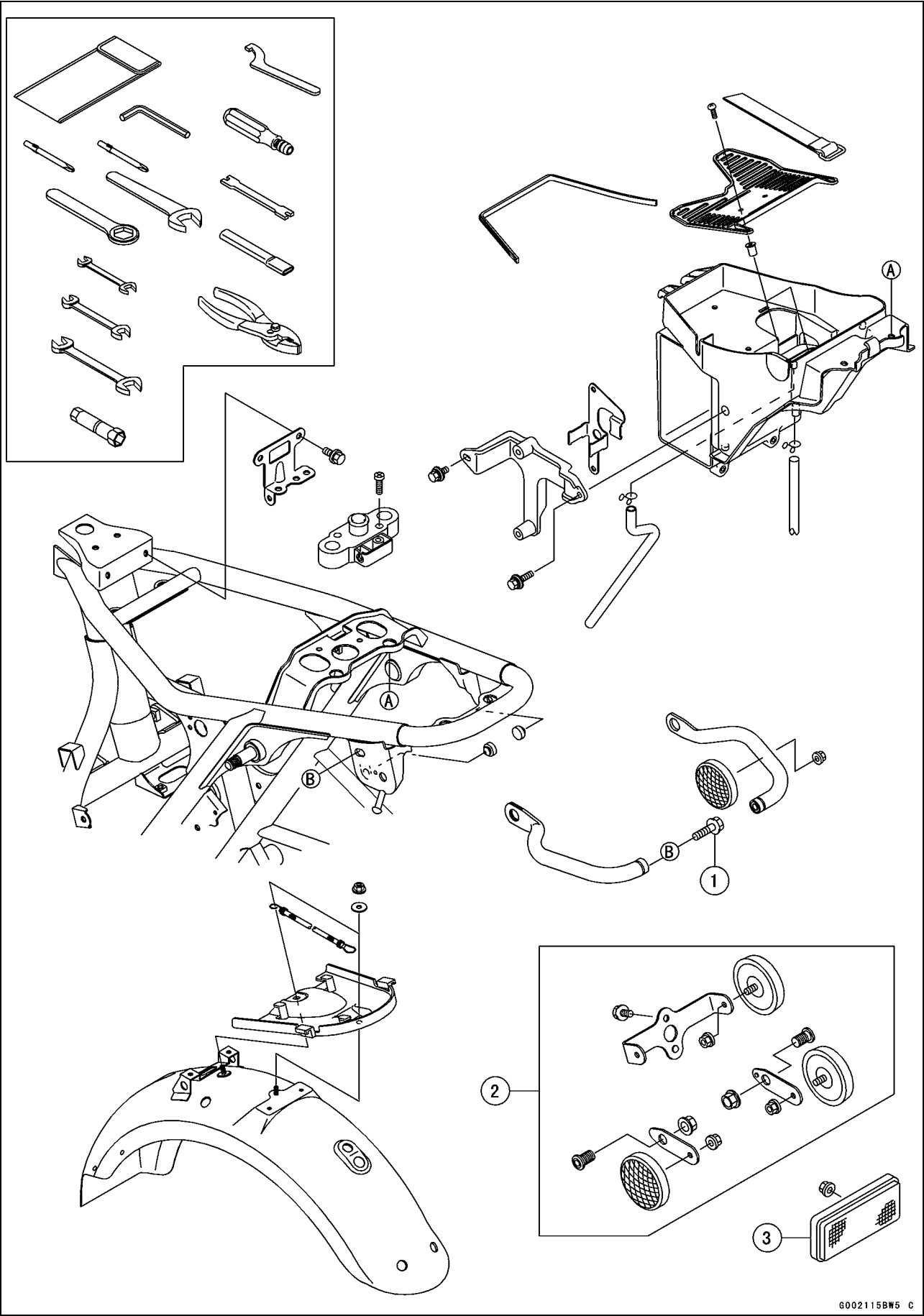
Frame

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14-2 FRAME

Exploded View



Exploded View

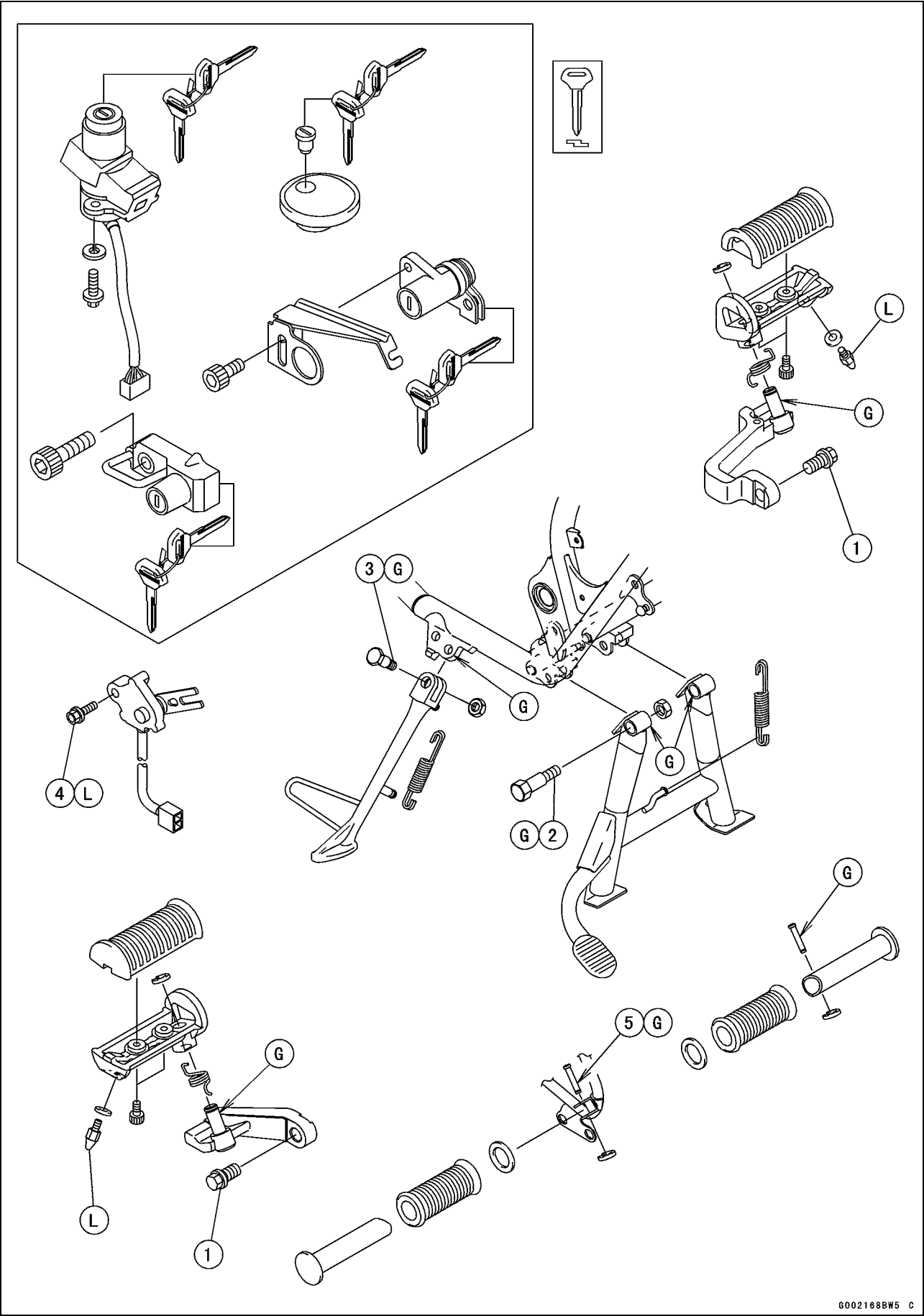
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Grab Rail Bolts	25	2.5	18	

2. Reflector Reflex (United States and Canada Model)

3. Reflector Reflex

14-4 FRAME

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Footpeg Mounting Bolts	59	6.0	43	
2	Center Stand Mounting Bolts	44	4.5	33	
3	Side Stand Mounting Bolt	44	4.5	33	
4	Side Stand Switch Mounting Bolt	8.8	0.9	78 in·lb	L

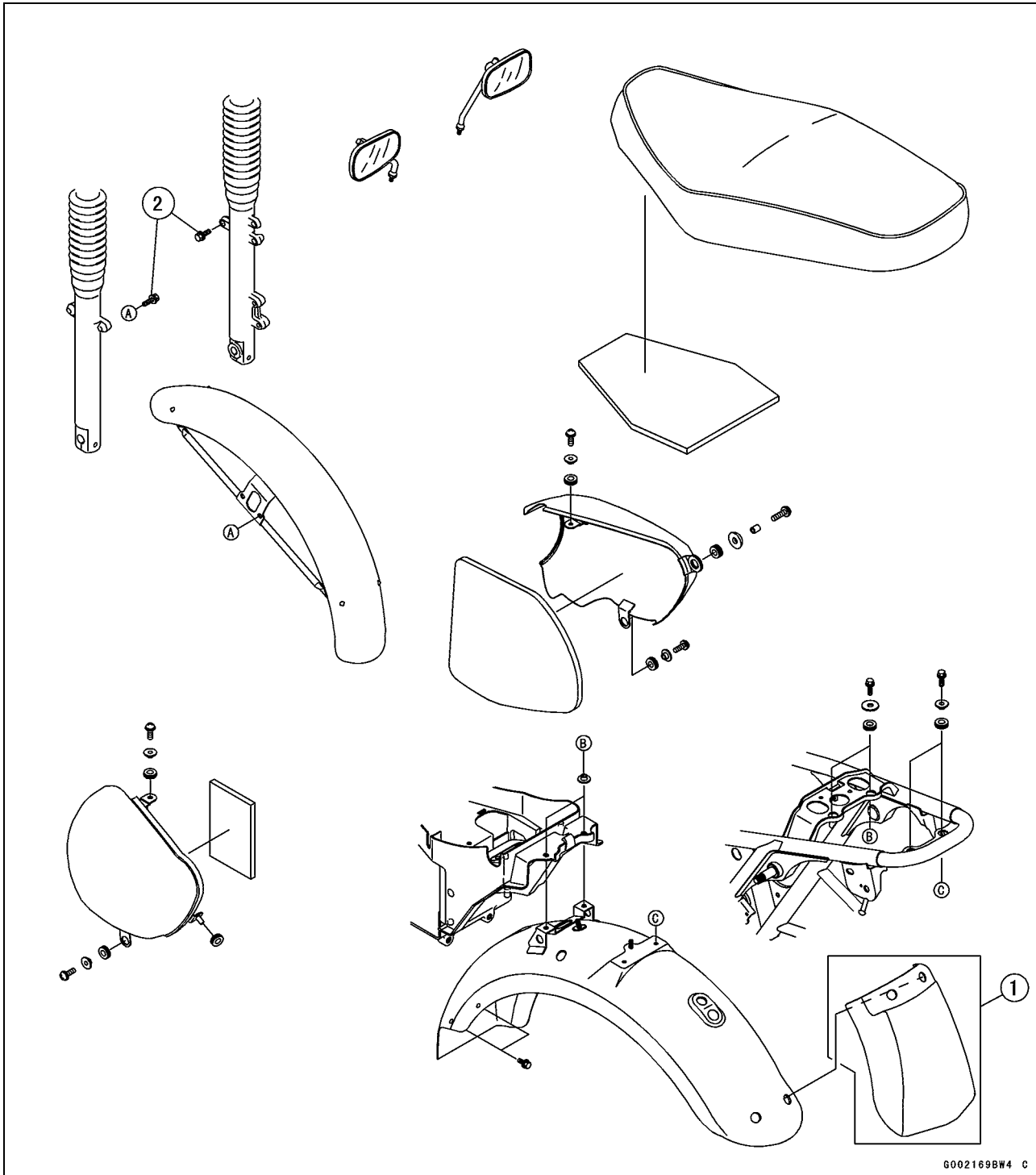
5. Rear Footpeg Mounting Pin

G: Apply grease.

L: Apply a non-permanent locking agent to the threads.

14-6 FRAME

Exploded View

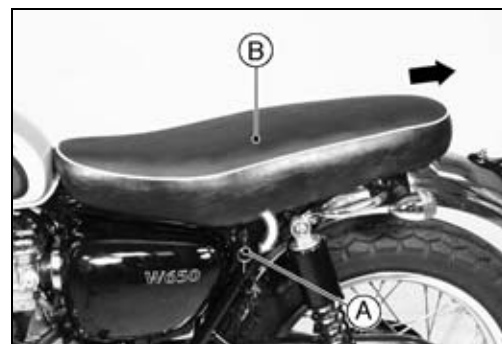


- 1. Flap (Norway Model)
- 2. Front Fender Bolts

Seat

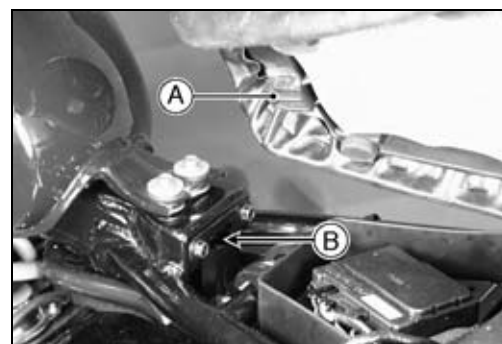
Seat Removal

- Turn the seat lock [A], and pull the seat [B] out from the back.



Seat Installation

- Insert the seat hook [A] under [B] the frame bracket.
- Press the back of the seat until it clicks into place.



14-8 FRAME

Side Covers

Left Side Cover Removal

- Remove the seat.
- Remove the screws [A].



- Move the cover forward to pull the stopper [A] from the grommet holes [B] in the frame, and remove the left side cover.



Right Side Cover Removal

- Remove the seat.
- Remove the screws [A].
- Remove the right side cover.



Fenders

Front Fender Removal

- Remove the mounting bolts [A] and remove the front fender [B].



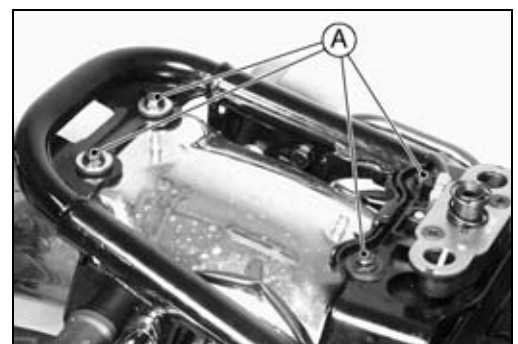
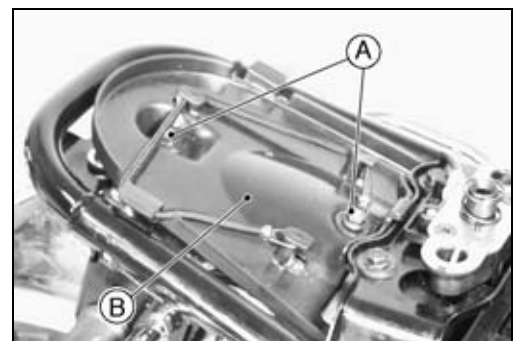
Front Fender Installation

- Using the bolt holes as a reference, install the fender with its longer portion [A] facing rear.



Rear Fender Removal

- Remove:
 - Seat (see Seat Removal)
 - Sub Wiring Harness Connector
 - Nuts [A]
 - U-shaped Lock Case [B]
- Remove the upper mounting bolts [A].
- Remove the seat lock mechanism.
- Pull out the sub wiring harness connector.
- Remove the lower mounting bolts [B].
- Pull out the rear fender.



14-10 FRAME

Fenders

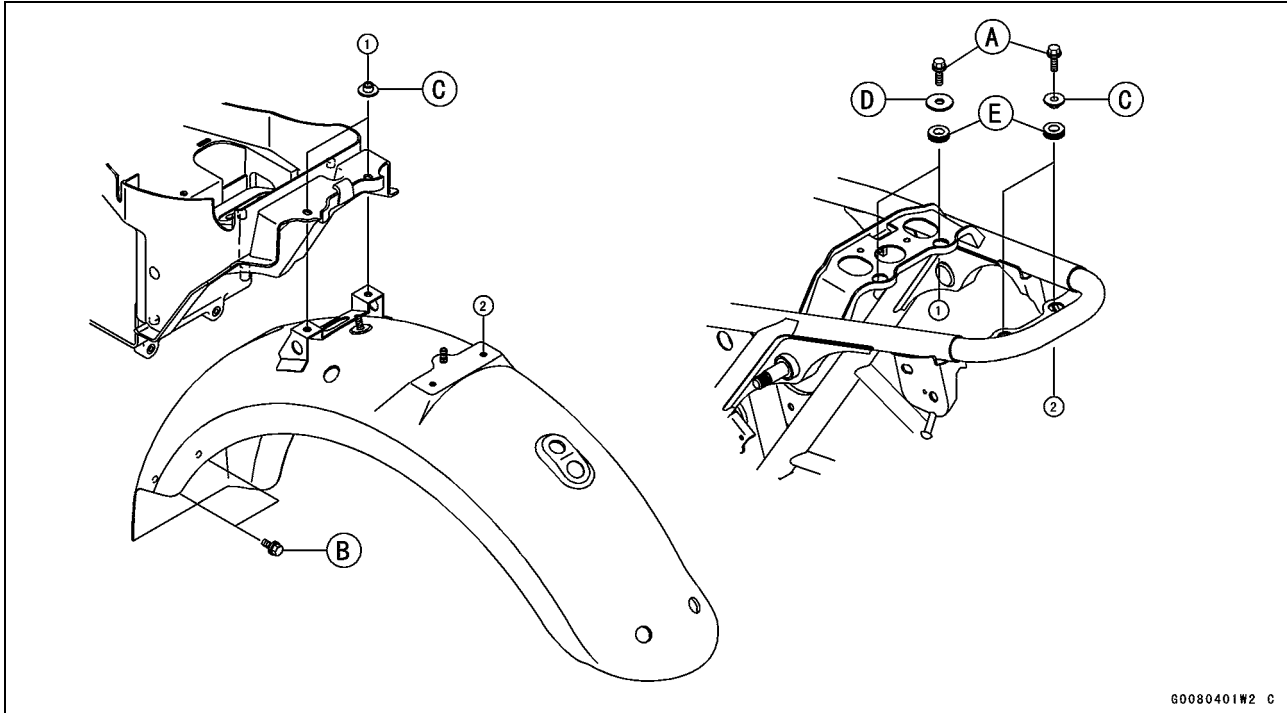
Rear Fender Installation

- Temporarily tighten the upper mounting bolts [A], and install the lower bolts [B].

Collars [C]

Washers [D]

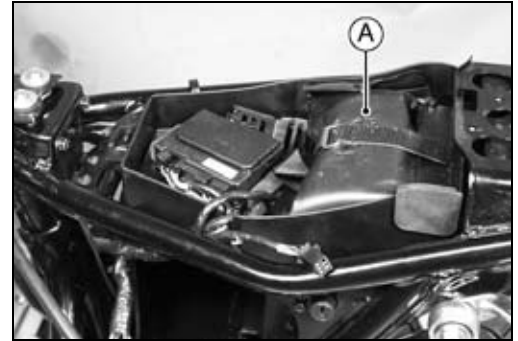
Dampers [E]



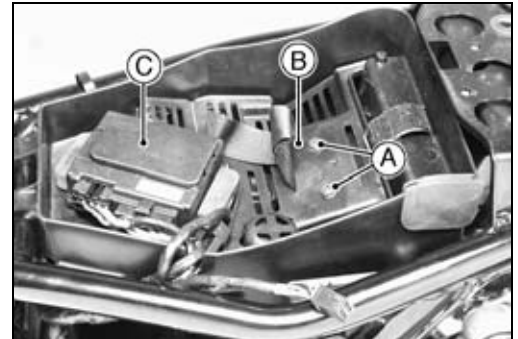
Battery Case

Battery Case Removal

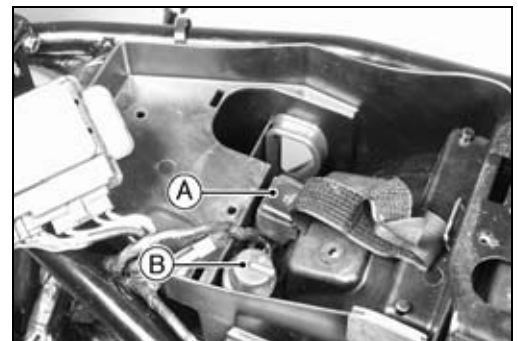
- Remove:
 - Air Cleaner Housing (see Fuel System chapter)
 - Rear Fender (see Rear Fender Removal)
 - Tool Kit [A]



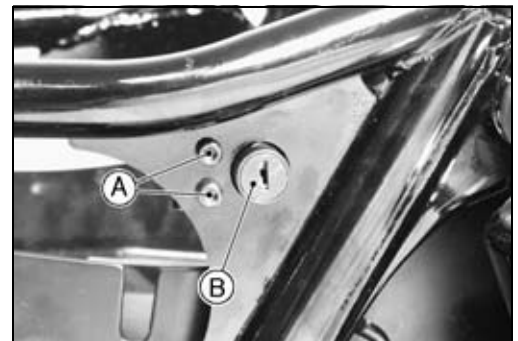
- Screws [A]
- Screen [B]
- Junction Box [C]



- Oil Pressure Warning Light Delay Unit [A]
- Normal Open Type Relay [B]



- Seat Lock Bolts [A]
- Seat Lock [B]



- Raise the front [A] of the battery case to take the case up and out.

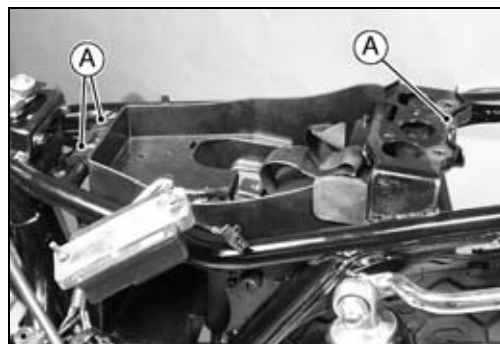


14-12 FRAME

Battery Case

Battery Case Installation

- Engage the front and rear hooks [A].
- Refer to the Appendix chapter for details on routing the cables, hoses, and wires.



Side Stand, Center Stand, Frame

Side Stand Removal

- Remove the muffler and remove the side stand bolt and nut.

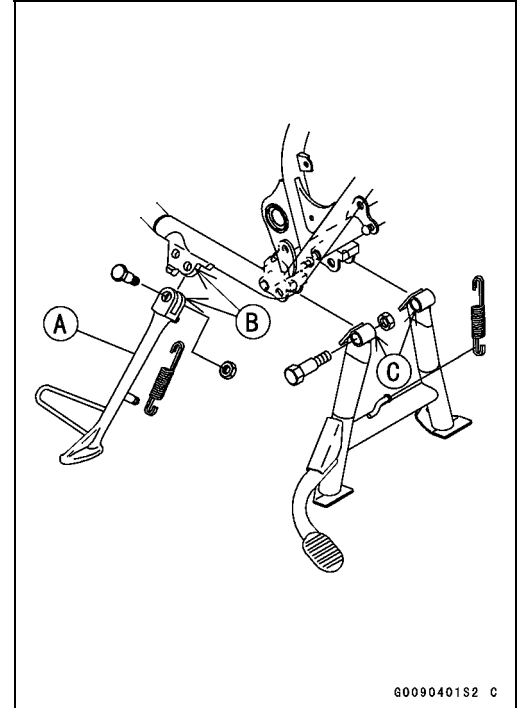
Side Stand Installation

- Apply grease to the sliding area [B] of the side stand [A].
- Tighten the bolt and lock them with the nut.

Torque - Side Stand Mounting Bolt: 44 N·m (4.5 kgf·m, 33 ft·lb)

- Hook the spring.
- Install the side stand switch.

Torque - Side Stand Switch Bolt: 8.8 N·m (0.9 kgf·m, 78 in·lb)



Center Stand Installation

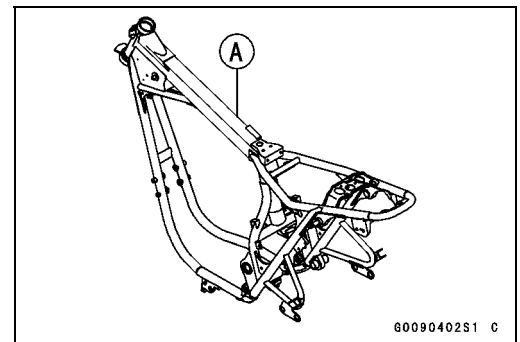
- Apply grease to the sliding area [C] of the center stand.

Frame Inspection

- Inspect the frame [A] for any signs of cracks, depression, bending, or deflection.
- ★ Replace the frame if it shows any signs of damage.

WARNING

Replace the frame with a new one if it is damaged; it is unsafe to use a frame by repairing it.



Electrical System

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15-2 ELECTRICAL SYSTEM

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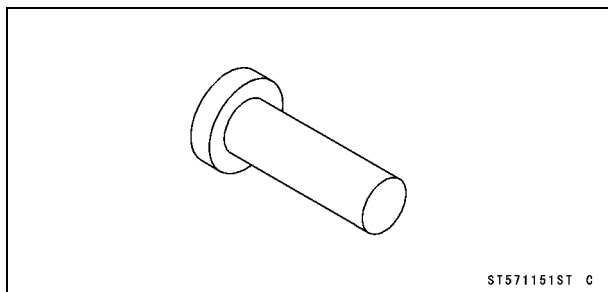
Specifications

Item	Standard	Service Limit
Battery		
Type	Sealed Battery	—
Capacity	12 V 12 Ah 12 V 10 Ah (On and after EJ650-A5/C5)	—
Voltage	12.8 V or more	—
Alternator (Charging System)		
Type	Three-phase AC	—
Charging Voltage (regulator/rectifier output voltage)	14 ~ 15 V @4 000 r/min (rpm)	—
Stator Coil Resistance	0.3 ~ 0.5 Ω	—
Ignition System		
Crankshaft Sensor Resistance	423 ~ 517 Ω	—
Ignition Coil:		
3 Needle Arcing Distance	8 mm (0.31 in.) or more	—
Primary Winding Resistance	2.6 ~ 3.2 Ω	—
Secondary Winding Resistance	13.5 ~ 16.5 k Ω	—
Spark Plug:	NGK CR8E or ND U24 ESR-N	—
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	—
IC Igniter Inspection:		—
Ignition Coil Primary Peak Voltage	100 V or more	—
Crankshaft Sensor Peak Voltage	1.6 V or more	—
Electric Starter System		
Starter Motor:		
Blush Length	12.0 ~ 12.5 mm (0.47 ~ 0.49 in.)	5.5 mm (0.22 in.)
Commutator Diameter	28 mm (1.1 in.)	27 mm (1.06 in.)
Switch and Sensor		
Rear Brake Light Switch Timing	ON after about 10 mm (0.39 in.) pedal travel	—
Oil Pressure Warning Light Switch Connections	When engine is stopped: ON When engine is running: OFF	—
Throttle Sensor:		
Output Voltage	When engine is idling: 0.9 ~ 1.1 V When grip is fully opened: 4.06 ~ 4.26 V	—
Input Voltage	Approx. 5 V	—

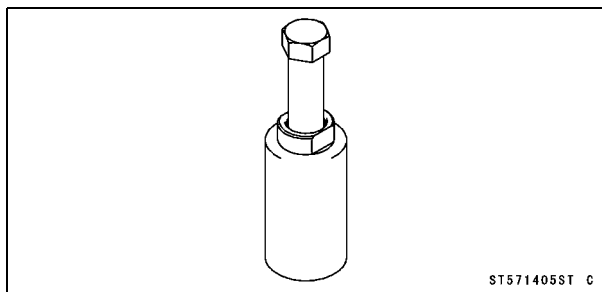
15-4 ELECTRICAL SYSTEM

Special Tools and Sealant

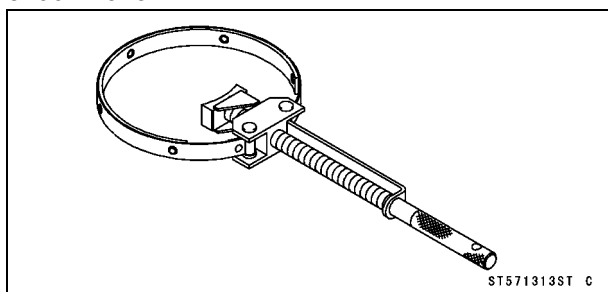
Rotor Puller Adapter, $\phi 9.5$:
57001-1151



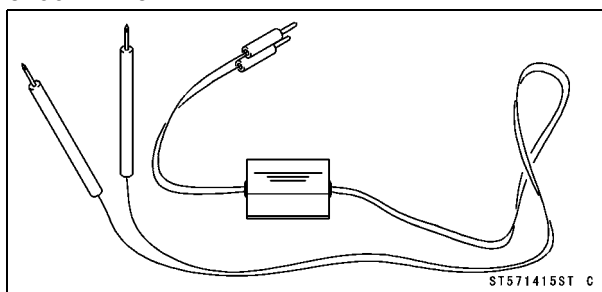
Flywheel Puller Assembly, M38 \times 1.5/M35 \times 1.5:
57001-1405



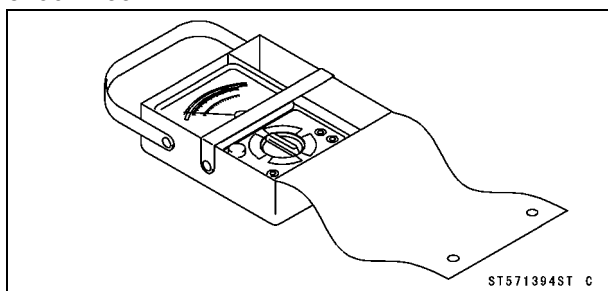
Flywheel Holder:
57001-1313



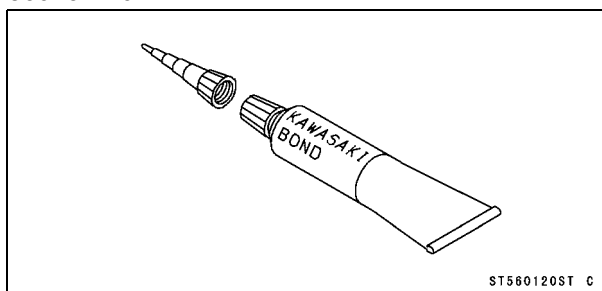
Peak Voltage Adapter:
57001-1415



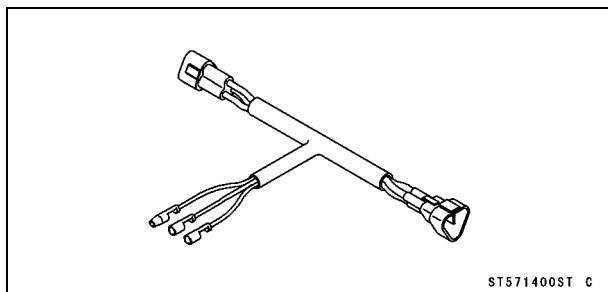
Hand Tester:
57001-1394



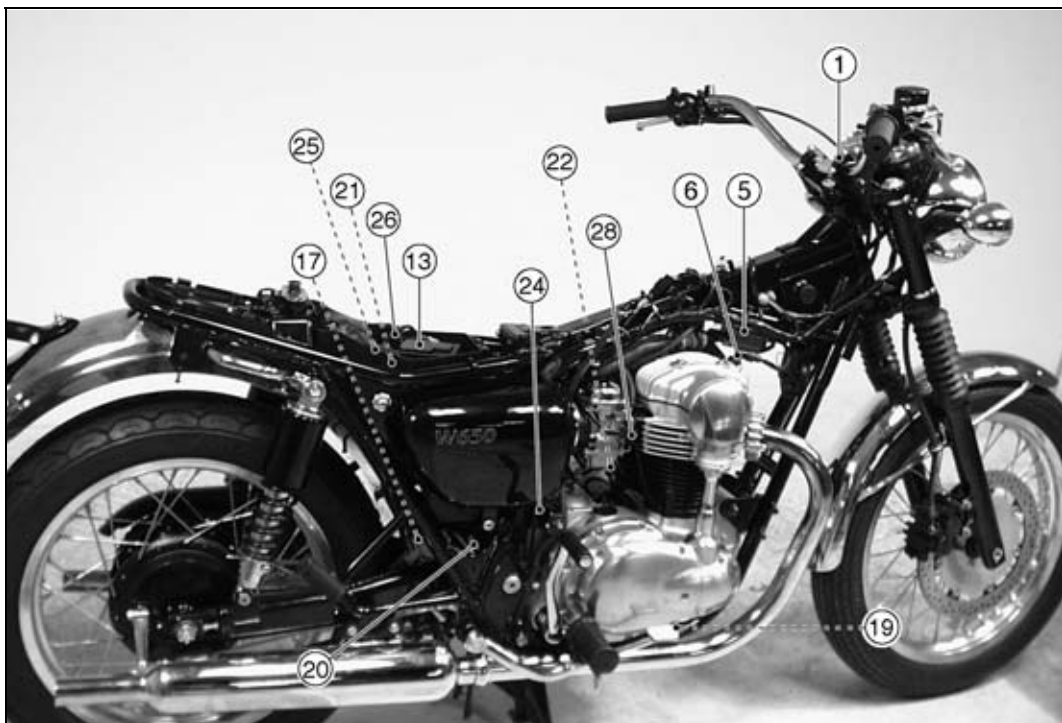
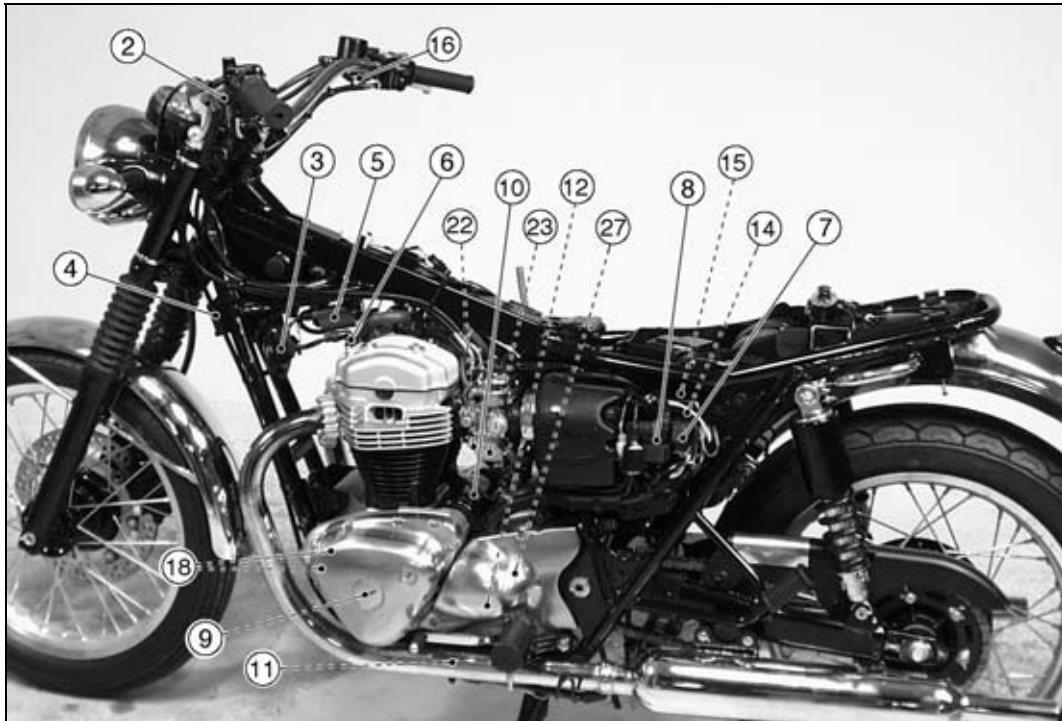
Kawasaki Bond (Silicone Sealant):
56019-120



Throttle Sensor Setting Adapter #1:
57001-1400



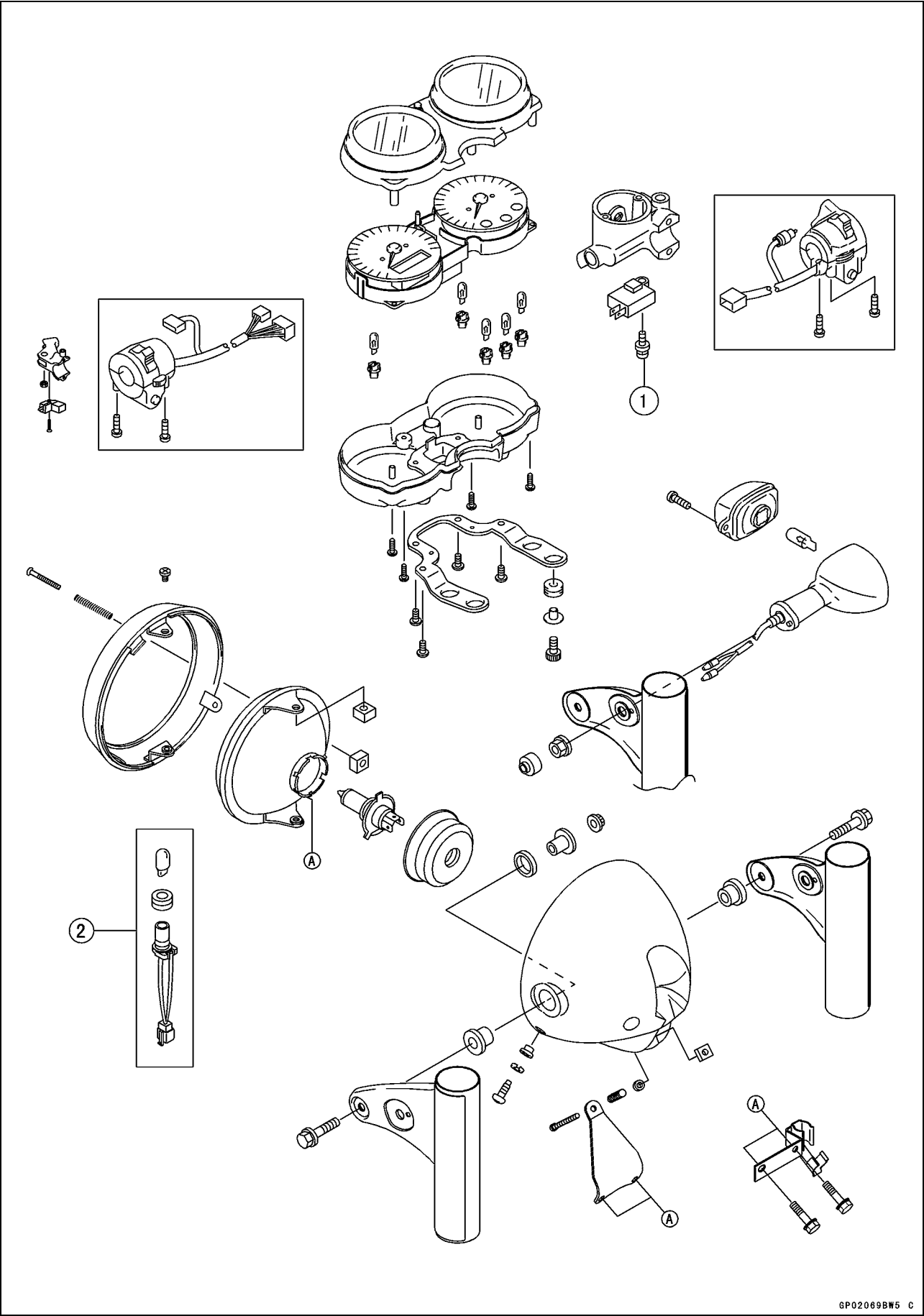
Parts Location



- | | | |
|-----------------------------------|------------------------------|---|
| 1. Ignition Switch | 12. Gear Position Switch | 21. Oil Pressure Warning Light Delay Unit |
| 2. Starter Lockout Switch | 13. Junction Box | 22. Carburetor Heater |
| 3. Horn | 14. IC Igniter | 23. Carburetor Temperature Sensor |
| 4. Carburetor Heater Control Unit | 15. Battery | 24. Atmospheric Temperature Sensor |
| 5. Ignition Coil | 16. Front Brake Light Switch | 25. Normal Open Type Relay |
| 6. Spark Plug | 17. Rear Brake Light Switch | 26. Rectifier |
| 7. Turn Signal Relay | 18. Crankshaft Sensor | 27. Speed Sensor |
| 8. Starter Relay | 19. Oil Pressure Warning | 28. Throttle Sensor |
| 9. Alternator | 20. Regulator/Rectifier | |
| 10. Starter Motor | | |
| 11. Side Stand Switch | | |

15-6 ELECTRICAL SYSTEM

Exploded View



ELECTRICAL SYSTEM 15-7

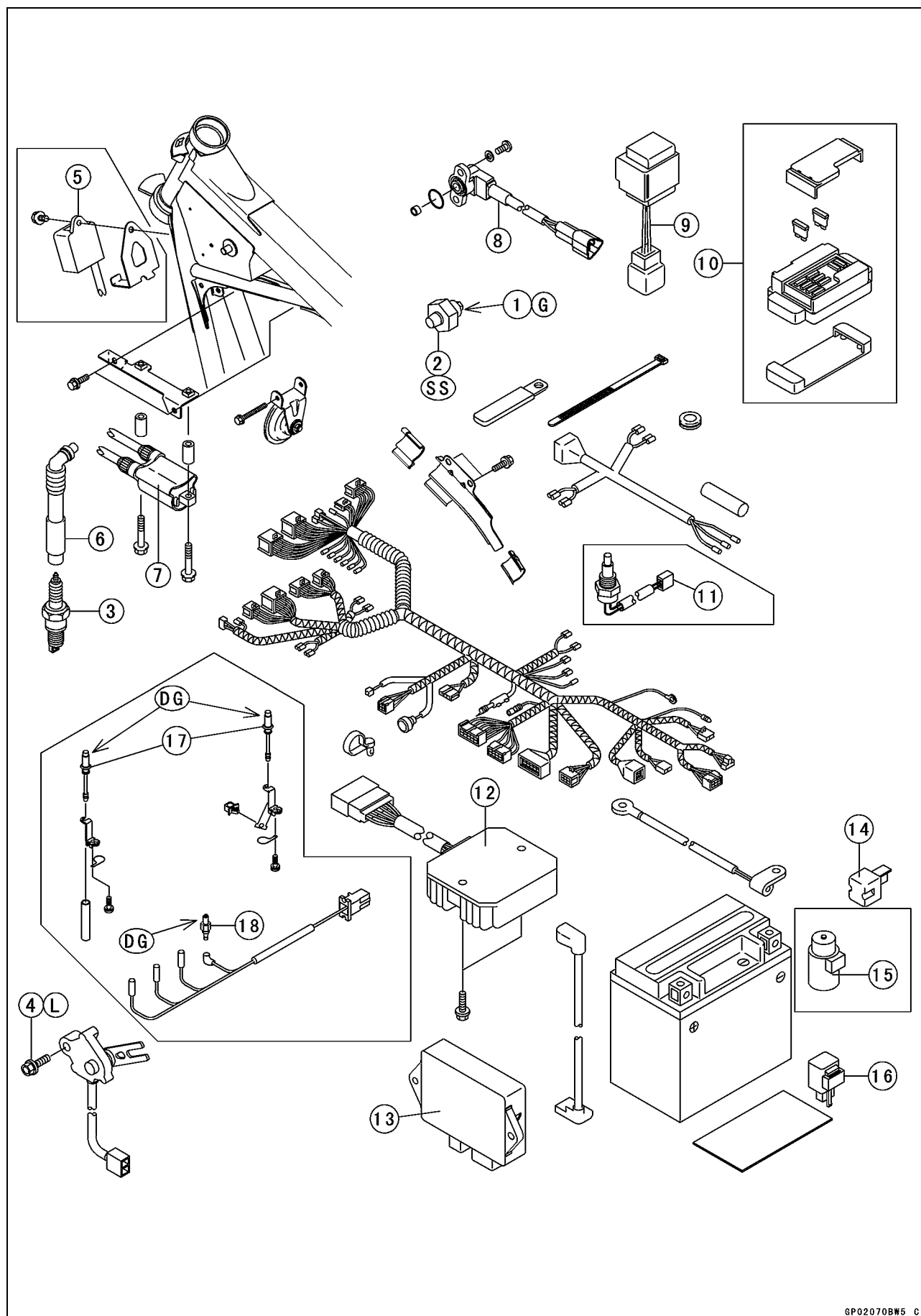
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Brake Light Switch Screw	1.2	0.12	10 in·lb	

2. City Light (Other than United States, Canada, Australia and Taiwan Models)

15-8 ELECTRICAL SYSTEM

Exploded View



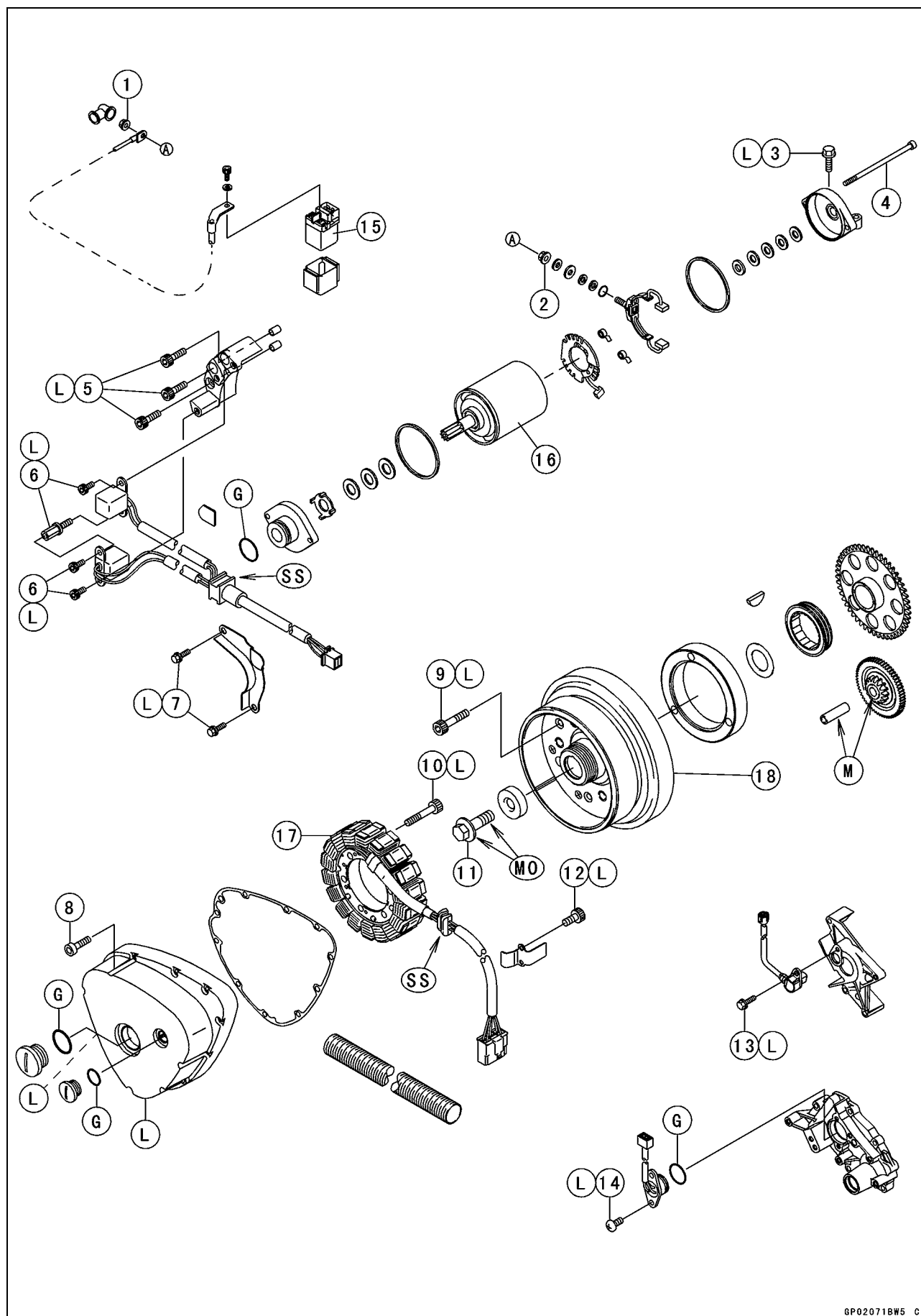
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Pressure Warning Light Switch Lead Lead Bolt	1.6	0.16	14 in·lb	
2	Oil Pressure Warning Light Switch	15	1.5	11	SS
3	Spark Plug	13	1.3	113 in·lb	
4	Side Stand Switch Mounting Bolt	8.8	0.9	78 in·lb	L

- 5. Heater Control Unit (Other than United States, Canada and Taiwan Model)
 - 6. Spark Plug Cap
 - 7. Ignition Coil
 - 8. Throttle Sensor
 - 9. Oil Pressure Warning Light Delay Unit
 - 10. Junction Box
 - 11. Atmospheric Temperature Sensor (Other than United States, Canada and Taiwan Model)
 - 12. Regulator/Rectifier
 - 13. IC Igniter
 - 14. Rectifier
 - 15. Normal Open Type Relay (Other than United States, Canada and Taiwan Model)
 - 16. Turn Signal Relay
 - 17. Carburetor Heater (Other than United States, Canada and Taiwan Model)
 - 18. Carburetor Temperature Sensor (Other than United States, Canada and Taiwan Model)
- DG: Apply heat transfer grease.
- G: Apply grease.
- L: Apply a non-permanent locking agent to the threads.
- SS: Apply silicon sealant (Kawasaki Bond: 56019-120).

15-10 ELECTRICAL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Starter Motor Cable Nut	4.9	0.5	43 in·lb	
2	Starter Motor Terminal Nut	11	1.1	95 in·lb	
3	Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	L
4	Starter Motor Thru-Bolts	4.9	0.5	43 in·lb	
5	Crankshaft Sensor Mounting Bracket Bolts	12	1.2	104 in·lb	L
6	Crankshaft Sensor Mounting Bolts	7.8	0.8	69 in·lb	L
7	Crankshaft Sensor Lead Guard Plate Bolts	9.8	1.0	87 in·lb	L
8	Alternator Cover Bolts	12	1.2	104 in·lb	(2, L)
9	One-Way Clutch Mounting Allen Bolts	34	3.5	25	L
10	Alternator Stator Mounting Bolts	12	1.2	104 in·lb	L
11	Alternator Rotor Bolt	157	16	116	
12	Alternator Starter Lead Clamp Bolts	7.8	0.8	69 in·lb	L
13	Speed Sensor Mounting Bolt	7.8	0.8	69 in·lb	L
14	Gear Position Sensor Screws	3.9	0.4	35 in·lb	L

15. Starter Relay

16. Starter Motor

17. Stator

18. Alternator

MO: Apply molybdenum desulfide oil.

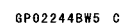
G: Apply grease.

L: Apply a non-permanent locking agent to the threads.

M: Apply molybdenum disulfide grease.

SS: Apply silicon sealant (Kawasaki Bond: 56019-120).

Exploded View



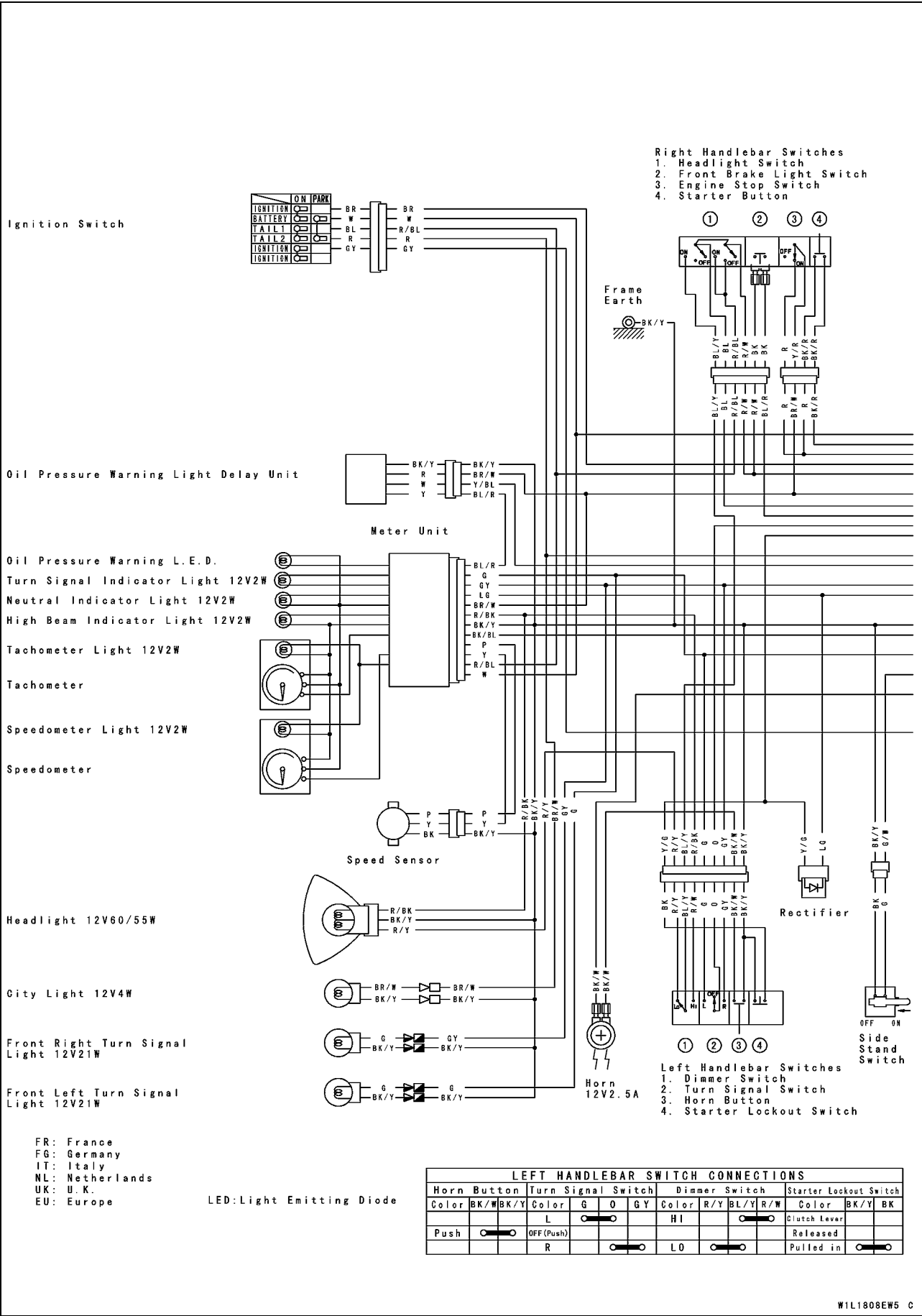
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Tail Light Mounting Nuts	5.9	0.6	52	
2	Turn Signal Light Screws	1	0.1	9	

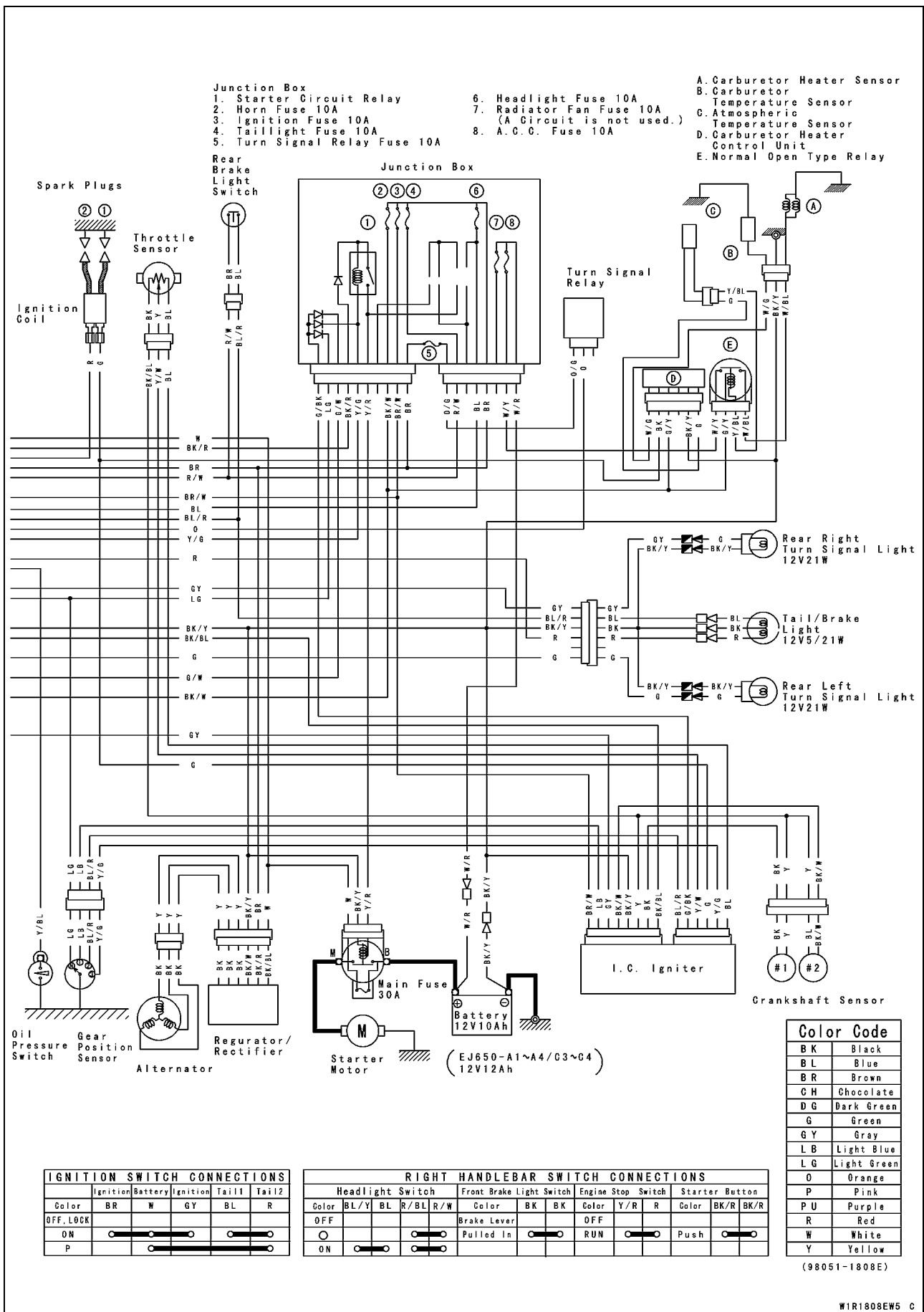
- 3. Flap (Norway Model)
- 4. Rear Brake Light Switch

15-14 ELECTRICAL SYSTEM
EJ650-A1 ~ A3/C3 ~ C4 Wiring Diagram

(Other than United States, Canada and Australia)

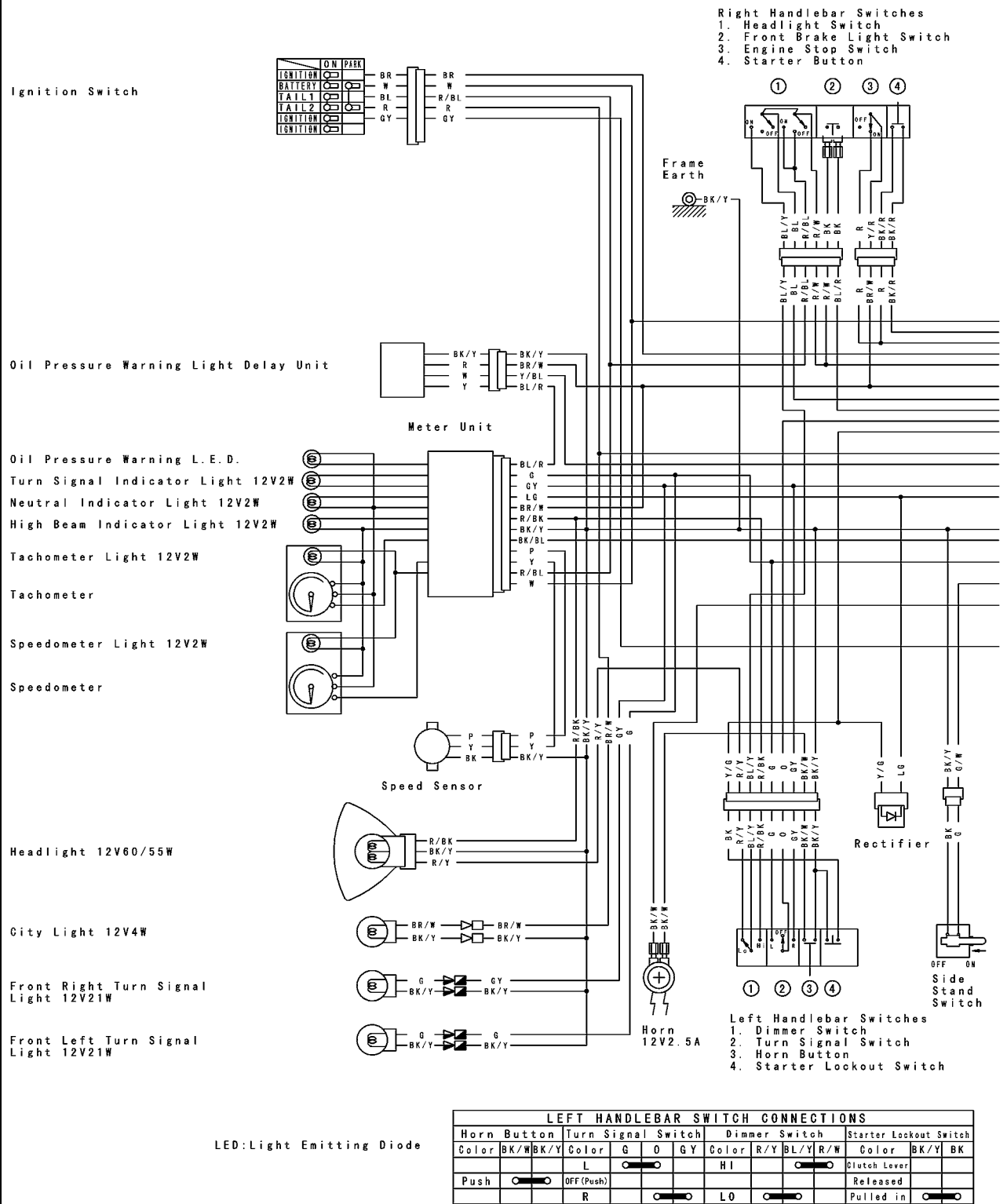


EJ650-A1 ~ A3/C3 ~ C4 Wiring Diagram

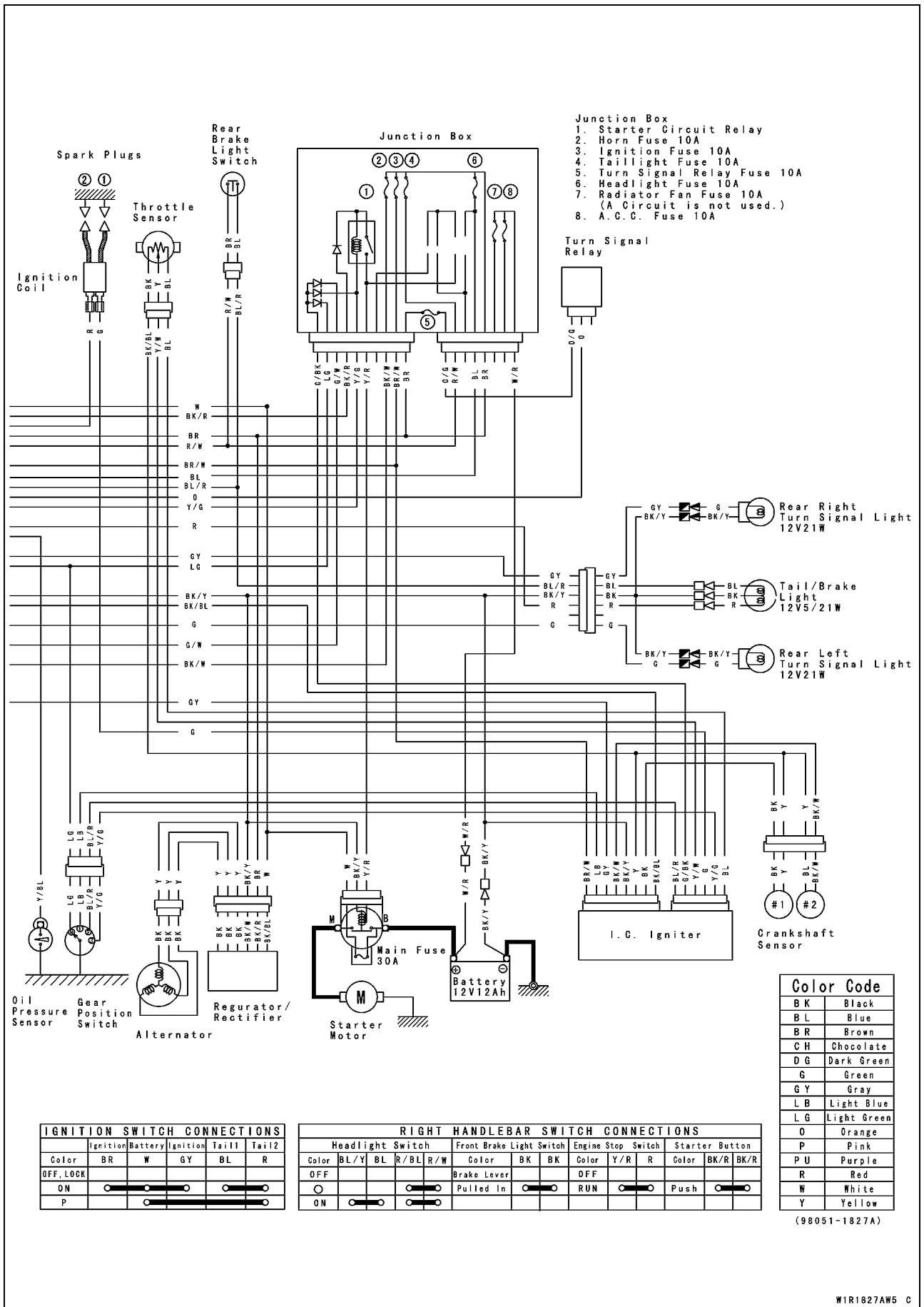


15-16 ELECTRICAL SYSTEM

EJ650-A1 Wiring Diagram (Europe, Norway and Spain)

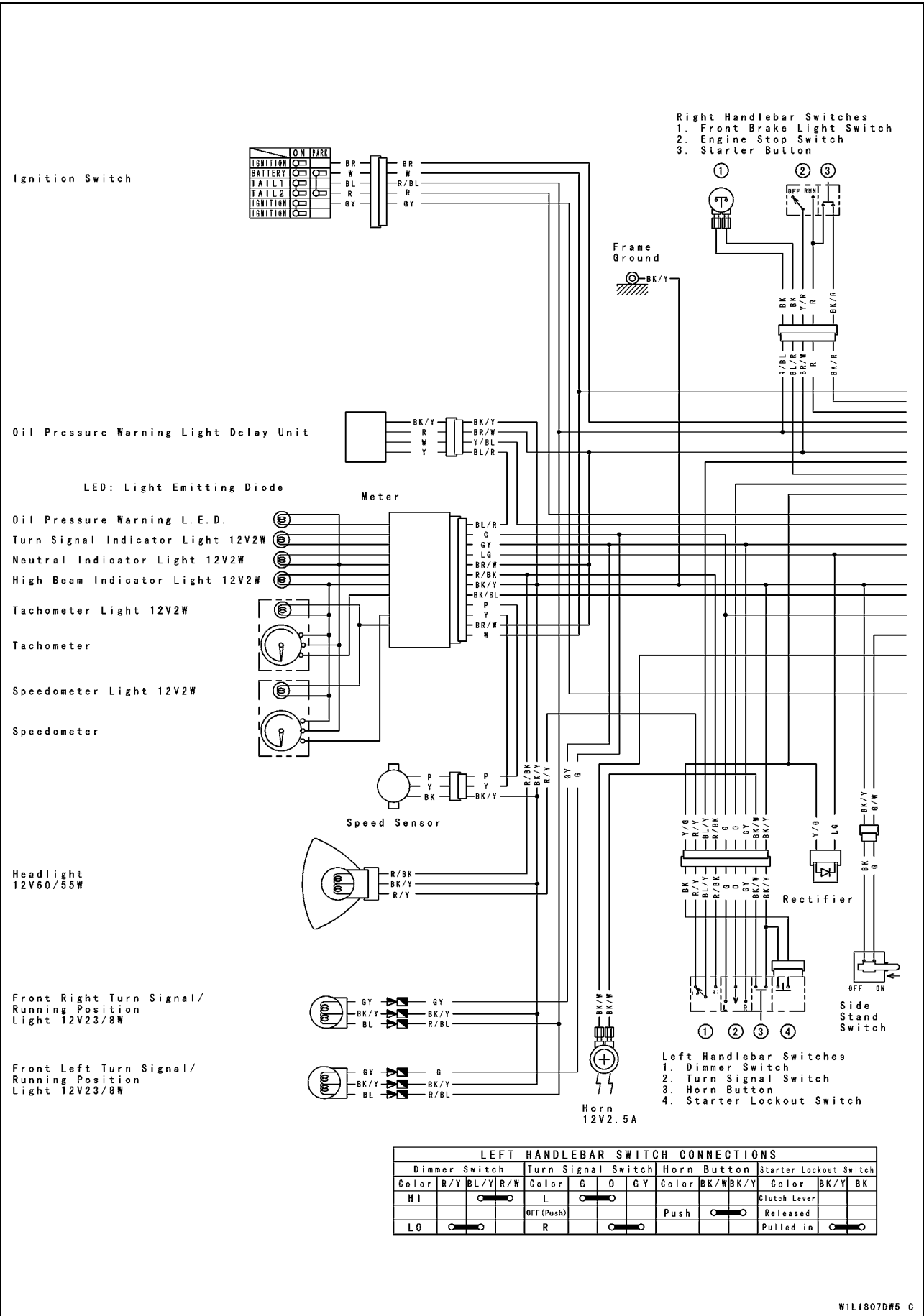


EJ650-A1 Wiring Diagram (Europe, Norway and Spain)

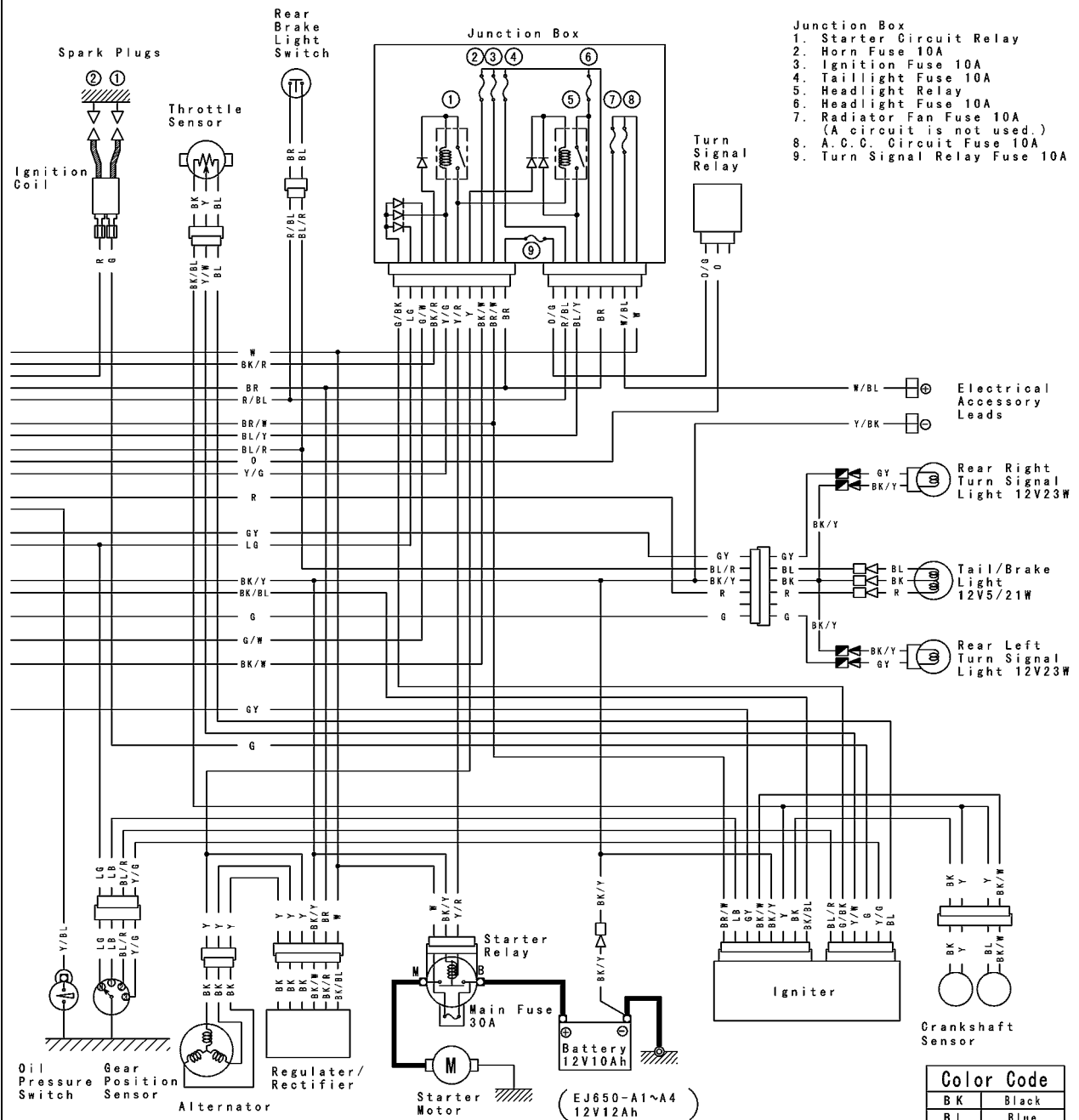


15-18 ELECTRICAL SYSTEM






EJ650-A1 ~ A5 Wiring Diagram (United States & Canada), EJ650-A5 (Taiwan)



EJ650-A1 ~ A5 Wiring Diagram (United States & Canada), EJ650-A5 (Taiwan)

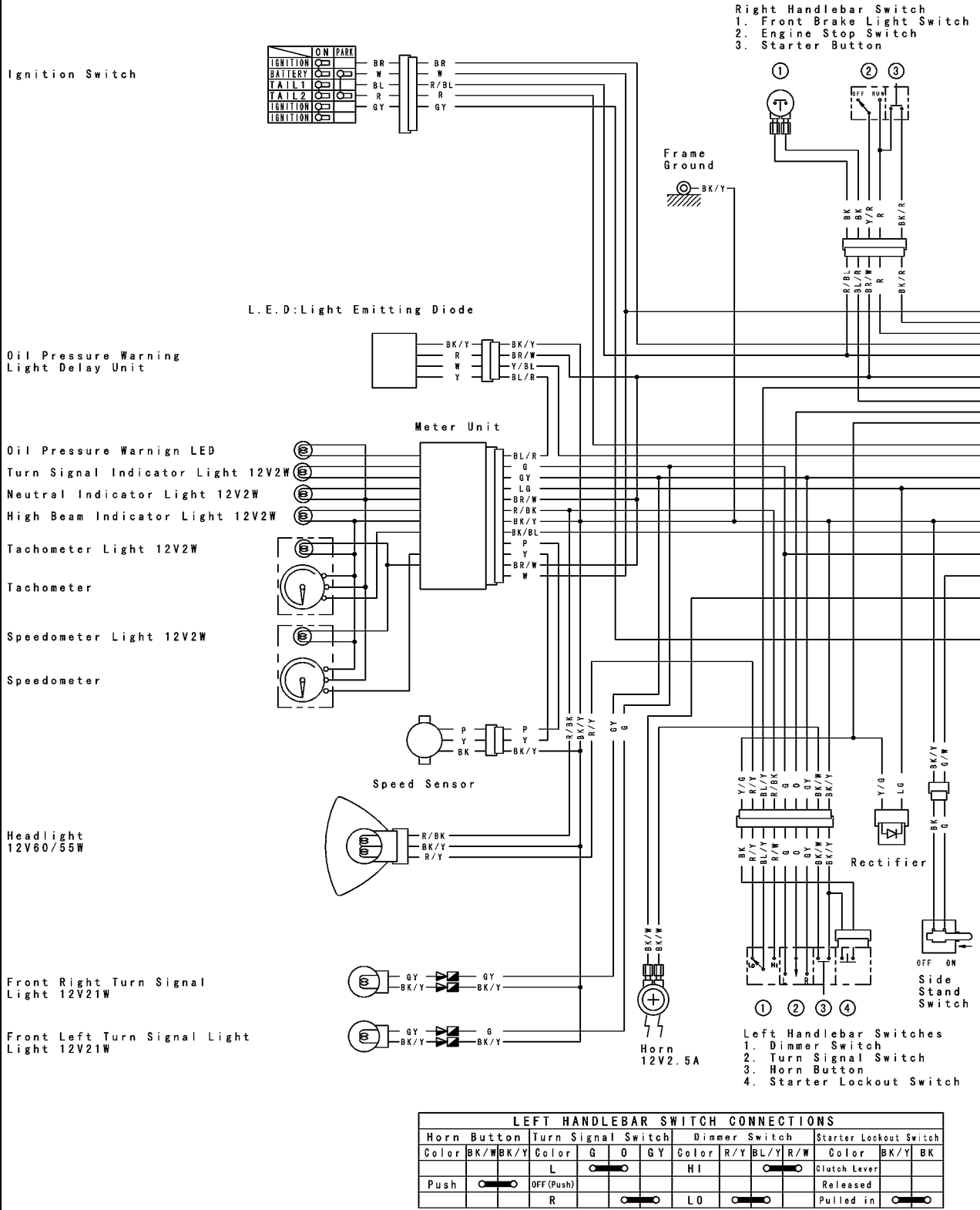


IGNITION SWITCH CONNECTIONS						
	Ignition	Battery	Tail1	Tail2	Ignition	Ignition
Color	BR	W	BL	R	GY	-
OFF, LOCK						
ON						
P						

RIGHT HANDLEBAR SWITCH CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	Y/R	R	Color	R	BK/R
Brake Lever			OFF					
Pulled In			RUN			Push		

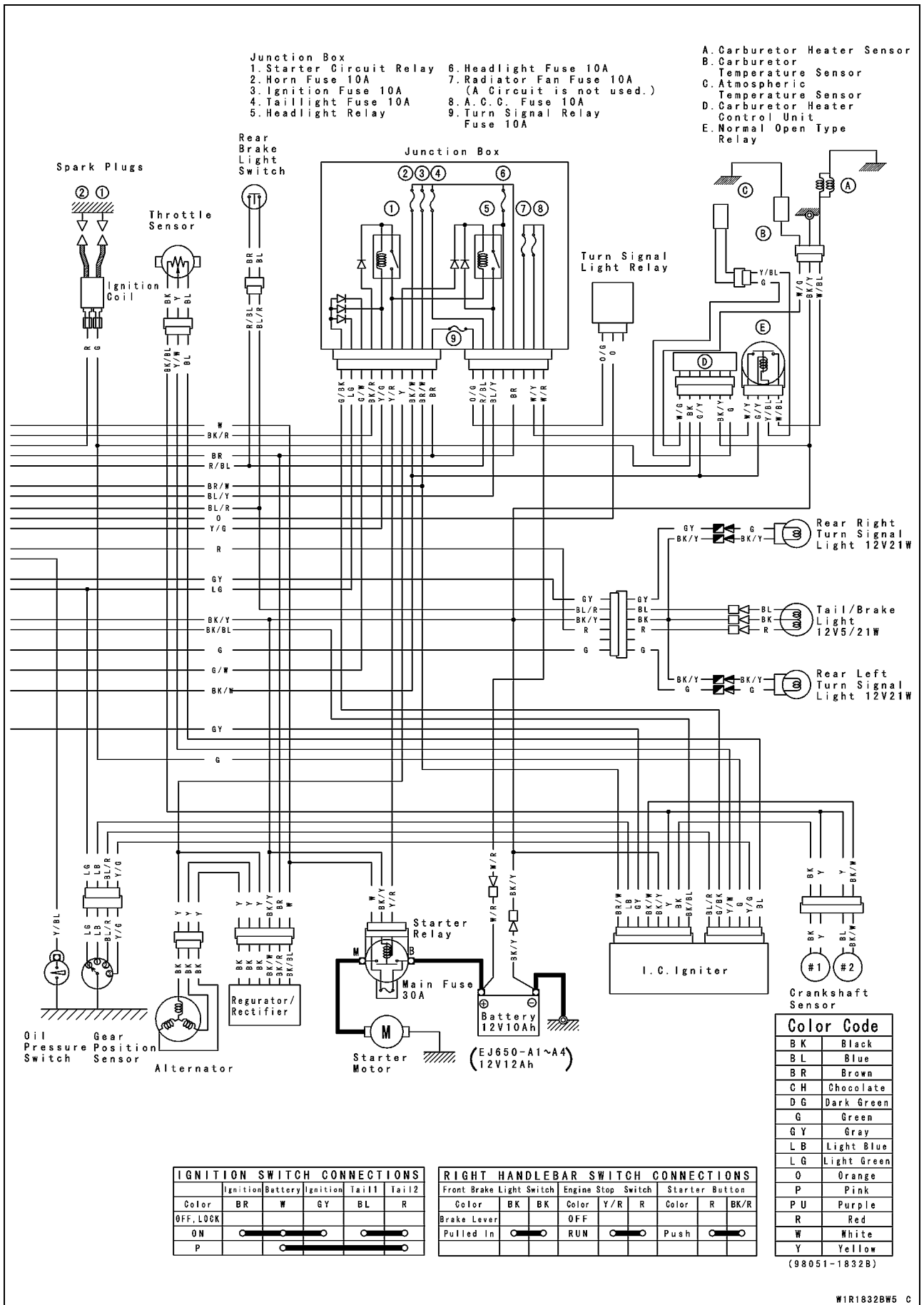
15-20 ELECTRICAL SYSTEM

EJ650-A1 ~ A5 Wiring Diagram (Australia)



LEFT HANDLEBAR SWITCH CONNECTIONS													
Horn Button			Turn Signal Switch			Dimmer Switch			Starter Lockout Switch				
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	BL/Y	R/W	Color	BK/Y	BK
			L				HI				Clutch Lever		
Push			OFF (Push)								Released		
			R				LO				Pulled in		

EJ650-A1 ~ A5 Wiring Diagram (Australia)



EJ650-A5/C5 ~ C7, C6F Wiring Diagram

Ignition Switch

	ON	PAUSE
IGNITION		
BATTERY		
TAIL 1		
TAIL 2		
IGNITION		

Oil Pressure Warning Light Delay Unit

Meter Unit

Speed Sensor

Headlight 12V60/55W

City Light 12V4W

Front Right Turn Signal Light 12V21W

Front Left Turn Signal Light 12V21W

Horn 12V2.5A

Rectifier

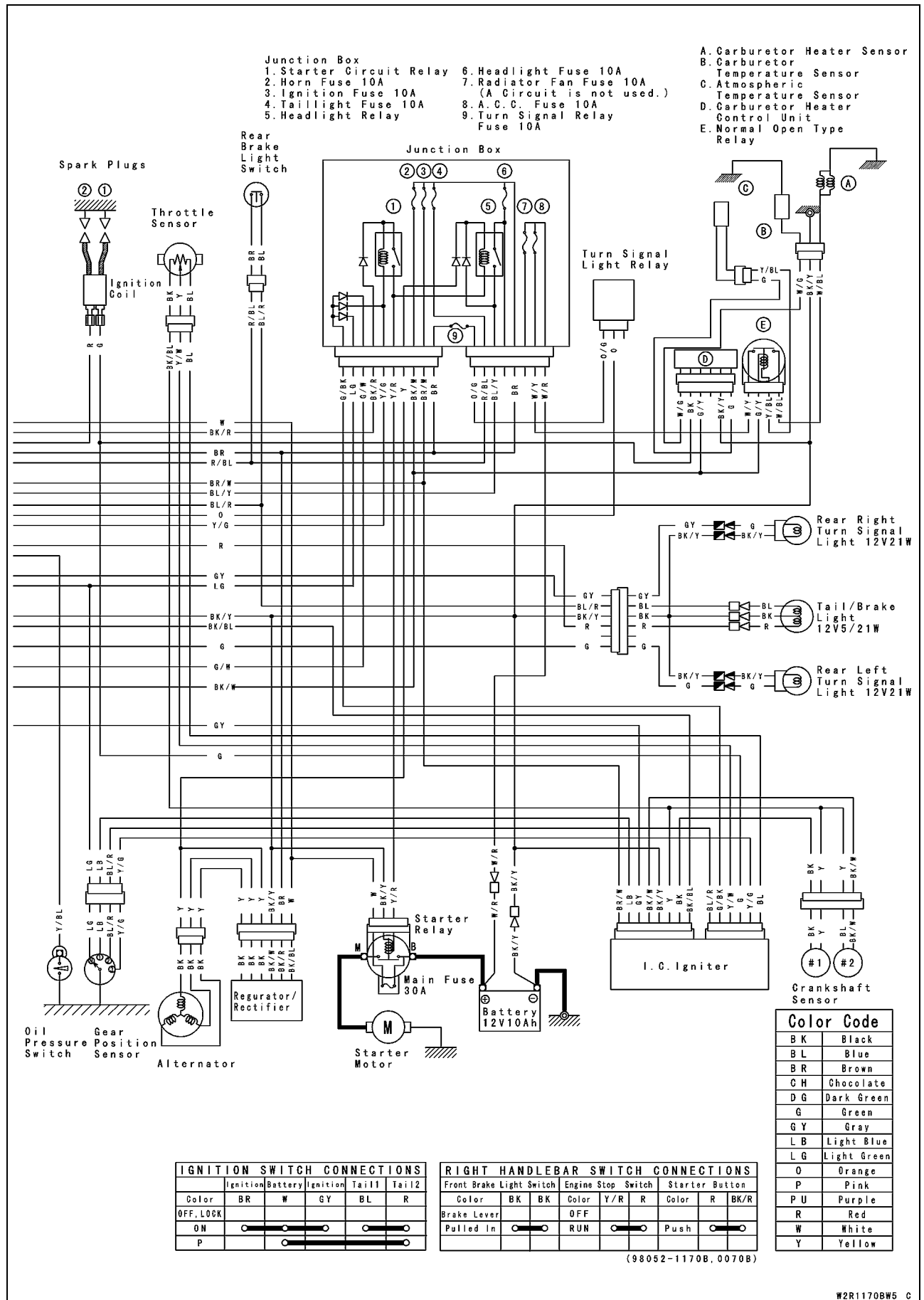
Side Stand Switch

Left Handlebar Switches

1. Dimmer Switch
2. Turn Signal Switch
3. Horn Button
4. Starter Lockout Switch

LEFT HANDLEBAR SWITCH CONNECTIONS													
Horn Button			Turn Signal Switch			Dimmer Switch			Starter Lockout Switch				
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	BL/Y	R/W	Color	BK/Y	BK
Push			L				HI				Clutch Lever		
			R				LO				Released		
											Pulled in		

EJ650-A5/C5 ~ C7, C6F Wiring Diagram



15-24 ELECTRICAL SYSTEM

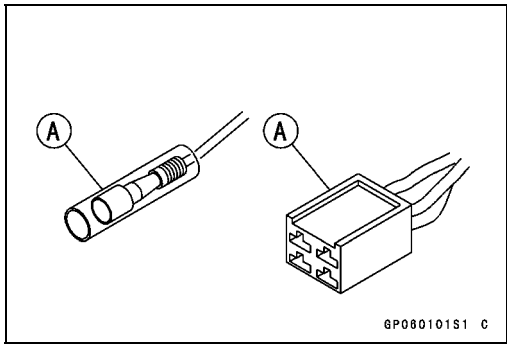
Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

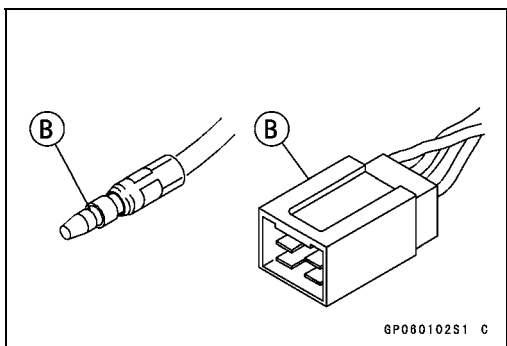
- Do not reverse the battery lead connections. This will burn out the diodes on the electrical parts.
- Always check the battery condition before determining the integrity of other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Applying a shock to the parts in such a manner can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is ON, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Do not use a meter illumination bulb rated for other than voltage or wattage specified in the wiring diagram, as the meter panel could be warped by excessive heat radiated from the bulb.
- To prevent a short, do not connect leads directly to the battery positive (+) terminal or allow the leads to come in contact with the frame.
- Troubles may involve one, or in some cases, all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).
- Color Codes:

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

○Electrical Connectors Female Connectors [A]



Male Connectors [B]



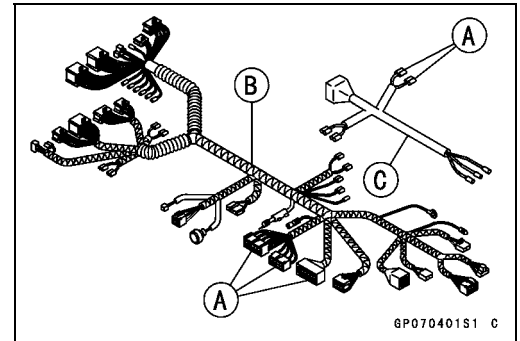
Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring has deteriorated, replace the damaged wiring.
- Pull each connector [A] apart and inspect it for corrosion, dirt, or damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it with a new part.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead that is suspected of having an open circuit.
- Connect the hand tester between the ends of the leads.

Special Tool - Kawasaki Hand Tester: 57001-1394

- Set the tester to the $\times 1 \Omega$ range, and read the tester.
- ★ If the tester does not read 0Ω , the lead is defective. Replace the lead, the main wiring harness [B], or the sub wiring harness [C] if necessary.



15-26 ELECTRICAL SYSTEM

Battery

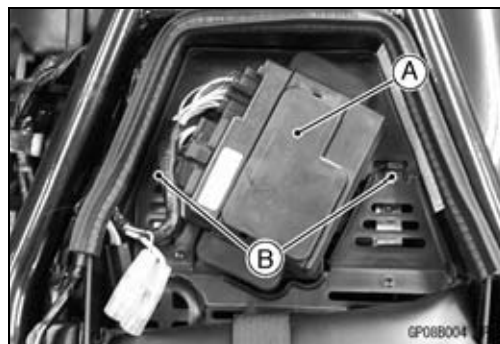
Battery Removal

- Remove
 - Seat (see Frame chapter)
 - Left Side Cover (see Frame chapter)
 - Junction Box [A]
 - Screen Lids [B]
- Disconnect the negative (–) lead [A] first and the positive (+) lead [B] from the battery.

CAUTION

Always disconnect the negative (–) lead first before disconnecting the positive (+) lead.

- Remove the battery holder bolts [A], and slide the battery holder [B] diagonally.
- Take out the battery.



Battery Installation

- Put the battery in the battery case.
- Connect the capped lead to the positive (+) terminal, and then connect the black lead to the negative (–) terminal.

⚠ WARNING

To connect, always connect the positive (+) lead first, and to disconnect, always disconnect the negative (–) lead first. Otherwise, it could create a spark, which could damage the electrical parts.

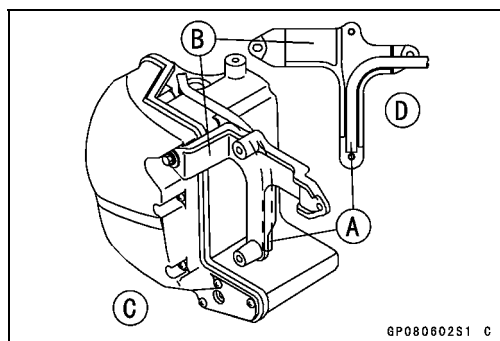
- After installing the battery holder [B], insert the carburetor air vent hose [A] into the guide in the back of the battery holder.

CAUTION

Do not allow the carburetor air vent hose to become wedged between parts, as this could cause the engine to malfunction.

View from the front of left side [C]

View from the back of battery holder [D]



Battery

Electrolyte Filling (precautions before using the battery)

CAUTION

Do not remove the seal sheet from the battery filler ports until just before use. Be sure to use a dedicated electrolyte container for correct electrolyte volume.

- Check to see that there is no peeling, tears, or holes in the seal sheet.
- Place the battery on a level surface, and remove the seal sheet [A].
- When removing the seal sheet, check to hear an air-sucking sound “Shoosh!” from the filler ports [B].

NOTE

○A battery whose seal sheet has any peeling, tears, holes, or from which the air-sucking sound was not heard requires an initial charge.

- Take the electrolyte container out of the vinyl bag.
- Detach the strip of caps (covers) [A] from the container.

NOTE

○Do not discard the strip of caps because it is used as the battery plugs later.
○Do not peel back or pierce the sealed areas [B] of the container.

- Place the electrolyte container upside down with the six sealed areas in line with the filler ports.
- Push the container down strongly enough to break the seals. Now the electrolyte should start to flow into the battery and bubbles will appear from six locations.

NOTE

○Do not tilt the container during filling as the electrolyte flow may be interrupted.

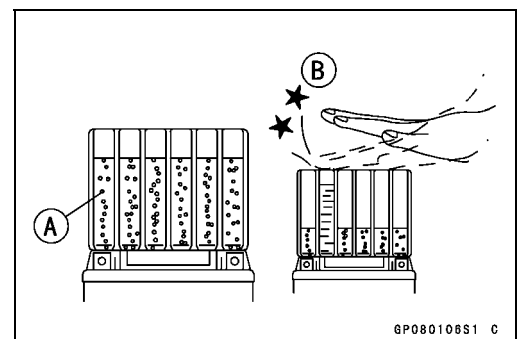
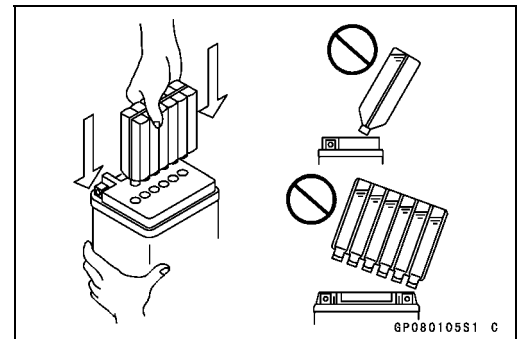
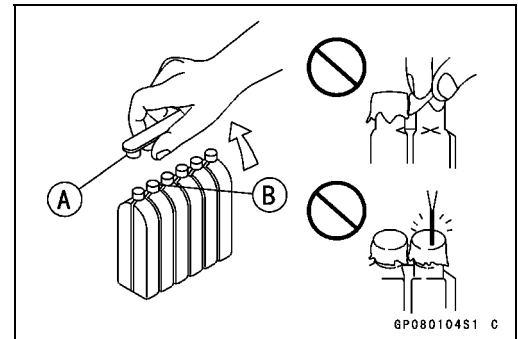
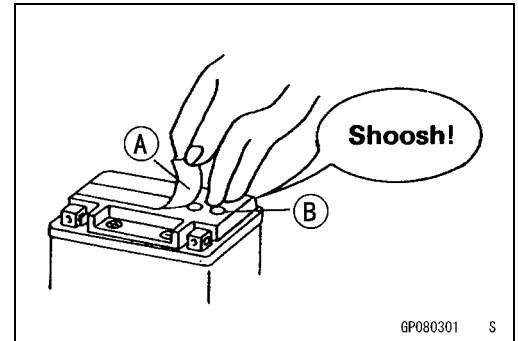
- Make sure air bubbles [A] are coming up from all six filler ports. Leave the container this way for 5 minutes or longer.

NOTE

○If no air bubbles are coming up from a filler port, tap [B] the bottom of the bottle two or three times, without removing the container from the battery.

CAUTION

Pour the electrolyte until the container is completely emptied.



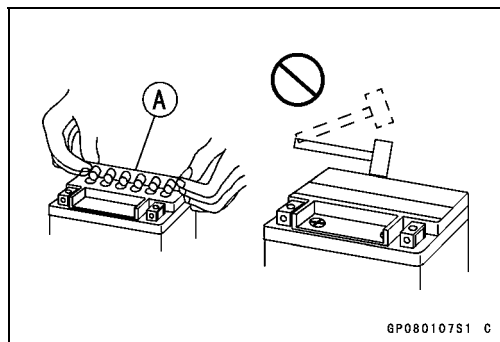
15-28 ELECTRICAL SYSTEM

Battery

- Be certain that all the electrolyte has flowed out, then, tap the bottom, and pull the container gently out of the battery.
- Let the battery sit for 20 minutes. During this time, the electrolyte permeates and the generated gas is released.
- Fit the strip of caps (covers) [A] tightly into the filler ports until the strip is at the same level as the top of the battery.

NOTE

○ Do not use a hammer; press down evenly with both hands.



⚠ WARNING

Once you installed the strip of caps after filling the battery with electrolyte, never remove it.

Initial Charge

While a sealed battery can be used after only filling with electrolyte, a battery may not be able to sufficiently move a starter motor to start an engine in the cases shown in the table below, where an initial charge is required before use. However, if a battery shows a terminal voltage* higher than 12.8 V after 10 minutes of filling, no initial charge is necessary.

Condition requiring initial charge	Charging method
At low temperatures (lower than 0° C)	1.4 A × 2 ~ 3 hours 1.2 A × 2 ~ 3 hours (On and after EJ650-A5/C5)
Battery stored at high temperature and humidity.	1.4 A × 15 ~ 20 hours
Seal peeled, torn, or punctured during storage (The air-sucking sound "Shoosh!" is not heard while removing the seal).	1.2 A × 15 ~ 20 hours (On and after EJ650-A5/C5)
Battery as old as 2 years or more after manufacture. Battery manufacturing date is printed on battery top. Example: 12 10 90 T1 Day Month Year Mfg. location	

* Terminal voltage: To measure the terminal voltage, use a digital voltmeter that can read in 0.1V increments.

Precautions

(1) No topping-up necessary

Under normal use conditions, it is not necessary to top up this battery for the duration of its service life. Never attempt to forcibly pry off the sealing plug to add water, as this is very dangerous.

(2) Charging

If the engine will not start, the horn sounds weak, or the lamps are dim, the battery could be discharged. If this is the case, charge the battery for 5 ~ 10 hours at the charging amperage indicated in the Specifications (see this chapter). If the battery must be quick charged due to unavoidable circumstances, do so by following the maximum charging amperage and time listed on the battery.

CAUTION

This battery has been designed so that its performance will not be affected as long as it is charged as described above. However, its performance could be severely affected if the battery is charged using a method that differs from the instructions. Never remove the strip of caps during charging. Even in an unlikely event that an excessive amount of gas is generated through overcharging, the safety valves function to ensure safety.

(3) If the motorcycle will not be used for a long time:

Charge the battery and disconnect the negative (–) lead before storing the motorcycle. During storage, charge at least once a month.

(4) Battery life:

Battery

If the battery does not have sufficient power to start the engine even after charging it a few times, it might have reached the end of its service life. If this is the case, replace the battery, after making sure that there is no problem with the starting system of the motorcycle.

⚠ WARNING

Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.

No fire should be drawn near the battery, or no terminals should have the tightening loosened.

The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water. Get medical attention if severe.

Interchangeability

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.

Charging Condition Inspection

- The battery charging condition can be checked by measuring the battery terminal voltage.
- Remove the battery (see Battery Removal).
- Measure the battery terminal voltage.

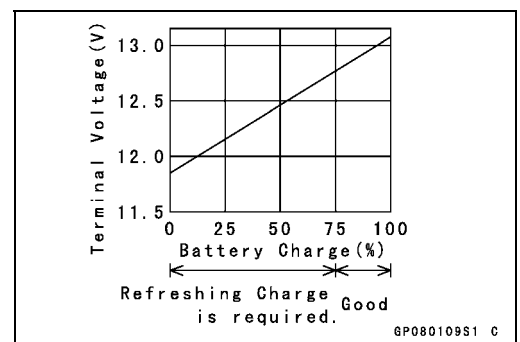
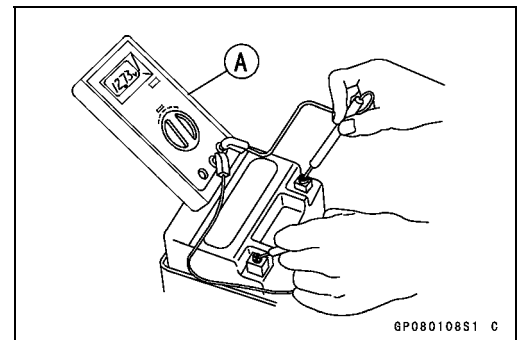
NOTE

- Measure with a digital voltmeter [A] that can read in 0.1 V increments.

- ★ If the reading is below the specification, recharge the battery.

Terminal Voltage

Standard: 12.8 V or more

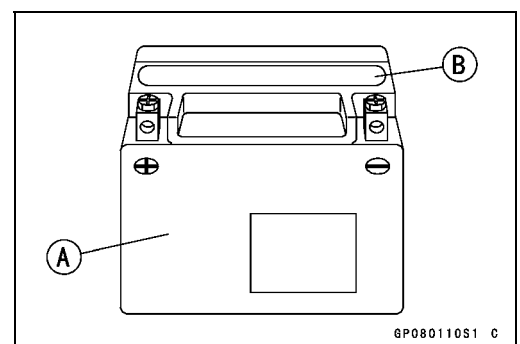


Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Refresh-charge the battery as described below, according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove sealing caps [B] even at charging. Never add water. Charge with current and time as stated below.



Terminal voltage: 11.5 ~ less than 12.8 V

Standard Charge

- 1.4 A × 5 ~ 10 hours (see following table)
- 1.2 A × 5 ~ 10 hours (On and after EJ650-A5/C5)

Quick Charge

- 6 A × 1 hour
- 5 A × 1 hour (On and after EJ650-A5/C5)

15-30 ELECTRICAL SYSTEM

Battery

CAUTION

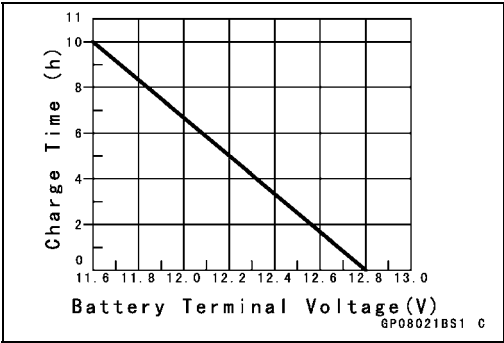
Do not quick charge as much as possible. If the battery must be quick charged due to unavoidable circumstances, perform a standard charge later on.

Terminal voltage: less than 11.5 V

Charging method

1.4 A × 20 h

1.2 A × 20 h (On and after EJ650-A5/C5)

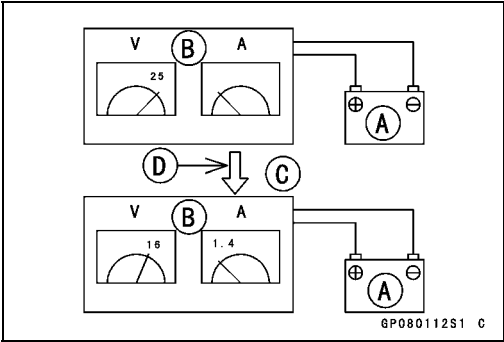


NOTE

○If the current does not flow when charging, raise the voltage initially (25 V as maximum), and let down the voltage to charge when the current starts to flow as a yardstick. If ammeter shows no change in current after 5 minutes, you need a new battery. The current, if it can flow into the battery tends to become excessive. Adjust the voltage as often as possible to keep the current at standard value (1.4 A) (On and after EJ650-A5/C5, 1.2 A).

- Determine the condition of the battery after recharging.
- Measure the battery terminal voltage 30 minutes after the recharging has been completed.

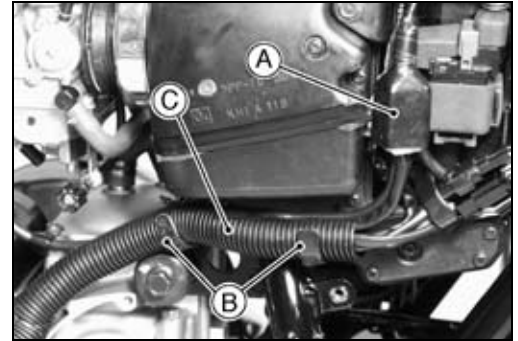
Criteria	Judgment
12.8 V or higher	Good
12.0 ~ 12.8 V	Charge insufficient → Recharge
12.0 V or lower	Unserviceable → Replace battery



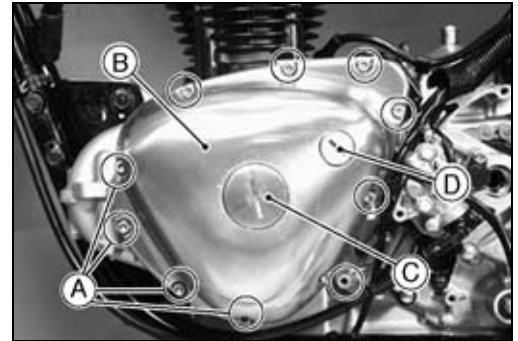
Charging System

Alternator Cover Removal

- Remove:
 - Engine Oil (drain, see Periodic Maintenance chapter)
 - Engine Sprocket Cover (see Final Drive chapter)
 - Seat (see Frame chapter)
 - Left Side Cover (see Frame chapter)
 - Alternator Lead Connector [A]
- Open the clamps [B] and pull the alternator lead from the lead protective tube [C].

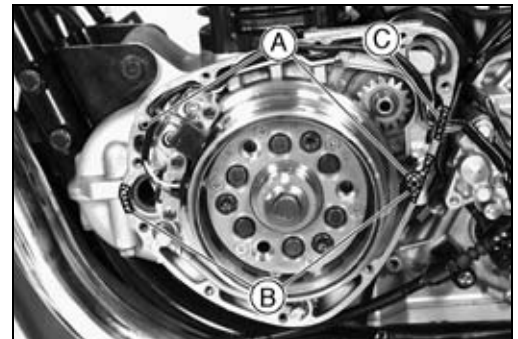


- Remove:
 - Alternator Cover Bolts [A]
 - Alternator Cover [B]
- Remove the rotor plug [C] and the timing plug [D], and remove the alternator cover by placing your finger in the plug holes.



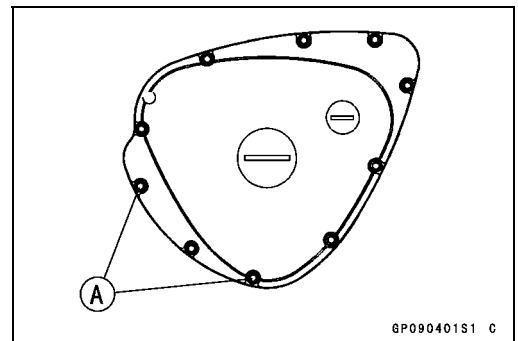
Alternator Cover Installation

- Install the knock pins [A].
- Apply silicon sealant to the crankcase mating surfaces [B] and to the grommet.
- Sealant - Kawasaki Bond (Silicon Sealant): 56019-120**
- Replace the alternator cover gasket with a new one.



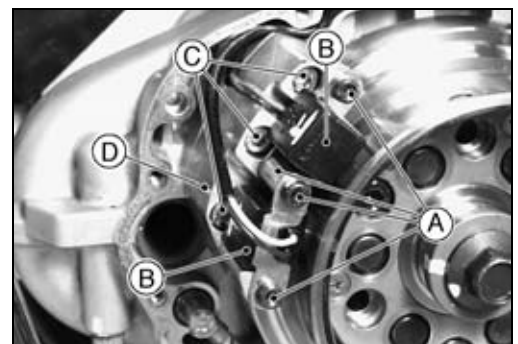
- Install the alternator cover.
- Apply silicon sealant to the grommet.
- Apply a non-permanent locking agent to the two cover bolts [A].

Torque - Alternator Cover Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)



Alternator Rotor Removal

- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Crankshaft Sensor Mounting Bolts [A]
 - Crankshaft Sensors [B]
 - Crankshaft Sensor Bracket Bolts [C]
 - Crankshaft Sensor Bracket [D]

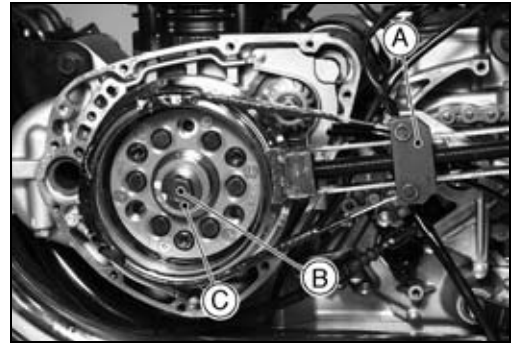


15-32 ELECTRICAL SYSTEM

Charging System

- Hold the alternator rotor using the flywheel holder [A], and remove the rotor bolt [B] together with the washer [C].

Special Tool - Flywheel Holder: 57001-1313



- Insert the rotor puller adapter [A] into the crankshaft hole.

Special Tool - Rotor Puller Adapter, $\phi 9.5$: 57001-1151

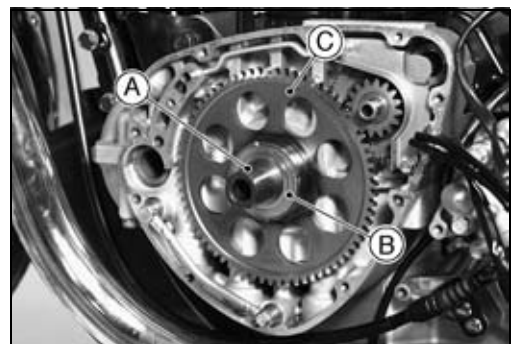


- Using the flywheel puller [A], remove the alternator rotor.

Special Tool - Flywheel Puller Assembly, M38 \times 1.5/M35 \times 1.5: 57001-1405

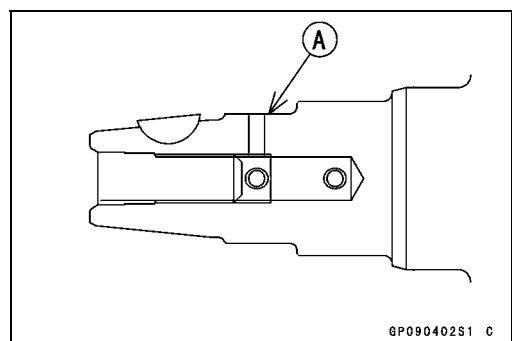


- Remove the woodruff key [A], spacer [B], and starter clutch sprocket [C].



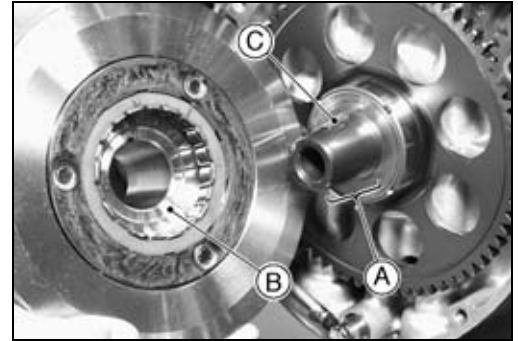
Alternator Rotor Installation

- Apply molybdenum disulfide grease to the crankshaft journal [A] of the starter clutch sprocket.
- Install the starter clutch sprocket and spacer on the crankshaft.



Charging System

- Clean and wipe:
Crankshaft, tapered portion [A]
Alternator Rotor, tapered portion [B]
- Install the woodruff key [C] in the crankshaft groove.

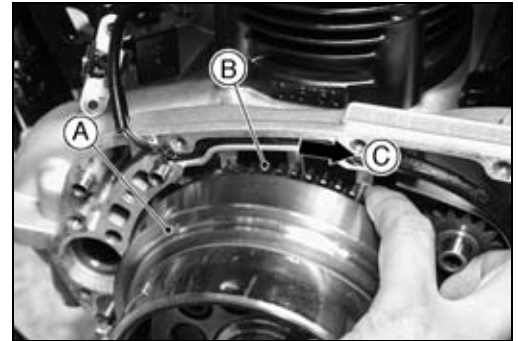


- Remove the starter motor (see Starter Motor Removal).
- Align the groove of the alternator rotor [A] with the woodruff key of the crankshaft, and install the rotor while turning [C] the starter clutch sprocket [B].

NOTE

○ Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.

- Install the rotor and tighten it with 70 N·m (7 kgf·m, 52 ft·lb) of torque.
- Remove the washer and rotor bolt.
- Check the tightening torque with rotor puller.
- ★ If the rotor is not pulled out with 20 N·m (2 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.
- ★ If the rotor is pulled out with under 20 N·m (2 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.
- Apply molybdenum disulfide oil to the threaded portion and the seating surface of the rotor bolt.
- Hold the rotor using the flywheel holder and install the rotor bolt.

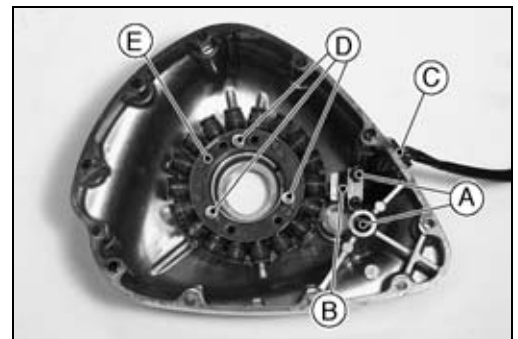


Special Tool - Flywheel Holder: 57001-1313

Torque - Alternator Rotor Bolt: 157 N·m (16 kgf·m, 116 ft·lb)

Alternator Stator Removal

- Remove:
Alternator Cover (see Alternator Cover Removal)
Clamp Mounting Bolts [A]
Clamp [B]
Lead Grommet [C]
Alternator Stator Mounting Bolts [D]
Alternator Stator [E]



15-34 ELECTRICAL SYSTEM

Charging System

Alternator Stator Installation

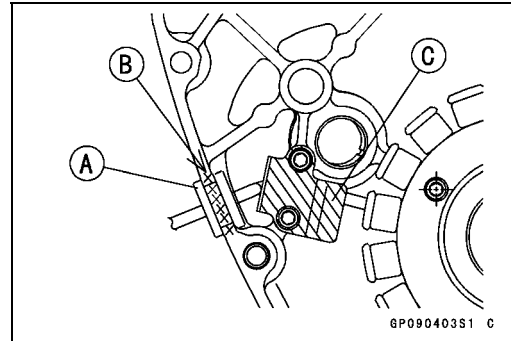
- Apply a non-permanent locking agent to the alternator stator bolts.
- Install the alternator stator.

Torque - Alternator Stator Mounting Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

- Apply silicone sealant [B] around the grommet [A] for the alternator lead, and install the grommet.
- Apply a non-permanent locking agent to the clamp bolts and secure the leads with the clamp [C].

Torque - Lead Clamp Bolt: 7.8 N·m (0.80 kgf·m, 69 in·lb)

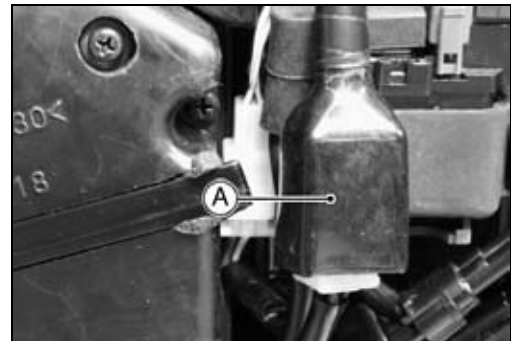
Sealant - Kawasaki Bond (Silicon Sealant): 56019-120



Alternator Inspection

There are three types of alternator failures: short circuit, open circuit, and demagnetized rotor. If there is a short or open circuit in the coil, the output decreases, or is zero. A rotor could become demagnetized if it is dropped, struck, left apart from the stator, or simply through aging, leading to reduced output.

- Measure the alternator's no-load output in the following sequence:
 - Turn the ignition switch OFF.
 - Remove the left side cover.
 - Remove the alternator lead connector.
 - Connect the hand tester to the female connector [A].
 - Start the engine.
 - Maintain the engine speed at 4 000 rpm.
 - Measure the voltage (total 3 times)



Alternator Output Voltage

Tester Range	Connecting Terminal		Standard @4 000 rpm
	Tester positive (+) terminal	Tester negative (–) terminal	
250 V AC	1 black wire (female connector)	Another black wire (female connector)	60 ~ 90 V

Special Tool - Kawasaki Hand Tester: 57001-1394

- ★ If the output voltage is within the standard, the alternator is operating normally, but the regulator/rectifier is damaged. If the measurement is considerably lower than the standard, the alternator is damaged. Measure the stator coil resistance in the following sequence:

Charging System

- Stop the engine.
- Connect the hand tester as shown in the table.
- Read the measurement on the tester (total 3 times, with the lead combinations)

Special Tool - Kawasaki Hand Tester: 57001-1394

Stator Coil Resistance

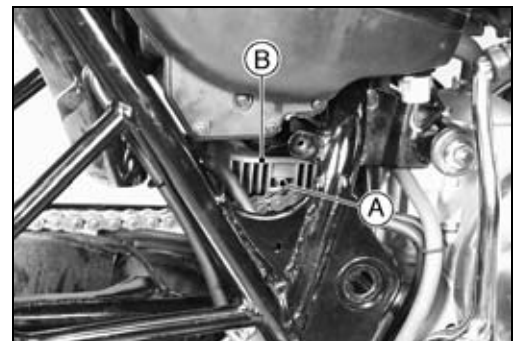
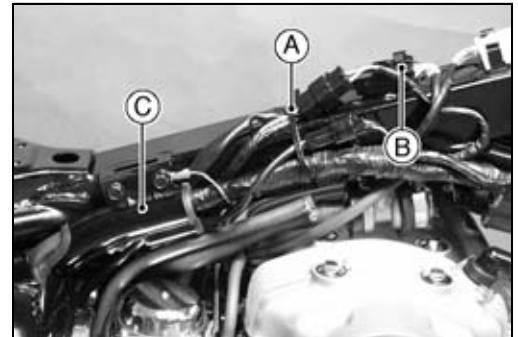
Tester Range	Connecting Terminal		Standard
	Tester positive (+) terminal	Tester negative (-) terminal	
$\times 1 \Omega$	1 black wire (female connector)	Another black wire (female connector)	$0.3 \sim 0.5 \Omega$

- ★ If the measurement is greater than the standard or is infinity (∞), replace the stator, which has an open circuit. If the measurement is considerably lower than the table, replace the stator, which has a short circuit.
- Set the hand tester resistance to the $\times 1 \text{ k}\Omega$ range and connect it between the respective wire and the frame.
- ★ If the tester reads a value other than infinity (∞), the coil is shorted; therefore, replace the stator.
- ★ Even if the stator coil indicates the proper resistance, if the alternator's no-load output is low, the rotor is demagnetized; therefore, replace the rotor.

Regulator/Rectifier Removal

- Remove:
 - Fuel Tank (see Fuel System chapter)
 - Strap [A]
 - Regulator/Rectifier Lead Connector [B]
 - Main Wiring Harness Cover [C]

Swingarm (see Suspension chapter)
 Regulator/Rectifier Mounting Bolts [A]
 Regulator/Rectifier [B]



15-36 ELECTRICAL SYSTEM

Charging System

Charging Voltage (Regulator/Rectifier Output Voltage) Inspection

- Inspect the battery's state of charge.
- Warm up the engine.
- Remove the fuel tank.
- Turn the ignition switch OFF.
- Connect the hand tester [A] to the regulator/rectifier lead connector. Keep the tester connected.



Charging Voltage-Regulator/Rectifier Output Voltage Inspection

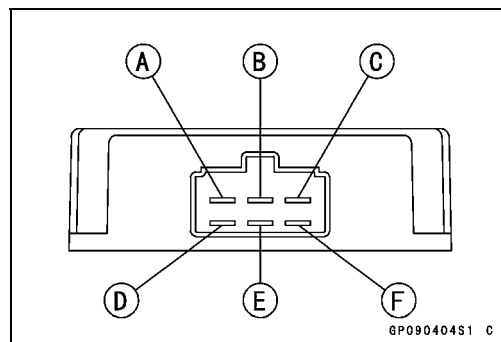
Tester Range	Connecting Terminal		Standard
	Tester positive (+) terminal	Tester negative (-) terminal	
25 V DC	BK/BL (W)	BK/W (BK/Y)	14 ~ 15 V

Special Tool - Kawasaki Hand Tester: 57001-1394

- Start the engine and vary the engine speed in order to read the voltage at different speeds. The output voltage should be close to the battery voltage at low speeds, and it should increase with the increase in the engine speed.
- ★ If the measurement is within the standard, the charging system is normal.
- ★ If the measurement is higher than the standard, check the leads for open circuit or poor contact, and inspect the regulator/rectifier.
- ★ If the measurement is lower than the standard, check the alternator's no load output voltage and inspect the regulator/rectifier.

Rectifier Inspection

- Check the resistance of the rectifier.
- Disconnect the regulator/rectifier connector (see the Charging System Circuit diagram).
 - Black/Blue Lead Terminal [A]
 - Black/Red Lead Terminal [B]
 - Black/White Lead Terminal [C]
 - Black 1 Lead Terminal [D]
 - Black 2 Lead Terminal [E]
 - Black 3 Lead Terminal [F]
- Connect the hand tester to the regulator/rectifier as shown in the table, and measure the resistance of the respective diodes in both directions, in the sequence indicated in the table.
- ★ The measured resistance should be small in one direction and 10 or more times in the other direction. If the measured resistance of any of the two wires (black/blue or black/white) is small or large in both directions, the rectifier is damaged; therefore, replace the regulator/rectifier.



Charging System

Rectifier Circuit Inspection

Num- ber	Connecting Terminal		Stan- dard	Tester Range
	Tester positive (+) terminal	Tester negative (-) terminal		
1	Black 1	Black/Blue	∞	$\times 10 \Omega$ or $\times 100 \Omega$
2	Black 2			
3	Black 3			
4	Black 1	Black/White	1/2 grad- uation	
5	Black 2			
6	Black 3			
7	Black/Blue	Black 1		
8		Black 2		
9		Black 3		
10	Black/White	Black 1	∞	
11		Black 2		
12		Black 3		

NOTE

○The actual resistance measurement varies with the tester used and the individual diodes. Generally speaking, it is acceptable if the tester's indicator swings approximately halfway.

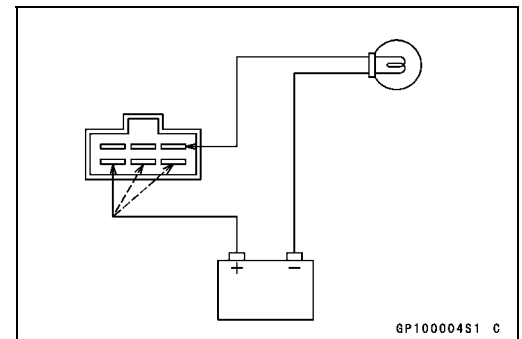
Regulator Inspection

○To test the regulator, prepare three 12 V batteries and a light bulb (a 12 V, 3 ~ 6-watt light bulb in a socket with leads).

CAUTION

The light bulb functions simultaneously as an indicator and a circuit breaker to protect the regulator/rectifier from excessive current. Therefore, do not use an ammeter in place of the light bulb.

- The first stage of the regulator circuit tests consists of the following:
 - Connect the light bulb and the 12 V battery to the regulator/rectifier as shown.
 - Check black-1, black-2, and black-3 terminals individually.
 - ★If the light bulb illuminates, it means that the regulator/rectifier is damaged and it must be replaced.
 - ★If the light bulb does not illuminate, continue with the test.



15-38 ELECTRICAL SYSTEM

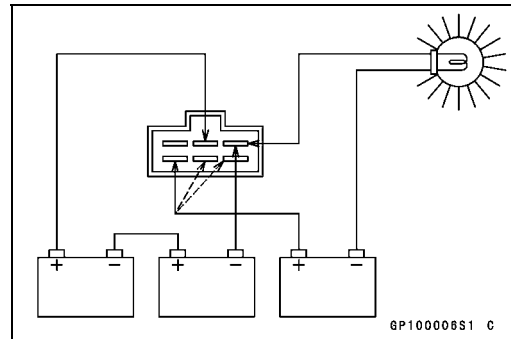
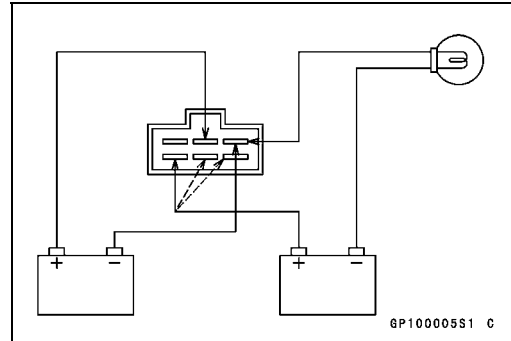
Charging System

- The second stage of the regulator circuit tests consists of the following:
 - Connect the light bulb and the 12 V battery in the same way as in the first stage.
 - Apply 12 V to the black/red terminal.
 - Check black-1, black-2, and black-3 terminals individually.
 - ★ If the light bulb illuminates, it means that the regulator/rectifier is damaged and it must be replaced.
 - ★ If the light bulb does not illuminate, continue with the test.
- The third stage of the regulator circuit tests consists of the following:
 - Connect the light bulb and the 12 V battery in the same way as in the first stage.
 - Using an additional 12 V battery, momentarily apply 24 V to the black/red terminal.
 - Check black-1, black-2, and black-3 terminals individually.

CAUTION

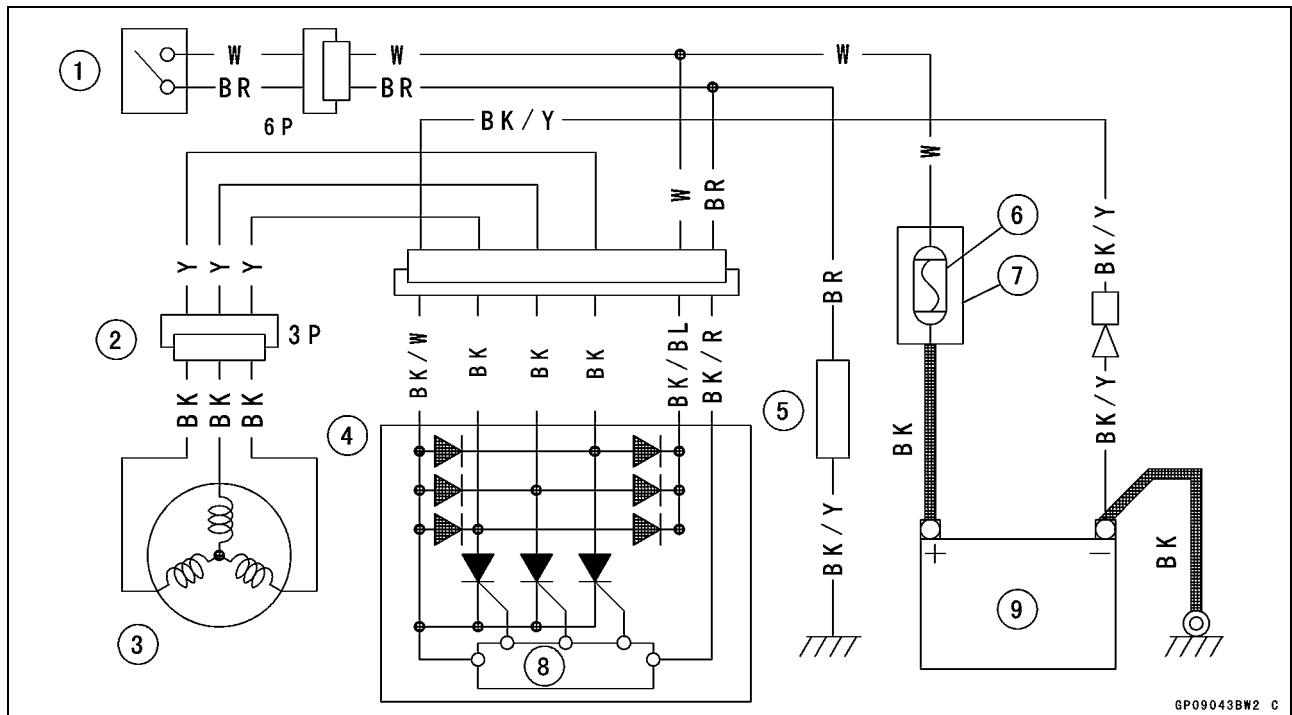
Do not apply a voltage in excess of 24 V, as this will damage the regulator/rectifier. Even when applying 24 V, limit it to 2 ~ 3 seconds; otherwise, the regulator/rectifier will be damaged.

- ★ If the light bulb does not illuminate even when 24 V is applied momentarily to the black/red terminal, the regulator/rectifier is damaged and it must be replaced.
- ★ Occasionally, the regulator/rectifier could be faulty even if it does not show any problems in all of the foregoing tests. If the charging system does not function properly after all parts and the battery have been inspected, replace the regulator/rectifier with one that is known to be functioning properly, and perform the regulator/rectifier tests.



Charging System

Charging System Circuit



GP09043BW2 C

1. Ignition Switch
2. 3-Pin Connector
3. Alternator
4. Regulator/Rectifier
5. Load
6. Main Fuse 30 A
7. Starter Relay
8. Controller
9. Battery

15-40 ELECTRICAL SYSTEM

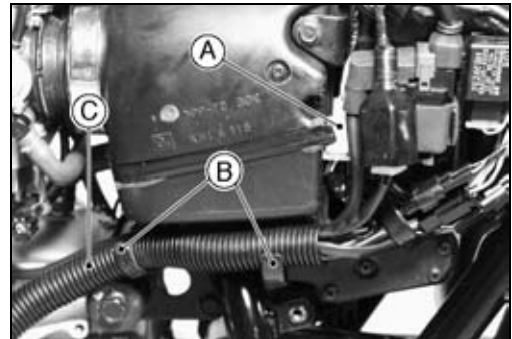
Ignition System

CAUTION

Do not disconnect the battery wires or any other electrical connections when the ignition switch is ON, as this could damage the IC igniter. Never reverse the connections of the battery, as this could damage the igniter.

Crankshaft Sensor Removal

- Remove:
 - Left Side Cover (see Frame chapter)
 - Crankshaft Sensor Connector [A]
- Open the clamp [B].
- Pull out the crankshaft sensor lead from the lead protective tube [C].



- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Lead Grommet [A]
 - Crankshaft Sensor Mounting Bolts [B]
 - Crankshaft Sensor #1 [C]
 - Crankshaft Sensor #2 [D]



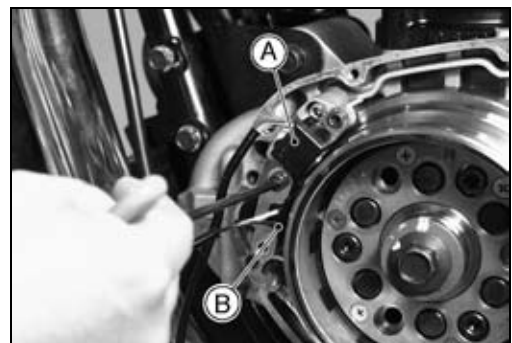
Crankshaft Sensor Installation

- Install the crankshaft sensor #1 [A], then the #2 [B].
- Apply a non-permanent locking agent to the crankshaft sensor mounting bolts.

Torque - Crankshaft Sensor Mounting Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)

- Run the lead protective tube as close as possible to the crankshaft sensor, and install it along the crankcase groove and the wiring harness plate.
- Apply silicon sealant around the lead grommet.

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



Ignition System

Crankshaft Sensor Inspection

- Remove:
 - Left Side Cover (see Frame chapter)
 - Crankshaft Sensor Lead Connector (see Crankshaft Sensor Removal)
- Set the hand tester to $\times 100 \Omega$, and measure the resistance between the female connector's black lead [A] and the yellow lead terminal [B], and between the black/white lead [C] and the blue lead terminal [D].

Crankshaft Sensor Resistance

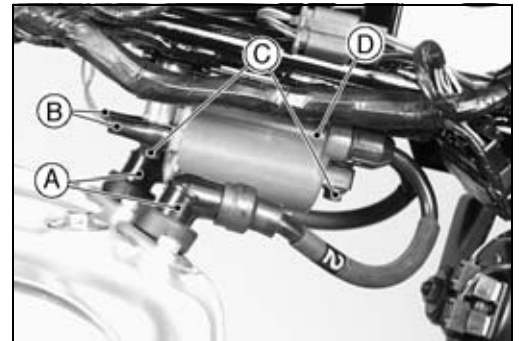
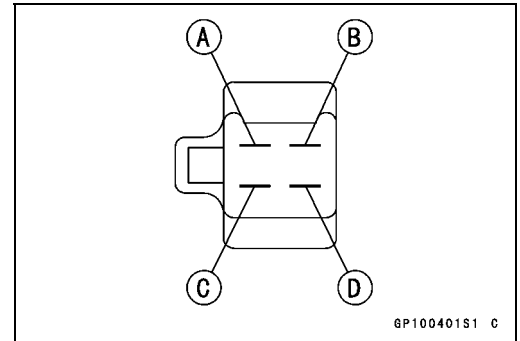
Standard: 423 ~ 517 Ω

- ★ If the reading is out of standard, replace the crankshaft sensor.
- Set the hand tester to the maximum range and measure the resistance between the frame and the female connector's black lead, yellow lead, black/white lead, and blue lead terminals.
- ★ If the reading is not infinity (∞), replace the crankshaft sensor.

Special Tool - Kawasaki Hand Tester: 57001-1394

Ignition Coil Removal

- Remove:
 - Spark Plug Caps [A]
 - Ignition Coil Primary Leads [B]
 - Ignition Coil Mounting Bolts [C]
 - Ignition Coil [D]

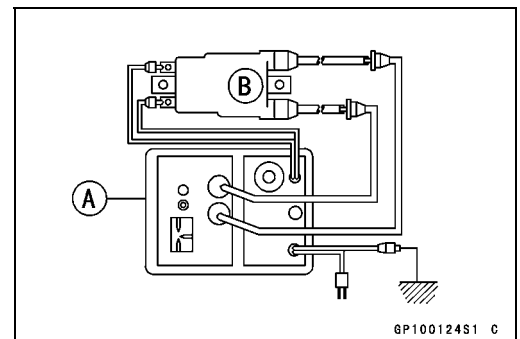


Ignition Coil Inspection

- Remove the ignition coil.
- With the plug cap attached, measure the arcing distance with a suitable commercially available coil tester [A] to check the condition of the ignition coil [B].

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the coil body or leads.



Ignition Coil Arcing Distance

Standard: 8 mm (0.31 in.) or more

- ★ If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.

15-42 ELECTRICAL SYSTEM

Ignition System

- Remove the spark plug caps to measure the arcing distance again.
- ★ If the arcing distance is subnormal as before, replace the ignition coil.
- ★ If the arcing distance is now normal, replace the spark plug cap.

NOTE

○ If the coil tester is unavailable, the internal resistance of the ignition coil can be checked with a hand tester. However, this inspection is not sufficient to determine whether or not the coil is defective.

- Remove the spark plug caps and measure the resistance as shown.
- Set the hand tester to the $\times 1 \Omega$ range and measure [A] the resistance of the primary windings.
- Set the hand tester to the $\times 1 \text{ k}\Omega$ range and measure [B] the resistance of the secondary windings.

Special Tool - Kawasaki Hand Tester: 57001-1394

Ignition Coil Resistance

Standard:

Primary windings	2.6 ~ 3.2 Ω
Secondary windings	13.5 ~ 16.5 $\text{k}\Omega$

- ★ If the measurement is out of standard, replace the ignition coil [C].
- Visually inspect the secondary lead.
- ★ If it is damaged, replace the ignition coil.
- To install the spark plug caps, turn them in clockwise.

Spark Plug Removal/Installation

- Remove:
 - Fuel Tank (see Fuel System chapter)
 - Spark Plug Caps
 - Spark Plugs

Owners Tool - Spark Plug Wrench M16: 92110-1145 [A]

- Install the spark plugs.

Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 113 in·lb)

Spark Plug Cleaning/Inspection

- Refer to the Spark Plug Cleaning/Inspection in the Periodic Maintenance chapter.

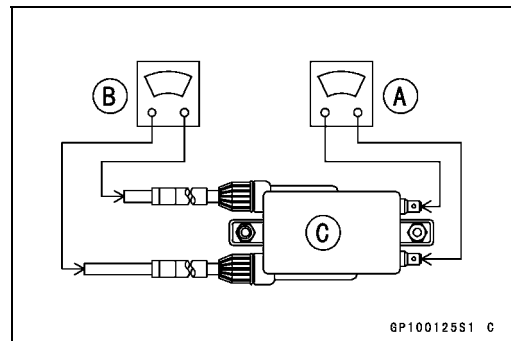
Spark Plug Gap Inspection

- Refer to the Spark Plug Gap Inspection in the Periodic Maintenance chapter.

IC Igniter Inspection

CAUTION

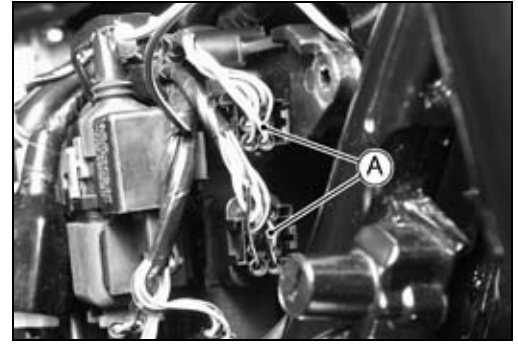
Do not disconnect the IC igniter or other electrical connections when the ignition switch is ON or the engine is running, as this could damage the igniter.



Ignition System

Igniter Activation Voltage Inspection

- Remove:
 - Left Side Cover (see Frame chapter)
 - Battery Holder Bolts (see Battery Removal)
- Remove the igniter connector [A] from the main wiring harness.



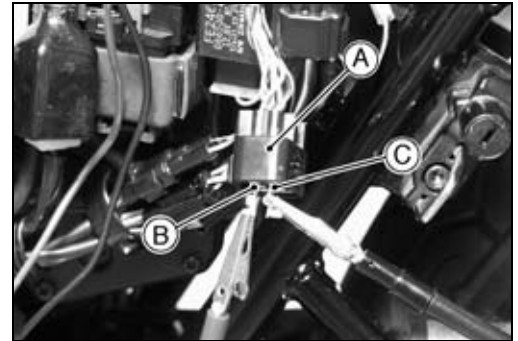
- Set the hand tester to the DC 25 V range, and connect it to the brown/white [B] and black/yellow [C] terminals of the igniter connector [A] on the main wiring harness.

Special Tool - Kawasaki Hand Tester: 57001-1394

Connect

Tester's positive (+) terminal → brown/yellow lead terminal

Tester's negative (-) terminal → black/yellow lead terminal



- Turn the ignition switch ON.
- Read the voltage on the tester.

Igniter Activation Voltage

Standard: Battery voltage

- ★ If there is no voltage or the voltage is low, inspect the battery voltage, ignition switch, and the ignition fuse.

Ignition Coil Primary Peak Voltage Inspection

- Remove:
 - Seat (see Frame chapter)
 - Fuel Tank (see Fuel System chapter)

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Ignition System

- Remove the spark plug caps from the spark plugs.
- Attach a good spark plugs [A] to the removed spark plug caps and ground them to the engine.

NOTE

○ To obtain a correct measurement, the leads as well as the lead connections must be correct. Take the voltage measurement with the proper cylinder compression (with the spark plugs in the cylinder head). Without proper compression, a correct measurement cannot be obtained.

- Set the tester to the DC 250 V range. Connect the peak voltage adapter [C] to the tester [B], and connect the adapter terminals to the respective terminals of the ignition coil [D].
- Keep the terminals connected.

Special Tool - Kawasaki Hand Tester: 57001-1394
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

Connect

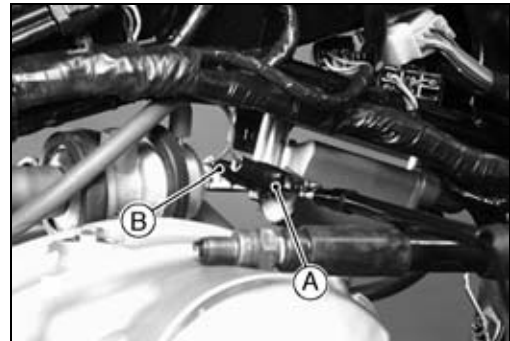
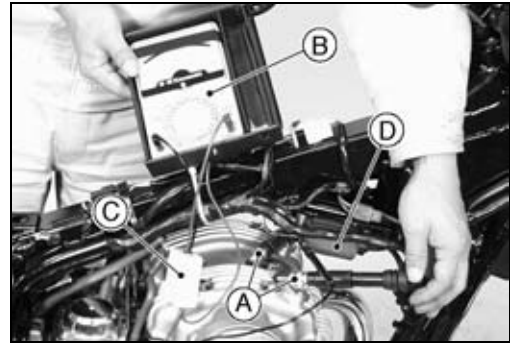
Adapter's positive (+) terminal → green lead terminal [A]

Adapter's negative (–) terminal → red lead terminal [B]

- Turn the ignition switch ON.
- Shift the gears to neutral, and run the engine stop switch.
- Turn the starter motor for several seconds and read the maximum value on the tester.

Ignition Coil Primary Peak Voltage

Standard: DC 100 V or more



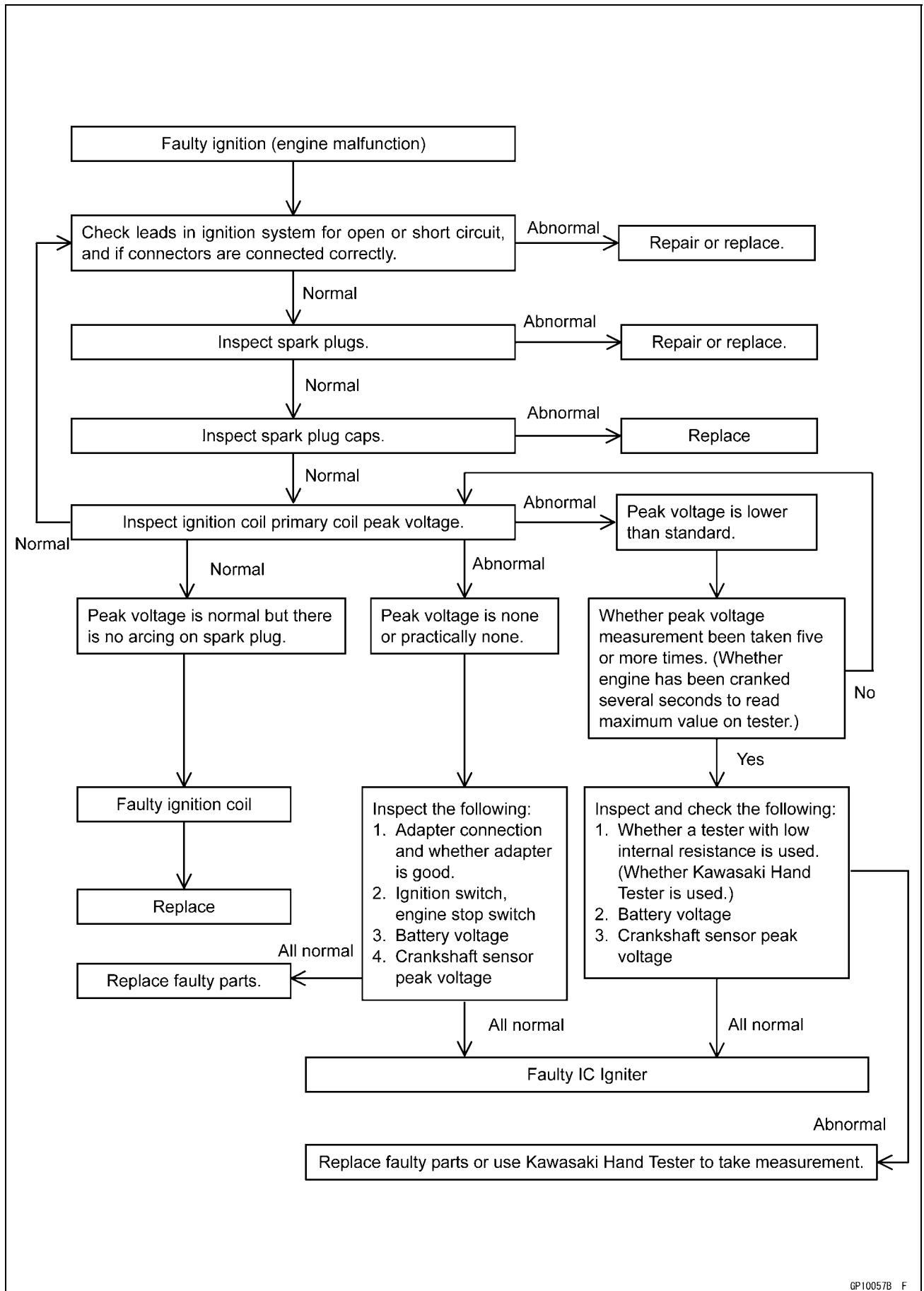
WARNING

To avoid high-voltage electrical shocks, do not touch the adapter terminals or leads.

- ★ If the peak voltage is lower than the standard, refer to the next page.

Ignition System

Troubleshooting



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Ignition System

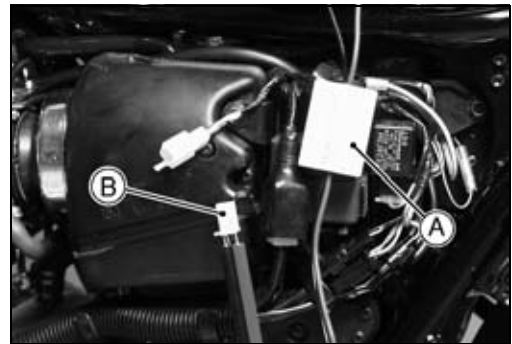
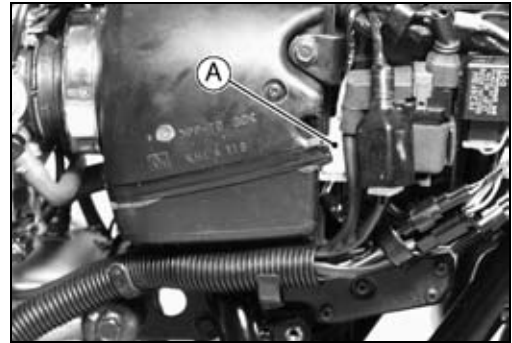
Crankshaft Sensor Peak Voltage Inspection

- Measure the peak voltage of the crankshaft sensor as follows:
 - Remove the left side cover.
 - Remove the crankshaft sensor connector [A].

NOTE

- *To obtain a correct measurement, the leads as well as the lead connections must be correct. Take the voltage measurement with the proper cylinder compression (with the spark plugs in the cylinder head). Without proper compression, a correct measurement cannot be obtained.*
- Set the tester to the DC 10 V range.
- Connect the peak voltage adapter [A] to the tester, and connect the adapter terminal to the crankshaft sensor connector [B] terminal.

Special Tool - Kawasaki Hand Tester: 57001-1394
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B



Connect

#1 V

- Adapter's positive (+) terminal → yellow lead terminal [B]
- Adapter's negative (-) terminal → black lead terminal [A]

#2 V

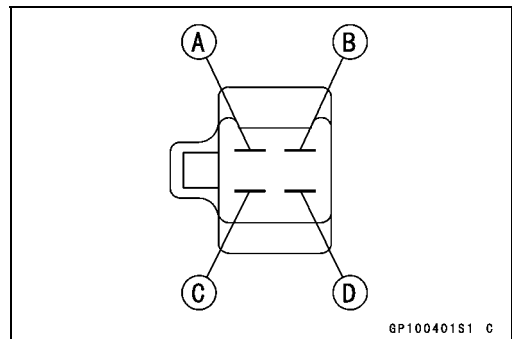
- Adapter's positive (+) terminal → blue lead terminal [D]
- Adapter's negative (-) terminal → black/white lead terminal [C]

- Turn the starter motor for several seconds and read the maximum value on the tester.

Crankshaft Sensor Peak Voltage

Standard: DC1.6 V or more

- ★ If the peak voltage is lower than the standard, inspect the crankshaft sensor.



Ignition System

Throttle Sensor Voltage Inspection

- Remove the connector from the throttle sensor [A].
- Set the tester to the DC10 V range, and connect it to the throttle sensor connector [C] on the main wiring harness.

Connect

Tester's positive (+) terminal → blue lead

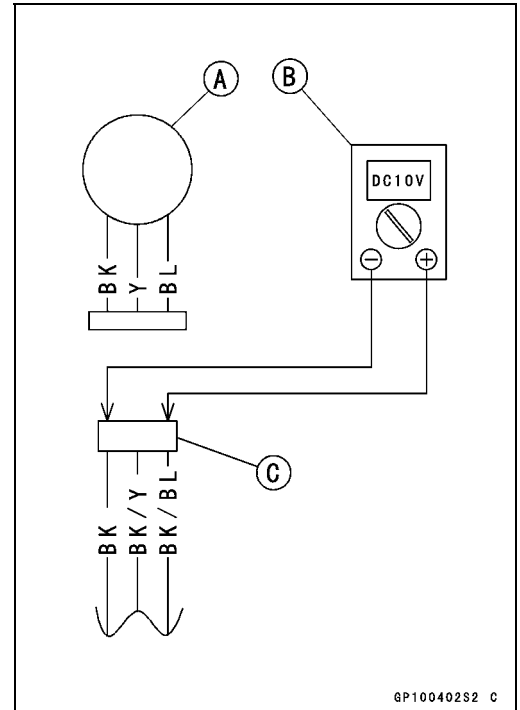
Tester's negative (–) terminal → black lead

- Turn the ignition switch ON.

Throttle Sensor Input Voltage

Standard: Approx. 5 V

- ★ If the voltage is out of standard, inspect the battery voltage. If the battery voltage is normal, replace the IC igniter.



Interlock Operation Inspection

- Remove:
 - Seat (see Frame chapter)
 - Junction Box [A]

NOTE

○ To check the operation voltage of the interlock mechanism, extend the side stand and shift the gear into 1st.

- Set the tester to the DC25 V range, and connect the tester terminals to the green/black terminal of the junction box and to the frame ground.

Connect

Tester's positive (+) terminal → green/black terminal [A]

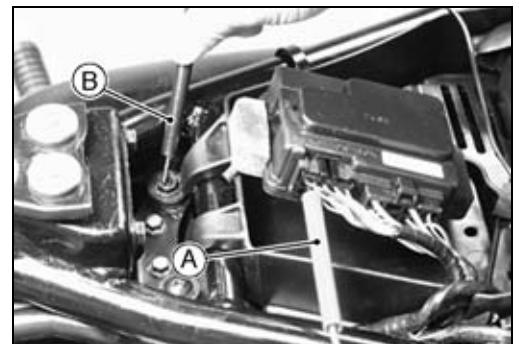
Tester's negative (–) terminal → frame ground [B]

- Turn the ignition switch ON.
- Press the starter button and read the voltage on the tester.

Interlock Operation Voltage

Standard: Approx. 6 ~ 13.4 V

- ★ If the voltage is lower than the standard, inspect the side stand switch, starter lockout switch, gear position sensor, and starter circuit relay.
- ★ If the voltage is normal, perform the following inspection:
 - Squeeze the clutch lever and start the engine.
 - Extend the side stand and shift the gear into 1st.
 - Gradually release the clutch lever.
- ★ If the engine does not stop with the clutch lever released entirely, the igniter is damaged.

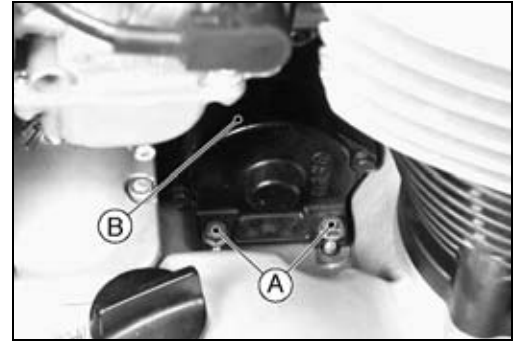


1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Spark Plug
5. Ignition Coil
6. Throttle Sensor
7. Junction Box
8. Ignition Circuit Fuse 10 A
9. Starter Lockout Switch
10. Rectifier
11. Side Stand Switch
12. Gear Position Switch
13. Main Fuse 30 A
14. Battery
15. IC Igniter
16. Crankshaft Sensor #1
17. Crankshaft Sensor #2

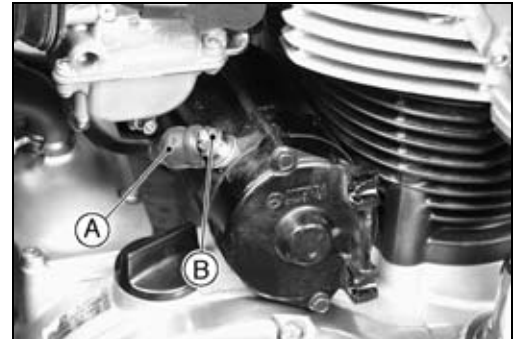
Starter System

Starter Motor Removal

- Remove:
 - Starter Motor Mounting Bolts [A]
 - Starter Motor [B]

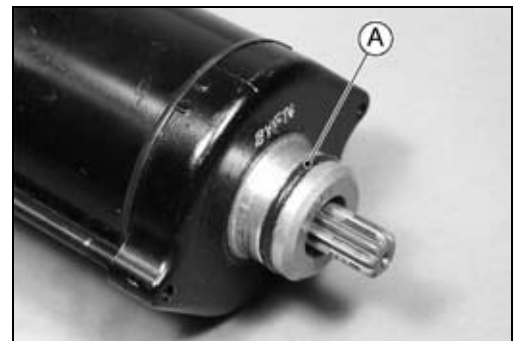


- Remove:
 - Rubber Boot [A]
 - Starter Motor Cable Nut [B]



Starter Motor Installation

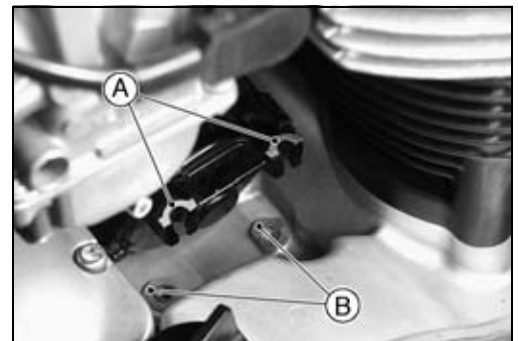
- Apply engine oil to the O-ring [A].



- Clean the starter motor's seating surface [A] and the crankcase's seating surface [B].
- Apply a non-permanent locking agent to the mounting bolts and tighten them.

Torque - Starter Motor Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Starter Motor Cable Nut: 4.9 N·m (0.5 kgf·m, 43 in·lb)



Starter Motor Disassembly

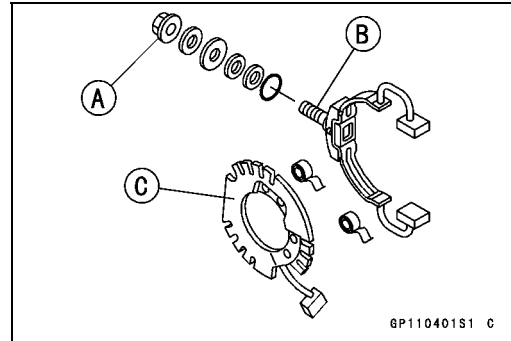
- Remove:
 - Starter Motor Thru-Bolt [A]
 - End Covers [B]
- Remove the armature from the yoke [C].



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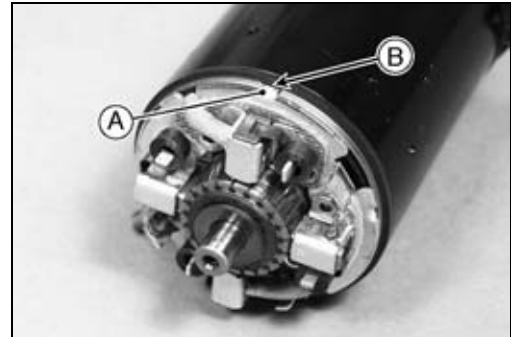
Starter System

- Remove the terminal locknut [A] and the terminal bolt [B], and take out the brush plate [C] from the yoke, together with the brushes.

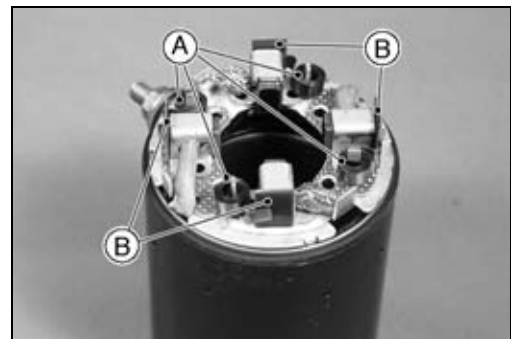


Starter Motor Assembly

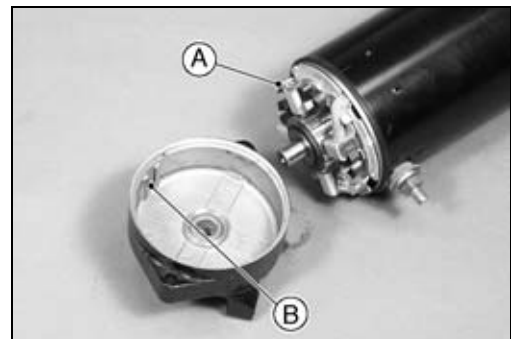
- Install the terminal assembly on the yoke.
Torque - Starter Motor Terminal Nut: 11 N·m (1.1 kgf·m, 95 in·lb)
- Fit the tongue [A] on the brush plate into the yoke groove [B].



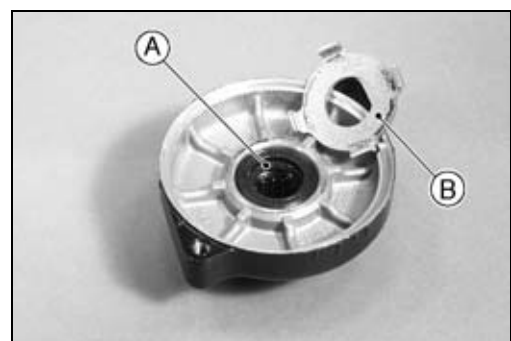
- Insert a suitable plastic sheets [B] between the springs and the brush holders to keep the springs [A] in place.
- Insert the brushes into the brush holders.
- Insert the armature and remove the plastic sheet.



- Fit the tongue [A] on the brush plate into the end cover groove [B].



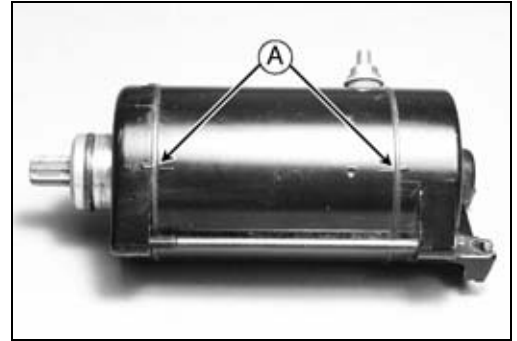
- Apply a thin coat of high-temperature grease to the oil seal [A].
- Install the washer [B] with the tab on the end cover.



Starter System

- Align the marks [A] to assemble the yoke and the end cover.

Torque - Starter Motor Thru-bolts: 4.9 N·m (0.5 kgf·m, 43 in·lb)



Carbon Brush Inspection

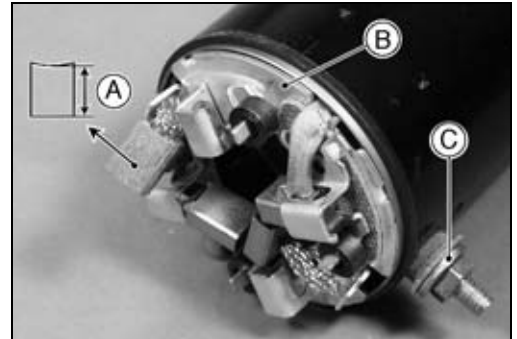
- Measure the length [A] of each brush.

Carbon Brush Length

Standard: 12.0 ~ 12.5 mm (0.47 ~ 0.49 in.)

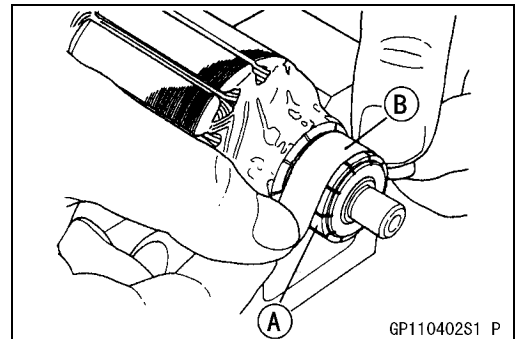
Service Limit: 5.5 mm (0.22 in.)

- ★ If any is worn down beyond the service limit, replace the brush plate [B] and the terminal assembly [C].



Commutator Inspection, Cleaning

- Inspect the commutator [A], smooth its surface with emery cloth [B], and clean out the grooves.



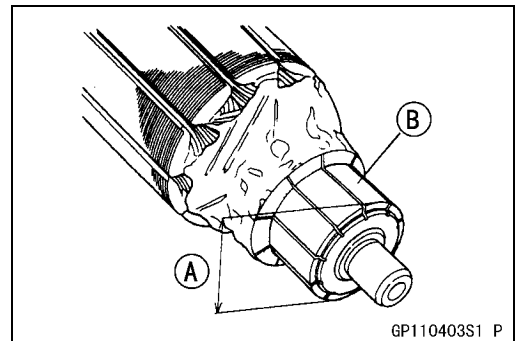
- Measure the diameter [A] of the commutator [B].

Commutator Diameter

Standard: 28 mm (1.1 in.)

Service Limit: 27 mm (1.06 in.)

- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.



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Starter System

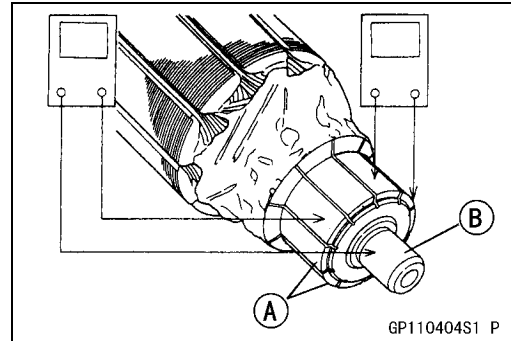
Armature Inspection

- Set the hand tester to the $\times 1 \Omega$ range, and measure the resistance between any two commutator segments [A].
- ★ If there is no continuity between any two segments, replace the starter motor.
- Set the hand tester to the $\times 1 \Omega$ range, and measure the resistance between the commutator and the shaft [B].
- ★ If there is continuity, replace the starter motor.

Special Tool - Hand Tester: 57001-1394

NOTE

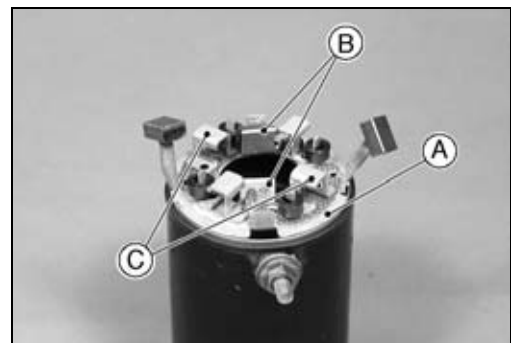
○ Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.



Brush Plate Inspection

- Set the hand tester to the $\times 1 \Omega$ range, and measure the resistance between the brush plate [A] and the negative (-) brush [B].
- ★ If the measurement does not reach 0Ω , the brush plate has an open circuit. Therefore, replace the brush plate assembly.
- Set the hand tester to the $\times 1 \text{ k}\Omega$ range, and measure the resistance between the brush plate and the positive (+) brush holder [C].
- ★ If the measurement does not reach infinity (∞), the brush holder is shorted. Therefore, replace the brush plate assembly.

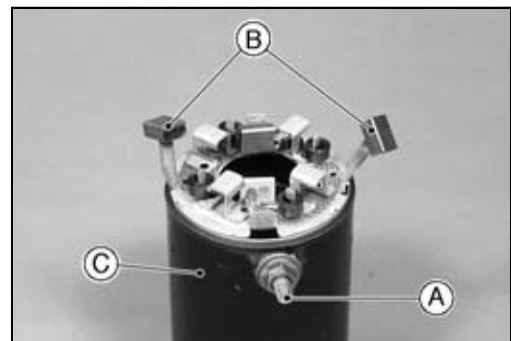
Special Tool - Hand Tester 57001-1394



Terminal Assembly Inspection

- Set the hand tester to the $\times 1 \Omega$ range, and measure the resistance between the terminal [A] and the positive (+) brush [B].
- ★ If the measurement does not reach 0Ω , the terminal assembly has an open circuit. Therefore, replace the terminal assembly.
- Set the hand tester to the $\times 1 \text{ k}\Omega$ range, and measure the resistance between the terminal and the yoke [C].
- ★ If the measurement does not reach infinity (∞), the terminal assembly is shorted. Therefore, replace the terminal assembly.

Special Tool - Hand Tester: 57001-1394



Starter System

Starter Relay Inspection

- Remove:
 - Seat
 - Left Side Cover
 - Starter Relay
- Connect the hand tester [A] and 12 V battery [B] to the starter relay [C] as shown.

Testing Relay

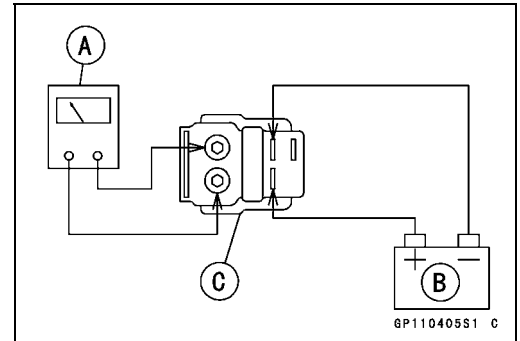
Tester Range: $\times 1 \Omega$

Standard: When battery is connected $\rightarrow 0 \Omega$

When battery is disconnected $\rightarrow \infty \Omega$

Special Tool - Hand Tester: 57001-1394

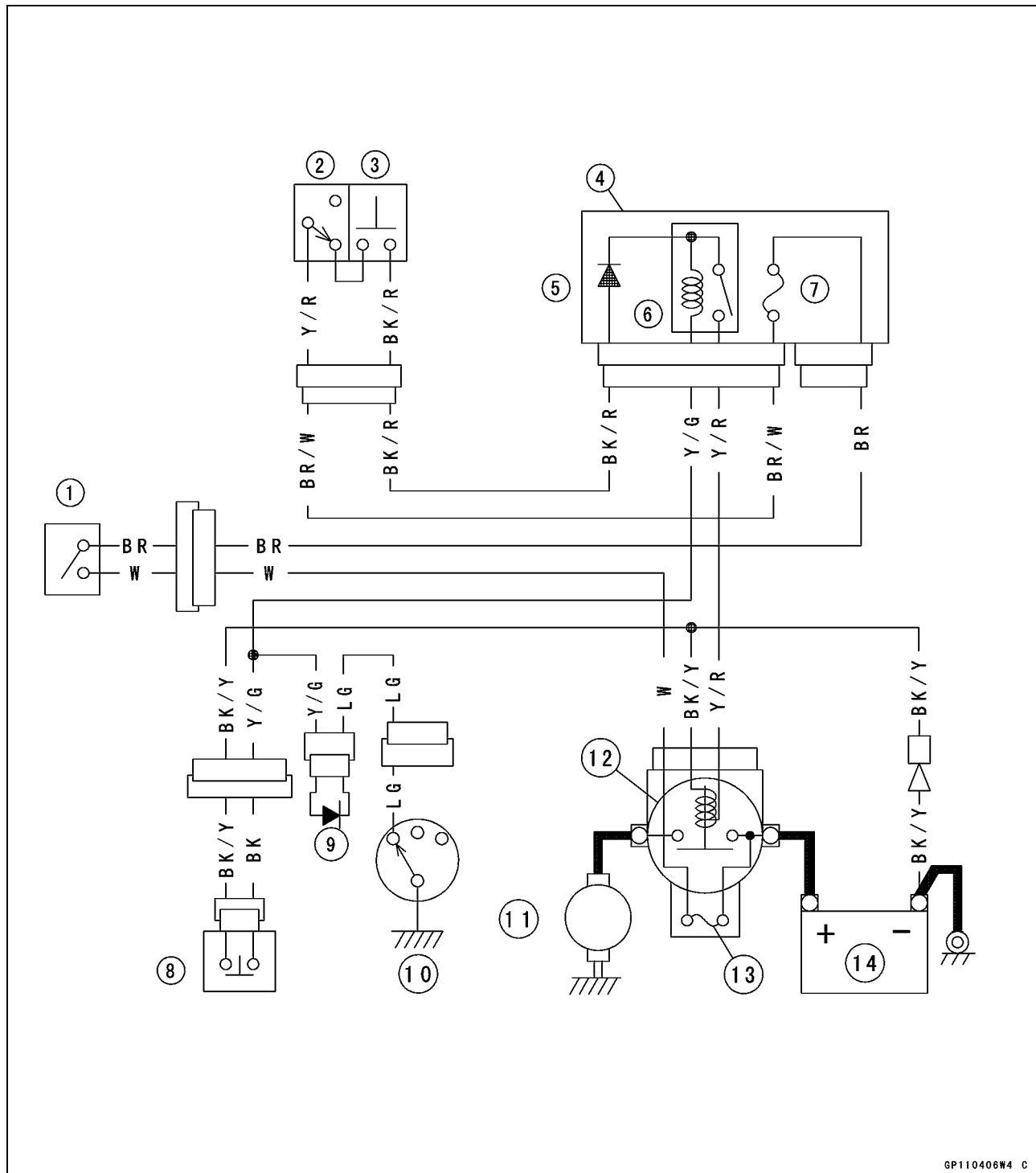
- ★ If the relay does not work as specified, it is defective. Replace the relay.



15-54 ELECTRICAL SYSTEM

Starter System

Starter System Circuit



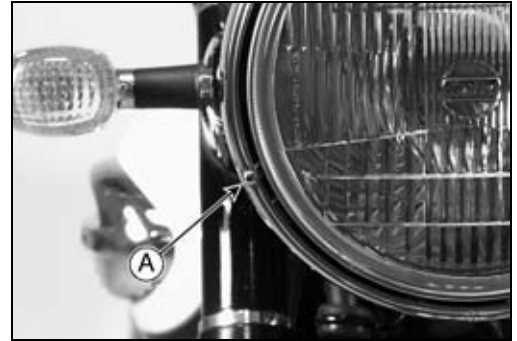
GP110406W4 C

- | | |
|-------------------------------|---------------------------|
| 1. Ignition Switch | 8. Starter Lockout Switch |
| 2. Engine Stop Switch | 9. Rectifier |
| 3. Starter Button | 10. Gear Position Switch |
| 4. Junction Box | 11. Starter Motor |
| 5. Diode | 12. Starter Relay |
| 6. Starter Circuit Relay | 13. Main Fuse 30 A |
| 7. Ignition Circuit Fuse 10 A | 14. Battery |

Lighting System

Headlight Beam Adjustment

- Turn the horizontal adjuster screw [A] on the headlight in or out until the beam points straight ahead.
- Turn the vertical adjuster screw [A] on the headlight in or out to adjust the high beam slightly lower than horizontal.

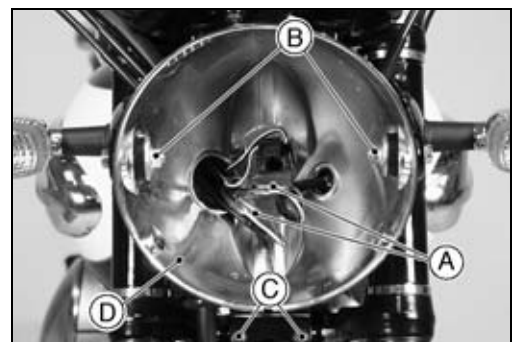


Headlight Unit and Housing Removal

- Remove:
Mounting Screws [A] (both sides)
- Remove:
Headlight Connector [A]
City Light Connector (Europe Model only)
Headlight Unit [B]



Turn Signal Light Wire Connectors [A]
Mounting Bolts, Nuts [B]
Adjusting Bracket Bolts [C]
Headlight Housing [D]

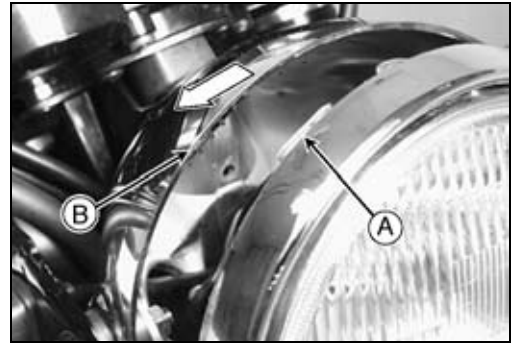


15-56 ELECTRICAL SYSTEM

Lighting System

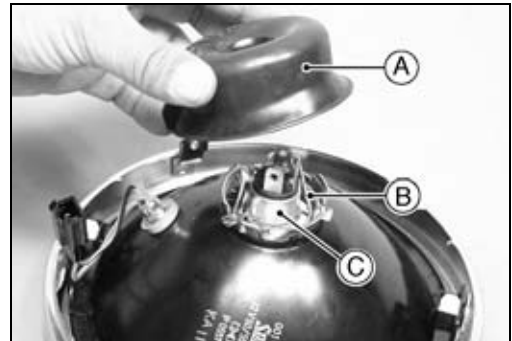
Headlight Unit Installation

- Fit the protrusion [A] on the headlight unit rim into the recess [B] of the headlight housing.



Headlight Bulb Replacement

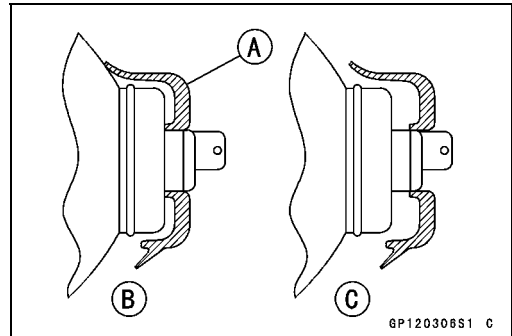
- Remove:
 - Headlight Unit
 - Dust Cover [A]
 - Retainer [B]
- Replace the headlight bulb [C].



CAUTION

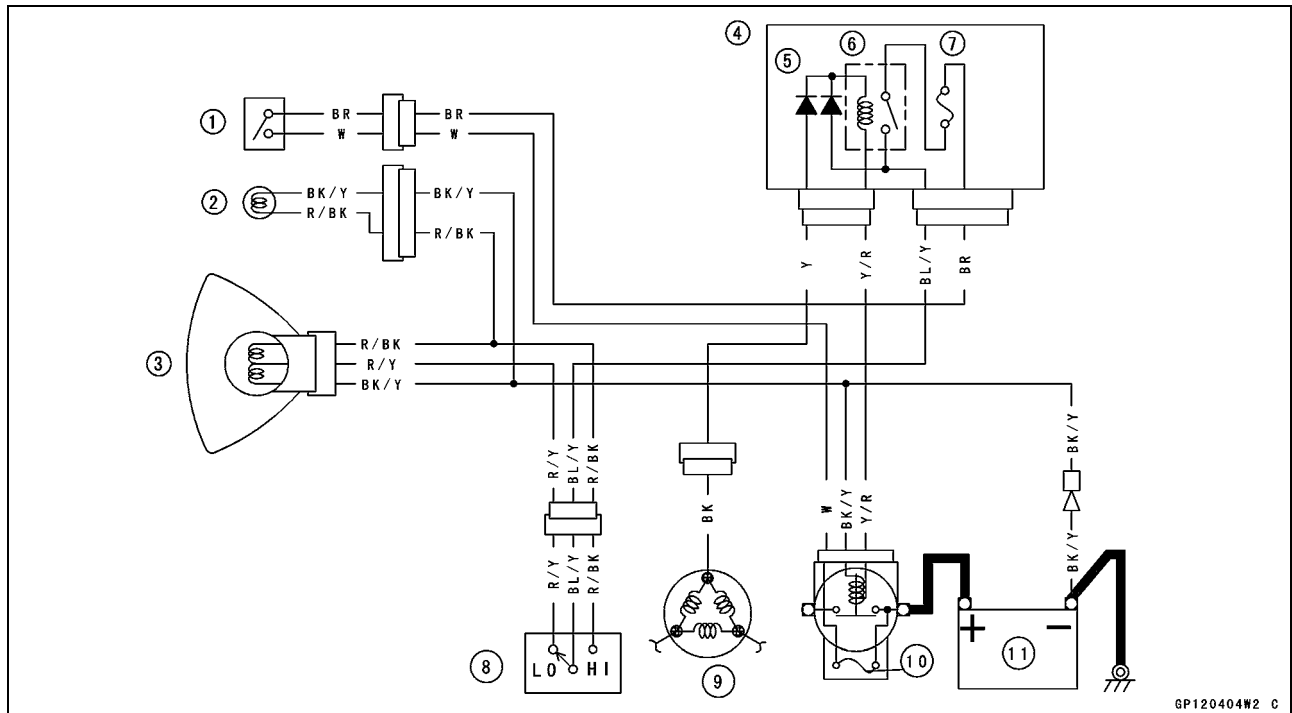
When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

- Fit the dust cover [A] with the TOP mark upward, onto the bulb firmly as shown in the figure.
 - Good [B]
 - Bad [C]
- Adjust the headlight beam.



Lighting System

Headlight Circuit (EJ650-A1 ~, United States, Canada and Australia) (EJ650-A5, Taiwan)

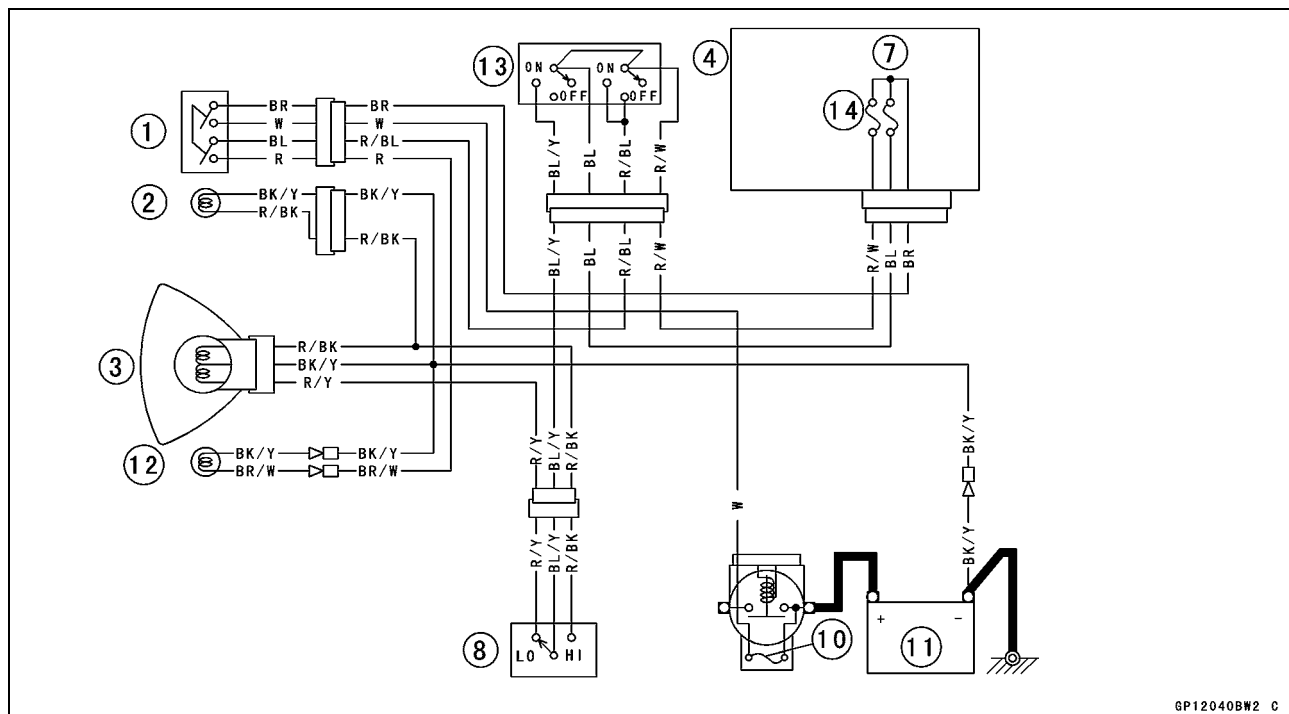


1. Ignition Switch
2. High Beam Indicator Light
3. Headlight
4. Junction Box
5. Diodes
6. Headlight Circuit Relay
7. Headlight Fuse 10 A
8. Dimmer Switch
9. Alternator
10. Main Fuse 30 A
11. Battery
12. City Light
13. Headlight Switch
14. Taillight Fuse 10 A

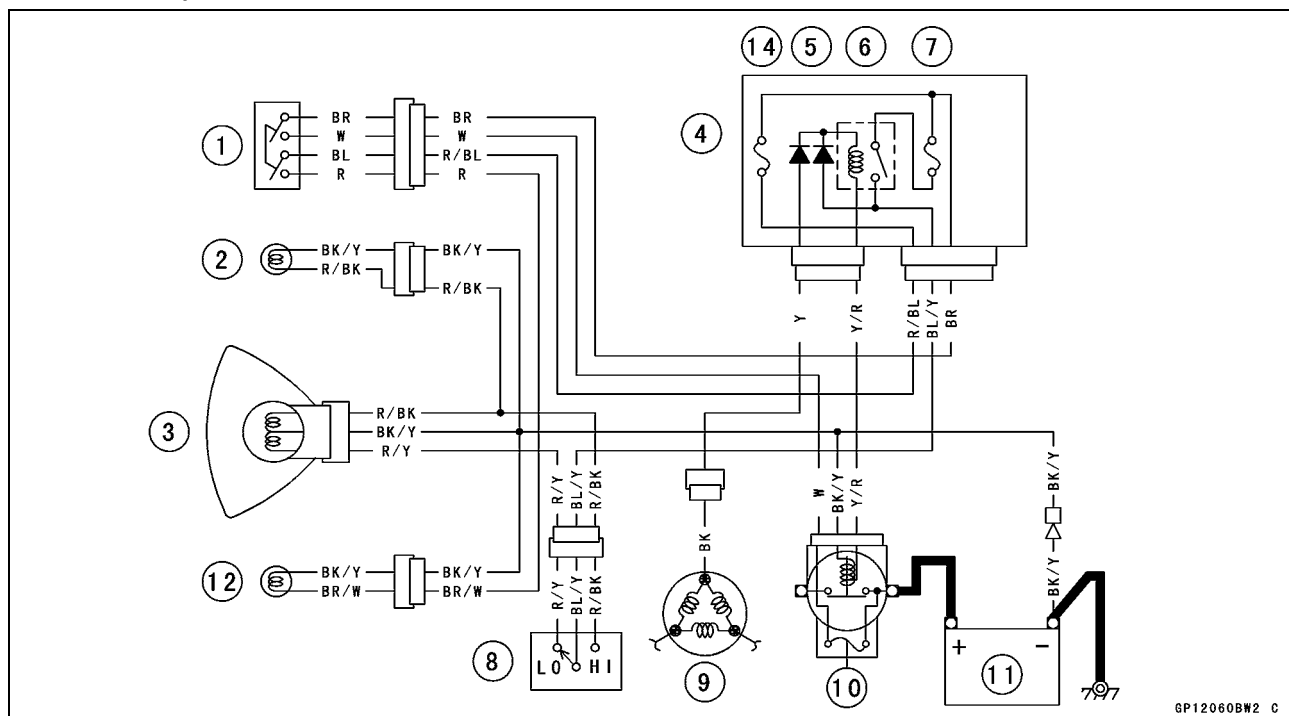
15-58 ELECTRICAL SYSTEM

Lighting System

Headlight Circuit (EJ650-A1 ~ A4/C3 ~ C4, Other than United States, Canada and Australia)



Headlight Circuit (EJ650-A5/C5 ~ C7, C6F, Other than United States, Canada, Australia and Taiwan)

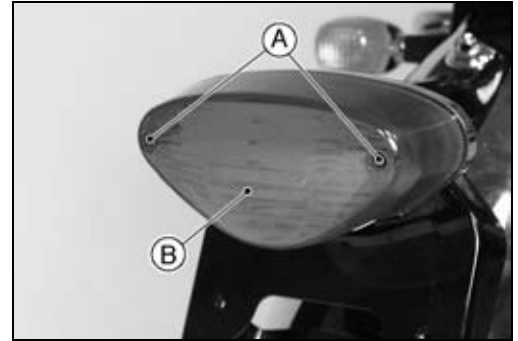


- | | |
|------------------------------|-------------------------|
| 1. Ignition Switch | 8. Dimmer Switch |
| 2. High Beam Indicator Light | 9. Alternator |
| 3. Headlight | 10. Main Fuse 30 A |
| 4. Junction Box | 11. Battery |
| 5. Diodes | 12. City Light |
| 6. Headlight Circuit Relay | 13. Headlight Switch |
| 7. Headlight Fuse 10 A | 14. Taillight Fuse 10 A |

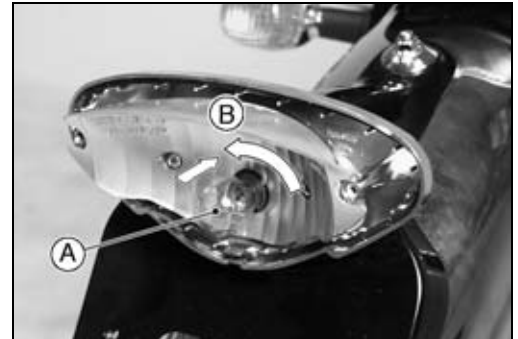
Lighting System

Tail/Brake Light Bulb Replacement

- Remove the mounting screws [A].
- Remove the tail/brake light lens [B].



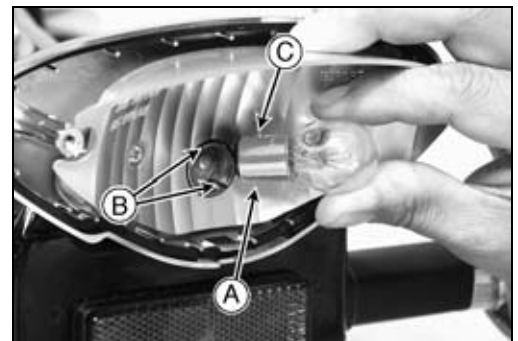
- Push the bulb [A] in the socket and turn it counterclockwise [B] to remove.



- Insert the new bulb with its front pin [A] facing downward, into the socket groove [B].

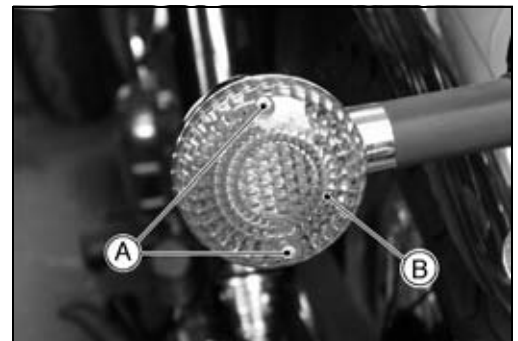
Rear Pin [C]

- Push the bulb, turn it clockwise, and let go of it. The bulb will lock in place.
- Tighten the lens mounting screws, without overtightening them.



Turn Signal Light Bulb Replacement

- Remove the turn signal light screws [A] and remove the lens [B].



- Push the bulb [A] in the socket and turn the bulb counterclockwise.
- Replace the bulb.

Torque - Turn Signal Light Screws: 1 N·m (0.1 kgf·m, 9 in·lb)



15-60 ELECTRICAL SYSTEM

Lighting System

Turn Signal Relay Inspection

- Remove the left side cover (see Frame chapter).
- Remove the turn signal relay [A].



- Connect the 12 V battery and the turn signal lights as shown, and count how many times the lights flash for one minute.

Turn Signal Relay [A]

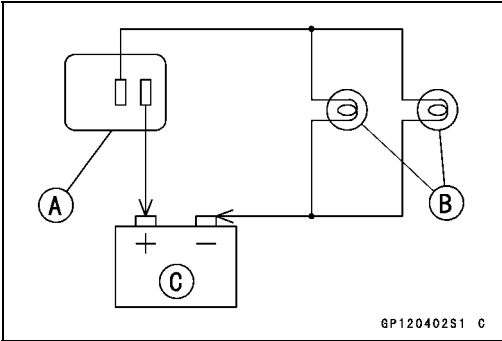
Turn Signal Light [B]

12 V Battery [C]

Turn Signal Relay Flashing

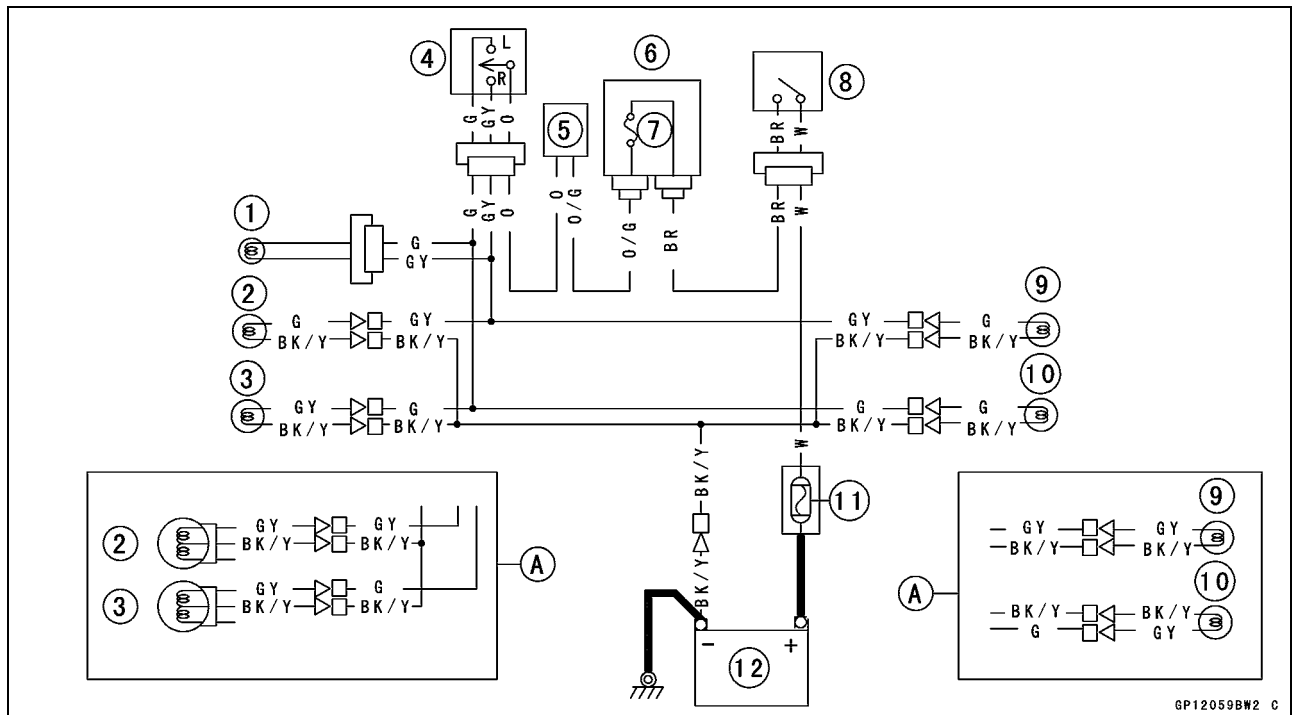
Load		Flashing times(per minute)
Number of Turn Signal Lights	Wattage (W)	
1	21 or 23	140 ~ 250
2	42 or 46	75 ~ 95

★If the lights do not flash as specified, replace the turn signal relay.



Lighting System

Turn Signal Light Circuit



GP12059BW2 C

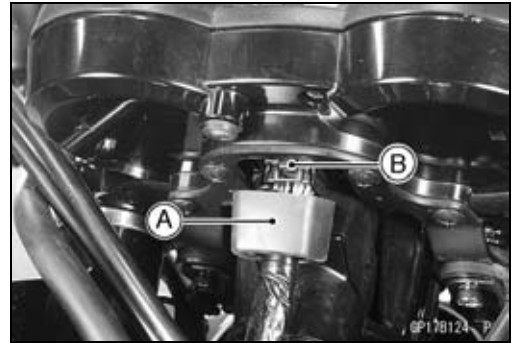
1. Turn Signal Indicator Light
 2. Front Right Turn Signal Light
 3. Front Left Turn Signal Light
 4. Turn Signal Switch
 5. Turn Signal Relay
 6. Junction Box
 7. Turn Signal Fuse 10 A
 8. Ignition Switch
 9. Rear Right Turn Signal Light
 10. Rear Left Turn Signal Light
 11. Main Fuse 30 A
 12. Battery
- A: United States, Canada and Taiwan Model

15-62 ELECTRICAL SYSTEM

Meter

Meter Removal

- Remove the headlight housing (see Headlight Unit and Housing Removal).
- Remove the rubber boot [A] and disconnect the lead connector [B].

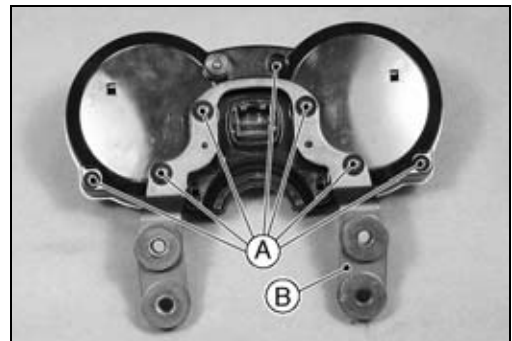


- Remove the meter bolts [A].
- Remove the meter unit [B].

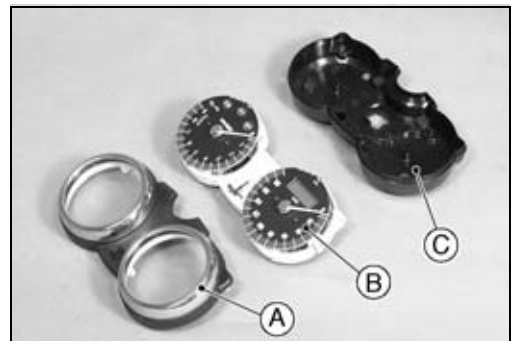


Meter Disassembly

- Remove:
 - Meter Unit (see Meter Removal)
 - Screws [A]
 - Meter Bracket [B]

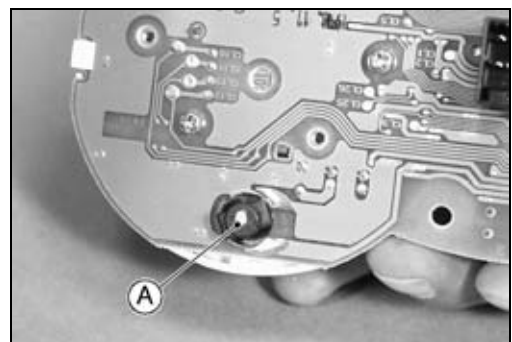


- Disassemble the digital meter unit.
 - Upper Meter Cover [A]
 - Digital Meter Assembly [B]
 - Lower Meter Cover [C]



Bulb Replacement

- Remove:
 - Meter Unit (see Digital Meter Removal)
- Disassemble the digital meter unit.
- Turn the bulb socket [A] counterclockwise to remove.

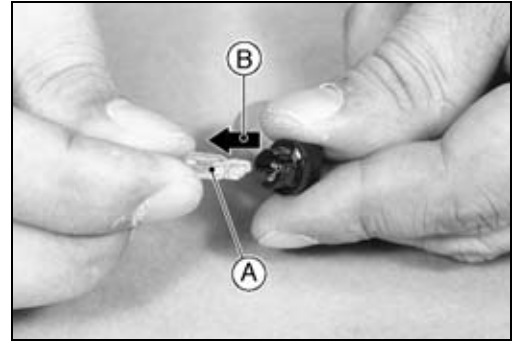


Meter

- To remove the wedge-base type bulb [A], pull the bulb straight out [B].

CAUTION

Do not turn the bulb. Pull the bulb straight out to prevent damage to the bulb.
Do not use bulb rated for greater wattage than the specified value (refer to the wiring diagram).



Meter Inspection

Mode Selection and Reset Button Checks

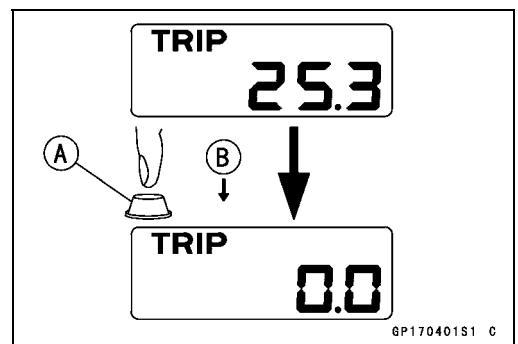
- When the ignition switch is turned ON, all the LCD segments (the letters and numbers of the liquid crystal display) [A] on the meter to illuminate for 3 seconds.
- ★ If they do not illuminate, check the LCD segments.



- Check that the display [B] changes to the ODO, TRIP, and CLOCK displays each time the mode selector button [A] is pressed.
- ★ If the display does not change, replace the meter assembly.



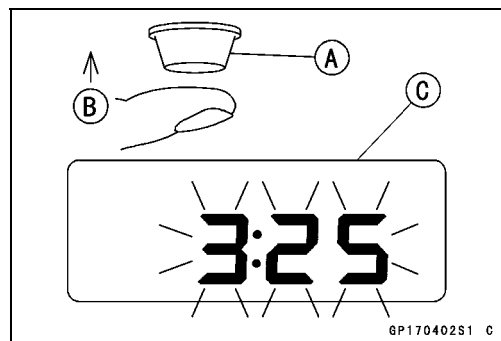
- Check that pressing [B] the mode selector button [A] longer than 2 seconds while in the TRIP mode resets the display to "0.0".
- ★ If the display does not change, replace the meter assembly.



15-64 ELECTRICAL SYSTEM

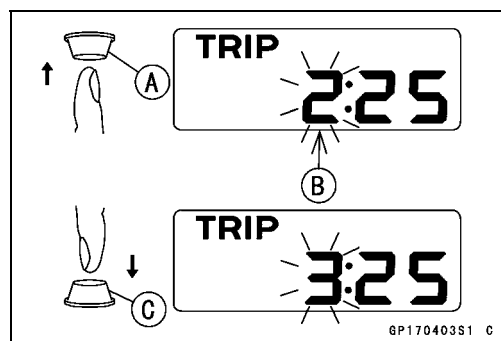
Meter

- Press the mode selector button to CLOCK.
- Pressing [B] the reset button [A] longer than 2 seconds enables the display to assume the HOUR/MINUTE setting mode [C]. Check that the time can be set in this mode.
- The numbers flash on the display.
- ★ If the time cannot be set, replace the meter assembly.

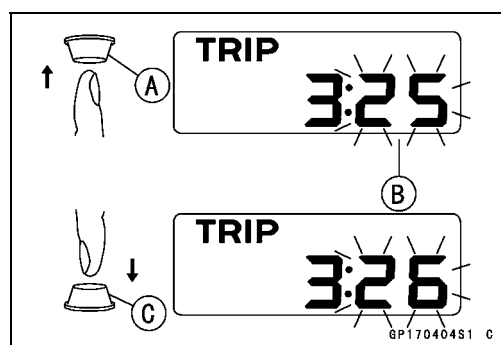


Clock Setting

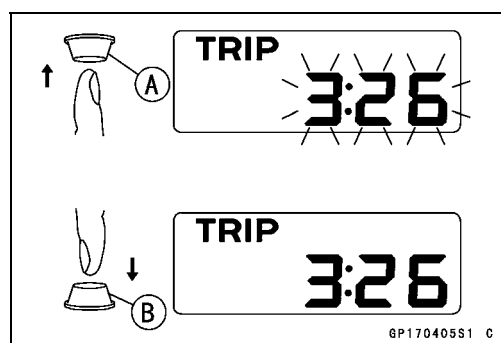
- In the HOUR/MINUTE setting mode, press the reset button [A] again to effect the HOUR setting mode.
- The hour display flashes [B] on the display.
- Press the mode selector button [C] to set the hour.



- In the HOUR setting mode, press the reset button [A] to effect the MINUTE setting mode.
- The minute display flashes [B] on the display.
- Press the mode selector button [C] to set the minute.



- In the MINUTE setting mode, press the reset button [A] to return to the HOUR/MINUTE setting mode.
- Press the mode selector button [B] to complete the time setting process.
- The clock starts counting the seconds as soon as the mode selector button is pressed.



Meter

LCD Segment Inspection

- Remove the meter unit.

CAUTION

Place the meter facing up. If a meter is left upside down or sideways for any length of time, it will malfunction.

- With pins [1] and [5] of the black connector [A] connected to the battery [B], verify that connecting pins [3] and [5] together causes all the LCD segments (the letters and numbers of the liquid crystal display) to illuminate for 3 seconds. Next, check that disconnecting pin [3] causes all the LCD segments to become unlit.

- [1] Battery Negative (–)
- [2] Meter Light
- [3] Ignition
- [4] Speed Sensor Pulse
- [5] Battery Positive (+)
- [6] Speed Sensor Power Voltage
- [7] Tachometer Pulse
- [8] Neutral Light
- [9] Turn Signal Light
- [10] Turn Signal Light
- [11] High Beam Light
- [12] Oil Pressure Warning Light

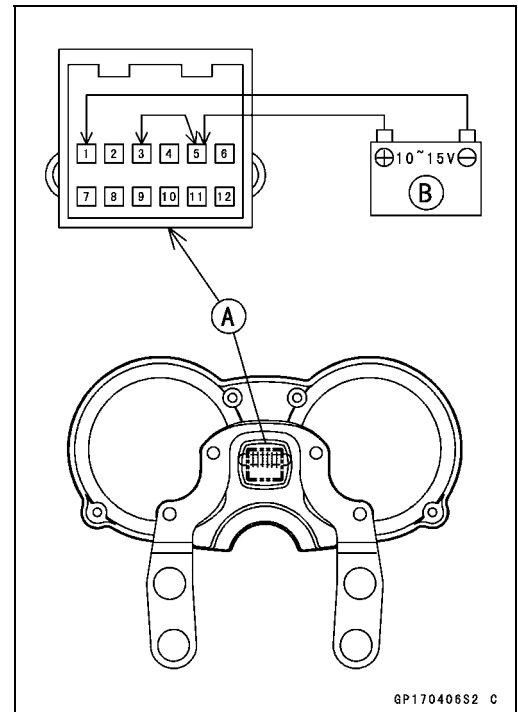
- ★ If there is any problem, replace the meter assembly.

CAUTION

Do not short terminals [1] and [6], and [4] and [6].

Speedometer Inspection

- If an oscillator is unavailable, check the speedometer as follows:
 - Install the meter unit.
 - Set the motorcycle on its center stand, and raise the rear wheel.
 - Turn the ignition switch ON, and turn the rear wheel by hand to see if the speedometer shows the vehicle speed [A] that corresponds to the wheel rotation.
- ★ If it does not show properly, inspect the speed sensor and the power to the speed sensor.



15-66 ELECTRICAL SYSTEM

Meter

- If an oscillator is available, check the speedometer as follows:
- Connect the terminals in the same way as in the LCD segment inspection.
- Connect the oscillator [A] to the terminal [4] of the connector on the meter. The vehicle speed that corresponds to the input frequency will be displayed when a short waveform such as the one shown in the diagram is input.

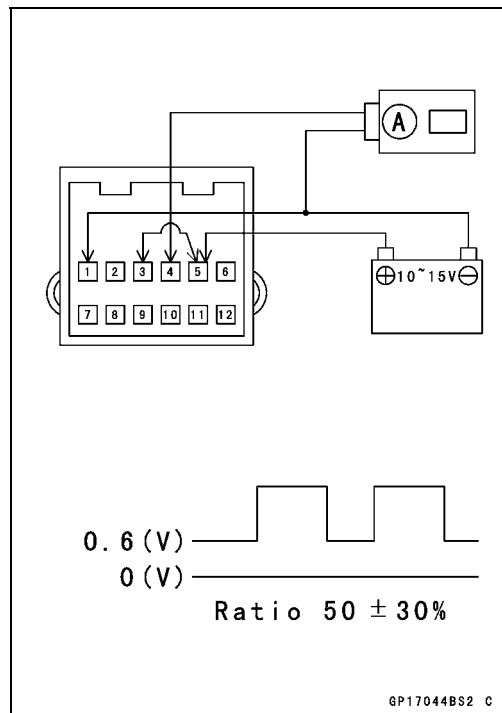
Example: An input frequency of 80 Hz will display 60 km/h.

An input frequency of 132 Hz will display 60 mph.

EJ650-C6 ~;

An input frequency of 77 Hz will display 60 km/h.

- ★ If the meter does not function correctly, replace the meter assembly.

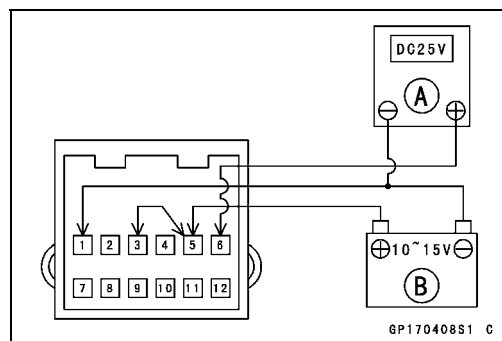


Speed Sensor Power Inspection

- Connect the terminals in the same way as in the LCD segment inspection.
- Set the hand tester [A] to DC25 V, and check the voltage between terminals 6 and 1.
- ★ If the voltage between the terminals is less than 8 V, replace the meter assembly.

CAUTION

Do not short terminals [1] and [6], and [4] and [6].

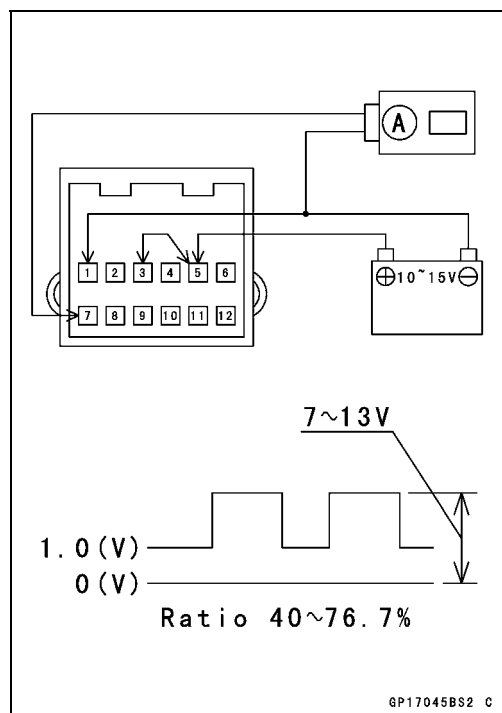


Tachometer Inspection

- Connect the terminals in the same way as in the LCD segment inspection.
- Connect the oscillator [A] to the terminal [7] of the connector on the meter.
- The rpm that corresponds to the input frequency will be displayed when a short waveform such as the one shown in the diagram is input.

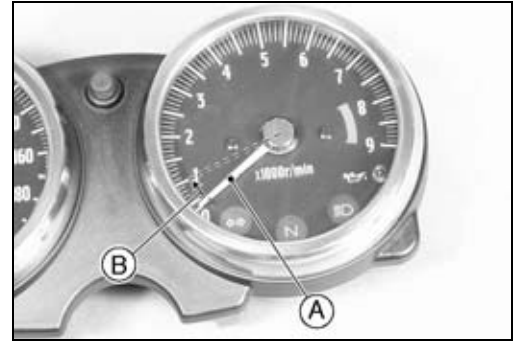
Example: An input frequency of 200 Hz will display 6 000 rpm.

- ★ If the meter does not function correctly, replace the meter assembly.



Meter

- If an oscillator is unavailable, check the tachometer as follows:
 - Connect the 12 V battery to the meter terminal in the same way as in the LCD segment inspection.
 - Using a suitable lead, connect and disconnect the meter terminals [5] and [7].
 - Connecting the terminals should cause the tachometer needle [A] to swing [B].
- ★ If connecting the terminals does not cause the tachometer needle to swing, replace the meter assembly.



ODO Meter Inspection

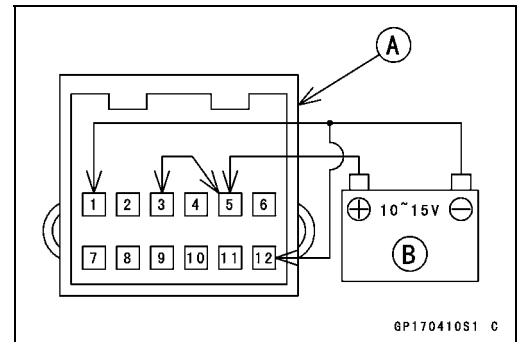
- During the speedometer inspection, verify that the odometer reading increases.
- ★ If it does not increase, replace the meter assembly.

TRIP Meter Check

- During the speedometer inspection, verify that the tripometer reading increases.
- ★ If there is any problem, replace the meter assembly.

Oil Pressure Warning Light Inspection

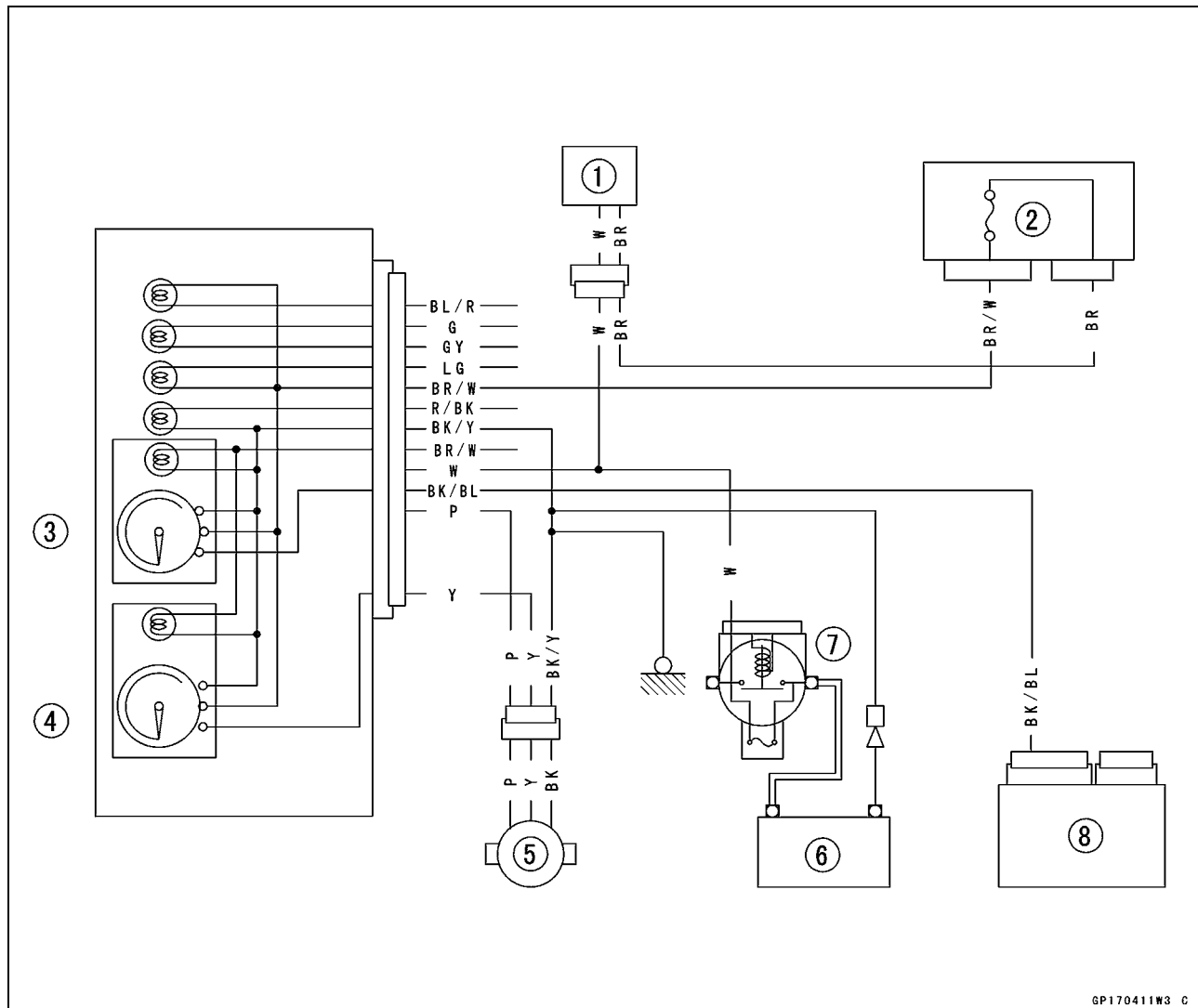
- Connect the 12 V battery to the meter terminal in the same way as in the LCD segment inspection.
- Using an auxiliary lead, ground the meter terminal [12].
- ★ If grounding the terminal does not cause the warning light to illuminate, replace the meter unit.



15-68 ELECTRICAL SYSTEM

Meter

Meter Circuit



1. Ignition Switch
2. Ignition Fuse 10 A
3. Tachometer
4. Speedometer
5. Speed Sensor
6. Battery
7. Main Fuse 30 A
8. IC Igniter

Switches and Sensors

Front Brake Light Switch Inspection

- Refer to the Front Brake Light Switch Inspection in the Periodic Maintenance chapter.

Rear Brake Light Timing Inspection

- Refer to the Rear Brake Light Timing Inspection in the Periodic Maintenance chapter.

Rear Brake Light Timing Adjustment

- Refer to the Rear Brake Light Timing Adjustment in the Periodic Maintenance chapter.

Switch Inspection

- Check the switches for continuity (they should read almost 0 Ω).
- Refer to the wiring diagram for details concerning the switches on the handlebar and the ignition switch.
- ★ If any one of the switches has an open or short circuit, repair or replace it.

Special Tool - Kawasaki Hand Tester: 57001-1394

Rear Brake Light Switch Connection Table

	BR	BL
Brake pedal depressed	○ — ○	○ — ○
Constant		

Side Stand Switch Connection Table

	BK	G
Side stand kicked up	○ — ○	○ — ○
Side stand lowered		

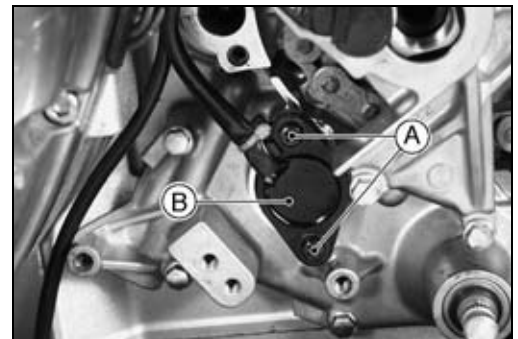
Oil Pressure Warning Light Switch Connection Table*

	Switch Terminal	Ground
Engine stopped	○ — ○	○ — ○
Engine running		

* Provided there is no problem with the engine lubrication system

Gear Position Sensor Removal

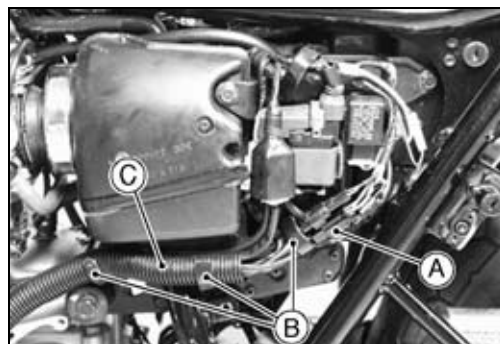
- Remove:
 - Engine Sprocket Cover (see Final Drive chapter)
 - Clutch Release Case Assembly (see Clutch chapter)
 - Gear Position Sensor Screws [A]
- Pull out the gear position sensor [B].



15-70 ELECTRICAL SYSTEM

Switches and Sensors

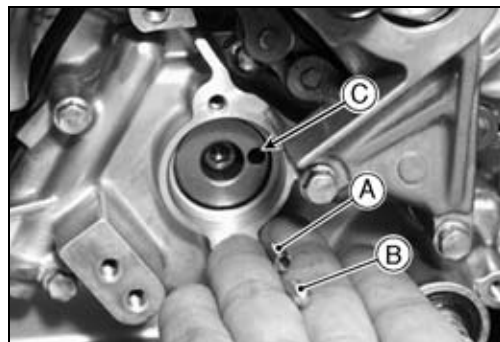
- Remove:
 - Seat (see Frame chapter)
 - Left Side Cover (see Frame chapter)
- Disconnect the gear position sensor connector [A].
- Open the clamps [B] and pull out the crankshaft sensor lead from the lead protective tube [C].



Gear Position Sensor Installation

- Securely place the spring [A] and pin [B] into the hole [C] of the drum holder.
- Apply grease to the O-ring and install the gear position sensor.
- Apply a non-permanent locking agent to the gear position sensor screws and tighten them.

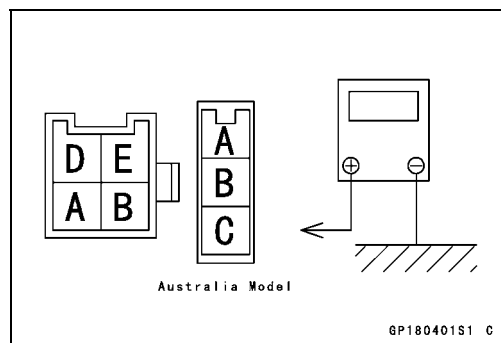
Torque - Gear Position Sensor Screws: 3.9 N·m (0.4 kgf·m, 35 in·lb)



Gear Position Sensor Inspection

- Disconnect the gear position sensor connector.
- Check the switch for continuity at the following gear positions: neutral, 3rd, and 4th.
- For other than Australia model to check the neutral, 1st, 2nd, and 3rd gear positions.

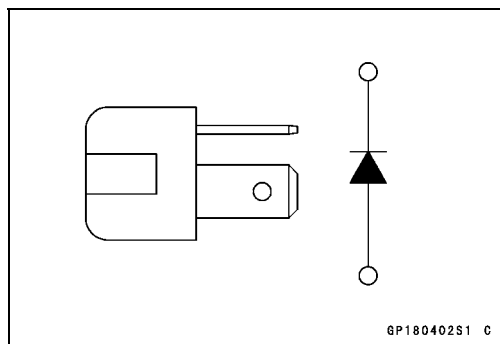
Gear Position	Tester (+)	Tester (–)
Neutral	Light green Lead [A]	Engine ground
1st	Light Blue Lead [D]	
2nd	Blue/red Lead [E]	
3rd	Yellow/green Lead [B]	
4th	Green/red Lead [C]	



- ★ The switch is normal if there is continuity in the respective gear positions.
- ★ If the switch has an open or short circuit, repair or replace it.

Diode (Rectifier) Inspection

- Set the hand tester to the $\times 100 \Omega$ range.
- Special Tool - Kawasaki Hand Tester: 57001-1394**
- Check the continuity between the diode terminals in both directions.
- ★ If there is continuity in one direction (forward direction) but no continuity (infinity) in the reverse direction, the diode is normal.
- ★ The diode is defective if there is continuity after changing the direction, or if it remains with no continuity.



NOTE

- The actual resistance measurement in the forward direction varies with the tester used and the individual diodes. Generally speaking, it is acceptable if the tester's indicator swings approximately halfway.

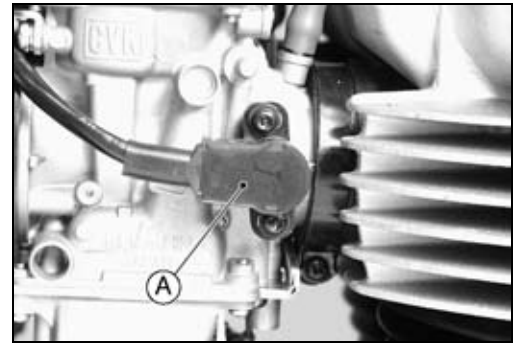
Switches and Sensors

Throttle Sensor Removal and Installation

CAUTION

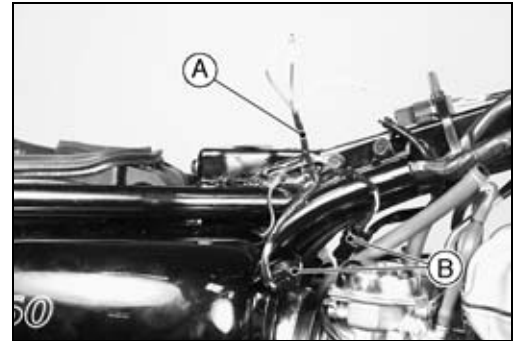
Do not remove the throttle sensor [A] because the sensor's mounting position must be adjusted once it is removed.

- To replace the sensor, see **Throttle Sensor Position Adjustment**.



Throttle Sensor Inspection

- Remove the fuel tank (see Fuel System chapter).
- Use a suitable hose to connect the fuel tank and the carburetor.
- Thoroughly warm up the engine.
- Check:
 - Idle Speed (see Periodic Maintenance chapter)
 - Battery's state of charge (see this chapter)
- Turn the ignition switch OFF.
- Disconnect the throttle sensor connector and connect the adapter [A] between the connectors [B].



Special Tool - Throttle Sensor Setting Adapter: 57001-1400

- Measure the throttle sensor's input voltage.
 - Connect the hand tester to the adapter.
 - Hand tester (+) → blue lead (color of lead on throttle sensor)
 - Hand tester (-) → black lead (color of lead on throttle sensor)

Throttle Sensor Input Voltage

Standard: 4.9 ~ 5.1 V

- ★ If the input voltage is out of standard, inspect the IC igniter.
- Connect the hand tester to the adapter.
 - Hand tester (+) → yellow lead terminal (color of lead on throttle sensor) [C]
 - Hand tester (-) → black lead terminal (color of lead on throttle sensor) [D]
- Start the engine.
- Measure the sensor's output voltage at idle speed.

Throttle Sensor Output Voltage (at idle)

Standard: 0.9 ~ 1.1 V

15-72 ELECTRICAL SYSTEM

Switches and Sensors

- ★ If the voltage is out of standard, adjust the sensor position (see Throttle Sensor Position Adjustment).
- ★ If the voltage is within the standard, perform the following inspection:
 - Stop the engine.
 - Measure the sensor's output voltage at wide open throttle with the ignition switch turned ON.

Throttle Sensor Output Voltage (wide open throttle)

Standard: 4.06 ~ 4.26 V

- ★ If the voltage is out of standard, replace the throttle sensor.

Throttle Sensor Position Adjustment

- Connect the throttle sensor setting adapter between the sensor wire connectors (see Throttle Sensor Inspection).

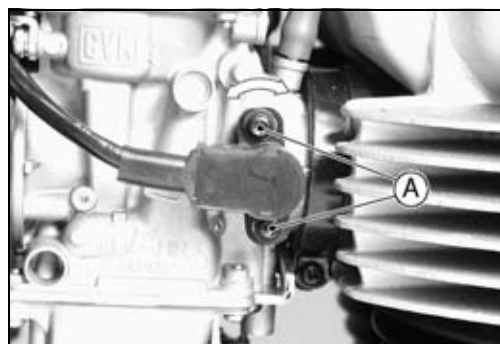
Special Tool - Throttle Sensor Setting Adapter: 57001-1400

- Start the engine.
- Operate the engine at idle speed (see Periodic Maintenance chapter).
- Loosen the sensor mounting screws [A].
- Adjust the sensor mounting position to set the sensor output voltage to the standard, and tighten the mounting screws.

Throttle Sensor Output Voltage (at idle)

Standard: 0.9 ~ 1.1 V

- ★ If the standard voltage cannot be obtained, replace the throttle sensor.



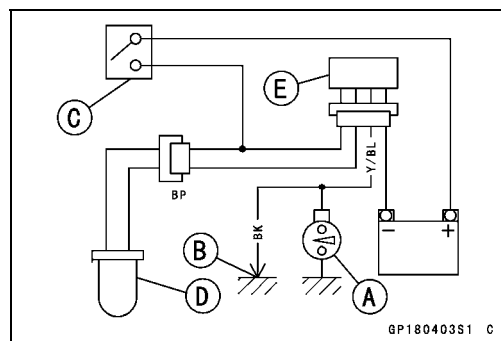
Oil Pressure Warning Light Delay Unit Inspection

- Remove the lead [B] from the oil pressure warning light switch [A], and ground it to the engine.
- Turn the ignition switch [C] ON.
- ★ After the oil pressure warning light [D] illuminates, return the oil pressure warning light switch lead to its original position.
- ★ If the oil pressure warning light does not illuminate, inspect the warning light bulb and wiring.
- ★ If there is no problem with the warning light bulb and wiring, replace the oil pressure warning light delay unit [E].
- Turn the ignition switch ON.
- Grounding the oil pressure warning light switch lead to the engine should cause the oil pressure warning light to illuminate after a delay.
- Measure the length of time it takes the warning light to illuminate after the switch lead has been grounded.

Illumination Lag Time

Standard: Approx. 3 seconds

- ★ If the illumination lag time is considerably different from the standard, replace the delay unit.

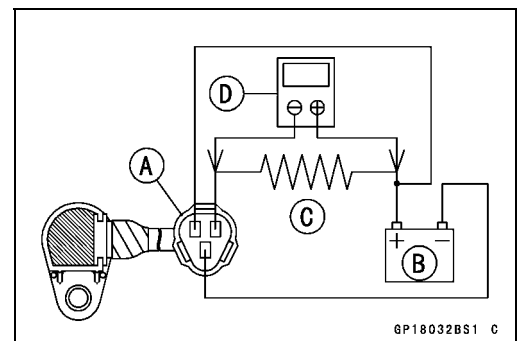
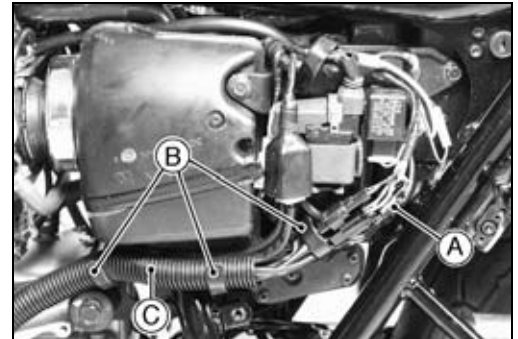
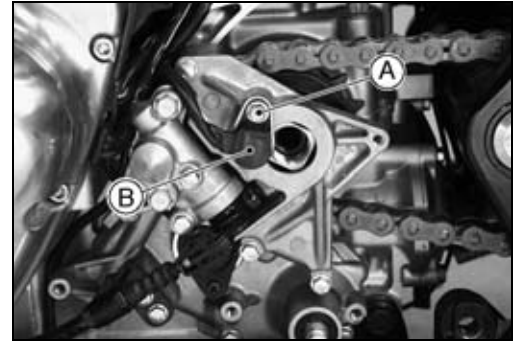


Switches and Sensors

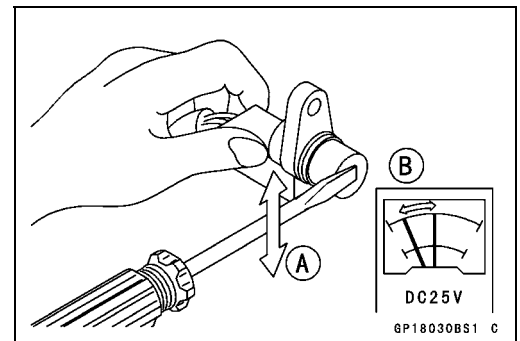
Speed Sensor Inspection

- Remove:
 - Engine Sprocket (see Final Drive chapter)
 - Speed Sensor Bolt [A]
 - Speed Sensor [B]
- Remove:
 - Left Side Cover (see Frame chapter)
 - Speed Sensor Connector [A]
- Open the clamps [B] and pull out the speed sensor lead from the lead protective tube [C].
- Connect the 12 V battery [B], 10 k Ω resistor [C], and hand tester [D] to the speed sensor connector [A] terminals as shown.
- Set the tester to the DC25 V range.

Special Tool - Kawasaki Hand Tester: 57001-1394



- Slide a screwdriver sideways [A] along the speed sensor surface.
- At this time, the tester's indicator should swing right and left [B].
- ★ If the tester's indicator does not swing right and left, replace the speed sensor.



Speed Sensor Installation Note

- Installation is the reverse of removal.
- Torque - Speed Sensor Mounting Bolt: 7.8 N·m (0.8 kgf·m, 69 in·lb)**

15-74 ELECTRICAL SYSTEM

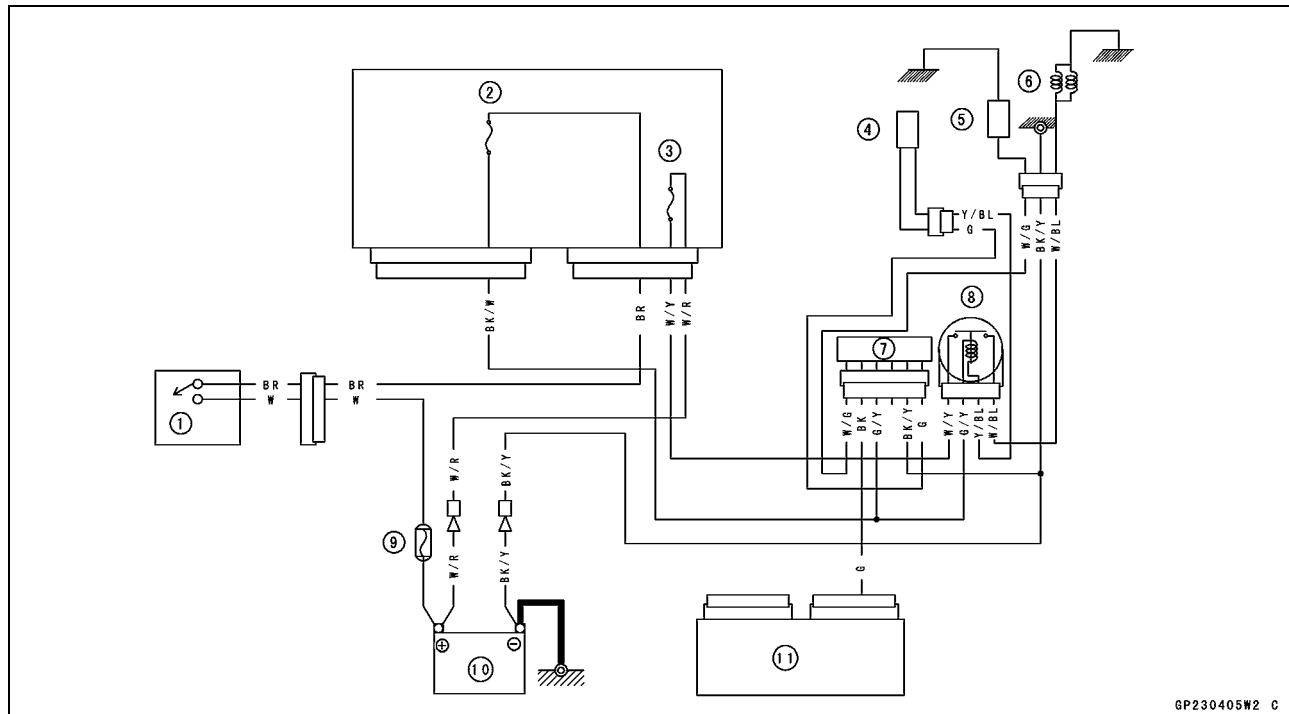
Carburetor Heater (Other than United States, Canada and Taiwan)

At times, the temperature of the carburetor could be too low for efficient atomization of fuel, such as immediately after the engine has been started or when the ambient temperature is low. Under these conditions, the electric carburetor heater electrically heats the carburetor to prevent the engine from stalling.

Outline

To activate the carburetor heater, the (stopped) engine must first be started. Then, the PTC (Positive Temperature Coefficient) sensor detects the temperature of the carburetor body, and this signal is sent to the control unit. When the atmospheric temperature sensor is ON, the control unit turns the carburetor heater relay ON or OFF in accordance with the signals sent by the igniter and the PTC sensor. As a result, the carburetor heater operates or stops operating depending on whether the relay is turned ON or OFF.

Carburetor Heater Circuit



1. Ignition Switch
2. Horn Fuse 10 A
3. Accessory Fuse 10 A
4. Atmospheric Temperature Sensor
5. PTC Sensor (Carburetor Temperature Sensor)
6. Carburetor Heater
7. Carburetor Heater Control Unit
8. Normal Open Type Relay
9. Main Fuse 30 A
10. Battery
11. IC Igniter

Carburetor Heater Inspection

- Disconnect the connector [A] from the carburetor heater lead.
- Set the hand tester to the $\times 1 \Omega$ range, and measure the resistance between the carburetor heater terminal and the carburetor body.

Carburetor Heater Resistance

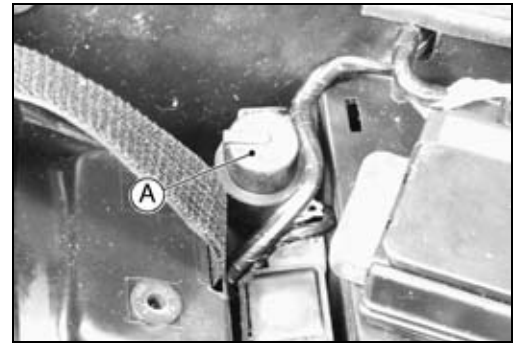
Standard: 7 ~ 12 Ω



Carburetor Heater (Other than United States, Canada and Taiwan)

Normal Open Type Relay Inspection

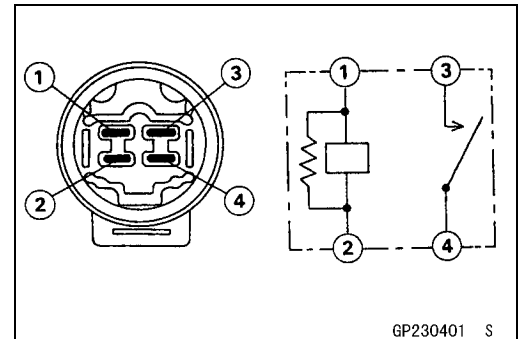
- Remove:
 - Seat (see Frame chapter)
 - Screen (see Frame chapter)
- Remove the relay [A] from the frame.



- Connect the 12 V battery as indicated in the table, and check the continuity between the terminals.

Table 1: Relay Circuit Inspection

Battery Connection	Tester Connection	Measurement (Ω)
1-2	3-4	0
—	3-4	∞



Atmospheric Temperature Sensor Inspection

- Remove:
 - Right Side Cover (see Frame chapter)
- Remove the atmospheric temperature sensor [A].



- Set the hand tester to the $\times 1 \Omega$ range, and check the continuity between the terminals.

Special Tool - Kawasaki Hand Tester: 57001-1394

- Immerse the atmospheric temperature sensor [A] and the thermometer [B] in a container filled with coolant, and gradually increase the temperature of the coolant.

NOTE

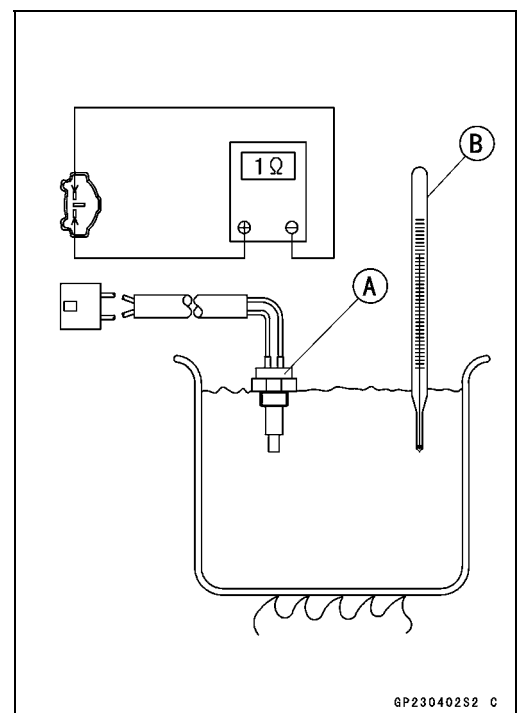
○Do not allow the atmospheric temperature sensor or the thermometer to come in contact with the container.

Atmospheric Temperature Sensor Activation

Increasing temperature: ON \rightarrow OFF between 7 ~ 13° C

Decreasing temperature: OFF \rightarrow ON before 3° C

★If the sensor does not operate properly, replace it.

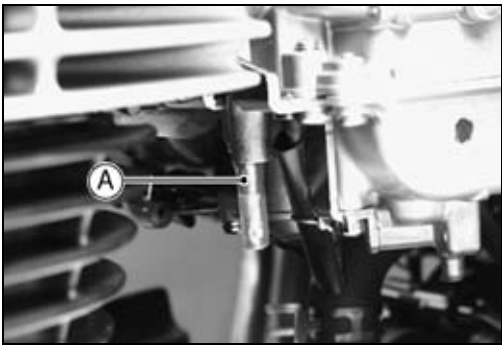


15-76 ELECTRICAL SYSTEM

Carburetor Heater (Other than United States, Canada and Taiwan)

PTC Sensor (Carburetor Temperature Sensor)
Inspection

- Remove the PTC sensor [A].



- Set the hand tester to the $\times 1\text{ k}\Omega$ and measure the resistance between the terminals.

Special Tool - Kawasaki Hand Tester: 57001-1394

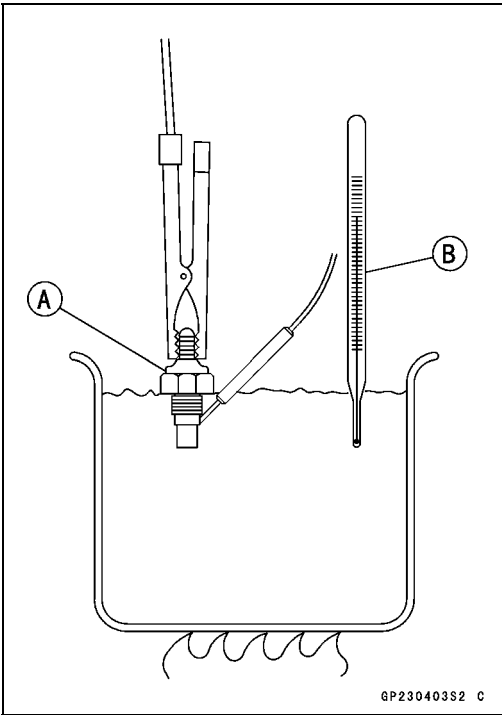
- Immerse the PTC sensor [A] and the thermometer [B] in a container filled with water, and gradually increase the water temperature.

NOTE

○Do not allow the PTC sensor or the thermometer to come in contact with the container.

Temperature (°C)	Sensor Resistance (kΩ)	Temperature (°C)	Sensor Resistance (kΩ)
8	2.5	12	4.6
9	2.9	13	5.4
10	3.4	14	6.5
11	4.0	15	7.7

- ★ If the measurements are out of standard, replace the PTC sensor.



Carburetor Heater Control Unit Inspection

- Remove:
 - Fuel Tank (see Fuel System chapter)
 - Carburetor Heater Control Unit Connector [A]
- Set the hand tester to the $\times 1\text{ k}\Omega$ range, and measure the internal resistance of the control unit [B].

Special Tool - Kawasaki Hand Tester: 57001-1394

- ★ If the measurement is out of standard, replace the control unit.



CAUTION

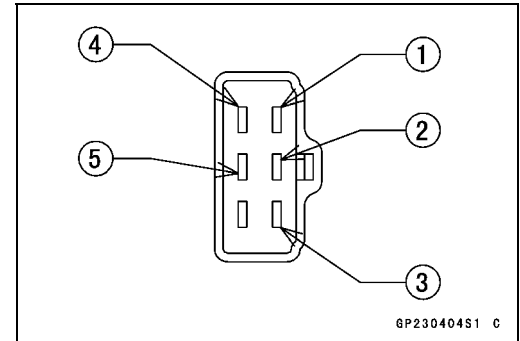
Using a tester other than the Kawasaki Hand Tester may show different readings. The use of a megger or a tester with high-voltage battery could damage the unit.

Carburetor Heater (Other than United States, Canada and Taiwan)

Heater Control Unit Internal Resistance

Unit: k Ω

		Tester Positive (+) Terminal				
		1 (white/ green)	2 (green)	3 (green/ yellow)	4 (black/ yellow)	5 (black)
*(-)	1 (white/ green)	—	7 ~ 28	∞	6.5 ~ 28	17 ~ 80
	2 (green)	∞	—	∞	∞	∞
	3 (green/ yellow)	6 ~ 26	9.5 ~ 40	—	9.5 ~ 40	24 ~ 150
	4 (black/ yellow)	4.4 ~ 19	1.4 ~ 6	∞	—	6.5 ~ 28
	5 (black)	13 ~ 60	10 ~ 45	∞	6.5 ~ 28	—



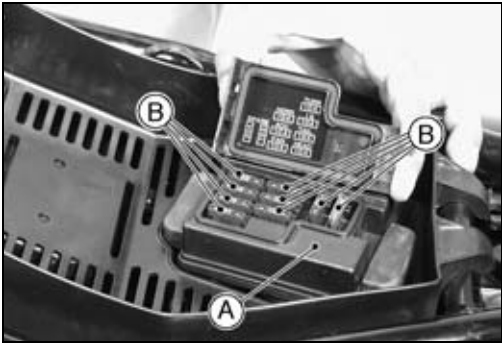
*(-): Tester Negative Terminal

* Due to the effect of the internal condenser, the tester indicator will make a large swing the moment the tester probe contacts the terminal, and moves slowly to an area where it stabilizes. Take the reading at the area where the indicator stabilizes.

15-78 ELECTRICAL SYSTEM

Junction Box

The junction box [A] contains fuses [B]. It also contains relays and diodes but they cannot be removed.



Junction Box Fuse Circuit Inspection

- Remove the junction box.
 - Inspect the fuses and replace them if they are blown.
 - Inspect the continuity between the terminals.
- ★ If the measurements differ from those in the table, replace the junction box.

Special Tool - Kawasaki Hand Tester: 57001-1394

Fuse Circuit Inspection

Tester Connection	Measurement (Ω)
1-1A	0
1-2	0
3A-4	0
6-5	0
6-10	0
6-7	0
6-17	0
1A-8	∞
2-8	∞
3A-8	∞
6-2	∞
6-3A	∞
17-3A	∞

Junction Box

Headlight Relay and Starter Circuit Relay Circuit Inspection

- Remove the junction box.
- Check the continuity between the terminals in accordance with Table I.

Table I: Relay Circuit Inspection (without battery)

	Tester Connection	Measurement (Ω)
Headlight Relay *	7-8	∞
	7-13	∞
	(+)13-9 (-)	Other than ∞^{**}
Starter Circuit Relay	9-11	∞
	12-13	∞
	(+)13-11 (-)	∞
	(+)12-11 (-)	Other than ∞^{**}

*: EJ650-A1 ~ A4/C3 ~ C4, Canada and Australia Models only.

EJ650-A5/C5 ~ C7, C6F, All Models

** : The actual reading varies with the hand tester used.

The (+) and (-) indicate the polarity of the tester terminals to be connected.

- Connect the 12 V battery and check the continuity between the terminals in accordance with Table II.

★ If the measurements differ from those in the table, replace the junction box.

Special Tool - Kawasaki Hand Tester: 57001-1394

Table II: Relay circuit Inspection (battery connected)

	Tester Connection	Battery Connection(+) (-)	Measurement (Ω)
Headlight Relay	7-8*	9-13*	0
Starter Circuit Relay	(+) 13-11 (-)	11-12	Other than ∞^{**}

*: EJ650-A1 ~ A4/C3 ~ C4, Canada and Australia Models only.

EJ650-A5/C5 ~ C7, C6F, All Models

** : The actual reading varies with the hand tester used.

The (+) and (-) indicate the polarity of the tester terminals to be connected.

15-80 ELECTRICAL SYSTEM

Junction Box

Diode Circuit Inspection

- Remove the junction box.
- Set the hand tester to the $\times 1 \text{ k}\Omega$ range.
- Check the continuity between the following terminals in both directions:

Diode Circuit Inspection

Tester Connection	13-8*, 13-9*, 12-11, 12-14, 15-14, 16-14
--------------------------	--

*: EJ650-A1 ~ A4/C3 ~ C4, Canada and Australia Models only.

EJ650-A5/C5 ~ C7, C6F, All Models.

EJ650-A5/C5, All Models.

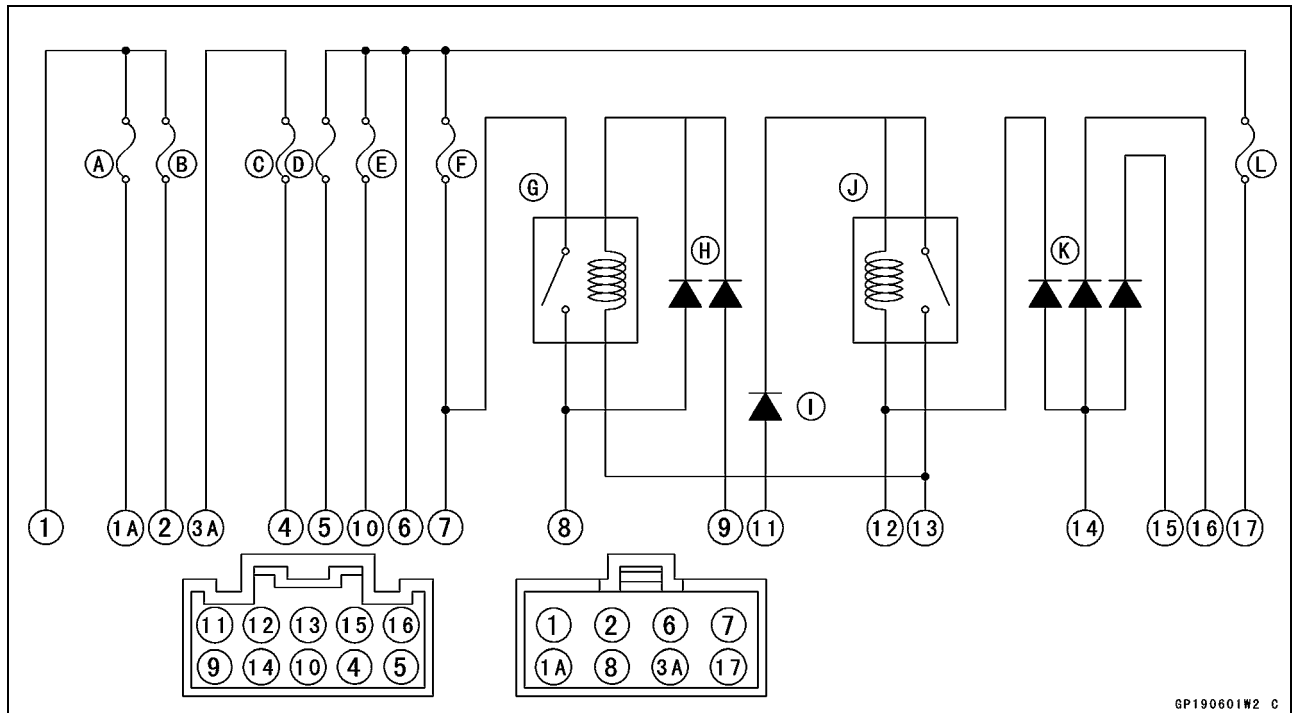
- ★ If there is continuity in one direction (forward direction) but no continuity (infinity) in the reverse direction, the diode is normal.
- ★ The diode is defective if there is continuity after changing the direction, or if it remains with no continuity. In this case, replace the junction box.

Special Tool - Kawasaki Hand Tester: 57001-1394

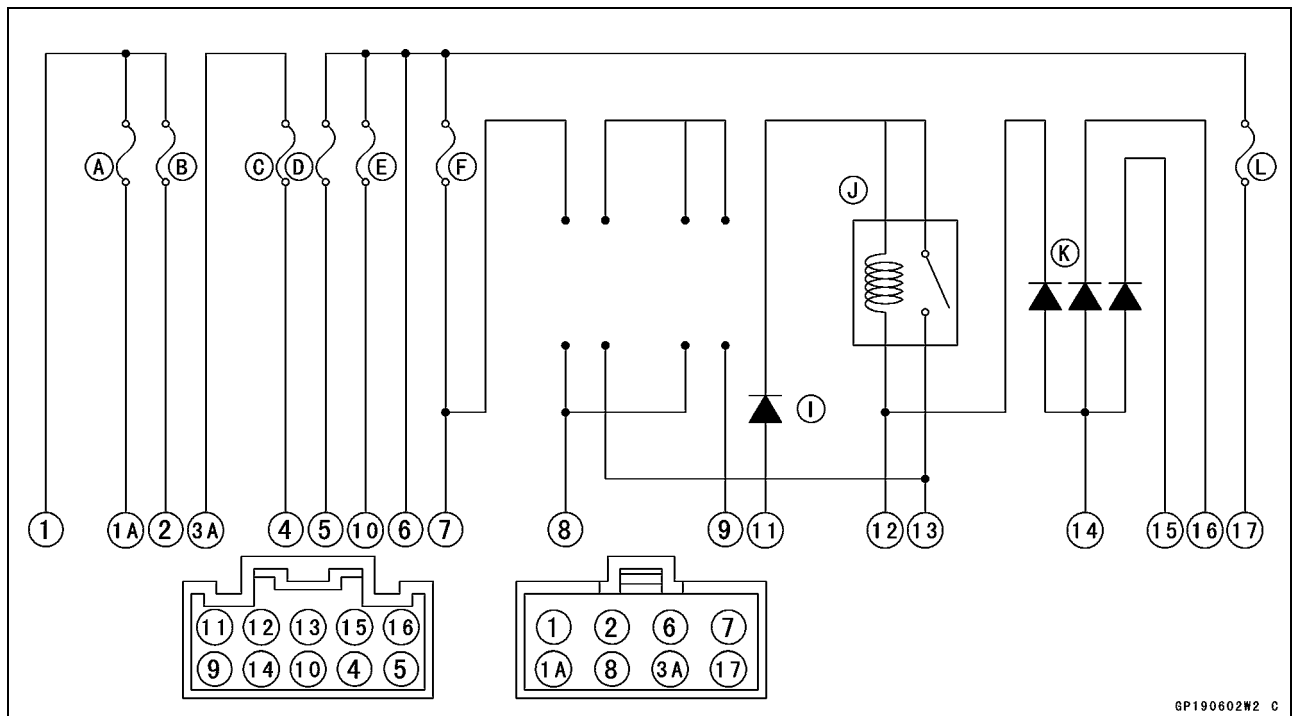
NOTE

○ *The actual resistance measurement in the forward direction varies with the tester used and the individual diodes. Generally speaking, it is acceptable if the tester's indicator swings approximately halfway.*

Junction Box

Junction Box Internal Circuit (EJ650-A1 ~ A4 United States, Canada and Australia)
(EJ650-A5/C5 ~ C7, C6F, All Models)

Junction Box Internal Circuit (EJ650-A1 ~ A4/C3 ~ C4, Other than United States, Canada and Australia)



- A. Accessory Fuse 10 A
- B. Radiator Fan Fuse 10 A
- C. Turn Signal Fuse 10 A
- D. Horn Fuse 10 A
- E. Ignition Fuse 10 A
- F. Headlight Fuse 10 A

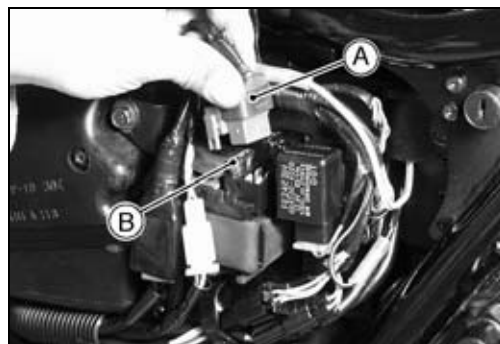
- G. Headlight Relay
- H. Headlight Diode
- I. Starter Diode
- J. Starter Circuit Relay
- K. Interlock Diode
- L. Taillight Fuse 10 A

15-82 ELECTRICAL SYSTEM

Junction Box

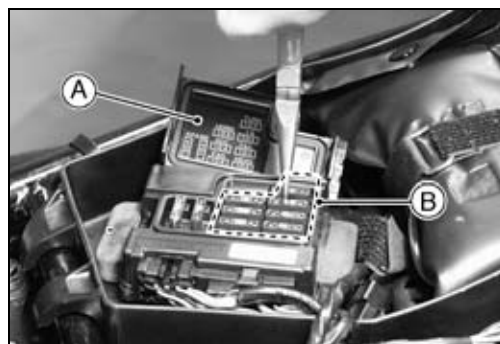
Main Fuse 30 A Removal

- Remove:
 - Seat (see Frame chapter)
 - Left Side Cover (see Frame chapter)
 - Starter Relay and Main Fuse 30 A Connector [A]
- Pull the main fuse [B] straight out of the starter relay with needle nose pliers.



Junction Box Fuse Removal

- Remove the seat (see Frame chapter).
- Remove the fuse cover [A].
- Pull the fuse [B] straight out with needle nose pliers.



Fuse Installation

- If a fuse fails during operation, inspect the electrical system to determine the cause. Merely replacing the fuse could cause it to be blown again.
- Install the fuses in the original position as specified in the layout diagram on the inside of the fuse cover in the junction box.

CAUTION

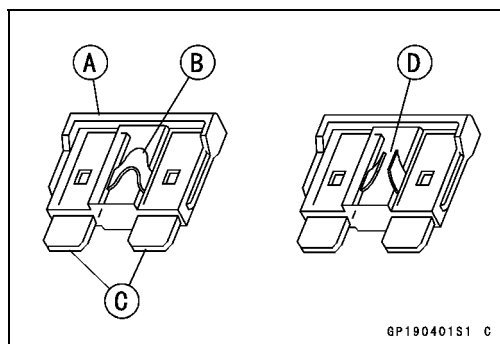
All the fuses in the junction box are 10 A. Do not use fuses that exceed this amperage.

Fuse Inspection

- Remove the fuse and inspect the fuse element.
- ★ If the fuse element is blown, replace the fuse.
 - Housing [A]
 - Element [B]
 - Terminal [C]
 - Blown Element [D]

NOTE

- 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.



CAUTION

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

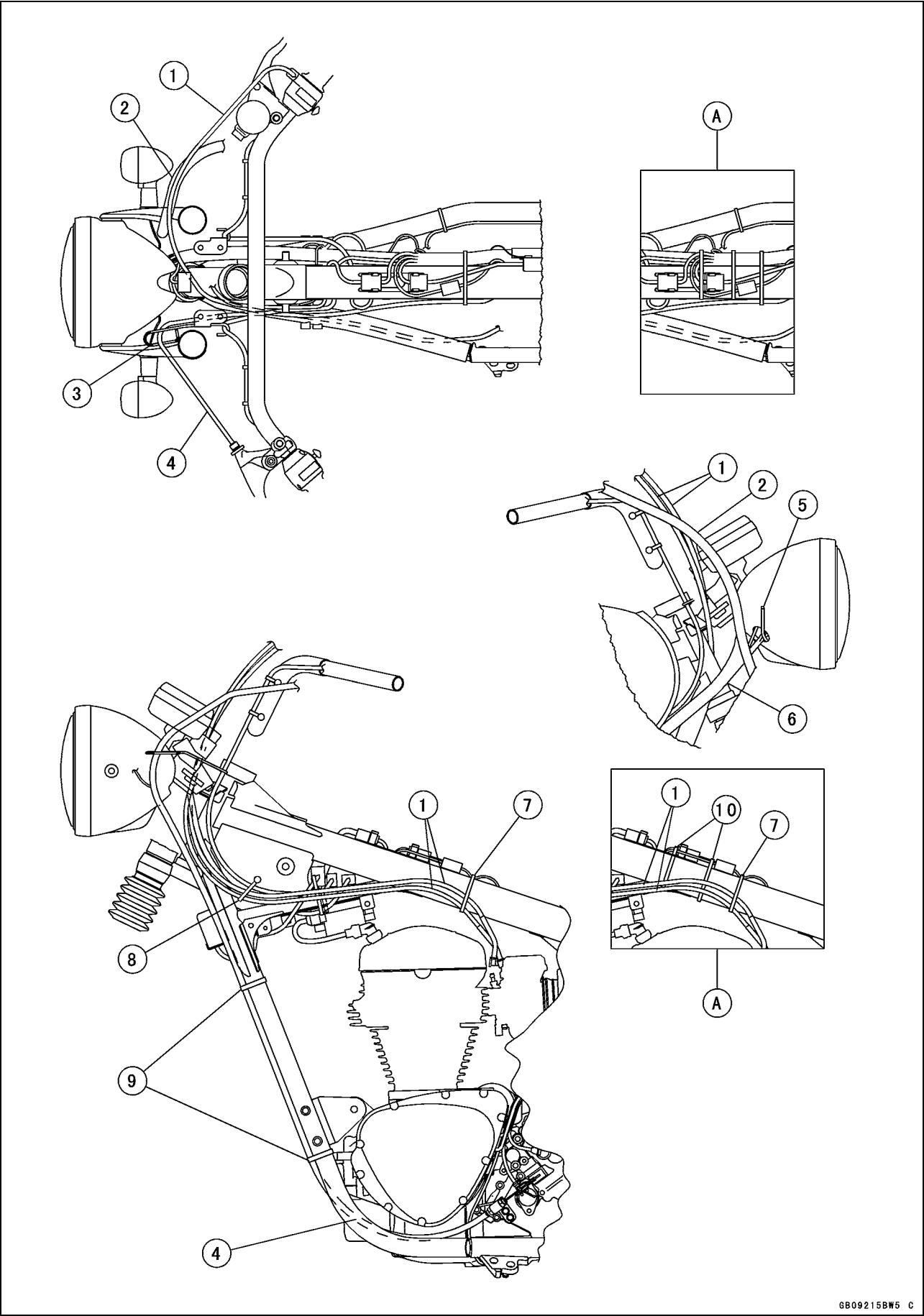
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16-2 APPENDIX

Cable, Wire, and Hose Routing

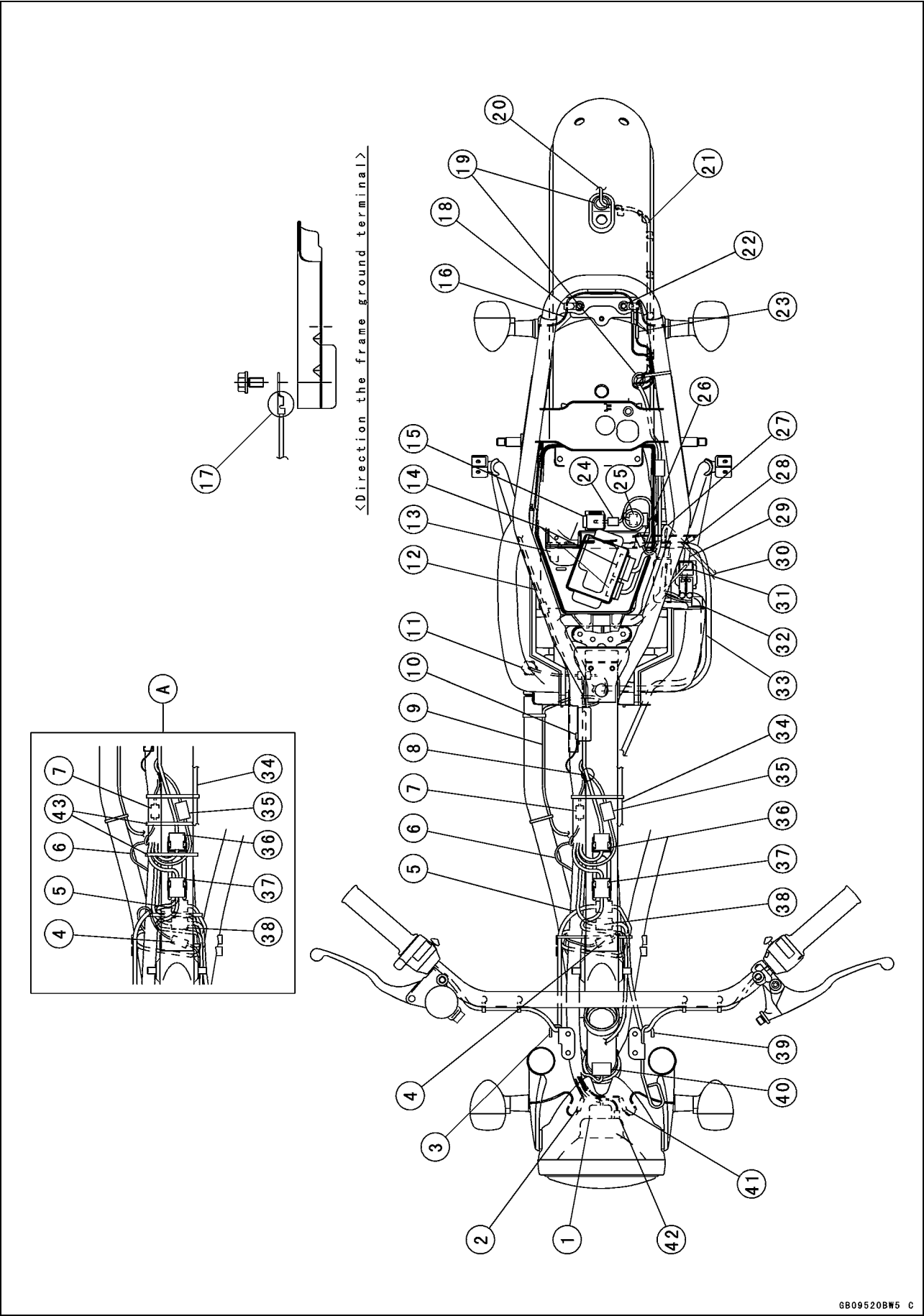


Cable, Wire, and Hose Routing

1. Throttle Cables
2. Brake Hose
3. Clamp (Install the clamp with the meter unit.)
4. Clutch Cable
5. Front Right Turn Signal Light Lead
6. Main Harness
7. Band (Main Harness, Throttle Cables, Carburetor Heater Lead, Throttle Sensor Lead, Regulator/Rectifier Lead)
8. Clamp (Throttle Cables, Left Handlebar Switch Lead, Ignition Switch Lead)
9. Clamps (Clutch Cable)
10. Clamps
 - A. On and after EJ650-C6P

16-4 APPENDIX

Cable, Wire, and Hose Routing

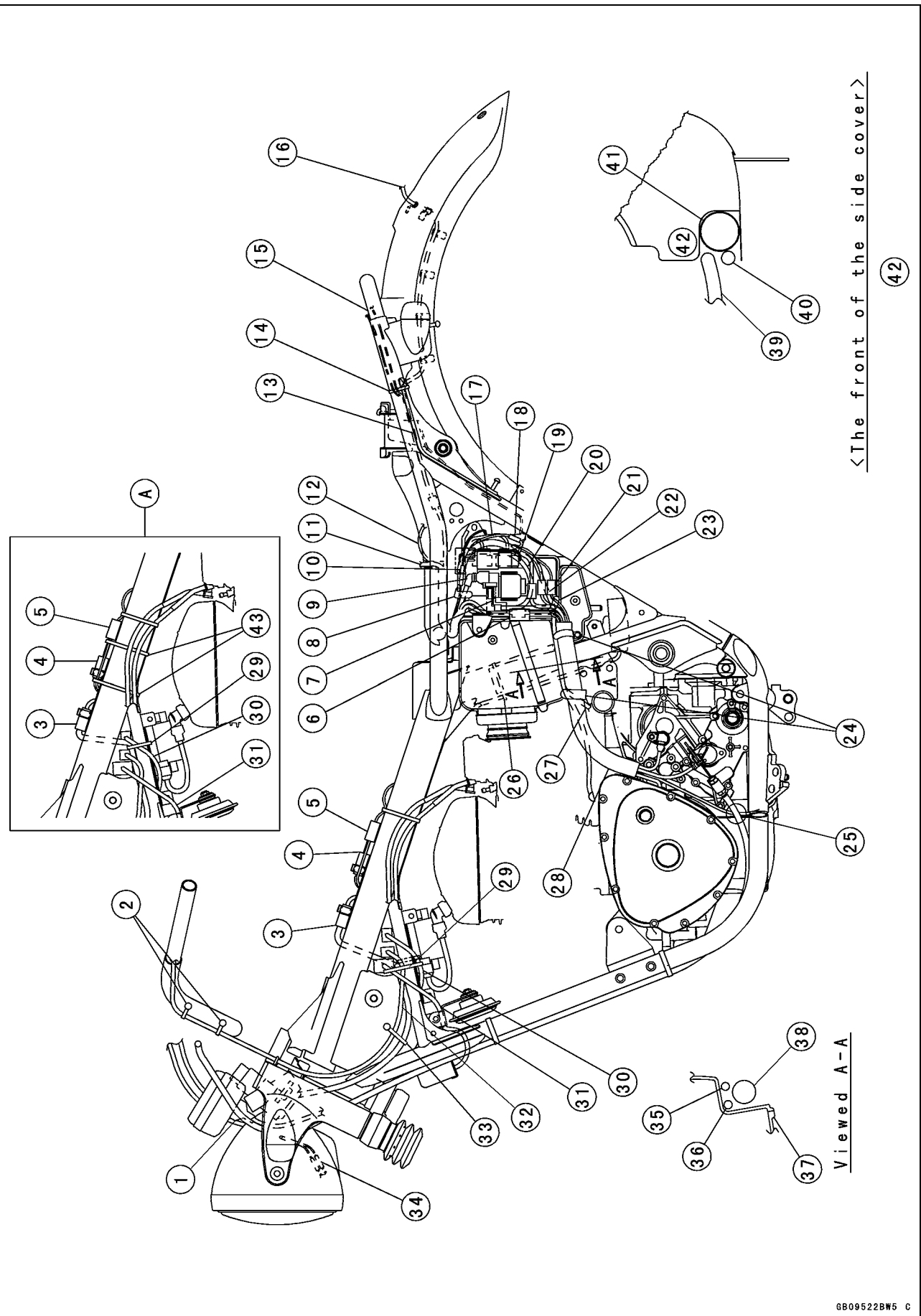


Cable, Wire, and Hose Routing

1. Headlight Connector
 2. Front Right Turn Signal Light Connectors
 3. Clamp
 4. Carburetor Heater Control Unit Connector
 5. Right Handlebar Switch Lead
 6. Ignition Coil Lead
 7. Throttle Sensor Connector
 8. Take care the lead direction.
 9. Oil Pressure Warning Light Switch Lead
 10. Frame Ground (Install the ground lead terminal with the main harness cover)
 11. Atmospheric Temperature Sensor
 12. Rear Brake Light Switch Lead
 13. Battery (–) Lead Terminal
 14. Junction Box Connector
 15. Oil Pressure Warning Light Delay Unit
 16. Rear Right Turn Signal Light Leads (Japanese Model only)
 17. Install the frame ground terminal so that calked part inward.
 18. Clamp
 19. Rubber Grommets
 20. Tail & License & Brake Light Lead
 21. Rear Harness (Run the harness through the clamps in the rear fender).
 22. Clamp
 23. Rear Left Turn Signal Light Connectors (Japanese Model only)
 24. Oil Pressure Warning Light Delay Unit Connector
 25. Normal Open Type Relay
 26. Rectifier
 27. I.C. Igniter Lead
 28. Battery Ground Lead
 29. Battery (+) Lead
 30. Turn Signal Light Relay, Speed Sensor, Gear Position Sensor and Sidestand Switch Connectors
 31. Starter Motor Relay
 32. Alternator and Crankshaft Sensor Connector
 33. Starter Motor Lead
 34. Throttle Cables
 35. Carburetor Heater Connector
 36. Regulator/Rectifier Connector
 37. Ignition Switch Connector
 38. Left Handlebar Switch Connector
 39. Clamp
 40. Electric Combination Meter Connector
 41. Front Left Turn Signal Light Connector
 42. City Light (Europe Model only)
 43. Band
- A: On and after EJ650-C6P

16-6 APPENDIX

Cable, Wire, and Hose Routing

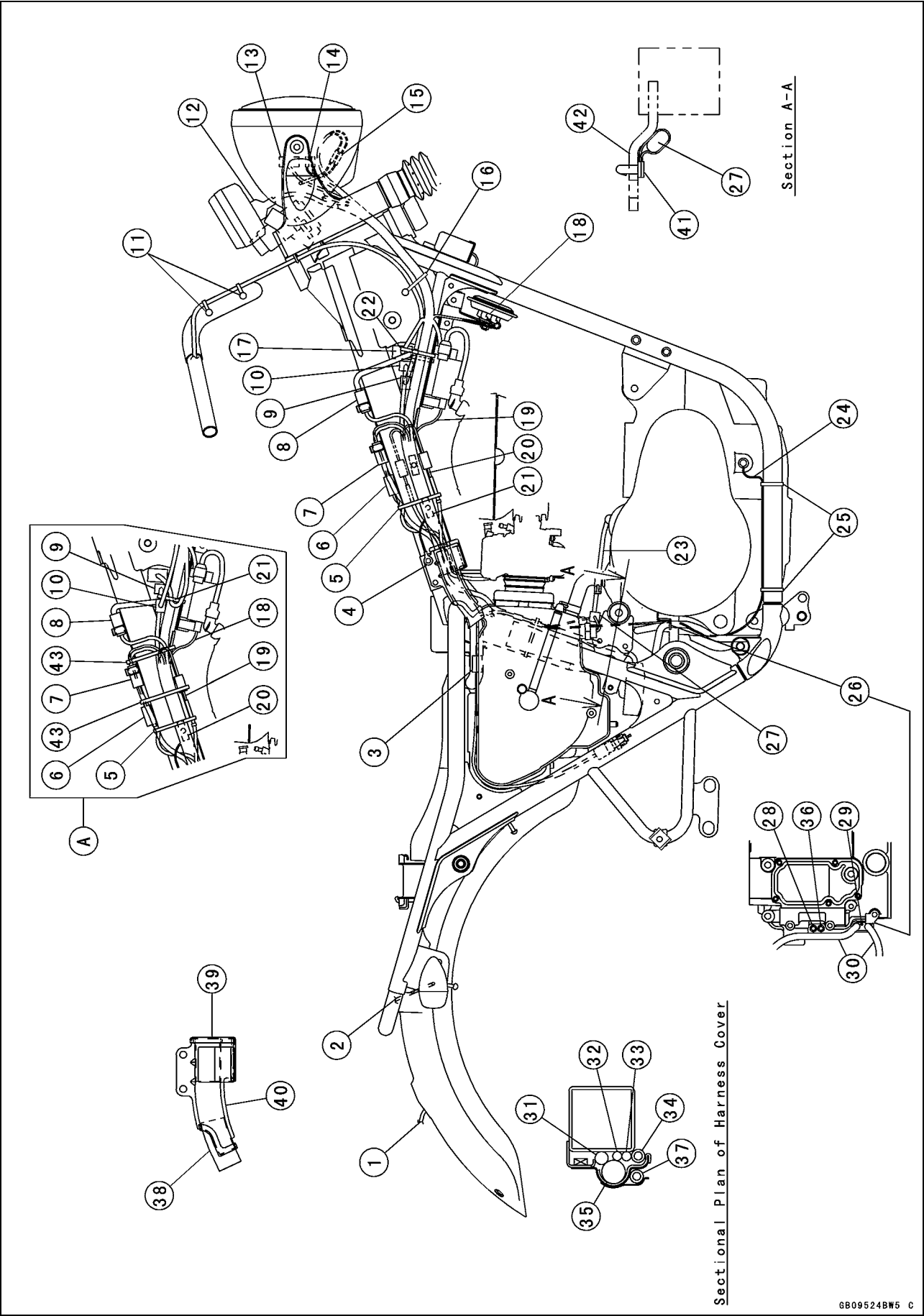


Cable, Wire, and Hose Routing

1. Meter Unit Connector
 2. Clamps
 3. Ignition Switch Connector
 4. Regulator/Rectifier Connector
 5. Carburetor Heater Connector
 6. Alternator (outside) and Crankshaft Sensor Connectors
 7. Starter Motor Lead
 8. Clamp
 9. Starter Relay
 10. Battery Terminal and Carburetor Heater Lead
 11. Junction Box Lead
 12. Normal Open Type Relay and Oil Pressure Warning Light Delay Unit Lead
 13. Rear Harness (Run the rear harness through the clamps in the rear fender)
 14. Band (Rear Harness)
 15. Turn Signal Light Lead (Japanese Model only)
 16. Tail and License & Brake Light Lead
 17. I.C. Igniter Leads
 18. Battery Ground Connector
 19. Turn Signal Relay
 20. Battery (+) Lead
 21. Throttle Sensor, Sidestand Switch and Gear Position Sensor Connector
 22. Battery (–) Lead
 23. Clamp
 24. Clamps
 25. Run the Sidestand Switch lead inside the clutch cable.
 26. Band
 27. Battery (–) Lead
 28. Lead Protective Tube (Insert the tube end to the engine sprocket cover.)
 29. Band
 30. Right Handlebar Switch Lead
 31. Carburetor Heater Control Unit
 32. Left Handlebar Switch Lead
 33. Clamp
 34. Front Left Turn Signal Light Connectors
 35. Battery (–) Lead
 36. Starter Motor Lead
 37. Air Cleaner Housing
 38. Lead Protective Tube
 39. Battery (–) Lead
 40. Starter Motor Lead
 41. Lead Protective Tube
 42. Note: Place the battery negative (–) lead and the starter motor lead inside the tube to prevent them from scraping against the side cover cutout. Also, be extremely careful when installing the side cover to prevent the wiring harnesses and leads from becoming jammed.
 43. Band
- A: On and after EJ650-C6P

16-8 APPENDIX

Cable, Wire, and Hose Routing

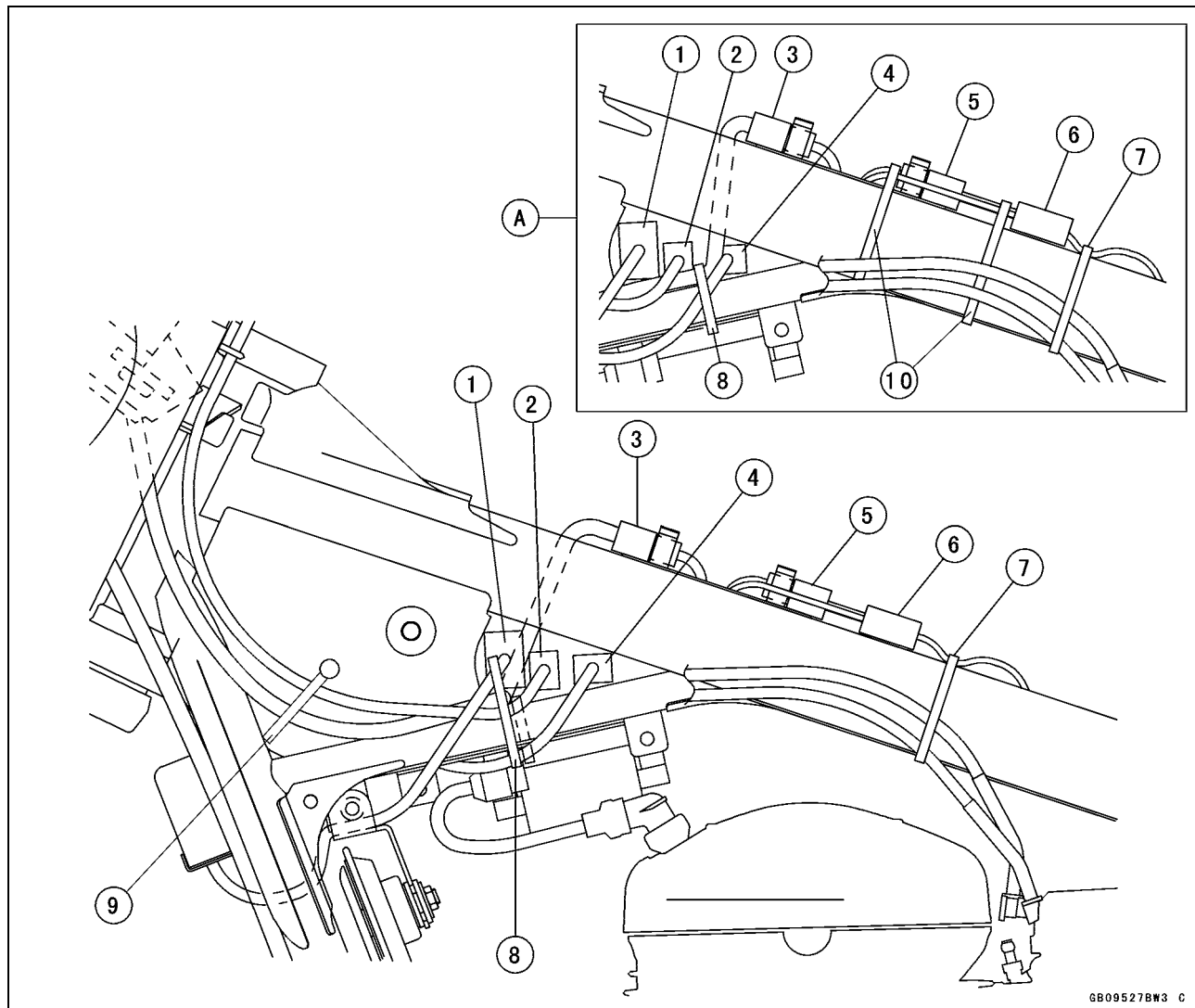


Cable, Wire, and Hose Routing

1. Tail & License & Brake Light Lead
2. Rear Right Turn Signal Light Lead (Japan Model only)
3. Rear Brake Light Switch Connector
4. Frame Ground (Install the frame ground together with main harness over.)
5. Band
6. Carburetor Heater Connector
7. Regulator/Rectifier Connector
8. Ignition Switch Connector
9. Left Handlebar Switch Connector
10. Right Handlebar Switch Connector
11. Clamps
12. Meter Connector
13. Headlight Connector
14. City Light Connectors (Europe Model Only)
15. Front Left Turn Signal Light Connectors
16. Clamp
17. Carburetor Heater Control Unit Connector
18. Horn (Take care the terminal caps direction)
19. Ignition Coil Leads
20. Throttle Sensor Lead (connect the sensor connector under the main harness.)
21. Main Harness Fix Position
22. Band
23. Starter Motor Lead
24. Oil Pressure Warning Light Switch Lead (Install the lead backward)
25. Bands
26. Clamp
27. Atmospheric Temperature Sensor Connector
28. Drain Hose (Fuel Tank)
29. Oil Pressure Warning Light Switch Lead
30. Drain Hoses of the Air Cleaner Housing
31. Regulator/Rectifier Lead
32. Throttle Sensor Lead
33. Carburetor Heater Lead
34. Drain Hose
35. Main Harness
36. Breather Hose (Fuel Tank)
37. Breather Hose (except California Model)
38. Cap (shall be adhered to the cover)
39. Cap (shall be adhered to the cover)
40. Cover
41. Clamp
42. Engine Bracket (rear right upper)
43. Band
- A: On and after EJ650-C6P

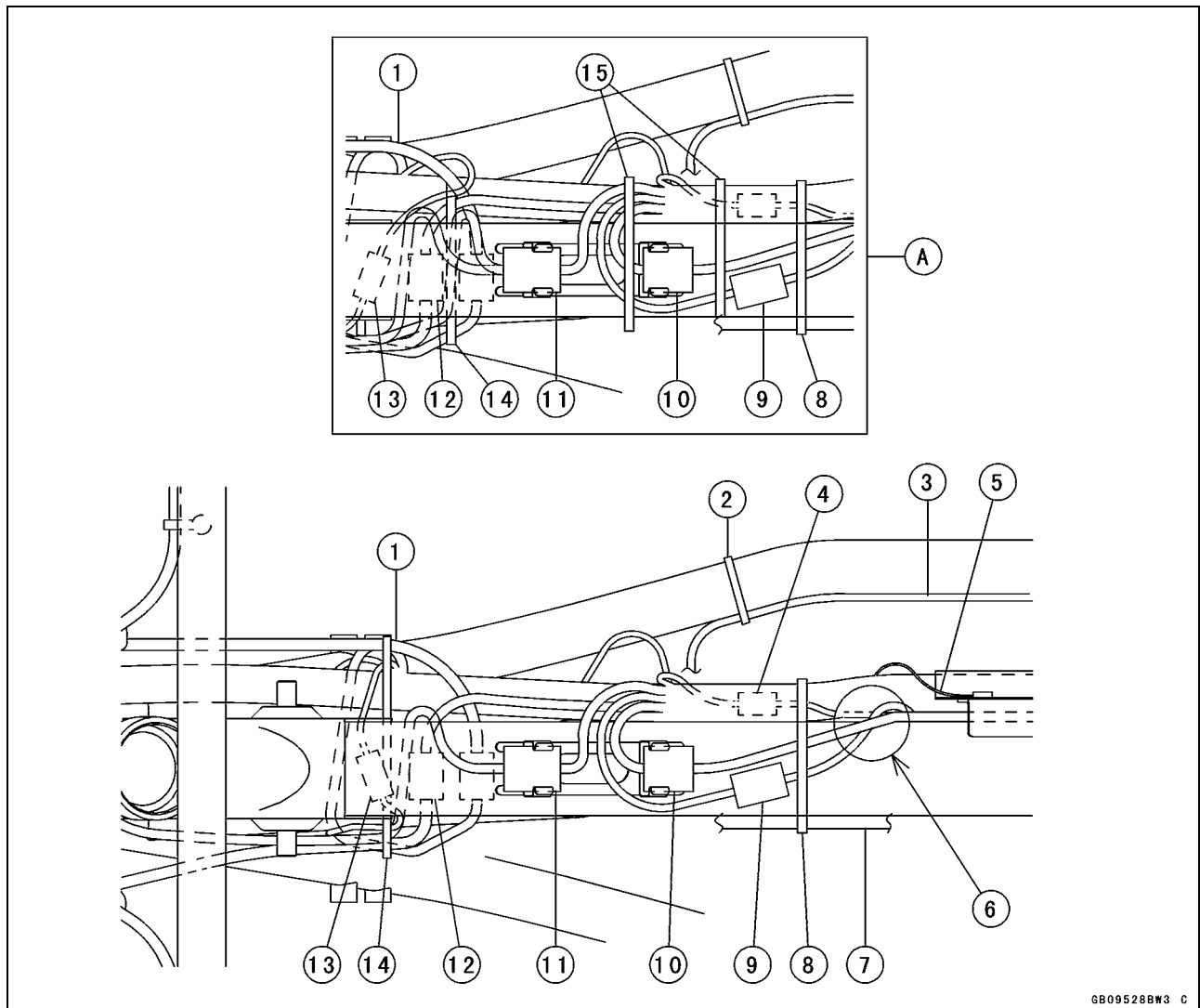
16-10 APPENDIX

Cable, Wire, and Hose Routing



1. Carburetor Heater Control Unit Connector
 2. Left Handlebar Switch Connector
 3. Ignition Switch Connector
 4. Right Handlebar Switch Connector
 5. Regulator/Rectifier Connector
 6. Carburetor Heater Connector
 7. Band
 8. Band
 9. Clamp (Ignition Switch, Left Handlebar Switch Leads and Throttle Cables)
 10. Band
- A: On and after EJ650-C6P

Cable, Wire, and Hose Routing

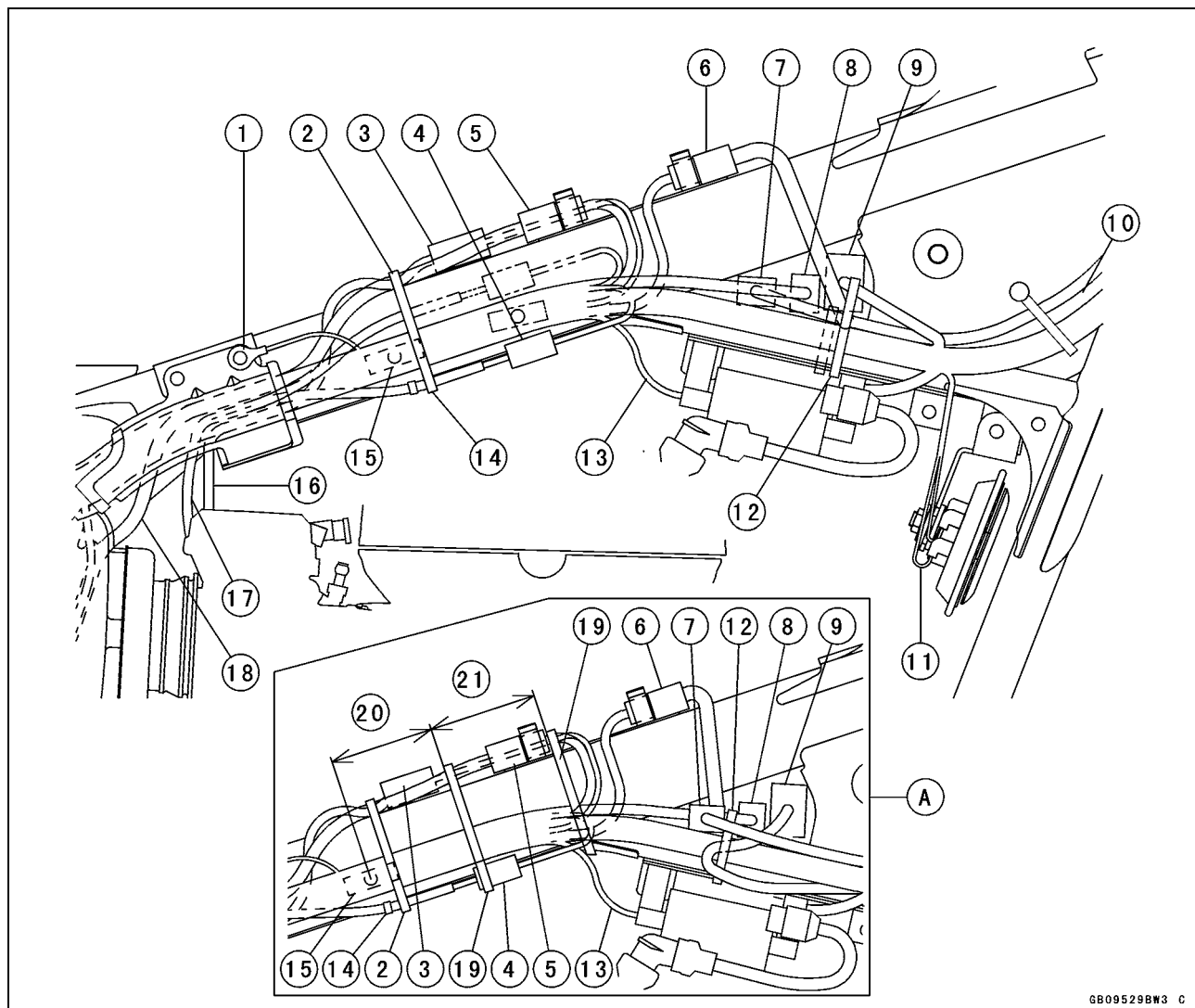


GB09528BW3 C

1. Right Handlebar Switch Lead
 2. Band
 3. Oil Pressure Warning Light Switch Lead
 4. Throttle Sensor Connector
 5. Frame Ground Lead
 6. Take care the lead direction
 7. Throttle Cables
 8. Band
 9. Carburetor Heater Connector
 10. Regulator/Rectifier Connector
 11. Ignition Switch Connector
 12. Left Handlebar Control Unit Connector
 13. Carburetor Heater Control Unit Connector
 14. Band
 15. Band
- A: On and after EJ650-C6P

16-12 APPENDIX

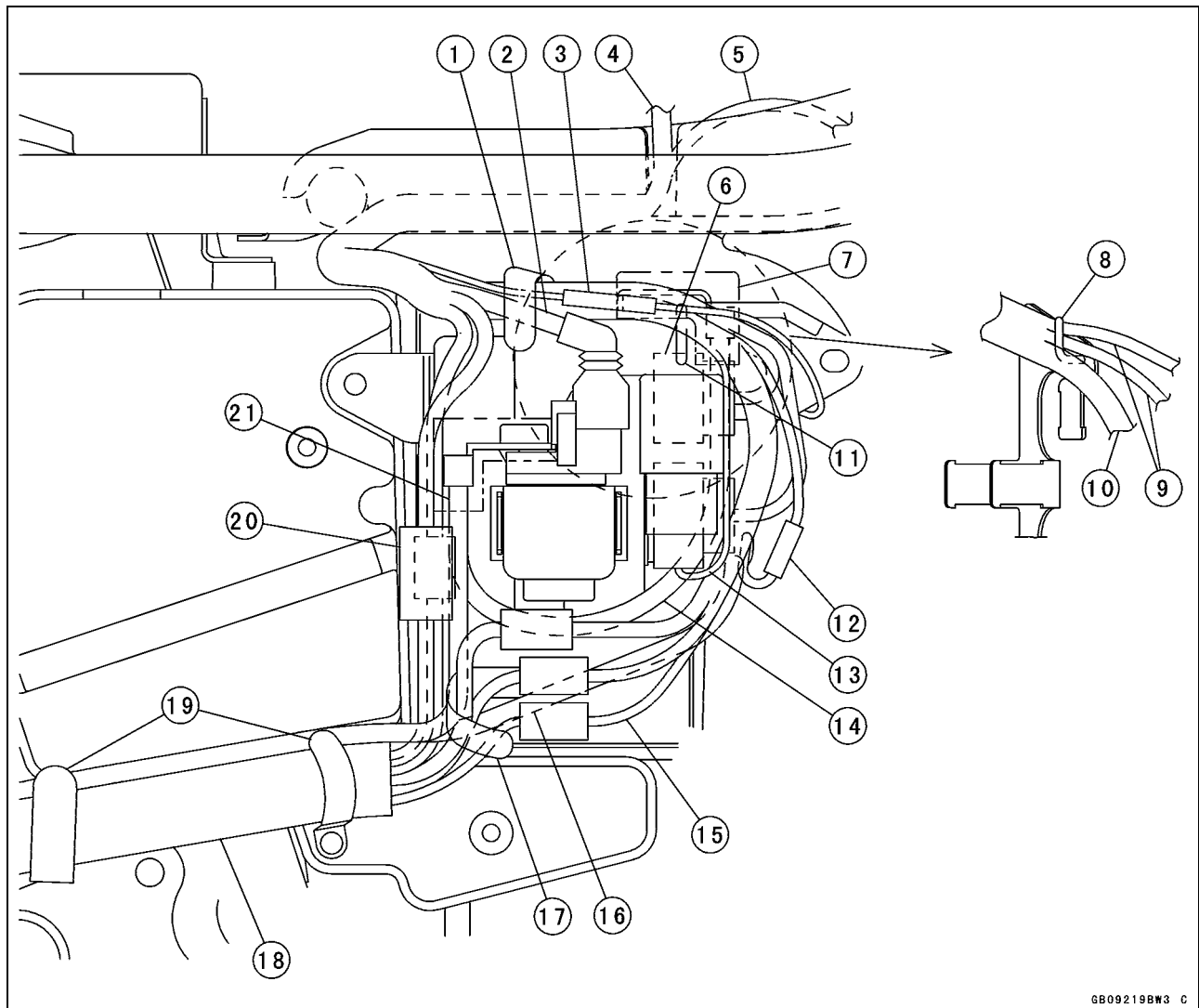
Cable, Wire, and Hose Routing



GB095298W3 C

1. Frame Ground (Install the frame ground together with main harness cover)
2. Band (Install the band to the front of the throttle sensor band [14].)
3. Carburetor Heater Connector
4. Throttle Sensor Connector
5. Regulator/Rectifier Connector
6. Ignition Switch Connector
7. Right Handlebar Switch Connector
8. Left Handlebar Switch Connector
9. Carburetor Heater Control Unit Connector
10. Clamp
11. Horn
12. Band
13. Ignition Coil Leads
14. Band (An Attached Throttle Sensor)
15. Main Harness Fix Position
16. Carburetor Heater Lead
17. Throttle Sensor Lead
18. Regulator/Rectifier Lead
19. Band
20. 50 ~ 70 mm (1.97 ~ 2.76 in.)
21. 70 ~ 90 mm (2.76 ~ 3.54 in.)
- A: On and after EJ650-C6P

Cable, Wire, and Hose Routing

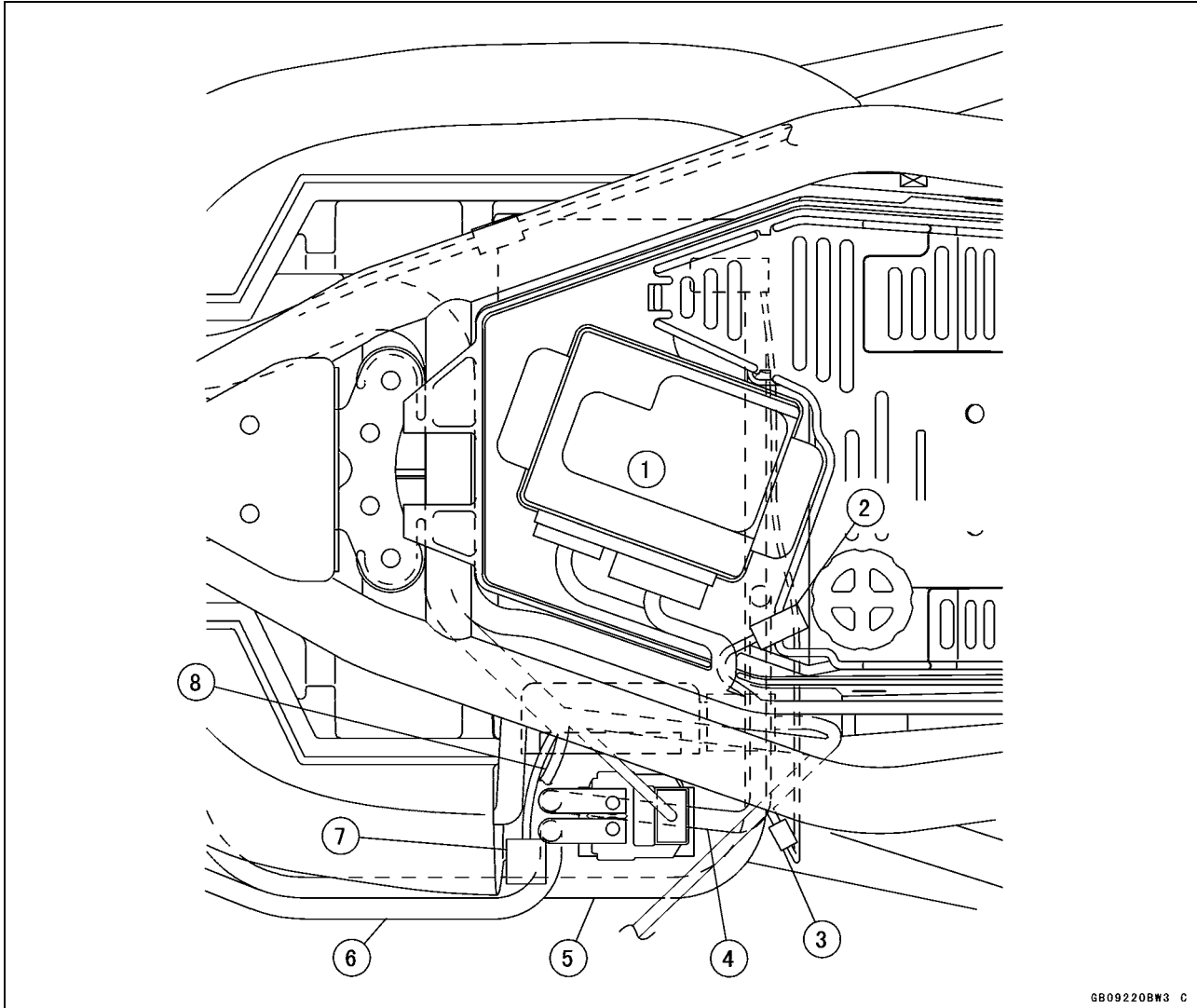


GB09219BW3 C

1. Clamp
2. Starter Relay
3. Positive Carburetor Heater Connector
4. Junction Box Lead
5. Normal Open Type Relay and Oil Pressure Warning Light Switch Leads
6. I.C. Igniter
7. Install the battery terminal from back side of the battery.
8. Clamp
9. Run the igniter leads inside of the clamp.
10. Run the other leads outside of the clamp.
11. Clamp
12. Battery (–) Lead Connector
13. Turn Signal Light Relay Lead
14. Battery (+) Lead
15. Throttle Sensor, Sidestand Switch and Gear Position Sensor Connectors
16. Battery (–) Lead
17. Clamp (Throttle Sensor, Sidestand Switch, Gear Position Sensor and Battery (–) Leads)
18. Lead Protective Tube
19. Clamps
20. Alternator (outside) and Crankshaft Sensor Connectors
21. Starter Motor Lead

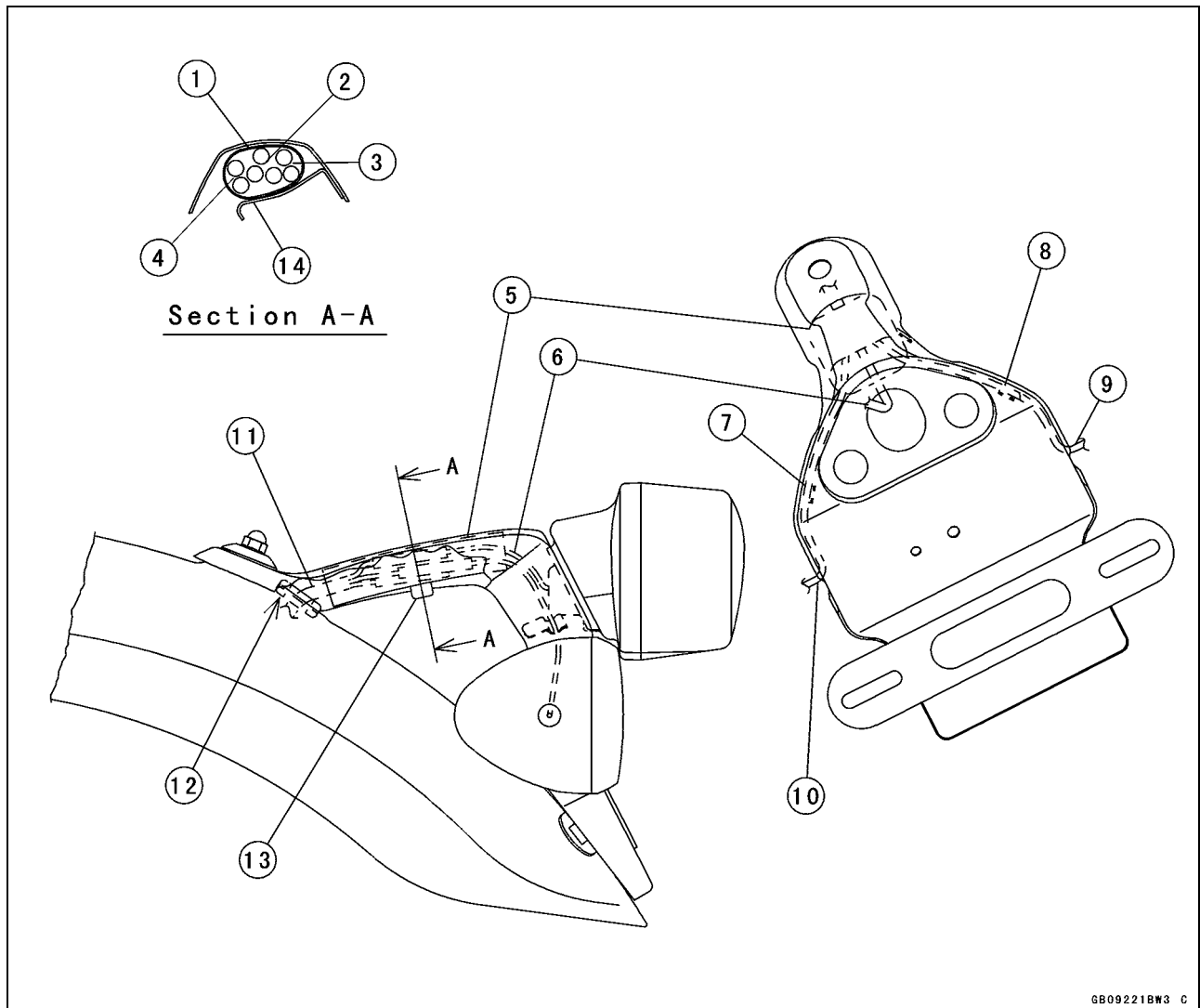
16-14 APPENDIX

Cable, Wire, and Hose Routing



1. Junction Box
2. Rectifier
3. Battery (-) Lead Connector
4. Battery (+) Lead
5. Battery (-) Lead
6. Starter Motor Lead
7. Alternator and Crankshaft Sensor Lead Connector
8. Crankshaft Sensor Lead

Cable, Wire, and Hose Routing

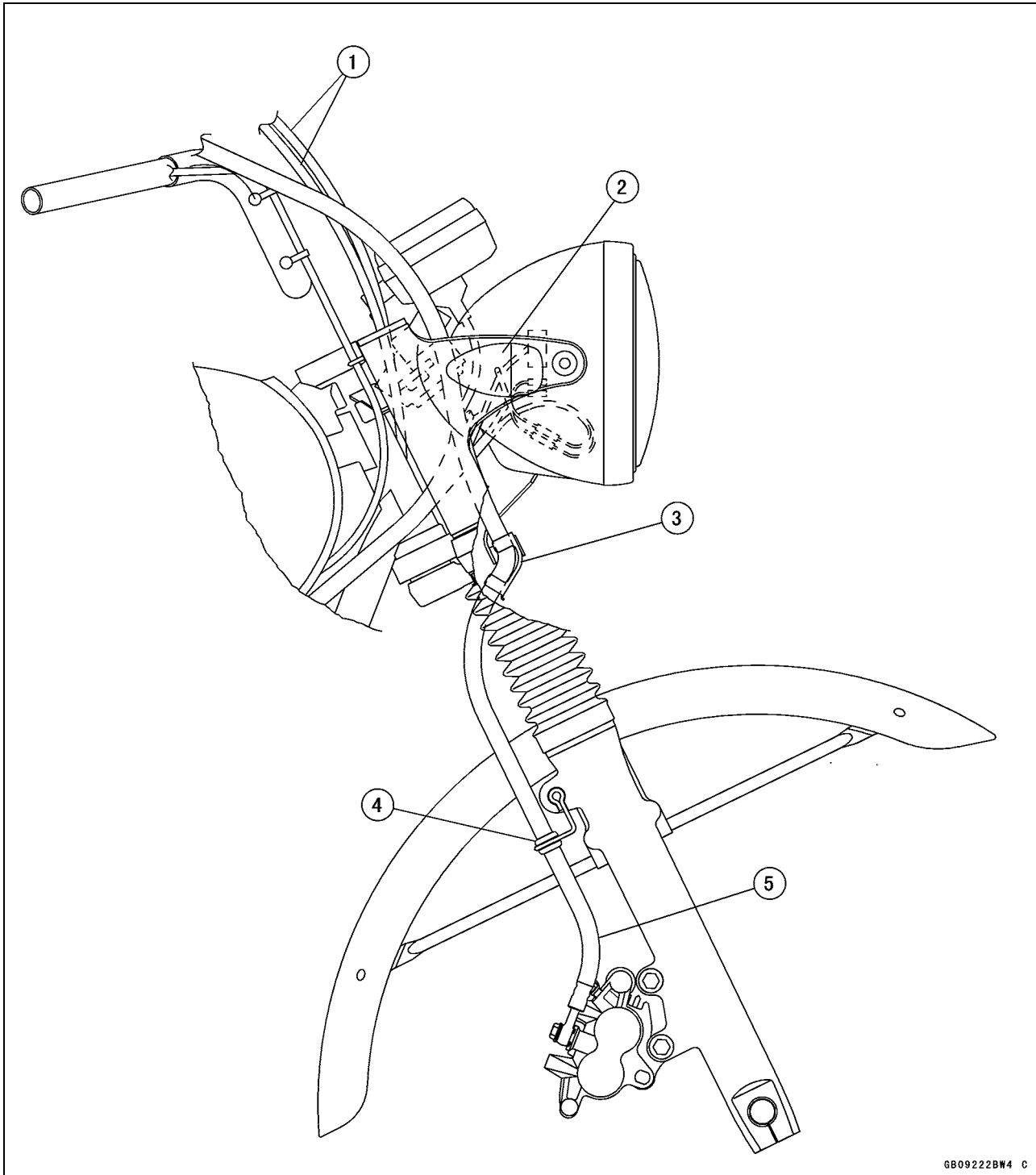


GB09221BW3 C

1. Tube
2. Tail & License & Brake Light Leads
3. Rear Right Turn Signal Light Leads
4. Rear Left Turn Signal Light Leads
5. Tube
6. Tail & License & Brake Light Lead
7. Clamp
8. Clamp
9. Run the rear right turn signal light lead through the clamp.
10. Run the rear left turn signal light lead through the clamp.
11. Rear Harness
12. Grommet
13. Clamp
14. Clamp (Push up the clamp after connecting the leads.)

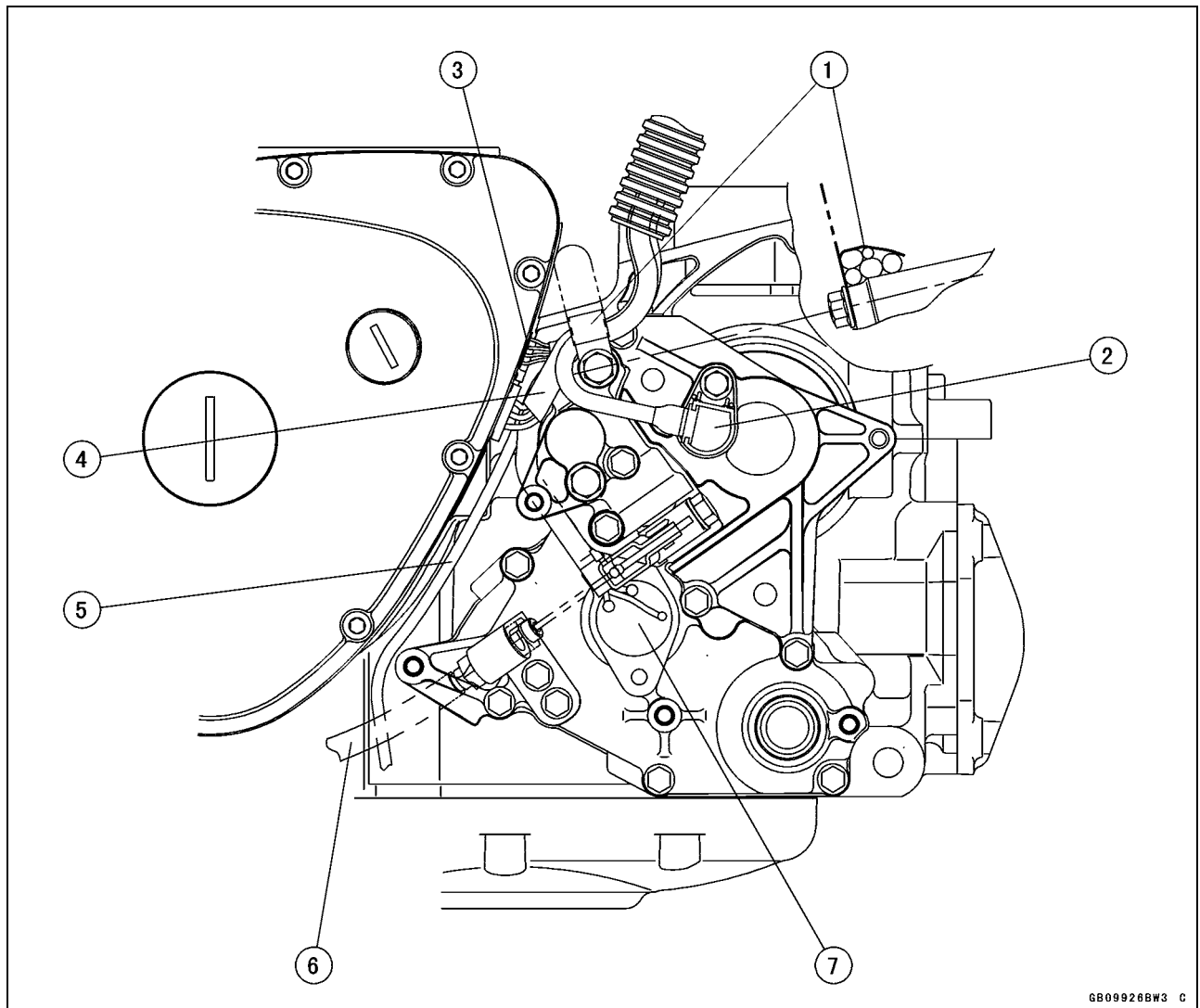
16-16 APPENDIX

Cable, Wire, and Hose Routing



1. Throttle Cables
2. Front Right Turn Signal Light Leads
3. Clamp (Install the clamp with headlight bracket.)
4. Clamp and Clamp Rubber
5. Brake Hose

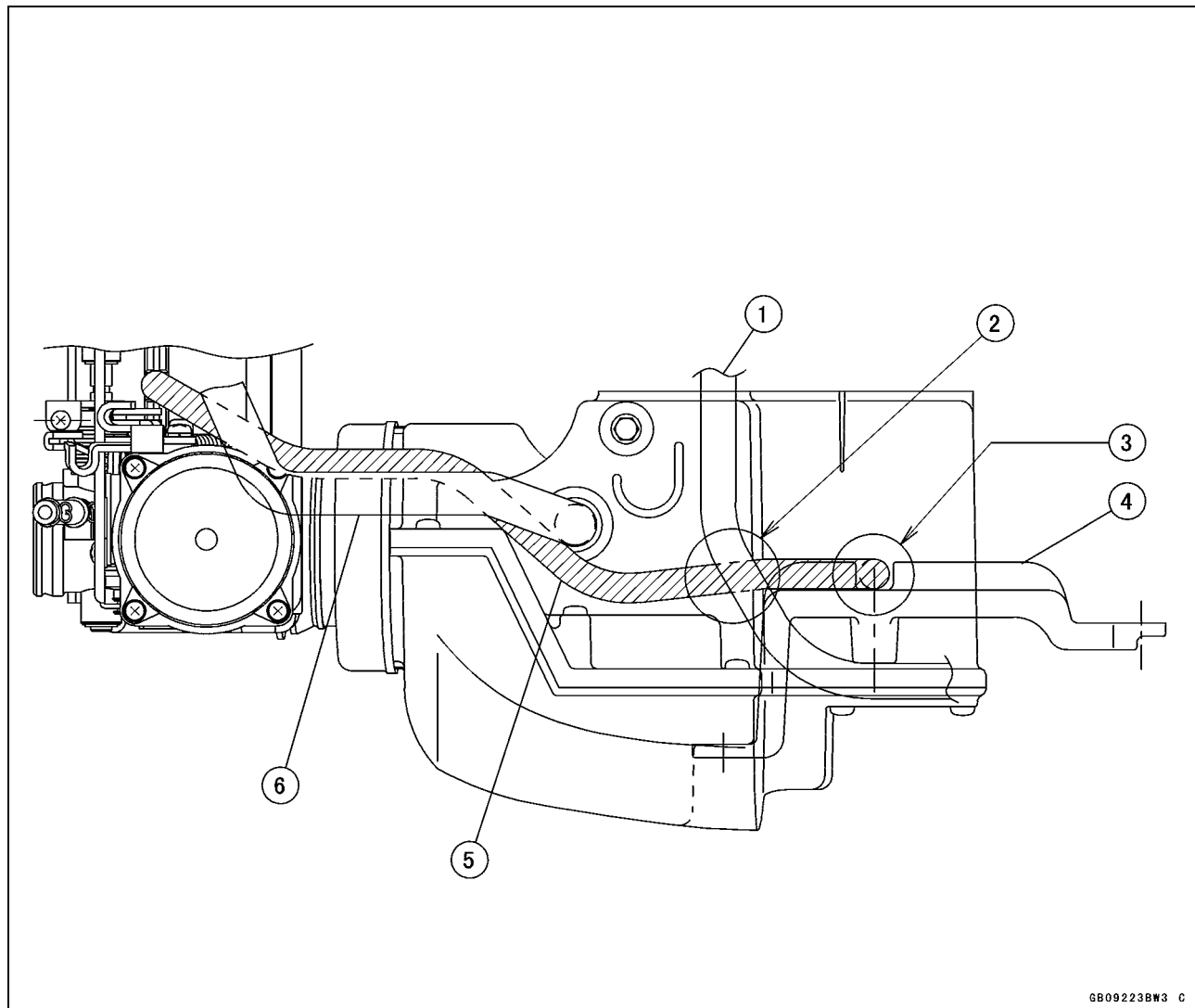
Cable, Wire, and Hose Routing



1. Clamp (Clamp the speed sensor, alternator, crankshaft sensor, gear position sensor and side stand switch leads and fold it to opposite side. Before folding the clamp, gather them to left side as possible as they can as shown so that they does not lap with the chain cover installation bolts.)
2. Speed Sensor
3. Crankshaft Sensor Lead
4. Alternator Lead
5. Side Stand Switch Lead
6. Clutch Cable
7. Gear Position Sensor

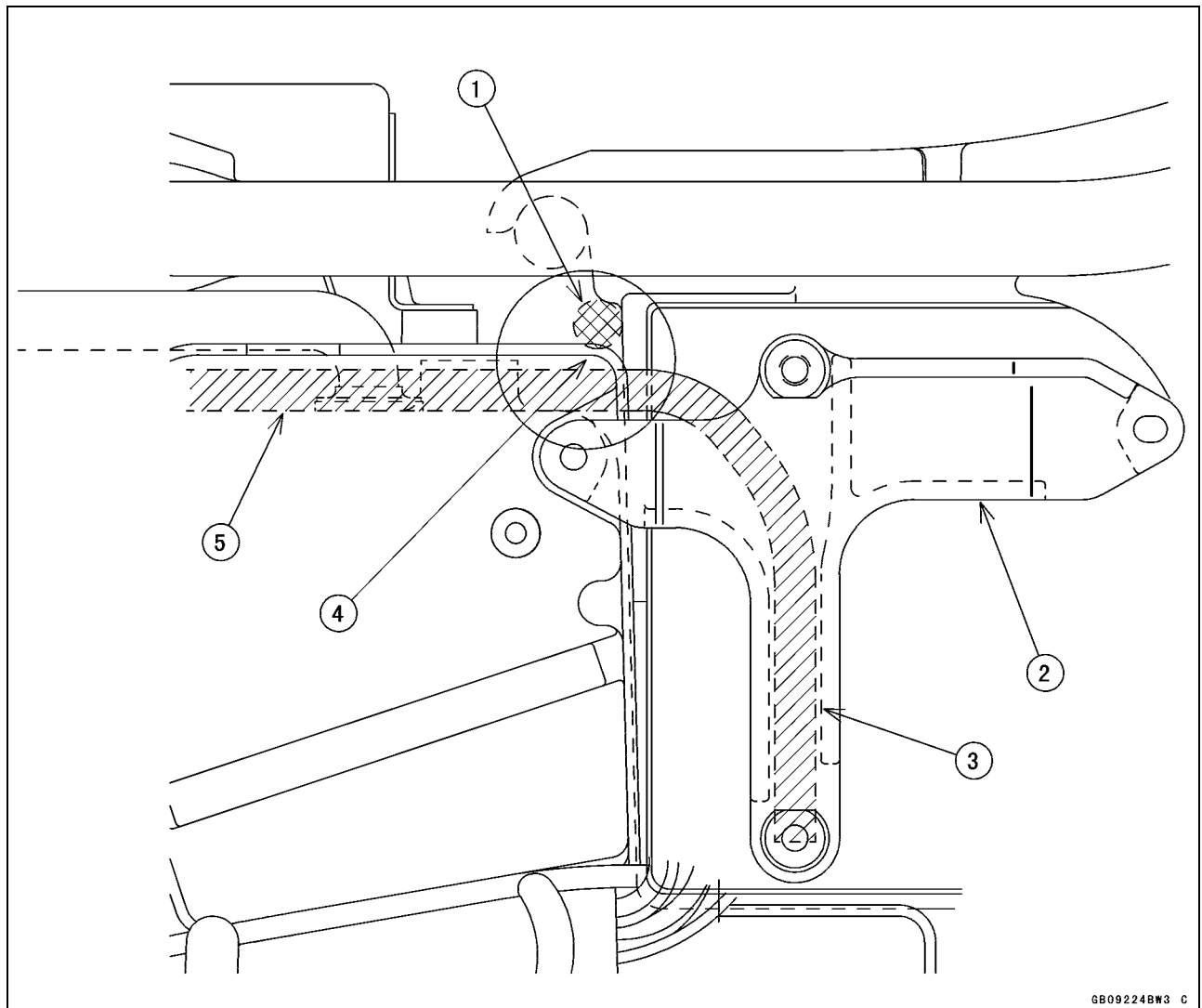
16-18 APPENDIX

Cable, Wire, and Hose Routing



1. Main Harness
2. Run the air vent tube under the main harness.
3. Insert the air vent tube to the groove.
4. Battery Holder
5. Air Vent Tube
6. Vacuum Valve Switch Pipe

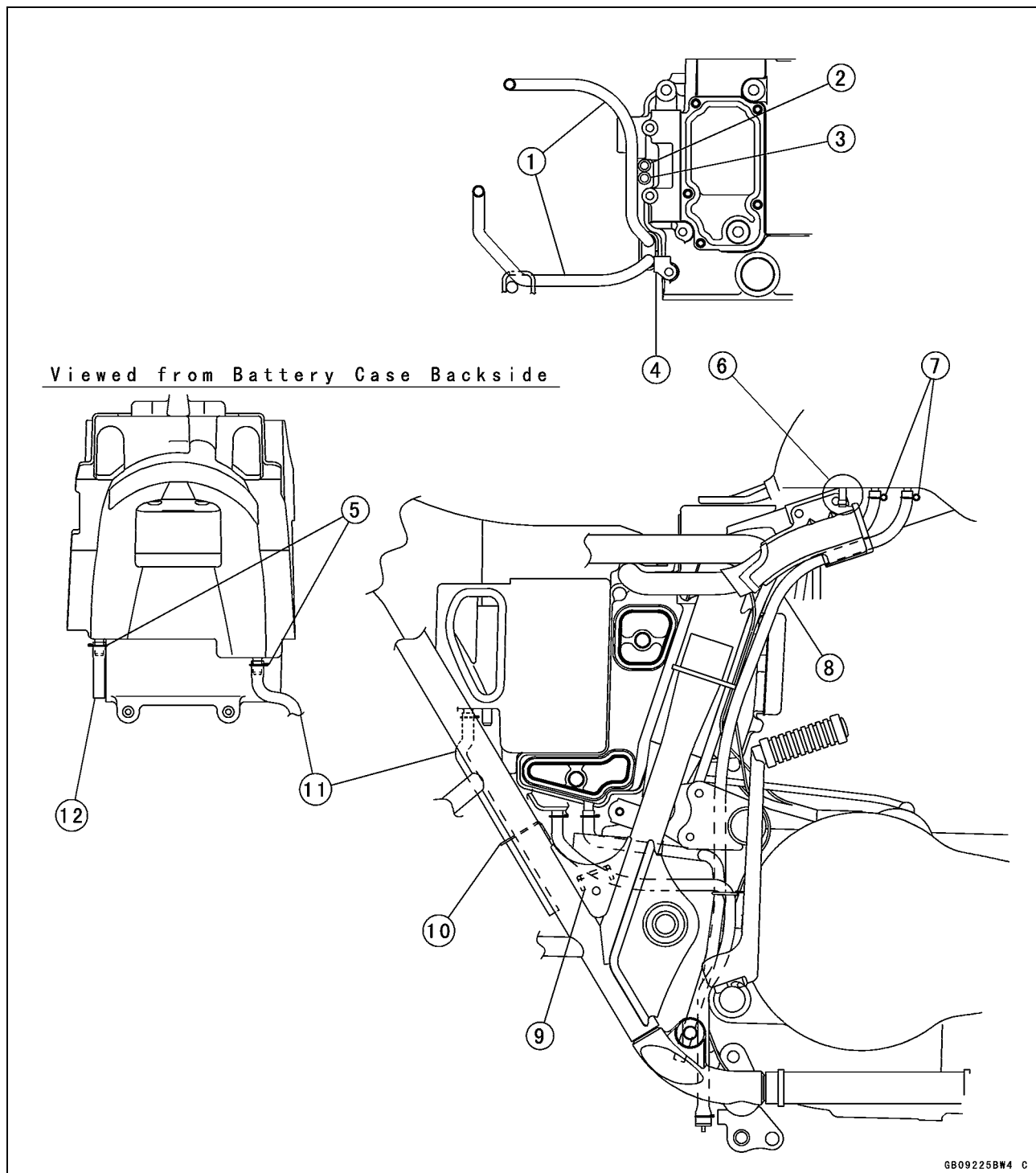
GB092238W3 C

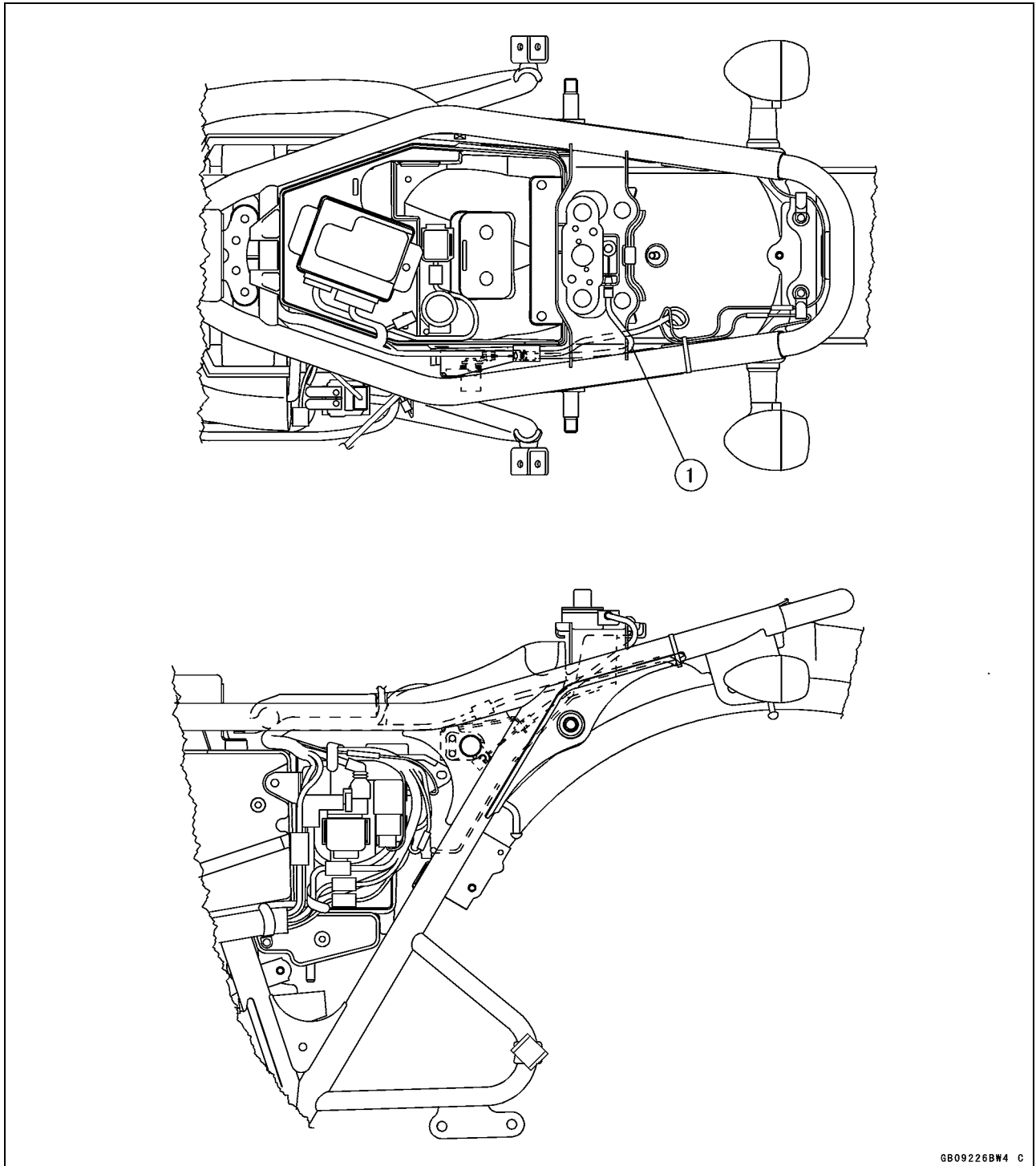
Cable, Wire, and Hose Routing

1. Main Harness
2. Battery Holder
3. Battery Holder Groove
4. Run the air vent tube under the main harness (Whether the air vent hose is crushed or not by the main harness when the side cover is installed is confirmed.)
5. Air Vent Tube

16-20 APPENDIX

Cable, Wire, and Hose Routing



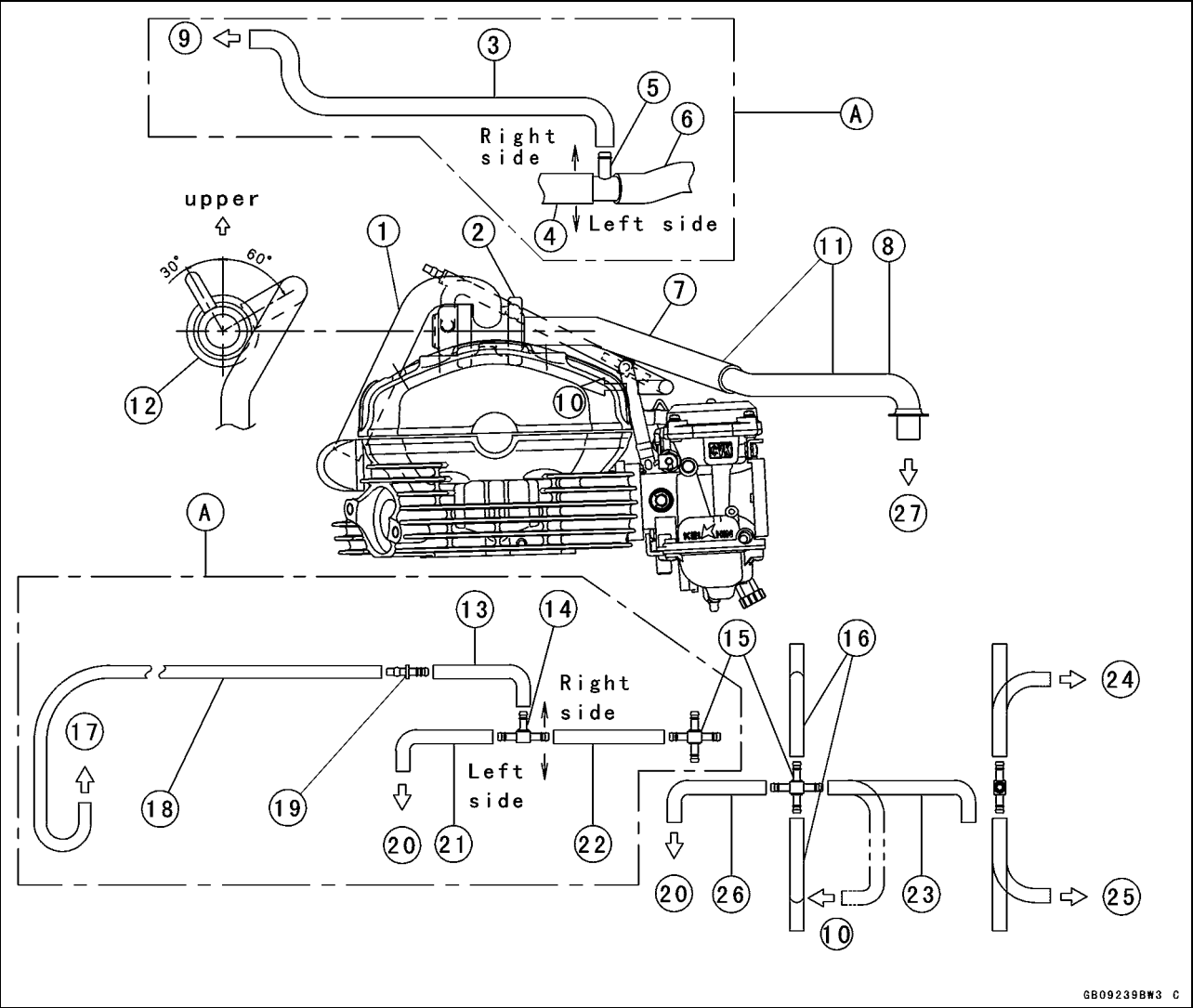
Cable, Wire, and Hose Routing

GB09226BW4 C

1. Seat Lock Cable

16-22 APPENDIX

Cable, Wire, and Hose Routing



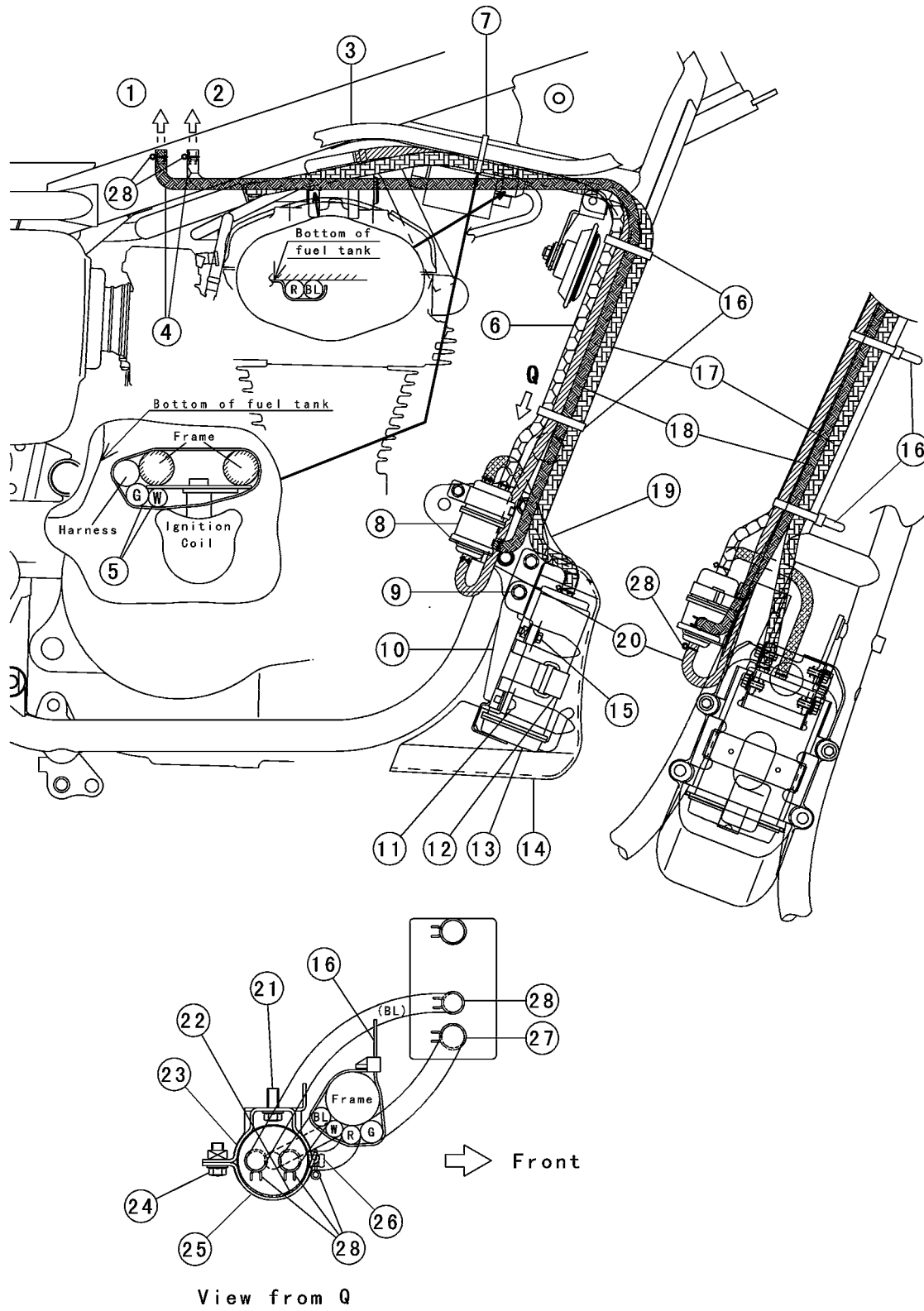
Cable, Wire, and Hose Routing

1. Vacuum Switch Valve Tube
2. Vacuum Switch Valve
3. Vacuum Switch Valve Tube (Green) (Install the tube with mark to the fitting)
4. Vacuum Switch Valve Tube
5. Fitting
6. Vacuum Switch Valve Tube
7. Vacuum Switch Valve Tube
8. Vacuum Switch Valve Pipe
9. To the Canister
10. To the Fuel Tap
11. Connect after aligning the white paint marks.
12. Direction of Air Hole
13. Tube
14. Fitting
15. Fitting
16. Tubes
17. To the Separator
18. Tube (White)
19. Fitting (Take care of the direction of fitting)
20. To the Vacuum Switch Valve
21. Tube
22. Tube
23. Tube
24. To the #2 Carburetor holder
25. To the #1 Carburetor holder
26. Tube
27. Insert to the grommet of upper Air Cleaner.
A: California and Taiwan Model

16-24 APPENDIX

Cable, Wire, and Hose Routing

Evaporative Emission Control System (California and Taiwan Model)



Cable, Wire, and Hose Routing

1. To the Fuel Tank (Blue tube)
2. To the Fuel Tank (Red tube)
3. Harness
4. Marked Side of tube should be connected to the fuel tank.
5. Two tubes (green & white) should be bound as shown.
6. Tube (Blue)
7. Band
8. Separator
9. Bolts
10. Bracket
11. Dampers
12. Band
13. Canister
14. Cover
15. Bolts
16. Bands (1. Tip of it should be directed to inside of frame. 2. It should be bound at upper place than the horn position.)
17. Tube (Green)
18. Tube (Red)
19. Tube (Blue) (Marked side should be connected to the canister)
20. Tube (White)
21. Bolt
22. Band
23. Bracket
24. Bolt
25. Bracket
26. The separator should be installed so that the nozzle for red tube point to forward.
27. Clamp
28. Clamps

Troubleshooting

NOTE

○ *This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

Engine Doesn't Start, Starting Difficulty

Starter motor not rotating:

- Starter lockout switch or gear position sensor trouble
- Starter motor trouble
- Battery voltage low
- Starter relay, starter circuit relay not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:

- Starter motor clutch trouble
- Torque limiter trouble

Engine won't turn over:

- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end, big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Balancer bearing seizure

No fuel flow:

- No fuel in tank
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel tap valve trouble
- Fuel tap vacuum hose clogged
- Fuel line clogged
- Carburetor float valve clogged
- Starting technique faulty (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)

Engine flooded:

- Fuel level in carburetor float bowl too high
- Float valve worn or jammed with foreign matter
- Starting technique faulty (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)

Fuel/air mixture incorrect:

- Pilot screw and/or idle adjusting screw improperly adjusted
- Pilot jet or air passage clogged

- Air cleaner element clogged, poorly sealed, or missing

- Starter jet clogged

No spark; spark weak:

- Ignition switch, engine stop switch OFF
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Spark plug dirty, broken, or improperly adjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect heat value
- IC igniter trouble
- Crankshaft sensor trouble
- Ignition coil trouble
- Ignition switch, engine stop switch shorted
- Gear position sensor, starter lockout switch, or side stand switch trouble.
- Wiring shorted or open
- Fuse blown

Compression low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve spring not seating properly (valve bent, deformed, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed

Spark weak:

- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect heat value
- IC igniter trouble
- Crankshaft sensor trouble
- Ignition coil trouble

Fuel/air mixture incorrect:

- Pilot screw improperly adjusted
- Pilot jet or air passage clogged
- Needle jet holder air passage clogged
- Pilot jet air passage clogged
- Air cleaner element clogged, poorly installed, or missing

Troubleshooting

Air cleaner sealing trouble
 Choke plunger stuck open
 Carburetor air vent hose clogged
 Carburetor starter system trouble
 Fuel level in carburetor float bowl too high or too low
 Fuel tank cap air vent obstructed
 Carburetor holder loose
 Air cleaner duct loose
 Air cleaner O-ring damaged
 Fuel tap clogged

Compression low:

Spark plug loose
 Cylinder head not sufficiently tightened down
 No valve clearance
 Cylinder, piston worn
 Piston ring deteriorated (worn, weak, broken, or sticking)
 Piston ring/groove clearance excessive
 Cylinder head gasket damaged
 Cylinder head warped
 Valve spring broken or weak
 Valve spring not seating properly (valve bent, deformed, worn, or carbon accumulation on the seating surface)

Other:

IC igniter trouble
 Carburetors not synchronizing
 Carburetor vacuum piston doesn't slide smoothly
 Carburetor vacuum piston diaphragm damaged
 Engine oil viscosity too high
 Brake dragging
 Drive train trouble
 Engine overheating
 Clutch slipping
 Throttle sensor trouble
 Bevel gear backlash maladjusted

Poor Running or No Power at High Speed

Firing incorrect:

Spark plug dirty, broken, or maladjusted
 Spark plug cap or high tension wiring trouble
 Spark plug cap shorted or not in good contact
 Spark plug incorrect heat value
 IC igniter trouble
 Crankshaft sensor trouble
 Ignition coil trouble

Fuel/air mixture incorrect:

Choke plunger stuck open
 Carburetor starter system trouble
 Main jet clogged or incorrect size
 Jet needle or needle jet worn
 Air jet clogged

Fuel level in carburetor float bowl too high or too low
 Needle jet air passage clogged
 Air cleaner element clogged, poorly sealed, or missing
 Air cleaner duct loose
 Air cleaner O-ring damaged
 Water or foreign matter in fuel
 Carburetor holder loose
 Fuel tank cap air vent obstructed
 Fuel tap clogged
 Fuel line clogged

Compression low:

Spark plug loose
 Cylinder head not sufficiently tightened down
 No valve clearance
 Cylinder, piston worn
 Piston ring deteriorated (worn, weak, broken, or sticking)
 Piston ring/groove clearance excessive
 Cylinder head gasket damaged
 Cylinder head warped
 Valve spring broken or weak
 Valve spring not seating properly (valve bent, deformed, worn, carbon accumulation on the valve surface)

Knocking:

Carbon build up in combustion chamber
 Fuel poor quality or incorrect
 Spark plug incorrect heat value
 IC igniter trouble
 Throttle sensor trouble

Other:

Throttle valve won't fully open
 Carburetor vacuum piston doesn't slide smoothly
 Carburetor vacuum piston diaphragm damaged
 Brake dragging
 Clutch slipping
 Bevel gear backlash maladjusted
 Overheating
 Engine oil level too high
 Engine oil viscosity too high
 Drive train trouble

Engine Overheating

Firing incorrect:

Spark plug dirty, broken, or maladjusted
 Spark plug incorrect
 IC igniter trouble

Fuel/air mixture incorrect:

Main jet clogged or incorrect size
 Fuel level in carburetor float bowl too low
 Carburetor holder loose
 Air cleaner element clogged, poorly sealed, or missing

Troubleshooting

Air cleaner duct loose

Air cleaner O-ring damaged

Compression high:

Carbon build up in combustion chamber

Engine load faulty:

Clutch slipping

Engine oil level too high

Engine oil viscosity too high

Brake dragging

Drive train trouble

Lubrication inadequate:

Engine oil level too low

Engine oil poor quality or incorrect

Clutch Operation Faulty

Clutch slipping:

Clutch cable maladjusted

Clutch inner cable sticking

Friction plate worn or warped

Steel plate worn or warped

Clutch spring broken or weak

Clutch release function trouble

Clutch hub or housing unevenly worn

Clutch not disengaging properly:

Clutch lever free play excessive

Clutch spring force uneven

Engine oil deteriorated

Engine oil viscosity too high

Engine oil level too high

Clutch housing seized

Clutch release function trouble

Clutch hub nut loose

Clutch plate warped or rough

Clutch hub spline damaged

Gear Shifting Faulty

Doesn't go into gear; shift pedal doesn't return:

Clutch not disengaging

Shift fork bent, worn, or seized

Shift return spring pin loose

Shift return spring weak or broken

Shift external mechanism arm broken

Shift external mechanism arm spring broken

Shift pawl broken

Gear seized

Gear set lever operation trouble

Shift drum 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 set lever spring weak or broken

Shift fork guide pin worn

Drive shaft, output shaft, and/or gear splines worn

Overshifts:

Gear set lever spring weak or broken

Shift external mechanism arm spring broken

Abnormal Engine Noise

Knocking:

IC igniter trouble

Carbon build up in combustion chamber

Fuel poor quality or incorrect

Spark plug incorrect heat value

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 portion worn

Valve lifter worn

Other noise:

Connecting rod big end, small end clearance excessive

Piston ring worn, broken, or stuck

Piston seizure, damage

Cylinder head gasket leaking

Exhaust pipe leaking at cylinder head connection

Crankshaft runout excessive

Engine mounts loose

Crankshaft bearing worn

Camshaft chain tensioner trouble

Camshaft chain, sprocket, chain guide worn

Primary gear worn or damaged

Balancer bearing worn

Alternator rotor loose

Bevel gear backlash & tooth contact maladjusted

Bevel gear bearing worn

Bevel gear worn or damaged

Abnormal Drive Train Noise

Clutch noise:

Clutch housing and friction plate engagement portion worn

Clutch housing gear worn

Outside friction plate groove incorrect installation

Foreign matter jammed in clutch housing gear teeth

Transmission noise:

Bearing worn

Transmission gear worn or damaged

Foreign matter jammed in gear teeth

Engine oil insufficient, low viscosity

Drive chain noise:

Drive chain maladjusted

Troubleshooting

- Drive chain worn
- Rear and/or engine sprocket worn
- Drive 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 trouble
- Spring weak or broken

Disc brake noise:

- Pad surface glazed
- Disc warped
- Caliper trouble
- Pad installed incorrectly

Drum brake noise:

- Brake lining worn or unevenly worn
- Drum unevenly worn or damaged
- Brake shoe spring weak or broken
- Foreign matter jammed in hub
- Brake maladjusted

Other noise:

- Bracket, nut, bolt, etc., not properly mounted or tightened

Oil Pressure Warning Light Stays ON

- Engine oil pump damaged
- Engine oil screen clogged
- Engine oil level too low
- Engine oil viscosity too low
- Camshaft bearing portion worn
- Crankshaft bearings worn
- Oil pressure warning light switch damaged
- Oil pressure warning light switch lead damaged
- Relief valve stuck open
- Crankcase oil passage O-ring damaged

Exhaust Smoke 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 element clogged
- Main jet too large or fallen off
- Choke valve stuck open
- Fuel level in carburetor float bowl too high

Brown smoke:

- Main jet too small
- Fuel level in carburetor float bowl too low
- Air cleaner duct loose
- Air cleaner O-ring damaged
- Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory

Handlebar hard to turn:

- Cable, hose, wire routing incorrect
- Steering stem nut too tight
- Steering stem bearing damaged
- Steering stem bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

Handlebar shakes or vibrates excessively:

- Tires worn
- Swingarm pivot bearings worn
- Rim warped
- Wheel bearing worn
- Handlebar clamp bolt loose
- Steering stem head bolt loose

Handlebar pulls to one side:

- Frame bent
- Rear wheel misaligned
- Swingarm bent or twisted
- Swingarm pivot shaft bent
- Steering maladjusted
- Front fork bent
- Right and left front fork oil level uneven

Suspension operation trouble: (Too hard)

- Tire air pressure too high
- Front fork oil excessive
- Front fork oil viscosity too high
- Rear shock absorber adjusted too hard
- Front fork bent

(Too soft)

- Front fork oil insufficient or leaking
- Front fork oil viscosity too low
- Rear shock absorber adjusted too soft
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking
- Tire air pressure too low

Brake Doesn't Hold

Disc brake:

- Air in brake system
- Pads, disc worn
- Brake fluid leaking
- Pads dirty
- Brake fluid deteriorated
- Brake master cylinder cup damaged
- Master cylinder inner wall damaged
- Disc warped

Drum brake:

- Brake maladjusted
- Brake lining worn or unevenly worn
- Drum unevenly worn or damaged
- Brake overheated
- Water in brake drum
- Brake cam, camshaft worn
- Brake lining contaminated with oil

16-30 APPENDIX

Troubleshooting

Battery Trouble

Battery Trouble

- Battery faulty (too low terminal voltage)
- Battery leads making poor contact
- Load excessive (e.g., bulb of excessive wattage)
- Ignition switch trouble
- Alternator trouble

Regulator/rectifier trouble

Wiring faulty

Battery overcharged:

- Battery faulty (temperature rise, safety valve open, lowterminal voltage)
- Alternator trouble
- Regulator/rectifier trouble

MODEL APPLICATION

Year	Model	Beginning Frame No.
1999	EJ650-A1	JKAEJ650AAA000001 or JKAEJEA1□XA000001
2000	EJ650-A2	JKAEJEA1□YA015001
2001	EJ650-A3	JKAEJEA1□1A030001 or JKAEJ650AAA030001
2001	EJ650-C3	JKAEJ650ACA030001
2002	EJ650-A4	JKAEJEA1□2A037001 or JKAEJ650AAA037001
2002	EJ650-C4	JKAEJ650ACA037001
2003	EJ650-A5	JKAEJEA1□3A041001 or JKAEJ650AAA041001
2003	EJ650-C5	KAEJ650ACA041001
2004	EJ650-C6P	JKAEJ650ACA046001
2005	EJ650-C7	JKAEJ650ACA049001
2006	EJ650C6F	JKAEJ650ACA053001

□: This digit in the frame number changes from one machine to another.



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