



# ZR-7S

ampere(s)	A
after bottom dead center	ABDC
alternating current	AC
after top dead center	ATDC
before bottom dead center	BBDC
before top dead center	BTDC
degree(s) Celsius	°C
direct current	DC
farad(s)	F
degree(s) Fahrenheit	°F
foot, feet	ft
gram(s)	g
hour(s)	h
liter(s)	l
ampere(s)	A
after bottom dead center	ABDC
alternating current	AC
after top dead center	ATDC
before bottom dead center	BBDC
before top dead center	BTDC
degree(s) Celsius	°C
direct current	DC
farad(s)	F
degree(s) Fahrenheit	°F
foot, feet	ft
gram(s)	g
hour(s)	h
liter(s)	l
lb	lb
m	m
min	min
N	N
Pa	Pa
PS	PS
psi	psi
r/min, rpm	r/min, rpm
TDC	TDC
TIR	TIR
V	V
W	W
Ω	Ω

# Motorcycle Service Manual

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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	r/min, 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)		

# Motorcycle Service Manual

**Read OWNER'S MANUAL before operating.**

**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 inlet system by cutting, drilling, or other means if such modifications result in increased noise levels.

**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.

## 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 inlet side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the fuel injection system.

### 2. Exhaust Emission Control System

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

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

### 3. Evaporative Emission Control System

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

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

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

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

### NOTE

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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.

# 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 Special Tool Catalog or 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 preparing this manual, we divided the product into its major systems. These systems became the manual's chapters. All information for a particular system from adjustment through disassembly and inspection is located in a single chapter.

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.

The Periodic Maintenance Chart is located in the General Information chapter. The chart gives a time schedule for required maintenance operations.

If you want spark plug information, for example, go to the Periodic Maintenance Chart first. The chart tells you how frequently to clean and gap the plug. Next, 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 Spark Plug 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.

### WARNING

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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.

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- Follow the procedures in the manual carefully. Don't take shortcuts.

- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

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 of parts.

# General Information

## Table of Contents

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Generally, installation or assembly is the reverse of removal or disassembly. 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 cause wire to stretch or 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 one 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.

(10) Liquid Gasket, Non-Permanent 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.

## 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 Leads

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.

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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.

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

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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.

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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.

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Replace a gasket or an O-ring with a new one 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.

(10) Liquid Gasket, Non-Permanent 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.

**Before Servicing**

(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. 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.

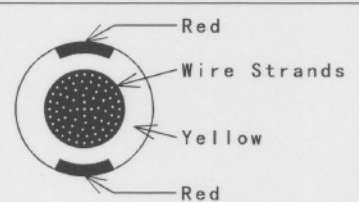

(17) Replacement Parts

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.

**Two-Color Electrical**

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

GB020801W1 0

(19) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

# 1-4 GENERAL INFORMATION

## Before Servicing

### (20) 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.

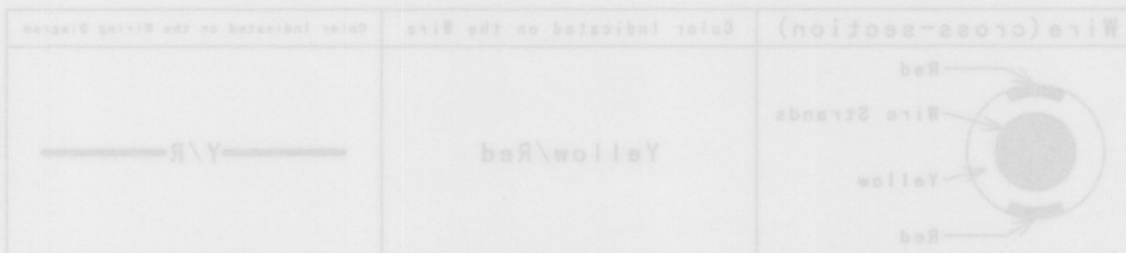
- |              |               |           |      |
|--------------|---------------|-----------|------|
| Abrasion     | Crack         | Hardening | Warp |
| Bent         | Dent          | Scratch   | Wear |
| Color change | Deterioration | Seizure   |      |

### (21) 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.



(19) Replacement Parts  
When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

Model Identification

Model Identification

ZR750-H1 (EU) Left Side View

ZR750-H1 (U.S.A. and Canada) Left Side View



ZR750-H1 (EU) Right Side View

ZR750-H1 (U.S.A. and Canada) Right Side View



## 1-6 GENERAL INFORMATION

### Model Identification

#### ZR750-H1 (U.S.A. and Canada) Left Side View



#### ZR750-H1 (U.S.A. and Canada) Right Side View



General Specifications

Items	ZR750-H1	ZR750-H2	ZR750-H3 ~ H5
<b>Dimensions</b>			
Overall Length	2 105 mm (82.87 in.)		
Overall Width	785 mm (30.9 in.)		
Overall Height	1 215 mm (47.83 in.)		
Wheelbase	1 455 mm (57.28 in.)		
Road Clearance	130 mm (5.12 in.)		
Seat Height	800 mm (31.50 in.)		
Dry Mass	210 kg (8.27 lb)		
Curb Mass:			
Front	111 kg (245 lb)		
Rear	117 kg (258 lb)		
Fuel Tank Capacity	22.0 L (5.8 US gal)		
<b>Performance</b>			
Minimum Turning Radius	2.8 m (110.2 in.)		
<b>Engine</b>			
Type	4-stroke, DOHC, 4-cylinder		
Cooling System	Air-cooled		
Bore And Stroke	66.0 × 54.0 mm (2.60 × 2.13 in.)		
Displacement	738 mL (45.03 cu in.)		
Compression Ratio	9.5		
Maximum Horsepower	56.0 kW (76 PS) @9 500 r/min (rpm), (US) -		
Maximum Torque	63.0 N·m (6.4 kgf·m, 46.3 ft·lb) @7 500 r/min (rpm), (US) -		
Carburetion System	Carburetor, Keihin, CVK32 × 4		
Starting System	Electric starter		
Ignition System	Battery and coil (transistorized)		
Timing Advance	Electronically advanced (digital igniter)		
Ignition Timing	From 12.5° BTDC @1 100 r/min (rpm) [(CAL, TW) @1 300 r/min (rpm)] to 37.5° BTDC @9 000 r/min (rpm)		
Spark Plugs	NGK DR9EA or ND X27 ESR-U		
Cylinder Numbering Method	Left to right 1-2-3-4		
Firing Order	1-2-4-3		
Valve Timing:			
Inlet			
Open	30° BTDC		
Close	60° ABDC		
Duration	270°		
Exhaust			
Open	60° BBDC		
Close	30° ATDC		
Duration	270°		
Lubrication System	Forced lubrication (wet sump with cooler)		

# 1-8 GENERAL INFORMATION

## General Specifications

Items	ZR750-H1	ZR750-H2	ZR750-H3 ~ H5
Engine Oil:			
Type	API SE, SF or SG API SH or SJ with JASO MA		
Viscosity	SAE10W-40, 10W-50, 20W-40, or 20W-50	SAE10W-40	
Capacity	3.6 L (3.8 US qt)		
<b>Drive Train</b>			
Primary Reduction System:			
Type	Chain and gear		
Reduction Ratio	2.550 (27/23 × 63/29)		
Clutch Type	Wet multi disc		
Transmission:			
Type	5-speed, constant mesh, return shift		
Gear Ratios:			
1st	2.333 (35/15)		
2nd	1.631 (31/19)		
3rd	1.272 (28/22)		
4th	1.040 (26/25)		
5th	0.875 (21/24)		
Final Drive System:			
Type	Chain		
Reduction ratio	2.375 (38/16)		
Overall drive ratio	5.299 @ Top gear		
<b>Frame</b>			
Type	Tubular, double cradle		
Caster (Rake Angel)	25.5°		
Trail	93 mm (3.66 in.)		
Front Tire:			
Type	Tubeless		
Size	120/70ZR17 58 W	120/70ZR17M/C 58 W	
Rear Tire:			
Type	Tubeless		
Size	160/60ZR17 69 W	160/60ZR17M/C 69 W	
Front Suspension:			
Type	Telescopic fork		
Wheel Travel	130 mm (5.12 in.)		
Rear Suspension:			
Type	Uni-trak swingarm		
Wheel Travel	130 mm (5.12 in.)		



# 1-10 GENERAL INFORMATION

## Periodic Maintenance Chart (U.S.A., Canada and Taiwan 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.**

FREQUENCY	Whichever comes first →	* ODOMETER READING × 1 000 km (× 1 000 mile)						
		0.8 (0.5)	5 (3)	10 (6)	15 (9)	20 (12)	25 (15)	30 (18)
INSPECTION	↓ Every							
Carburetor synchronization - check †		●	●	●	●	●	●	●
Idle speed - check †		●	●	●	●	●	●	●
Throttle grip play - check †		●		●		●		●
Spark plug - clean and gap †			●	●	●	●	●	●
Valve clearance - check †		●		●		●		●
Air suction valve - check †			●	●	●	●	●	●
Air cleaner element - clean		●	●	●	●	●	●	●
Air cleaner element - replace	5 cleanings					●		
Fuel system - check				●		●		●
Cylinder head bolt tightness - check †		●		●		●		●
Evaporative emission control system (CAL, TW) - check †		●	●	●	●	●	●	●
Brake light switch - check †		●	●	●	●	●	●	●
Brake pad wear - check #			●	●	●	●	●	●
Brake fluid level - check †	month	●	●	●	●	●	●	●
Brake fluid - change	2 years					●		
Clutch - adjust		●	●	●	●	●	●	●
Steering - check †		●	●	●	●	●	●	●
Drive chain wear - check †#			●	●	●	●	●	●
Muffler, exhaust pipe nuts and bolts tightness-perform †		●		●				
Nut, bolt, fastener tightness - check †		●		●		●		●
Tire wear - check †			●	●	●	●	●	●
Engine oil - change #	years	●		●		●		●
Oil filter - replace		●		●		●		●
General lubrication - perform			●	●	●	●	●	●
Front fork oil - change								●
Swingarm pivot, uni-trak linkage-lubricate				●		●		●
Steering stem bearing - lubricate	2 years					●		
Master cylinder cup and dust seal - replace	2 years							
Caliper piston seal and dust seal - replace	2 years							
Brake hose - replace	4 years							
Fuel hose - replace	4 years							
Drive chain - lubricate #		Every 600 km (400 mi)						
Drive chain slack - check #		Every 1 000 km (600 mi)						

Periodic Maintenance Chart (U.S.A., Canada and Taiwan 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.

Throttle control system-check: Check the throttle grip play and the throttle body bores.

CAL: California model

TW: Taiwan model

Item	Frequency	Severe Conditions	California Model (CAL)	Taiwan Model (TW)
Drive chain slack - check † #	Every 1,000 km (600 mi)			
Drive chain - lubricate #	Every 600 km (400 mi)			
Caliper piston seal and dust seal - replace	4 years			
Master cylinder cup and dust seal - replace	4 years			
Steering stem bearing - lubricate	2 years			
Swingarm pivot, uni-trak linkage - lubricate				
Rear shock absorber oil leak - check †				
Front fork oil leak - check †				
Front fork oil - change	2 years			
General lubrication - perform				
Oil filter - replace				
Engine oil - change #	6 months			
Tire wear - check †				
Muffler, exhaust pipe nuts and bolts tightness-perform †				
Nut, bolt, and fastener tightness - check †				
Drive chain wear - check † #				
Steering - check †				
Clutch - adjust				
Brake fluid - change	2 years			
Brake fluid level - check †	month			
Brake pad wear - check † #				
Fuel hose, connections - check †				
Brake hose, connections - check †				
Brake light switch - check †				
Cylinder head bolts tightness - check †				
Air cleaner element - clean † #				
Air suction valve - check †				
Valve clearance - check †				
Spark plug - clean and gap †				
Throttle grip play - check †				
Idle speed - check †				
Carburetor synchronization - check †				

#: 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.

# 1-12 GENERAL INFORMATION

## Periodic Maintenance Chart (Other than U.S.A., Canada, Taiwan Model)

INSPECTION	FREQUENCY ↓ Whichever comes first	* ODOMETER READING × 1 000 km (× 1 000 mile)						
		1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)
Carburetor synchronization - check †				●		●		●
Idle speed - check †		●		●		●		●
Throttle grip play - check †		●		●		●		●
Spark plug - clean and gap †			●	●	●	●	●	●
Valve clearance - check †				●		●		●
Air suction valve - check †			●	●	●	●	●	●
Air cleaner element - clean † #		●		●		●		●
Cylinder head bolts tightness - check †		●						
Brake light switch - check †		●	●	●	●	●	●	●
Brake hose, connections - check †			●	●	●	●	●	●
Fuel hose, connections - check †			●	●	●	●	●	●
Brake pad wear - check † #			●	●	●	●	●	●
Brake fluid level - check †	month	●	●	●	●	●	●	●
Brake fluid - change	2 years					●		
Clutch - adjust		●	●	●	●	●	●	●
Steering - check †		●	●	●	●	●	●	●
Drive chain wear - check † #			●	●	●	●	●	●
Nut, bolt, and fastener tightness - check †		●		●		●		●
Muffler, exhaust pipe nuts and bolts tightness-perform †		●		●				
Tire wear - check †			●	●	●	●	●	●
Engine oil - change #	6 month	●	●	●	●	●	●	●
Oil filter - replace		●		●		●		●
General lubrication - perform				●		●		●
Front fork oil - change	2 years					●		
Front fork oil leak - check †				●		●		●
Rear shock absorber oil leak - check †				●		●		●
Swingarm pivot, uni-trak linkage - lubricate				●		●		●
Steering stem bearing - lubricate	2 years			●		●		●
Master cylinder cup and dust seal - replace	4 years							
Caliper piston seal and dust seal - replace	4 years							
Drive chain - lubricate #		Every 600 km (400 mi)						
Drive chain slack - check † #		Every 1,000 km (600 mi)						

#: 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.

**Torque and Locking Agent**

Tighten all bolts and nuts to the proper torque using an accurate torque wrench. An insufficiently tightened bolt or nut may become damaged or fall off, possibly resulting in damage to the motorcycle and injury to the rider. A bolt or nut which is overtightened may become damaged, strip an internal thread, or break and then fall out. The following table lists the tightening torque for the major bolts and nuts, and the parts requiring use of a non-permanent locking agent or liquid gasket.

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

Letters used in the "Remarks" column mean:

**C:** Caulk the head of the fasteners after tightening.

**G:** Apply high temperature grease to the threads.

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

**LG:** Apply liquid gasket to the threads.

**O:** Apply engine oil to the threads and shaft portion.

**MO:** Apply molybdenum disulfide oil.

**The molybdenum disulfide oil is a mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).**

**R:** Replacement parts

**S:** Tighten the fasteners following the specified sequence.

**SS:** Apply silicone sealant (Kawasaki Bond: 56019-120) to the threads.

Fastener	Torque			Remarks
	N-m	kgf-m	ft-lb	
<b>Fuel System</b>				
Carburetor Holder Bolts	12	1.2	104 in-lb	L
Fuel Level Sensor Bolts	3.9	0.4	35 in-lb	
Fuel Tap Diaphragm Cover Screws	1.0	0.1	9 in-lb	
Fuel Tap Mounting Bolts	2.5	0.25	22 in-lb	
<b>Engine Top End</b>				
Air Suction Cover Bolts	12	1.2	104 in-lb	
Cylinder Head Cover Bolts	12	1.2	104 in-lb	L
Spark Plugs	14	1.4	10	
Cylinder Head Bolts	29	3.0	22	S
Cylinder Head Nuts	39	4.0	29	S
Camshaft Cap Bolts	12	1.2	104 in-lb	S
Camshaft Sprocket Bolts	15	1.5	11	L
Carburetor Holder Bolts	12	1.2	104 in-lb	L
Camshaft Chain Guide Bolts	11	1.1	97 in-lb	
Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in-lb	
Camshaft Chain Tensioner Cap Bolt	5.2	0.5	46 in-lb	
Muffler Connecting Nuts	34	3.5	25	
Muffler Mounting Bolt	25	2.5	18	
<b>Clutch</b>				
Clutch Hub Nut	132	13.5	98	R
Clutch Spring Bolts	8.8	0.9	78 in-lb	
Clutch Cover Damper Plate Bolts	9.8	1.0	87 in-lb	L
Clutch Cover Bolts	12	1.2	104 in-lb	
Clutch Release Lever Clamp Bolt	5.9	0.6	52 in-lb	
<b>Engine Lubrication System</b>				
Oil Cooler Pipe Joint Nuts	22	2.2	16	

# 1-14 GENERAL INFORMATION

## Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Pipe Lower End Mounting Bolts	8.8	0.9	78 in·lb	
Oil Passage Plugs	15	1.5	11	
Oil Pressure Switch	15	1.5	11	SS
Oil Pump Mounting Screws	5.1	0.52	45 in·lb	C
Oil Pump Mounting Bolts	5.1	0.52	45 in·lb	
Oil Pressure Relief Valve	15	1.5	11	L
Oil Filler Cap	1.5	0.15	13 in·lb	(Finger tighten)
Engine Oil Drain Plug	29	3.0	22	
Oil Pan Bolts	12	1.2	104 in·lb	
Oil Filter Mounting Bolt	20	2.0	14 in·lb	O
<b>Engine Removal/Installation</b>				
Engine Bracket Bolts	25	2.5	18	
Engine Mounting Bolts, Nuts	44	4.5	33	
<b>Crankshaft/Transmission</b>				
Upper Crankcase Studs	–	–	–	L (Planted side)
Upper Crankcase M6 Bolts	12	1.2	104 in·lb	
Upper Crankcase M8 Bolts	25	2.5	18	S
Lower Crankcase M6 Bolts	12	1.2	104 in·lb	S
Connecting Rod Big End Cap Nuts	36	3.7	27	
Return Spring Pin	20	2.0	14	
External Shift Mechanism Cover Bolts:				
(35 mm Length)	9.8	1.0	87 in·lb	L
(20 mm Length)	9.8	1.0	87 in·lb	
Neutral Switch	15	1.5	1.1	
Shift Pedal Pivot Bolt	23	2.3	17	G
Oil Passage Plug	15	1.5	11	L
Oil Nozzles	6.9	0.7	61 in·lb	L
Primary Chain Tensioner Holder Bolts	26	2.7	19	
Primary Chain Guide Bolts	12	1.2	104 in·lb	L
Starter Clutch Mounting Bolts	12	1.2	20	L
Secondary Shaft Bearing Holder Screws	5.1	0.52	45 in·lb	C
Secondary Shaft Nut	59	6.0	43	
Secondary Shaft Bearing Cap Screws	9.8	1.0	87 in·lb	
Shift Drum Pin Plate Screw	–	–	–	L
Shift Drum Guide Bolt	26	2.7	19	L
Shift Drum Positioning Bolt	26	2.7	19	
<b>Wheels/Tires</b>				
Front Axle Clamp Bolt	20	2.0	14	
Front Axle	98	10	72	
Front Caliper Mounting Bolts	34	3.5	25	
Rear Axle Nut	110	11	81	
<b>Final Drive</b>				
Engine Sprocket Nuts	128	13	94	MO

## GENERAL INFORMATION 1-15

### Torque and Locking Agent

Fastener	Torque			Remarks
	N-m	kgf-m	ft-lb	
Engine Sprocket Cover Bolts	12	1.2	104 in·lb	
Rear Coupling Studs	–	–	–	L (Planted side)
Rear Sprocket Nuts	59	6.0	43	
<b>Brakes</b>				
Brake Lever Pivot Bolt	1.0	0.1	9 in·lb	
Brake Lever Pivot Bolt Locknut	5.9	0.6	52 in·lb	
Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
Front Master Cylinder Clamp Bolts	8.8	0.9	78 in·lb	S
Brake Hose Banjo Bolts	34	3.5	25	
Caliper Mounting Bolts	34	3.5	25	
Caliper Bleed Valves	7.8	0.8	69 in·lb	
Brake Disc Mounting Bolts	27	2.8	20	L
Brake Pedal Mounting Bolt	8.8	0.9	78 in·lb	
Brake Pedal Adjuster Locknut	18	1.8	13	
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Rear Brake Reservoir Mounting Bolts	6.9	0.7	61 in·lb	
<b>Suspension</b>				
Front Fork Top Plugs	23	2.3	17	
Front Fork Clamp Bolts	20	2.0	14	
Front Fork Bottom Allen Bolts	30	3.0	22	L
Front Axle Clamp Bolts	20	2.0	14	
Swingarm Pivot Nut	110	11	80	G
Tie Rod Nuts	59	6.0	43	
Rocker Arm Nut	59	6.0	43	
Rear Shock Absorber Mounting Nuts	59	6.0	43	
<b>Steering</b>				
Handlebar Clamp Bolts	25	2.5	18	S
Steering Stem Head Nut	49	5.0	36	
Front Fork Clamp Bolts	20	2.0	14	
Steering Stem Nut	4.9	0.5	43 in·lb	
<b>Frame</b>				
Side Stand Bolt, Nut	44	4.5	33	
Grab Rail Bolts	25	2.5	18	
Wind Shield Screws	0.4	0.04	4 in·lb	
Footpeg Bracket Mounting Bolts	25	2.5	18	
Center Stand Nuts	29	3.0	22	
<b>Electrical System</b>				
Front Brake Light Switch Mounting Screws	1.2	0.12	10 in·lb	
Spark Plugs	14	1.4	10	
Starter Motor Cover Bolts	5.1	0.52	45 in·lb	
Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
Starter Motor Terminal Locknut	6.9	0.7	61 in·lb	
Starter Motor Cable Nut	4.9	0.5	43 in·lb	

# 1-16 GENERAL INFORMATION

## Torque and Locking Agent

Remarks	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
	Starter Motor through Bolt	6.9	0.7	61 in·lb	
	Alternator Cover Bolts	12	1.2	104 in·lb	L
	Alternator Stator Mounting Bolts	7.8	0.8	71 in·lb	
	Alternator Stator Wire Clamp Bolts	2.9	0.3	26 in·lb	
	Alternator Rotor Bolt	128	13	94	
	Oil Pressure Switch	15	1.5	11	SS
	Oil Pressure Switch Terminal Bolt	1.6	0.16	14 in·lb	
	Timing Rotor Bolt	40	4.1	30	
	Crankshaft Sensor Mounting Bolts	6.0	0.6	53 in·lb	
	Crankshaft Sensor Cover Bolts	12	1.2	104 in·lb	
	Wire Clamp Bolt	6.0	0.6	53 in·lb	
	Neutral Switch	15	1.5	11	
	Side Stand Switch Mounting Bolts	8.8	0.9	78 in·lb	L
	Battery Ground Wire Terminal Bolt	5.1	0.52	45 in·lb	
	Taillight Mounting Nuts	5.9	0.60	52 in·lb	

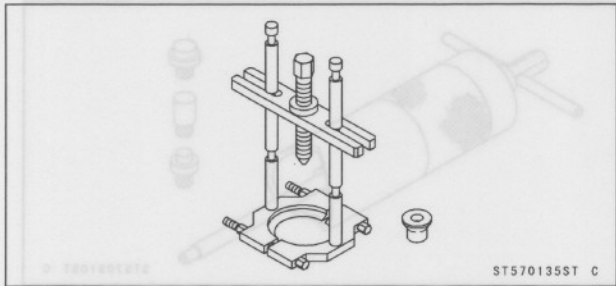
The table below, relating tightening torque to thread diameter, lists the basic torque for The bolts and nuts, Use this table for only the bolts and nuts which do not require a specific torque value, All of the values are for use with dry solvent-cleaned threads. Basic Torque for General Fasteners

### Basic Torque for General Fasteners

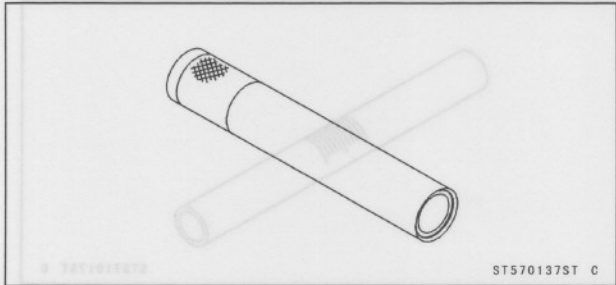
Threads dia. (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in·lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in·lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0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

Special Tools and Sealant

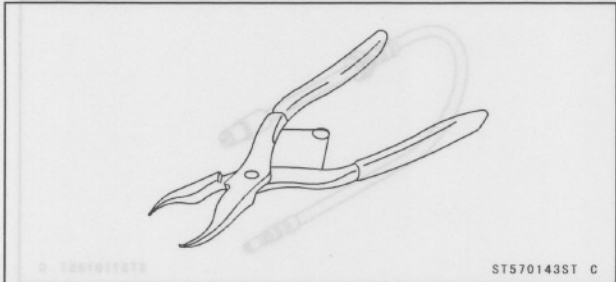
Bearing Puller:  
57001-135



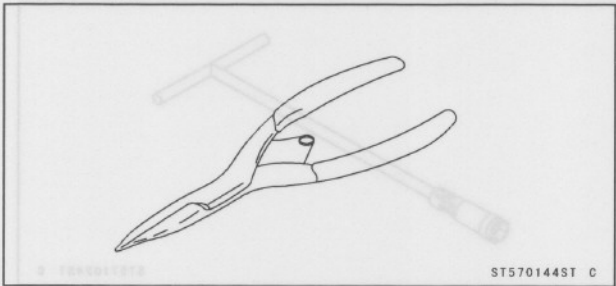
Steering Stem Bearing Driver:  
57001-137



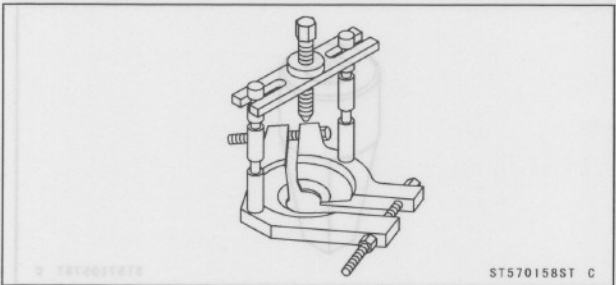
Inside Circlip Pliers:  
57001-143



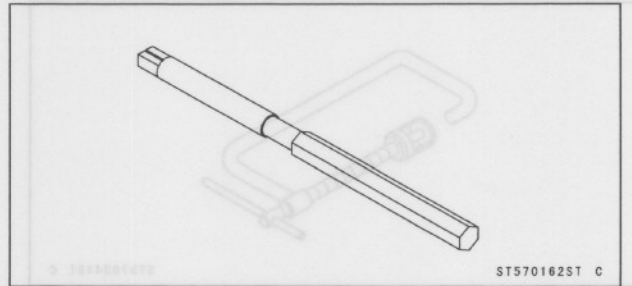
Outside Circlip Pliers:  
57001-144



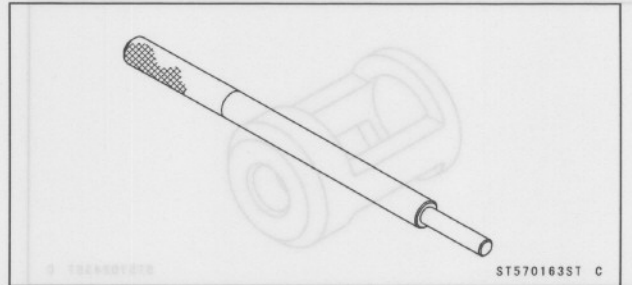
Bearing Puller:  
57001-158



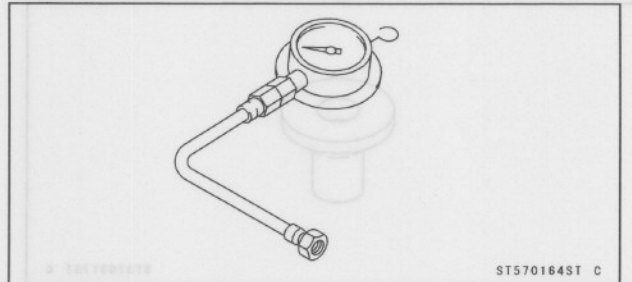
Valve Guide Reamer,  $\phi 7$ :  
57001-162



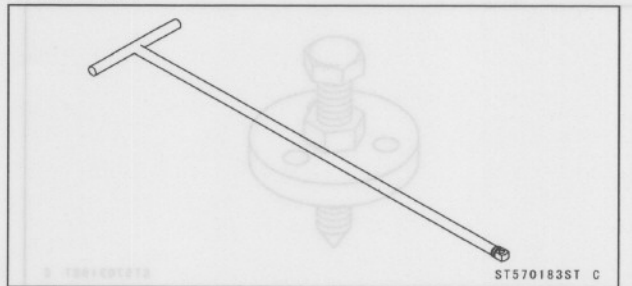
Valve Guide Arbor,  $\phi 7$ :  
57001-163



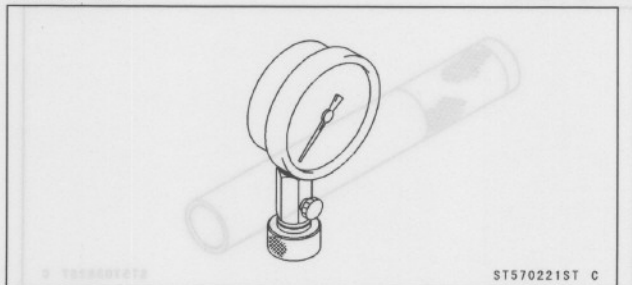
Oil Pressure Gauge, 10 kgf/cm<sup>2</sup>:  
57001-164



Fork Cylinder Holder Handle:  
57001-183



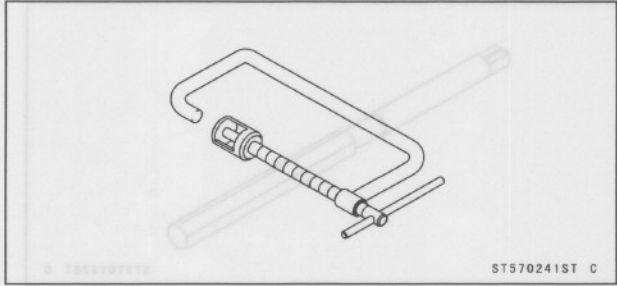
Compression Gauge, 20 kgf/cm<sup>2</sup>:  
57001-221



# 1-18 GENERAL INFORMATION

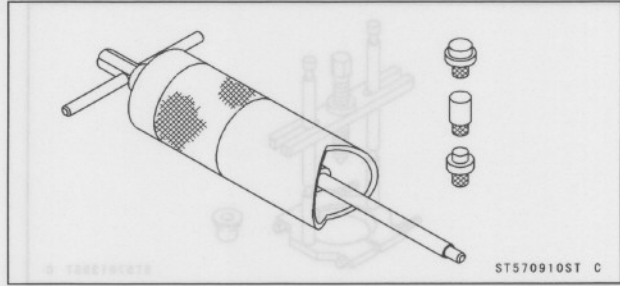
## Special Tools and Sealant

**Valve Spring Compressor Assembly:**  
57001-241



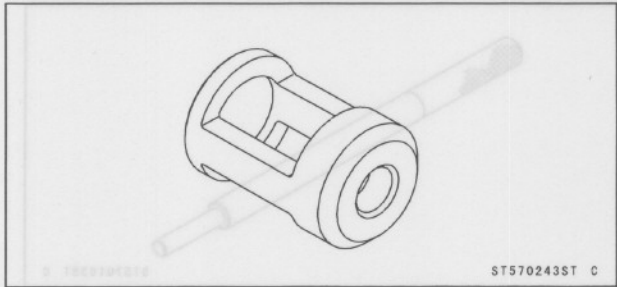
ST570241ST C

**Piston Pin Puller Assembly:**  
57001-910



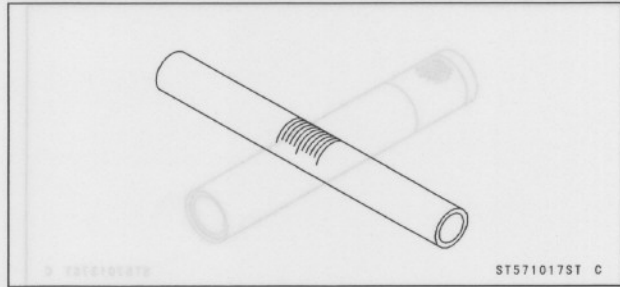
ST570910ST C

**Valve Spring Compressor Adapter,  $\phi 28.2$ :**  
57001-243



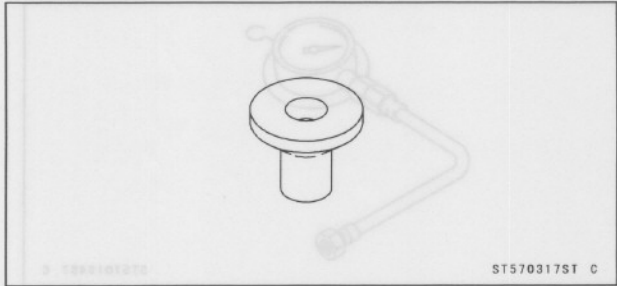
ST570243ST C

**Fuel Level Gauge:**  
57001-1017



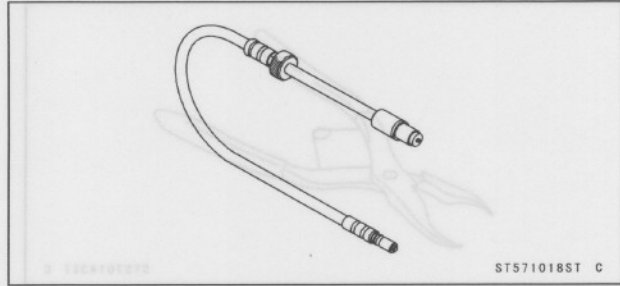
ST571017ST C

**Bearing Puller Adapter:**  
57001-317



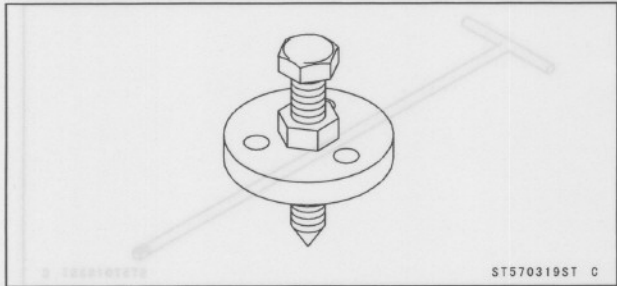
ST570317ST C

**Compression Gauge Adapter, M12 x 1.25:**  
57001-1018



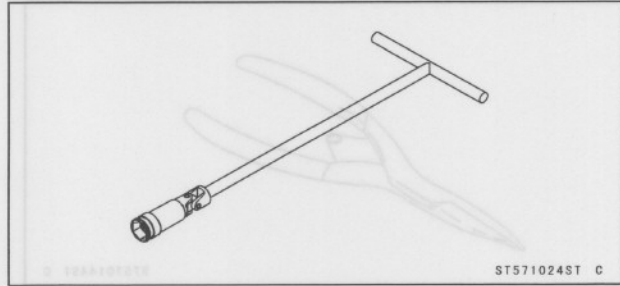
ST571018ST C

**Gear Pusher & Puller:**  
57001-319



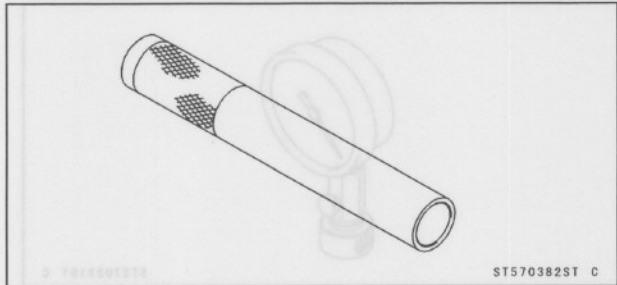
ST570319ST C

**Spark Plug Wrench, Hex 18:**  
57001-1024



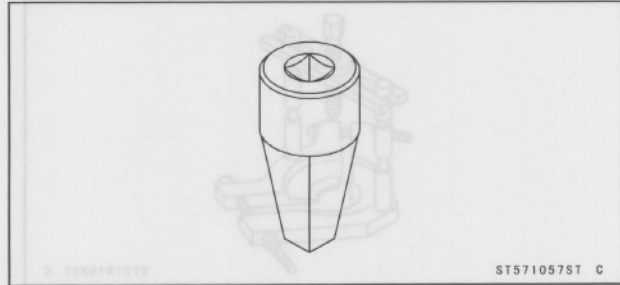
ST571024ST C

**Bearing Driver,  $\phi 32$ :**  
57001-382



ST570382ST C

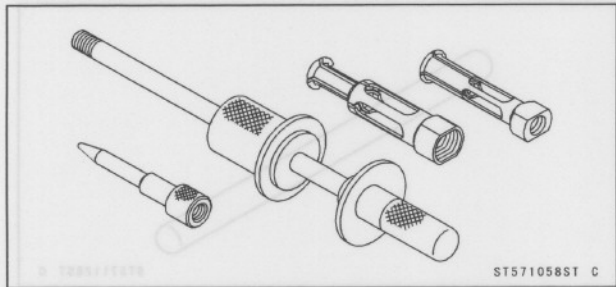
**Fork Cylinder Holder Adapter:**  
57001-1057



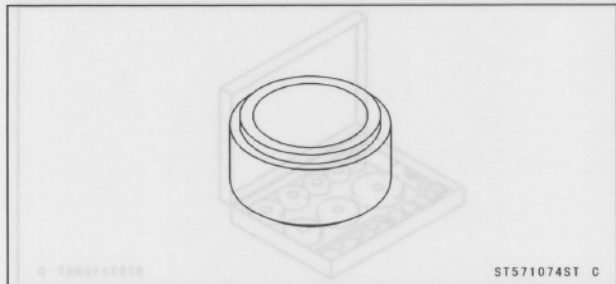
ST571057ST C

Special Tools and Sealant

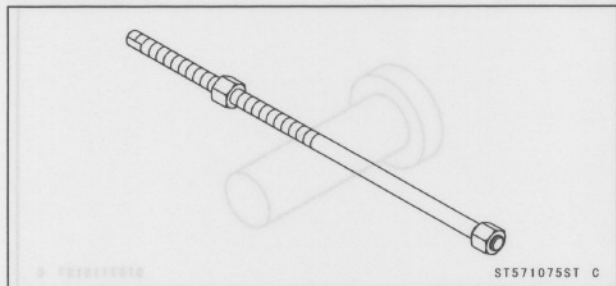
Oil Seal & Bearing Remover:  
57001-1058



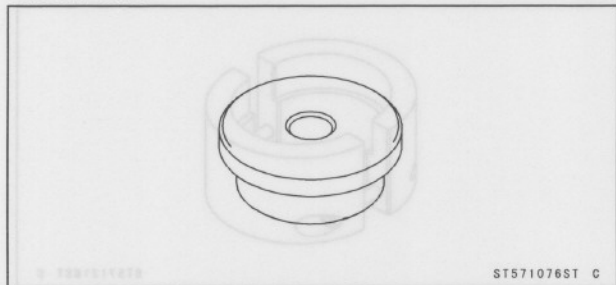
Steering Stem Bearing Driver Adapter,  $\phi 34.5$ :  
57001-1074



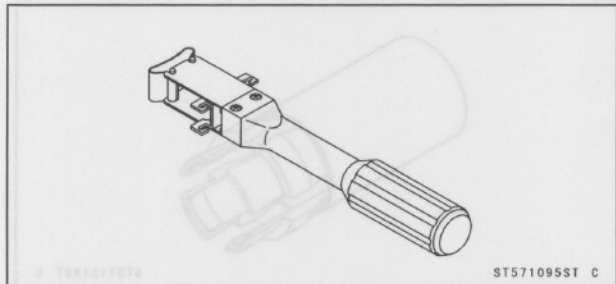
Head Pipe Outer Race Press Shaft:  
57001-1075



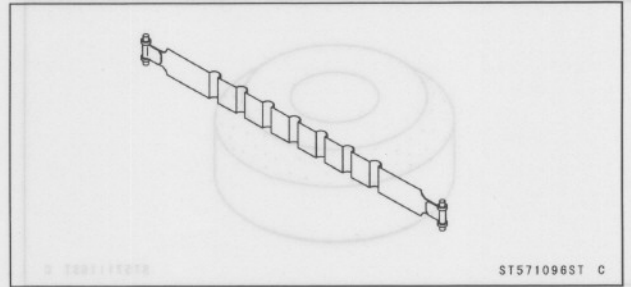
Head Pipe Outer Race Driver,  $\phi 51.5$ :  
57001-1076



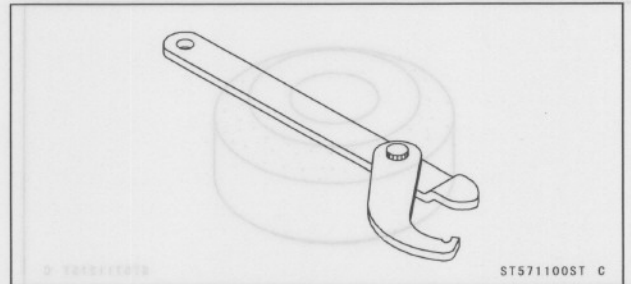
Piston Ring Compressor Grip:  
57001-1095



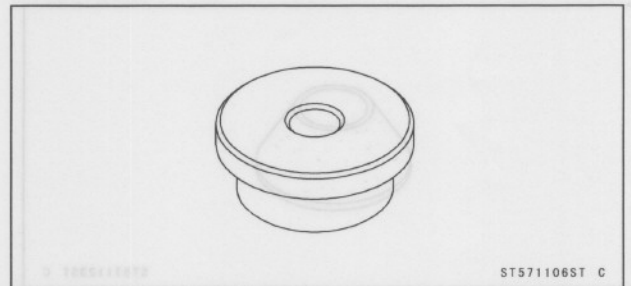
Piston Ring Compressor Belt,  $\phi 50 \sim \phi 67$ :  
57001-1096



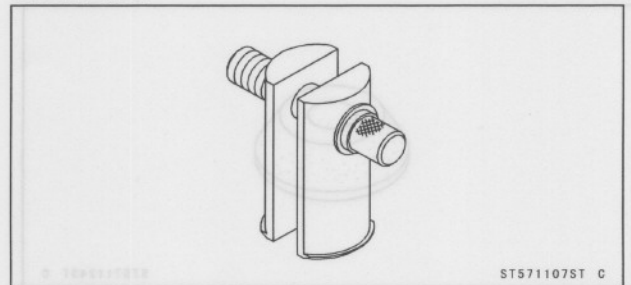
Steering Stem Nut Wrench:  
57001-1100



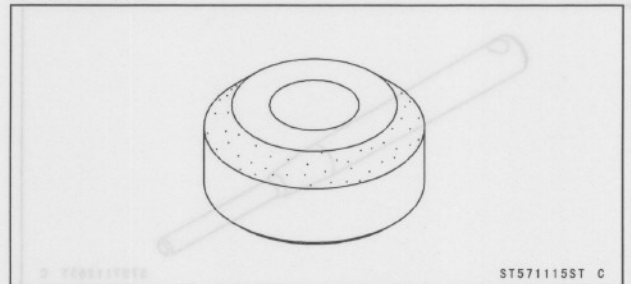
Head Pipe Outer Race Driver,  $\phi 46.5$ :  
57001-1106



Head Pipe Outer Race Remover ID > 37 mm:  
57001-1107



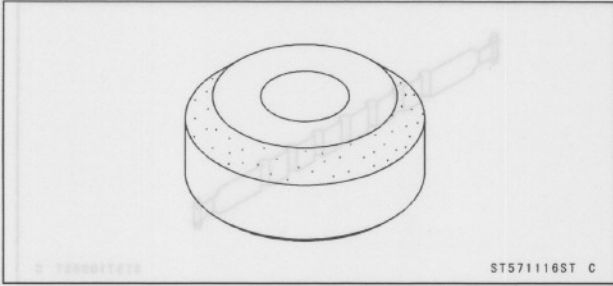
Valve Seat Cutter,  $45^\circ - \phi 32$ :  
57001-1115



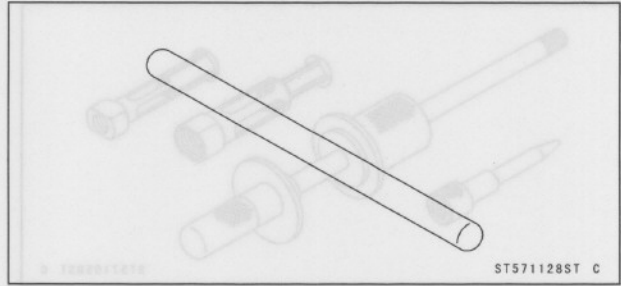
# 1-20 GENERAL INFORMATION

## Special Tools and Sealant

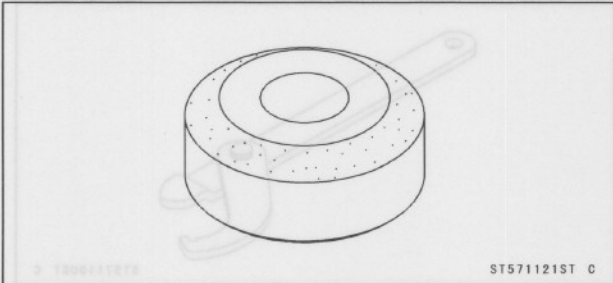
Valve Seat Cutter, 45° -  $\phi 35$ :  
57001-1116



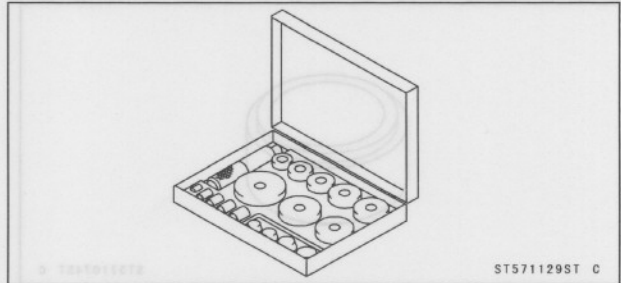
Valve Seat Cutter Holder Bar:  
57001-1128



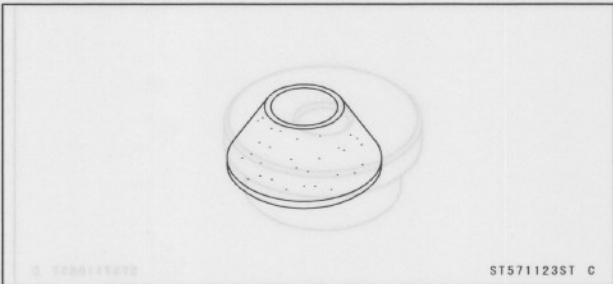
Valve Seat Cutter, 32° -  $\phi 35$ :  
57001-1121



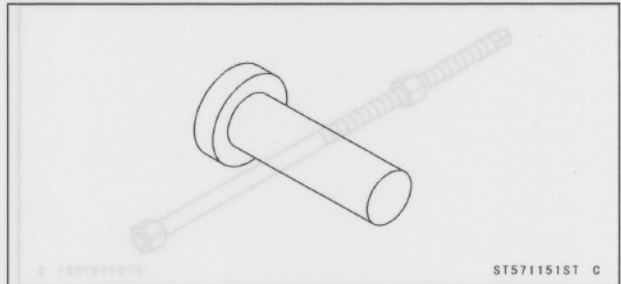
Bearing Driver Set:  
57001-1129



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



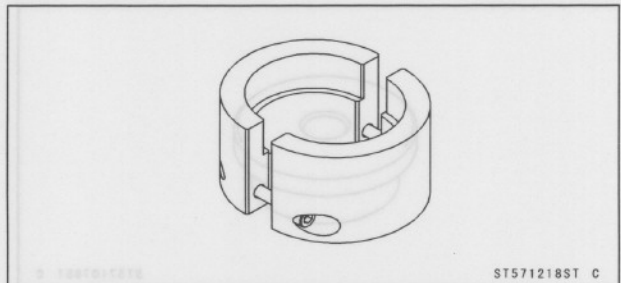
Rotor Puller Adapter,  $\phi 9.5$ :  
57001-1151



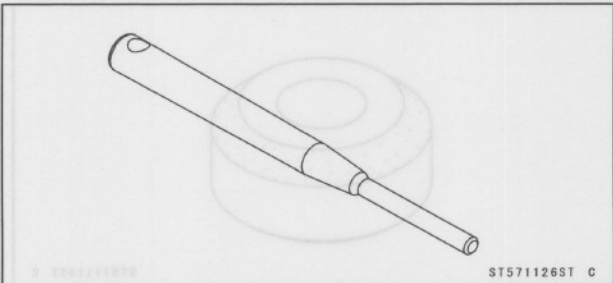
Valve Seat Cutter, 60° -  $\phi 41$ :  
57001-1124



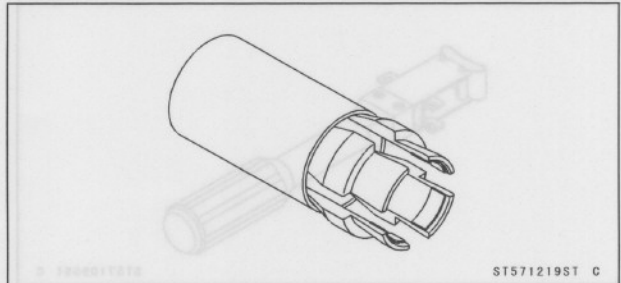
Fork Outer Tube Weight:  
57001-1218



Valve Seat Cutter Holder,  $\phi 7$ :  
57001-1126

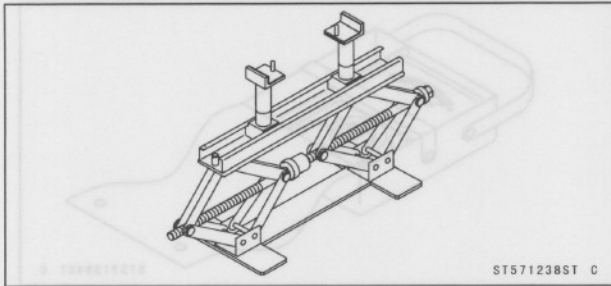


Front Fork Oil Seal Driver:  
57001-1219



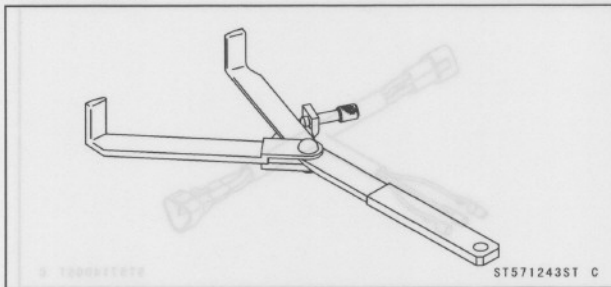
Special Tools and Sealant

Jack:  
57001-1238



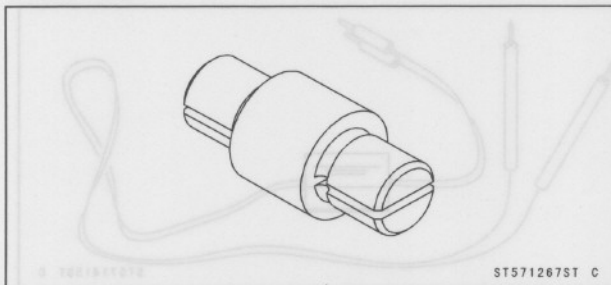
ST571238ST C

Clutch Holder:  
57001-1243



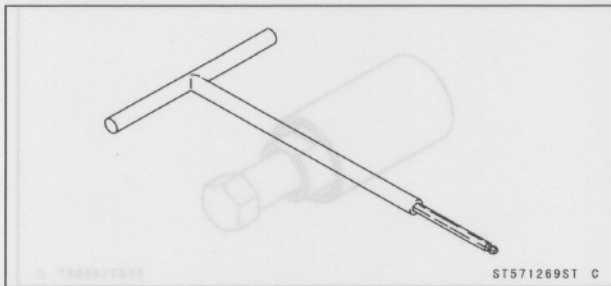
ST571243ST C

Bearing Remover Head,  $\phi 15 \times \phi 17$ :  
57001-1267



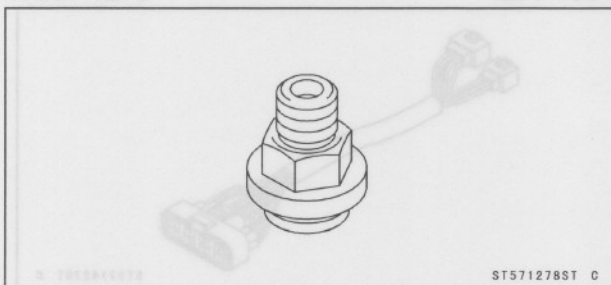
ST571267ST C

Carburetor Drain Plug Wrench, Hex 3:  
57001-1269



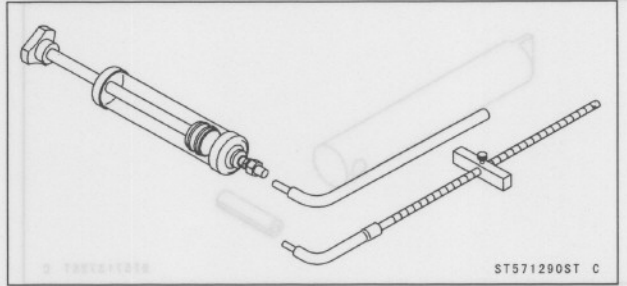
ST571269ST C

Oil Pressure Gauge Adapter, M18  $\times$  1.5:  
57001-1278



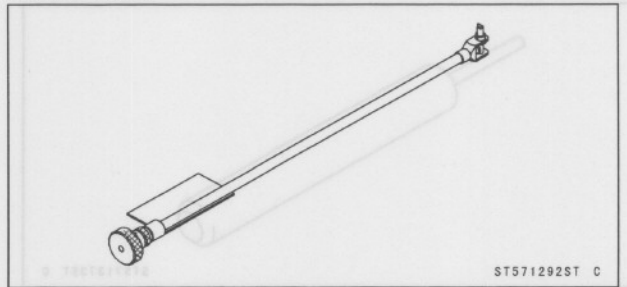
ST571278ST C

Fork Oil Level Gauge:  
57001-1290



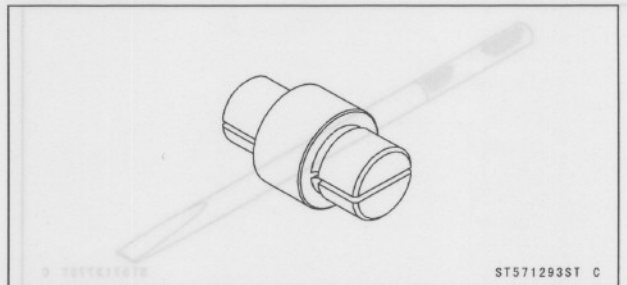
ST571290ST C

Pilot Screw Adjuster, C:  
57001-1292



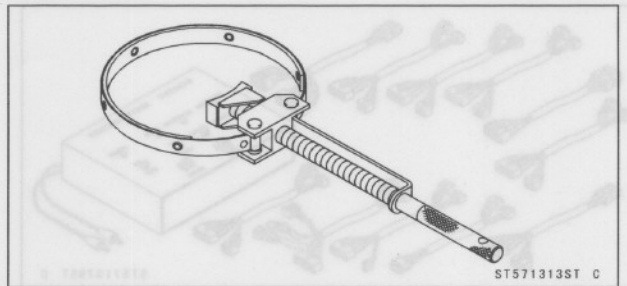
ST571292ST C

Bearing Remover Head,  $\phi 20 \times \phi 22$ :  
57001-1293



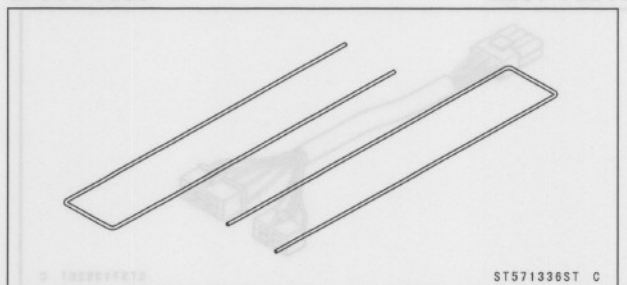
ST571293ST C

Flywheel Holder:  
57001-1313



ST571313ST C

Piston Base,  $\phi 2.3$ :  
57001-1336

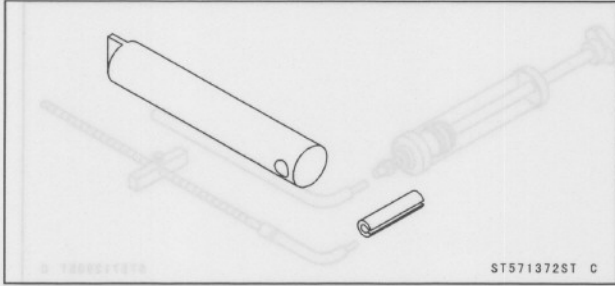


ST571336ST C

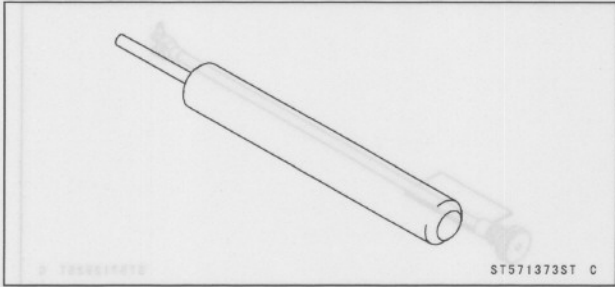
# 1-22 GENERAL INFORMATION

## Special Tools and Sealant

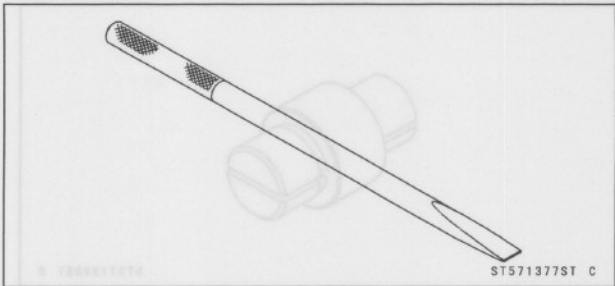
**Pilot Screw Adjuster Adapter,  $\phi 5$ :**  
57001-1372



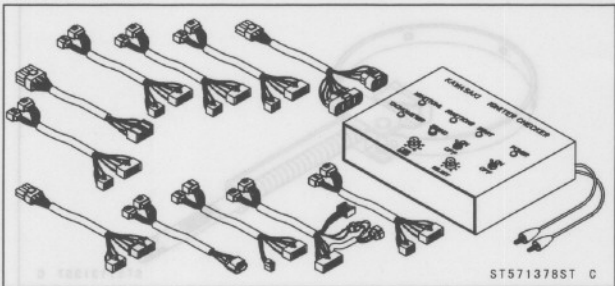
**Pilot Screw Adjuster Driver:**  
57001-1373



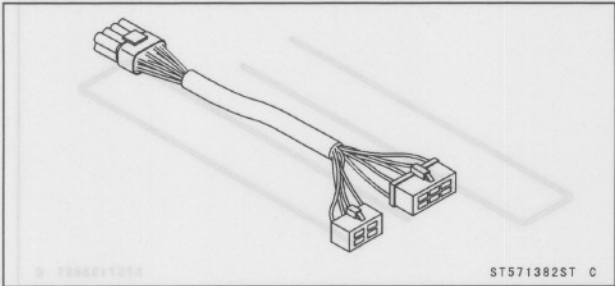
**Bearing Remover Shaft,  $\phi 13$ :**  
57001-1377



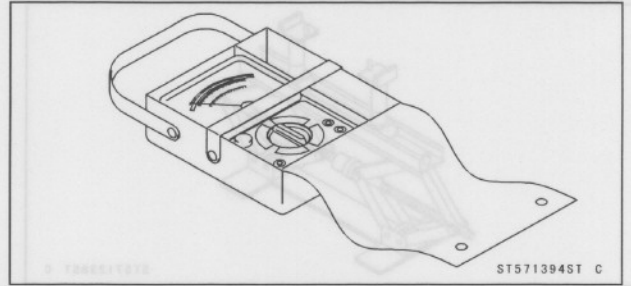
**Igniter Checker Assembly:**  
57001-1378



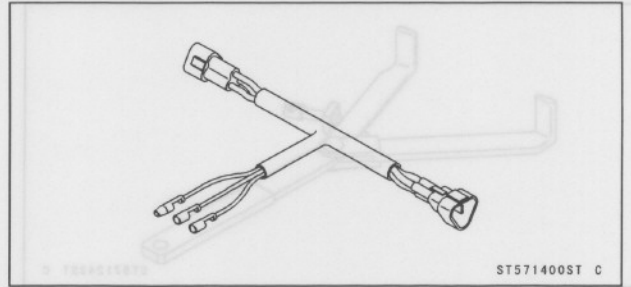
**Harness Adapter #2:**  
57001-1382



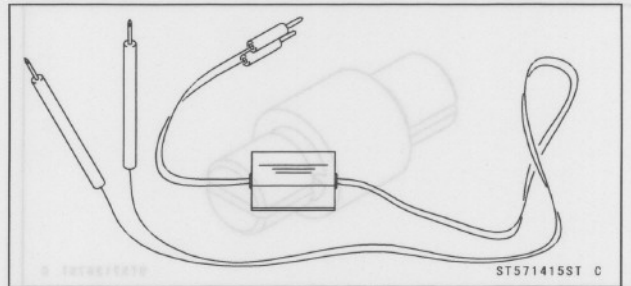
**Hand Tester:**  
57001-1394



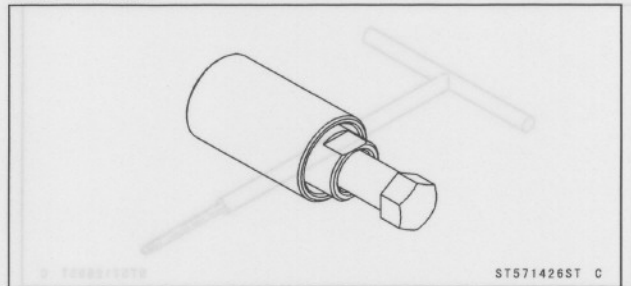
**Throttle Sensor Setting Adapter #1:**  
57001-1400



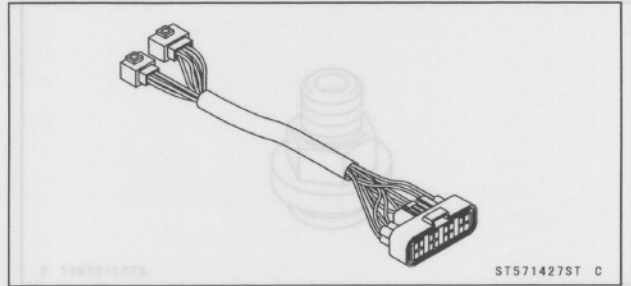
**Peak Voltage Adapter:**  
57001-1415



**Flywheel Puller Assembly, M30  $\times$  1.5, M33  $\times$  1.5:**  
57001-1426

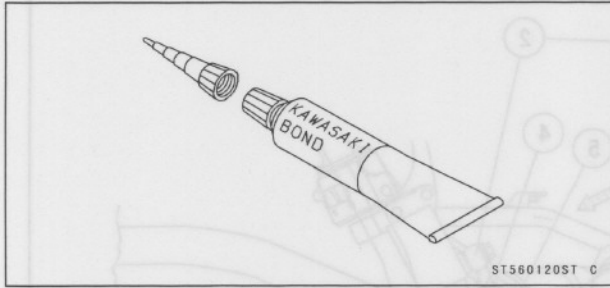


**Harness Adapter #14:**  
57001-1427

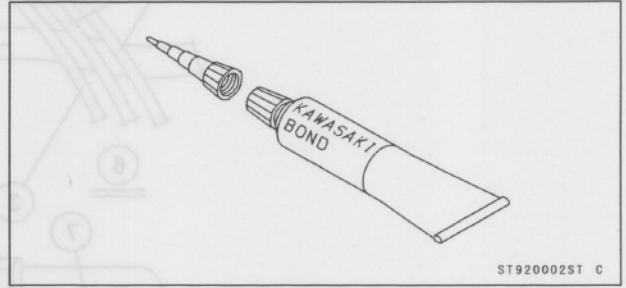


Special Tools and Sealant

Kawasaki Bond (Silicone Sealant):  
56019-120

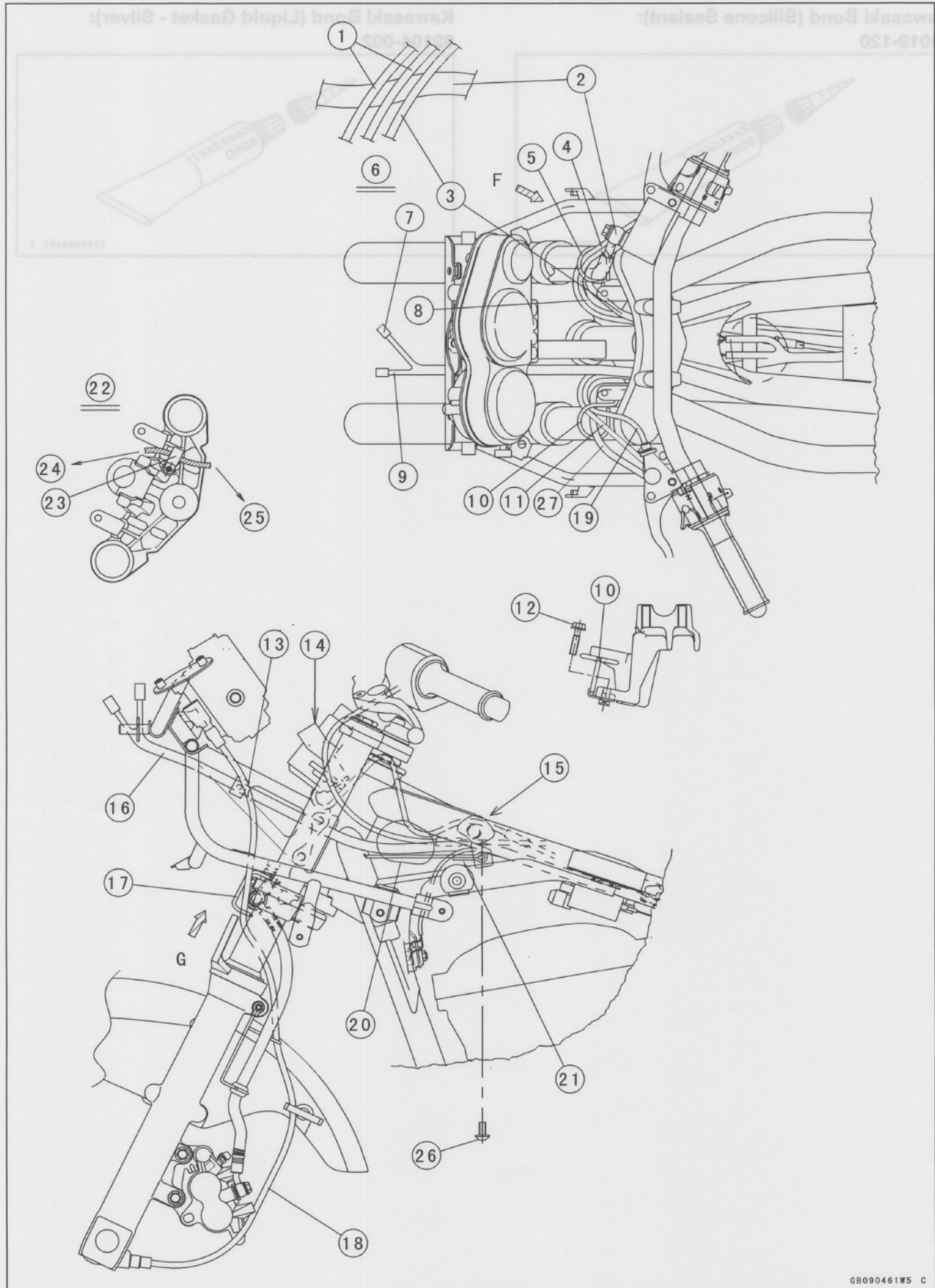


Kawasaki Bond (Liquid Gasket - Silver):  
92104-002



# 1-24 GENERAL INFORMATION

## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

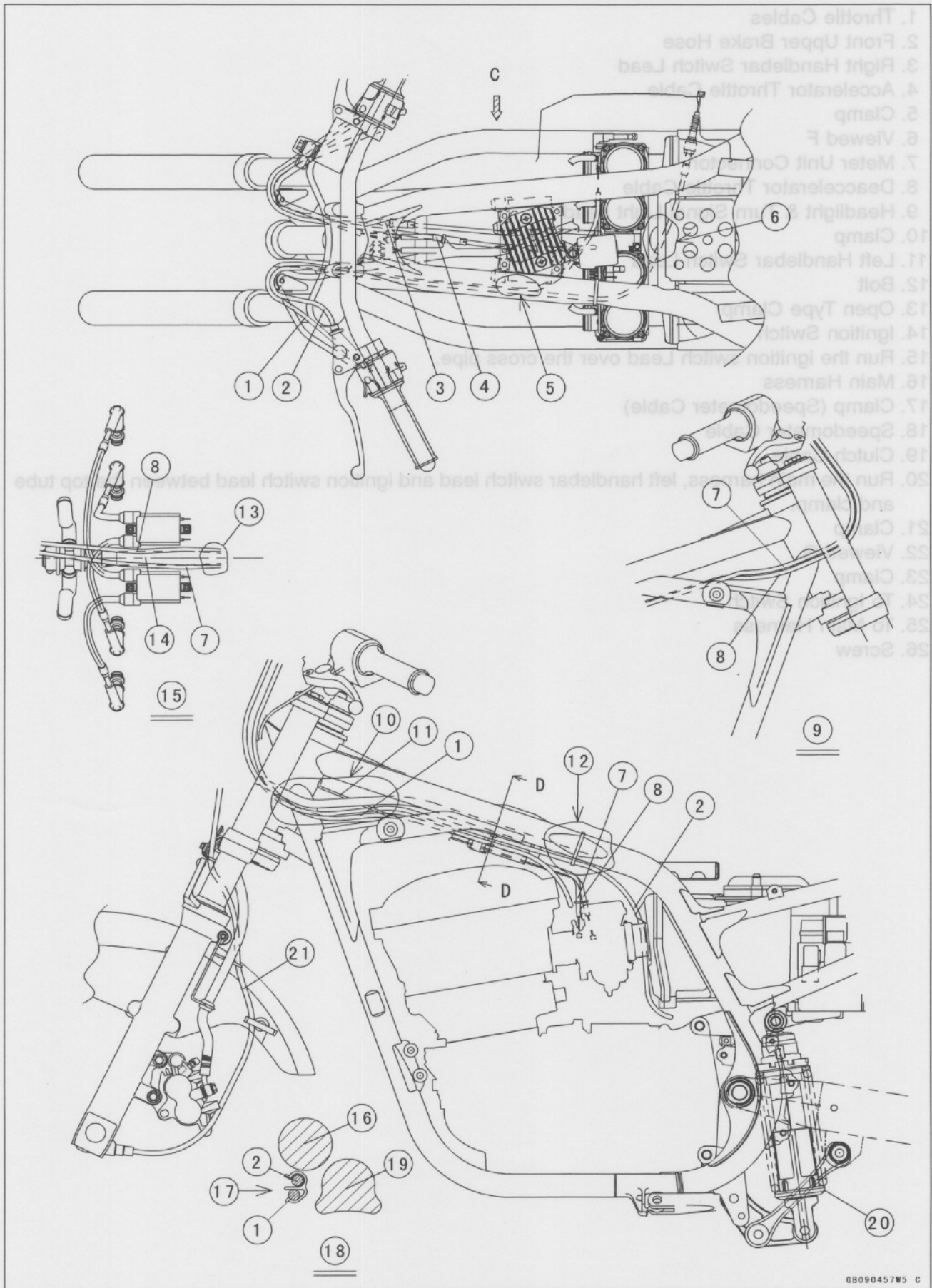
Cable, Wire, and Hose Routing

1. Throttle Cables
2. Front Upper Brake Hose
3. Right Handlebar Switch Lead
4. Accelerator Throttle Cable
5. Clamp
6. Viewed F
7. Meter Unit Connector
8. Deaccelerator Throttle Cable
9. Headlight & Turn Signal Light Lead
10. Clamp
11. Left Handlebar Switch Lead
12. Bolt
13. Open Type Clamp
14. Ignition Switch
15. Run the ignition switch Lead over the cross pipe.
16. Main Harness
17. Clamp (Speedometer Cable)
18. Speedometer Cable
19. Clutch Cable
20. Run the main harness, left handlebar switch lead and ignition switch lead between the top tube and clamp.
21. Clamp
22. Viewed G
23. Clamp
24. To Ignition Switch
25. To Main Harness
26. Screw

# 1-26 GENERAL INFORMATION

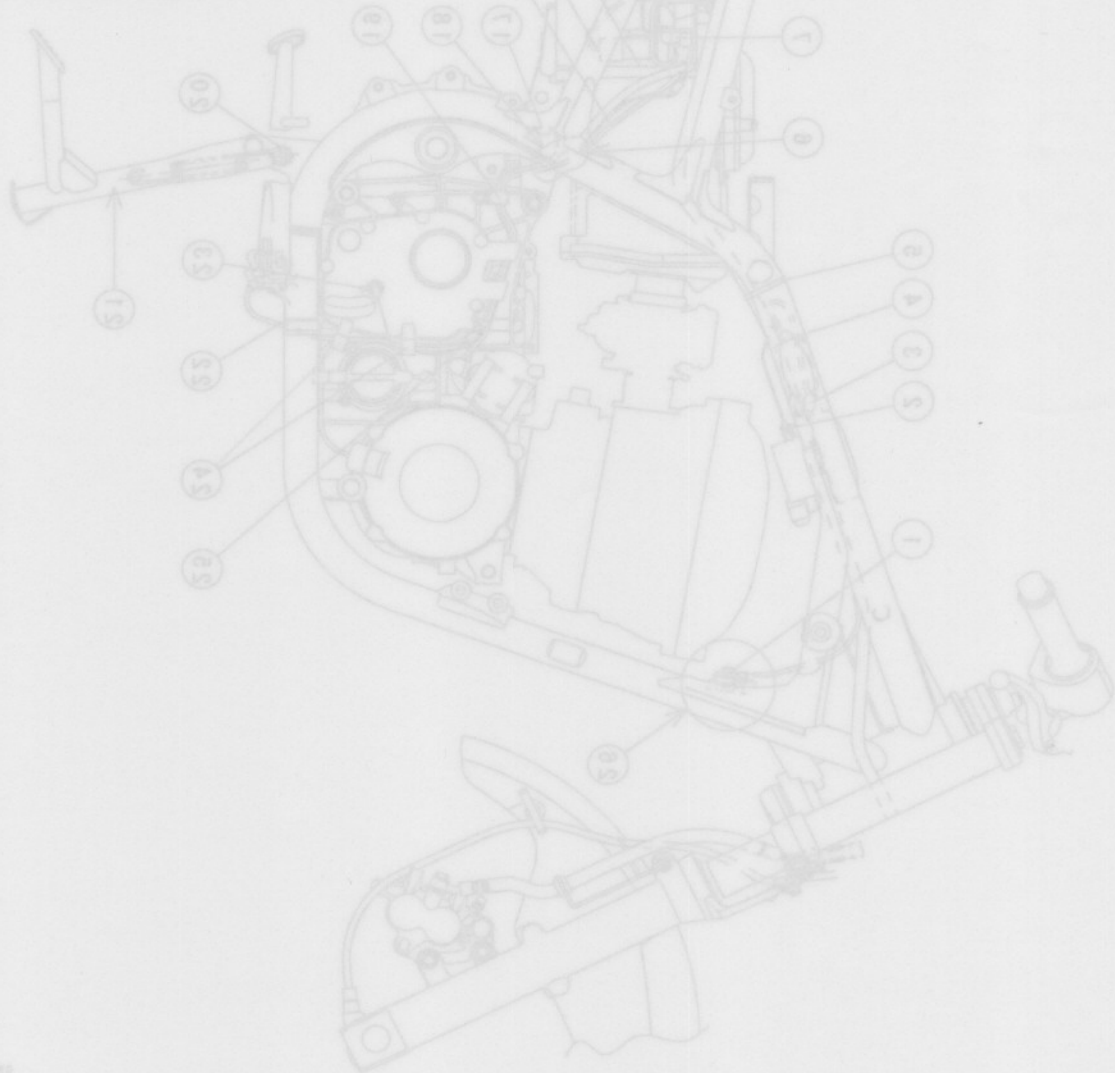
## Cable, Wire, and Hose Routing

Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

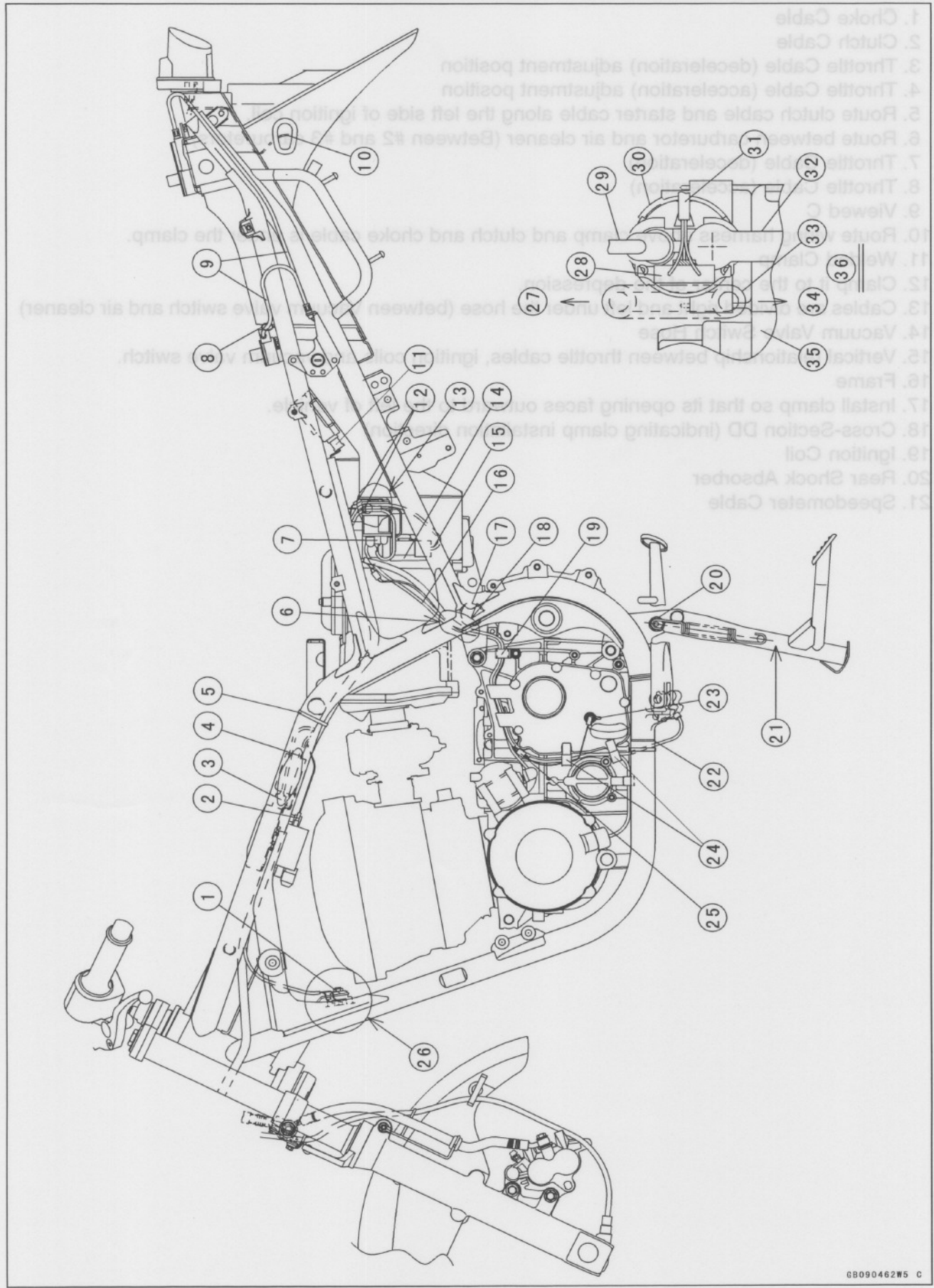
1. Choke Cable
2. Clutch Cable
3. Throttle Cable (deceleration) adjustment position
4. Throttle Cable (acceleration) adjustment position
5. Route clutch cable and starter cable along the left side of ignition coil.
6. Route between carburetor and air cleaner (Between #2 and #3 carburetors)
7. Throttle Cable (deceleration)
8. Throttle Cable (acceleration)
9. Viewed C
10. Route wiring harness above clamp and clutch and choke cable is under the clamp.
11. Welded Clamp
12. Clamp it to the center of the depression.
13. Cables are divided right and left under the hose (between Vacuum valve switch and air cleaner)
14. Vacuum Valve Switch Hose
15. Vertical relationship between throttle cables, ignition coils and vacuum valve switch.
16. Frame
17. Install clamp so that its opening faces outward to the left of vehicle.
18. Cross-Section DD (indicating clamp installation direction)
19. Ignition Coil
20. Rear Shock Absorber
21. Speedometer Cable



# 1-28 GENERAL INFORMATION

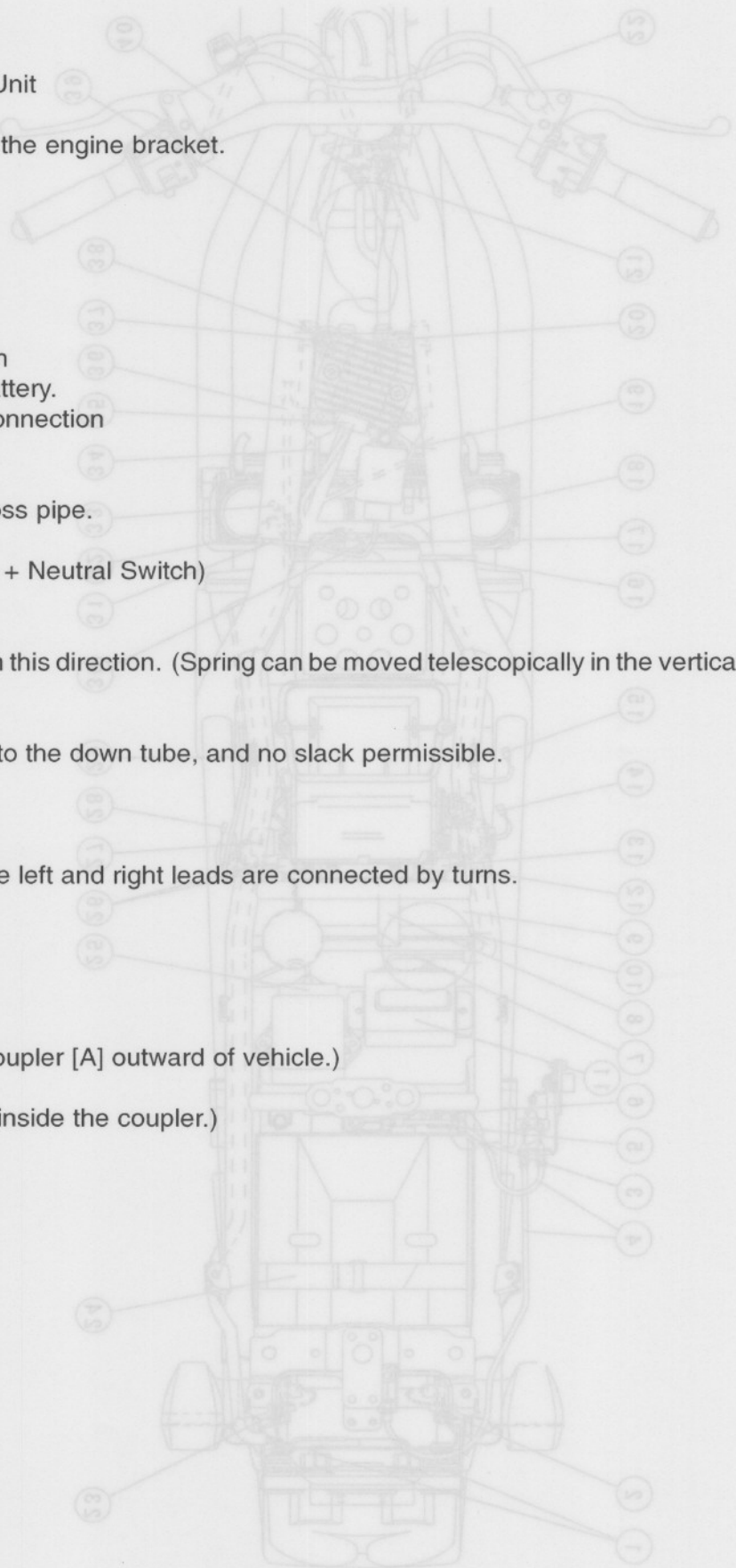
## Cable, Wire, and Hose Routing

Cable, Wire, and Hose Routing



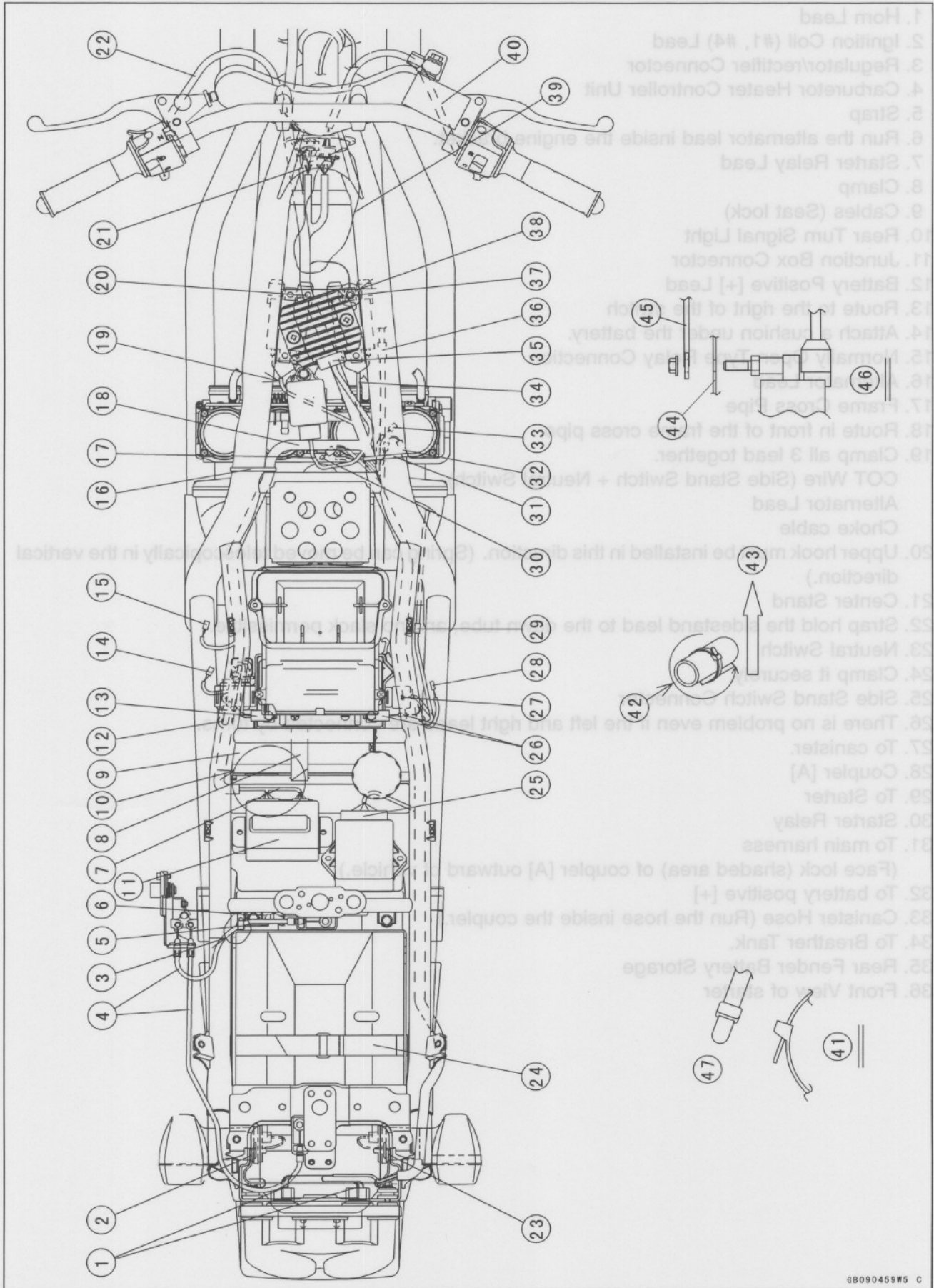
## Cable, Wire, and Hose Routing

1. Horn Lead
2. Ignition Coil (#1, #4) Lead
3. Regulator/rectifier Connector
4. Carburetor Heater Controller Unit
5. Strap
6. Run the alternator lead inside the engine bracket.
7. Starter Relay Lead
8. Clamp
9. Cables (Seat lock)
10. Rear Turn Signal Light
11. Junction Box Connector
12. Battery Positive [+] Lead
13. Route to the right of the switch
14. Attach a cushion under the battery.
15. Normally Open Type Relay Connection
16. Alternator Lead
17. Frame Cross Pipe
18. Route in front of the frame cross pipe.
19. Clamp all 3 lead together.  
COT Wire (Side Stand Switch + Neutral Switch)  
Alternator Lead  
Choke cable
20. Upper hook must be installed in this direction. (Spring can be moved telescopically in the vertical direction.)
21. Center Stand
22. Strap hold the sidestand lead to the down tube, and no slack permissible.
23. Neutral Switch
24. Clamp it securely.
25. Side Stand Switch Connector
26. There is no problem even if the left and right leads are connected by turns.
27. To canister.
28. Coupler [A]
29. To Starter
30. Starter Relay
31. To main harness  
(Face lock (shaded area) of coupler [A] outward of vehicle.)
32. To battery positive [+]
33. Canister Hose (Run the hose inside the coupler.)
34. To Breather Tank.
35. Rear Fender Battery Storage
36. Front View of starter



# 1-30 GENERAL INFORMATION

## Cable, Wire, and Hose Routing

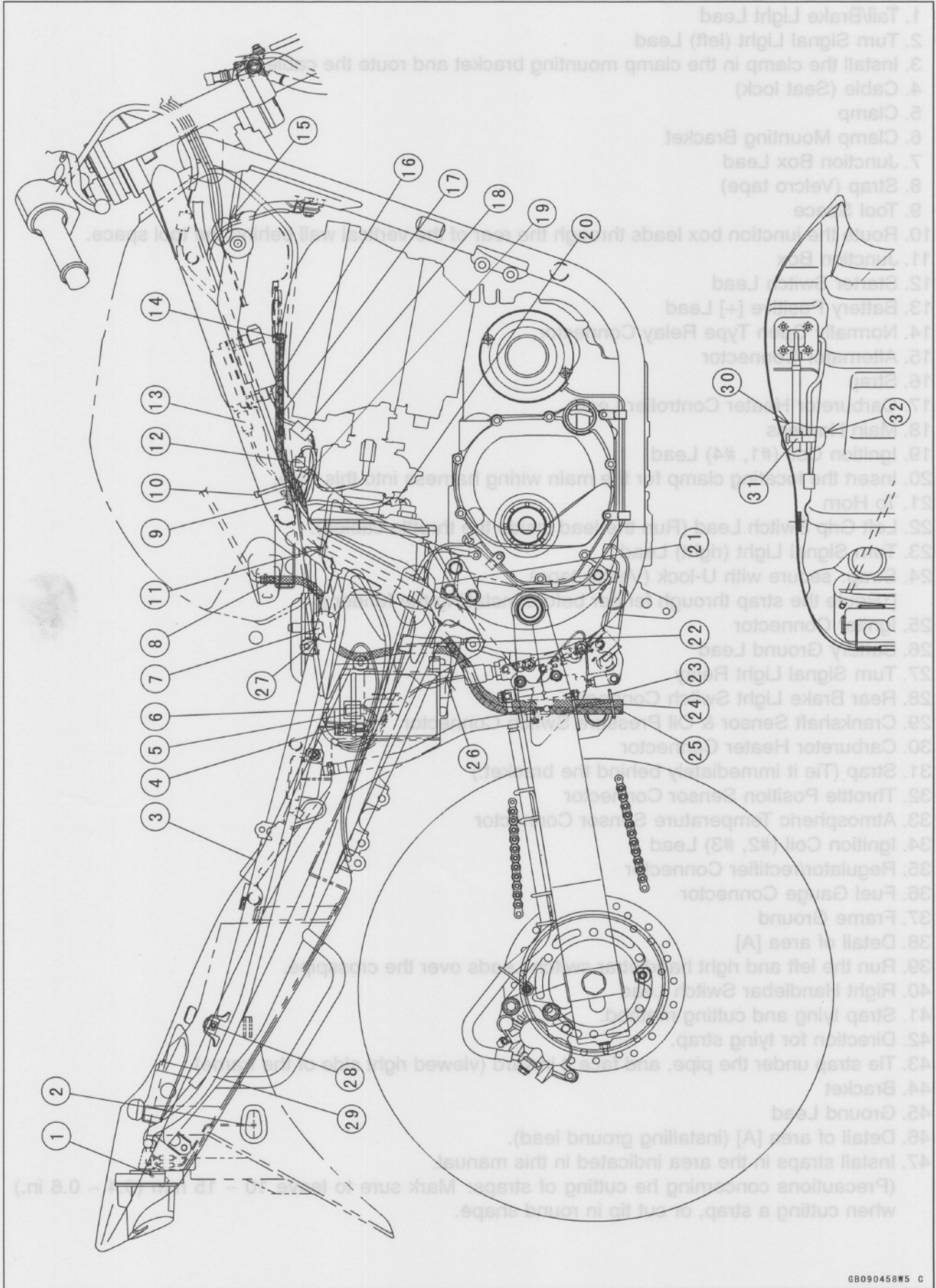


## Cable, Wire, and Hose Routing

1. Tail/Brake Light Lead
2. Turn Signal Light (left) Lead
3. Install the clamp in the clamp mounting bracket and route the cable.
4. Cable (Seat lock)
5. Clamp
6. Clamp Mounting Bracket
7. Junction Box Lead
8. Strap (Velcro tape)
9. Tool Space
10. Route the junction box leads through the rear of the vertical wall behind the tool space.
11. Junction Box
12. Starter Switch Lead
13. Battery Positive [+] Lead
14. Normally Open Type Relay Connector
15. Alternator Connector
16. Strap
17. Carburetor Heater Controller Lead
18. Main Harness
19. Ignition Coil (#1, #4) Lead
20. Insert the locating clamp for the main wiring harness into this hole.
21. To Horn
22. Left Grip Switch Lead (Run the lead inside the throttle cables).
23. Turn Signal Light (right) Lead
24. Strap: secure with U-lock (Velcro tape)  
[•Route the strap through fender before installing the fender.]
25. Igniter Connector
26. Battery Ground Lead
27. Turn Signal Light Relay
28. Rear Brake Light Switch Connector
29. Crankshaft Sensor & Oil Pressure Switch Connector
30. Carburetor Heater Connector
31. Strap (Tie it immediately behind the bracket.)
32. Throttle Position Sensor Connector
33. Atmospheric Temperature Sensor Connector
34. Ignition Coil (#2, #3) Lead
35. Regulator/rectifier Connector
36. Fuel Gauge Connector
37. Frame Ground
38. Detail of area [A]
39. Run the left and right handlebar switch Leads over the crosspipe.
40. Right Handlebar Switch Lead
41. Strap tying and cutting method.
42. Direction for tying strap.
43. Tie strap under the pipe, and face it inward (viewed right side of the frame)
44. Bracket
45. Ground Lead
46. Detail of area [A] (installing ground lead).
47. Install straps in the area indicated in this manual.  
(Precautions concerning the cutting of straps: Mark sure to leave 10 ~ 15 mm (0.4 ~ 0.6 in.) when cutting a strap, or cut tip in round shape.)

# 1-32 GENERAL INFORMATION

## Cable, Wire, and Hose Routing



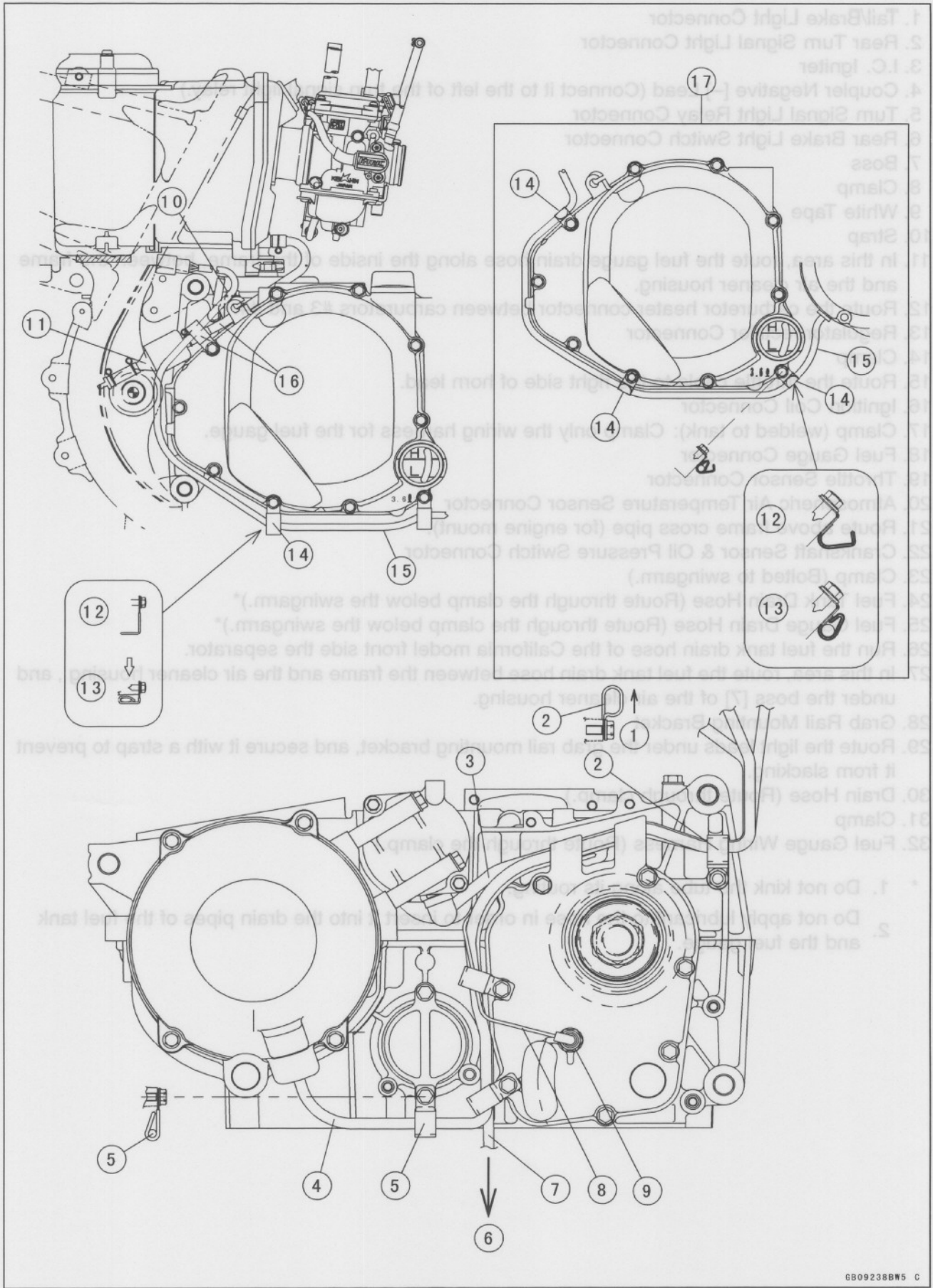
## Cable, Wire, and Hose Routing

- 
1. Tail/Brake Light Connector
  2. Rear Turn Signal Light Connector
  3. I.C. Igniter
  4. Coupler Negative [-] Lead (Connect it to the left of the turn signal light relay.)
  5. Turn Signal Light Relay Connector
  6. Rear Brake Light Switch Connector
  7. Boss
  8. Clamp
  9. White Tape
  10. Strap
  11. In this area, route the fuel gauge drain hose along the inside of the frame, between the frame and the air cleaner housing.
  12. Route the carburetor heater connector between carburetors #3 and #4.
  13. Regulator/rectifier Connector
  14. Clamp
  15. Route the throttle cable to the right side of horn lead.
  16. Ignition Coil Connector
  17. Clamp (welded to tank): Clamp only the wiring harness for the fuel gauge.
  18. Fuel Gauge Connector
  19. Throttle Sensor Connector
  20. Atmospheric Air Temperature Sensor Connector
  21. Route above frame cross pipe (for engine mount).
  22. Crankshaft Sensor & Oil Pressure Switch Connector
  23. Clamp (Bolted to swingarm.)
  24. Fuel Tank Drain Hose (Route through the clamp below the swingarm.)\*
  25. Fuel Gauge Drain Hose (Route through the clamp below the swingarm.)\*
  26. Run the fuel tank drain hose of the California model front side the separator.
  27. In this area, route the fuel tank drain hose between the frame and the air cleaner housing , and under the boss [7] of the air cleaner housing.
  28. Grab Rail Mounting Bracket
  29. Route the light leads under the grab rail mounting bracket, and secure it with a strap to prevent it from slacking.
  30. Drain Hose (Route through clamp.)
  31. Clamp
  32. Fuel Gauge Wiring Harness (Route through the clamp.)

- \* 1. Do not kink the tube along its routing.
2. Do not apply lubricant to the hose in order to insert it into the drain pipes of the fuel tank and the fuel gauge.

# 1-34 GENERAL INFORMATION

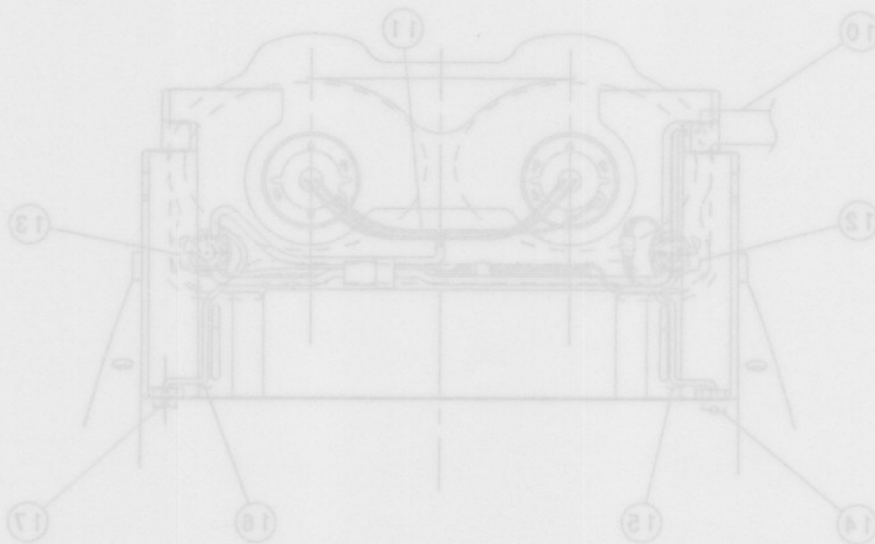
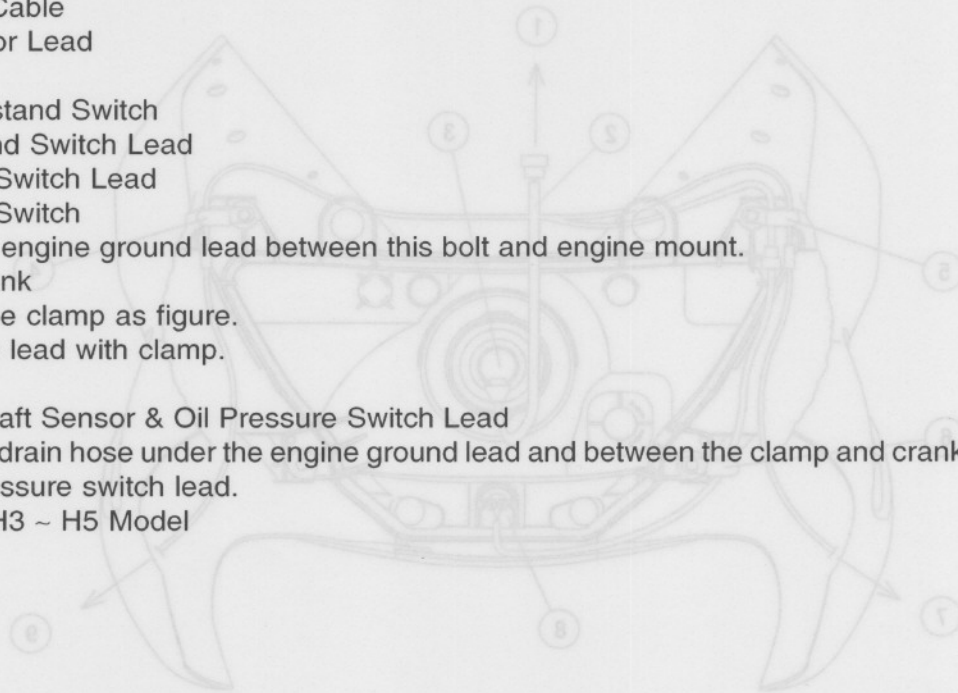
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

Cable, Wire, and Hose Routing

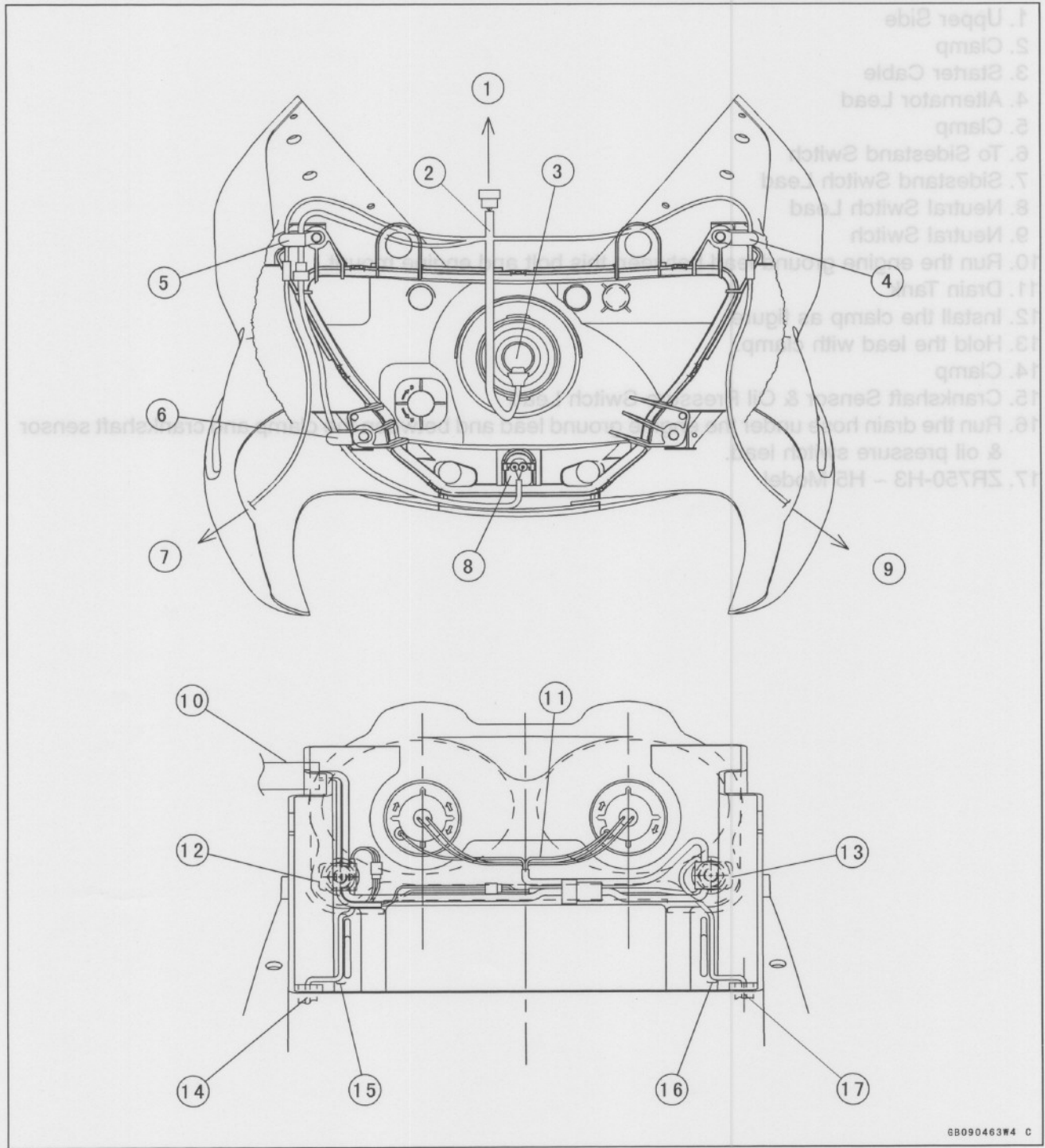
1. Upper Side
2. Clamp
3. Starter Cable
4. Alternator Lead
5. Clamp
6. To Sidestand Switch
7. Sidestand Switch Lead
8. Neutral Switch Lead
9. Neutral Switch
10. Run the engine ground lead between this bolt and engine mount.
11. Drain Tank
12. Install the clamp as figure.
13. Hold the lead with clamp.
14. Clamp
15. Crankshaft Sensor & Oil Pressure Switch Lead
16. Run the drain hose under the engine ground lead and between the clamp and crankshaft sensor & oil pressure switch lead.
17. ZR750-H3 ~ H5 Model



# 1-36 GENERAL INFORMATION

## Cable, Wire, and Hose Routing

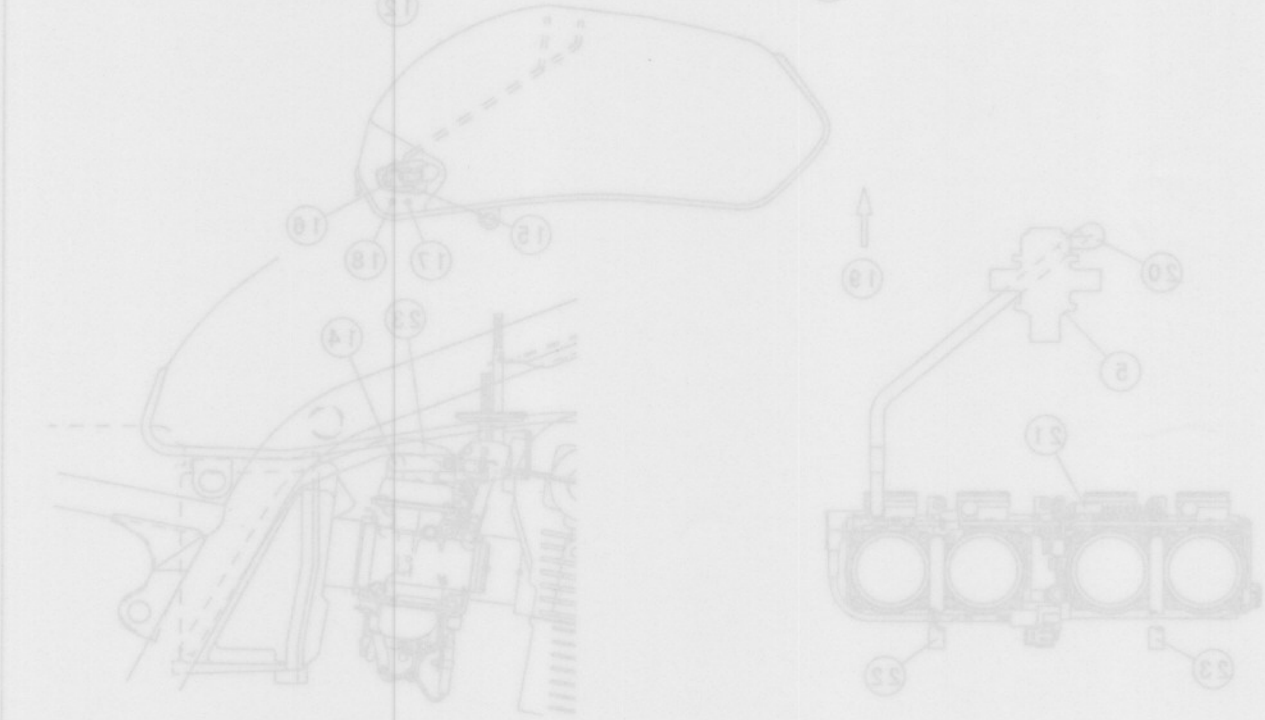
Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

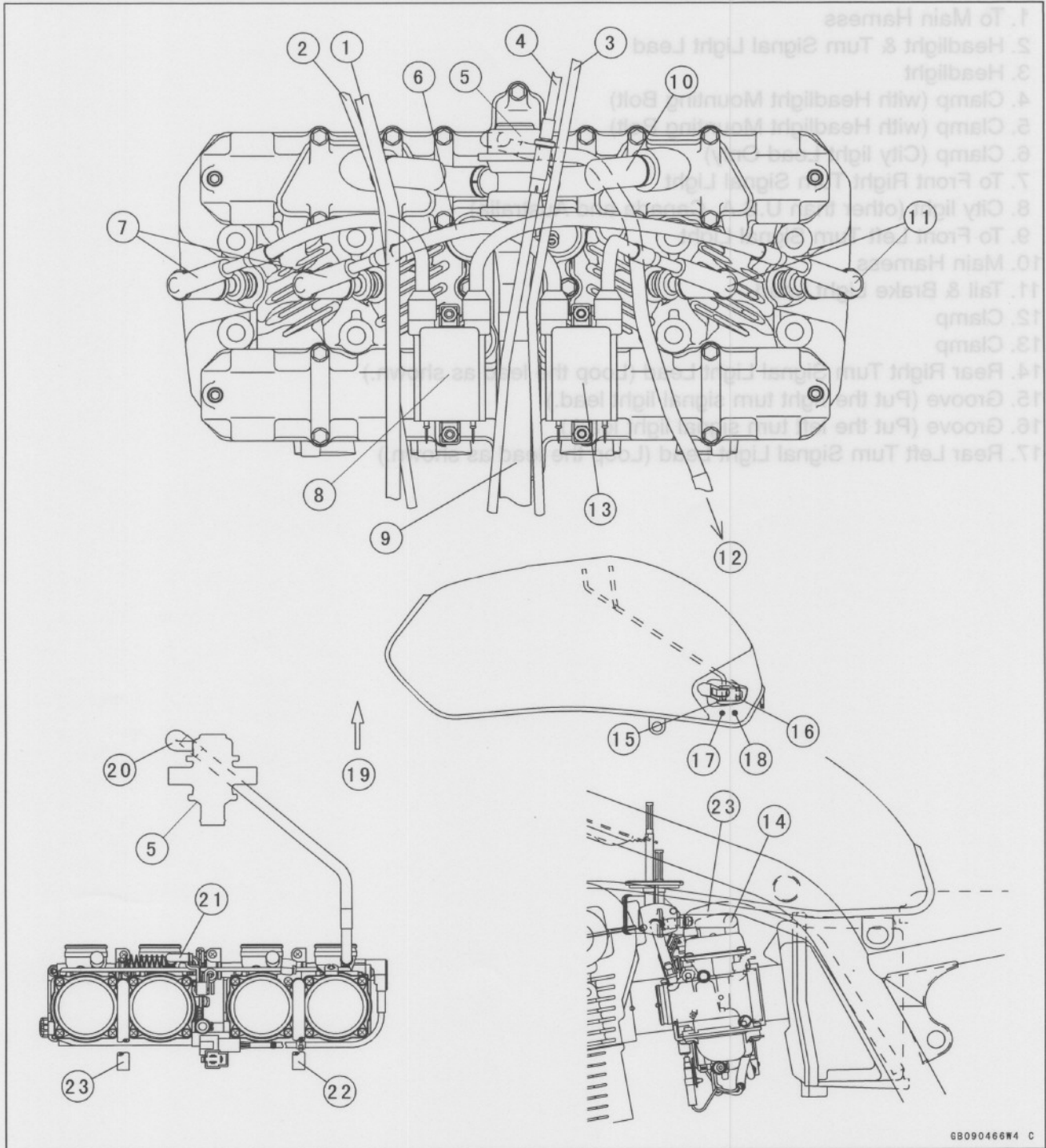
Cable, Wire, and Hose Routing

1. To Main Harness
2. Headlight & Turn Signal Light Lead
3. Headlight
4. Clamp (with Headlight Mounting Bolt)
5. Clamp (with Headlight Mounting Bolt)
6. Clamp (City light Lead Only)
7. To Front Right Turn Signal Light
8. City light (other than U.S.A. Canada and Australia)
9. To Front Left Turn Signal Light
10. Main Harness
11. Tail & Brake Light Lead
12. Clamp
13. Clamp
14. Rear Right Turn Signal Light Lead (Loop the lead as shown.)
15. Groove (Put the right turn signal light lead.)
16. Groove (Put the left turn signal light lead.)
17. Rear Left Turn Signal Light Lead (Loop the lead as shown.)



# 1-38 GENERAL INFORMATION

## Cable, Wire, and Hose Routing

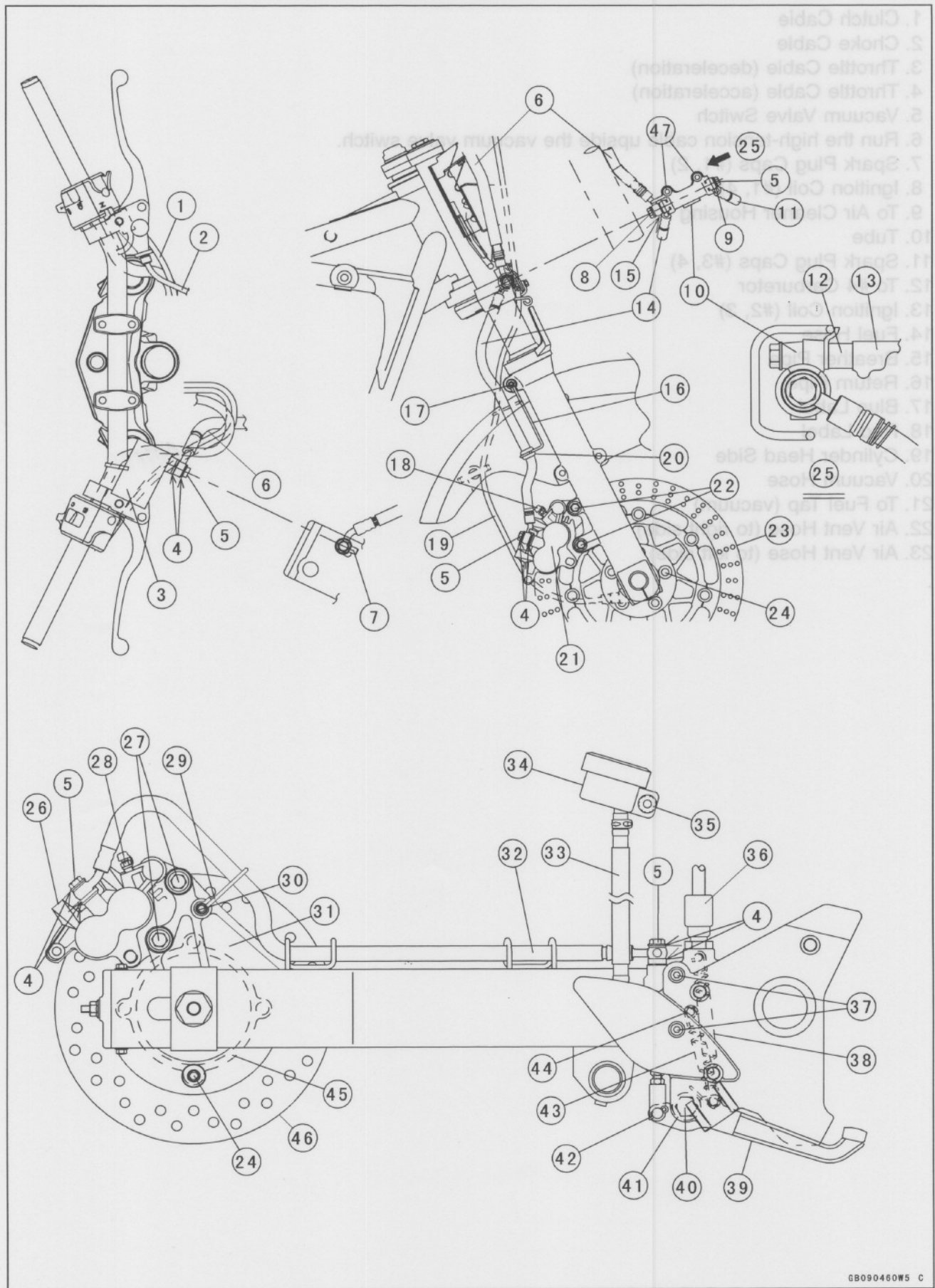


## Cable, Wire, and Hose Routing

1. Clutch Cable
2. Choke Cable
3. Throttle Cable (deceleration)
4. Throttle Cable (acceleration)
5. Vacuum Valve Switch
6. Run the high-tension cable upside the vacuum valve switch.
7. Spark Plug Caps (#1, 2)
8. Ignition Coil (#1, 4)
9. To Air Cleaner Housing
10. Tube
11. Spark Plug Caps (#3, 4)
12. To #4 Carburetor
13. Ignition Coil (#2, 3)
14. Fuel Hose
15. Breather Pipe
16. Return Pipe
17. Blue Label
18. Red Label
19. Cylinder Head Side
20. Vacuum Hose
21. To Fuel Tap (vacuum)
22. Air Vent Hose (to right side)
23. Air Vent Hose (to left side)

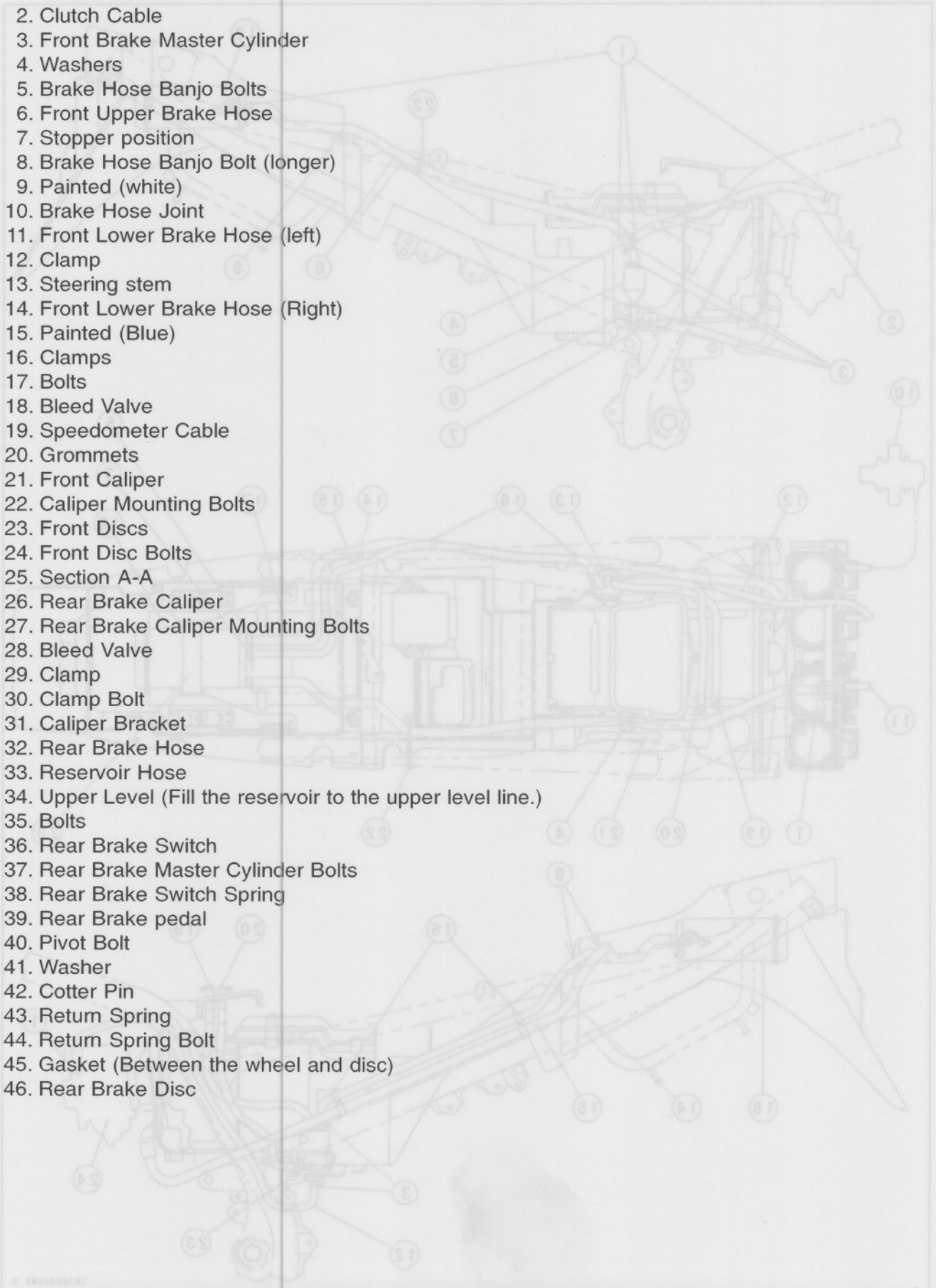
# 1-40 GENERAL INFORMATION

## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. Choke Cable
2. Clutch Cable
3. Front Brake Master Cylinder
4. Washers
5. Brake Hose Banjo Bolts
6. Front Upper Brake Hose
7. Stopper position
8. Brake Hose Banjo Bolt (longer)
9. Painted (white)
10. Brake Hose Joint
11. Front Lower Brake Hose (left)
12. Clamp
13. Steering stem
14. Front Lower Brake Hose (Right)
15. Painted (Blue)
16. Clamps
17. Bolts
18. Bleed Valve
19. Speedometer Cable
20. Grommets
21. Front Caliper
22. Caliper Mounting Bolts
23. Front Discs
24. Front Disc Bolts
25. Section A-A
26. Rear Brake Caliper
27. Rear Brake Caliper Mounting Bolts
28. Bleed Valve
29. Clamp
30. Clamp Bolt
31. Caliper Bracket
32. Rear Brake Hose
33. Reservoir Hose
34. Upper Level (Fill the reservoir to the upper level line.)
35. Bolts
36. Rear Brake Switch
37. Rear Brake Master Cylinder Bolts
38. Rear Brake Switch Spring
39. Rear Brake pedal
40. Pivot Bolt
41. Washer
42. Cotter Pin
43. Return Spring
44. Return Spring Bolt
45. Gasket (Between the wheel and disc)
46. Rear Brake Disc

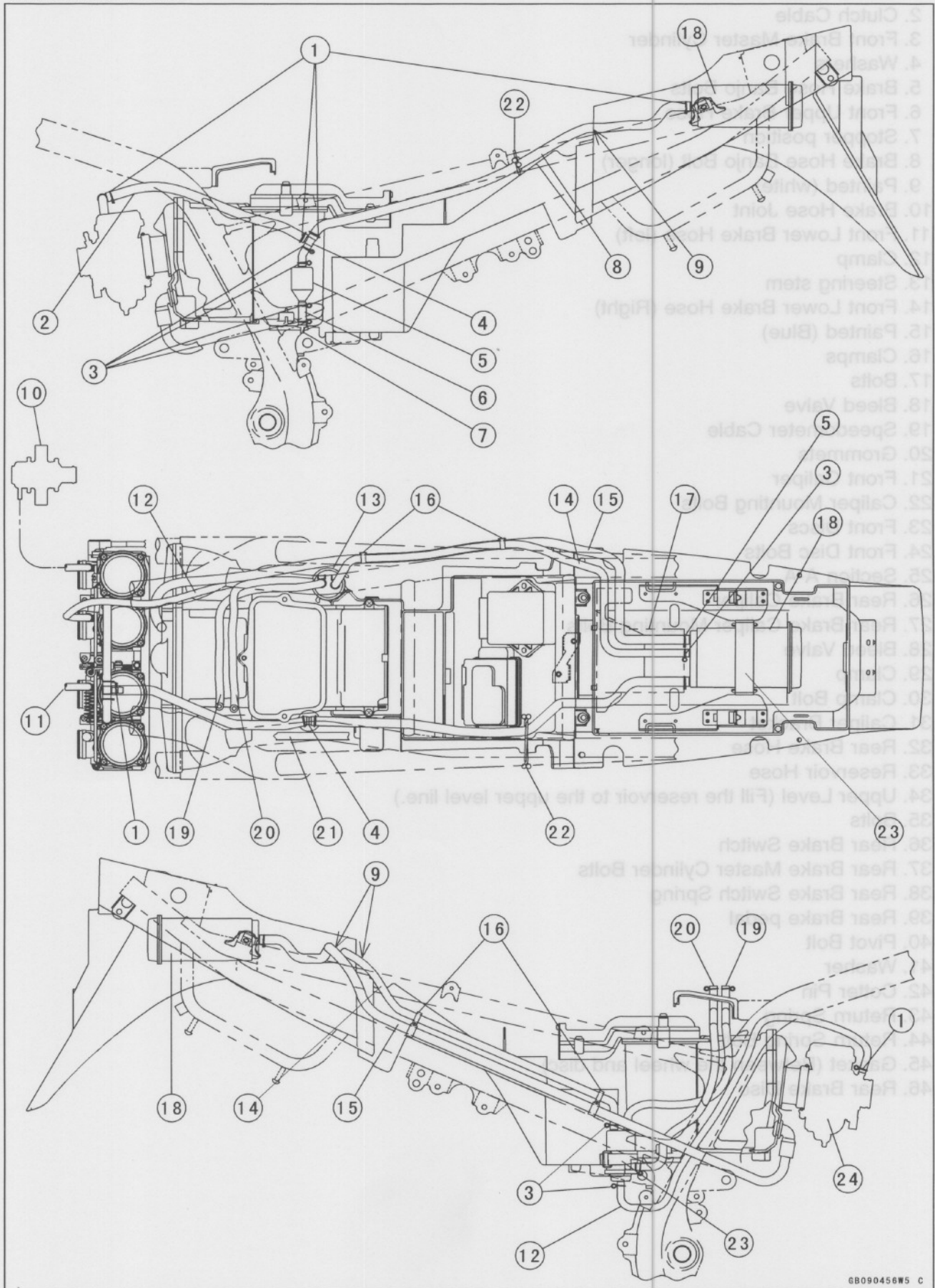


California Model

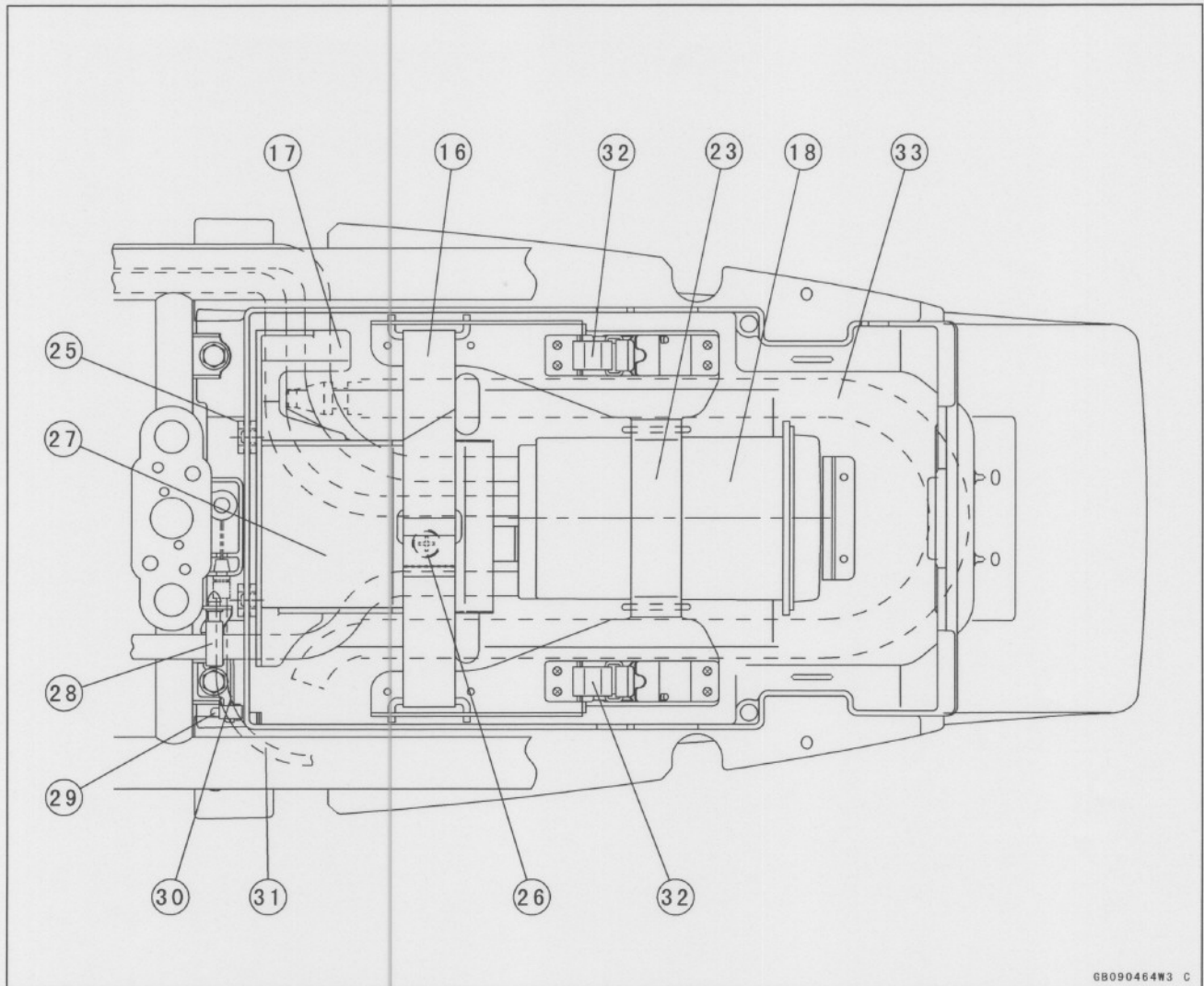
# 1-42 GENERAL INFORMATION

## Cable, Wire, and Hose Routing

### California Model



Cable, Wire, and Hose Routing



GB090464W3 C

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1. Clamps</li> <li>2. Hose (Yellow)</li> <li>3. Clamps</li> <li>4. Fitting</li> <li>5. Reservoir</li> <li>6. Hose</li> <li>7. Plug</li> <li>8. Hose (Yellow)</li> <li>9. Through the hole</li> <li>10. Vacuum Valve Switch</li> <li>11. To Fuel Tap</li> <li>12. Hose (White)</li> <li>13. Separator</li> <li>14. Hose (Blue)</li> <li>15. Hose (Green)</li> <li>16. Bands</li> <li>17. Cover</li> </ul> | <ul style="list-style-type: none"> <li>18. Canister</li> <li>19. Hose (Blue)</li> <li>20. Hose (Red)</li> <li>21. Main Harness</li> <li>22. Clamp (The frame pipe and hose are fixed at this position)</li> <li>23. Bands</li> <li>24. Carburetor #3</li> <li>25. Damper</li> <li>26. Screw</li> <li>27. Cover (Hold the canister Hoses)</li> <li>28. Clamp (Yellow Hose)</li> <li>29. Clamp (Seat lock Cable)</li> <li>30. Clamp Bracket</li> <li>31. Seat lock Cable</li> <li>32. Bands (U-Shaped Lock)</li> <li>33. U-Shaped Lock</li> </ul> |
|---|---|

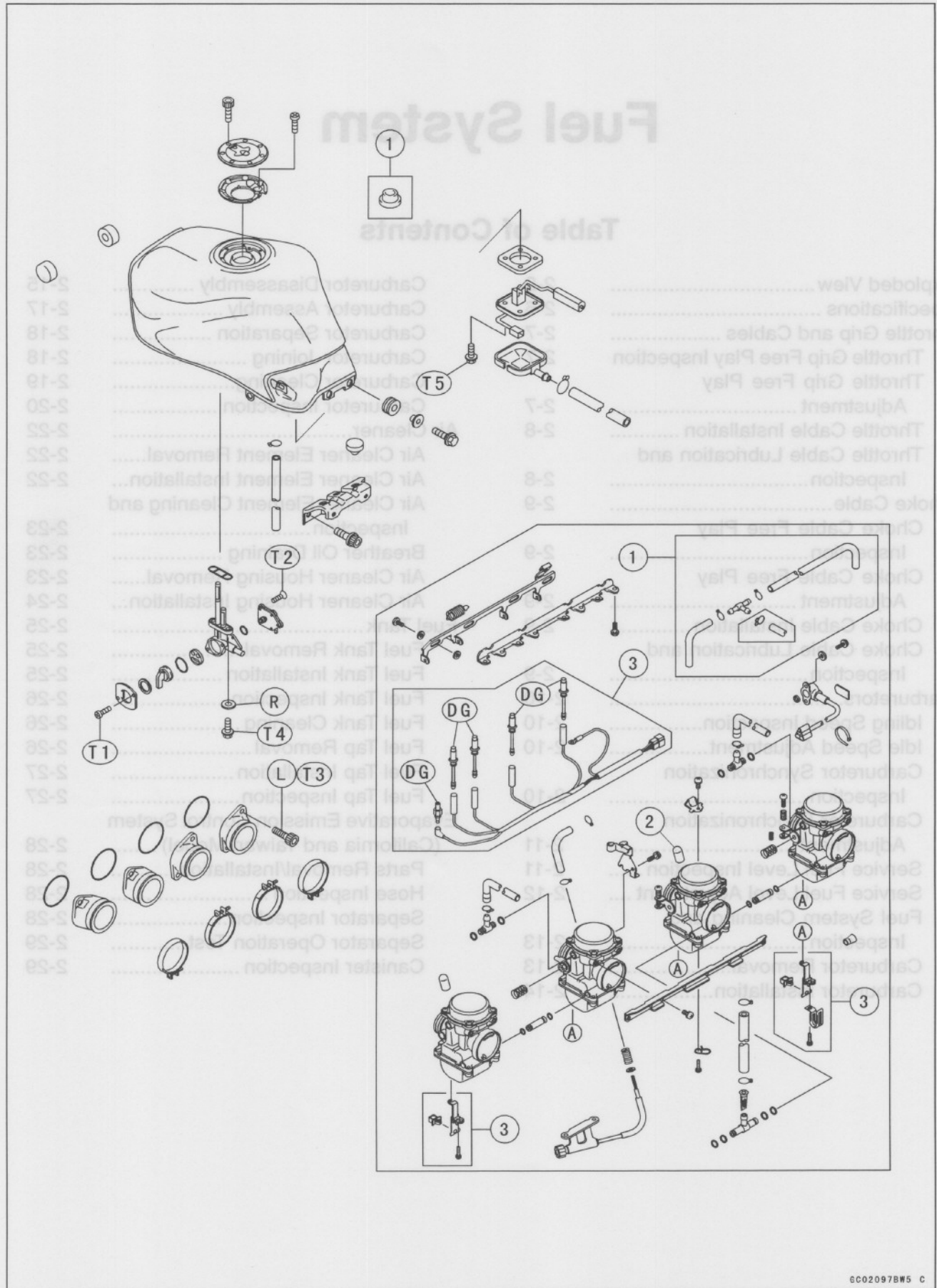
# Fuel System

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## 2-2 FUEL SYSTEM

### Exploded View



Exploded View

weiV babolqx3

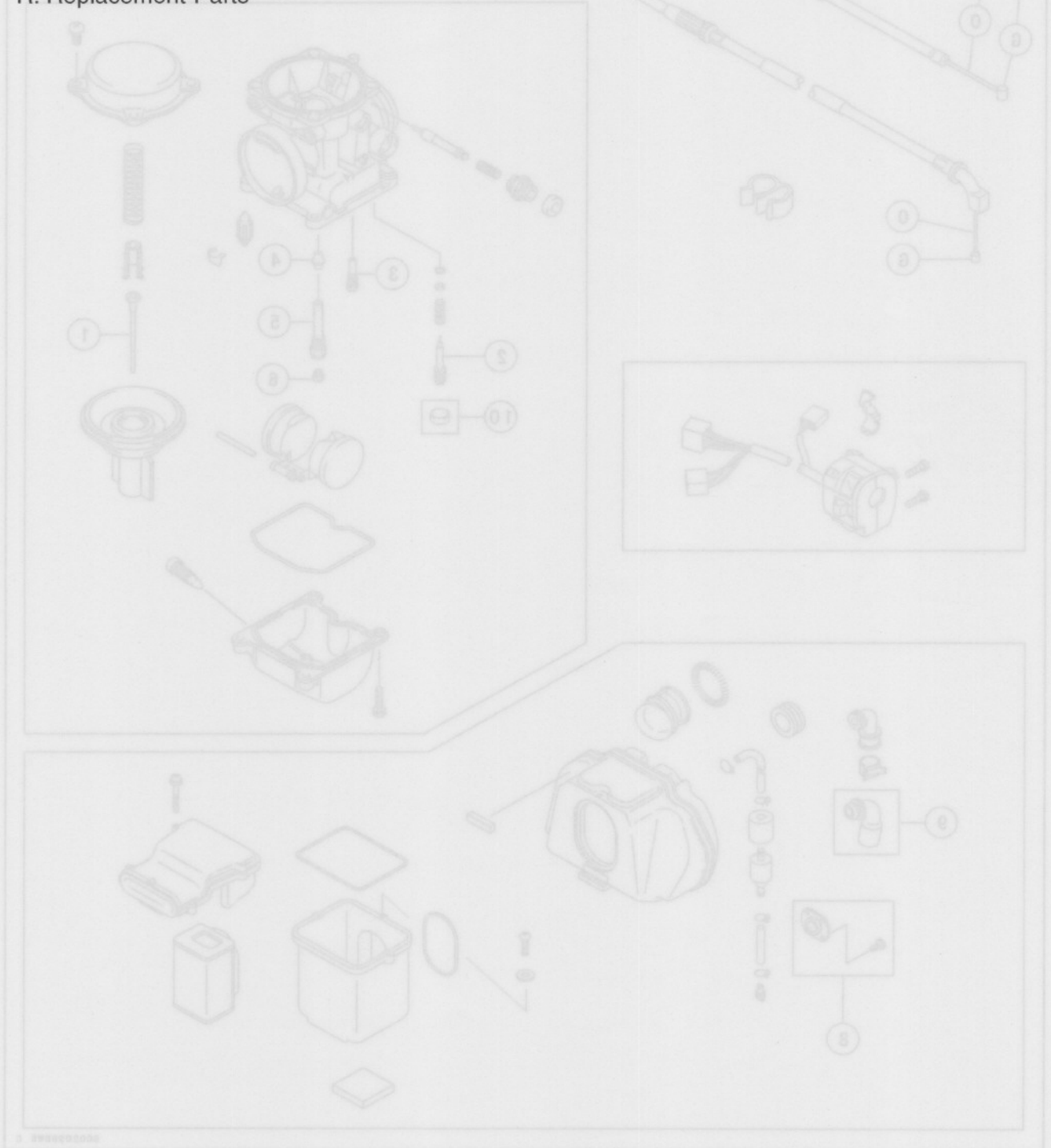
- 1. California and Taiwan Model
- 2. Other than California and Taiwan Model
- 3. Other than U.S.A., Canada and Taiwan Model

- T1: 0.8 N·m (0.08 kgf·m, 7 in·lb)
- T2: 1.0 N·m (0.1 kgf·m, 9 in·lb)
- T3: 12 N·m (1.2 kgf·m, 104 in·lb)
- T4: 2.5 N·m (0.25 kgf·m, 22 in·lb)
- T5: 3.9 N·m (0.4 kgf·m, 35 in·lb)

DG: Apply heat transfer grease.

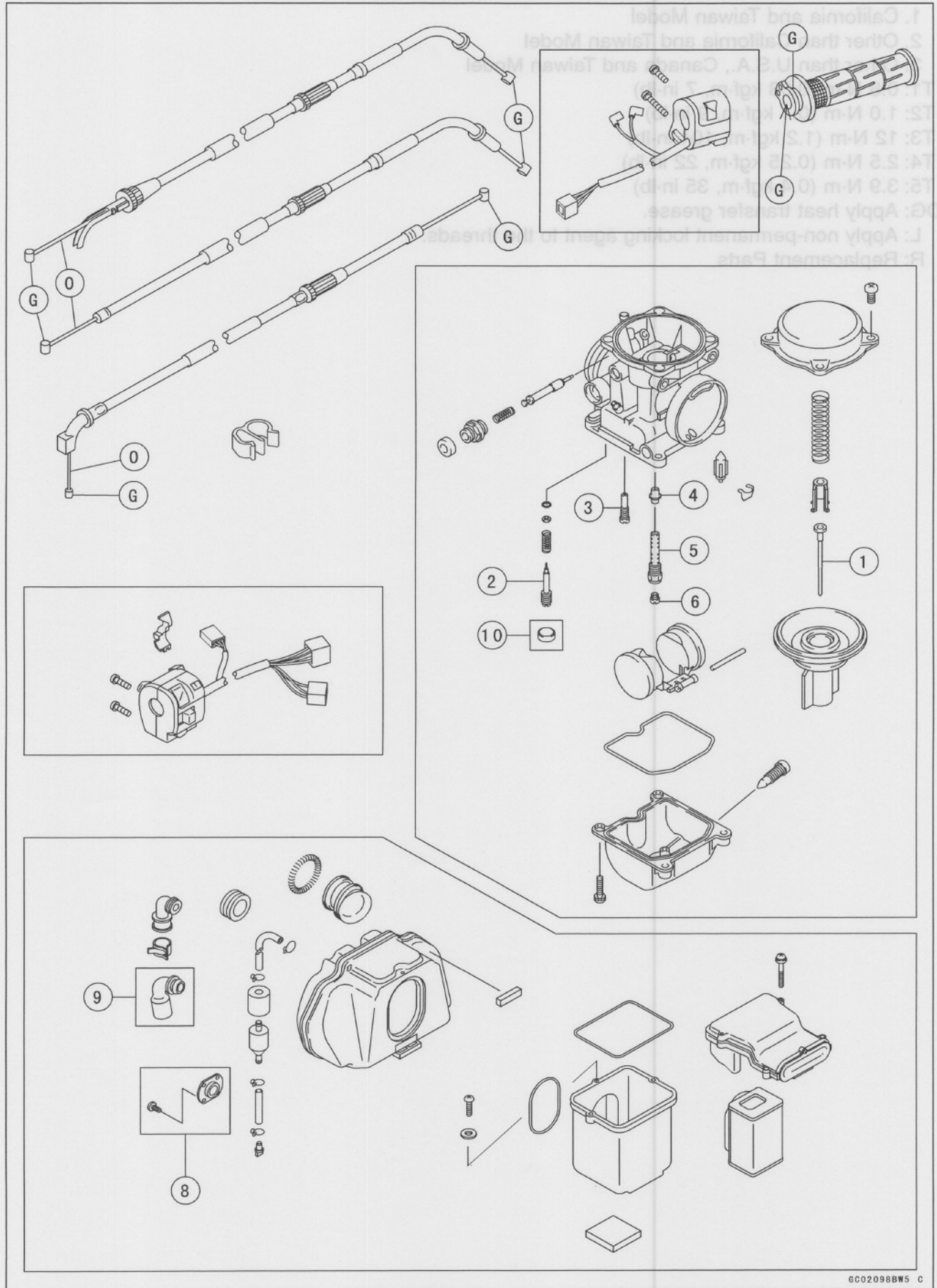
L: Apply non-permanent locking agent to the threads.

R: Replacement Parts



# 2-4 FUEL SYSTEM

## Exploded View



Exploded View

Specifications

Item	Standard	Item
1. Jet Needle		Throttle Grip and Cable
2. Pilot Screw		Throttle Grip Free Play
3. Pilot Jet	2 - 3 mm (0.08 - 0.12 in.)	Choke Cable
4. Needle Jet		Choke Cable Free Play
5. Needle Jet Holder		Carburetors
6. Main Jet	2 - 3 mm (0.08 - 0.12 in.)	Make Type
8. Other than U.S.A., Canada and Taiwan Model		Main Jet
9. California and Taiwan Model		Main Air Jet
10. U.S.A., Canada and Taiwan Model		Jet Needle
G: Apply grease.		Pilot Jet
O: Apply oil.		Needle Jet Holder
		Pilot Screw
		Idle Speed
		Carburetor Synchronization Vacuum
		Service Fuel Level (Below The Bottom Edge Of The Carburetor Body)
		Frost Height

CA: California Model  
 TW: Taiwan Model  
 US: U.S.A. Model

Special Tools - Fuel Level Gauge: 57001-1017  
 Carburetor Drain Plug Wrench, Hex 3: 57001-1269  
 Pilot Screw Adjuster, C: 57001-1292  
 Pilot Screw Adjuster Adapter, 45: 57001-1372  
 Pilot Screw Adjuster Driver: 57001-1373

## 2-6 FUEL SYSTEM

### Specifications

Item	Standard
<b>Throttle Grip and Cable</b>	
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
<b>Choke Cable</b>	
Choke Cable Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
<b>Carburetors</b>	
Make Type	Keihin, CVK 32
Main Jet	#108
Main Air Jet	#100
Jet Needle	#1 and #4 N6NC, #2 and #3 N4MD
Pilot Jet	#35
Needle Jet Holder	#1 and #4 (N413-16 Y00) has 0.7 mm × 14 holes #2 and #3 (N413-16 A00) has 0.6 mm × 18 holes
Pilot Screw	1 3/4 turns out, (CAL) (US) –
Idle Speed	1 100 ±50 r/min (rpm), (CAL) (TW) 1 300 ±50 r/min (rpm)
Carburetor Synchronization Vacuum	Less than 2.7 kPa (2 cmHg, 0.39 psi) difference between any two carburetors
Service Fuel Level (Below The Bottom Edge Of The Carburetor Body)	1.5 mm (0.06 in.) below ~ 0.5 mm (0.02 in.) above
Float Height	17 ±2 mm (0.67 ±0.08 in.)

CAL: California Model

TW: Taiwan Model

US: U.S.A. Model

#### Special Tools - Fuel Level Gauge: 57001-1017

Carburetor Drain Plug Wrench, Hex 3: 57001-1269

Pilot Screw Adjuster, C: 57001-1292

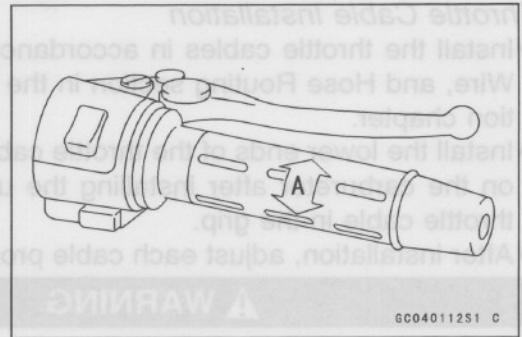
Pilot Screw Adjuster Adapter,  $\phi$ 5: 57001-1372

Pilot Screw Adjuster Driver: 57001-1373

## Throttle Grip and Cables

### Throttle Grip Free Play Inspection

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



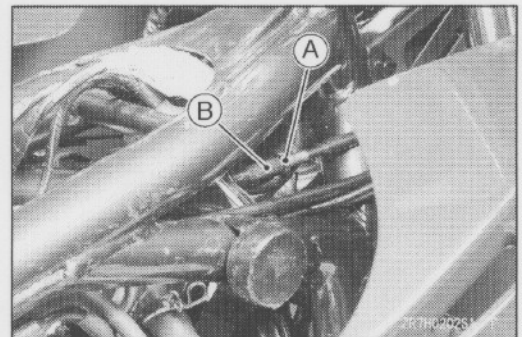
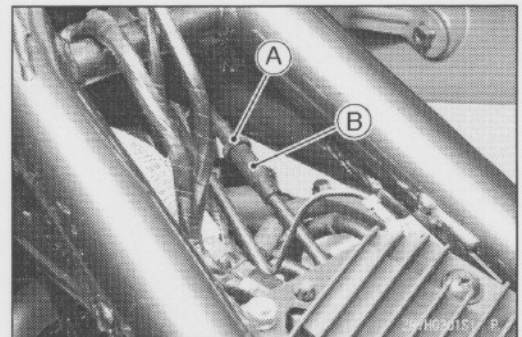
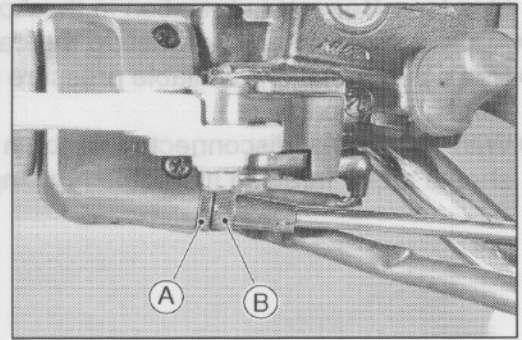
### Throttle Grip Free Play

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

- ★ If the free play is incorrect, adjust the throttle cable.

### Throttle Grip Free Play Adjustment

- Loosen the locknut [A].
  - Turn the adjuster [B] until the proper amount of throttle grip free play is obtained.
  - Tighten the locknut securely against the adjuster.
  - ★ If the free play cannot be adjusted with the upper adjuster, use the adjusters at the center of the cables.
  - Loosen the locknut, and screw the adjuster near the upper end of the accelerator cable all the way in.
  - Tighten the locknut securely.
- 
- Remove the fuel tank (see Fuel Tank Removal).
  - Loosen the locknuts at the center of the acceleration cable.
  - Screw both throttle cable adjuster to give the throttle grip plenty of play.
  - With the throttle grip completely closed, turn out the decelerator cable adjuster [A] until the inner cable just becomes tight.
  - Tighten the decelerator cable locknut [B] securely.
- 
- Turn the accelerator cable adjuster [A] until the correct throttle grip free play is obtained.
  - Tighten the accelerator cable locknut [B] securely.
  - ★ If the proper amount of free play can not be obtained in the adjustable range of the adjuster, use the adjuster at the upper end of the accelerator cable again.



## 2-8 FUEL SYSTEM

### Throttle Grip and Cables

#### Throttle Cable Installation

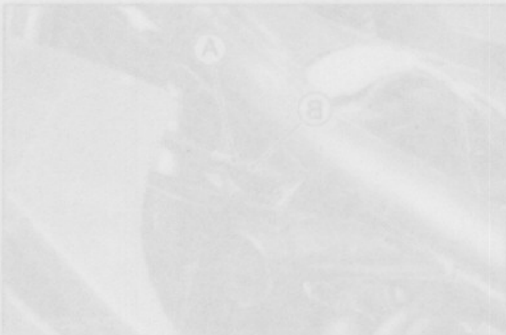
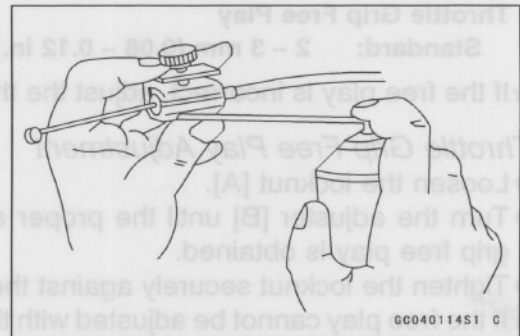
- Install the throttle cables in accordance with the Cable, Wire, and Hose Routing section in the General Information chapter.
- Install the lower ends of the throttle cables in the bracket on the carburetor after installing the upper ends of the throttle cable in the grip.
- After installation, adjust each cable properly.

#### **⚠ WARNING**

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

#### Throttle Cable Lubrication and Inspection

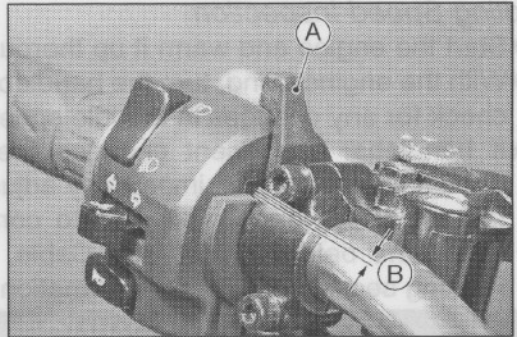
- Whenever the cables are removed, or in accordance with the Periodic Maintenance Chart, lubricate the throttle cables (see General Lubrication in the Appendix chapter).
- Apply a thin coating of grease to the cable upper ends.
- Use a commercially available pressure cable lubricator to lubricate the cables.
- With the cable disconnected at both ends, the cable should move freely in the cable housing.



## Choke Cable

### Choke Cable Free Play Inspection

- Push the choke lever [A] all the way to the front.
  - Check choke cable free play [B].
  - Determine the amount of choke cable play at the choke lever. Pull the choke lever until the starter plunger lever at the carburetor touches the starter plunger; the amount of choke lever lower end travel is the amount of choke cable play.
- ★ If the free play is incorrect, adjust the choke cable.

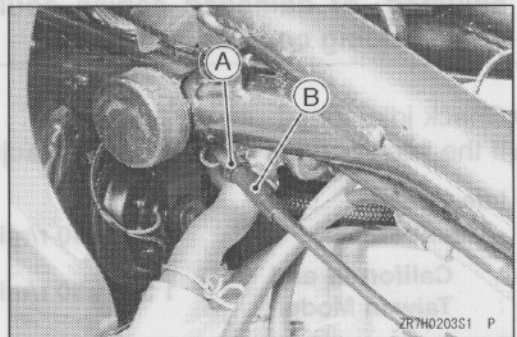


### Choke Cable Free Play

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

### Choke Cable Free Play Adjustment

- Remove the fuel tank (see Fuel Tank Removal).
- Loosen the locknut [A] in the center of the cable, and turn the adjuster [B] until the cable has the proper amount of free play.
- Tighten the locknut securely.



### Choke Cable Installation

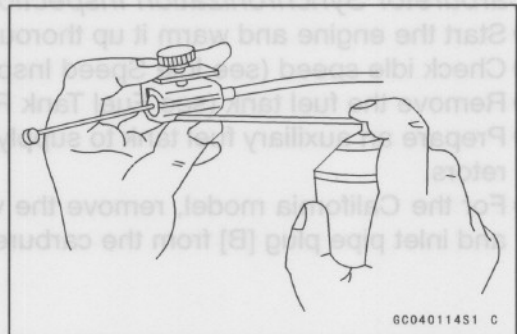
- Install the choke cable in accordance with the Cable, Wire, and Hose Routing section in General Information chapter.
- After installation, adjust the cable properly.

### **⚠ WARNING**

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

### Choke Cable Lubrication and Inspection

- Whenever the cable is removed, or in accordance with the Periodic Maintenance Chart, lubricate the choke cable (see General Lubrication in the Appendix chapter).
- Apply a thin coating of grease to the cable upper end.
- Use a commercially available pressure cable lubricator to lubricate the cable.
- With the cable disconnected at both ends, the cable should move freely in the cable housing.



## 2-10 FUEL SYSTEM

### Carburetors

#### Idling 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 or incorrectly routed, or damaged. Be sure to correct any of these conditions before riding (see Cable, Wire, and Hose Routing section in General Information chapter).

#### **⚠ WARNING**

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

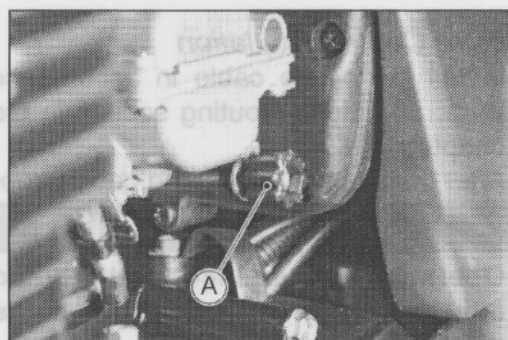
- Check idle speed.
- ★ If the idle speed is out of standard, adjust it.

#### Idle Speed

Standard:	1 100 ±50 r/min (rpm)
California and Taiwan Model	1 300 ±50 r/min (rpm)

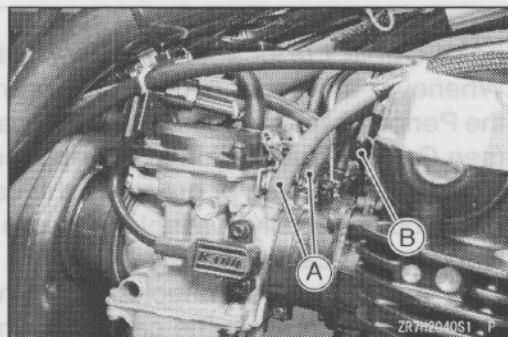
#### Idle Speed Adjustment

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

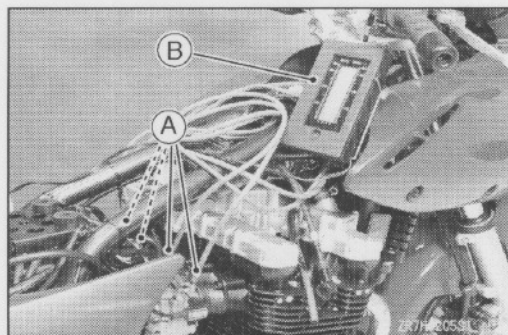


#### Carburetor Synchronization Inspection

- Start the engine and warm it up thoroughly.
- Check idle speed (see Idle Speed Inspection).
- Remove the fuel tank (see Fuel Tank Removal).
- Prepare an auxiliary fuel tank to supply fuel to the carburetors.
- For the California model, remove the vacuum hoses [A] and inlet pipe plug [B] from the carburetor.



- For the models other than the California model, remove the #1,3 inlet pipe lugs and #2,3 vacuum hoses.
- Connect a vacuum gauge hoses [A] to the fitting of the carburetor.  
Vacuum Gauge [B]
- Start the engine and read the intake vacuum of each carburetor at idle.
- ★ If the vacuum is incorrect, adjust the synchronization.



#### Carburetor Synchronization Vacuum

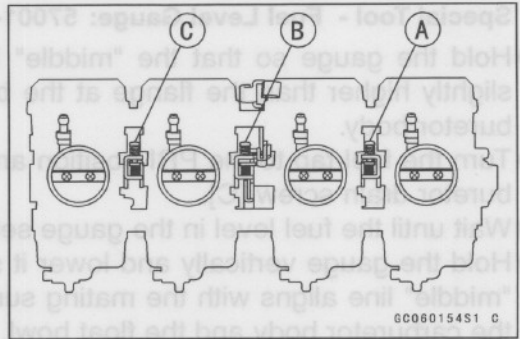
Standard: Less than 2.7 kPa (2 cmHg, 0.39 psi)  
difference between any two carburetors.

**Carburetors**

*Carburetor Synchronization Adjustment*

- Turn the adjusting screw to synchronize the carburetors.
- First synchronize the left two and then the right two carburetors by means of the left and right adjusting screws [A, C]. Then synchronize the left two carburetors and the right two carburetors using the center adjusting screw [B].
- ★ If the carburetor synchronization cannot be obtained by using the adjusting screws, check for dirt or blockage, and then check the pilot screw settings.

**Special Tools - Pilot Screw Adjuster, C: 57001-1292**  
**Pilot Screw Adjuster Adapter, φ5: 57001-1372**  
**Pilot Screw Adjuster Driver: 57001-1373**



- Check the carburetor synchronization again

**NOTE**

○ Do not turn the pilot screws carelessly during carburetor synchronization. You may cause poor running at low engine speed.

- Check idle speed.

*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.**

- Remove the carburetors and use an appropriate method to secure the carburetors upright.
- Use an appropriate hose to connect the fuel tank and the carburetors.
- 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 and the float bowl of the carburetors.



**NOTE**

○ Do not align the "middle" line on the gauge lower than the mating surface between the carburetor body and the float bowl. If it is lowered and then raised, the gauge will show a fuel level that is higher than the actual level, which will require a readjustment.

● Read the fuel level [E].

★ If it is out of standard, adjust the fuel level (see Service Fuel Level adjustment).

Service Fuel Level - (from mating surface)  
 Standard: 17.5 mm (0.69 in.) below - 0.7 mm (0.03 in.) above

● Tighten the drain screw.  
 ● Turn the fuel tap ON and remove the gauge.  
 ● Repeat the same procedure for the other carburetor.

**⚠ 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.

● Drain the fuel into a suitable container.  
 ● Remove the float bowl.  
 ● Remove the pin [A] and take out the float [B] with float valve needle [C].

● Bend the tang [A] on the float arm very slightly to change the float height.  
 ○ Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.

Float Height  
 Standard: 17.5 mm (0.69 in.)

## 2-12 FUEL SYSTEM

### Carburetors

#### Special Tool - Fuel Level Gauge: 57001-1017 [A]

- Hold the gauge so that the "middle" line [B] is placed slightly higher than the flange at the bottom of the carburetor body.
- Turn the fuel tap to the PRI position and loosen the carburetor drain screw [C].
- Wait until the fuel level in the gauge settles.
- Hold the gauge vertically and lower it slowly so that the "middle" line aligns with the mating surface [D] between the carburetor body and the float bowl.

#### NOTE

○ Do not align the "middle" line on the gauge lower than the mating surface between the carburetor body and the float bowl. If it is lowered and then raised, the gauge will show a fuel level that is higher than the actual level, which will require a remeasurement.

- Read the fuel level [E].
- ★ If it is out of standard, adjust the fuel level (see Service Fuel Level adjustment).

#### Service Fuel Level - (from mating surface)

Standard: 1.5 mm (0.06 in.) below ~ 0.5 mm (0.02 in.) above

- Tighten the drain screw.
- Turn the fuel tap ON and remove the gauge.
- Repeat the same procedure for the other carburetors.

#### Service Fuel Level Adjustment

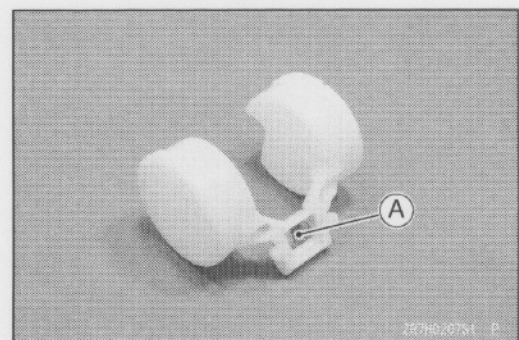
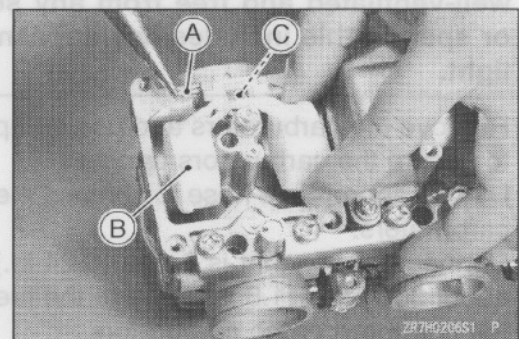
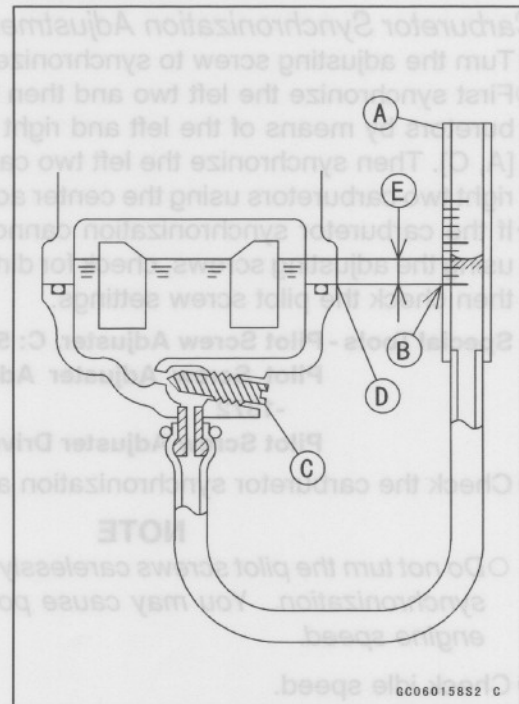
#### ⚠ WARNING

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.

- Drain the fuel into a suitable container.
- Remove the float bowl.
- Remove the pin [A] and take out the float [B] with float valve needle [C].
- Bend the tang [A] on the float arm very slightly to change the float height.
- Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.

#### Float Height

Standard: 17 ±2 mm (0.67 ±0.08 in.)

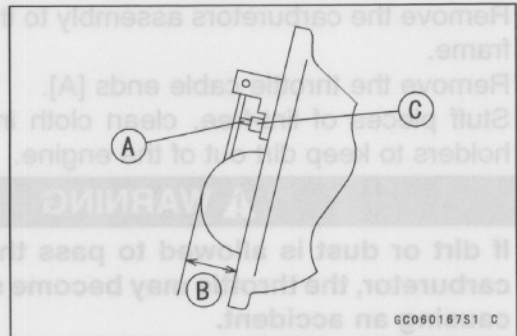


**Carburetors**

**NOTE**

○ Do not press on the needle rod [A] when measuring the float height [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 [C] is damaged.



*Fuel System Cleaning and Inspection*

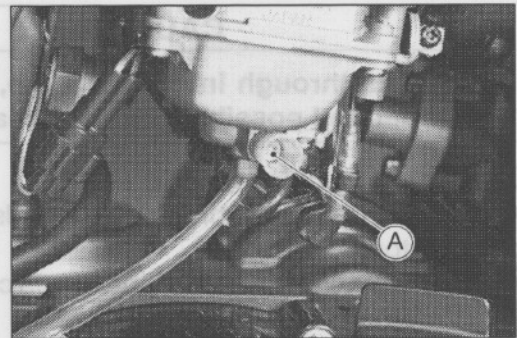
**⚠ WARNING**

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.

- Connect a suitable hose to the fitting at the bottom of each carburetor float bowl and run their lower ends into a suitable container.
- Turn the fuel tap to the PRI position.
- Turn out the carburetor drain bolt [A] 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 carburetors and the fuel tank.

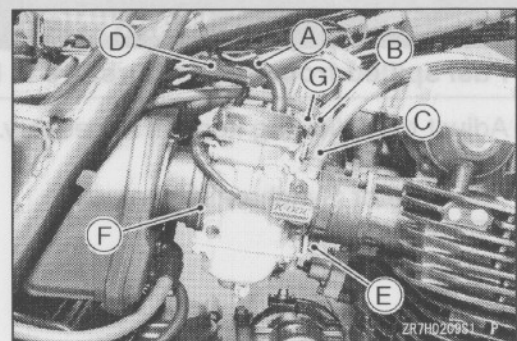


*Carburetor Removal*

**⚠ 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:
  - Seats (see Frame chapter)
  - Fuel Tank (see Fuel Tank Removal)
  - Vent Hose [A] (Clear the Vacuum Valve Switch Hose)
  - Vacuum Hose (For the California and Taiwan Model) [B]
  - Vacuum Hose [C]
  - Throttle Sensor Connector [D]
  - Carburetor Heater Connectors (For the other than U.S.A., Canada and Taiwan Model)
  - Carburetor Clamp Screws [E]
  - Holder Spring [F]
  - Choke Cable End [G]



## 2-14 FUEL SYSTEM

### Carburetors

- Remove the carburetors assembly to the light side of the frame.
- Remove the throttle cable ends [A].
- Stuff pieces of lint-free, clean cloth into the carburetor holders to keep dirt out of the engine.

#### **⚠ WARNING**

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

#### **CAUTION**

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

#### *Carburetor Installation*

- Be sure to install the throttle cable ends before install the carburetors
- Route the cables, harness, and hoses correctly (see General Information chapter).
- Tighten the clamps for the carburetor holders at the position in the figure.  
Upper Side [A]

#### **⚠ WARNING**

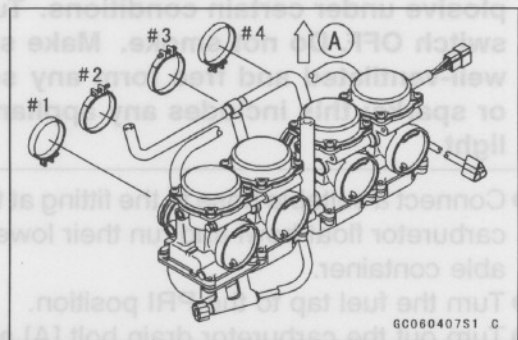
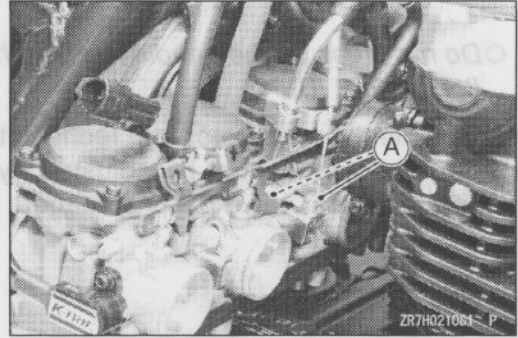
Be sure to install the holder clamp screws in the direction shown. Or, the screws could come in contact with the throttle linkage resulting in unsafe riding condition.

- Check fuel leakage from the carburetors.

#### **⚠ WARNING**

Fuel spilled from the carburetors is hazardous.

- Adjust the following items if necessary.
  - Idle Speed
  - Carburetor Synchronization
  - Throttle Cables
  - Choke Cable



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:
  - Seats (see Frame chapter)
  - Fuel Tank (see Fuel Tank Removal)
  - Vent Hose [A] (Clear the Vacuum Valve Switch Hose)
  - Vacuum Hose (For the California and Taiwan Model) [B]
  - Vacuum Hose [C]
  - Throttle Sensor Connector [D]
  - Carburetor Heater Connector (For the other than U.S.A., Canada and Taiwan Model)
  - Carburetor Clamp Screws [E]
  - Holder Spring [F]
  - Choke Cable End [G]

**Carburetors**

*Carburetor Disassembly*

- Remove the carburetors assembly.

**⚠ WARNING**

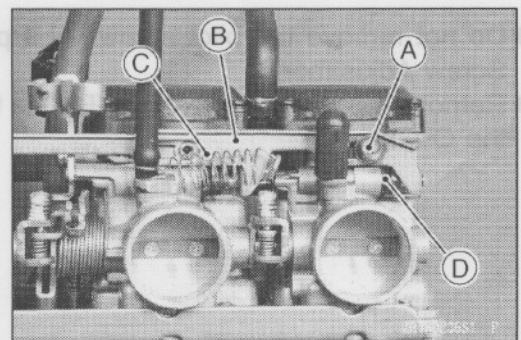
**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

**NOTE**

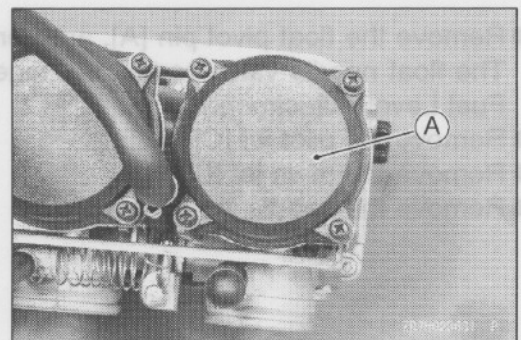
○ Carburetor can be disassembled in the joined state.

- For the U.S.A., Canada and Taiwan model, remove the pilot screw plug as follows: punch a hole in the plug and pry there with an awl or other suitable tool.
- Turn in the pilot screw and count the number of turns until it seats fully but not tightly, and then remove the screw. This is to set the screw to its original position when assembling.

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



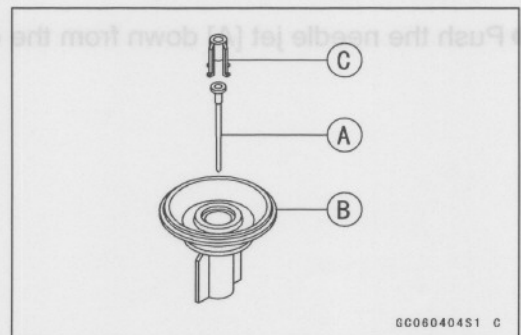
- Remove:  
 Upper Chamber Cover [A]  
 Spring  
 Vacuum Piston and Diaphragm



**CAUTION**

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

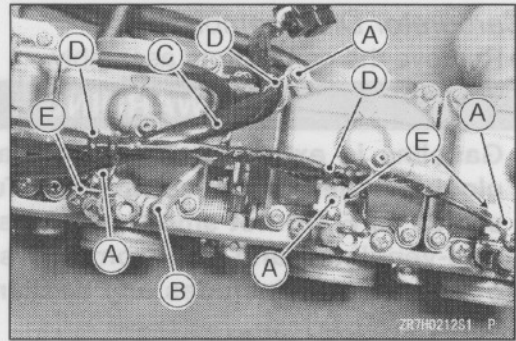
- Remove the jet needle [A] from the vacuum piston [B]. These are detached together with the spring seat [C].



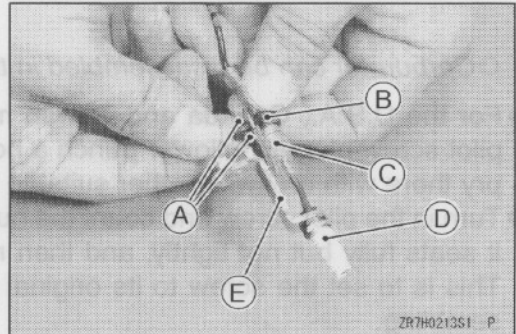
## 2-16 FUEL SYSTEM

### Carburetors

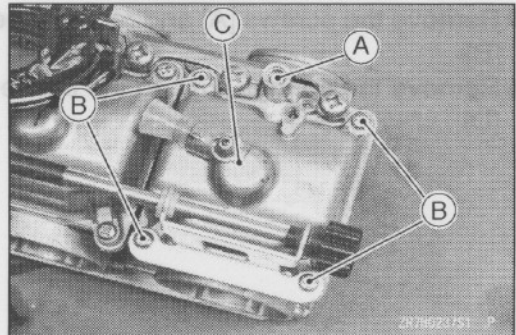
- For the other than U.S.A., Canada and Taiwan model: remove the screws [A], disconnect the carburetor temperature sensor connector [B] and take off the carburetor heater lead [C] together with the clamps [D], heater holders [E] and heaters.
- Remove the temperature sensor, if necessary.



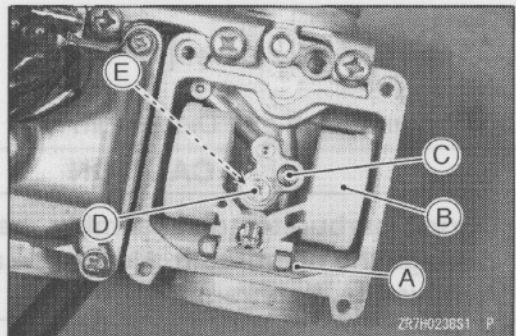
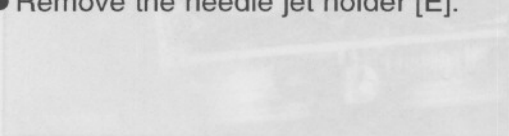
- Pinch the stopper [A] and then pull the clamp [B].
- Disconnect the connector [C] of the carburetor heater [D]. Carburetor Heater Holder [E]



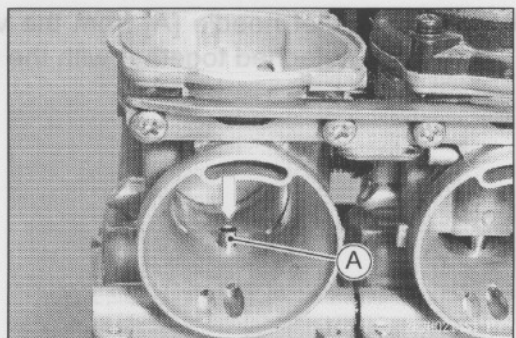
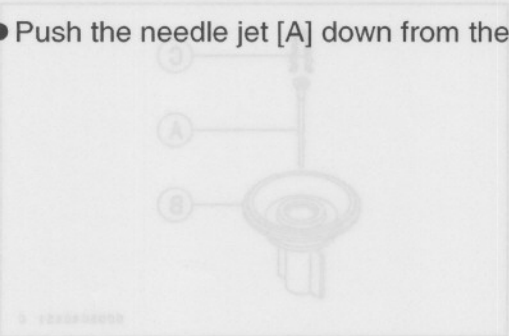
- Do not remove the pilot screw [A] if possible (see Pilot Screw Adjustment).
- Remove the float bowl screws [B], the float bowl [C], and the O-ring.



- 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].



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



**Carburetors**

*Carburetor Assembly*

**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] to the carburetor body.
- Then, screw in the needle jet holder [C].

○ Install the needle jet holder, noting the following.

The #1 and #4 carburetor has 0.7 mm × 14 holes [A]

The #2 and #3 carburetor has 0.6 mm × 18 holes [B]

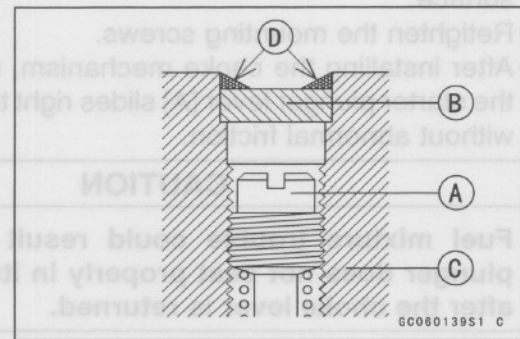
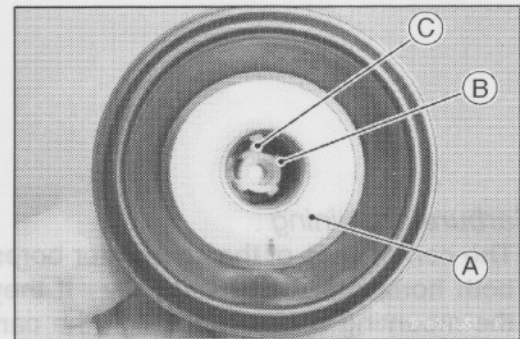
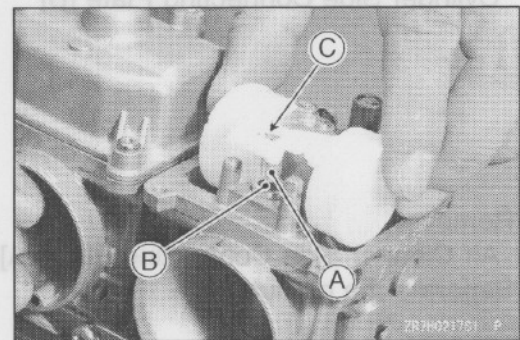
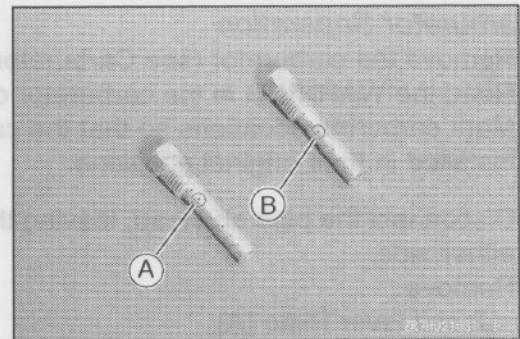
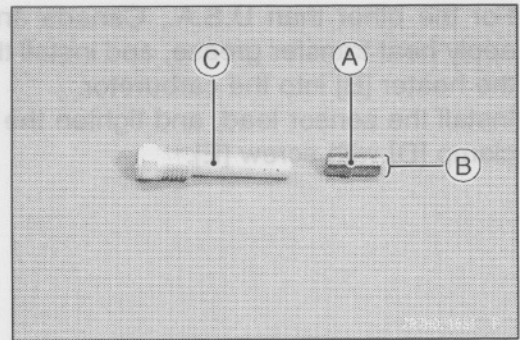
- Install the float valve needle [A] in the valve seat [B] and hook the needle hanger onto the float tang [C].
- Insert the float pivot pin into the pivot and the float holes (see Service Fuel Level Adjustment).
- Set the float to the standard height (see Service Fuel Level Adjustment).

- 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.

- 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 U.S.A., Canada and Taiwan model, 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**

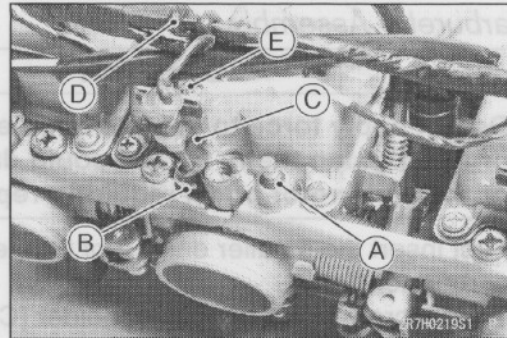
**Do not apply too much bonding agent to the plug or the pilot screw itself may be fixed.**



## 2-18 FUEL SYSTEM

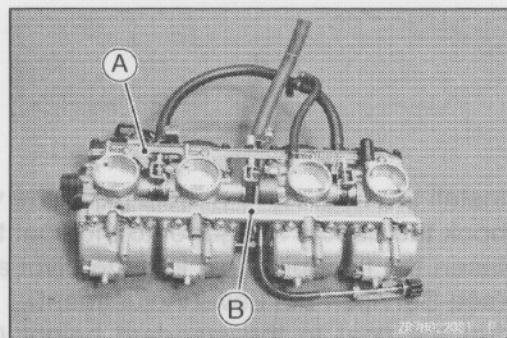
### Carburetors

- For the other than U.S.A., Canada and Taiwan model: 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 [E].

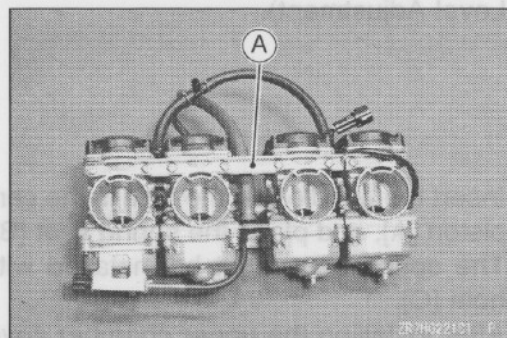


#### Carburetor Separation

- Remove the carburetor (see Carburetor Removal).
- Read the WARNING in the carburetor disassembly.
- Mark carburetor locations so that the carburetors can be installed in their original positions.
- Disconnect the pipe and lead, leaving them connected to either side.
- Remove:
  - Choke lever Plate [A]
  - Cylinder Side Connecting Plate [B]

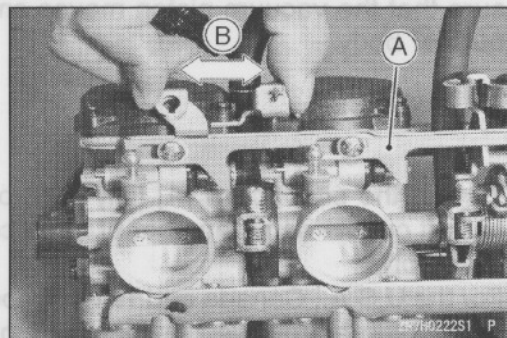


- Remove:
  - Air Cleaner Side Connecting Plate [A]
- Separate the carburetor.



#### Carburetor Joining

- The center lines of the carburetor bores must be parallel both horizontally and vertically. If they are not, loosen the mounting screws and align the carburetors on a flat surface.
- Retighten the mounting screws.
- After installing the choke mechanism, check to see that the starter plunger lever [A] slides right to left [B] smoothly without abnormal friction.

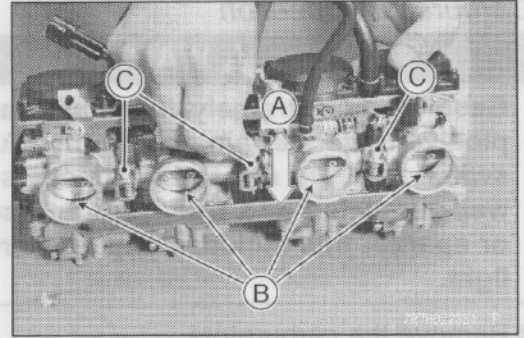


#### CAUTION

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

## Carburetors

- Visually synchronize the throttle (butterfly) valves.
- Check to see that all throttle valves open and close [A] smoothly without binding when turning the pulley.
- Visually check the clearance [B] between the throttle valve and the carburetor bore in each carburetor.
- ★ If there is a difference between any two carburetors, turn the synchronization adjusting screws [C] to obtain the same clearance.
- Install the carburetors (see Carburetor Installation).
- Adjust the synchronization (see Synchronization Adjustment).



### 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 in a carburetor cleaning solution.
- Rinse the parts in water and dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Assemble the carburetors and install them on the engine.

## 2-20 FUEL SYSTEM

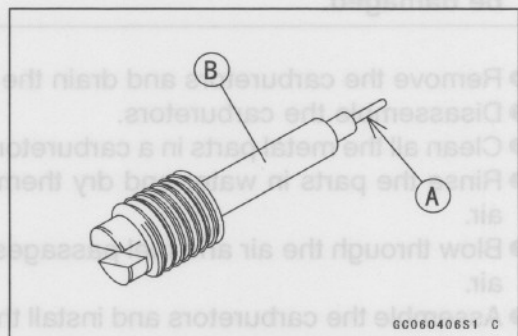
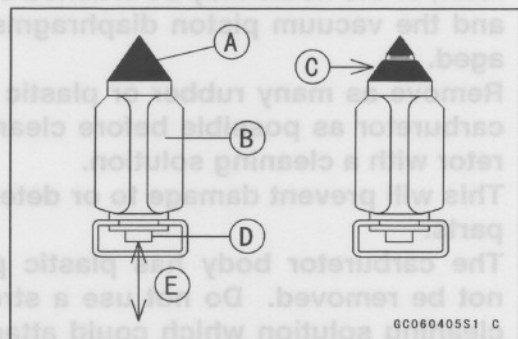
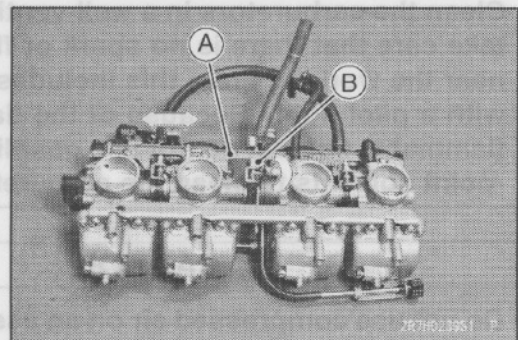
### Carburetors

#### Carburetor Inspection

#### ⚠ WARNING

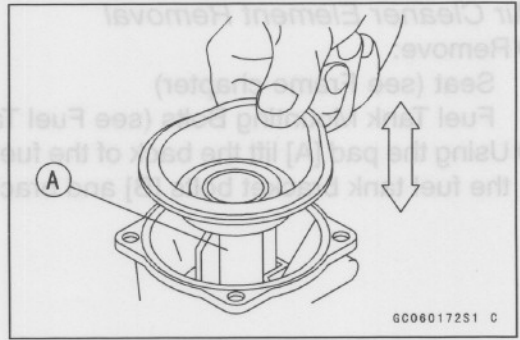
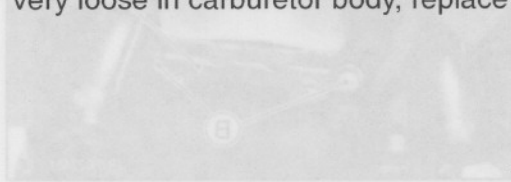
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetors.
- Before disassembling the carburetors, check the fuel level (see Fuel Level Inspection).
- ★ If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.
  
- Slide the starter plunger lever [A] to the left and release it to check that the starter plungers move smoothly and return by spring tension.
- ★ If the starter plungers do not work properly, replace the carburetors.
- Turn the throttle cable pulley [B] to check that the throttle butterfly valves move smoothly and return by spring tension.
- ★ If the throttle valves do not move smoothly, replace the carburetors.
  
- Disassemble the carburetors.
- Clean the carburetors.
- Check that the O-rings on the float bowl and pilot screw and the diaphragm on the vacuum piston are in good condition.
- ★ If any of the O-rings or diaphragms are not in good condition, replace them.
- 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.
- Push the rod [D] in the other end of the float valve needle, and then release it [E].
- ★ If the rod does not spring out, replace the needle.
  
- Check the tapered portion [A] of the pilot screw [B] for wear or damage.
- ★ If the pilot screw is worn or damaged on the tapered portion, it will prevent the engine from idling smoothly. Replace it.



**Carburetors**

- Check that the vacuum piston [A] moves smoothly in the carburetor body. The surface of the piston must not be excessively worn.
- ★ If the vacuum piston does not move smoothly, or if it is very loose in carburetor body, replace the carburetor.



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

- Take out the element [A].

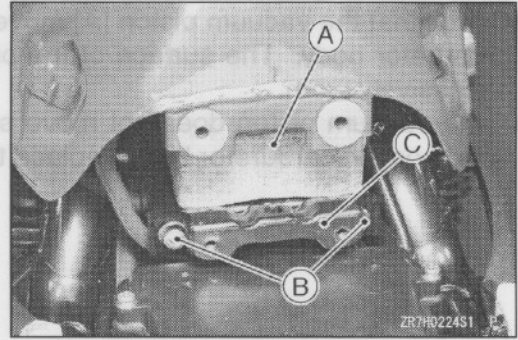
- Install the element with its opening [A] facing forward.
- Air Cleaner Element Installation

## 2-22 FUEL SYSTEM

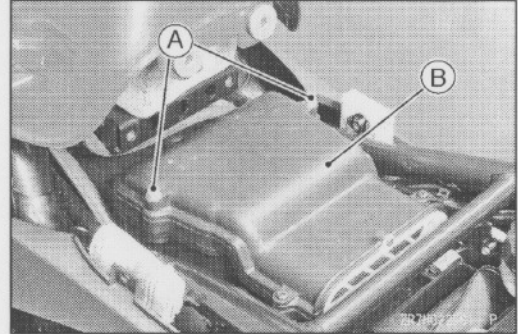
### Air Cleaner

#### Air Cleaner Element Removal

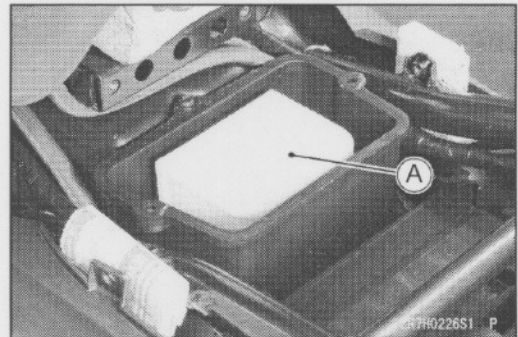
- Remove:
  - Seat (see Frame chapter)
  - Fuel Tank Mounting Bolts (see Fuel Tank Removal).
- Using the pad [A] lift the back of the fuel tank and remove the fuel tank bracket bolts [B] and bracket [C].



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

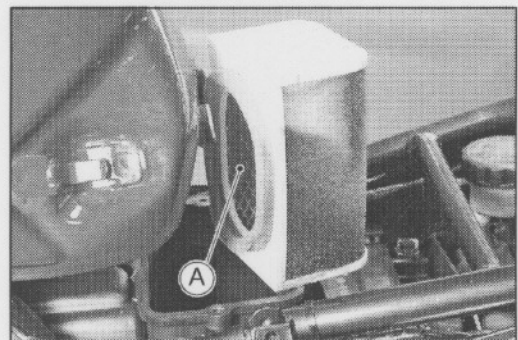


- Take out the element [A].



#### Air Cleaner Element Installation

- Install the element with its opening [A] facing forward.



## Air Cleaner

### Air Cleaner Element Cleaning and Inspection

#### ⚠ 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.
- Clean the element in cleaning solvent, and then dry it with compressed air or by shaking it.
- After cleaning, saturate a clean, lint-free towel with SE, SF or SG class SAE30 oil and apply the oil to the element by tapping the element outside with the towel.
- Visually inspect the element [A], sponge gasket [B], frame, etc.
- ★ If any parts are damaged, replace them.
- ★ If the gasket has peeled, secure it with adhesive.

### Breather Oil Draining

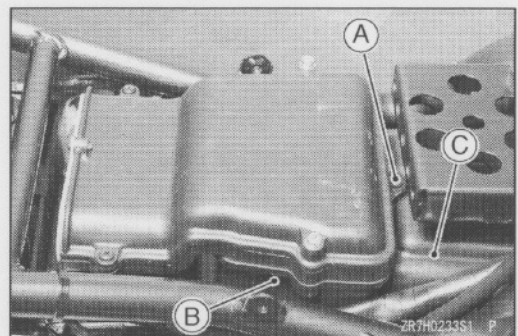
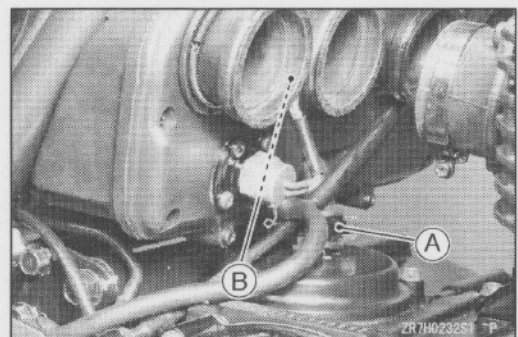
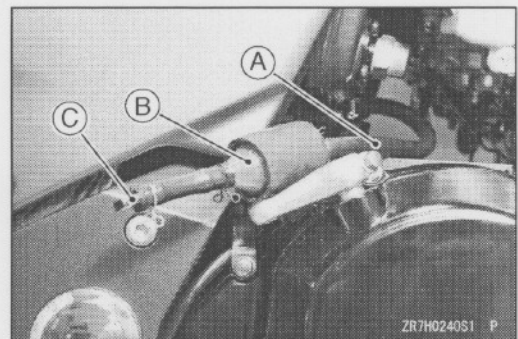
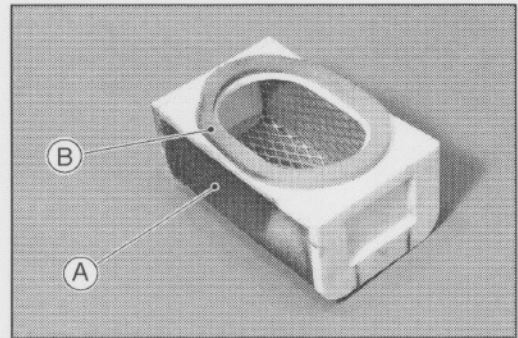
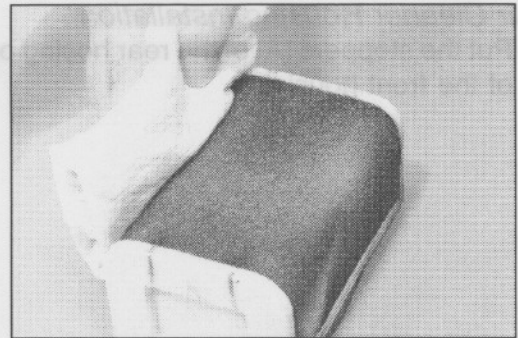
- Visually inspect the reservoir [B] at the lower end of the air cleaner drain hose [A] for any accumulation of oil.
- ★ If there is any accumulation of oil, remove the plug [C] to drain the oil.

#### ⚠ WARNING

After draining the oil, be sure to reinstall the plug on the end of the hose. Oil on tires will make them slippery and can cause an accident and injury.

### Air Cleaner Housing Removal

- Remove:
  - Seat (see Frame chapter)
  - Fuel Tank (see Fuel Tank Removal)
  - Carburetor (see Carburetor Removal)
  - Engine Breather Hose [A]
  - Atmospheric Temperature Sensor Connector [B]
  - Drain Hose (For California Model)
- Unscrew the screw [A] and pull the rear housing [B] to the upper.
- Pull the front housing [C] to the front.

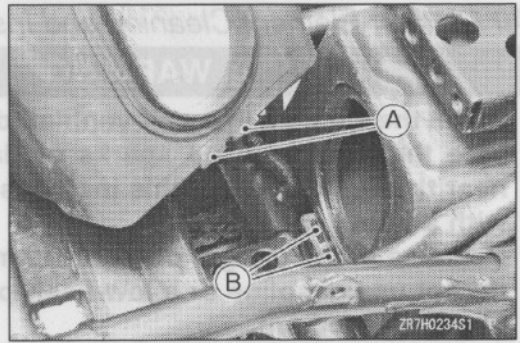
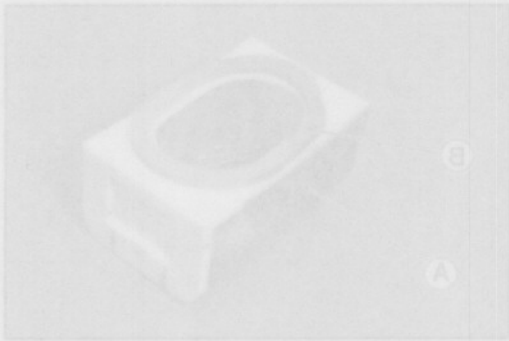
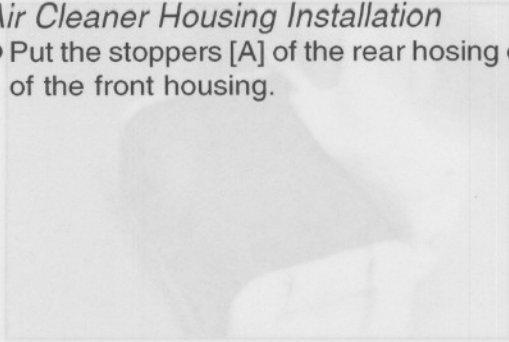


## 2-24 FUEL SYSTEM

### Air Cleaner

#### Air Cleaner Housing Installation

- Put the stoppers [A] of the rear hosing onto the groove [B] of the front housing.



- Remove the element.
- Clean the element in cleaning solvent, and then dry it with compressed air or by shaking it.
- After cleaning, saturate a clean, lint-free towel with SE-2F or SG class SAE30 oil and apply the oil to the element by tapping the element outside with the towel.
- Visually inspect the element [A], sponge gasket [B], frame, etc.
- ★ If any parts are damaged, replace them.
- ★ If the gasket has peeled, secure it with adhesive.

- #### Breather Oil Draining
- Visually inspect the reservoir [B] at the lower end of the air cleaner drain hose [A] for any accumulation of oil.
  - ★ If there is any accumulation of oil, remove the plug [C] to drain the oil.

**WARNING**  
After draining the oil, be sure to reinstall the plug on the end of the hose. Oil on tires will make them slippery and can cause an accident and injury.

- #### Air Cleaner Housing Removal
- Remove:
    - Seat (see Frame chapter)
    - Fuel Tank (see Fuel Tank Removal)
    - Carburetor (see Carburetor Removal)
    - Engine Breather Hose [A]
    - Atmospheric Temperature Sensor Connector [B]
    - Drain Hose (for California Model)

- Unscrew the screw [A] and pull the rear housing [B] to the upper.
- Pull the front housing [C] to the front.

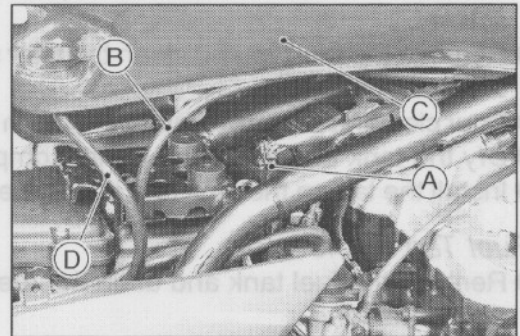
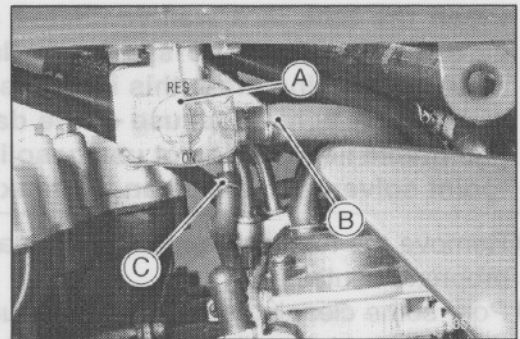
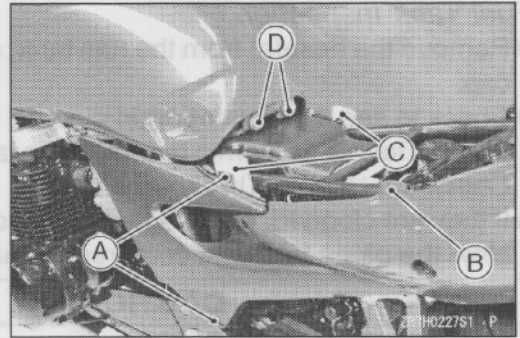
## Fuel Tank

### Fuel Tank Removal

#### **⚠ WARNING**

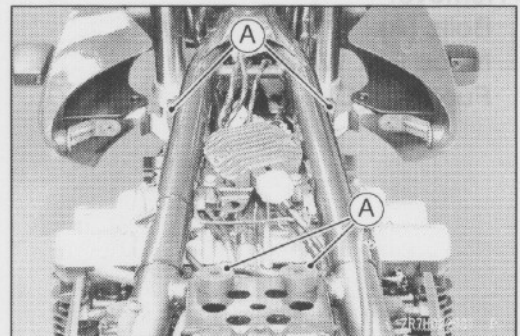
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition key to OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove:
  - Seat (see Frame chapter)
- Remove the Side Cover Screws [A] and the seat cover screw [B]
- Inset the thick cloths [C] between the frame and side covers.
- Remove the Fuel Tank Mounting Bolts [D]
- Turn the fuel tap [A] to the ON or RES position, and disconnect the fuel hose [B] and the vacuum hose [C].
- Disconnect the fuel level sensor wire connector [A].
- Disconnect the overflow drain hose [B], air vent hose [D] and remove the tank [C].



### Fuel Tank Installation

- Read the WARNING mentioned in Fuel Tank Removal.
- Route the hoses and wires properly (see General Information chapter).
- Be sure the hoses are clamped securely to prevent leaks.
- Check the rubber dampers [A].
- ★ If any damper is damaged or deteriorated, replace it.



## 2-26 FUEL SYSTEM

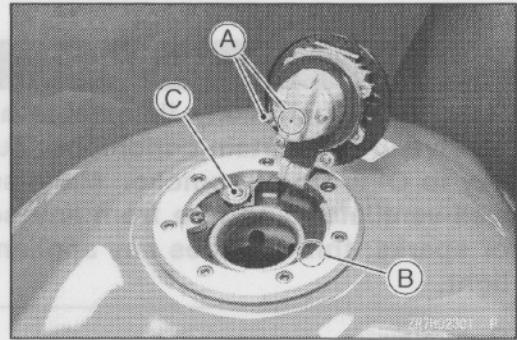
### Fuel Tank

#### Fuel Tank Inspection

- Remove the hose(s) from the fuel tank, and open the tank cap.
- Check to see if the water drain pipe [B] (also the breather pipe [C] for the California model) in the tank is not clogged. Check the tank cap breather also.
- ★ If they are clogged, remove the tank and drain it, and then blow the pipes free with compressed air.

#### CAUTION

**Do not apply compressed air to the air vent holes [A] in the tank cap. This could cause damage and clogging of the labyrinth in the cap.**



#### Fuel Tank Cleaning

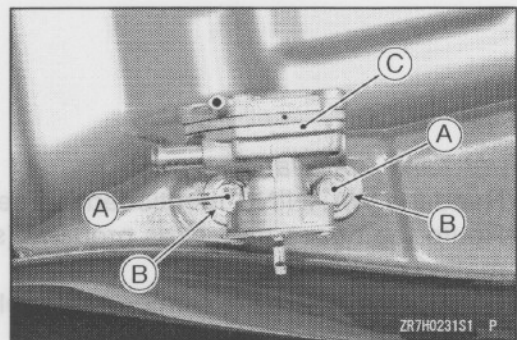
#### ⚠ WARNING

**Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; 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.
- Remove the fuel tap and clean the filter screen in cleaning solvent.
- Pour cleaning solvent through the tap in all lever positions.
- Dry the tank and the fuel tap with compressed air.
- Install the tap on the tank and install the tank in the frame.

#### Fuel Tap Removal

- Remove the fuel tank and drain the fuel into an appropriate container.
- Remove:
  - Bolts [A]
  - Nylon Flat Washers [B]
  - Fuel Tap [C]



**Fuel Tank**

*Fuel Tap Installation*

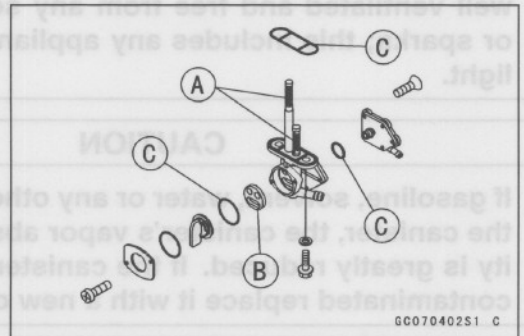
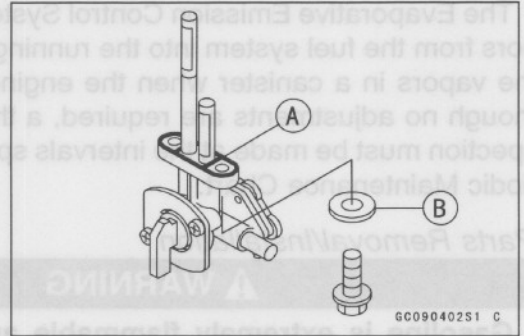
- Be sure the O-ring [A] is in good condition to prevent leaks.
- Be sure the nylon flat washers [B] are in good condition to prevent leaks.
- Do not use steel washers in place of the nylon flat washers, because they will not seal the bolts properly and fuel will leak.
- Be sure to clamp the fuel and vacuum hoses to the tap to prevent leaks.

**Torque - Fuel Tap Mounting Bolts: 2.5 N·m (0.25 kgf·m, 22 in·lb)**

*Fuel Tap Inspection*

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

**Torque - Fuel Tap Plate Screws: 0.8 N·m (0.08 kgf·m, 7 in·lb)**  
**Fuel Tap Mounting Bolts: 2.5 N·m (0.25 kgf·m, 22 in·lb)**



**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**

- Check that the hoses are securely connected.
- Replace any kinked, deteriorated or damaged hoses.

**Separator Inspection**

- Remove the right side cover (see Frame chapter).
- Disconnect the hoses from the liquid/vapor separator, and remove the separator from the motorcycle.
- Visually inspect the separator [A] for cracks and other damage.
- ★ If the separator has any cracks or is badly damaged, replace it with a new one.

## 2-28 FUEL SYSTEM

### Evaporative Emission Control System (California and Taiwan Model)

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 key to 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.**

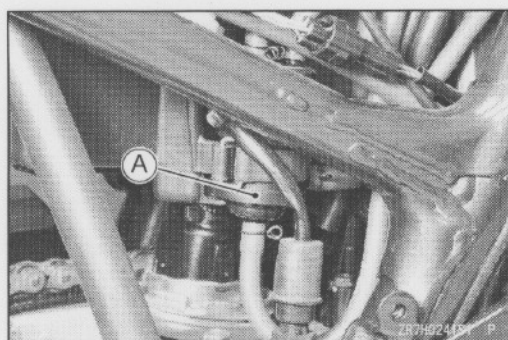
- ★ If liquid gasoline flows into the breather hose, remove the hose and blow it clean with compressed air.

#### *Hose Inspection*

- Check that the hoses are securely connected.
- Replace any kinked, deteriorated or damaged hoses.

#### *Separator Inspection*

- Remove the right side cover (see Frame chapter)
- Disconnect the hoses from the liquid/vapor separator, and remove the separator from the motorcycle.
- Visually inspect the separator [A] for cracks and other damage.
- ★ If the separator has any cracks or is badly damaged, replace it with a new one.

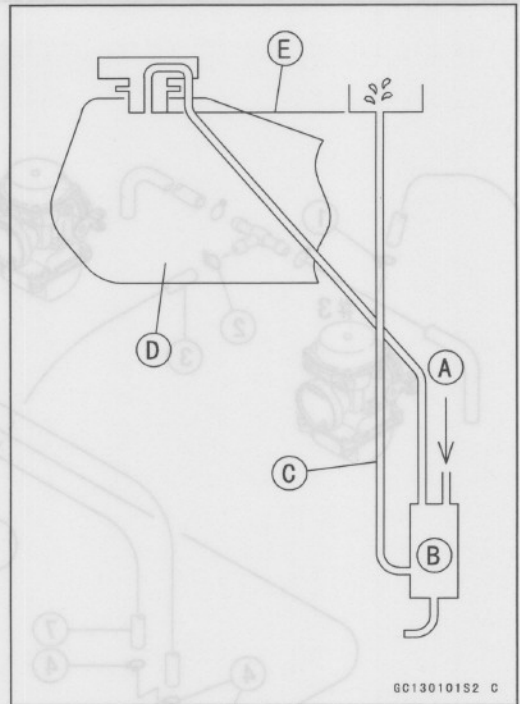


Evaporative Emission Control System (California and Taiwan Model)

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 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 of the hose, the separator works well. If it does not, replace the separator with a new one.

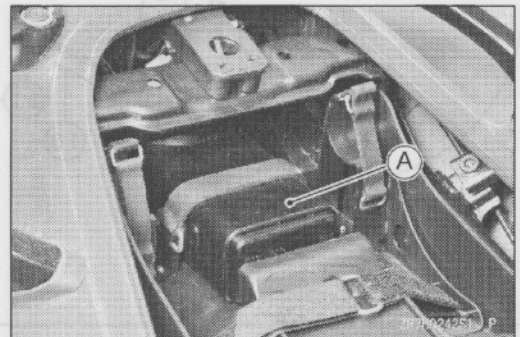


Canister Inspection

- Remove the seat (see Frame chapter).
- Remove the canister [A], 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**

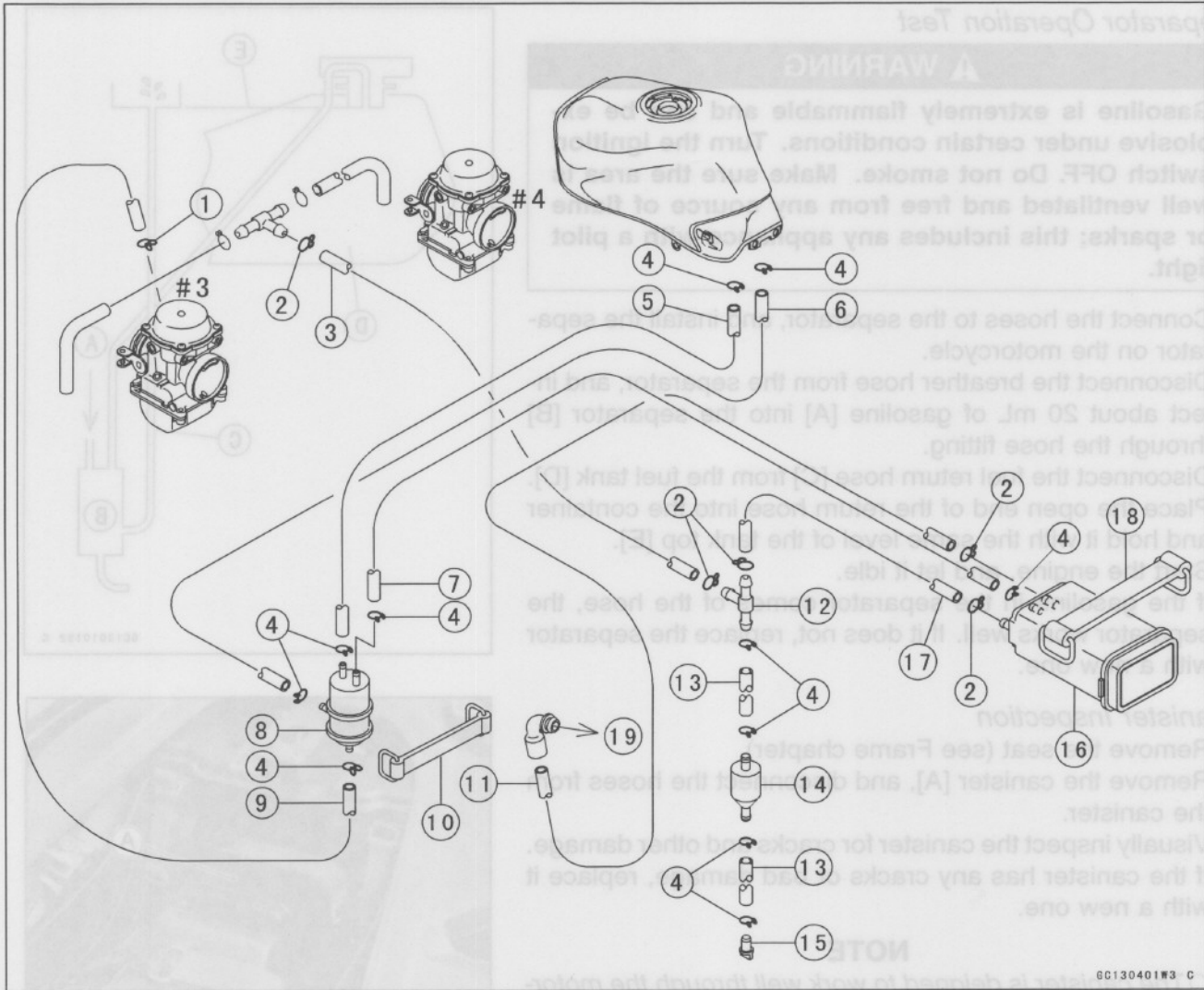
○ The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.



- 1. Clamp
- 2. Clamps
- 3. Breather Hose (Yellow)
- 4. Clamps
- 5. Breather Hose (Blue)
- 6. Fuel Return Hose (Red)
- 7. Breather Hose (Blue)
- 8. Liquid/Vapor Separator
- 9. Vacuum Hose (White)
- 10. Band
- 11. Purge Hose (Green)
- 12. Fitting
- 13. Drain Hose
- 14. Drain Tank
- 15. Plug
- 16. Canister
- 17. Breather Hose (Yellow)
- 18. Band
- 19. To Air Cleaner Housing

## 2-30 FUEL SYSTEM

### Evaporative Emission Control System (California and Taiwan Model)



1. Clamp
2. Clamps
3. Breather Hose (Yellow)
4. Clamps
5. Breather Hose (Blue)
6. Fuel Return Hose (Red)
7. Breather Hose (Blue)
8. Liquid/Vapor Separator
9. Vacuum Hose (White)
10. Band
11. Purge Hose (Green)
12. Fitting
13. Drain Hose
14. Drain Tank
15. Plug
16. Canister
17. Breather Hose (Yellow)
18. Band
19. To Air Cleaner Housing

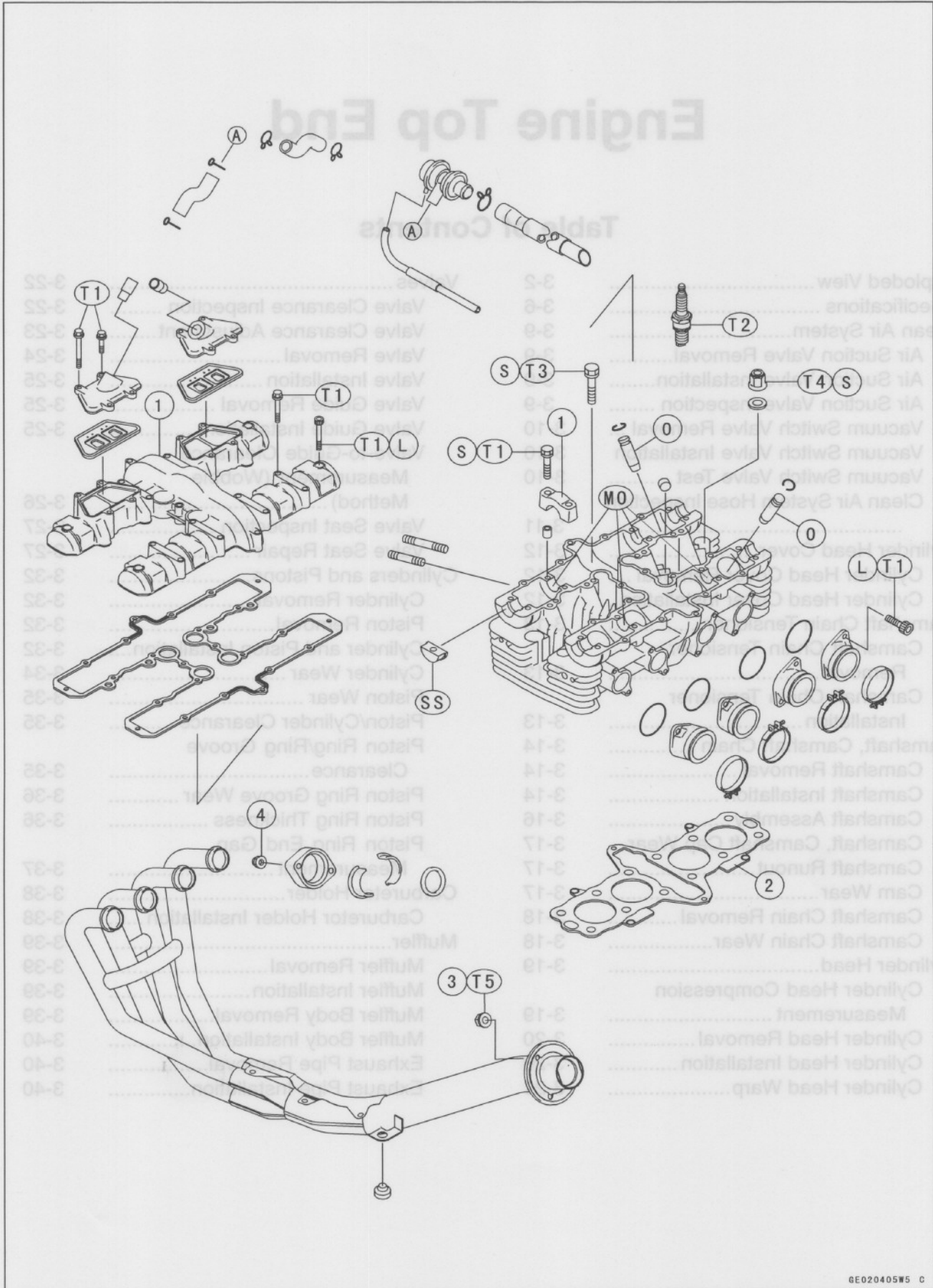
# Engine Top End

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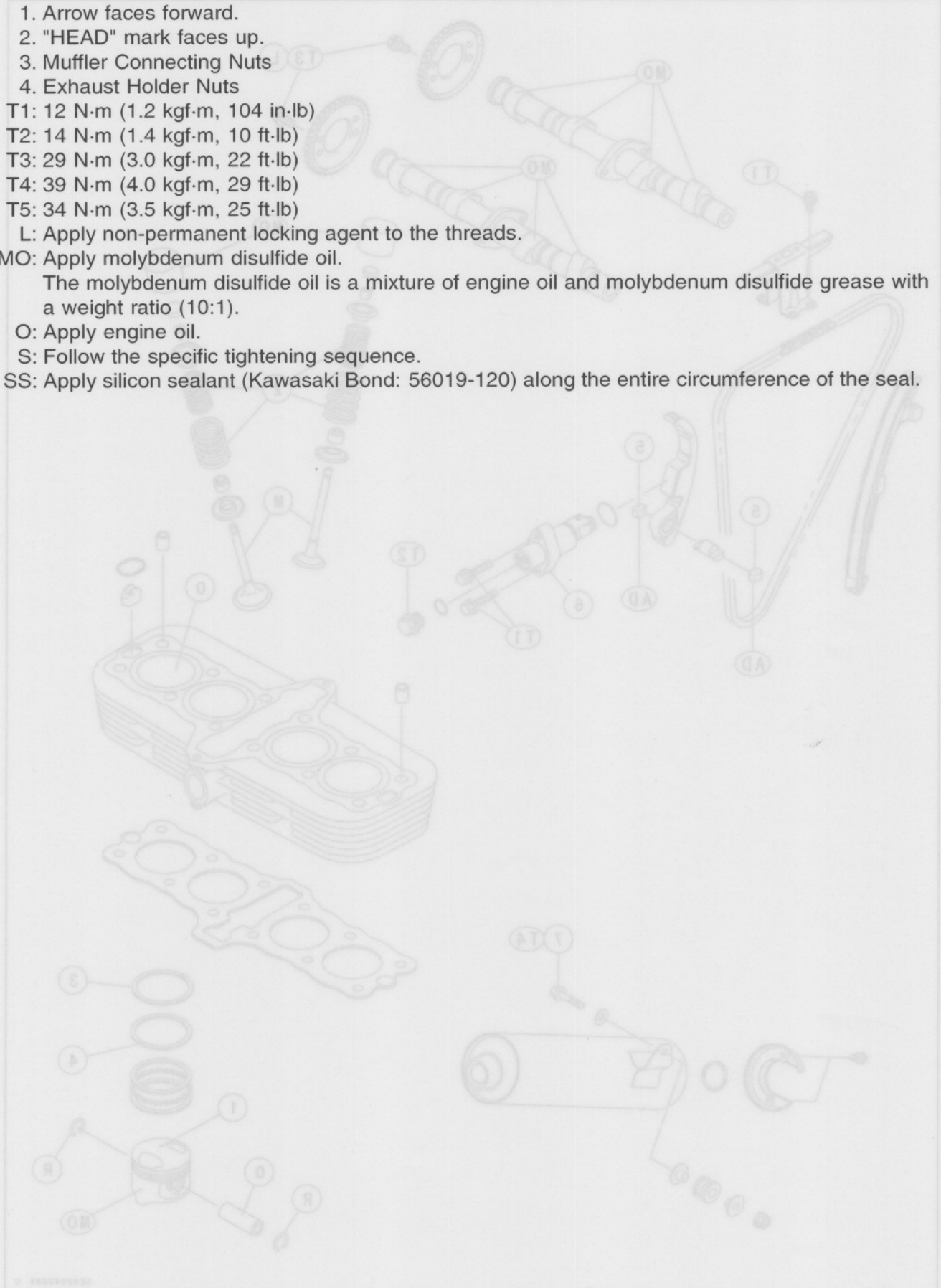
# 3-2 ENGINE TOP END

## Exploded View



## Exploded View

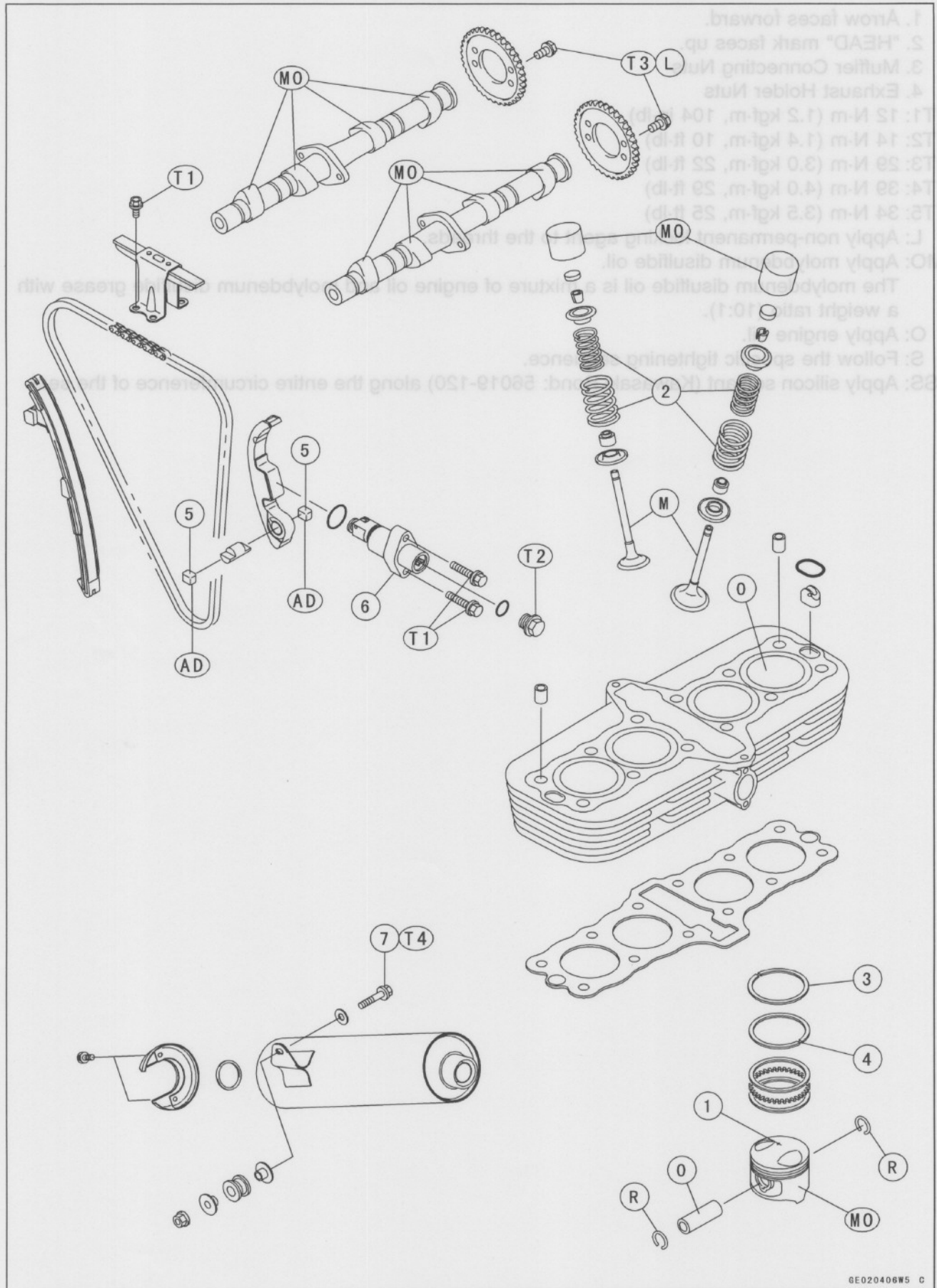
Exploded View



# 3-4 ENGINE TOP END

## Exploded View

Exploded View



Exploded View

Specifications

<p>1. Arrow faces forward.                  2. Closed coil end faces down.                  3. "R" mark faces up.                  4. "RN" mark faces up.                  5. "UP" mark faces up.                  6. Arrow faces left side.                  7. Muffler Mounting Bolt                  T1: 11 N·m (1.1 kgf·m, 97 in·lb)                  T2: 5.2 N·m (0.5 kgf·m, 46 in·lb)                  T3: 15 N·m (1.5 kgf·m, 11 ft·lb)                  T4: 25 N·m (2.5 kgf·m, 18 ft·lb)                  AD: Apply adhesive.                  L: Apply non-permanent locking agent.                  M: Apply molybdenum disulfide grease.                  MO: Apply molybdenum disulfide oil.                  The molybdenum disulfide oil is a mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).                  O: Apply engine oil.                  R: Replacement Parts.</p>	<p>Standard                  57 - 65 kPa (430 - 490 mmHg)                  8.3 - 9.4 psi                  36.245 - 36.353 mm                  (1.4270 - 1.4315 in.)                  0.100 - 0.141 mm                  (0.0039 - 0.0058 in.)                  21.94 - 21.96 mm                  (0.8638 - 0.8644 in.)                  22.060 - 22.081 mm                  (0.8693 - 0.8733 in.)                  127.00 - 127.36 mm                  (5.000 - 5.014 in.)</p>	<p>Item                  Clean Air System                  Vacuum Switch Valve Closing                  Pressure (Open - Close)                  Camshaft, Camshaft Chain                  Cam Height                  Camshaft Cap Oil Clearance                  Camshaft Journal Diameter                  Camshaft Bearing Inside Diameter                  Camshaft Runout                  Camshaft Chain 20-link Length</p>
<p>—                  0.05 mm                  (0.002 in.)</p>	<p>(Usable range)                  755 - 1177 kPa                  (7.7 - 12.0 kgf/cm<sup>2</sup>; 109 - 170 psi)                  385 r/min (rpm)</p>	<p>Cylinder Head                  Cylinder Compression                  Cylinder Head Warp</p>
<p>—                  0.5 mm                  (0.020 in.)                  0.7 mm                  (0.028 in.)                  0.05 mm                  (0.0020 in.) TIR                  0.95 mm                  (0.2735 in.)                  0.94 mm                  (0.2735 in.)                  7.08 mm                  (0.2787 in.)                  0.30 mm                  (0.0118 in.)</p>	<p>0.08 - 0.18 mm                  (0.0031 - 0.0071 in.)                  0.8 - 1.5 mm                  (0.031 - 0.047 in.)                  0.8 - 1.5 mm                  (0.031 - 0.047 in.)                  Not more than 0.01 mm TIR                  (0.0004 in.)                  6.95 - 6.98 mm (0.2742 - 0.2748 in.)                  6.95 - 6.97 mm (0.2738 - 0.2744 in.)                  7.00 - 7.05 mm                  (0.2756 - 0.2782 in.)                  0.07 - 0.15 mm                  (0.0028 - 0.0059 in.)</p>	<p>Valves                  Valve Clearance (When Cold)                  Valve Head Thickness:                  Inlet                  Exhaust                  Valve Stem Bend                  Valve Stem Diameter                  Inlet                  Exhaust                  Valve Guide Inside Diameter                  Valve Guide Clearance (Wobble Method):                  Inlet</p>

### 3-6 ENGINE TOP END

#### Specifications

Item	Standard	Service Limit
<b>Clean Air System</b>		
Vacuum Switch Valve Closing Pressure (Open → Close)	57 ~ 65 kPa (430 ~ 490 mmHg, 8.3 ~ 9.4 psi)	—
<b>Camshaft, Camshaft Chain</b>		
Cam Height	36.245 ~ 36.353 mm (1.4270 ~ 1.4312 in.)	36.15 mm (1.423 in.)
Camshaft/Cap Oil Clearance	0.100 ~ 0.141 mm (0.0039 ~ 0.0056 in.)	0.23 mm (0.009 in.)
Camshaft Journal Diameter	21.94 ~ 21.96 mm (0.8638 ~ 0.8646 in.)	21.91 mm (0.8626 in.)
Camshaft Bearing Inside Diameter	22.060 ~ 22.081 mm (0.8685 ~ 0.8693 in.)	22.14 mm (0.872 in.)
Camshaft Runout	—	0.1 mm (0.004 in.)
Camshaft Chain 20-link Length	127.00 ~ 127.36 mm (5.000 ~ 5.014 in.)	128.9 mm (5.07 in.)
<b>Cylinder Head</b>		
Cylinder Compression	(Usable range) 755 ~ 1177 kPa , (7.7 ~ 12.0 kgf/cm <sup>2</sup> 109 ~ 170 psi) @385 r/min (rpm)	—
Cylinder Head Warp	—	0.05 mm (0.002 in.)
<b>Valves</b>		
Valve Clearance (When Cold)	0.08 ~ 0.18 mm (0.0031 ~ 0.0071 in.)	—
Valve Head Thickness:		
Inlet	0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)	0.5 mm (0.020 in.)
Exhaust	0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)	0.7 mm (0.028 in.)
Valve Stem Bend	Not more than 0.01 mm TIR (0.0004 in.)	0.05 mm (0.0020 in.) TIR
Valve Stem Diameter		
Inlet	6.965 ~ 6.980 mm (0.2742 ~ 0.2748 in.)	6.95 mm (0.2732 in.)
Exhaust	6.955 ~ 6.970 mm (0.2738 ~ 0.2744 in.)	6.94 mm (0.2732 in.)
Valve Guide Inside Diameter	7.000 ~ 7.015 mm (0.2756 ~ 0.2762 in.)	7.08 mm (0.2787 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Inlet	0.07 ~ 0.15 mm (0.0028 ~ 0.0059 in.)	0.30 mm (0.0118 in.)

## Specifications

Item	Standard	Service Limit
Exhaust Valve Seating Surface Outside Diameter:	0.06 ~ 0.14 mm (0.0024 ~ 0.0055 in.)	0.28 mm (0.0110 in.)
Inlet	32.9 ~ 33.1 mm (1.295 ~ 1.303 in.)	—
Exhaust	28.9 ~ 29.1 mm (1.138 ~ 1.146 in.)	—
Valve Seating Surface Width	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)	—
Valve Seat Cutting Angle	45°, 32°, 60°	—
Valve Spring Free Length:		
Inner	37.25 mm (1.467 in.)	35.9 mm (1.413 in.)
Outer	41.85 mm (1.648 in.)	40.3 mm (1.587 in.)
<b>Cylinder, Piston</b>		
Cylinder Inside Diameter	66.005 ~ 66.017 mm (2.5986 ~ 2.5991 in.)	66.10 mm (2.602 in.)
Piston Diameter	65.951 ~ 65.966 mm (2.5965 ~ 2.5971 in.)	65.81 mm (2.591 in.)
Piston/Cylinder Clearance	0.040 ~ 0.067 mm (0.0016 ~ 0.0026 in.)	—
Oversize Pistons And Rings	+ 0.5 mm (0.020 in.) and + 1.0 mm (0.039 in.)	—
Piston Ring/Groove Clearance:		
Top	0.050 ~ 0.080 mm (0.0020 ~ 0.0031 in.)	0.18 mm (0.0071 in.)
Second	0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Piston Ring Groove Width:		
Top	1.03 ~ 1.05 mm (0.0406 ~ 0.0413 in.)	1.13 mm (0.0445 in.)
Second	1.22 ~ 1.24 mm (0.0480 ~ 0.0488 in.)	1.32 mm (0.0520 in.)
Oil	2.01 ~ 2.03 mm (0.0791 ~ 0.0799 in.)	2.11 mm (0.0831 in.)
Piston Ring Thickness:		
Top	0.970 ~ 0.985 mm (0.0382 ~ 0.0390 in.)	0.90 mm (0.0354 in.)
Second	1.17 ~ 1.19 mm (0.0461 ~ 0.0469 in.)	1.10 mm (0.0433 in.)

### 3-8 ENGINE TOP END

#### Specifications

Item	Standard	Service Limit
Piston Ring End Gap:		
Top	0.15 ~ 0.30 mm (0.0059 ~ 0.018 in.)	0.6 mm (0.0236 in.)
Second	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)	0.75 mm (0.0295 in.)
Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	1.0 mm (0.0394 in.)

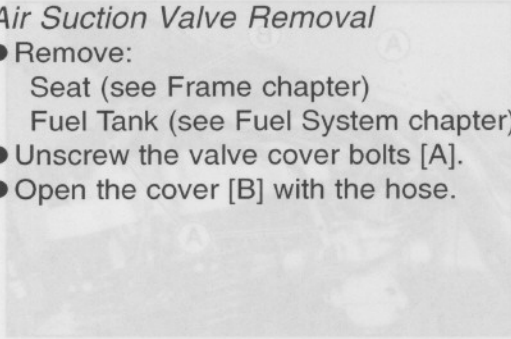
- Special Tools - Valve Guide Reamer,  $\phi$ 7: 57001-162**  
**Valve Guide Arbor,  $\phi$ 7: 57001-163**  
**Compression Gauge, 20 kgf/cm<sup>2</sup>: 57001-221**  
**Valve Spring Compressor Set: 57001-241**  
**Valve Spring Compressor Adapter: 57001-243**  
**Piston Pin Puller Set: 57001-910**  
**Compression Gauge Adapter: 57001-1018**  
**Spark Plug Wrench: 57001-1024**  
**Piston Ring Compressor Grip: 57001-1095**  
**Piston Ring Compressor Belt,  $\phi$ 50 ~  $\phi$ 67: 57001-1096**  
**Valve Seat Cutter, 45° -  $\phi$ 32: 57001-1115**  
**Valve Seat Cutter, 45° -  $\phi$ 35: 57001-1116**  
**Valve Seat Cutter, 32° -  $\phi$ 35: 57001-1121**  
**Valve Seat Cutter, 60° -  $\phi$ 30: 57001-1123**  
**Valve Seat Cutter, 60° -  $\phi$ 41: 57001-1124**  
**Valve Seat Cutter Holder,  $\phi$ 7: 57001-1126**  
**Valve Seat Cutter Holder Bar: 57001-1128**  
**Piston Base,  $\phi$ 2.3: 57001-1336**

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

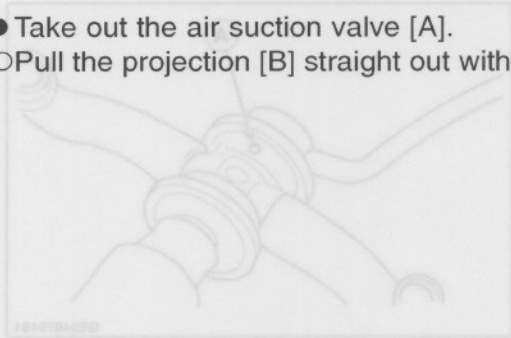
## Clean Air System

### Air Suction Valve Removal

- Remove:
  - Seat (see Frame chapter)
  - Fuel Tank (see Fuel System chapter)
- Unscrew the valve cover bolts [A].
- Open the cover [B] with the hose.

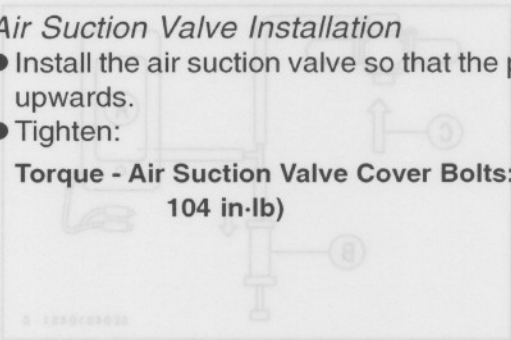


- Take out the air suction valve [A].
- Pull the projection [B] straight out with the pliers.



### Air Suction Valve Installation

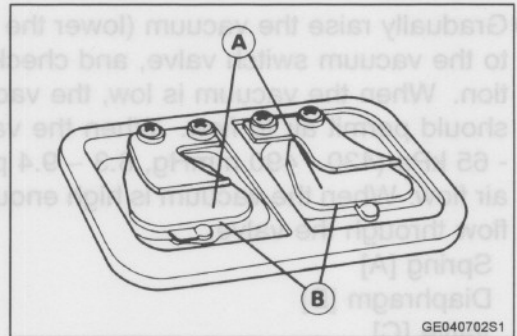
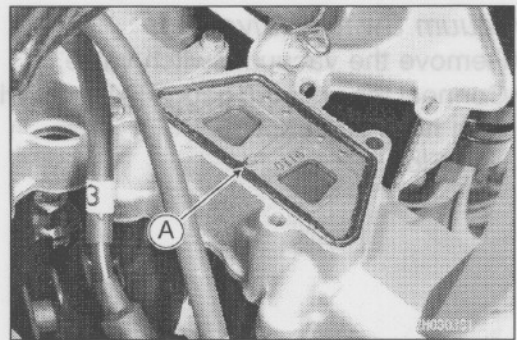
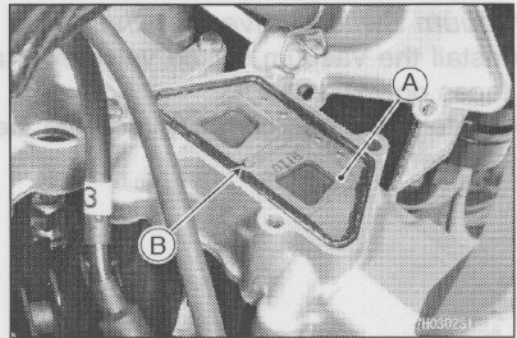
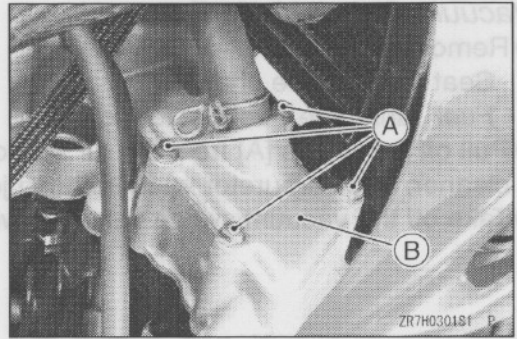
- Install the air suction valve so that the projection [A] faces upwards.
- Tighten:
  - Torque - Air Suction Valve Cover Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**



### Air Suction Valve Inspection

The air suction valve is essentially a check valve which allows fresh air to flow from the air cleaner into the exhaust port. Any air that has passed the air suction valve is prevented from returning to the air cleaner.

- Remove the air suction valves.
- Visually inspect the reeds [A] for cracks, folds, warps, head 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 head damage.
- ★ If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.
- ★ If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high flash-point solvent.



### CAUTION

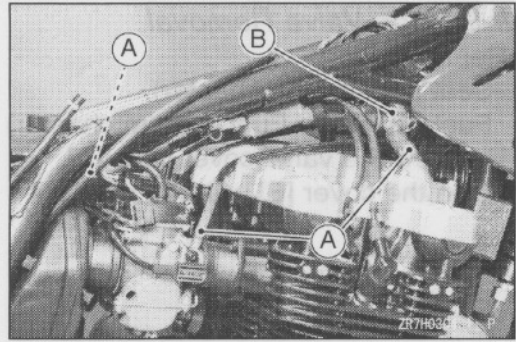
Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.

## 3-10 ENGINE TOP END

### Clean Air System

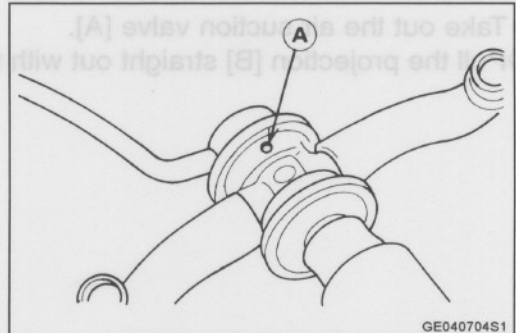
#### Vacuum Switch Valve Removal

- Remove:
  - Seat (see Frame chapter)
  - Fuel Tank (see Fuel System chapter)
- Pull off the hoses [A] from the air suction valve cover, air cleaner, and carburetor vacuum hose joint.
- Take off the vacuum switch valve [B] with the hoses.



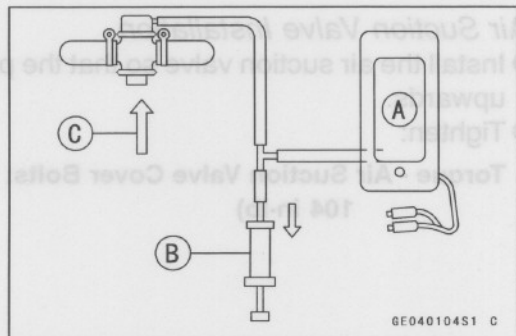
#### Vacuum Switch Valve Installation

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



#### Vacuum Switch Valve Test

- Remove the vacuum switch valve.
- Connect the vacuum gauge [A] and syringe [B] to the vacuum hoses as shown.
  - Air Flow [C]



- 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 rises to 57 - 65 kPa (430 - 490 mmHg, 8.3 ~ 9.4 psi), it should stop air flow. When the vacuum is high enough, the air cannot flow through the valve.

Spring [A]  
Diaphragm [B]  
Valve [C]

Low Vacuum [D]  
Secondary Air Flow [E]

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

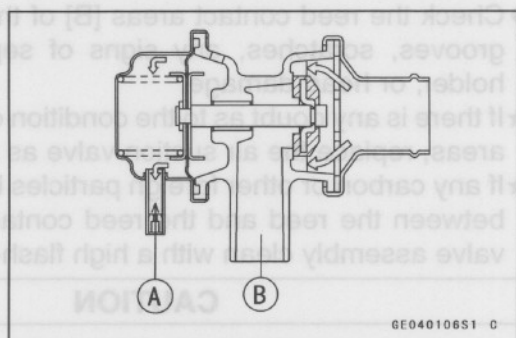
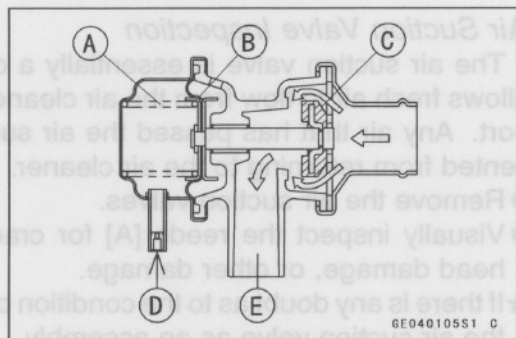
#### NOTE

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

#### Vacuum Switch Valve Closing Pressure (Open → Close)

Standard: 57 ~ 65 kPa (430 ~ 490 mmHg, 8.3 ~ 9.4 psi)

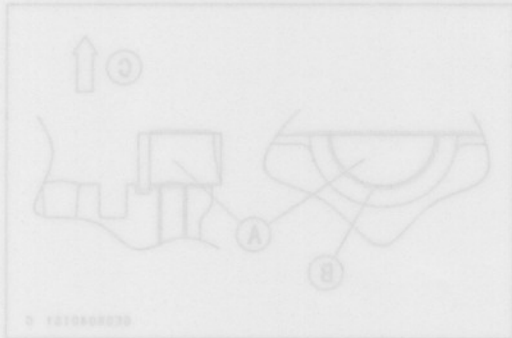
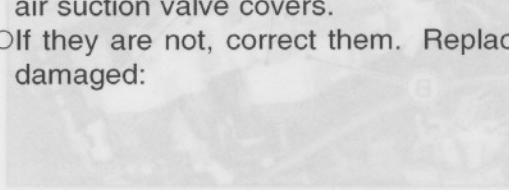
High Vacuum [A]  
Secondary air cannot flow [B]



**Clean Air System**

*Clean Air System Hose Inspection*

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



- Start the engine and warm it up thoroughly. Allow the engine to cool down and tighten the head cover bolts.
- Tighten forward.
- Install the cylinder head cover with the arrow [A] pointing forward.
- Replace the cylinder head cover gasket with a new one.
- Torque - Cylinder Head Cover Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)
- Apply sealant to the entire sealing surface [B] of the rubber plug.
- Replace the rubber plug [A] with a new one.
- Sealant - Kawasaki Bond (Silicon Sealant): 96019-120
- Upper Side [C]
- Cylinder Head Cover Installation

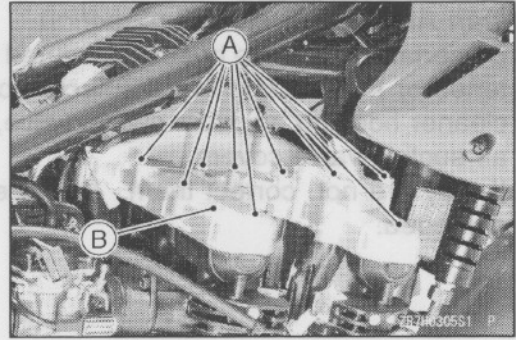
Cylinder Head Cover Removal  
 ● Remove the cover bolts [A] and remove  
 Ignition Coil (see Electrical System chapter)  
 Fuel Tank (see Fuel System chapter)  
 Seat (see Frame chapter)  
 ● Remove:

## 3-12 ENGINE TOP END

### Cylinder Head Cover

#### Cylinder Head Cover Removal

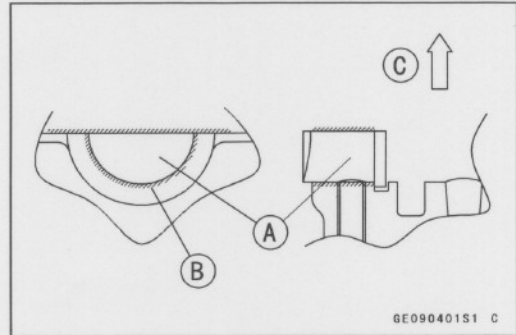
- Remove:
  - Seat (see Frame chapter)
  - Fuel Tank (see Fuel System chapter)
  - Ignition Coil (see Electrical System chapter)
- Remove the cover bolts [A] and remove the cover [B].



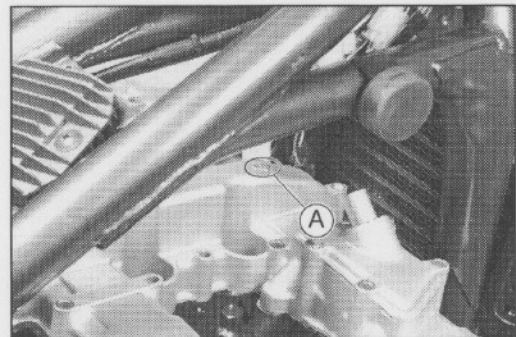
#### Cylinder Head Cover Installation

- Replace the rubber plug [A] with a new one.
- Apply sealant to the entire sealing surface [B] of the rubber plug.
  - Upper Side [C]

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



- Replace the cylinder head cover gasket with a new one.
- Install the cylinder head cover with the arrow [A] pointing forward.
- Tighten:
  - Torque - Cylinder Head Cover Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**
- Start the engine and warm it up thoroughly. Allow the engine to cool down and tighten the head cover bolts.



## Camshaft Chain Tensioner

### Camshaft Chain Tensioner Removal

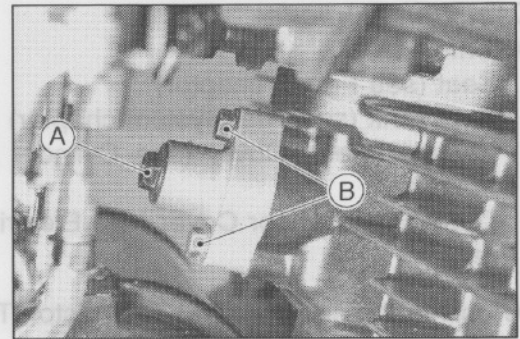
#### CAUTION

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below:

When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the camshaft chain and the tensioner.

Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation".

Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing and damage the valves.



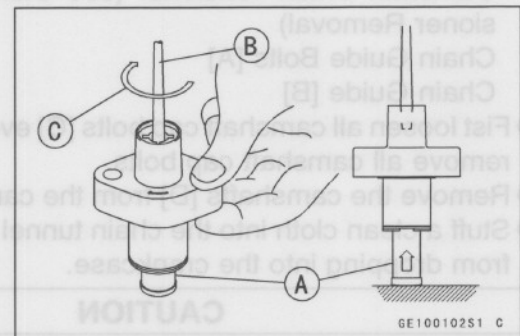
- Loosen the Cap bolt [A].
- Remove the mounting bolts [B] and pull out the chain tensioner.

### Camshaft Chain Tensioner Installation

- Remove the cap bolt and the O-ring.
- Turn the push rod [A] clockwise [C] (toward the direction indicated with an arrow mark) with a screwdriver [B] till it stops, pushing it.

#### CAUTION

The tensioner will not be available because of disengagement if turning counter clockwise.

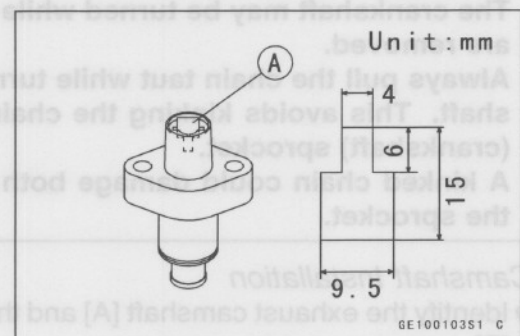


- While holding the rod in position with a holder plate [A], install the tensioner on the cylinder block.

#### NOTE

○ To make the procedure easy, use a holder plate to keep the rod from pushing out. A replacement chain tensioner (spare parts) has a holder plate.

- The holder plate can be made of 1 mm thick aluminum plate as shown.

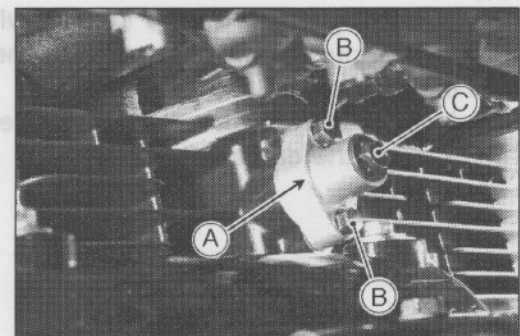


- Install the O-ring in the tensioner body and cap bolt.
- Install the tensioner so that the arrow mark [A] faces left side of the engine tighten the mounting bolts [B].

**Torque - Chain Tensioner Mounting Bolts:** 11 N·m (1.1 kgf·m, 97 in·lb)

- Remove the screwdriver (or the holder plate) and tighten the cap [C].

**Torque - Chain Tensioner Cap:** 5.2 N·m (0.50 kgf·m, 46 in·lb)

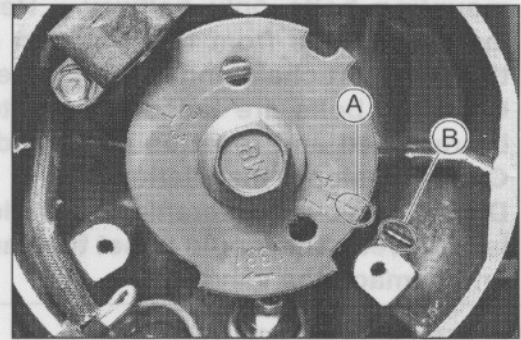


## 3-14 ENGINE TOP END

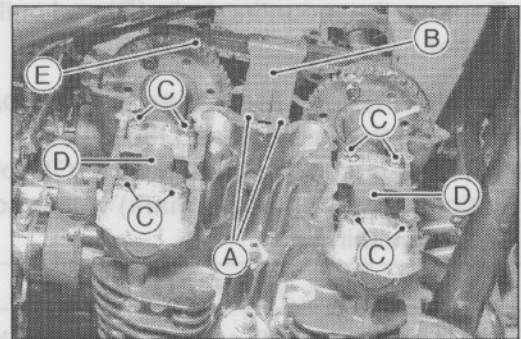
### Camshaft, Camshaft Chain

#### Camshaft Removal

- Remove:
  - Seat (see Frame chapter)
  - Fuel Tank (see Fuel System chapter)
  - Cylinder Head Cover (see Cylinder Head Cover Removal)
  - Crankshaft Sensor Cover (see Electrical System chapter)
- Position the crankshaft at #1,4 piston TDC.
  - TDC mark for #1,4 Pistons [A]
  - Timing Mark [B]



- Remove:
  - Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  - Chain Guide Bolts [A]
  - Chain Guide [B]
- First loosen all camshaft cap bolts [C] evenly halfway, then remove all camshaft cap bolts.
- Remove the camshafts [D] from the camshaft chain [E].
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.

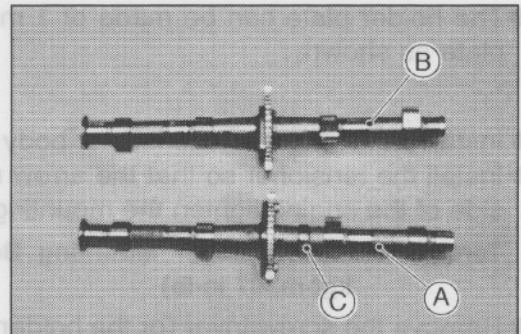


#### CAUTION

The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

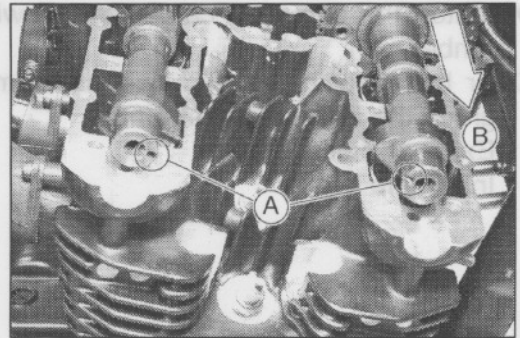
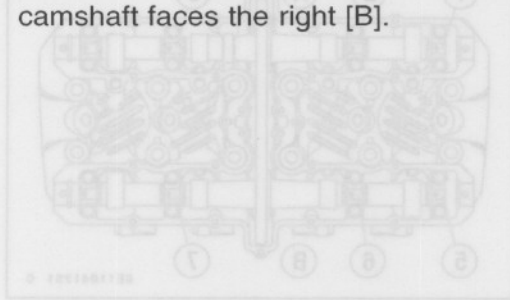
#### Camshaft Installation

- Identify the exhaust camshaft [A] and the intake camshaft [B].
- Check the right side of the seat to which the camshaft sprocket mounts, and the one with the protrusion [C] is the exhaust camshaft.
- Apply molybdenum disulfide oil to the cam and journal surfaces of the camshaft.



**Camshaft, Camshaft Chain**

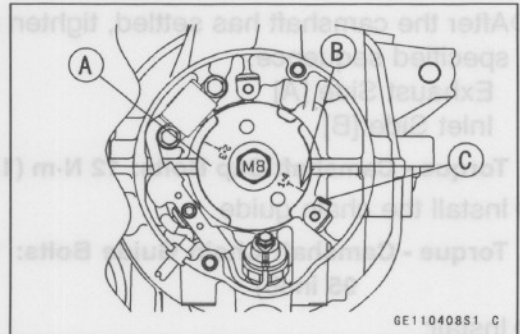
- Install the camshafts so that the cutout [A] of each camshaft faces the right [B].



- Turn the timing rotor [A] in the positive direction, and align the TDC mark [B] of the #1 and #4 pistons with the timing mark [C] on the crankcase.

**CAUTION**

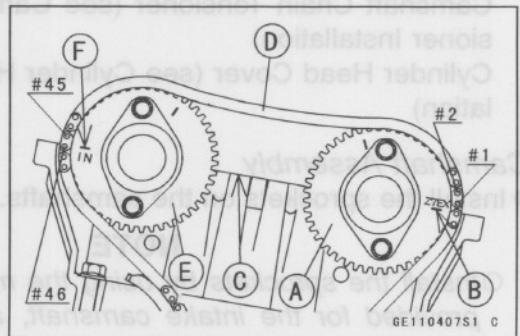
**Always pull up the chain taut while turning the crankshaft.**



- Place the chain on the sprockets.

**NOTE**

- Always pull up the chain taut on the tension (exhaust) side.
- Place the chain [D] by aligning the timing mark "Z7EX" [B] of the exhaust sprocket [A] with the top [C] of the cylinder head.
- Place the chain by aligning the timing mark "IN" [F] of the intake sprocket [E] with the top [C] of the cylinder head, which accommodates 45 pins between the exhaust and intake timing marks.

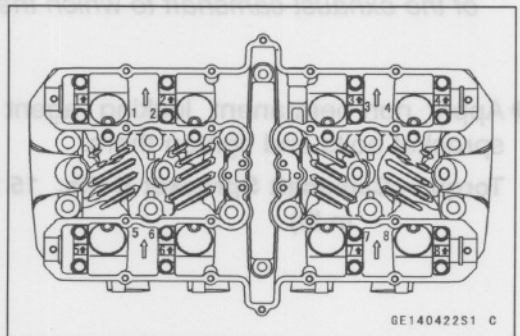


- Install the camshaft caps.

**CAUTION**

**The camshaft caps are machined with the cylinder head, and the camshaft may seize if the caps are installed in a wrong position.**

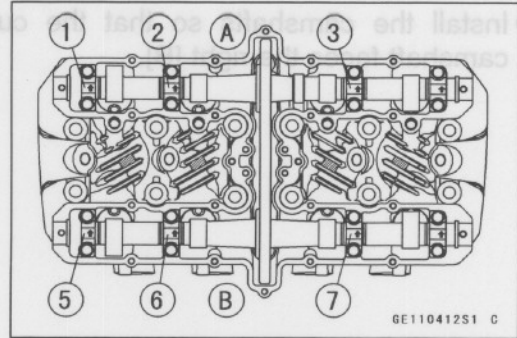
- Match the position numbers on the caps with the numbers on the cylinder head, and install the caps with their arrows facing forward.



## 3-16 ENGINE TOP END

### Camshaft, Camshaft Chain

- Tighten the camshaft cap bolts following the sequence number.
- For both the intake and exhaust camshafts, uniformly tighten the bolts a little at a time.
  - Exhaust Side [A]
  - Inlet Side [B]



- After the camshaft has settled, tighten all the bolts in the specified sequence.
  - Exhaust Side [A]
  - Inlet Side [B]

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

- Install the chain guide

**Torque - Camshaft Chain Guide Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)**

- Install:

Camshaft Chain Tensioner (see Camshaft Chain Tensioner Installation)

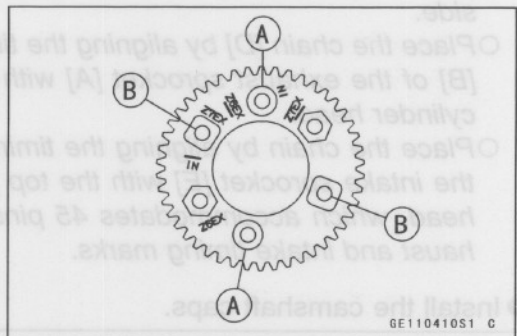
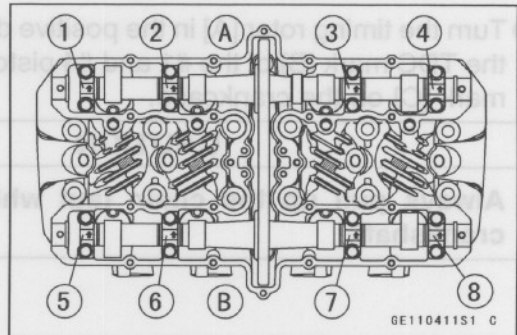
Cylinder Head Cover (see Cylinder Head Cover Installation)

#### Camshaft Assembly

- Install the sprockets on the camshafts.

#### NOTE

- Install the sprockets by using the mounting holes [A] provided for the intake camshaft, and the mounting holes [B] provided for the exhaust camshaft, respectively. There is a protrusion on the right side of the seat of the exhaust camshaft to which the sprocket mounts.



- Apply non-permanent locking agent to the camshaft sprocket bolts and tighten them.

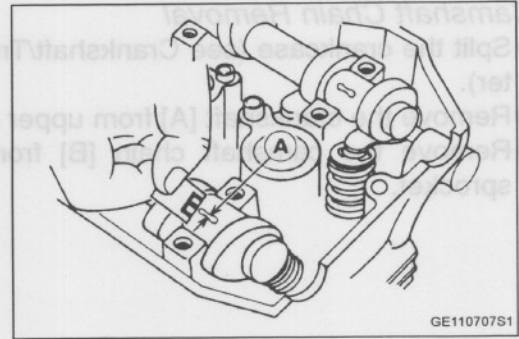
**Torque - Camshaft Sprocket Bolts: 15 N·m (1.5 kgf·m, 11 in·lb)**

**Camshaft, Camshaft Chain**

*Camshaft, Camshaft Cap Wear*

- Cut strips of plastigage to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Measure each clearance between the camshaft journal and the camshaft cap using plastigage (press gauge) [A].
- Tighten:

**Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**  
**Camshaft Chain Guide Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)**



**NOTE**

○ Do not turn the camshaft when the plastigage is between the journal and camshaft cap.

**Camshaft Journal, Camshaft Cap Clearance**

**Standard: 0.100 ~ 0.141 mm (0.0039 ~ 0.0056 in.)**  
**Service Limit: 0.23 mm (0.009 in.)**

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

**Camshaft Journal Diameter**

**Standard: 21.94 ~ 21.96 mm (0.8638 ~ 0.8646 in.)**  
**Service Limit: 21.91 mm (0.8626 in.)**

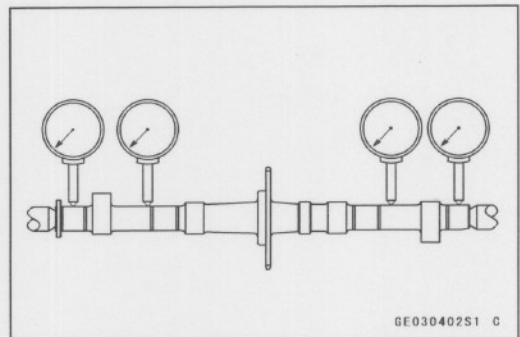
- ★ If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.
- ★ If the clearance still remains out of the limit, replace the cylinder head unit.

*Camshaft Runout*

- Remove the camshaft.
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure runout with a dial gauge at the specified place as shown.
- ★ If the runout exceeds the service limit, replace the shaft.

**Camshaft Runout**

**Service Limit: TIR 0.1 mm (0.004 in.)**

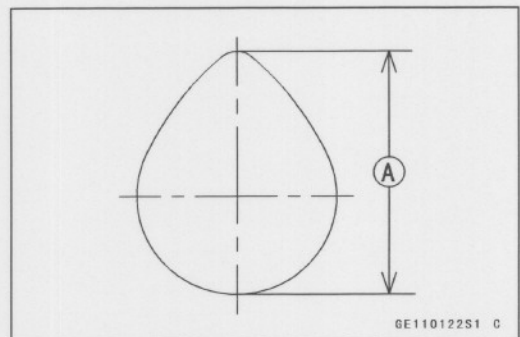


*Cam Wear*

- Remove the camshaft.
- Measure the height [A] of each cam with a micrometer.
- ★ If the cams are worn down past the service limit, replace the camshaft.

**Cam Height**

	Standard:	Service Limit
Exhaust,	36.245 ~ 36.353 mm	36.15 mm
Inlet	(1.4270 ~ 1.4312 in.)	(1.423 in.)

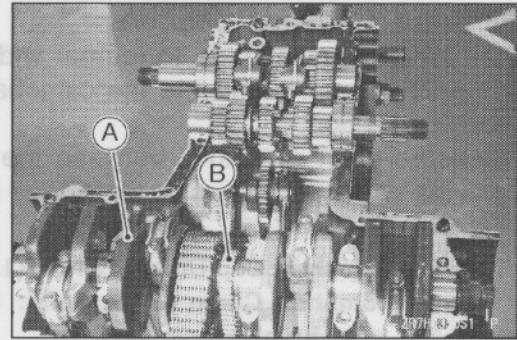
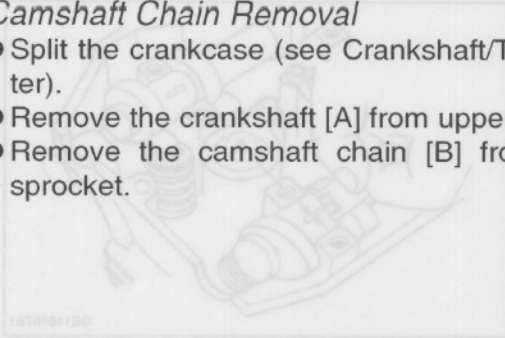


### 3-18 ENGINE TOP END

#### Camshaft, Camshaft Chain

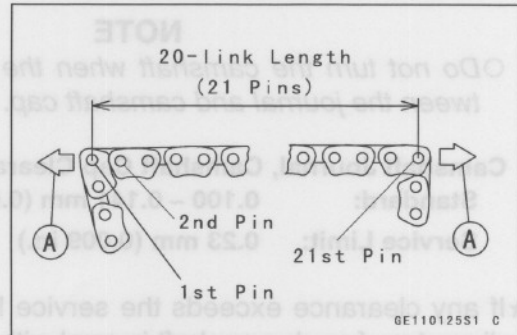
##### Camshaft Chain Removal

- Split the crankcase (see Crankshaft/Transmission chapter).
- Remove the crankshaft [A] from upper crankcase.
- Remove the camshaft chain [B] from the crankshaft sprocket.



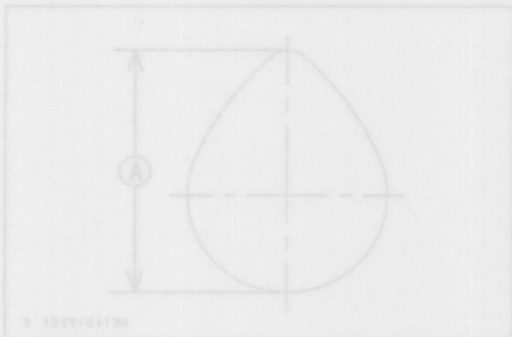
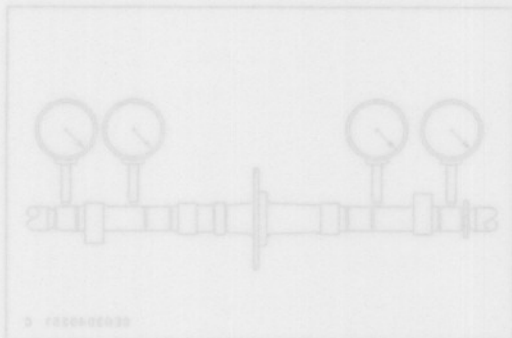
##### Camshaft Chain Wear

- Hold the chain taut with a force [A] of about 49 N (5 kg, 11 lb) in some manner, and measure a 20-link length. Since the chain may wear unevenly, take measurement at several places.
- ★ If any measurement exceeds the service limit, replace the chain. Also, replace the camshafts and the crankshaft when the chain is replaced.



##### Camshaft Chain 20-link Length

- Standard:** 127.00 ~ 127.36 mm (5.000 ~ 5.014 in.)
- Service Limit:** 128.9 mm (5.07 in.)



Camshaft Journal Diameter  
 Standard: 21.94 ~ 21.96 mm (0.8638 ~ 0.8646 in.)  
 Service Limit: 21.91 mm (0.8626 in.)

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

Camshaft Runout  
 ● Remove the camshaft.  
 ● Set the camshaft in a camshaft alignment jig or on V blocks.  
 ● Measure runout with a dial gauge at the specified place as shown.  
 ★ If the runout exceeds the service limit, replace the shaft.

Camshaft Runout  
 Service Limit: TIR 0.1 mm (0.004 in.)

Cam Wear  
 ● Remove the camshaft.  
 ● Measure the height [A] of each cam with a micrometer.  
 ★ If the cams are worn past the service limit, replace the camshaft.

##### Cam Height

	Standard:	Service Limit
Exhaust	38.245 ~ 38.323 mm (1.4270 ~ 1.4312 in.)	38.15 mm (1.423 in.)
Inlet		

**Cylinder Head**

*Cylinder Head Compression Measurement*

- Start the engine and warm it up thoroughly.
- Stop the engine and remove all the spark plugs.

**Special Tool - Spark Plug Wrench: 57001-1024**

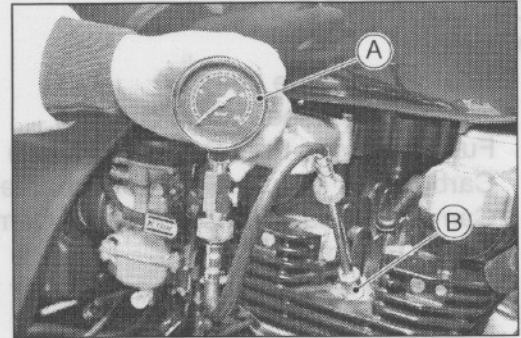
- Measure the compression of a cylinder.
- With the throttle fully open, use the starter motor to turn the engine over, and read the highest reading on the compression gauge.

**Special Tools - Compression Gauge, 20 kgf/cm<sup>2</sup>: 57001-221**

[A]

**Compression Gauge Adapter: 57001-1018**

[B]



**NOTE**

- Use a battery that is fully charged.
- Make sure that there are no compression leaks from the cylinder head gasket.

**Cylinder Compression**

**Usable Range:** 755 ~ 1 177 kPa (7.7 ~ 12.0 kgf/cm<sup>2</sup>, 109 ~ 170 psi) @385 r/min (rpm)

- Measure the compression of the remaining cylinders in the same manner.

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

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

## 3-20 ENGINE TOP END

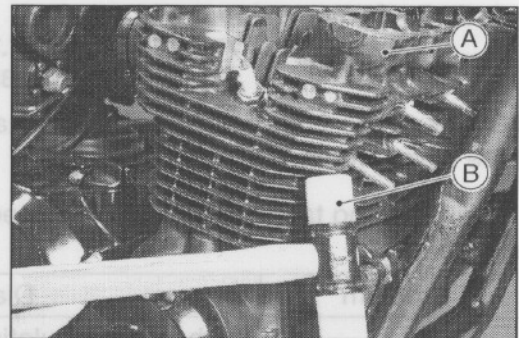
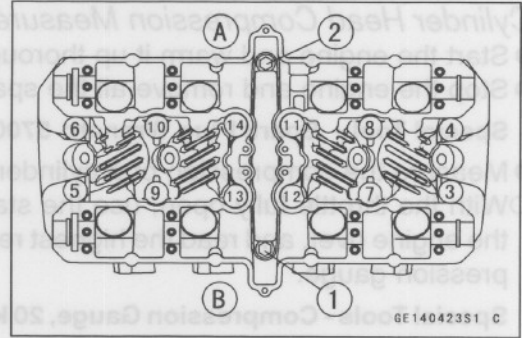
### Cylinder Head

#### Cylinder Head Removal

- Remove:
  - Seat (see Frame chapter)
  - Side Covers (see Frame chapter)
  - Fuel Tank (see Fuel System chapter)
  - Carburetors (see Fuel System chapter)
  - Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  - Cylinder Head Cover (see Cylinder Head Cover Removal)
  - Camshaft (see Camshaft Removal)
  - Exhaust Pipe and Muffler (see this chapter)
- Remove the cylinder head bolts [1 ~ 2] in the numbered sequence.
- Remove the cylinder head nuts [3 ~ 14] in the numbered sequence.
  - Exhaust Side [A]
  - Inlet Side [B]
- Remove the cylinder head [A].

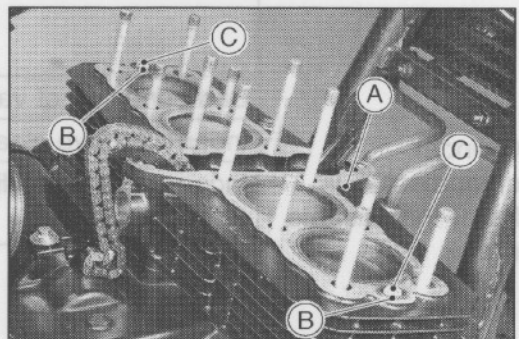
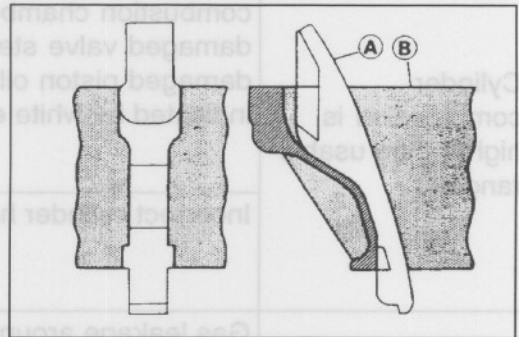
#### NOTE

- Tap lightly with a rubber mallet [B] if the cylinder head does not separate easily.



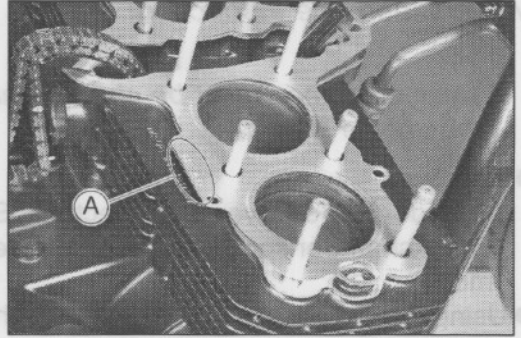
#### Cylinder Head Installation

- Install the front camshaft chain guide [A].
  - Align the upper shoulder of the chain guide with the top [B] of the cylinder.
- Install the O-rings [B] on the cylinder [A], and install the orifices [C].



**Cylinder Head**

- Install the gasket with its "HEAD" mark [A] facing up.

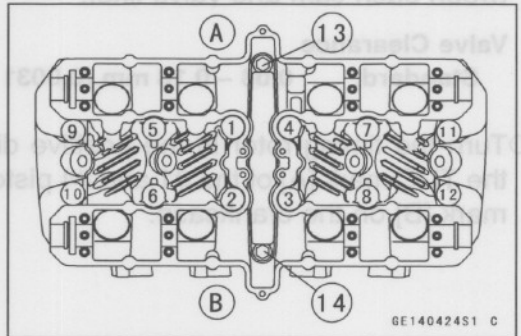


- Tighten the cylinder head nuts following the tightening sequence [1 ~ 12].  
Exhaust Side [A]  
Inlet Side [B]

**Torque - Cylinder Head Nuts: 39 N·m (4.0 kgf·m, 29 ft·lb)**  
**First: 23 N·m (2.3 kgf·m, 16.5 ft·lb)**  
**Final: 39 N·m (4.0 kgf·m, 29 ft·lb)**

- After tightening all head nut, retighten them.
- Tighten the cylinder head bolts [13 ~ 14].

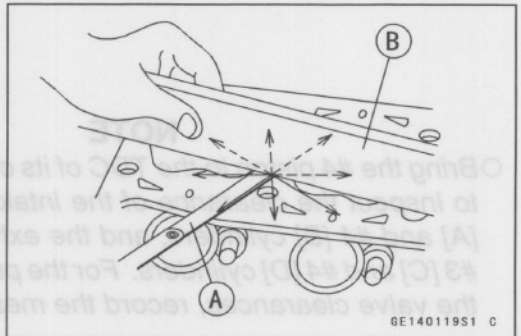
**Torque - Cylinder Head Bolts: 29 N·m (3.0 kgf·m, 22 ft·lb)**



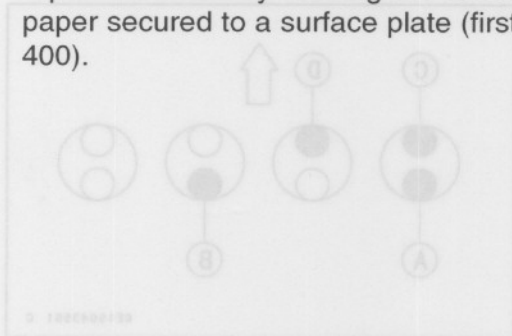
**Cylinder Head Warp**

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

**Cylinder Head Warp**  
**Standard: ---**  
**Service Limit: 0.05 mm (0.002 in.)**



- ★ If the cylinder head is warped more than the service limit, replace it.
- ★ If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).



**NOTE**  
 Bring the #1 piston to the TDC of its compression stroke to inspect the clearance of the intake valves of the #1 [A] and #2 [B] cylinders, and the exhaust valves of the #1 [C] and #2 [D] cylinders. For the purpose of adjusting the valve clearance, record the measured values.  
 ★ If any measurement is out of standard, adjust the valve clearance.

## 3-22 ENGINE TOP END

### Valves

#### Valve Clearance Inspection

##### NOTE

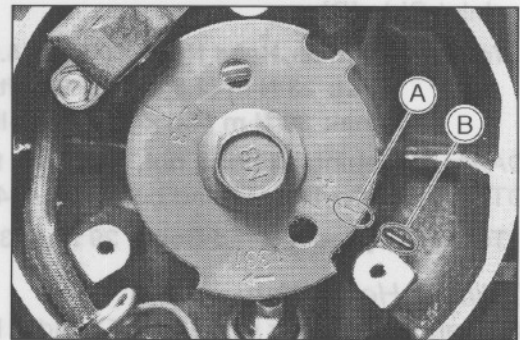
○ valve clearance must be checked and adjusted when the engine is cold.

- Remove:
  - Cylinder Head Cover (see Electrical System chapter)
  - Crankshaft Sensor Cover (see Cylinder Head Cover Removal)
- Using a thickness gauge, measure the clearances between each cam and valve lifter.

##### Valve Clearance

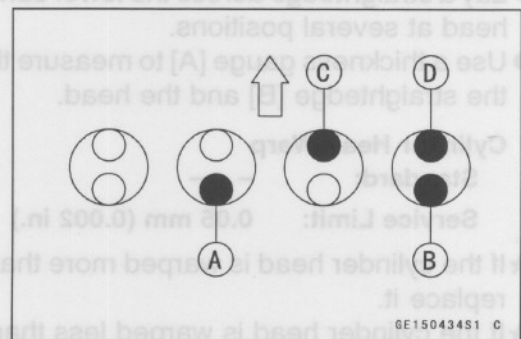
Standard: 0.08 ~ 0.18 mm (0.0031 ~ 0.0071 in.)

- Turn the timing rotor in the positive direction, and align the TDC mark [A] of the #1 and #4 pistons with the timing mark [B] on the crankcase.



##### NOTE

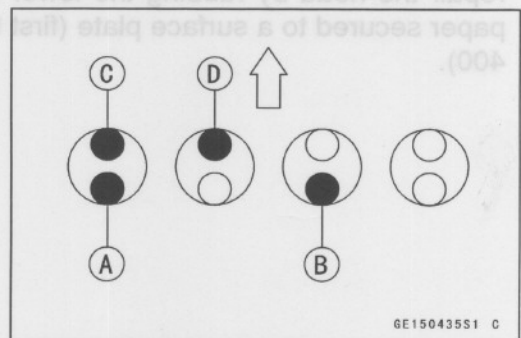
○ Bring the #4 piston to the TDC of its compression stroke to inspect the clearance of the intake valves of the #2 [A] and #4 [B] cylinders, and the exhaust valves of the #3 [C] and #4 [D] cylinders. For the purpose of adjusting the valve clearances, record the measured values.



##### NOTE

○ Bring the #1 piston to the TDC of its compression stroke to inspect the clearance of the intake valves of the #1 [A] and #3 [B] cylinders, and the exhaust valves of the #1 [C] and #2 [D] cylinders. For the purpose of adjusting the valve clearances, record the measured values.

- ★ If any measurement is out of standard, adjust the valve clearance.



**Valves**

*Valve Clearance Adjustment*

- Remove the camshaft [A].
- Remove the valve lifter [B] of the applicable valve.
- Remove the shim [C] from the top of the spring retainer.

**NOTE**

○ Mark and record the valve lifter and shim locations so they can be reinstalled in their original positions.

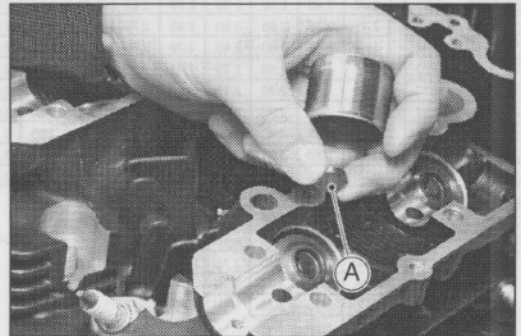
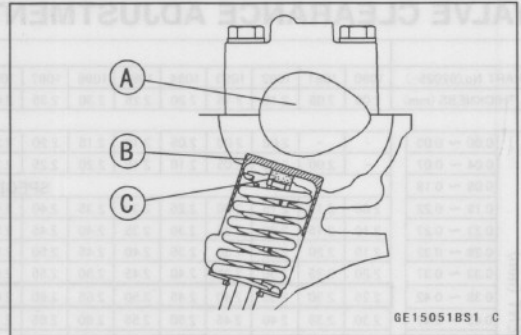
- Measure the thickness of the removed shim.
- Select an appropriate shim from the Valve Clearance Adjustment Chart and replace it with the removed shim.

**NOTE**

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

○ The shim must be installed with its thickness indication [A] facing the retainer. At this time, apply grease to the shim or to the retainer to prevent the shim from falling off during the operation.

- Install the camshafts. Be sure to time the camshafts properly (see Camshaft Installation)
- Remeasure any valve clearance that was adjusted. Readjust if necessary.



**CAUTION**

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



Valve Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valve lifter and shim from the valve.
- Mark and record the valve lifter and shim locations so they can be installed in their original positions.
- Using the valve spring compressor assembly, remove the valve.

Special Tools - Valve Spring Compressor Set: 57001-241 [A]  
 Valve Spring Compressor Adapter: 57001-242 [B]

# 3-24 ENGINE TOP END

## Valves

### VALVE CLEARANCE ADJUSTMENT CHART

PART No.(92025-)	PRESENT SHIM																											
	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114			
THICKNESS (mm)	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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			
0.00 ~ 0.03	-	-	2.00	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05			
0.04 ~ 0.07	-	2.00	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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			
0.08 ~ 0.18	SPECIFIED VALVE CLEARANCE / NO CHANGE REQUIRED																											
0.19 ~ 0.22	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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				
0.23 ~ 0.27	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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					
0.28 ~ 0.32	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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						
0.33 ~ 0.37	2.20	2.25	2.30	2.35	2.40	2.45	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							
0.38 ~ 0.42	2.25	2.30	2.35	2.40	2.45	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								
0.43 ~ 0.47	2.30	2.35	2.40	2.45	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									
0.48 ~ 0.52	2.35	2.40	2.45	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										
0.53 ~ 0.52	2.40	2.45	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											
0.58 ~ 0.62	2.45	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												
0.63 ~ 0.72	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													
0.68 ~ 0.72	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														
0.73 ~ 0.77	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															
0.78 ~ 0.82	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																
0.83 ~ 0.87	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																	
0.88 ~ 0.92	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																		
0.93 ~ 0.97	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																			
0.98 ~ 1.02	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																				
1.03 ~ 1.07	2.90	2.95	3.00	3.05	3.10	3.15	3.20																					
1.08 ~ 1.12	2.95	3.00	3.05	3.10	3.15	3.20																						
1.13 ~ 1.17	3.00	3.05	3.10	3.15	3.20																							
1.18 ~ 1.22	3.05	3.10	3.15	3.20																								
1.23 ~ 1.27	3.10	3.15	3.20																									
1.28 ~ 1.32	3.15	3.20																										
1.32 ~ 1.38	3.20																											

INSTALL THE SHIM OF THIS THICKNESS.

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

Example: Present Shim is 2.50 mm Measured clearance is 0.41 mm Replace 2.50 shim with 2.75 mm shim.

5. Apply molybdenum disulfide oil to the valve lifter surface and install the lifter.
6. Install the camshaft.
7. Recheck the valve clearance and adjust it if it is necessary.

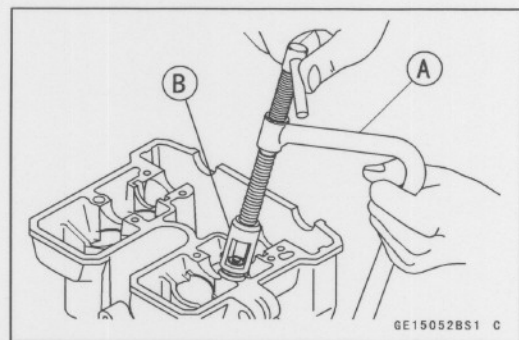
#### Valve Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valve lifter and shim from the valve.
- Mark and record the valve lifter and shim locations so they can be installed in their original positions.
- Using the valve spring compressor assembly, remove the valve.

Special Tools - Valve Spring Compressor Set: 57001-241

[A]

Valve Spring Compressor Adapter: 57001-243 [B]



6E150528S1 C

**Valves**

*Valve Installation*

- Replace the oil seal [C] with a new one.
- Apply a thin coat of 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 inner valve spring [E] and the outer valve spring [D] so that their closed coil end faces the spring seat [B].
- Compress the valve springs to install the split keepers [G] in order to secure the spring retainer [F] in place.

**Special Tools - Valve Spring Compressor Set: 57001-241**  
**Valve Spring Compressor Adapter: 57001-243**

- The shim [H] must be installed with its thickness indication facing the retainer.

**NOTE**

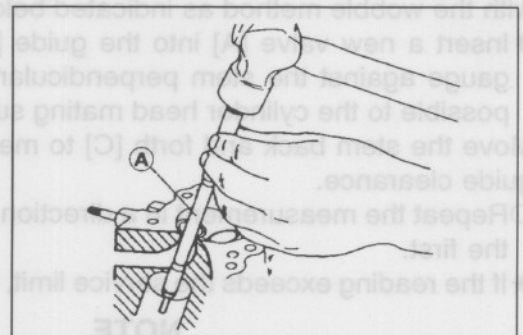
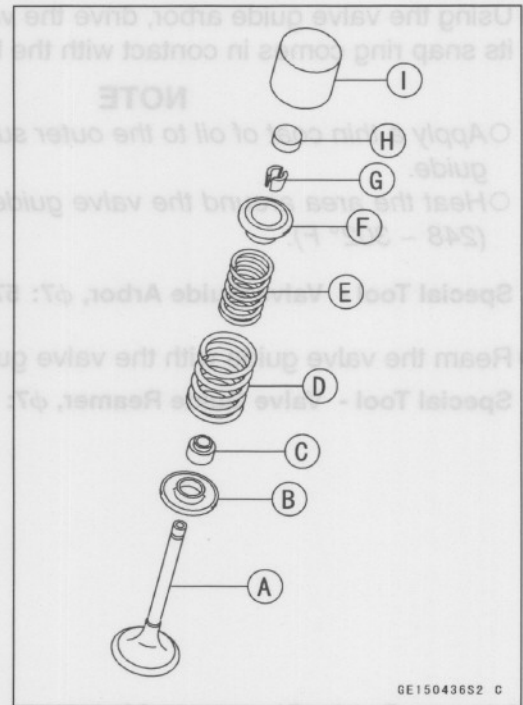
○ Apply grease to the shim or to the retainer to prevent the shim from falling off while the camshaft is being installed.

- Apply molybdenum disulfide oil to the valve lifter [I] surface; then install the lifter.

*Valve Guide Removal*

- Remove the valve.
- Remove the oil seal.
- Remove the spring seat.
- Heat the area around the valve guide to 120 ~ 150° C (248 ~ 302° F) and hammer lightly on the valve guide arbor to remove the valve guide towards the top of the cylinder head.

**Special Tool - Valve Guide Arbor, φ7: 57001-163 [A]**



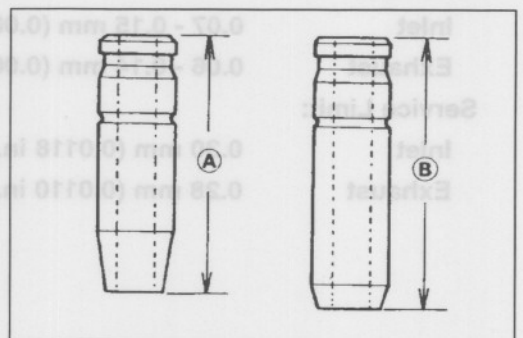
**CAUTION**

**Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head in oil and heat the oil.**

*Valve Guide Installation*

- Install the valve guides, making sure to install the intake valve guide the exhaust valve guide in their respective positions.

Intake Valve Guide: Short [A]  
 Exhaust Valve Guide: Long [B]



## 3-26 ENGINE TOP END

### Valves

- Using the valve guide arbor, drive the valve guide in until its snap ring comes in contact with the head surface.

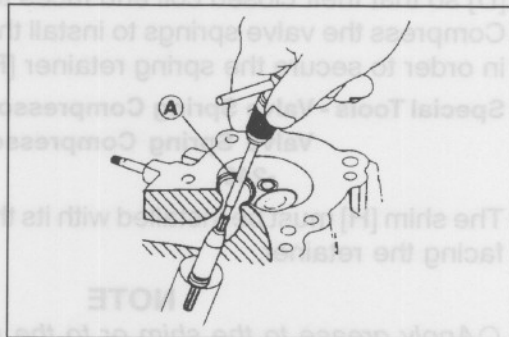
#### NOTE

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

**Special Tool - Valve Guide Arbor,  $\phi 7$ : 57001-163**

- Ream the valve guide with the valve guide reamer.

**Special Tool - Valve Guide Reamer,  $\phi 7$ : 57001-162 [A]**



#### Valve-to-Guide Clearance Measurement (Wobble Method)

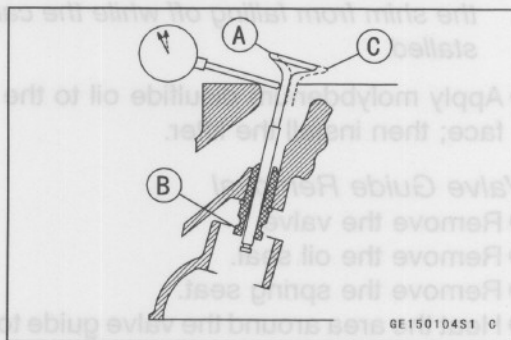
If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.

Move the stem back and forth [C] to measure valve/valve guide clearance.

- Repeat the measurement in a direction at a right angle to the first.

★ If the reading exceeds the service limit, replace the guide.



#### NOTE

- The reading is not actual valve/valve guide clearance because the measuring point is above the guide.

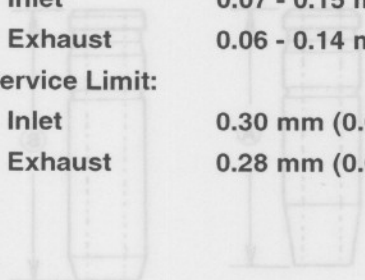
#### Valve/Valve Guide Clearance (Wobble Method)

##### Standard:

Inlet	0.07 - 0.15 mm (0.0028 ~ 0.0059 in.)
Exhaust	0.06 - 0.14 mm (0.0024 ~ 0.0055 in.)

##### Service Limit:

Inlet	0.30 mm (0.0118 in.)
Exhaust	0.28 mm (0.0110 in.)



**Valves**

*Valve Seat Inspection*

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

**Valve Seating Surface Diameter**

**Standard:**

<b>Intake</b>	<b>32.9 ~ 33.1 mm (1.295 ~ 1.303 in.)</b>
<b>Exhaust</b>	<b>28.9 ~ 29.1 mm (1.138 ~ 1.146 in.)</b>

- Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.

Good [E]

- ★ If the width is too wide [G], too narrow [H] or uneven [J], repair the seat.

**Valve Seat Seating Surface Width**

**Standard: 0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)**

*Valve Seat Repair*

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

**Special Tools - Valve Seat Cutter Holder,  $\phi 7$ : 57001-1126 [B]**

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

**Inlet Valve:**

**Valve Seat Cutter, 45° -  $\phi 35$ : 57001-1116**

**Valve Seat Cutter, 32° -  $\phi 35$ : 57001-1121**

**Valve Seat Cutter, 60° -  $\phi 41$ : 57001-1124**

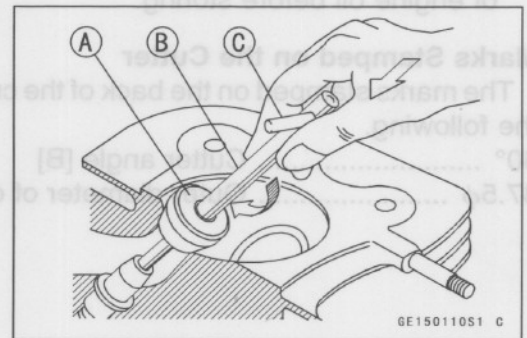
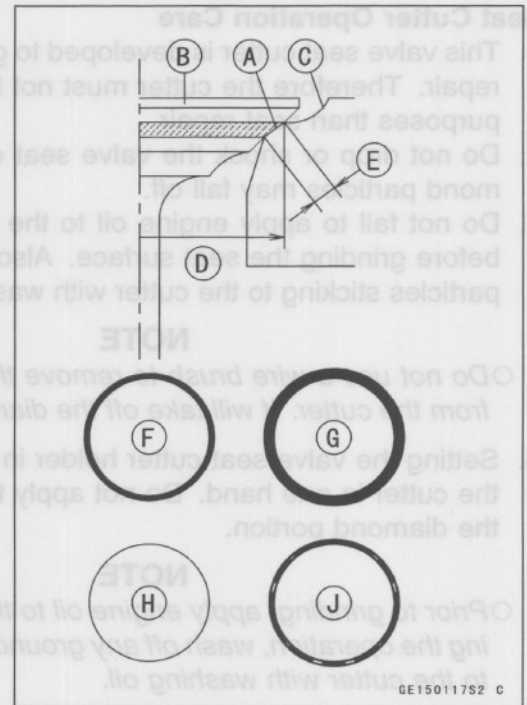
**Exhaust Valve:**

**Valve Seat Cutter, 45° -  $\phi 32$ : 57001-1115**

**Valve Seat Cutter, 32° -  $\phi 35$ : 57001-1121**

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

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



**CAUTION**

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

## 3-28 ENGINE TOP END

### Valves

#### Seat Cutter Operation Care

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

#### NOTE

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

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

#### NOTE

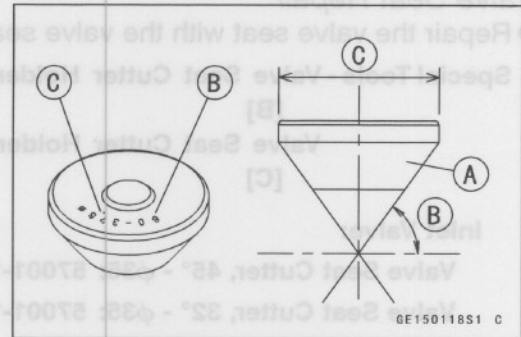
○ Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.

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

#### Marks Stamped on the Cutter

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

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



#### Operating Procedures

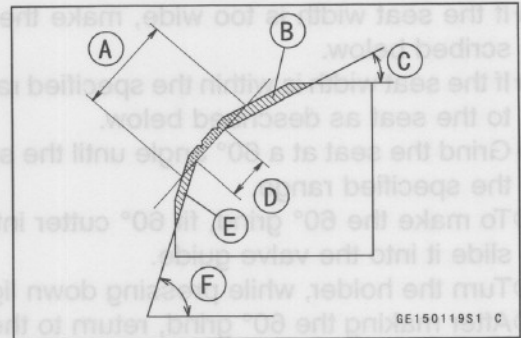
- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

#### CAUTION

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

**Valves**

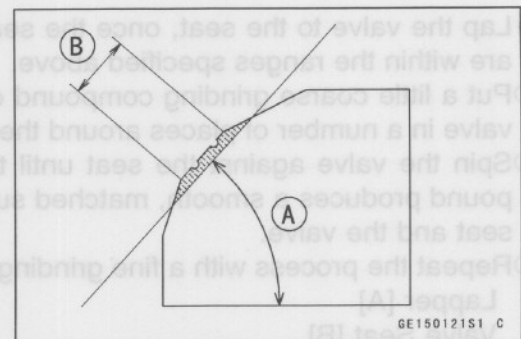
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
  - Widened Width [A] of engagement by machining with 45° cutter
  - Ground Volume [B] by 32° cutter
  - 32° [C]
  - Correct Width [D]
  - Ground Volume [E] by 60° cutter
  - 60° [F]



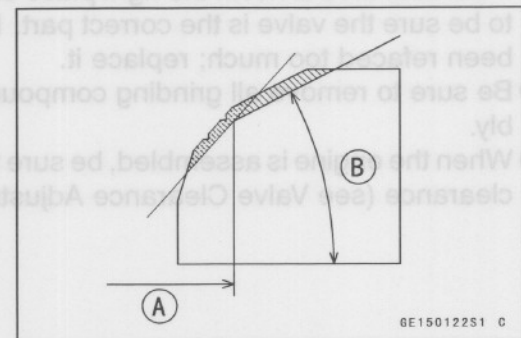
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.
  - Original Seating Surface [B]

**NOTE**

- Remove all pittings of flaws from 45° ground surface.
- After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 60° grinding operation easier.
- When the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.



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



**CAUTION**

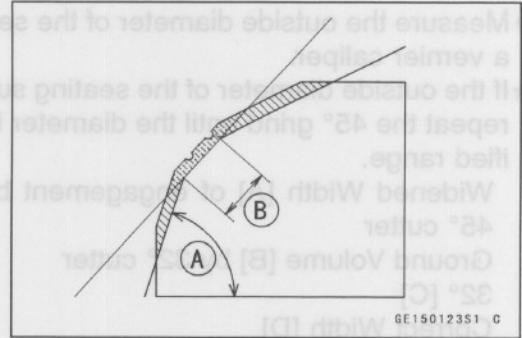
**The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.**

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

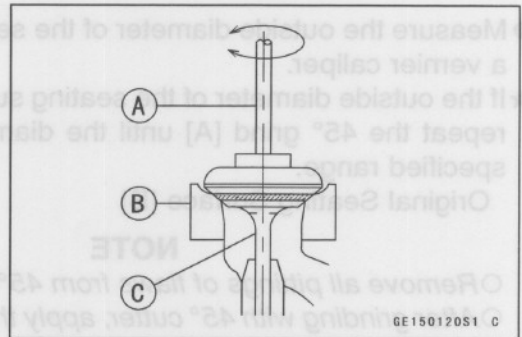
## 3-30 ENGINE TOP END

### Valves

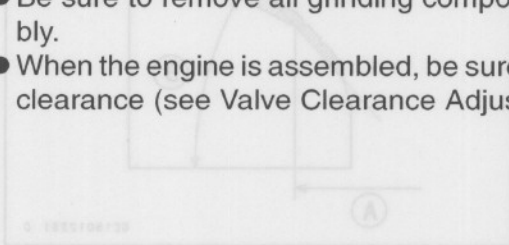
- ★ If the seat width is too wide, make the 60° [A] grind described below.
  - ★ If the seat width is within the specified range, lap the valve to the seat as described below.
  - Grind the seat at a 60° angle until the seat width is within the specified range.
  - To make the 60° grind, fit 60° cutter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



- Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.
  - Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
  - Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
  - Repeat the process with a fine grinding compound.
- Lapper [A]  
Valve Seat [B]  
Valve [C]



- The seating area should be marked about in the middle of the valve face.
- ★ If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Adjustment).



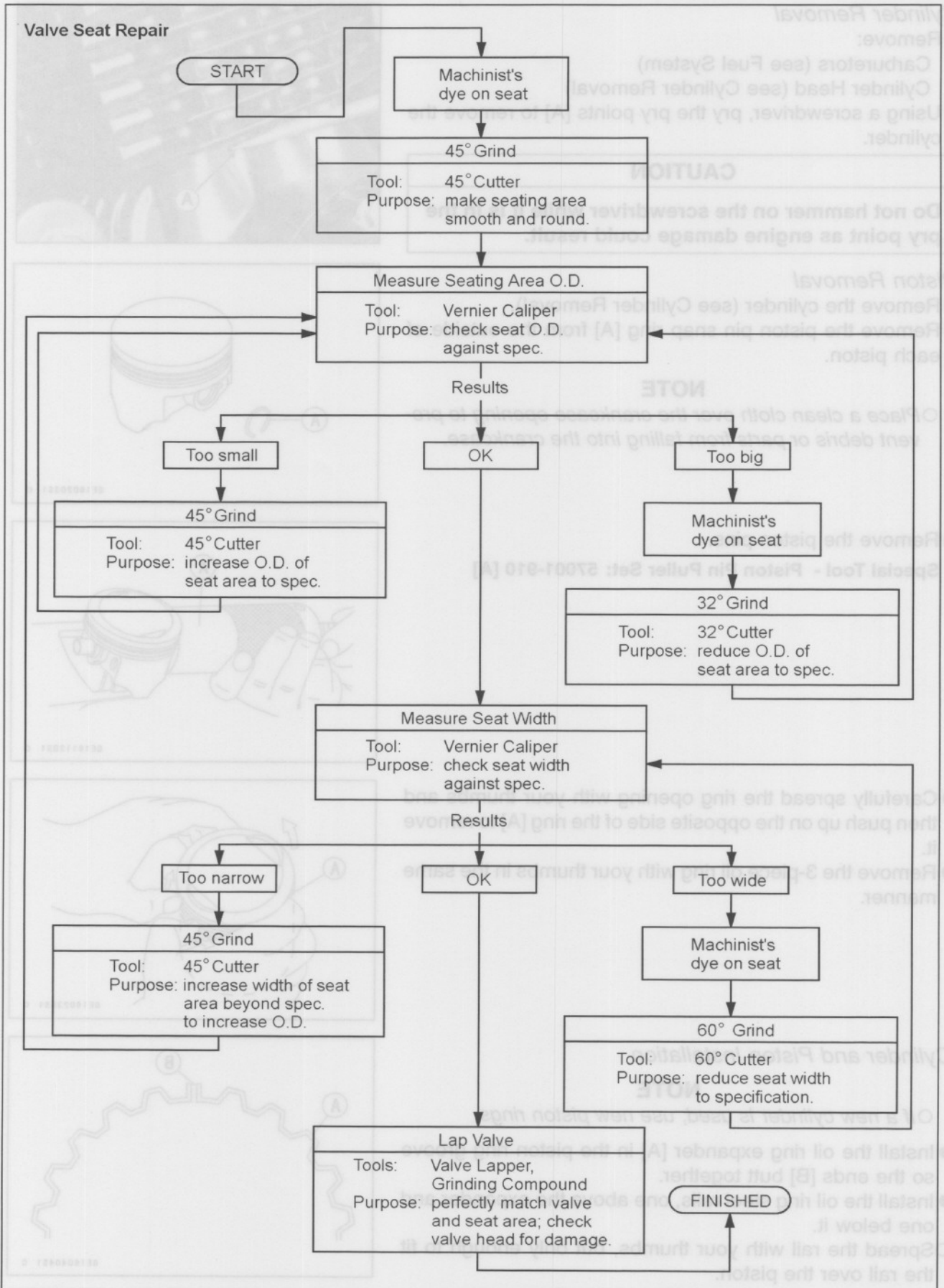
#### CAUTION

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

After making the 32° grind, return to the seat O.D. measurement step above.

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

Valves



## 3-32 ENGINE TOP END

### Cylinders and Pistons

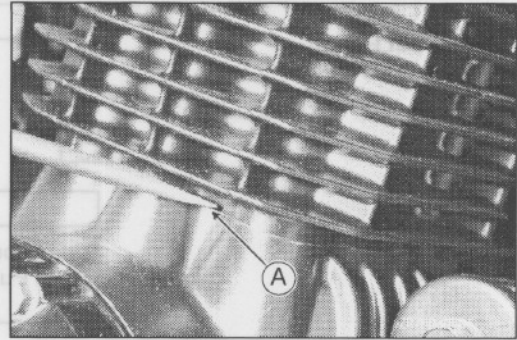
Valves

#### Cylinder Removal

- Remove:
  - Carburetors (see Fuel System)
  - Cylinder Head (see Cylinder Removal)
- Using a screwdriver, pry the pry points [A] to remove the cylinder.

#### CAUTION

Do not hammer on the screwdriver while it is in the pry point as engine damage could result.

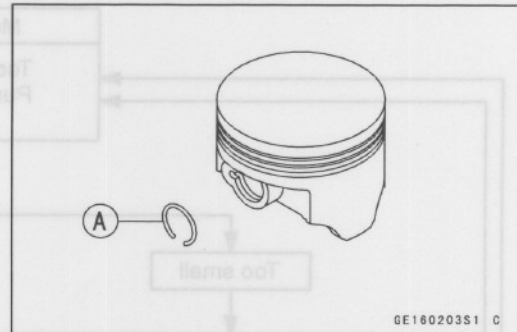


#### Piston Removal

- Remove the cylinder (see Cylinder Removal).
- Remove the piston pin snap ring [A] from the outside of each piston.

#### NOTE

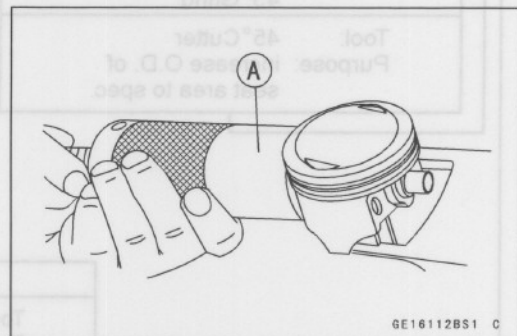
○ Place a clean cloth over the crankcase opening to prevent debris or parts from falling into the crankcase.



GE160203S1 C

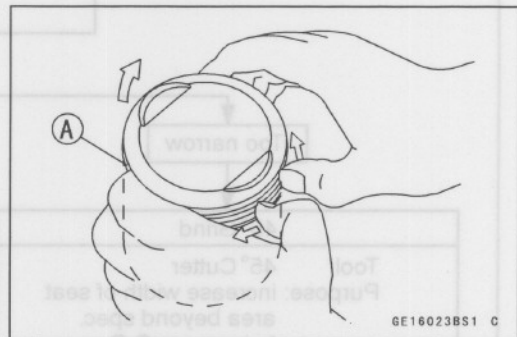
- Remove the piston pins.

Special Tool - Piston Pin Puller Set: 57001-910 [A]



GE16112BS1 C

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



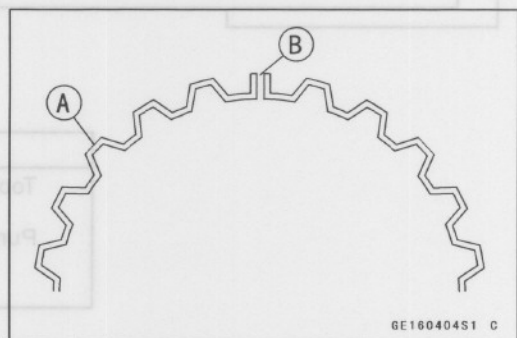
GE16023BS1 C

#### Cylinder and Piston Installation

#### NOTE

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

- 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, but only enough to fit the rail over the piston.
- Release the rail into the bottom piston ring groove.



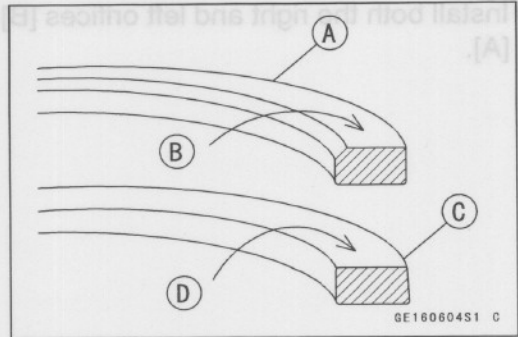
GE160404S1 C

#### NOTE

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

**Cylinders and Pistons**

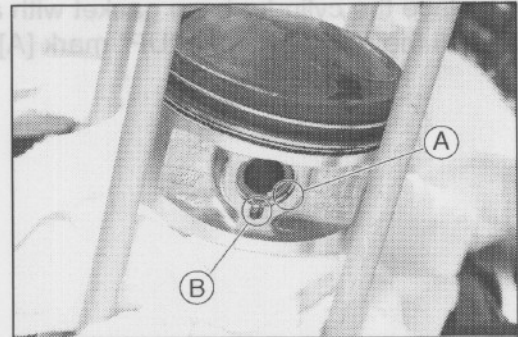
- Do not mix up the top and second ring.
- Install the top ring [A] so that the "R" mark [B] faces up.
- Install the second ring [C] so that the "RN" mark [D] faces up.



**NOTE**

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

- Install the piston with its marking hollow facing forward.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.
- When installing the piston pin snap ring, compress it only enough to install it and no more.
- Place a clean cloth under pistons and install the piston pin snap ring from the outside of each piston.



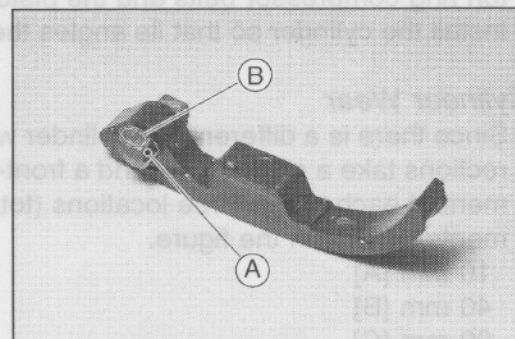
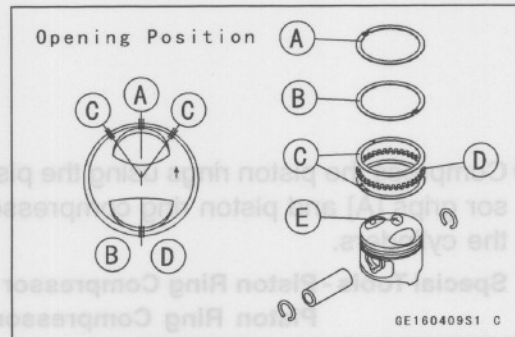
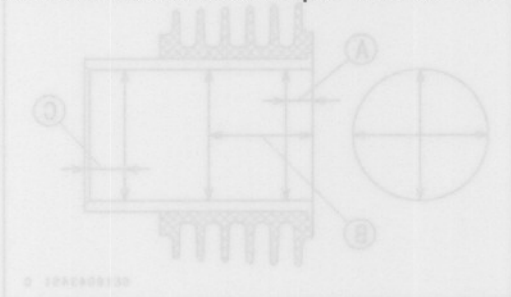
**CAUTION**

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

- Apply molybdenum disulfide oil to the inside wall of the small end of the connecting rod.
- Install the piston by facing the hollow on the top of the piston forward.
- The piston ring openings must be positioned as shown in the figure. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.

- Top Ring [A]
- Second Ring [B]
- Oil Ring Steel Rails [C]
- Oil Ring Expander [D]
- Allow [E]

- Install the rear camshaft chain guide by securing the rubber damper [A] on the shaft with adhesive.
- Install the rubber damper with its "UP" mark [B] facing up.

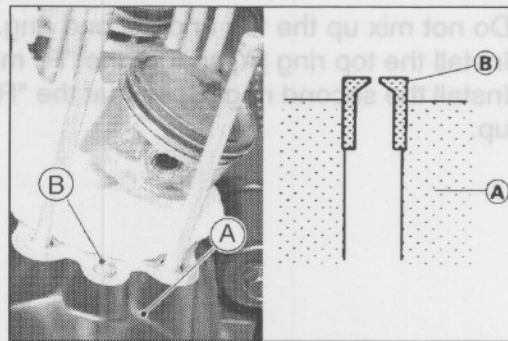
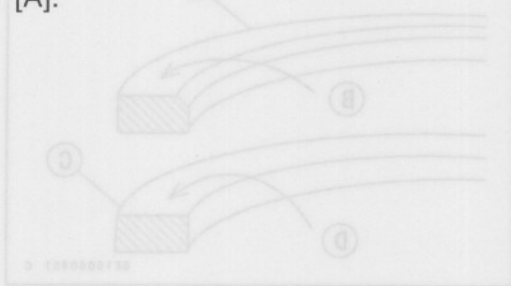


Cylinder Inside Diameter  
 Standard: 66.008 - 66.017 mm (2.5981 - 2.5991 in.)  
 Service Limit: 66.10 mm (2.602 in.)

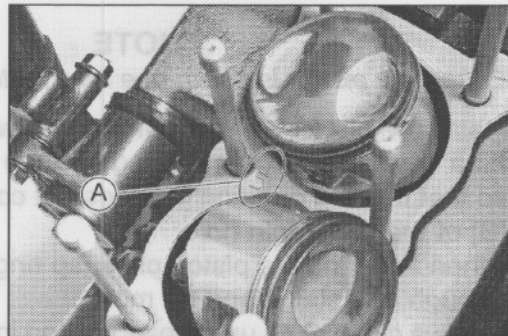
## 3-34 ENGINE TOP END

### Cylinders and Pistons

- Install both the right and left orifices [B] on the crankcase [A].

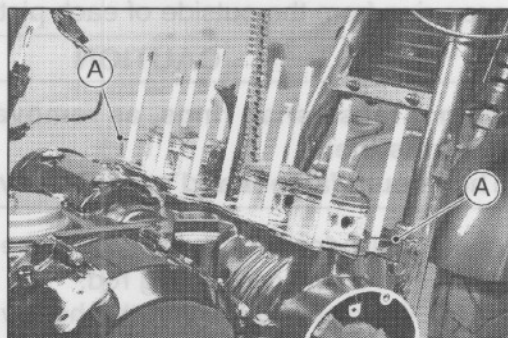
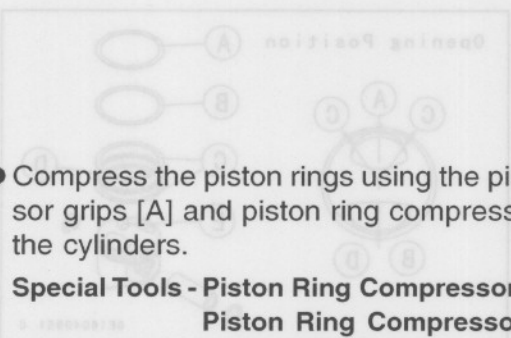


- Replace the cylinder base gasket with a new one.
- Install the gasket with its "UP" mark [A] facing up.



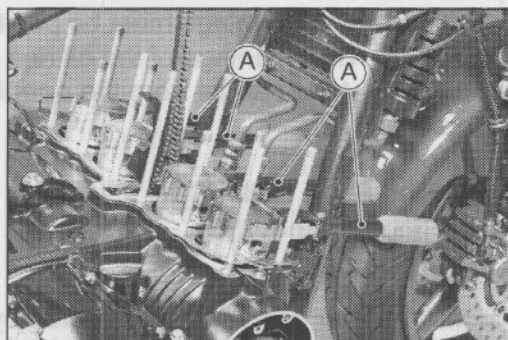
- Apply molybdenum disulfide oil to the front and back surfaces of the piston skirt and the inner wall of the cylinder.
- Slip the piston base [A] under the pistons to hold them level.

**Special Tool - Piston Base,  $\phi 2.3$ : 57001-1336**



- Compress the piston rings using the piston ring compressor grips [A] and piston ring compressor belt, and install the cylinders.

**Special Tools - Piston Ring Compressor Grip: 57001-1095**  
**Piston Ring Compressor Belt,  $\phi 50 \sim \phi 67$ : 57001-1096**



- Insert the piston rings in the cylinder, and remove the piston ring compressor belts and the piston bases.
- Install the cylinder so that its angles the piston angle.

#### Cylinder Wear

- Since there is a difference in cylinder wear in different directions take a side-to-side and a front-to-back measurement at each of the three locations (total of six measurements) shown in the figure.

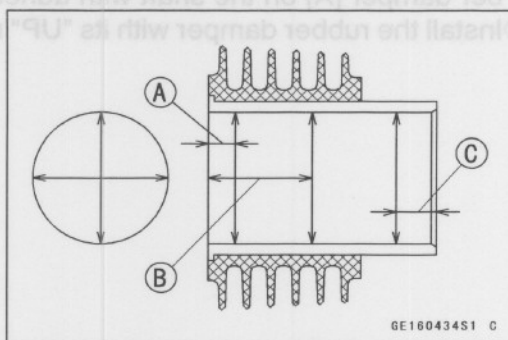
- 10 mm [A]
- 40 mm [B]
- 20 mm [C]

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

#### Cylinder Inside Diameter

**Standard: 66.005 ~ 66.017 mm (2.5986 ~ 2.5991 in.)**

**Service Limit: 66.10 mm (2.602 in.)**



GE160434S1 C

## Cylinders and Pistons

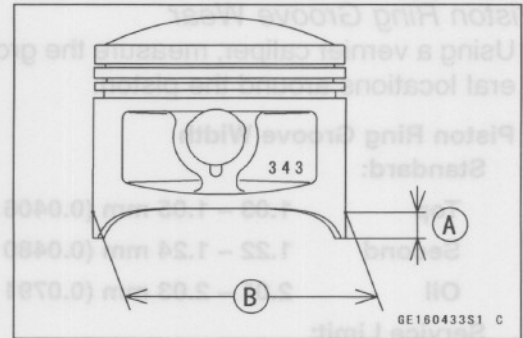
### Piston Wear

- Measure the diameter [B] (front-to-back) of each piston 6 mm [A] up from the bottom of the piston.
- ★ If the piston's diameter is smaller than the service limit, replace the piston.

#### Piston Diameter

**Standard:** 65.951 ~ 65.966 mm (2.5965 ~ 2.5971 in.)

**Service Limit:** 65.81 mm (2.591 in.)



### Piston/Cylinder Clearance

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

#### Piston/Cylinder Clearance

**Standard:** 0.040 ~ 0.067 mm (0.0016 ~ 0.0026 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.

### Piston Ring/Ring Groove Clearance

- 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** 0.050 ~ 0.080 mm (0.0020 ~ 0.0031 in.)

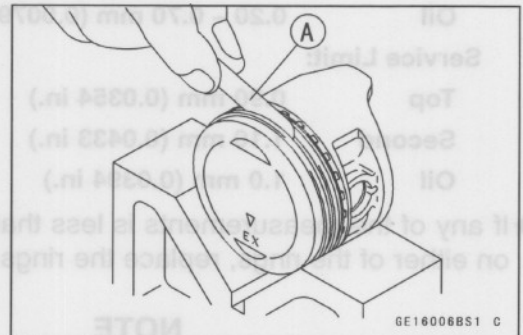
**Second** 0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in.)

##### Service Limit:

**Top** 0.18 mm (0.0071 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 and the piston as a set.



## 3-36 ENGINE TOP END

### Cylinders and Pistons

#### Piston Ring Groove Wear

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

#### Piston Ring Groove Width

##### Standard:

Top	1.03 ~ 1.05 mm (0.0406 ~ 0.0413 in.)
Second	1.22 ~ 1.24 mm (0.0480 ~ 0.0488 in.)
Oil	2.01 ~ 2.03 mm (0.0791 ~ 0.0799 in.)

##### Service Limit:

Top	1.13 mm (0.0455 in.)
Second	1.32 mm (0.0520 in.)
Oil	2.11 mm (0.0831 in.)

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

#### Piston Ring Thickness

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

#### Piston Ring Thickness

##### Standard:

Top	0.970 ~ 0.985 mm (0.0382 ~ 0.0390 in.)
Second	1.17 ~ 1.19 mm (0.0461 ~ 0.0469 in.)
Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)

##### Service Limit:

Top	0.90 mm (0.0354 in.)
Second	1.10 mm (0.0433 in.)
Oil	1.0 mm (0.0394 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.
- ★ If the ring end gap exceeds the service limit, replace the ring.

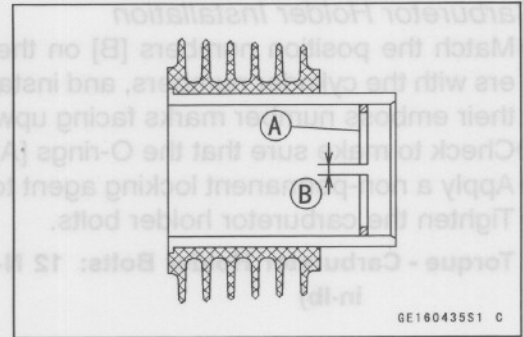
### Piston Ring Thickness

#### Standard:

Top	0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.)
Second	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)
Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)

#### Service Limit:

Top	0.60 mm (0.0236 in.)
Second	0.75 mm (0.0295 in.)
Oil	1.0 mm (0.0394 in.)



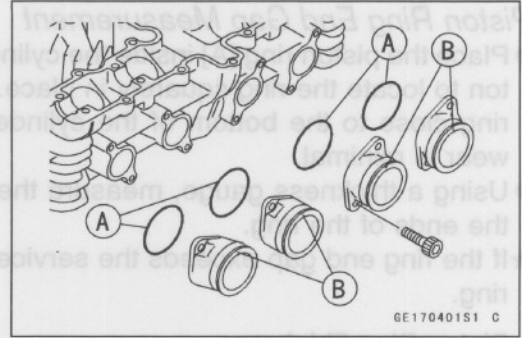
### 3-38 ENGINE TOP END

#### Carburetor Holder

##### Carburetor Holder Installation

- Match the position numbers [B] on the carburetor holders with the cylinder numbers, and install the holders with their emboss number marks facing upward.
- Check to make sure that the O-rings [A] is not damage.
- Apply a non-permanent locking agent to the holder bolts.
- Tighten the carburetor holder bolts.

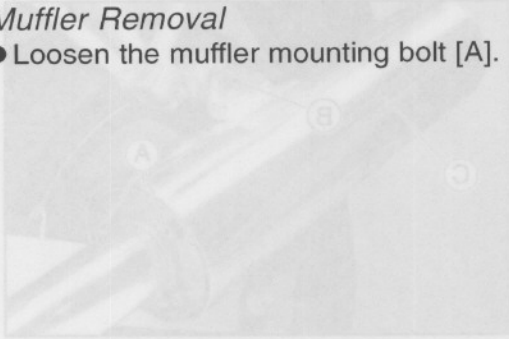
**Torque - Carburetor Holder Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**



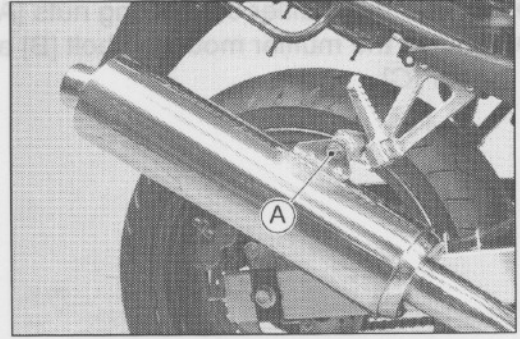
## Muffler

### Muffler Removal

- Loosen the muffler mounting bolt [A].



- Remove the exhaust pipe holder nuts [A].



- Remove the muffler mounting bolt and muffler.

### Muffler Installation

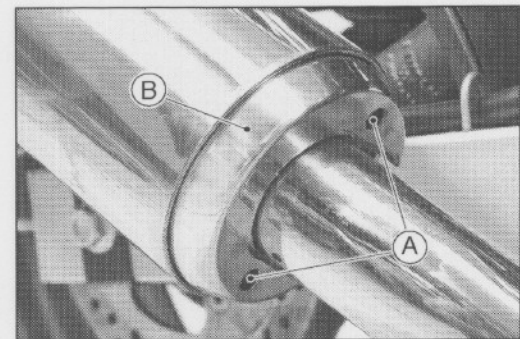
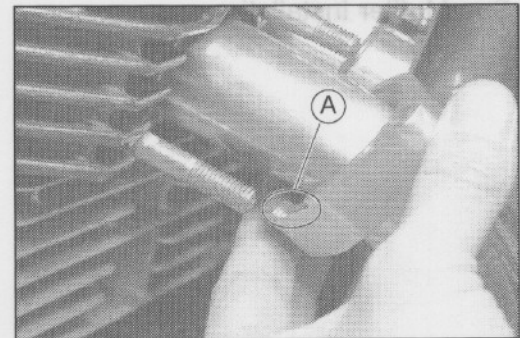
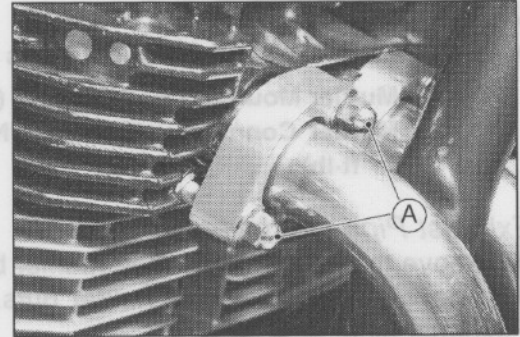
- Inspect the gaskets and replace them if they are damaged.
- Install the exhaust pipe holder with its notch [A] facing down.
- Temporarily tighten the bolt and nuts.
- Uniformly tighten the exhaust pipe holder nuts.
- Tighten the muffler mounting bolt.

**Torque - Muffler Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Start the engine and warm it up thoroughly. Allow the engine to cool down and additionally tighten the clamp bolts and holder nuts.

### Muffler Body Removal

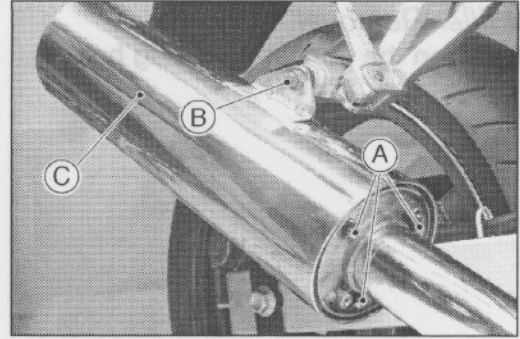
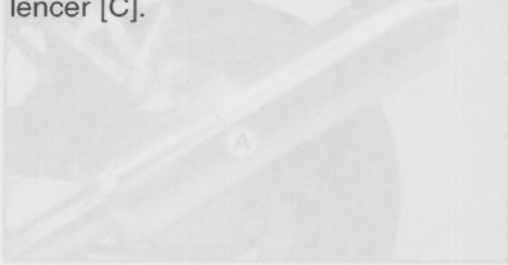
- Remove the muffler connecting cover bolts [A].
- Remove the muffler connecting cover [B].



## 3-40 ENGINE TOP END

### Muffler

- Remove the muffler connecting nuts [A].
- Remove the muffler mounting bolt [B] and remove the silencer [C].



#### Muffler Body Installation

- Inspect the gasket and replace it if it is damaged.

**Torque - Muffler Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**  
**Muffler Connecting Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)**

#### Exhaust Pipe Removal

- Remove the muffler body (see muffler body Removal)
- Remove the exhaust pipe holder nuts, and remove the exhaust pipe.

#### Exhaust Pipe Installation

- See Muffler Installation.



● Remove the muffler mounting bolt and muffler.  
Muffler Installation  
● Inspect the gaskets and replace them if they are damaged.  
● Install the exhaust pipe holder with its notch [A] facing down.  
● Temporarily tighten the bolt and nuts.  
● Uniformly tighten the exhaust pipe holder nuts.  
● Tighten the muffler mounting bolt.  
Torque - Muffler Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)  
● Start the engine and warm it up thoroughly. Allow the engine to cool down and additionally tighten the clamp bolts and holder nuts.

Muffler Body Removal  
● Remove the muffler connecting cover bolts [A].  
● Remove the muffler connecting cover [B].

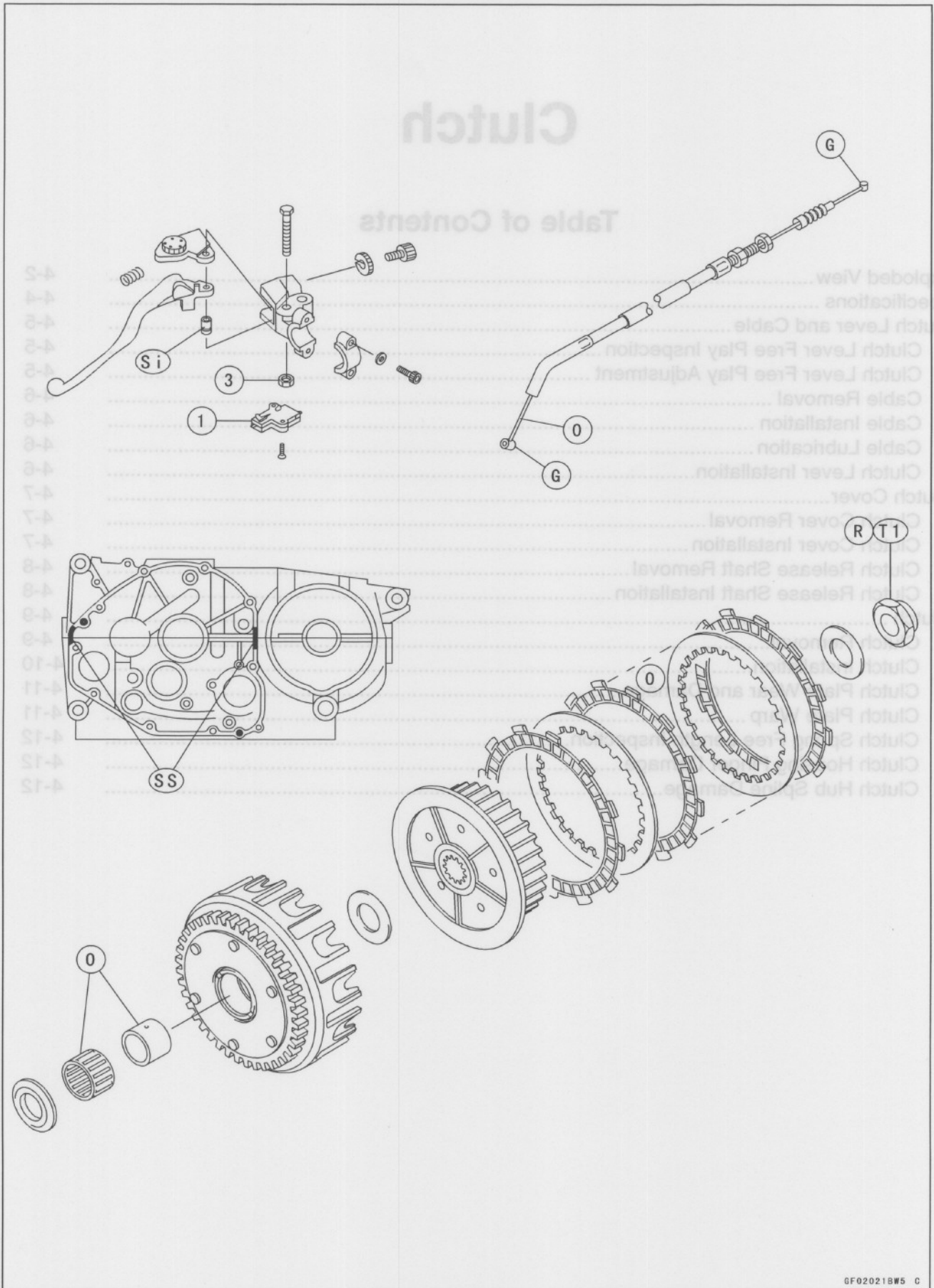
# Clutch

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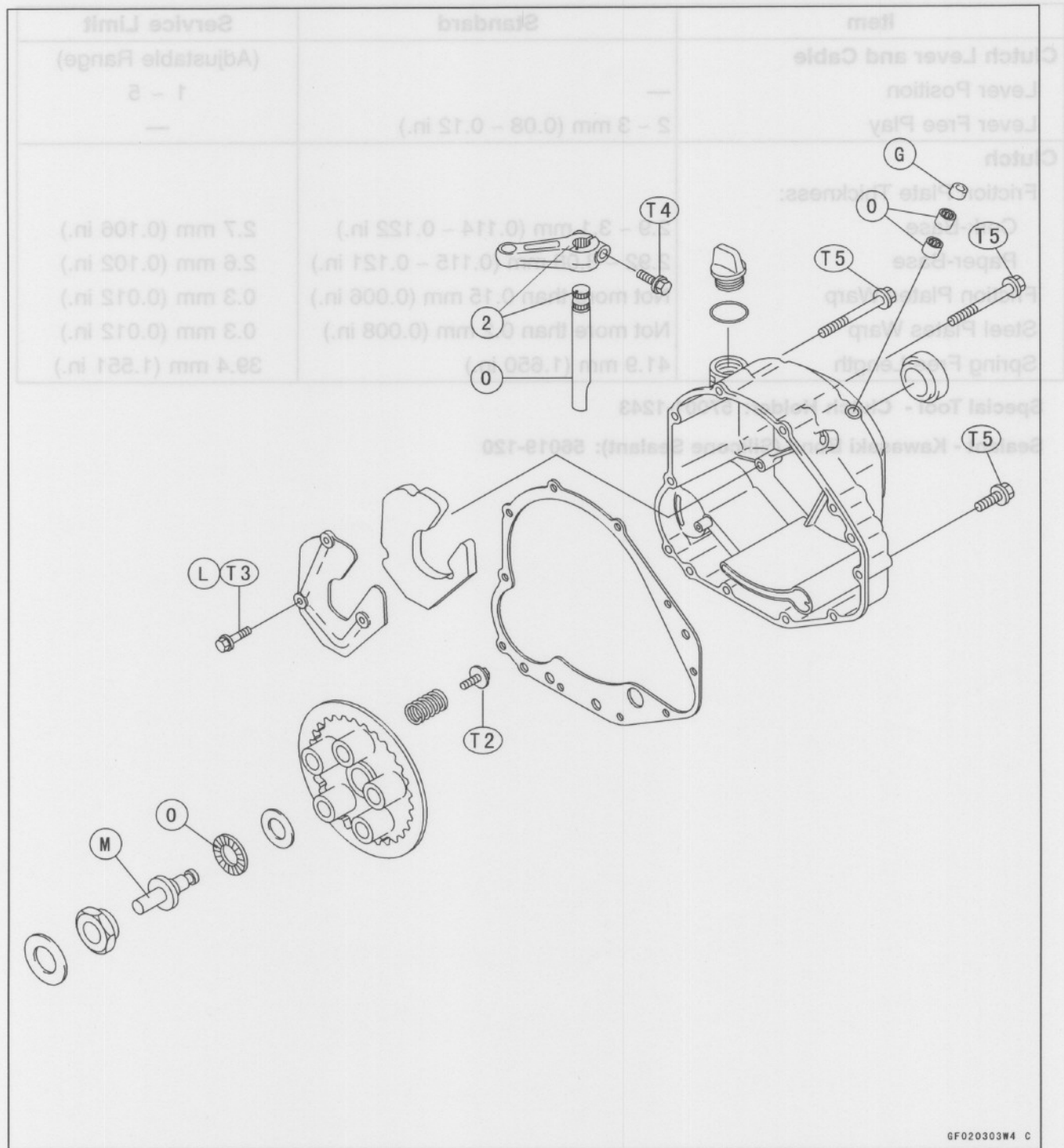
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# 4-2 CLUTCH

## Exploded View



Exploded View



- 1. Starter Lockout Switch
- 2. Align the marks.
- 3. Clutch Lever Pivot Nut
- T1: 132 N·m (13.5 kgf·m, 98 ft·lb)
- T2: 8.8 N·m (0.9 kgf·m, 78 in·lb)
- T3: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- T4: 5.9 N·m (0.6 kgf·m, 52 in·lb)
- T5: 12 N·m (1.2 kgf·m, 104 in·lb)
- G: Apply high-temperature grease.

- L: Apply non-permanent locking agent to the threads.
- M: Apply molybdenum disulfide grease.
- O: Apply engine oil.
- R: Replacement Part
- Si: Apply silicon grease or PBC grease.
- SS: Apply silicon sealant (Kawasaki Bond: 56019-120).

GF020303W4 C

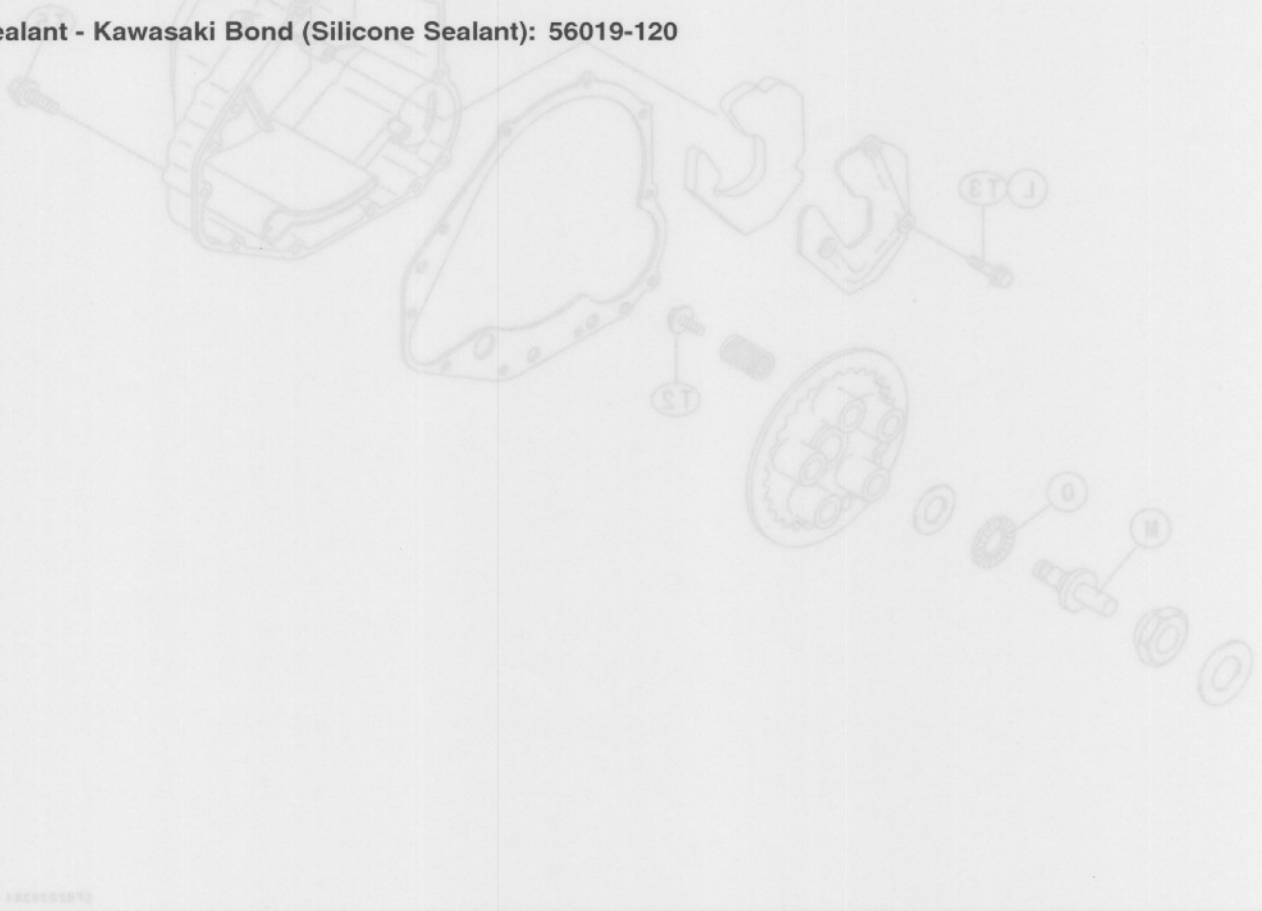
## 4-4 CLUTCH

### Specifications

Item	Standard	Service Limit
<b>Clutch Lever and Cable</b>		(Adjustable Range)
Lever Position	—	1 ~ 5
Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	—
<b>Clutch</b>		
Friction Plate Thickness:		
Cork-Base	2.9 ~ 3.1 mm (0.114 ~ 0.122 in.)	2.7 mm (0.106 in.)
Paper-Base	2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)	2.6 mm (0.102 in.)
Friction Plates Warp	Not more than 0.15 mm (0.006 in.)	0.3 mm (0.012 in.)
Steel Plates Warp	Not more than 0.2 mm (0.008 in.)	0.3 mm (0.012 in.)
Spring Free Length	41.9 mm (1.650 in.)	39.4 mm (1.551 in.)

Special Tool - Clutch Holder: 57001-1243

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



G: Apply high-temperature grease.  
T1: 132 N·m (13.5 kgf-m, 98 ft-lb)  
T2: 8.8 N·m (0.9 kgf-m, 78 in-lb)  
T3: 9.8 N·m (1.0 kgf-m, 87 in-lb)  
T4: 5.9 N·m (0.6 kgf-m, 52 in-lb)  
T5: 12 N·m (1.2 kgf-m, 104 in-lb)  
SS: Apply silicon sealant (Kawasaki Bond: 56019-120).  
S: Apply silicon grease or PBC grease.  
R: Replacement Part.  
O: Apply engine oil.  
M: Apply molybdenum disulfide grease.  
L: Apply non-permanent locking agent to the threads.

1. Starter Lockout Switch  
2. Align the marks.  
3. Clutch Lever Pivot Nut  
T1: 132 N·m (13.5 kgf-m, 98 ft-lb)  
T2: 8.8 N·m (0.9 kgf-m, 78 in-lb)  
T3: 9.8 N·m (1.0 kgf-m, 87 in-lb)  
T4: 5.9 N·m (0.6 kgf-m, 52 in-lb)  
T5: 12 N·m (1.2 kgf-m, 104 in-lb)  
G: Apply high-temperature grease.

## Clutch Lever and Cable

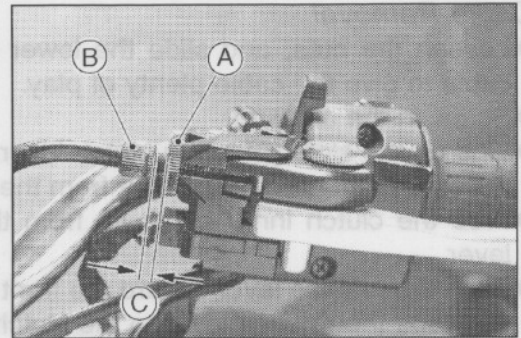
### Clutch Lever Free Play Inspection

- Pull the clutch lever just enough to take up the free play [C].
- Measure the gap between the lever and lever holder.

#### Clutch Lever Free Play

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

- ★ If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust it.

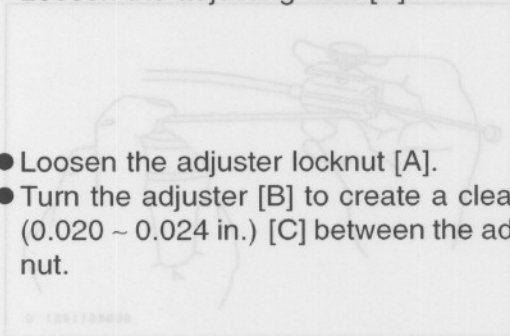


### Clutch Lever Free Play Adjustment

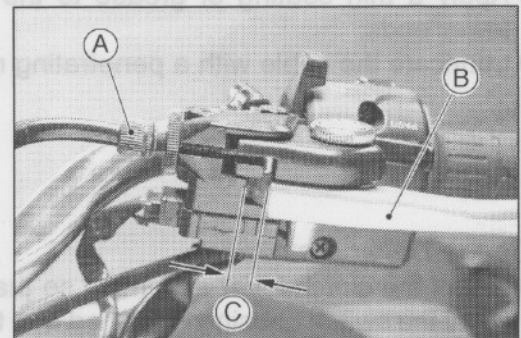
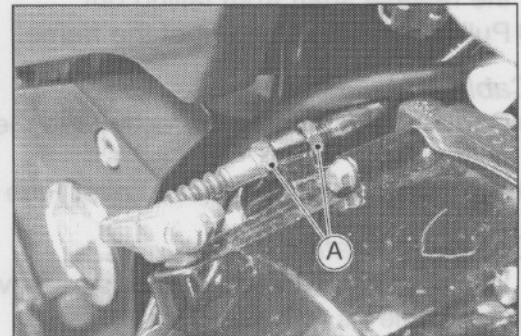
#### ⚠ WARNING

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

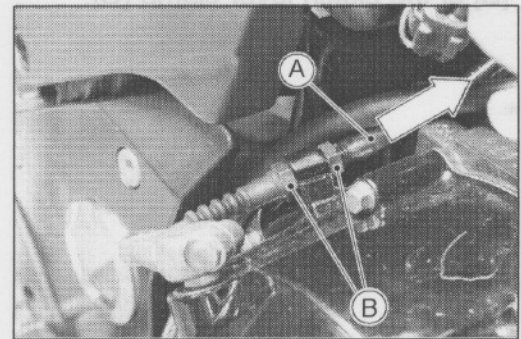
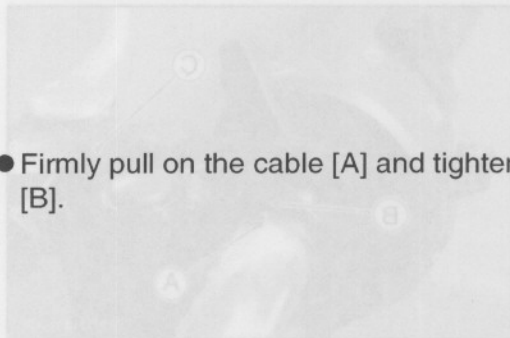
- Loosen the adjusting nuts [A].



- Loosen the adjuster locknut [A].
- Turn the adjuster [B] to create a clearance of 5 ~ 6 mm (0.020 ~ 0.024 in.) [C] between the adjuster and the locknut.



- Firmly pull on the cable [A] and tighten the adjusting nuts [B].



- Turn the adjuster to adjust the free play to 2 ~ 3 mm (0.08 ~ 0.12 in.).
- Tighten the locknut.
- Check that the upper end of the cable is fitted correctly in the adjuster.

#### ⚠ WARNING

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

- Start the engine to check for any clutch slippage or if the clutch disengages properly.

## 4-6 CLUTCH

### Clutch Lever and Cable

#### Cable Removal

- Loosen the nuts, and slide the lower end of the clutch cable to give the cable plenty of play.
- Screw in the adjuster.
- Line up the slots [A] in the clutch lever, lock nut and adjuster, and then free the cable from the lever.
- Free the clutch inner cable tip from the clutch release lever.
- Push the release lever toward the front of the motorcycle and tape the release lever to the clutch cover to prevent the release shaft from falling out.
- Pull the clutch cable out of the frame.

#### Cable Installation

- Run the clutch cable correctly (see General Information chapter).
- Adjust the clutch cable (see Lever Free Play Adjustment).

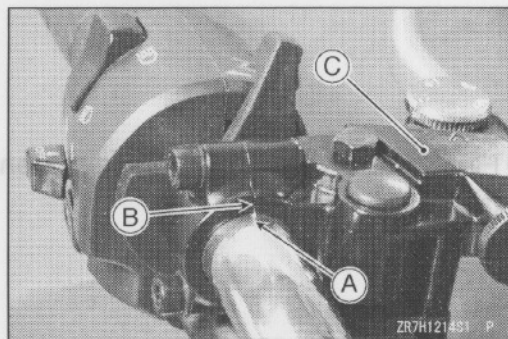
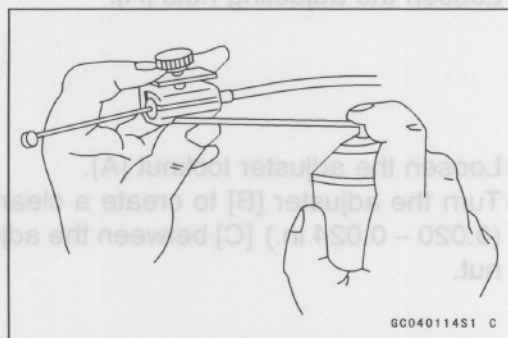
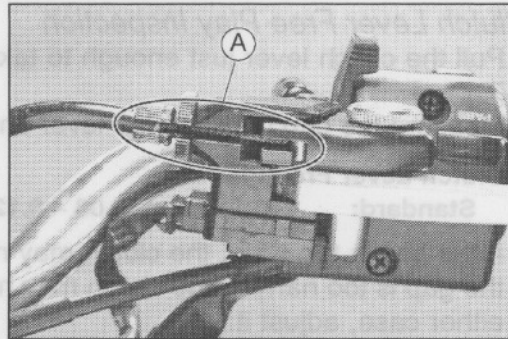
#### Cable Lubrication

Whenever the clutch cable is removed, lubricate the clutch cable as follows.

- Apply a thin coating of grease to the cable upper and lower ends.
- Lubricate the cable with a penetrating rust inhibitor.

#### Clutch Lever Installation

- Install the clutch lever assembly so that the punch mark [A] of the switch housing is aligned with the mating surface [B] of the clutch lever clamp [C].



- Turn the adjuster to adjust the free play to 2 - 3 mm (0.08 - 0.12 in.).
- Tighten the locknut.
- Check that the upper end of the cable is fitted correctly in the adjuster.

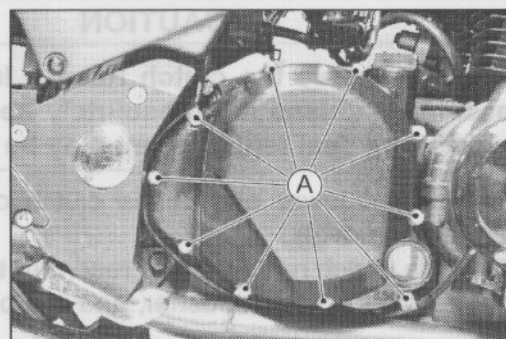
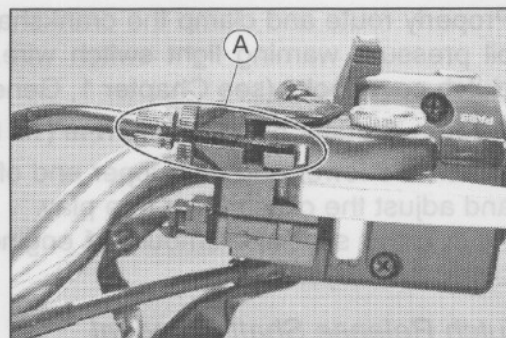
**WARNING**  
Be sure that the outer cable end is fully seated in the adjuster at the clutch lever, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

- Start the engine to check for any clutch slipage or if the clutch disengages properly.

## Clutch Cover

### Clutch Cover Removal

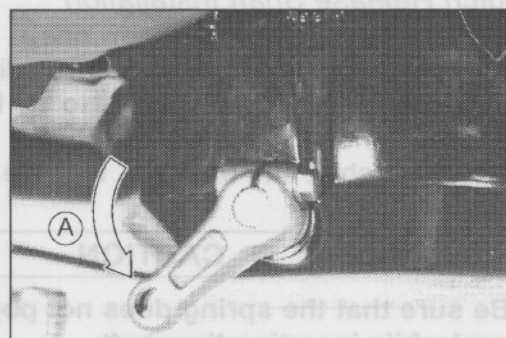
- Drain engine oil.
  - Detach the clutch cable at its lower end.
  - Loosen the adjusting nuts at the lower end of the cable.
  - Loosen the adjuster locknut at the upper end of the cable and screw in the adjuster.
  - Align the grooves [A] of the lever, locknut, and adjuster.
  - Set the lever adjuster to "5".
  - Detach the clutch cable at its upper end.
  - Detach the lower end of the cable from the release lever.
- Remove the clutch cover bolts [A].



- Turn the release lever counterclockwise [A] and remove the clutch cover.

### CAUTION

Do not pull out the clutch release shaft for clutch cover removal. Clutch release shaft removal damages the oil seal in the clutch cover, necessitating oil seal replacement.



### Clutch Cover Installation

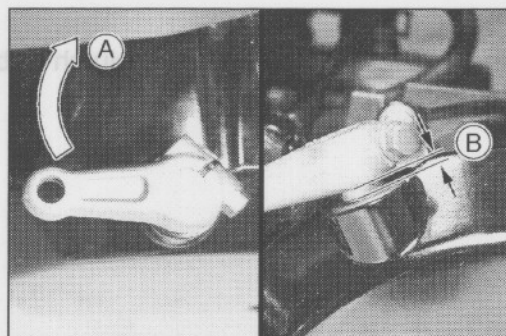
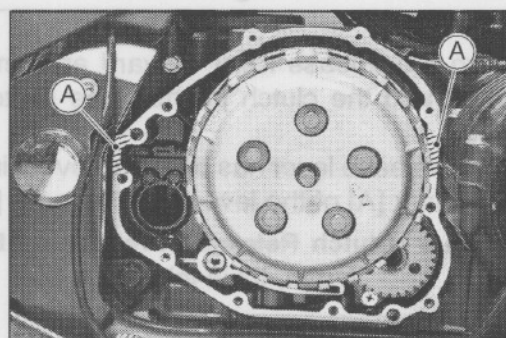
- Replace the gasket with a new one.
- Apply silicon sealant around [A] the crankcase mating surface for the clutch cover gasket.

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

- Install the clutch cover while keeping the release lever turned counterclockwise.
- Turn the release lever clockwise [A] and engage the release shaft and the clutch pusher.

### NOTE

- Slightly pull the release shaft out of the cover to engage it. When it is engaged, a clearance of approximately 4 mm [B] will be created between the lever and the cover.



## 4-8 CLUTCH

### Clutch Cover

- Properly route and clamp the crankshaft sensor and the oil pressure warning light switch wire, and tighten the clutch cover bolts (see Chapter 1, General Information).

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

- Attach the lower end and upper end of the clutch cable, and adjust the clutch lever free play.
- Pour in the specified amount of engine oil (see Engine Lubrication System)

#### Clutch Release Shaft Removal

#### CAUTION

**Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, oil seal replacement may be required.**

- Detach the lower end of the clutch cable (see Clutch Cover Removal).
- Turn the clutch release lever rearward to free the release shaft from the clutch pusher, and pull out the shaft.

#### Clutch Release Shaft Installation

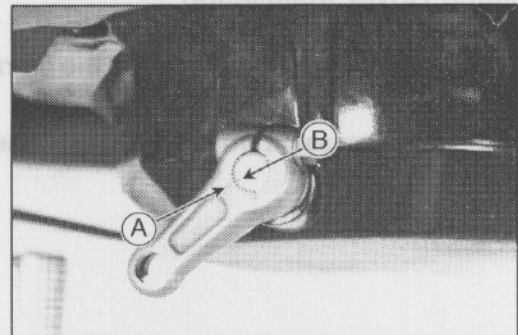
- Replace the oil seal with a new one.
- Apply high-temperature grease to the lip of the oil seal in the release hole, and engine oil to the bearing.
- Apply engine oil to the release shaft.
- Insert the shaft into the hole, with the cutout facing the clutch.

#### CAUTION

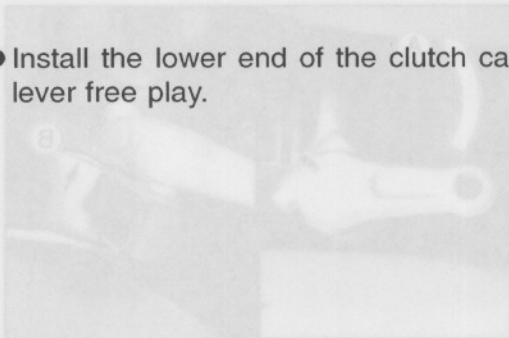
**Be sure that the spring does not pop out of the oil seal while inserting the shaft.**

- Turn the release lever forward and engage the release shaft and the clutch pusher (see Clutch Cover Installation).
- If the release lever has been removed, install it by aligning the mark [A] of the lever and the mark [B] of the shaft.

**Torque - Clutch Release Lever Clamp Bolt: 5.9 N·m (0.6 kgf·m, 52 in·lb)**



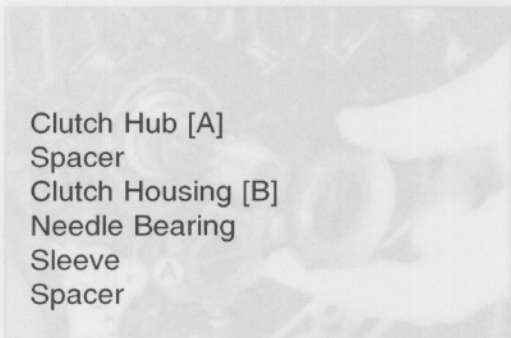
- Install the lower end of the clutch cable and adjust the lever free play.



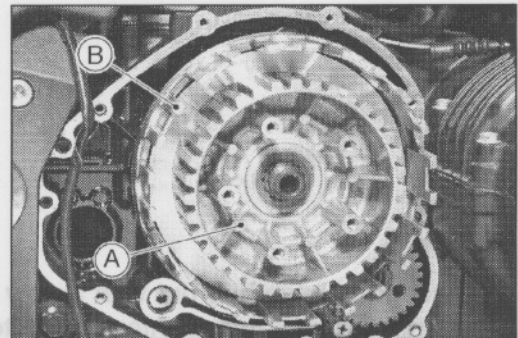
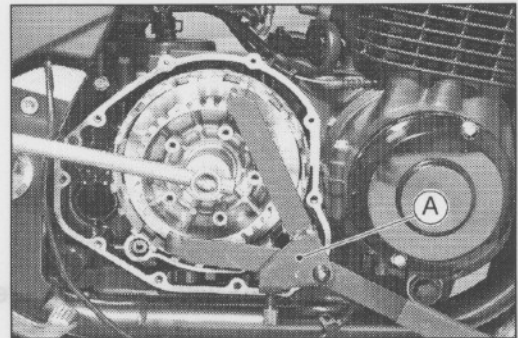
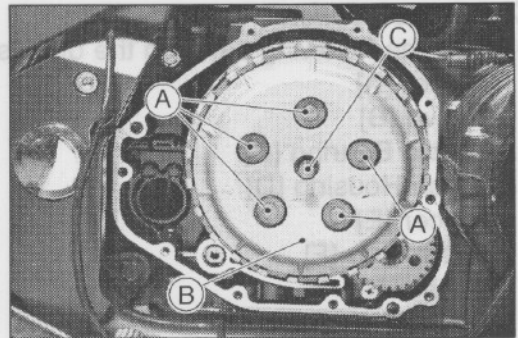
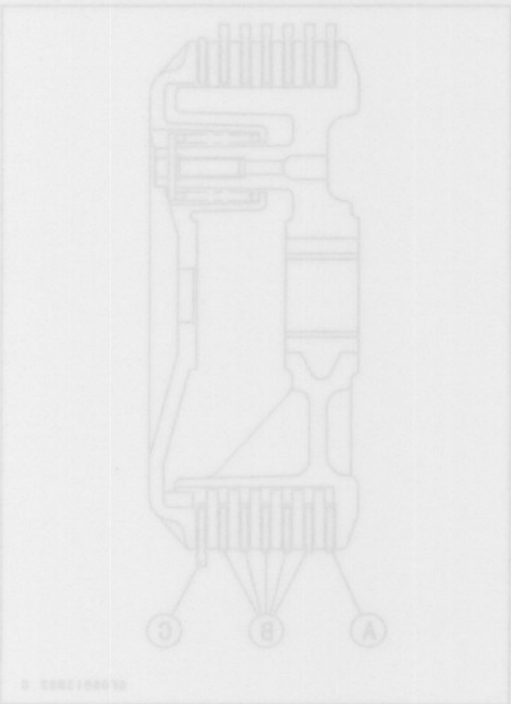
**Clutch**

**Clutch Removal**

- Remove:
    - Engine Oil (drain, see Engine Lubrication System chapter)
    - Clutch Cable Lower End (see Clutch Cable Removal)
    - Clutch Cover (see Clutch Cover Removal)
    - Clutch Spring Bolts [A]
    - Washer
    - Springs
    - Clutch Spring Plate [B]
    - Shim
    - Thrust Bearing
    - Pusher [C]
    - Friction Plates, Steel Plates
    - Clutch Hub Nut, Washer
  - Holding the clutch hub, remove the nut.
- Special Tool - Clutch Holder: 57001-1243 [A]**



- Clutch Hub [A]
- Spacer
- Clutch Housing [B]
- Needle Bearing
- Sleeve
- Spacer



Special Tool - Clutch Holder: 57001-1243

Torque - Clutch Hub Nut: 132 N·m (13.2 kgf-m, 98 ft-lb)

- Install the plates alternately in the following order: first the cork-base friction plate [A], then the steel plate and paper-base friction plates [B] and steel plates at five times.
- Install the last cork-base friction plate [C] by aligning its protrusions with the shallow grooves.

**CAUTION**

If new plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

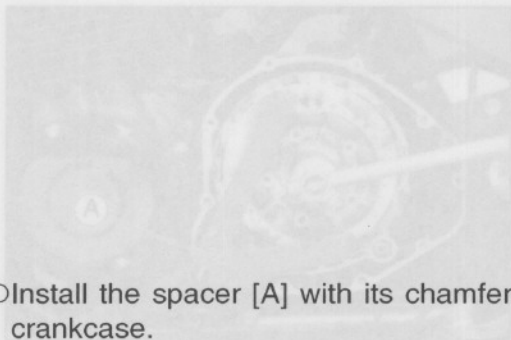
## 4-10 CLUTCH

### Clutch

#### Clutch Installation

- Install the following parts on the drive shaft.

Spacer [A]  
Sleeve [B]  
Needle Bearing [C]  
Clutch Housing [D]  
Spacer [E]  
Clutch Hub [F]  
Washer [G]  
Nut [I]



- Install the spacer [A] with its chamfered side facing the crankcase.



- Replace the clutch hub nut with a new one.
- Holding the clutch hub, tighten the clutch hub nut.

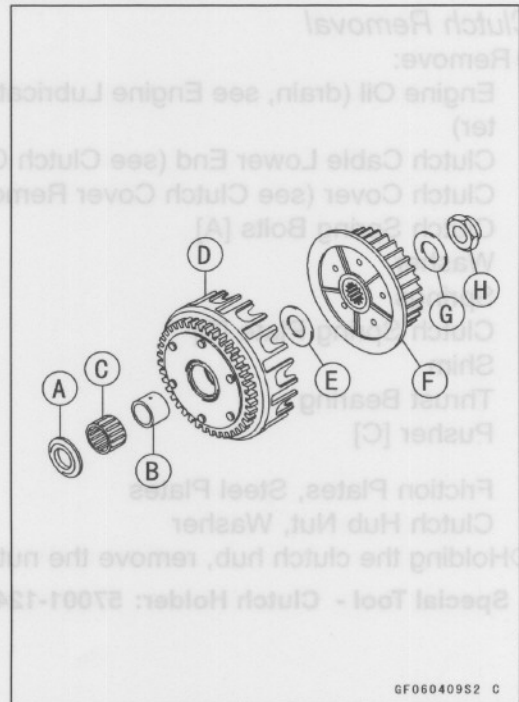
**Special Tool - Clutch Holder: 57001-1243**

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

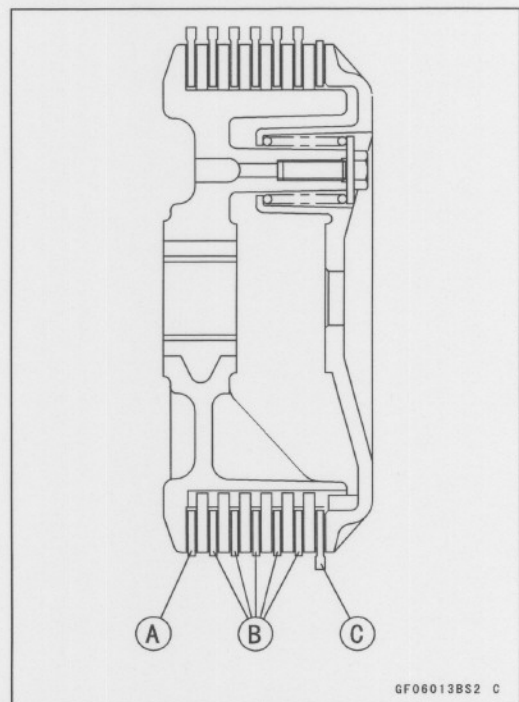
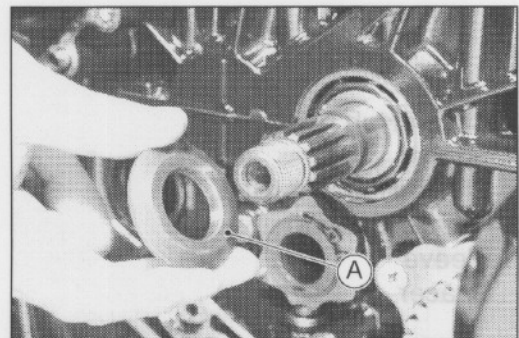
- Install the plates alternately in the following order: first the cork-base friction plate [A], then the steel plate, and paper-base friction plates [B] and steel plates at five time.
- Install the last cork-base friction plate [C] by aligning its protrusions with the shallow grooves.

#### CAUTION

If new plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.



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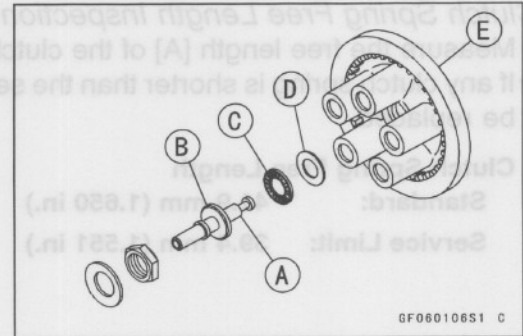


GF060138S2 C

## Clutch

- Apply engine oil to the thrust bearing [C].
- Apply molybdenum disulfide grease to the clutch spring plate pusher ends [A] before installing.
- Install the clutch spring plate [E] together with the shim [D], thrust bearing, and pusher [B].

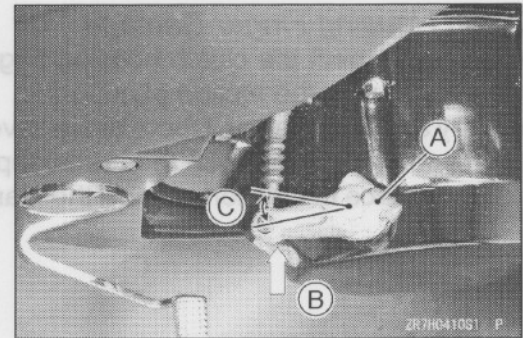
**Torque - Clutch Spring Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)**



- Install the clutch cover (see Clutch Cover Installation).
- Push the release lever [A] towards the crankcase so that when it stops moving the angle of the release lever is as shown.

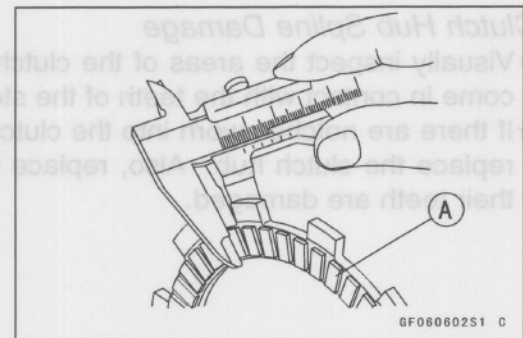
Less than 20° [C]

- ★ If the angle is exceeded the 20°, replace the shim to the 1.2 mm thick shim.



### Clutch Plate Wear and Damage

- 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 plates [A] at several places.



### Friction Plate Thickness

#### Standard:

**Cork-base** 2.9 ~ 3.1 mm (0.114 ~ 0.122 in.)

**Paper-base** 2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)

#### Service Limit:

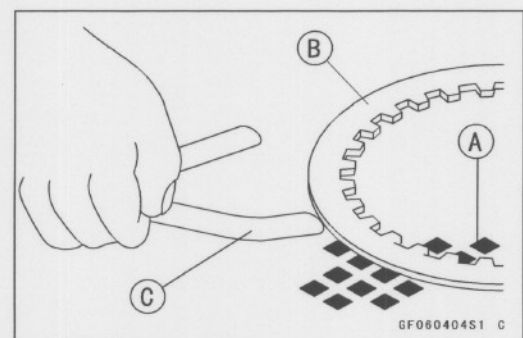
**Cork-base** 2.7 mm (0.106 in.)

**Paper-base** 2.6 mm (0.102 in.)

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

### Clutch Plate Warp

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



### Friction Plate Warp

**Standard:** 0.15 mm (0.008 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.)

## 4-12 CLUTCH

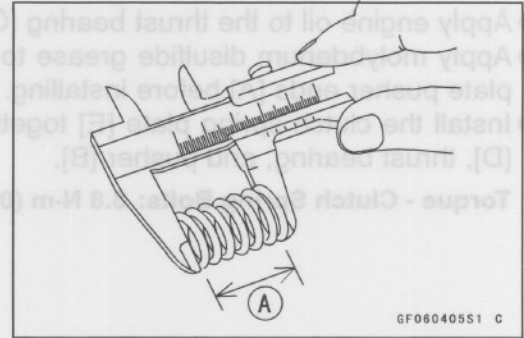
### Clutch

#### Clutch Spring Free Length Inspection

- Measure the free length [A] of the clutch springs.
- ★ If any clutch spring is shorter than the service limit, it must be replaced.

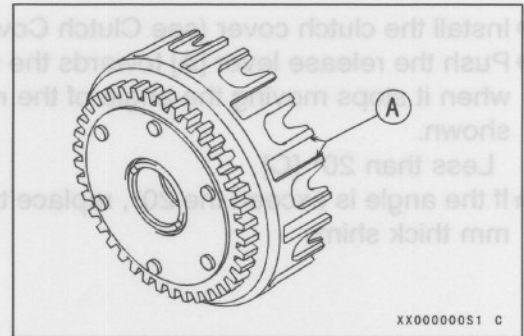
#### Clutch Spring Free Length

Standard:	41.9 mm (1.650 in.)
Service Limit:	39.4 mm (1.551 in.)



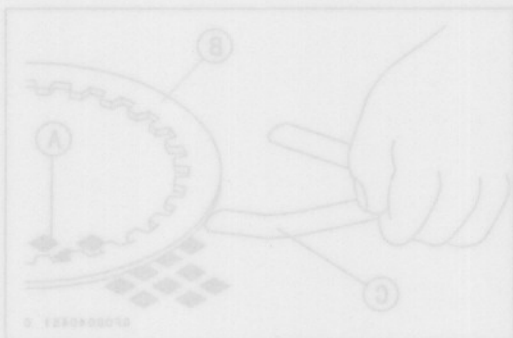
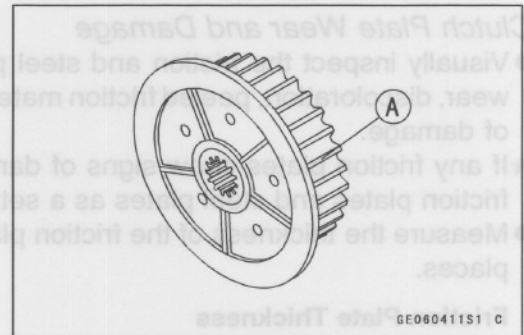
#### Clutch Housing Finger Damage

- 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

- 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.



Clutch Plate Thickness

Standard:

Cork-base 2.9 - 3.1 mm (0.114 - 0.122 in.)

Paper-base 2.92 - 3.08 mm (0.115 - 0.121 in.)

Service Limit:

Cork-base 2.7 mm (0.106 in.)

Paper-base 2.6 mm (0.102 in.)

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

Clutch Plate Warp

● 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].

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

Friction Plate Warp

Standard: 0.15 mm (0.008 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.)

# Engine Lubrication System

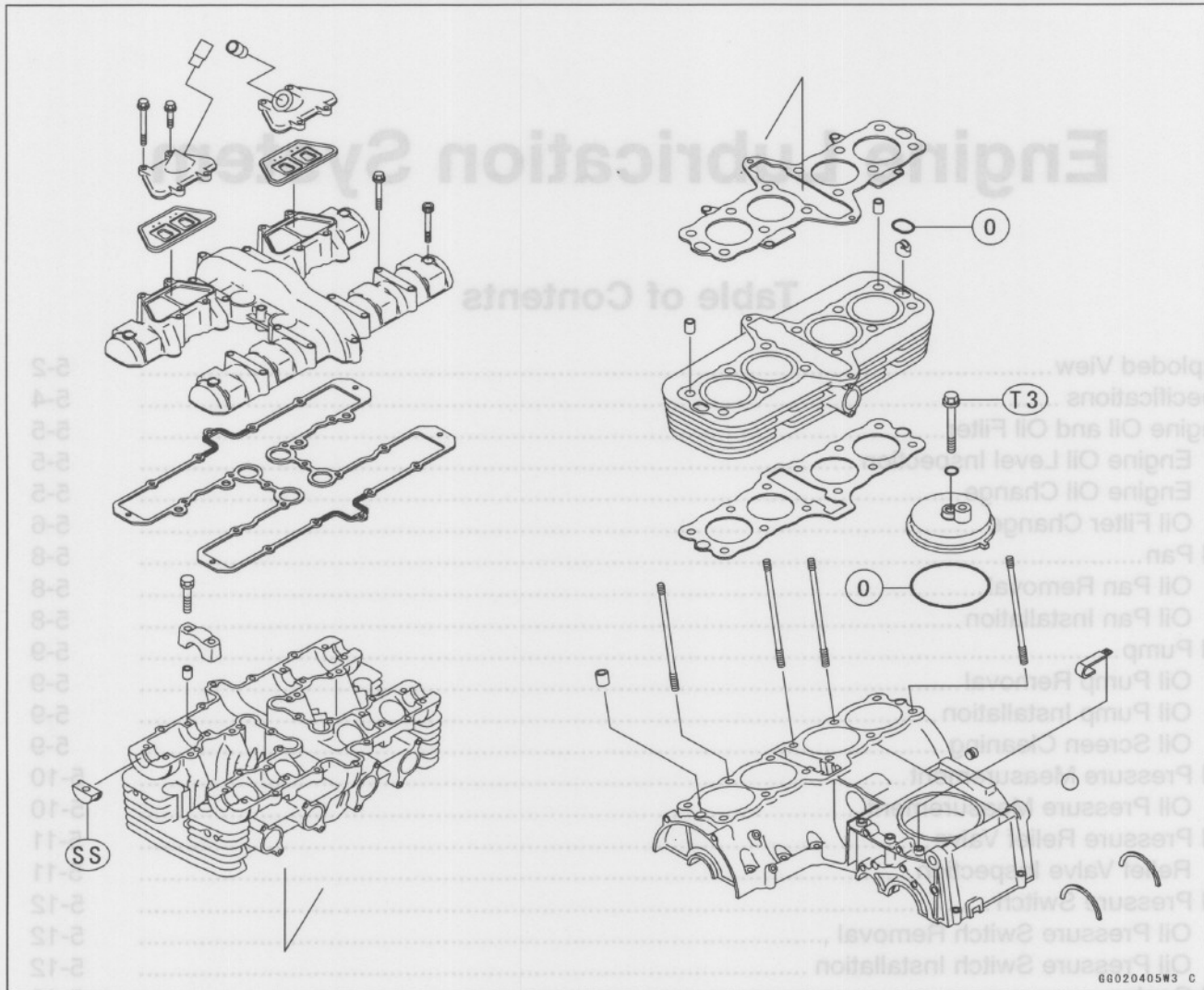
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SS: Apply silicon sealant (Kawasaki Bond: 56019-120).  
 O: Apply engine oil.  
 L: Apply non-permanent locking agent to the threads.  
 G: Apply high-temperature grease.  
 C: After tightening, stake it with a punch.  
 T9: 20 N·m (2.0 kgf-m, 14 ft-lb)  
 T8: 12 N·m (1.2 kgf-m, 104 in-lb)  
 T7: 29 N·m (3.0 kgf-m, 22 ft-lb)  
 T8: 1.5 N·m (0.15 kgf-m, 13 in-lb) (finger-tighten)  
 T8: 2.1 N·m (0.22 kgf-m, 45 in-lb)  
 T4: 15 N·m (1.5 kgf-m, 11 ft-lb)  
 T3: 2.9 N·m (0.3 kgf-m, 25 in-lb)  
 T2: 8.8 N·m (0.9 kgf-m, 78 in-lb)  
 T1: 22 N·m (2.2 kgf-m, 16 ft-lb)  
 9: Oil filter  
 8: Engine oil drain plug  
 7: Oil pressure relief valve  
 6: Oil pump  
 5: Oil level gauge  
 4: Oil filler cap  
 3: Oil pressure warning light switch  
 2: Oil passage plug  
 1: Oil cooler

## 5-2 ENGINE LUBRICATION SYSTEM

### Exploded View



66020405W3 C

1. Oil Cooler
2. Oil Passage Plug
3. Oil Pressure Warning Light Switch
4. Oil Filler Cap
5. Oil Level Gauge
6. Oil Pump
7. Oil Pressure Relief Valve
8. Engine Oil Drain Plug
9. Oil Filter

T1: 22 N·m (2.2 kgf·m, 16 ft·lb)

T2: 8.8 N·m (0.9 kgf·m, 78 in·lb)

T3: 5.9 N·m (0.6 kgf·m, 52 in·lb)

T4: 15 N·m (1.5 kgf·m, 11 ft·lb)

T5: 5.1 N·m (0.52 kgf·m, 45 in·lb)

T6: 1.5 N·m (0.15 kgf·m, 13 in·lb) (finger-tighten)

T7: 29 N·m (3.0 kgf·m, 22 ft·lb)

T8: 12 N·m (1.2 kgf·m, 104 in·lb)

T9: 20 N·m (2.0 kgf·m, 14 ft·lb)

C: After tightening, stake it with a punch.

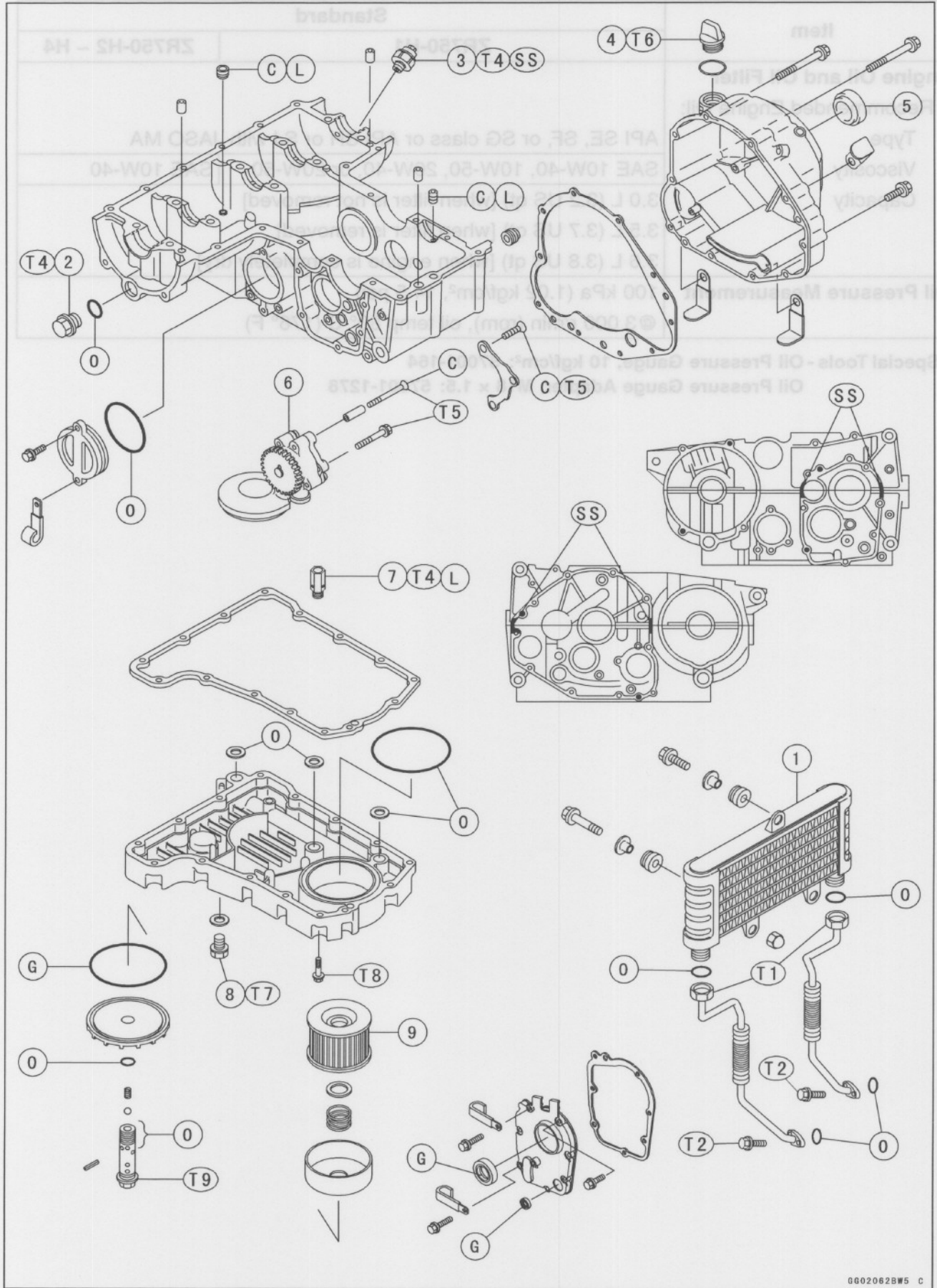
G: Apply high-temperature grease.

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

O: Apply engine oil.

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

Exploded View



## 5-4 ENGINE LUBRICATION SYSTEM

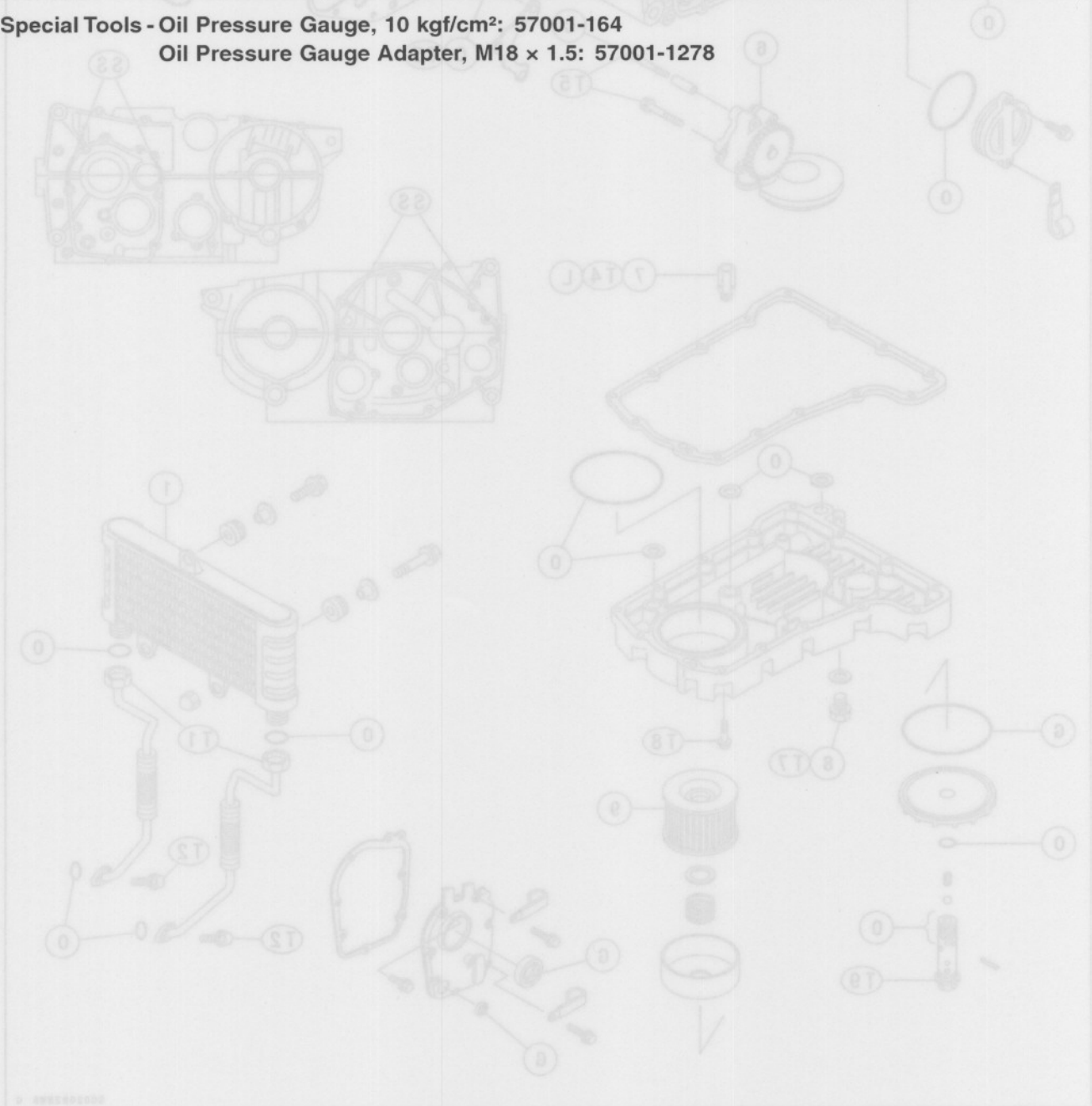
### Specifications

Exploded View

Item	Standard	
	ZR750-H1	ZR750-H2 ~ H4
<b>Engine Oil and Oil Filter</b>		
Recommended Engine Oil:		
Type	API SE, SF, or SG class or API SH or SJ with JASO MA	
Viscosity	SAE 10W-40, 10W-50, 20W-40, or 20W-50	SAE 10W-40
Capacity	3.0 L (3.2 US qt) [when filter is not removed] 3.5 L (3.7 US qt) [when filter is removed] 3.6 L (3.8 US qt) [when engine is completely dry]	
<b>Oil Pressure Measurement</b>	100 kPa (1.02 kgf/cm <sup>2</sup> , 14.5 psi) @3 000 r/min (rpm), oil temp 80° C (176° F)	

Special Tools - Oil Pressure Gauge, 10 kgf/cm<sup>2</sup>: 57001-164

Oil Pressure Gauge Adapter, M18 x 1.5: 57001-1278



## Engine Oil and Oil Filter

**⚠ WARNING**

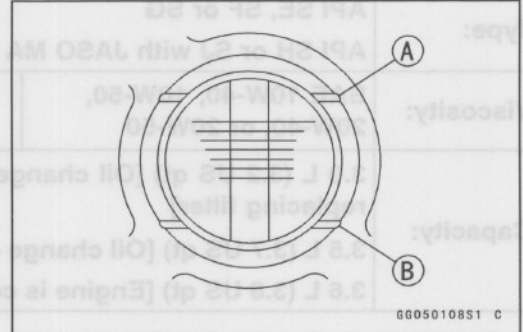
Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, accident, and injury.

*Engine Oil Level Inspection*

- Use the center stand to support the motorcycle upright.
- Check that the engine oil level is between the upper [A] and lower [B] levels on the gauge.

**NOTE**

- Situate the motorcycle so that it is perpendicular to the ground.
- If the motorcycle has just been used, wait several minutes to allow the oil level to stabilize.
- If 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**

Racing the engine before the oil reaches every part can cause engine seizure.

If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the oil pressure warning light will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

- ★ If the oil level is too high, drain the oil from the filler neck.
- ★ If the oil level is too low, fill to the upper level with the specified type of oil.

*Engine Oil Change***⚠ WARNING**

To avoid a serious burn, never touch the exhaust pipe during oil change.

- Set the motorcycle on its center stand and stop the engine after it has been warmed up thoroughly.
- Remove the oil filler cap.
- Place a drain pan under the engine, remove the drain plug [A] and drain the oil.
- The oil in the filter can be drained by removing the oil filter (see Oil Filter Change).
- Replace the drain plug gasket with new one if it is damaged.



## 5-6 ENGINE LUBRICATION SYSTEM

### Engine Oil and Oil Filter

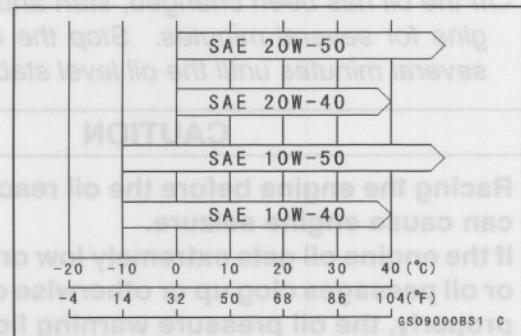
- After draining the oil, reinstall the drain plug.  
**Torque - Engine Oil Drain Plug: 29 N·m (3.0 kgf·m, 22 ft·lb)**
- Pour in the specified amount of engine oil.

#### Recommended Engine Oil

	ZR750-H1	ZR750-H2 ~ H4
Type:	API SE, SF or SG API SH or SJ with JASO MA	
Viscosity:	SAE 10W-40, 10W-50, 20W-40, or 20W-50	SAE 10W-40
Capacity:	3.0 L (3.2 US qt) [Oil change - without replacing filter] 3.5 L (3.7 US qt) [Oil change - replacing filter] 3.6 L (3.8 US qt) [Engine is completely dry]	

#### NOTE

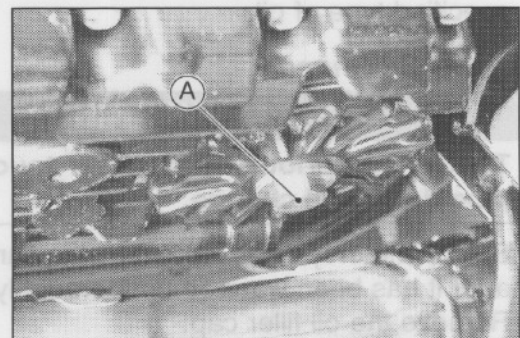
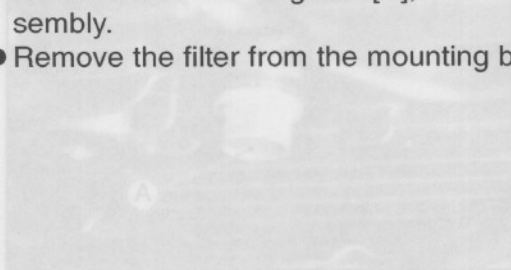
- Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.



- Install the oil filler cap.  
**Torque - Oil Filler Cap: 1.5 N·m (0.15 kgf·m, 13 in·lb) (Finger tighten)**
- Check the oil level.

#### Oil Filter Change

- Drain the engine oil (see Engine Oil Change).
- Remove the mounting bolt [A], and take out the filter assembly.
- Remove the filter from the mounting bolt.



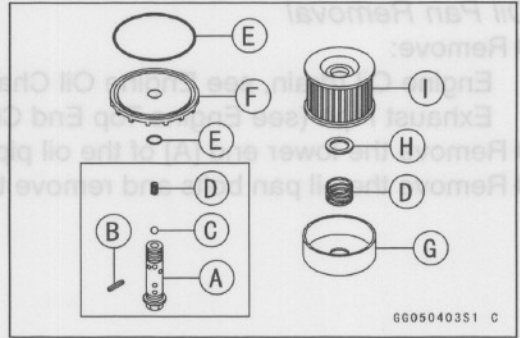
Engine Oil and Oil Filter

○ Install a new filter on the mounting bolt.

**NOTE**

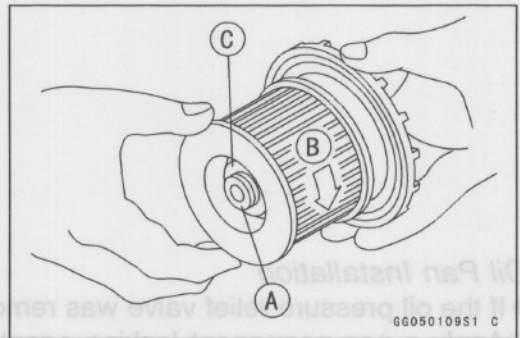
○ The oil filter bypass valve is assembled in the filter bolt.

- Filter Bolt [A]
- Spring Pin [B]
- Steel Ball [C]
- Spring [D]
- O-ring [E]
- Filter Cover [F]
- Oil Fence [G]
- Washer [H]
- Oil Filter [I]



**NOTE**

○ Apply engine oil to the threads of the mounting bolt [A] and the bypass shaft. Turn [B] the filter to install it, while making sure that the grommet [C] does not become detached.



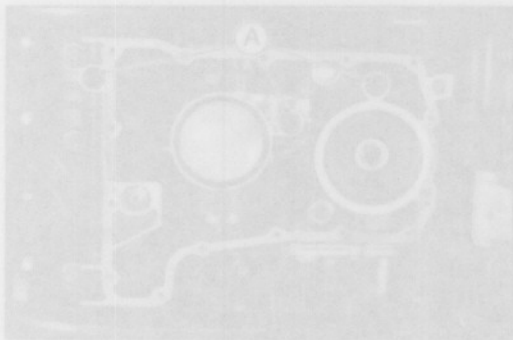
○ Install the filter assembly.

**Torque - Oil Filter Mounting Bolt: 20 N·m (2.0 kgf·m, 14 ft·lb)**

● Pour in the specified type and amount of oil (see Oil Filter Change).

**CAUTION**

Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.



**Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11.0 ft·lb)**

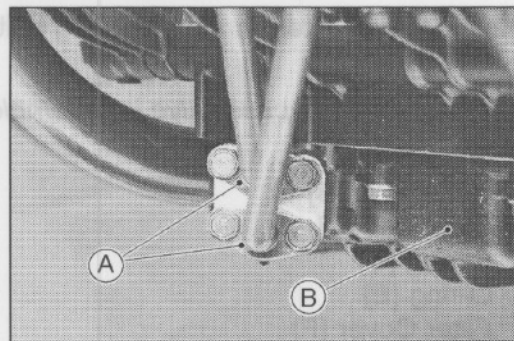
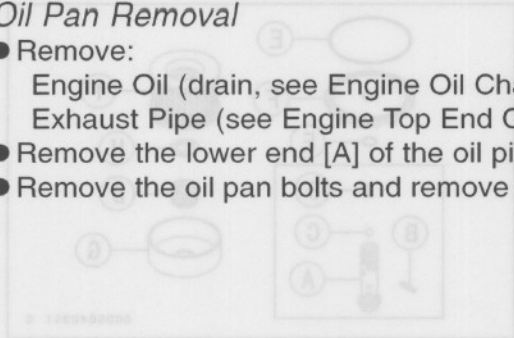
- Check the O-rings [A] for any damage.
- ★ Replace it if it is damaged.
- Apply engine oil to the O-ring
- Install the O-ring in the passage between the crankcase and the oil pan with the flat side of the O-ring facing the crankcase
- Replace the oil pan gasket with a new one.
- Install the oil pan.
- Torque - Oil Pan Bolts: 12 N·m (1.2 kgf·m, 10.4 in·lb)**
- Install the lower end [A] of the oil pipe.
- Torque - Oil Pipe Lower End Mounting Bolts [B]: 8.8 N·m (0.9 kgf·m, 7.8 in·lb)**

## 5-8 ENGINE LUBRICATION SYSTEM

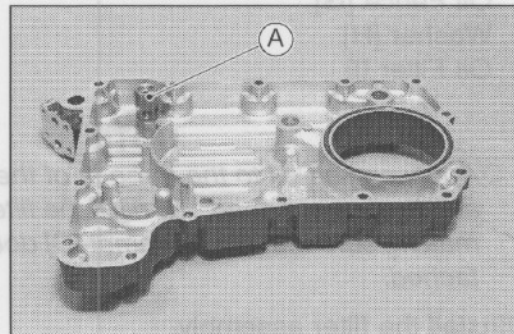
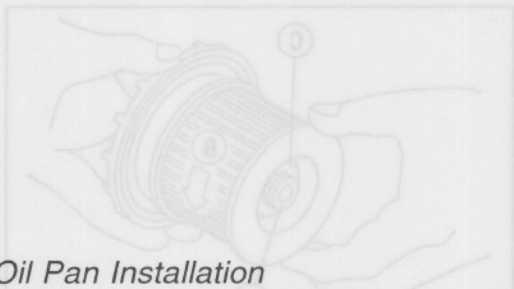
### Oil Pan

#### Oil Pan Removal

- Remove:
  - Engine Oil (drain, see Engine Oil Change)
  - Exhaust Pipe (see Engine Top End Chapter)
- Remove the lower end [A] of the oil pipes.
- Remove the oil pan bolts and remove the oil pan [B].



- Remove the relief valve [A] if necessary.



#### Oil Pan Installation

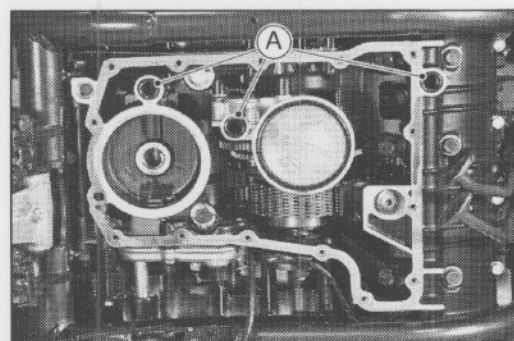
- If the oil pressure relief valve was removed, install it.
- Apply a non-permanent locking agent to the threads of the oil pressure relief valve, and tighten it.

#### CAUTION

Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

**Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11.0 ft·lb)**

- Check the O-rings [A] for any damage.
- ★ Replace it if it is damaged.
- Apply engine oil to the O-ring
- Install the O-ring in the passage between the crankcase and the oil pan with the flat side of the O-ring facing the crankcase

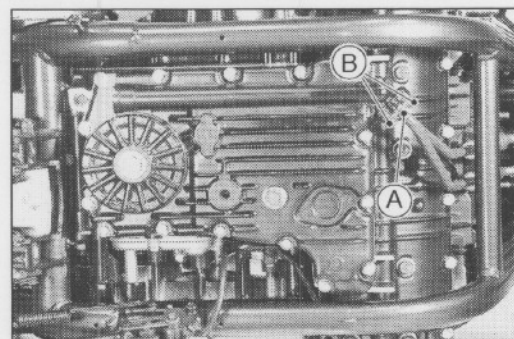


- Replace the oil pan gasket with a new one.
- Install the oil pan.

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

- Install the lower end [A] of the oil pipe.

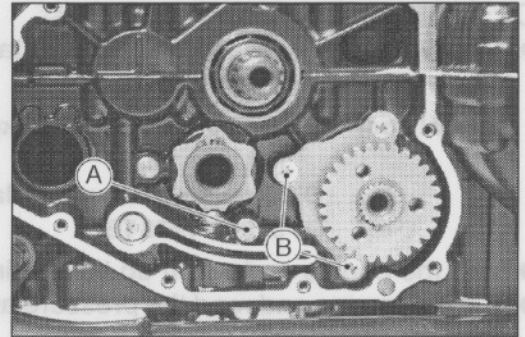
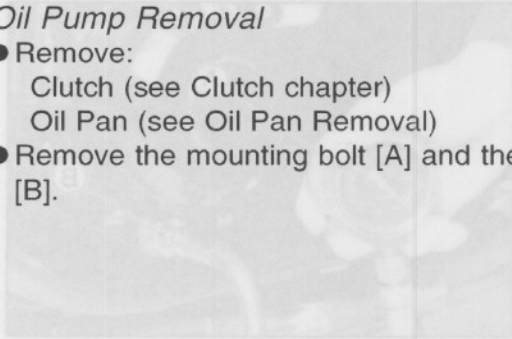
**Torque - Oil Pipe Lower End Mounting Bolts [B]: 8.8 N·m (0.9 kgf·m, 78 in·lb)**



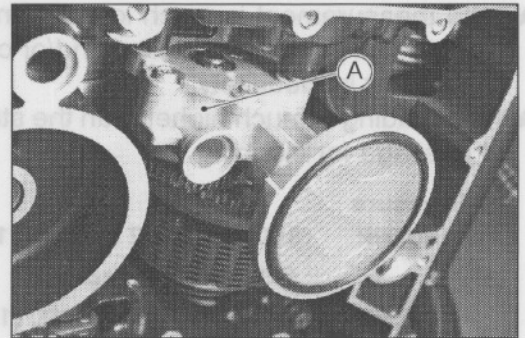
## Oil Pump

### Oil Pump Removal

- Remove:
  - Clutch (see Clutch chapter)
  - Oil Pan (see Oil Pan Removal)
- Remove the mounting bolt [A] and the mounting screws [B].

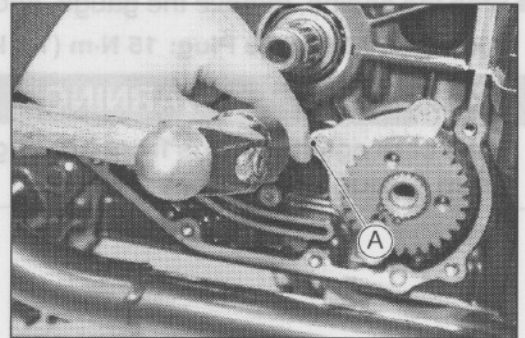


- Remove the oil pump [A].



### Oil Pump Installation

- Tighten the mounting screws and stake them [A].
- Torque - Oil Pump Mounting Screw: 5.1 N·m (0.52 kgf·m, 45 in·lb)  
Oil Pump Mounting Bolt: 5.1 N·m (0.52 kgf·m, 45 in·lb)



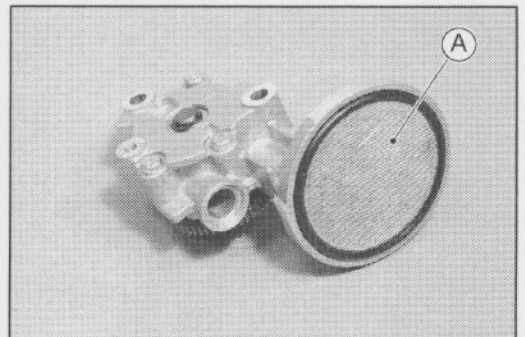
### Oil Screen Cleaning

- Clean the oil screen [A] with high-flash point solvent and remove any particles stuck to it.

#### **⚠ WARNING**

Clean the screen in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvents.

- Check the screen carefully for any damage: holes and broken wires.
- ★ If the screen is damaged, replace it.



## 5-10 ENGINE LUBRICATION SYSTEM

### Oil Pressure Measurement

#### Oil Pressure Measurement

- Remove the oil passage plug and install the oil pressure gauge [A] and adapter [B].

**Special Tool - Oil Pressure Gauge, 10 kgf/cm<sup>2</sup>: 57001-164 [A]**

**Oil Pressure Gauge Adapter, M18 × 1.5: 57001-1278 [B]**

- Start the engine and warm up the engine.
- Run the engine and read the pressure at an engine speed of 3,000 r/min (rpm).
- ★ If the measurement is much lower than the standard, inspect the oil pump, relief valve and/or crankshaft bearing insert wear immediately.
- ★ If the reading is much higher than the standard, check the oil passage for clogging.

#### Oil Pressure

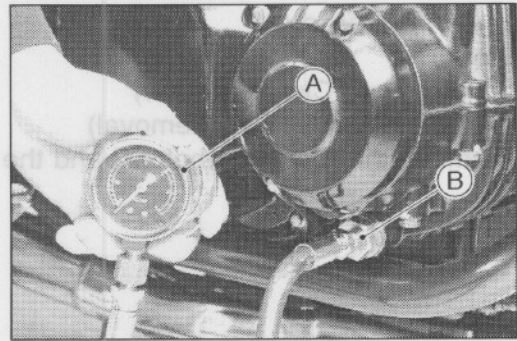
**Standard: 100 kPa (1.02 kgf/cm<sup>2</sup>, 14.5 psi)**

**@3 000 r/min (rpm),**

**Oil temperature 80°C (176°F)**

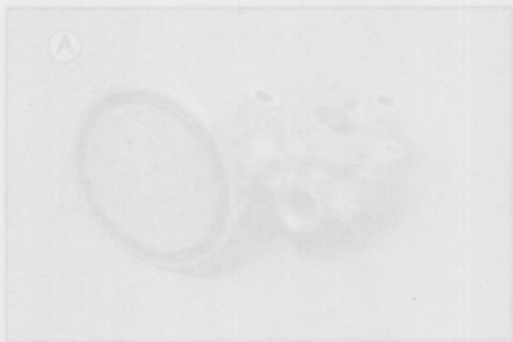
- Stop the engine, remove the gauge, and reinstall the plug.

**Torque - Oil Passage Plug: 15 N·m (1.5 kgf·m, 11 ft·lb)**



#### **⚠ WARNING**

**Take care against burns from hot engine oil that will drain through the oil passage.**



#### **⚠ WARNING**

Clean the screen in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvents.

- Check the screen carefully for any damage: holes and broken wires.
- ★ If the screen is damaged, replace it.

## Oil Pressure Relief Valve

### Relief Valve Inspection

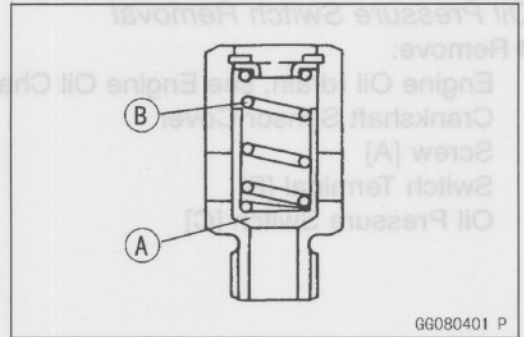
- Remove:
  - Oil Pan (see Oil Pan Removal)
  - Relief Valve [A]
- Using a wooden stick, push the inner valve to make sure that the valve [A] moves smoothly and that it returns to its original position by the force of the spring [B].

### 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 flash-point 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. The oil pressure relief valve is position made with no allowance for replacement of individual parts.

**Torque - Oil Pressure Relief Valve: 1.5 N·m (1.5 kgf·m, 11 ft·lb)**



### **⚠ WARNING**

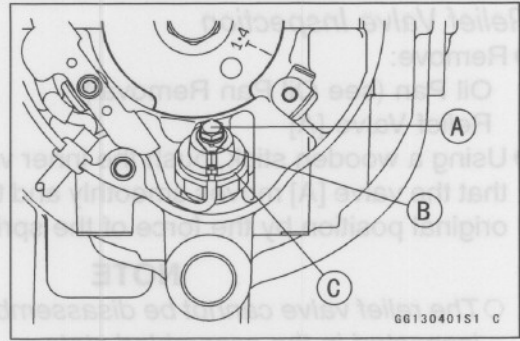
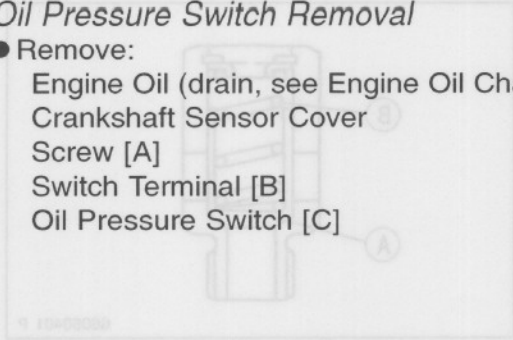
Clean the oil pressure relief valve in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvent.

## 5-12 ENGINE LUBRICATION SYSTEM

### Oil Pressure Switch

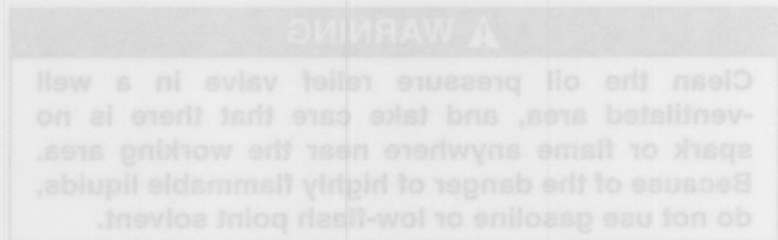
#### Oil Pressure Switch Removal

- Remove:
  - Engine Oil (drain, see Engine Oil Change)
  - Crankshaft Sensor Cover
  - Screw [A]
  - Switch Terminal [B]
  - Oil Pressure Switch [C]



#### Oil Pressure Switch Installation

- Apply silicone sealant to the threads of the oil pressure switch and tighten it.
  - Sealant - Kawasaki Bond (Silicone Sealant): 56019-120**
  - Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11.0 ft·lb)**
- Tighten the terminal bolt.
  - Torque - Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)**
- Apply grease to the terminal.

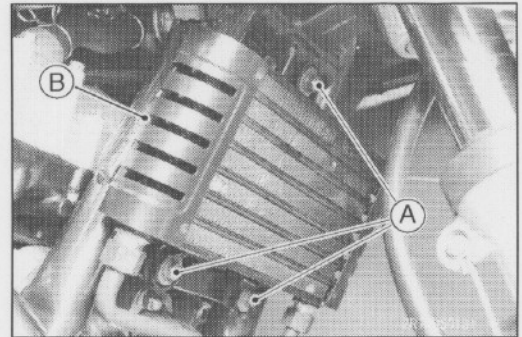
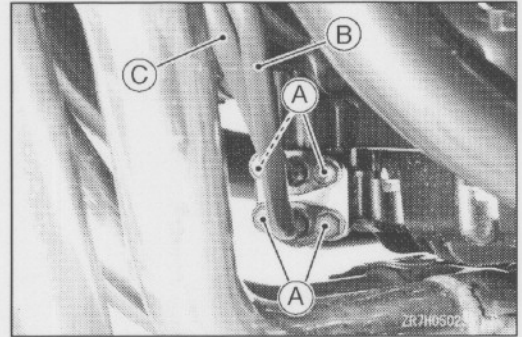


**Oil Cooler**

*Oil Cooler Removal*

- Remove:
  - Bolts [A]
  - Supply Side Hose [B]
  - Return Side Hose [C]

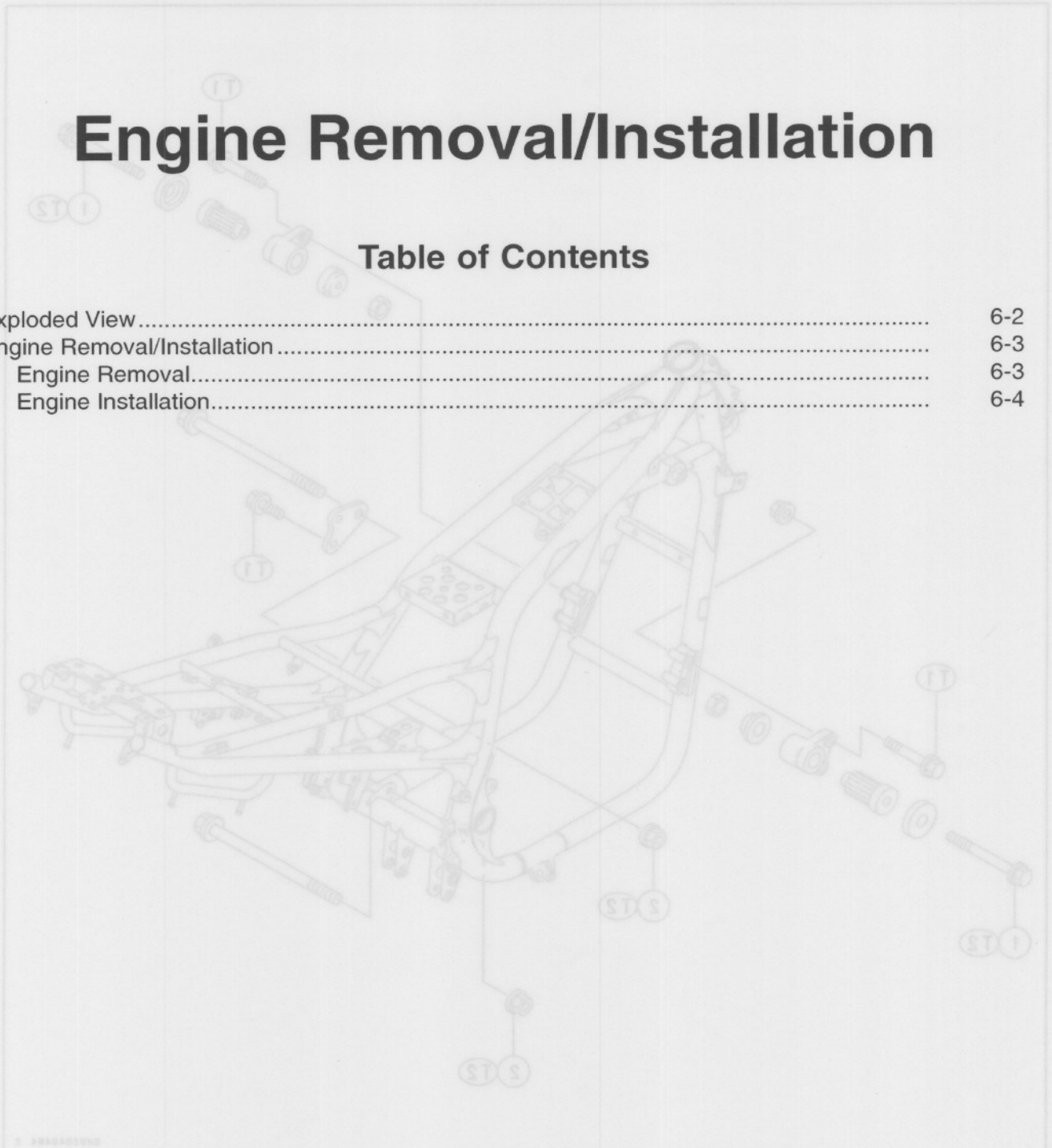
- Remove:
  - Bolts [A]
  - Oil Cooler [B]



# Engine Removal/Installation

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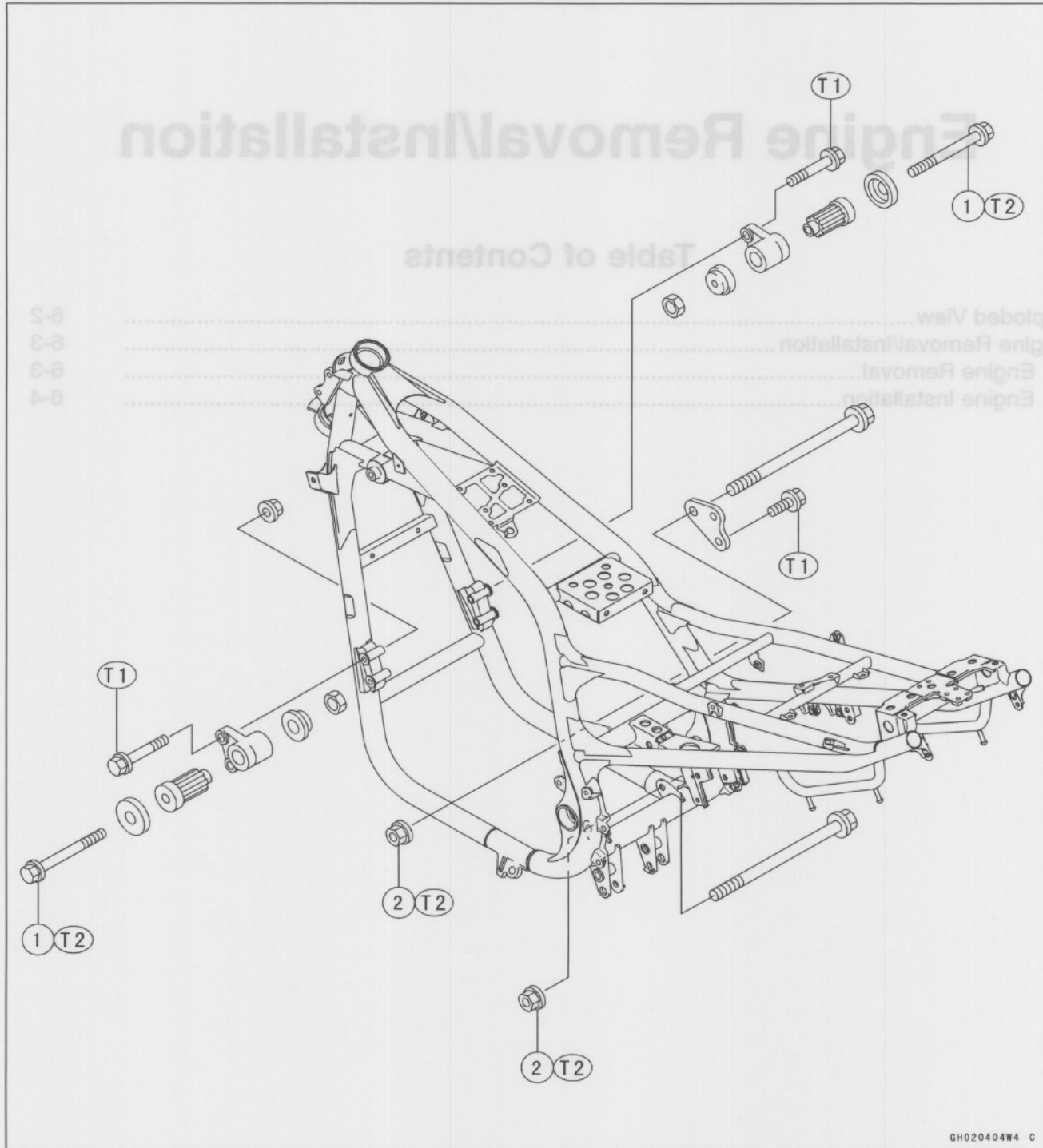
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1. Engine Mounting Bolts  
 2. Engine Mounting Nuts  
 IT: 25 N·m (2.5 kgf·m, 18 ft·lb)  
 TS: 44 N·m (4.5 kgf·m, 33 ft·lb)

## 6-2 ENGINE REMOVAL/INSTALLATION

### Exploded View



1. Engine Mounting Bolts
  2. Engine Mounting Nuts
- T1: 25 N·m (2.5 kgf·m, 18 ft·lb)  
T2: 44 N·m (4.5 kgf·m, 33 ft·lb)

## 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.

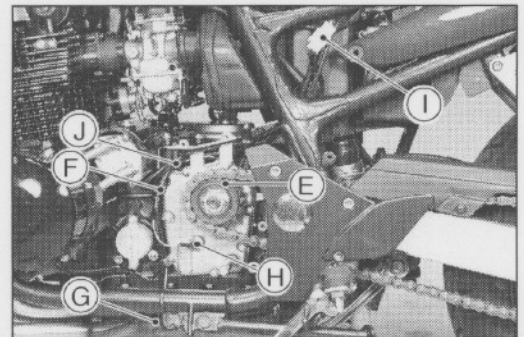
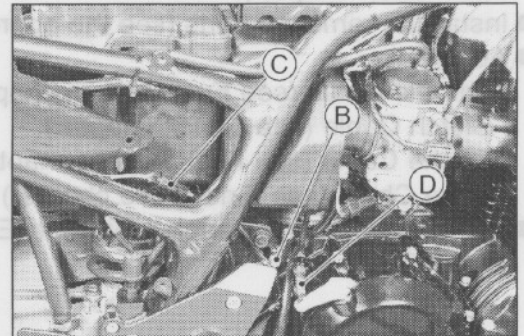
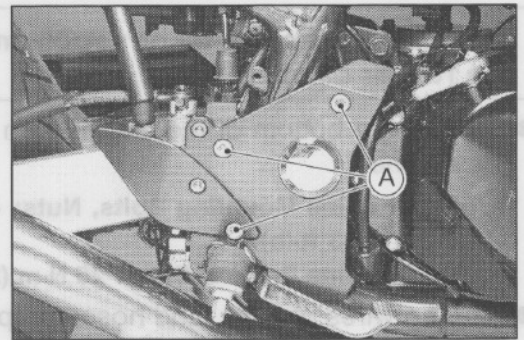
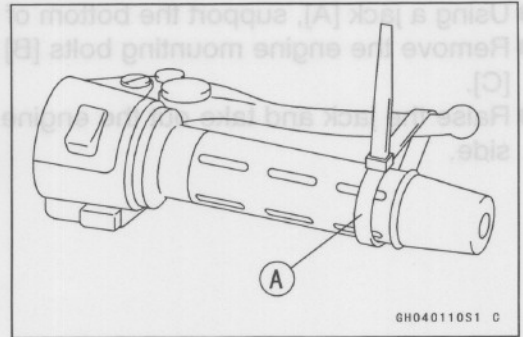
#### **⚠ WARNING**

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.

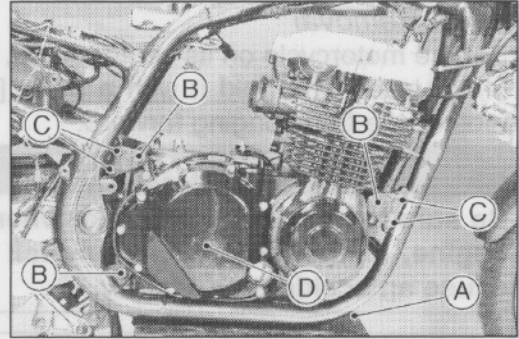
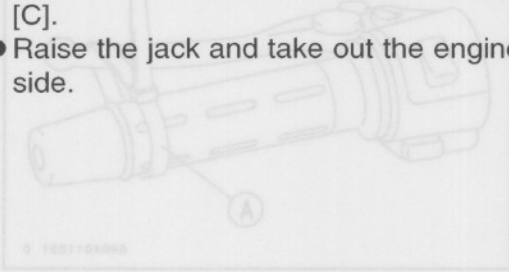
- Remove (see the respective chapters):
  - Engine Oil (drain)
  - Fairing (see Frame chapter)
  - Seat (see Frame chapter)
  - Side Cover (see Frame chapter)
  - Fuel Tank (see Fuel System chapter)
  - Right Side Step Bracket Bolts [A]
  - Frame Ground Terminal [B]
  - Crankshaft Sensor, Oil Pressure Switch Wire Connector [C]
  - Clutch Cable Lower End [D]
  - Shift Lever (see Crankshaft/Transmission chapter)
  - Engine Sprocket Cover (see Final Drive chapter)
  - Engine Sprocket [E]
  - Side Stand Switch Lead Connector [F]
  - Side Stand Switch [G]
  - Neutral Switch Lead Connector [H]
  - Alternator Lead Connector [I]
  - Starter Motor Lead Terminal [J]
  - Air Cleaner Housing, Rear (see Fuel System chapter)
  - Carburetor (see Fuel System chapter)
  - Air Cleaner Housing, Front (see Fuel System chapter)
  - Horn
  - Ignition Coil (see Electrical System chapter)
  - Vacuum Switch Valve and Hoses (see Fuel System chapter)
  - Exhaust Pipe and Muffler (see Engine Top End chapter)
  - Oil Cooler and Oil Pipe (see Engine Lubrication System chapter)



## 6-4 ENGINE REMOVAL/INSTALLATION

### Engine Removal/Installation

- Using a jack [A], support the bottom of the engine.
- Remove the engine mounting bolts [B] and bracket bolts [C].
- Raise the jack and take out the engine [D] from the right side.



#### Engine Installation

- Apply soap and water solution around the rubber damper and install it in the bracket.

#### CAUTION

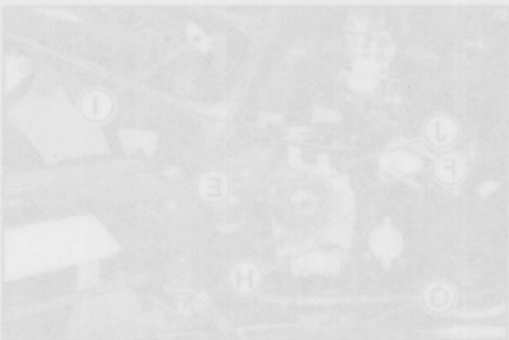
**Do not apply engine oil or petroleum distillates on the rubber damper.**

- Support the bottom of the engine with a jack and install the engine.

**Torque - Engine Mounting Bolts, Nuts: 44 N·m (4.5 kgf·m, 33 ft·lb)**

**Engine Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Run the wires, cables, and hoses properly (see General Information chapter).
- Install the removed parts (see the appropriate chapters).
- Adjust:
  - Throttle Cable (see Fuel System chapter)
  - Clutch Cable (see Clutch chapter)
  - Choke Cable (see Fuel System chapter)
  - Drive Chain (see Final Drive chapter)
- Fill the engine with engine oil (see Engine Lubrication chapter)



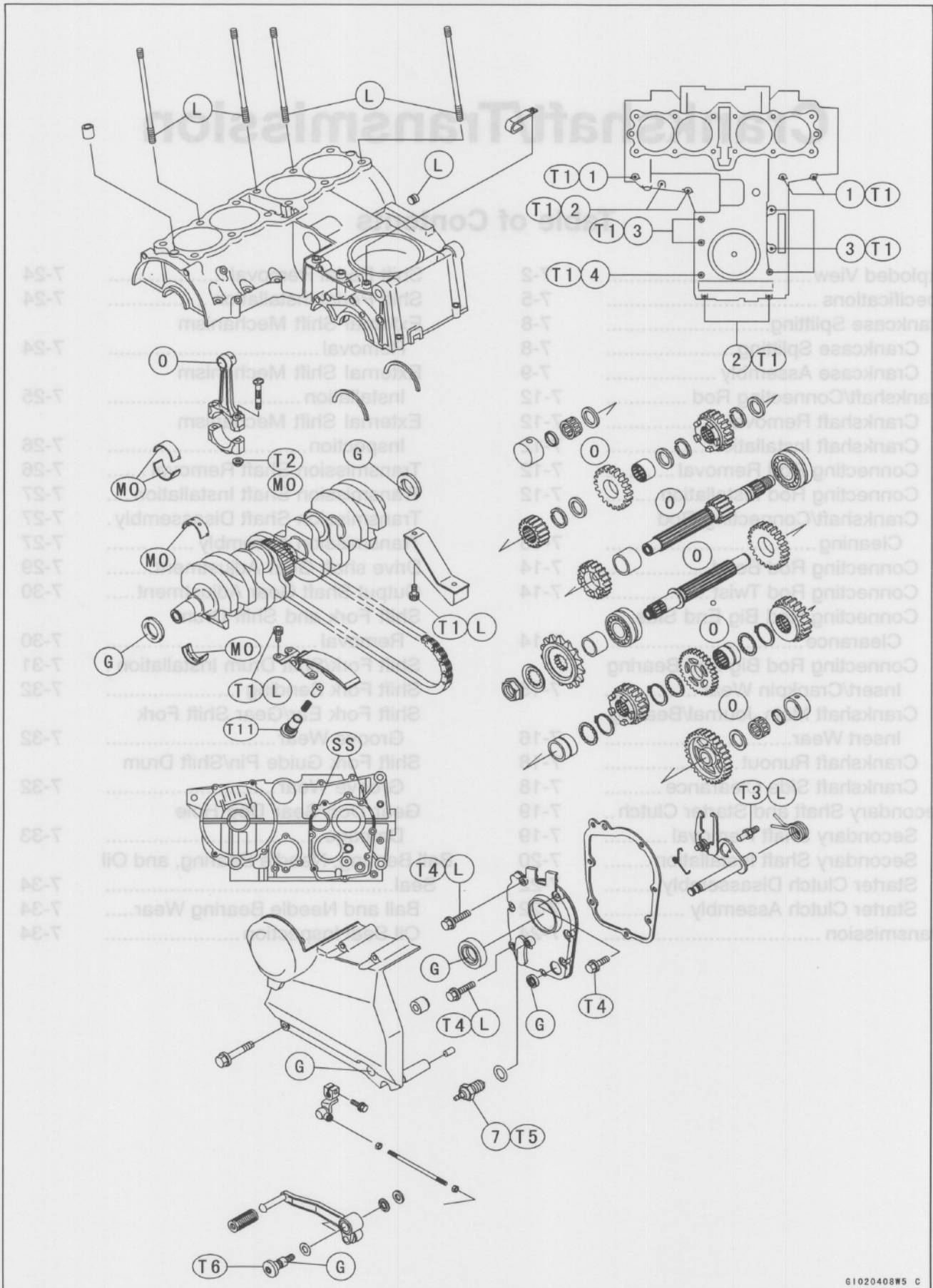
# Crankshaft/Transmission

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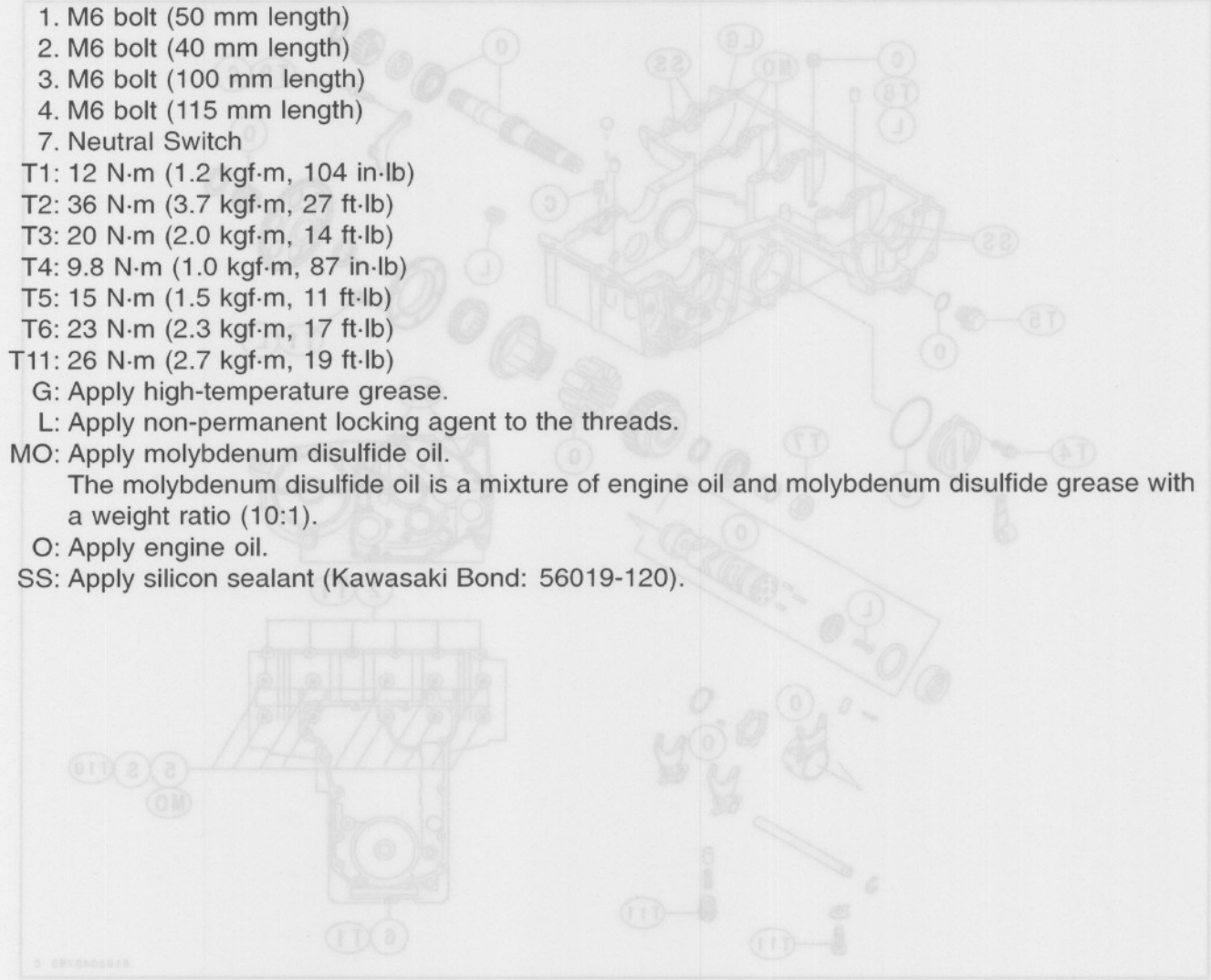
# 7-2 CRANKSHAFT/TRANSMISSION

## Exploded View



Exploded View

Exploded View



- 1. M6 bolt (50 mm length)
- 2. M6 bolt (40 mm length)
- 3. M6 bolt (100 mm length)
- 4. M6 bolt (115 mm length)
- 7. Neutral Switch
- T1: 12 N·m (1.2 kgf·m, 104 in·lb)
- T2: 36 N·m (3.7 kgf·m, 27 ft·lb)
- T3: 20 N·m (2.0 kgf·m, 14 ft·lb)
- T4: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- T5: 15 N·m (1.5 kgf·m, 11 ft·lb)
- T6: 23 N·m (2.3 kgf·m, 17 ft·lb)
- T11: 26 N·m (2.7 kgf·m, 19 ft·lb)
- G: Apply high-temperature grease.
- L: Apply non-permanent locking agent to the threads.
- MO: Apply molybdenum disulfide oil.  
The molybdenum disulfide oil is a mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).
- O: Apply engine oil.
- SS: Apply silicon sealant (Kawasaki Bond: 56019-120).

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

2: Follow the specific tightening sequence.

O: Apply engine oil.

The molybdenum disulfide oil is a mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).

MO: Apply molybdenum disulfide oil.

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

G: After tightening, stake it with a punch.

T11: 26 N·m (2.7 kgf·m, 19 ft·lb)

T10: 25 N·m (2.5 kgf·m, 18 ft·lb)

T9: 21 N·m (2.1 kgf·m, 15 ft·lb)

T8: 8.9 N·m (0.9 kgf·m, 8 in·lb)

T7: 29 N·m (3.0 kgf·m, 21 ft·lb)

T5: 15 N·m (1.5 kgf·m, 11 ft·lb)

T4: 9.8 N·m (1.0 kgf·m, 87 in·lb)

T1: 12 N·m (1.2 kgf·m, 104 in·lb)

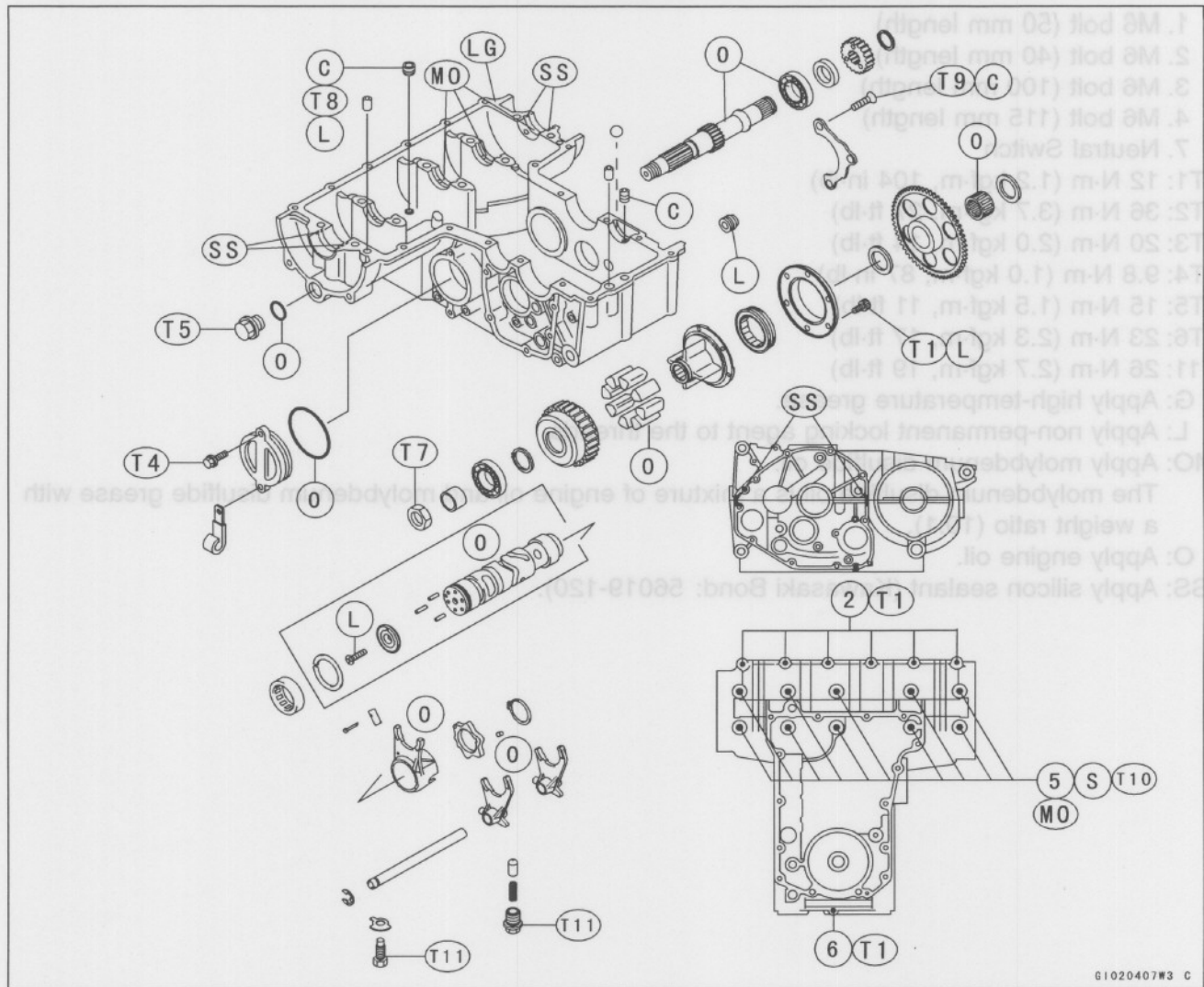
6: M6 bolt (105 mm length)

5: M6 bolt (95 mm length)

2: M6 bolt (40 mm length)

## 7-4 CRANKSHAFT/TRANSMISSION

### Exploded View



G1020407W3 C

- 2. M6 bolt (40 mm length)
- 5. M8 bolt (95 mm length)
- 6. M6 bolt (105 mm length)
- T1: 12 N·m (1.2 kgf·m, 104 in·lb)
- T4: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- T5: 15 N·m (1.5 kgf·m, 11 ft·lb)
- T7: 59 N·m (6.0 kgf·m, 43 ft·lb)
- T8: 6.9 N·m (0.7 kgf·m, 61 in·lb)
- T9: 5.1 N·m (0.52 kgf·m, 45 in·lb)
- T10: 25 N·m (2.5 kgf·m, 18 ft·lb)
- T11: 26 N·m (2.7 kgf·m, 19 ft·lb)

C: After tightening, stake it with a punch.

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

LG: Apply silver liquid gasket (Kawasaki Bond: 92104-002).

MO: Apply molybdenum disulfide oil.

The molybdenum disulfide oil is a mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).

O: Apply engine oil.

S: Follow the specific tightening sequence.

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

# CRANKSHAFT/TRANSMISSION 7-5

## Specifications

Item	Standard	Service Limit
<b>Crankshaft, Connecting Rods</b>		
Connecting Rod Bend	—	0.2/100 mm (0.0079/4 in.)
Connecting Rod Twist	—	0.2/100 mm (0.0079/4 in.)
Connecting Rod Big End Side Clearance	0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.)	0.48 mm (0.0157 in.)
Connecting Rod Big End Bearing, Insert/Crankpin Clearance	0.036 ~ 0.066 mm (0.0014 ~ 0.0026 in.)	0.10 mm (0.0039 in.)
Crankpin Diameter:	34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)	34.97 mm (1.3768 in.)
Marking	None	— — —
	○	— — —
Connecting Rod Big End Bore Diameter:	38.000 ~ 38.016 mm (1.3778 ~ 1.3780 in.)	— — —
Marking	None	— — —
	○	— — —
	(1.4964 ~ 1.4967 in.)	
Connecting Rod Big End Bearing Insert Thickness:		
Brown	1.475 ~ 1.480 mm (0.0581 ~ 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:

Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	None	Blue	92028-1920
○	○	Black	92028-1921
None	None		
None	○	Brown	92028-1922

## 7-6 CRANKSHAFT/TRANSMISSION

### Specifications

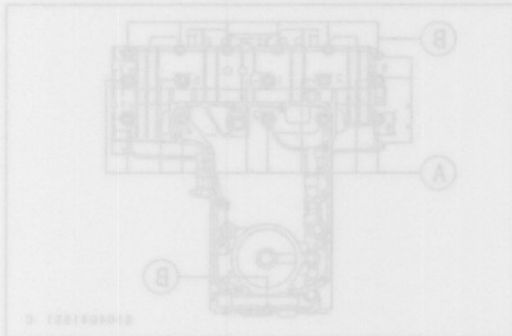
Item	Standard	Service Limit	
Crankshaft Main Bearing Insert/ Journal Clearance	0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in.)	0.08 mm (0.0032 in.)	
Crankshaft Main Journal Diameter:	35.984 ~ 36.000 mm (1.4167 ~ 1.4173 in.)	35.96 mm (1.4157 in.)	
Marking	None	---	
	1	---	
Crankcase Main Bearing Inside Diameter:	39.000 ~ 39.016 mm (1.5354 ~ 1.5361 in.)	---	
Marking	○	---	
	None	---	
	None	---	
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:			
		Bearing Insert	
Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Size Color	Part Number
○	1	Brown	92028-1919
None	None	Blue	92028-1917
○	None	Black	92028-1918
None	○		
Crankshaft Side Clearance	0.05 ~ 0.15 mm (0.0020 ~ 0.0059 in.)	0.35 mm (0.0138 in.)	
Crankshaft Runout	Less than 0.02 (0.0008 in.) mm TIR	0.05 mm (0.0020 in.) TIR	

Specifications

Item	Standard	Service Limit
<b>Transmission</b>		
Shift Fork Ear Thickness	4.9 ~ 5.0 mm (0.193 ~ 0.197 in.)	4.8 mm (0.189 in.)
Gear Shift Fork Groove Width	5.05 ~ 5.15 mm (0.1988 ~ 0.2028 in.)	5.25 mm (0.2067 in.)
Shift Fork Guide Pin Diameter:		
Drive Shaft	7.985 ~ 8.000 mm (0.3144 ~ 0.3150 in.)	7.9 mm (0.311 in.)
Output Shaft	7.900 ~ 8.000 mm (0.3110 ~ 0.3150 in.)	7.8 mm (0.307 in.)
Shift Drum Groove Width	8.05 ~ 8.20 mm (0.3169 ~ 0.3228 in.)	8.3 mm (0.327 in.)

- Special Tools - Bearing Puller: 57001-135**  
**Outside Circlip Pliers: 57001-144**  
**Bearing Puller Adapter: 57001-317**  
**Gear Pusher & Puller: 57001-319**  
**Bearing Driver,  $\phi 32$ : 57001-382**  
**Bearing Driver Set: 57001-1129**  
**Flywheel Holder: 57001-1313**

- Sealant - Kawasaki Bond (Silicone Sealant): 56019-120**  
**Kawasaki Bond (Liquid Gasket - Silver): 92104-002**



NOTE

- Remove the upper crankcase bolts [A].
- Turn the engine upside down to remove the following:  
 Oil Filter (see Engine Lubrication System chapter)  
 Oil Pan (see Engine Lubrication System chapter)  
 Oil Pump (see Engine Lubrication System chapter)  
 Starter Clutch Assembly (see Secondary Shaft and Starter Clutch Removal)
- Remove the 6 mm bolts [A] and 8 mm bolts (10 -- 1) [B] from the lower crankcase half.
- Pry the points [A] to separate the mating surfaces and remove the lower crankcase half.

## 7-8 CRANKSHAFT/TRANSMISSION

### Crankcase Splitting

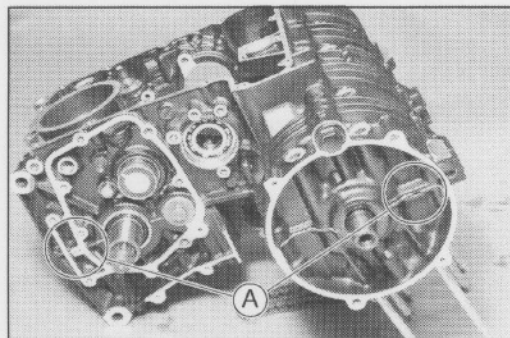
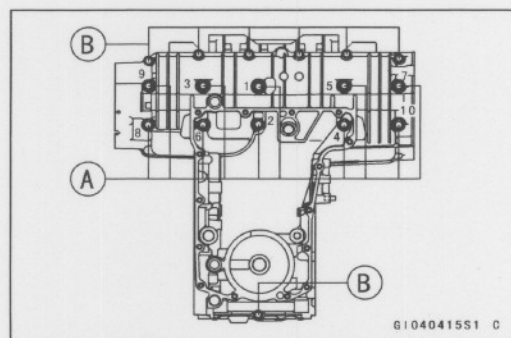
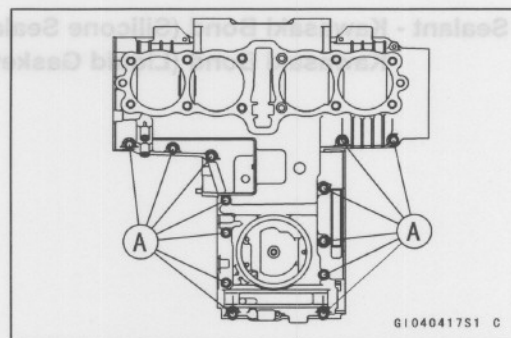
#### Crankcase Splitting

- Remove:
  - Engine Oil (drain, see Engine Lubrication System chapter)
  - Clutch (see Clutch chapter)
  - Engine Sprocket Cover (see Final Drive chapter)
  - Alternator Cover (see Electrical System chapter)
  - Secondary Shaft Nut (see Secondary Shaft and Starter Clutch chapter)
  - Alternator Rotor (see Electrical System chapter)
  - Starter Motor (see Electrical System chapter)
  - External Shift Mechanism (see External Shift Mechanism Removal)
  - Crankshaft Sensor, Oil Pressure Switch Wire (see Electrical System chapter)
  - Timing Rotor (see Electrical System chapter)
  - Engine (see Engine Removal/Installation chapter)

#### NOTE

○ If the purpose of disassembling the crankcase is to remove the crankshaft, all the parts down to the pistons must be removed before removing the engine (see Engine Top End chapter).

- Remove the upper crankcase bolts [A].
- Turn the engine upside down to remove the following:
  - Oil Filter (see Engine Lubrication System chapter)
  - Oil Pan (see Engine Lubrication System chapter)
  - Oil Pump (see Engine Lubrication System chapter)
  - Starter Clutch Assembly (See Secondary Shaft and Starter Clutch Removal)
- Remove the 6 mm bolts [A] and 8 mm bolts (10 → 1) [B] from the lower crankcase half.
- Pry the points [A] to separate the mating surfaces and remove the lower crankcase half.



**Crankcase Splitting**

*Crankcase Assembly*

**CAUTION**

The upper and lower crankcase halves are machined at the factory in the assembled state, so they must be replaced as a set. If the crankcase halves are replaced with a new one, measure the diameter of the crankshaft main journal, and install the proper bearing inserts in accordance with the combination of the new crankcase and the crankshaft marks. Replace the lower crankcase 8 mm bolts with new ones if they have already been removed 5 times.

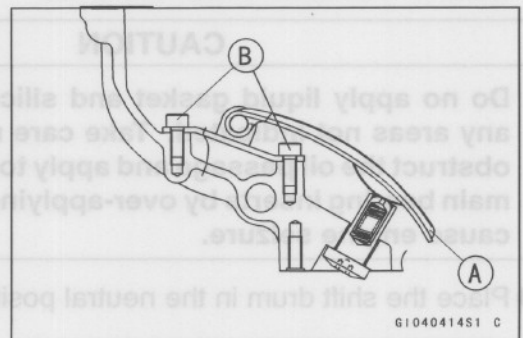
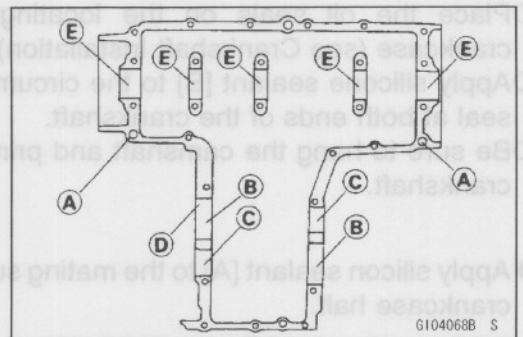
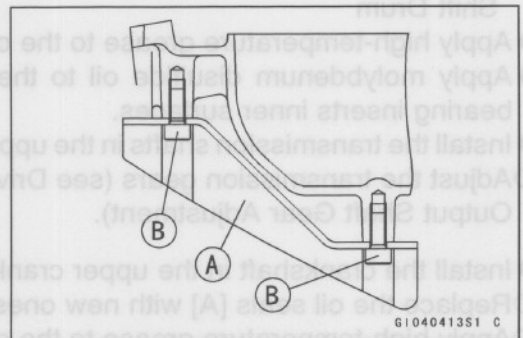
- Clean the crankcase mating surfaces with cleaning solvent and wipe them dry.
- Using Compressed air, blow out the oil passages in the crankcase halves.
- If the upper primary chain guide [A] is removed, install it.
- Apply a non-permanent locking agent to the threads of the chain guide bolts [B] and tighten them.

**Torque - Primary Chain Guide Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**

- Check to make sure that the following parts are in their correct positions:
- Upper Crankcase Half:
  - Knock Pins [A]
  - Set Rings [B]
  - Set Pins [C]
  - Rubber Plug [D] (into the Oil hole of the drive shaft bearing)
  - Bearing Inserts [E]

- If the lower primary chain guide [A] is removed, install it.
- Apply a non-permanent locking agent to the threads of the chain guide bolts [B] and tighten them.

**Torque - Lower Primary Chain Guide Bolts: 12 N·m (1.2 kgf·m, in·lb)**



## 7-10 CRANKSHAFT/TRANSMISSION

### Crankcase Splitting

Lower Crankcase Half:  
Bearing Inserts [A]  
Shift Mechanism [B]

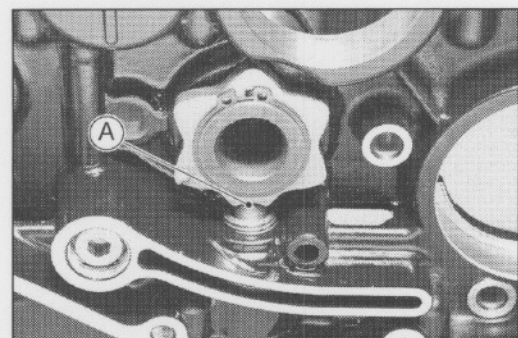
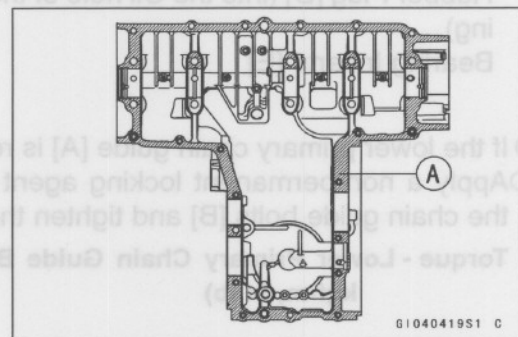
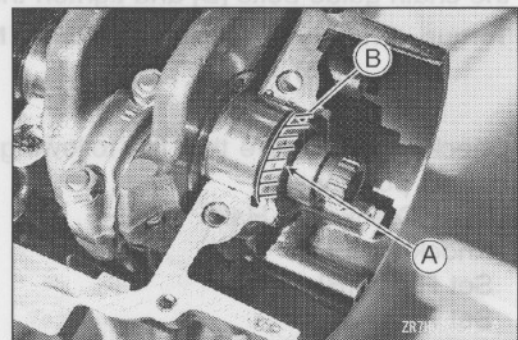
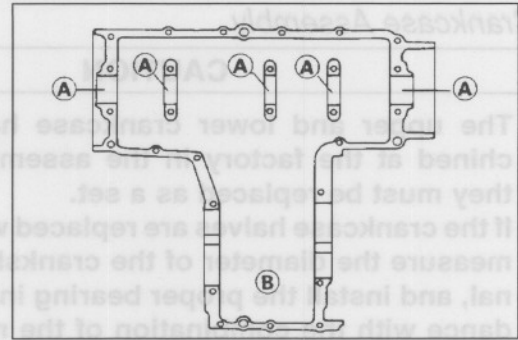
- Apply engine oil:
  - Transmission Gears
  - Ball Bearings
  - Shift Drum
- Apply high-temperature grease to the oil seal lip.
- Apply molybdenum disulfide oil to the crankshaft main bearing inserts inner surfaces.
- Install the transmission shafts in the upper crankcase half.
- Adjust the transmission gears (see Drive Shaft Gear and Output Shaft Gear Adjustment).
- Install the crankshaft in the upper crankcase half.
- Replace the oil seals [A] with new ones.
- Apply high-temperature grease to the oil seal lip.
- Place the oil seals on the locating portions of the crankcase (see Crankshaft Installation).
- Apply silicone sealant [B] to the circumference of the oil seal at both ends of the crankshaft.
- Be sure to hang the camshaft and primary chain on the crankshaft.
- Apply silicon sealant [A] to the mating surface of the lower crankcase half.

Sealant - Kawasaki Bond: 56019-120

#### CAUTION

Do not apply liquid gasket and silicone sealant to any areas not indicated. Take care not to block or obstruct the oil passage and apply to the crankshaft main bearing inserts by over-applying. These could cause engine seizure.

- Place the shift drum in the neutral position [A].



### Crankcase Splitting

- Fit the shift fork ears into the grooves of the respective gears, and install the lower crankcase half on the upper crankcase half.
- Apply molybdenum disulfide oil to the threads and seating surface of the lower Crankcase 8 mm bolts.
- Tighten the lower crankcase bolts using the following steps:
  - Temporarily tighten all bolts.
  - Tighten the 8 mm bolts [A] in the sequence (1~10) shown on the crankcase, in two separate passes. Tighten them to one-half the specified torque in the first pass, and to the specified torque in the second pass.
  - Tighten the 6 mm [B] bolts.

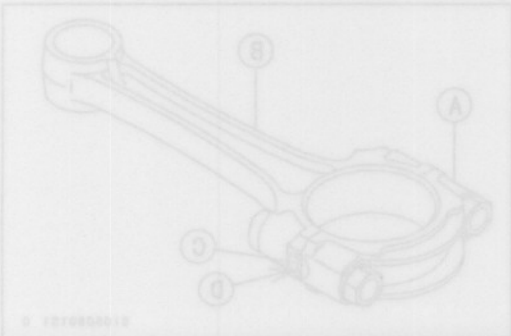
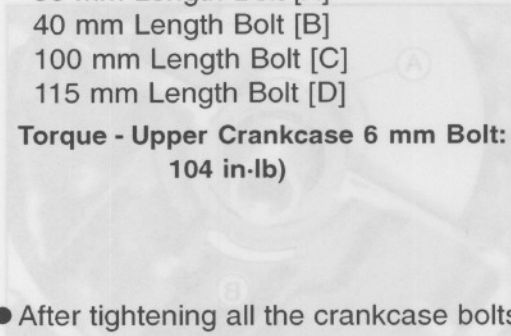
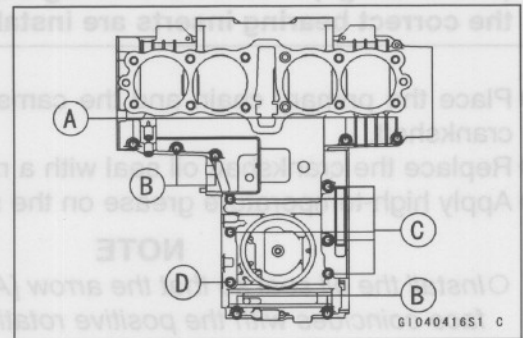
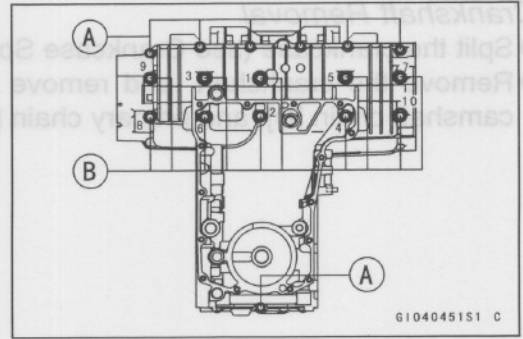
**Torque - Lower Crankcase 8 mm Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

**Lower Crankcase 6 mm Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**

- Tighten the upper crankcase bolts.
  - 50 mm Length Bolt [A]
  - 40 mm Length Bolt [B]
  - 100 mm Length Bolt [C]
  - 115 mm Length Bolt [D]

**Torque - Upper Crankcase 6 mm Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)**

- After tightening all the crankcase bolts, check the following:
  - 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.



**CAUTION**

If the crankshaft bearing inserts, bearing inserts, or the crankshaft main journal bearing inserts are replaced with new ones, select the bearing inserts and check clearance with a bearing gauge (Press Gauge) before assembling engine to be sure the correct clearance is installed.

**NOTE**

Apply high torque on the arrow [A] of the outer surface of the crankcase Splitting direction [B] of the crankshaft.

**NOTE**

Mark and record the locations of the connecting rods and their caps so that they can be reassembled in their original positions.

**CAUTION**

To minimize vibration, a pair of connecting rods (left two rods or right two) should have the same weight mark (a capital letter of the alphabet).

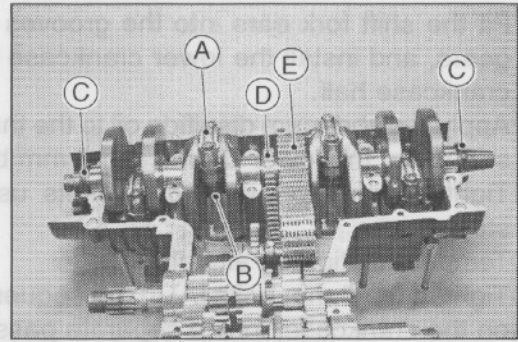
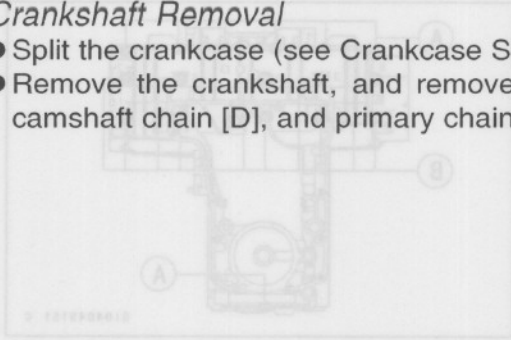
Big End Cap [A]  
 Connecting Rod [B]  
 Weight Mark, Alphabet [C]  
 Diameter Mark (Around Weight Mark) [D] "O" or no mark

## 7-12 CRANKSHAFT/TRANSMISSION

### Crankshaft/Connecting Rod

#### Crankshaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the crankshaft, and remove the oil seals [C], camshaft chain [D], and primary chain [E].



#### Crankshaft Installation

##### CAUTION

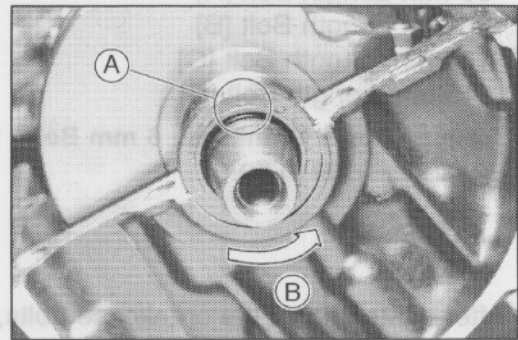
If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (Press Gauge) before assembling engine to be sure the correct bearing inserts are installed.

- Place the primary chain and the camshaft chain on the crankshaft.
- Replace the crankshaft oil seal with a new one.
- Apply high-temperature grease on the seal lip.

##### NOTE

○ Install the oil seal so that the arrow [A] of the outer surface coincides with the positive rotation direction [B] of the crankshaft.

- Apply silicon sealant to the left and right sides.
- Apply a molybdenum disulfide oil to the crankcase main bearing inserts and crankshaft main journals.
- Assemble the crankcase (see Crankcase Assembly).

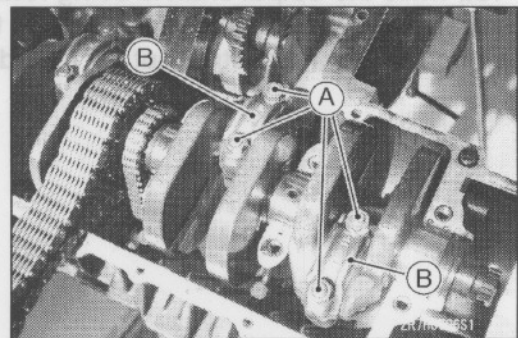


#### Connecting Rod Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the connecting rod nuts [A].
- Remove the big end cap [B], and remove the connecting rod.

##### NOTE

○ Mark and record the locations of the connecting rods and their caps so that they can be reassembled in their original positions.

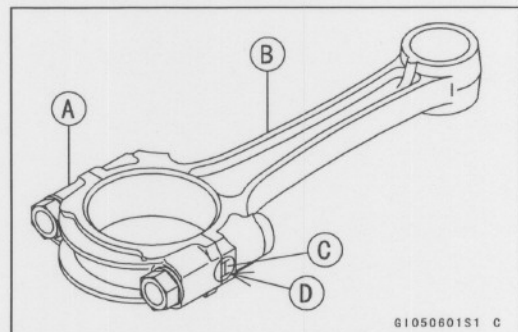


#### Connecting Rod Installation

##### CAUTION

To minimize vibration, a pair of connecting rods (left two rods or right two) should have the same weight mark (a capital letter of the alphabet).

- Big End Cap [A]
- Connecting Rod [B]
- Weight Mark, Alphabet [C]
- Diameter Mark (Around Weight Mark) [D] "O" or no mark



61050601S1 C

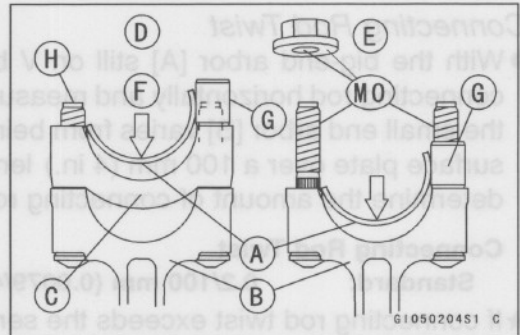
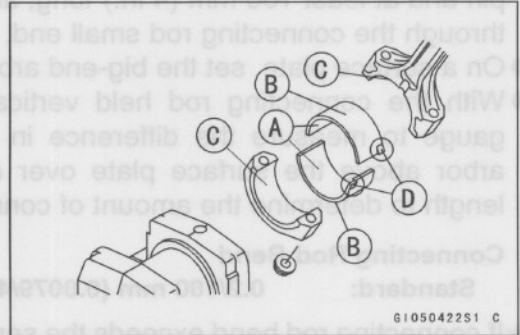
**Crankshaft/Connecting Rod**

**CAUTION**

If the connecting rods, bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage before assembling engine to be sure the correct bearing inserts are installed.

- Apply molybdenum disulfide oil to the inside [A] of the big end bearing inserts.
- The molybdenum disulfide oil is a mixture of engine oil and molybdenum disulfide grease with a weight ratio (10 : 1).
- ★ If bearing inserts are replaced, install them as follows.
  - Do not apply molybdenum disulfide oil to the outside [B] of the inserts or the inside [C] of the connecting rod and cap.
  - Install the inserts so that their nails [D] are on the same side and fit into the recess of the connecting rod and cap.
  - When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows:
    - Installation [D] to Cap
    - Installation [E] to Connecting Rod
    - Push [F]
    - Dowel Pin [G]
    - Connecting Rod Bolts [H]
  - Install the cap on the connecting rod, aligning the weight and diameter marks.
  - Remove debris and clean the surface of inserts.
  - Apply molybdenum disulfide oil [MO] to the threads and seating surface of the big end nuts.
  - Tighten the big end nuts to the specified torque.
 

**Torque - Connecting Rod Big End Cap Nuts: 36 N·m (3.7 kgf·m, 27 ft·lb)**



**Crankshaft/Connecting Rod Cleaning**

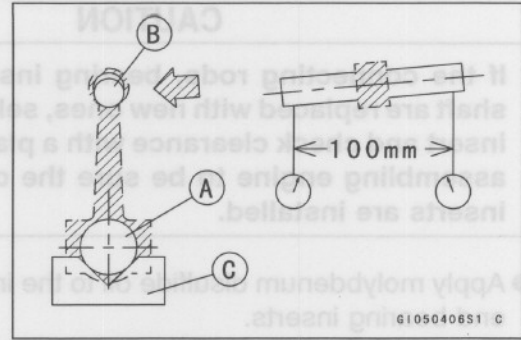
- After removing the connecting rods from the crankshaft clean them with a high flash-point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

## 7-14 CRANKSHAFT/TRANSMISSION

### Crankshaft/Connecting Rod

#### Connecting Rod Bend

- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor [B] of the same diameter as the piston pin and at least 100 mm (4 in.) long, and insert the arbor through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (4 in.) length to determine the amount of connecting rod bend.



#### Connecting Rod Bend

**Standard:** 0.2/100 mm (0.0079/4 in.)

- ★ If connecting rod bend exceeds the service limit, the connecting rod must be replaced.

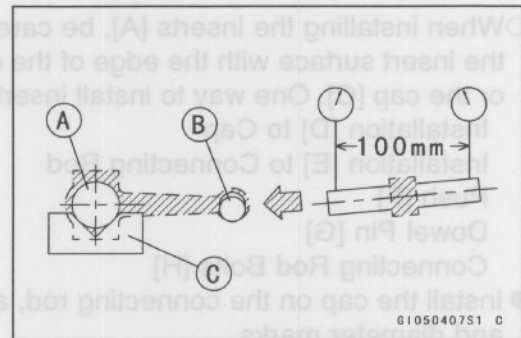
#### Connecting Rod Twist

- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the small end arbor [B] varies from being parallel with the surface plate over a 100 mm (4 in.) length of the arbor to determine the amount of connecting rod twist.

#### Connecting Rod Twist

**Standard:** 0.2/100 mm (0.0079/4 in.)

- ★ If connecting rod twist exceeds the service limit, the connecting rod must be replaced.



#### Connecting Rod Big End Side Clearance

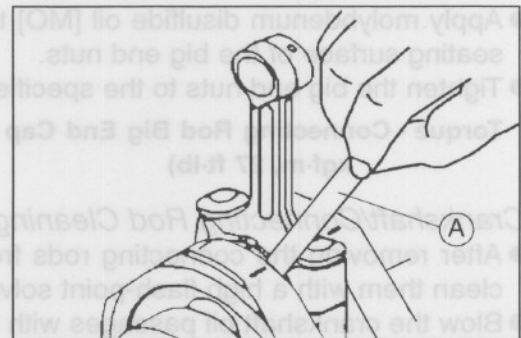
- Insert a thickness gauge [A] between the big end [B] and either crank web to determine clearance.

#### Connecting Rod Big End Side Clearance

**Standard:** 0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.)

**Service Limit:** 0.48 mm (0.0157 in.)

- ★ If clearance exceeds the service limit, replace the connecting rod with a new one and then check clearance again. If clearance is too large after connecting rod replacement, the crankshaft must be replaced also.



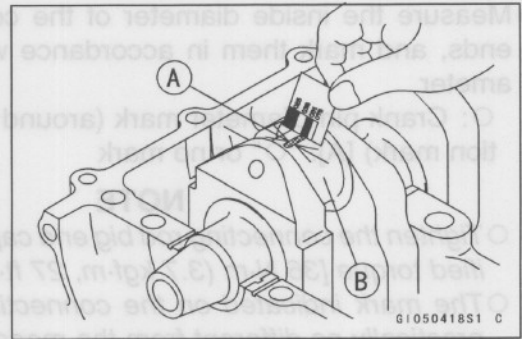
**Crankshaft/Connecting Rod**

**Connecting Rod Big End Bearing Insert/Crankpin Wear**

- Insert a strip of Plastigage [A] to measure the clearance between the bearing and the crankpin [B].

**NOTE**

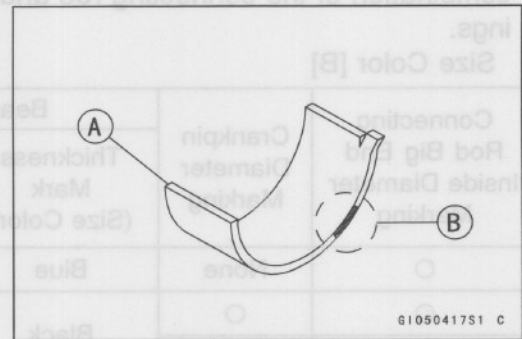
- Tighten the connecting rod big end cap nuts to the specified torque [36 N·m (3.7 kgf·m, 27 ft·lb)].
- Do not move the connecting rod while measuring the clearance.



**Connecting Rod Big End Bearing Insert/Crankpin Clearance**

- Standard:** 0.036 ~ 0.066 mm (0.0014 ~ 0.0026 in.)
- Service Limit:** 0.10 mm ( 0.0039 in.)

- ★ If the clearance is within the standard, no bearing replacement is required.
- ★ If the clearance is between 0.067 mm and the service limit, replace the bearing with bearing painted blue [A], and remeasure the clearance. The clearance may exceed the upper limit slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★ If the clearance exceeds the service limit, measure the diameter of the crankpins.



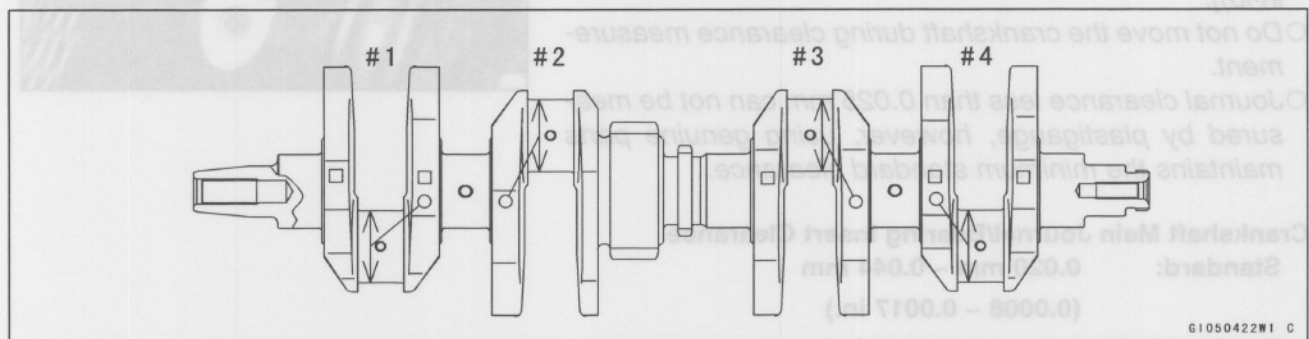
**Crankpin Diameter**

- Standard:** 34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)
- Service Limit:** 34.97 mm (1.3768 in.)

- ★ If any crankpin has worn past the service limit, replace the crankshaft with a new one.
- ★ If the measured crankpin diameters are 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:** 34.984 ~ 34.994 mm (1.3773 ~ 1.3777 in.)
- : 34.995 ~ 35.000 mm (1.3778 ~ 1.3780 in.)



## 7-16 CRANKSHAFT/TRANSMISSION

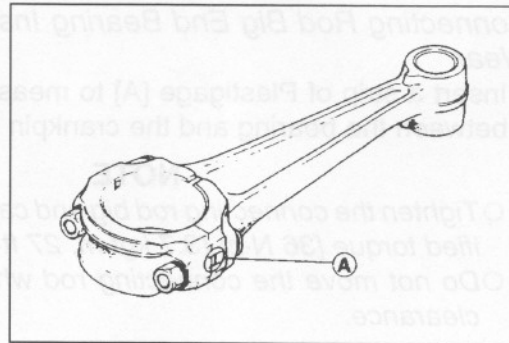
### Crankshaft/Connecting Rod

- Measure the inside diameter of the connecting rod big ends, and mark them in accordance with the inside diameter.

○: Crank pin Diameter mark (around weight classification mark) [A]: "○" or no mark

#### NOTE

- Tighten the connecting rod big end cap nuts to the specified torque [36 N·m (3.7 kgf·m, 27 ft·lb)].
- The mark indicated on the connecting rod should be practically no different from the measurement.



#### Connecting Rod Big End Inside Diameter Marks

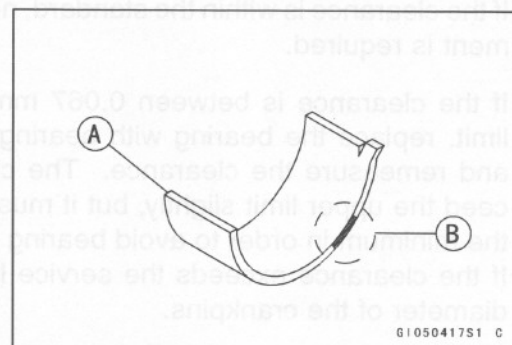
None: 38.000 ~ 38.008 mm (1.4961 ~ 1.4964 in.)

○: 38.009 ~ 38.016 mm (1.4964 ~ 1.4967 in.)

- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft markings.

Size Color [B]

Connecting Rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Thickness Mark (Size Color)	Part Number
○	None	Blue	92028-1920
○	○	Black	92028-1921
None	None		
None	○	Brown	92028-1922



- Install a new inserts in the connecting rod and measure the clearance between the inserts and the crankpin.

#### Crankshaft Main Journal/Bearing Insert Wear

- Using a strip of Plastigage (press gauge) [A], measure the clearance between the journal [B] and the bearing insert.

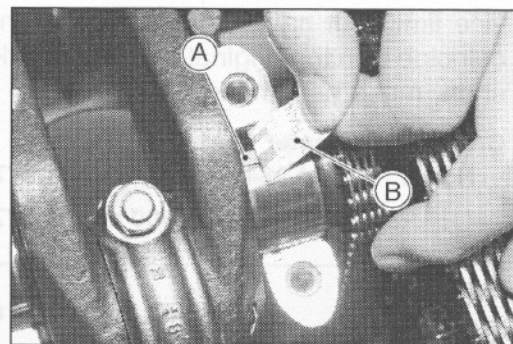
#### NOTE

- Tighten the crankcase bolts to the specified torque [M8: 25 N·m (2.5 kgf·m, 18 ft·lb), M6: 12 N·m (1.2 kgf·m, 104 in·lb)].
- Do not move the crankshaft during clearance measurement.
- Journal clearance less than 0.025 mm can not be measured by plastigauge, however, using genuine parts maintains the minimum standard clearance.

#### Crankshaft Main Journal/Bearing Insert Clearance

Standard: 0.020 mm ~ 0.044 mm  
(0.0008 ~ 0.0017 in.)

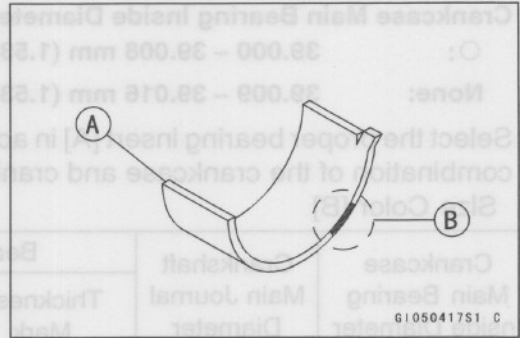
Service Limit: 0.08 mm (0.0032 in.)



- ★ If clearance is within the standard, no bearing replacement is required.

**Crankshaft/Connecting Rod**

- ★ If the clearance is between 0.045 mm and the service limit, 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.

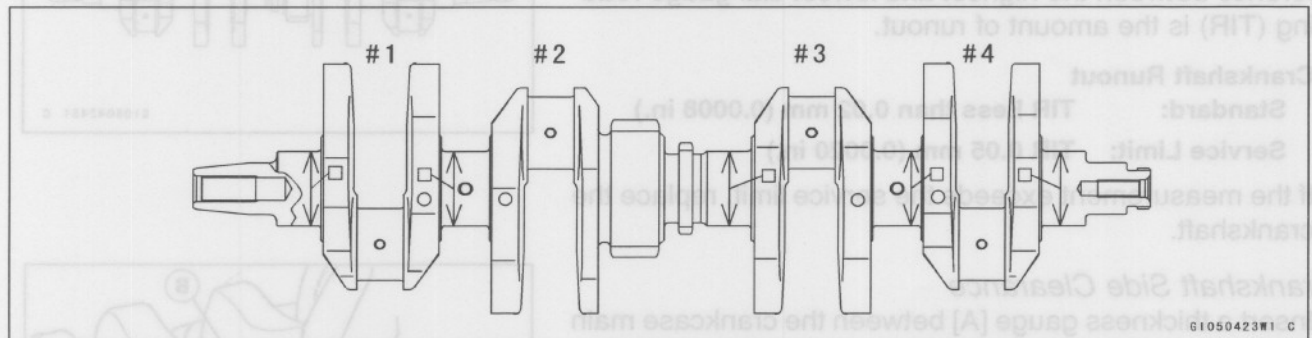


**Crankshaft Main Journal Diameter**  
**Standard:** 35.984 ~ 36.000 mm  
 (1.4167 ~ 1.4173 in.)  
**Service Limit:** 35.96 mm (1.4157 in.)

- If the main journal is worn beyond the service limit, replace the crankshaft with a new one.
- 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 [A] on the crankshaft, make new marks.

□: Crankshaft Main Journal Diameter Marks, "1" or no mark.

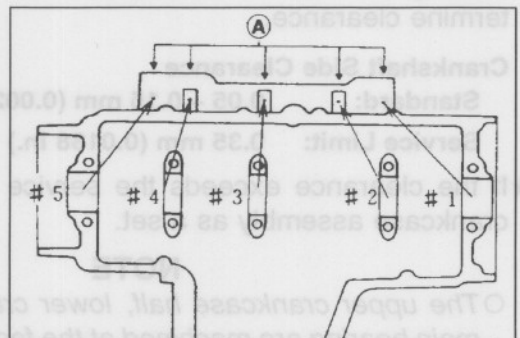
**Crankshaft Main Journal Diameter Marks**  
**None:** 35.984 ~ 35.992 mm (1.4167 ~ 1.4170 in.)  
**1:** 35.993 ~ 36.000 mm (1.4170 ~ 1.4173 in.)



- Measure the crankcase main bearing inside diameter, and mark [A] the upper crankcase half in accordance with the measured inside diameter.  
 Crankcase Main Bearing Inside Diameter Marks [A]: "○" or none

**NOTE**

- Tighten the crankcase bolts to the specified torque [M8: 25 N·m (2.5 kgf·m, 18 ft·lb), M6: 12 N·m (1.2 kgf·m, 104 in·lb)].
- The mark indicated on the upper crankcase half should be practically no different from the measurement.



## 7-18 CRANKSHAFT/TRANSMISSION

### Crankshaft/Connecting Rod

#### Crankcase Main Bearing Inside Diameter Marks

○: 39.000 ~ 39.008 mm (1.5354 ~ 1.5357 in.)

None: 39.009 ~ 39.016 mm (1.5358 ~ 1.5361 in.)

- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft markings.  
Size Color [B]

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert	
		Thickness Mark (Size Color)	Part Number
○	1	Brown	92028-1919
None	None	Blue	92028-1917
○	None	Black	92028-1918
None	1		

- Install new inserts in the crankcase and measure the clearance between the journal and the inside diameter.

#### Crankshaft Runout

- Set the crankshaft with a flywheel alignment jig or on V blocks.
- Set a dial gauge against the points indicated.
- Turn the crankshaft slowly to measure the runout. The difference between the highest and lowest dial gauge reading (TIR) is the amount of runout.

#### Crankshaft Runout

**Standard:** TIR Less than 0.02 mm (0.0008 in.)

**Service Limit:** TIR 0.05 mm (0.0020 in.)

- ★ If the measurement exceeds the service limit, replace the crankshaft.

#### Crankshaft Side Clearance

- Insert a thickness gauge [A] between the crankcase main bearing and the crank web [B] at the No.2 journal to determine clearance.

#### Crankshaft Side Clearance

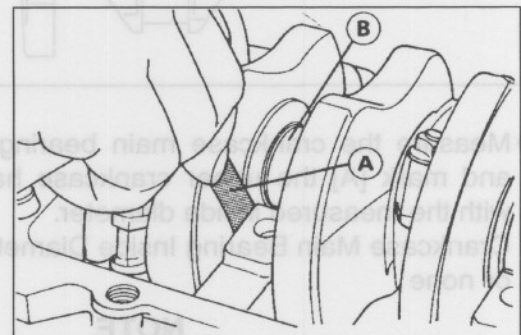
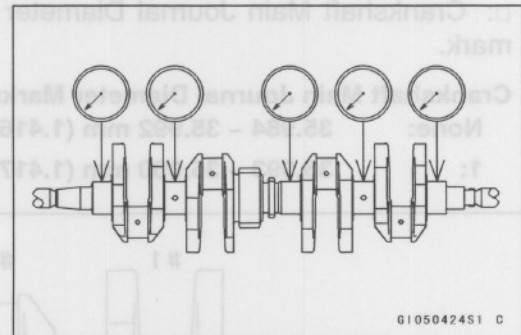
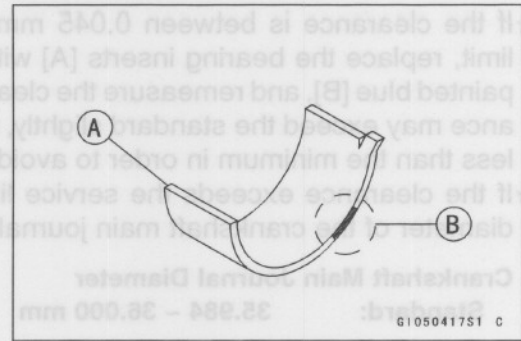
**Standard:** 0.05 ~ 0.15 mm (0.0020 ~ 0.0059 in.)

**Service Limit:** 0.35 mm (0.0138 in.)

- ★ If the clearance exceeds the service limit, replace the crankcase assembly as a set.

#### NOTE

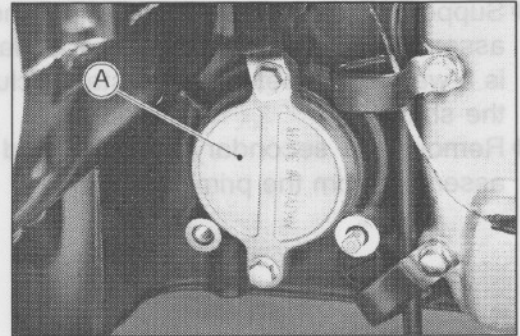
- The upper crankcase half, lower crankcase half, and main bearing are machined at the factory in the assembled state, so they must be replaced as a set.



**Secondary Shaft and Starter Clutch**

*Secondary Shaft Removal*

- Remove:
  - Engine Oil (drain, see Engine Lubrication System chapter)
  - Exhaust Pipe (see Engine Top End chapter)
  - Engine Sprocket Cover (see Final Drive chapter)
  - Clutch (see Clutch chapter)
  - Oil Pump (see Engine Lubrication System chapter)
  - Alternator Cover (see Electrical System chapter)
- Remove the secondary shaft bearing cap [A].

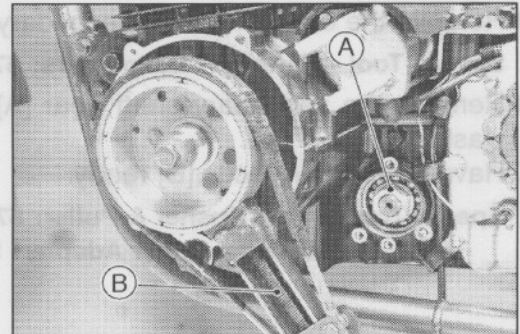


- Remove the secondary shaft nut [A].

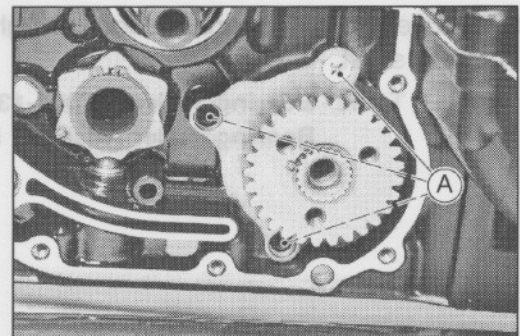
**NOTE**

○ Hold the alternator rotor to prevent the secondary shaft from turning.

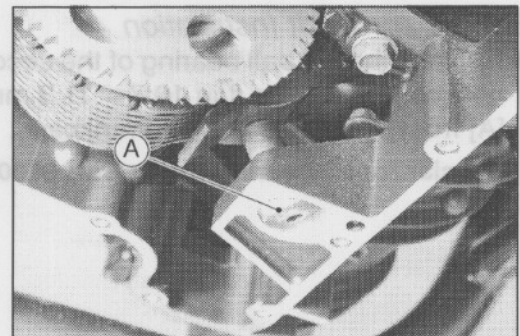
**Special Tool - Flywheel Holder: 57001-1313 [B]**



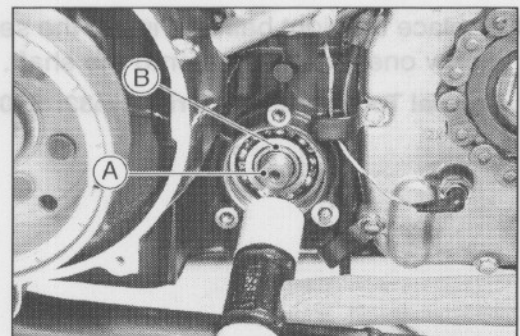
- Remove the secondary shaft bearing holder screws [A]. The two out of the three screws are used in common with the oil pump mounting screws.



- Remove the tensioner holder [A].
- Replace the tensioner holder with a new one.



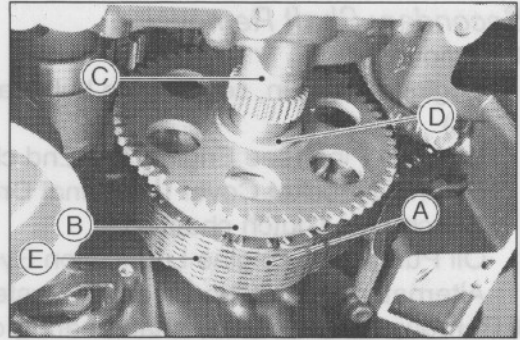
- Tap on the secondary shaft [A] from the left of the crankcase to remove the left bearing of the shaft from the case. The left bearing of the shaft has the collar [B].



## 7-20 CRANKSHAFT/TRANSMISSION

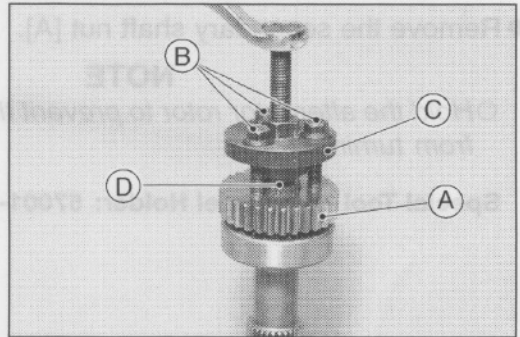
### Secondary Shaft and Starter Clutch

- Support the secondary sprocket [A] and the starter clutch assembly [B], and pull out the secondary shaft [C]. There is a washer [D] between the starter clutch assembly and the shaft.
- Remove the secondary sprocket and the starter clutch assembly from the primary chain [E].



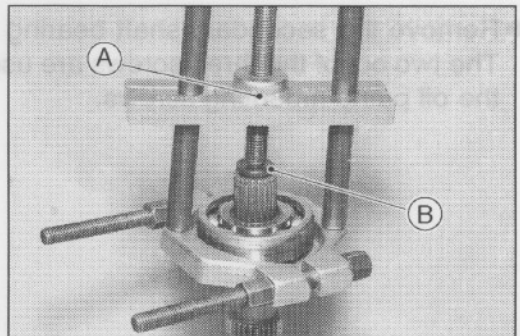
- Remove the circlip from the secondary shaft.  
**Special Tool - Outside Circlip Pliers: 57001-144**
- Remove the secondary shaft gear [A], and remove the washer.
- Have three 8 mm bolts [B] ready.

**Special Tools - Gear Pusher & Puller: 57001-319 [C]**  
**Bearing Puller Adapter: 57001-317 [D]**



- Remove the ball bearing from the right side of the secondary shaft.

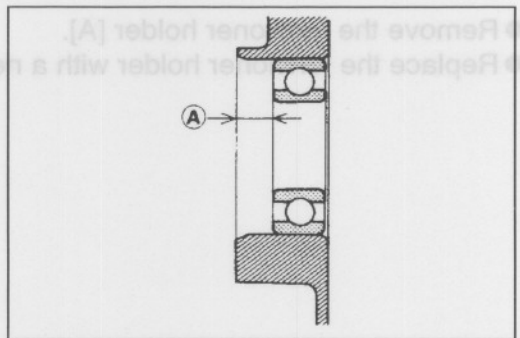
**Special Tools - Bearing Puller: 57001-135 [A]**  
**Bearing Puller Adapter: 57001-317 [B]**



#### Secondary Shaft Installation

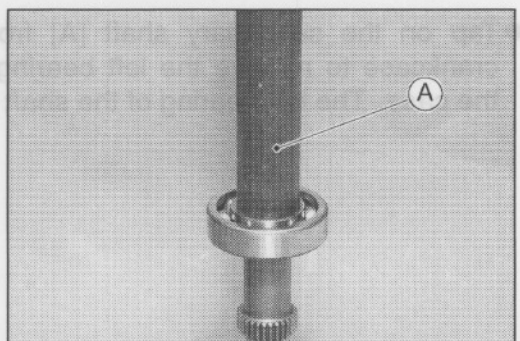
- Replace the left ball bearing of the secondary shaft with a new one, and drive it in 10.7 ~ 11.3 mm (0.42 ~ 0.44 in.) [A] from the outside of the crankcase.

**Special Tool - Bearing Driver Set: 57001-1129**



- Replace the right ball bearing of the secondary shaft with a new one, and drive it onto the shaft.

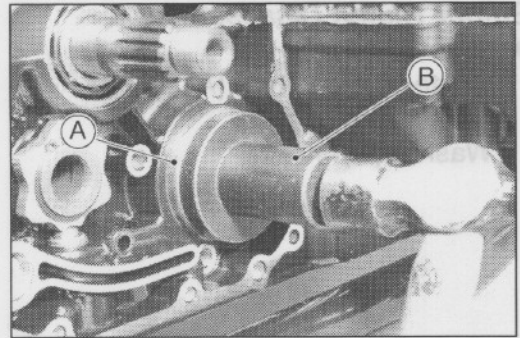
**Special Tool - Bearing Driver,  $\phi 32$ : 57001-382 [A]**



Secondary Shaft and Starter Clutch

- Place the primary chain on the secondary sprocket and the starter clutch assembly. Through the chain, insert the secondary shaft with a washer from the right side of the crankcase.
- Insert a collar in the left bearing of the shaft.
- Drive the right bearing [A] of the shaft into the crankcase until it bottoms out.

**Special Tool - Bearing Driver,  $\phi 32$ : 57001-382 [B]**

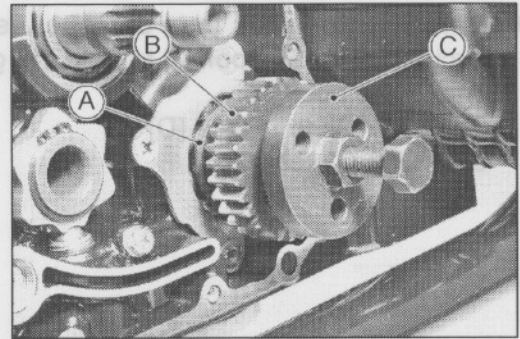


- Install the bearing holder and stake the heads of the screws.
- Install the oil pump.
- Place the washer [A] over the secondary shaft and install the gear [B].

**Special Tool - Gear Pusher & Puller: 57001-319 [C]**

**NOTE**

○ Apply engine oil to the secondary shaft and to the area between the secondary shaft gear and the gear pusher/puller. Use the flywheel holder (special tool: 57001-1313) on the alternator rotor to prevent the secondary shaft from turning.

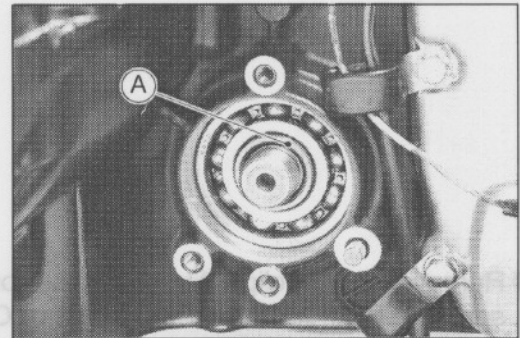


- Install a new circlip.
- Special Tool - Outside Circlip Pliers: 57001-144**
- Check that the collar [A] is placed on the left of the secondary shaft, and tighten the secondary shaft nut.

**Torque - Secondary Shaft Nut: 59 N·m (6.0 kgf·m, 43 ft·lb)**

**NOTE**

○ Hold the alternator rotor to prevent the secondary shaft from turning.

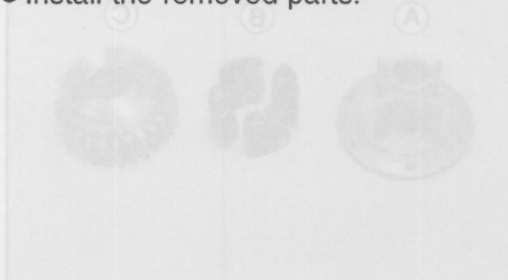
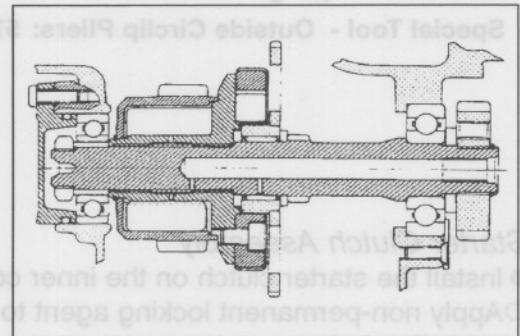


**Special Tool - Flywheel Holder: 57001-1313**

- Install the secondary shaft bearing cap and run the wires properly (see General Information chapter).
- Torque - Cap Screws: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install the spring and pin into the tensioner holder.
- Tighten the holder.

**Torque - Tensioner Holder: 26 N·m (2.7 kgf·m, 20 ft·lb)**

- Install the removed parts.



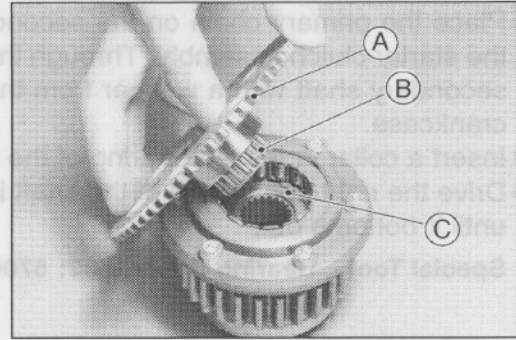
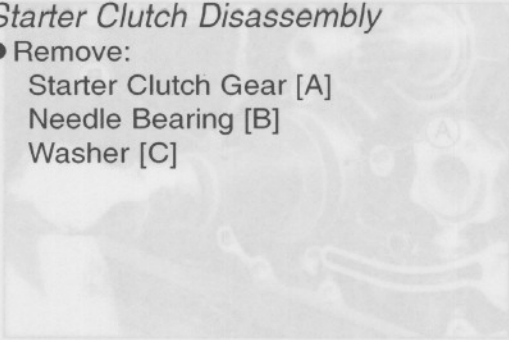
## 7-22 CRANKSHAFT/TRANSMISSION

### Secondary Shaft and Starter Clutch

#### Starter Clutch Disassembly

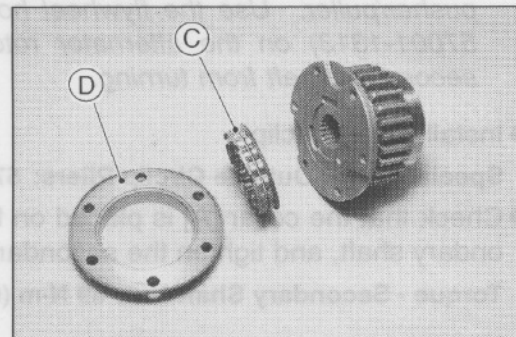
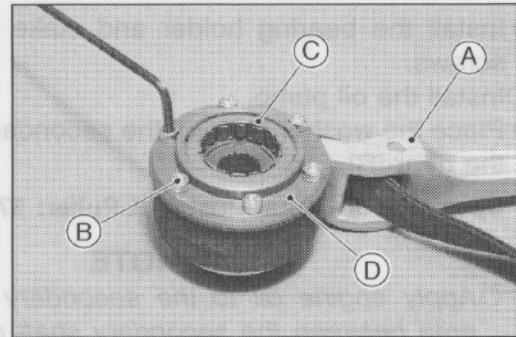
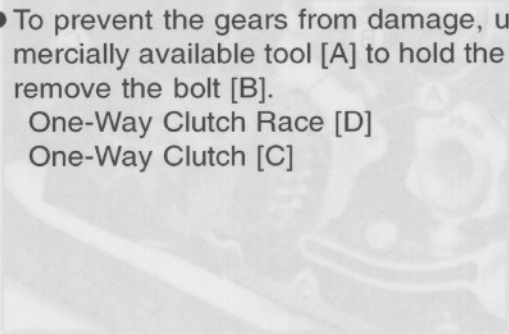
● Remove:

- Starter Clutch Gear [A]
- Needle Bearing [B]
- Washer [C]



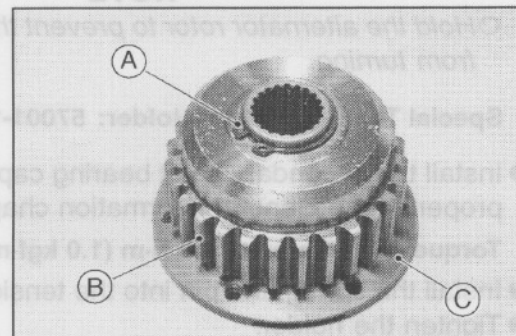
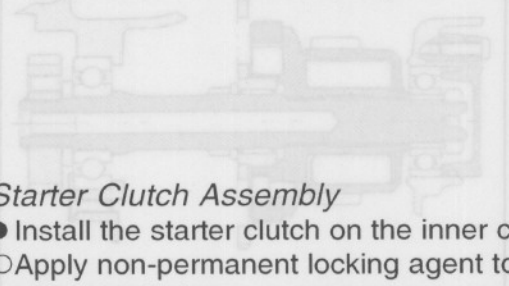
- To prevent the gears from damage, use a suitable commercially available tool [A] to hold the gear securely, and remove the bolt [B].

- One-Way Clutch Race [D]
- One-Way Clutch [C]



- Remove the circlip [A], and take out the secondary sprocket [B] from the inner coupling [C]. There are eight rubber dampers between the secondary sprocket and the inner coupling.

**Special Tool - Outside Circlip Pliers: 57001-144**



#### Starter Clutch Assembly

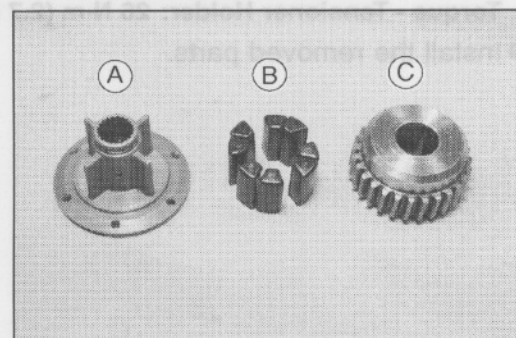
- Install the starter clutch on the inner coupling.

- Apply non-permanent locking agent to the threads of the mounting bolts.

**Torque - Starter Clutch Mounting Bolts: 12 N·m (1.2 kgf·m, 104 ft·lb)**

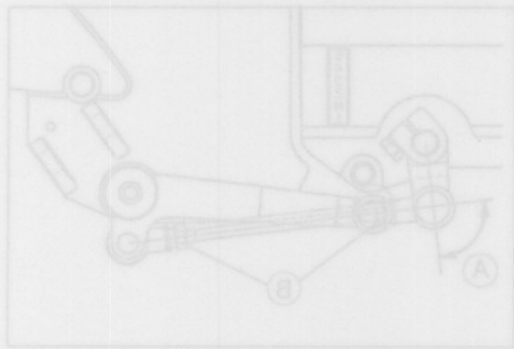
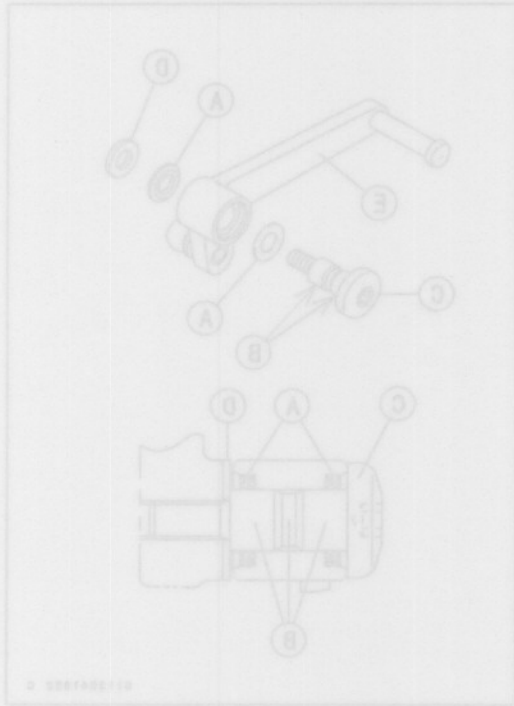
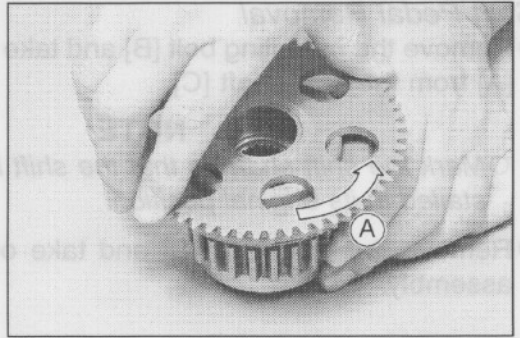
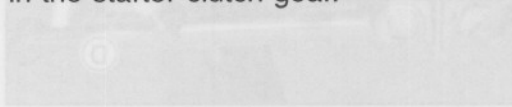
- Inspect the rubber dampers [B], and replace it if it is damaged.
- Apply a small amount of engine oil on the rubber dampers, and assemble the inner coupling [A] and the secondary sprocket [C].
- Install a new circlip.

**Special Tool - Outside Circlip Pliers: 57001-144**



Secondary Shaft and Starter Clutch

- Install the spring, spring cap, and roller on the starter clutch.
- After installing the washer, install the starter clutch gear on the clutch while turning the starter clutch gear counter-clockwise [A].
- Apply engine oil on the needle bearings and install them in the starter clutch gear.



Shift Pedal Installation

- Install the oil seals [A] direction as shown.
- Apply grease [B] to the pivot portion of the pivot bolt [C] and tighten it.
- Washer [D]
- Shift Pedal [E]

Torque - Shift Pedal Pivot Bolt: 23 N·m (2.3 kgf-m, 17 ft-lb)

- Install the shift pedal assembly so that the shift link rod and the pedal are parallel and the shift lever and the shift pedal form an angle of approximately 90° [A].

NOTE

- The locknut next to the knurled portion of the rod has left-hand threads.
- ★ If necessary, adjust the pedal position from the standard position to suit you as follows.
- Loosen the locknuts [B] and turn the rod to adjust the angle.
- Tighten the locknuts securely.

External Shift Mechanism Removal

- Remove:
  - Shift Lever (see Shift Pedal Removal)
  - Engine Sprocket Cover (see Final Drive chapter)
  - Engine Sprocket (see Final Drive chapter)
  - Neutral Switch Wire Connector [A]
  - Side Stand Switch [B]
  - External Shift Mechanism Cover [C]

NOTE

○ Place an oil drain pan under the cover.

## 7-24 CRANKSHAFT/TRANSMISSION

### Transmission

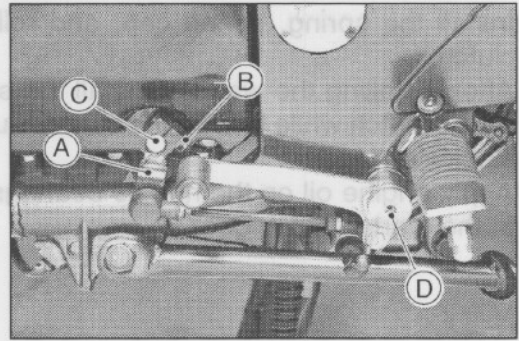
#### Shift Pedal Removal

- Remove the mounting bolt [B] and take out the shift lever [A] from the shift shaft [C].

#### NOTE

○ Mark the shift shaft so that the shift lever can be reinstalled in its original position.

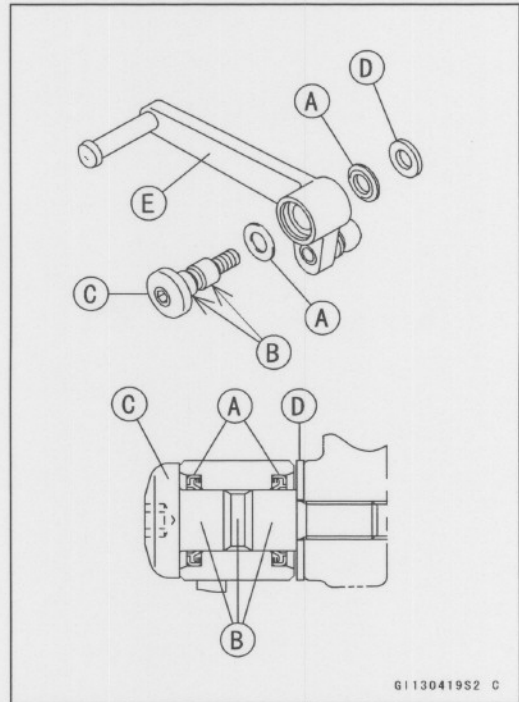
- Remove the pivot bolt [D] and take out the shift pedal assembly.



#### Shift Pedal Installation

- Install the oil seals [A] direction as shown.
- Apply grease [B] to the pivot portion of the pivot bolt [C] and tighten it.  
Washer [D]  
Shift Pedal [E]

**Torque - Shift Pedal Pivot Bolt: 23 N·m (2.3 kgf·m, 17 ft·lb)**



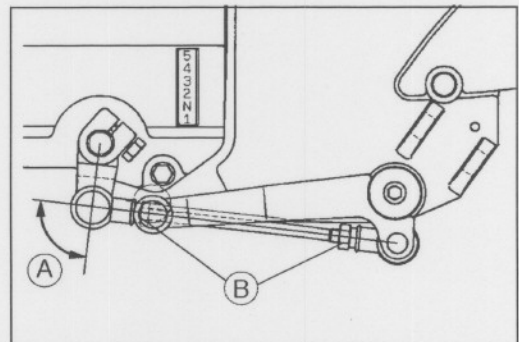
G1130419S2 C

- Install the shift pedal assembly so that the shift link rod and the pedal are parallel and the shift lever and the shift pedal arm form an angle of approximately 90° [A].

#### NOTE

○ The locknut next to the knurled portion of the rod has left-hand threads.

- ★ If necessary, adjust the pedal position from the standard position to suit your as follows.
- Loosen the locknuts [B] and turn the rod to adjust the angle.
- Tighten the locknuts securely.

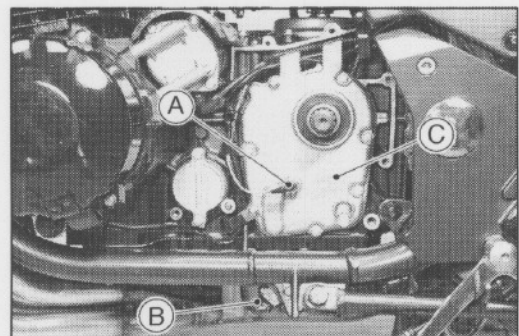


#### External Shift Mechanism Removal

- Remove:  
Shift Lever (see Shift Pedal Removal)  
Engine Sprocket Cover (see Final Drive chapter)  
Engine Sprocket (see Final Drive chapter)  
Neutral Switch Wire Connector [A]  
Side Stand Switch [B]  
External Shift Mechanism Cover [C]

#### NOTE

○ Place an oil drain pan under the cover.

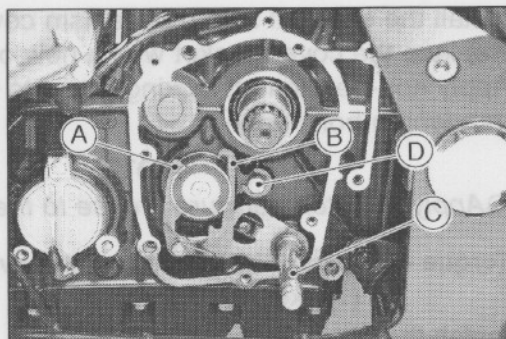


Transmission

- Remove the shift arm [A] and the overshift limiter [B] from the shift drum pin, pull out the shift shaft [C], and remove the external shift mechanism.

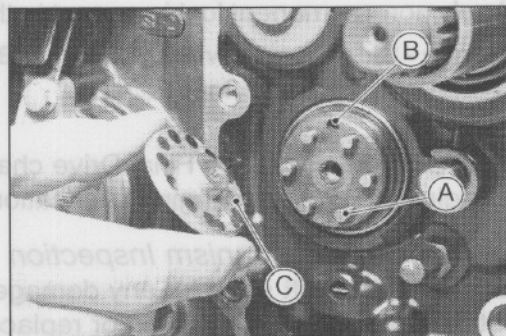
**CAUTION**

Do not pull the shift rod [D] out of crankcase, or the shift forks inside the crankcase will fall to the bottom of the oil pan, requiring removal of the crankcase to install them.



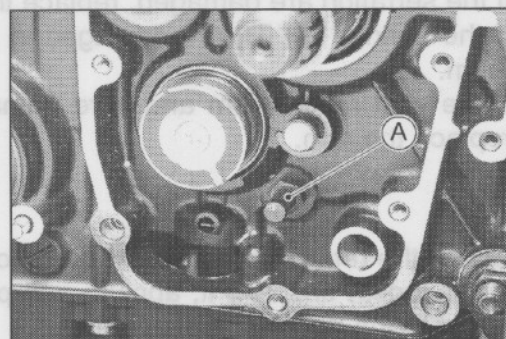
*External Shift Mechanism Installation*

- If the shift drum pin has been removed, install it so that the long pin [A] is positioned in the third hole clockwise from the hole [B].
- Install the pin plate by inserting the long pin into the hole [C] without the round edge.
- Apply non-permanent locking agent to the threads of the pin plate screw.

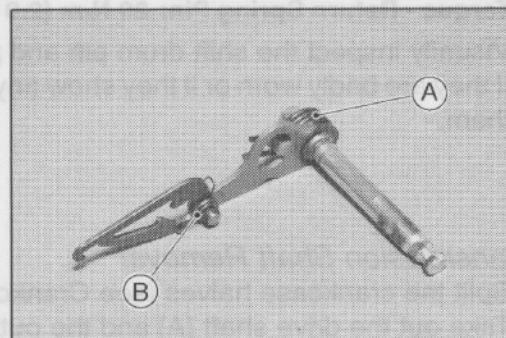


- Inspect the tightening condition of the return spring pin [A].
- ★ Remove it if it is loose, apply non-permanent locking agent to the threads, and tighten it.

**Torque - Return Spring Pin: 20 N·m (2.0 kgf·m, 14 ft·lb)**

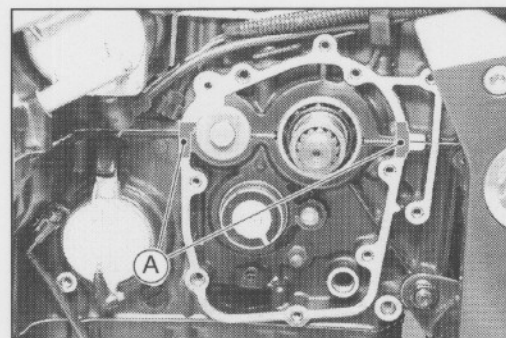


- Make sure that the return spring [A] and the ball spring [B] are properly installed, and install the external shift mechanism.
- Engage the shift arm and the overshift limiter with the shift drum pin.



- Apply silicon sealant [A] to the mating surfaces of the crankcase and the external shift mechanism cover gasket.

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



## 7-26 CRANKSHAFT/TRANSMISSION

### Transmission

- Install the external shift mechanism cover.
- Replace the cover gasket with a new one.
- Apply non-permanent locking agent to the cover bolt (35 mm length bolts only).

#### NOTE

- Apply high-temperature grease to the oil seal lip.

**Torque - External Shift Mechanism Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**

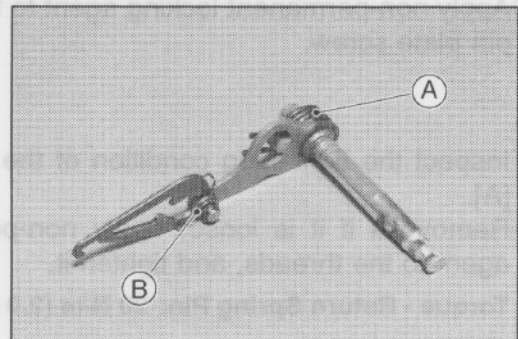
- Install the side stand switch.
- Apply non-permanent locking agent to the mounting bolts.

**Torque - Side Stand Switch Mounting Bolts: 3.9 N·m (0.4 kgf·m, 35 in·lb)**

- Check:
  - Drive chain slack (see Final Drive chapter)
  - Engine oil level (see Engine Lubrication System chapter)

#### External Shift Mechanism Inspection

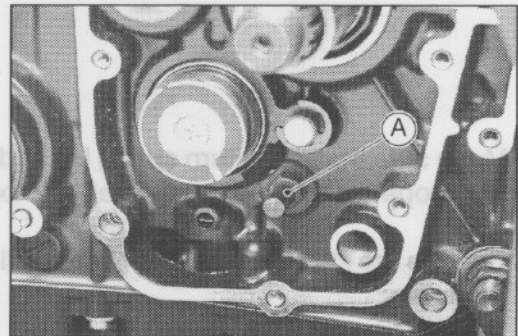
- Examine the shift shaft for any damage.
- ★ If the shaft is bent, straighten or replace it.
- ★ If the serration are damaged, replace the shaft.
- ★ If the springs [A] [B] are damaged in any way, replace them.
- ★ If the shift mechanism arms are damaged in any way, replace the arm.



- Check the return spring pin [A] is not loose.
- ★ If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

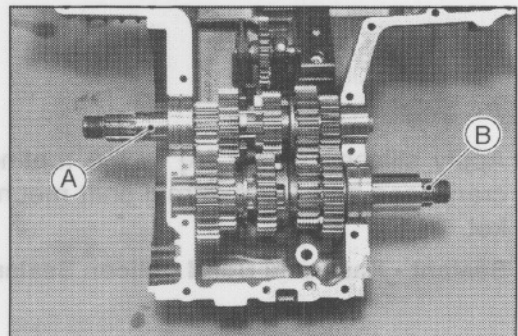
**Torque - Return Spring Pin: 20 N·m (2.0 kgf·m, 14 ft·lb)**

- Visually inspect the shift drum pin and pin plate.
- ★ If they are badly worn or if they show any damage, replace them.



#### Transmission Shaft Removal

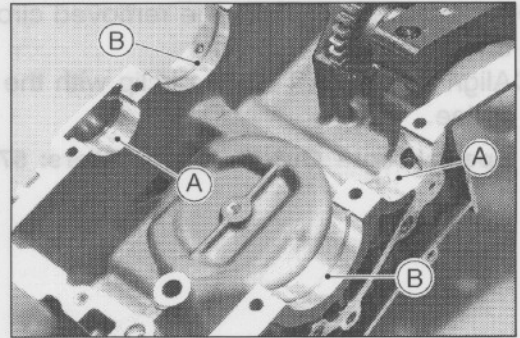
- Split the crankcase halves (see Crankcase Splitting).
- Take out the drive shaft [A] and the output shaft [B].



**Transmission**

*Transmission Shaft Installation*

- Adjust the transmission gears (see Drive and Output Shaft Adjustment).
- Engage the hole in the needle bearing of the transmission shaft with the set pin [A], and engage the groove in the outer race of the ball bearing with the set ring [B].
- Apply engine oil:  
Transmission Gears  
Ball Bearings
- Assemble the crankcase (see Crankcase Assembly).

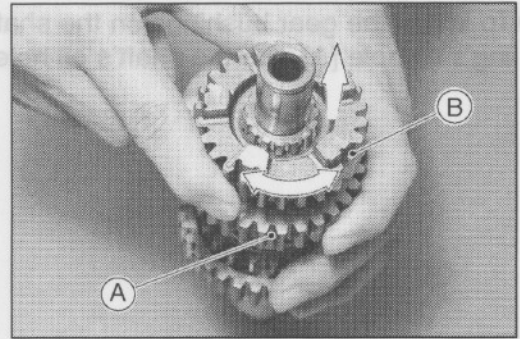


*Transmission Shaft Disassembly*

- Remove the transmission shafts.
- Remove the circlip and take out the gears.

**Special Tool - Outside Circlip Pliers: 57001-144**

- The 4th gear on the output shaft has three balls assembled into it for the positive neutral finder mechanism.
- Remove the output shaft 4th gear as follows:
  - Hold the 3rd gear [A] with one hand, and place the output shaft upright.
  - Quickly spin the 4th gear [B] and pull it upward while the internal steel balls move outward by the centrifugal force.

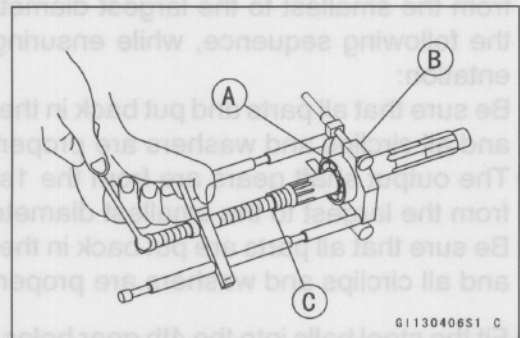


- Remove the ball bearing [A].

**Special Tools - Bearing Puller: 57001-135 [B]**

**Bearing Puller Adapter: 57001-317 [C]**  
(Adapter to be used only for the drive shaft bearing.)

- Discard the bearing.



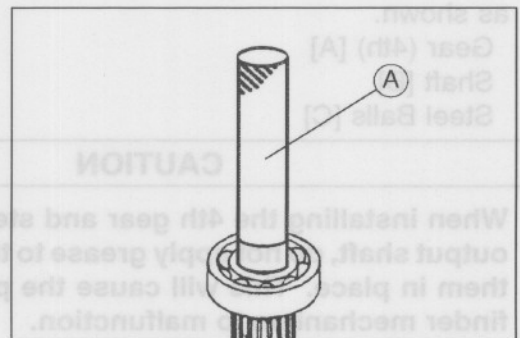
*Transmission Assembly*

- Replace the ball bearing with a new one.
- Apply engine oil to the ball bearing and shaft.

**NOTE**

○ Install the bearings so that the marked side faces out.

**Special Tool - Bearing Driver,  $\phi 32$ : 57001-382 [A]**

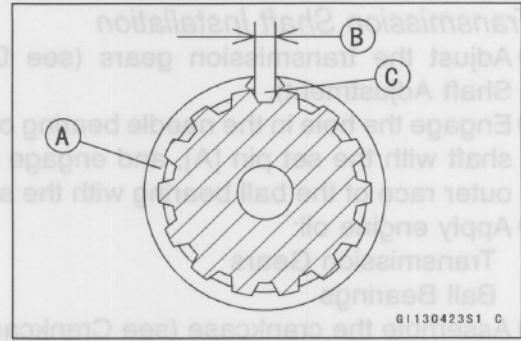


## 7-28 CRANKSHAFT/TRANSMISSION

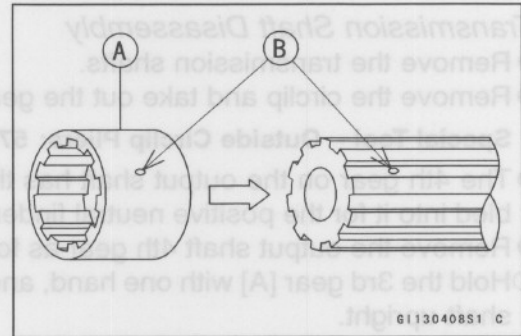
### Transmission

- Make sure to replace the removed circlip [A] 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**



- To install the gear bushings on the shafts align the bushing's oil hole [A] with the shaft's oil hole [B].



- The drive shaft gears are from the 1st to the 5th gears, from the smallest to the largest diameter. Install them in the following sequence, while ensuring their correct orientation:

Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.

- The output shaft gears are from the 1st to the 5th gears, from the largest to the smallest diameter.

Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.

- Fit the steel balls into the 4th gear holes of the output shaft as shown.

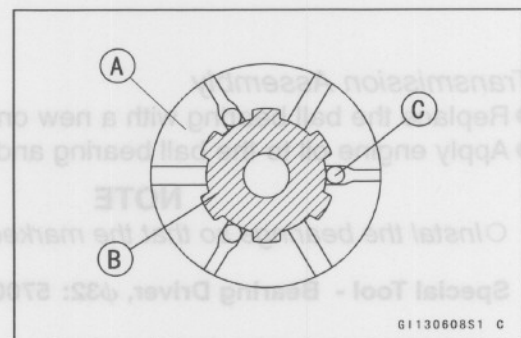
Gear (4th) [A]

Shaft [B]

Steel Balls [C]

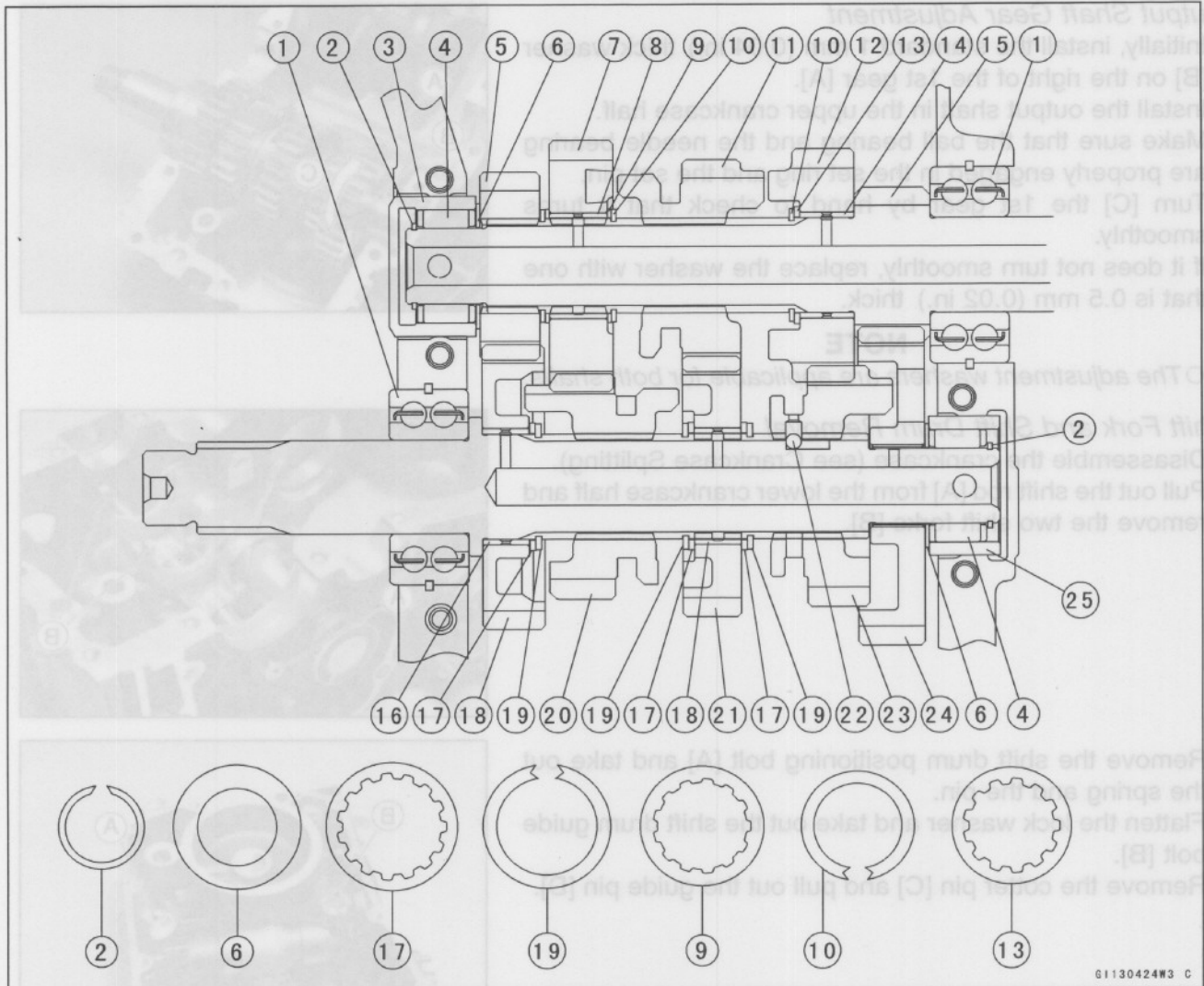
#### CAUTION

**When installing the 4th gear and steel balls on the output shaft, do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.**



- After assembling the 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).
- After assembly, make sure that the gears spin and slide properly.

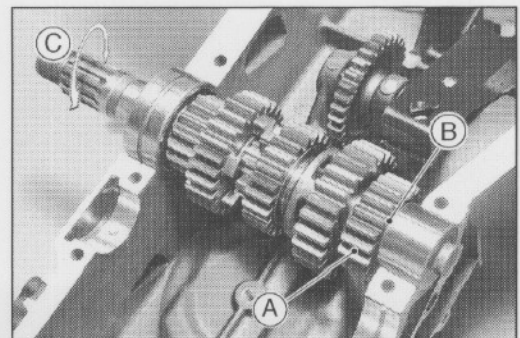
Transmission



- |                           |                        |
|---------------------------|------------------------|
| 1. Ball Bearing           | 14. Bushing            |
| 2. Circlip                | 15. 1st Gear           |
| 3. Bearing Outer Race     | 16. Busing             |
| 4. Needle Bearing         | 17. Toothed Washer     |
| 5. 2nd Gear               | 18. 2nd Gear           |
| 6. Thrust Washer (Spacer) | 19. Circlip            |
| 7. 5th (Top) Gear         | 20. 5th (Top) Gear     |
| 8. Bushing                | 21. 3rd Gear           |
| 9. Toothed Washer         | 22. Steel Ball         |
| 10. Circlip               | 23. 4th Gear           |
| 11. 3rd Gear              | 24. 1st Gear           |
| 12. 4th Gear              | 25. Bearing Outer Race |
| 13. Toothed Washer        |                        |

*Drive shaft Gear Adjustment*

- Initially, install the standard 1 mm (0.04 in.) thick washer [B] on the left of the 2nd gear [A].
- Install the drive shaft in the upper crankcase half.
- Make sure that the ball bearing and the needle bearing are properly engaged in the set ring and the set pin.
- Turn the drive shaft by hand [C] to check that it turns smoothly.
- ★ If it still does not turn smoothly, replace the washer with one that is 0.5 mm (0.02 in.) thick.



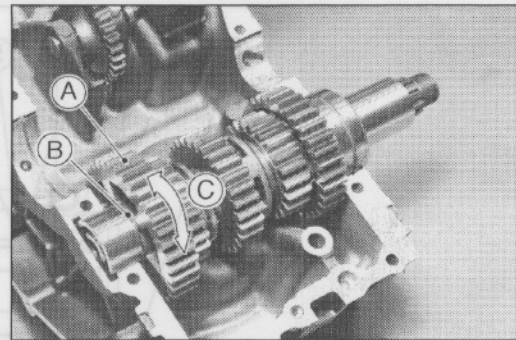
## 7-30 CRANKSHAFT/TRANSMISSION

### Transmission

Transmission

#### Output Shaft Gear Adjustment

- Initially, install the standard 1 mm (0.04 in.) thick washer [B] on the right of the 1st gear [A].
- Install the output shaft in the upper crankcase half.
- Make sure that the ball bearing and the needle bearing are properly engaged in the set ring and the set pin.
- Turn [C] the 1st gear by hand to check that it turns smoothly.
- ★ If it does not turn smoothly, replace the washer with one that is 0.5 mm (0.02 in.) thick.

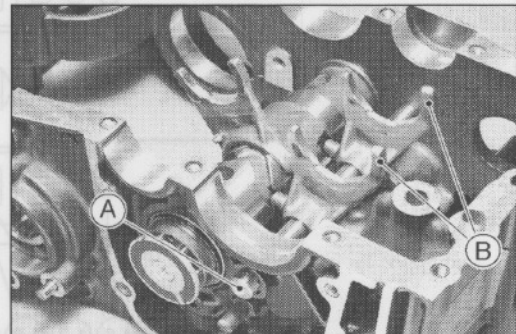


#### NOTE

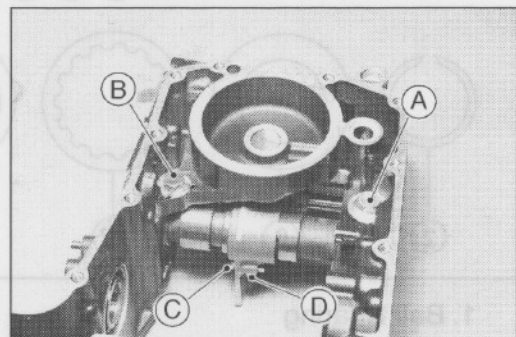
- The adjustment washers are applicable for both shafts.

#### Shift Fork and Shift Drum Removal

- Disassemble the crankcase (see Crankcase Splitting).
- Pull out the shift rod [A] from the lower crankcase half and remove the two shift forks [B].



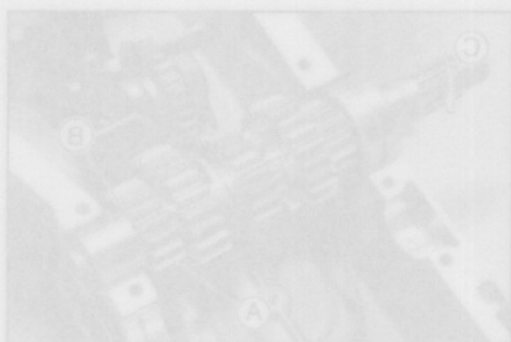
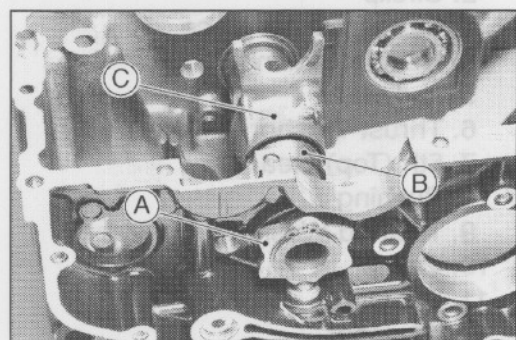
- Remove the shift drum positioning bolt [A] and take out the spring and the pin.
- Flatten the lock washer and take out the shift drum guide bolt [B].
- Remove the cotter pin [C] and pull out the guide pin [D].



- Remove the circlip and take out the shift drum cam [A].

**Special Tool - Outside Circlip Pliers: 57001-144**

- Pull out the shift drum [B] and take out the 4th/5th shift fork [C].

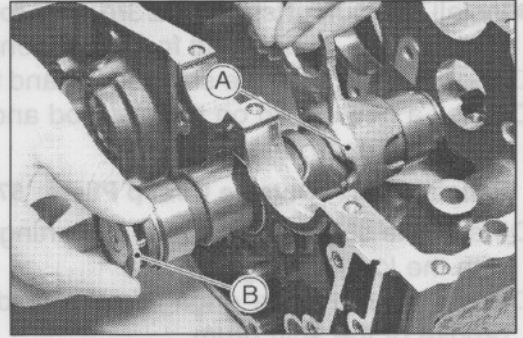


Drive shaft gear adjustment  
Initially, install the standard 1 mm (0.04 in.) thick washer [B] on the left of the 2nd gear [A].  
Install the drive shaft in the upper crankcase half.  
Make sure that the ball bearing and the needle bearing are properly engaged in the set ring and the set pin.  
Turn the drive shaft by hand [C] to check that it turns smoothly.  
★ If it still does not turn smoothly, replace the washer with one that is 0.5 mm (0.02 in.) thick.

## Transmission

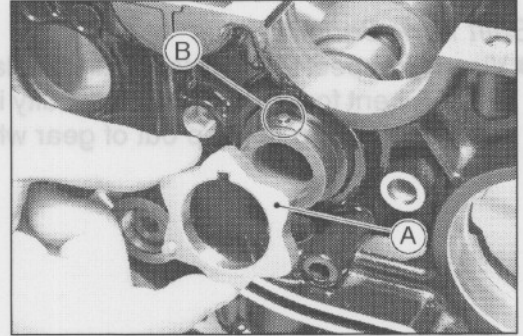
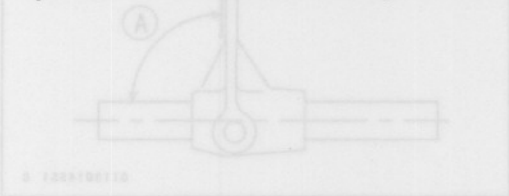
## Shift Fork/Shift Drum Installation

- Install the drive shaft 4th/5th shift fork with the shorter flange [A] facing the pin plate [B].

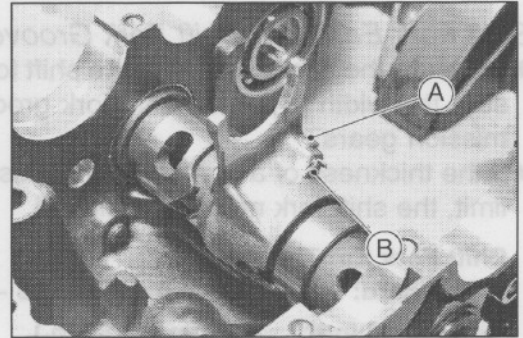


- Install the shift drum cam [A] by aligning it with the drive pin [B].
- Secure it with a new circlip.

**Special Tool - Outside Circlip Pliers: 57001-144**

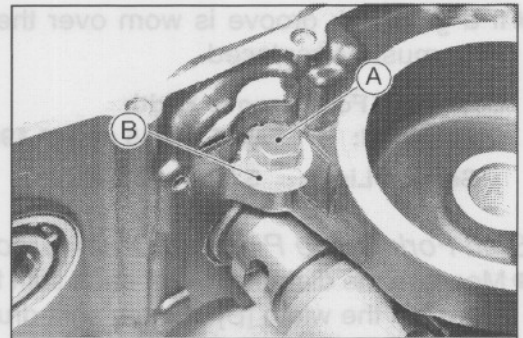
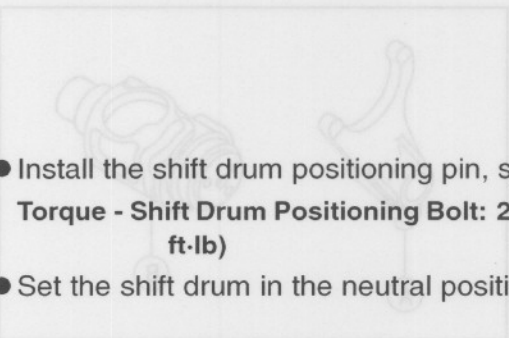


- Install the guide pin in the 4th/5th shift fork.
- Fit the guide pin [A] into the center groove of the shift drum.
- Push the new cotter pin [B] from the opposite side of the shift drum cam, and bend the longer end of the pin inward.

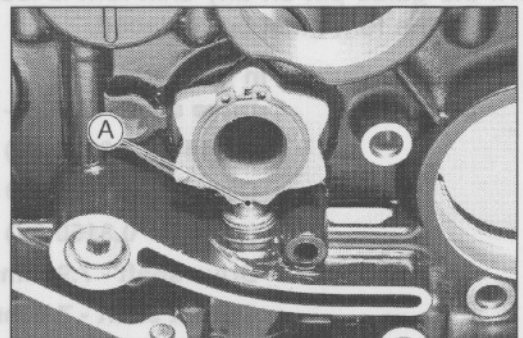


- After tightening the shift drum guide bolt [A], bend the lock washer [B].

**Torque - Shift Drum Guide Bolt: 26 N·m (2.7 kgf·m, 19 ft·lb)**



- Install the shift drum positioning pin, spring, and bolt.
- Torque - Shift Drum Positioning Bolt: 26 N·m (2.7 kgf·m, 19 ft·lb)**
- Set the shift drum in the neutral position [A].



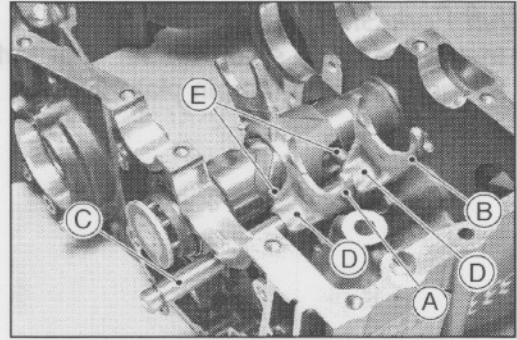
## 7-32 CRANKSHAFT/TRANSMISSION

### Transmission

- Install the output shaft 2nd/3rd shift fork [A] and the 1st shift fork [B]. These shift forks are identical parts.
- Apply engine oil to the shift rod [C] and the ear of the fork.
- Install a new circlip on the shift rod and insert it from the left of the case.

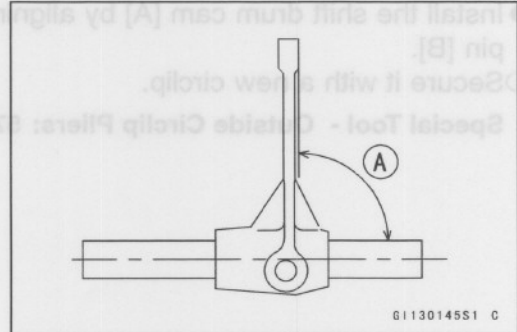
#### Special Tool - Outside Circlip Pliers: 57001-144

- Install the shift fork on the rod, starting with the shift fork with the longer flange [D].
- Push the rod while engaging the guide pin [E] into the groove of the shift drum.



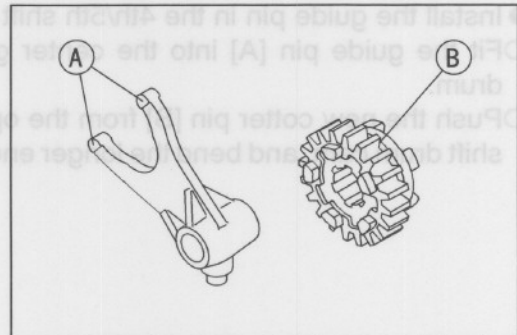
#### Shift Fork Bending

- 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.  
[A] 90°



#### Shift Fork Ear/Gear Shift Fork Groove Wear

- Measure the thickness [A] of the shift fork ears, and measure the width [B] of the shift fork grooves on the transmission gears.
- ★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.



#### Shift Fork Ear Thickness

- Standard:** 4.9 ~ 5.0 mm (0.193 ~ 0.197 in.)  
**Service Limit:** 4.8 mm (0.189 in.)

- ★ If a gear fork groove is worn over the service limit, the gear must be replaced.

#### Gear Shift Fork Groove Width

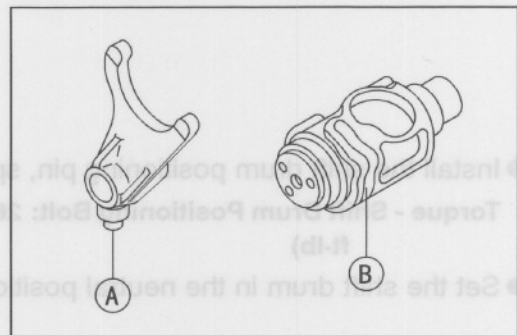
- Standard:** 5.05 ~ 5.15 mm (0.1988 ~ 0.2028 in.)  
**Service Limit:** 5.3 mm (0.2067 in.)

#### Shift Fork Guide Pin/Shift Drum Groove Wear

- Measure the diameter [A] of each shift fork guide pin, and measure the width [B] of each shift drum groove.
- ★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

#### Shift Fork Guide Pin Diameter

- Standard:** Drive shaft - 7.985 ~ 8.000 mm (0.3144 ~ 0.3150 in.)  
Output shaft - 7.900 ~ 8.000 mm (0.3110 ~ 0.3150 in.)  
**Service Limit:** Drive shaft - 7.9 mm (0.311 in.)  
Output shaft - 7.8 mm (0.307 in.)



**Transmission**

★ If any shift drum groove is worn over the service limit, the drum must be replaced.

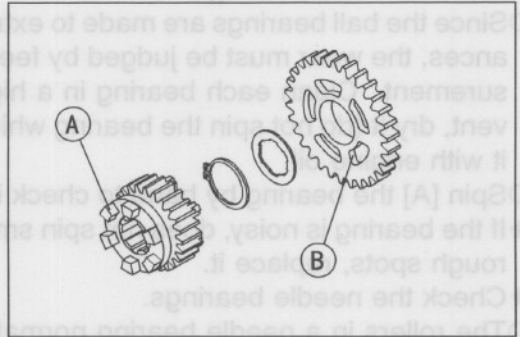
**Shift Drum Groove Width**

**Standard:** 8.05 ~ 8.20 mm (0.3169 ~ 0.3228 in.)

**Service Limit:** 8.3 mm (0.327 in.)

*Gear Dog/Gear Dog Hole Damage*

- Visually inspect the gear dogs [A] and gear dog holes [B].
- ★ Replace any damaged gears or gears with excessively worn dogs or dog holes.



## 7-34 CRANKSHAFT/TRANSMISSION

### Ball Bearing, Needle Bearing, and Oil Seal

#### Ball and Needle Bearing Wear

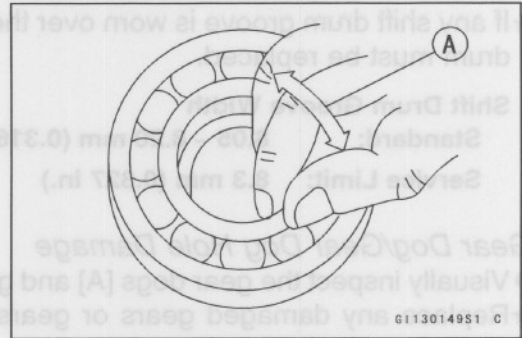
#### CAUTION

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

- Check 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 a high-flash point solvent, dry it (do not spin the bearing while it is dry), 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.
- Check the needle bearings.
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
- ★ If there is any doubt as to the condition of a needle bearing, replace it.

#### Oil Seal Inspection

- Inspect the oil seal.
- Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.



# Wheels/Tires

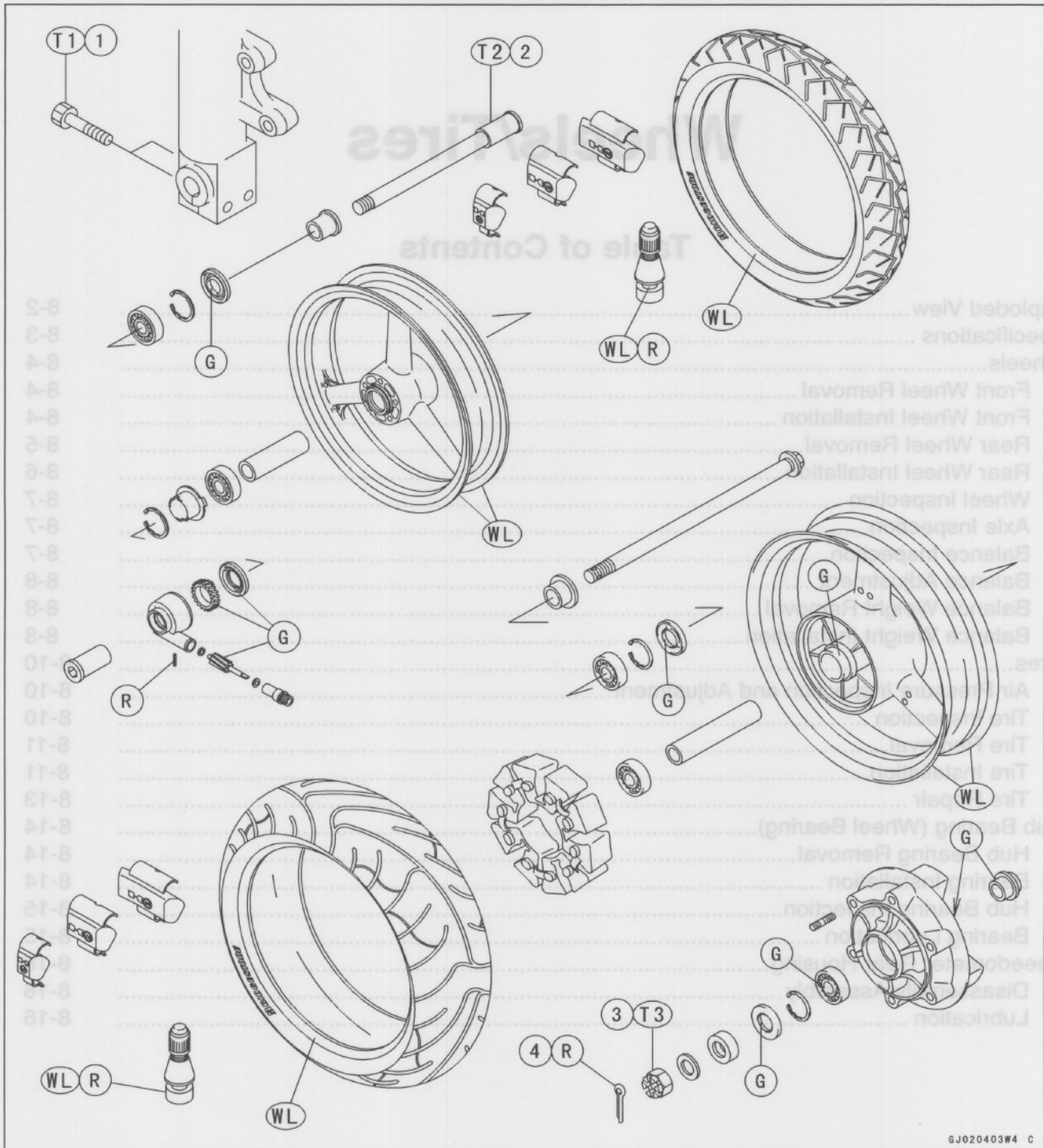
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1. Front Axle Clamp Bolts  
 2. Front Axle  
 3. Rear Axle Nut  
 4. Rear Axle Nut Cotter Pin  
 T1: 20 N·m (2.0 kgf·m, 14 ft·lb)  
 T2: 98 N·m (10 kgf·m, 72 ft·lb)  
 T3: 110 N·m (11 kgf·m, 81 ft·lb)  
 G: Apply grease  
 R: Replacement Parts  
 WL: Apply soap and water solution or rubber lubricant.

## 8-2 WHEELS/TIRES

### Exploded View



GJ020403W4 C

1. Front Axle Clamp Bolts
  2. Front Axle
  3. Rear Axle Nut
  4. Rear Axle Nut Cotter Pin
- T1: 20 N·m (2.0 kgf·m, 14 ft·lb)  
T2: 98 N·m (10 kgf·m, 72 ft·lb)  
T3: 110 N·m (11 kgf·m, 81 ft·lb)  
G: Apply grease  
R: Replacement Parts.  
WL: Apply soap and water solution or rubber lubricant.

Specifications

Item	Standard		Service Limit
<b>Wheels (Rims)</b>			
Rim Runout:			
Axial	---		0.5 mm (0.020 in.)
Radial			0.8 mm (0.031 in.)
Axle Runout/100 mm (4 in.)	Under 0.05 mm (0.0020 in.)		0.2 mm (0.008 in.)
	<b>ZR750-H1 ~ H2</b>	<b>ZR750-H3 ~ H5</b>	
<b>Tires</b>			
Air Pressure (when cold):			
Front	Up to 182 kg (401 lb) load: 250 kPa (2.5kgf/cm <sup>2</sup> , 36 psi)		---
Rear	Up to 182 kg (401 lb) load: 250 kPa (2.5kgf/cm <sup>2</sup> , 36 psi)		---
Tread Depth:			
Front	4.3 mm (0.17 in.)		1 mm (0.04 in.) AR, FG, ST 1.6 mm (0.062 in.)
Rear	7 mm (0.28 in.)		Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)
Standard Tires:			
Front	120/70 ZR17 (58W)	120/70 ZR17 M/C (58W)	---
	BRIDGESTONE BT020 F RADIAL J DUNLOP D220F ST MICHELIN MACADAM 100X		
Rear	160/60 ZR17 (69W)	160/60 ZR17 M/C (69W)	---
	BRIDGESTONE BT020 R RADIAL DUNLOP D220F ST MICHELIN MACADAM 100X		

AR: Austria  
 FG: Germany  
 ST: Switzerland

**⚠ WARNING**

**Use the same manufacturer's tires on both front and rear wheels.**

- Special Tools - Inside Circlip Pliers: 57001-143
- Bearing Driver Set: 57001-1129
- Jack: 57001-1238
- Bearing Remover Shaft: 57001-1377
- Bearing Remover Head,  $\phi$  15 x  $\phi$  17: 57001-1267
- Bearing Remover Head,  $\phi$  20 x  $\phi$  22: 57001-1293

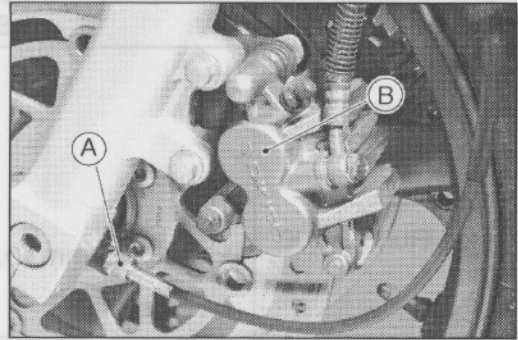
## 8-4 WHEELS/TIRES

### Wheels

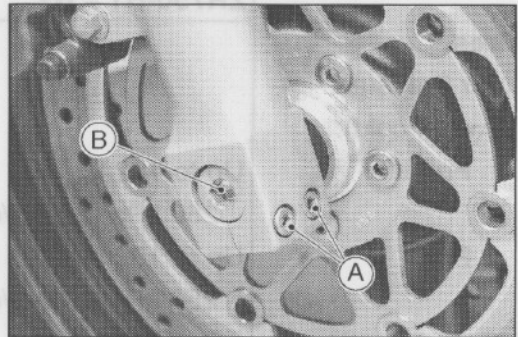
Specifications

#### Front Wheel Removal

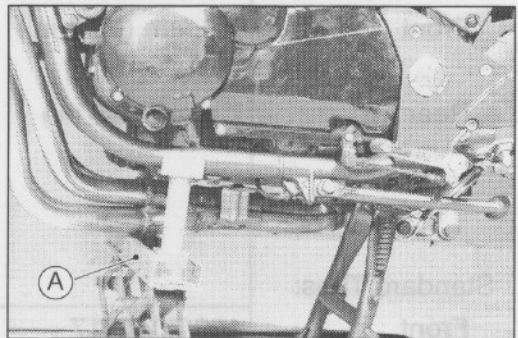
- Remove:
  - Speedometer Cable, lower end [A]
  - Left Front Brake Caliper (remove the mounting bolts and take the caliper out of the disc) [B]



- Right Front Axle Clamp Bolts (loosen) [A]
- Front Axle (loosen) [B]



- Raise the front wheel off the ground.  
**Special Tool - Jack: 57001-1238 [A]**



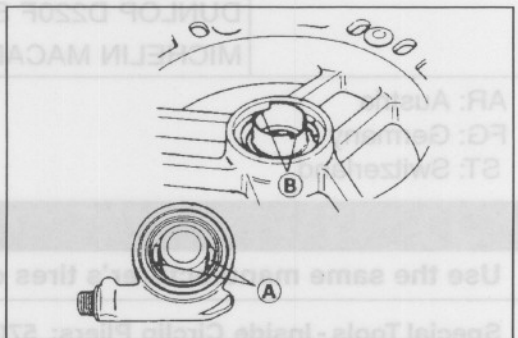
- Pull out the front axle and remove the front wheel.

#### CAUTION

Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

#### Front Wheel Installation

- If the speedometer gear housing is removed, engage the protrusion [A] inside the speedometer gear housing with the cutout [B] in the gear drive of the wheel.



## Wheels

- Place the stop [A] of the speedometer gear housing between the stops [B] of the fork.
- Install the collar on the right side of the hub.
- Install the axle from the right side.

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

**Front Axle Clamp Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)**

**Front Caliper Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**

### NOTE

- Tighten the two clamp bolts alternately two times to ensure even tightening torque.
- Tighten the top plug before tightening the upper fork clamp bolt.

- 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.**

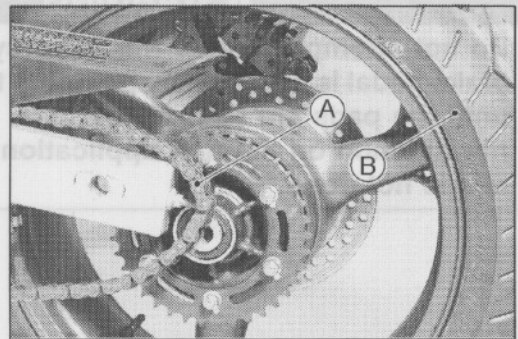
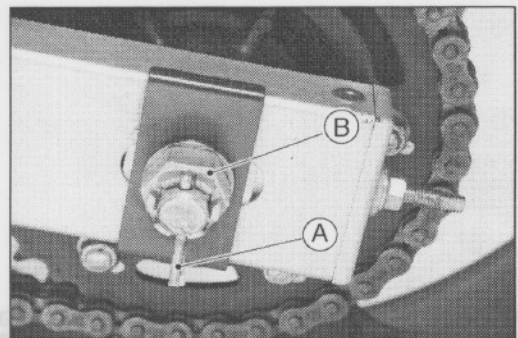
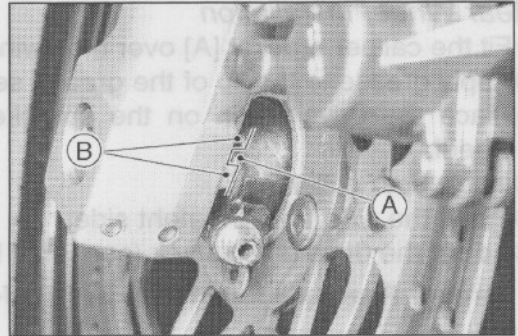
### Rear Wheel Removal

- Set the motorcycle on its center stand and raise the rear wheel off the ground.
- Loosen the drive chain (see Final Drive chapter).
- Remove the cotter pin [A] and the rear axle nut [B].

- Take out the chain [A] to the left side of the rear sprocket.
- Remove the rear axle.
- Pull the rear wheel [B] to the back to take it out of the rear caliper.

### CAUTION

**Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.**



## 8-6 WHEELS/TIRES

### Wheels

#### Rear Wheel Installation

- Fit the caliper bracket [A] over the swingarm stop [B].
- Apply grease to the lip of the grease seal.
- Place the drive chain on the sprocket and install the wheel.
- Insert both collars.
- Insert the axle from the right side.
- Adjust the drive chain slack (see Final Drive chapter).

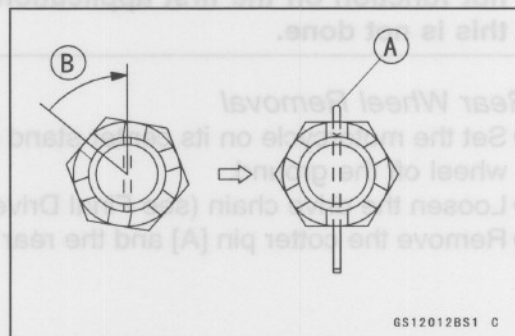
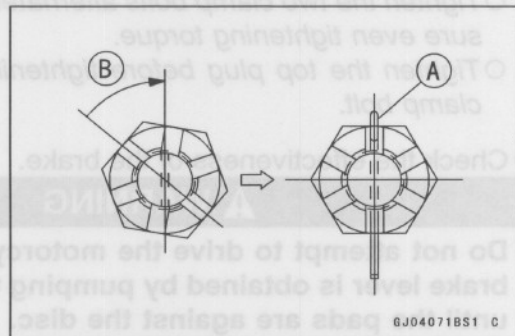
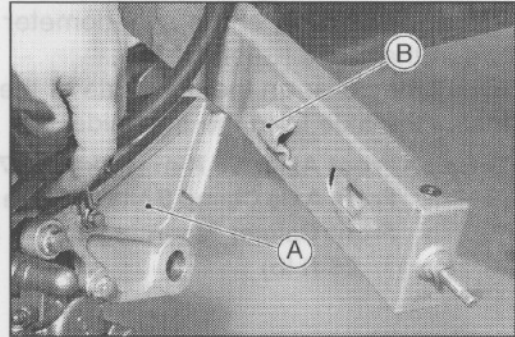
**Torque - Rear Axle Nut: 108 N·m (11 kgf·m, 80 ft·lb)**

- Insert a new cotter pin [A].

#### NOTE

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

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



- Check the effectiveness of the rear brake.

#### ⚠ WARNING

Do not attempt to drive the motorcycle until a full brake pedal is obtained by pumping the brake pedal until the pads are against the disc. The brake will not function on the first application of the pedal if this is not done.



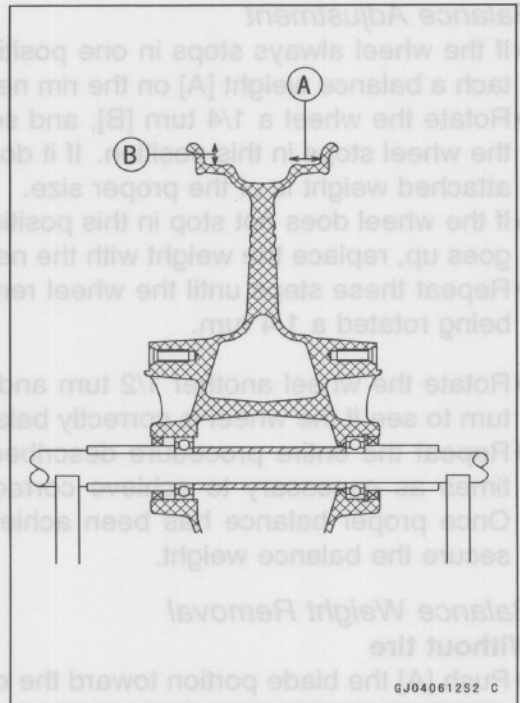
#### CAUTION

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

**Wheels**

*Wheel Inspection*

- Raise the front or rear wheel.
- Special Tool - Jack: 57001-1238**
- Turn the wheel by hand to check that it turns smoothly without making a noise.
- ★ If any abnormal condition is found, replace the hub bearings.
  
- Check the rim for cracks, dents, bend, or warpage.
- ★ If there is any damage to the wheel, replace the wheel.
- Remove the wheel, and replace the tire.
- Using a dial gauge, measure the radial [A] and axial [B] rim runout.
- The difference (TIR) between the maximum and minimum values read on the dial gauge is the amount of runout.
- ★ If rim runout exceeds the service limit, inspect the bearings. If the problem is not due to the bearings, replace the wheel.



**Rim Runout**

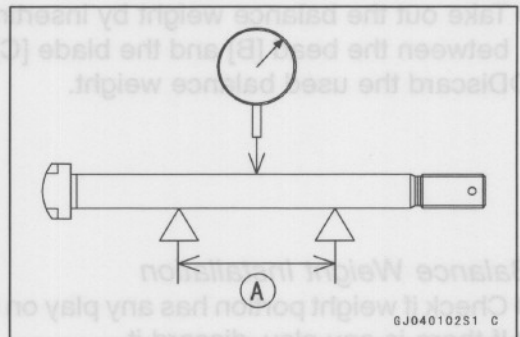
Item	Service Limit
Axial Runout	TIR 0.5 mm (0.020 in.)
Radial Runout	TIR 0.8 mm (0.031 in.)

**⚠ WARNING**

**Never attempt to repair a damaged wheel. If there is any damage besides wheel bearings, the wheel must be replaced to insure safe operational condition.**

*Axle Inspection*

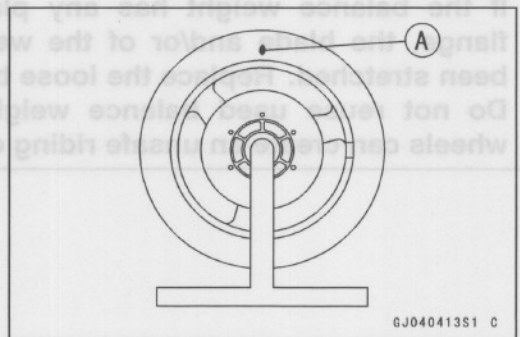
- Visually inspect the front and rear axles.
- ★ If the axle is cracked, damaged, or bent, replace it.
- Place the axle in two V blocks that are placed 100 mm (4 in.) [A] apart, and set a dial gauge on the axle at a point halfway between the blocks. Turn the axle to measure the runout.
- ★ If axle runout exceeds the service limit, replace the axle.



**Axle Runout/100 mm (4 in.)**  
**Standard: TIR 0.05 (0.0020 in.)**  
**Service Limit: TIR 0.2 mm (0.008 in.)**

*Balance Inspection*

- If the wheel balance has been altered, such as due to the replacement of the tire, inspect the wheel balance.
- 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.

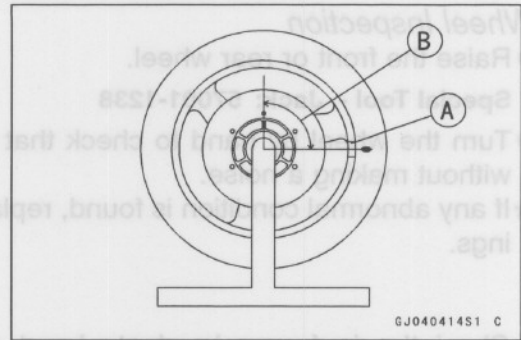


## 8-8 WHEELS/TIRES

### Wheels

#### Balance Adjustment

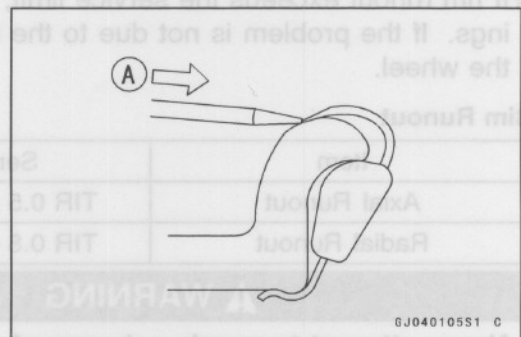
- If the wheel always stops in one position, tentatively attach a balance weight [A] on the rim near the marking.
- Rotate the wheel a 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the tentatively attached weight is of the proper size.
- ★ If the wheel does not stop in this position and the weight goes up, replace the weight with the next heavier size.
- 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, permanently secure the balance weight.



#### Balance Weight Removal

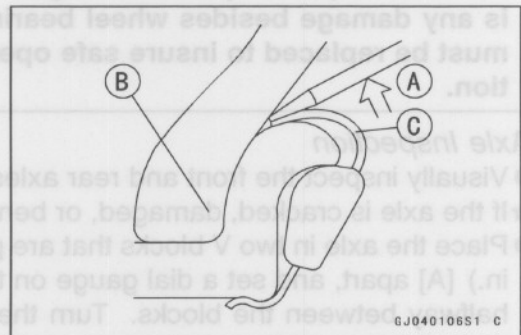
##### Without tire

- Push [A] the blade portion toward the outside with a regular tip screwdriver, and slip the balance weight off, as shown.
- Discard the used balance weight.



##### With tire

- Remove the balance weight by using a screwdriver to pry [A] on the blade.
- Take out the balance weight by inserting the screwdriver between the bead [B] and the blade [C], as shown.
- Discard the used balance weight.



#### Balance Weight Installation

- Check if weight portion has any play on the blade and clip.
- If there is any play, discard it.

### ⚠ WARNING

If the balance weight has any play on the rim flange, the blade and/or of the weight clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight. Unbalanced wheels can create an unsafe riding condition.

**Wheels**

○ If 20 g (0.71 oz.) or more balance weight must be attached to the wheel, they must be attached to both sides of the wheel in the combination shown below, in order to ensure driving stability.

**Balance Weight Installation**

Necessary Weight (mass)	Weight Combination	
	Side [A]	Side [B]
10 g (0.35 oz.)	10 g (0.35 oz.)	-
20 g (0.71 oz.)	10 g (0.35 oz.)	10 g (0.35 oz.)
30 g (1.06 oz.)	20 g (0.71 oz.)	10 g (0.35 oz.)
40 g (1.41 oz.)	20 g (0.71 oz.)	20 g (0.71 oz.)
50 g (1.76 oz.)	30 g (1.06 oz.)	20 g (0.71 oz.)
60 g (2.12 oz.)	30 g (1.06 oz.)	30 g (1.06 oz.)
70 g (2.47 oz.)	20 g (0.71 oz.) + 20 g (0.71 oz.)	30 g (1.06 oz.)
80 g (2.82 oz.)	20 g (0.71 oz.) + 20 g (0.71 oz.)	20 g (0.71 oz.) + 20 g (0.71 oz.)
90 g (3.17 oz.)	20 g (0.71 oz.) + 30 g (1.06 oz.)	20 g (0.71 oz.) + 20 g (0.71 oz.)

**NOTE**

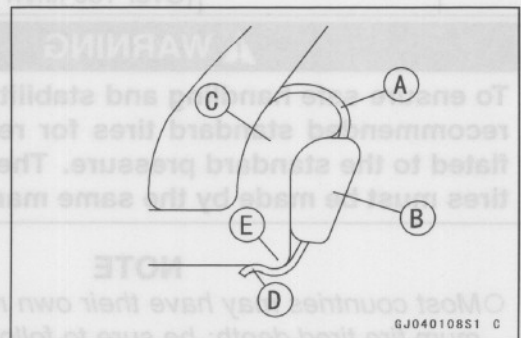
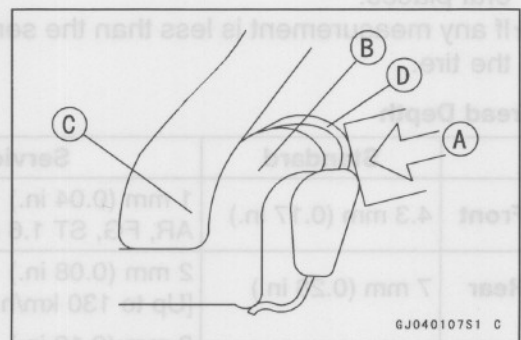
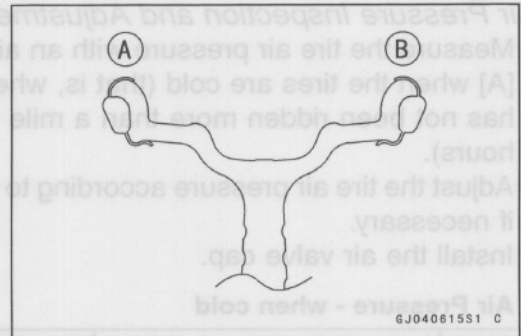
○ If the imbalance is less than 10 g (0.35 oz.), it will not affect the motorcycle's stability during driving. Do not use more than four balance weights or exceed 90 g (3.17 oz.). In such a case, inspect the wheel.

- Apply a soap and water solution to the tire bead [C], rim flange [B], and weight blade [D]. This helps the balance weight slip onto the rim flange.

**CAUTION**

**Do not lubricate the tire bead with engine oil or petroleum distillates because they will deteriorate the tire.**

- Lightly hammer (or push) [A] the balance weight to install it.
- After installing, make sure that the blade [A] and weight [B] are fully seated on the rim flange [C], and that the clip [D] is hooked over the rim ridge [E] and reaches the rim flat portion.

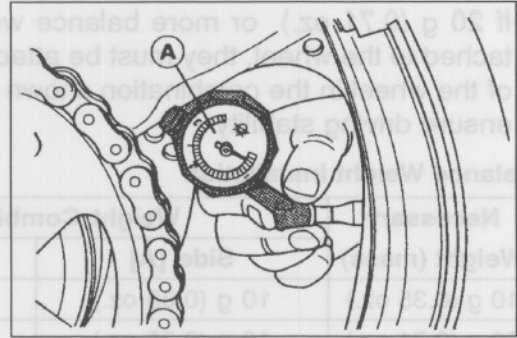


## 8-10 WHEELS/TIRES

### Tires

#### Air Pressure Inspection and Adjustment

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



#### Air Pressure - when cold

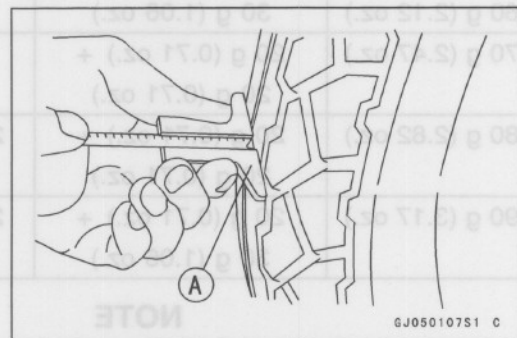
<b>Front</b>	Up to 182 kg (401 lb) load	250 kPa (2.5 kg/cm <sup>2</sup> , 36 psi)
<b>Rear</b>	Up to 182 kg (401 lb) load	250 kPa (2.5 kg/cm <sup>2</sup> , 36 psi)

#### Tire Inspection

- Visually inspect the sidewalls and tread for cracks and cuts.

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

- ★ Replace the tire with a new one in case of damage.
- Check for any nails, metal pieces, stones, or other foreign particles that may be embedded or stuck in the tires.
- ★ Repair or replace the tire with a new one if necessary.
- Using a depth gauge [A], measure the tread depth at several places.
- ★ If any measurement is less than the service limit, replace the tire.



#### Tread Depth

	Standard	Service Limit
<b>Front</b>	4.3 mm (0.17 in.)	1 mm (0.04 in.) AR, FG, ST 1.6 mm (0.062 in.)
<b>Rear</b>	7 mm (0.28 in.)	2 mm (0.08 in.) [Up to 130 km/h (80 mph)] 3 mm (0.12 in.) [Over 130 km/h (80 mph)]

### **⚠ WARNING**

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

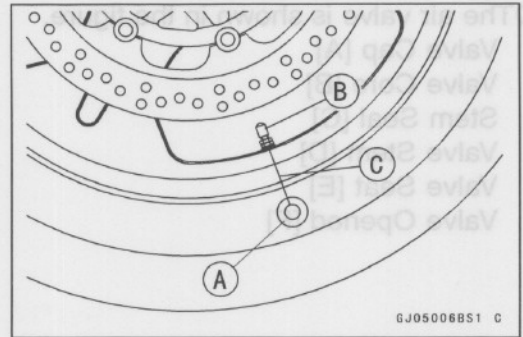
### **NOTE**

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

**Tires**

*Tire Removal*

- Remove:
  - Wheel (see this chapter)
  - Brake Disc (see Brakes chapter)
  - Valve Core (let out the air)
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
  - Chalk Mark or Yellow Mark [A]
  - Air valve [B]
  - Align [C]
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.



**CAUTION**

**Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.**

- Remove the tire from the rim using a suitable commercially available tire changer.

**NOTE**

○ *The tires cannot be removed with hand tools because they fit the rims too tightly.*

*Tire Installation*

**WARNING**

**Use the same manufacturer's tires on both front and rear wheels.**

- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

**CAUTION**

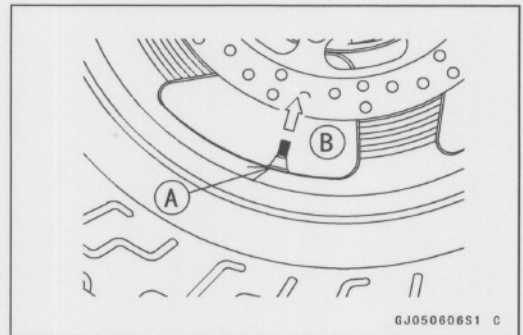
**Replace the air valve whenever the tire is replaced. Do not reuse the air valve.**

- Install a new valve in the rim.
  - Remove the valve cap, lubricate the stem seal with a soap and water solution or rubber lubricant, and pull the valve stem [A] through the rim from the inside out [B] until it snaps into place.

**CAUTION**

**Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.**

- Apply a soap and water solution, or rubber lubricant to the rim flange and tire beads.

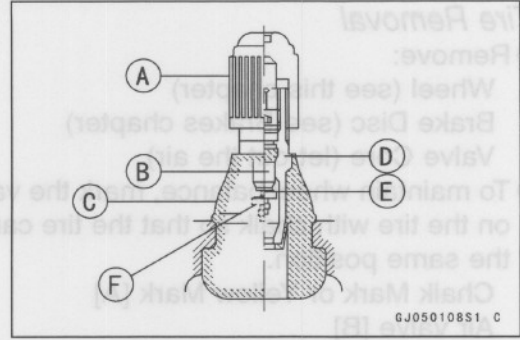
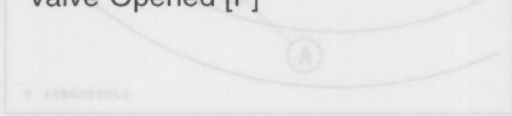


## 8-12 WHEELS/TIRES

### Tires

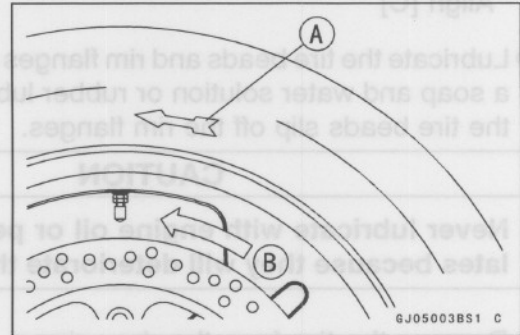
- The air valve is shown in the figure.

Valve Cap [A]  
Valve Core [B]  
Stem Seal [C]  
Valve Stem [D]  
Valve Seat [E]  
Valve Opened [F]



- Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.

Rotation Direction [A]  
Tire Rotation Mark [B]

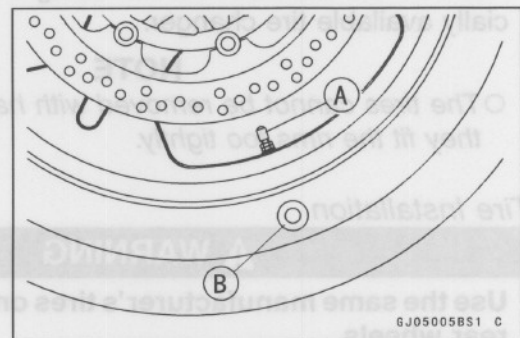


- Position the tire on the rim so that the valve [A] is at the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).

- Install the tire on the rim using a suitable commercially available tire changer.

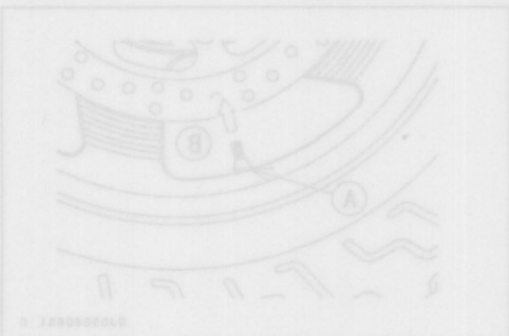
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.

- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.



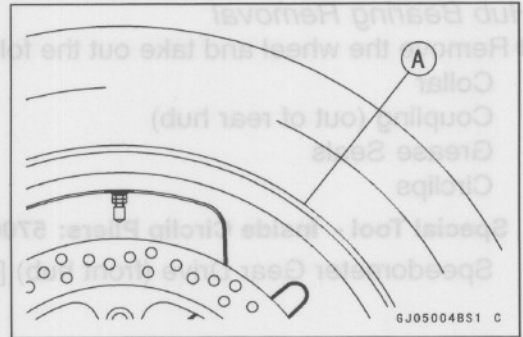
### ⚠ WARNING

Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm<sup>2</sup>, 57 psi). Overinflating can explode the tire with possibility of injury and loss of life.



**Tires**

- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.
- ★ If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.
- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.
- Inflate the tire slightly above standard inflation.
- Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.
- Adjust the air pressure to the specified pressure (see Tire Inspection).
- Install the air valve cap.
- Install the brake disc(s) so that the marked side faces out (see Brakes chapter).
- Adjust the wheel balance.

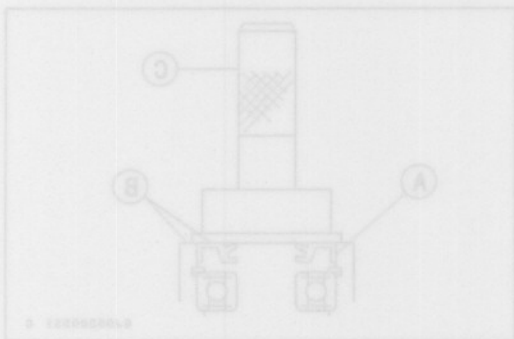


**CAUTION**

Do not lay the wheel on the ground facing down. This can damage or warp the disc. Place wooden blocks under the wheel so that the disc does not touch the ground.

**Tire Repair**

Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.



**NOTE**

○ Install the bearings so that the marked side faces out.

● Install the bearings by using the bearing driver set which does not contact the bearing inner race.

● Press in each bearing [A] right until they are fl bottomed.

Special Tool - Bearing Driver Set: 57001-1129 [B]

● Replace the clips with a new one.

Special Tool - Inside Clip Pliers: 57001-143

● Replace the grease seal [A] with a new one and press it in so that seal surface is flush [B] with the end of the hub hole.

● Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001-1129 [C]

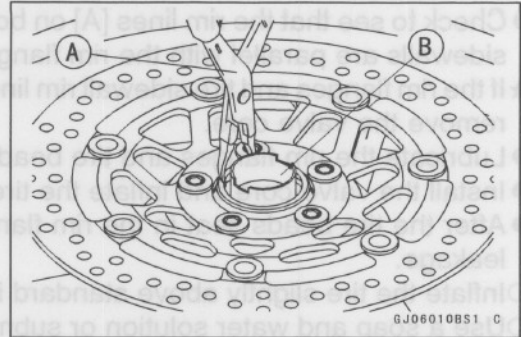
## 8-14 WHEELS/TIRES

### Hub Bearing (Wheel Bearing)

#### Hub Bearing Removal

- Remove the wheel and take out the following parts:
  - Collar
  - Coupling (out of rear hub)
  - Grease Seals
  - Circlips

**Special Tool - Inside Circlip Pliers: 57001-143 [A]**  
Speedometer Gear Drive (front hub) [B]



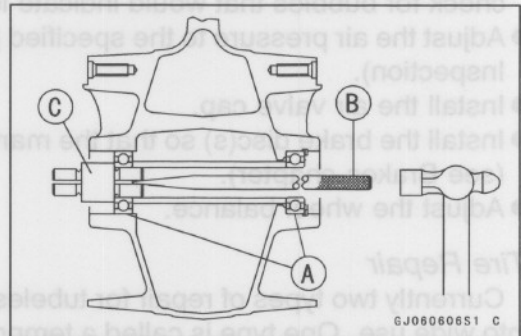
- Use the bearing remover to remove the hub bearings [A].

#### CAUTION

**Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place wooden blocks under the wheel so that the disc does not touch the ground.**

- Select a remover head that matches the bearing bore and insert it.
- Pass the remover shaft 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: 57001-1377 [B]**  
**Bearing Remover Head,  $\phi 15 \times \phi 17$ : 57001-1267 [C]**  
**Bearing Remover Head,  $\phi 20 \times \phi 22$ : 57001-1293 [C]**



#### Bearing Installation

- Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.

#### NOTE

- Install the bearings so that the marked side faces out.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.
- Press in each bearing [A] right until they are bottomed.

**Special Tool - Bearing Driver Set: 57001-1129 [B]**

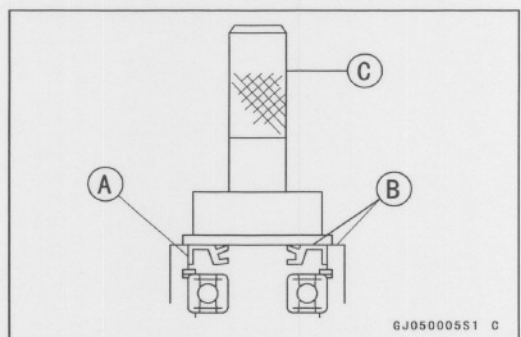
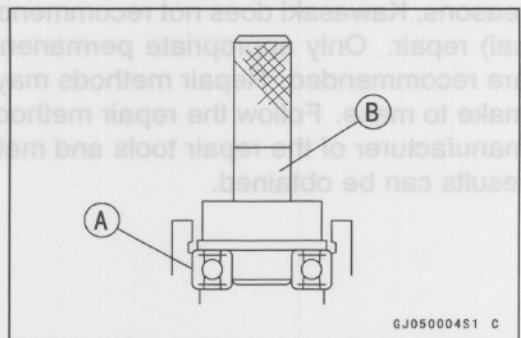
- Replace the circlips with a new one.

**Special Tool - Inside Circlip Pliers: 57001-143**

- Replace the grease seal [A] with a new one and press it in so that seal surface is flush [B] with the end of the hub hole.

- Apply high-temperature grease to the grease seal lips.

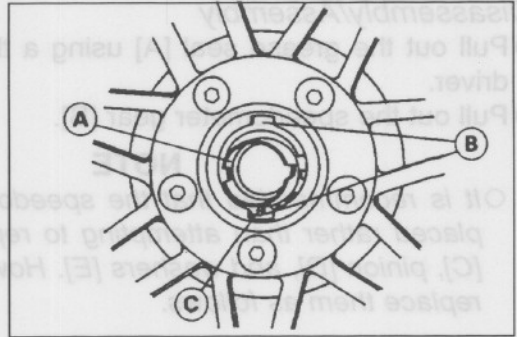
**Special Tool - Bearing Driver Set: 57001-1129 [C]**



## Hub Bearing (Wheel Bearing)

- Engage the speedometer gear drive [A] into the notch [B] of the front wheel hub and install the circlip [C].

**Special Tool - Inside Circlip Pliers: 57001-143**



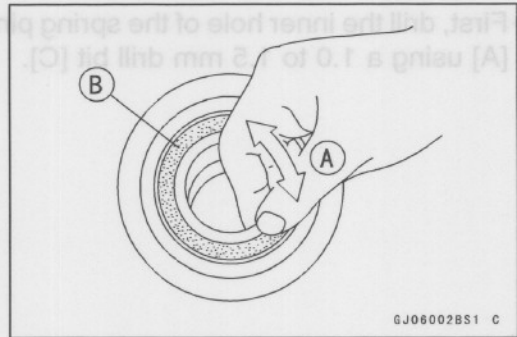
### Hub Bearing Inspection

Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement.

**NOTE**

○ Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.

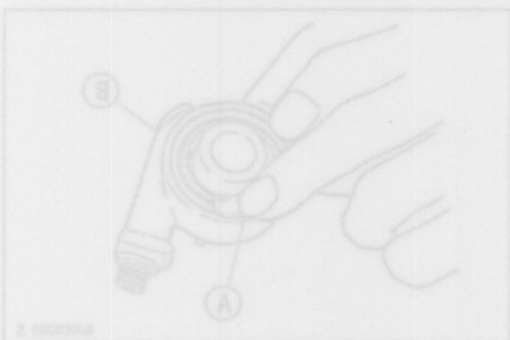
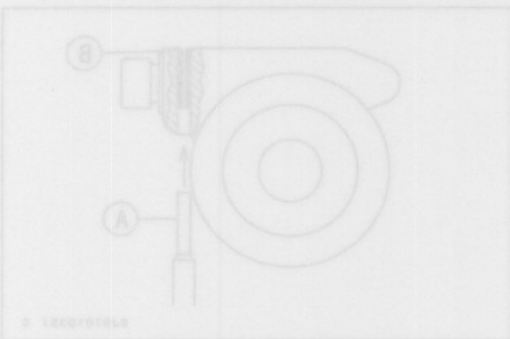
- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.
- ★ If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.
- Inspect the bearing seal [B] for tears or leakage.
- ★ If the seal is torn or is leaking, replace the bearing.



### Bearing Lubrication

**NOTE**

○ Since the bearings are packed with grease and sealed on both sides, lubrication is not required.



- Apply high temperature grease to the seal lips.
- Press in the grease seal so that the seal end is flush with the end of the hole.
- Replace the grease seal.
- Secure the pin in place.
- After inserting a new spring pin, stake the housing hole to the speedometer cable bushing, pinion, and washers.
- Apply grease to the gear, pinion, grease seal, and washers.
- Using a 3 mm rod [A], tap the pin [B] out, and then pull out

Lubrication  
● Clean the speedometer gear housing [A] and grease the grease seal lips [B].

## 8-16 WHEELS/TIRES

### Speedometer Gear Housing

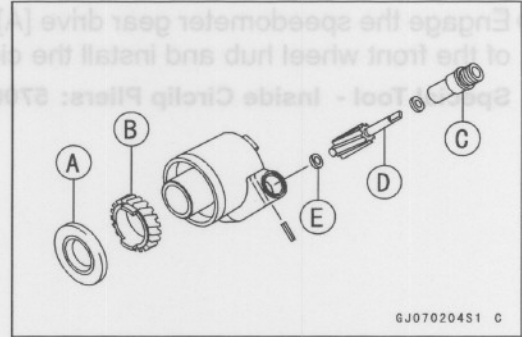
#### Disassembly/Assembly

- Pull out the grease seal [A] using a thin-bladed screwdriver.
- Pull out the speedometer gear [B].

#### NOTE

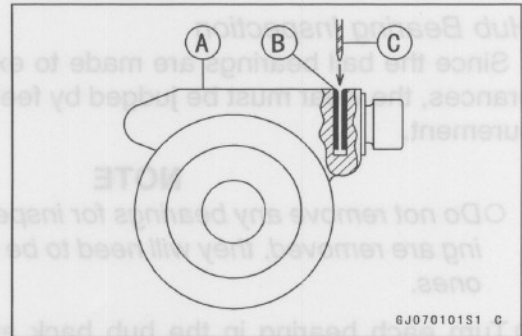
○ It is recommended that the speedometer unit be replaced rather than attempting to replace the bushing [C], pinion [D], and washers [E]. However, if you wish, replace them as follows.

- First, drill the inner hole of the spring pin [B] in the housing [A] using a 1.0 to 1.5 mm drill bit [C].



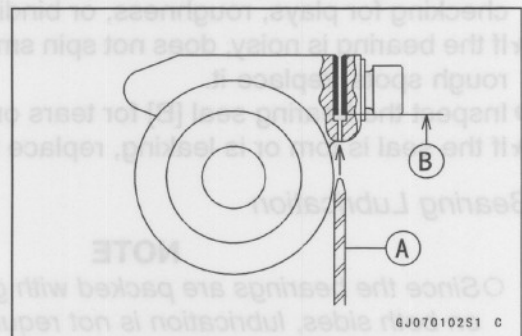
GJ070204S1 C

- Drill the housing from the opposite side to the pin end [B], using a 3.0 to 3.5 mm drill bit [A].



GJ070101S1 C

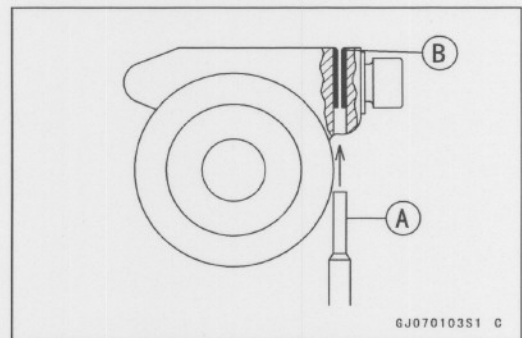
- Using a 3 mm rod [A], tap the pin [B] out, and then pull out the speedometer cable bushing, pinion, and washers.
- Apply grease to the gear, pinion, grease seal, and washers (see Exploded View).
- After inserting a new spring pin, stake the housing hole to secure the pin in place.
- Replace the grease seal.
- Press in the grease seal so that the seal end is flush with the end of the hole.
- Apply high temperature grease to the seal lips.



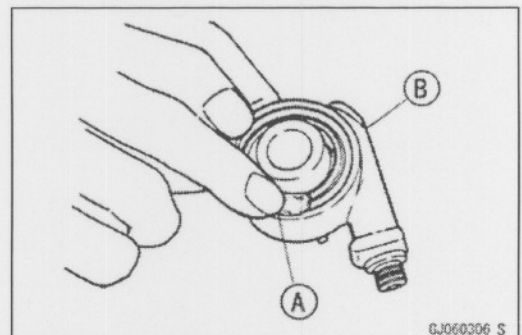
GJ070102S1 C

#### Lubrication

- Clean the speedometer gear housing [A] and grease the grease seal lips [B].



GJ070103S1 C



GJ060306 S

# Final Drive

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The molybdenum disulfide oil is mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).

MO: Apply molybdenum disulfide oil to the thread and seating surface.

L: Apply a non-permanent locking agent to the threads (of stud bolt).

G: Apply high-temperature grease.

CO: Apply chain oil.

T3: 12 N·m (1.2 kgf·m, 104 in·lb)

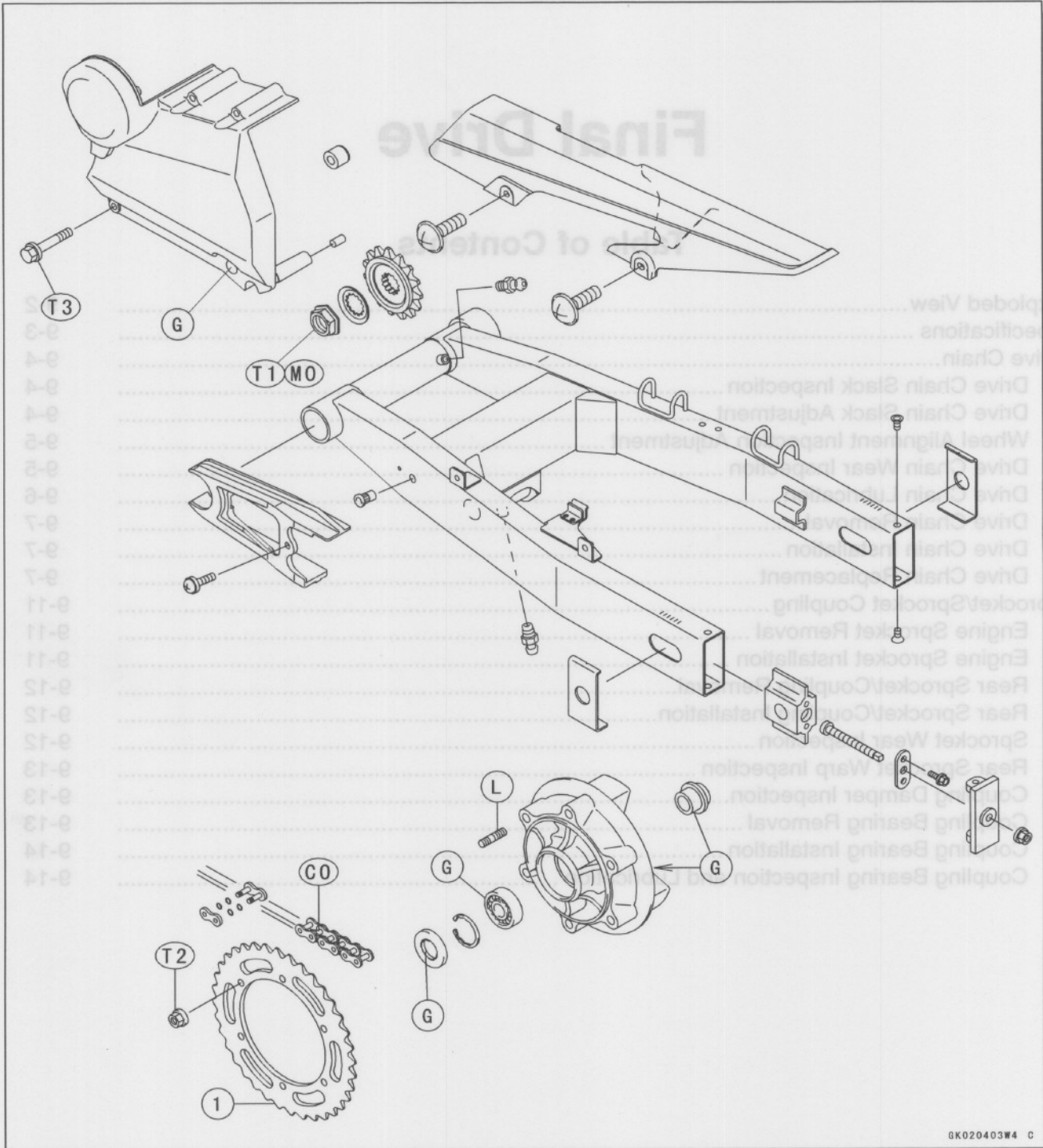
T2: 59 N·m (6.0 kgf·m, 43 ft·lb)

T1: 127 N·m (13 kgf·m, 94 ft·lb)

1: Letting side faces out.

## 9-2 FINAL DRIVE

### Exploded View



1. Lettering side faces out.

T1: 127 N·m (13 kgf·m, 94 ft·lb)

T2: 59 N·m (6.0 kgf·m, 43 ft·lb)

T3: 12 N·m (1.2 kgf·m, 104 in·lb)

CO: Apply chain oil.

G: Apply high-temperature grease.

L: Apply a non-permanent locking agent to the threads (of stud bolt).

MO: Apply molybdenum disulfide oil to the thread and seating surface.

The molybdenum disulfide oil is mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).

8K020403W4 C

Specifications

Item	Standard	Service Limit
<b>Drive Chain</b>		
Chain Slack	30 ~ 45 mm (1.2 ~ 1.8 in.)	
Chain 20-link Length	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Standard Chain		
Make	ENUMA	---
Type	EK525 MV-X, Endless	---
Link	108 Links	---
<b>Sprockets, Coupling</b>		
Engine Sprocket Diameter	71.01 ~ 71.21 mm (2.796 ~ 2.804 in.)	70.3 mm (2.77 in.)
Rear Sprocket Diameter	182.13 ~ 182.63 mm (7.170 ~ 7.190 in.)	181.8 mm (7.16 in.)
Rear Sprocket Warp	Under 0.4 mm (0.016 in.)	0.5 mm (0.020 in.)

Special Tools - Inside Circlip Pliers: 57001-143  
 Bearing Driver Set: 57001-1129



Drive Chain Slack Adjustment

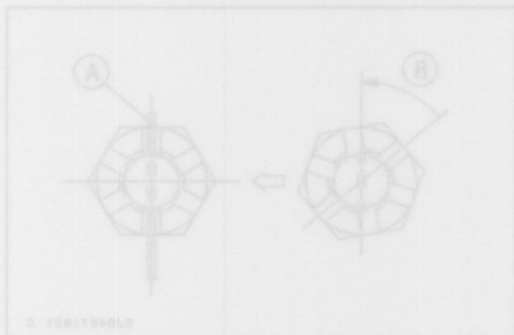
- Pull out the cotter pin [A].
- Loosen the axle nut [B].
- Turn both chain adjuster locknuts [C].
- ★ If the chain is too loose, turn out the left and right chain adjuster [D] evenly.
- ★ If the chain is too tight, turn in the left and right chain adjusters evenly, and kick the wheel forward.
- Turn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

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

- Tighten both chain adjuster locknuts securely.
- Tighten the axle nut.
- Torque - Rear Axle Nut: 108 N·m (11 kgf-m, 80 ft-lb)
- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

NOTE

- Insert a new cotter pin [A].
- 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. Off should be within 30 degrees.
- Loosen once and tighten again when the slot goes past the nearest hole.



## 9-4 FINAL DRIVE

### Drive Chain

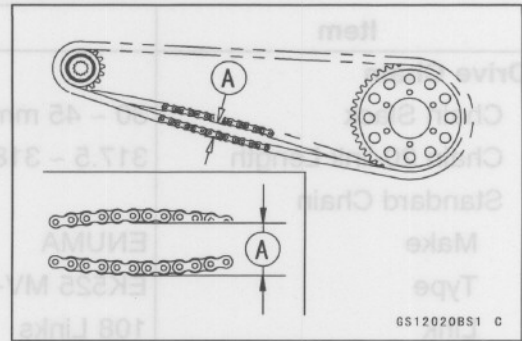
#### Drive Chain Slack Inspection

##### 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 Wheel Alignment Inspection).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the front and rear sprockets.
- ★ If the chain slack exceeds the standard, adjust it.

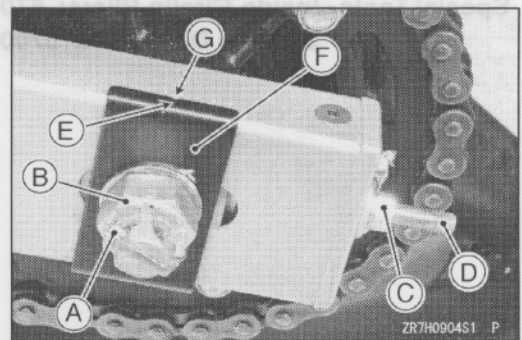
##### Drive Chain Slack

Standard: 30 ~ 45 mm (1.2 ~ 1.8 in.)



#### Drive Chain Slack Adjustment

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



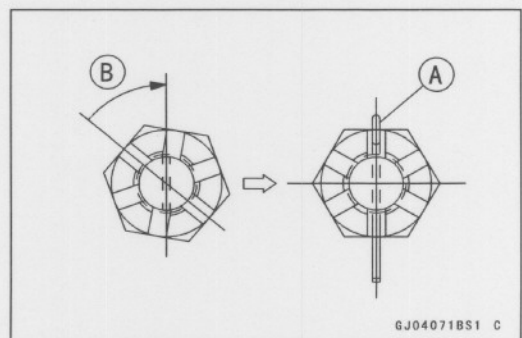
##### ⚠ WARNING

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

- Tighten both chain adjuster locknuts securely.
- Tighten the axle nut.  
**Torque - Rear Axle Nut: 108 N·m (11 kgf·m, 80 ft·lb)**
- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Insert a new cotter pin [A].

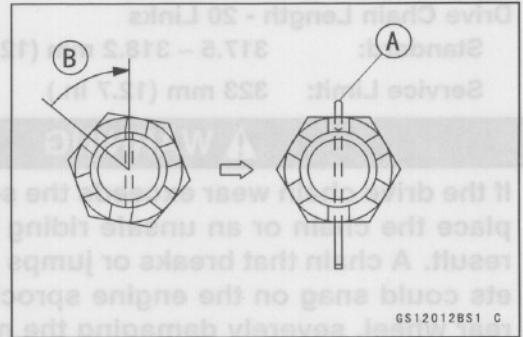
##### NOTE

- When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hoke 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.



## Drive Chain

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

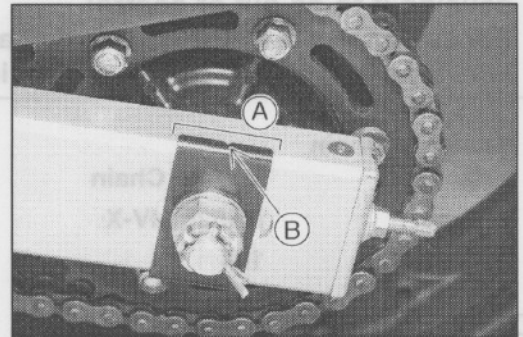


### Wheel Alignment Inspection Adjustment

- Check to see that the graduation of the chain adjuster [B] and the swingarm notch [A] of both sides are in the same relative position.
- ★ If they are do not, adjust the chain slack and align the wheel alignment (see chain slack Adjustment).

#### NOTE

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

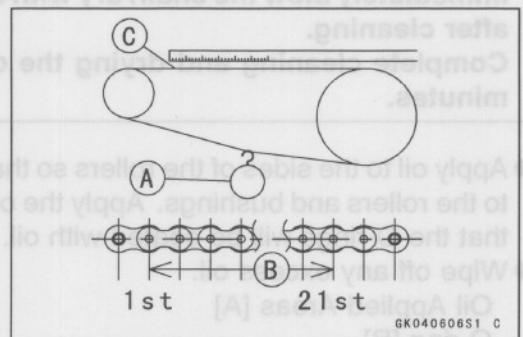
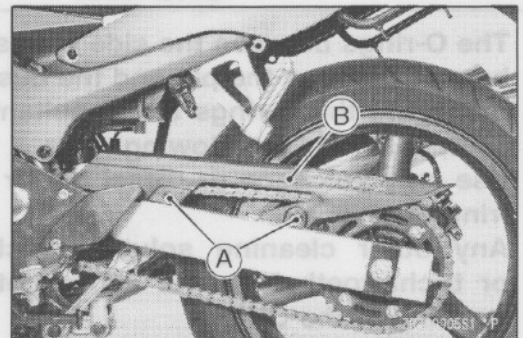


### ⚠ WARNING

Misalignment of both alignment indicators will result in abnormal wear of the drive chain and the sprocket, which may result in an unsafe riding condition.

### Drive Chain Wear Inspection

- Remove:
  - Mounting Screw [A]
  - Chain Cover [B]
- Rotate the rear 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, 201 lb) weight [A] on the chain.
- Measure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurement at several place.
- ★ If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.



## 9-6 FINAL DRIVE

### Drive Chain

#### Drive Chain Length - 20 Links

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

Service Limit: 323 mm (12.7 in.)

#### **⚠ WARNING**

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

For safety, use only the standard chain. It is an endless type and should not be cut for installation

#### Standard Chain

Make: Enuma Chain

Type: EK525 MV-X

Links: 108

#### 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.

#### **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.

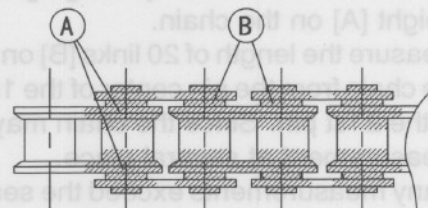
Use only kerosene or diesel oil for cleaning an O-ring drive chain.

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.
  - Oil Applied Areas [A]
  - O-ring [B]

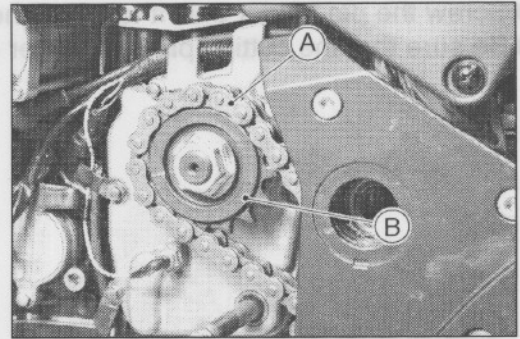


6K040607S1 C

**Drive Chain**

*Drive Chain Removal*

- Remove:
  - Rear Wheel (see Wheels/Tires chapter)
  - Chain Cover (see Drive Chain Wear Inspection)
  - Swingarm (see Suspension chapter)
  - Engine Sprocket Cover (see Engine Sprocket Removal)
- Disengage the drive chain [A] from the engine sprocket [B], and take it off the chassis.



*Drive Chain Installation*

- Engage the drive chain to the engine sprocket.
- Install:
  - Swingarm (see Suspension chapter)
  - Rear Wheel (see Wheels/Tires chapter)
  - Engine Sprocket Cover
  - Chain Cover
- Adjust the chain slack after installing the chain (see Drive Chain Slack Adjustment).

*Drive Chain Replacement*

- Remove:
  - Chain Cover
  - Engine Sprocket (see Engine Sprocket Removal)
- Using a suitable tool, cut the drive chain by removing the link pins.

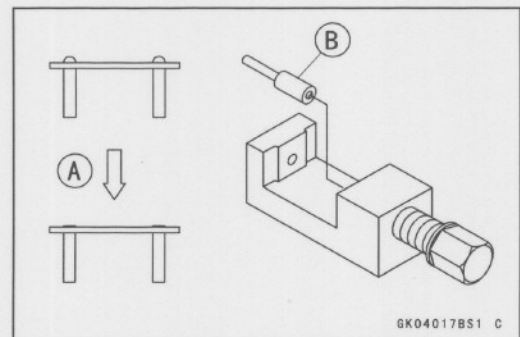
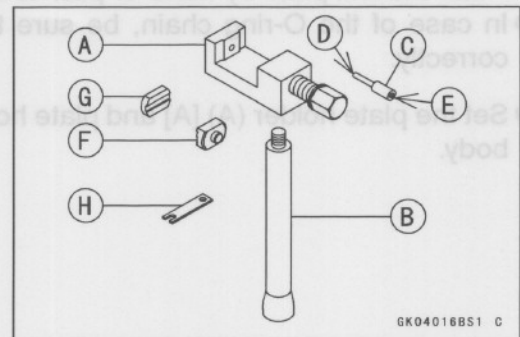
**Recommended Tool: EK JOINT TOOL #50**

**CAUTION**

**Read the Tool Manual before removing.**

- Body [A]
- Handlebar [B]
- Cutting & Riveting Pin [C]
- For Cutting [D]
- For Riveting [E]
- Plate Holder (A) [F]
- Plate Holder (B) [G]
- Gauge [H]

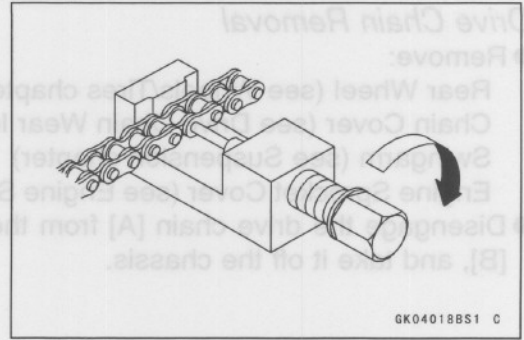
- Grind [A] the pin head to make it flat.
- Set the cutting & riveting pin [B] as shown.



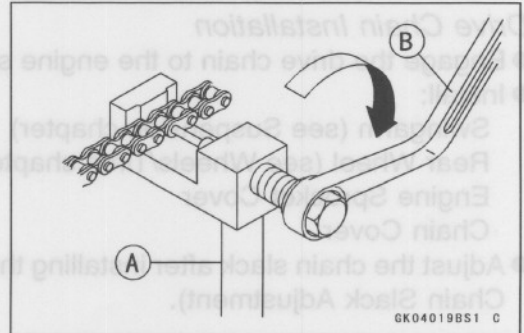
## 9-8 FINAL DRIVE

### Drive Chain

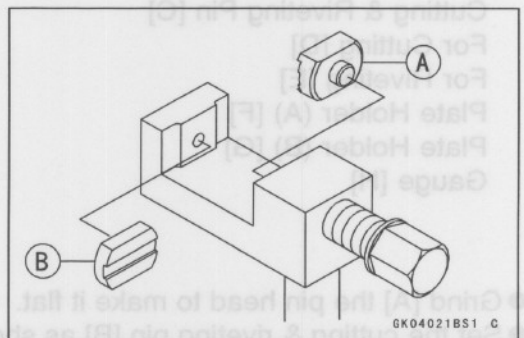
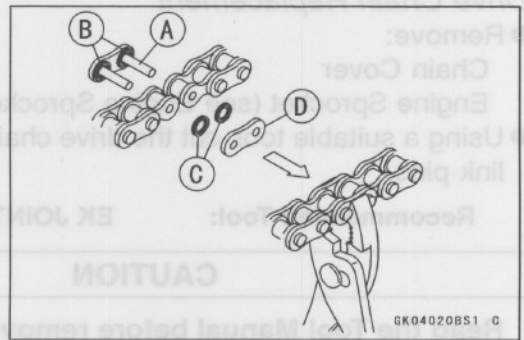
- Screw the pin holder until it touches the chain pin.
- Be sure that the cutting pin hits center of the chain pin.



- Screw the handlebar [A] into body.
- Turn the pin holder with the wrench [B] clockwise to the extract chain pin.

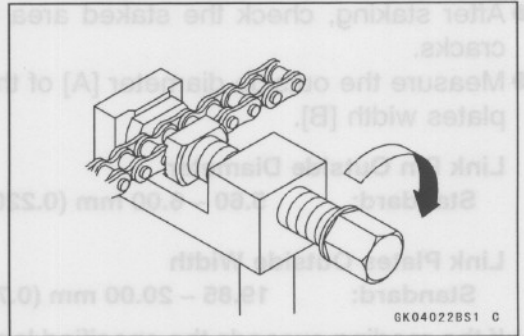
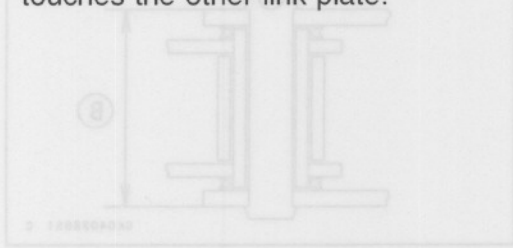


- Engage the new drive chain to the old drive chain and pull the end of the old drive chain until they are changing the position.
- Remove the old drive chain from the new drive chain.
- Apply grease to the new link pins [A] and new O-rings [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the O-rings [C].
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- In case of the O-ring chain, be sure to set the O-rings correctly.
- Set the plate holder (A) [A] and plate holder (B) [B] on the body.

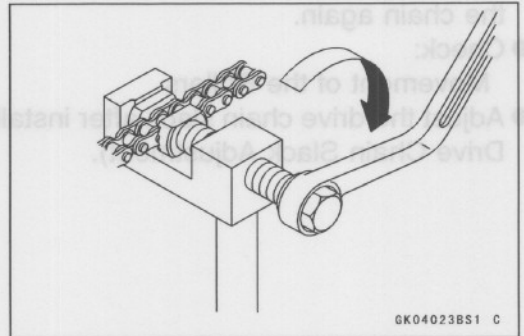


Drive Chain

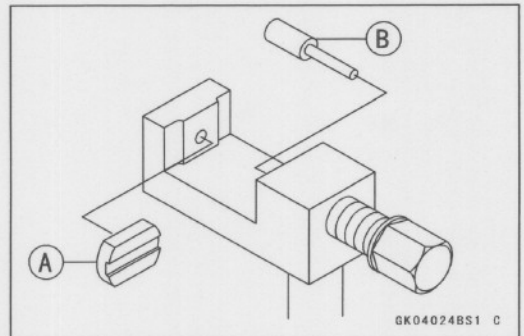
- Fit the plate holder (A) to the link plate.
- Turn the pin holder by hand until the plate holder (B) touches the other link plate.



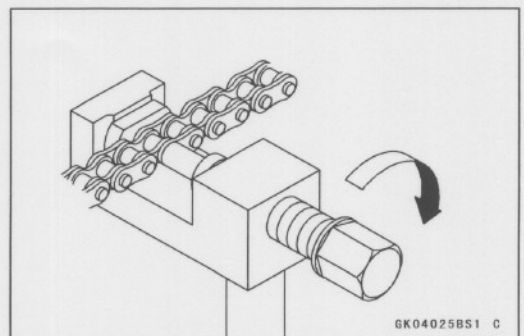
- Turn the pin holder by wrench clockwise until two pins of the link come into the groove of the plate holder (A).
- Take off the plate holder.



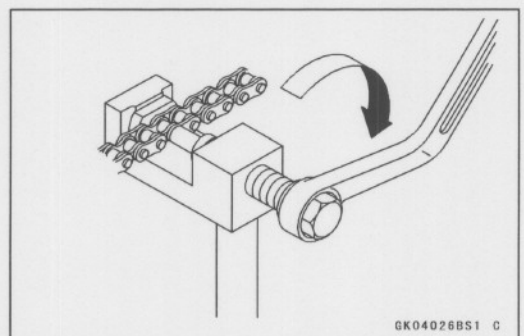
- Set the plate holder (B) [A] and cutting & riveting pin [B] as shown.



- Turn the pin holder until the riveting pin touches the link pin.



- Turn the wrench clockwise until the tip of the riveting pin hits the link pin.
- Rivet it.
- Some work for the other link pin.



## 9-10 FINAL DRIVE

### Drive Chain

- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

#### Link Pin Outside Diameter

Standard: 5.60 ~ 6.00 mm (0.220 ~ 0.236 in.)

#### Link Plates Outside Width

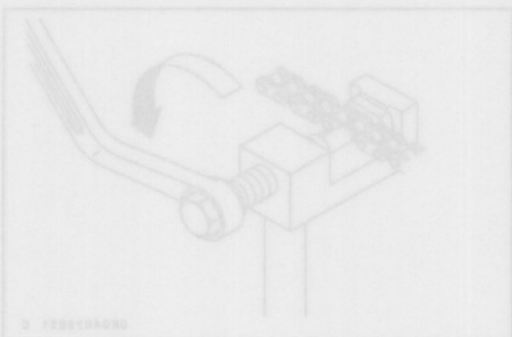
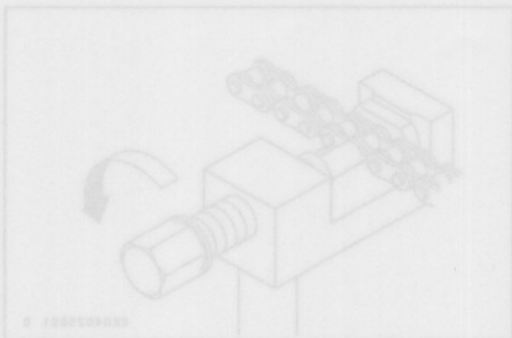
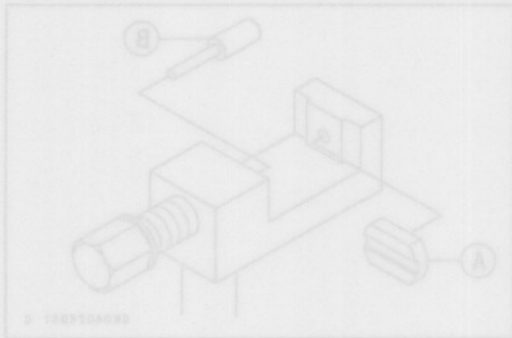
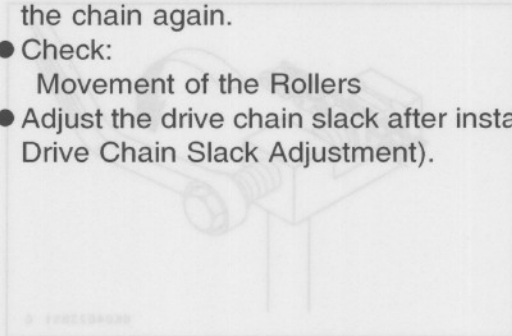
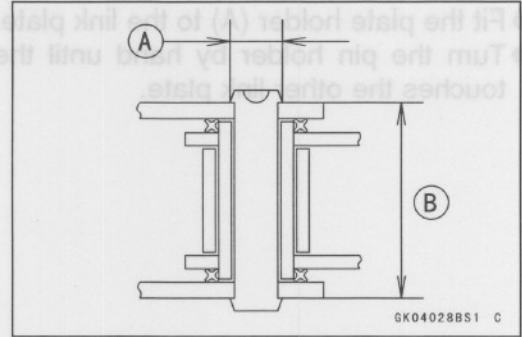
Standard: 19.85 ~ 20.00 mm (0.703 ~ 0.787 in.)

- ★ If the reading exceeds the specified length, cut and rejoin the chain again.

- Check:

Movement of the Rollers

- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment).



● Turn the pin holder by wrench clockwise until two pins of the link come into the groove of the plate holder (A).  
● Take off the plate holder.

● Set the plate holder (B) and cutting & riveting pin (B) as shown.

● Turn the pin holder until the riveting pin touches the link pin.

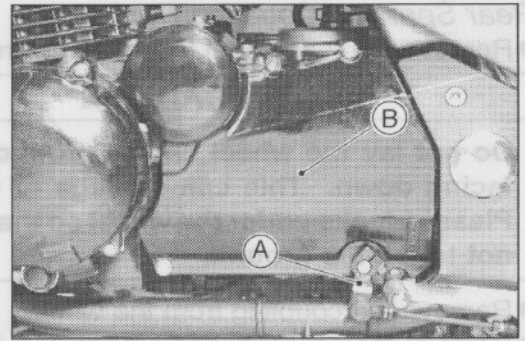
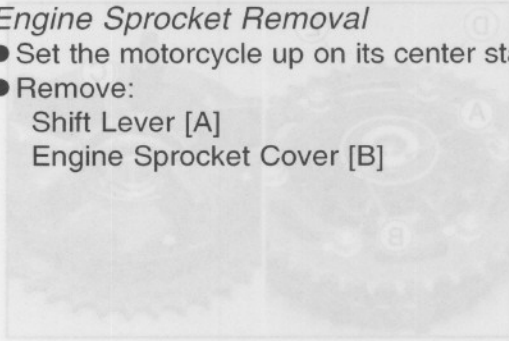
● Turn the wrench clockwise until the tip of the riveting pin fits of the link pin.

● Rivet it.  
● Some work for the other link pin.

## Sprocket/Sprocket Coupling

### Engine Sprocket Removal

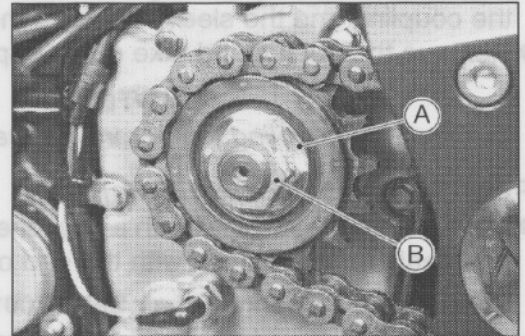
- Set the motorcycle up on its center stand.
- Remove:
  - Shift Lever [A]
  - Engine Sprocket Cover [B]



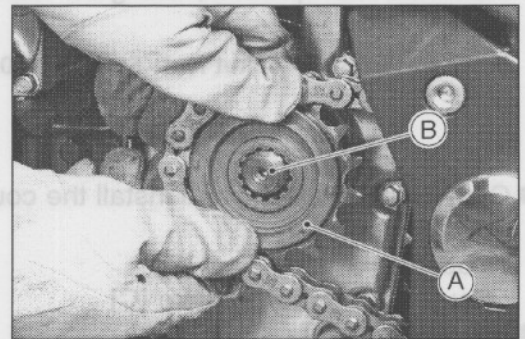
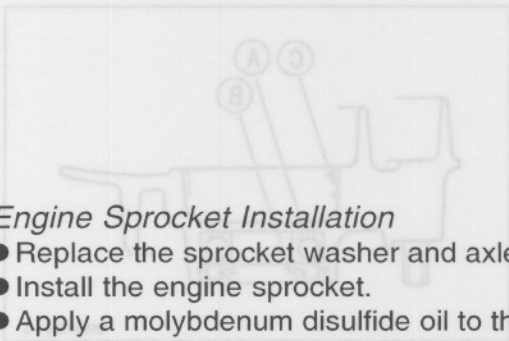
- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B], and take out the washer.

### NOTE

○ Apply the rear brake to loosen the sprocket nut.



- Slacken the drive chain all the way (see Drive Chain Slack Adjustment).
- Take out the drive chain together with the engine sprocket from the output shaft [B], and remove the sprocket [A].



### Engine Sprocket Installation

- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket.
- Apply a molybdenum disulfide oil to the thread and seating surface of the engine sprocket nut.
- Tighten the engine sprocket nut [A] and bend the one side [B] of the washer over the nut.

### NOTE

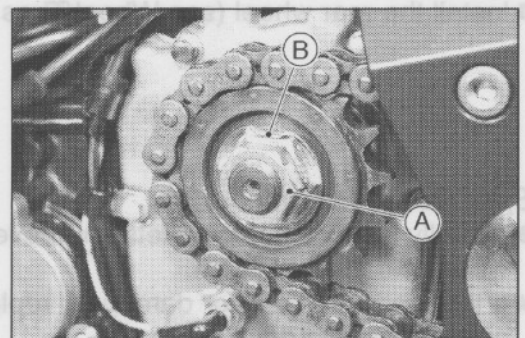
○ Apply the rear brake to tighten the nut.

**Torque - Engine Sprocket Nut: 128 N·m (13 kgf·m, 94 ft·lb)**

- Check to see that the rubber dampers in place to the sprocket cover.
- Install the pin and fit the sprocket cover.
- Tighten the sprocket cover bolts.

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

- Adjust the drive chain slack (see Drive Chain Slack Adjustment).



## 9-12 FINAL DRIVE

### Sprocket/Sprocket Coupling

#### Rear Sprocket/Coupling Removal

- Remove the rear wheel (see Wheel/Tires chapter).

#### CAUTION

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Please blocks under the wheel so that the disc does not touch the ground.

- Remove the coupling from the wheel.
- Remove the collar [A] and grease seal [B] from the left of the coupling and the sleeve [C] from the right.
- Remove the nut [D] and take out the sprocket [E].

#### NOTE

○ Attach the coupling temporarily to the hub.

#### Rear Sprocket/Coupling Installation

- Replace the grease seal with a new one and press it in so that seal surface is flush with the end of the hole.

**Special Tool - Bearing Driver Set: 57001-1129**

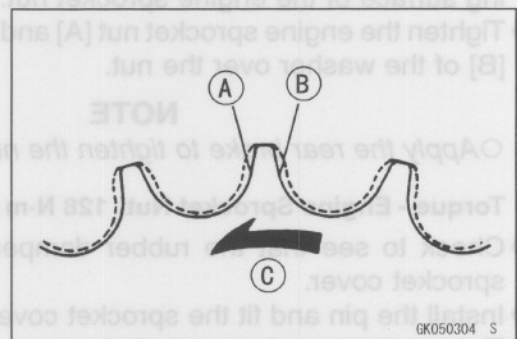
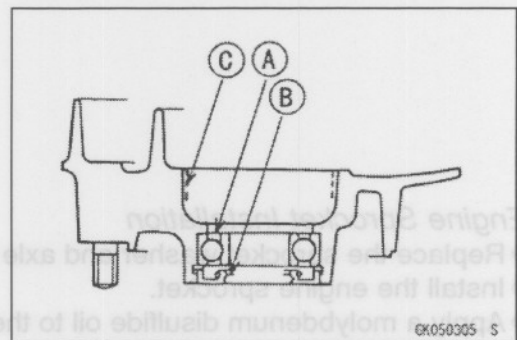
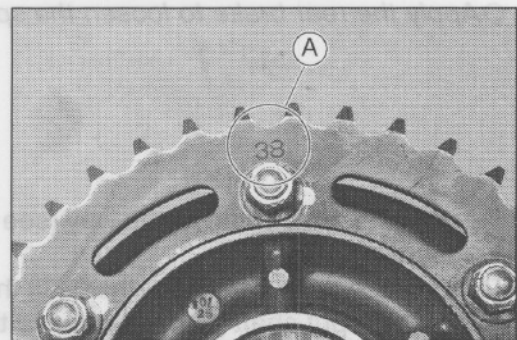
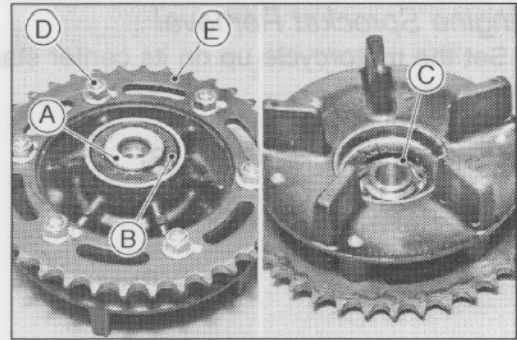
- Install the rear sprocket, facing the tooth number marking [A] outward.

**Torque - Rear Sprocket Nut: 59 N·m (6.0 kgf·m, 43 ft·lb)**

- Grease the following and install the coupling.
  - Ball Bearing [A]
  - Coupling Grease Seal [B]
  - Coupling Internal Surface [C]
- Install the collars.
- Install the rear wheel (see Wheel/Tires chapter)

#### Sprocket Wear Inspection

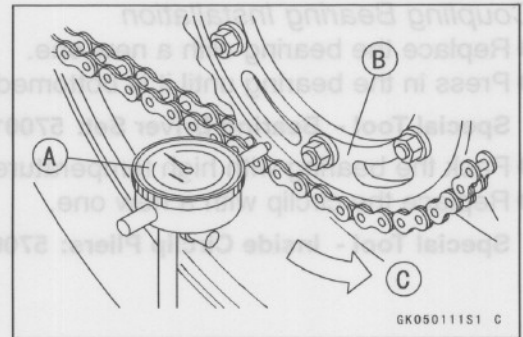
- Visually inspect the sprockets for uneven wear, abnormal wear, or damaged teeth.
- ★ If the teeth are worn or damaged, replace the sprockets and inspect the drive chain.
  - Worn Teeth (engine sprocket) [A]
  - Worn Teeth (rear sprocket) [B]
  - Rotation Direction [C]



## Sprocket/Sprocket Coupling

### Rear Sprocket Warp Inspection

- Raise the rear wheel off the ground (see Wheels/Tires chapter) so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).
- ★ If the runout exceeds the service limit, replace the rear sprocket.

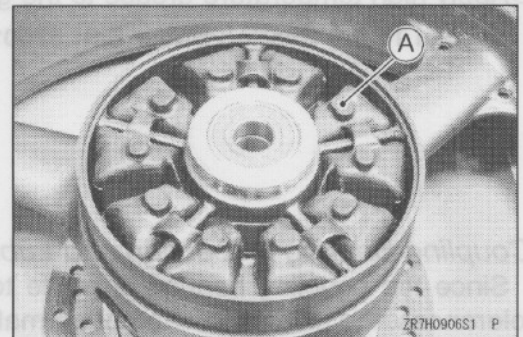


### Rear Sprocket Warp

- Standard:** TIR 0.4 mm (0.016 in.) or less
- Service Limit:** TIR 0.5 mm (0.020 in.)

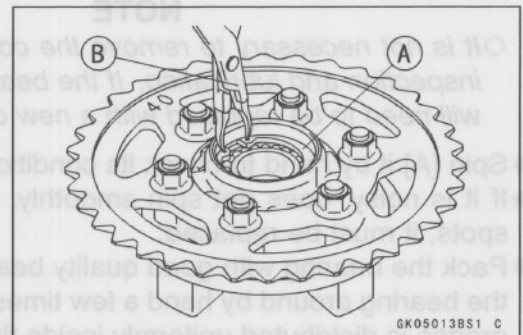
### Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.

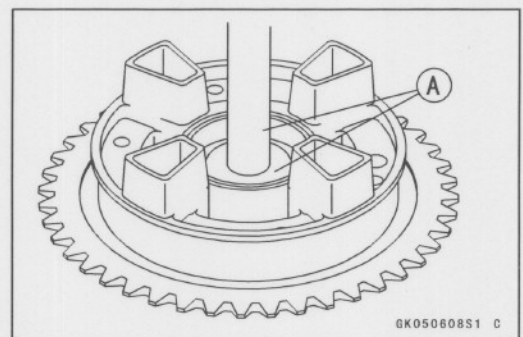


### Coupling Bearing Removal

- Remove:
  - Coupling
  - Grease Seal
  - Circlip [A]
- **Special Tool - Inside Circlip Pliers: 57001-143 [B]**



- Remove the bearing by tapping from the wheel side.
- **Special Tool - Bearing Driver Set: 57001-1129 [A]**



## 9-14 FINAL DRIVE

### Sprocket/Sprocket Coupling

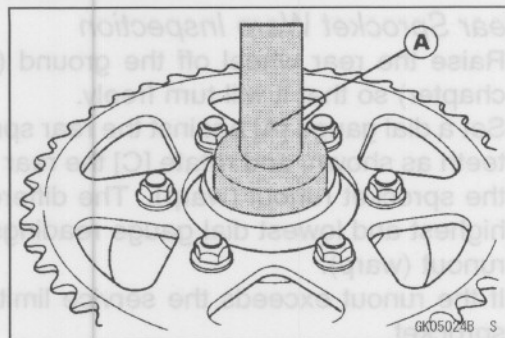
#### Coupling Bearing Installation

- Replace the bearing with a new one.
- Press in the bearing until it is bottomed.

**Special Tool - Bearing Driver Set: 57001-1129 [A]**

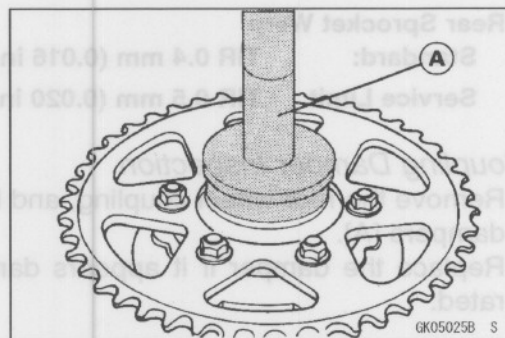
- Pack the bearing with high temperature grease.
- Replace the circlip with a new one.

**Special Tool - Inside Circlip Pliers: 57001-143**



- Replace the grease seal with a new one.
- Press in the grease seal so that the seal surface is flush with the end of the hole.
- Apply high temperature grease to the grease seal lips.

**Special Tool - Bearing Driver Set: 57001-1129 [A]**



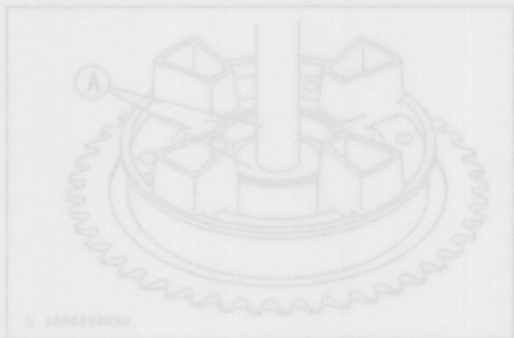
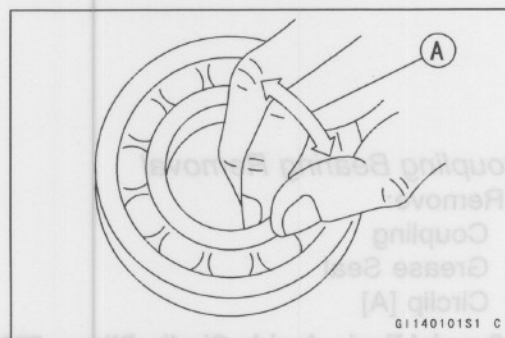
#### Coupling Bearing Inspection and Lubrication

Since the coupling bearing is made to extremely close tolerances, the clearance can not normally be measured.

#### NOTE

○ It is not necessary to remove the coupling bearing for inspection and lubrication. If the bearing is removed, it will need to be replaced with a new one.

- Spin [A] it by hand to check its condition.
- ★ If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
- Pack the bearing with good quality bearing grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.



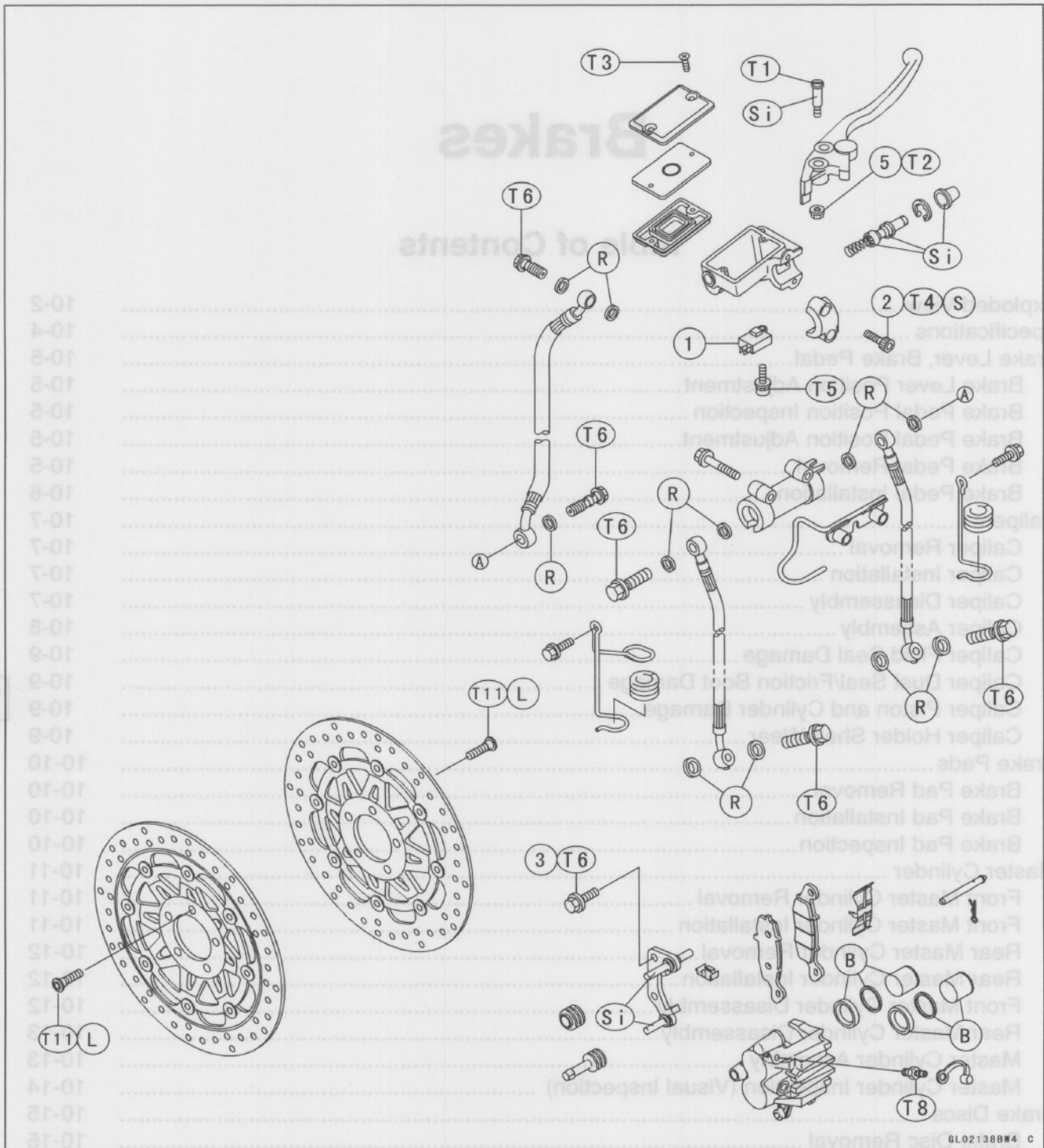
# Brakes

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# 10-2 BRAKES

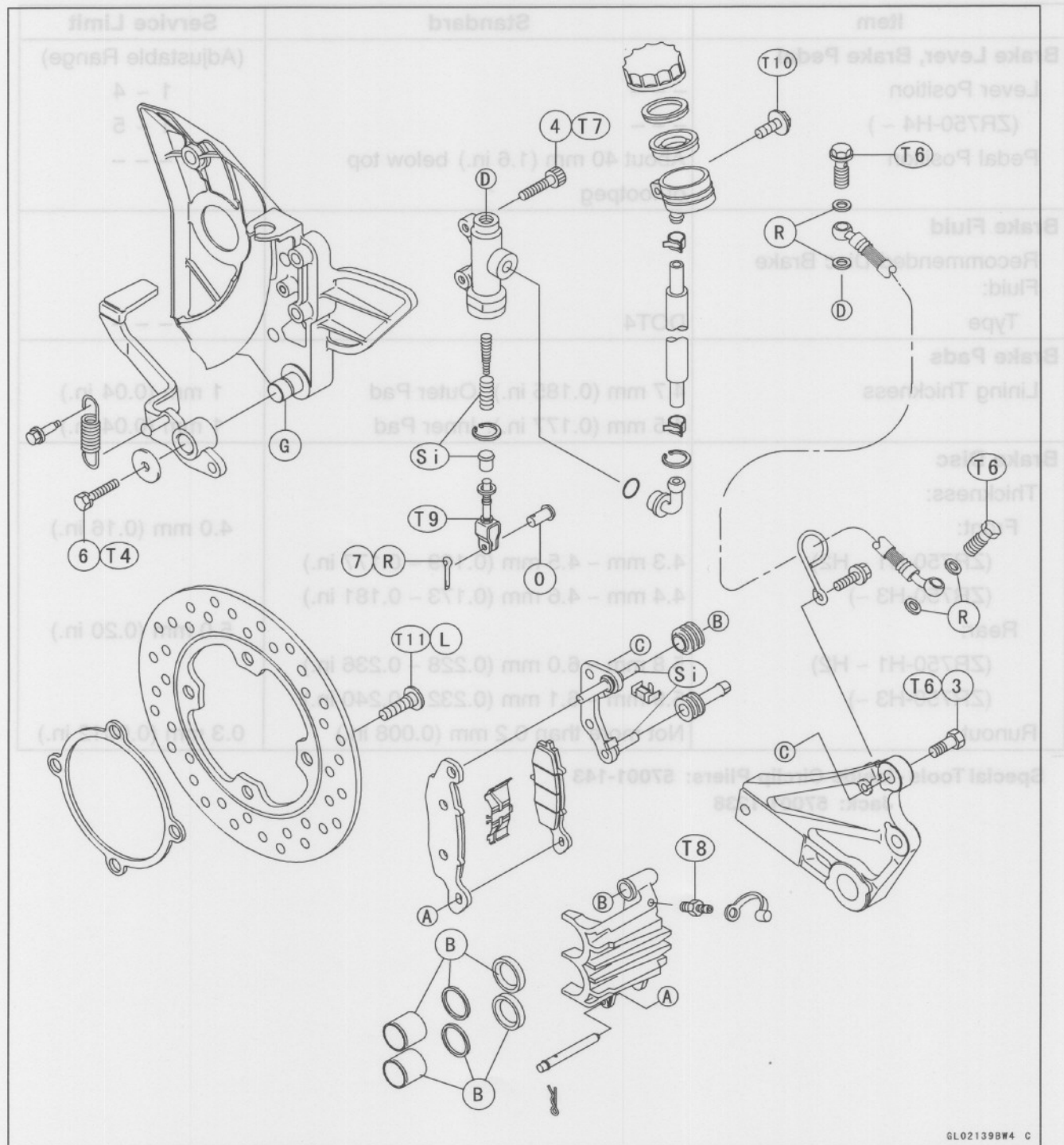
## Exploded View



GL02138BW4 C

- |  |                                    |
|--|------------------------------------|
| 1. Front Brake Light Switch            | T3: 1.5 N·m (0.15 kgf·m, 13 in·lb) |
| 2. Front Master Cylinder Clamp Bolts   | T4: 8.8 N·m (0.9 kgf·m, 78 in·lb)  |
| 3. Caliper Mounting Bolts              | T5: 1.2 N·m (0.12 kgf·m, 10 in·lb) |
| 4. Rear Master Cylinder Mounting Bolts | T6: 34 N·m (3.5 kgf·m, 25 ft·lb)   |
| 5. Brake Lever Pivot Bolt Locknut      | T7: 25 N·m (2.5 kgf·m, 18 ft·lb)   |
| 6. Brake Pedal Mounting Bolt           | T8: 7.8 N·m (0.8 kgf·m, 69 in·lb)  |
| 7. Brake Rod Joint Cotter Pin          | T9: 18 N·m (1.8 kgf·m, 13 ft·lb)   |
| T1: 1.0 N·m (0.1 kgf·m, 9 in·lb)       | T10: 6.9 N·m (0.7 kgf·m, 61 in·lb) |
| T2: 5.9 N·m (0.6 kgf·m, 52 in·lb)      | T11: 27 N·m (2.8 kgf·m, 20 ft·lb)  |

## Exploded View



GL021398W4 C

# 10-4 BRAKES

## Specifications

Item	Standard	Service Limit
<b>Brake Lever, Brake Pedal</b> Lever Position (ZR750-H4 ~ ) Pedal Position	--- --- About 40 mm (1.6 in.) below top of footpeg	(Adjustable Range) 1 ~ 4 1 ~ 5 ---
<b>Brake Fluid</b> Recommended Disc Brake Fluid: Type	DOT4	---
<b>Brake Pads</b> Lining Thickness	4.7 mm (0.185 in.): Outer Pad 4.5 mm (0.177 in.): Inner Pad	1 mm (0.04 in.) 1 mm (0.04 in.)
<b>Brake Disc</b> Thickness: Front: (ZR750-H1 ~ H2) (ZR750-H3 ~ ) Rear: (ZR750-H1 ~ H2) (ZR750-H3 ~ ) Runout	4.3 mm ~ 4.5 mm (0.169 ~ 0.177 in.) 4.4 mm ~ 4.6 mm (0.173 ~ 0.181 in.) 5.8 mm ~ 6.0 mm (0.228 ~ 0.236 in.) 5.9 mm ~ 6.1 mm (0.232 ~ 0.240 in.) Not more than 0.2 mm (0.008 in.)	4.0 mm (0.16 in.) 5.0 mm (0.20 in.) 0.3 mm (0.0012 in.)

**Special Tools - Inside Circlip Pliers: 57001-143**

**Jack: 57001-1238**

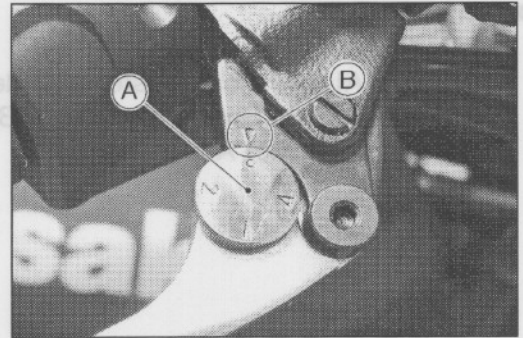
B: Apply brake fluid.  
 G: Apply high-temperature grease.  
 L: Apply a non-permanent locking agent.  
 O: Apply engine oil.  
 R: Replacement parts.  
 S: Follow the specific tightening sequence.  
 St: Apply silicon grease or PBC grease.

## Brake Lever, Brake Pedal

### Brake Lever Position Adjustment

The brake lever is adjustable to four positions to suit the rider.

- Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B].
- The distance from the grip to the lever is maximum at Number 1 and minimum at Number 4, or Number 5 (ZR750-H4 ~).

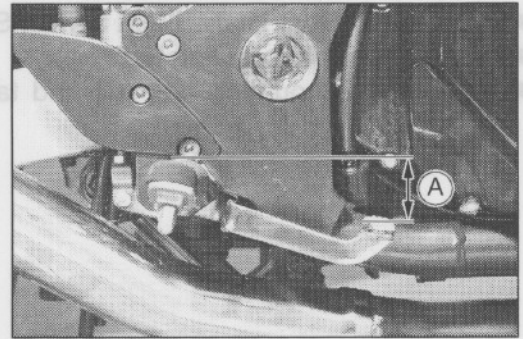


### Brake Pedal Position Inspection

- Inspect the position [A] of the brake pedal.
- ★ Adjust the position if it is out of standard.

#### Brake Pedal Position

Standard: 40 mm (1.6 in.)

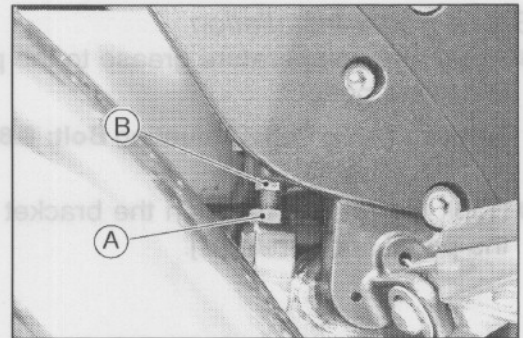


### Brake Pedal Position Adjustment

#### NOTE

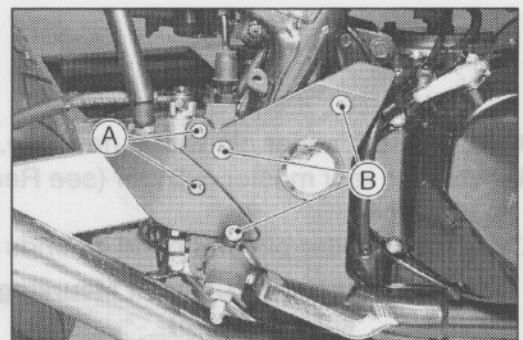
○ Visually it is not necessary to adjust the pedal position, but always adjust it when the push rod locknut has been loosened.

- Loosen the adjuster locknut [A] at the bottom of the master cylinder, which is behind the right step bracket.
  - Turn the push rod with the hex head [B] to achieve the correct pedal position (see Brake Pedal Position Inspection).
  - Tighten the adjuster locknut.
- Torque - Brake Pedal Adjuster Locknut: 18 N·m (1.8 kgf·m, 13 ft·lb)**
- Inspect the engagement timing of the brake light switch (see Electrical System chapter).



### Brake Pedal Removal

- Remove:
  - Rear Master Cylinder Mounting Bolts [B]
  - Right Step Bracket Bolts [A]

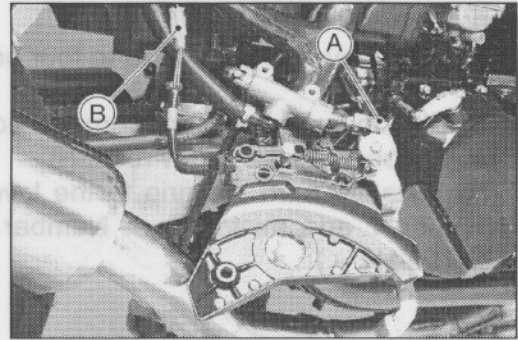
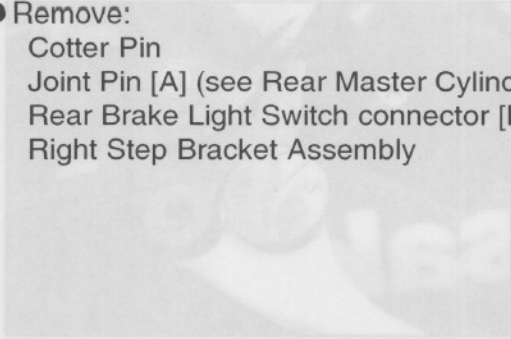


## 10-6 BRAKES

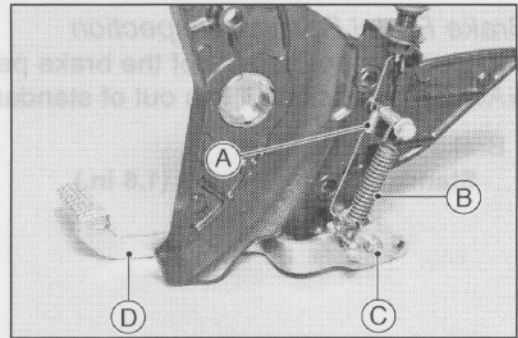
### Brake Lever, Brake Pedal

- Remove:

- Cotter Pin
- Joint Pin [A] (see Rear Master Cylinder Removal)
- Rear Brake Light Switch connector [B]
- Right Step Bracket Assembly



- Remove the Rear Brake Light Switch Spring [A].
- Remove the return spring [B].
- Remove the mounting bolt [C] and take out the brake pedal [D].

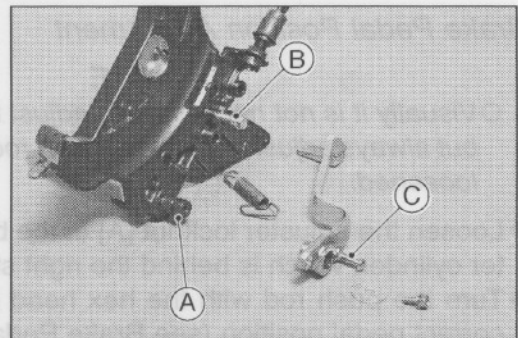


#### Brake Pedal Installation

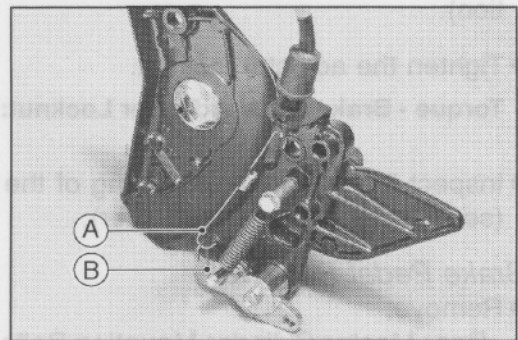
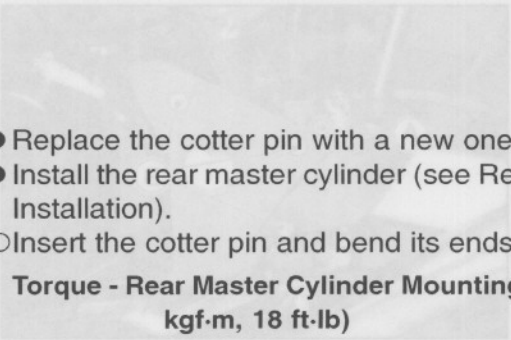
- Apply high-temperature grease to the pivot shaft [A] and install the pedal.

**Torque - Brake Pedal Mounting Bolt: 8.8 N·m (0.9 kgf·m, 78 in·lb)**

- Hook the return spring on the bracket hook bolt [B] and the pedal hook shaft [C].



- Connect the rear brake light switch connector.
- Install the step bracket assembly.
- Hook the lower end [A] of the rear brake light switch spring on the pedal hook bolt [B].



- Replace the cotter pin with a new one.
  - Install the rear master cylinder (see Rear Master Cylinder Installation).
  - Insert the cotter pin and bend its ends surely.
- Torque - Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Check the brake pedal position (see Brake Pedal Position Inspection).

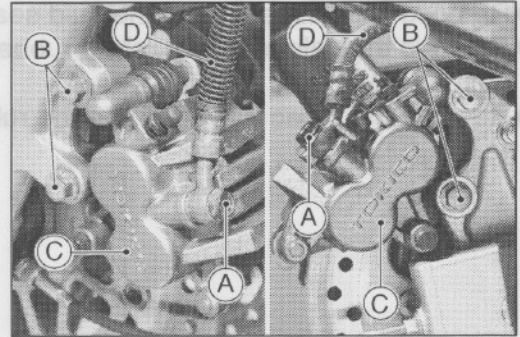
## Calipers

### Caliper Removal

- Slightly loosen the banjo bolt [A].
- Remove the mounting bolts [B] and remove the caliper [C] from the disc.
- Remove the banjo bolt and detach the brake hose [D] (see Brake Hose Removal/Installation).

#### NOTE

- After the caliper removal, if compressed air will not be available for disassembling the caliper, remove the piston before detaching the brake hose (see Caliper Disassembly).



#### CAUTION

Immediately wash away any brake fluid that spills.

### Caliper Installation

- Install the caliper and the hose.
- Replace the flat washers on each side of the hose fitting with new ones.

**Torque - Caliper Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**  
**Brake Hose Banjo Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)**

- Check the fluid level in the brake reservoirs.
- Bleed the brake line (see Brake Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

#### WARNING

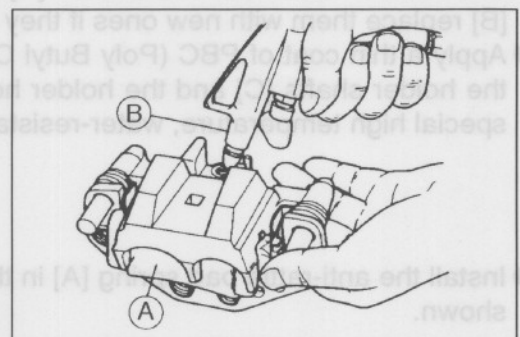
Do not attempt to drive the motorcycle until a full brake lever or pedal is obtained by pumping the brake lever or pedal until the pads are against the disc. The brakes will not function on the first application of the lever or pedal if this is not done.

### Caliper Disassembly

- Remove the caliper.
- Remove the pads and anti-rattle springs (see Pad Removal).
- Take out the piston.
- Cover the piston area with a clean, thick cloth [A].
- Lightly blow compressed air [B] into the hole for the banjo bolt to remove the piston.

#### WARNING

To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston(s) may crush your hand or fingers.



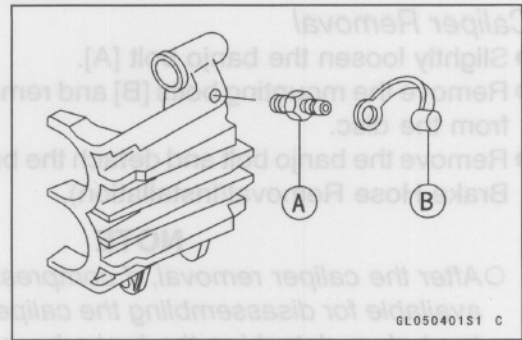
#### NOTE

- If compressed air is not available, with the brake hose still attached, apply the brake lever to remove the piston. The remaining process is as described above.

## 10-8 BRAKES

### Calipers

- Remove the dust seal and the fluid seal.
- Remove the caliper holder, shaft rubber friction boot and dust cover.
- Remove the bleed valve [A] and the rubber cap [B].



#### Caliper Assembly

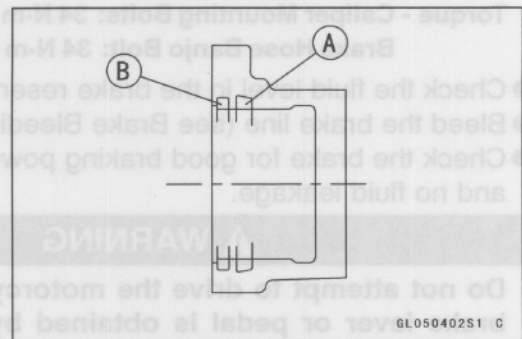
- Wash all parts other than the pads.

#### CAUTION

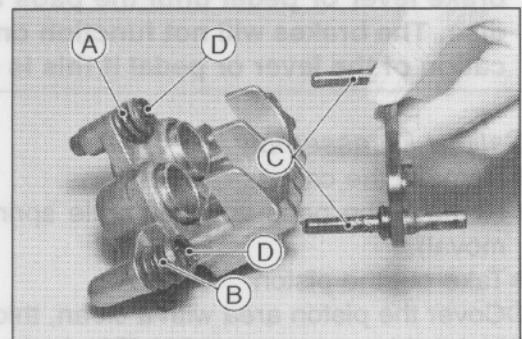
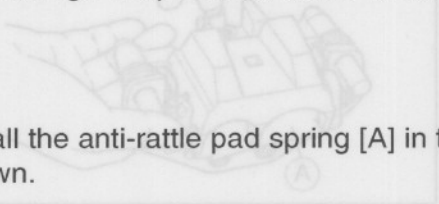
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

- Install the bleed valve and rubber cap.  
**Torque - Caliper Bleed Valve: 7.8 N·m (0.8 kgf·m, 69 in·lb)**

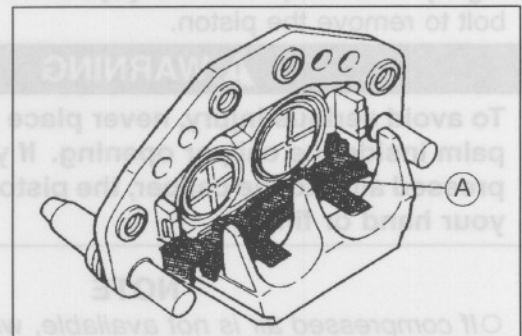
- Replace the fluid seals [A] with new ones.
  - Apply brake fluid to them, and install them in to the cylinder by hand.
- Replace the dust seals [B] whenever the fluid seals are replaced with new ones.
  - Apply brake fluid to them, and install them in to the cylinder by hand.



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



- Install the anti-rattle pad spring [A] in the caliper body as shown.



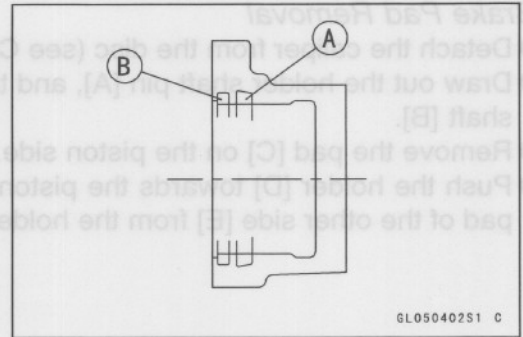
- Install the pads (see Pad Installation).
- Wash the caliper with water to remove brake fluid and wipe it off.

## Calipers

### Caliper Fluid Seal Damage

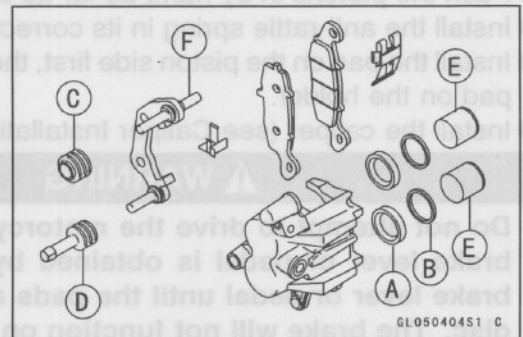
The fluid seals [A] around the piston maintain the proper pad/disc clearance. If the seals are not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

- Replace the fluid seals under any of the following conditions; (a) fluid leakage around the pad; (b) brakes overheat (c) there is a large difference in inner and outer pad wear; (d) the seal is stuck to the piston.
- ★ If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.



### Caliper Dust Seal/Friction Boot Damage

- Check that the dust seals [B] and friction boot [D] are not cracked, worn, swollen, or otherwise damaged.
- ★ If they show any damage, remove the caliper bracket and replace them.
  - Fluid Seal [A]
  - Dust Cover [C]



### Caliper Piston and Cylinder Damage

- 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

The caliper body must slide smoothly on the caliper holder shaft [F]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

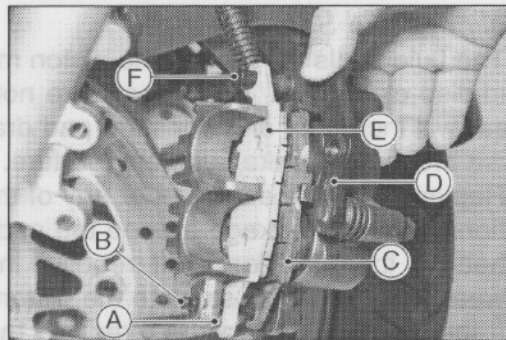
- Check to see that the caliper holder shaft are not badly worn or stepped, and that the rubber friction boots are not damaged.
- ★ If the rubber friction boot is damaged, replace the rubber friction boot. To replace the friction boot, remove the pads and the caliper bracket.
- ★ If the caliper holder shaft is damage, replace the caliper bracket.

## 10-10 BRAKES

### Brake Pads

#### Brake Pad Removal

- Detach the caliper from the disc (see Caliper Removal).
- Draw out the holder shaft pin [A], and take off the holder shaft [B].
- Remove the pad [C] on the piston side.
- Push the holder [D] towards the piston, and remove the pad of the other side [E] from the holder shaft [F].



#### Brake Pad Installation

- Push the pistons in by hand as far as they will go.
- Install the anti-rattle spring in its correct position.
- Install the pad on the piston side first, then install the other pad on the holder.
- Install the caliper (see Caliper Installation).

#### **⚠ WARNING**

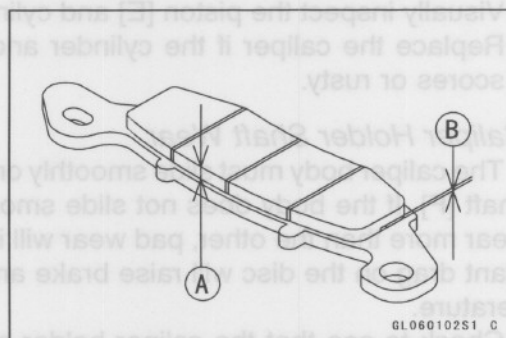
Do not attempt to drive the motorcycle until a full brake lever or pedal is obtained by pumping the brake lever or pedal until the pads are against the disc. The brake will not function on the first application of the lever or pedal if this not done.

#### Brake Pad Inspection

- Check the pads for damage and lining thickness.
- ★ If any pad is damaged, replace the pads as a set.
- ★ If the lining thickness [A] of either pad is less than the service limit [B], replace both pads in the caliper as a set.

#### Brake Pad Thickness

- Standard:**            4.7 mm (0.185 in.): Outer Pad  
                              4.5 mm (0.177 in.): Inner Pad
- Service Limit:**    1 mm (0.04 in.)



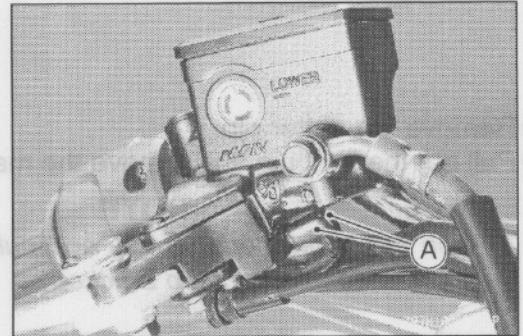
## Master Cylinder

### CAUTION

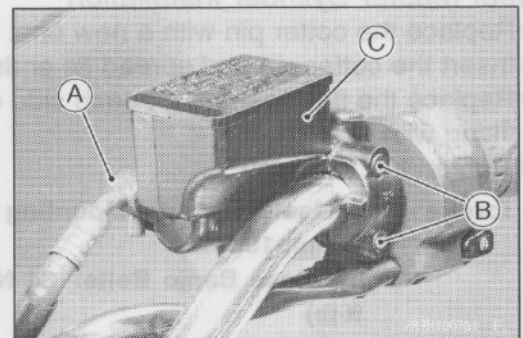
Brake fluid damages a paint surface or a plastic part upon contact by peeling, discoloring, or cracking. Therefore, immediately wash the affected area with water and wipe it off if it comes in contact with brake fluid.

### Front Master Cylinder Removal

- Disconnect the connectors [A] of the front brake light switch wires.

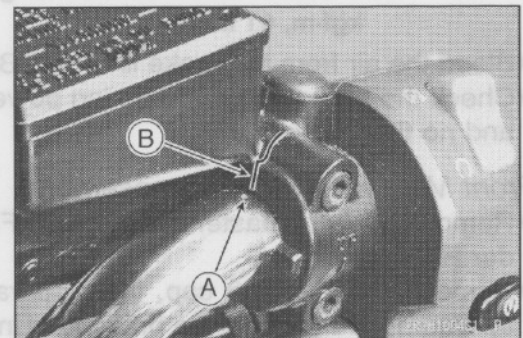


- Unscrew the banjo bolt [A], and detach the brake hose (see Brake Hose Removal/Installation).
- Remove the clamp bolts [B] and remove the master cylinder [C] together with the reservoir, brake lever, and brake light switch.



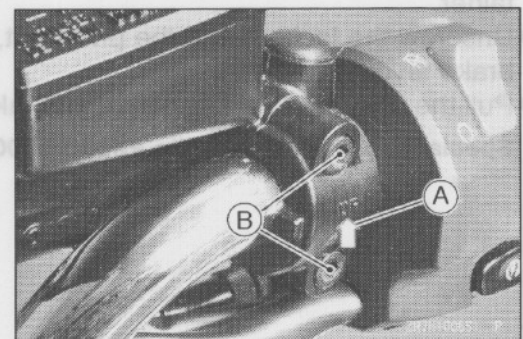
### Front Master Cylinder Installation

- Align the punch mark [A] on the handlebar and the clamp mating surface [B] so that the reservoir is parallel.



- Install the clamp with its arrow [A] facing up.
- Tighten the bolts [B], top and bottom, in that order, leaving a small clearance at the bottom of the clamp.

**Torque - Front Master Cylinder Clamp Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)**



- Replace the flat washers on each side of the brake hose fitting with new ones.
- Tighten the banjo bolt.

**Torque - Brake Hose Banjo Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)**

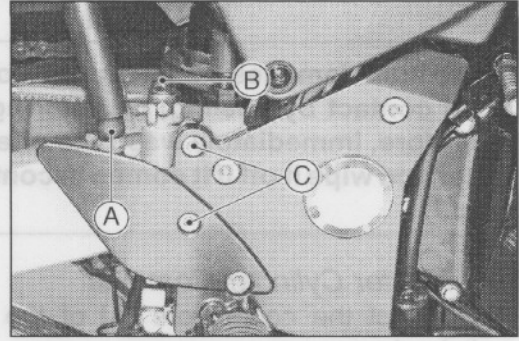
- Bleed the air from the brake line (see Brake Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

## 10-12 BRAKES

### Master Cylinder

#### Rear Master Cylinder Removal

- Remove the lower end [A] of the reservoir hose, and drain the brake fluid from the reservoir into a suitable container.
- Remove the reservoir and the hose.
- Remove the brake hose banjo bolt [B] (see Brake Hose Removal and Installation).
- Remove the master cylinder mounting bolts [C].



- Remove the cotter pin.
- Pull out the joint pin and remove the master cylinder.

#### NOTE

○ Push the brake pedal down, and pull out the joint pin from the hole in the step bracket.

#### Rear Master Cylinder Installation

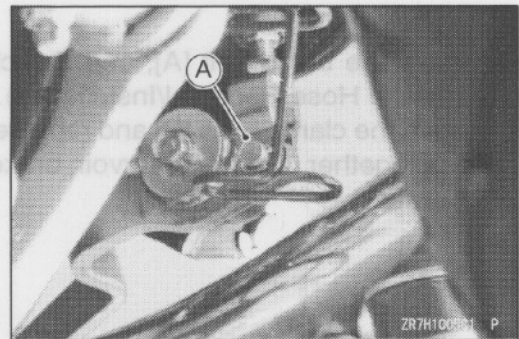
- Replace the cotter pin with a new one.
- Insert the cotter pin and spread its ends [A].
- Replace the flat washers on each side of the brake hose fitting with new ones.
- Tighten the following:

**Torque - Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

**Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**

**Rear Brake Reservoir Mounting Bolt: 6.9 N·m (0.7 kgf·m, 61 in·lb)**

- Bleed the air from the brake line (see Brake Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.



#### Front Master Cylinder Disassembly

- Remove the front master cylinder (see Front Master Cylinder Removal).
- Remove the reservoir cap, the diaphragm plate and diaphragm, and transfer the brake fluid into a suitable container.
- Unscrew the locknut and the pivot bolt, and take out the brake lever.
- Pull the dust cover out of place, and take out the circlip.

**Special Tool - Inside Circlip Pliers: 57001-143**

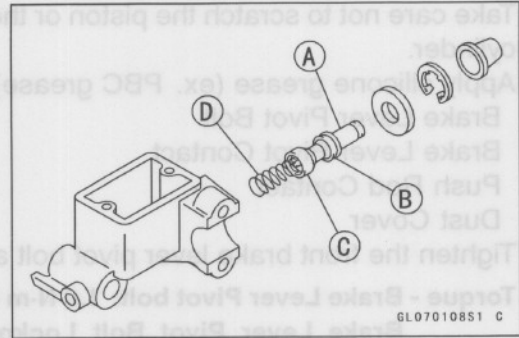


## Master Cylinder

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

### CAUTION

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



## Rear Master Cylinder Disassembly

### NOTE

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

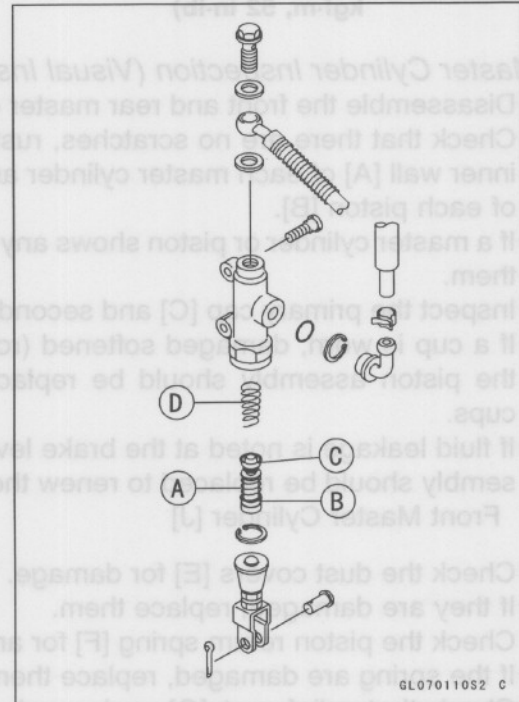
- Remove the rear master cylinder (see Rear Master Cylinder Removal).
- Slide the dust cover of the push rod out of place, and remove the circlip.

**Special Tool - Inside Circlip Pliers: 57001-143**

- Pull out the push rod together with the piston stop.
- Pull out the piston [A], secondary cup [B], primary cup [C], and the return spring [D].

### CAUTION

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



## Master Cylinder Assembly

- Before assembly, clean all parts with brake fluid or alcohol, and apply brake fluid to the removed parts and 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 part. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

## 10-14 BRAKES

### Master Cylinder

- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease (ex. PBC grease).
  - Brake Lever Pivot Bolt
  - Brake Lever Pivot Contact
  - Push Rod Contact
  - Dust Cover
- Tighten the front brake lever pivot bolt and locknut.

**Torque - 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)**

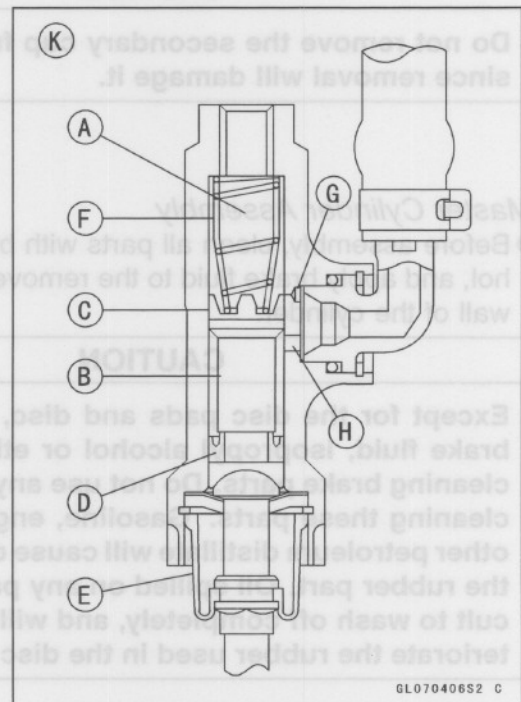
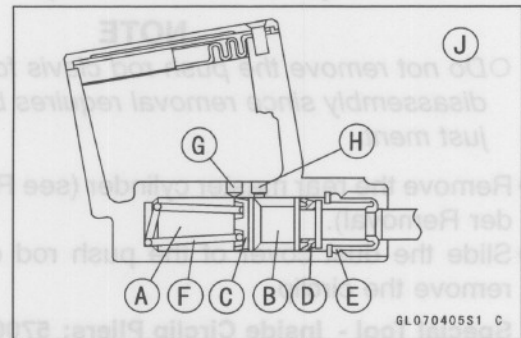
#### Master Cylinder Inspection (Visual Inspection)

- Disassemble the front and rear master cylinders.
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].
- ★ If a master cylinder or piston shows any damage, replace them.
- Inspect the primary cap [C] and secondary cap [D].
- ★ If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.
- ★ If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.

#### Front Master Cylinder [J]

- Check the dust covers [E] for damage.
- ★ If they are damaged, replace them.
- Check the piston return spring [F] for any damage.
- ★ If the spring are damaged, replace them.
- Check that relief port [G] and supply port [H] are not plugged.
- ★ If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

#### Rear Master Cylinder [K]



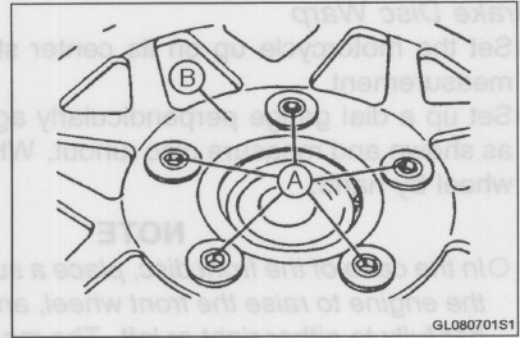
## Brake Discs

### Brake Disc Removal

- Remove the wheel (see Wheels/Tires chapter).
- Unscrew the mounting bolts [A], and take out the disc [B].

#### CAUTION

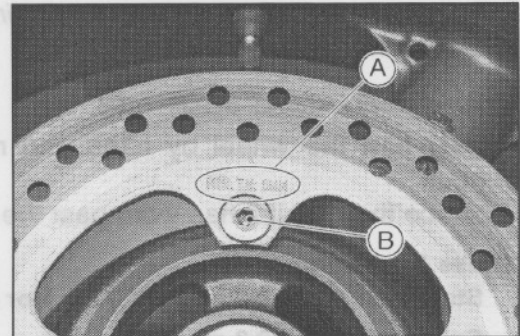
Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



### Brake Disk Installation

- Facing the mark side [A] outward, install the brake disc, and tighten the bolts [B].

**Torque - Brake Disc Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)**



### Brake Disc Wear

- Visually inspect the disc.
- ★ Replace the disc if it shows any damage or crack.
- Measure the thickness of each disc at the point where it has worn the most.
- ★ Replace the disc if it has worn past the service limit.

#### Thickness

##### Standard

(ZR750-H1 ~ H2):

Front	4.3 ~ 4.5 mm (0.169 ~ 0.177 in.)
Rear	5.8 ~ 6.0 mm (0.228 ~ 0.236 in.)

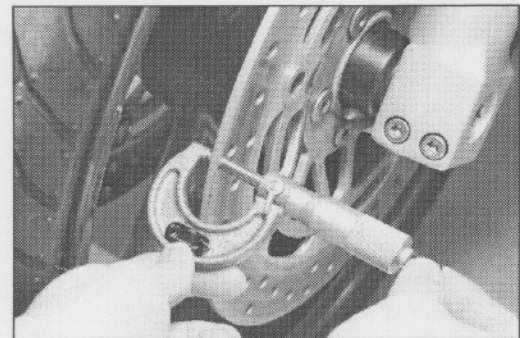
##### Standard

(ZR750-H3 ~):

Front	4.4 ~ 4.6 mm (0.173 ~ 0.181 in.)
Rear	5.9 ~ 6.1 mm (0.232 ~ 0.240 in.)

##### Service Limit:

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



# 10-16 BRAKES

## Brake Discs

### Brake Disc Warp

- Set the motorcycle up on its center stand for rear disc measurement.
- Set up a dial gauge perpendicularly against the disc [A] as shown and measure disc runout. While turning [B] the wheel by hand.

### NOTE

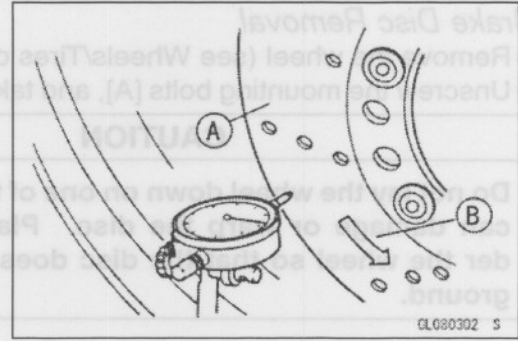
○ In the case of the front disc, place a suitable base under the engine to raise the front wheel, and turn the handlebar fully to either right or left. The measurement should be taken approximately 10 mm (0.4 in.) inside from the outer perimeter.

### Special Tool - Jack: 57001-1238

- Slowly turn the wheel by hand and measure the disc runout.
- ★ Replace the disc if it has worn past the service limit.

### Brake Disc Runout

**Standard:** 0.2 mm (0.008 in.) or less  
**Service Limit:** 0.3 mm (0.012 in.)



Brake Disc Installation  
 Facing the mark side [A] outward, install the brake disc  
 and tighten the bolts [B].  
 Torque - Brake Disc Mounting Bolts: 27 N·m (20 lb-ft)

Brake Disc Wear  
 Visually inspect the disc.  
 Replace the disc if it shows any damage or crack.  
 Measure the thickness of each disc at the point where it  
 has worn the most.  
 Replace the disc if it has worn past the service limit.

Thickness	Standard	Service Limit
(ZR750-H1 - H2):		
Front	4.3 - 4.5 mm (0.169 - 0.177 in.)	4.0 mm (0.16 in.)
Rear	5.8 - 6.0 mm (0.228 - 0.236 in.)	5.0 mm (0.20 in.)
Standard		
(ZR750-H3 -):		
Front	4.4 - 4.6 mm (0.173 - 0.181 in.)	4.0 mm (0.16 in.)
Rear	5.9 - 6.1 mm (0.232 - 0.240 in.)	5.0 mm (0.20 in.)

## Brake Fluid

### Brake Fluid Level Inspection

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

#### NOTE

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

- Remove the seat, and check that the brake fluid level in the rear brake fluid reservoir [C] is between the upper [D] and the lower [E] level lines.
- ★ If the fluid level is lower than the lower level line, fill the reservoir with the specified type of brake fluid.

#### ⚠ 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 already is in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter. Mixing different types and brand of brake fluid lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.

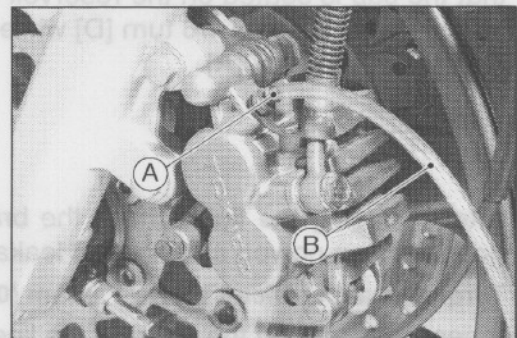
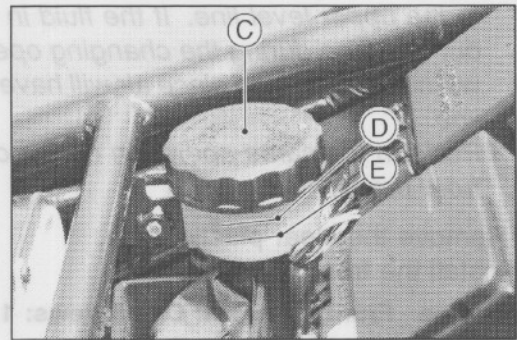
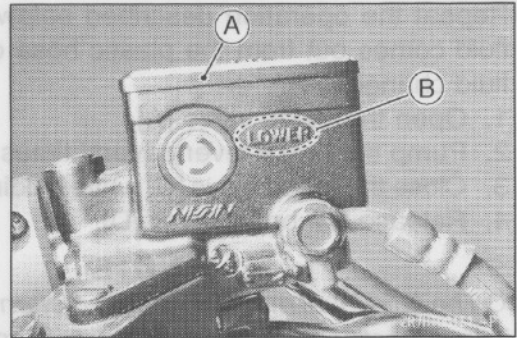
**Recommended Disc Brake Fluid**  
Grade: DOT4

### Brake Fluid Change

#### NOTE

○ The procedure described below for changing the fluid in the front brake is also applicable for the rear brake.

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



#### ⚠ WARNING

Be sure to bleed the air from the brake line whenever brake lever or pedal action feels soft or spongy after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

#### NOTE

○ The procedure described below for bleeding the front brake is also applicable for the rear brake.

## 10-18 BRAKES

### Brake Fluid

- Repeat the operation described below until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.
  1. Open the bleed valve [A].
  2. Pump the brake lever several times and hold it [B].
  3. Close the bleed valve [C] while holding the brake lever.
  4. Release the brake lever [D].

#### 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.
  - Perform the same operation on the other caliper of the front brake.
- Remove the clear plastic hose.
  - Install the front reservoir cap.

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

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

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

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

- ★ If necessary, bleed the air from the lines.

#### Brake Bleeding

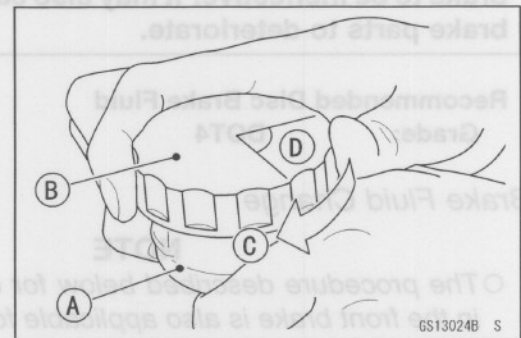
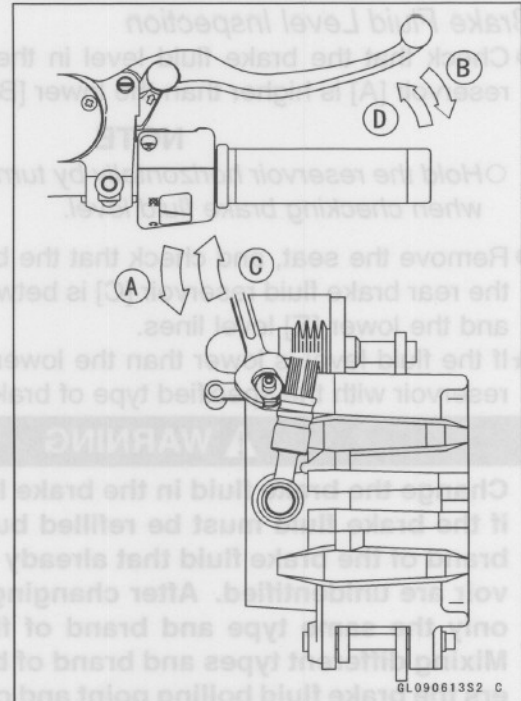
The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

#### ⚠ WARNING

**Be sure to bleed the air from the brake line whenever brake lever or pedal action feels soft or spongy after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.**

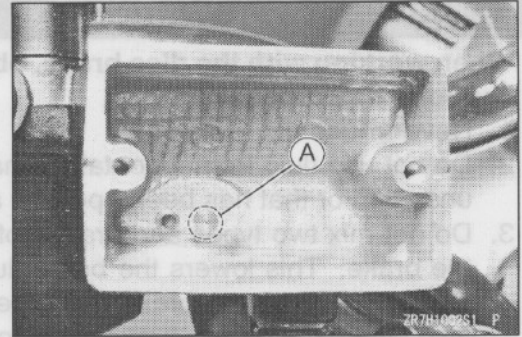
#### NOTE

- The procedure described below for bleeding the front brake is also applicable for the rear brake.



## Brake Fluid

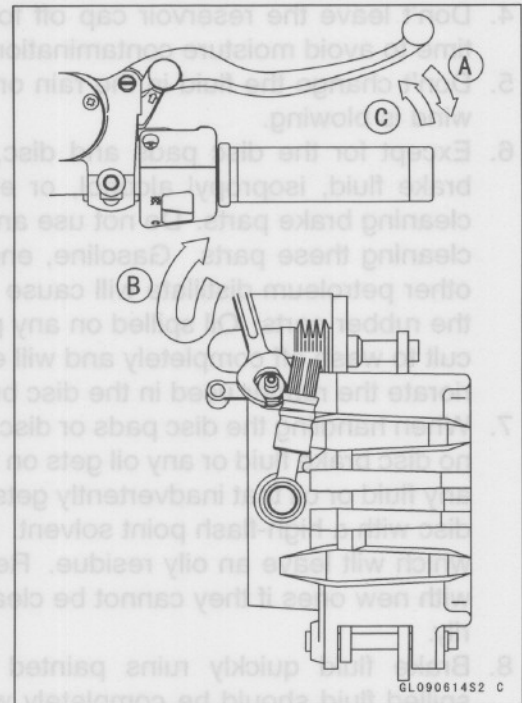
- Remove the reservoir cap, diaphragm plate, and diaphragm, and fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- Slowly pump the brake lever several times to completely eliminate the air in the master cylinder, until no air bubbles can be seen rising up through the fluid from the small holes [A] at the bottom of the reservoir.
- This operation is for completely eliminating any air in the master cylinder.



- Temporarily install the reservoir cap.
- 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 bubbles can be seen coming out into the plastic hose.
  1. Pump the brake lever until it becomes hard, and apply the brake lever and hold it [A].
  2. Quickly open and close [B] the bleed valve while keeping the brake lever applied.
  3. Release the brake lever [C].

### NOTE

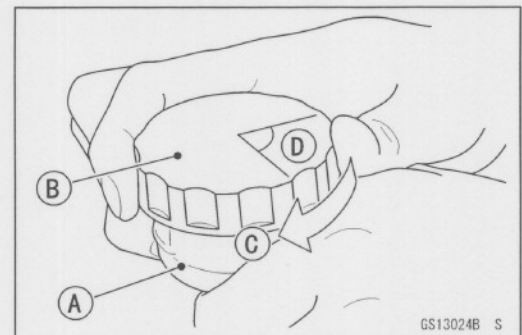
- The fluid level must be checked often during the bleeding operation and replenished with specified brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.
- Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.
- Perform the same operation on the other caliper of the front brake, and on the other bleed valve of the rear brake.



- Install the front reservoir cap

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

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



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

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

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

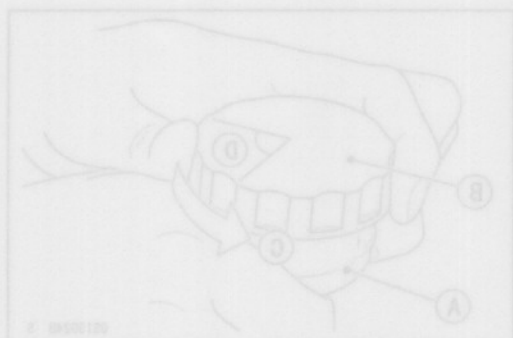
## 10-20 BRAKES

### Brake Fluid

#### **⚠ WARNING**

When working with the disc brake, observe the precautions listed below.

1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning 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.**



● Follow procedure below to rear brake fluid reservoir cap correctly.  
● First, tighten the rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/8 turn [D] while holding the brake fluid reservoir body [A].

● Remove the clear plastic hose.  
● Tighten the bleed valve, and install the rubber cap.  
Torque - Caliper Bleed Valve: 7.8 N-m (0.8 kgf-m, 69 in-lb)  
● Check the fluid level.  
● After changing the fluid, check the brake for fluid level, good braking power, and no fluid leakage.

● Install the front reservoir cap  
Torque - Front Reservoir Cap Screws: 1.5 N-m (0.15 kgf-m, 13 in-lb)

#### **NOTE**

● The fluid level must be checked often during operation and replenished with speed as necessary. If the fluid in the reservoir is low, bleed the brake completely out any time during bleeding. The operation must be done over again from the beginning since air will have entered the line.  
● Tap the brake hose lightly from the caliper for more complete bleeding.  
● Perform the same operation on the other front brake, and on the other bleed valve.

● Remove the rubber cap from the bleed valve.  
● Temporarily install the reservoir cap.

● 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 bubbles can be seen coming out into the reservoir.  
1. Pump the brake lever until it becomes firm.  
2. Quickly open and close [B] the bleed valve while the brake lever is applied.  
3. Release the brake lever [C].  
● This operation is for completely eliminating air from the master cylinder.  
● Holes [A] at the bottom of the reservoir can be seen rising up through the fluid from the upper level line in the reservoir.  
● Slowly pump the brake lever several times to completely eliminate the air in the master cylinder, until the upper level line in the reservoir.  
● Remove the reservoir cap, disengage the spring, and fill the reservoir with fresh brake fluid.

## Brake Hose

### Brake Hose Removal/Installation

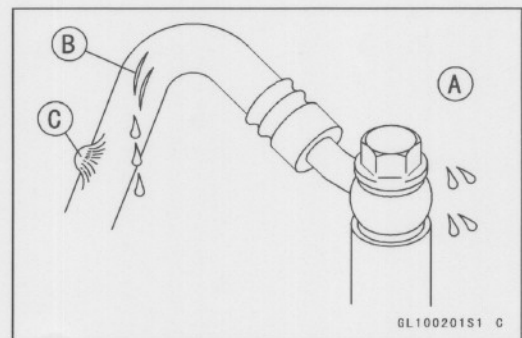
#### CAUTION

**Brake fluid quickly ruins painted or plastic surfaces; any spilled fluid should be completely wiped up immediately with wet cloth.**

- When removing the brake hose, take care not to spill the brake fluid on the painted or plastic parts.
- When removing the brake hose, temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
- There are washers on each side of the brake hose fitting. Replace them with new ones when installing.
- When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and route the hoses according to Cable, Wire and Hose Routing section in General Information chapter.
- Tighten:
  - Torque - Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)**
- Bleed the brake line after installing the brake hose (see Bleeding the Brake Line).

### Brake Hose Inspection

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.
- ★ Replace it if any cracks [B] or bulges [C] or fluid leak [A] are noticed.



# Suspension

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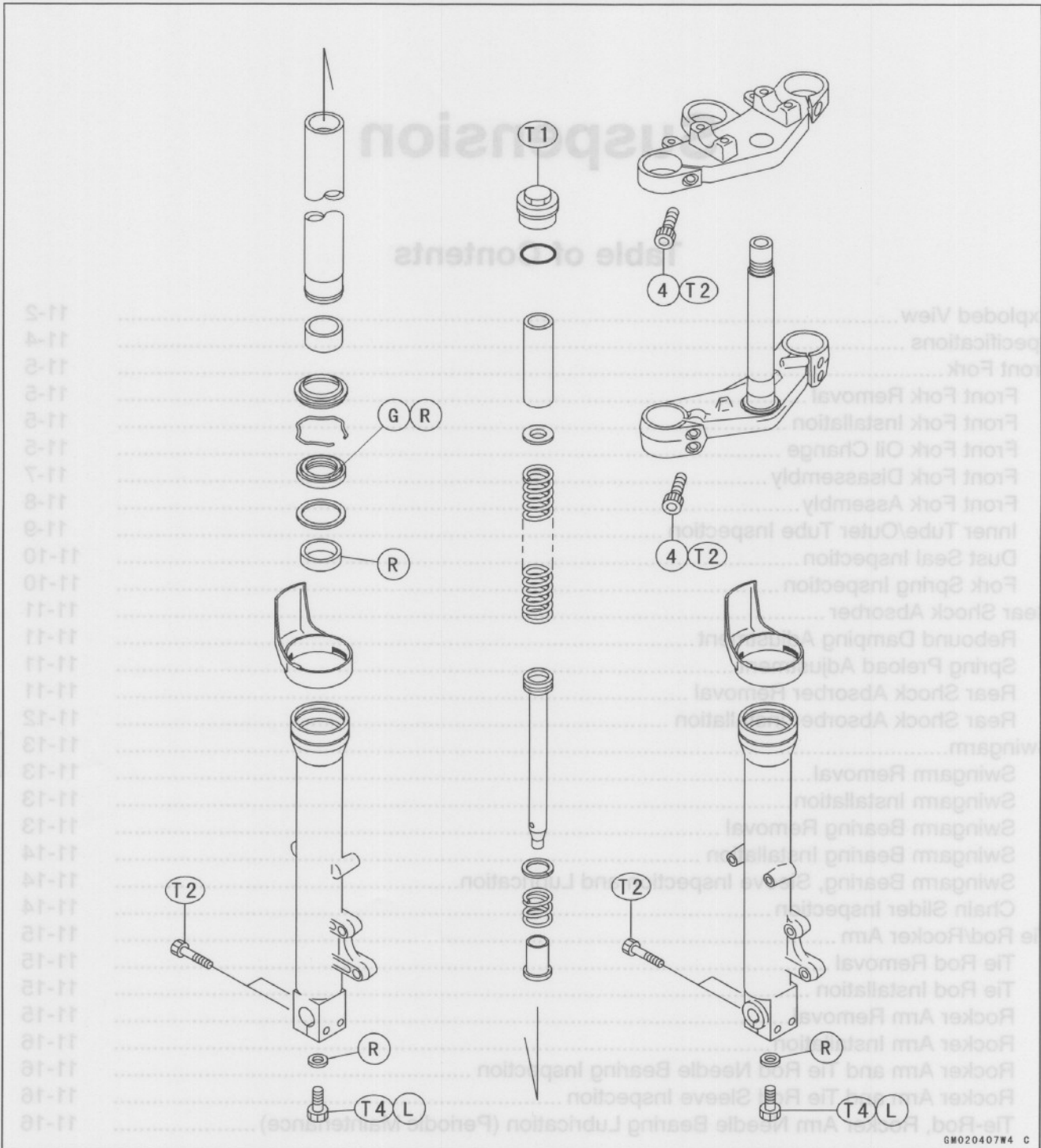
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T2: 20 N·m (2.0 kgf·m, 14 ft·lb)  
 T3: 29 N·m (3.0 kgf·m, 43 ft·lb)  
 T4: 29 N·m (3.0 kgf·m, 22 ft·lb)  
 T5: 110 N·m (11 kgf·m, 80 ft·lb)  
 G: Apply high-temperature grease.  
 L: Apply non-permanent locking agent to the threads.  
 R: Replacement Parts

T1: 23 N·m (2.3 kgf·m, 17 ft·lb)  
 8. Swingarm Pivot Shaft Nut  
 7. Tie Rod Nuts  
 6. Rocker Arm Nut  
 5. Rear Shock Absorber Mounting Nuts  
 4. Front Fork Clamp Bolts  
 3. Front  
 2. Adjuster mark position  
 1. View from under side

## 11-2 SUSPENSION

### Exploded View

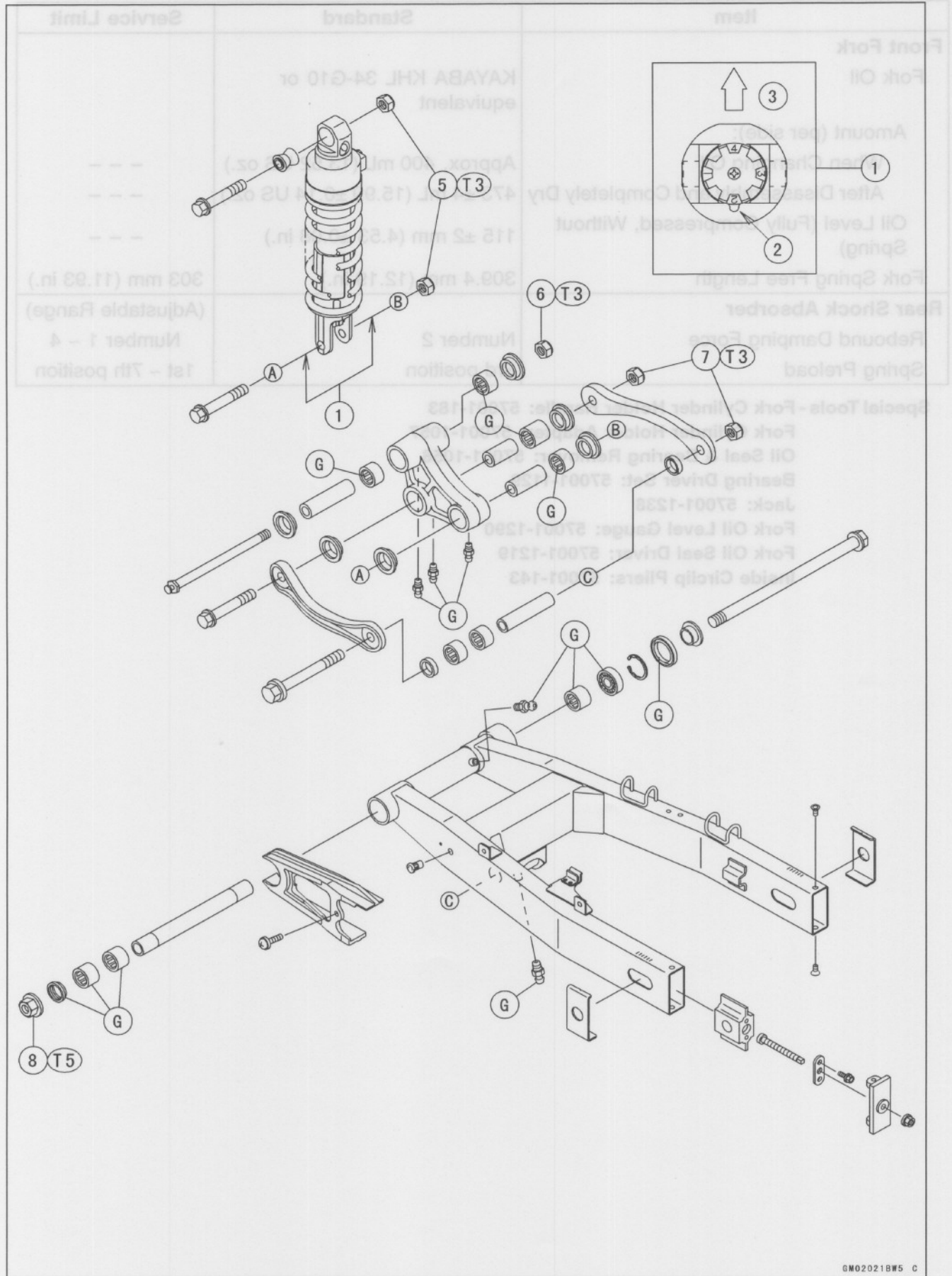


GM020407W4 C

1. View from under side
  2. Adjuster mark position
  3. Front
  4. Front Fork Clamp Bolts
  5. Rear Shock Absorber Mounting Nuts
  6. Rocker Arm Nut
  7. Tie Rod Nuts
  8. Swingarm Pivot Shaft Nut
- T1: 23 N·m (2.3 kgf·m, 17 ft·lb)

- T2: 20 N·m (2.0 kgf·m, 14 ft·lb)  
 T3: 59 N·m (6.0 kgf·m, 43 ft·lb)  
 T4: 29 N·m (3.0 kgf·m, 22 ft·lb)  
 T5: 110 N·m (11 kgf·m, 80 ft·lb)
- G: Apply high-temperature grease.  
 L: Apply non-permanent locking agent to the threads.  
 R: Replacement Parts

Exploded View



# 11-4 SUSPENSION

## Specifications

Exploded View

Item	Standard	Service Limit
<b>Front Fork</b>		
Fork Oil	KAYABA KHL 34-G10 or equivalent	
Amount (per side):		
When Changing Oil	Approx. 400 mL (13.52 US oz.)	---
After Disassembly and Completely Dry	473 ±4 mL (15.99 ±0.14 US oz.)	---
Oil Level (Fully Compressed, Without Spring)	115 ±2 mm (4.53 ±0.08 in.)	---
Fork Spring Free Length	309.4 mm (12.19 in.)	303 mm (11.93 in.)
<b>Rear Shock Absorber</b>		
Rebound Damping Force	Number 2	(Adjustable Range) Number 1 ~ 4
Spring Preload	3rd position	1st ~ 7th position

- Special Tools - Fork Cylinder Holder Handle: 57001-183**  
**Fork Cylinder Holder Adapter: 57001-1057**  
**Oil Seal & Bearing Remover: 57001-1058**  
**Bearing Driver Set: 57001-1129**  
**Jack: 57001-1238**  
**Fork Oil Level Gauge: 57001-1290**  
**Fork Oil Seal Driver: 57001-1219**  
**Inside Circlip Pliers: 57001-143**

## Front Fork

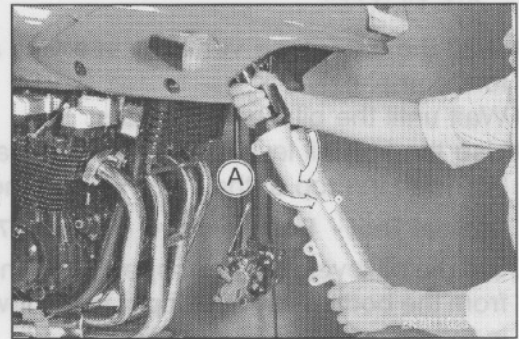
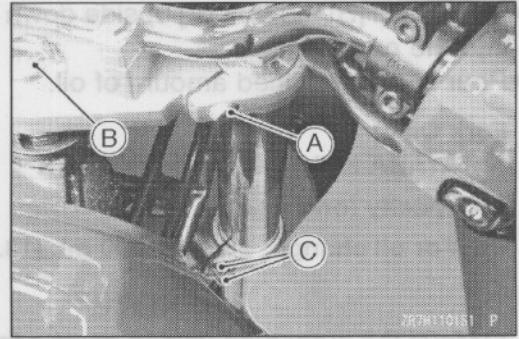
### Front Fork Removal

- Remove:
  - Front Wheel (see Tire/Wheels chapter)
  - Front Fender (see Frame chapter)
  - Front Brake Caliper (see Brakes chapter)

#### NOTE

○ If the fork is to be disassembled later, loosen the top plug before-hand. Loosen the upper clamp bolts [A] before loosening the top plug [B].

- Loosen the fork upper clamp bolt and the fork lower clamp bolts [C].
- With a twisting motion [A], work the fork leg down and out.

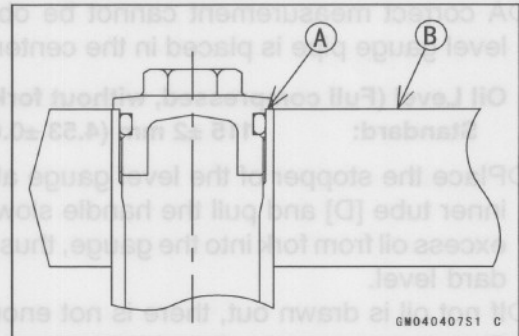


### Front Fork Installation

#### NOTE

○ If loosen the top plug, tighten the top plug before tightening the upper fork clamp bolt.

- Install the fork with the upper end of the inner tube flush [A] against the top surface of the stem head [B].
- Torque - Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)**



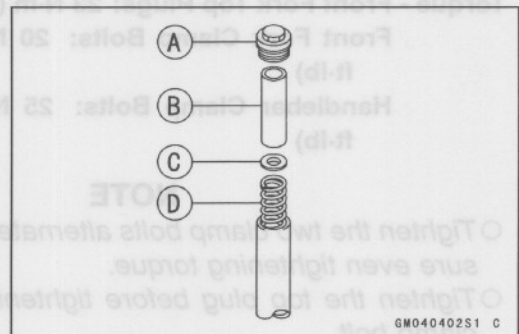
### ⚠ WARNING

Run the cables, wiring harnesses, and hoses properly to prevent them from obstructing the movement of the handlebar (see General Information chapter).

- Install the front fender and the front wheel (see Wheels/Tires chapter).

### Front Fork Oil Change

- Remove the front fork (see Front Fork Removal).
- Remove:
  - Top Plug [A]
  - Collar [B]
  - Fork Spring Seat [C]
  - Fork Spring [D]



## 11-6 SUSPENSION

### Front Fork

- Compress [B] the fork [A] upside down to draw out the oil into the contain [C].
- Pour in the specified amount of oil.

#### Fork Oil

**KAYABA KHL34-G10 or equivalent**

**Capacity (one side):**

**For oil change: approx. 400 mL (13.52 US oz.)**

#### NOTE

- Move the outer tube up and down a few times to remove the air that is trapped in the fork oil in order to stabilize the oil level.

- 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 (Full compressed, without fork spring)**

**Standard: 115 ±2 mm (4.53 ±0.08 in.)**

- 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 fork into the gauge, thus attaining the standard level.
- If not oil is drawn out, there is not enough oil in the fork. Pour in some more oil and measure again.

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

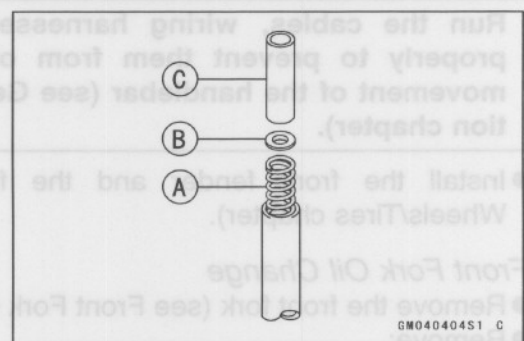
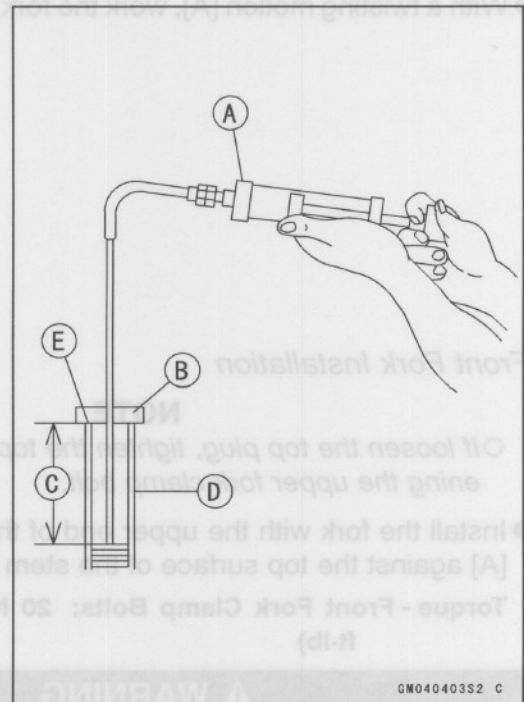
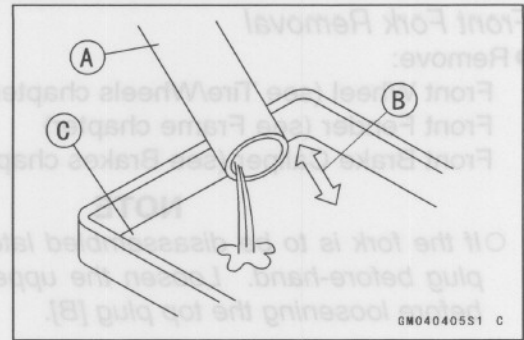
**Torque - Front Fork Top Plugs: 23 N-m (2.3 kgf-m, 17 ft-lb)**

**Front Fork Clamp Bolts: 20 N-m (2.0 kgf-m, 14 ft-lb)**

**Handlebar Clamp Bolts: 25 N-m (2.5 kgf-m, 18 ft-lb)**

#### NOTE

- Tighten the two clamp bolts alternately two times to ensure even tightening torque.
- Tighten the top plug before tightening the upper fork clamp bolt.



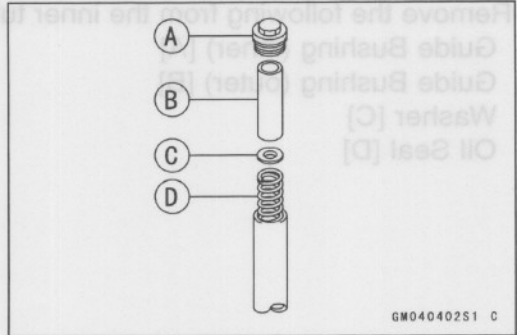
## Front Fork

### Front Fork Disassembly

- Remove the front fork (see Front Fork Removal).
- Remove the top plug with O-ring [A], take out the spacer [B], spring seat [C], and spring [D].
- Drain the fork oil (see Front Fork Oil Change).

**NOTE**

○ Turn the fork upside down and drain the oil while compressing the fork.

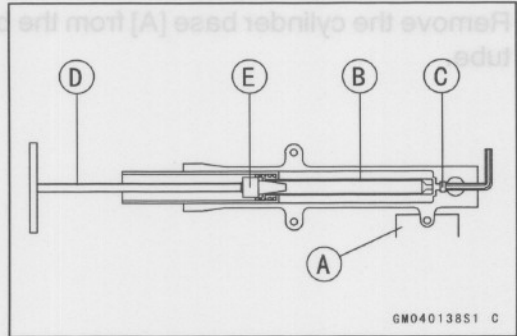


- Remove the Allen bolt [C] from the bottom of the fork.

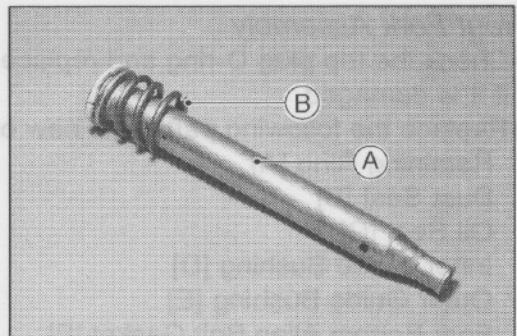
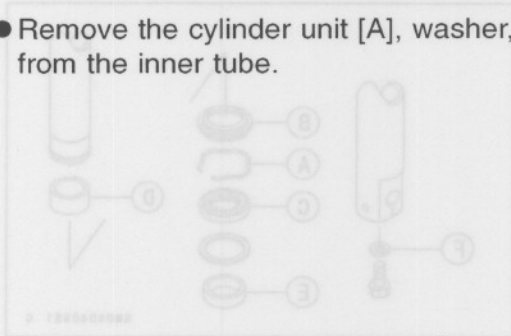
**Special Tools - Fork Cylinder Holder Handle: 57001-183 [D]  
Fork Cylinder Holder Adapter: 57001-1057 [E]**

**NOTE**

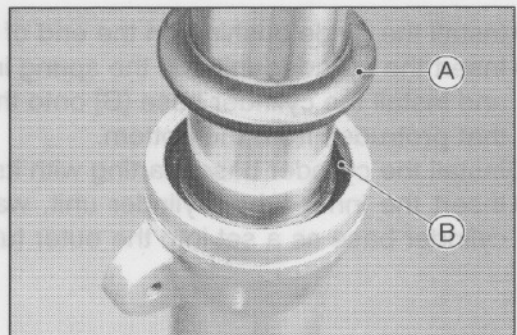
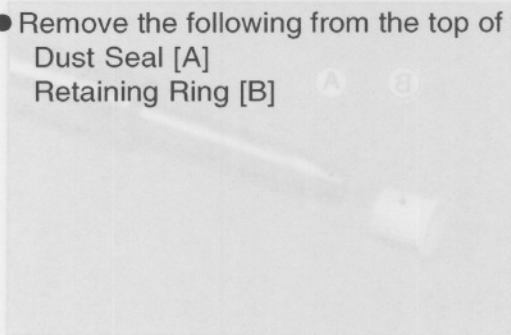
○ Hold the outer tube in a vise [A], stop the cylinder unit [B] from turning by using the special tools, and unscrew the Allen bolt.



- Remove the cylinder unit [A], washer, and the spring [B] from the inner tube.



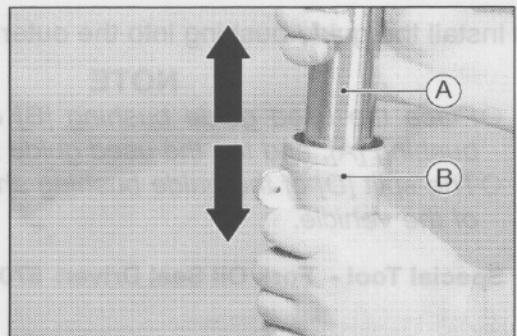
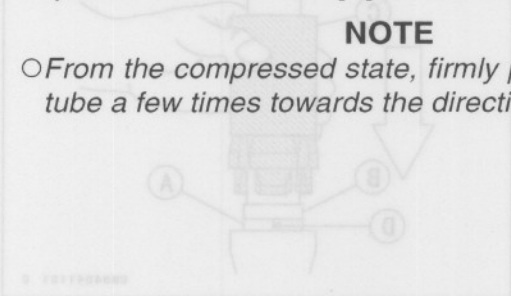
- Remove the following from the top of the outer tube:  
Dust Seal [A]  
Retaining Ring [B]



- Separate the inner tube [B] from the outer tube [A].

**NOTE**

○ From the compressed state, firmly pull down the outer tube a few times towards the direction of elongation.

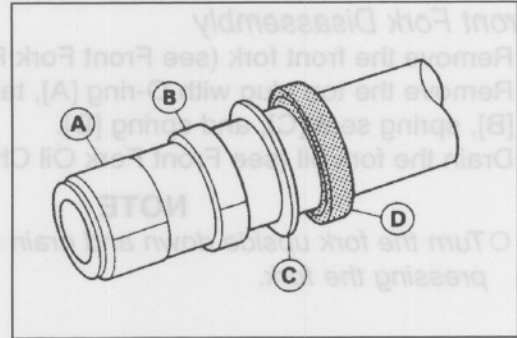
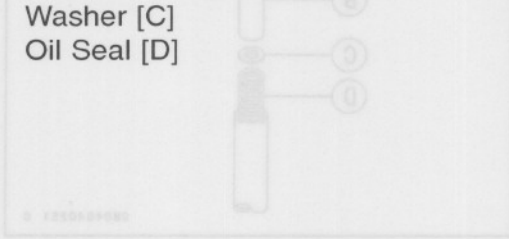


## 11-8 SUSPENSION

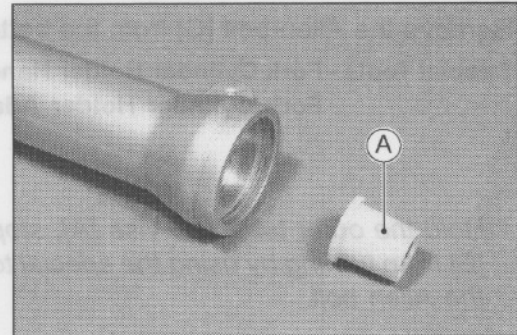
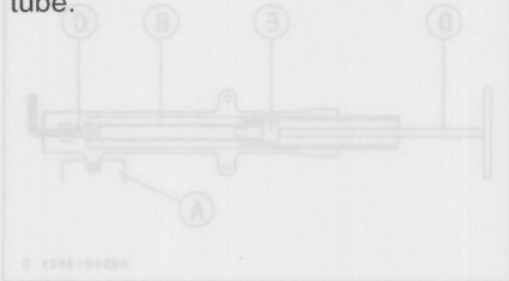
### Front Fork

- Remove the following from the inner tube:

Guide Bushing (inner) [A]  
 Guide Bushing (outer) [B]  
 Washer [C]  
 Oil Seal [D]

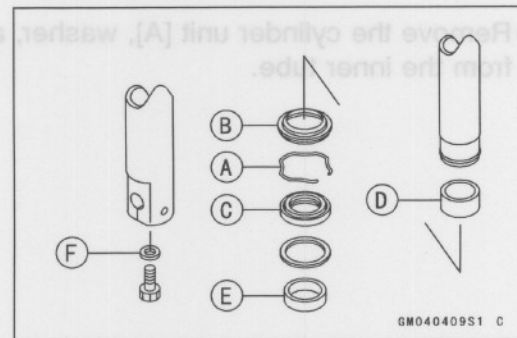


- Remove the cylinder base [A] from the bottom of the outer tube.

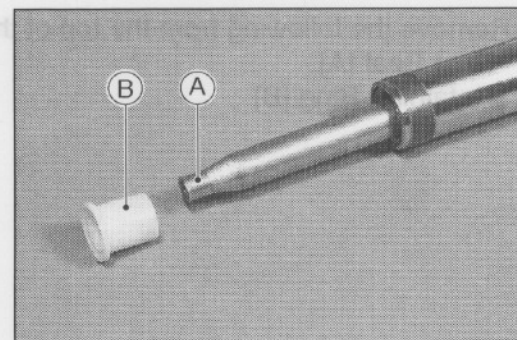


#### Front Fork Assembly

- 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]
  - Fork Bottom Allen Bolt Gasket [F]



- Install the guide bushing on the end of the inner tube.
- Insert the cylinder unit and the spring into the inner tube, and install the cylinder base [B] onto the cylinder end [A] that protrudes from the bottom.
- Install the cylinder base starting with its stepped end.
- Insert the inner tube, cylinder unit, washer, spring, and cylinder base as a set into the outer tube.

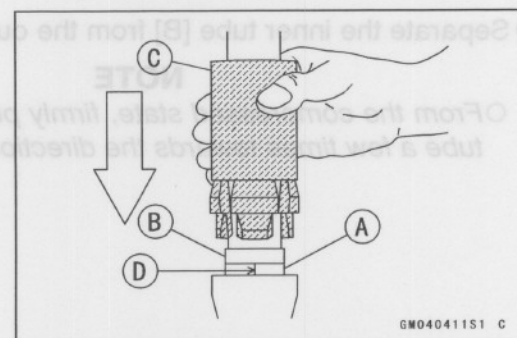


- Install the guide bushing into the outer tube.

#### NOTE

- Place the used guide bushing [B] on the new guide bushing [A], and tap the used guide bushing.
- The split [D] of the guide bushing should face the side of the vehicle.

Special Tool - Fork Oil Seal Driver: 57001-1219 [C]

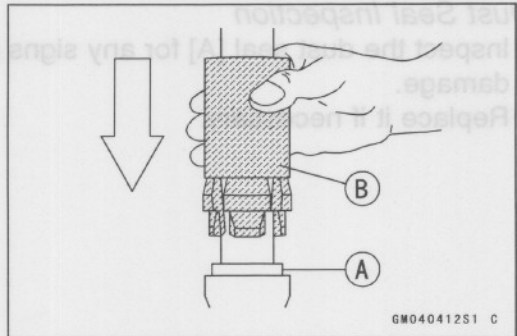


**Front Fork**

- After installing the washer, drive the oil seal [A] into place.
- Apply high-temperature grease to the oil seal lips

**Special Tool - Fork Oil Seal Driver: 57001-1219 [B]**

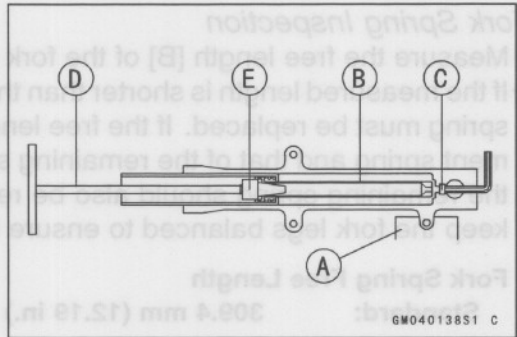
- Install the retaining ring into the outer tube.
- Install the dust seal by hand.



- Apply non-permanent locking agent to the threads of the bottom Allen bolt [C].
- Hold the front fork horizontally in a vise [A].
- Hold the cylinder unit [B] with the special tools and tighten the bottom Allen bolt to secure the cylinder in place.

**Torque - Front Fork Bottom Allen Bolt: 30 N·m (3.0 kgf·m, 22 ft·lb)**

**Special Tools - Fork Cylinder Holder Handle: 57001-183 [D]  
Fork Cylinder Holder Adapter: 57001-1057 [E]**



- Pour in the specified amount of oil and install the removed parts (see Front Fork Oil Change).

**Fork Oil**

**KAYABA KHL34-G10 or equivalent**

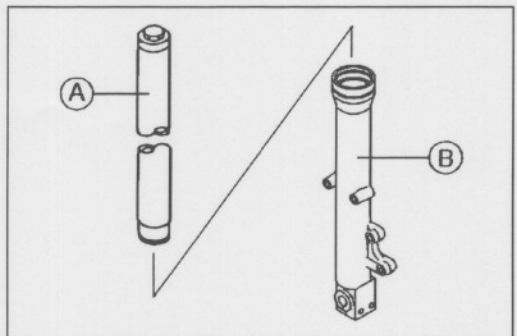
**Capacity 473 ±4 mL (15.99 ±0.14 US oz.)**

**(one side): (after fork disassembly, completely dry)**

- Install the front fork (see Front Fork Installation).

*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**

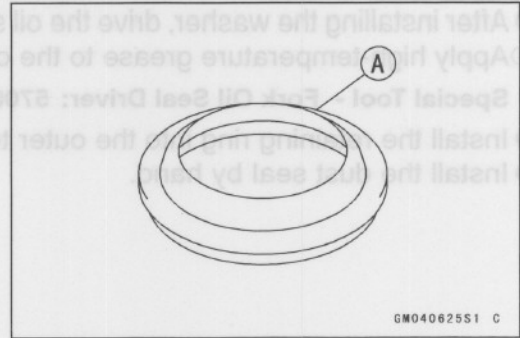
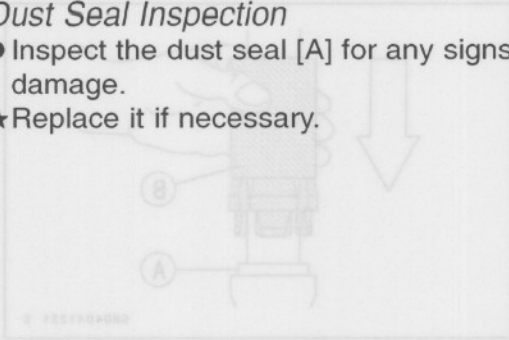
**Replace the inner and outer tubes with new ones if they are bent because it is dangerous to use them by repairing them. Make sure to inspect the inner and outer tubes of the other side.**

# 11-10 SUSPENSION

## Front Fork

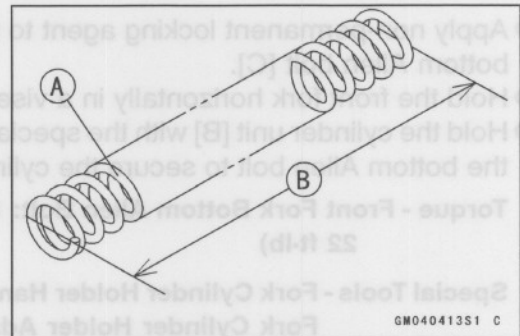
### Dust Seal Inspection

- Inspect the dust seal [A] for any signs of deterioration or damage.
- ★ Replace it if necessary.



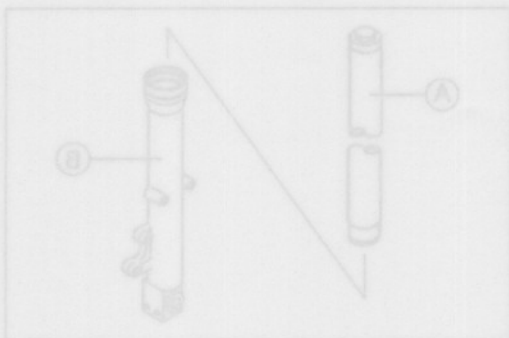
### Fork Spring Inspection

- Measure the free length [B] of the fork spring [A].
- ★ 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.



### Fork Spring Free Length

- Standard: 309.4 mm (12.19 in.)
- Service Limit: 303 mm (11.93 in.)



● Pour in the specified amount of oil and install the removed parts (see Front Fork Oil Change).

Fork Oil  
KAYABA KHL34-G10 or equivalent  
Capacity 473 ± 4 mL (12.99 ± 0.14 US oz.)  
(one side): (after fork disassembly, completely dry)  
● Install the front fork (see Front Fork Installation).

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.

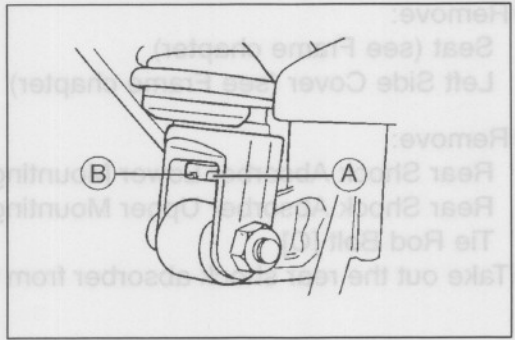
● Place the inner tube in the outer tube [B] and pump them back and forth manually to check for smooth operation.  
★ If the movement is not smooth, replace both the inner tube and the outer tube.

**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.

**Rear Shock Absorber**

*Rebound Damping Adjustment*

- Turn the damper adjuster [A] to adjust the rebound damping.
- Align the numbered mark [B] of the adjuster.
- The standard adjuster setting for average-build rider of 68 kg (150 lb) with no passenger and no accessories is position "2".
- ★ If the damper's effectiveness is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

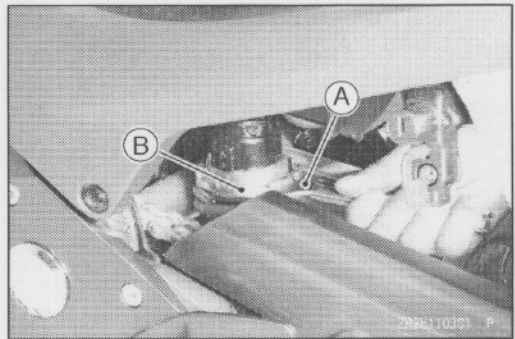


**Rebound Damping Adjustment**

Adjuster Position	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1	Weak	Soft	Light	Good	Street
2	↑	↑	↑	↑	↑
3	↓	↓	↓	↓	↓
4	Strong	Hard	Heavy	Bad	Highway

*Spring Preload Adjustment*

- Turn the nut backward.
- Using the hook wrench [A], turn the adjusting nut [B] to adjust the spring preload.
- The standard adjuster setting for average-build rider of 68 kg (150 lb) with no passenger and no accessories is 3rd position.



**Spring Preload Setting**

**Standard Position:** 3rd position

**Operating Range:** 1st to 7th position

- ★ If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

**Spring Preload Adjustment**

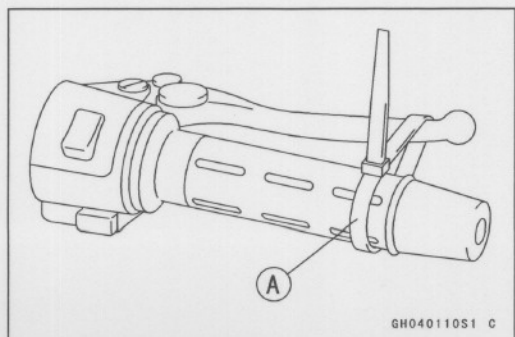
Adjuster Position	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
7th	Strong	Hard	Heavy	Bad	Highway

*Rear Shock Absorber Removal*

- Set the motorcycle on its center stand and raise the rear wheel.
- Squeeze the brake lever slowly and hold it with a band [A].

**⚠ WARNING**

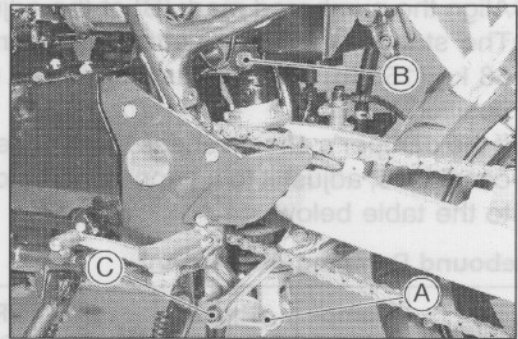
Be sure to hold the front brake when removing the shock absorber, or the motorcycle may fall over. It could cause an accident and injury.



# 11-12 SUSPENSION

## Rear Shock Absorber

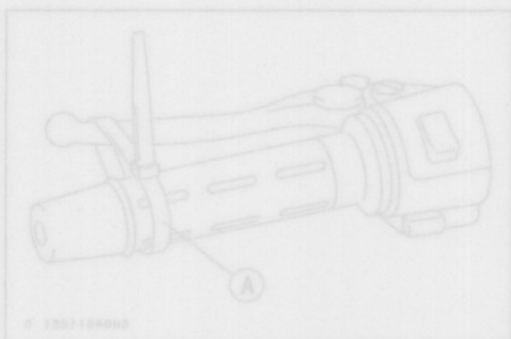
- Remove:
  - Seat (see Frame chapter)
  - Left Side Cover (see Frame chapter)
- Remove:
  - Rear Shock Absorber Lower Mounting Bolt [A]
  - Rear Shock Absorber Upper Mounting Bolt [B]
  - Tie Rod Bolt [C]
- Take out the rear shock absorber from the bottom.



### Rear Shock Absorber Installation

- Apply grease to the needle bearing of the shock absorber.
- Tighten the rear shock absorber mounting nuts.

**Torque - Rear Shock Absorber Mounting Nuts: 59 N·m (6.0 kgf·m, 43 ft·lb)**



Adjuster Position	Damping Force	Shock Absorber Hardness	Shock Absorber Load	Road Conditions	Driving Speed
1st	Weak	Soft	Light	Good	Low
↓	↑	↑	↑	↑	↑
7th	Strong	Hard	Heavy	Bad	Highway

**Spring Preload Adjustment**

Refer to the table below for appropriate position by referring to the table below.

Operating Range: 1st to 7th position

Standard Position: 3rd position

Spring Preload Setting

kg (150 lb) with no passenger and no accessories is 3rd position.

○ The standard adjuster setting for average-build rider of 68 adjust the spring preload.

● Using the hook wrench [A], turn the adjusting nut [B] to turn the nut backward.

● Spring Preload Adjustment

**WARNING**

Be sure to hold the front brake when removing the shock absorber, or the motorcycle may fall over. It could cause an accident and injury.

**Rear Shock Absorber Removal**

- Set the motorcycle on its center stand and raise the rear wheel.
- Squeeze the brake lever slowly and hold it with a band [A].

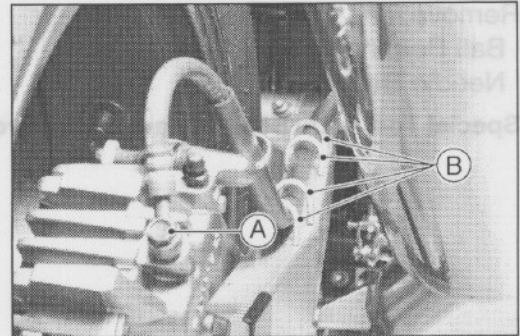
## Swingarm

### Swingarm Removal

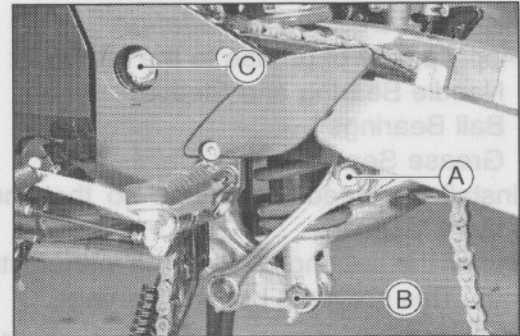
- Remove:
  - Rear Brake Hose Banjo Bolt [A]
  - Pass the Clamps [B] to pull it out.
  - Rear Wheel (see Wheels/Tires chapter)
  - Chain Cover (see Final Drive chapter)

#### NOTE

- Place the tip of the brake hose at a position that is higher than the rear brake fluid reservoir.



- Remove:
  - Upper Tie Rod Bolt [A]
  - Pivot Shaft Caps
  - Lower Shock Absorber Bolt [B]
  - Pivot Shaft Nut [C]
- Pull off the pivot shaft and remove the swingarm.



### Swingarm Installation

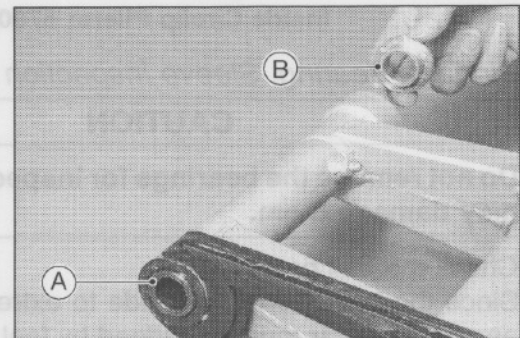
- Apply plenty of grease to the following:
  - Ball Bearing
  - Needle Bearings
  - Grease Seals [A]
- Install right collars [B].
- Insert the pivot shaft into the frame from the left side.
- Tighten the following:

**Torque - Swingarm Pivot Shaft Nut: 110 N·m (11 kgf·m, 80 ft·lb)**

**Upper Tie Rod Nut: 59 N·m (6.0 kgf·m, 43 in·lb)**

**Lower Shock Absorber Nut: 59 N·m (6.0 kgf·m, 43 in·lb)**

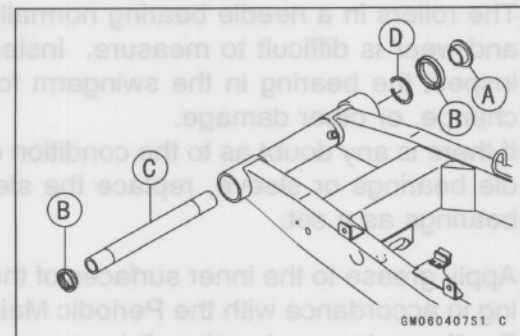
- Install the removed parts (see the respective chapters).



### Swingarm Bearing Removal

- Remove:
  - Swingarm (see Swingarm Removal)
  - Collar [A]
  - Grease Seals [B]
  - Sleeve [C]
  - Circlip (right side) [D]

**Special Tool - Inside Circlip Pliers: 57001-143**

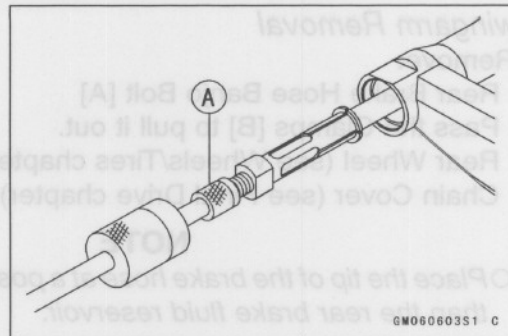
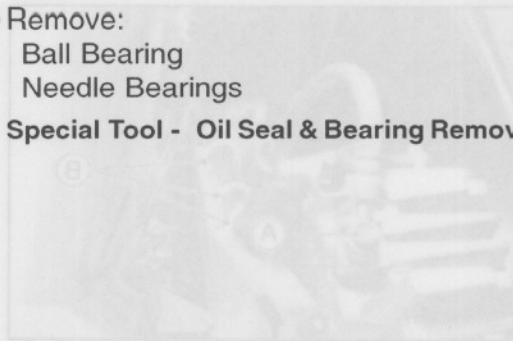


## 11-14 SUSPENSION

### Swingarm

- Remove:
  - Ball Bearing
  - Needle Bearings

**Special Tool - Oil Seal & Bearing Remover: 57001-1058 [A]**

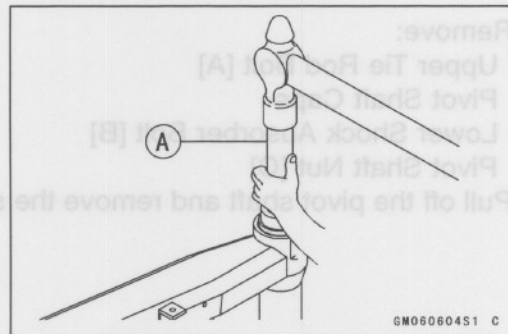


#### Swingarm Bearing Installation

- Apply plenty of grease to the following:
  - Needle Bearing and Sleeve
  - Ball Bearings
  - Grease Seal Lip
- Install the needle bearings so that the manufacturer's marks face in.
- Install the bearings so that the manufacturer's marks face out. This prevents bearing damage.

**Special Tools - Bearing Driver Set: 57001-1129 [A]**

**Inside Circlip Pliers: 57001-143**

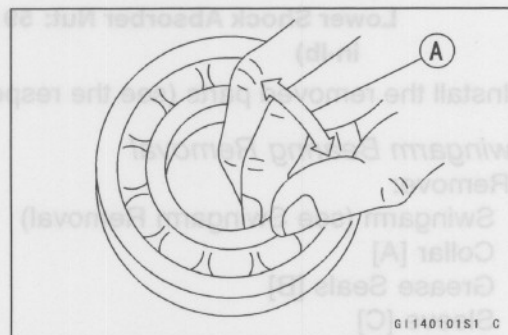


#### Swingarm Bearing, Sleeve Inspection and Lubrication

#### CAUTION

**Do not remove the bearings for inspection. Remove may damage them.**

- Check the ball bearing.
  - Since the ball bearing is made to extremely close tolerances, the wear must be judged by feel rather than measurement.
- Turn [A] the bearing in the swingarm back and forth while checking for plays, roughness, or binding. If bearing play, roughness, or binding is found, replace the bearing.
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing in the swingarm for abrasion, color change, or other damage.
- ★ If there is any doubt as to the condition of any of the needle bearings or sleeve, replace the sleeve, and needle bearings as a set.
- Apply grease to the inner surfaces of the swingarm bearing in accordance with the Periodic Maintenance Chart.
  - For the swingarm bearing, it is grease nipple [A] on the swingarm for lubrication. Force grease into the nipple until it comes out at both sides of the swingarm, and wipe off any excess.



#### Chain Slider Inspection

- Visually inspect the chain slider.
- ★ Replace the chain slider if it shows any signs of abnormal wear or damage.

**Tie Rod/Rocker Arm**

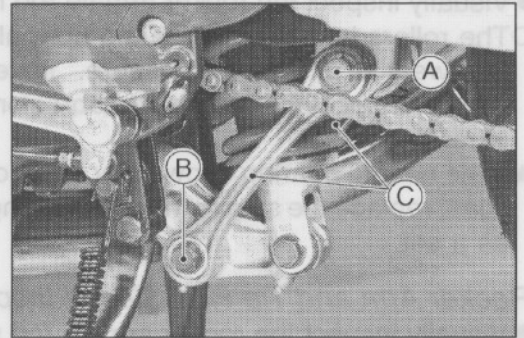
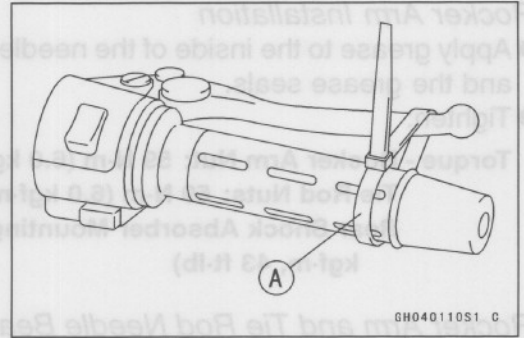
*Tie Rod Removal*

- Set the motorcycle on its center stand and raise the rear wheel.
- Squeeze the brake lever slowly and hold it with a band [A].

**⚠ WARNING**

Be sure to hold the front brake when removing the shock absorber, or the motorcycle may tall over. It could cause an accident and injury.

- Remove:
  - Upper Tie Rod Bolt [A]
  - Lower Tie Rod Bolt [B]
  - Tie Rods [C]



*Tie Rod Installation*

- Apply grease to the inside of the needle bearings, sleeve and the grease seals.
- Install the tie-rods so that the chamfered side faces the bolt and nut.
- Tighten the tie rod nuts.

**Torque - Tie Rod Nuts: 59 N·m (6.0 kgf·m, 43 ft·lb)**

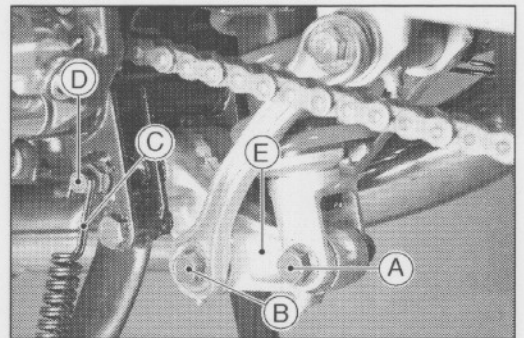
*Rocker Arm Removal*

- Set the motorcycle on its center stand and raise the rear wheel.
- Squeeze the brake lever slowly and hold it with a band.

**⚠ WARNING**

Be sure to hold the front brake when removing the shock absorber, or the motorcycle may tall over. It could cause an accident and injury.

- Remove:
  - Lower Rear Shock Absorber Bolt [A]
  - Lower Tie Rod Bolt [B]
  - Center Stand Spring [C]
  - Rocker Arm Bolt [D]
  - Rocker Arm [E]



## 11-16 SUSPENSION

### Tie Rod/Rocker Arm

#### Rocker Arm Installation

- Apply grease to the inside of the needle bearings, sleeve, and the grease seals.
- Tighten:

**Torque - Rocker Arm Nut: 59 N·m (6.0 kgf·m, 43 ft·lb)**

**Tie Rod Nuts: 59 N·m (6.0 kgf·m, 43 ft·lb)**

**Rear Shock Absorber Mounting Nut: 59 N·m (6.0 kgf·m, 43 ft·lb)**

#### Rocker Arm and Tie Rod Needle Bearing Inspection

- Visually inspect the rocker arm/tie rod needle bearings.
- 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 abnormal conditions, replace the sleeve, needle bearing, and ball bearing as a set.

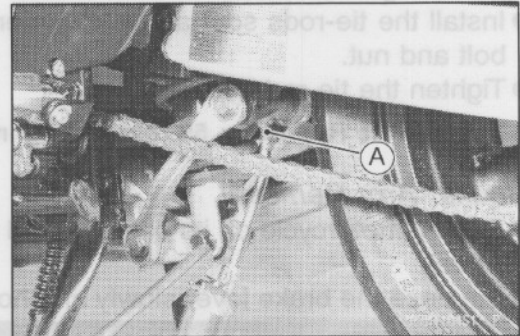
#### Rocker Arm and Tie Rod Sleeve Inspection

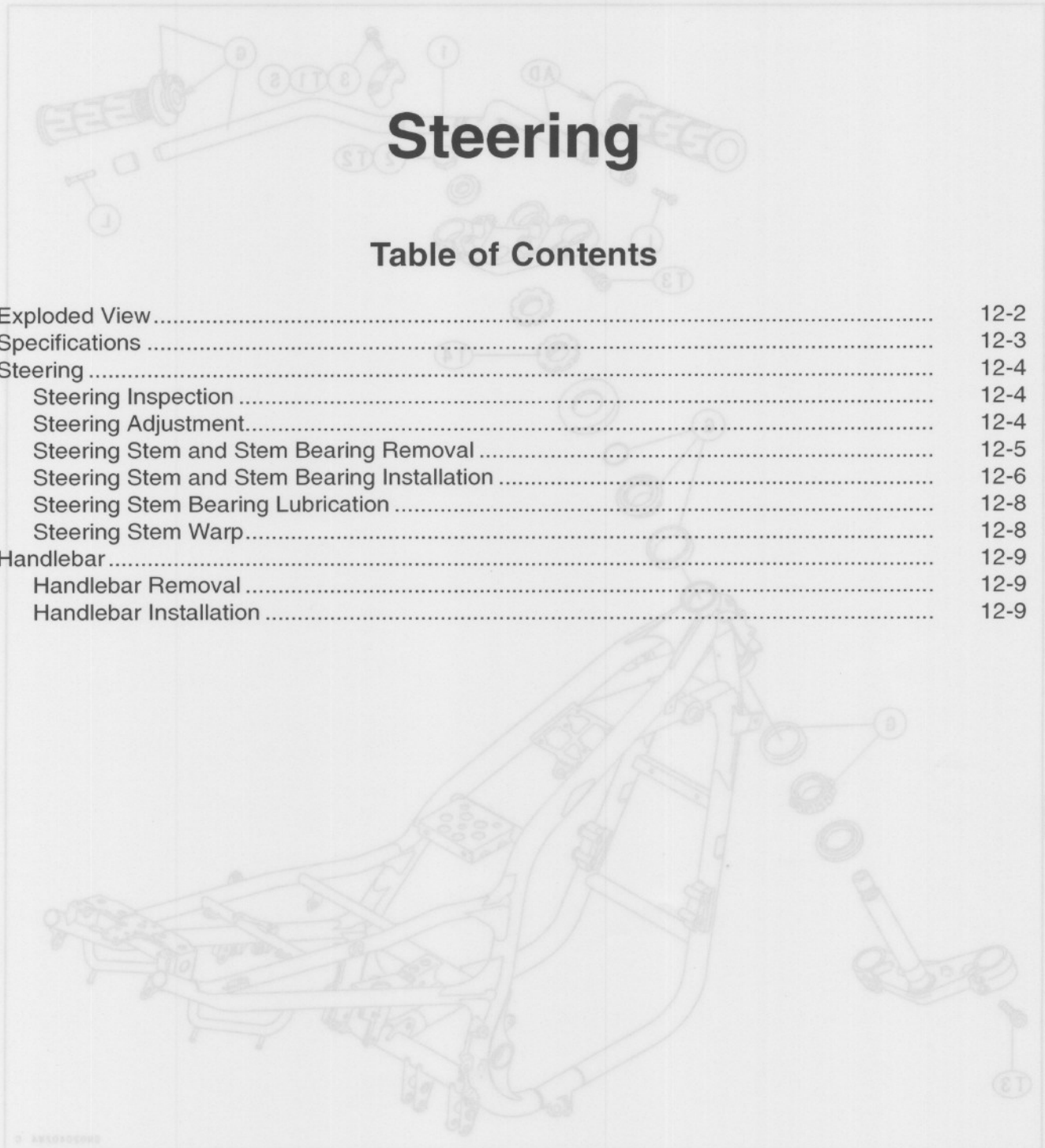
- Visually inspect the rocker arm/tie rod sleeves.
- ★ If the sleeve shows any signs of abnormal wear, discoloration, or damage, replace the sleeve, needle bearing, and ball bearing as a set.

#### Tie-Rod, Rocker Arm Needle Bearing Lubrication (Periodic Maintenance)

In order for the tie-rod and rocker arm to function safely and wear slowly, it should be lubricated in accordance with the Periodic Maintenance Chart.

- For the rocker arm and tie-rod needle bearings there are grease nipples [A] on the rocker arm and swingarm for lubrication. Force grease into the nipples until it comes out at both sides of the rocker arm and tie-rod, and wipe off any excess.





# Steering

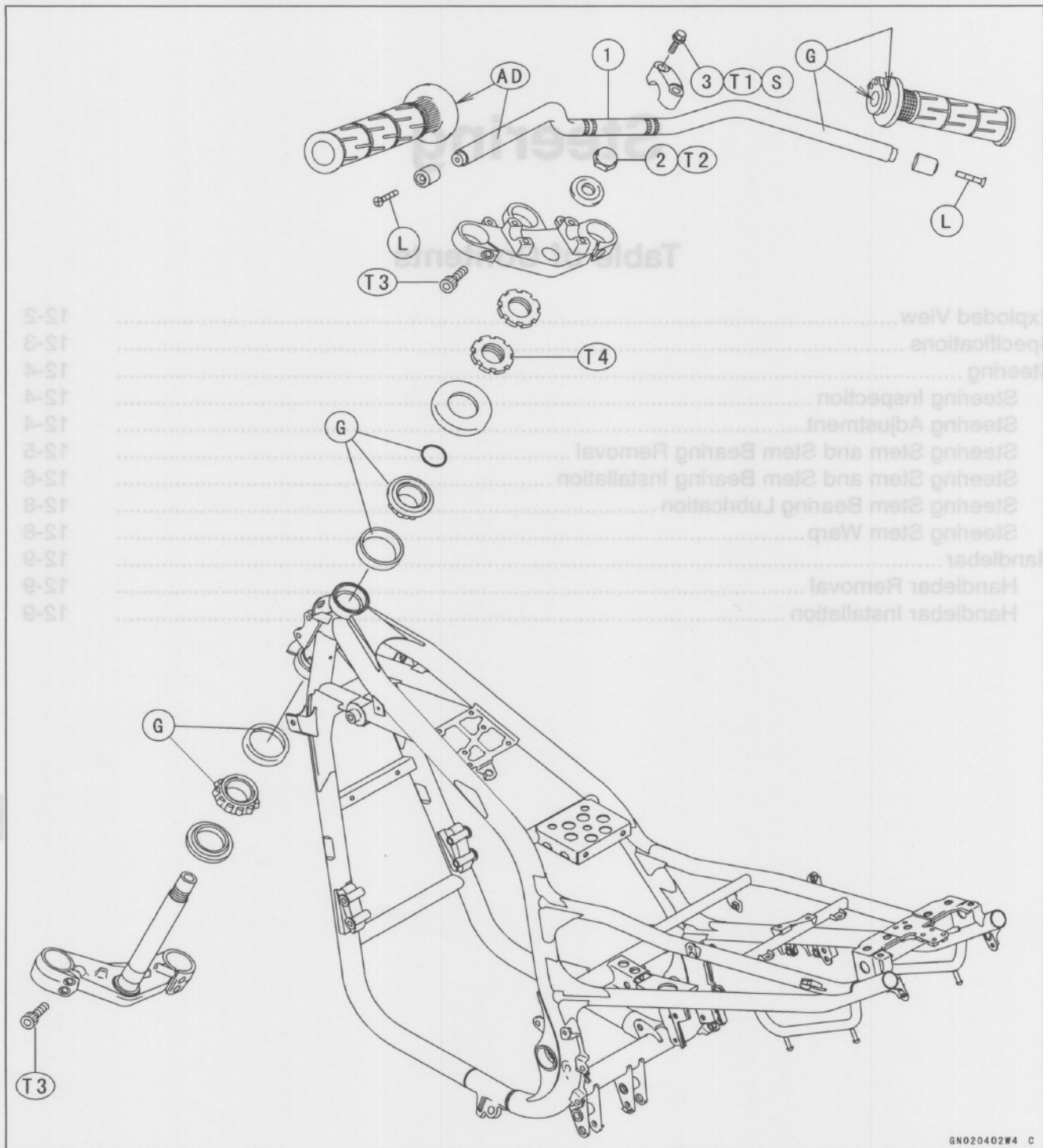
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1. Align the punch mark with the gap between the holder and the clamp.  
 2. Stem Head Nut  
 3. Handlebar Clamp Bolts  
 T1: 25 N·m (2.5 kgf·m, 18 ft·lb)  
 T2: 49 N·m (5.0 kgf·m, 36 ft·lb)  
 T3: 20 N·m (2.0 kgf·m, 14 ft·lb)  
 T4: 9 N·m (0.9 kgf·m, 43 in·lb)  
 AD: Apply adhesive.  
 G: Apply grease.  
 J: Apply a non-permanent locking agent to the threads.  
 S: Follow the specific tightening sequence.

## 12-2 STEERING

### Exploded View



GN020402W4 C

1. Align the punch mark with the gap between the holder and the clamp.

2. Stem Head Nut

3. Handlebar Clamp Bolts

T1: 25 N·m (2.5 kgf·m, 18 ft·lb)

T2: 49 N·m (5.0 kgf·m, 36 ft·lb)

T3: 20 N·m (2.0 kgf·m, 14 ft·lb)

T4: 4.9 N·m (0.5 kgf·m, 43 in·lb)

AD: Apply adhesive.

G: Apply grease.

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

S: Follow the specific tightening sequence.

Specifications

- Special Tools - Steering Stem Bearing Driver: 57001-137
- Bearing Puller: 57001-158
- Bearing Puller Adapter: 57001-317
- 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 Inspection

- Raise the front wheel off the grounds, using the jack
- With the front wheel pointing straight ahead, turn the steering wheel to the right and left, and swing fully left and right from the top of the stop.
- If the wheel binds or catches before the fork hits the stop.
- Feel for steering looseness by pushing and pulling [A] the forks.
- If you feel looseness, the steering is too loose.

NOTE

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

Steering Adjustment

- Loosen the Front Fork Lower Clamp Bolts [A]
- Remove the Handbar.
- Loosen the Steering Stem Head Nut.

- Raise the front wheel and turn the stem locknut [A] to adjust.
- Loosen the stem locknut if the steering is too tight, and tighten the stem locknut if the steering is too loose.

Special Tools - Jack: 57001-1238

Steering Stem Nut Wrench: 57001-1100 [B]

NOTE

- Do not separate the upper and lower stem locknuts.
- Turn the lower nut to loosen and turn the upper nut to tighten. In either case, turn the nut only 1/8 of a turn at a time.

## 12-4 STEERING

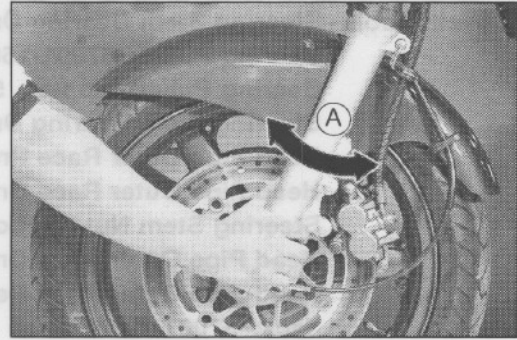
### Steering

#### Steering Inspection

- Raise the front wheel off the grounds, using the jack.

**Special Tool - Jack: 57001-1238**

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

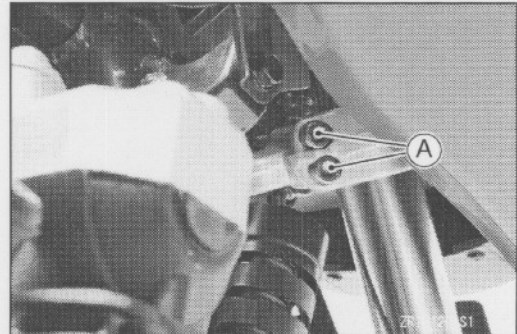


#### NOTE

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

#### Steering Adjustment

- Loosen the Front Fork Lower Clamp Bolts [A].
- Remove the Handlebar.
- Loosen the Steering Stem Head Nut.



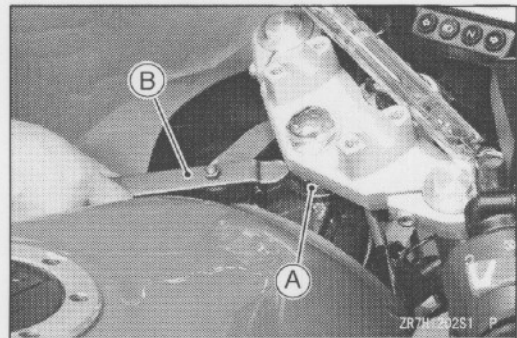
- Raise the front wheel and turn the stem locknut [A] to adjust.
- Loosen the stem locknut if the steering is too tight, and tighten the stem locknut if the steering is too loose.

**Special Tools - Jack: 57001-1238**

**Steering Stem Nut Wrench: 57001-1100 [B]**

#### NOTE

- Do not separate the upper and lower stem locknuts. Turn the lower nut to loosen and turn the upper nut to tighten. In either case, turn the nut only 1/8 of a turn at a time.



Steering

- Tighten the following:
  - Torque - Steering Stem Head Nut: 49 N·m (5.0 kgf·m, 36 ft·lb)
  - Front Fork Lower Clamp Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)

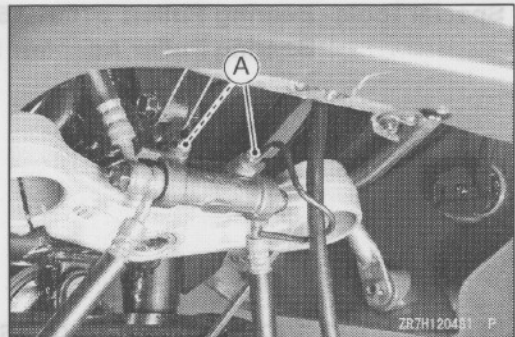
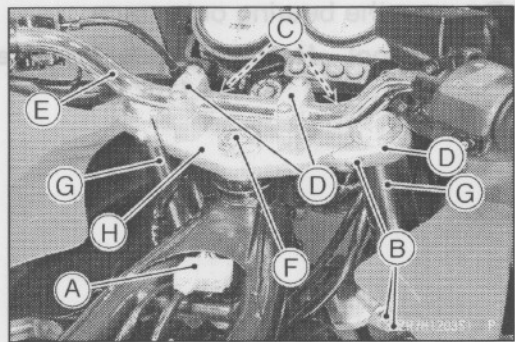
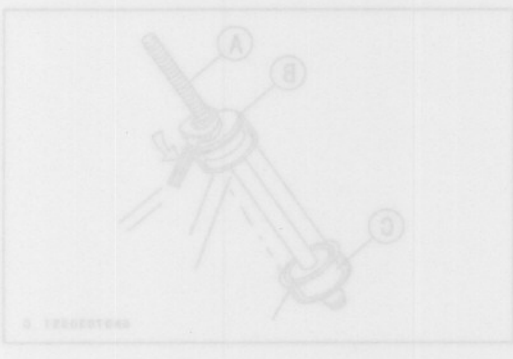
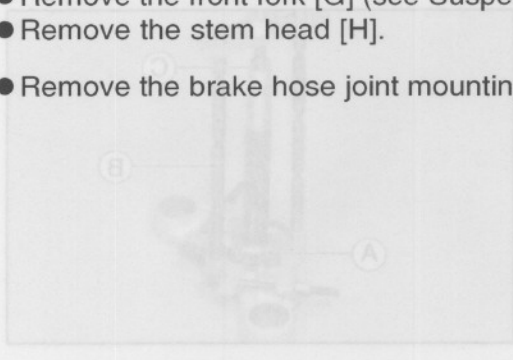
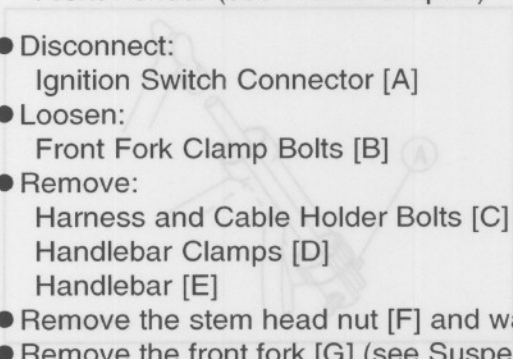
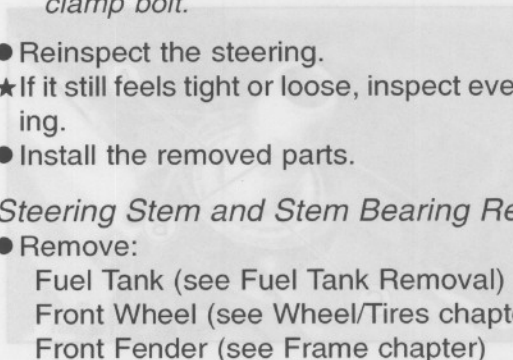
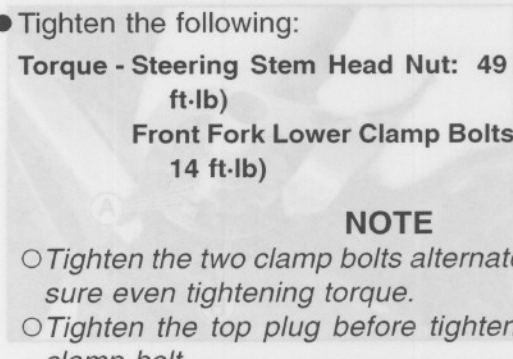
**NOTE**

- Tighten the two clamp bolts alternately two times to ensure even tightening torque.
- Tighten the top plug before tightening the upper fork clamp bolt.

- Reinspect the steering.
- ★ If it still feels tight or loose, inspect every part of the steering.
- Install the removed parts.

*Steering Stem and Stem Bearing Removal*

- Remove:
  - Fuel Tank (see Fuel Tank Removal)
  - Front Wheel (see Wheel/Tires chapter)
  - Front Fender (see Frame chapter)
- Disconnect:
  - Ignition Switch Connector [A]
- Loosen:
  - Front Fork Clamp Bolts [B]
- Remove:
  - Harness and Cable Holder Bolts [C]
  - Handlebar Clamps [D]
  - Handlebar [E]
- Remove the stem head nut [F] and washer.
- Remove the front fork [G] (see Suspension chapter).
- Remove the stem head [H].
- Remove the brake hose joint mounting bolts [A].



Remove the stem locknut [A].  
Remove the stem cap [B].  
Special Tool - Steering Stem Nut Wrench: 57001-1100 [B]

Hold the stem base, remove the O-ring [A], and take out the stem [B].  
Remove the upper bearing [C].

Remove ID < 37 mm

Remove the lower bearing [A] and grease seal.

Replace the bearing outer races with new ones.  
Apply grease to the outer race, and drive both upper and lower races into the head pipe at the same time.

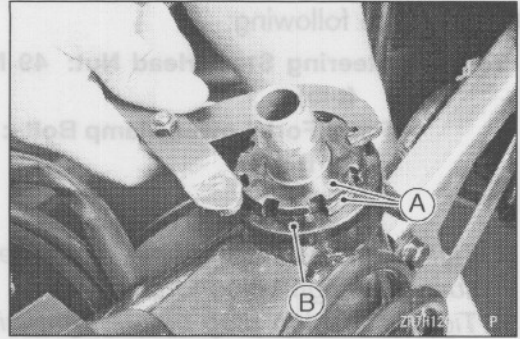
Special Tools - Head Pipe Outer Race Press Shift: 57001-1075 [A]  
Head Pipe Outer Race Driver, 448.5: 57001-1105 [B]  
Head Pipe Outer Race Driver, 451.5: 57001-1076 [C]

## 12-6 STEERING

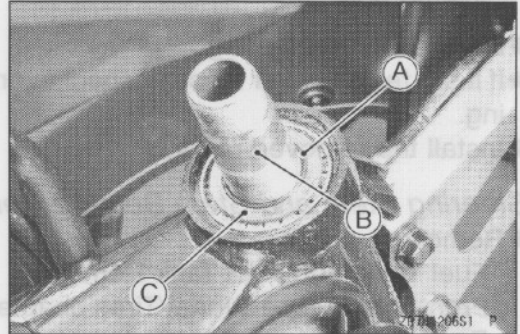
### Steering

- Remove the stem locknuts [A].
- Remove the stem cap [B].

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

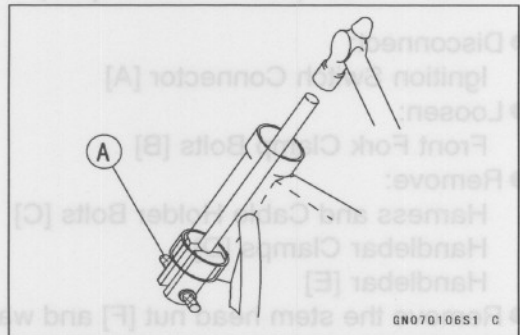
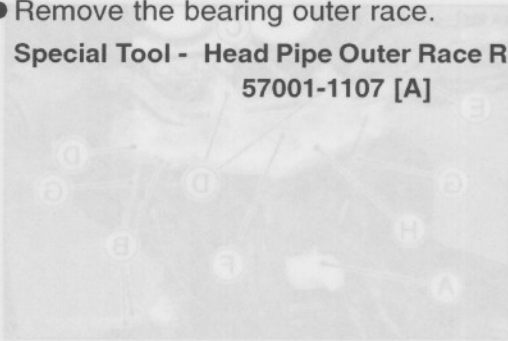


- Hold the stem base, remove the O-ring [A], and take out the stem [B].
- Remove the upper bearing [C].



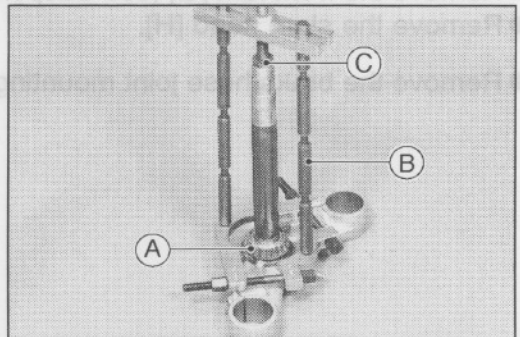
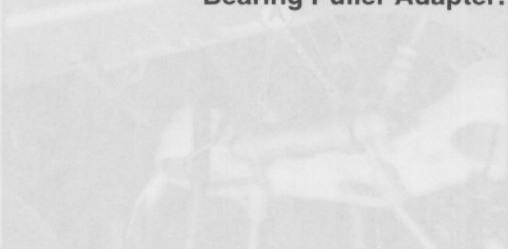
- Remove the bearing outer race.

**Special Tool - Head Pipe Outer Race Remover ID > 37 mm: 57001-1107 [A]**



- Remove the lower bearing [A] and grease seal.

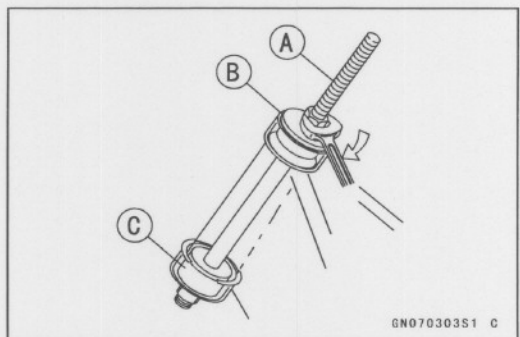
**Special Tools - Bearing Puller: 57001-158 [B]  
Bearing Puller Adapter: 57001-317 [C]**



#### Steering Stem and Stem Bearing Installation

- Replace the bearing outer races with new ones.
- Apply grease to the outer race, and drive both upper and lower races into the head pipe at the same time.

**Special Tools - Head Pipe Outer Race Press Shaft: 57001-1075 [A]  
Head Pipe Outer Race Driver,  $\phi 46.5$ : 57001-1106 [B]  
Head Pipe Outer Race Driver,  $\phi 51.5$ : 57001-1076 [C]**

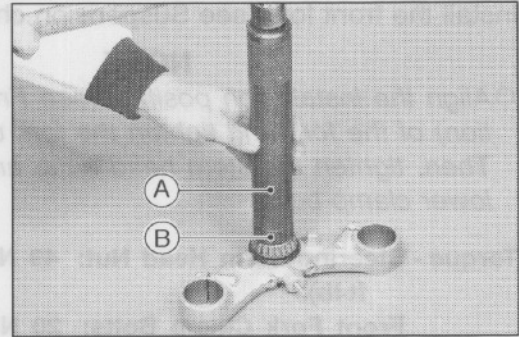


## Steering

- Replace the lower bearing with a new one.
- Install the grease seal on the steering stem, and drive the lower bearing [A] applied the grease onto the stem.

**Special Tools - Steering Stem Bearing Driver: 57001-137 [A]**

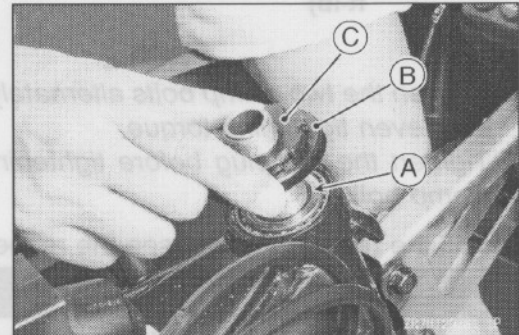
**Steering Stem Bearing Driver Adapter,  $\phi 34.5$ : 57001-1074 [B]**



- Apply grease to the upper bearing, and install it in the head pipe.
- Insert the stem shaft through the head pipe and the bearings. Then, while holding the stem base from the bottom, install the O-ring [A] on the shaft.
- Install the stem cap [B] and hand-tighten the locknuts [C].

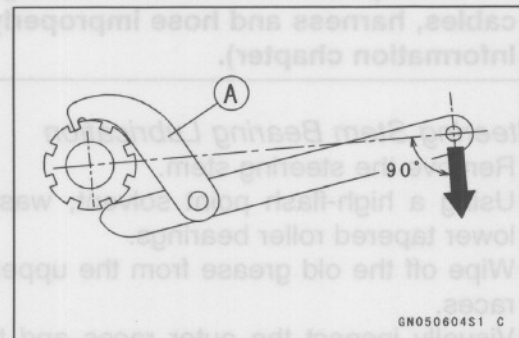
**NOTE**

○ To install the stem locknut, face its stepped side down.



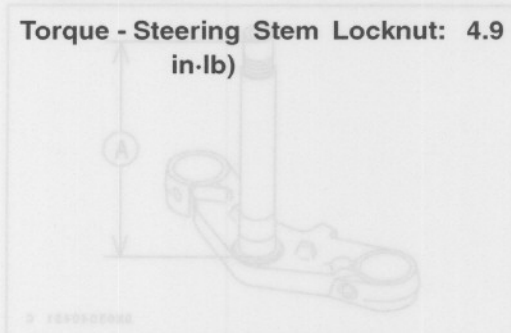
- Install the stem head.
- Install the washer, and lightly tighten the stem head nut.
- Allow the bearings to settle.
- Torque the stem locknut to 39 N·m (4.0 kgf·m, 29 ft·lb).

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



- Check whether the stem turns smoothly without free play. If it feels tight or has free play, the bearings could be damaged.
- Gradually loosen the stem locknut until the stem turns easily.
- Retighten the stem locknut and stop when the stem starts to turn hard.

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



## 12-8 STEERING

### Steering

- Install the front fork (see Suspension chapter).

#### NOTE

- Align the installation position (see Front Fork Installation) of the fork and tighten the fork upper clamp bolt. Then, tighten the stem head nuts, and finally the fork lower clamp bolts.

**Torque - Steering Stem Head Nut: 49 N·m (5.0 kgf·m, 36 ft·lb)**

**Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)**

#### NOTE

- Tighten the two clamp bolts alternately two times to ensure even tightening torque.
- Tighten the top plug before tightening the upper fork clamp bolt.

- Install the removed parts (see the respective chapters).

#### ⚠ WARNING

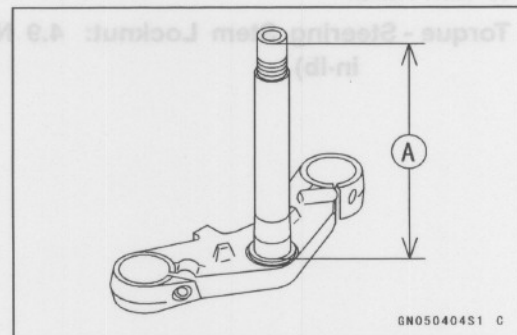
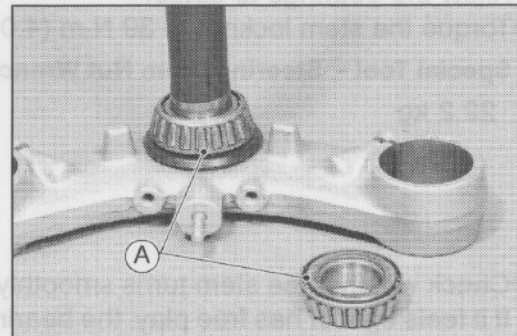
**Do not impede the handlebar turning by routing the cables, harness and hose improperly (see General Information chapter).**

#### 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.

#### Steering Stem Warp

- Whenever the steering stem is removed, or if the steering cannot be adjusted for smooth action, check the steering stem for straightness.
- ★ If the steering stem [A] is bent, replace the steering stem.

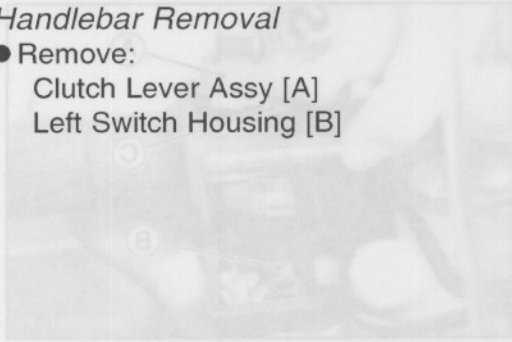


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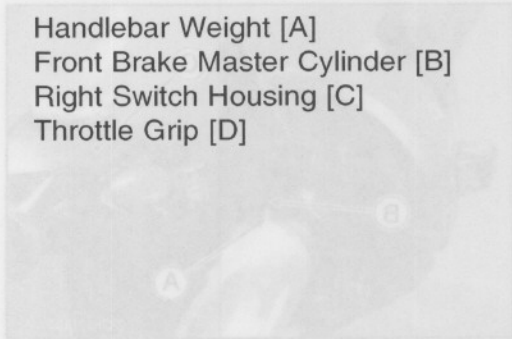
## Handlebar

### Handlebar Removal

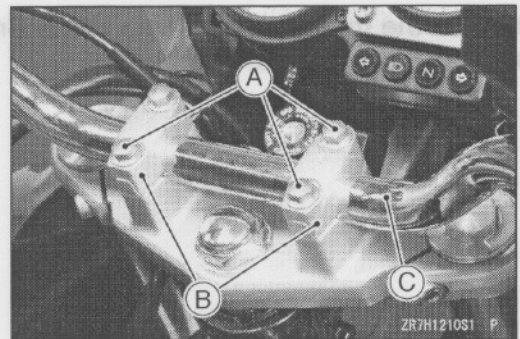
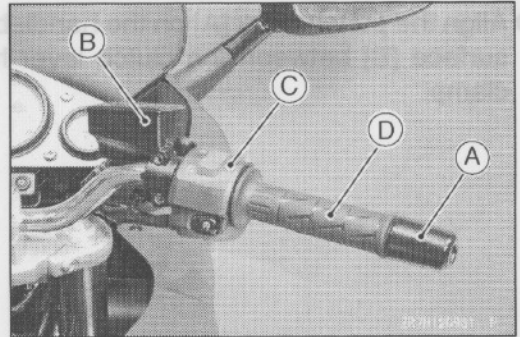
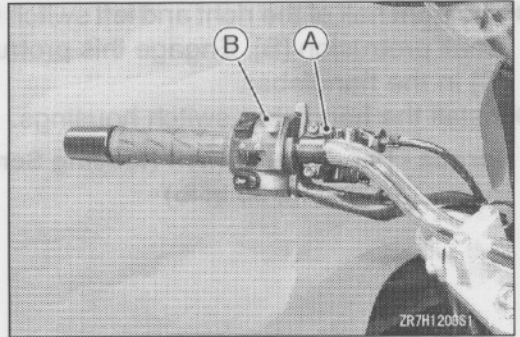
- Remove:
  - Clutch Lever Assy [A]
  - Left Switch Housing [B]



- Handlebar Weight [A]
- Front Brake Master Cylinder [B]
- Right Switch Housing [C]
- Throttle Grip [D]

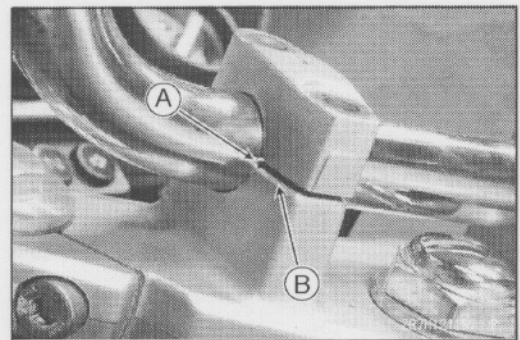


- Remove the handlebar clamp bolts [A].
- Remove the handlebar clamps [B] and take out the handlebar [C].



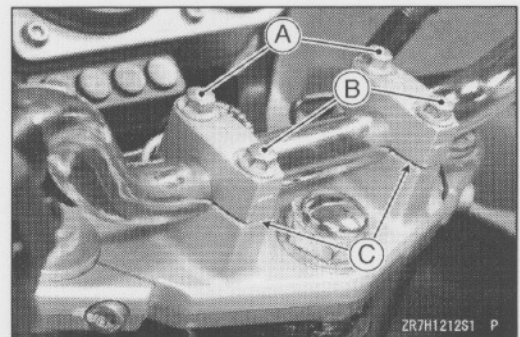
### Handlebar Installation

- Align the punch mark [A] on the handlebar with the gap [B] between the left holder and the left clamp.



- First tighten the front clamp bolts [A]. Then, tighten the rear clamp bolts [B]. After tightening the bolts, a clearance [C] will be created behind the clamps.

**Torque - Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

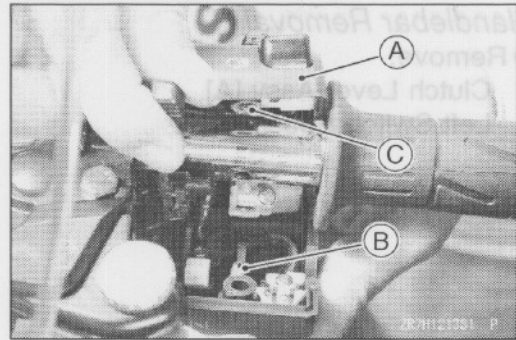


## 12-10 STEERING

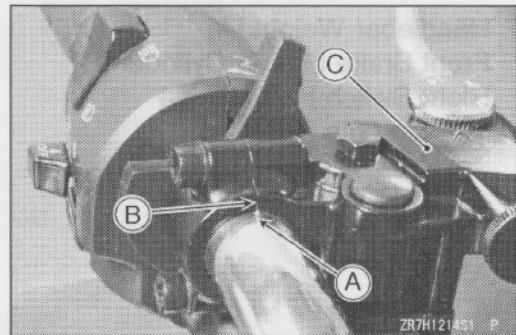
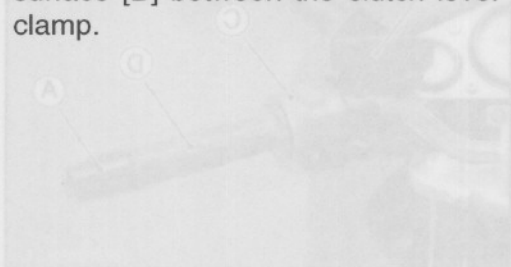
### Handlebar

- 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.



- Install the front master cylinder (see Brake chapter).
- Install the throttle and left grip.



● Remove the handlebar clamp bolts [A].  
● Remove the handlebar clamps [B] and take out the handlebar [C].

Handlebar installation  
● Align the punch mark [A] on the handlebar with the gap [B] between the left holder and the left clamp.

● First tighten the front clamp bolts [A]. Then, tighten the rear clamp bolts [B]. After tightening the bolts, a clearance [C] will be created behind the clamps.  
Torque - Handlebar Clamp Bolts: 22 N·m (2.3 kgf·m, 18 ft·lb)

# Frame

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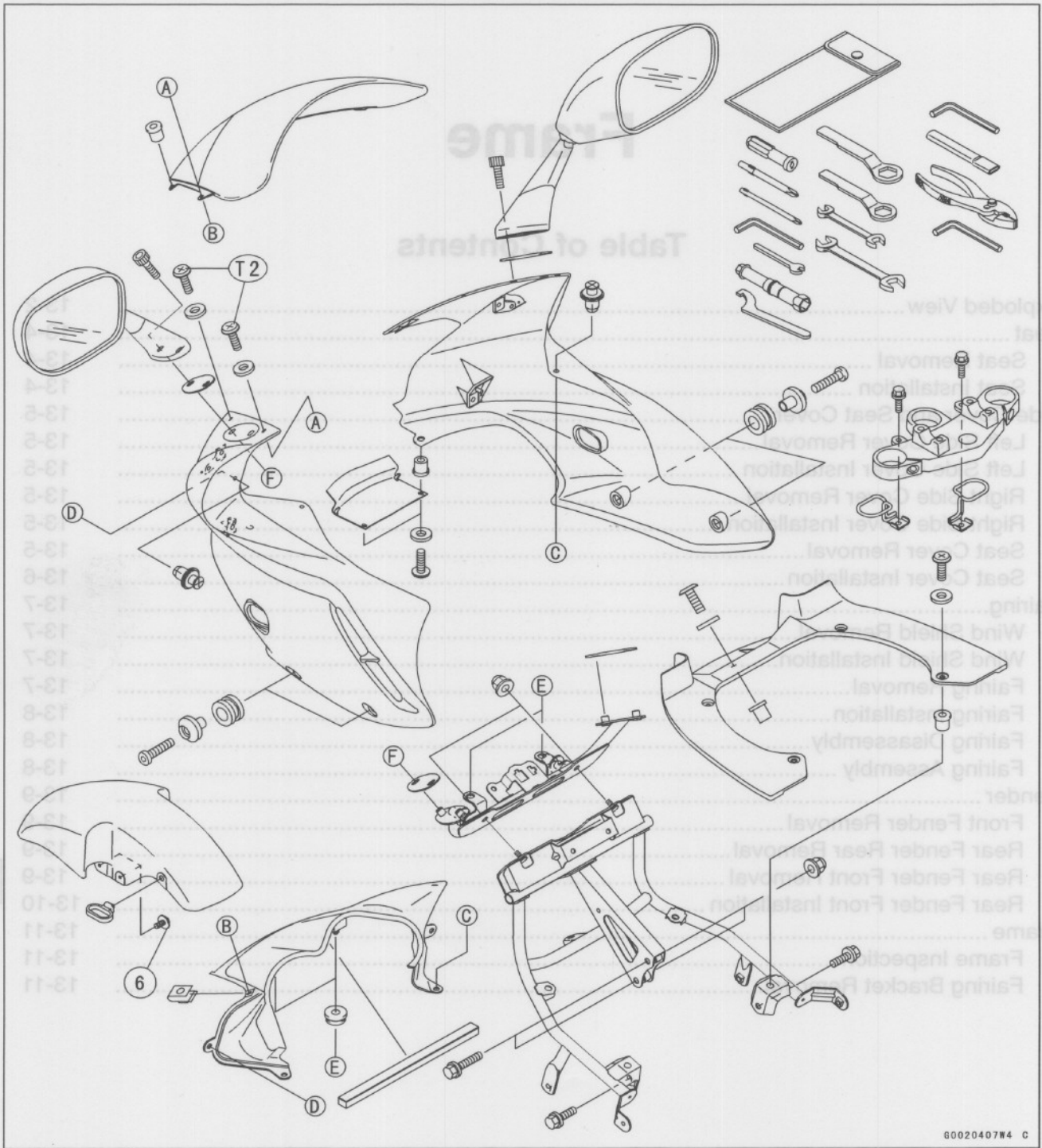
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US: U.S.A. Model  
 CN: Canada Model  
 CAL: California Model  
 L: Apply a non-permanent locking agent.  
 G: Apply grease.  
 T4: 44 N-m (4.5 kgf-m, 33 ft-lb)  
 T3: 29 N-m (3.0 kgf-m, 22 ft-lb)

T2: 0.4 N-m (0.04 kgf-m, 4 in-lb)  
 T1: 25 N-m (2.5 kgf-m, 18 ft-lb)  
 8 Front Fender Mounting Bolts  
 5 Footpeg Mounting Pin Clips  
 4 Side Stand Bolt, Nut  
 3 Footpeg Bracket Mounting Bolts  
 2 Center Stand Nut  
 1 Longer end faces up.

# 13-2 FRAME

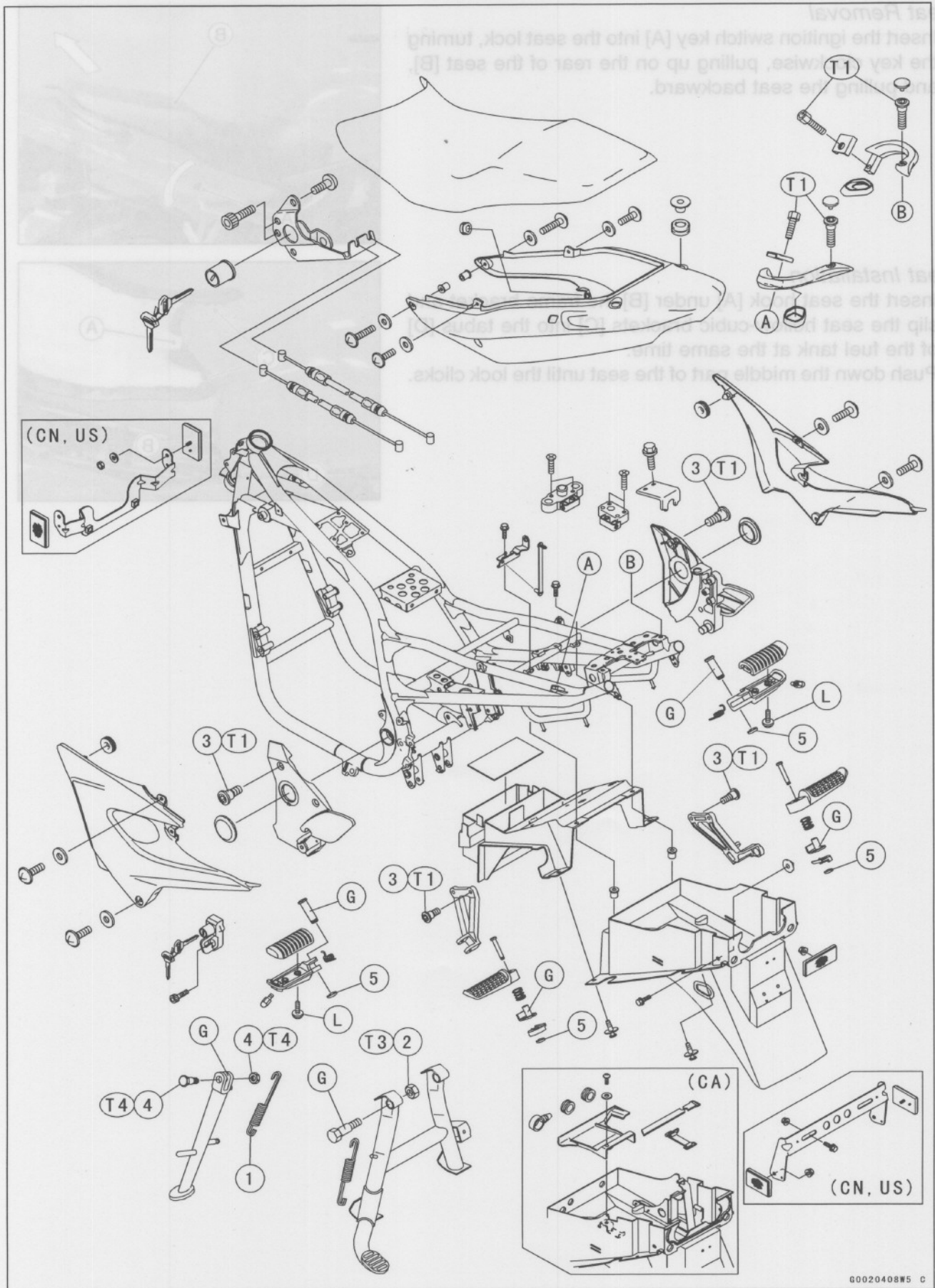
## Exploded View



- 1. Longer end faces up.
- 2. Center Stand Nut
- 3. Footpeg Bracket Mounting Bolts
- 4. Side Stand Bolt, Nut
- 5. Footpeg Mounting Pin Circlips
- 6. Front Fender Mounting Bolts
- T1: 25 N·m (2.5 kgf·m, 18 ft·lb)
- T2: 0.4 N·m (0.04 kgf·m, 4 in·lb)

- T3: 29 N·m (3.0 kgf·m, 22 ft·lb)
- T4: 44 N·m (4.5 kgf·m, 33 ft·lb)
- G: Apply grease.
- L: Apply a non-permanent locking agent.
- CAL: California Model
- CN: Canada Model
- US: U.S.A. Model

Exploded View



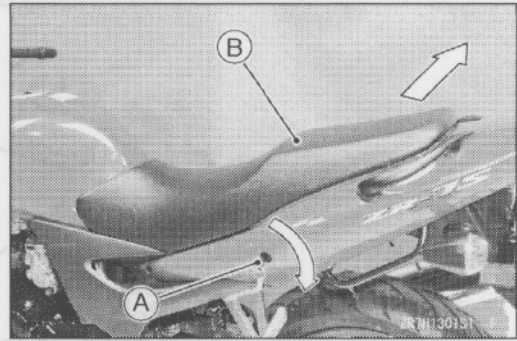
## 13-4 FRAME

### Seat

weiv bebolqx3

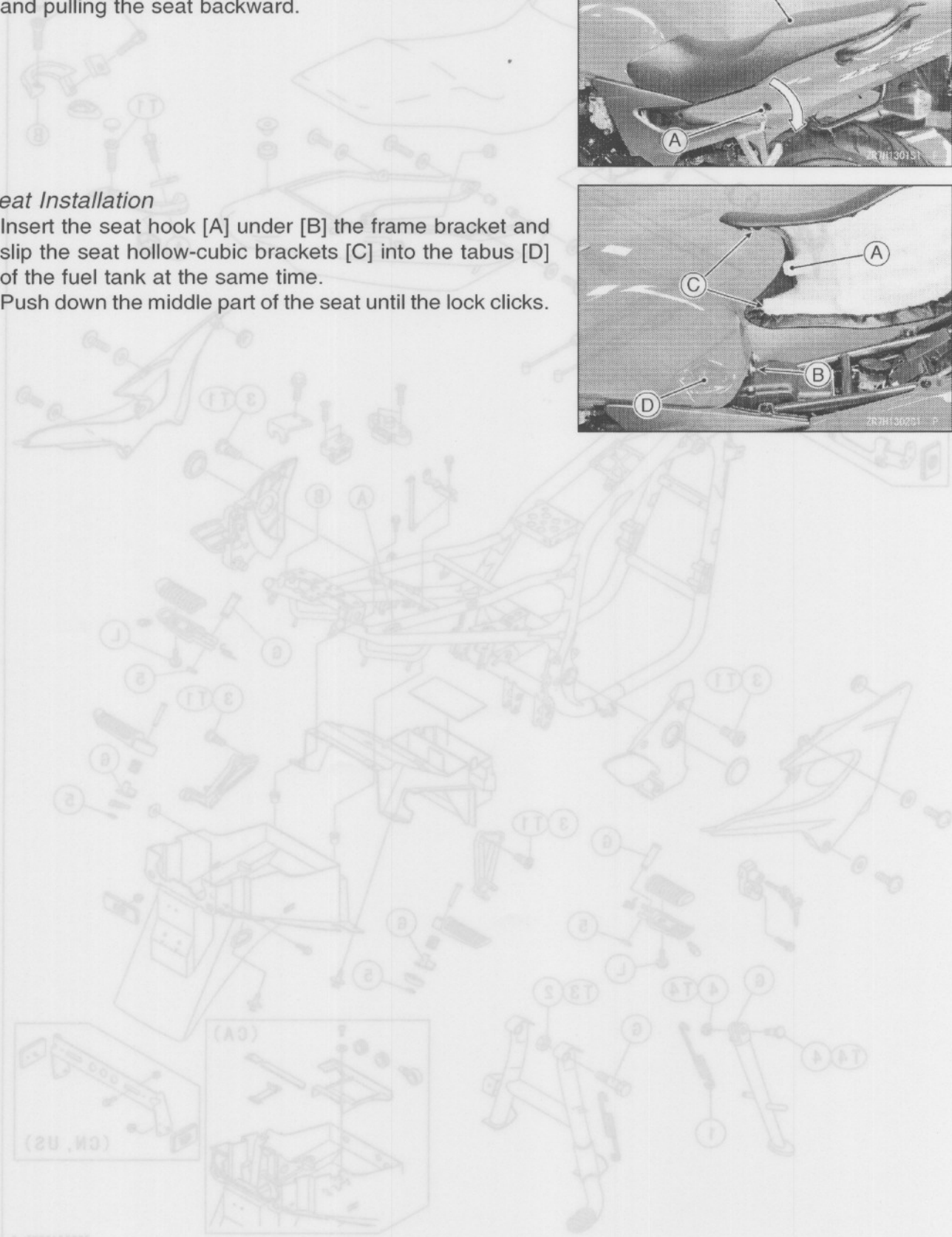
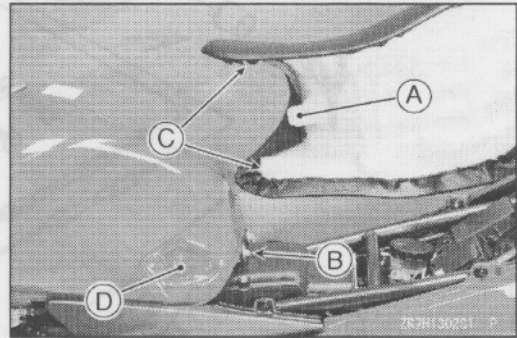
#### Seat Removal

- Insert the ignition switch key [A] into the seat lock, turning the key clockwise, pulling up on the rear of the seat [B], and pulling the seat backward.



#### Seat Installation

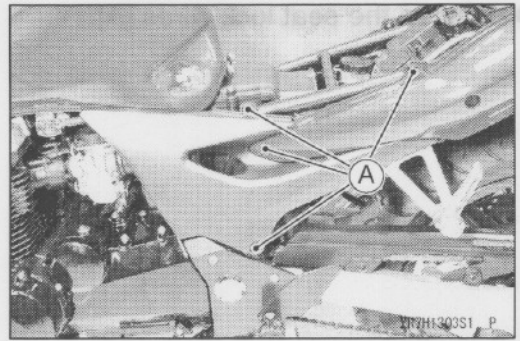
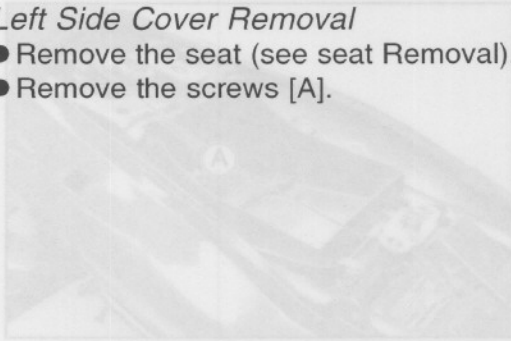
- Insert the seat hook [A] under [B] the frame bracket and slip the seat hollow-cubic brackets [C] into the tabus [D] of the fuel tank at the same time.
- Push down the middle part of the seat until the lock clicks.



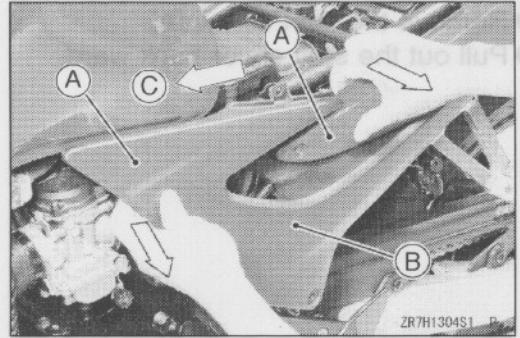
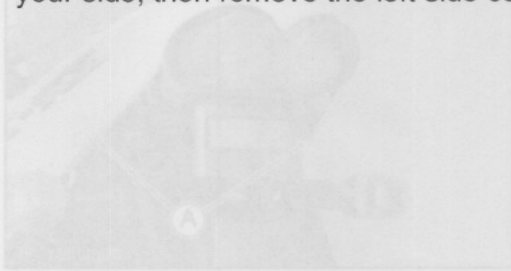
**Side Cover and Seat Cover**

*Left Side Cover Removal*

- Remove the seat (see seat Removal).
- Remove the screws [A].

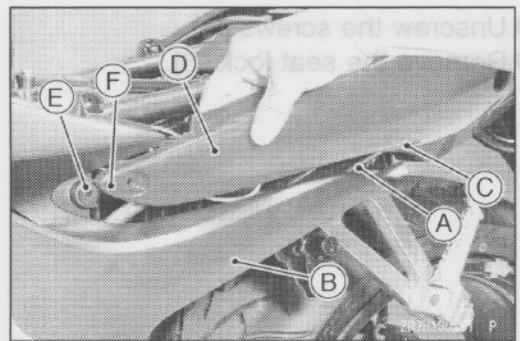
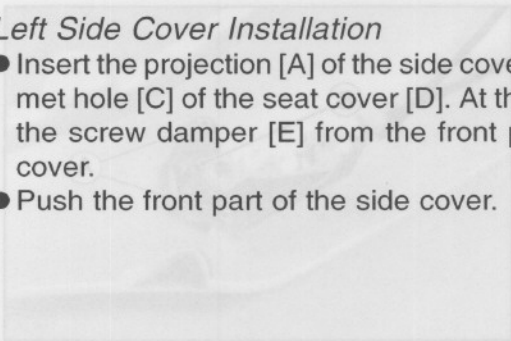


- Pull the front parts [A] of the seat and side [B] covers to your side, then remove the left side cover forward [C].



*Left Side Cover Installation*

- Insert the projection [A] of the side cover [B] into the grommet hole [C] of the seat cover [D]. At the same time, clear the screw damper [E] from the front part [F] of the seat cover.
- Push the front part of the side cover.



*Right Side Cover Removal*

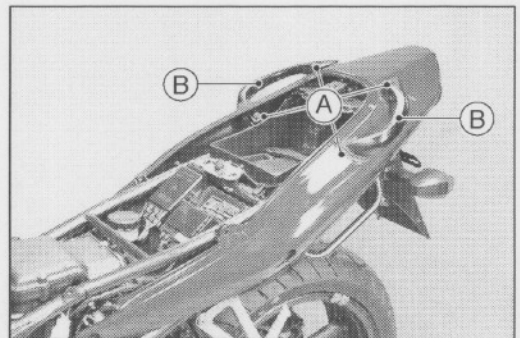
- Remove the right side cover following the same procedure of left side cover.

*Right Side Cover Installation*

- Install the right side cover following the same procedure of left side cover.

*Seat Cover Removal*

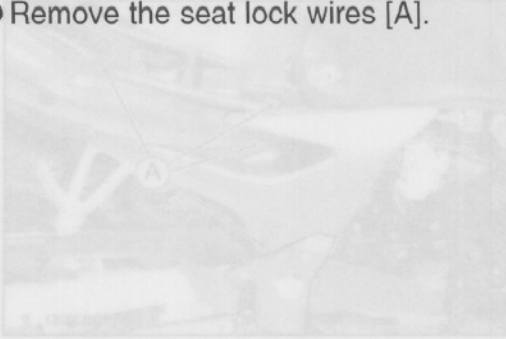
- Remove:
  - Seat (see Seat Removal)
  - Side Covers
  - Grab Rail Bolts [A]
  - Grab Rails [B]



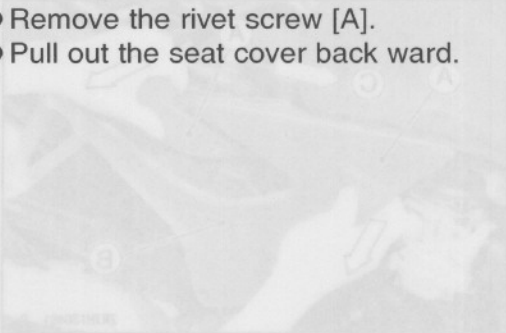
## 13-6 FRAME

### Side Cover and Seat Cover

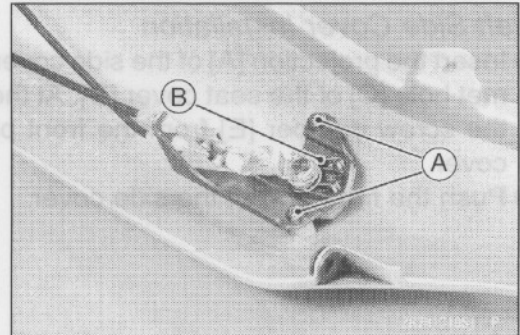
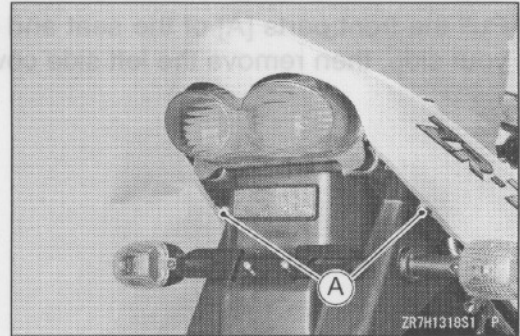
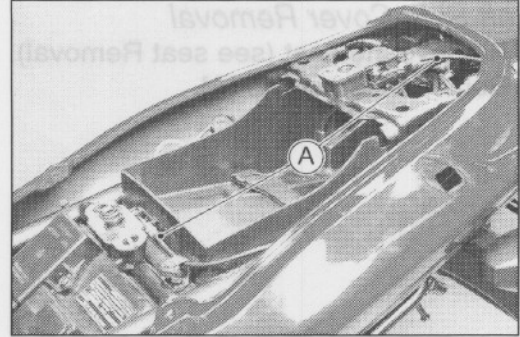
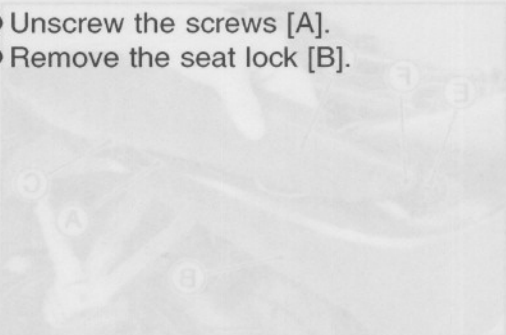
- Remove the seat lock wires [A].



- Remove the rivet screw [A].
- Pull out the seat cover back ward.



- Unscrew the screws [A].
- Remove the seat lock [B].



#### Seat Cover Installation

- Tighten the grab rail bolts.

**Torque - Grab Rail Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**



Side Cover and Seat Cover

Remove the seat lock wires [A].

Remove the rivet screw [A]. Pull out the seat cover back ward.

Unscrew the screws [A]. Remove the seat lock [B].

Right Side Cover Removal  
Remove the right side cover following the same procedure of left side cover.

Right Side Cover Installation  
Install the right side cover following the same procedure of left side cover.

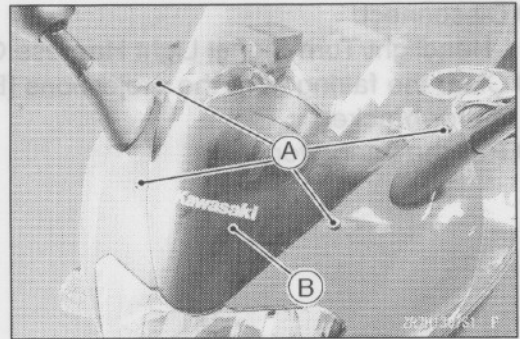
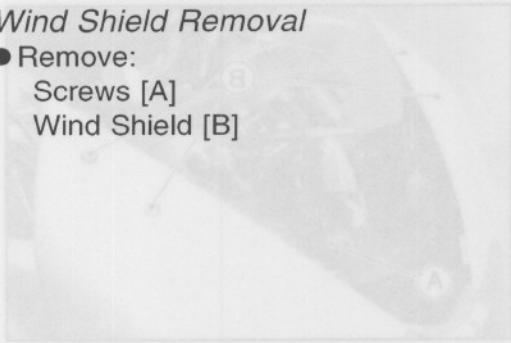
Seat Cover Removal  
Remove:

Seat (see Seat Removal)  
Side Covers  
Grab Rail Bolts [A]  
Grab Rails [B]

**Fairing**

*Wind Shield Removal*

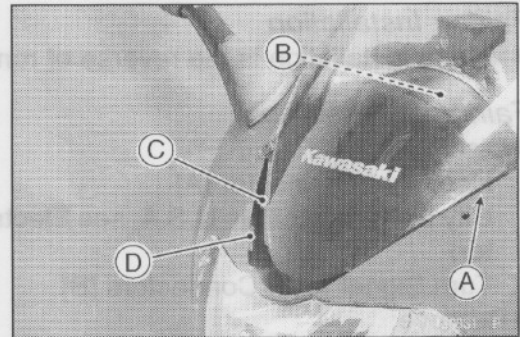
- Remove:  
Screws [A]  
Wind Shield [B]



*Wind Shield Installation*

- Put the each side [A] of the shield between the fairing and inner cover [B], and then install the other side.
- Put the tabs [C] of the shield in the grooves [D] of the fairing.

**Torque - Wind Shield Screws: 0.4 N·m (0.04 kgf·m, 4 in·lb)**

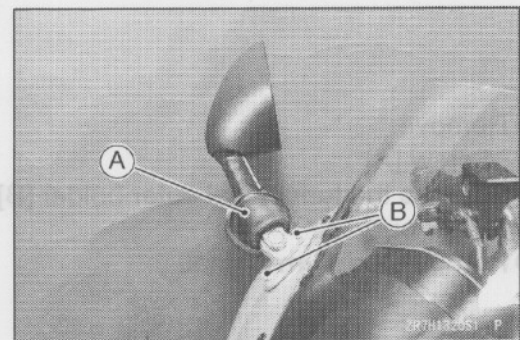
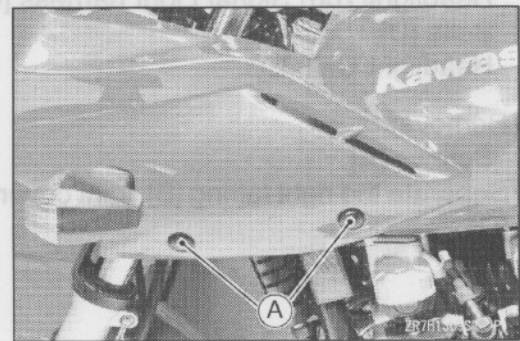


*Fairing Removal*

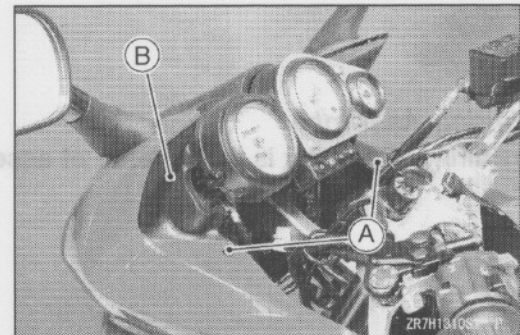
**CAUTION**

**Be careful not to scratch the painted surface during removal or installation.**

- Remove:  
Bolts [A] (both sides)
- Slide the rubber covers [A] and unscrew the bolts [B].



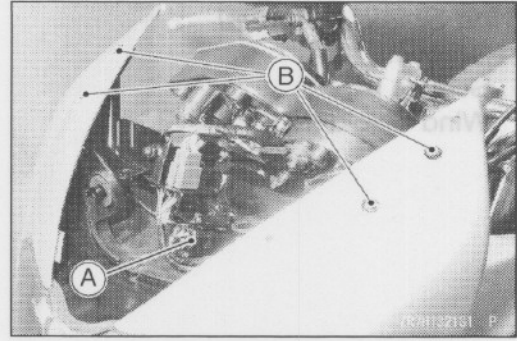
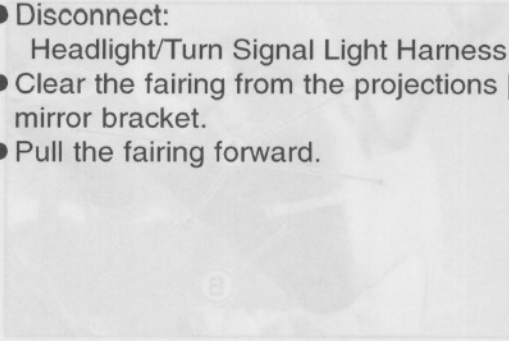
- Remove:  
Wind Shield (see Wind Shield Removal)  
Screws [A]  
Inner Cover [B]



## 13-8 FRAME

### Fairing

- Disconnect:
  - Headlight/Turn Signal Light Harness Connector [A]
- Clear the fairing from the projections [B] of the rear view mirror bracket.
- Pull the fairing forward.

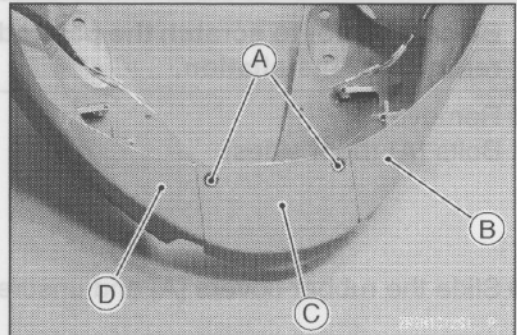
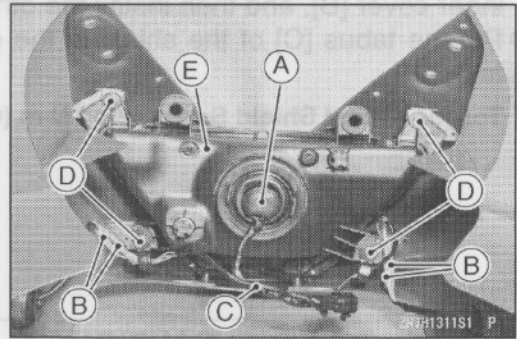


#### Fairing Installation

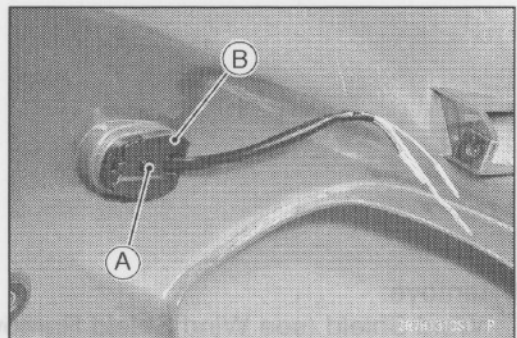
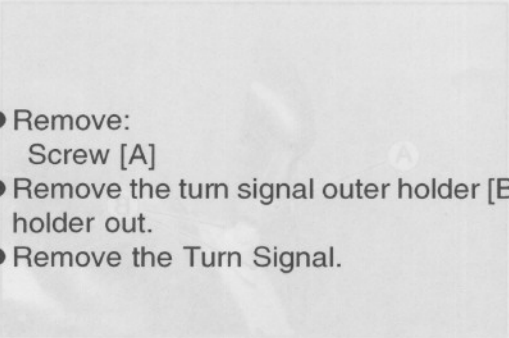
- Fairing installation is the reverse of removal.

#### Fairing Disassembly

- Disconnect:
  - Headlight Connector [A]
  - City Light (other than U.S.A. see Electrical System chapter)
  - Turn Signal Light Connectors [B]
- Remove:
  - Headlight/Turn Signal Light harness [C]
  - Bolts [D]
  - Headlight Unit [E]
- Remove:
  - Screws [A]
- Separate the right fairing [B], joint cover [C], and left fairing [D].

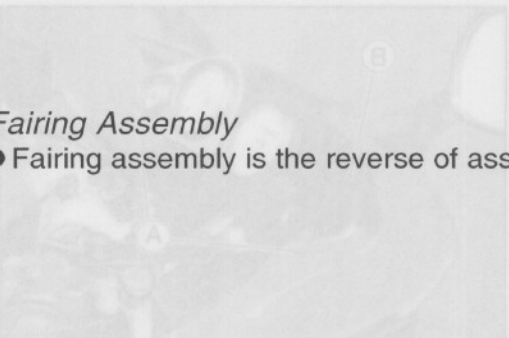


- Remove:
  - Screw [A]
- Remove the turn signal outer holder [B] and pull the inner holder out.
- Remove the Turn Signal.



#### Fairing Assembly

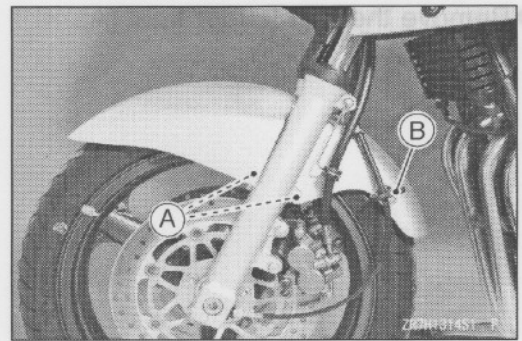
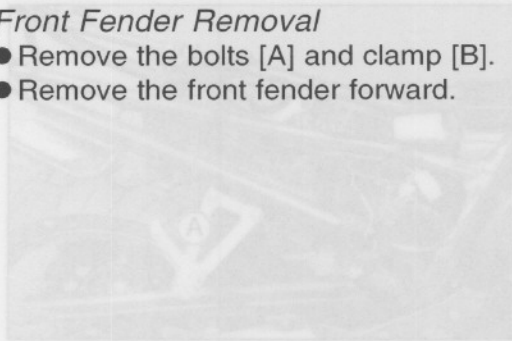
- Fairing assembly is the reverse of assembly.



**Fender**

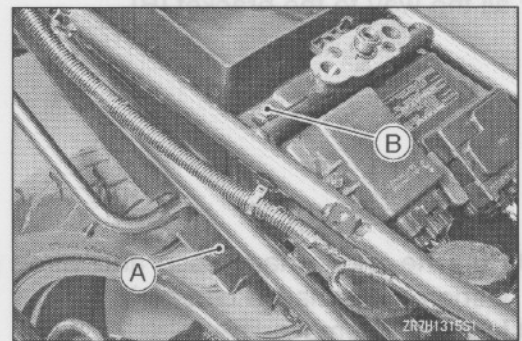
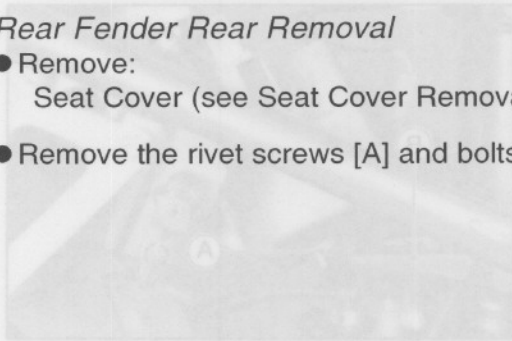
*Front Fender Removal*

- Remove the bolts [A] and clamp [B].
- Remove the front fender forward.

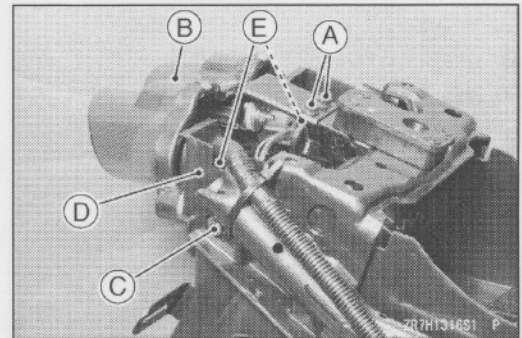


*Rear Fender Rear Removal*

- Remove:
  - Seat Cover (see Seat Cover Removal)
- Remove the rivet screws [A] and bolts [B].

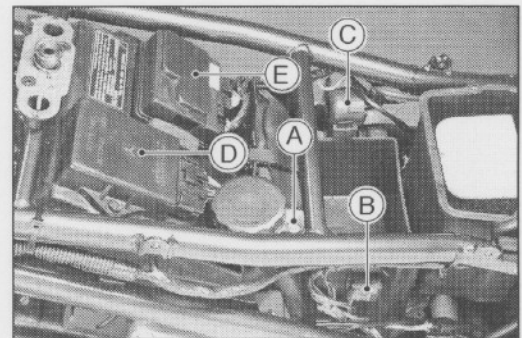


- Disconnect the tail/brake light and turn signal wire connectors.
- Unscrew the bracket bolts [A] and nuts [E].
- Remove the tail/brake light Assembly [B].
- Unscrew the mounting bolts [C], and take out the rear fender rear [D].



*Rear Fender Front Removal*

- Remove:
  - Rear Fender Rear
  - Side Covers (see Left Side Cover Removal)
  - Battery (see Electrical System chapter)
  - Rear Brake Fluid Reservoir Mounting Bolt [A]
- Remove from the rear fender:
  - Turn Signal Relay [B]
  - Starter Relay [C]
  - IC Igniter [D]
  - Junction Box [E]

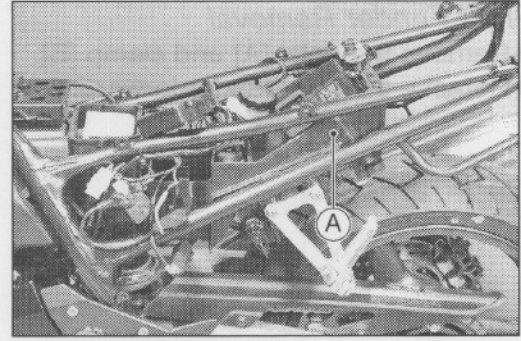
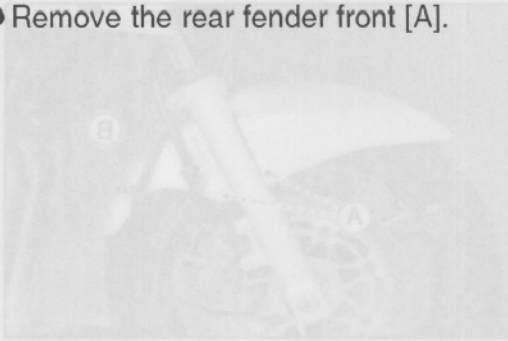


# 13-10 FRAME

## Fender

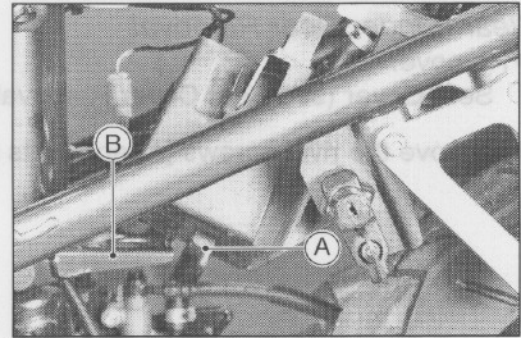
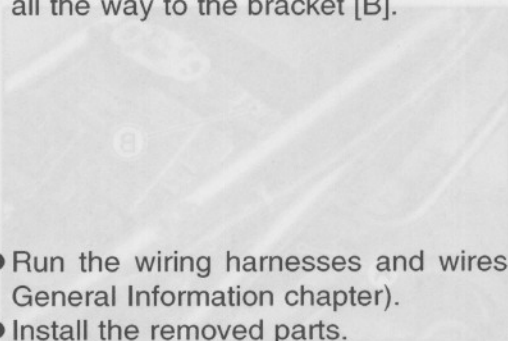
Fender

- Remove the rear fender front [A].



### Rear Fender Front Installation

- Install the rear fender front by pushing the stopper [A], which is located at the front bottom of the rear fender front, all the way to the bracket [B].



- Run the wiring harnesses and wires properly (see the General Information chapter).
- Install the removed parts.



- Disconnect the tailbrake light and turn signal wire connectors.
- Unscrew the bracket bolts [A] and nuts [E].
- Remove the tailbrake light Assembly [B].
- Unscrew the mounting bolts [C], and take out the rear fender rear [D].

### Rear Fender Front Removal

- Remove:
  - Rear Fender Rear
  - Side Covers (see Left Side Cover Removal)
  - Battery (see Electrical System chapter)
  - Rear Brake Fluid Reservoir Mounting Bolt [A]
- Remove from the rear fender:
  - Turn Signal Relay [B]
  - Starter Relay [C]
  - IC Igniter [D]
  - Junction Box [E]

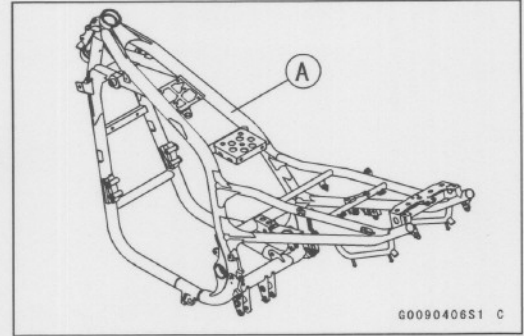
## Frame

### Frame Inspection

- Visually inspect the frame [A] for cracks, dents, bending, or warp.
- ★ If there is any damage to the frame, replace it.

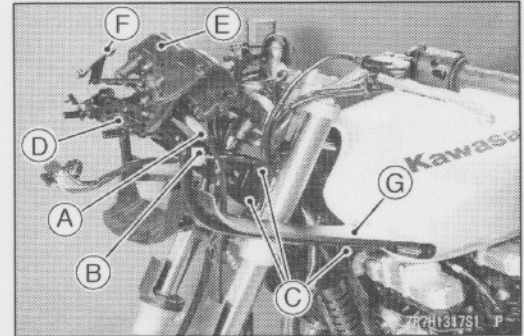
### **⚠ WARNING**

A repaired frame may fail in use, possibly causing an accident. If the frame is bent, dented, cracked, or warped, replace it.



### Fairing Bracket Removal

- Remove:
  - Fairing (see Fairing Removal)
  - Speedometer Cable Upper End [A]
  - Main Harness Clamp [B]
- Unscrew the bolts [C] and pull out the fairing bracket [D] together with the meter unit [E], rear view mirror bracket [F] and lower inner cover [G].



# Electrical System

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# 14-2 ELECTRICAL SYSTEM

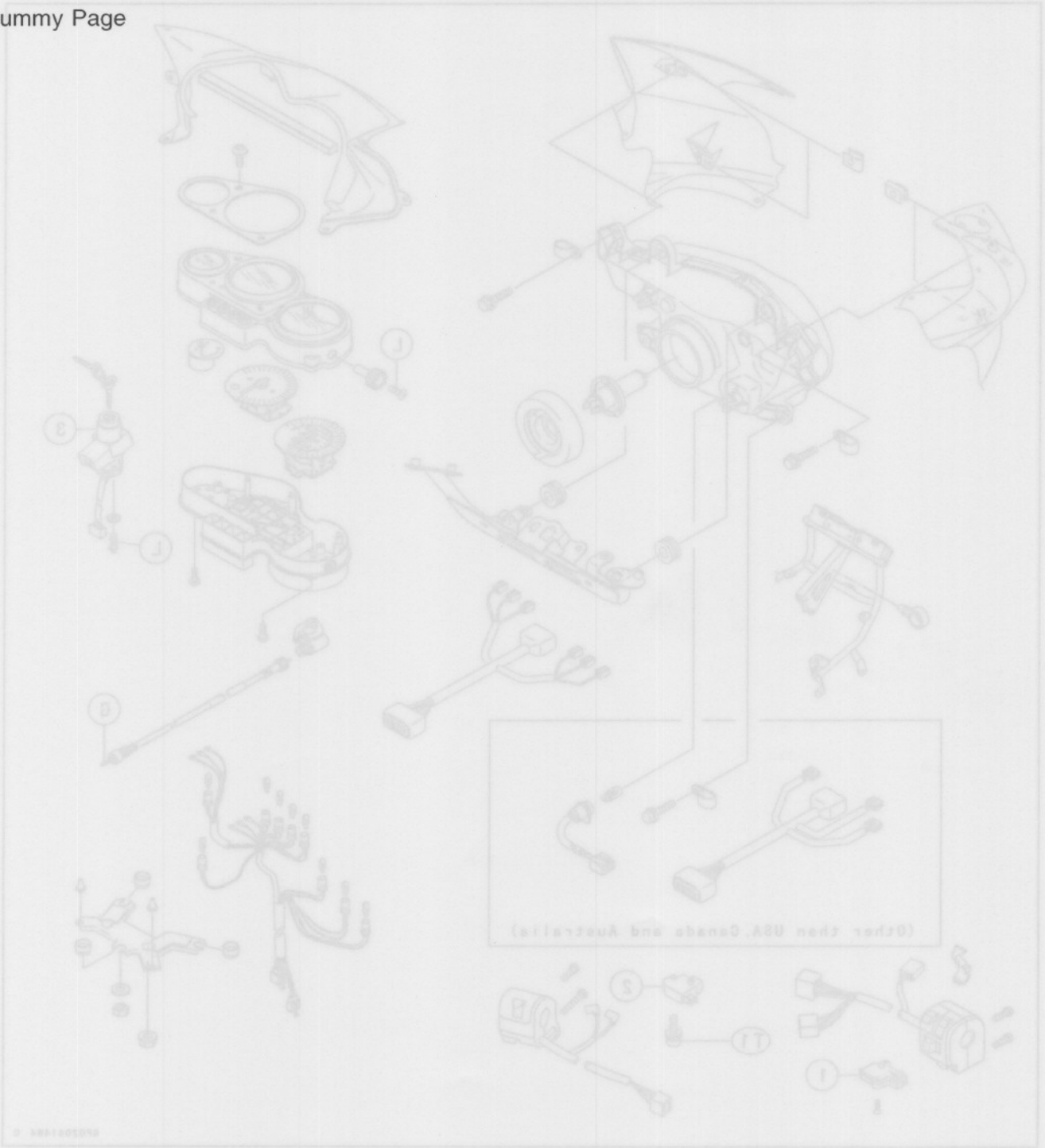
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Exploded View

Dummy Page

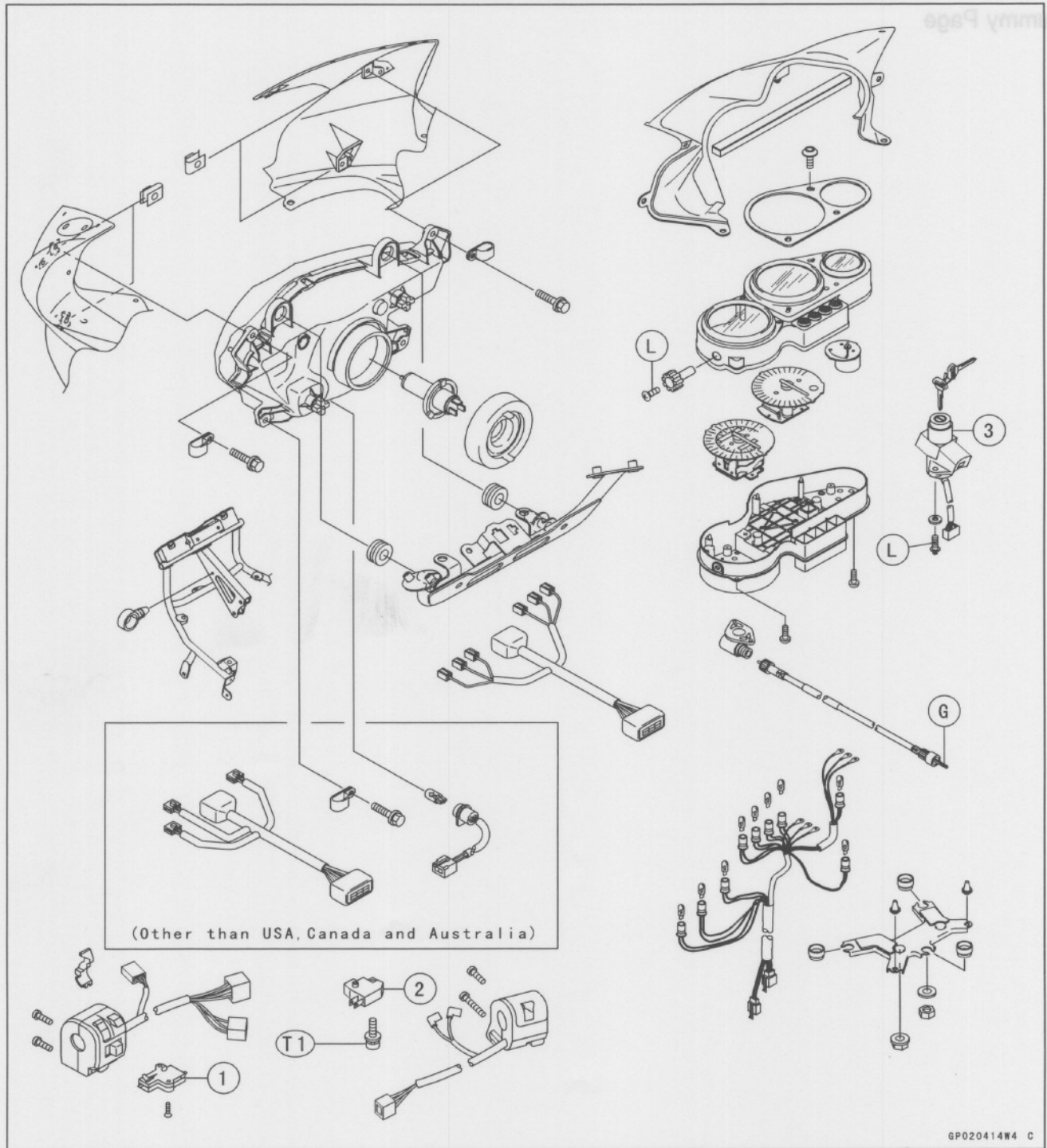


- 10. Starter Motor
- 11. Alternator Stator
- 12. Alternator Rotor
- 13. Oil Pressure Warning Light Switch
- 14. Timing Rotor
- 15. Crankshaft Sensor
- 16. Neutral Switch
- 17. Rear Brake Light Switch
- 18. Side Stand Switch

- 1. Starter Lockout Switch
- 2. Front Brake Light Switch
- 3. Ignition Switch
- 4. Fuel Level Sensor
- 5. Regulator/Rectifier
- 6. #1 Ignition Coil
- 7. #2 Ignition Coil
- 8. Spark Plug
- 9. Horn

# 14-4 ELECTRICAL SYSTEM

## Exploded View

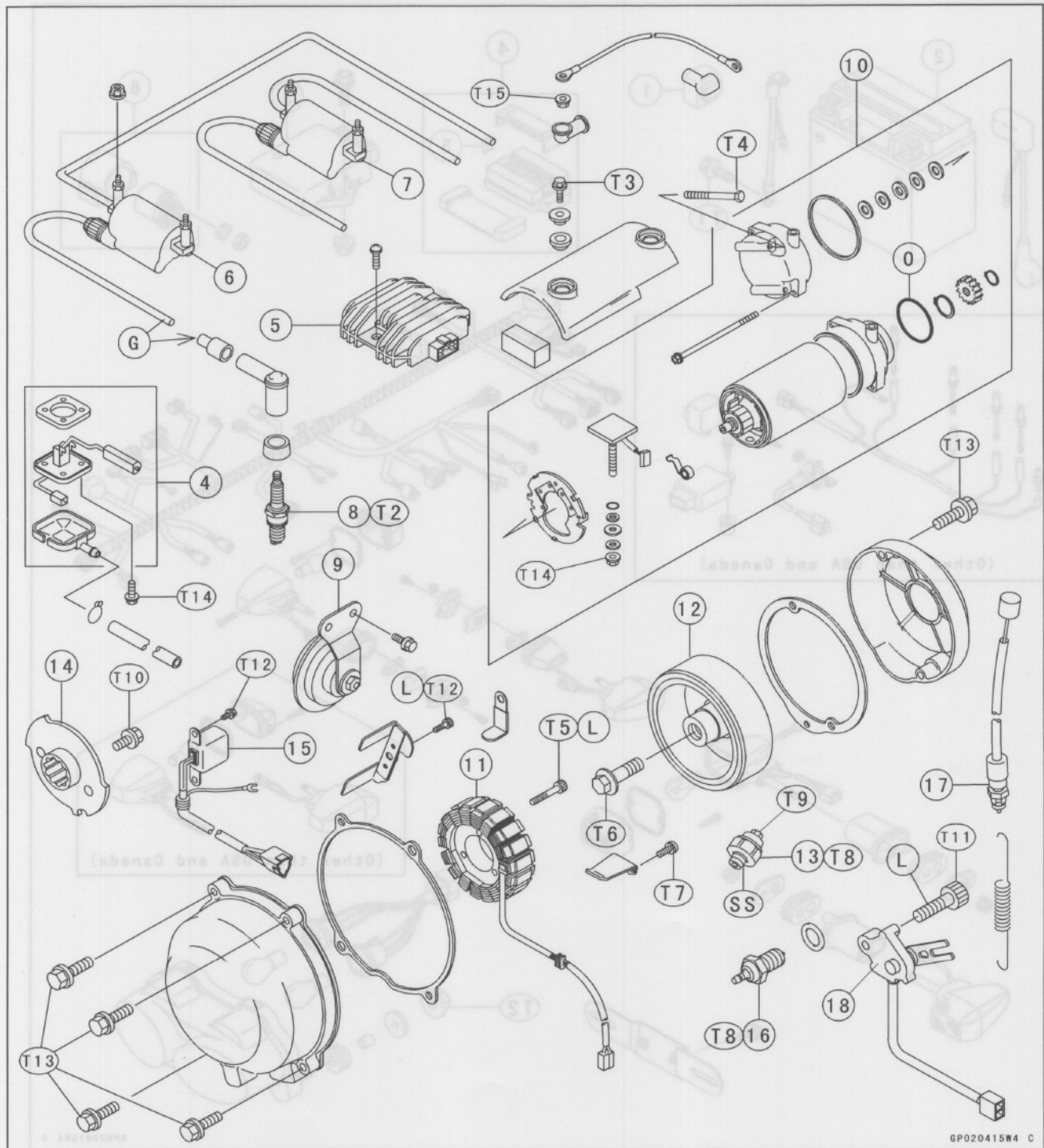


GP020414W4 C

- |                             |                                       |
|-----------------------------|---------------------------------------|
| 1. Starter Lockout Switch   | 10. Starter Motor                     |
| 2. Front Brake Light Switch | 11. Alternator Stator                 |
| 3. Ignition Switch          | 12. Alternator Rotor                  |
| 4. Fuel Level Sensor        | 13. Oil Pressure Warning Light Switch |
| 5. Regulator/Rectifier      | 14. Timing Rotor                      |
| 6. #1, #4 Ignition Coil     | 15. Crankshaft Sensor                 |
| 7. #2, #3 Ignition Coil     | 16. Neutral Switch                    |
| 8. Spark Plug               | 17. Rear Brake Light Switch           |
| 9. Horn                     | 18. Side Stand Switch                 |

## Exploded View

weiV bebolqx3



GP020415W4 C

- T1: 1.2 N·m (0.12 kgf·m, 10 in·lb)  
 T2: 14 N·m (1.4 kgf·m, 10 ft·lb)  
 T3: 5.1 N·m (0.52 kgf·m, 45 in·lb)  
 T4: 9.8 N·m (1.0 kgf·m, 87 in·lb)  
 T5: 7.8 N·m (0.8 kgf·m, 71 in·lb)  
 T6: 128 N·m (13 kgf·m, 94 ft·lb)  
 T7: 2.9 N·m (0.3 kgf·m, 26 in·lb)  
 T8: 15 N·m (1.5 kgf·m, 11 ft·lb)  
 T9: 1.6 N·m (0.16 kgf·m, 14 in·lb)  
 T10: 40 N·m (4.1 kgf·m, 30 ft·lb)  
 T11: 8.8 N·m (0.9 kgf·m, 78 in·lb)

- T12: 5.9 N·m (0.6 kgf·m, 53 in·lb)  
 T13: 12 N·m (1.2 kgf·m, 104 in·lb)  
 T14: 3.9 N·m (0.4 kgf·m, 35 in·lb)  
 T15: 4.9 N·m (0.5 kgf·m, 43 in·lb)

G: Apply grease.

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

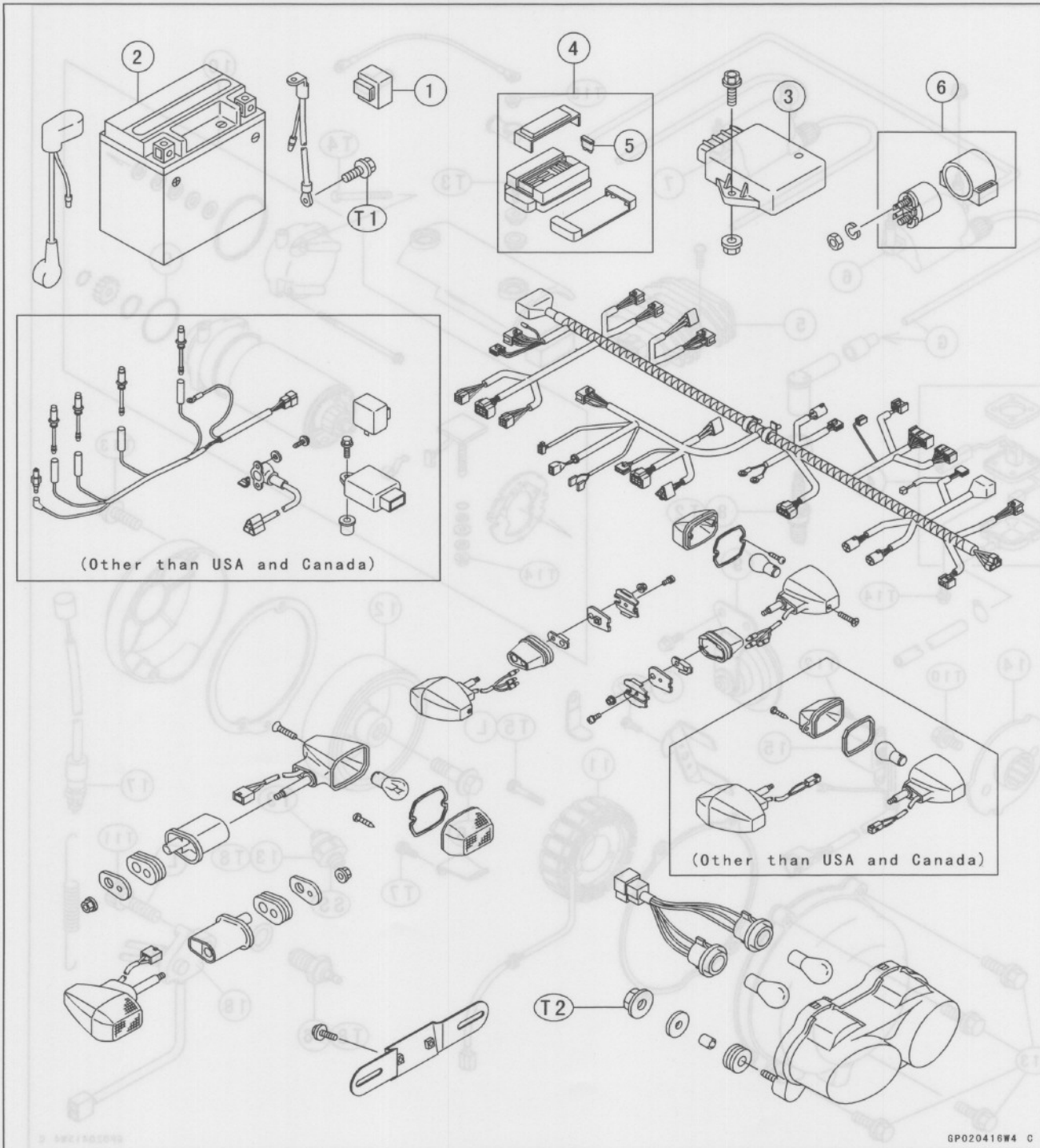
O: Apply oil.

SS: Apply silicon sealant (Kawasaki Bond: 56019-120) along the entire circumference of the seal.

# 14-6 ELECTRICAL SYSTEM

## Exploded View

Exploded View



1. Turn Signal Relay
  2. Battery
  3. IC Igniter
  4. Junction Box
  5. Fuse
  6. Starter Relay
- T1: 5.1 N·m (0.52 kgf·m, 45 in·lb)  
 T2: 5.9 N·m (0.6 kgf·m, 52 in·lb)

GP020416W4 C

## Specifications

Item	Standard	Service Limit
<b>Battery</b>		
Terminal Voltage	12.8 V or more	---
<b>Charging System</b>		
Alternator Output Voltage	35 V or more @4000 r/min (rpm)	---
Stator Coil Resistance	0.1 ~ 0.8 $\Omega$	---
Charging Voltage (Regulator/Rectifier Output Voltage)	14 ~ 15 V 14.7 $\pm$ 0.5 V (with headlight switch ON if applicable)	---
<b>Ignition System</b>		
Crankshaft Sensor Resistance	380 ~ 560 $\Omega$	---
Ignition Coil:		
3 Needle Arcing Distance	7 mm (0.28 in.) or more	---
Winding Resistance:		
Primary Windings	2.61 ~ 3.19 $\Omega$	---
Secondary Windings	13.5 ~ 16.5 k $\Omega$	---
Spark plug:		
Type	NGK DR9EA or ND X27ES R-U,	---
Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in.)	---
<b>Electric Starter System</b>		
Starter motor:		
Carbon brush length	12.0 ~ 12.5 mm (0.47 ~ 0.49 in.)	6 mm (0.24 in.)
Commutator diameter	28.0 mm (1.10 in.)	27.0 mm (1.06 in.)
<b>Switch and Sensor</b>		
Brake light timing	On after about 10 mm (0.4 in.) pedal travel	---
Fuel level sensor resistance:		
Full position	4 ~ 10 $\Omega$	---
Empty position	90 ~ 100 $\Omega$	---

**Special Tools - Outside Circlip Pliers: 57001-144**

**Hand Tester: 57001-1394**

**Spark Plug Wrench, Hex 18: 57001-1024**

**Rotor Puller Adapter,  $\phi$  9.5: 57001-1151**

**Flywheel Puller Assembly, M30 x 1.5, M33 x 1.5: 57001-1426**

**Flywheel Holder: 57001-1313**

**Igniter Checker Set: 57001-1378**

**Harness Adapter #14: 57001-1427**

**Harness Adapter #2: 57001-1382**

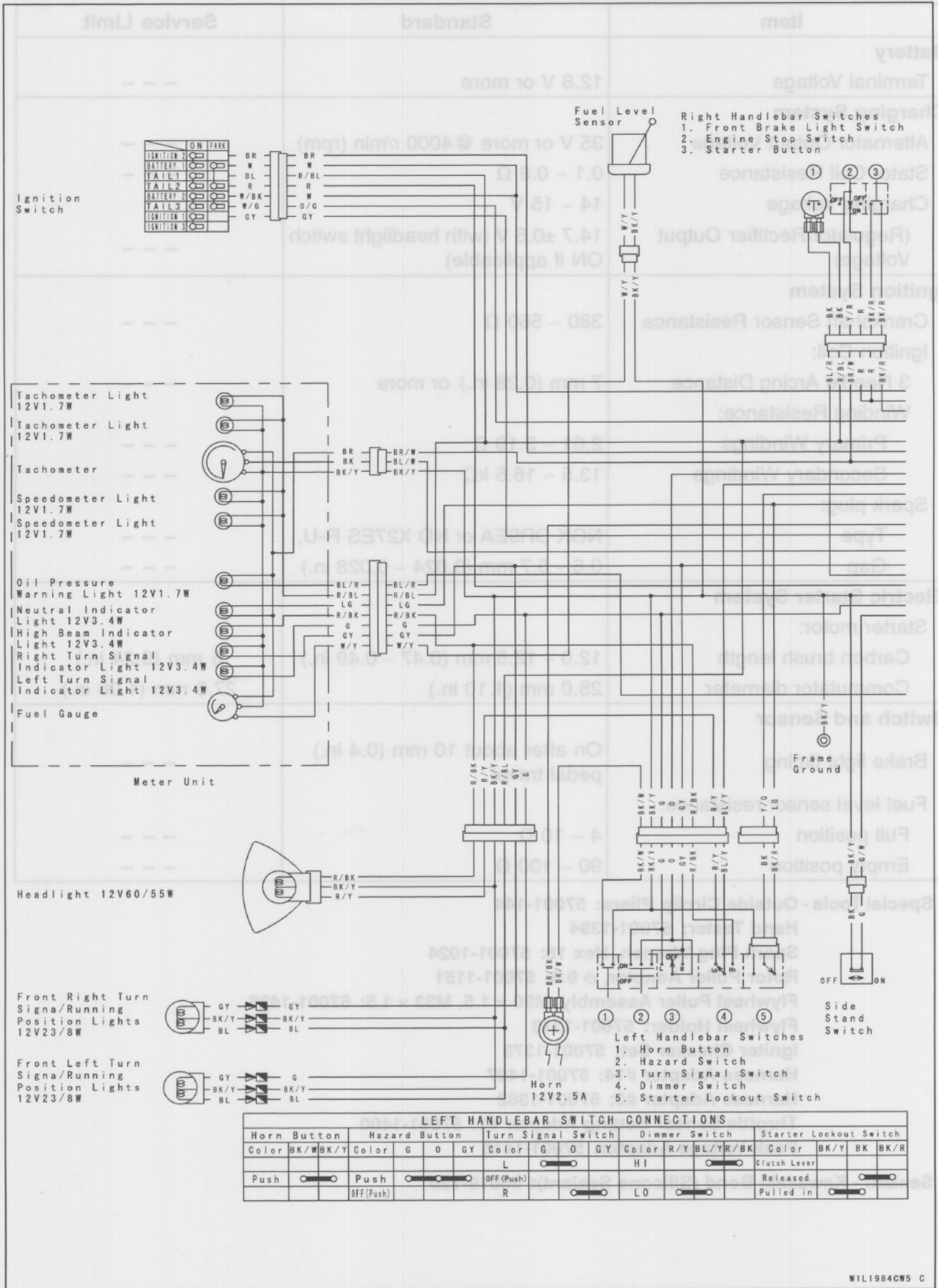
**Throttle Sensor Setting Adapter #1: 57001-1400**

**Peak Voltage Adapter: 57001-1415**

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

# 14-8 ELECTRICAL SYSTEM

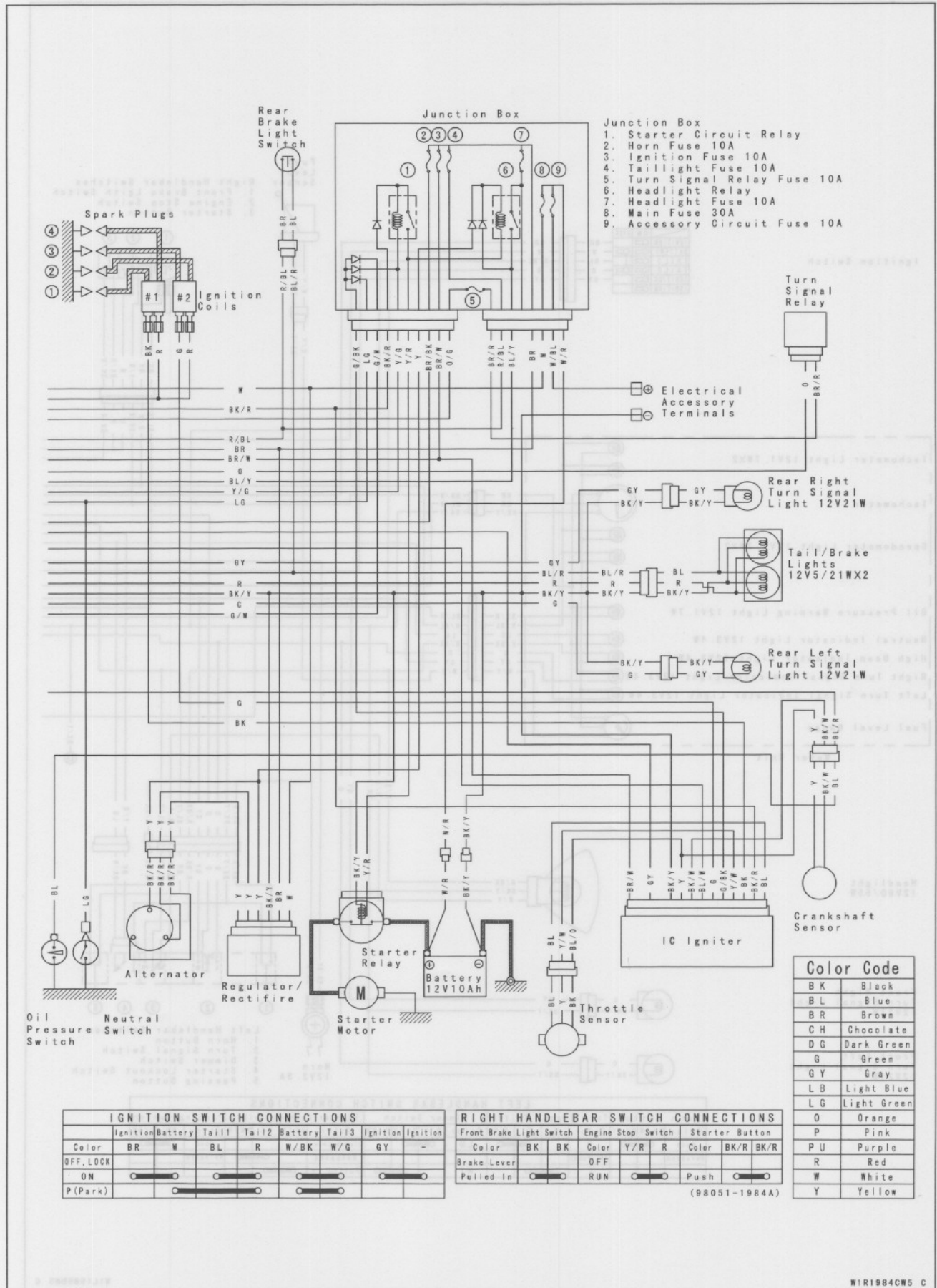
## Wiring Diagram (U.S.A., Canada and Taiwan Model)



LEFT HANDLEBAR SWITCH CONNECTIONS

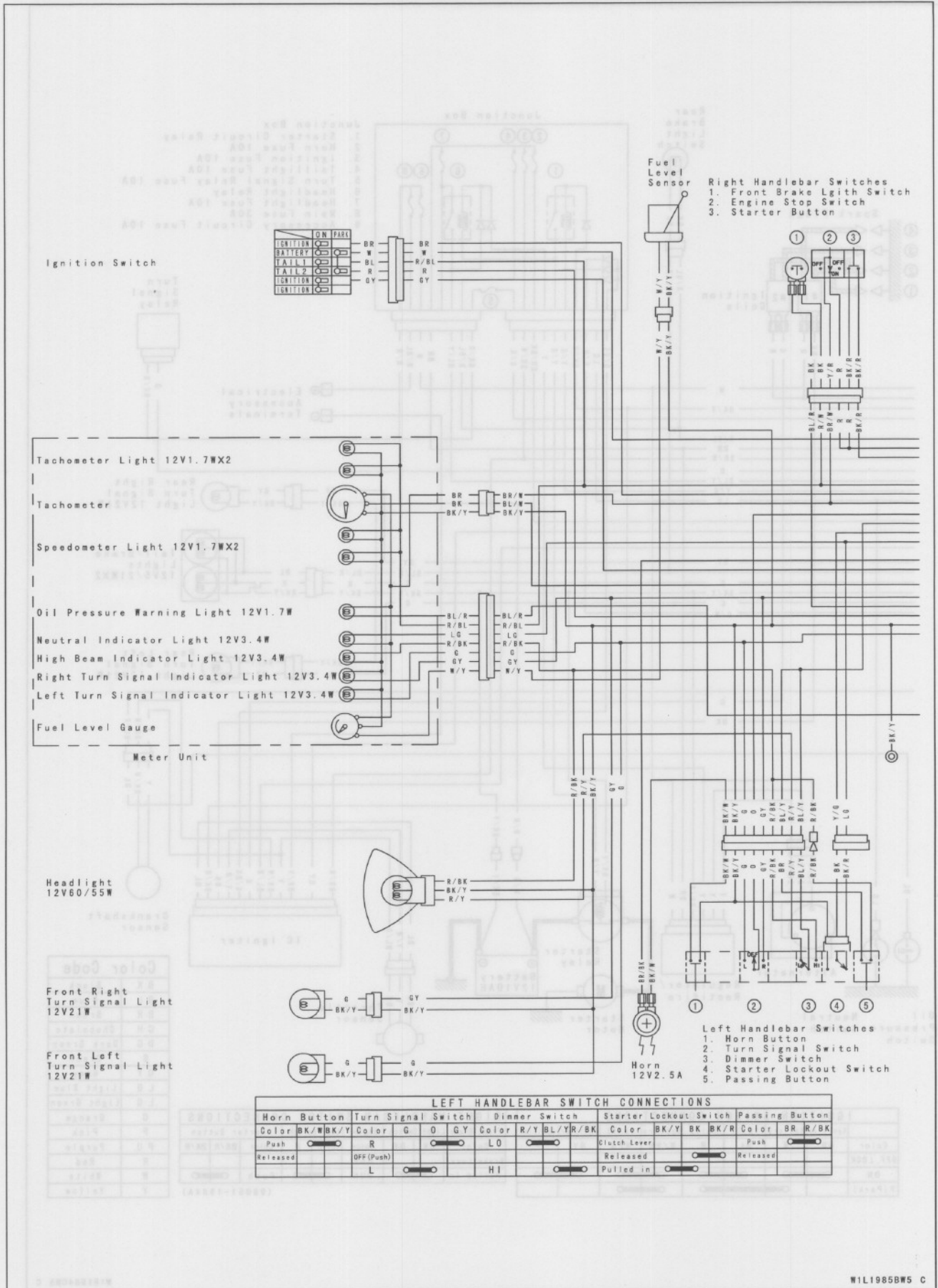
Horn Button	Hazard Button	Turn Signal Switch	Dimmer Switch	Starter Lockout Switch
Color BK/WBK/Y	Color G O GY	Color G O GY	Color R/Y BL/YR/BK	Color BK/Y BK BK/R
Push	Push	OFF (Push)	HI	Glutch Lever
	OFF (Push)	R	LO	Released
				Pulled in

## Wiring Diagram (U.S.A., Canada and Taiwan Model)

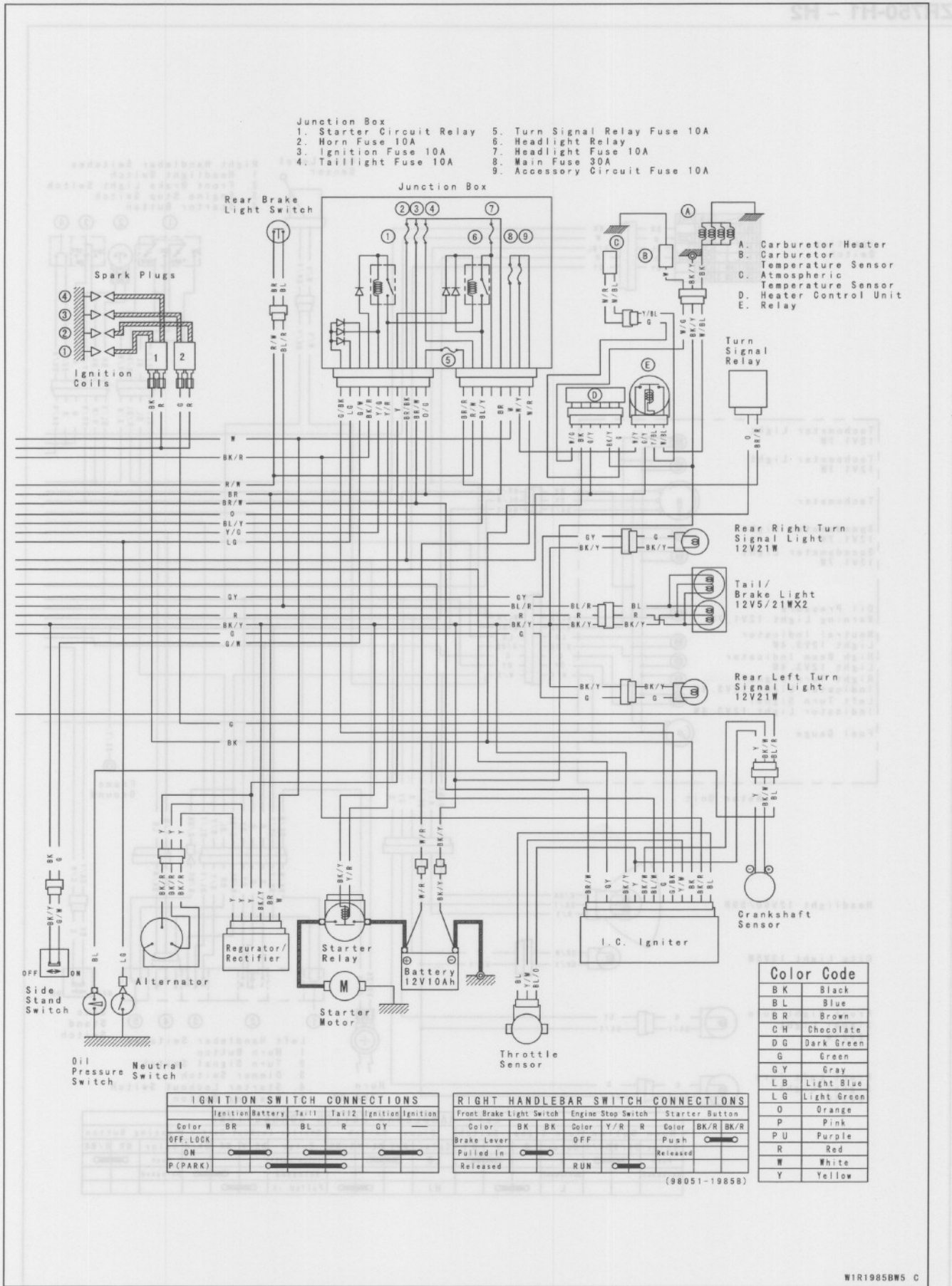


# 14-10 ELECTRICAL SYSTEM

## Wiring Diagram (Australia Model)



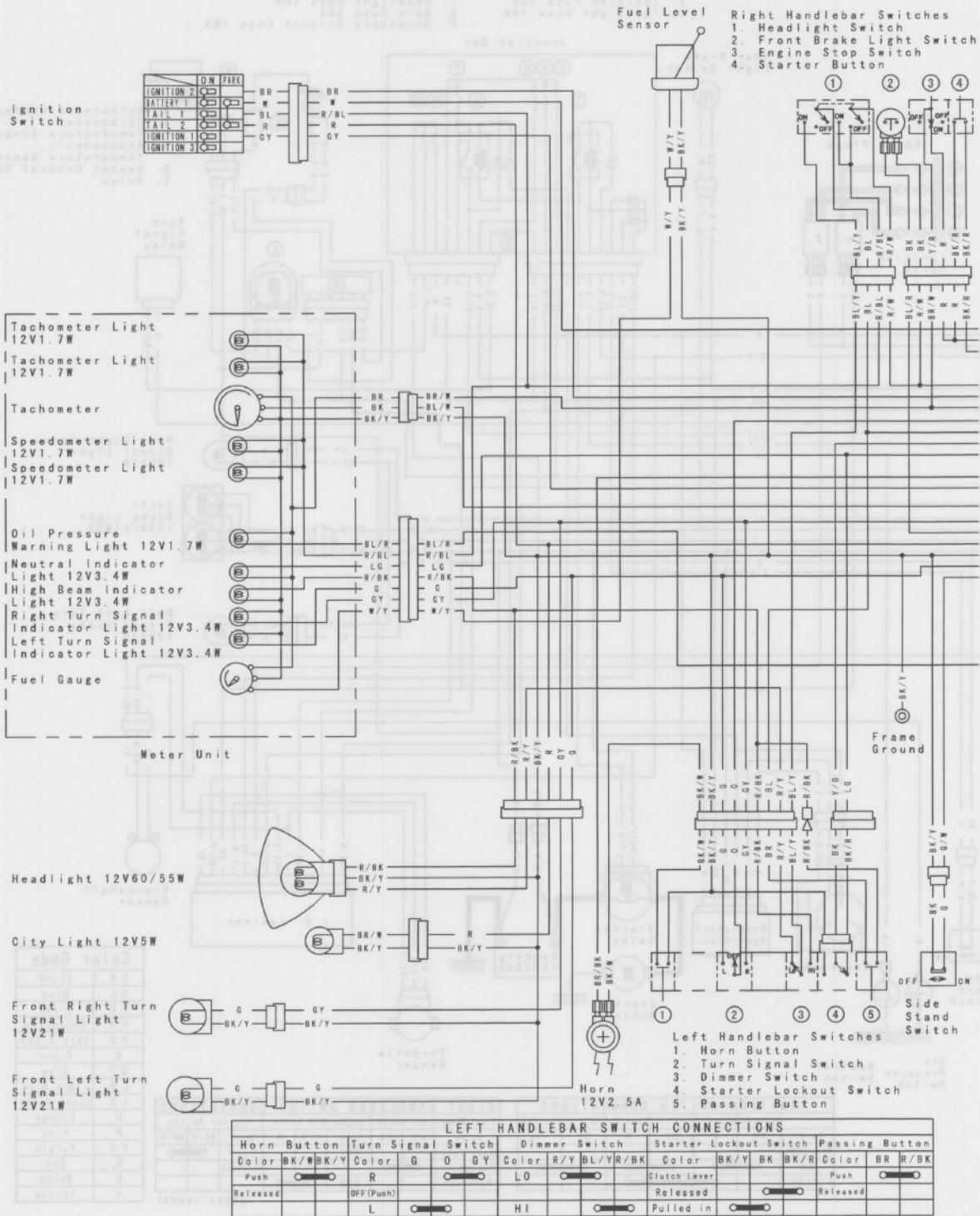
Wiring Diagram (Australia Model)



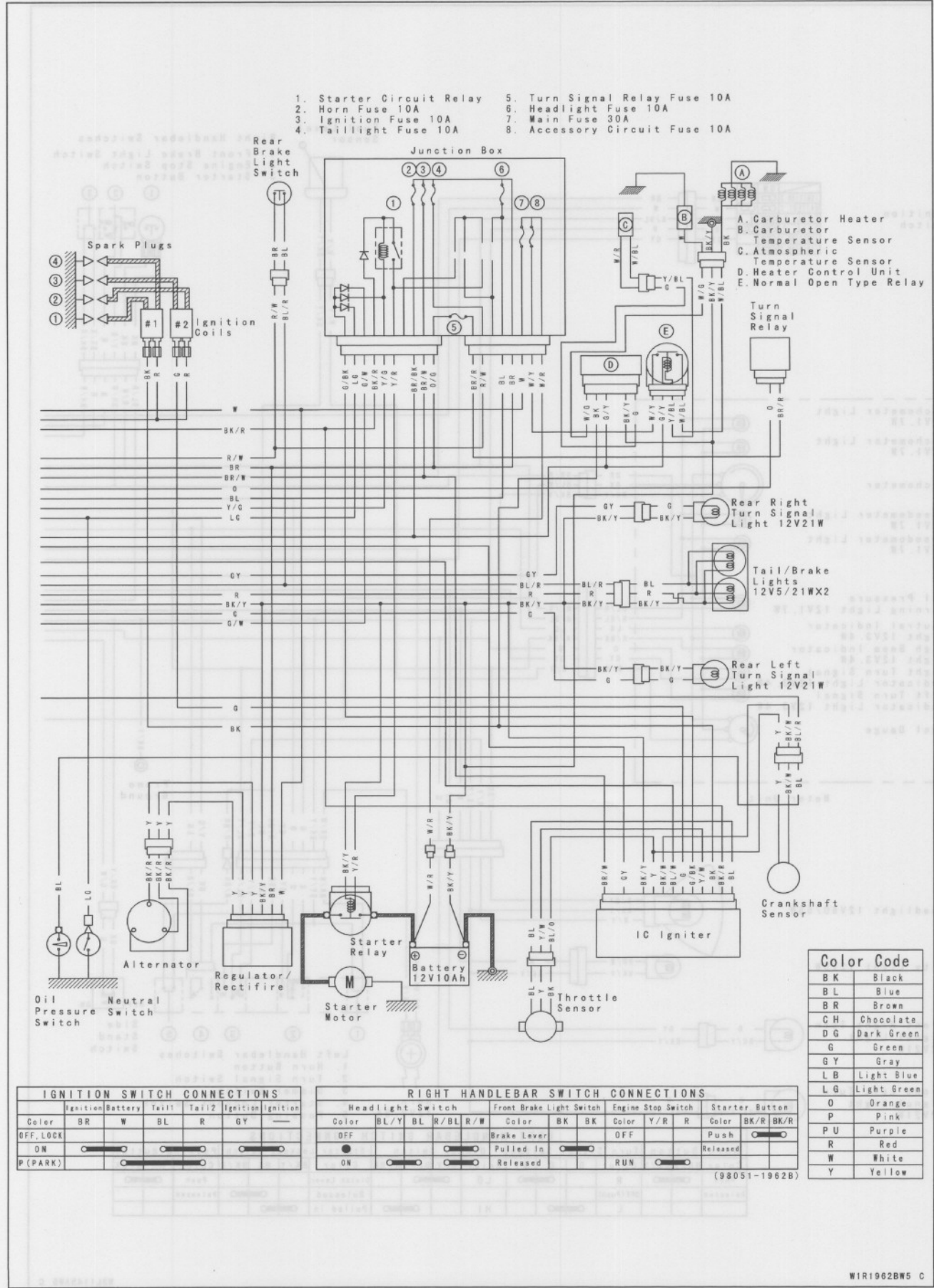
# 14-12 ELECTRICAL SYSTEM

## Wiring Diagram (Other than U.S.A., Canada, Australia and Taiwan Model)

ZR750-H1 ~ H2



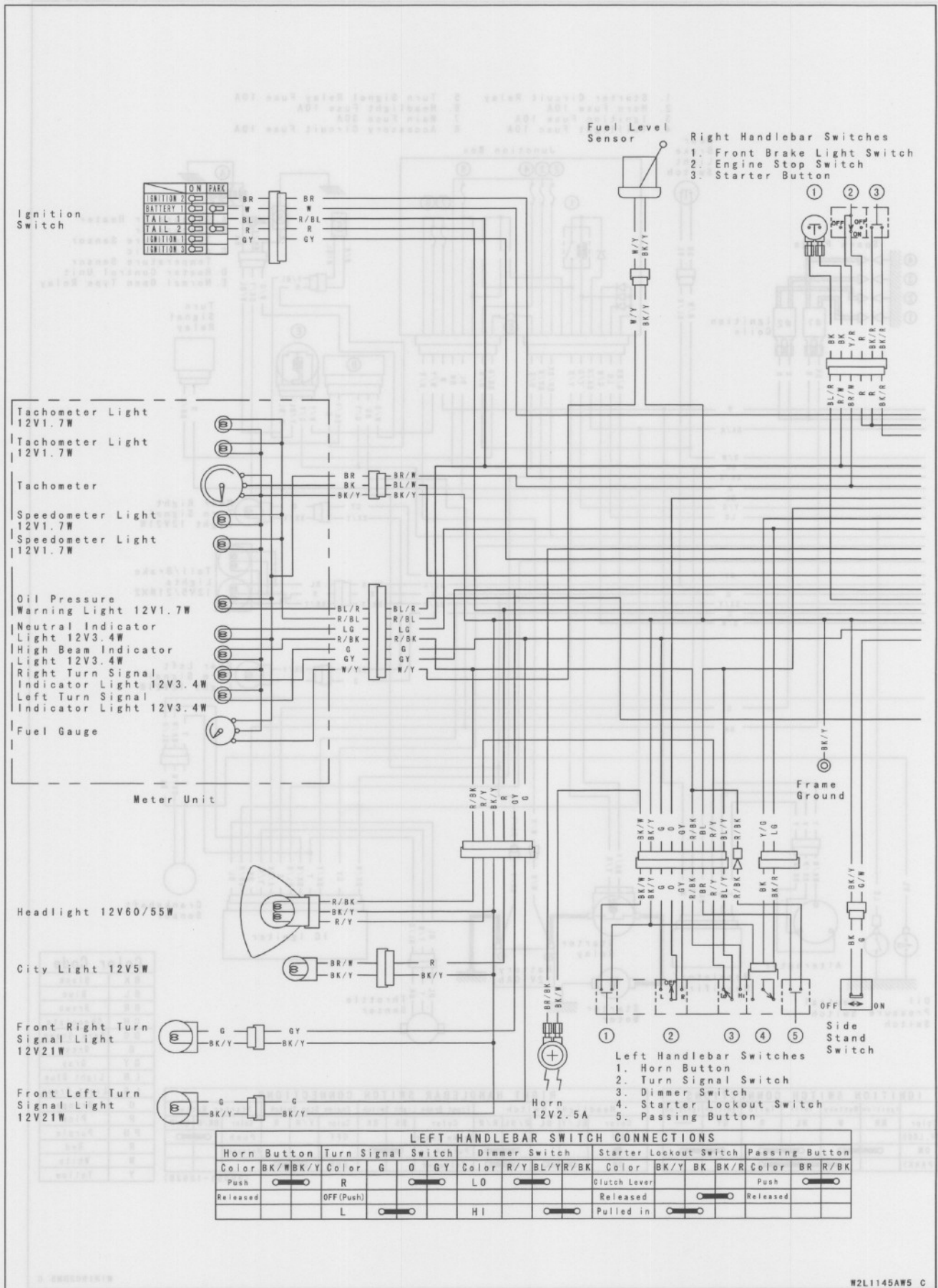
Wiring Diagram (Other than U.S.A., Canada, Australia and Taiwan Model)



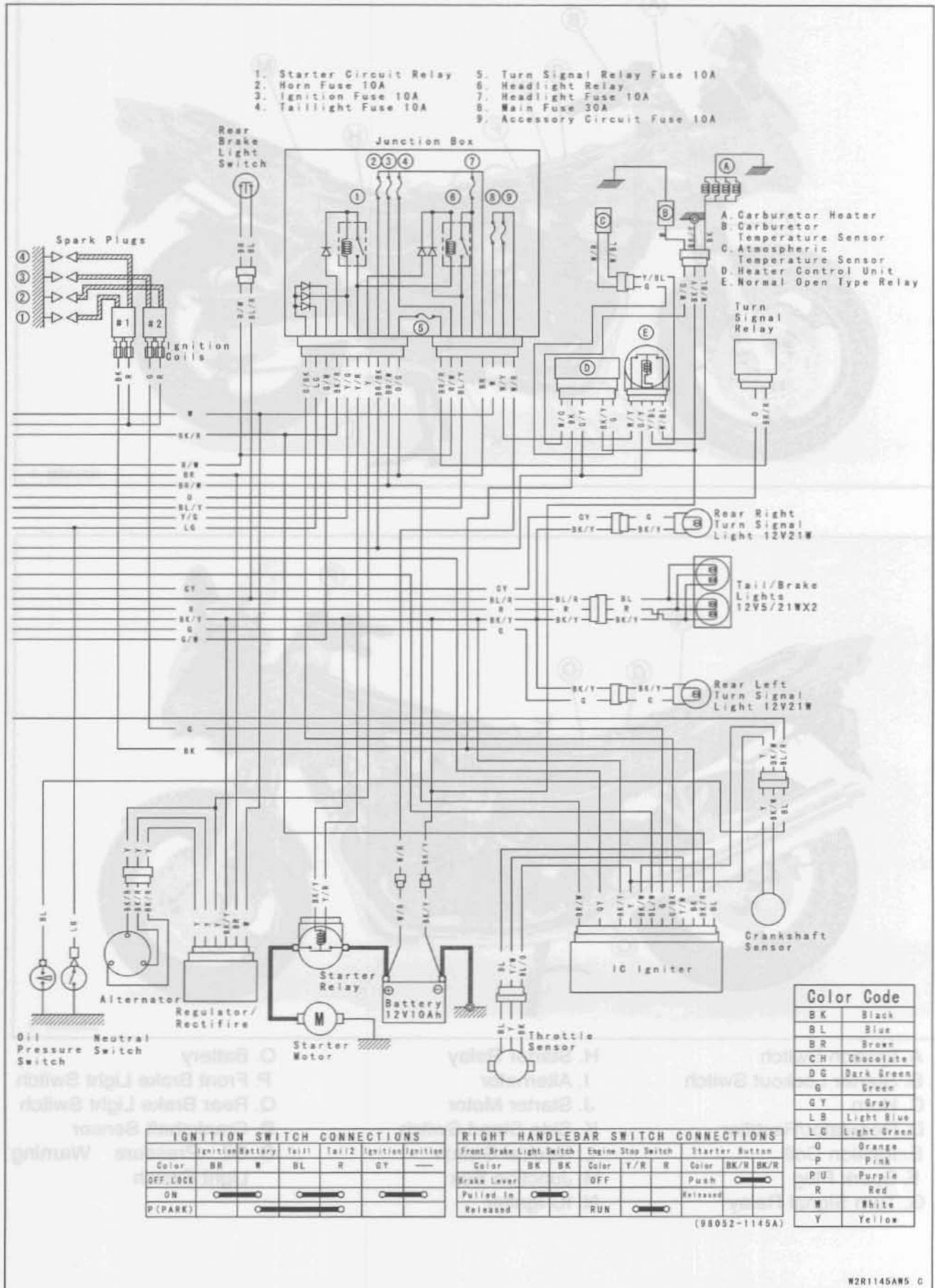
# 14-14 ELECTRICAL SYSTEM

## Wiring Diagram (Other than U.S.A., Canada, Australia and Taiwan Model)

ZR750-H3 ~



Wiring Diagram (Other than U.S.A., Canada, Australia and Taiwan Model)



- 1. Starter Circuit Relay
- 2. Horn Fuse 10A
- 3. Ignition Fuse 10A
- 4. Taillight Fuse 10A
- 5. Turn Signal Relay Fuse 10A
- 6. Headlight Relay
- 7. Headlight Fuse 10A
- 8. Main Fuse 30A
- 9. Accessory Circuit Fuse 10A

- A. Carburetor Heater
- B. Carburetor Temperature Sensor
- C. Atmospheric Temperature Sensor
- D. Heater Control Unit
- E. Normal Open Type Relay

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

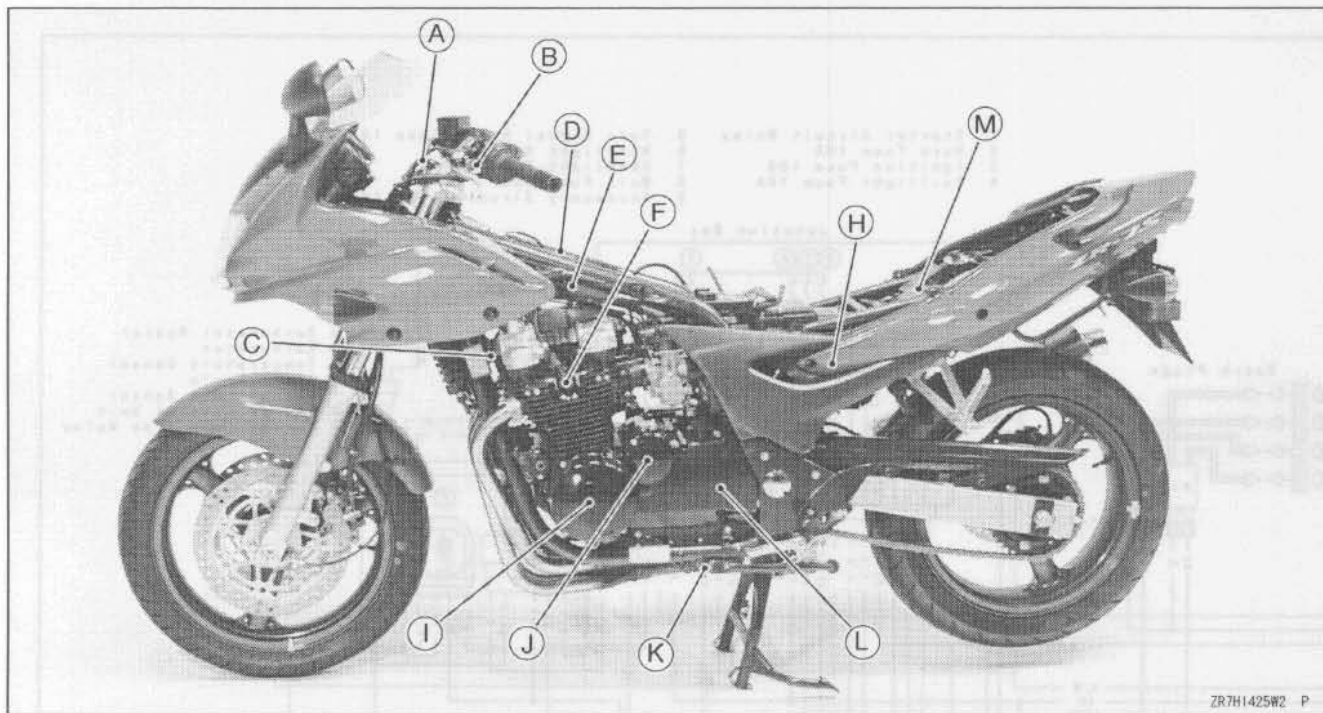
IGNITION SWITCH CONNECTIONS						
	Ignition	Battery	Tail/1	Tail/2	Ignition	Ignition
Color	BR	W	BL	R	GY	---
OFF, LOCK	[Switch Diagram]		[Switch Diagram]		[Switch Diagram]	
ON	[Switch Diagram]		[Switch Diagram]		[Switch Diagram]	
P(PARK)	[Switch Diagram]		[Switch Diagram]		[Switch Diagram]	

RIGHT HANDLEBAR SWITCH CONNECTIONS					
	Front Brake Light Switch	Engine Stop Switch	Starter Button		
Color	BK	BK	Color	Y/R	R
Color	BK	Color	Y/R	R	Color
Brake Lever	OFF	OFF	Push	[Switch Diagram]	[Switch Diagram]
Pulled In	[Switch Diagram]	[Switch Diagram]	Released	[Switch Diagram]	[Switch Diagram]
Released	[Switch Diagram]	[Switch Diagram]	RUN	[Switch Diagram]	[Switch Diagram]

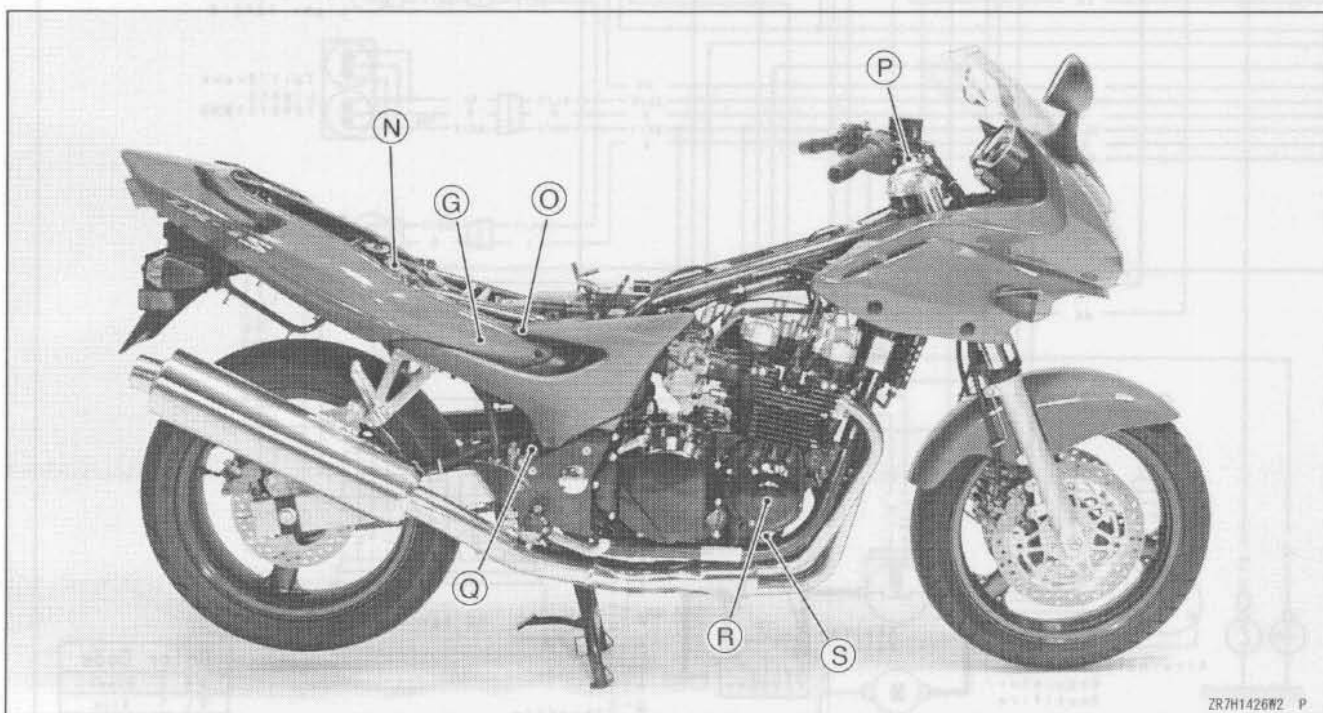
(98032-1145A)

# 14-16 ELECTRICAL SYSTEM

## Parts Location



ZR7H1425W2 P



ZR7H1426W2 P

- |                           |                      |                                      |
|---------------------------|----------------------|--------------------------------------|
| A. Ignition Switch        | H. Starter Relay     | O. Battery                           |
| B. Starter Lockout Switch | I. Alternator        | P. Front Brake Light Switch          |
| C. Horn                   | J. Starter Motor     | Q. Rear Brake Light Switch           |
| D. Regulator/Rectifier    | K. Side Stand Switch | R. Crankshaft Sensor                 |
| E. Ignition Coil          | L. Neutral Switch    | S. Oil Pressure Warning Light Switch |
| F. Spark Plug             | M. Junction Box      |                                      |
| G. Turn Signal Relay      | N. IC Igniter        |                                      |

## Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

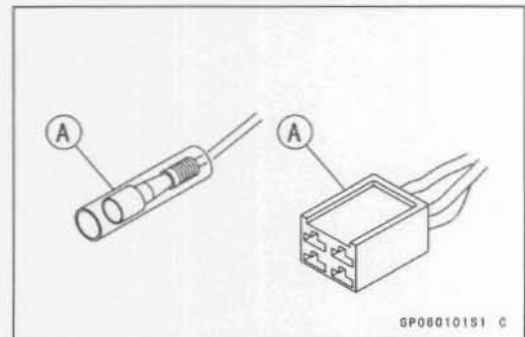
- Do not reverse the battery wire connections. This will burn out the diodes on the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery wires 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 or gauge panel could be warped by excessive heat radiated from the bulb.
- Take care not to short the wires that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they 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

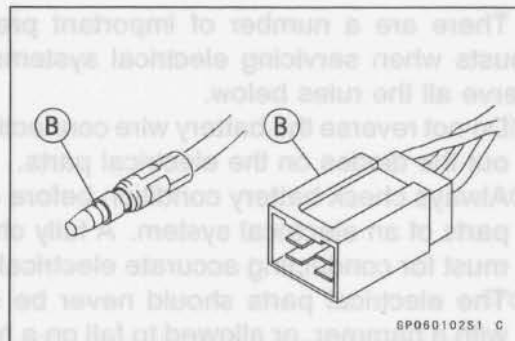
### ○ Electrical Connectors

#### Female Connectors [A]



Precautions

Male Connectors [B]



There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

Always use the correct wire connections. This will ensure that the electrical system is safe and reliable.

Always use the correct type of wire and terminals. Do not use any other type of wire or terminal.

Always use the correct type of electrical tape. Do not use any other type of tape.

Always use the correct type of electrical components. Do not use any other type of component.

Always use the correct type of electrical tools. Do not use any other type of tool.

Always use the correct type of electrical safety equipment. Do not use any other type of equipment.

Always use the correct type of electrical wiring. Do not use any other type of wiring.

Always use the correct type of electrical components. Do not use any other type of component.

Always use the correct type of electrical tools. Do not use any other type of tool.

Always use the correct type of electrical safety equipment. Do not use any other type of equipment.

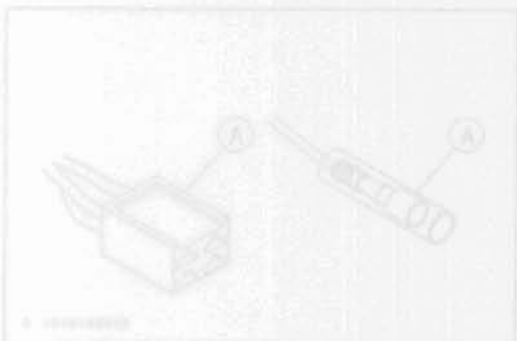
Always use the correct type of electrical wiring. Do not use any other type of wiring.

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	LG	Light blue	R	Red
CH	Chocolate	LG	Light green	W	White
DG	Dark green	O	Orange	Y	Yellow

Electrical Connector  
Female Connector [A]



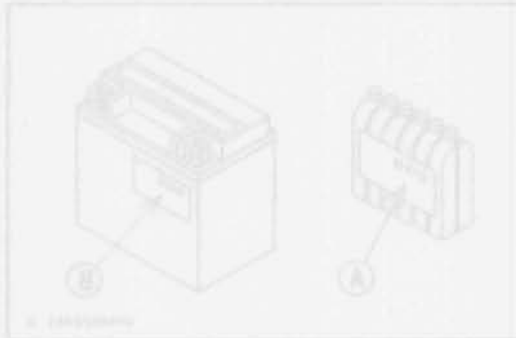
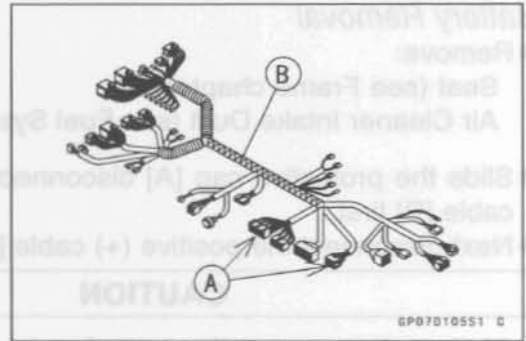
**Electrical Wiring**

*Wiring Inspection*

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the wire which is suspected of being a problem.
- Connect the hand tester between the ends of the wires

**Special Tool - Hand Tester: 57001-1394**

- Set the tester to the  $\times 1 \Omega$  range, and read the tester.
- ★ If the tester does not read  $0 \Omega$ , the wire is defective. Replace the wire or the wiring harness [B] if necessary.



Remove the battery [D].

Battery installation

Place the battery in the battery box.

Connect the capped cable [A] to the (+) terminal.

Put a light coat of grease on the (+) terminal to prevent corrosion.

Cover the (+) terminal with its protective cap [B].

Connect the negative cable [C] to the (-) terminal [D].

Install the removed parts.

**CAUTION**

To connect, always connect the positive (+) wire first and to disconnect, always disconnect the negative (-) wire first. Otherwise, it could create a spark, which could damage the electrical parts.

Electrolyte Filling

Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name for 2R75D-H1: XTX12-B2

**CAUTION**

Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type. This is to prevent overfilling of the electrolyte, shorting the battery life, and deterioration of the battery performance.

**Battery**

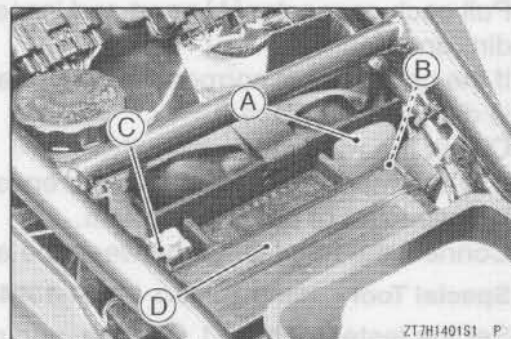
*Battery Removal*

- Remove:
  - Seat (see Frame chapter)
  - Air Cleaner Intake Duct (see Fuel System chapter)
- Slide the protective cap [A] disconnect the negative (-) cable [B] first.
- Next disconnect the positive (+) cable [C].

**CAUTION**

**Always disconnect the negative (-) cable first before disconnecting the positive (+) cable.**

- Remove the battery [D].

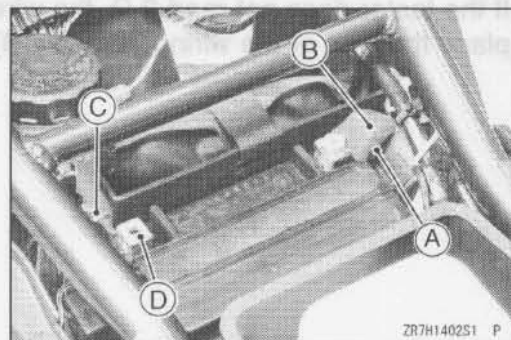


*Battery Installation*

- Place the battery in the battery box.
- Connect the capped cable [A] to the (+) terminal.
- Put a light coat to grease on the (+) terminal to prevent corrosion.
- Cover the (+) terminal with its protective cap [B].
- Connect the negative cable [C] to the (-) terminal [D].
- Install the removed parts.

**CAUTION**

**To connect, always connect the positive (+) wire first, and to disconnect, always disconnect the negative (-) wire first. Otherwise, it could create a spark, which could damage the electrical parts.**



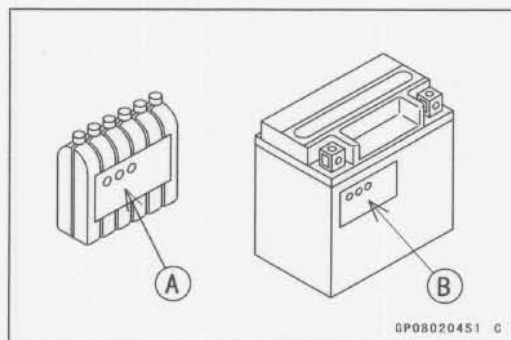
*Electrolyte Filling*

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name for ZR750-H1: XTX12-BS

**CAUTION**

**Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type. This is to prevent overfilling of the electrolyte, shorting the battery life, and deterioration of the battery performance.**



## Battery

- Check to see that there is no peeling, tears or holes in the seal sheet on the top of the battery.
- Place the battery on a level surface.
- Remove the seal sheet [A].

### CAUTION

Do not remove the seal sheet sealing the filler ports [B] until just before use.

### NOTE

- A battery whose seal sheet has any peeling, tears, or holes, requires a refreshing charge (initial charge).

- Take the electrolyte container out of the plastic bag.
- Detach the seal cap [A] from the container.

### NOTE

- Do not discard the seal cap because it is used as the battery plugs later.
- Do not peel back or pierce the seals [B] on the container.

- Place the electrolyte container upside down aligning the six seals with the six battery filler ports.
- Push the container down strongly enough to break the seals. Now the electrolyte should start to flow into the battery.

### NOTE

- Do not tilt the container as the electrolyte flow may be interrupted.

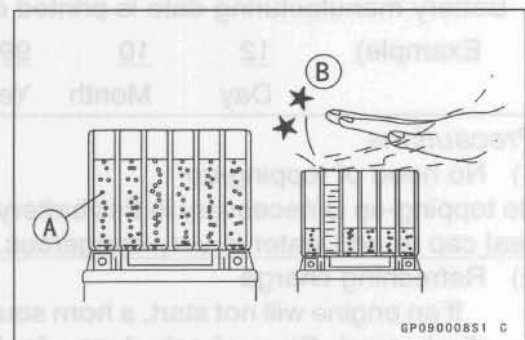
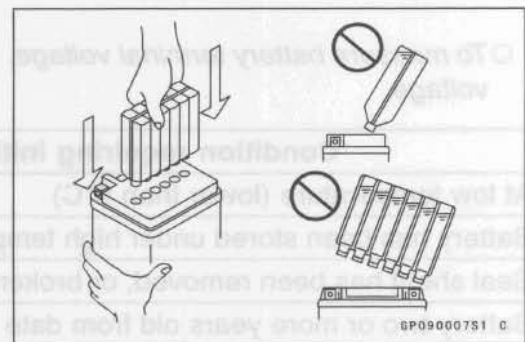
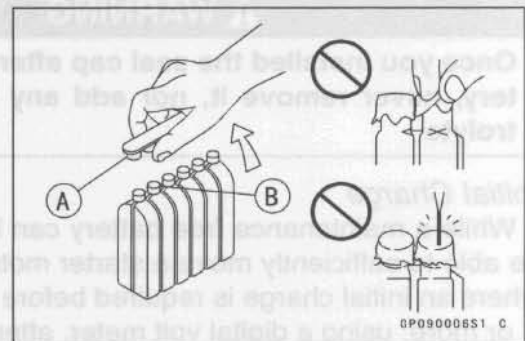
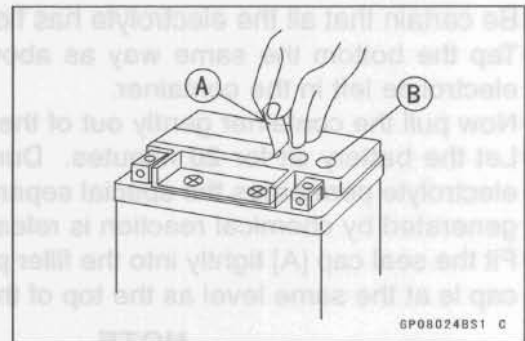
- Make sure air bubbles [A] are coming up from all six filler ports.
- Leave the container this way for 5 minutes or longer.

### NOTE

- If no air bubbles are coming up from a filler port, tap [B] the bottom of the container two or three times. Never remove the container from the battery.

### CAUTION

Fill the electrolyte into the battery until the container is completely emptied.



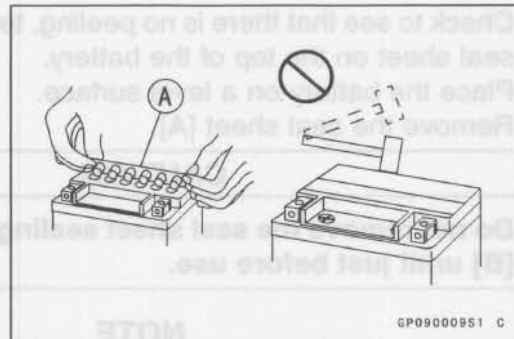
This battery is designed to sustain no unusual deterioration if recharged according to the method specified above. However, the battery's performance may be reduced if it is charged under conditions other than given above. Never remove the seal cap during recharging.

If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

When you do not use the motorcycle for months:

## Battery

- Be certain that all the electrolyte has flowed out.
- Tap the bottom the same way as above if there is any electrolyte left in the container.
- Now pull the container gently out of the battery.
- Let the battery sit for **20 minutes**. During this time, the electrolyte permeates the special separators and the gas generated by chemical reaction is released.
- Fit the seal cap [A] tightly into the filler ports until the seal cap is at the same level as the top of the battery.



### NOTE

- Do not hammer. Press down evenly with both hands.

### ⚠ WARNING

Once you installed the seal cap after filling the battery, never remove it, nor add any water or electrolyte.

### Initial Charge

While a maintenance free 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 of 12.6 V or more, using a digital volt meter, after 10 minutes of filling, no initial charge is necessary.

### NOTE

- To measure battery terminal voltage, use a digital voltmeter which can be read one decimal place voltage.

Condition requiring initial charge	Charging method
At low temperature (lower than 0°C)	1.2 A × 2 ~ 3 hours
Battery has been stored under high temperature and humidity.	1.2 A × 15 ~ 20 hours
Seal sheet has been removed, or broken - peeling, tear or hole.	
Battery two or more years old from date of manufacture. Battery manufacturing date is printed on battery top. Example) <u>12</u> <u>10</u> <u>99</u> <u>T1</u> Day    Month    Year    Mfg. location	

### Precautions

- 1) No need of topping-up

No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

- 2) Refreshing charge

If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see this chapter).

When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

### CAUTION

**This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.**

**If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.**

- 3) When you do not use the motorcycle for months:

## Battery

Give a refresh charge before you store the motorcycle and store it with the negative lead removed. Give a refresh charge **once a month** during storage.

### 4) Battery life:

If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

## ⚠ WARNING

Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger.

This procedure prevents sparks at the battery terminals which could ignite any battery gases.

No fire should be drawn near the battery, or no terminals should have the tightening loosened.

The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water. Get medical attention if severe.

### Interchange

A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

### Charging Condition Inspection

- Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].
- Remove the seat (see Frame chapter).
- Disconnect the battery terminals.

## CAUTION

Be sure to disconnect the negative terminal first.

- Measure the battery terminal voltage.

## NOTE

- Measure with a digital voltmeter which can be read one decimal place voltage.

- ★ If the reading is 12.6 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

### Battery Terminal Voltage

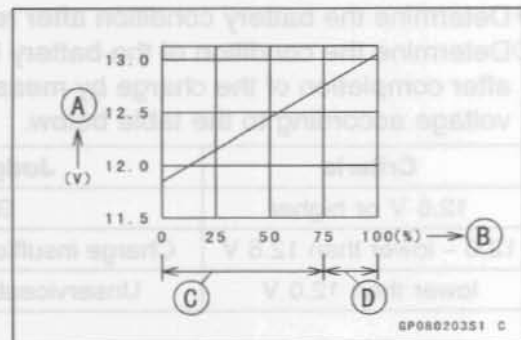
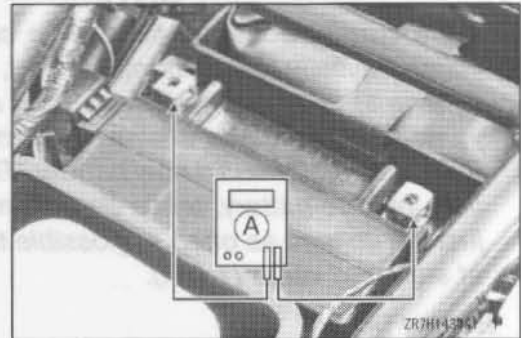
Standard: 12.6 V or more

Terminal Voltage (V) [A]

Battery Charge Rate (%) [B]

Refresh charge is required [C]

Good [D]



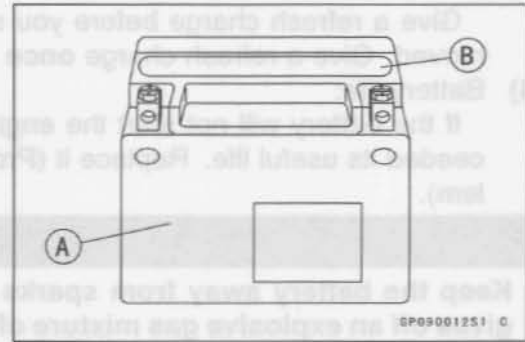
## Battery

### Refreshing Charge

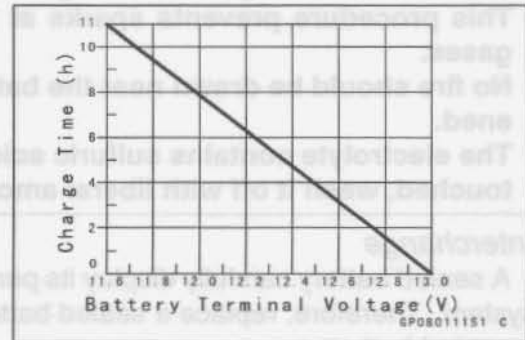
- Remove the battery [A] (see this chapter).
- Do refresh charge by following method according to the battery terminal voltage.

### ⚠ WARNING

This battery is sealed type. Never remove seal cap [B] even at charging. Never add water. Charge with current and time as stated below.



Terminal Voltage: 11.5 – less than 12.6 V  
 Standard Charge 1.2 A × 5 – 10 h  
 (see following chart)  
 Quick Charge 5 A × 1.0 h



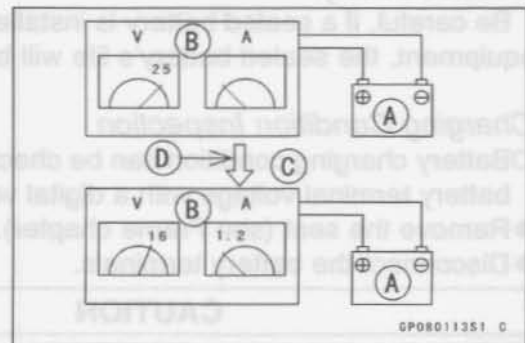
### CAUTION

If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

Terminal Voltage: less than 11.5 V  
 Charging Method: 1.2 A × 20 h

### 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 (1.2 A).



- Battery [A]
- Battery Charger [B]
- Standard Value [C]
- Current starts to flow [D].

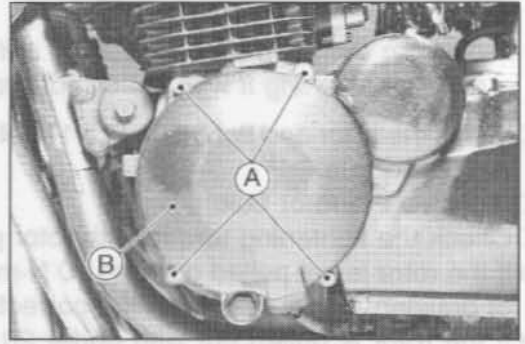
- Determine the battery condition after refresh charge.
- Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Criteria	Judgement
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

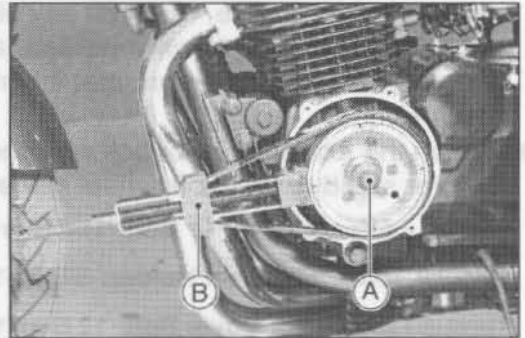
## Charging System

### Alternator Rotor Removal

- Remove the alternator cover bolts [A].
- Remove the alternator cover [B].



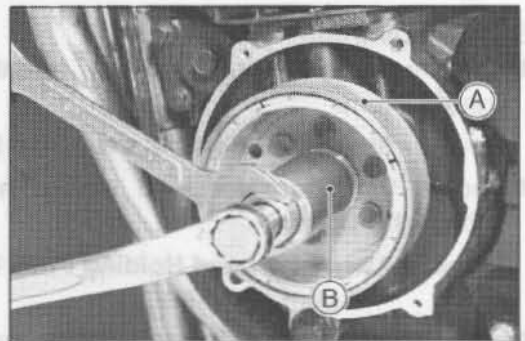
- Holding the rotor steady, unscrew the rotor bolt [A]  
Special Tool - Flywheel Holder: 57001-1313 [B]



- Insert the rotor puller adapter into the rotor bolt hole.  
Special Tool - Rotor Puller Adapter: 57001-1151 [A]

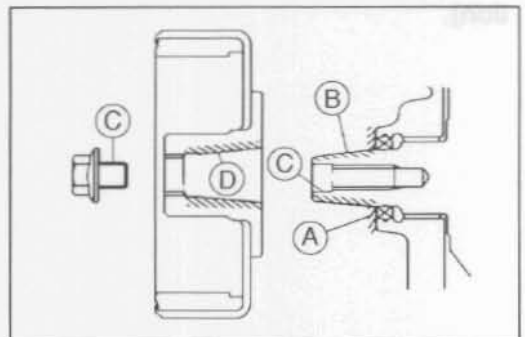


- Remove the rotor [A], using the rotor puller.  
Special Tool - Flywheel Puller Assembly, M30 x 1.5, M33 x 1.5: 57001-1426 [B]



### Alternator Rotor Installation

- Clean the following areas with cleaning solvent:
  - Oil seal surface of crankshaft [A]
  - Tapered portion of crankshaft [B]
  - Threaded portion of alternator bolt and crankshaft [C]
  - Tapered portion of alternator rotor [D]



## Charging System

### NOTE

- Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.
- Install the rotor and tighten it with 113 N·m (11.5 kgf·m, 83 ft·lb) of torque.
- Remove the 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.
- Tighten the alternator rotor bolt while holding the alternator rotor steady with the flywheel holder.
 

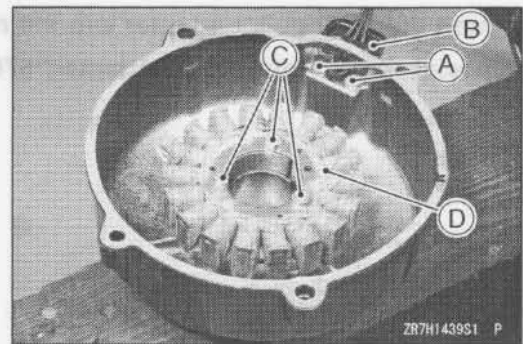
**Torque - Alternator Rotor Bolt: 128 N·m (13 kgf·m, 94 ft·lb)**

**Special Tool - Flywheel Holder: 57001-1313**

**Torque - Alternator Cover Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)**

### Stator Coil Removal

- Remove:
  - Alternator Cover (see Alternator Rotor Removal)
  - Holding Plate Bolts [A] and Plate Alternator Grommet [B]
  - Stator Coil Bolts [C]
- Remove the stator coil [D] from the alternator cover.

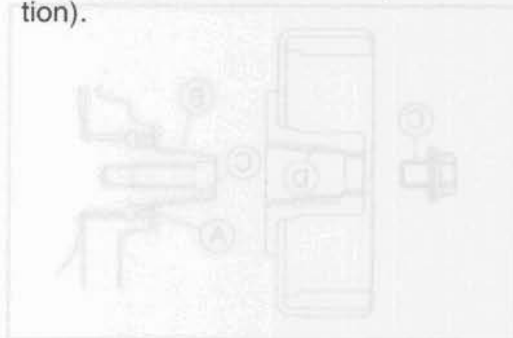


### Stator Coil Installation

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

**Torque - Stator Coil Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)**
- Secure the alternator lead with a holding plate, and tighten the bolts.
 

**Torque - Alternator Lead Holding Plate Bolts: 2.9 N·m (0.3 kgf·m, 26 in·lb)**
- Install the Alternator Cover (see Alternator Rotor Installation).

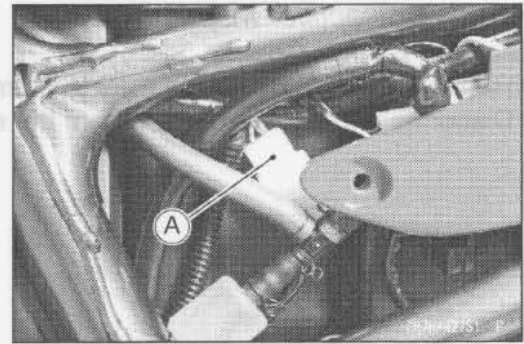


## Charging System

### 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 at 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 voltage in the following sequence:
  - Turn the ignition switch OFF.
  - Remove the left side cover (see Frame chapter)
  - Remove the alternator lead connector [A].
  - Connect the hand tester as shown in Table 1.



**Table 1. Alternator No-Load Output Voltage**

Tester Range	Connecting terminal		Standard @ 4 000 r/min (rpm)
	Tester positive (+) terminal	Tester negative (-) terminal	
AC250 V	One yellow lead	Another yellow lead	35 V or more

- Start the engine.
- Maintain the engine speed at 4 000 r/min (rpm).
- Measure the voltage (total 3 times).
- ★ If the measurement is considerably lower than the standard, stop the engine, and inspect the stator coil.
- Measure the stator coil resistance.
  - Connect the hand tester as shown in Table 2.

**Table 2. Alternator No-Load Output Voltage**

Tester Range	Connecting terminal		Standard
	Tester positive (+) terminal	Tester negative (-) terminal	
$\times 1 \Omega$	One yellow lead	Another yellow lead	0.1 – 0.8 $\Omega$

- Read the measurement (total 3 times).
- ★ If the measurement is greater than the standard, replace the stator.
- Set the hand tester to  $\times 1 \Omega$  range and connect it between the respective yellow wire in the female connector of the alternator and the frame to measure the resistance.
- ★ If the tester reads a value other than infinity ( $\infty$ ), replace the stator.
- ★ If the output voltage is out of standard even if the stator coil and wires appear normal, replace the alternator rotor.

- [A] White Lead Terminal
- [B] Brown Lead Terminal
- [C] Black/Yellow Lead Terminal
- [D] Yellow 1 Lead Terminal
- [E] Yellow 2 Lead Terminal
- [F] Yellow 3 Lead Terminal

**Table 3. Resistor Circuit Inspection**

Tester Range	Connecting terminal		Standard
	Tester positive (+) terminal	Tester negative (-) terminal	
$\times 1 \Omega$	W	Y1	1
		Y2	2
		Y3	3
$\times 1 \Omega$	BKY	Y1	4
		Y2	5
		Y3	6
$\times 1 \Omega$	W	Y1	7
		Y2	8
		Y3	9
$\times 1 \Omega$	BKYW	Y1	10
		Y2	11
		Y3	12

**NOTE**

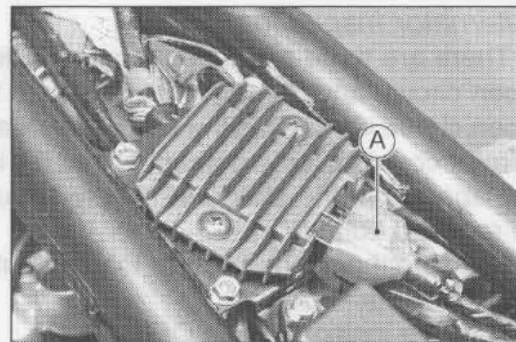
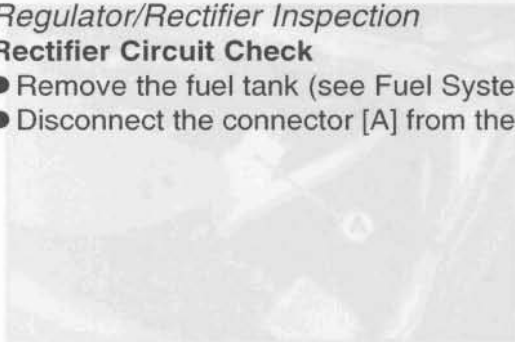
○ The actual resistance measurement varies with the tester used and the individual diodes. Generally speaking, it is acceptable if the tester's indicator swings approximately halfway.

## Charging System

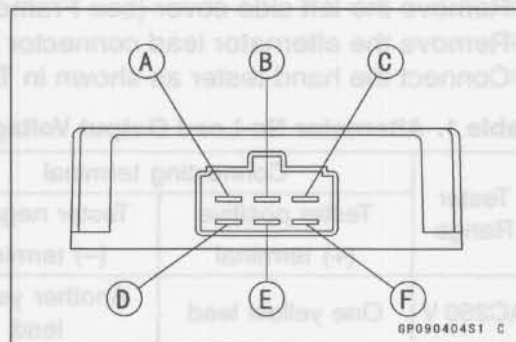
### Regulator/Rectifier Inspection

#### Rectifier Circuit Check

- Remove the fuel tank (see Fuel System chapter).
- Disconnect the connector [A] from the regulator/rectifier.



- White Lead Terminal [A]
- Brown Lead Terminal [B]
- Black/Yellow Lead Terminal [C]
- Yellow 1 Lead Terminal [D]
- Yellow 2 Lead Terminal [E]
- Yellow 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 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 (White or Yellow) is small or large in both directions, the rectifier is damaged; therefore, replace the regulator/rectifier.

#### Rectifier Circuit Inspection

	Connecting terminal		Standard	Tester-range
	Tester positive (+) terminal	Tester negative (-) terminal		
1	Y1	W	∞	Approximately 1/2 of the entire graduation × 10 Ω or × 100 Ω
2	Y2			
3	Y3			
4	Y1	BK/Y	Approximately 1/2 of the entire graduation	
5	Y2			
6	Y3			
7	W	Y1	∞	
8		Y2		
9		Y3		
10	BK/YW	Y1	∞	
11		Y2		
12		Y3		

#### 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.

## Charging System

### Regulator Circuit Check

- Prepare the following:
  - Test Light Bulb: one 12 V 3.4 W bulb
  - Batteries: three 12 V batteries
  - Wires: five wires of appropriate lengths

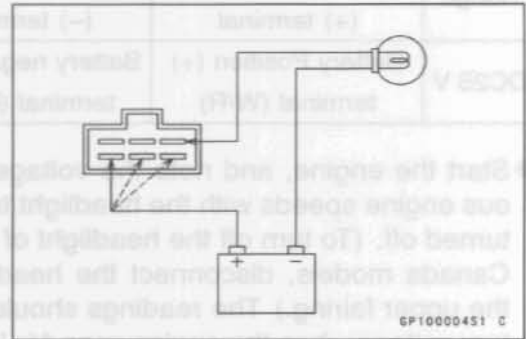
#### CAUTION

The test light works as an indicator and also a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

- Check to be sure the rectifier circuit is normal before continuing.

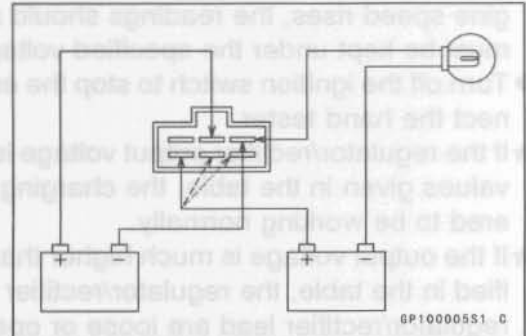
#### Regulator Circuit Test-1st Step:

- Connect the test light and the 12 V battery to the regulator/rectifier as shown.
- Check Y1, Y2, and Y3 terminal respectively.
- ★ If the test light turns on, the regulator/rectifier is defective. Replace it.
- ★ If the test light does not turn on, continue the test.



#### Regulator Circuit Test-2nd Step:

- Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test-1st Step".
- Apply 12 V to the BR (voltage monitoring) terminal.
- Check Y1, Y2, and Y3 terminal respectively.
- ★ If the test light turns on, the regulator/rectifier is defective. Replace it.
- If the test light does not turn on, continue the test.



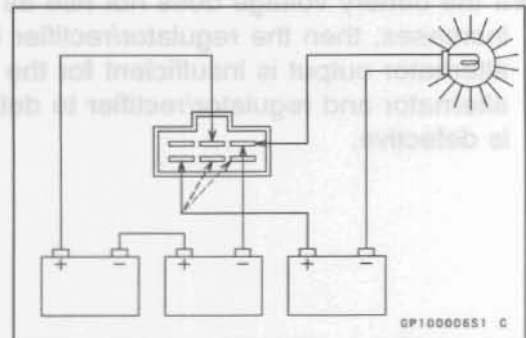
#### Regulator Circuit Test-3rd Step:

- Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test-1st Step".
- Momentarily apply 24 V to the BR terminal by adding a 12 V battery.
- Check Y1, Y2, and Y3 terminals respectively.

#### CAUTION

Do not apply more than 24 V to the regulator/rectifier and do not leave the 24 V applied for more than a few seconds, or the unit will be damaged.

- ★ If the test light did not light when the 24 V was applied momentarily to the BR terminal, the regulator/rectifier is defective. Replace it.
- ★ If the regulator/rectifier passes all of the tests described, it may still be defective. If the charging system still does not work properly after checking all of the components and the battery, test the regulator/rectifier by replacing it with a known good unit.



## Charging System

### Charging Voltage (regulator/rectifier's output voltage)

#### Inspection

- Inspect the charging condition of the battery (see Battery Section).
- Warm up the engine to obtain actual alternator operating conditions.
- Turn the ignition switch OFF.
- Connect the hand tester in accordance with the following table:

### Charging Voltage (regulator/rectifier's output voltage)

#### Inspection

Tester Range	Connecting terminal		Standard
	Tester positive (+) terminal	Tester negative (-) terminal	
DC25 V	Battery Position (+) terminal (W/R)	Battery negative (-) terminal (BK/Y)	14 ~ 15 V

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. (To turn off the headlight of US, Australia and Canada models, disconnect the headlight connector in the upper fairing.) The readings should show nearly battery voltage when the engine speed is low, and as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.
- Turn off the ignition switch to stop the engine, and disconnect the hand tester.
- ★ If the regulator/rectifier output voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★ If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier lead are loose or open.
- ★ If the battery voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.



### CAUTION

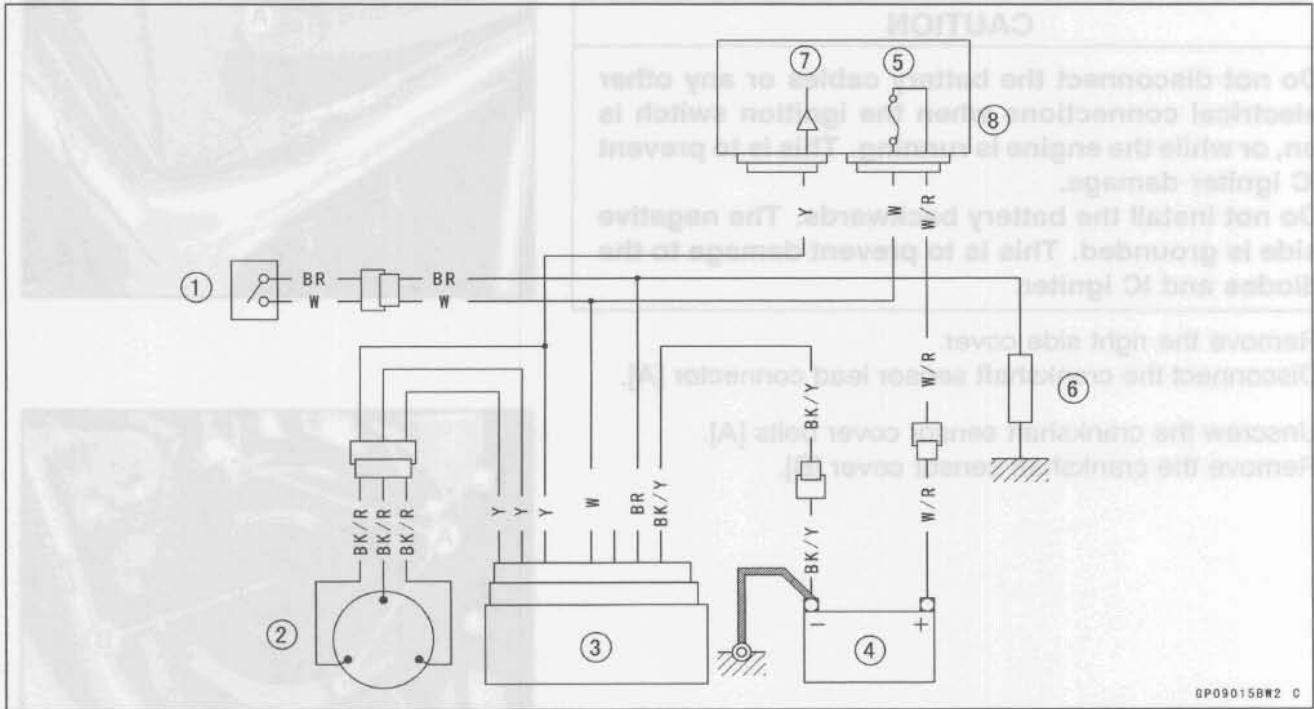
The test light works as an indicator to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

### CAUTION

Do not apply more than 24 V to the regulator/rectifier and do not leave the 24 V applied for more than a few seconds, or the unit will be damaged.

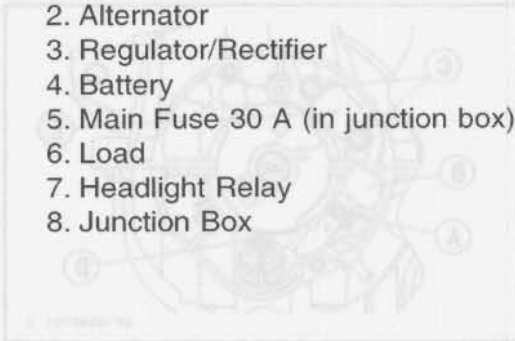
Charging System

Charging System Circuit



0P090158W2 C

1. Ignition Switch
2. Alternator
3. Regulator/Rectifier
4. Battery
5. Main Fuse 30 A (in junction box)
6. Load
7. Headlight Relay
8. Junction Box



• Uncrew the lead holder bolt [A] and remove the holder  
 [B]  
 • Uncrew the crankshaft sensor mounting bolts [C]  
 • Remove the oil pressure warning light switch lead termi-  
 nal [D] and remove the crankshaft sensor [E] together with  
 the lead.

• Install the crankshaft sensor cover.  
 Torque - Crankshaft Sensor Cover Bolt: 12 N·m (7.2 kgf·m,  
 104 in·lb)  
 Crankshaft Sensor Mounting Bolt: 8.0 N·m (0.8  
 kgf·m, 52 in·lb)  
 Torque - Oil Pressure Warning Light Switch Terminal Bolt:  
 1.5 N·m (0.15 kgf·m, 14 in·lb)  
 • Run the leads wire properly (see General Information  
 chapter).  
 Crankshaft Sensor Installation

## Ignition System

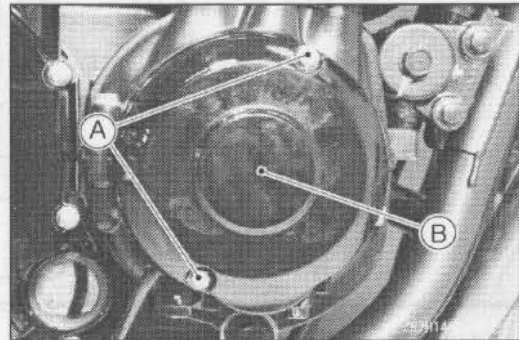
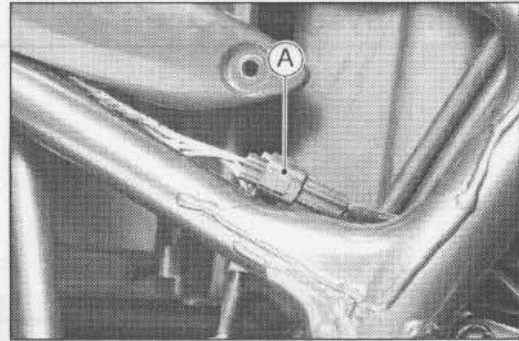
## Crankshaft Sensor Removal

**CAUTION**

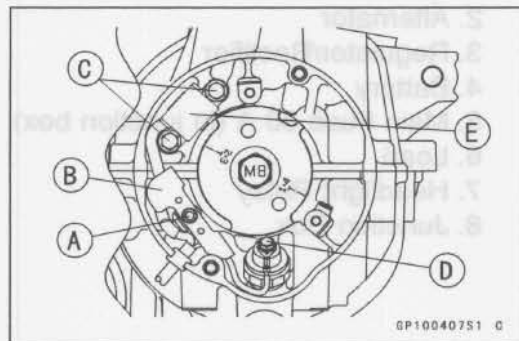
Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent IC igniter damage.

Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and IC igniter.

- Remove the right side cover.
- Disconnect the crankshaft sensor lead connector [A].
- Unscrew the crankshaft sensor cover bolts [A].
- Remove the crankshaft sensor cover [B].



- Unscrew the lead holder bolt [A] and remove the holder [B].
- Unscrew the crankshaft sensor mounting bolts [C].
- Remove the oil pressure warning light switch lead terminal [D] and remove the crankshaft sensor [E] together with the lead.

*Crankshaft Sensor Installation*

- Run the leads wires properly (see General Information chapter).

**Torque - Oil Pressure Warning Light Switch Terminal Bolt:**  
1.6 N·m (0.16 kgf·m, 14 in·lb)


**Crankshaft Sensor Mounting Bolts:** 6.0 N·m (0.6 kgf·m, 53 in·lb)

- Install the crankshaft sensor cover.

**Torque - Crankshaft Sensor Cover Bolt:** 12 N·m (1.2 kgf·m, 104 in·lb)

## Ignition System

### Crankshaft Sensor Inspection

- Remove the right side cover.
- Disconnect the crankshaft sensor lead connector.
- Set the hand tester to the  $\times 100 \Omega$  range, and measure the resistance between the female connector's black lead and the yellow lead terminal 

**Special Tool - Hand Tester: 57001-1394**

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

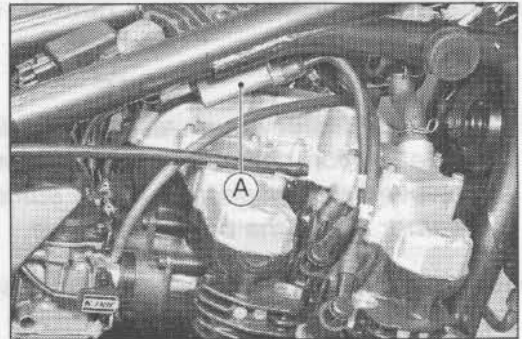
### Crankshaft Sensor Resistance

**Standard: 380 ~ 560  $\Omega$**

- Set the hand tester to the maximum range and measure the resistance between the frame ground and the female connector's black wire, yellow wire terminals.
- ★ If the reading is not infinity ( $\infty$ ), replace the crankshaft sensor.

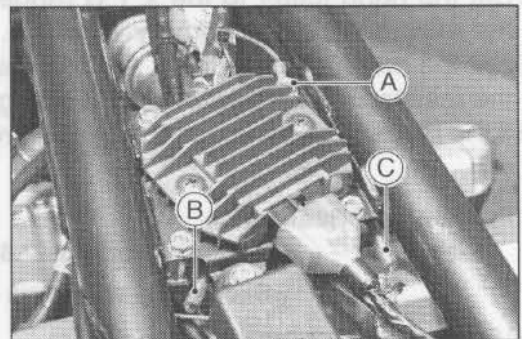
### Ignition Coil Removal

- Remove the fuel tank (see Fuel tank Removal).
- Disconnect the secondary lead from the spark plug.
- Disconnect the primary lead from the ignition coil.
- Remove the mounting nuts and take out the ignition coil [A].
- Disconnect the secondary lead from the spark plug cap.



### Ignition Coil Installation

- Tighten the ground terminal [A] with the front mounting nut for the #3 and #4 ignition coils.
- Connect the primary wire to the primary coil terminal as follows:
  - Black wire → ignition coil for #1, #4 cylinder [B]
  - Green wire → ignition coil for #2, #3 cylinder [C]
  - Red wire → ignition coil for #1 ~ #4 cylinder



## Ignition System

### Ignition Coil Inspection

- Remove the ignition coils.
- With the spark plug caps left attached, connect the ignition coil [B] to the tester [A] to measure the arcing distance.

### ⚠ WARNING

To avoid extremely high voltage shocks, do not touch the coil body or leads.

- ★ If the distance reading is less than the specified value, the ignition coil or spark plug caps are defective.

### Ignition Coil Arcing Distance

**Standard:** 7 mm (0.28 in.) or more

- 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 caps

### 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 on the right.
- 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. Ignition Coil [C]
- ★ If the measurement is out of standard, replace the ignition coil.

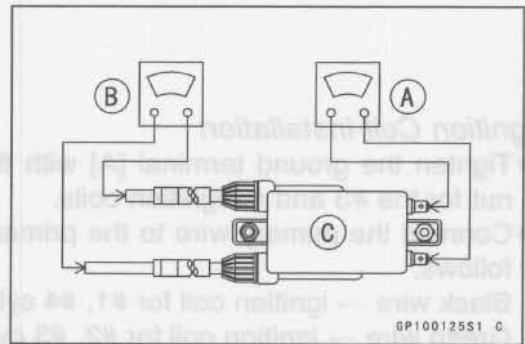
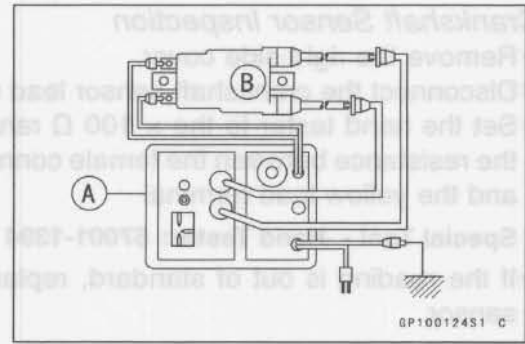
### Ignition Coil Resistance

**Standard:** Primary windings 2.61 ~ 3.19  $\Omega$   
Secondary windings 13.5 ~ 16.5  $\text{k}\Omega$

- Visually inspect the secondary wire.
- ★ If it is damaged, replace the ignition coil.
- To install the spark plug caps, turn them in clockwise.

### Spark Plug Removal, Installation

- Take out the spark plug cap and remove the spark plug.  
**Owner's Tool - Spark Plug Wrench: 92110-1130 [A]**  
**Special Tool - Spark Plug Wrench: 57001-1024**
- Install the spark plug and tighten it to the specified torque.  
**Torque - Spark Plug: 14 N·m (1.4 kgf·m, 10 ft·lb)**
- Fit the plug caps securely.
- Pull up the spark plug caps lightly to make sure of the installation of the spark plug caps.



## Ignition System

### Spark Plug Cleaning, Inspection

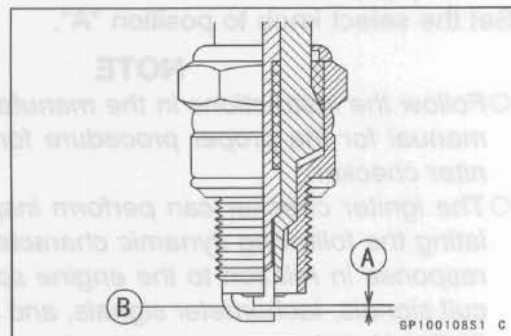
- Remove the spark plugs and visually inspect them.
- ★ If the spark plugs have any carbon deposits on them, use a spark plug cleaner or a wire brush to remove them.
- ★ If the spark plugs are contaminated with oil, wash them in cleaning solvent.
- ★ If the spark plug's center electrode is corroded or burned, or if the insulator is broken, replace the spark plug.

### Spark Plug Gap Inspection

- Using a wire type spark plug gap gauge, measure the spark plug gap [A].
- ★ If the gap is incorrect, carefully bend the side electrode [B] with a suitable tool to obtain the correct gap.

#### Spark Plug Gap

Standard: 0.6 ~ 0.7 mm (0.024 ~ 0.028 in.)



### IC Igniter Removal

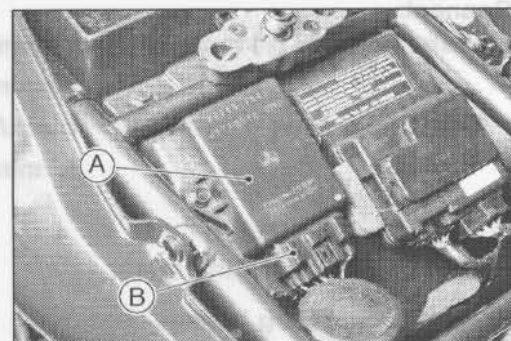
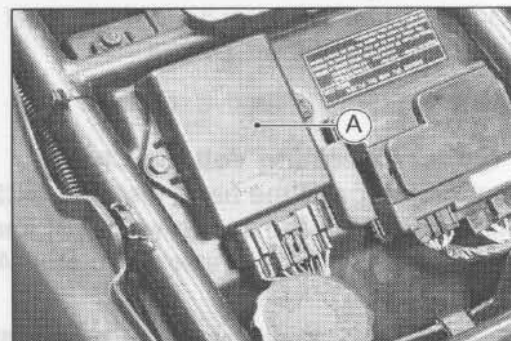
#### CAUTION

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.

- Remove the seat (see Frame chapter).
- Remove the IC igniter [A] from the bracket, and disconnect the connector.
- Remove the IC Igniter.

### IC Igniter Inspection

- Remove the seat (see Frame chapter).
- Disconnect the connector [B] from the igniter [A].
- Remove the igniter.



## Ignition System

- To examine the condition of the igniter, connect the igniter checker to the igniter as shown.

**Special Tools - Igniter Checker Set: 57001-1378 [A]**

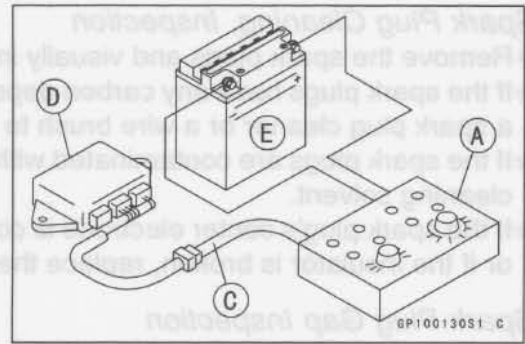
**Wiring Harness Adapter, #14: 57001-1427 [B]**

**Wiring Harness Adapter, #2: 57001-1382 [C]**

IC Igniter [D]

Battery [E]

- Set the select knob to position "A".



### NOTE

- Follow the instructions in the manufacturer's operation manual for the proper procedure for operating the igniter checker.
- The igniter checker can perform inspections by simulating the following dynamic characteristics: the igniter response in relation to the engine speed, interlock circuit signals, tachometer signals, and engine overspeed limiter signals.
- The igniter checker cannot be used for inspecting the conditions of the CDI unit.

- ★ If the igniter is defective, replace it.

### IC Igniter Operating Voltage Check

- Set the range of the hand tester to DC25 V, and connect its terminals to the brown/white [B] and the black/yellow [C] terminals in the igniter connector [A] at the main harness.

**Special Tool - Kawasaki Hand Tester: 57001-1394**

**Connect:**

Tester positive (+) terminal → brown/white lead terminal

Tester negative (-) terminal → black/yellow lead terminal

- Turn the ignition switch ON.
- Read the voltage on the tester.

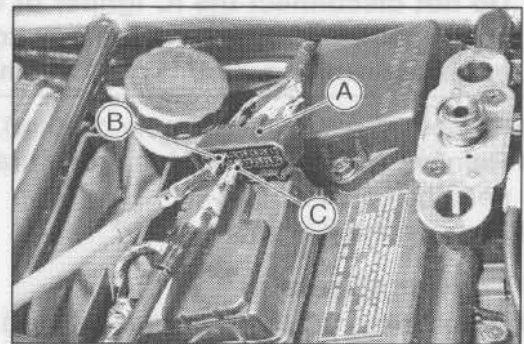
### IC Igniter Operating Voltage

**Standard: battery voltage**

- ★ If there is no voltage or if it is low, inspect the battery voltage, ignition switch, and the ignition fuse.

### Ignition Coil Primary Side Peak Voltage Inspection

- Remove the following parts:
  - Seat (see Frame chapter).
  - Fuel Tank (see Fuel System chapter).

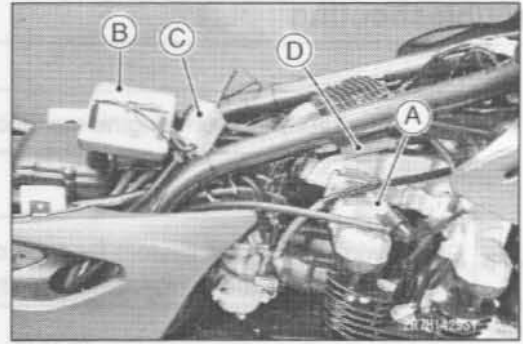


## Ignition System

- Remove the spark plug cap from a spark plug.
- Attach a spark plug [A] that is known to be good to the removed spark plug cap, and ground the spark plug to the engine.

### NOTE

- To obtain a correct measurement, the leads as well as the wire connections must be correct.
- Perform the measurement with the cylinder compression in the normal state (with the spark plug inserted in the cylinder head). Without the proper compression, a correct measurement cannot be obtained.



- Set the range of the tester to 250 V. 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**

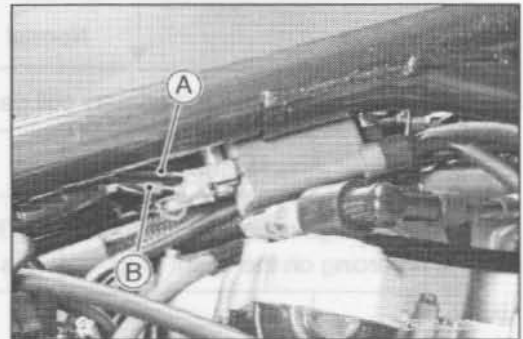
### Connect:

Adapter positive (+) lead [A] → green lead terminal

Adapter negative (-) lead [B] → red lead terminal

Adapter positive (+) lead [A] → black lead terminal

Adapter negative (-) lead [B] → red lead terminal



- Turn the ignition switch ON.
- Shift the gear into neutral and push the engine stop switch to RUN.
- Crank the starter motor for several seconds and read the highest value on the tester.

### Ignition Coil Primary Side Peak Voltage

Standard: 100 V or more

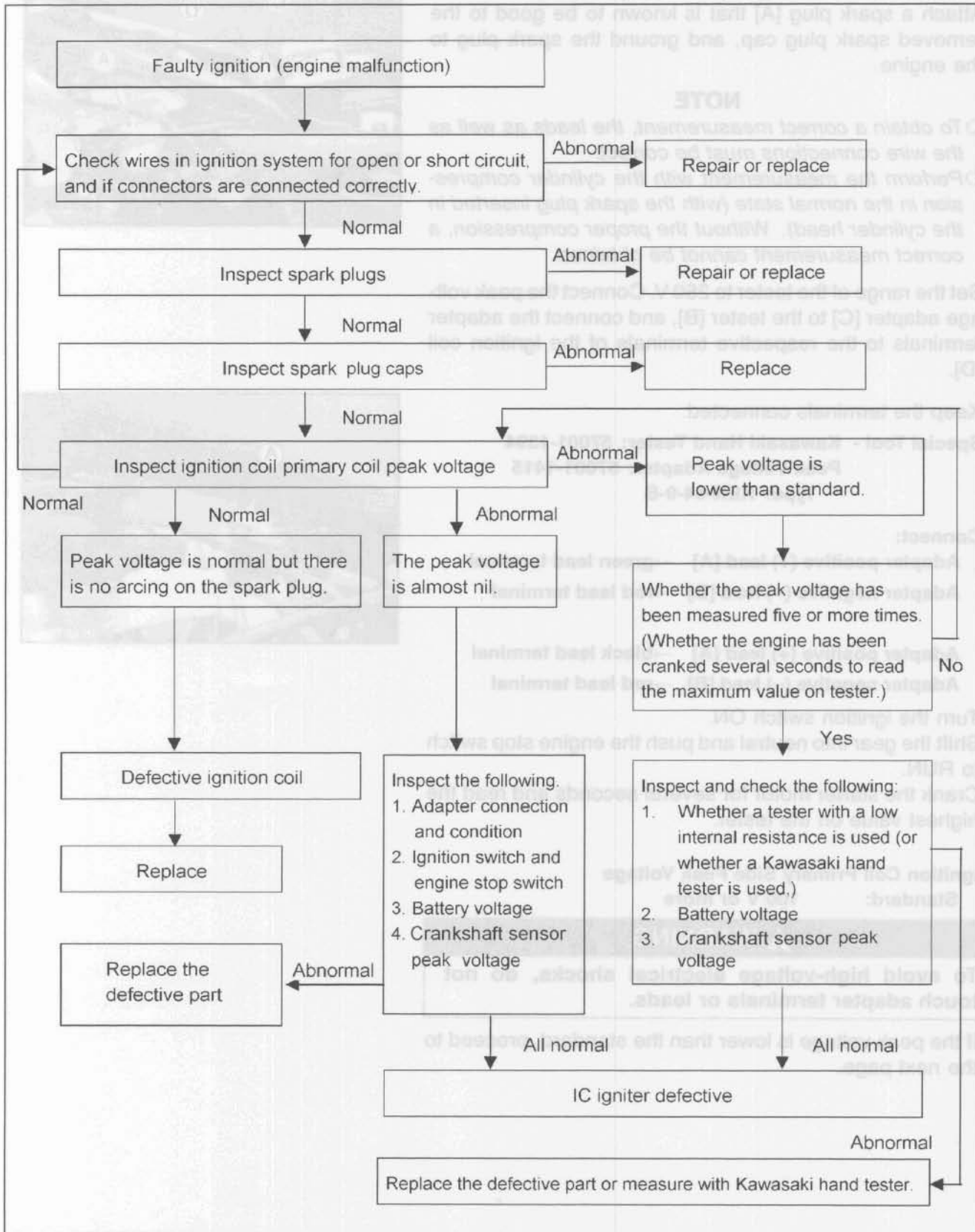
### **⚠ WARNING**

**To avoid high-voltage electrical shocks, do not touch adapter terminals or leads.**

- ★ If the peak voltage is lower than the standard, proceed to the next page.

Ignition System

Troubleshooting



## Ignition System

### Crankshaft Sensor Peak Voltage Inspection

- Measure the crankshaft sensor's peak voltage as follows:
  - Remove the right side cover.
  - Disconnect 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 range of the tester to DC 10 V.
- Connect the peak voltage adapter [A] to the tester, and connect the terminals of the adapter to the terminals of the crankshaft sensor connector [B].

**Special Tool - Kawasaki Hand Tester: 57001-1394**  
**Peak Voltage Adapter: 57001-1415**  
**Type: KEK-54-9-B**

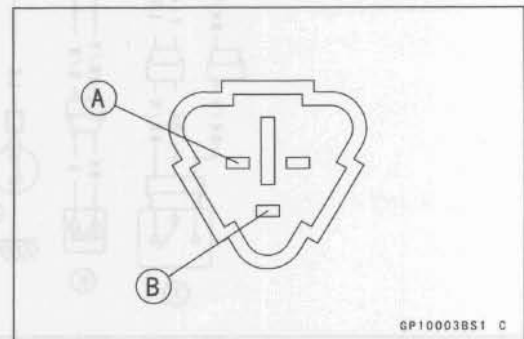
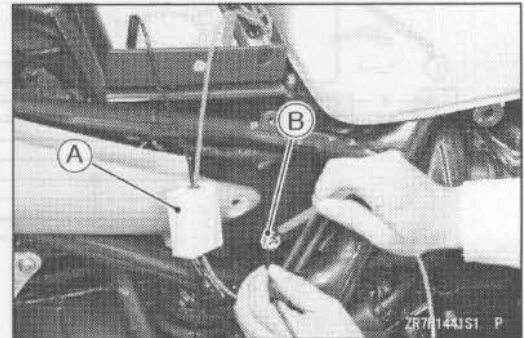
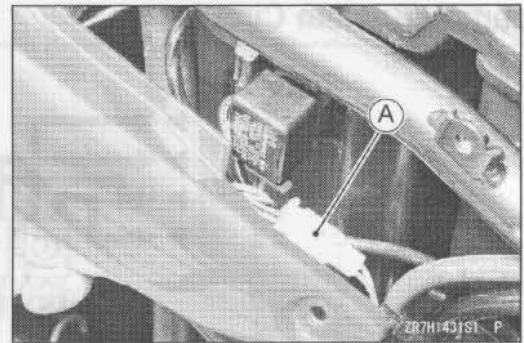
#### Connect:

Adapter positive (+) terminal → yellow lead terminal [A]  
 Adapter negative (-) terminal → black/white lead terminal [B]

- Crank the starter motor for several seconds and read the highest value on the tester.

**Crankshaft Sensor Peak Voltage**  
**Standard: 2.4 V or more**

- ★ If the peak voltage is lower than the standard, inspect the crankshaft sensor.

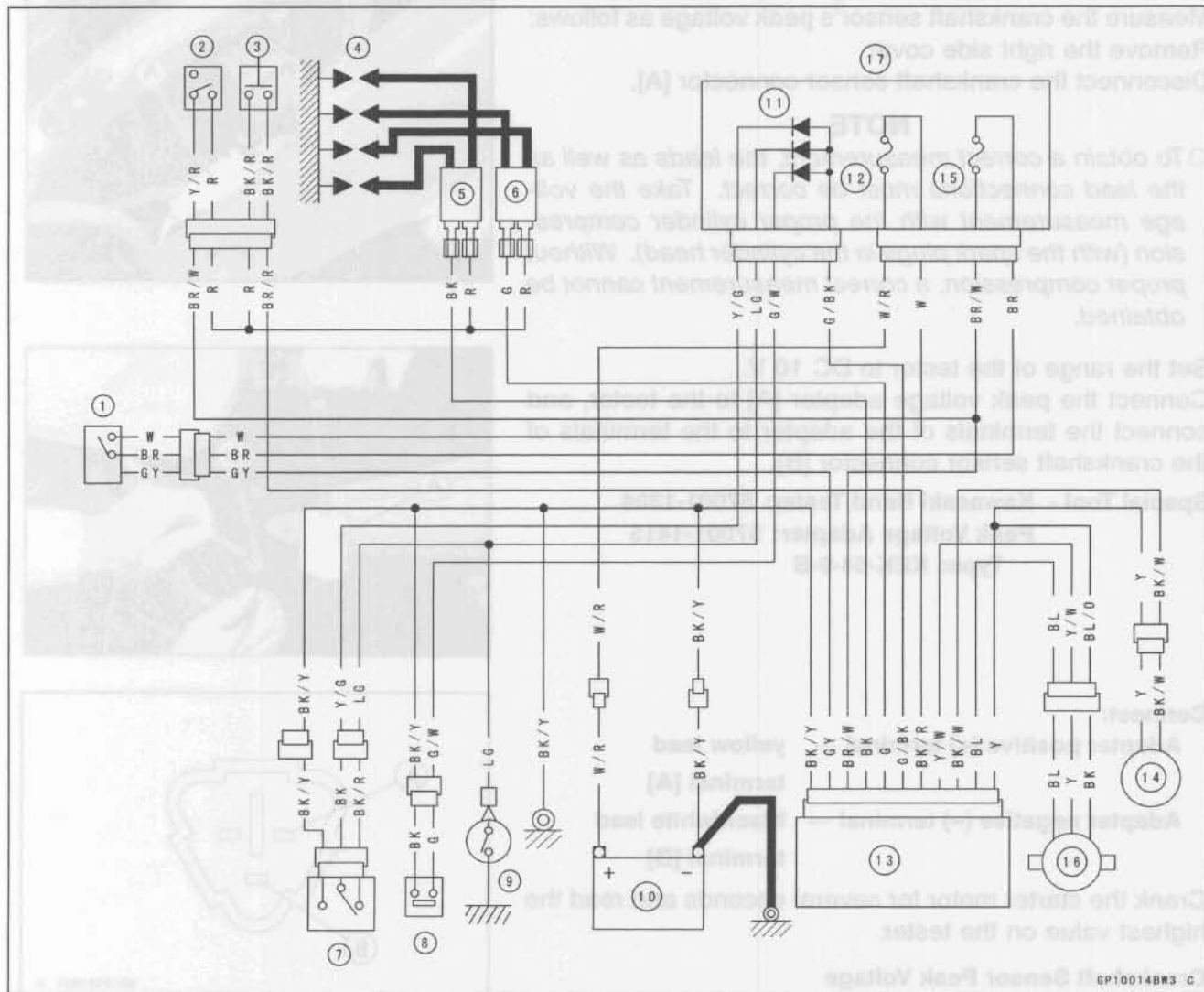


1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Spark Plug
5. #1, #4 Ignition Coil
6. #2, #3 Ignition Coil
7. Starter Lockout Switch
8. Side Stand Switch
9. Neutral Switch
10. Battery
11. Diode
12. Main Fuse 30 A
13. IC Igniter
14. Crankshaft Sensor
15. Ignition Fuse 10 A
16. Throttle Sensor
17. Junction Box

# 14-40 ELECTRICAL SYSTEM

## Ignition System

### Ignition System Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Spark Plugs
5. #1, #4 Ignition Coil
6. #2, #3 Ignition Coil
7. Starter Lockout Switch
8. Side Stand Switch
9. Neutral Switch
10. Battery
11. Diodes
12. Main Fuse 30 A
13. IC Igniter
14. Crankshaft Sensor
15. Ignition Fuse 10 A
16. Throttle Sensor
17. Junction Box

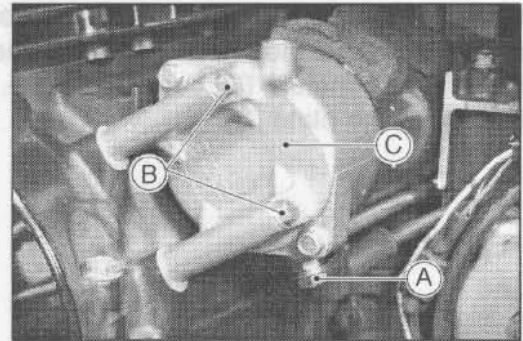
## Electric Starter System

### Starter Motor Removal

- Remove:
  - Engine Sprocket Cover (see Final Drive chapter)
  - Starter Motor Cover
  - Starter Motor Wire [A]
  - Starter Motor Mounting Bolts [B]
  - Starter Motor [C]

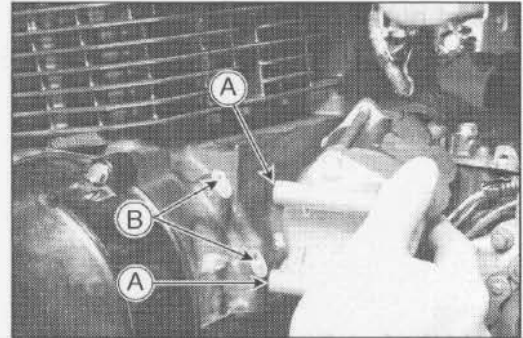
#### CAUTION

**Do not tap the end of the starter motor shaft or the motor may be damaged.**

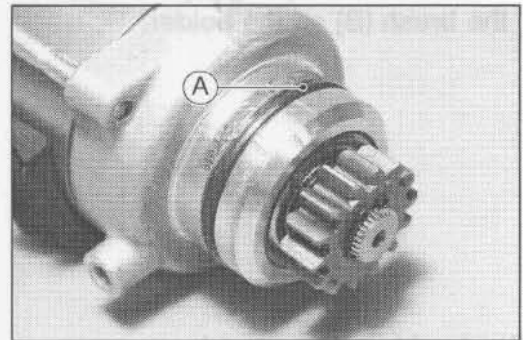


### Starter Motor Installation

- When installing the starter motor, clean the starter motor lugs [A] and crankcase [B] where the starter motor is grounded.



- If the O-ring [A] shows any damage or if it is hardened, replace it with a new one.
- Apply a small amount of engine oil to the O-ring.

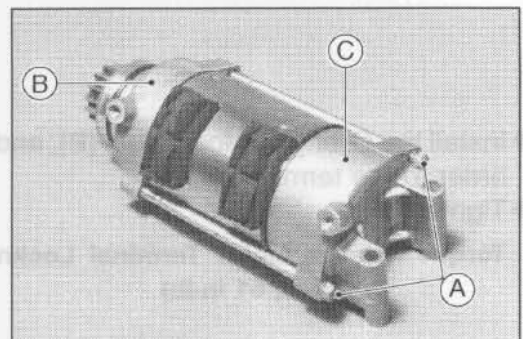


- Push the starter motor into the crankcase, guiding the sprocket (torque limiter) onto the shaft at the same time.
- Tighten:

**Torque - Starter Motor Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**

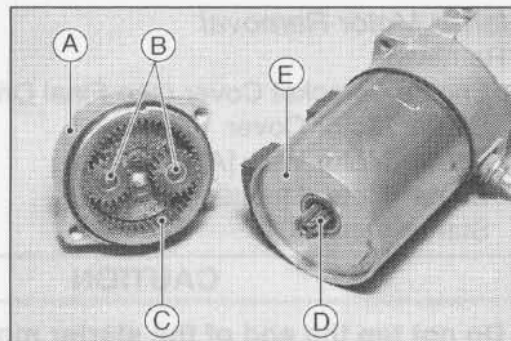
### Starter Motor Disassembly

- Remove:
  - Starter Motor Through Bolts [A]
  - Right End Cover [B]
  - Left End Cover [C]

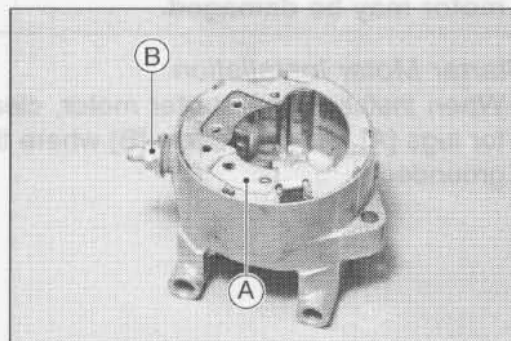


Electric Starter System

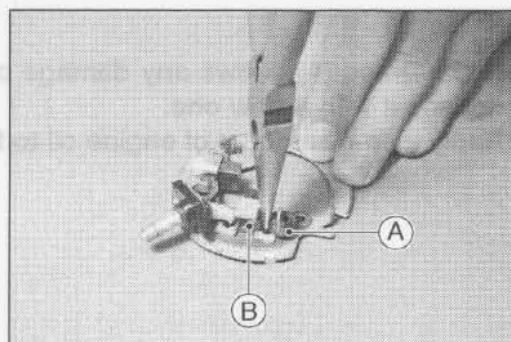
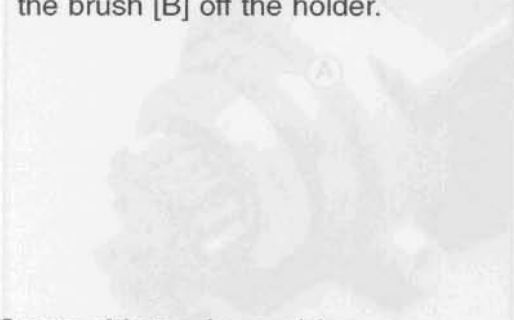
- Do not disassemble the right end cover [A].
- Do not remove the planet gears [B] and internal gear [C].
- Push the armature [D] out of the yoke.
- Remove the plate [E].



- To remove the brush plate assembly [A], remove the terminal nut [B].

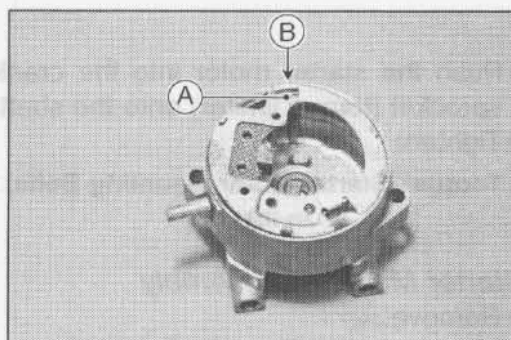
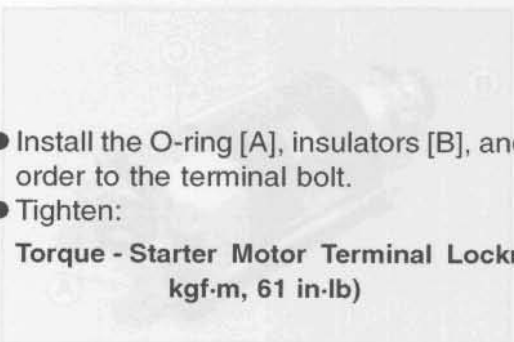


- Hold the brush spring [A] with needle nose pliers, and pull the brush [B] off the holder.



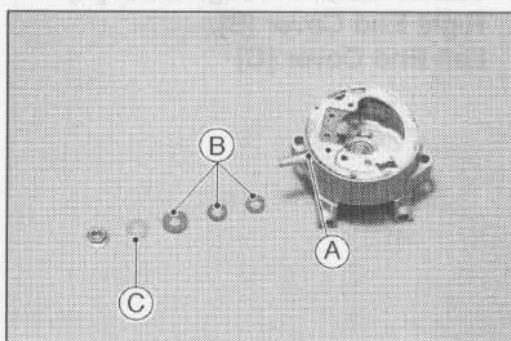
Starter Motor Assembly

- Replace the O-rings with new ones.
- Install the brush plate assembly to the left end cover so that the projection [A] on the brush plate fits into the groove [B] on the left end cover.



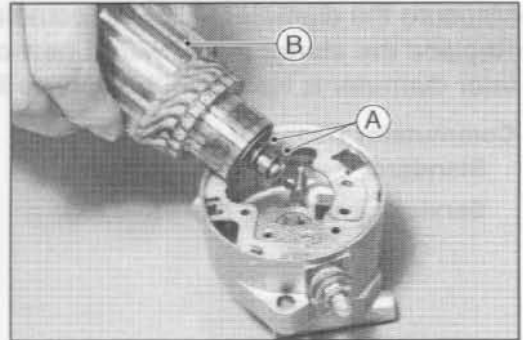
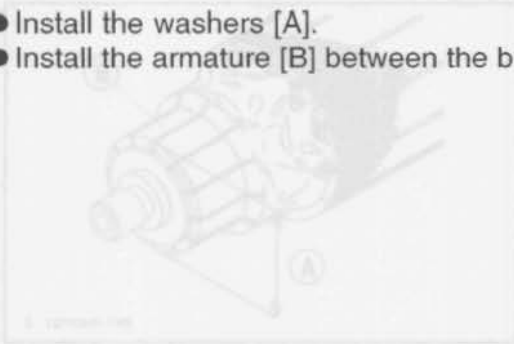
- Install the O-ring [A], insulators [B], and washer [C] in that order to the terminal bolt.
- Tighten:

**Torque - Starter Motor Terminal Locknut: 6.9 N-m (0.70 kgf-m, 61 in-lb)**

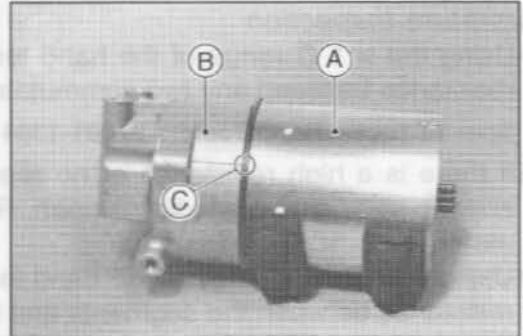
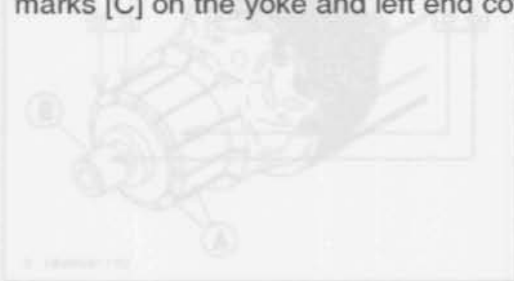


## Electric Starter System

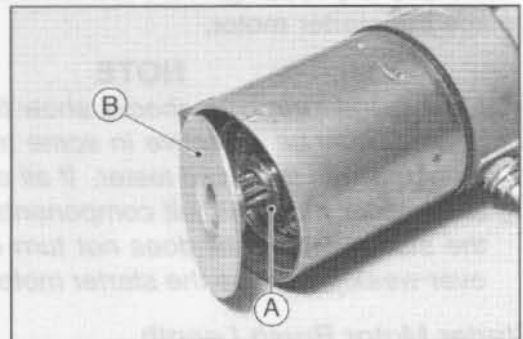
- Install the washers [A].
- Install the armature [B] between the brushes.



- Install the yoke [A] onto the left end cover [B] aligning the marks [C] on the yoke and left end cover.

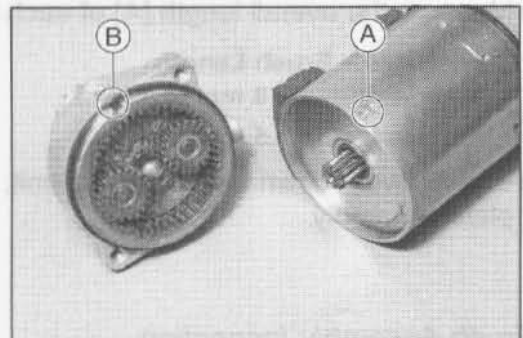


- Install the washers [A].
- Install the plate [B] into the yoke until it is stopped.



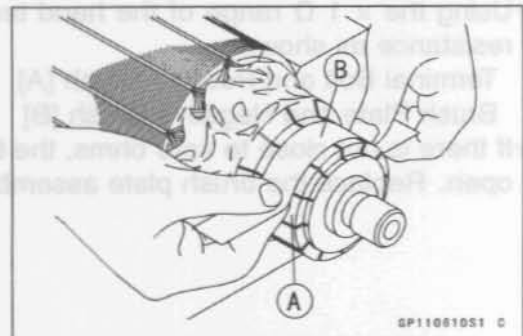
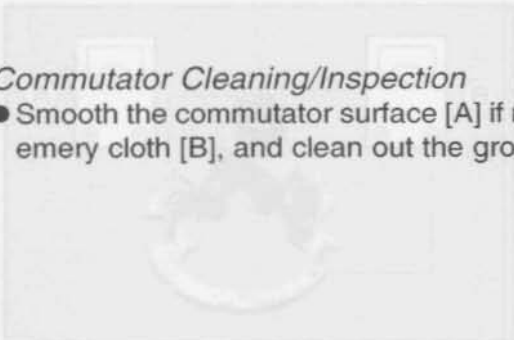
- Install the right end cover so that the projection [A] fits into the notch [B] on the internal gear.
- Tighten:

**Torque - Starter Motor Through Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)**



### Commutator Cleaning/Inspection

- Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.

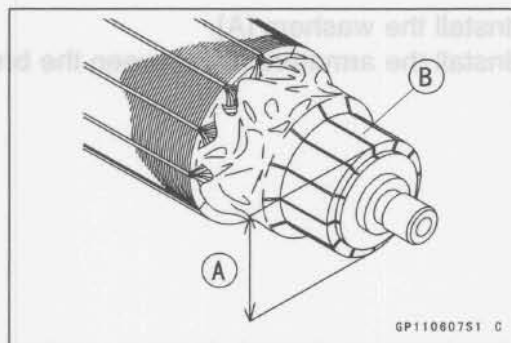


**Electric Starter System**

- Measure the diameter [A] of the commutator [B].
- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.

**Commutator Diameter**

**Standard:** 28 mm (1.10 in.)  
**Service Limit:** 27 mm (1.06 in.)

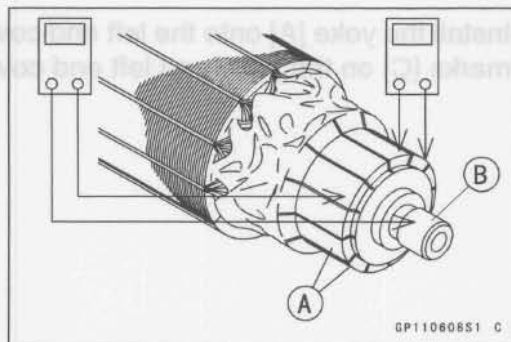


**Armature Inspection**

- Using the  $\times 1 \Omega$  range of the hand tester, measure the resistance between any two commutator segments [A].

**Special Tool - Hand Tester: 57001-1394**

- ★ If there is a high resistance or no reading ( $\infty$ ) between any two segments, a winding is open. Replace the starter motor.
- Using the highest range of the hand tester, measure the resistance between the segments and the shaft [B].
- ★ If there is any reading at all, the armature has short. Replace the starter motor.



**NOTE**

○ Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detected 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.

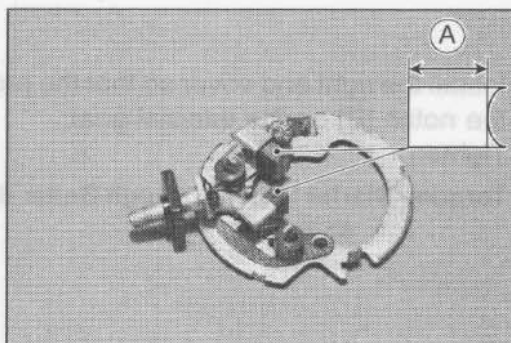
**Starter Motor Brush Length**

- Measure the overall length [A] of each brush.

**Starter Motor Brush Length**

**Standard:** 8 mm (0.31 in.)  
**Service Limit:** 5 mm (0.20 in.)

- ★ If any is worn down to the service limit, replace the brush plate assembly.



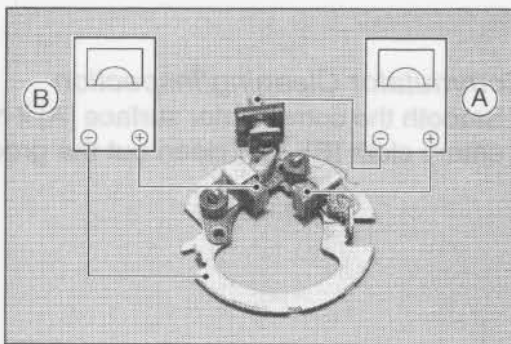
**Brush Assembly Inspection**

- Using the  $\times 1 \Omega$  range of the hand tester, measure the resistance as shown

Terminal Bolt and Positive Brush [A]

Brush Plate and Negative Brush [B]

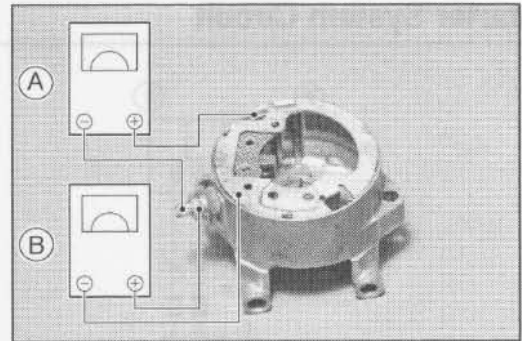
- ★ If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assembly.



## Electric Starter System

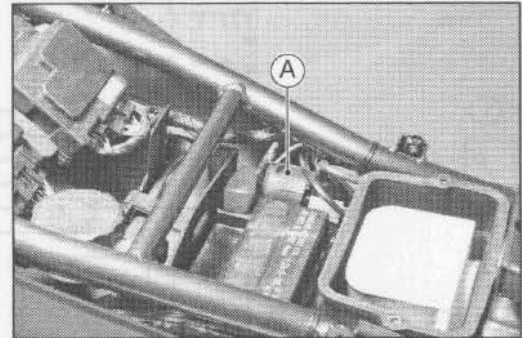
### Brush Plate and Terminal Bolt Inspection

- Using the highest range of the hand tester, measure the resistance as follows:
  - Terminal Bolt and Left End Cover [A]
  - Terminal Bolt and Brush Plate [B]
- ★ If there is any reading, the brush holder assembly has a short. Replace the brush plate assembly.



### Starter Relay Inspection

- Remove:
  - Seat (see Frame chapter)
  - Starter Relay [A]



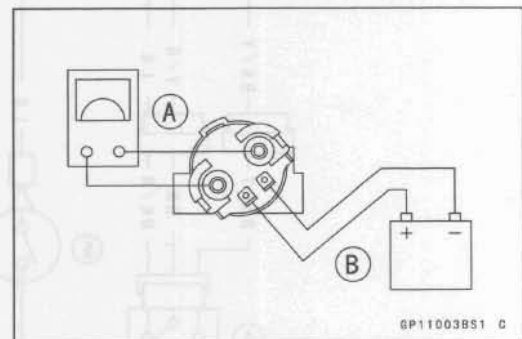
- Connect the hand tester [A] and 12 V battery [B] to the starter relay as shown.
- If the relay does not work as specified, the relay is defective. Replace the relay.

### Testing Relay

Hand Tester Range:  $\times 1 \Omega$  range

Criteria: When battery is connected  $\rightarrow 0 \Omega$

When battery is disconnected  $\rightarrow \infty \Omega$

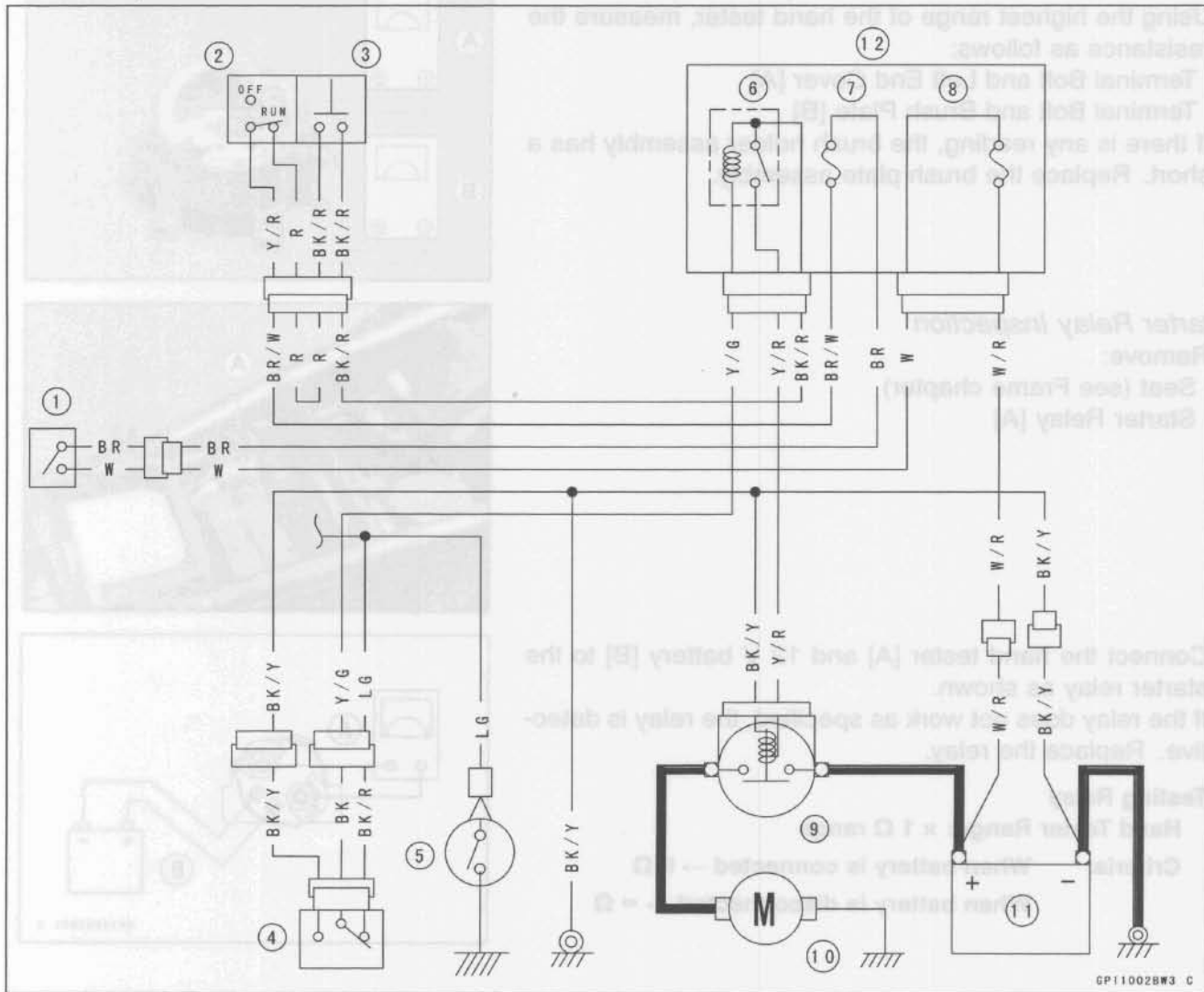


GP11003BS1 C

- Ignition Switch
- Engine Stop Switch
- Starter Button
- Starter Lockout Switch
- Neutral Switch
- Starter Circuit Relay
- Ignition Fuse 10 A
- Main Fuse 30 A
- Starter Relay
- Starter Motor
- Battery
- Junction Box

Electric Starter System

Starter System Circuit

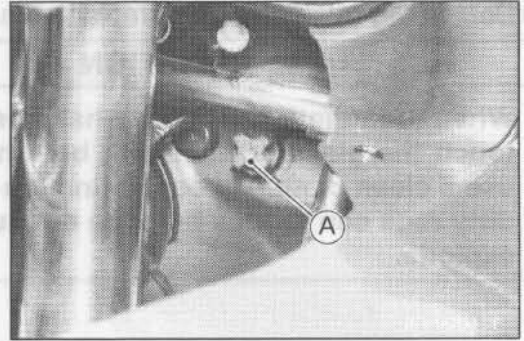


- 1. Ignition Switch
- 2. Engine Stop Switch
- 3. Starter Button
- 4. Starter Lockout Switch
- 5. Neutral Switch
- 6. Starter Circuit Relay
- 7. Ignition Fuse 10 A
- 8. Main Fuse 30 A
- 9. Starter Relay
- 10. Starter Motor
- 11. Battery
- 12. Junction Box

GP11002BW3 C

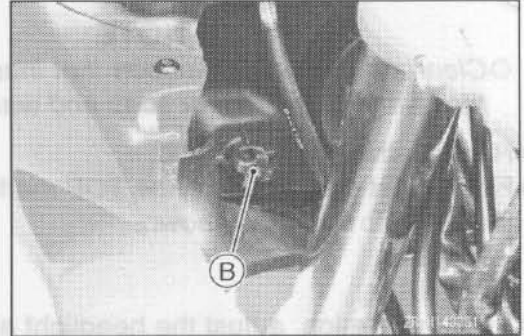
## Lighting System

The US, Canada, Australia, and Taiwan models adopt the daylight system and have a headlight relay in the junction box. In these models, the headlight does not go on when the ignition switch and the engine stop switch are first turned on. The headlight comes on after the starter button is released and stays on until the ignition switch is turned off. The headlight will go out momentarily whenever the starter button is pressed and come back on when the button is released.



### Headlight Beam Horizontal/Vertical Adjustment

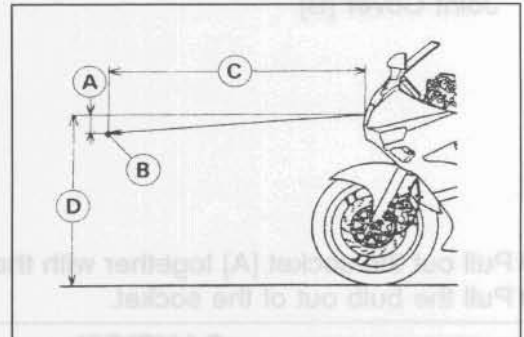
- Turn the horizontal adjusters [A] on the headlight in or out until the beam points straight ahead.
- Turn the vertical adjusters [B] on the headlight in or out to adjust the headlight vertically.



#### NOTE

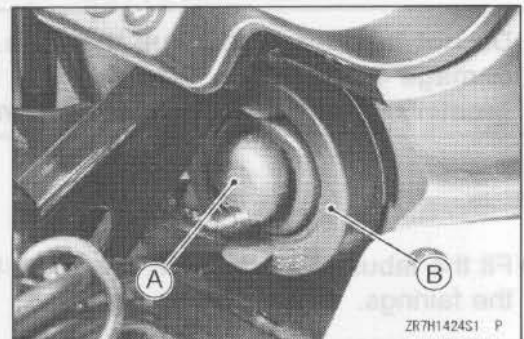
- On high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight(s) to the proper angle according to local regulations.
- For US model, the proper angle is 0.4 degrees below horizontal. This is 50 mm (2 in.) drop at 7.6 m (25 ft) measured from the center of the headlights with the motorcycle on its wheels and the rider seated.

50 mm (2 in.) [A]  
 Center of Brightest Spot [B]  
 7.6 m (25 ft) [C]  
 Height of Headlight Center [D]



### Headlight Bulb Replacement

- Remove the headlight connector [A].
- Remove the dust cover [B].



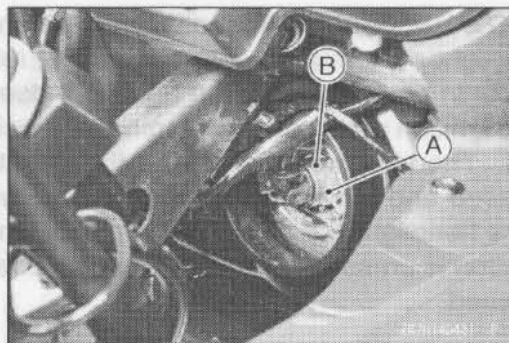
ZR7H1424S1 P

Lighting System

- Detach the retainer [A] and replace the bulb [B].

**CAUTION**

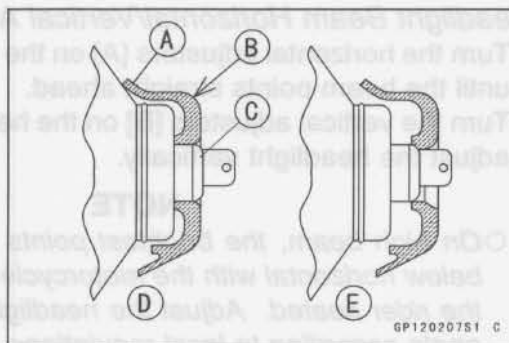
When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.



**NOTE**

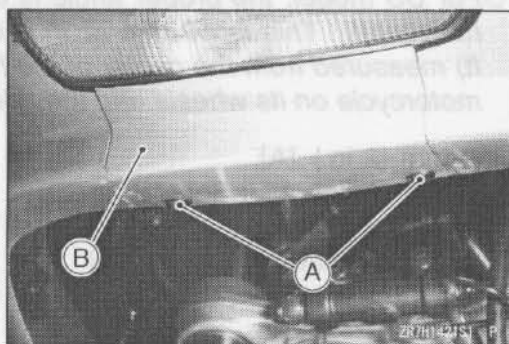
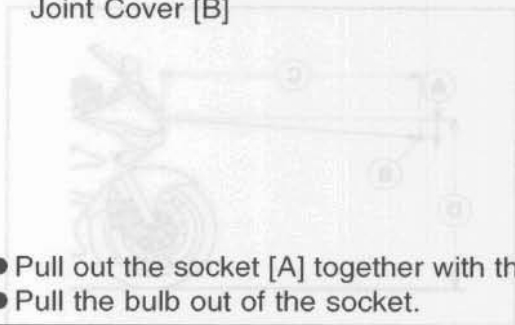
○ Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.

- Replace the headlight bulb.
- Fit the dust cover [A] with the TOP mark [B] upward, onto the [C] bulb firmly as shown.
  - Good [D]
  - Bad [E]
- After installation, adjust the headlight aim (see Headlight Beam Adjustment).



City Light Bulb Replacement

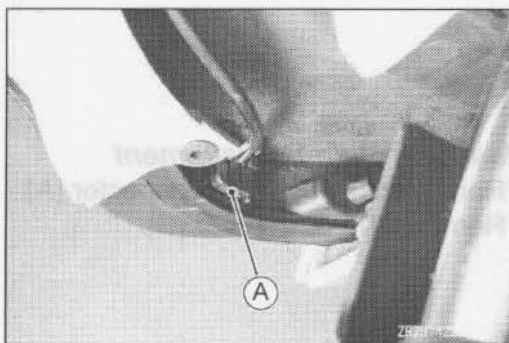
- Remove:
  - Screws [A]
  - Joint Cover [B]



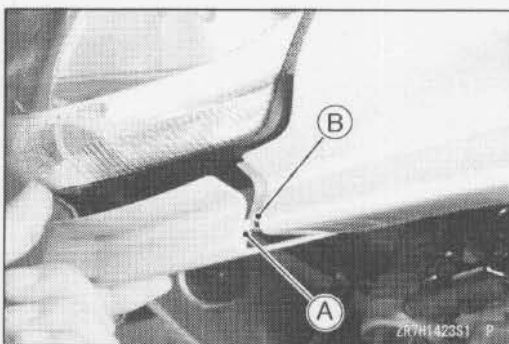
- Pull out the socket [A] together with the bulb.
- Pull the bulb out of the socket.

**CAUTION**

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.



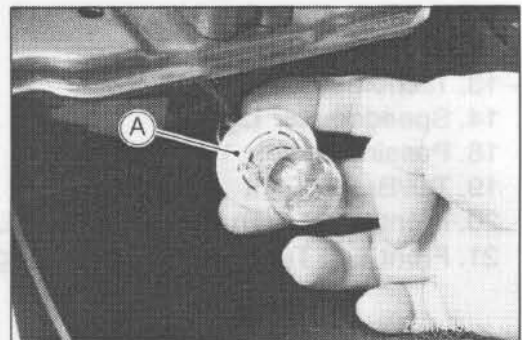
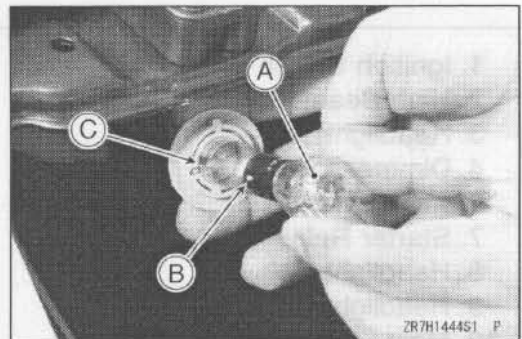
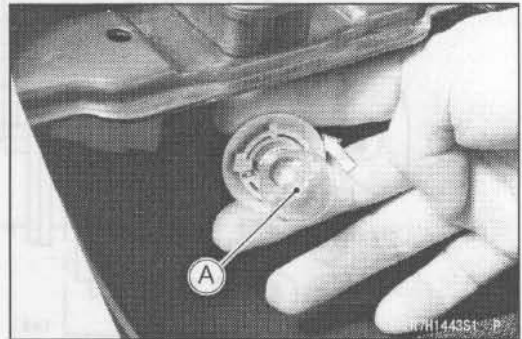
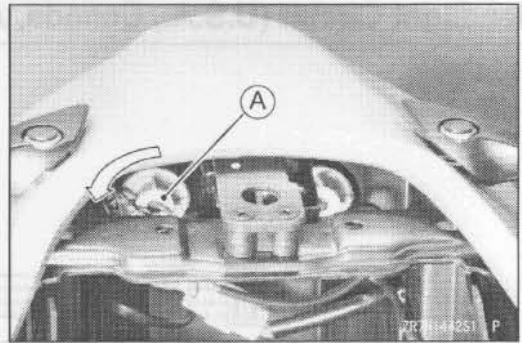
- Fit the tabs [A] of the joint cover into the grooves [B] of the fairings.



## Lighting System

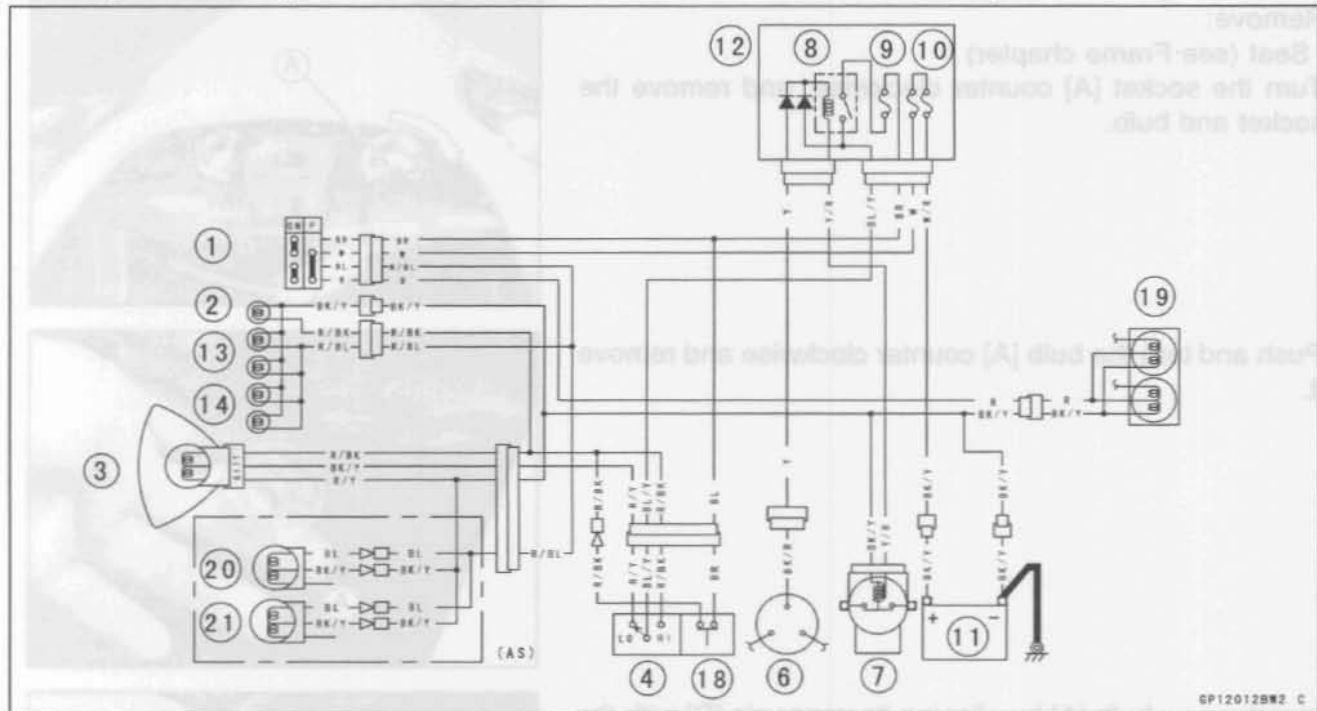
### Tail/Brake Light Bulb Replacement

- Remove:
  - Seat (see Frame chapter)
  - Turn the socket [A] counter clockwise, and remove the socket and bulb.
  
- Push and turn the bulb [A] counter clockwise and remove it.
  
- Insert a new bulb [A] by aligning its upper pin [B] with the upper groove [C] in the socket, and turn the bulb clockwise.
  
- Insert the socket by aligning its wide projection [A] wide notch, and turn it clockwise.



Lighting System

Headlight Circuit (U.S.A., Canada, Australia and Taiwan Models)

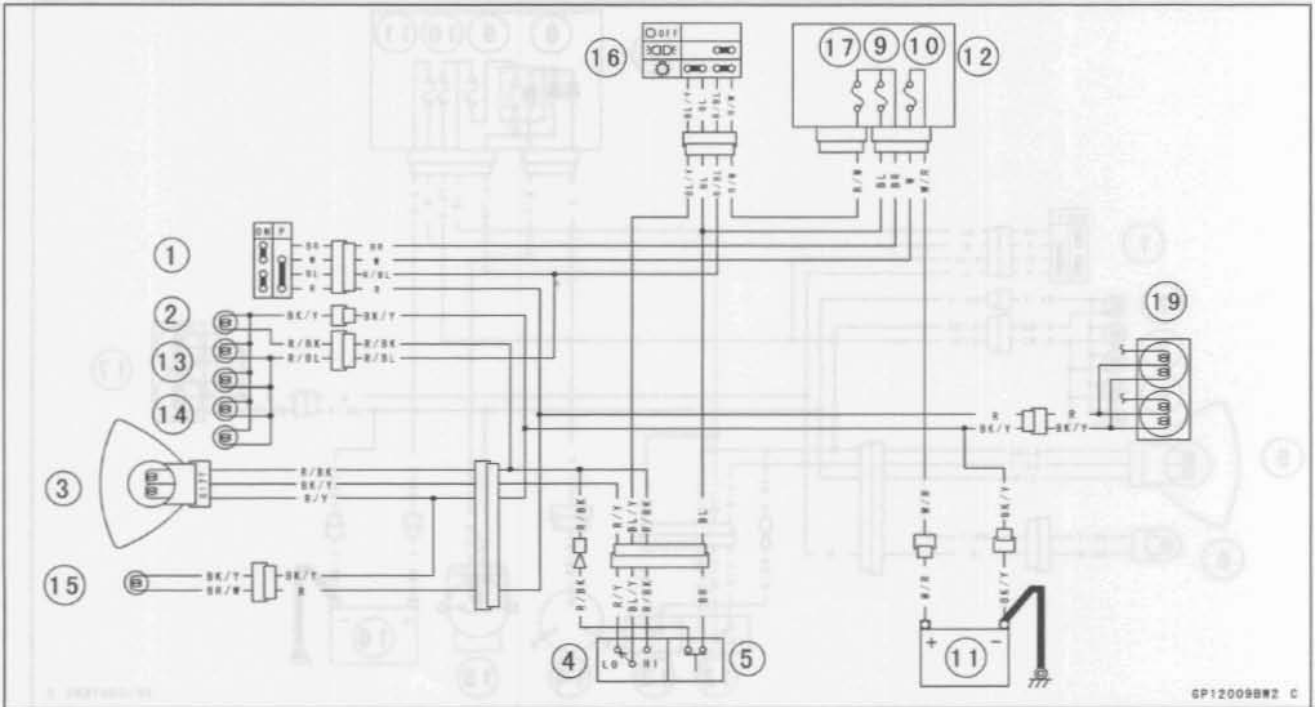


1. Ignition Switch
2. High Beam Indicator Light
3. Headlight
4. Dimmer Switch
6. Alternator
7. Starter Relay
8. Headlight Relay
9. Headlight Fuse 10 A
10. Main Fuse 30 A
11. Battery
12. Junction Box
13. Tachometer Lights
14. Speedometer Lights
18. Passing Button
19. Tail/Brake Light
20. Front Right Turn Signal Position Light
21. Front Left Turn Signal Position Light

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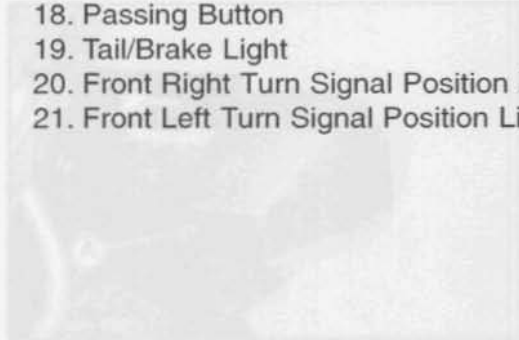
Lighting System

Headlight Circuit (Other than U.S.A., Canada, Australia and Taiwan Models)



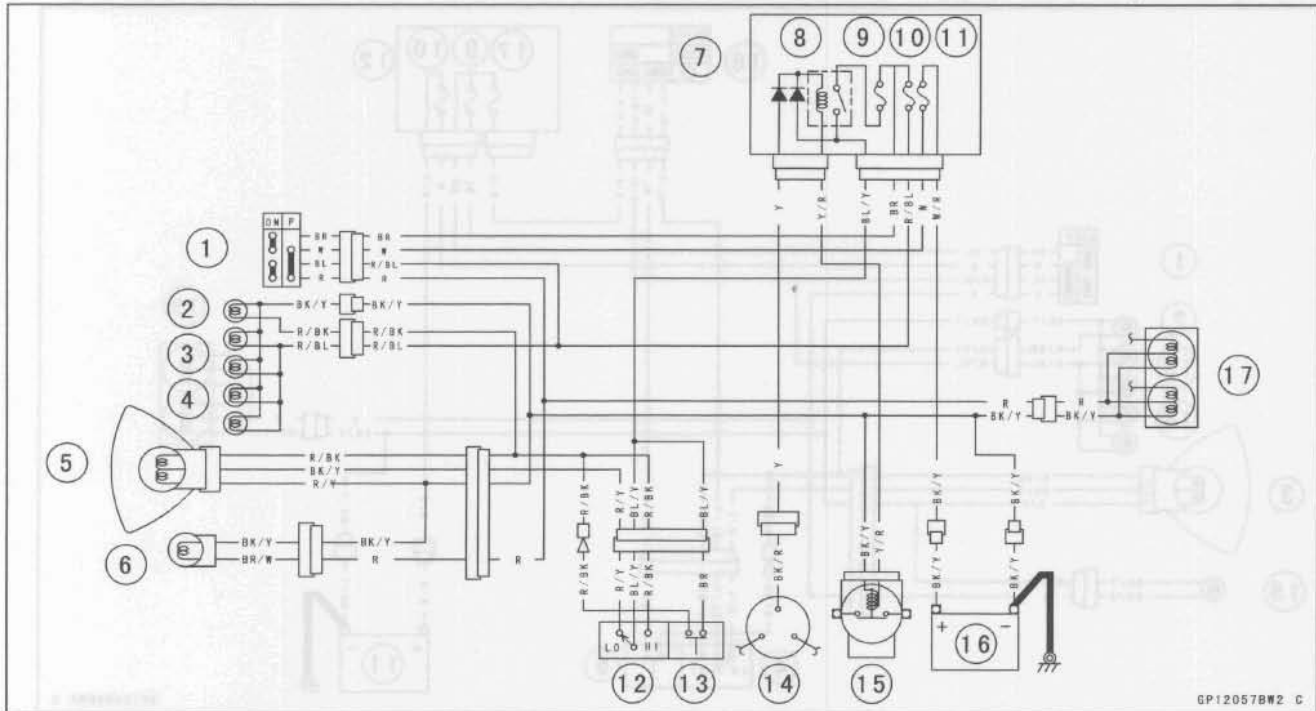
- 1. Ignition Switch
- 2. High Beam Indicator Light
- 3. Headlight
- 4. Dimmer Switch
- 5. Passing Button
- 6. Alternator
- 7. Starter Relay
- 8. Headlight Relay
- 9. Headlight Fuse 10 A
- 10. Main Fuse 30 A
- 11. Battery
- 12. Junction Box
- 13. Tachometer Lights
- 14. Speedometer Lights
- 15. City Light
- 16. Headlight Switch
- 17. Taillight Fuse 10 A
- 18. Passing Button
- 19. Tail/Brake Light
- 20. Front Right Turn Signal Position Light
- 21. Front Left Turn Signal Position Light

- 1. Ignition Switch
- 2. High Beam Indicator Light
- 3. Tachometer Light
- 4. Speedometer Light
- 5. Headlight
- 6. City Light
- 7. Junction Box
- 8. Headlight Relay
- 9. Headlight Fuse 10 A
- 10. Tail Light Fuse 10 A
- 11. Main Fuse 30 A
- 12. Dimmer Switch
- 13. Passing Button
- 14. Alternator
- 15. Starter Relay
- 16. Battery
- 17. Taillight Fuse



Turn Signal Light Bulb Replacement  
 • Unscrew the screw [A]

ZR750-H3 ~ H4 (Other than U.S.A., Canada, Australia and Taiwan Models)



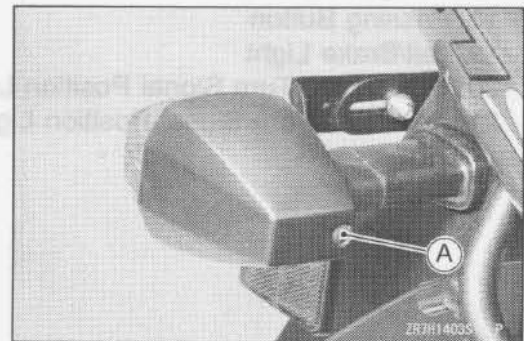
GP12057BM2 C

1. Ignition Switch
2. High Beam Indicator Light
3. Tachometer Light
4. Speedometer Light
5. Headlight
6. City Light
7. Junction Box
8. Headlight Relay
9. Headlight Fuse 10 A
10. Tail Light Fuse 10 A
11. Main Fuse 30 A
12. Dimmer Switch
13. Passing Button
14. Alternator
15. Starter Relay
16. Battery
17. Tail/Brake Light

1. Ignition Switch
2. High Beam Indicator Light
3. Headlight
4. Dimmer Switch
5. Passing Button
6. Alternator
7. Starter Relay
8. Headlight Relay
9. Headlight Fuse 10 A
10. Main Fuse 30 A
11. Battery
12. Junction Box
13. Tachometer Light
14. Speedometer Light
15. City Light
16. Headlight Switch
17. Tail Light Fuse 10 A

Turn Signal Light Bulb Replacement

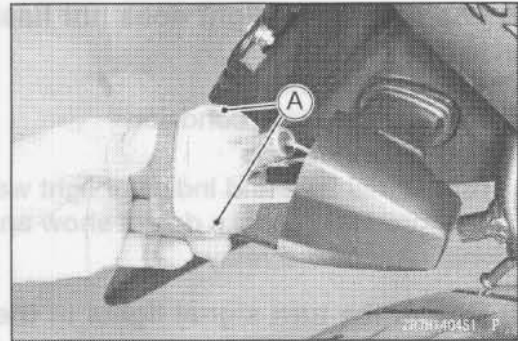
- Unscrew the screw [A]



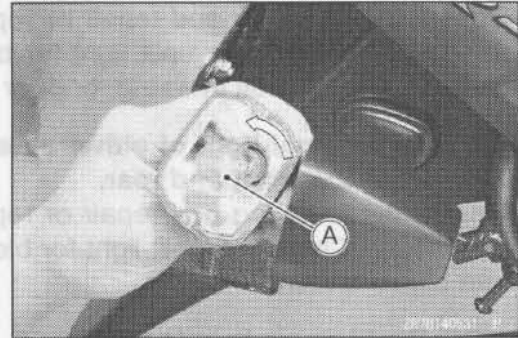
ZR7H1403S

## Lighting System

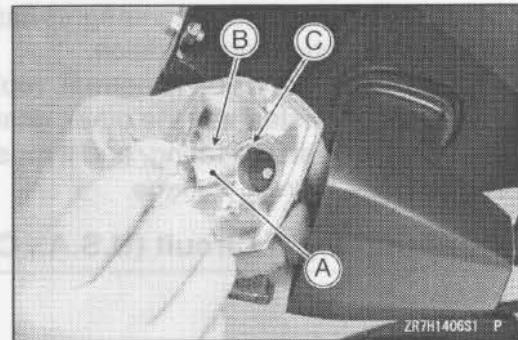
- Unscrew the screws [A]



- Push and turn the bulb [A] counter clockwise and remove it.



- Insert the new bulb [A] by aligning its upper pin [B] with the upper groove [C] in the socket, and turn the bulb clockwise.



### Turn Signal Relay Inspection

- Remove the left side cover.
- Inspect the condition of the relay [A] in reference to the abnormal conditions listed below.

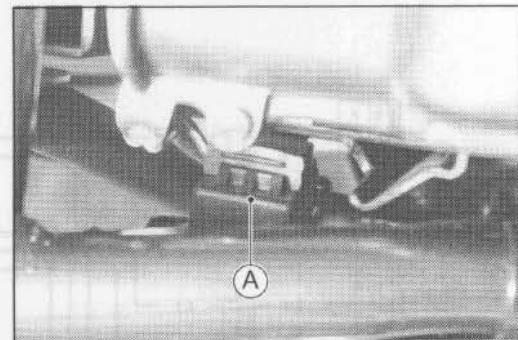
#### (1) The turn signal light does not illuminate.

- Inspect the charging condition of the battery.
- Disconnect the wires from the relay and check the relay terminals for continuity.
- ★ If there is no continuity or there is slight resistance, replace the relay.
- ★ If the relay does not show any abnormal condition, inspect the wiring of the turn signal circuit.

#### Special Tool - Hand Tester: 57001-1394

- Set the tester to the DC 10 V range, and connect the following: tester's positive (+) wire to the brown wire that was disconnected from the relay; and tester's negative (-) wire to the orange wire.
- Turn the ignition switch ON, and turn the turn signal switch from L to R. Measure the voltage between both terminals at this time.
- ★ If there is no battery voltage, the fuse, ignition switch, or the wiring is faulty.
- ★ Even if there is battery voltage, but the turn signal light still does not illuminate, reinspect the wiring connections.

#### Special Tool - Hand Tester: 57001-1394



Lighting System

(2) The turn signal light does not flash or the flashing cycle is slow.

- Inspect the following:
  - Battery's charging condition
  - Wiring connections
  - Turn signal light and indicator light wattage
- ★ If the foregoing checks do not show any abnormal conditions, replace the relay.

(3) One of the turn signal lights in the front or rear remains lit.

- Inspect the following and repair or replace the parts as necessary: Check the unlit light for blown bulb, wrong wattage, open circuit in wiring, or poor contact.

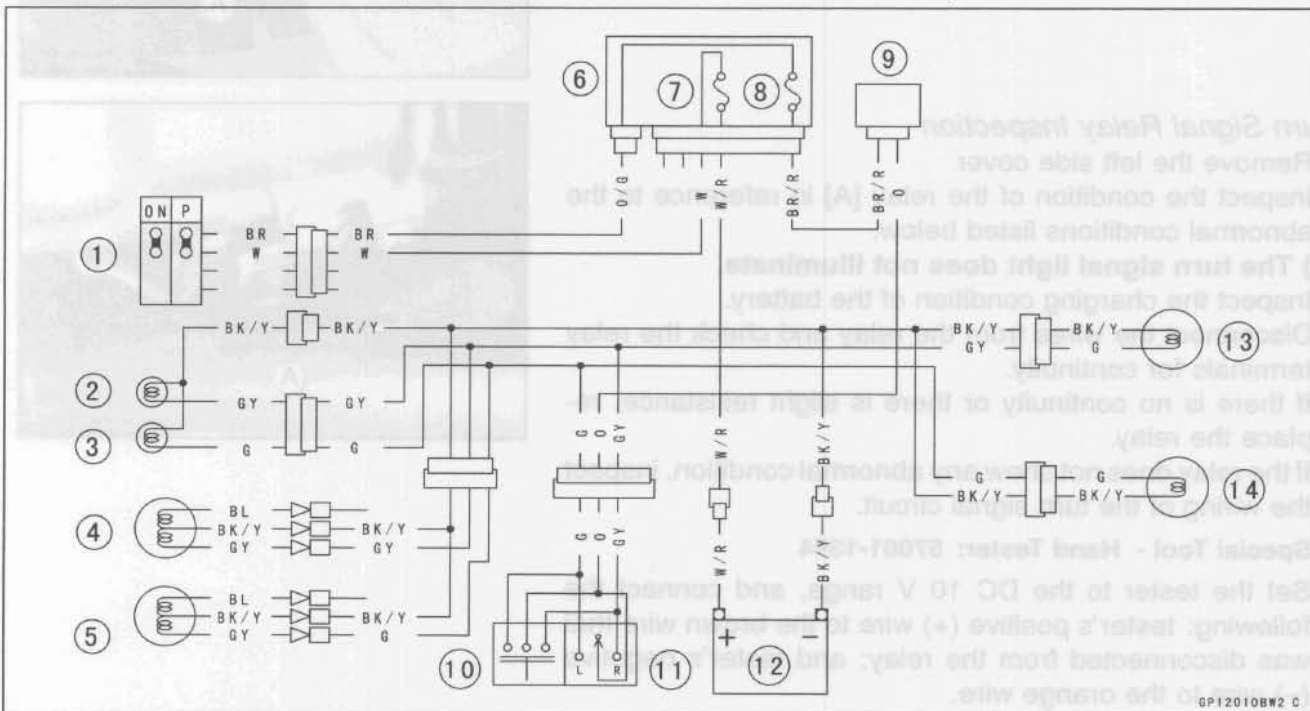
(4) The turn signal light of either side does not illuminate both in the front and rear.

- Inspect the following and repair or replace the parts as necessary: Check the unlit light for blown bulb, or faulty turn signal switch.

(5) The flashing cycle is too fast.

- If both right and left turn signal lights flash too fast, inspect the battery's charging condition.
- ★ If the charging condition is normal, replace the relay.
- If one flashes faster than the other, either one of the bulbs has a higher wattage rating, and it must be replaced with one with the correct wattage.

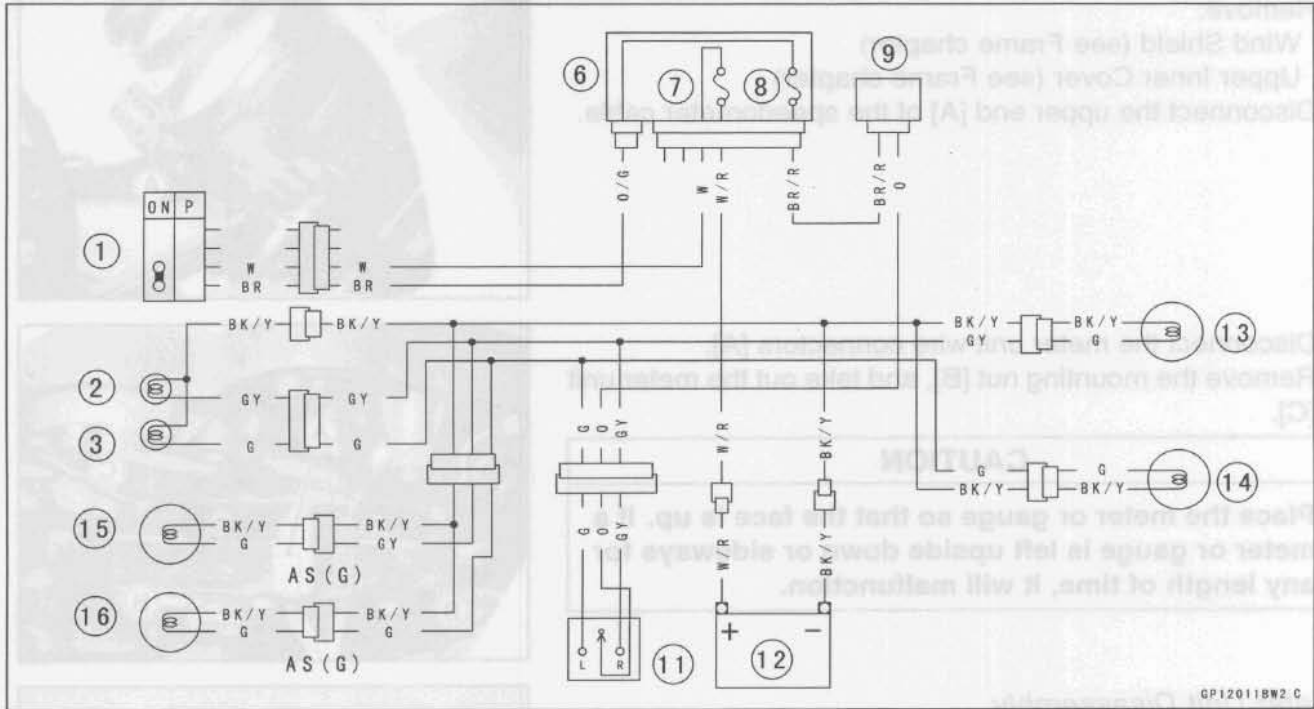
Turn Signal Light Circuit (U.S.A., Canada and Taiwan Models)



GP12010BW2 C

Lighting System

Turn Signal Light Circuit (Other than U.S.A., Canada and Taiwan Models)



AS: Australia Model

1. Ignition Switch
2. Right Turn Signal Indicator Light
3. Left Turn Signal Indicator Light
4. Front Right Turn Signal/Running Position Light
5. Front Left Turn Signal/Running Position Light
6. Junction Box
7. Main Fuse 30 A
8. Turn Signal Relay Fuse 10 A
9. Turn Signal Relay
10. Hazard Switch
11. Turn Signal Switch
12. Battery
13. Rear Right Turn Signal Light
14. Rear Left Turn Signal Light
15. Front Right Turn Signal Light
16. Front Left Turn Signal Light

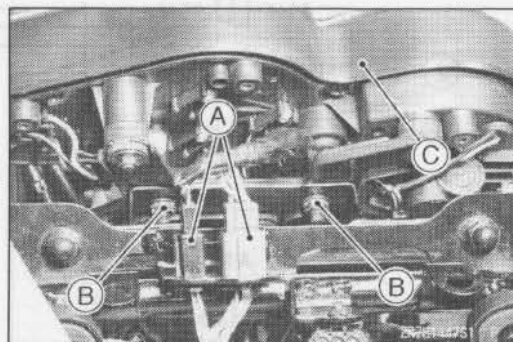
Meters, Gauges

Meter Unit Removal

- Remove:
  - Wind Shield (see Frame chapter)
  - Upper Inner Cover (see Frame chapter)
- Disconnect the upper end [A] of the speedometer cable.



- Disconnect the meter unit wire connectors [A].
- Remove the mounting nut [B], and take out the meter unit [C].

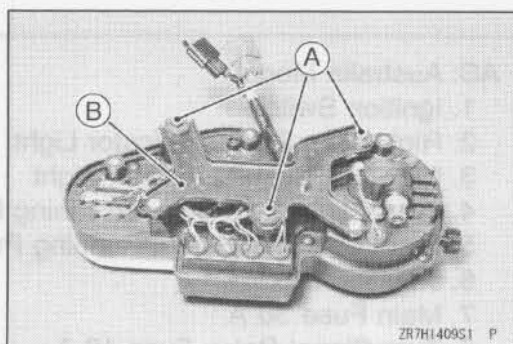


**CAUTION**

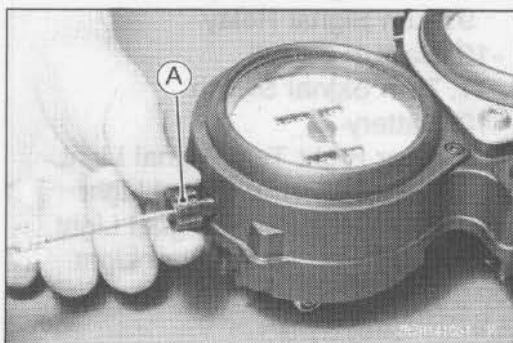
Place the meter or gauge so that the face is up. If a meter or gauge is left upside down or sideways for any length of time, it will malfunction.

Meter Unit Disassembly

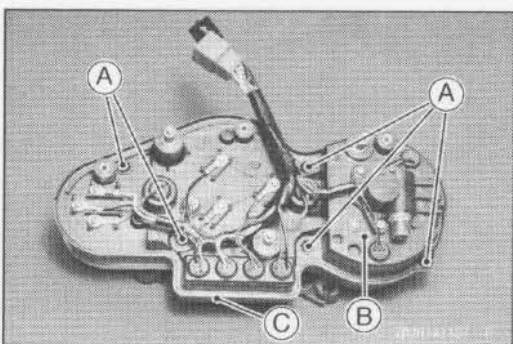
- Remove:
  - Meter Unit (see Meter Unit Removal)
  - Nuts [A]
  - Bracket [B]



- Unscrew the screw and remove the trip meter knob [A].

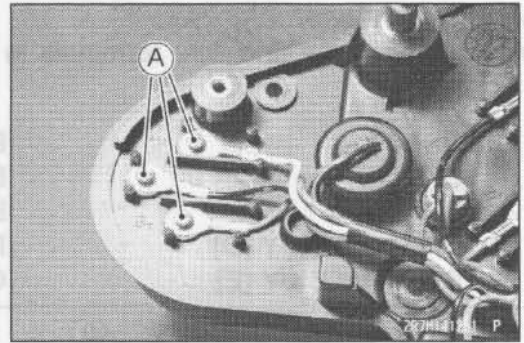


- Unscrew the screws [A] and separate the meter assembly [B] and upper meter cover [C].

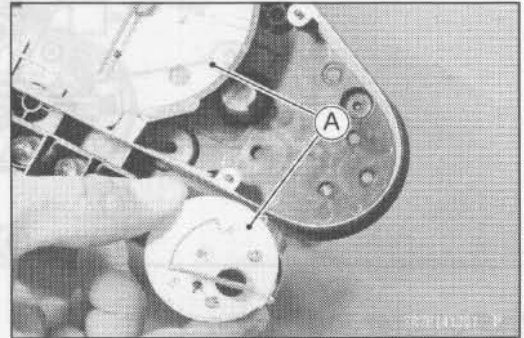


## Meters, Gauges

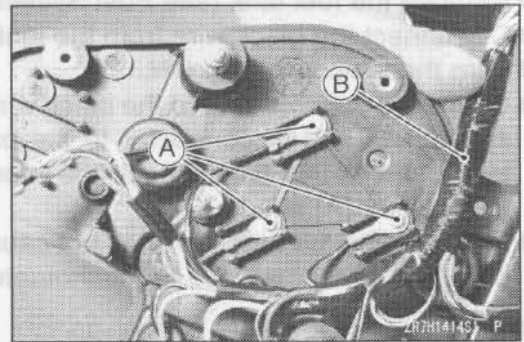
- Unscrew the screws [A] and remove the fuel gauge.

**CAUTION**

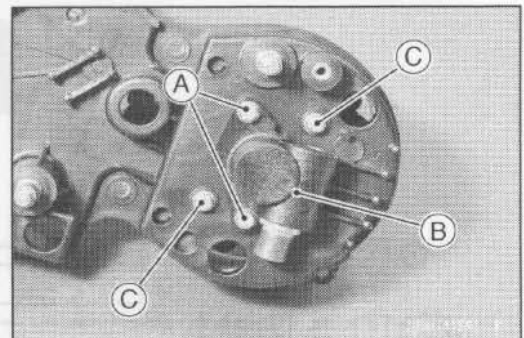
Do not fail to remove the screws while the meter faced up [A] when removing each meters. If the screws are removed while the meter faced down, the meter may come down, and the meter may be damage.



- Pull the sockets out from the lower meter cover.
- Unscrew the screws [A].
- Remove the meter harness [B] and tachometer.



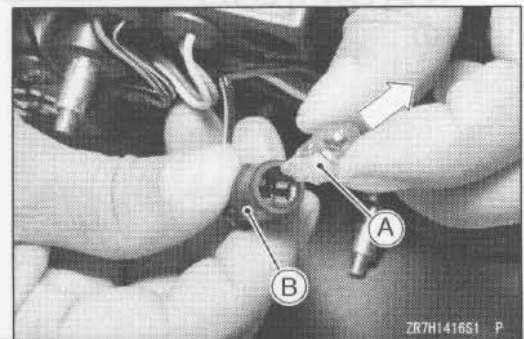
- Unscrew the screws [A] and remove the speedometer upper gear Assembly [B].
- Unscrew the screws [C] and remove the speedometer.

*Bulb Replacement*

- Remove:
  - Meter Unit (see Meter Unit Removal)
  - Socket
- Remove the wedge-base type bulb [A], pull the bulb out of the socket [B].

**CAUTION**

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for other than voltage or wattage specified in the wiring diagram.



Meters, Gauges

Meters, Gauges

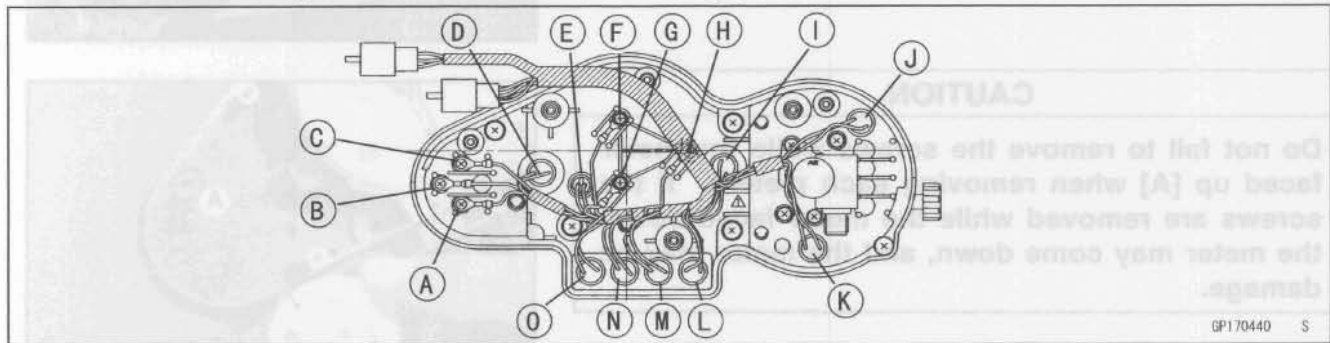
Meter Unit Assembly

- Install the bulbs and wire terminals in the original positions.

BR [A]  
BK/Y [B]  
W/Y [C]  
R/BL and BK/Y [D]  
BL/R and BK/Y [E]

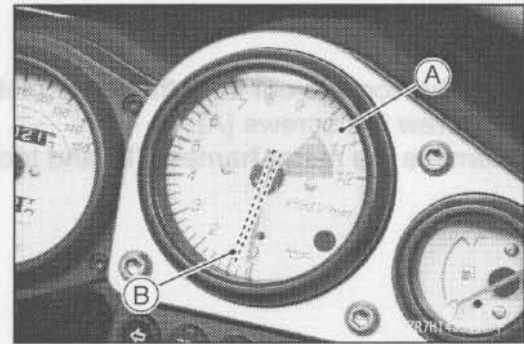
BK [F]  
BR [G]  
BK/Y [H]  
R/BL and BK/Y [I] [J] [K]  
G and BK/Y [L]

R/BK and BK/Y [M]  
LG and BK/Y [N]  
GY and BK/Y [O]

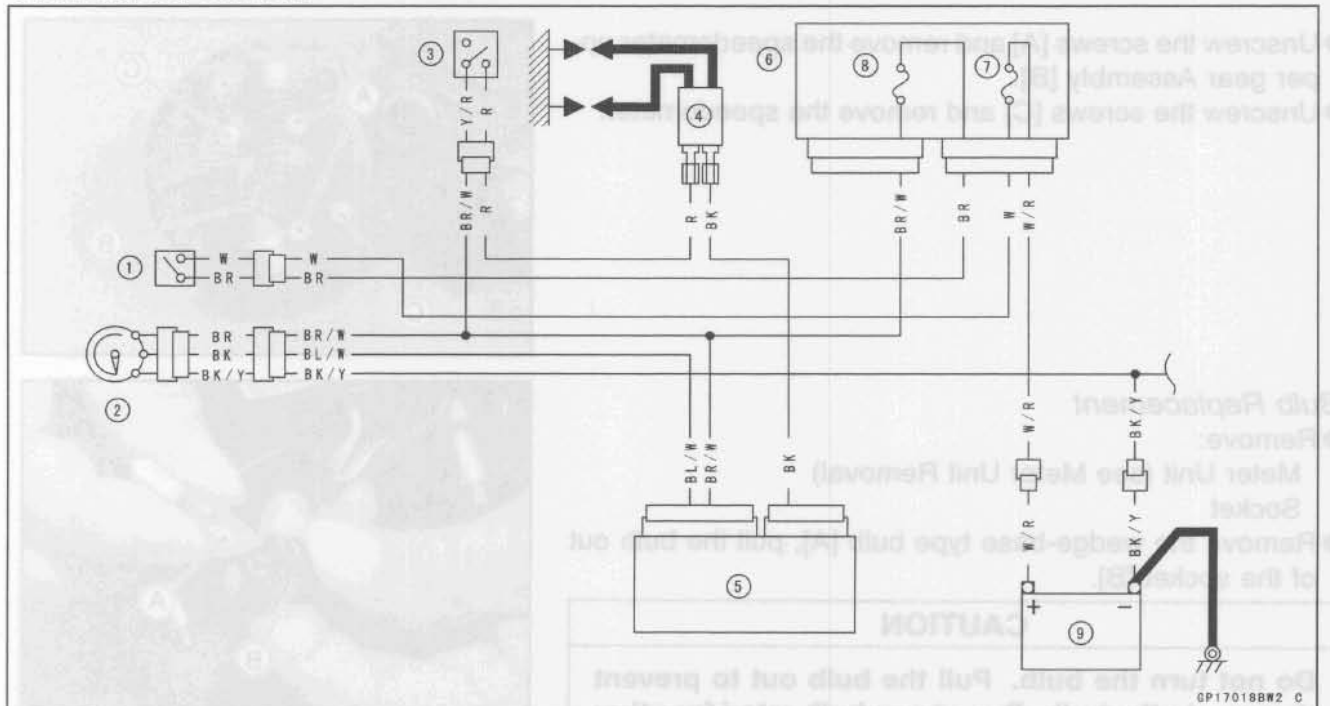


Tachometer Inspection

- Remove the fuel tank (see Fuel System chapter).
- Disconnect the black wire from the ignition coil.
- Turn the ignition switch ON.
- Connect a suitable wire to the black wire, and momentarily connect and disconnect it to the battery positive (+) terminal. At this time, check the movement [B] of the tachometer [A] needle.
- ★ If connecting the terminal does not cause the tachometer needle to swing, replace the tachometer.



Tachometer Circuit



1. Ignition Switch
2. Tachometer
3. Engine Stop Switch

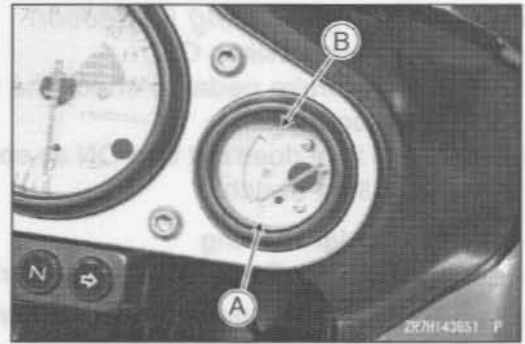
4. Ignition Coil
5. IC Igniter
6. Junction Box

7. Main Fuse 30 A
8. Ignition Fuse 10 A
9. Battery

Meters, Gauges

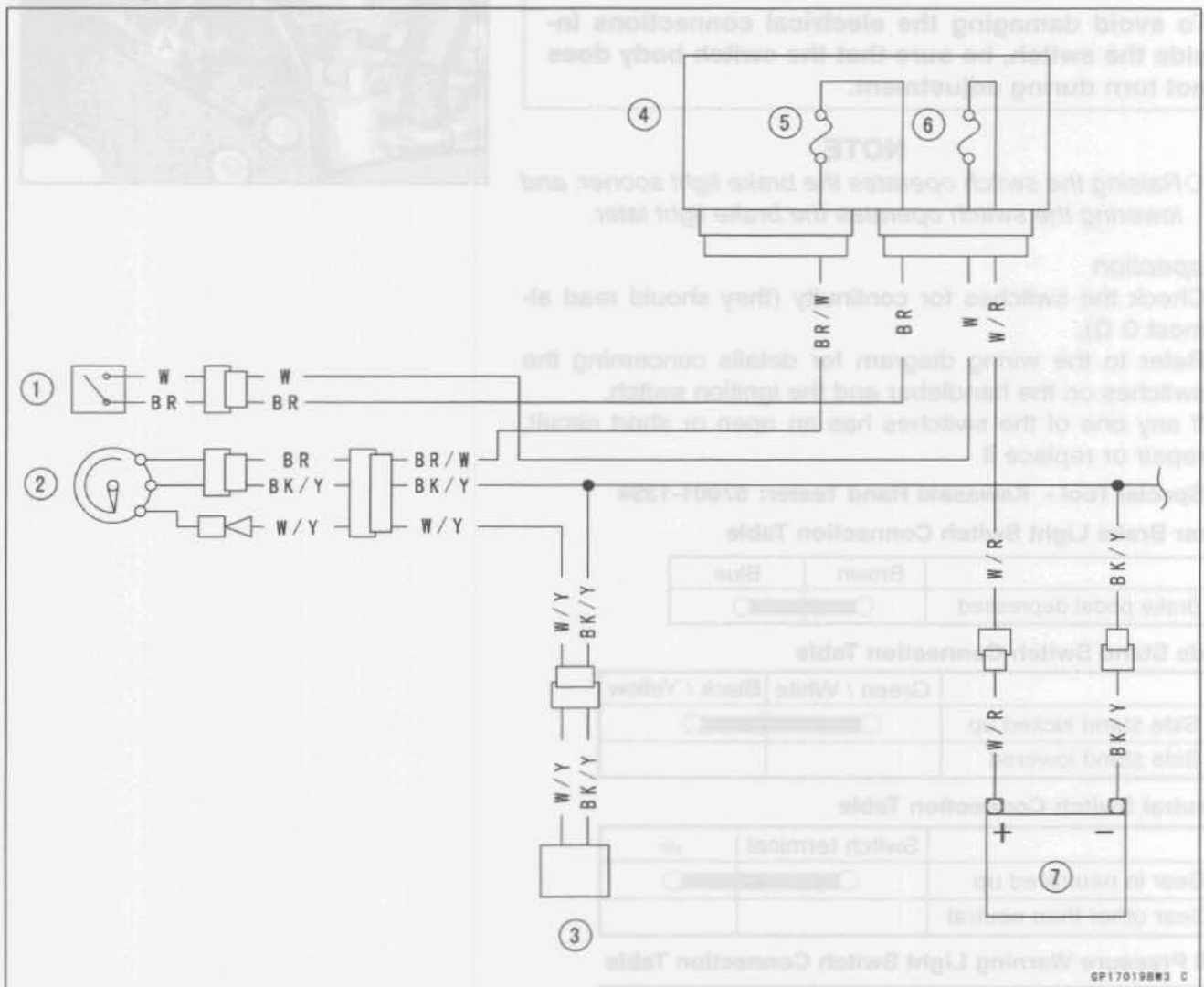
Fuel Gauge Operation Inspection

- Remove the fuel tank and disconnect the fuel level sensor lead connector.
- Turn the ignition switch ON.
- Using a suitable wire, short the terminals of the connector on the main wiring harness. At this time, check the movement of the fuel gauge needle.
- ★ The fuel gauge needle should point to E [A] when the terminals are not shorted, and to F [B] when they are shorted. Otherwise, the fuel gauge or the wiring is faulty.



- Inspect the wiring of the fuel gauge circuit.
- ★ If no abnormal condition is found in the circuit, replace the fuel gauge.

Fuel Gauge Circuit



- 1. Ignition Switch
- 2. Fuel Gauge
- 3. Fuel Level Sensor
- 4. Junction Box

- 5. Ignition Fuse 10 A
- 6. Main Fuse 30 A
- 7. Battery

6P170198W3 C

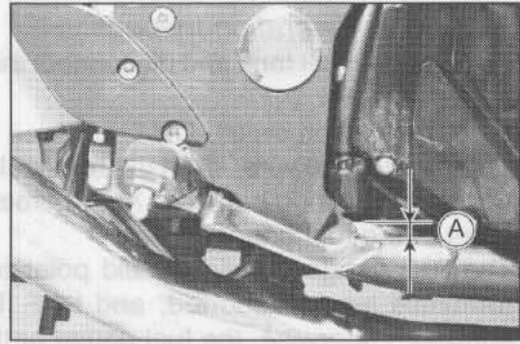
Switches and Sensors

Rear Brake Light Timing Inspection

- Turn the ignition switch ON.
- Depress the brake pedal to check the timing of the rear brake light operation.
- ★ If the brake light does not turn ON as specified, adjust the rear brake light switch.

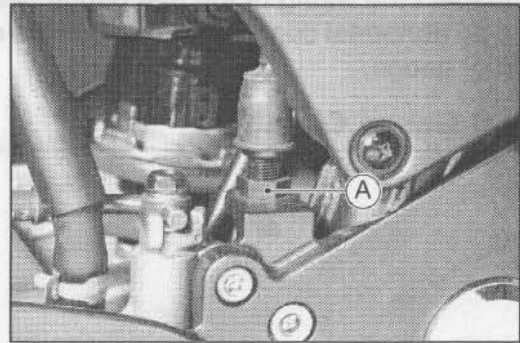
Rear Brake Light Timing

**Standard:** Turns ON when the brake pedal is depressed approximately 10 mm (0.4 in.) [A]



Rear Brake Light Timing Adjustment

- Turn the adjusting nut [A] to adjust the switch.



**CAUTION**

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

**NOTE**

○ Raising the switch operates the brake light sooner, and lowering the switch operates the brake light later.

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

	Brown	Blue
Brake pedal depressed	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Side Stand Switch Connection Table

	Green / White	Black / Yellow
Side stand kicked up	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Side stand lowered	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Neutral Switch Connection Table

	Switch terminal	$\pi/\pi$
Gear in neutral	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Gear other than neutral	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Oil Pressure Warning Light Switch Connection Table

	Switch terminal	$\pi/\pi$
Engine stopped	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Engine running	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- ★ Provided there is no problem with the engine lubrication system.



1. Ignition Switch  
2. Fuel Gauge  
3. Fuel Level Sensor  
4. Junction Box

## Switches and Sensors

### Fuel Level Sensor Inspection

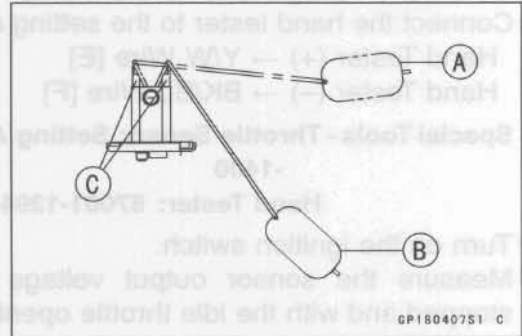
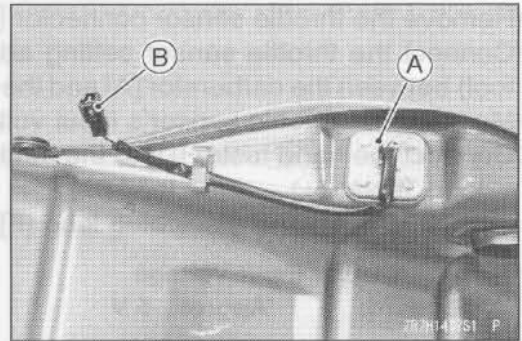
- Remove the fuel tank and take out the fuel level sensor [A].
- Measure the resistance between the terminals of the wire connector [B].
- ★ If the measurement is out of standard, or if the resistance does not change smoothly in accordance with the up and down movement of the float, replace the sensor.

#### Fuel Level Sensor Resistance

Standard:      **Maximum Position (full): 4 ~ 10  $\Omega$**   
                   **Minimum Position (empty): 90 ~ 100  $\Omega$**

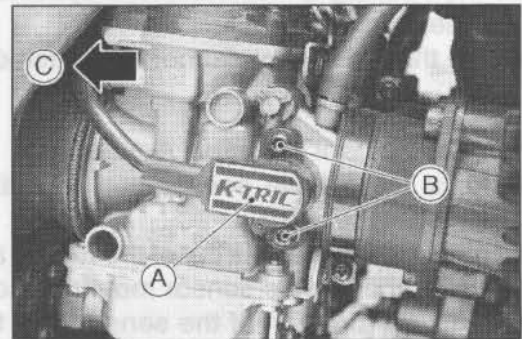
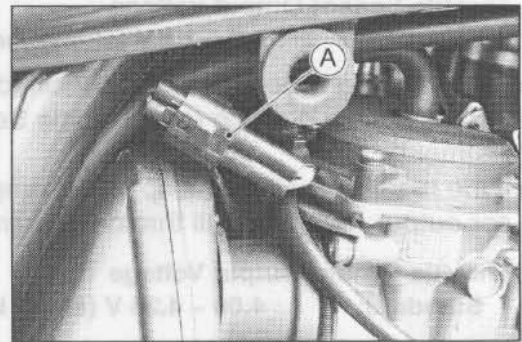
#### Special Tool - Hand Tester: 57001-1394

- Check whether the float moves up and down without binding.
- ★ If it does not move smoothly, replace the sensor.
  - Float in Full Position [A]
  - Float in Empty Position [B]
  - Float Arm Stoppers [C]



### Throttle Sensor Removal and Installation

- Remove:
  - Seat (see Frame chapter)
  - Right Side Cover (see Frame chapter)
- Disconnect the throttle sensor connector [A].
- Remove the mounting screw [B] and remove the throttle sensor [A].
  - Inlet side [C]
- When installing the throttle sensor, make sure to perform an adjustment (see Throttle Sensor Adjustment).



### Throttle Sensor Inspection

#### NOTE

○ Make sure that the battery is fully charged.

- Start the engine and warm it up thoroughly.
- Check the idle speed and stop the engine.
- ★ If the idle speed is out of standard, adjust it (see Fuel System chapter).

#### Idle Speed

Standard:      **1 100  $\pm$ 50 r/min (rpm)**

## Switches and Sensors

- Remove the throttle sensor connector [A].
- Connect the throttle sensor setting adapter [C] (special tool) between the carburetor [A] and the main harness [B].
- Measure the throttle sensor's input voltage.
  - Connect the hand tester [D] to the setting adapter.
    - Hand Tester (+) → blue lead [G]
    - Hand Tester (-) → black/blue lead [F]

**Throttle Sensor Input Voltage**

Standard:        **Approx. 5 V**

- ★ If the input voltage is cut of standard, inspect the igniter.
- Connect the hand tester to the setting adapter.
  - Hand Tester (+) → Y/W Wire [E]
  - Hand Tester (-) → BK/BL Wire [F]

**Special Tools - Throttle Sensor Setting Adapter #1: 57001-1400**

**Hand Tester: 57001-1394**

- Turn on the ignition switch.
- Measure the sensor output voltage with the engine stopped and with the idle throttle opening.

**Throttle Sensor Output Voltage**

Standard:        **0.9 ~ 1.1 V (at idle throttle opening)**

- ★ If the reading is not within the specified range, adjust the throttle sensor position (see Throttle Sensor Position Adjustment).
- ★ If the reading is within the specified range, check the sensor output voltage at full throttle opening.

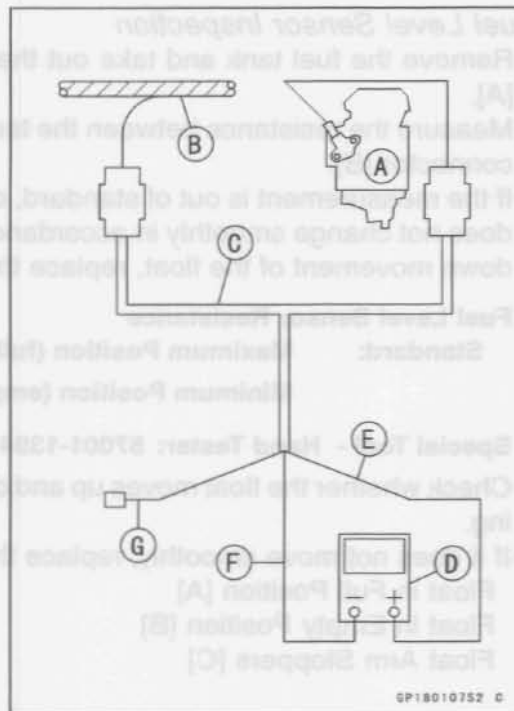
**Throttle Sensor Output Voltage**

Standard:        **4.06 ~ 4.26 V (at full throttle opening)**

- ★ If the reading is not within the specified range, readjust the sensor.
- ★ If the throttle sensor cannot be adjusted, replace the sensor.

**Throttle Sensor Position Adjustment**

- Check the throttle sensor output voltage (see Throttle Sensor Inspection).
- If the output voltage is out of the range, adjust it as follows.
- Loosen the throttle sensor mounting screws.
- Adjust the position of the sensor until the output voltage is within the specified range (see Throttle Sensor Inspection).

**NOTE**

Check the battery is fully charged.  
 Start the engine and warm it up thoroughly.  
 Check the idle speed and stop the engine.  
 If the idle speed is out of standard, adjust it (see Fuel System chapter).

Idle Speed  
 Standard: 1000 ±50 min (rpm)

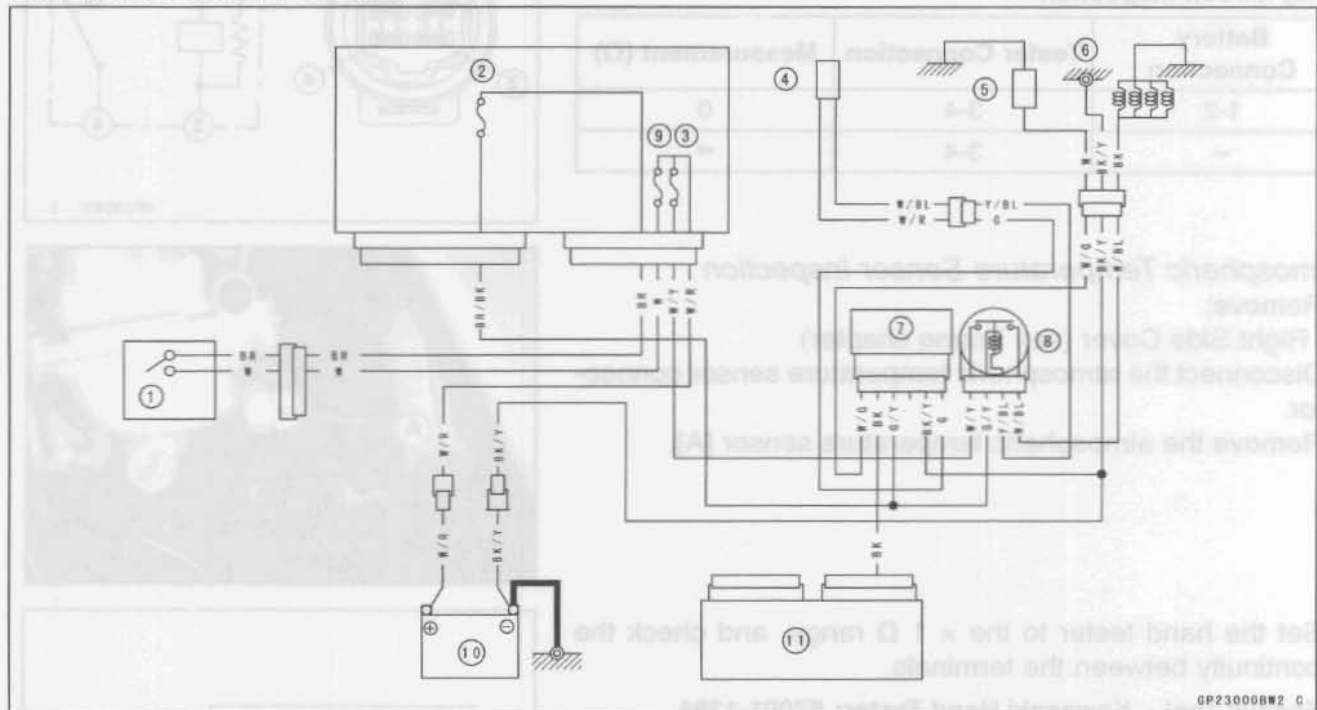
## Carburetor Heater

At times, the temperature of the carburetors 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 heaters electrically heat the carburetors to prevent the engine from stalling.

### Outline

To activate the carburetor heaters, the (stopped) engine must first be started. Then, the PTC [Positive Temperature Coefficient (Carburetor Temperature)] sensor detects the temperature of one 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 IC 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



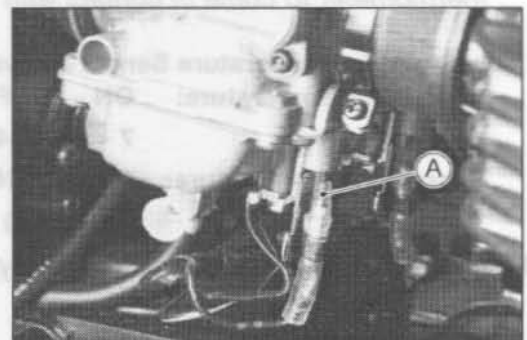
- |   |                                   |
|---|-----------------------------------|
| 1. Ignition Switch                            | 7. Carburetor Heater Control Unit |
| 2. Horn Fuse 10 A                             | 8. Normal Open Type Relay         |
| 3. Accessory Fuse 10 A                        | 9. Main Fuse 30 A                 |
| 4. Atmospheric Temperature Sensor             | 10. Battery                       |
| 5. PTC Sensor (Carburetor Temperature Sensor) | 11. IC Igniter                    |
| 6. Carburetor Heaters                         |                                   |

### 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

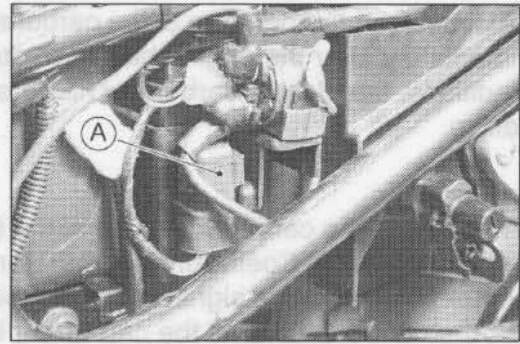
Standard: 7 ~ 12  $\Omega$



**Carburetor Heater**

*Normal Open Type Relay Inspection*

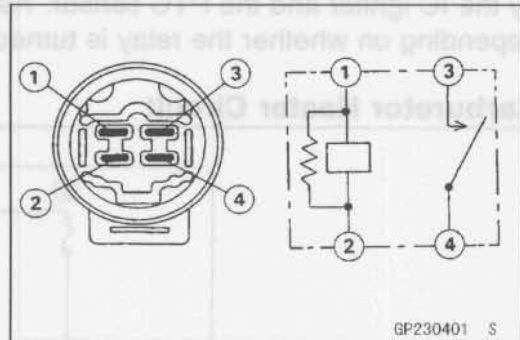
- Remove:
  - Seat (see Frame chapter)
  - Left Side Cover (see Frame chapter)
- Remove the relay [A] from the frame.



- Connect the 12 V battery as indicated in the table, and check the continuity between the terminals.

**Relay Circuit Inspection**

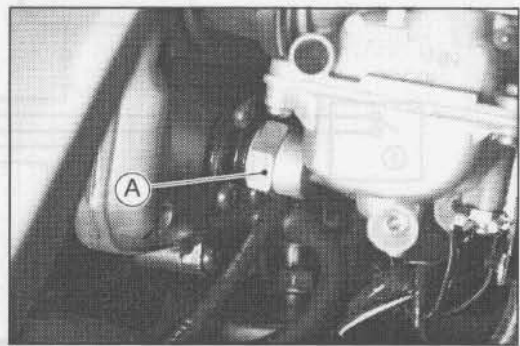
Battery Connection	Tester Connection	Measurement ( $\Omega$ )
1-2	3-4	0
-	3-4	$\infty$



GP230401 S

*Atmospheric Temperature Sensor Inspection*

- Remove:
  - Right Side Cover (see Frame chapter)
- Disconnect the atmospheric temperature sensor connector.
- 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**

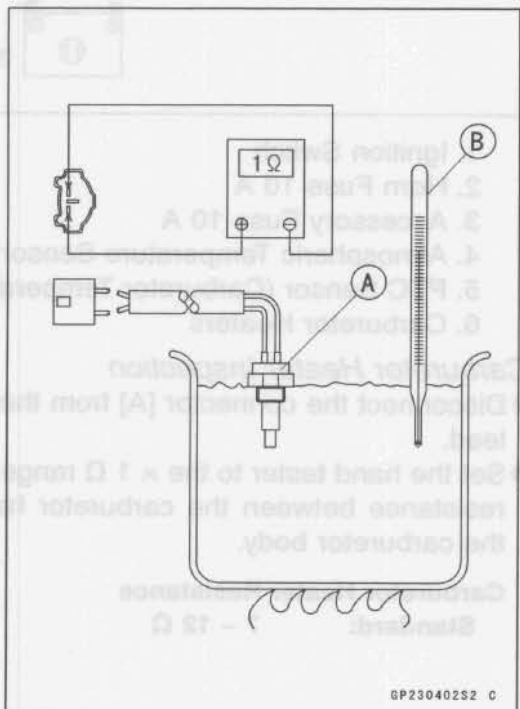
○ Do not allow the atmospheric temperature sensor or the thermometer to come in contact with the container.

**Atmospheric Temperature Sensor Activation**

Increasing temperature: ON  $\rightarrow$  OFF between  
7 ~ 13°C (45° ~ 55°F)

Decreasing temperature: OFF  $\rightarrow$  ON before  
3°C (37°F)

★ If the sensor does not operate properly, replace it.

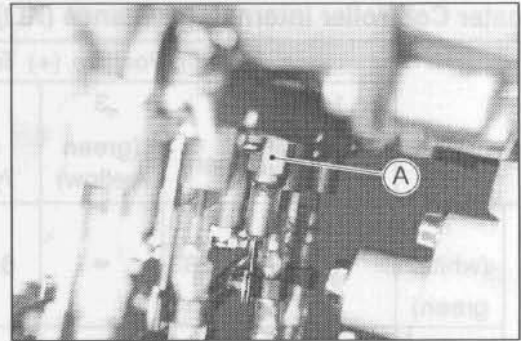


GP230402S2 C

## Carburetor Heater

### 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**

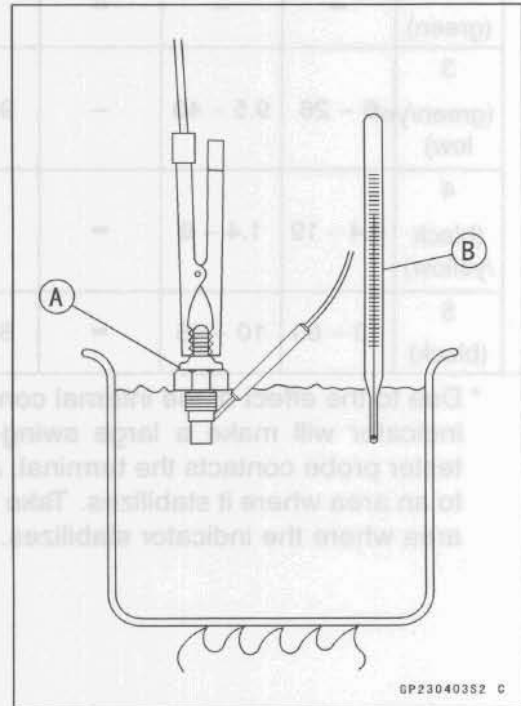
- Immerse the PTC sensor [A] and the thermometer [B] in a container filled with water, and gradually increase the water temperature.

#### NOTE

○ Do not allow the PTC sensor or the thermometer to come in contact with the container.

Temperature °C (°F)	Sensor Resistance (k $\Omega$ )	Temperature °C (°F)	Sensor Resistance (k $\Omega$ )
8 (46)	2.5	12 (54)	4.6
9 (48)	2.9	13 (55)	5.4
10 (50)	3.4	14 (57)	6.5
11 (52)	4.0	15 (59)	7.7

- ★ If the measurements are out of standard, replace the PTC sensor.

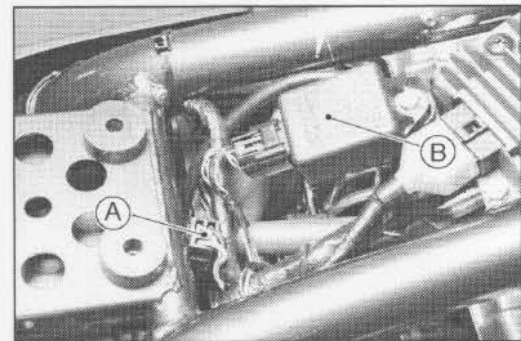


### Carburetor Heater Controller Inspection

- Remove:
  - Fuel Tank (see Fuel System chapter)
  - Carburetor Heater Controller Connector [A]
- Set the hand tester to the  $\times 1 \text{ k}\Omega$  range, and measure the internal resistance of the controller [B].

**Special Tool - Kawasaki Hand Tester: 57001-1394**

- ★ If the measurement is out of standard, replace the controller.



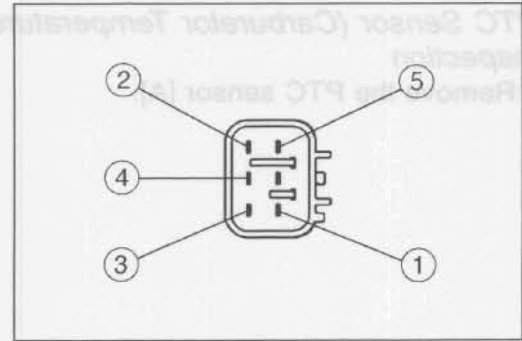
#### CAUTION

Using a tester other than the Kawasaki Hand Tester may show different readings. The use of a measure or a tester with high-voltage battery could damage the unit.

Carburetor Heater

Heater Controller internal Resistance (KΩ)

	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/yel low)	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	-



\* 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.

Temperature °C (°F)	Sensor Resistance (kΩ)	Temperature °C (°F)
8 (46)	2.2	12 (54)
9 (48)	2.9	13 (55)
10 (50)	3.4	14 (57)
11 (52)	4.0	15 (59)

\* If the measurement is out of standard, replace the PTC sensor.



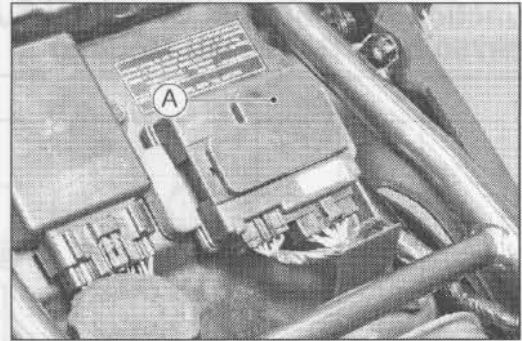
Carburetor Heater Controller Inspection  
 Remove:  
 Fuel Tank (see Fuel System chapter)  
 Carburetor Heater Controller Connector [A]  
 Set the hand tester to the × 1 kΩ range, and measure the internal resistance of the controller [B].  
 Special Tool - Kawasaki Hand Tester: 57001-1204  
 \* If the measurement is out of standard, replace the controller.

**CAUTION**  
 Using a tester other than the Kawasaki Hand Tester may show different readings. The use of a measure or a tester with high-voltage battery could damage the unit.

## Junction Box

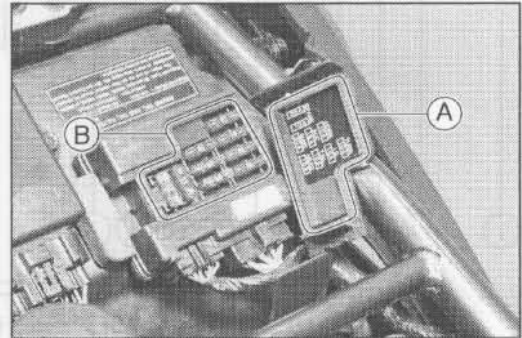
### Fuse Removal

- Remove the seat.
- Remove the fuse cover [A], and pull the fuse out with needle nose pliers.



### Fuse Installation

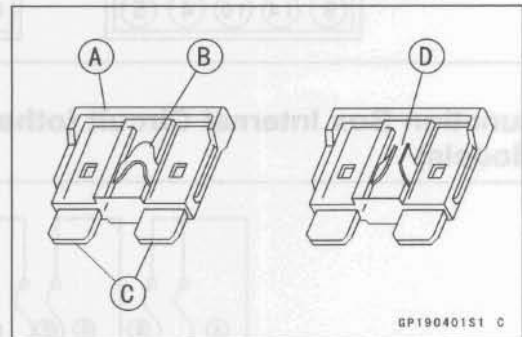
- Install the fuses [B] in the original position as specified in the layout diagram [A] on the inside of the fuse cover.



### Fuse Inspection

- Remove the fuse and inspect the element.
- ★ If the element is blown out, replace the fuse.

Housing [A]  
 Fuse Element [B]  
 Terminals [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, and installation of a fuse with a lower rating may cause the fuse to be blown quickly.

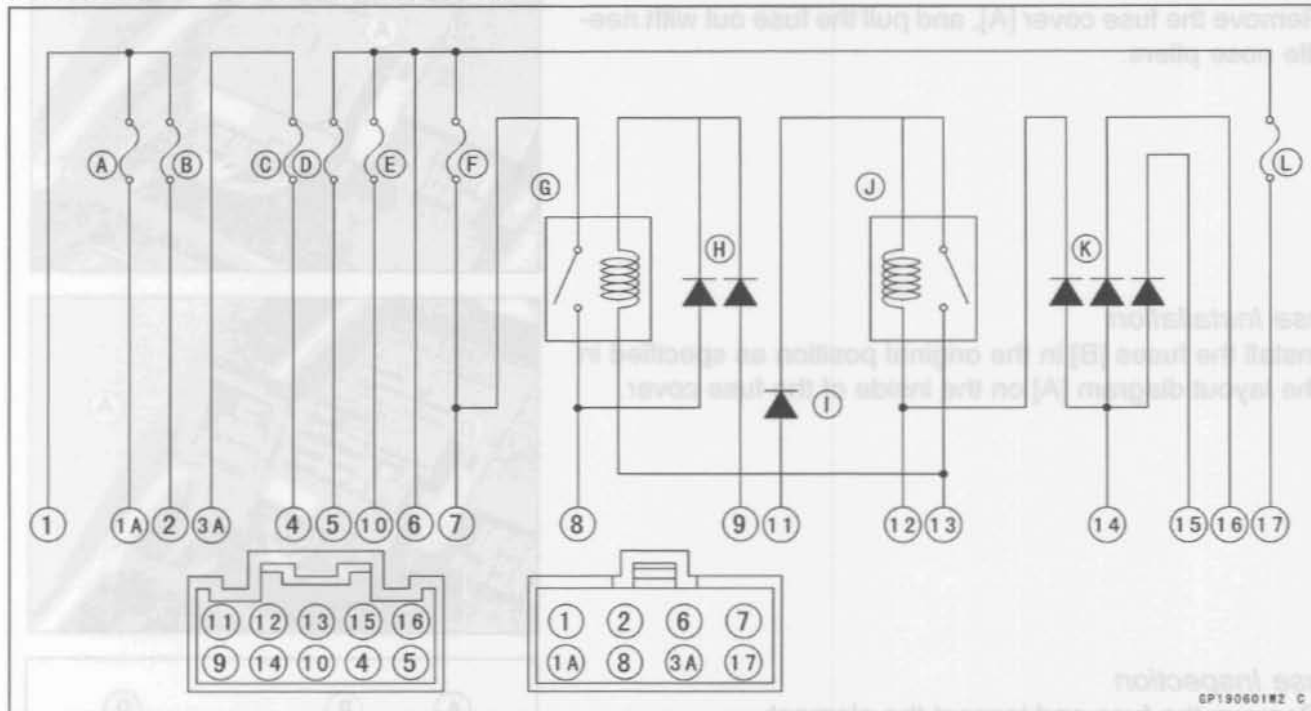
### Fuse Circuit Inspection

- Inspect the fuses and replace those that are blown.
- Remove the junction box.
- Check the continuity between the terminals.
- ★ If any of the measurements differ from those in the table, replace the junction box.

**Special Tool - Hand Tester: 57001-1394**

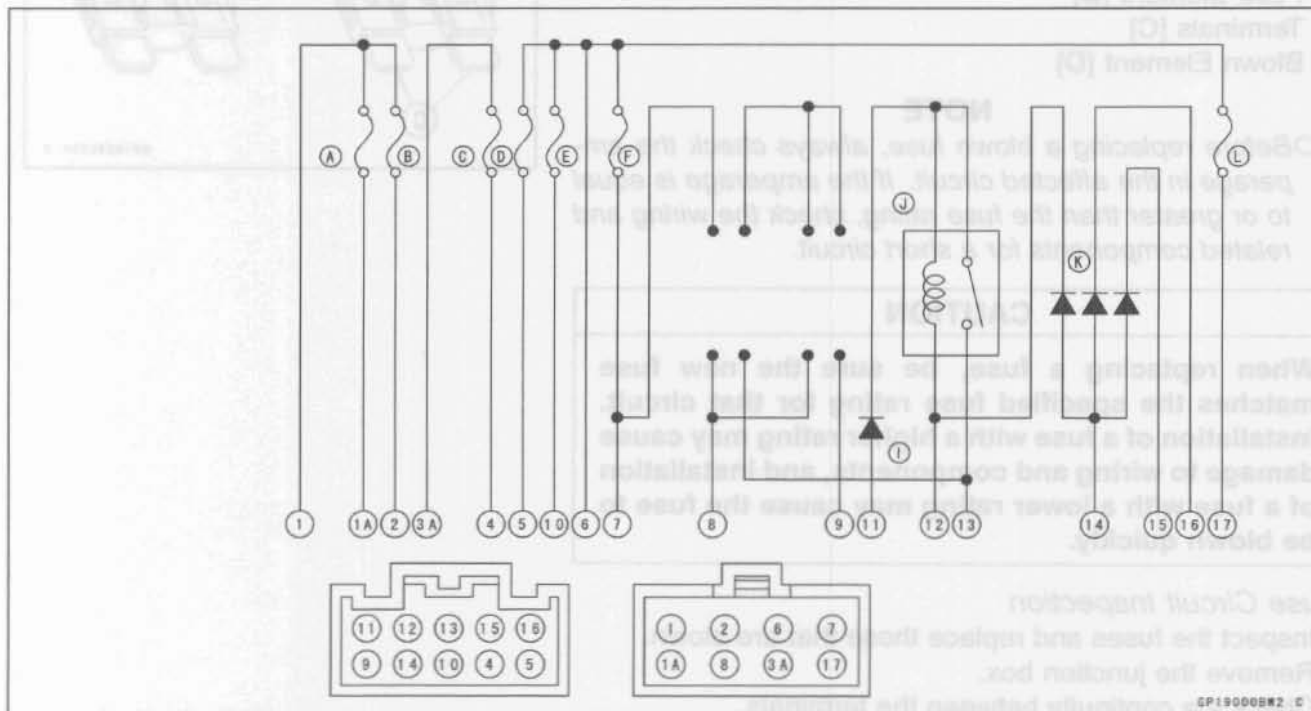
Junction Box

Junction Box Internal Circuit (U.S.A., Canada, Australia and Taiwan Models)  
(ZR750-H3 ~ H4: N, NU Models)



GP190601M2 C

Junction Box Internal Circuit (other than U.S.A., Canada, Australia and Taiwan Models)



GP190601M2 C

- N: No Catalytic Converter
- NU: No Catalytic Converter (UK model)
- A. Accessory Fuse 15 A
- B. Main Fuse 30 A

- C. Turn Signal Relay Fuse 10 A
- D. Horn Fuse 10 A
- E. Ignition Fuse 10 A
- F. Headlight Fuse 10 A
- G. Headlight Relay

- H. Headlight Diodes
- I. Starter Diode
- J. Starter Circuit Relay
- K. Interlock Diodes
- L. Taillight Fuse 10 A

Junction Box

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	∞

Table 1. Relay Circuit Inspection (without battery)

Tester Connection	Measurement (Ω)	
7 - 8	∞	Headlight Relay*
7 - 13	∞	
(+) 13 - 9 (-)	∞	Starter Circuit Relay
9 - 11	∞	
12 - 13	∞	other than **
(+) 13 - 11 (-)	∞	
(+) 12 - 11 (-)	∞	

(\*) U.S.A., Canada, Australia and Taiwan Models  
 (\*\*) The actual reading varies with the hand tester used.  
 (+): Apply tester positive wire  
 (-): Apply tester negative wire  
 Connect a 12 V battery in accordance with Table 2 and check the continuity between the terminals. If any of the measurements differ from those in the table, replace the junction box.  
 Special Tool - Hand Tester: 27001-903

Table 2. Relay Circuit Inspection (battery connected)

Tester Connection	Battery Connection	Measurement (W)
7 - 8 *	9 - 13 *	0
(+) 13 - 11 (-)	11 - 1	other than **

(\*) U.S.A., Canada, Australia and Models  
 (\*\*) The actual reading varies with the hand tester used.  
 (+): Apply tester positive wire  
 (-): Apply tester negative wire

# 14-70 ELECTRICAL SYSTEM

## Junction Box

### Headlight Relay, Starter Circuit Relay Circuit Inspection

- Remove the junction box.
- Check the continuity between the terminals in accordance with Table 1.

**Table 1. Relay Circuit Inspection (without battery)**

	Tester Connection	Measurement ( $\Omega$ )
<b>Headlight Relay*</b>	7 - 8	$\infty$
	7 - 13	$\infty$
	(+) 13 - 9 (-)	other than $\infty^{**}$
<b>Starter Circuit Relay</b>	9 - 11	$\infty$
	12 - 13	$\infty$
	(+) 13 - 11 (-)	$\infty$
	(+) 12 - 11 (-)	other than $\infty^{**}$

(\*): U.S.A., Canada Australia and Taiwan Models

(\*\*): The actual reading varies with the hand tester used.

(+): Apply tester positive wire.

(-): Apply tester negative wire.

- Connect a 12 V battery in accordance with Table 2 and check the continuity between the terminals.

★If any of the measurements differ from those in the table, replace the junction box.

**Special Tool - Hand Tester: 57001-983**

**Table 2. Relay Circuit Inspection (battery connected)**

	Tester Connection	Battery Connection (+) (-)	Measurement (W)
<b>Headlight Relay*</b>	7 - 8 *	9 - 13 *	0
<b>Starter Circuit Relay</b>	(+) 13 - 11 (-)	11 - 1	other than $\infty^{**}$

(\*): U.S.A., Canada, Australia and Models

(\*\*): The actual reading varies with the hand tester used.

(+): Apply tester positive wire.

(-): Apply tester negative wire.

## Junction Box

---

### *Diode Circuit Inspection*

- Remove the junction box.
- Check the continuity between the following terminals, in both directions:

### **Diode Circuit Inspection**

<b>Tester Connection</b>	13 - 8, 13 - 9, 12 - 11, 12 - 14, 15 - 14, 16 - 14
--------------------------	---

If the measurement is low in one direction (forward direction), but 10 or more times higher in the reverse direction (with practically no movement of the needle), 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.

### **NOTE**

- *The actual meter reading varies with the meter used and the individual diodes, but generally speaking, the diode is good if the tester's needle sings about 1/2 the scale.*

# Appendix

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## Additional Considerations for Racing

This motorcycle has been manufactured for use in a reasonable and prudent manner and as a vehicle only. However, some may wish to subject this motorcycle to abnormal operation, such as would be experienced under racing conditions. KAWASAKI STRONGLY RECOMMENDS THAT ALL RIDERS RIDE SAFELY AND OBEY ALL LAWS AND REGULATIONS CONCERNING THEIR MOTORCYCLE AND ITS OPERATION.

Racing should be done under supervised conditions, and recognized sanctioning bodies should be contacted for further details. For those who desire to participate in competitive racing or related use, the following technical information may prove useful. However, please note the following important notes.

- You are entirely responsible for the use of your motorcycle under abnormal conditions such as racing, and Kawasaki shall not be liable for any damages which might arise from such use.
- Kawasaki's Limited Motorcycle Warranty and Limited Emission Control Systems Warranty specifically exclude motorcycles which are used in competition or related uses. Please read the warranty carefully.
- Motorcycle racing is a very sophisticated sport, subject to many variables. The following information is theoretical only, and Kawasaki shall not be liable for any damages which might arise from alterations utilizing this information.
- When the motorcycle is operated on public roads, it **must** be in its original state in order to ensure safety and compliance with applicable regulations.

### Carburetor:

Sometimes an alteration may be desirable for improved performance under special conditions when proper mixture is not obtained after the carburetor has been properly adjusted, and all parts cleaned and found to be functioning properly.

If the engine still exhibits symptoms of overly rich or lean carburetion after all maintenance and adjustments are correctly performed, the main jet can be replaced with a smaller or larger one. A smaller numbered jet gives a leaner mixture and a larger numbered jet a richer mixture.

## Additional Considerations for Racing

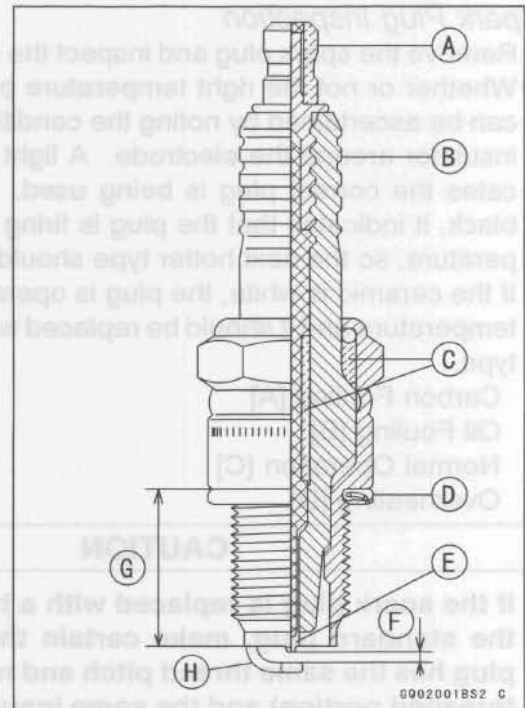
### Spark Plug:

The spark plug ignites the fuel and air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plug must be used, and the spark plug must be kept clean and the gap adjusted.

Tests have shown the plug listed in the "General Information" chapter to be the best plug for general use.

Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of the correct heat range is used should be determined by removing and inspecting the plug.

- Terminal [A]
- Insulator [B]
- Cement [C]
- Gasket [D]
- Center Electrode [E]
- Gap [F]
- Reach [G]
- Side Electrode [H]



When a plug of the correct heat range is being used, the electrodes will stay hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself. This temperature is about 400 ~ 800°C (750 ~ 1450°F) and can be judged by noting the condition and color of the ceramic insulator around the center electrode. If the ceramic is clean and of a light brown color, the plug is operating at the right temperature.

A spark plug for higher operating temperatures is used for racing. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a "colder" plug. If a spark plug with too high a heat range is used - that is, a "cold" plug that cools itself too well - the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceramic insulator.

The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or bridging across the gap. Such a short will prevent an effective spark. Carbon build-up on the plug can also cause other troubles. It can heat up red-hot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

## Additional Considerations for Racing

*Spark Plug Inspection*

- Remove the spark plug and inspect the ceramic insulator.
- ★ Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is black, it indicates that the plug is firing at too low a temperature, so the next hotter type should be used instead. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

Carbon Fouling [A]

Oil Fouling [B]

Normal Operation [C]

Overheating [D]

**CAUTION**

If the spark plug is replaced with a type other than the standard plug, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same insulator type (regular type or projected type) as the standard plug.

If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.

If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.

**Standard Spark Plug Threads**

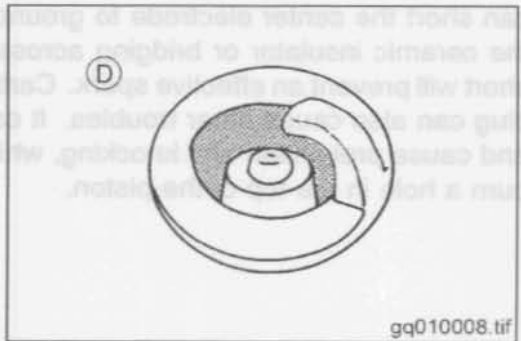
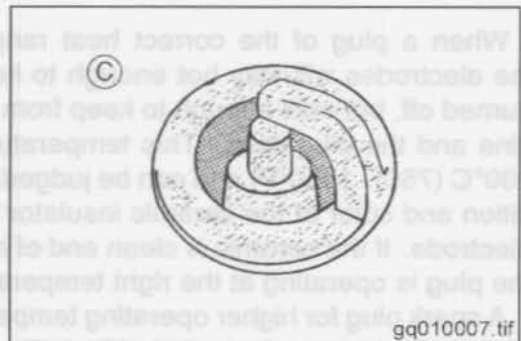
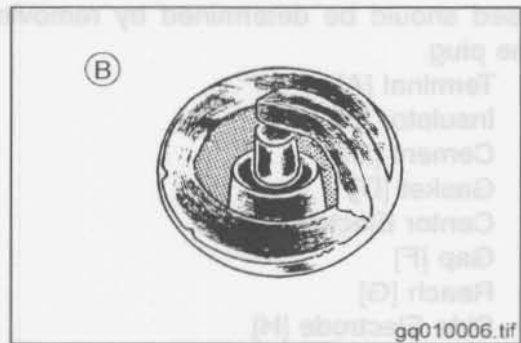
Diameter: 12 mm (0.47 in.)

Pitch: 1.25 mm (0.049 in.)

Reach: 19 mm (0.75 in.)

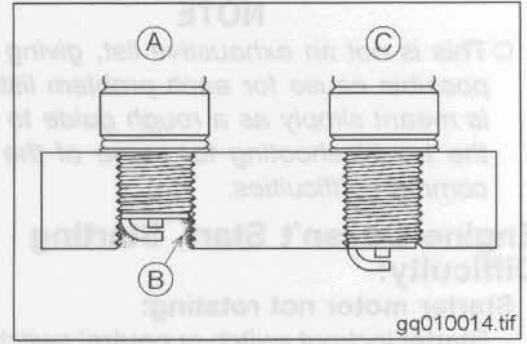
**NOTE**

- The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling).



Additional Considerations for Racing

- Tool short [E]
- Carbon builds up here [F]
- Correct reach [G]



**Poor Running at Low Speed:**

- Spark weak:
- Battery voltage low
- Spark plug dirty, broken, or misadjusted
- Spark plug cap or high tension wiring too loose
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble
- Crankshaft sensor trouble
- Ignition coil trouble
- Fuel/air mixture incorrect:
- Pilot screw misadjusted
- Pilot jet, or air passage clogged
- Air bleed pipe holes clogged
- Pilot passage clogged
- Air cleaner element clogged, poorly sealed, or missing
- Starter plunger stuck open
- Fuel level in carburetor float bowl too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Air cleaner dust loose
- Air cleaner O-ring damaged

- Starter motor rotating but engine doesn't turn over:
- Starter clutch trouble
- Engine won't turn over:
- Valve seizure
- Valve lifter seizure
- Cylinder piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter kite gear seizure
- No fuel flow:
- No fuel in tank
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Fuel valve clogged
- Engine flooded:
- Fuel level in carburetor float bowl too high
- Fuel valve worn or stuck open
- Starting technique faulty
- (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)
- No spark; spark weak:
- Battery voltage low
- Spark plug dirty, broken, or misadjusted
- Spark plug cap or high tension wiring too loose
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble

- Starter motor trouble
- Battery voltage low
- Starter leaves not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown
- Starter motor rotating but engine doesn't turn over:
- Starter clutch trouble
- Engine won't turn over:
- Valve seizure
- Valve lifter seizure
- Cylinder piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter kite gear seizure
- No fuel flow:
- No fuel in tank
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Fuel valve clogged
- Engine flooded:
- Fuel level in carburetor float bowl too high
- Fuel valve worn or stuck open
- Starting technique faulty
- (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)
- No spark; spark weak:
- Battery voltage low
- Spark plug dirty, broken, or misadjusted
- Spark plug cap or high tension wiring too loose
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble

**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 neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

**Starter motor rotating but engine doesn't turn over:**

- Starter clutch trouble

**Engine won't turn over:**

- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure

**No fuel flow:**

- No fuel in tank
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

**Engine flooded:**

- Fuel level in carburetor float bowl too high
- Float valve worn or stuck open
- Starting technique faulty
- (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)

**No spark; 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
- IC igniter trouble

- Neutral, starter lockout, or sidestand switch trouble
- Crankshaft sensor trouble
- Ignition coil trouble
- Ignition or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

**Fuel/air mixture incorrect:**

- Pilot screw and/or idle adjusting screw maladjusted
- Pilot jet, or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter jet clogged

**Compression Low:**

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

**Poor Running at Low Speed:****Spark weak:**

- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble
- Crankshaft sensor trouble
- Ignition coil trouble

**Fuel/air mixture incorrect:**

- Pilot screw maladjusted
- Pilot jet, or air passage clogged
- Air bleed pipe bleed holes clogged
- Pilot passage clogged
- Air cleaner element clogged, poorly sealed, or missing
- Starter plunger stuck open
- Fuel level in carburetor float bowl too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Air cleaner duct loose
- Air cleaner O-ring damaged

## Troubleshooting Guide

### Compression low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head warped
- Cylinder head gasket damaged
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

### Other:

- IC igniter trouble
- Carburetor not synchronizing
- Carburetor vacuum piston doesn't slide smoothly
- Carburetor vacuum piston diaphragm damaged
- Engine oil viscosity too high
- Drive train trouble
- Brake dragging
- Air suction valve trouble
- Vacuum switch valve trouble
- Engine overheating
- Clutch slipping

### Poor Running or No Power at High Speed:

#### Firing incorrect:

- Spark plug dirty, broken, or maladjusted
- Spark plug cap shorted or coil wiring trouble
- Spark plug cap or high tension coil not in good contact
- Spark plug incorrect
- IC igniter trouble
- Crankshaft sensor trouble
- Ignition coil trouble

#### Fuel/air mixture incorrect:

- Starter plunger stuck open
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Air jet clogged
- Fuel level in carburetor float bowl too high or too low
- Bleed holes of needle jet holder or needle jet 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 to carburetor insufficient

Fuel tank 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 bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

### Knocking:

- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- IC igniter trouble

### Miscellaneous:

- Throttle valve won't fully open
- Carburetor vacuum piston doesn't slide smoothly
- Carburetor vacuum piston diaphragm damaged
- Brake dragging
- Clutch slipping
- Overheating
- Engine oil level too high
- Engine oil viscosity too high
- Drive train trouble
- Air suction valve trouble
- Vacuum switch valve trouble

### Overheating:

#### Firing incorrect:

- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- IC igniter trouble

#### Fuel/air mixture incorrect:

- Main jet clogged or wrong size
- Fuel level in carburetor float bowl too low
- Carburetor holder loose
- Air cleaner duct loose
- Air cleaner element poorly sealed, or missing
- Air cleaner O-ring damaged
- Air cleaner clogged

### Compression high:

- Carbon built up in combustion chamber

### Engine load faulty:

- Clutch slipping
- Engine oil level too high

Engine oil viscosity too high  
 Drive train trouble  
 Brake dragging

**Lubrication inadequate:**

Engine oil level too low  
 Engine oil poor quality or incorrect

**Clutch Operation Faulty:****Clutch slipping:**

Friction plate worn or warped  
 Steel plate worn or warped  
 Clutch spring broken or weak  
 Clutch hub or housing unevenly worn  
 No clutch lever play  
 Clutch inner cable trouble  
 Clutch release mechanism trouble

**Clutch not disengaging properly:**

Clutch plate warped or too rough  
 Clutch spring compression uneven  
 Engine oil deteriorated  
 Engine oil viscosity too high  
 Engine oil level too high  
 Clutch housing frozen on drive shaft  
 Clutch hub nut loose  
 Clutch hub spline damaged  
 Clutch friction plate installed wrong  
 Clutch lever play excessive  
 Clutch release mechanism trouble

**Gear Shifting Faulty:****Doesn't go into gear; shift pedal doesn't return:**

Clutch not disengaging  
 Shift fork bent, worn, or seized  
 Gear stuck on the shaft  
 Shift drum positioning pin spring broken  
 Shift return spring weak or broken  
 Shift return spring pin loose  
 Shift mechanism arm spring broken  
 Shift mechanism arm broken  
 Shift pawl broken  
 Pawl spring broken

**Jumps out of gear:**

Shift fork ear worn, bent  
 Gear groove worn  
 Gear dogs and/or dog holes worn  
 Shift drum groove worn  
 Shift drum positioning pin spring weak or broken  
 Shift fork guide pin worn  
 Drive shaft, output shaft, and/or gear splines worn

**Overshifts:**

Shift positioning pin spring weak or broken  
 Overshift limiter broken

**Abnormal Engine Noise:****Knocking:**

IC igniter trouble  
 Carbon built up in combustion chamber  
 Fuel poor quality or incorrect  
 Spark plug incorrect  
 Overheating

**Piston slap:**

Cylinder/piston clearance excessive  
 Cylinder, piston worn  
 Connecting rod bent  
 Piston pin, piston pin hole worn

**Valve noise:**

Valve clearance incorrect  
 Valve spring broken or weak  
 Camshaft bearing worn  
 Valve lifter worn

**Other noise:**

Connecting rod small end clearance excessive  
 Connecting rod big end clearance excessive  
 Piston ring/groove clearance excessive  
 Piston ring worn, broken, or stuck  
 Piston ring groove worn  
 Piston seizure, damage  
 Cylinder head gasket leaking  
 Exhaust pipe leaking at cylinder head connection  
 Crankshaft runout excessive  
 Engine mounts loose  
 Crankshaft bearing worn  
 Primary gear worn or chipped  
 Camshaft chain tensioner trouble  
 Camshaft chain, sprocket, guide worn  
 Air suction valve damaged  
 Vacuum switch valve damaged  
 Alternator rotor loose  
 Primary chain worn

**Abnormal Drive Train Noise:****Clutch noise:**

Clutch rubber damper weak or damaged  
 Clutch housing/friction plate clearance excessive  
 Clutch housing gear worn

**Transmission noise:**

Bearings worn  
 Transmission gears worn or chipped  
 Metal chips jammed in gear teeth  
 Engine oil insufficient

**Drive line noise:**

Drive chain adjusted improperly  
 Drive chain worn  
 Rear and/or engine sprocket worn  
 Chain lubrication insufficient  
 Rear wheel misaligned

## Troubleshooting Guide

### Abnormal Frame Noise:

#### Front fork noise:

- Oil insufficient or too thin
- Spring weak or broken

#### Rear shock absorber noise:

- Shock absorber damaged

#### Disc brake noise:

- Pad installed incorrectly
- Pad surface glazed
- Disc warped
- Caliper trouble

#### Other noise:

- Bracket, nut, bolt, etc. not properly mounted or tightened

### Oil Pressure Warning Light Goes On:

- Engine oil pump damaged
- Engine oil screen clogged
- Engine oil filter clogged
- Engine oil level too low
- Engine oil viscosity too low
- Camshaft bearing worn
- Crankshaft bearings worn
- Oil pressure warning light switch damaged
- Oil pressure warning light switch Wiring faulty
- Relief valve stuck open
- O-ring at the oil passage in the crankcase damaged

### Exhaust Smokes Excessively:

#### White smoke:

- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

#### Black smoke:

- Air cleaner element clogged
- Main jet too large or fallen off
- Starter plunger 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 routing incorrect
- Hose routing incorrect
- Wiring routing incorrect
- Steering stem locknut too tight
- Steering stem bearing damaged

Steering stem bearing lubrication inadequate

Steering stem bent

Tire air pressure too low

#### Handlebar shakes or excessively vibrates:

- Tire worn
- Swingarm pivot bearings worn
- Rim warped, or not balanced
- Wheel bearing worn
- Handlebar clamp bolts loose
- Steering stem head nut loose
- Front/rear axle runout excessive

#### Handlebar pulls to one side:

- Frame bent
- Wheel misalignment
- Swingarm bent or twisted
- Steering maladjusted
- Front fork bent
- Right and left front fork oil level uneven

#### Shock absorption unsatisfactory:

(Too hard)

- Front fork oil excessive
- Front fork oil viscosity too high
- Rear shock absorber adjustment too hard
- Tire air pressure too high
- Front fork bent

(Too soft)

- Tire air pressure too low
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Rear shock adjustment too soft
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking

### Brake Doesn't Hold:

- Air in the brake line
- Pad or disc worn
- Brake fluid leakage
- Disc warped
- Contaminated pad
- Brake fluid deteriorated
- Primary or secondary cup damaged in master cylinder
- Master cylinder scratched inside

### Battery Trouble:

#### Battery discharged:

- Battery faulty
- Battery leads making poor contact
- Load excessive (e.g., bulb of excessive wattage)
- Ignition switch trouble
- Alternator trouble
- Wiring faulty
- Regulator/rectifier trouble

#### Battery overcharged:

- Regulator/rectifier trouble

## Troubleshooting Guide

## Battery faulty

Steering stem bearing loose  
Steering stem bent  
Tire air pressure too low  
Handheld shocks or excessively vibrates  
Tire worn  
Suspension pivot bearings worn  
Rim warped or not balanced  
Wheel bearing worn  
Handheld clamp bolts loose  
Steering stem head nut loose  
Front/rear axle runout excessive  
Handheld guide to one side:  
Frame bent  
Wheel misalignment  
Swingarm bent or twisted  
Steering misadjusted  
Front fork bent  
Right and left fork oil level uneven  
Shock absorption unsatisfactory:  
(Too hard)  
Front fork oil excessive  
Front fork oil viscosity too high  
Rear shock absorber adjustment too hard  
Tire air pressure too high  
Front fork bent  
(Too soft)  
Tire air pressure too low  
Front fork oil insufficient and/or leaking  
Front fork oil viscosity too low  
Rear shock adjustment too soft  
Front fork, rear shock absorber spring weak  
Rear shock absorber oil leaking

## Brake Doesn't Hold:

Air in the brake line  
Pad or disc worn  
Brake fluid leakage  
Disc warped  
Contaminated pad  
Brake fluid deteriorated  
Primary or secondary cup damaged in master cylinder  
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## Battery Trouble:

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Load excessive (e.g. bulb of excessive wattage)  
Ignition switch trouble  
Alternator trouble  
Wiring faulty  
Regulator/rectifier trouble  
Battery overcharged  
Regulator/rectifier trouble

## Troubleshooting Guide

## Abnormal Frame Noise:

Front fork noise  
Oil insufficient or too thin  
Spring weak or broken  
Rear shock absorber noise  
Shock absorber damaged  
Disc brake noise  
Fet installed incorrectly  
Fet surface glazed  
Disc warped  
Cable trouble  
Other noise:  
Bracket, nut, bolt, etc. not properly mounted or tightened

## Oil Pressure Warning Light Goes On:

Engine oil pump damaged  
Engine oil screen clogged  
Engine oil filter clogged  
Engine oil level too low  
Engine oil viscosity too low  
Camshaft bearing worn  
Crankshaft bearing worn  
Oil pressure warning light switch damaged  
Oil pressure warning light switch wiring faulty  
Rocker valve stuck open  
O-ring at the oil passage in the crankcase damaged

## Exhaust Smokes Excessively:

White smoke:  
Piston oil ring worn  
Cylinder worn  
Valve oil seal damaged  
Valve guide worn  
Engine oil level too high  
Black smoke:  
Air cleaner element clogged  
Main jet too large or fallen off  
Starter plunger 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 dust loose  
Air cleaner O-ring damaged  
Air cleaner poorly sealed or missing

## Handling and/or Stability Un satisfactory:

Handheld hard to turn:  
Cable routing incorrect  
Hose routing incorrect  
Wiring routing incorrect  
Steering stem locknut too tight  
Steering stem bearing damaged

## General Lubrication

### Lubrication (Periodic Maintenance)

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

#### NOTE

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

#### Pivots: Lubricate with Motor Oil.

Rear Brake Rod Joint

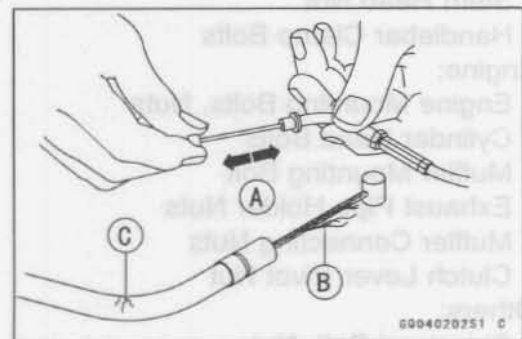
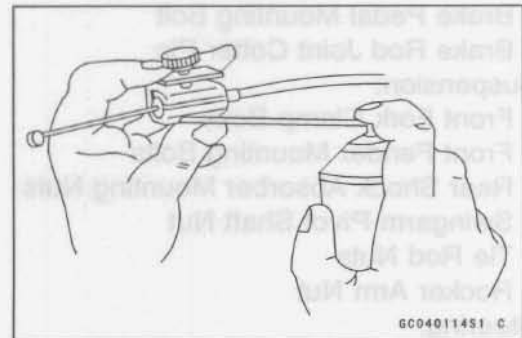
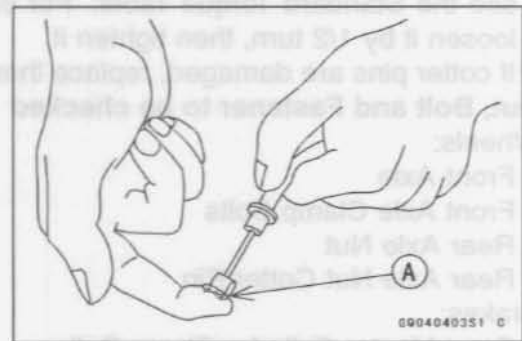
#### Points: Lubricate with Grease.

Clutch Inner Cable Upper and Lower Ends [A]  
 Throttle Inner Cable Upper and Lower Ends  
 Choke Inner Cable Upper and Lower End  
 Speedometer Inner Cable Lower End  
 Clutch Lever (Silicon Grease)  
 Brake Lever (Silicon Grease)  
 Brake Pedal  
 Side Stand  
 Front and Rear Footpegs  
 Swingarm Bearings  
 Rocker Arm Bearings  
 Tie-Rod Bearing

#### Cables: Lubricate with Rust Inhibiter

Choke Cable  
 Throttle Cables  
 Clutch Cable

- Lubricate the cables by seeping the oil between the cable and housing.
- The cable may be lubricated by using a commercially available pressure cable lubricator with an aerosol cable lubricant.
- With the cable disconnected at both ends, the cable should move freely [A] within the cable housing.
- ★ If cable movement is not free after lubricating, if the cable is frayed [B] or if the cable housing is kinked [C], replace the cable.



## 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, retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.

- ★ If cotter pins are damaged, replace them with new ones.

## Nut, Bolt and Fastener to be checked

## Wheels:

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

## Brakes:

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

## Suspension:

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

## Steering:

- Stem Head Nut
- Handlebar Clamp Bolts

## Engine:

- Engine Mounting Bolts, Nuts
- Cylinder Head Bolts
- Muffler Mounting Bolt
- Exhaust Pipe Holder Nuts
- Muffler Connecting Nuts
- Clutch Lever Pivot Nut

## Others:

- Sidestand Bolt, Nut
- Center Stand Nuts
- Footpeg Mounting Pin Circlips
- Footpeg Bracket Mounting Bolts

## Lubrication (Periodic Maintenance)

- Before lubricating each part, clean off any old grease or oil. Use a brush to remove and wipe off any grease or oil.
- Lubricate the points listed below with indicated lubricant.

## NOTE

○ Whenever the vehicle has been wet or in very conditions, especially after high-pressure water spray, perform the

cleaning.

Pivots: Lubricate with Motor Oil.  
Rear Brake Rod Joint

Points: Lubricate with Grease.

Clutch Inner Cable Upper and Lower Ends

Throttle Inner Cable Upper and Lower Ends

Clutch Inner Cable Upper and Lower Ends

Speedometer Inner Cable Lower End

Clutch Lever (Silicon Grease)

Brake Lever (Silicon Grease)

Brake Pedal

Side Stand

Front and Rear Footpegs

Swingarm Bearings

Rocker Arm Bearings

Tie-Rod Bearing

Te-Rod Bearing

Cables: Lubricate with Rust Inhibitor

Clutch Cable

Throttle Cable

Clutch Cable

● Lubricate the cables by applying the oil between the cable

and housing.

○ The cable may be lubricated by using a commercially

available pressure cable lubricator with an aerosol cable

lubricant.

● With the cable disconnected at both ends, the cable

should move freely (A) within the cable housing.

● If cable movement is not free after lubricating, the cable

is frayed (B) or if the cable housing is kinked (C), replace

the cable.