Quick Reference Guide

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

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

Kawasaki

KLE500

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.

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LIST OF ABBREVIATIONS

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

Read OWNER’S MANUAL before operating.

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

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

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

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

⚠ WARNING

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

CAUTION

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

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

NOTE

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

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

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

General Information

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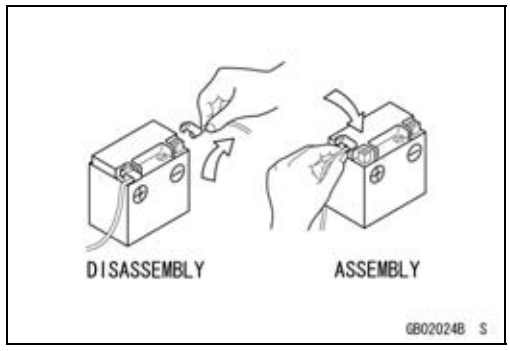
Before Servicing

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

Especially note the following:

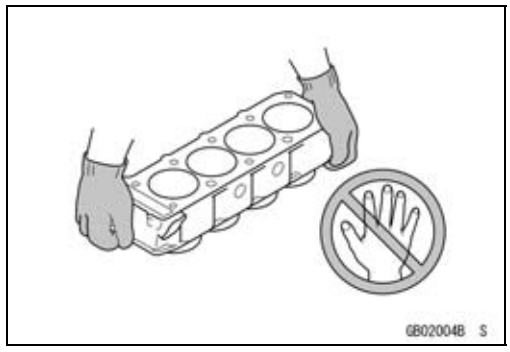
Battery Ground

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



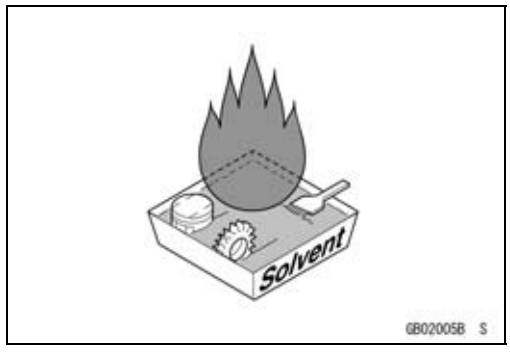
Edges of Parts

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



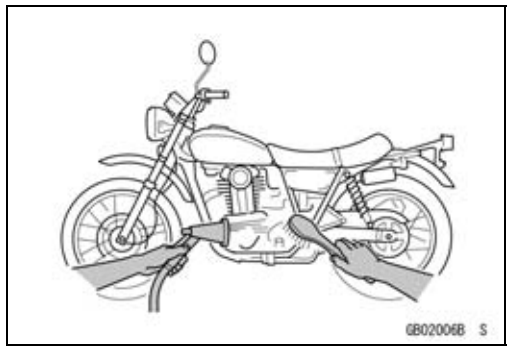
Solvent

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



Cleaning vehicle before disassembly

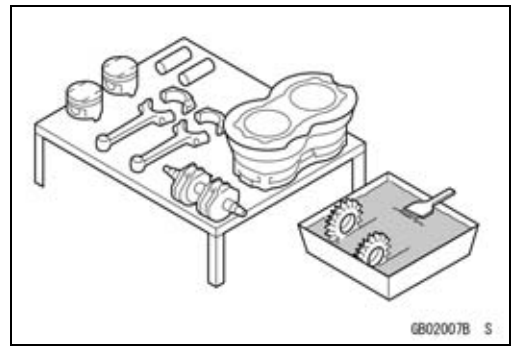
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

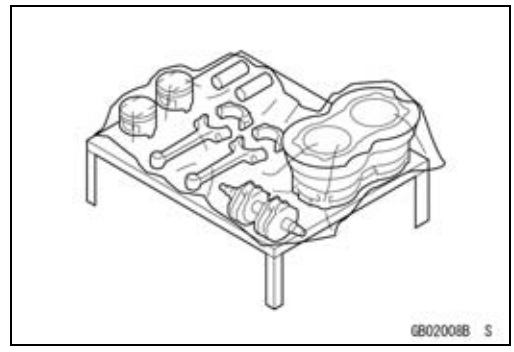
Arrangement and Cleaning of Removed Parts

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



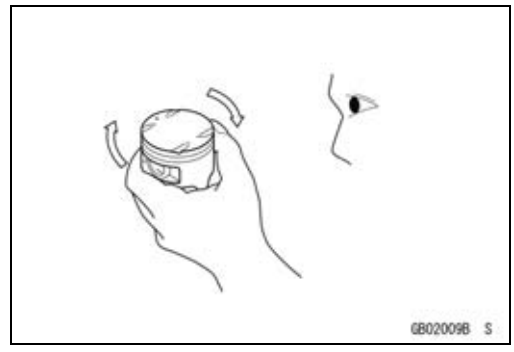
Storage of Removed Parts

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



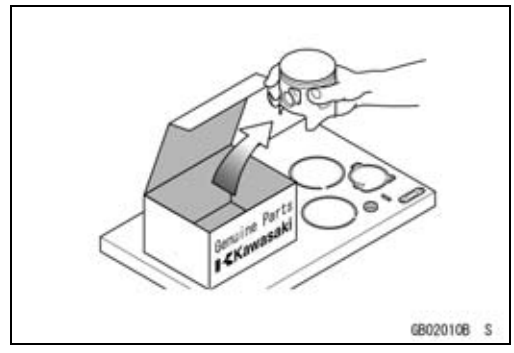
Inspection

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



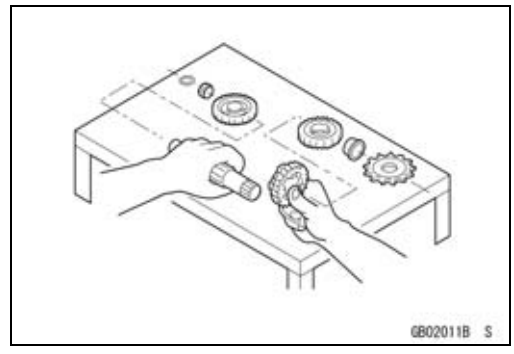
Replacement Parts

Replacement Parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, Oil seals, Grease seals, circlips or cotter pins must be replaced with new ones whenever disassembled.



Assembly Order

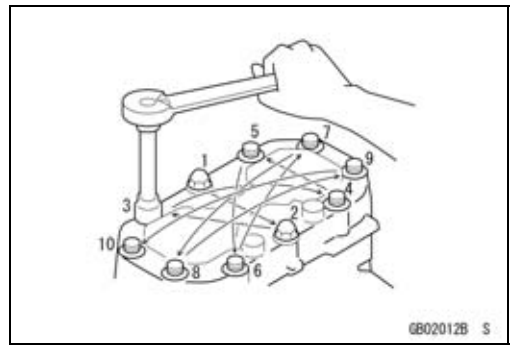
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

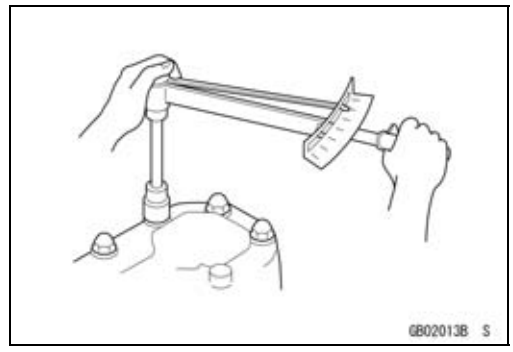
Tightening Sequence

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



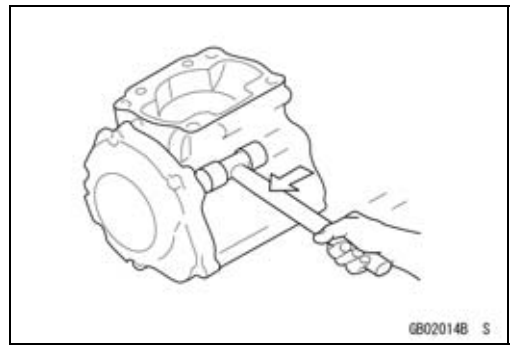
Tightening Torque

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



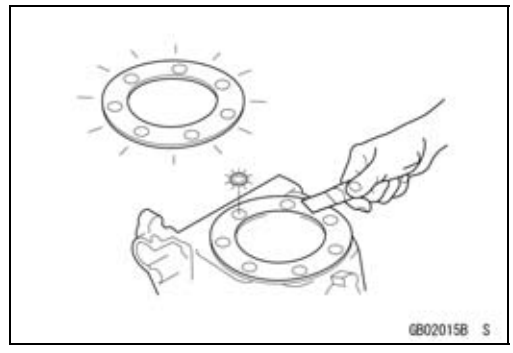
Force

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



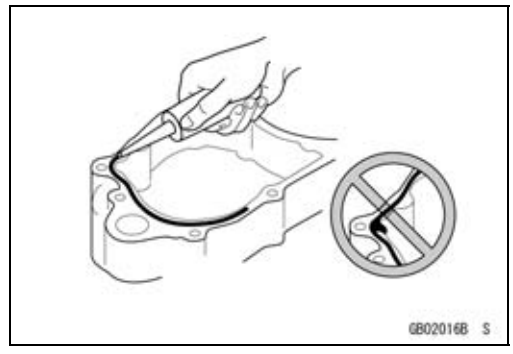
Gasket, O-ring

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



Liquid Gasket, Locking Agent

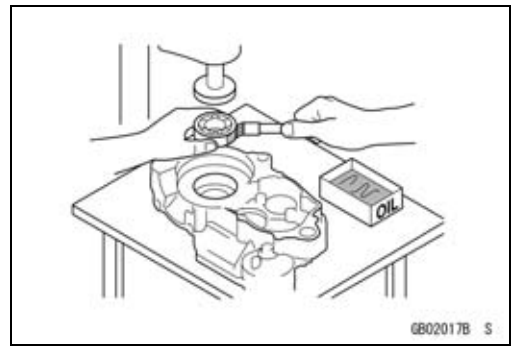
For applications that require Liquid Gasket or a Locking agent, clean the surfaces so that no oil residue remains before applying liquid gasket or locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

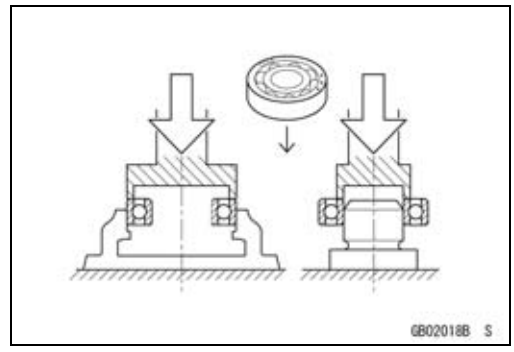
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

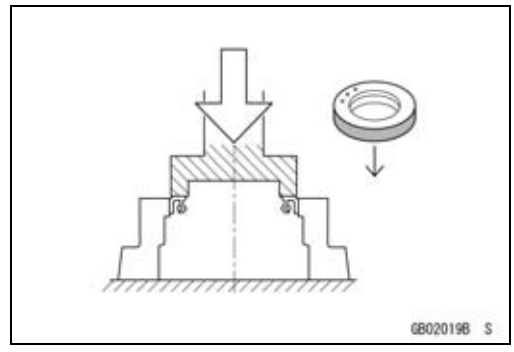
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

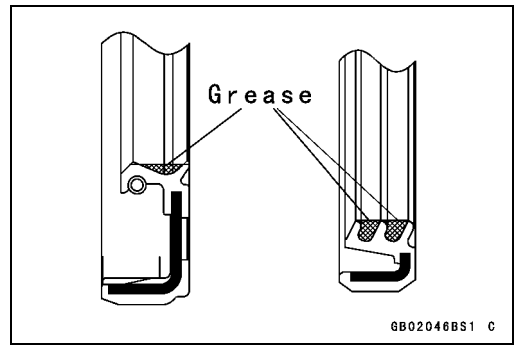


Oil Seal, Grease Seal

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

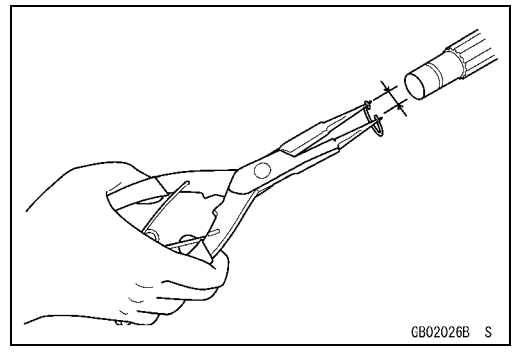


Apply specified grease to lip of seal before installing the seal.



Circlips, Cotter Pins

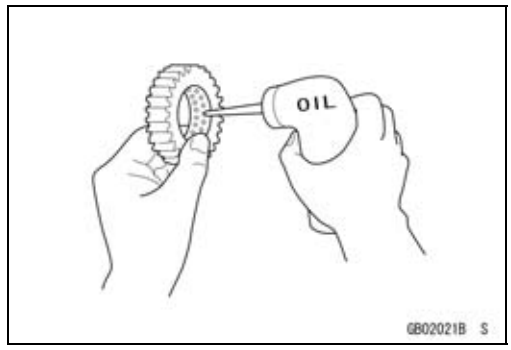
Replace circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

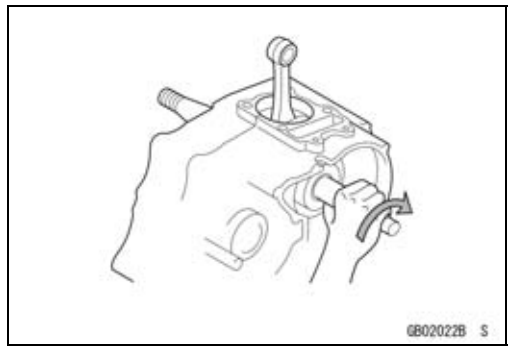
Lubrication

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



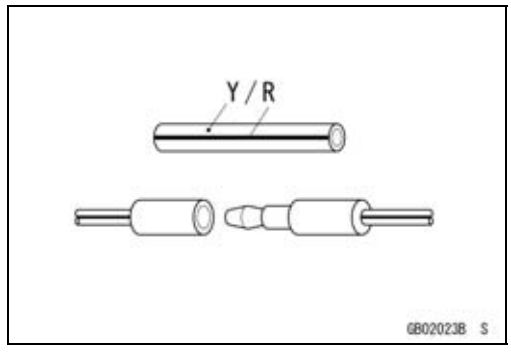
Direction of Engine Rotation

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



Electrical Wires

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



Model Identification

KLE500-B1 Left Side View

KLE500-B1 Right Side View

General Specifications

Items	KLE500-B1
Dimensions	
Overall Length	2 215 mm (87.2 in.)
Overall Width	880 mm (34.6 in.)
Overall Height	1 270 mm (50.0 in.)
Wheelbase	1 500 mm (59.0 in.)
Road Clearance	180 mm (7.09 in.)
Seat Height	850 mm (33.5 in.)
Dry Weight	181 kg (399 lb.)
Curb Weight:	
Front	95 kg (209 lb.)
Rear	105 kg (232 lb.)
Fuel tank Capacity	15 L (4.0 US gal.)
Performance	
Minimum Turning Radius	2.4 m (7.9 ft.)
Engine	
Type	4-stroke, DOHC, 2-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	74.0 × 58.0 mm (2.91 × 2.28 in.)
Displacement	498 mL (30.39 cu in.)
Compression Ratio	9.8:1
Maximum Horsepower	33 kW (44.9 PS) @8 300 r/min (rpm)
Maximum Torque	41 N·m (4.2 kgf·m, 30 ft·lb) @7 500 r/min (rpm)
Carburetion System	Carburetors, Keihin CVK34 × 2
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically Advanced (digital)
Ignition Timing	From 10° BTDC @1 300 r/min (rpm) to 35° BTDC @5 000 r/min (rpm)
Spark Plugs	NGK DR9EA or ND X27ESR-U
Cylinder Numbering Method	Left to right, 1-2
Firing Order	1-2
Valve Timing:	
Inlet	
Open	27° BTDC
Close	47° ABDC
Duration	254°
Exhaust	
Open	52° BBDC
Close	22° ATDC
Duration	254°
Lubrication System	Forced lubrication

General Specifications

Items	KLE500-B1
Engine Oil:	
Grade	API SE, SF, SG or API SH or SJ with JASO MA
Viscosity	SAE10W-40
Capacity	3.4 L (3.6 US qt)
Drive Train	
Primary Reduction System:	
Type	Chain
Reduction Ratio	2.652 (61/23)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed constant mesh, return shift
Gear Ratios:	
1st	2.571 (36/14)
2nd	1.722 (31/18)
3rd	1.333 (28/21)
4th	1.125 (27/24)
5th	0.961 (25/26)
6th	0.851 (23/27)
Final Drive System:	
Type	Chain drive
Reduction Ratio	2.588 (44/17)
Overall Drive Ratio	5.847 @Top gear
Frame	
Type	Tubular, double cradle
Caster (rake angle)	27°
Trail	105 mm (4.13 in.)
Front Tire:	
Type	Tubeless
Size	90/90-21 M/C 54S
Rear Tire:	
Type	Tubeless
Size	130/80-17 M/C 65S
Front Suspension:	
Type	Telescopic fork
Wheel Travel	220 mm (8.66 in.)
Rear Suspension:	
Type	Swingarm
Wheel Travel	200 mm (7.87 in.)
Brake Type:	
Front	Single disc
Rear	Single disc

General Specifications

Items	KLE500-B1
Electrical Equipment	
Battery	12 V 10 Ah
Headlight:	
Type	Semi-sealed beam
Bulb	12 V 55/55 W (quartz-halogen)
Tail/brake Light	12 V 5/21 W
Alternator:	
Type	Three-phase AC
Rated output	17 A × 14 V @6 000 r/min (rpm)

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

Unit Conversion Table

Prefixes for Units:

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

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

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

Units of Force:

N	×	0.1020	=	kg
N	×	0.2248	=	lb
kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length:

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

Units of Torque:

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

Units of Pressure:

kPa	×	0.01020	=	kgf/cm²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cm Hg
kgf/cm²	×	98.07	=	kPa
kgf/cm²	×	14.22	=	psi
cm Hg	×	1.333	=	kPa

Units of Speed:

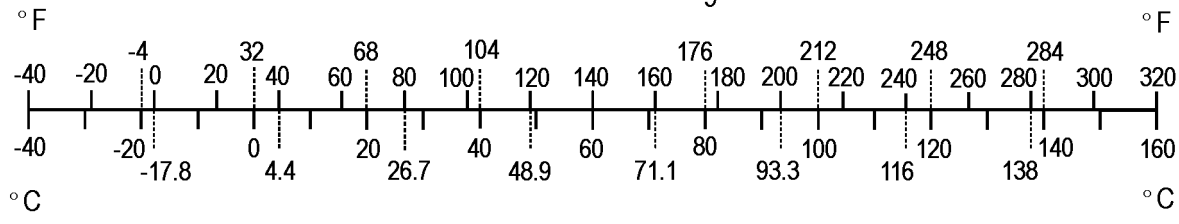
km/h	×	0.6214	=	mph

Units of Power:

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

Units of Temperature:

$$\frac{9(^\circ C + 40)}{5} - 40 = {}^\circ F \qquad \frac{5(^\circ F + 40)}{9} - 40 = {}^\circ C$$



Periodic Maintenance

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Periodic Maintenance Chart

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

FREQUENCY / OPERATION	Whichever comes first ➡ / ⬇ Every	* ODOMETER READING × 1000 km (× 1000 mile) 1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	See Page
Fuel System									
Throttle cable-inspect	year	●		●		●		●	2-14
Idle speed-inspect		●		●		●		●	2-15
Carburetor synchronization-inspect				●		●		●	2-16
Coolant filter-clean	year								2-17
Air cleaner element-clean #				●		●		●	2-17
Fuel hoses and connections-inspect	year	●		●		●		●	2-17
Cooling System									
Coolant level-inspect		●		●		●		●	2-18
Radiator hose and connection-inspect	year	●		●		●		●	2-19
Engine Top End									
Air suction valve-inspect				●		●		●	2-19
Valve clearance-inspect						●			2-19
Clutch									
Clutch operation (play, disengagement, engagement)-inspect		●		●		●		●	2-21
Wheels and Tires									
Tire air pressure-inspect			●	●	●	●	●	●	2-22
Tire tread wear-inspect				●		●		●	2-22
Wheel/tire damage-inspect				●		●		●	2-23
Wheel bearing damage-inspect	year			●		●		●	2-24
Spoke tightness and rim runout-inspect		●	●	●	●	●	●	●	2-24
Final Drive									
Drive chain slack-inspect #	Every 1 000 km (600 mile)								2-25
Drive chain wear-inspect #	Every 6 000 km (4 000 mile)								2-26
Drive chain lubrication condition-inspect #	Every 600 km (400 mile)								2-27
Drive chain guide wear-inspect	Every 12 000 km (7 500 mile)								–
Brake System									
Brake fluid leak (brake hose and pipe)-inspect	year	●	●	●	●	●	●	●	2-27
Brake hose damage-inspect	year	●	●	●	●	●	●	●	2-28
Brake hose installation condition-inspect	year	●	●	●	●	●	●	●	2-28
Brake operation (effectiveness, play, no drag)-inspect	year	●	●	●	●	●	●	●	2-28
Brake fluid level-inspect	6 months	●	●	●	●	●	●	●	2-28
Brake pad wear-inspect #			●	●	●	●	●	●	2-29
Brake light switch operation-inspect		●	●	●	●	●	●	●	2-30

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

FREQUENCY / OPERATION	Whichever comes first ➡ / ⬇ Every	* ODOMETER READING × 1000 km (× 1000 mile) 1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	See Page
Suspensions									
Front forks/rear shock absorber operation (damping and smooth stroke)-inspect				●		●		●	2-30
Front forks/rear shock absorber oil leak-inspect	year			●		●		●	2-31
Rocker arm operation-inspect				●		●		●	2-31
Rocker arm bearings and sleeves -lubricate						●			2-31
Tie-rods operation-inspect				●		●		●	2-32
Swingarm pivot-lubricate						●			2-32
Steering System									
Steering play-inspect	year	●		●		●		●	2-32
Steering stem bearings-lubricate	2 years					●			2-33
Electrical System									
Spark plug condition-inspect				●		●		●	2-34
Lights and switches operation-inspect	year			●		●		●	2-34
Headlight aiming-inspect	year			●		●		●	2-36
Side stand switch operation-inspect	year			●		●		●	2-37
Engine stop switch operation-inspect	year			●		●		●	2-38
Others									
Chassis parts-lubricate	year			●		●		●	2-38
Bolts, nuts and fasteners tightness-inspect		●		●		●		●	2-39

#: 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.

Periodic Maintenance Chart

Periodic Replacement Parts

FREQUENCY / CHANGE/REPLACEMENT	Whichever come first ➡ / Every ⬇	* ODOMETER READING × 1000 km (× 1000 mile) 1 (0.6)	12 (7.5)	18 (12)	24 (15)	36 (24)	48 (30)	See Page
Fuel hose	4 years						●	2-40
Air cleaner element	2 years							2-40
Coolant	3 years					●		2-40
Radiator hose and O-ring	3 years					●		2-43
Engine oil #	year	●	●		●	●	●	2-43
Oil filter	year	●	●		●	●	●	2-44
Brake hose	4 years						●	2-44
Brake fluid	2 years				●		●	2-45
Master Cylinder/Caliper Rubber Parts	4 years						●	2-47

#: 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.

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 and then tighten it to the specified torque.

Letters used in the "Remarks" column mean:

EO: Apply engine oil to the threads and seating surface.
L: Apply a non-permanent locking agent to the threads.
LG: Apply liquid gasket to the threads.
Lh: Left-hand threads.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil (mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)
R: Replacement parts.
S: Tighten the fasteners following the specified sequence.
SS: Apply silicone sealant to the threads.
St: Stake the fasteners to prevent loosening.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System				
Fuel Tap Cover Screws	0.8	0.08	7 in·lb	
Fuel Tap Mounting Bolts	5.0	0.51	44 in·lb	
Air Cut Valve Cover Screws	1.0	0.10	9 in·lb	
Cooling System				
Radiator Hose Clamp Screws	2.5	0.25	22 in·lb	
Radiator Fan Switch	18	1.8	13	
Thermostat Housing Bolts	11	1.1	95 in·lb	
Water Temperature Sensor	7.8	0.8	69 in·lb	SS
Water Pump Cover Bolts	11	1.1	95 in·lb	
Water Pump Shaft	25	2.5	18	Lh
Water Pump Impeller	9.8	1.0	87 in·lb	Lh
Water Pipe Bolts	9.8	1.0	87 in·lb	L
Cylinder Head Jacket Plug	9.8	1.0	87 in·lb	L
Radiator Cap Holder Mounting Bolts	11	1.1	95 in·lb	
Coolant Drain Plug	11	1.1	95 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	11	1.1	95 in·lb	
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
Camshaft Cap Bolts	12	1.2	104 in·lb	S
Rocker Shafts	39	4.0	29	EO
Valve Adjuster Locknuts	25	2.5	18	
Camshaft Sprocket Bolts	15	1.5	11	L
Cylinder Head Bolts (10 mm)	51	5.2	38	S
Cylinder Head Bolts (6 mm)	9.8	1.0	87 in·lb	S
Camshaft Chain Tensioner Mounting Bolts	11	1.1	95 in·lb	
Camshaft Chain Tensioner Cap Bolt	13	1.3	9.5	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Main Oil Pipe Upper Banjo Bolts M8	12	1.2	104 in·lb	
Main Oil Pipe Lower Banjo Bolt M10	20	2.0	14.5	
Water Jacket Plug	9.8	1.0	87 in·lb	L
Oil Pipe Bolts (in the cylinder head)	11	1.1	95 in·lb	
Main Oil Pipe Mounting Bolt	11	1.1	95 in·lb	
Clutch				
Oil Filler Plug	1.5	0.15	13 in·lb	
Clutch Hub Nut	132	13.5	98	
Clutch Spring Bolts	9.3	0.95	82 in·lb	
Clutch Cable Holder Bolt	11	1.1	95 in·lb	
Clutch Cover Bolts	11	1.1	95 in·lb	
Engine Lubrication System				
Oil Filler Plug	1.5	0.15	13 in·lb	
Oil Passage Plug	18	1.8	13	
Oil Filter Mounting Stud	25	2.5	18	L (Planted side)
Oil Filter (Cartridge Type)	17	1.7	12.5	
Oil Pipe for Balancer Shaft Banjo Bolt	20	2.0	14.5	
Oil Pipe for Drive Shaft Upper Banjo Bolt M6	7.8	0.8	69 in·lb	
Oil Pipe for Drive Shaft Lower Banjo Bolt M8	12	1.2	104 in·lb	
Oil Pipe for Output Shaft Upper Banjo Bolt M6	7.8	0.8	69 in·lb	
Oil Pipe for Output Shaft Lower Banjo Bolt M8	12	1.2	104 in·lb	
Oil Pipe for Output Shaft Mounting Bolt	11	1.1	95 in·lb	L
Oil Pump Outer Oil Pipe Bolts	11	1.1	95 in·lb	L
Relief Valve	15	1.5	11	L
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	
Oil Pressure Switch	15	1.5	11	SS
Main Oil Pipe Mounting Bolt	11	1.1	95 in·lb	
Main Oil Pipe Upper Banjo Bolts	12	1.2	104 in·lb	
Main Oil Pipe Lower Banjo Bolt	20	2.0	14.5	
Rocker Shafts	39	4.0	29	
Engine Oil Drain Plug	29	3.0	22	
Oil Pan Mounting Bolts	11	1.1	95 in·lb	
Oil Pump Mounting Bolts	11	1.1	95 in·lb	
Engine Removal/Installation				
Downtube Bolts	44	4.5	33	
Engine Mounting Bolts and Nuts	44	4.5	33	
Engine Mounting Bracket Bolts	25	2.5	18	
Crankshaft/Transmission				
Breather Body Bolt	5.9	0.6	52 in·lb	
Crankcase Bolts (8 mm)	27	2.8	20	S
Crankcase Bolts (6 mm)	12	1.2	104 in·lb	S

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Upper Primary Chain Guide Mounting Bolt	11	1.1	95 in·lb	L
Lower Primary Chain Guide Mounting Bolt	11	1.1	95 in·lb	L
Connecting Rod Big End Nuts	36	3.7	27	
Return Spring Pin	20	2.0	14.5	L
Gear Positioning Lever Pivot Stud	–	–	–	L (planted side)
Gear Positioning Lever Nut	11	1.1	95 in·lb	
Shift Pedal Link Lever Mounting Bolt	12	1.2	104 in·lb	
Shift Drum Bearing Holder Bolts	11	1.1	95 in·lb	L
Shift Drum Cam Pin Plate Screw	–	–	–	L
Engine Sprocket Nut	127	13	94	EO
External Shift Mechanism Cover Bolts	11	1.1	95 in·lb	
Neutral Switch	15	1.5	11	
Wheels/Tires				
Spoke Nipple	2.0 ~ 3.9	0.2 ~ 0.4	17 ~ 35 in·lb	
Front Axle Nut	88	9.0	65	
Rear Sprocket Nut	33	3.4	24	
Rear Axle Nut	108	11	80	
Final Drive				
Engine Sprocket Nut	127	13	94	EO
Rear Sprocket Nuts	33	3.4	24	
Rear Coupling Studs	–	–	–	L (planted side)
Rear Axle Nut	108	11	80	
Drive Chain Guide Bolts	11	1.1	95 in·lb	
Brakes				
Brake Hose Banjo Bolts	34	3.5	25	
Front Reservoir Cap Screws	1.5	0.15	13 in·lb	
Brake Lever Pivot Bolt	1.0	0.10	9 in·lb	
Brake Lever Pivot Locknut	5.9	0.60	52 in·lb	
Front Master Cylinder Clamp Bolts	11	1.1	95 in·lb	S
Front Brake Light Switch Mounting Screw	1.2	0.12	10 in·lb	
Front Caliper Mounting Bolts	34	3.5	25	
Rear Caliper Mounting Bolts	25	2.5	18	
Caliper Bleed Valves	7.8	0.8	69 in·lb	
Brake Disc Mounting Bolts	23	2.3	16.5	L
Brake Pedal Bolt	25	2.5	18	
Rear Reservoir Mounting Bolt	5.9	0.60	52 in·lb	
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Suspension				
Front Fork Upper Clamp Allen Bolts	25	2.5	18	S
Front Fork Lower Clamp Bolts	23	2.3	16.5	S

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Front Fork Top Bolts	30	3.1	22	
Front Fork Bottom Allen Bolt	30	3.1	22	L
Rear Shock Absorber Upper Mounting Nut	59	6.0	43	
Rear Shock Absorber Lower Mounting Nut	98	10	72	
Swingarm Pivot Nut	118	12	87	
Rocker Arm Pivot Nut	98	10	72	
Tie-Rod Mounting Nuts	98	10	72	
Steering				
Handlebar Clamp Bolts	25	2.5	18	S
Handlebar Weight Allen Bolts	–	–	–	L
Front Fork Upper Clamp Allen Bolts	25	2.5	18	S
Front Fork Lower Clamp Bolts	23	2.3	16.5	S
Steering Stem Head Nut	39	4.0	29	
Steering Stem Locknut	Hand -Tighten (about 4.9)	Hand -Tighten (about 0.5)	Hand -Tighten (about 43 in·lb)	
Frame				
Tail Grip Bolts	25	2.5	18	
Front Footpeg Bracket Bolts	34	3.5	25	
Sidestand Bolt and Nut	44	4.5	33	
Rear Footpeg Bracket Bolts	25	2.5	18	
Carrier Stay Mounting Bolts	25	2.5	18	
Electrical System				
Crankshaft Sensor Mounting Screws	8.3	0.85	74 in·lb	L
Timing Inspection Plug	2.5	0.25	22 in·lb	
Alternator Rotor Bolt Plug	1.5	0.15	13 in·lb	
Alternator Cover Bolts	11	1.1	95 in·lb	
Alternator Lead Clamp Screws	2.9	0.30	26 in·lb	
Spark Plug	14	1.4	10	
Alternator Stator Allen Bolts	12	1.2	104 in·lb	
Alternator Rotor Bolt	69	7.0	51	Lh
Starter Motor Mounting Bolts	11	1.1	95 in·lb	
Starter Chain Guide Bolts	4.9	0.5	43 in·lb	L
Starter Motor Through Bolts	6.9	0.7	65 in·lb	
Starter Motor Terminal Nut	4.9	0.5	43 in·lb	
Starter Motor Lead Clamp Nut	4.9	0.5	43 in·lb	
Starter Clutch Allen Bolts	34	3.5	25	L
Sidestand Switch Mounting Screw	3.9	0.4	35 in·lb	L
Sidestand Bolt and Nut	44	4.5	33	
Radiator Fan Switch	18	1.8	13	
Water Temperature Switch	7.8	0.80	69 in·lb	SS
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Pressure Switch	15	1.5	11	SS
Neutral Switch	15	1.5	11	
Tail Light Mounting Nut	5.9	0.6	52 in·lb	

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

Basic Torque for General Fasteners

Threads 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

Specifications

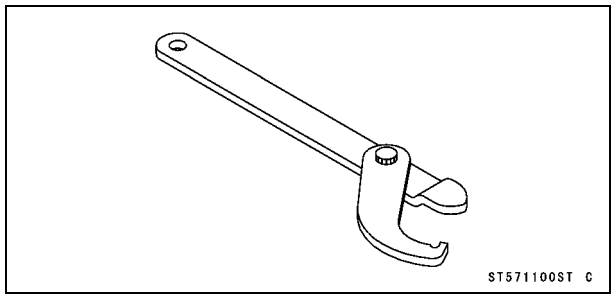
Item	Standard	Service Limit
Fuel System		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle Speed	1 200 ±50 r/min (rpm)	– – –
Engine Top End		
Valve Clearance		
Inlet	0.13 ~ 0.18 mm (0.0051 ~ 0.0071 in.)	– – –
Exhaust	0.18 ~ 0.23 mm (0.0070 ~ 0.0090 in.)	– – –
Clutch		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Wheels/Tires		
Air Pressure		
Front	150 kPa (1.5 kgf/cm², 21 psi)	– – –
Rear	225 kPa (2.25 kgf/cm², 32 psi)	– – –
Tread Depth		
Front		
Dunlop	6.9 mm (0.27 in.)	1 mm (0.04 in.)
Bridgestone	6.0 mm (0.24 in.)	
Rear		
Dunlop	8.8 mm (0.35 in.)	2 mm (0.08 in.) (Up to 130 km/h (80 mph))
Bridgestone	8.5 mm (0.33 in.)	3 mm (0.12 in.) (Over to 130 km/h (80 mph))
Rim Runout		
Axial	0.5 mm (0.02 in.)	1.5 mm (0.06 in.)
Radial	0.8 mm (0.03 in.)	1.5 mm (0.06 in.)
Final Drive		
Drive Chain Slack	2 ~ 12 mm (0.08 ~ 0.47 in.)	– – –
Drive Chain Wear (20-link length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Brakes		
Brake Fluid Grade	DOT4	– – –
Pad Lining Thickness	5.5 mm (0.203 in.)	1 mm (0.04 in.)
Brake Light Timing		
Front	ON after 10 mm (0.39 in.) lever travel	– – –
Rear	ON after 15 mm (0.59 in.) pedal travel	– – –
Electrical System		
Spark Plug Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in.)	– – –
Replacement Parts		
Coolant Capacity	1.7 L (1.8 US qt)	– – –
Engine Oil		
Grade	API SE, SF, SG or API SH or SJ with JASO MA	– – –
Viscosity	SAE10W-40	– – –

Specifications

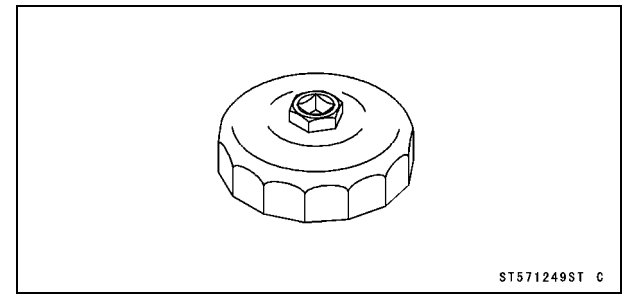
Item	Standard	Service Limit
Capacity		
when filter is not removed	2.8 L (3.0 US qt)	– – –
when filter is removed	3.0 L (3.2 US qt)	– – –
when engine is completely dry	3.4 L (3.6 US qt)	– – –

Special Tools

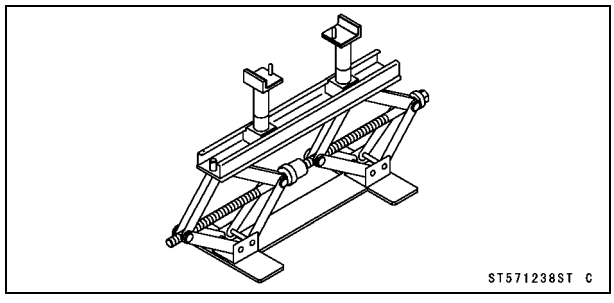
Steering Stem Nut Wrench:
57001-1100



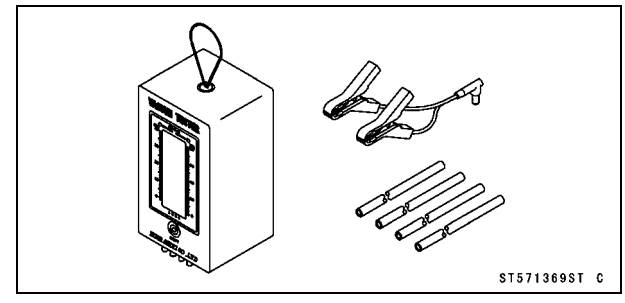
Oil Filter Wrench:
57001-1249



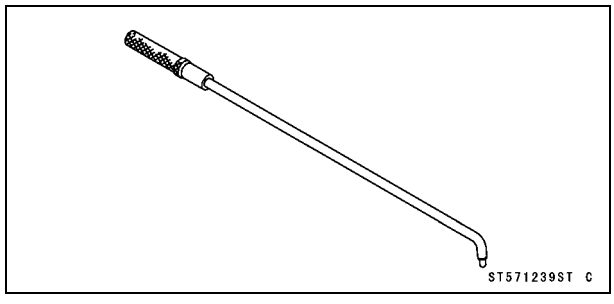
Jack:
57001-1238



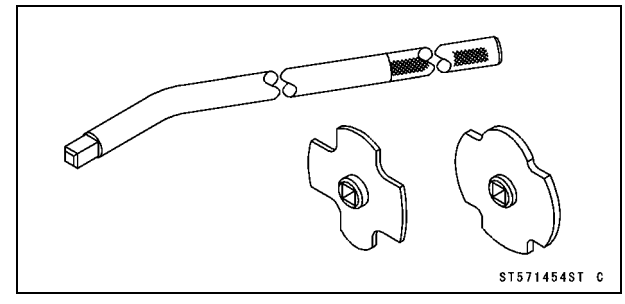
Vacuum Gauge:
57001-1369



Pilot Screw Adjuster, A:
57001-1239



Filler Cap Driver:
57001-1454



Maintenance Procedure

Fuel System

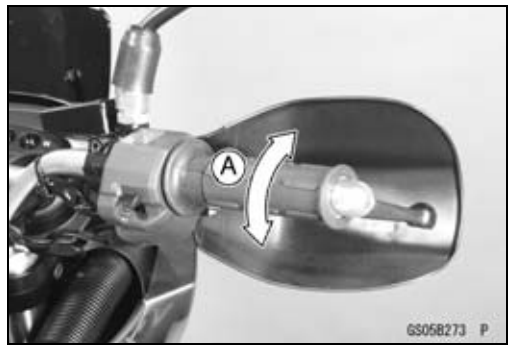
Throttle Cable Inspection

Throttle Grip Free Play Inspection

- Check throttle grip play [A] by lightly turning the throttle grip back and forth.

★If the free play is improper, adjust the throttle cable.

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



- Check that the throttle grip moves smoothly from full open to close, and the throttle closes quickly and completely in all steering positions by the return spring.

★If the throttle grip does not return properly, check the throttle cable routing, grip free play, and cable damage. Then lubricate the throttle cable.

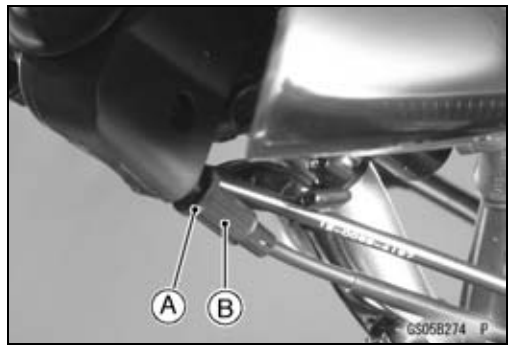
- Run the engine at the idle speed, and turn the handlebar all the way to the right and left to ensure that the idle speed does not change.

★If the idle speed increase, check the throttle cable free play and the cable routing.

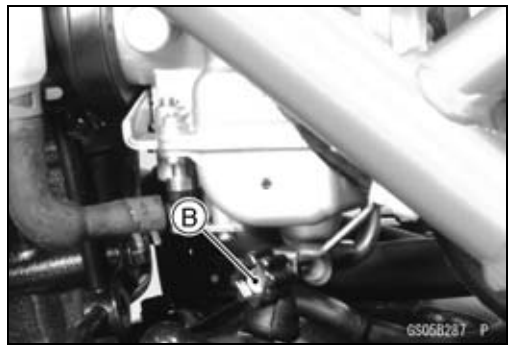
Throttle Grip Free Play Adjustment

★If the free play is incorrect, loosen the locknut [A] and turn the adjuster [B] of the accelerator cable until the 2 ~ 3 mm (0.08 ~ 0.12 in.) of throttle grip play is obtained.

- Tighten the locknut against the adjuster securely.



- Check that the throttle pulley [A] stops against the idle adjusting screw [B] with the throttle grip closed.



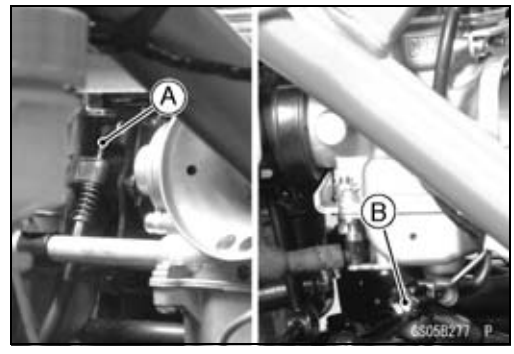
Maintenance Procedure

★If the play can not be adjusted by using the adjuster at the throttle grip, use the adjuster [A] of the decelerator cable under the fuel tank.
- Screw in the adjuster fully at the throttle grip and tighten the locknut.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System chapter).

○Make the necessary free play adjustment at the lower cable end.

- Check that the throttle pulley stops [A] against the idle adjusting screw [B], with the throttle grip released and stops against the carburetor stopper with the throttle grip opened.
- Turn the handlebar from side to side while idling the engine.

★If idle speed varies, the cable may be poorly routed or damaged.

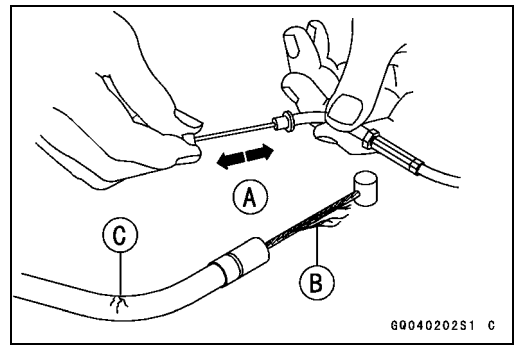


⚠ WARNING

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

Throttle Cable Inspection
- Remove both ends of the throttle cables.
- With the throttle 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.



Idle Speed Inspection

Idle Speed Inspection
- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides.

★If handlebar movement changes the idle speed, the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged. Be sure to correct any of these conditions before riding.

⚠ WARNING

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

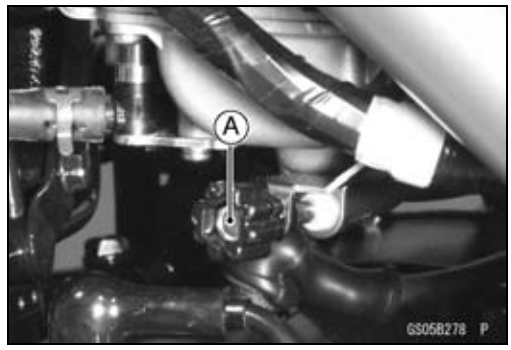
- Check idle speed.

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

Idle Speed
1 200 ±50 r/min (rpm)

Maintenance Procedure

Idle Speed Adjustment



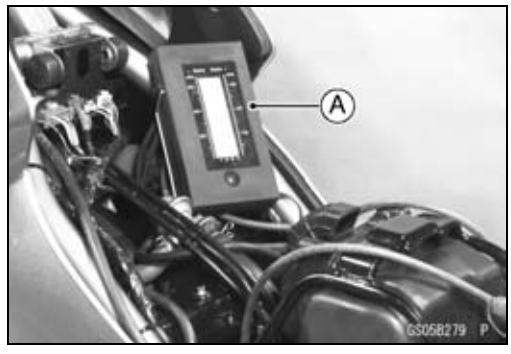
- Start the engine and warm it up thoroughly.
- Turn the adjusting screw [A] until idle speed is correct.

○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

Synchronization Inspection

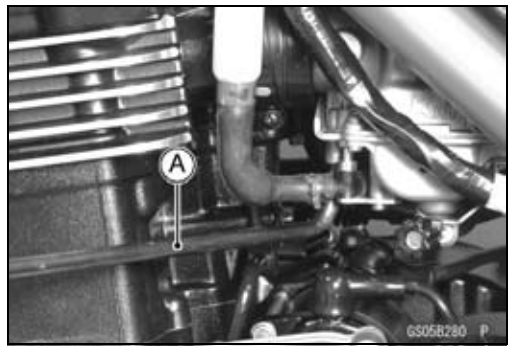
- Situate the motorcycle so that it is perpendicular to the ground.
- Remove the fuel tank and connect the auxiliary fuel tank to supply the fuel.
- Warm up the engine.
- Check idle speed and adjust if necessary.



- Pull the vacuum hoses off, and attach vacuum gauge [A] to the vacuum hose fittings on the carburetors.

Special Tool - Vacuum Gauge: 57001-1369

Synchronization Adjustment



○The pilot screw is set at the factory and should not be removed. But if necessary, check the pilot screw opening as follows.

- 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 (correct) position when assembling.

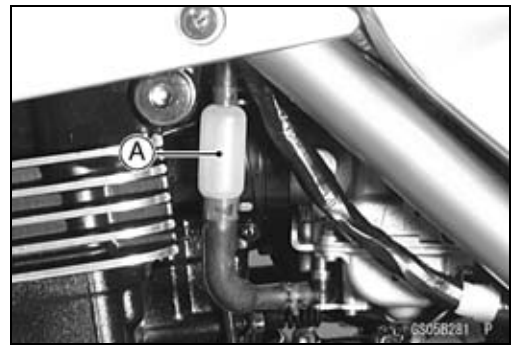
Special Tool - Pilot Screw Adjuster, C [A]: 57001-1239

NOTE

○*Each carburetor has different opening of the pilot screw. When setting the pilot screw, do not refer to the specifications which show mean opening of the pilot screws.*

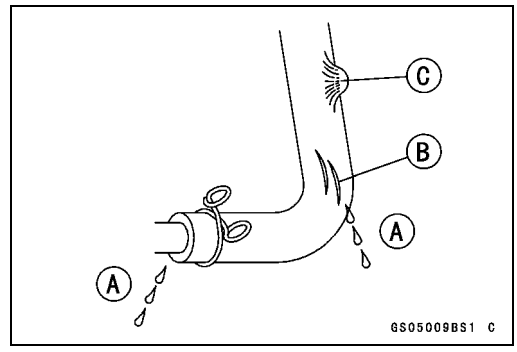
Maintenance Procedure

Coolant Filter Cleaning



○Before winter season starts, clean the coolant filter [A] in the carburetor system.
- Drain the coolant (see Coolant Draining).
- Remove the coolant filter from the cooling hoses in the carburetor system.
- Blow dirt and sediment off the filter with compressed air.

Fuel Hoses and Connections Check



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

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

★Replace the hose if it has been sharply bent or kinked.

Air Cleaner Element Cleaning and Inspection

NOTE

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

○*After riding through rain or on muddy roads, the element should be cleaned immediately.*

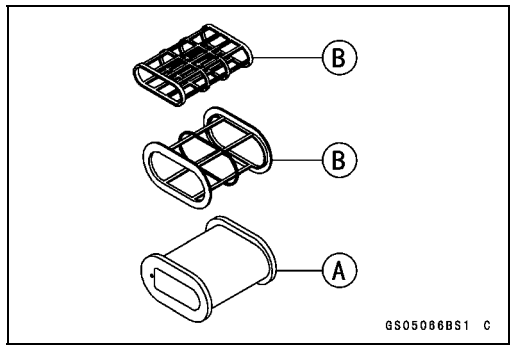
⚠ WARNING

Clean the element in a well-ventilated area, and make sure that there are no sparks or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or a low-flash point solvent to clean the element.

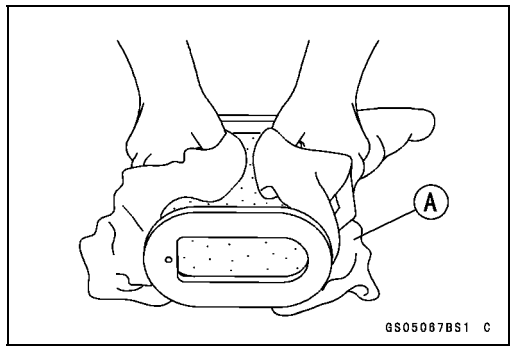
Maintenance Procedure

- Remove the element assembly from the air cleaner housing (see Air Cleaner Element Removal in the Fuel System chapter).
- Separate the element [A] from the element holders [B].
- Clean the element in a bath of high-flash point solvent, and then dry it with compressed air or by shaking it.
- Visually check the element for tear or breaks.

★If any of the parts of the element are damaged, replace them with a new one.



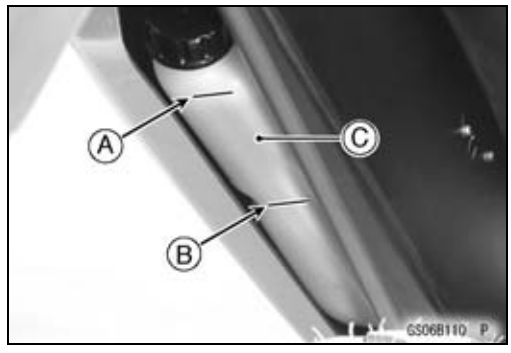
- After cleaning of the element, saturate it with high quality form air filter oil and squeeze out excess oil.
- Wrap the element [A] in a clean rag [B] and squeeze it as dry as possible.
- Assemble the element with the holders, and install them into the air cleaner housing.



Cooling System

Coolant Level Inspection

- Situate the motorcycle so that it is perpendicular to the ground.
- Check the level through the coolant level gauge on the reservoir tank [C]. The coolant level should be between the "H" (High) [A] and the "L" (Low) [B] level lines.



NOTE

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

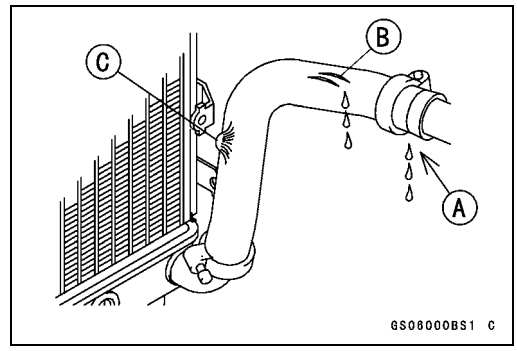
★If the coolant level is lower than the "L" (Low) level line, add coolant to the "F" (Full) level line.

CAUTION

For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days. If coolant must be added often, or the reserve tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks (see Visual Leak Inspection, and Cooling System Pressure Testing).

Maintenance Procedure

Radiator Hoses and Connections Inspection



○The high pressure inside the radiator hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained. Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

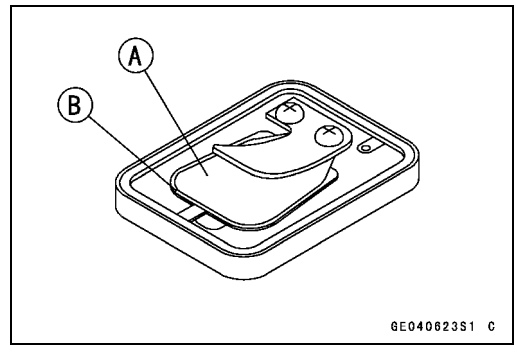
★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.

● Check that the hoses are securely connected and clamps are tightened correctly.

Torque - Radiator Hose Clamp Screws: 2.5 N·m (0.25 kgf·m, 22 in·lb)

Engine Top End

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, heat damage, or other damage.

★If there is any doubt as to the condition of the reed, replace the air suction valve as an assembly.

● Check the reed contact areas [B] of the valve holder for grooves, scratches, any signs of separation from the holder, or heat damage.

★If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.

● If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly 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.

Valve Clearance Inspection

Valve Clearance Inspection

NOTE

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

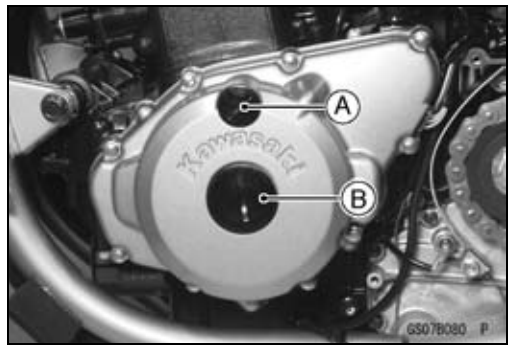
● Remove the cylinder head cover (see Cylinder Head Cover Removal in the Engine Top End chapter).

● Remove the cylinder head oil pipes (see Cylinder Head Oil Pipe Removal in the Engine Top End chapter).

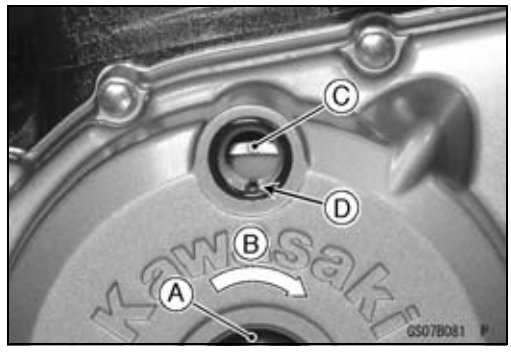
Maintenance Procedure

● Unscrew the upper [A] and lower [B] caps on the alternator cover.

Special Tool - Filler Cap Driver: 57001-1454

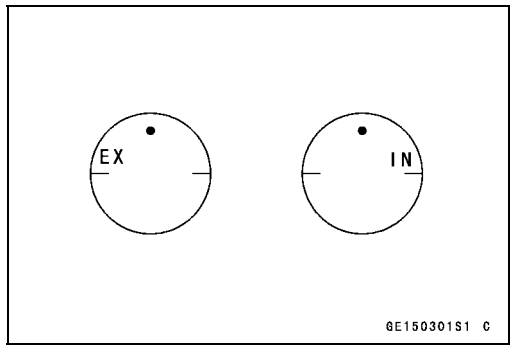


● Check the valve clearance when the pistons are at TDC.
○The pistons are numbered beginning with the engine left side.
● Using a wrench on the crankshaft rotation bolt [A], turn the crankshaft clockwise [B] until the "C" mark [C] on the rotor is aligned with the notch [D] in the edge of the upper hole in the alternator cover for #2 piston and "T" mark for #1 piston.



○Measure the valve clearance of the valves for which the cam lobe is pointing away from the rocker arm.
● Each piston has two inlet and two exhaust valves. Measure these two inlet or exhaust valves at the same crankshaft position.

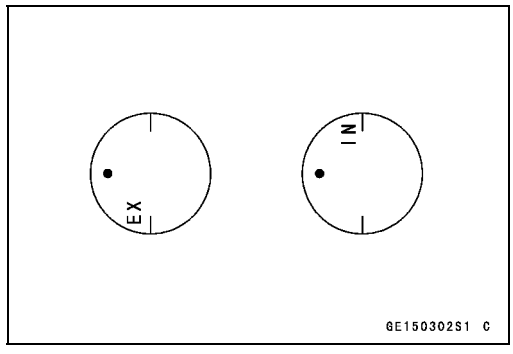
Valve Clearance Measuring Position
#2 Piston TDC at End of Compression Stroke →
Inlet valve clearances of #2 piston, and
Exhaust valve clearances of #2 piston



NOTE

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

Valve Clearance Measuring Position
#1 Piston TDC at End of Compression Stroke →
Inlet valve clearances of #1 piston, and
Exhaust valve clearances of #1 piston

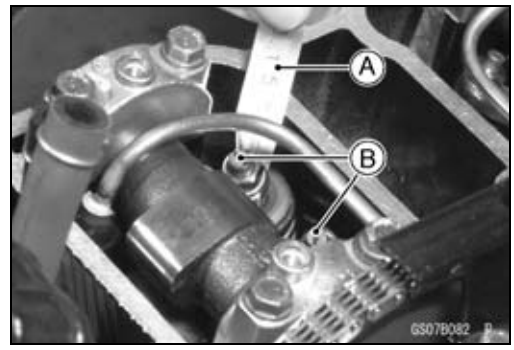


Maintenance Procedure

- Measure the clearance of each valve by inserting a thickness gauge [A] between the adjusting screw [B] and the valve stem.

Valve Clearance (when cold)

Inlet	**0.13 ~ 0.18 mm (0.0051 ~ 0.0071 in.)**
Exhaust	**0.18 ~ 0.23 mm (0.0070 ~ 0.0090 in.)**



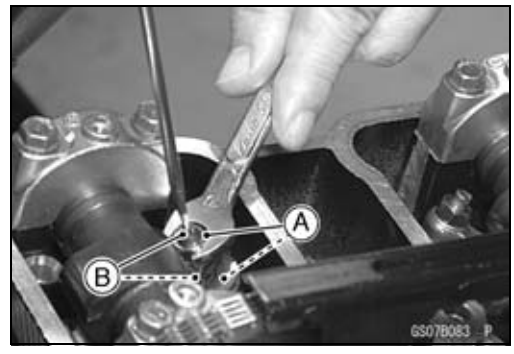
Valve Clearance Adjustment

★If the valve clearance is incorrect, loosen the locknut [A] and turn the adjusting screw [B] until the correct clearance is obtained.

- Tighten the locknut.

Torque - Valve Adjuster Locknuts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install the two caps on the alternator cover.



Clutch

⚠ WARNING

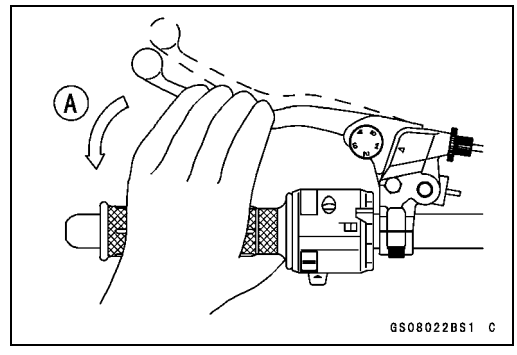
To avoid a serious burn, never touch the engine or exhaust pipe during clutch adjustment.

Clutch Operation Inspection

Clutch Operation Inspection

- With the engine idling, make sure that there is no noise or abnormally heavy feeling when pulling [A] in the clutch lever fully. Also, make sure that the shift lever operates smoothly.
- When moving off the motorcycle by releasing the clutch lever gradually, make sure that the clutch does not slip and that the clutch engages smoothly.

★If the clutch operation is insufficiency, inspect the clutch system.



⚠ WARNING

When inspecting by running the vehicle, note a surrounding traffic situation enough in the place of safety.

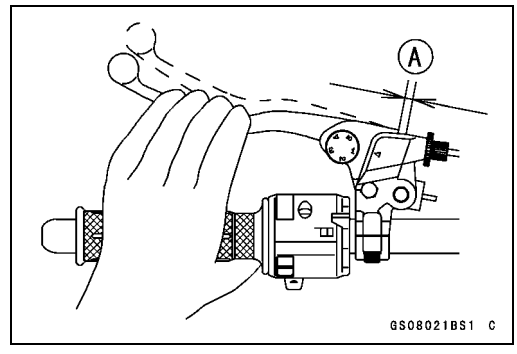
Clutch Lever Free Play Inspection

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

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

Clutch Lever Free Play

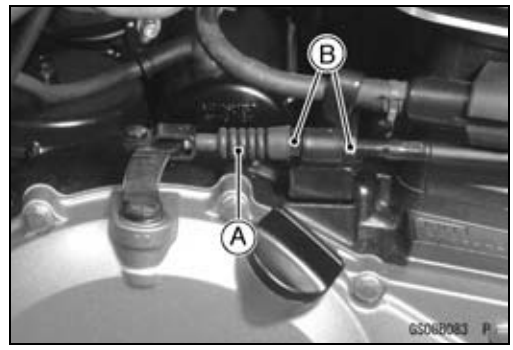
Standard:	**2 ~ 3 mm (0.08 ~ 0.12 in.)**



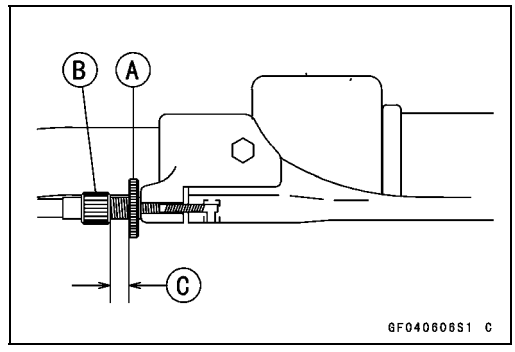
Maintenance Procedure

Clutch Lever Free Play Adjustment

- Slide back the dust cover [A].
- Loosen both adjuster nuts [B] at the right hand crankcase as far as they will go.



- Loosen the knurled locknut [A] at the clutch lever.
- Turn the adjuster [B] so that 5 ~ 6 mm (0.20 ~ 0.24 in.) [C] of threads are visible.



⚠ WARNING

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

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

Wheels/Tires

Air Pressure Inspection/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.

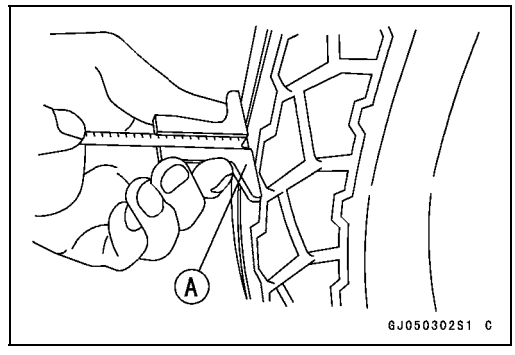
Air Pressure (when cold)

Front	150 kPa (1.5 kgf/cm², 21 psi)
Rear	225 kPa (2.25 kgf/cm², 32 psi)

Tire Tread Wear Inspection

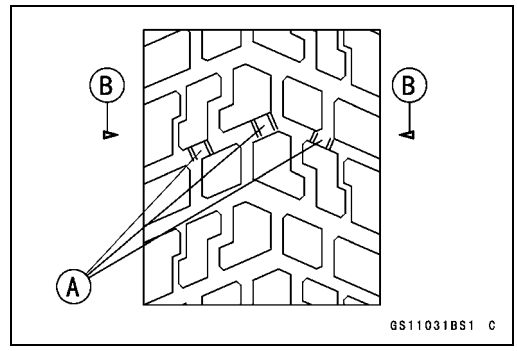
As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald.

- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.



Maintenance Procedure

Wear Indicator [A]
Wear Indicator Position Mark [B]



★If any measurement is less than the service limit, replace the tire.

Tread Depth

Front	**DUNLOP**	**BRIDGESTONE**
Standard	**6.9 mm (0.27 in.)**	**6.0 mm (0.24 in.)**
Service Limit	**1 mm (0.04 in.)**	
Rear	**DUNLOP**	**BRIDGESTONE**
Standard	**8.8 mm (0.35 in.)**	**8.5 mm (0.33 in.)**
Service Limit	**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.
Use the same manufacturer's tires on both front and rear wheels.

NOTE

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

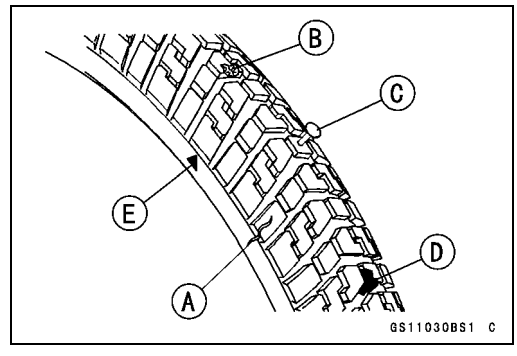
Wheel/Tire Damage Inspection

- Remove any imbedded stones [D], nail [C] or other foreign particles from the tread.

Wear Indicator [E]

- Visually inspect the tire for cracks [A] and cuts [B], and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.

★If any damage is found, replace the wheel if necessary.



Maintenance Procedure

Wheel Bearing Damage Inspection

- Using a jack and attachment, raise the front wheel off the ground (see Wheels/Tires chapter).
- Turn the handlebar all the way to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the front wheel and inspect the wheel bearing (see Hub Bearing Inspection in the Wheels/Tires chapter).

Spoke Tightness and Rim Runout Inspection

Spoke Tightness Inspection

- Check whether all the spokes are uniformly tightened.

★Uniformly tighten the spokes if any spoke is loose or unevenly tightened.

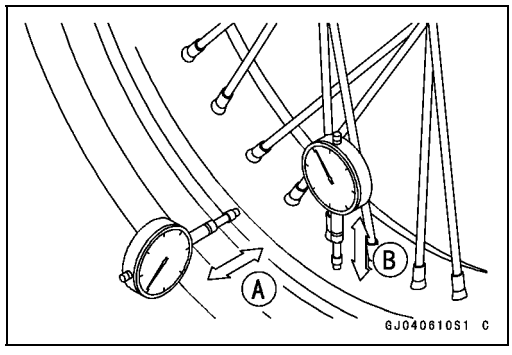
Torque - Spoke Nipple: 3.0 N·m (0.3 kgf·m, 26 in·lb)
(On and after EJ650-A3/C3): 5.1 N·m (0.52 kgf·m, 45 in·lb)

- Inspect the rims.

⚠ WARNING

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

Rim Runout Inspection



- Raise the front/rear wheel of the ground.

Special Tool - Jack: 57001-1238

- Check the rim for damage or warpage.

★If there is any damage to the rim, replace the rim.

- Measure the radial [A] and axial [B] rim runout by placing a dial gauge against the sides and the outer circumference of the rim, and slowly rotating the wheel.

Rim Runout (with tire installed)

Standard:	
Axial Runout	**0.5 mm (0.02 in.)**
Radial Runout	**0.8 mm (0.03 in.)**
Service Limit:	
Axial Runout	**1.5 mm (0.06 in.)**
Radial Runout	**1.5 mm (0.06 in.)**

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

⚠ WARNING

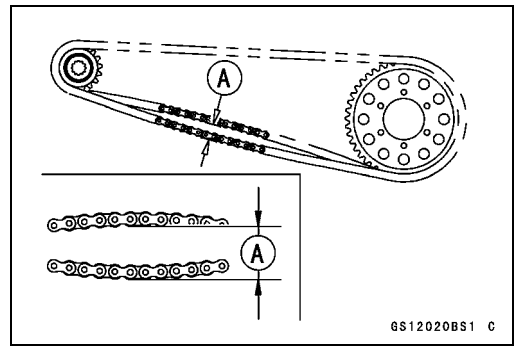
Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new part.

Maintenance Procedure

Final Drive

Drive Chain Slack Inspection

Drive Chain Slack Inspection



NOTE

○*Check the slack with the motorcycle setting on its side stand.*

○*Clean the chain if it is dirty, and lubricate it if it appears dry.*

- Check the wheel alignment (see Wheel Alignment Inspection/Adjustment).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the sprockets.

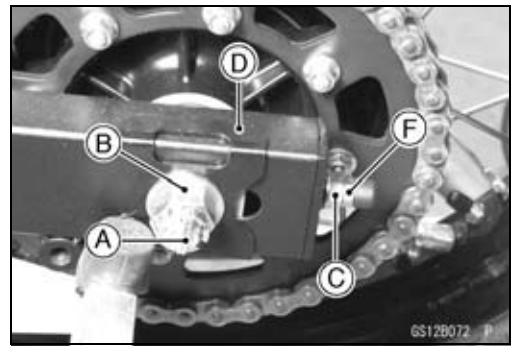
★If the chain slack exceeds the standard, adjust it.

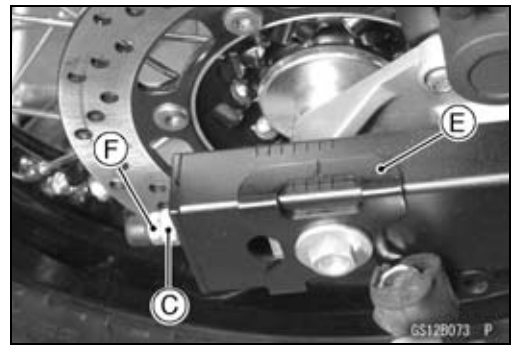
Chain Slack

Standard: 35 ~ 45 mm (1.4 ~ 1.8 in.)

Drive Chain Slack Adjustment

- Remove:
  Cotter Pin [A]
- Loosen:
  Axle Nut [B]
  Chain Adjuster Locknuts [F] (both sides)
- Turn the chain adjusting nuts [C] forward or rearward until the drive chain has the correct amount of chain slack. To keep the chain and wheel properly aligned, the left adjuster mark [D] position should align with the same graduation that the right adjuster mark [E] position aligns with.





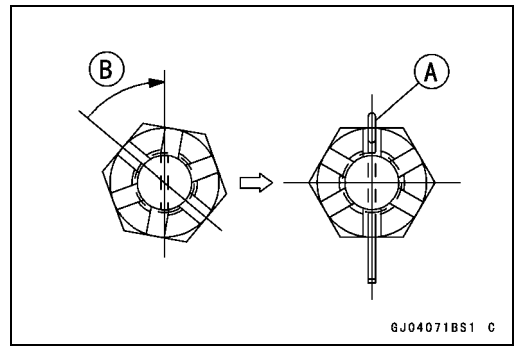
⚠ WARNING

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 (see Front/Rear Wheel Installation in the Wheels/Tires chapter).

Torque - Rear Axle Nut: 108 N·m (11 kgf·m, 80 ft·lb)

- Insert a the new cotter pin [A].



NOTE

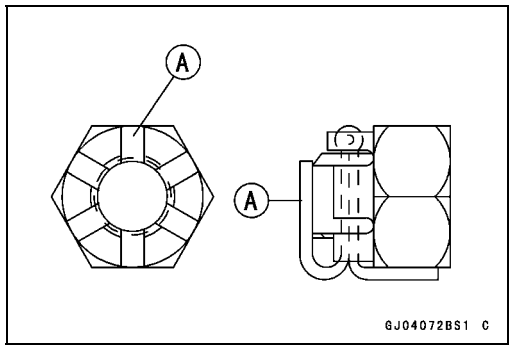
○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle shaft, tighten the nut clockwise [A] up to next alignment.*

○*It should be within 30 degree.*

○*Loosen once and tighten again when the slot goes past the nearest hole.*

Maintenance Procedure

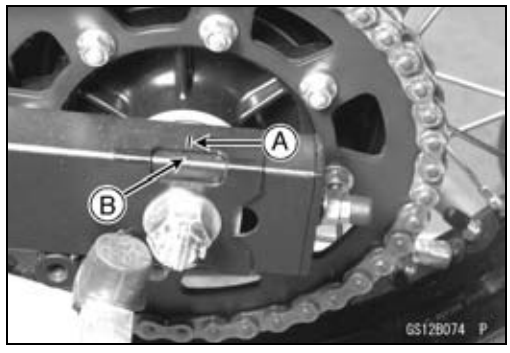
● Bend the cotter pin [A] over the nut.



● Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
● Check the rear brake.

Wheel Alignment Inspection/Adjustment

● Check that the left adjuster mark [A] position should align with the same graduation [B] that the right adjuster mark position aligns with.
★If they do not, adjust the chain slack and align the wheel alignment.



NOTE

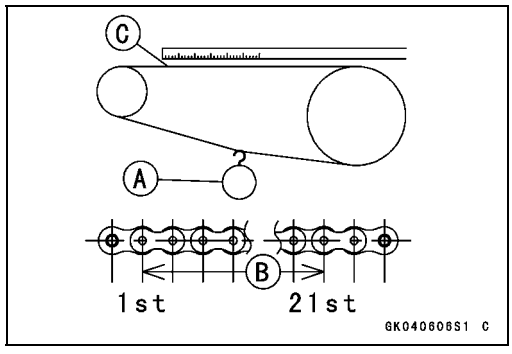
○*Wheel alignment can also be checked using the straightedge or string method.*

⚠ WARNING

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

Drive Chain Wear Inspection

● Remove:
Chain Cover
● Rotate the rear wheel to inspect the drive chain for damaged rollers, loose pins and links.
★If there is any irregularity, replace the drive chain.
★Lubricate the drive chain if it appears dry.
● Stretch the chain taut by hanging a 98 N (10 kg, 20 lb) weight [A] on the chain.
● Measure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.
★If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.



Drive Chain 20-link Length

Standard:	**317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)**
Service Limit:	**323 mm (12.7 in.)**

Maintenance Procedure

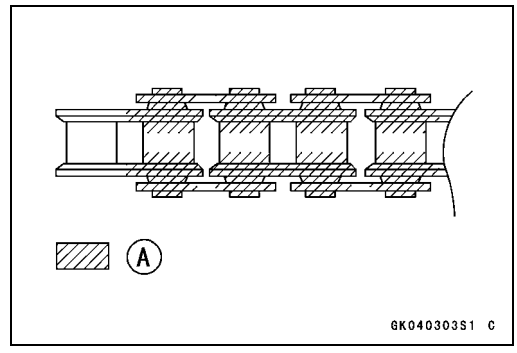
⚠ WARNING

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 safely, use only the standard chain. It is an endless type and should not be cut for installation.

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.

[A] Apply oil



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.
Blow the chain dry with compressed air immediately after cleaning.
Complete cleaning and drying the chain within 10 minutes.

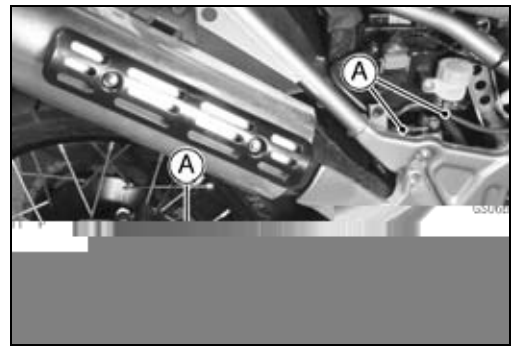
- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.

Brakes

Brake Fluid Leak (Brake Hose and Pipe) Inspection

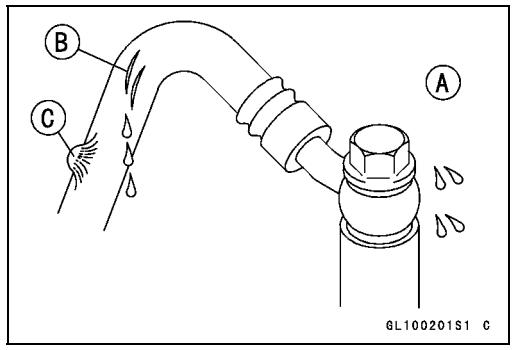
- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A] and fittings.

★If the brake fluid leaked from any position, inspect or replace the problem part.



Maintenance Procedure

Brake Hose Damage and Installation Condition Inspection



- Inspect the brake hose and fittings for deterioration, cracks and signs of leakage.

○The high pressure inside the brake line can cause fluid to leak [A] or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace the hose if any cracks [B] or bulges [C] are noticed.

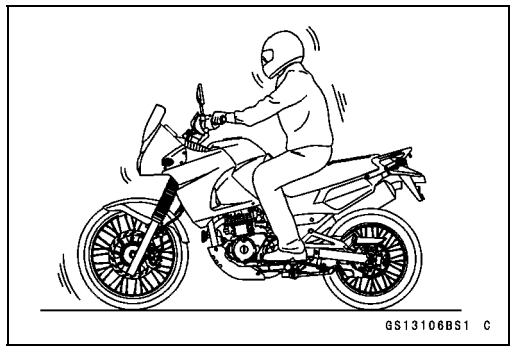
★Tighten any loose fittings and any banjo bolts.

Torque - Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Inspect the brake hose routing.

★If any brake hose routing is incorrect, route the brake hose according to Cable, Wire and Hose Routing Section in the Appendix chapter.

Brake Operation Inspection



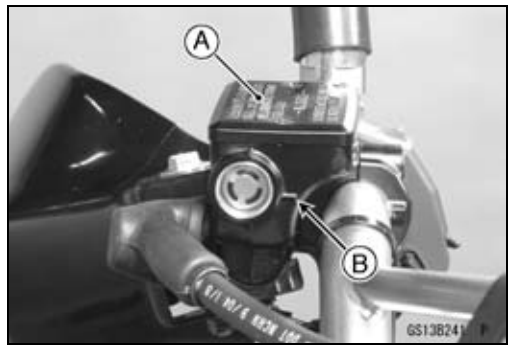
- Inspect the operation of the front and rear brake by running the vehicle on the dry road.

★If the brake operation is insufficiency, inspect the brake system.

⚠ WARNING

When inspecting by running the vehicle, note a surrounding traffic situation enough in the place of safety.

Brake Fluid Level Inspection

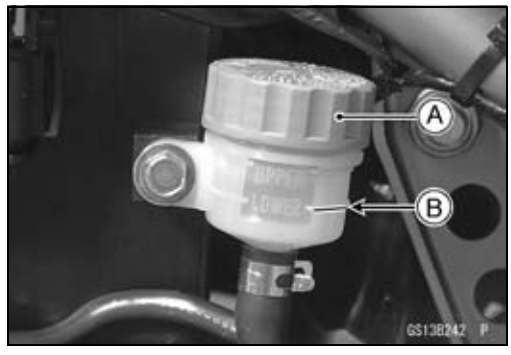


- Check that the brake fluid level in the front/rear brake reservoirs [A] is above the lower level line [B].

NOTE

○*Hold the reservoirs horizontal by raising the motorcycle perpendicular to the ground when checking brake fluid level.*

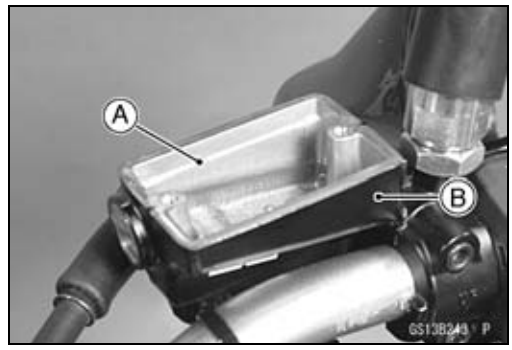
Special Tool - Jack: 57001-1238



- Remove the right side cover.

Maintenance Procedure

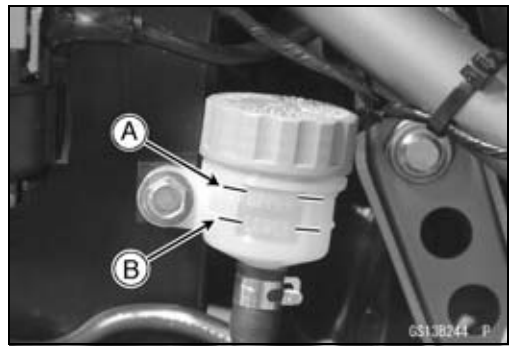
★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [A] in the reservoir [B].



⚠ WARNING

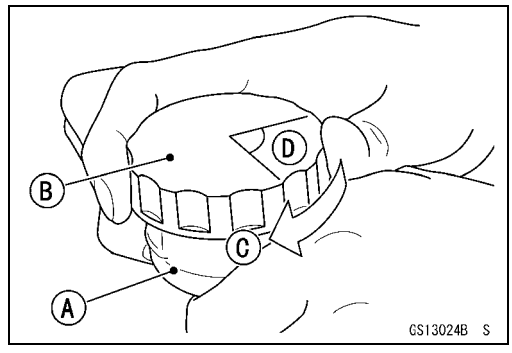
Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter.

Recommended Disc Brake Fluid
Grade: DOT4



★If the rear brake reservoir cap is open to fill the brake fluid, follow the procedure below to install the cap correctly.

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



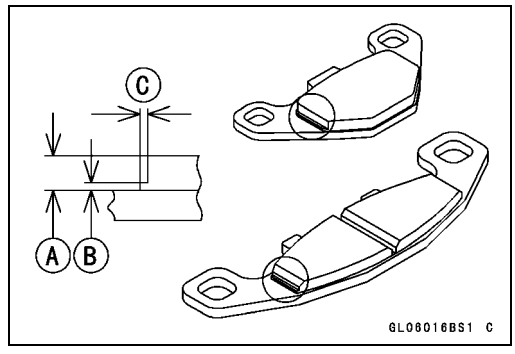
Brake Pad Wear Inspection

In accordance with the Periodic Maintenance Chart, inspect the brake pads for wear.

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

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

Stepped Portion [C]



Pad Lining Thickness
Standard: 5.15 mm (0.203 in.)
Service Limit: 1 mm (0.04 in.)

Maintenance Procedure

Brake Light Switch Operation Inspection

Front Brake Light Timing Inspection

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

Rear Brake Light Timing Inspection

- Turn on the ignition switch.
- Check the operation of the rear brake light switch by depressing the brake pedal. The brake light should go on as specified.

★If it does not, adjust the brake light timing.

Brake Light Timing

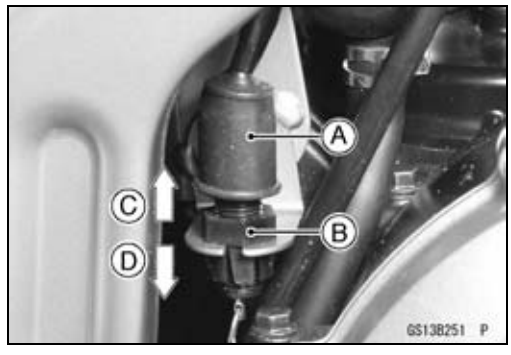
Standard: On after about 15 mm (0.59 in.) pedal travel [A]

Rear Brake Light Timing Adjustment

Brake light timing is adjusted by changing the position of the rear brake light switch [A].

- Adjust the position of the switch so that the brake light goes on after the specified pedal travel by turning the adjusting nut [B].

[C] Lights sooner.
[D] Lights later.



CAUTION

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

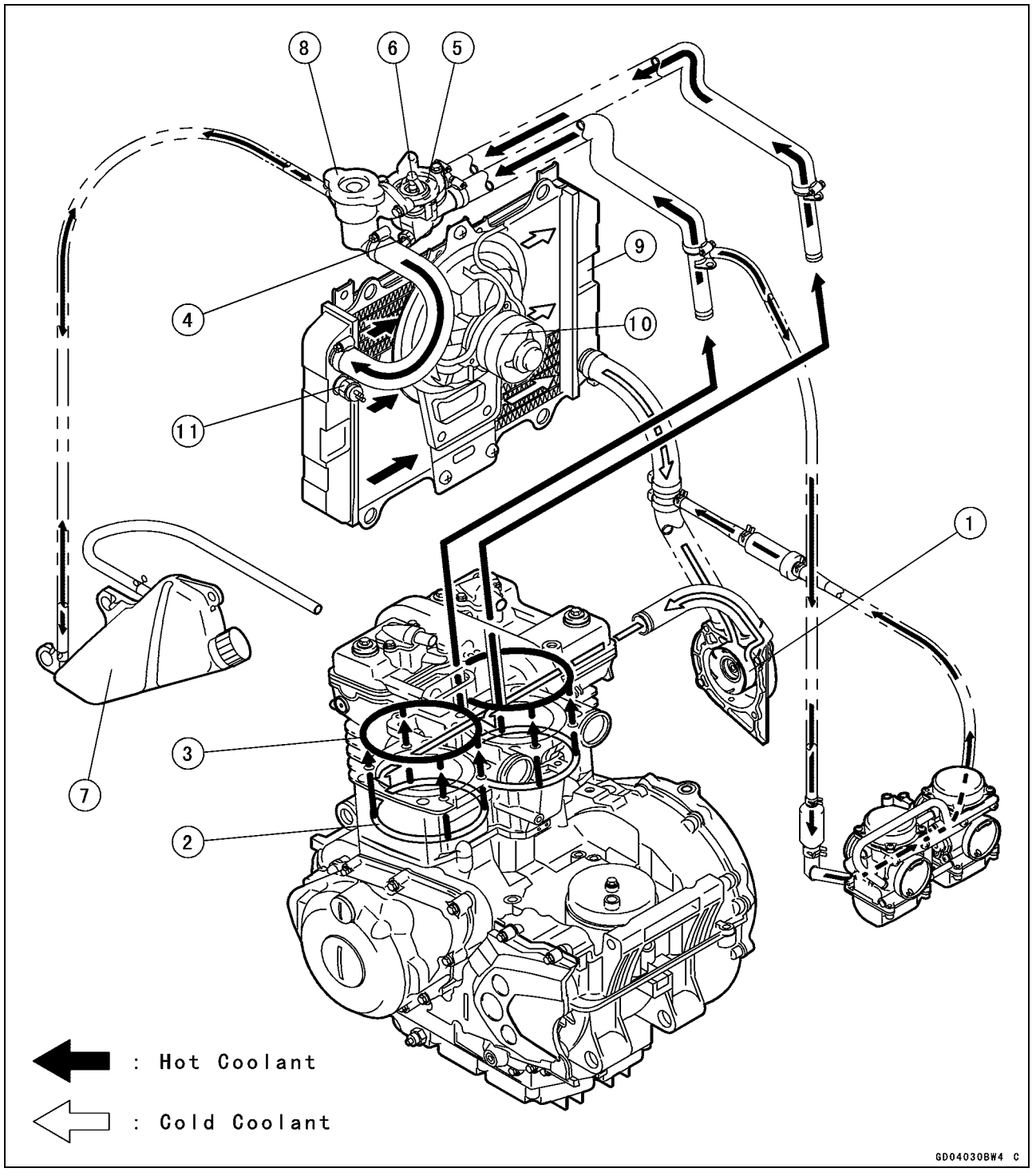
Suspension

Front Forks/Rear Shock Absorber Operation Inspection

- Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.

★If the forks do not smoothly or noise is found, inspect the fork oil level or fork clamps (see Front Fork Oil Change in the Suspension chapter).

Coolant Flow Chart



1. Water Pump (driven by balancer shaft)
2. Cylinder Jacket
3. Cylinder Head Jacket
4. Water Temperature Switch
5. Air Bleeder Hole
6. Thermostat
7. Reserve Tank
8. Radiator Cap
9. Radiator
10. Radiator Fan
11. Radiator Fan Switch

Coolant

Coolant Deterioration Inspection

- Visually inspect the coolant in the reservoir tank.

○If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case flush the cooling system.

○If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

Coolant Level Inspection

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

Coolant Draining

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

Coolant Filling

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

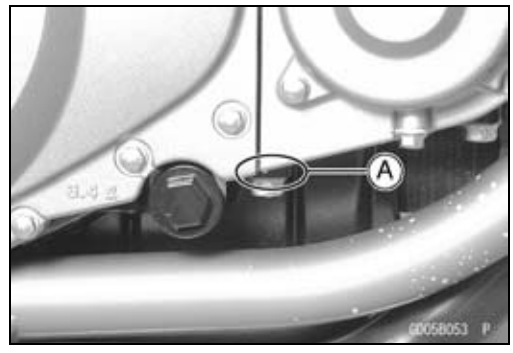
Visual Leak Inspection

Any time the system slowly loses water, inspect for leaks.

- Check the water pump body drainage outlet passage [A] for coolant leaks.

★If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the mechanical seal.

★If there are no apparent leaks, pressure test the system.

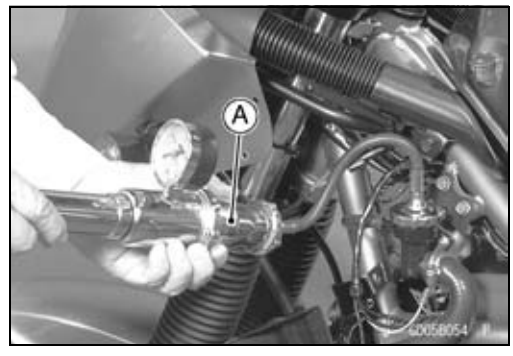


Cooling System Pressure Testing

CAUTION

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kgf/cm², 18 psi).

- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the radiator cap, and install a cooling system pressure tester [A] on the radiator filler neck.



NOTE

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

- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kgf/cm², 18 psi).
- Watch the gauge for at least 6 seconds. If the pressure holds steady, the system is all right.

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the cylinder liner O-rings.

- Remove the pressure tester, replenish the coolant, and install the radiator cap.

Coolant

Flushing

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

- Drain the cooling system.
- Fill the cooling system with fresh water mixed with a flushing compound.

CAUTION
Avoid the use of a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see Coolant Change in the Periodic Maintenance chapter).

Coolant Filter Cleaning

- Refer to the Coolant Filter Cleaning in the Periodic Maintenance chapter.

Coolant Valve Inspection

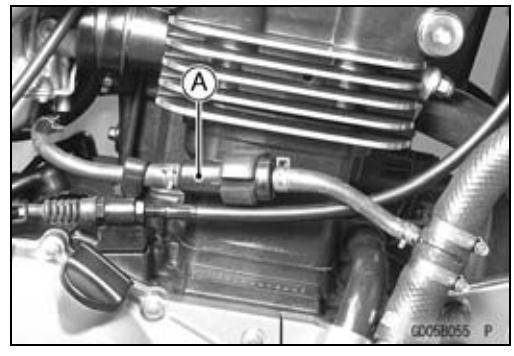
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the coolant valve on the engine right side.

- Inspect the coolant valve [A] at room temperature.

★If the valve is closed, replace the valve with a new one.

○To check valve opening, just blow through the valve.

Valve Closing Temperature (for reference)
Standard: 70°C (158°F) or more at 25 kPa (0.25 kgf/cm², 3.6 psi)

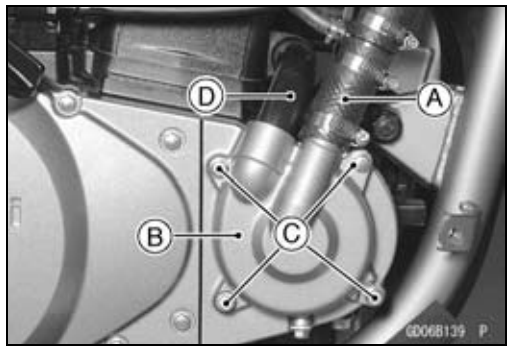


Water Pump

Water Pump Removal

- Drain the coolant.
- Remove the engine guard (see Engine Guard Removal in the Frame chapter)

- Loosen the clamp and remove the radiator hose [A] from the water pump cover [B].
- Remove the four cover bolts [C].
- With the water pipe [D] attached, remove the water pump cover.

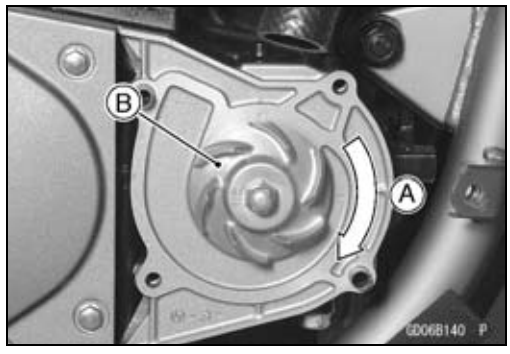


- Install the right footpeg assembly.

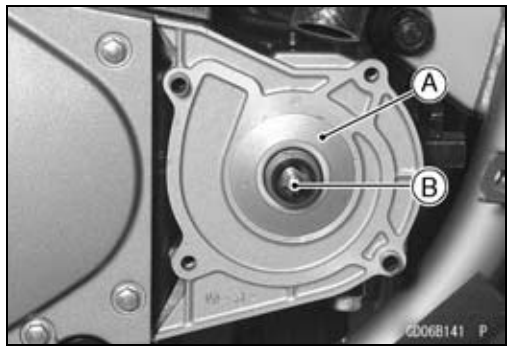
NOTE

○*The impeller and water pump shaft have a left-handed thread, therefore they must be turned clockwise [A] to remove.*

- Shift the transmission into 1st gear.
- While applying the rear brake, remove the impeller [B].



- Pull the water pump housing [A] and gasket out of the right crankcase.
- Turn the water pump shaft [B] clockwise, and remove it.



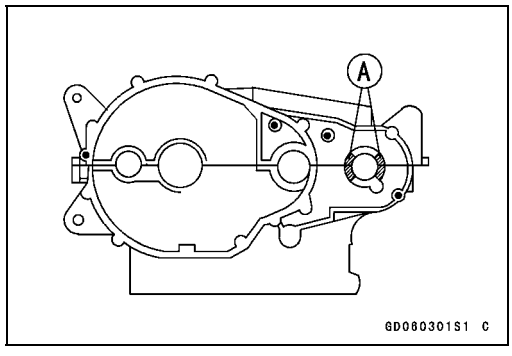
Water Pump Installation

- When installing the water pump shaft or impeller, shift the transmission into 1st gear and apply the rear brake.
- Apply silicone sealant to the area [A] where the mating surface of the crankcase contacts the water pump housing gasket.

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

- Apply high temperature grease to the lips of the water pump housing oil seal.
- Turn the water pump shaft or impeller counterclockwise, and tighten them.

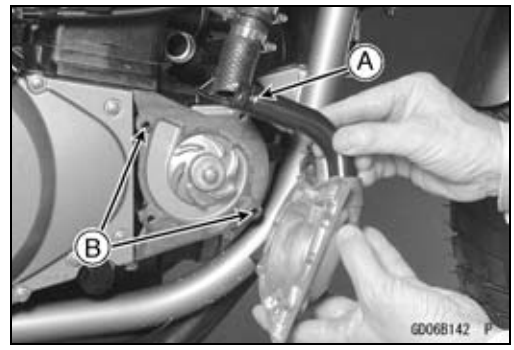
Torque - Water Pump Shaft: 25 N·m (2.5 kgf·m, 18 ft·lb)
Water Pump Impeller: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Water Pump

- Be sure to install the water pipe O-rings [A], and apply high temperature grease to them.
- Install the water pump cover with the water pipe, being careful of the two knock pins [B].

Torque - Water Pump Cover Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)



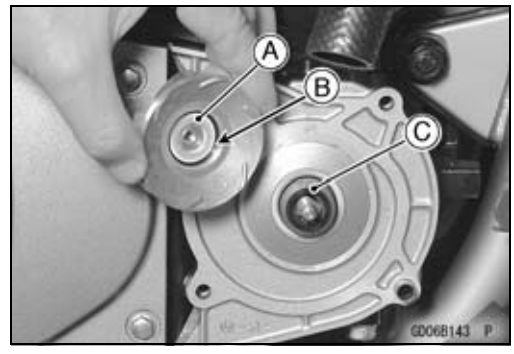
Mechanical Seal Inspection

- Visually inspect the mechanical seal.

★If any one of the parts is damaged, replace the mechanical seal as a unit.

○The sealing seat and rubber seal may be removed easily by hand.

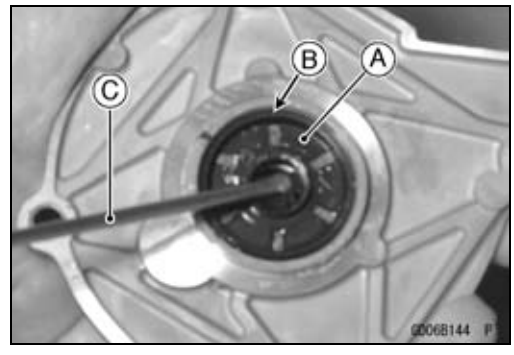
[A] Impeller Sealing Seat Surface
[B] Rubber Seal
[C] Mechanical Seal Diaphragm



Water Pump Housing Disassembly

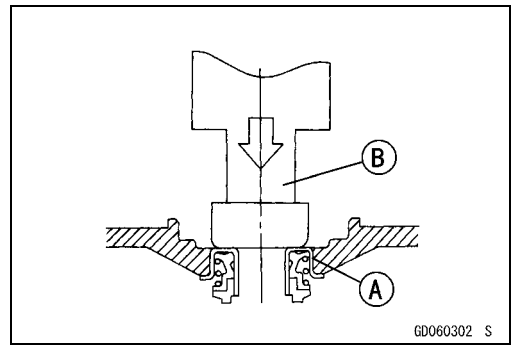
CAUTION
Be careful not to damage the sealing surface of the mechanical seal.

- Take the oil seal [A] out of the housing [B] with a hook [C].



- Press the mechanical seal [A] out of the housing with a bearing driver [B].

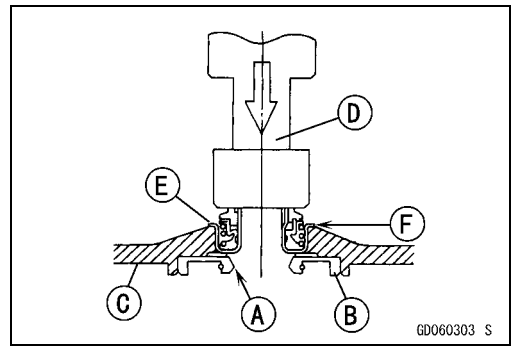
Special Tool - Bearing Driver Set: 57001-1129



Water Pump Housing Assembly

- Apply a high temperature grease [A] to the oil seal [B].
- Press the oil seal into the housing with a bearing driver until it stops at the bottom surface of the housing [C].
- Press the mechanical seal into the housing with a bearing driver [D] until its flange [E] touches the surface [F] of the housing.

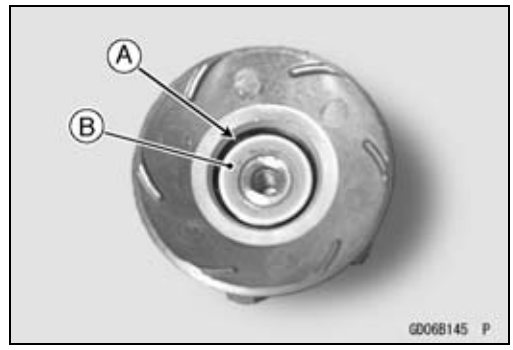
Special Tool - Bearing Driver Set: 57001-1129



Water Pump

Impeller Assembly

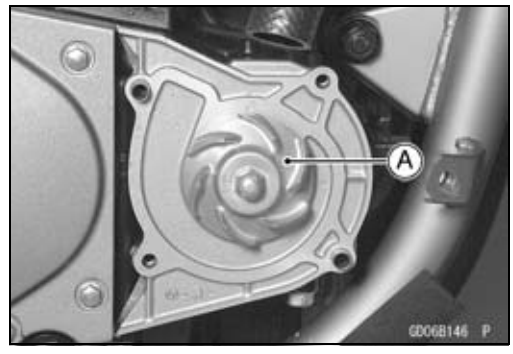
- Clean the sliding surface of the mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rubber seal [A] and sealing seat [B], and install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.



Pump Impeller Inspection

- Visually check the impeller [A].

★If the surface is corroded, or if the blades are damaged, replace the impeller.



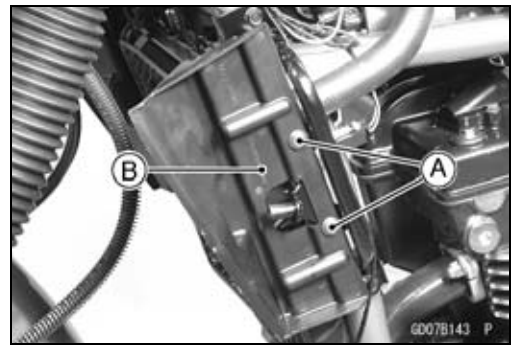
Radiator, Radiator Fan

⚠ WARNING

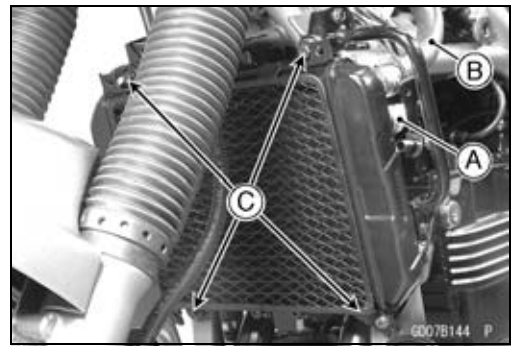
The radiator fan is connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE RADIATOR FAN CONNECTOR IS DISCONNECTED. TOUCHING THE FAN BEFORE THE CONNECTOR IS DISCONNECTED COULD CAUSE INJURY FROM THE FAN BLADES.

Radiator Removal

- Drain the coolant.
- Remove:
  Both Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Both Radiator Cover Screws [A] and Radiator Covers [B]

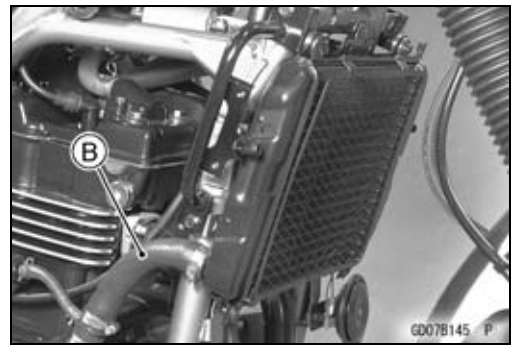


- Disconnect:
  Radiator Fan Connector
  Radiator Fan Switch Connector [A]
  Radiator Hoses [B]
- Unscrew the radiator mounting bolts [C] and remove the radiator taking care not to damage the radiator core.



CAUTION

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

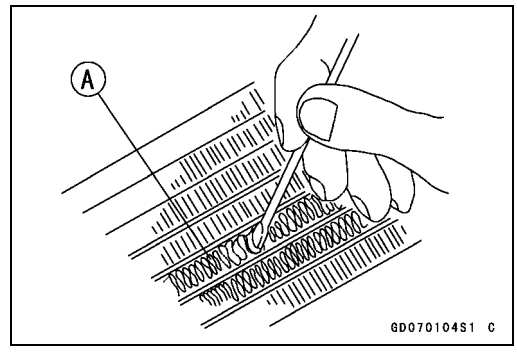


Radiator Inspection

- Check the radiator core.

★If there are obstructions to air flow, remove them.

★If the corrugated fins [A] are deformed, carefully straighten them with the blade of a thin screw driver.



CAUTION

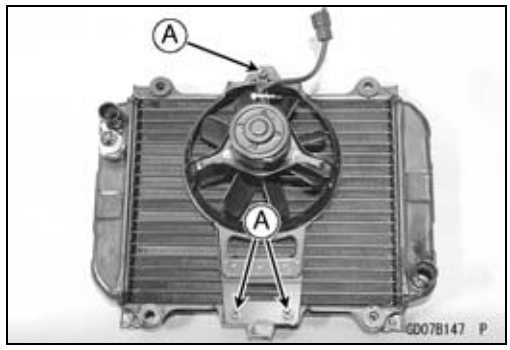
Do not tear the radiator tubes while straightening the fins.

★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparable deformed fins, replace the radiator with a new one.

Radiator, Radiator Fan

Radiator Fan Removal

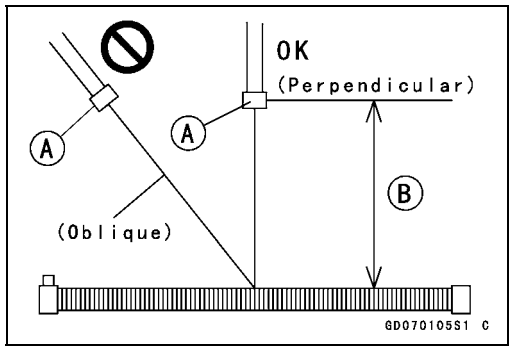
- Remove the radiator (see Radiator Removal).
- Remove the radiator fan mounting screws [A].



CAUTION

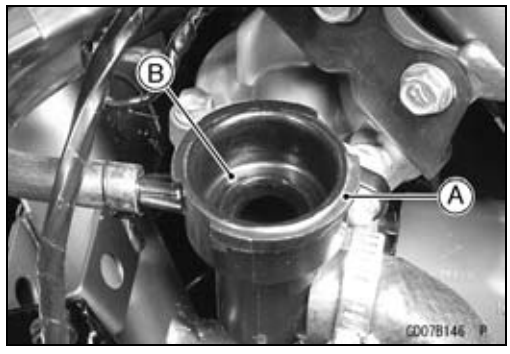
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage.

1) Keep the steam gun [A] away more than 0.5 m (20 in.) [B] from the radiator core.
2) Hold the steam gun perpendicular to the core surface.
3) Run the steam gun horizontally following the core fin direction. Running it vertically may damage the fin.



Filler Neck Inspection

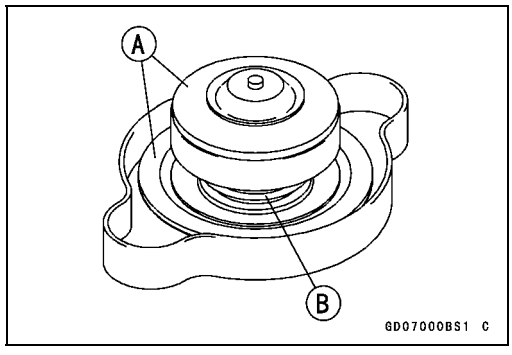
- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the frame chapter)
- Check the radiator filler neck for signs of damage.
- Check the condition of the top [A] and bottom sealing seats [B] in the filler neck. They must be smooth and clean for the radiator cap to function properly.



Radiator Cap Inspection

- Check the condition of the bottom and top valve seals [A], valve spring [B] of the radiator cap.

★If any one of them shows visible damage, replace the cap with a new one.



- Install the cap [A] on a cooling system pressure tester [B].

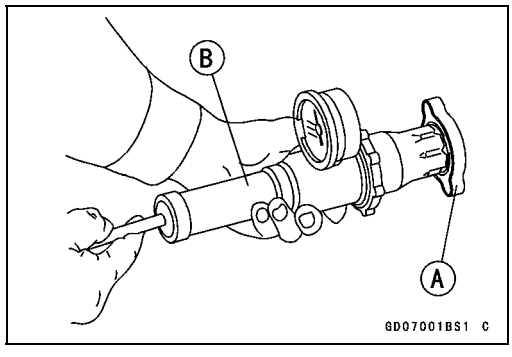
NOTE

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

- Watching the pressure gauge, slowly pump the pressure tester to build up the pressure. The relief valve must open within the relief pressure range as shown below. The gauge hand must remain at least 6 seconds between the lowest relief pressure and the valve opened pressure.

Radiator Cap Relief Pressure
Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 14 ~ 18 psi)

★If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.



Radiator, Radiator Fan

Radiator Hose and Connection Inspection

- Refer to the Radiator Hoses and Connections Inspection in the Periodic Maintenance chapter.

Radiator Hose, Pipe, Air Vent Hose, Reservoir Tank Hose Installation

- Install the radiator hoses. Avoid sharp bending, kinking, flattening, or twisting.
- Tighten the hose clamps securely.

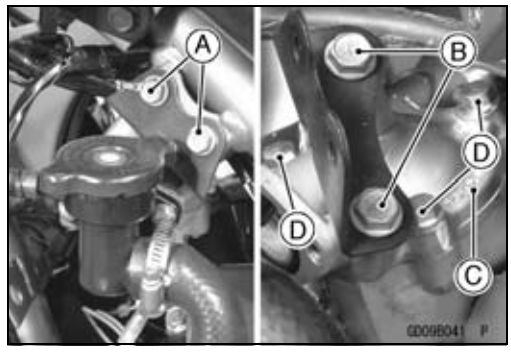
Torque - Radiator Hose Clamp Screws: 2.5 N·m (0.25 kgf·m, 22 in·lb)

- Route the air vent hose, radiator hoses, pipes and reservoir tank hose (see Cable, Wire, and Hose Routing in the Appendix chapter).

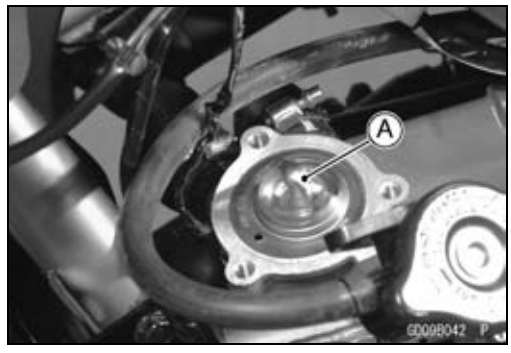
Thermostat

Thermostat Removal

- Drain the coolant.
- Remove the left lower fairing (see Lower Fairings Removal in the Frame chapter).
- Turn the handlebar to right side fully.
- Remove the radiator filler mounting bolts [A].
- Remove the thermostat housing mounting bolts [B], and pull the thermostat housing [C] to outside.
- Unscrew the thermostat housing bolts [D].

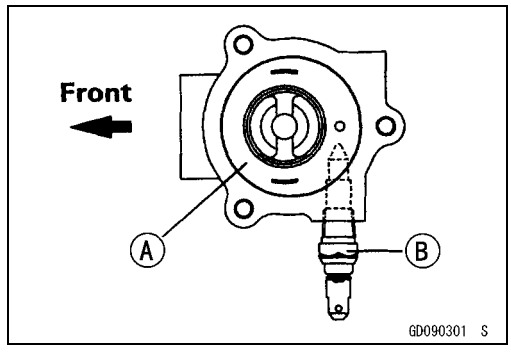


- Pull out the thermostat [A].



Thermostat Installation

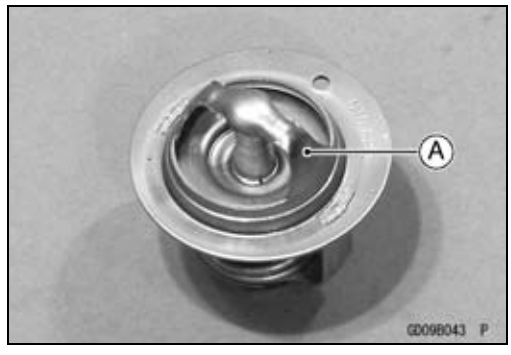
- Install the thermostat [A] into the thermostat housing so that the thermostat does not touch the water temperature switch [B] as shown.
- Be sure to install the O-ring on the thermostat housing cover.
- Fill the radiator with coolant.



Thermostat Inspection

- Remove the thermostat, and inspect the thermostat valve [A] at room temperature.

★If the valve is open, replace the valve with a new one.

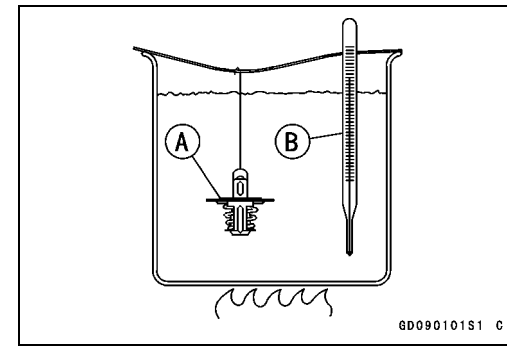


Thermostat

- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.
  [B] Thermometer

★If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature
80.5 ~ 83.5°C (177 ~ 182°F)



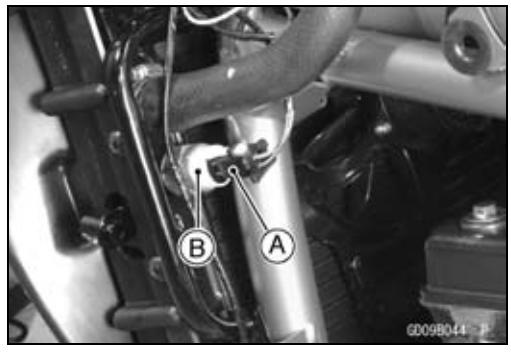
Radiator Fan Switch, Water Temperature Switch

CAUTION

The fan switch or the water temperature switch should never be allowed to fall on a hard surface. Such a shock to these parts can damage them.

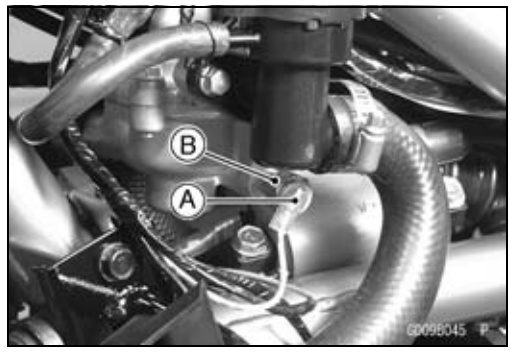
Radiator Fan Switch Removal

- Remove the Left Lower Fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the fan switch connector [A] and remove the radiator fan switch [B].



Water Temperature Switch Removal

- Drain the coolant.
- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the lead [A] and remove the water temperature switch [B].



Radiator Fan Switch, Water Temperature Switch Installation

- Apply silicone sealant to the threads before mounting the water temperature switch.

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

○Do not apply silicone sealant to the radiator fan switch on the radiator.

- Tighten the water temperature switch and the fan switch.

Torque - Water Temperature Switch: 7.8 N·m (0.80 kgf·m, 69 in·lb)
Radiator Fan Switch: 18 N·m (1.8 kgf·m, 13.0 ft·lb)

Radiator Fan Switch, Water Temperature Switch Inspection

- Refer to the Switch and Sensor in the Electrical System chapter for these inspections.

Engine Top End

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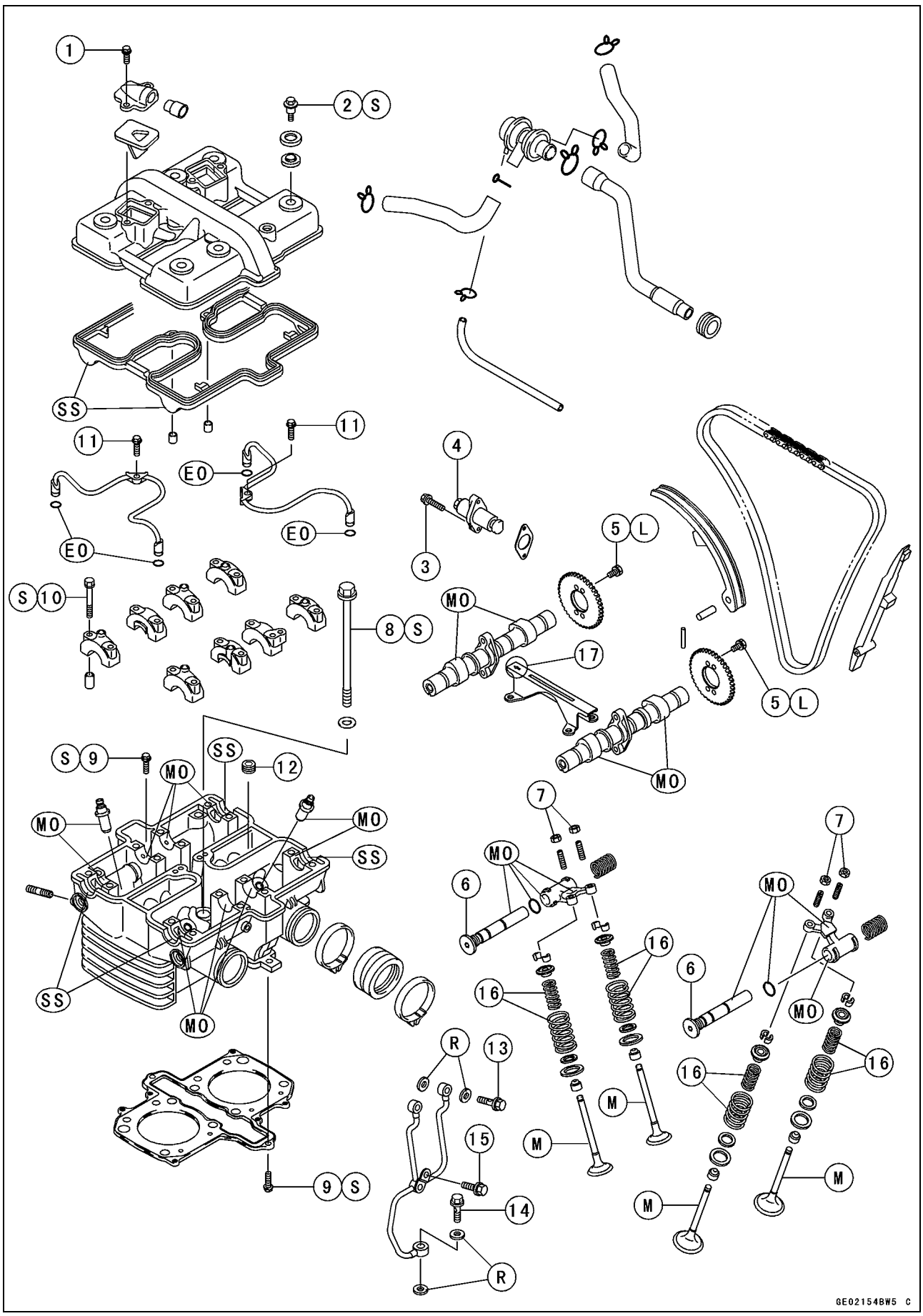
Exploded View

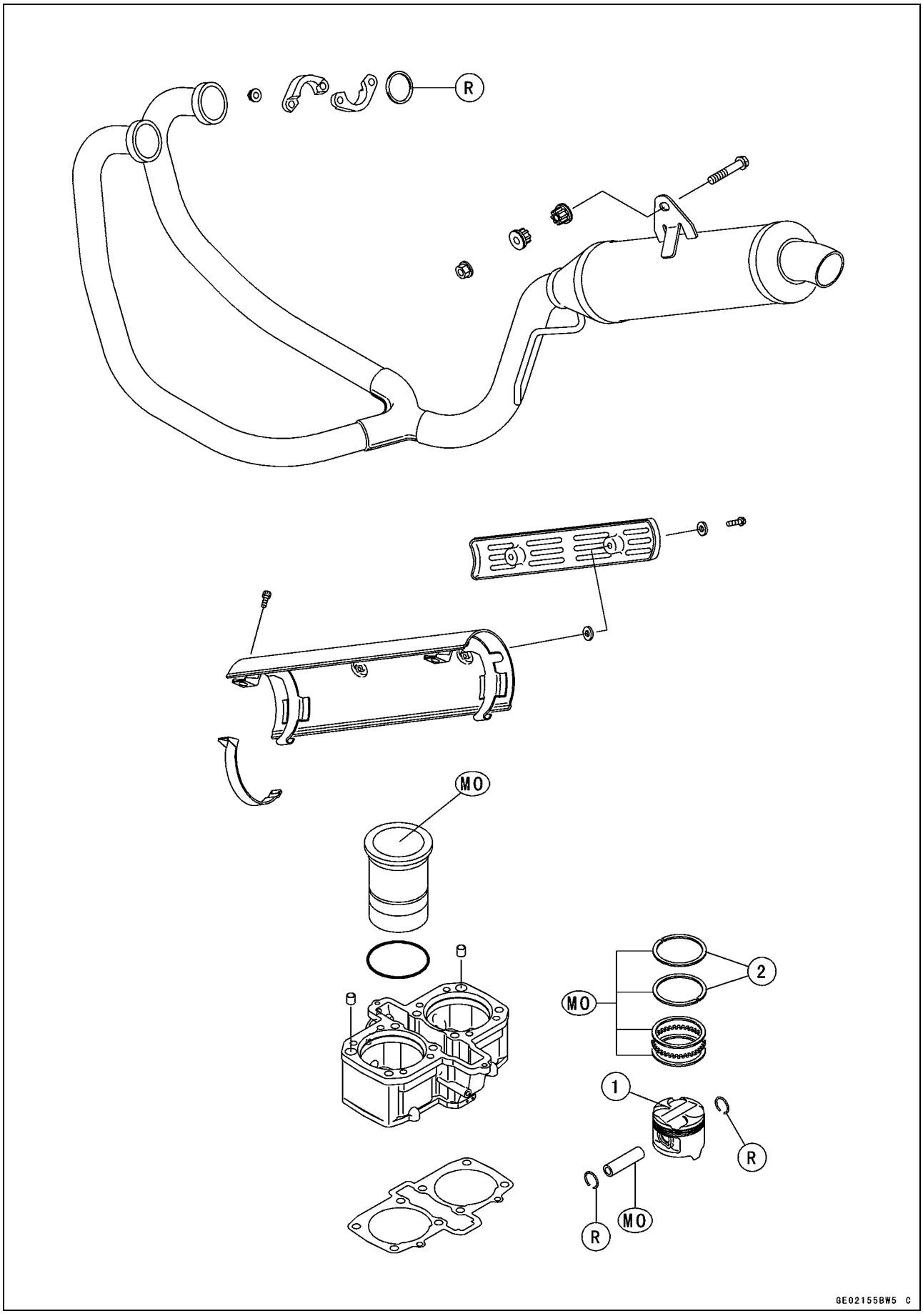


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	11	1.1	95 in·lb	
2	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
3	Camshaft Chain Tensioner Mounting Bolts	11	1.1	95 in·lb	
4	Camshaft Chain Tensioner Cap Bolt	13	1.3	113 in·lb	
5	Camshaft Sprocket Bolts	15	1.5	11	L
6	Rocker Shafts	39	4.0	29	EO
7	Valve Adjuster Locknuts	25	2.5	18	
8	Cylinder Head Bolts (10 mm)	51	5.2	38	S
9	Cylinder Head Bolts (6 mm)	9.8	1.0	87 in·lb	S
10	Camshaft Cap Bolts	12	1.2	104 in·lb	S
11	Oil Pipe Bolts	11	1.1	95 in·lb	
12	Water Jacket Plug	9.8	1.0	87 in·lb	L
13	Main Oil Pipe Upper Banjo Bolt	12	1.2	104 in·lb	
14	Main Oil Pipe Lower Banjo Bolt	20	2.0	14.5	
15	Main Oil Pipe Mounting Bolt	11	1.1	95 in·lb	

16. Closed coil end faces downward.
17. Arrow points to the front.
EO: Apply engine oil.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil.
R: Replacement Parts
S: Follow the specific tightening sequence.
SS: Apply Silicone sealant.

Exploded View



Exploded View

1. “N” marked side faces up.
2. Install the piston so that the circle mark on the top of the piston come to front side of the engine.

MO: Apply molybdenum disulfide oil.
R: Replacement Parts

Specifications

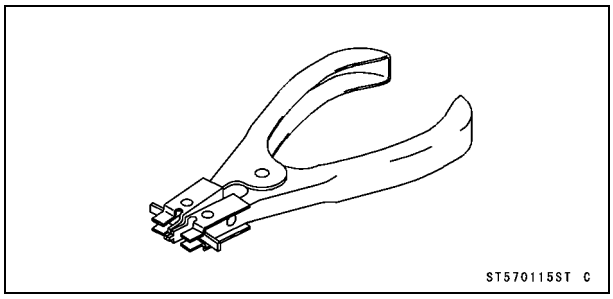
Item	Standard	Service Limit
Clean Air System		
Vacuum Switch Valve Closing Pressure	Open → Close 45 ~ 53 kPa (340 ~ 400 mmHg)	– – –
Camshafts		
Cam Height:		
Exhaust	35.416 ~ 35.530 mm (1.3943 ~ 1.3988 in.)	35.32 mm (1.3905 in.)
Inlet	35.476 ~ 35.590 mm (1.3967 ~ 1.4012 in.)	35.38 mm (1.3929 in.)
Camshaft, Camshaft Cap Clearance	0.030 ~ 0.071 mm (0.0012 ~ 0.0028 in.)	0.16 mm (0.006 in.)
Camshaft Journal Diameter	24.950 ~ 24.970 mm (0.9823 ~ 0.9831 in.)	24.92 mm (0.9811 in.)
Camshaft Bearing Inside Diameter	25.000 ~ 25.021 mm (0.9843 ~ 0.9851 in.)	25.08 mm (0.9874 in.)
Camshaft Runout	TIR 0.03 mm (0.0012 in.) or less	TIR 0.1 mm (0.004 in.)
Rocker Arm Inside Diameter	12.500 ~ 12.518 mm (0.4921 ~ 0.4928 in.)	12.55 mm (0.4941 in.)
Rocker Shaft Diameter	12.466 ~ 12.484 mm (0.4908 ~ 0.4915 in.)	12.44 mm (0.4898 in.)
Cylinder Head		
Cylinder Compression	(usable range)	
Electric Starter	960 ~ 1 470 kPa (9.8 ~ 15.0 kgf/cm², 139 ~ 213 psi) @450 r/min (rpm)	– – –
Cylinder Head Warp	– – –	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.18 ~ 0.23 mm (0.0070 ~ 0.0090 in.)	– – –
Inlet	0.13 ~ 0.18 mm (0.0051 ~ 0.0071 in.)	– – –
Valve Head Thickness:		
Exhaust	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in.)	0.7 mm (0.028 in.)
Inlet	0.4 ~ 0.6 mm (0.0157 ~ 0.0236 in.)	0.25 mm (0.01 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	5.455 ~ 5.470 mm (0.2148 ~ 0.2154 in.)	5.44 mm (0.2142 in.)
Inlet	5.475 ~ 5.490 mm (0.2156 ~ 0.2161 in.)	5.46 mm (0.2150 in.)
Valve Guide Inside Diameter:		
Exhaust	5.500 ~ 5.512 mm (0.2165 ~ 0.2170 in.)	5.58 mm (0.2197 in.)
Inlet	5.500 ~ 5.512 mm (0.2165 ~ 0.2170 in.)	5.58 mm (0.2197 in.)
Valve/valve Guide Clearance (wobble method):		
Exhaust	0.07 ~ 0.14 mm (0.0028 ~ 0.0055 in.)	0.27 mm (0.0106 in.)
Inlet	0.02 ~ 0.08 mm (0.0008 ~ 0.0032 in.)	0.22 mm (0.0087 in.)
Valve Seat Cutting Angle	45°, 32°, 60°	– – –
Valve Seat Surface:		
Width:		
Exhaust	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)	– – –
Inlet	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)	– – –

Specifications

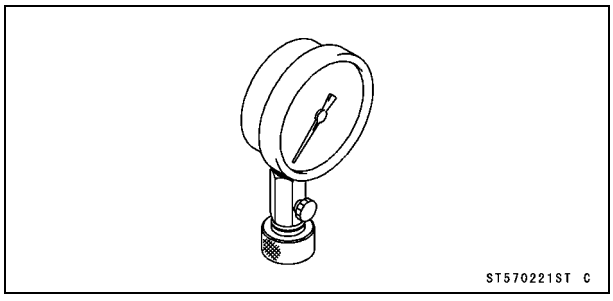
Item	Standard	Service Limit
Outside diameter:		
Exhaust	24.0 ~ 24.2 mm (0.945 ~ 0.953 in.)	– – –
Inlet	28.3 ~ 28.5 mm (1.114 ~ 1.122 in.)	– – –
Valve spring free length:		
Inner	36.3 mm (1.429 in.)	35 mm (1.3780 in.)
Outer	40.4 mm (1.591 in.)	39 mm (1.5354 in.)
Cylinder, Piston		
Cylinder Inside Diameter	74.000 ~ 74.012 mm (2.9134 ~ 2.9139 in.)	74.11 mm (2.9177 in.)
Piston Diameter	73.942 ~ 73.957 mm (2.9111 ~ 2.9117 in.)	73.79 mm (2.9051 in.)
Piston/cylinder Clearance	0.043 ~ 0.070 mm (0.0017 ~ 0.0028 in.)	– – –
Oversize Piston and Rings	+0.5 mm (0.020 in.)	– – –
Piston Ring/groove Clearance:		
Top	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Second	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in.)	0.16 mm (0.0063 in.)
Piston Ring Groove Width:		
Top	0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)	0.92 mm (0.0362 in.)
Second	1.01 ~ 1.03 mm (0.0398 ~ 0.0406 in.)	1.11 mm (0.0437 in.)
Piston Ring Thickness:		
Top	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.0276 in.)
Second	0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)	0.90 mm (0.0354 in.)
Piston Ring End Gap:		
Top	0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)	0.7 mm (0.0276 in.)
Second	0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)	0.7 mm (0.0276 in.)
Oil	0.2 ~ 0.7 mm (0.008 ~ 0.028 in.)	1.0 mm (0.0394 in.)

Special Tools and Sealant

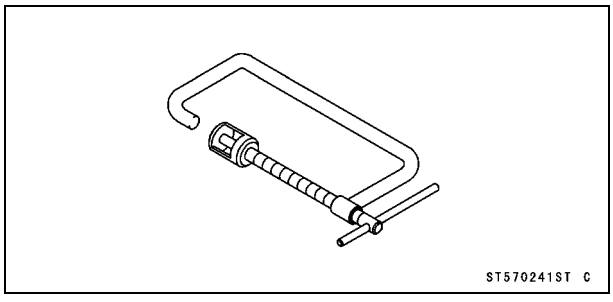
Piston Ring Pliers:
57001-115



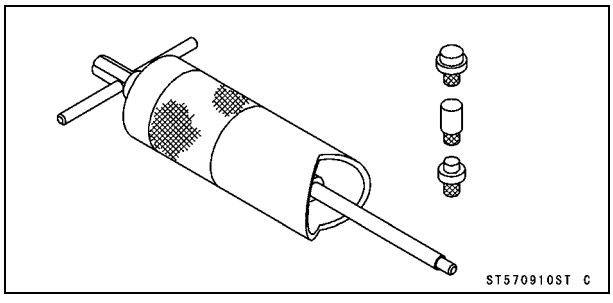
Compression Gauge, 20 kgf/cm²:
57001-221



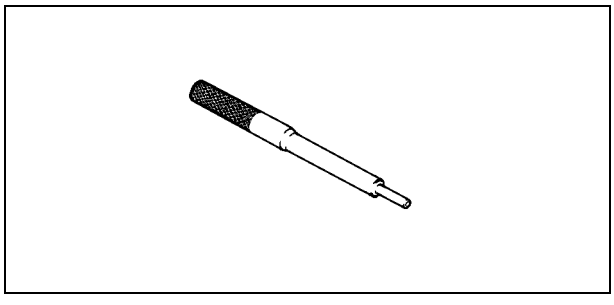
Valve Spring Compressor Assembly:
57001-241



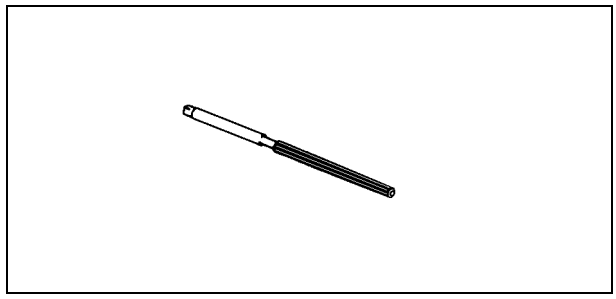
Piston Pin Puller Assembly:
57001-910



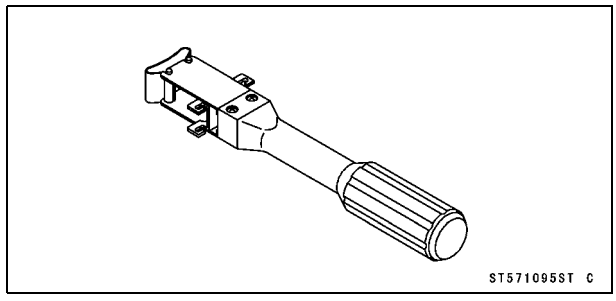
Valve Guide Arbor, ϕ5.5:
57001-1021



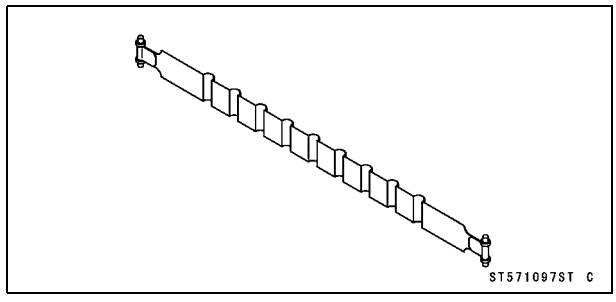
Valve Guide Reamer, ϕ5.5:
57001-1079



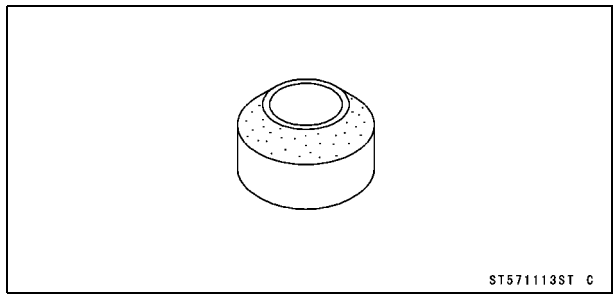
Piston Ring Compressor Grip:
57001-1095



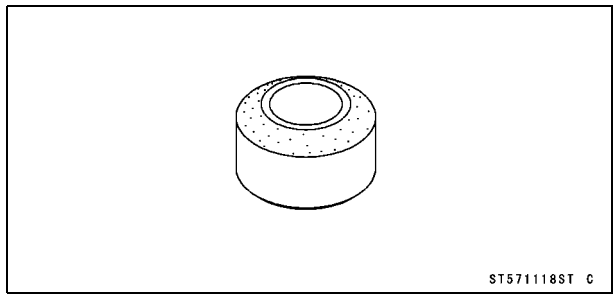
Piston Ring Compressor Belt, ϕ67 ~ ϕ79:
57001-1097



Valve Seat Cutter, 45° - ϕ24.5:
57001-1113

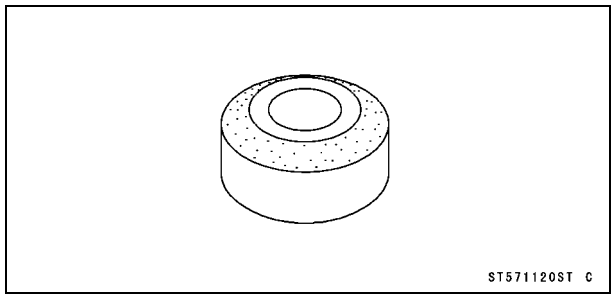


Valve Seat Cutter, 32° - ϕ25:
57001-1118

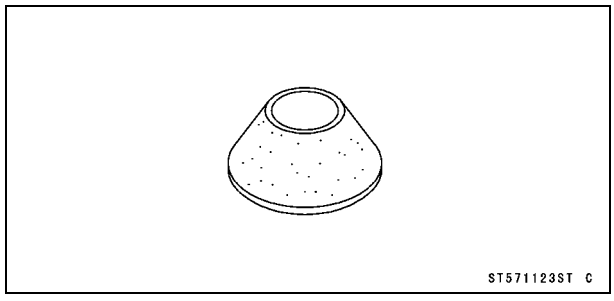


Special Tools and Sealant

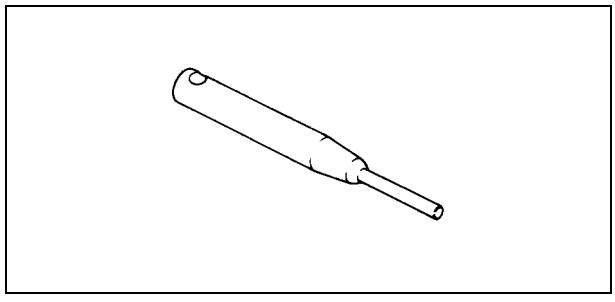
Valve Seat Cutter, 32° - ϕ30:
57001-1120



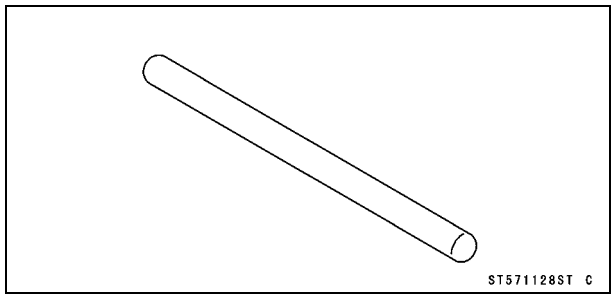
Valve Seat Cutter, 60° - ϕ30:
57001-1123



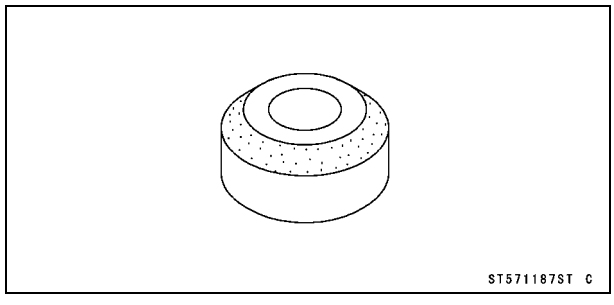
Valve Seat Cutter Holder, ϕ5.5:
57001-1125



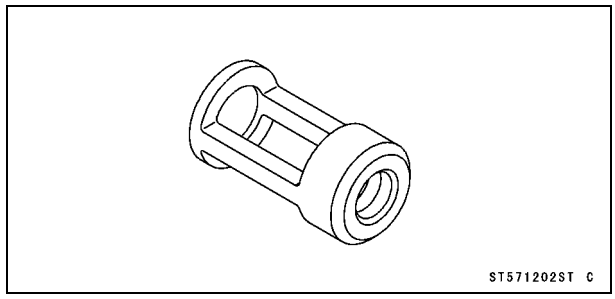
Valve Seat Cutter Holder Bar:
57001-1128



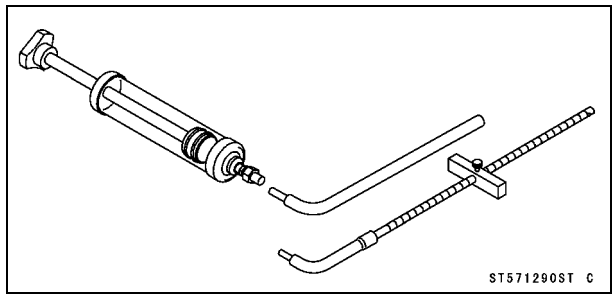
Valve Seat Cutter, 45° - ϕ30:
57001-1187



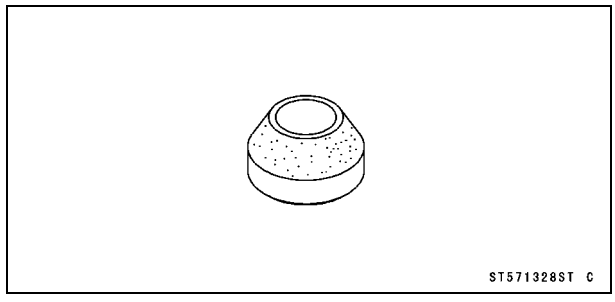
Valve Spring Compressor Adapter, ϕ22:
57001-1202



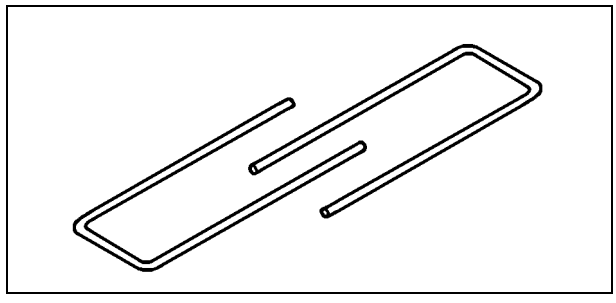
Fork Oil Level Gauge:
57001-1290



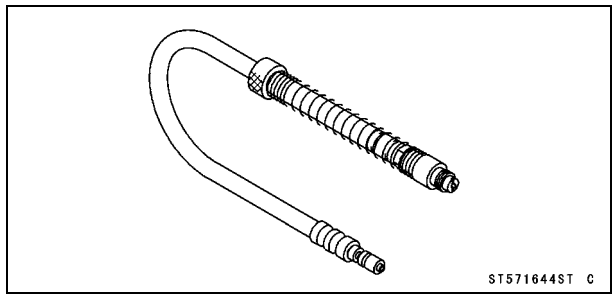
Valve Seat Cutter, 60° - ϕ25:
57001-1328



Piston Base, ϕ2.3:
57001-1336

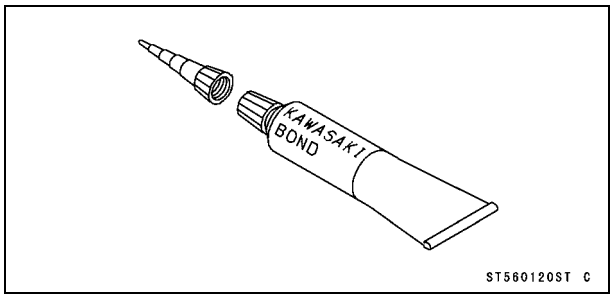


Compression Gauge Adapter, M12 × 1.25:
57001-1644



Special Tools and Sealant

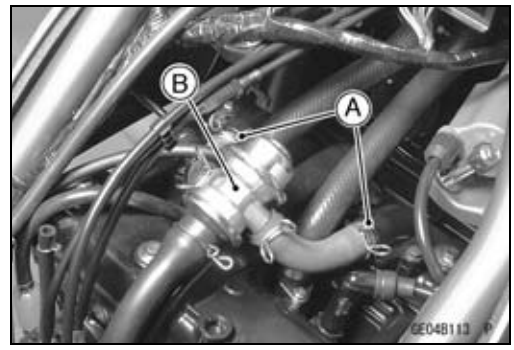
Kawasaki Bond (Silicone Sealant):
56019-120



Clean Air System

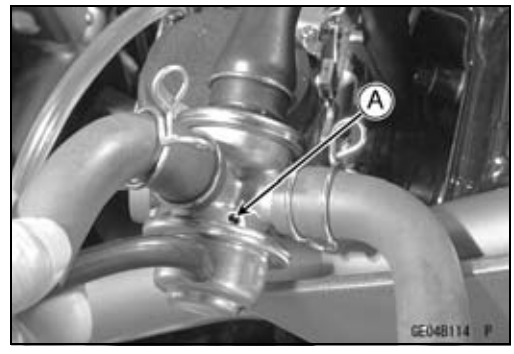
Vacuum Switch Valve Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
- Remove the clamps [A] and take off the vacuum switch valve [B].



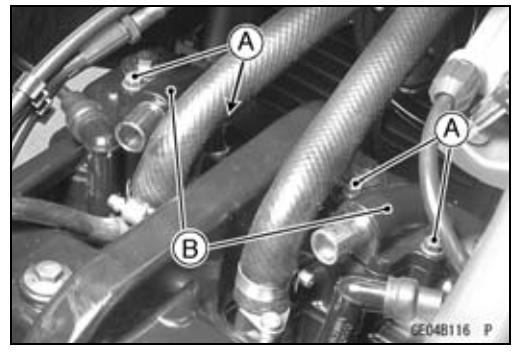
Vacuum Switch Valve Installation

- Install the vacuum switch valve so that the air hole [A] faces downwards.



Air Suction Valve Removal

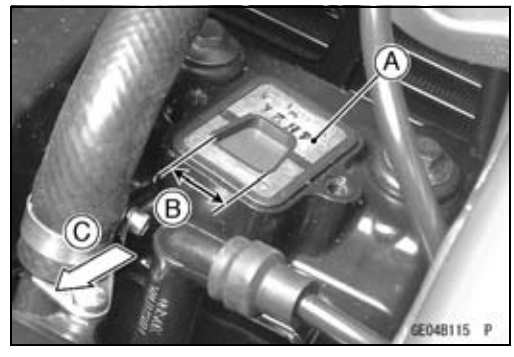
- Remove the vacuum switch valve (see Vacuum Switch Valve Removal).
- Remove the bolts [A] and remove the air suction valve covers [B].



Air Suction Valve Installation

- Replace the gasket with a new one.
- Install the air suction valve [A] so that its wider side [B] of the reed faces the rear [C].

Torque - Air Suction Valve Cover Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)



Air Suction Valve Inspection

- Refer to the Engine Top End in the Periodic Maintenance chapter.

Clean Air System Hose Inspection

- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, silencer, vacuum switch valve, carburetors, and air suction valve covers.

★If they are not, correct them. Replace them if they are damaged.

Clean Air System

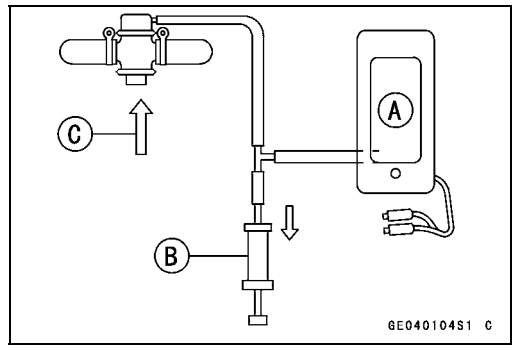
Vacuum Switch Valve Test

Using the vacuum gauge and a syringe, inspect the vacuum switch operation as follows.

- Remove a vacuum switch valve.
- Connect a vacuum gauge [A] and syringe [B] or fork oil level gauge to the vacuum hoses as shown.

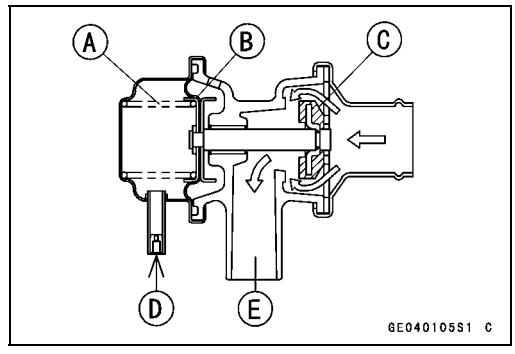
Air Flow [C]

Special Tool - Fork Oil Level Gauge: 57001-1290



- Gradually raise the vacuum (lower the pressure) applied to the vacuum switch valve, and check the valve operation. When the vacuum is low, the vacuum switch valve should permit air to flow. When the vacuum raises to the level shown below, the valve should stop air flow. When the vacuum is high enough, air cannot flow through the valve.

Spring [A]
Diaphragm [B]
Valve [C]
Low Vacuum [D]
Secondary Air Flow [E]



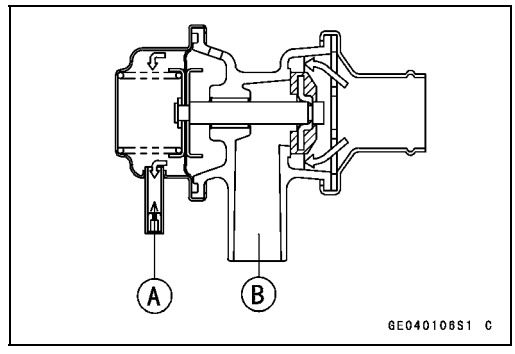
★If the vacuum switch valve does not operate as described, replace it with a new one.

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: 45 ~ 53 kPa (340 ~ 400 mmHg)

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

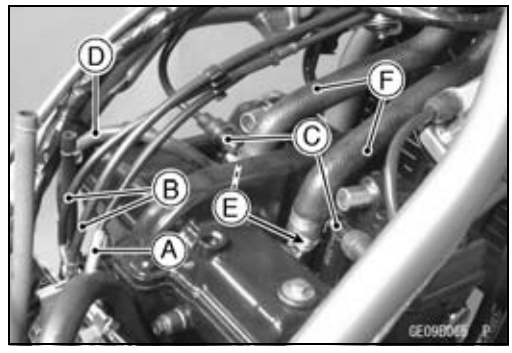


Cylinder Head Cover

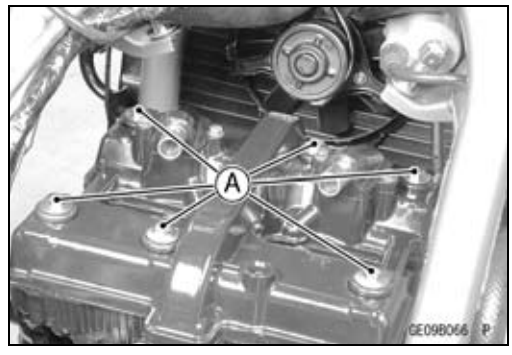
Cylinder Head Cover Removal

- Drain the coolant (see Coolant Draining in the Cooling System chapter).
- Remove:
  Side Covers (see Side Cover Removal in the Frame chapter)
  Seat (see Seat Removal in the Frame chapter)
  Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)

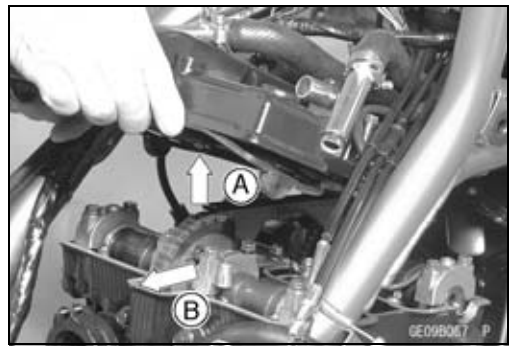
  Choke Cable Lower End [A]
  Throttle Cable Lower Ends [B]
  Spark Plug Caps [C]
  Vacuum Switch Valve
- Remove the coolant hose [D] from the pipe.
- Remove the radiator hoses and pipes mounting screws [E] and pull up them.



- Unscrew the cylinder head cover bolts [A].



- Tilt up the right side [A] of the head cover slightly, move the head cover back [B] and upward.
- Remove the cylinder head cover.



Cylinder Head Cover

Cylinder Head Cover Installation

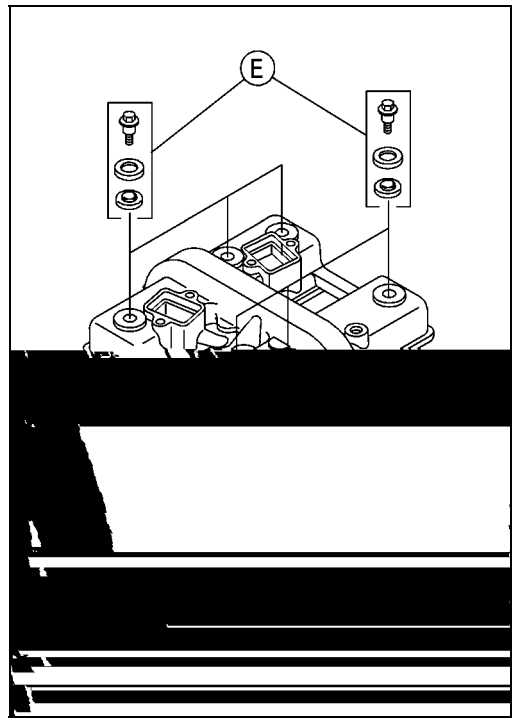
- Replace the head cover gasket [A] with a new one, if it is damaged.
- Stick the gasket to the cover with a liquid gasket [B] for installation convenience.
- Be sure to install the knock pins [C].
- Apply silicone sealant [D] as shown.

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

- Tighten the cover bolts [E].

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

- Install the removed parts in reverse of removal.



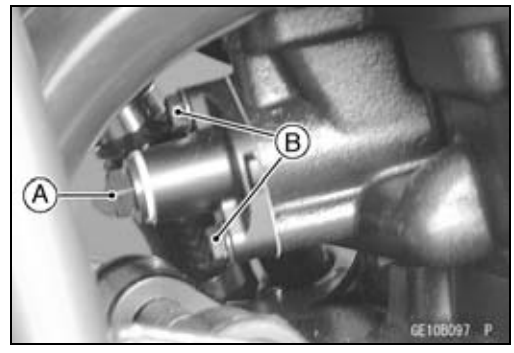
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

CAUTION

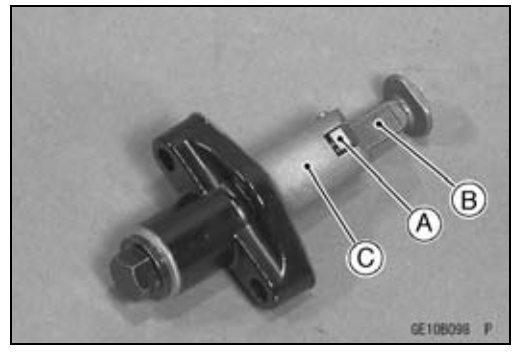
This is a non-return type cam chain tensioner. The push rod does not return to its original position once it moves out to take up cam chain slack. Observe all the rules listed below:
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "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] before tensioner removal for later disassembly convenience.
- Unscrew the mounting bolts [B] and remove the camshaft chain tensioner [C].



Camshaft Chain Tensioner Installation

- Release the stopper [A] and push the rod [B] into the tensioner body [C].

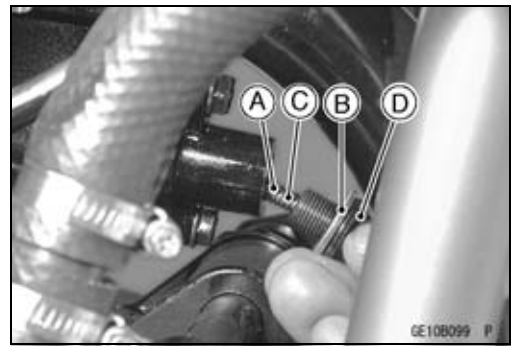


- Replace the gasket with a new one.
- Tighten the mounting bolts.

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

- Install the spring [A], washer [B], Pin [C], and tighten the cap bolt [D].

Torque - Camshaft Chain Tensioner Cap Bolt: 13 N·m (1.3 kgf·m, 9.5 ft·lb)

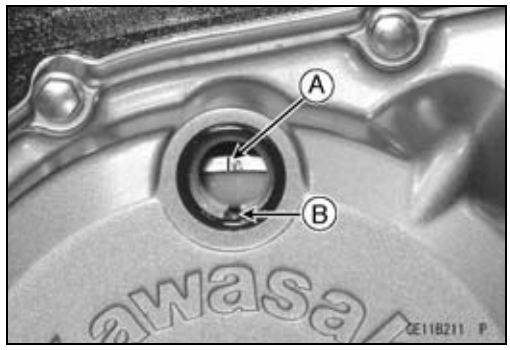


Camshaft, Camshaft Chain

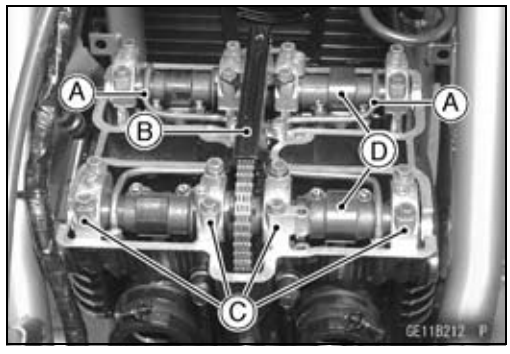
Camshaft Removal

- Remove the cylinder head cover (see Cylinder Head Cover Removal).
- Position the crankshaft at #2 piston TDC.

○Using a wrench on the crankshaft rotation bolt turn the crankshaft clockwise until the "C" mark line [A] on the rotor is aligned with the notch [B] in the edge of the upper hole in the alternator cover.



- Remove:
  Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  Cylinder Head Oil Pipes [A]
  Top Chain Guide [B]
  Camshaft Caps [C]
  Camshafts [D]
- 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

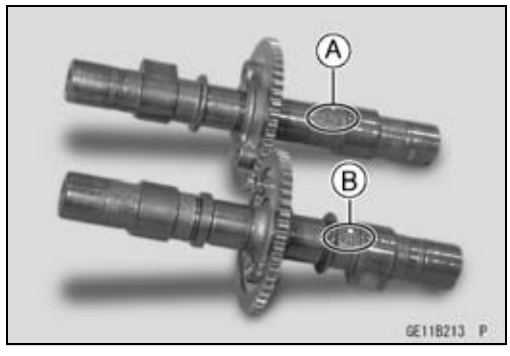
- Apply molybdenum disulfide oil to all cam parts and journals.
- If the camshaft(s) and/or cylinder head are replaced with new ones, apply a thin coat of a molybdenum disulfide oil on the new cam part surfaces.

NOTE

○*The Exhaust camshaft has an EX mark [A] and the inlet camshaft has an IN mark [B]. Be careful not to mix up these shafts.*

○*Be sure to operate from the engine left side.*

- Position the crankshaft at #2 piston TDC (see Camshaft Removal).

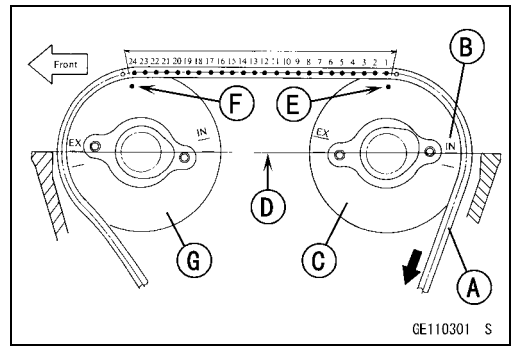


CAUTION

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, Camshaft Chain

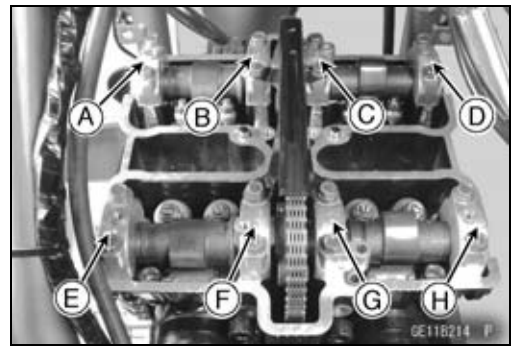
● Engage the camshaft chain with the camshaft sprockets.
○Pull the tension side [A] (inlet side) of the chain taut to install the chain.
○The timing marks [B] on the inlet sprocket [C] must be aligned with the cylinder head upper surface [D].
● Pull the chain taut and fit it onto the camshaft sprocket.
● Starting with the punch mark [E] on the top of the inlet sprocket, count to the 24th pin. Feed the inlet camshaft through the chain and align the 24th pin with the punch mark [F] on the exhaust camshaft sprocket [G].



● Be sure to install the knock pins.
● Install the camshaft caps and top chain guide in the correct locations as shown. Location alphabets are marked on the cylinder head and each cap.

CAUTION

The camshaft caps are machined with the cylinder head. So, if a cap is installed in a wrong location, the camshaft may seize because of improper oil clearance in the bearings.



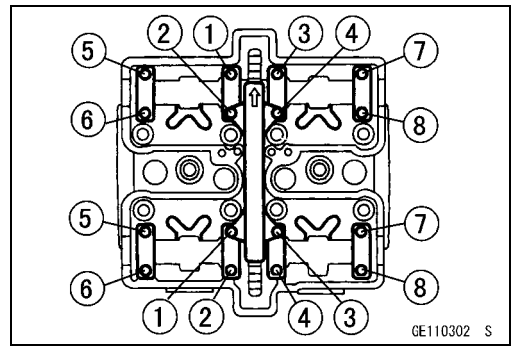
● First tighten down the two camshaft cap bolts (#1 and #2 bolts in the figure) evenly to seat the camshafts in place, then tighten all bolts following the specified tightening sequence.

Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 8.5 ft·lb)

● Install the head oil pipes.

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

● Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).
● Check the chain timing.

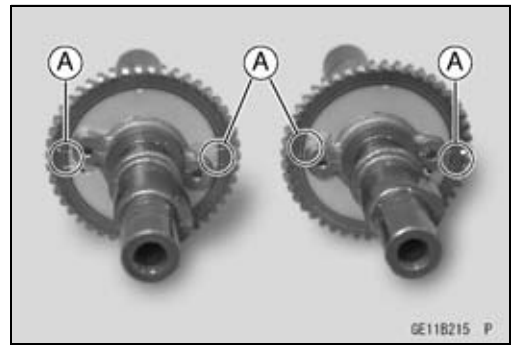


Camshaft and Sprocket Assembly

○The inlet and exhaust sprockets are identical.
● Install the sprockets so that the marked [A] ("IN" and "EX") side faces to the left side.

CAUTION

Inlet sprocket must use "I" marked bolt holes.
Exhaust sprocket must use "E" marked bolt holes.



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

Torque - Camshaft Sprocket Bolts: 15 N·m (1.5 kgf·m, 11.0 ft·lb)

★If a new camshaft is to be used, apply a thin coat of a molybdenum disulfide oil to the cam surfaces.

Camshaft, Camshaft Chain

Camshaft, Camshaft Cap Wear

The journal wear is measured using plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

- Cut strips of plastigage to journal width. Place a strip on each journal parallel to the camshaft with the camshaft installed in the correct position and so that the plastigage will be compressed between the journal and camshaft cap.

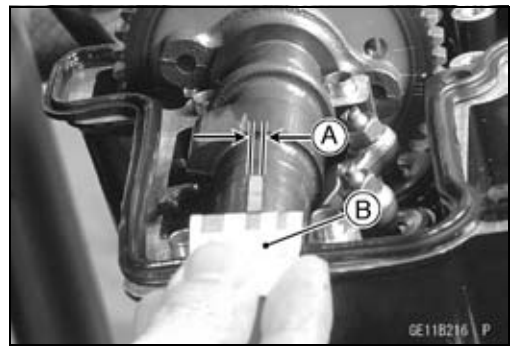
- Install the camshaft caps, tightening the bolts in the correct sequence.

Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 8.5 ft·lb)

NOTE

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

- Remove the camshaft caps again, and measure the plastigage width [A] to determine the clearance between each journal and camshaft cap. Measure the widest portion of the plastigage.
  Plastigage Scale [B]



★If any clearance exceeds the service limit, measure the camshaft journal diameter and the camshaft bearing inside diameter.

★If any of the measurements is beyond the service limit, replace the worn part and check the clearance again.

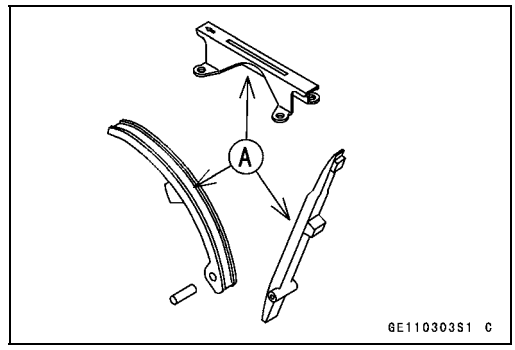
Camshaft Journal, Camshaft Cap Clearance

Standard:	**0.030 ~ 0.071 mm (0.0012 ~ 0.0028 in.)**
Service Limit:	**0.16 mm (0.006 in.)**

Camshaft Chain Guide Wear

- Visually inspect the rubber [A] on the guides.

★If the rubber is damaged or cut, replace the guides.

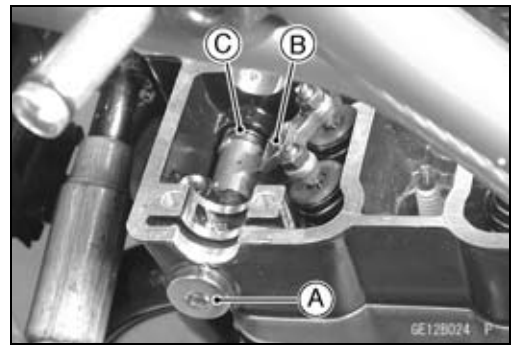


Rocker Shaft, Rocker Arm

Rocker Shaft, Rocker Arm Removal

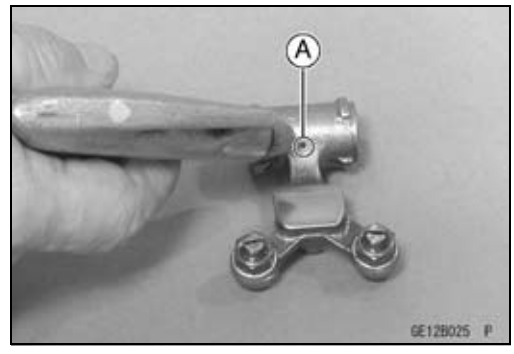
- Remove the camshafts (see Camshaft Removal).
- Unscrew the rocker shafts [A] and remove the rocker arms [B] and springs [C].

○Mark and record the rocker arm locations so that the rocker arm can be reinstalled in their original positions.



Rocker Shaft, Rocker Arm Installation

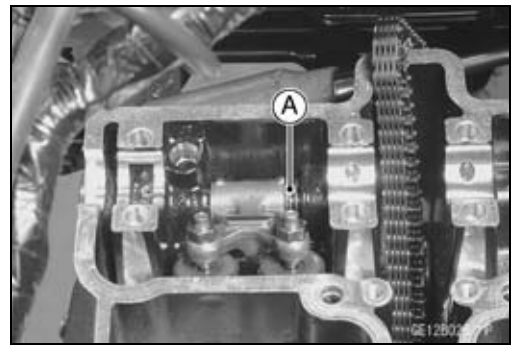
- Blow the rocker arm oil passage [A] clean with compressed air.
- Apply molybdenum disulfide oil to all the rocker arms and the rocker shafts.



- Install the retainer spring [A] on each rocker arm so that the spring is placed to the camshaft chain side.
- Check that the O-rings are in good condition and install the O-rings onto the rocker shafts.
- Insert the shaft running it through the cylinder head, rocker arms and springs.
- Tighten the rocker shafts.

Torque - Rocker Shafts: 39 N·m (4.0 kgf·m, 29 ft·lb)

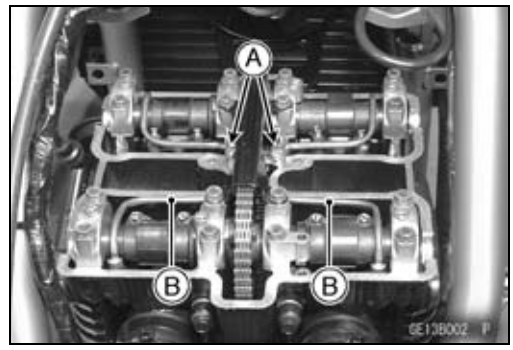
- Install the camshaft (see Camshaft Installation).
- Check the chain timing.



Oil Pipe

Cylinder Head Oil Pipe Removal

- Remove the oil pipe mounting bolts [A] and pull the oil pipes [B] and O-rings out of the cylinder head.



Cylinder Head Oil Pipe Installation

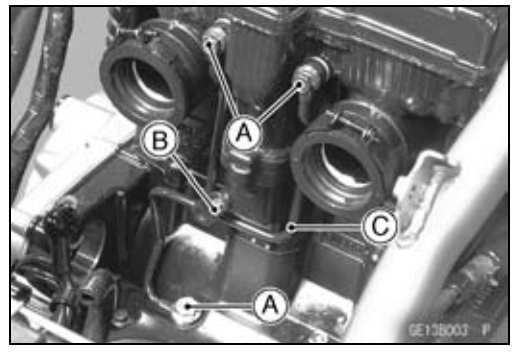
- Flush out the oil pipes with a high flash-point solvent.
- Check that the O-rings are in good condition.

★If they are damaged, replace them with new ones.

- Apply a small amount of engine oil to the O-rings.
- Fix the oil pipes properly into the cylinder head oil passage holes by pushing both ends at the same time.
- Install the oil pipe mounting bolts.

Main Oil Pipe Removal

- Remove:
  Carburetor (see Carburetor Removal in the Fuel System chapter)
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
- Unscrew the banjo bolts [A] and mounting bolt [B].
- Remove the oil pipe [C].



Main Oil Pipe Installation

- Flush out the oil pipes with a high flash-point solvent.
- Discard the used gaskets and install new gaskets on each side of the pipe fittings.
- Tighten the banjo bolts and mounting bolt to a snug fit, and then tighten them to the specified torque.

Torque - Main Oil Pipe Upper Banjo Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)
Main Oil Pipe Lower Banjo Bolt: 20 N·m (2.0 kgf·m, 14.5 ft·lb)
Main Oil Pipe Mounting Bolt: 11 N·m (1.1 kgf·m, 95 in·lb)

Cylinder Head

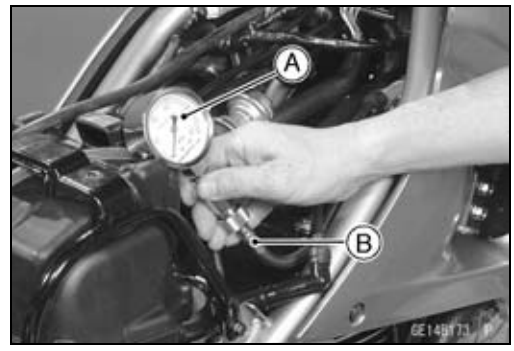
Compression Measurement

● Remove:
Side Covers (see Side Cover Removal in the Frame chapter)
Lower Fairings (see Lower Fairing Removal in the Frame chapter)
Seat (see Seat Removal in the Frame chapter)

● Thoroughly warm up the engine so that the engine oil between the piston and cylinder wall will help seal compression as it does during normal running.

● Stop the engine, remove the fuel tank, ignition coil and spark plugs, and attach the compression gauge firmly into the spark plug hole.

Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221 [A]
Compression Gauge Adapter, M12 × 1.25: 57001-1644 [B]



● Measure the cylinder compression.

● Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

NOTE

○*Be sure the battery is fully charged.*
○*Be sure no air leaks out of the cylinder head gasket.*

Cylinder Compression (Usable Range)
960 ~ 1 470 kPa (9.8 ~ 15.0 kgf/cm², 139 ~ 213 psi) @410 r/min (rpm)

● Repeat the measurement for the other cylinder.

★If cylinder compression is higher than the usable range, check the following:

1. Carbon build-up on the piston head and cylinder head. - clean off any carbon on the piston head and cylinder head.
2. Cylinder head gasket, cylinder base gasket - use only the proper gaskets for the cylinder head and base. The use of gaskets of the incorrect thickness will change the compression.
3. Valve stem oil seals and piston rings - rapid carbon accumulation in the combustion chambers may be caused by damaged valve stem oil seals and/or damaged piston oil rings. This may be indicated by white exhaust smoke.

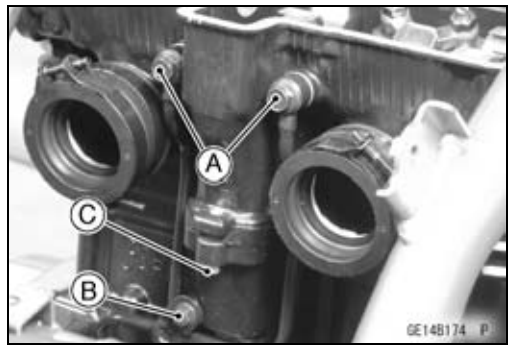
Cylinder Head

★If cylinder compression is lower than the usable range, check the following:
1. Gas leakage around the cylinder head - replace the damaged gasket and check the cylinder head for warping.
2. Condition of the valve seating.
3. Valve clearance - if a valve requires an unusually large adjustment to obtain proper clearance, the valve may be bent, and not seating completely.
4. Piston/cylinder clearance, piston seizure.
5. Piston ring, piston ring groove.

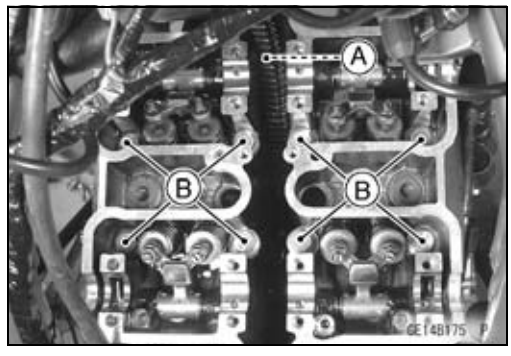
Cylinder Head Removal

● Remove:
Cylinder Head Cover (see Cylinder Head Cover Removal)
Exhaust Pipes and Mufflers (see Crankshaft/Transmission chapter)
Cam Chain Tensioner (see Chain Tensioner Removal)
Camshafts (see Camshaft Removal)
Carburetors (see Carburetor Removal in the Fuel System chapter)

● Remove the main oil pipe banjo bolts [A].
● Loosen the main oil pipe mounting bolt [B].
● Remove the rear 6 mm cylinder head bolt [C].

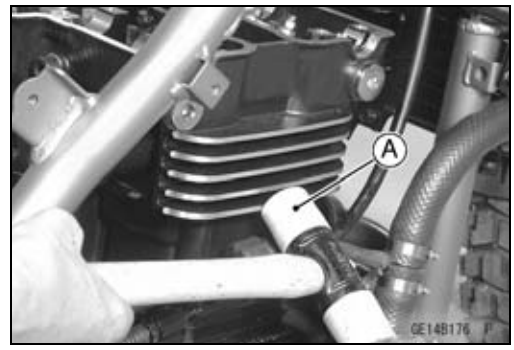


● Remove the front 6 mm cylinder head bolt [A] first, then remove the 10 mm cylinder head bolts [B] This prevents excessive stress on the small bolts.



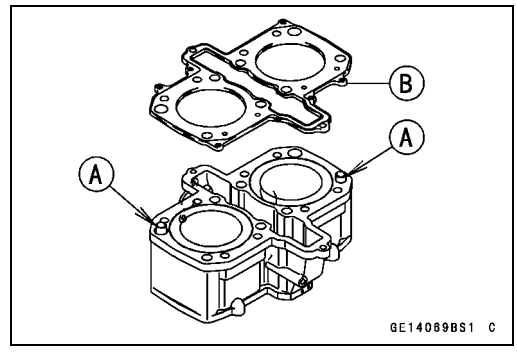
Cylinder Head

- Tap in the places shown with a mallet [A] to remove the cylinder head.

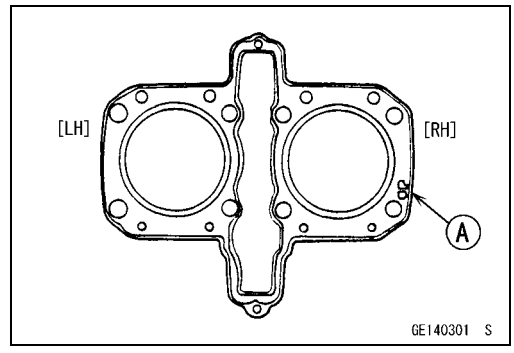


Cylinder Head Installation

- Install the rear chain guide, knock pins [A] and new gasket [B].



- Install a new cylinder head gasket with "UP" [A] marked side positioning to the right.

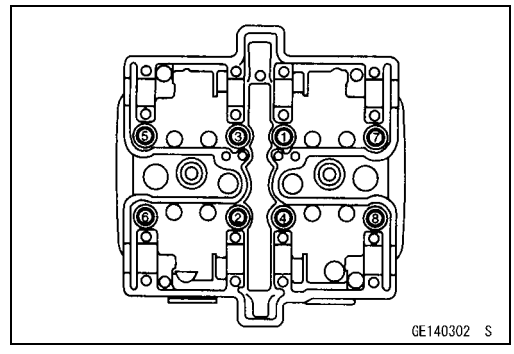


NOTE

○*The camshaft caps are machined with the cylinder head so if a new cylinder head is installed, use the caps that are supplied with the new head.*

- Tighten the 10 mm cylinder head bolts following the tightening sequence. Tighten them first to about one half of the specified torque.

Torque - Cylinder Head Bolts 10 mm: 51 N·m (5.2 kgf·m, 38 ft·lb)
Cylinder Head Bolts 6 mm: 9.8 N·m (1.0 kgf·m, 87 in·lb)



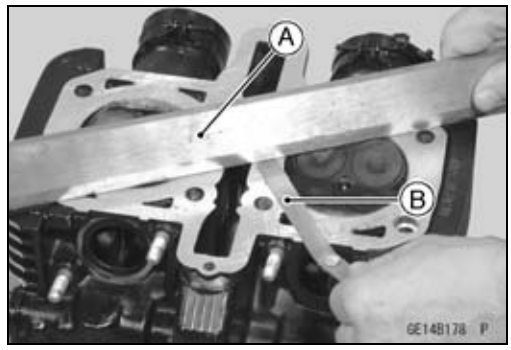
- Tighten the 6 mm cylinder bolts.
- Install the camshafts, camshaft caps and top chain guide.
- Install the head oil pipes.

Cylinder Head

Cylinder Head Warp

- Clean the cylinder head (see Cylinder Head Cleaning).
- Lay a straightedge [A] across the lower surface of the head at several different points, and measure warp by inserting a thickness gauge [B] between the straightedge and the head.

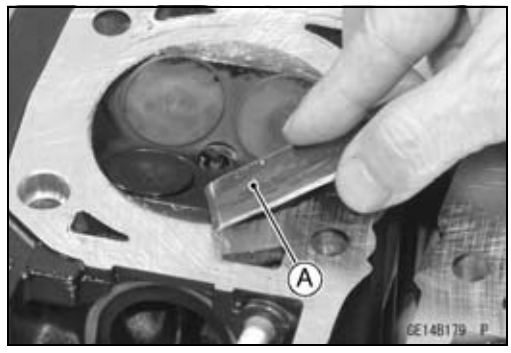
★If warp exceeds the service limit, repair the mating surface. Replace the cylinder head if the mating surface is badly damaged.



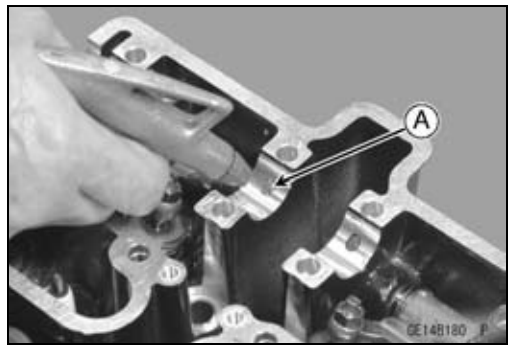
Cylinder Head Warp
Service Limit: 0.05 mm (0.002 in.)

Cylinder Head Cleaning

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valves (see Valve Removal).
- Wash the head with a high-flash point solvent.
- Scrape [A] the carbon out of the combustion chamber and exhaust port with a suitable tool.



- Using compressed air, blow out any particles which may obstruct the oil passage [A] in the cylinder head.
- Install the valves (see Valve Installation).



Valves

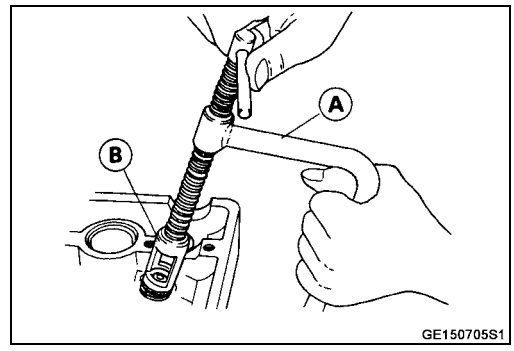
Valve Clearance Inspection

- Refer to the Valve Clearance Inspection in the Periodic Maintenance chapter.

Valve Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Use a valve spring compressor assembly to press down the valve spring retainer, and remove the split keepers.

Special Tools - Valve Spring Compressor Assembly: 57001 -241 [A]
Valve Spring Compressor Adapter, ϕ22: 57001-1202 [B]



Valve Installation

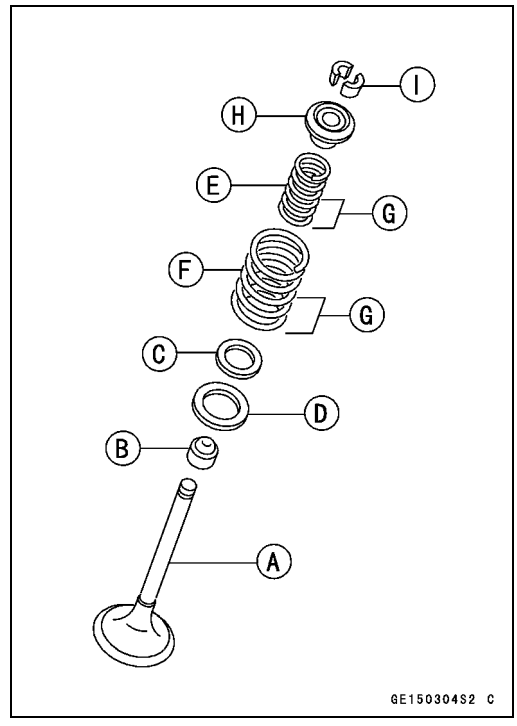
- Check to see that the valve [A] moves smoothly up and down in the guide.
- Check to see that the valve seats properly in the valve seat. If it does not, repair the valve seat.
- Replace the oil seal [B] with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Be sure to install the inner [C] and outer [D] spring seats under the inner [E] and outer [F] springs.

○Install the springs so that the closed coil end [G] is facing toward the valve seat (downwards).

- Install the spring retainer [H], press it down with the valve spring compressor assembly, and fit the split keepers [I] into place.

Special Tools - Valve Spring Compressor Assembly: 57001 -241
Valve Spring Compressor Adapter, ϕ22: 57001-1202

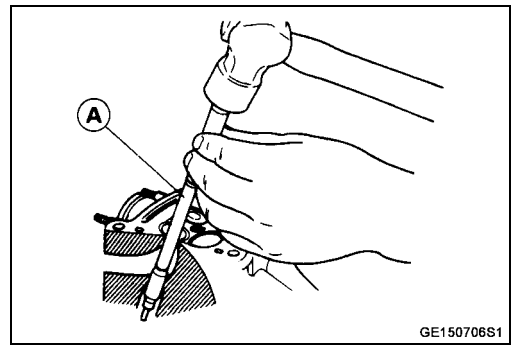
- Install the other removed parts.



Valve Guide Removal

- Remove:
  Valve (see Valve Removal)
  Oil Seal
  Spring Seats
- Heat the area around the valve guide to about 120 ~ 150°C (248 ~ 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

Special Tool - Valve Guide Arbor, ϕ5.5: 57001-1021



Valves

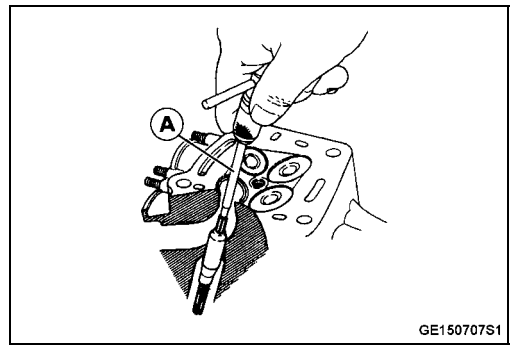
Valve Guide Installation

- Apply molybdenum disulfide oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).
- Drive the valve guide in from the top of the head using the valve guide arbor. The flange stops the guide from going in too far.

Special Tool - Valve Guide Arbor, ϕ5.5: 57001-1021

- Ream the valve guide with a valve guide reamer [A] even if the valve guide is reused.

Special Tool - Valve Guide Reamer, ϕ5.5: 57001-1079



Valve Seat Inspection

- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Coat the valve seat with machinist's dye.
○Push the valve into the guide.
○Rotate the valve against the seat with a lapping tool.
○Pull the valve out, and check the seating pattern on the valve head. It must be the correct width and even all the way around.

- Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter of the valve seating pattern is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter

Inlet	**28.3 ~ 28.5 mm (1.114 ~ 1.122 in.)**
Exhaust	**24.0 ~ 24.2 mm (0.945 ~ 0.953 in.)**

NOTE

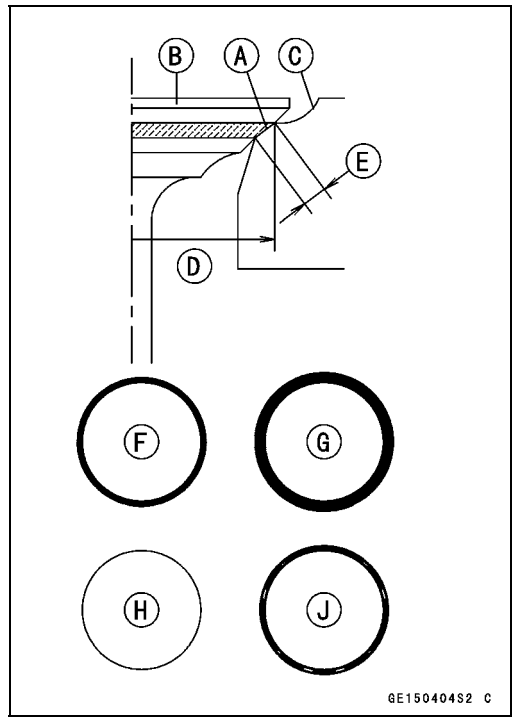
○*The valve stem and guide must be in good condition, or this check will not be valid.*

★If the valve seating pattern is not correct, repair the seat (see Valve Seat Repair).

- 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.

★If the width is too wide, too narrow or uneven, repair the seat (see Valve Seat Repair).

[F] Good
[G] Too Wide
[H] Too Narrow
[J] Uneven



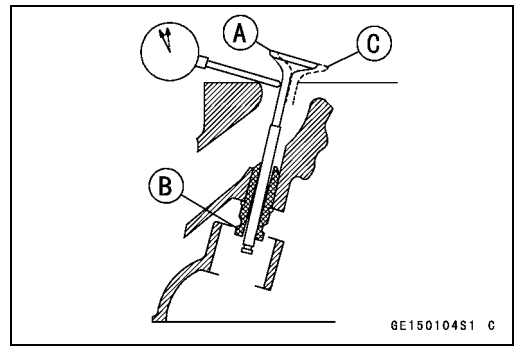
Valve Seating Surface Width

Inlet	**0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)**
Exhaust	**0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)**

Valves

Measuring Valve-to-guide Clearance (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	**0.02 ~ 0.08 mm (0.0008 ~ 0.0032 in.)**
Exhaust	**0.07 ~ 0.14 mm (0.0028 ~ 0.0055 in.)**
Service Limit:	
Inlet	**0.22 mm (0.0087 in.)**
Exhaust	**0.27 mm (0.0106 in.)**

Valve Seat Repair

- Repair the valve seat with the valve seat cutters.

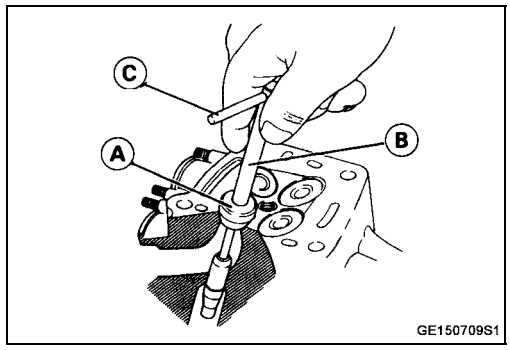
Special Tools -

Inlet Valve		
Seat Cutter	**45°-ϕ30.0**	**57001-1187**
Seat Cutter	**32°-ϕ30.0**	**57001-1120**
Seat Cutter	**60°-ϕ30.0**	**57001-1123**
Exhaust Valve		
Seat Cutter	**45°-ϕ24.5**	**57001-1113**
Seat Cutter	**32°-ϕ25.0**	**57001-1118**
Seat Cutter	**60°-ϕ25.0**	**57001-1328**
Valve Seat Cutter Holder - ϕ5.5		**57001-1125**
Valve Seat Cutter Holders Bar		**57001-1128**

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

Valves

Seat Cutter Operating Cares



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.*

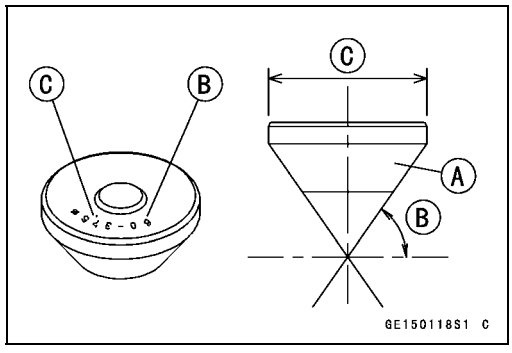
4. Setting the valve seat cutter holder [A] in position, operate the cutter [B] in one hand [C]. Do not apply too much force to the diamond portion.

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 the cutter with washing oil and apply a thin layer of engine oil before storing.

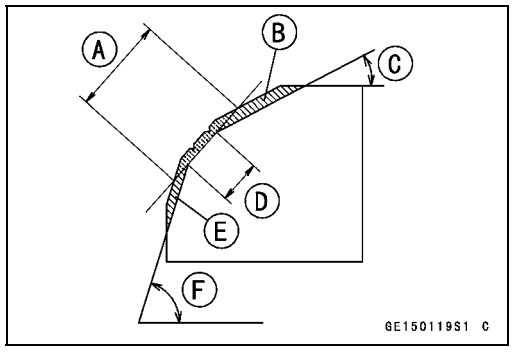
Marks Stamped on the Cutter



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

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

Operating Procedures



- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter to 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.

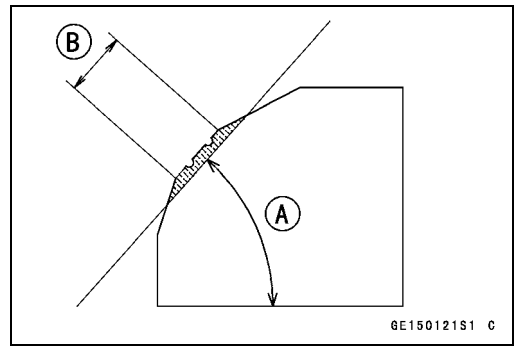
[A] Grind the seat at a 45° angle to enlarge the width of the seating surface.
[B] 32° cut
[C] 32°
[D] Specified seating surface width
[E] 60° cut
[F] 60°

Valves

● Measure the outside diameter (O.D.) 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.*

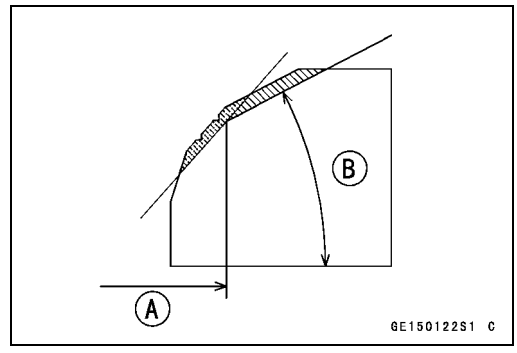
★If the outside diameter of the seating surface is too large, make the 32° grind described below.

★If the outside diameter [A] 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 to 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.

★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.

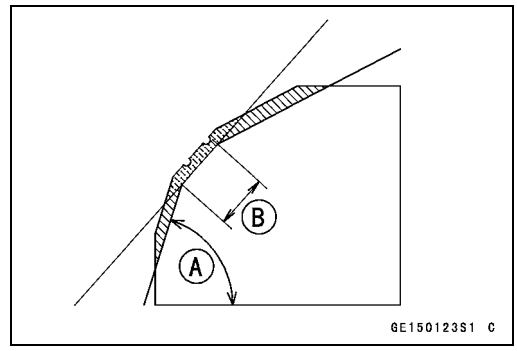
● Grind the seat at a 60° angle until the seat width is within the specified range.

○To make the 60° grind, fit a 60° cutter to the holder, and slide it into the valve guide.

○Turn the holder, while pressing down lightly.

○After making the 60° grind, return to the seat width measurement step above.

Correct Width [B]



Valves

- Lap the valve to the seat, once the seat width and 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.

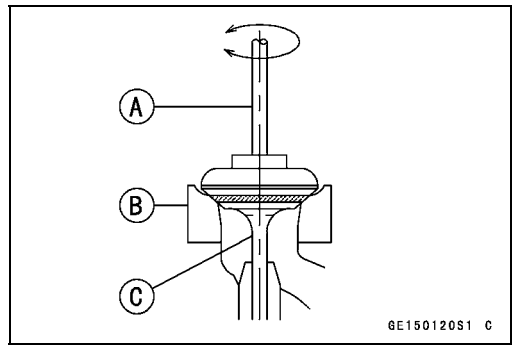
○Repeat the process with a fine grinding compound.

[A] Lapper
[B] Valve Seat
[C] Valve

- The seating area should be marked about in the middle of the valve face.

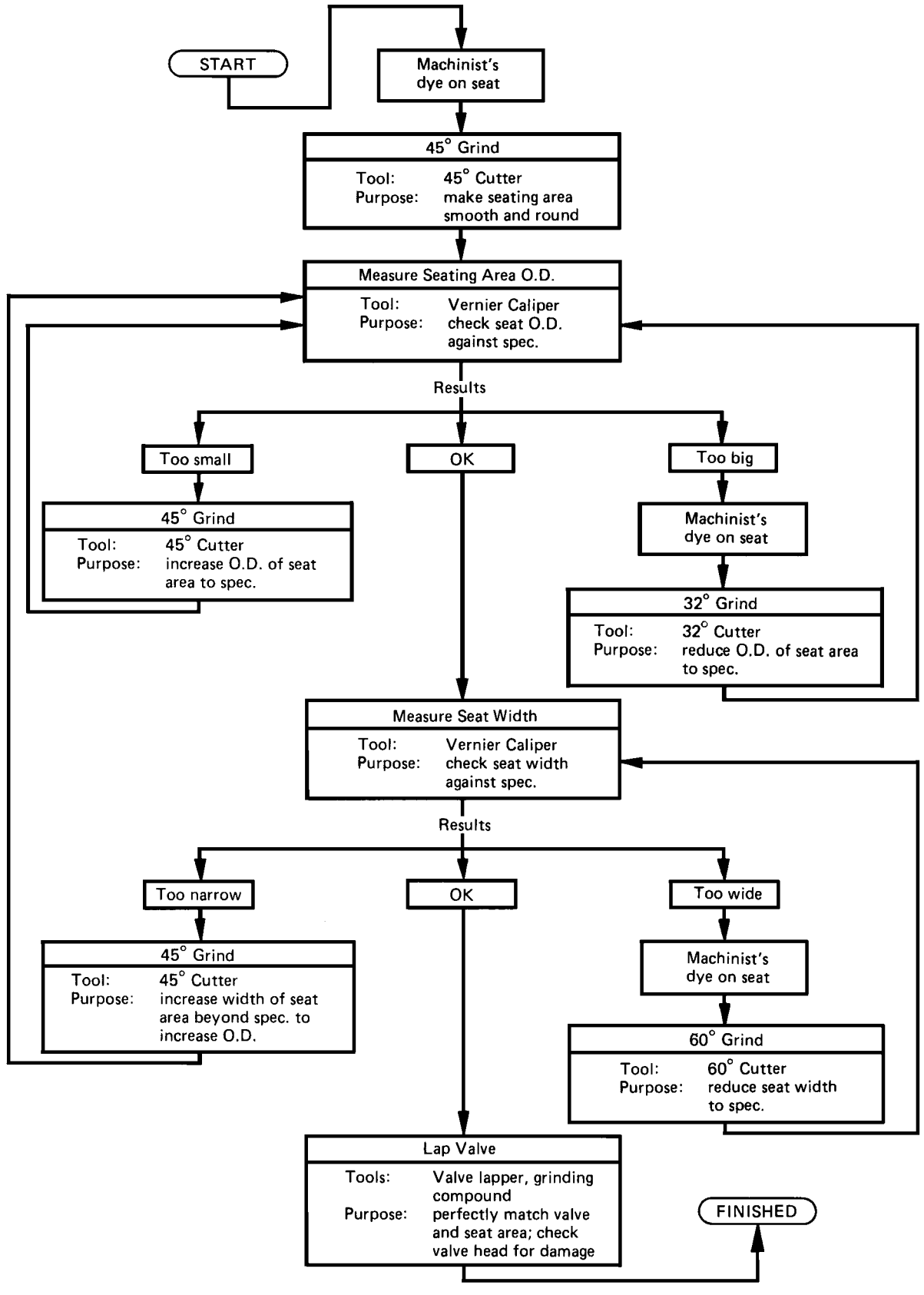
★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.

- 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 in the Periodic Maintenance chapter).



Valves

Valve Seat Repair

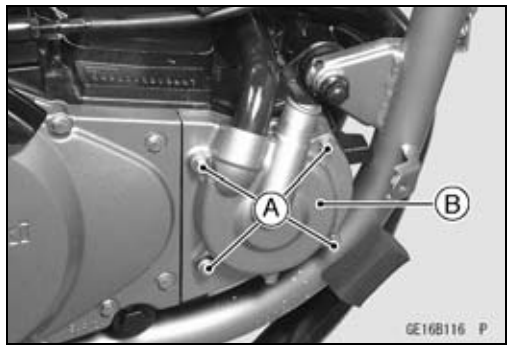


GE150308 S

Cylinder, Piston

Cylinder Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the main oil pipe mounting bolt.
- Remove the bolts [A] and pull out the water pipe with water pump cover [B] (see water pump removal in the Cooling System chapter).
- Take out the cylinder block so as not to damage the main oil pipe.

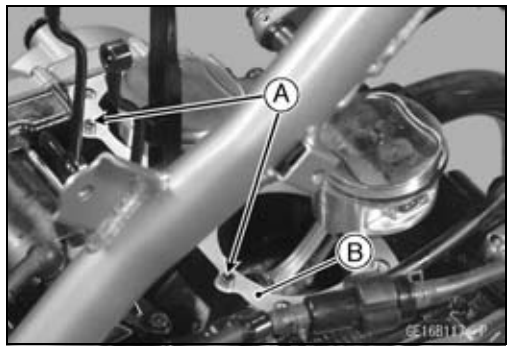


Cylinder Installation

- Install:
  Dowel Pins [A]
  New Cylinder Base Gasket [B]

○Install the cylinder base gasket so that the swallen groove come to upper side.

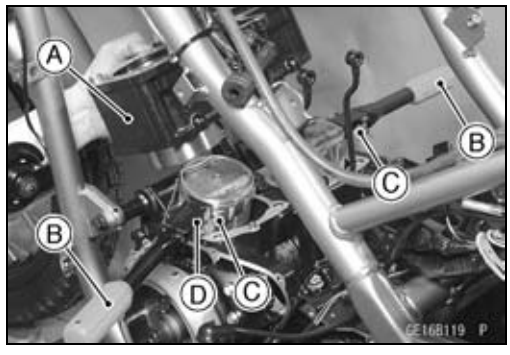
- Apply molybdenum disulfide oil to the cylinder bore.
- Position the crankshaft so that all the piston heads are almost level.



- Install the cylinder block [A].

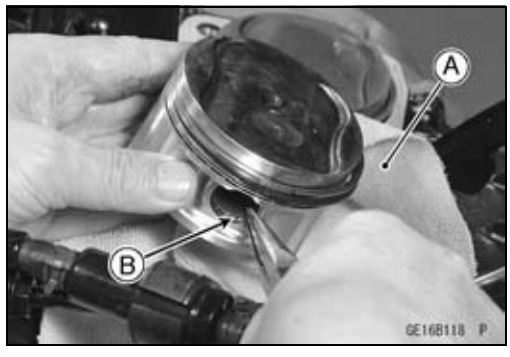
Special Tool - Piston Ring Compressor Grip: 5700-1095 [B]
Piston Ring Compressor Belt, ϕ67 ~ ϕ79: 5700-1097 [C]
Piston Base, ϕ2.3: 5700-1336 [D]

○Insert the piston rings with your thumbs, if the special tools are not available.



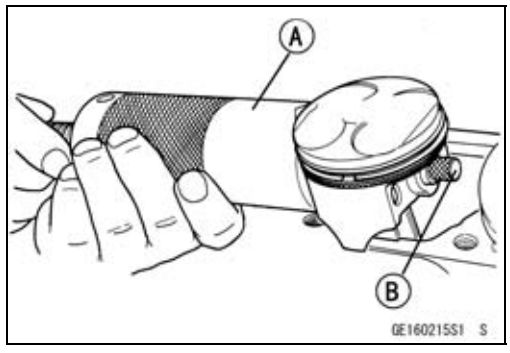
Piston Removal

- Remove the cylinder (see Cylinder Removal).
- Wrap a clean cloth [A] around the base of each piston to secure it in position for removal and so that no parts and dirt will fall into the crankcase.
- Remove the piston pin snap rings [B] from the outside of each piston.



- Remove the piston by pushing its piston pin puller out the side from which the snap ring was removed. Use a piston pin puller, if the pin is tight.

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

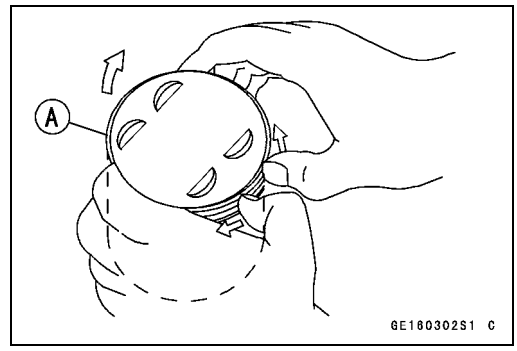


Cylinder, Piston

- Remove the top and second rings with piston ring pliers.

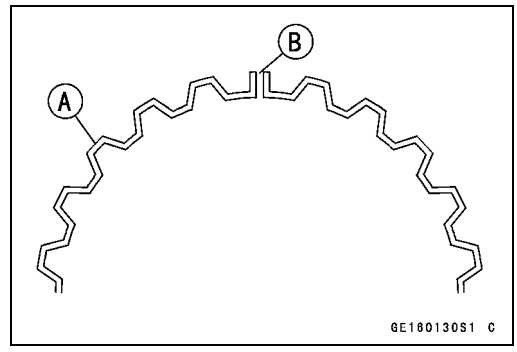
Special Tool - Piston Ring Pliers: 57001-115

- If the special tool is not available, carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.

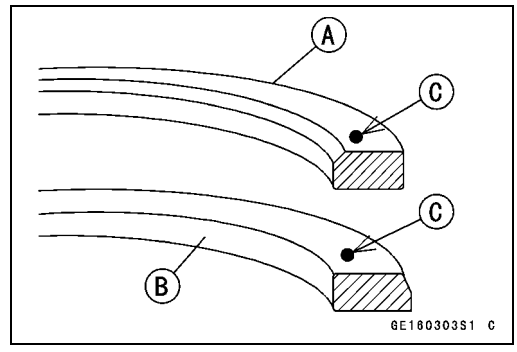


Piston Installation

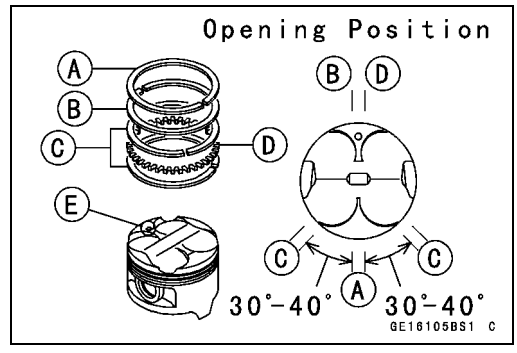
- Apply molybdenum disulfide oil to the oil ring expanders, oil ring steel rails, top rings, second rings and piston pins.
- Install the oil ring expander [A] in the piston oil ring groove so that the expander ends [B] butt together, never overlap.
- Install the upper and lower steel rails. There is no UP or Down to the rails. They can be installed either way.



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



- Position each piston ring so that the openings in the top ring and oil ring steel rails are facing forwards, and the second ring and oil ring expander openings face the rear. The openings of the oil ring steel rails must be about 30° ~ 40° of angle from the opening of the top ring.
  [A] Top Ring
  [B] Second Ring
  [C] Oil Ring Steel Rails
  [D] Oil Ring Expander
  [E] Circle

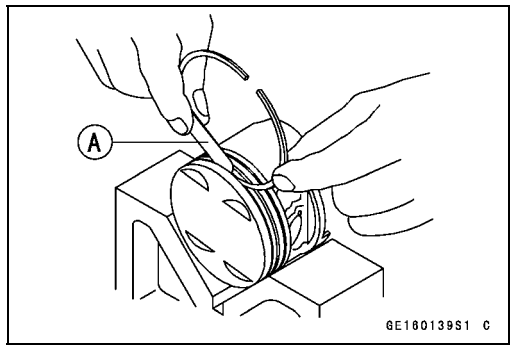


- Install the piston so that the circle mark on the top of the piston come to front side of the engine.
- When installing a piston pin snap ring, compress it only enough to install it and no more.

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

Cylinder, Piston

Piston Ring, Piston Ring Groove Wear



- Check for uneven groove wear by inspecting the ring seating.

★The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.

- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.

Piston Ring/Groove Clearance

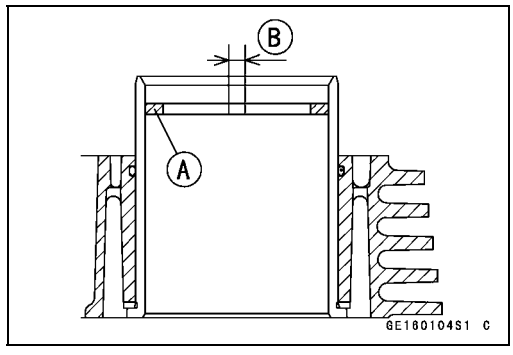
Standard:

Top	**0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)**
Second	**0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in.)**

Service Limit:

Top	**0.17 mm (0.0067 in.)**
Second	**0.16 mm (0.0063 in.)**

Piston Ring End Gap



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

Piston Ring End Gap

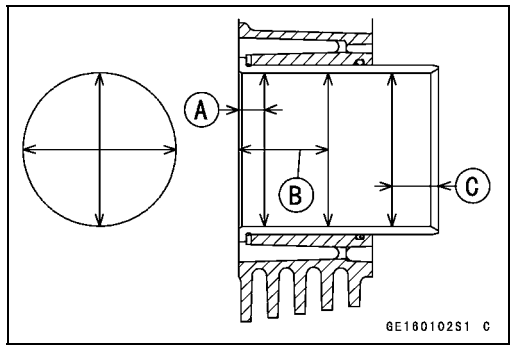
Standard:

Top	**0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)**
Second	**0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)**
Oil	**0.2 ~ 0.7 mm (0.008 ~ 0.028 in.)**

Service Limit:

Top	**0.7 mm (0.0276 in.)**
Second	**0.7 mm (0.0276 in.)**
Oil	**1.0 mm (0.0394 in.)**

Cylinder Inside Diameter



- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the 3 locations (total of 6 measurements) shown in the figure.

★If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be bored to oversize and then honed.

[A] 10 mm
[B] 60 mm
[C] 20 mm

Cylinder Inside Diameter

Standard:	**74.000 ~ 74.012 mm (2.9134 ~ 2.9139 in.)**
Service Limit:	**74.11 mm (2.9177 in.)**

Cylinder, Piston

Piston Diameter

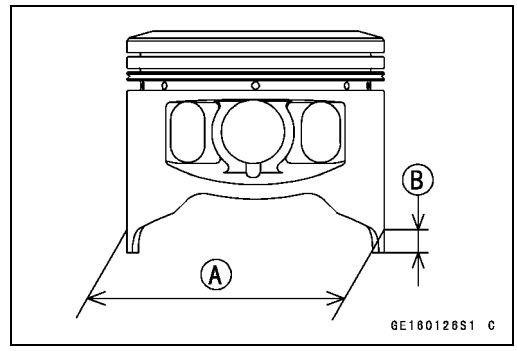
- Measure the outside diameter [A] of each piston 5 mm [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under the service limit, replace the piston.

Piston Diameter

Standard: 73.942 ~ 73.957 mm (2.9111 ~ 2.9117 in.)

Service Limit: 73.79 mm (2.9051 in.)



Boring, Honing

When boring and honing a cylinder, note the following:

○There is one oversize piston available. Oversize pistons require oversize rings. Oversize pistons and rings available are **0.5 mm** larger than standard.

○Before boring a cylinder, first measure the exact diameter of the oversize piston, and then, according to the standard clearance in the Service Data Section, determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than **0.5 mm** oversize, the cylinder block must be replaced.

○Cylinder inside diameter must not vary more than **0.01 mm** at any point.

○Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.

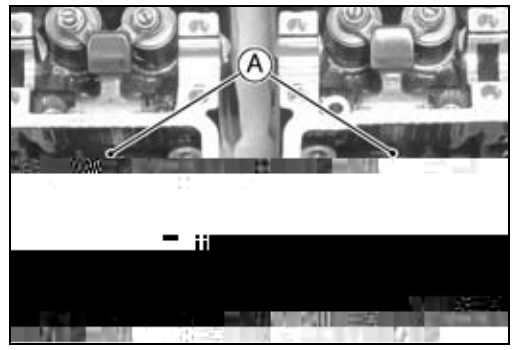
○In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus **0.1 mm** and the service limit for the piston is the oversize piston original diameter minus **0.15 mm.** If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

○Never separate the liner from the cylinder, because the top surface of cylinder and liner is machined at the factory as an assembly.

Carburetor Holder

Carburetor Holder Installation

- Install the carburetor holders. The projection [A] faces upwards.

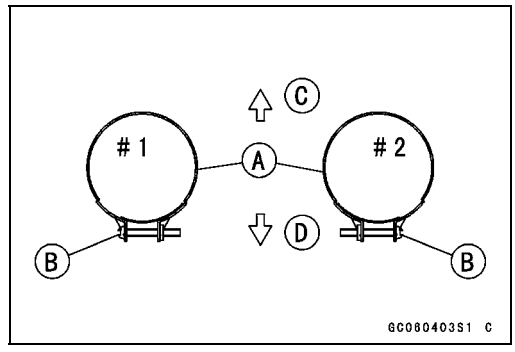


- Install the holder clamps [A] as shown being careful of the screw position and the screw head [B] direction.

⚠ WARNING

Install the clamp screws horizontally. Otherwise the screws could come in contact with the vacuum adjusting screws, resulting in an unsafe riding condition.

[C] Top
[D] Bottom

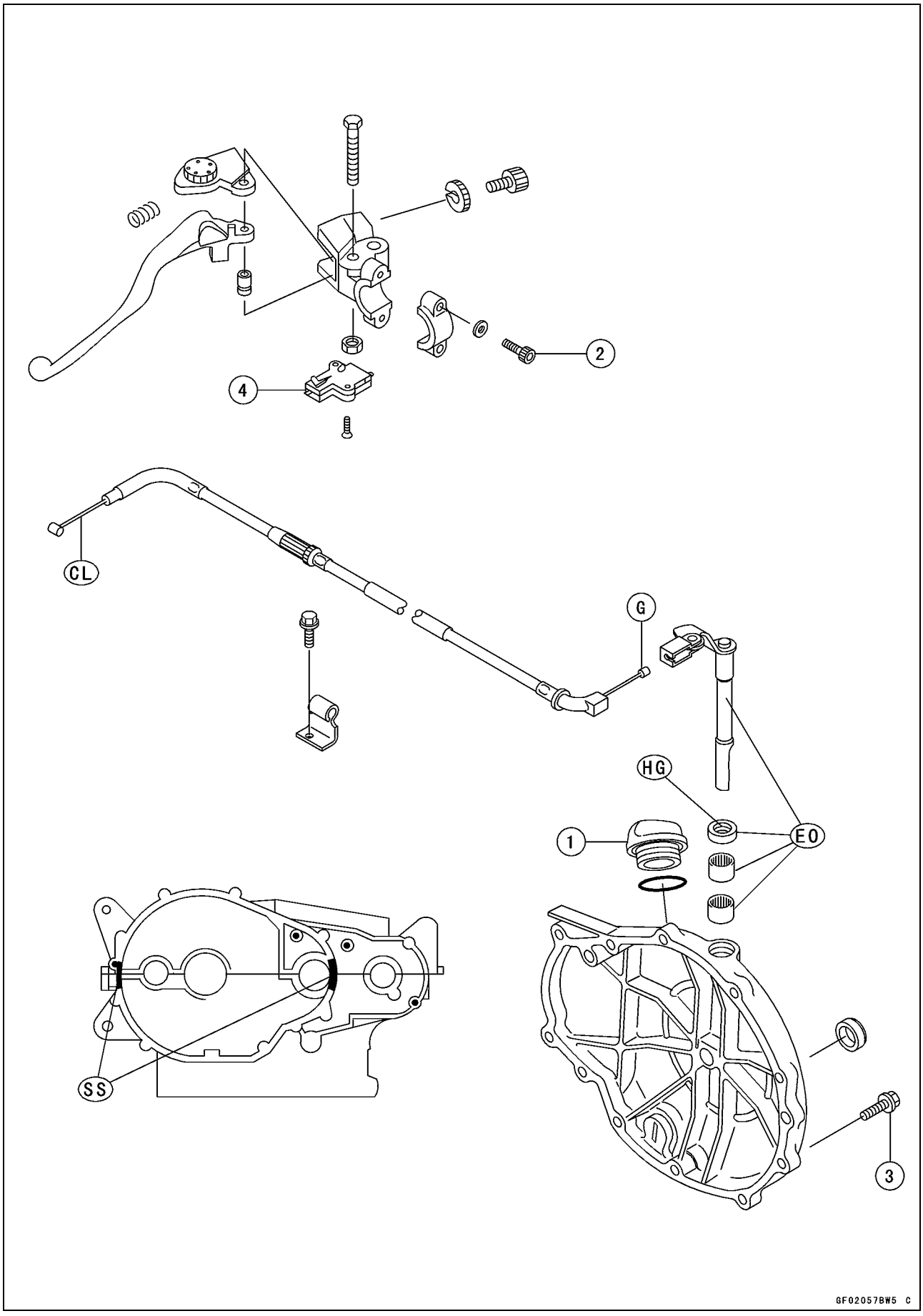


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Spring Bolts	9.3	0.95	82 in·lb	
2	Clutch Hub Nut	132	13.5	98	

EO: Apply engine oil.
M: Apply molybdenum disulfide grease.
R: Replacement Parts

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Filler Plug	1.5	0.15	13 in·lb	
2	Clutch Cable Holder Bolts	11	1.1	95 in·lb	
3	Clutch Cover Bolts	11	1.1	95 in·lb	

4. Starter Lockout Switch
CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
HG: Apply high temperature grease.
SS: Apply silicone sealant.

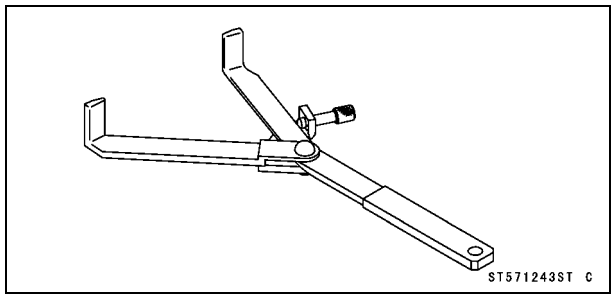
6-6 CLUTCH

Specifications

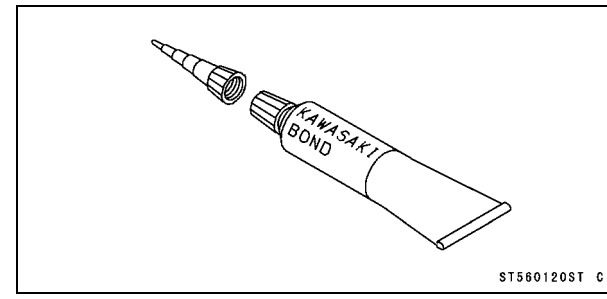
Item	Standard	Service Limit
Clutch Lever Position	Non-adjustable	– – –
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Clutch		
Friction Plate Thickness	2.9 ~ 3.1 mm (0.114 ~ 0.122 in.)	2.75 mm (0.1082 in.)
Friction and Steel Plate Warp	0.2 mm (0.008 in.) or less	0.3 mm (0.012 in.)
Clutch Spring Free Length	34.2 mm (1.346 in.)	33.1 mm (1.303 in.)

Special Tool and Sealant

Clutch Holder:
57001-1243



Kawasaki Bond (Silicone Sealant):
56019-120



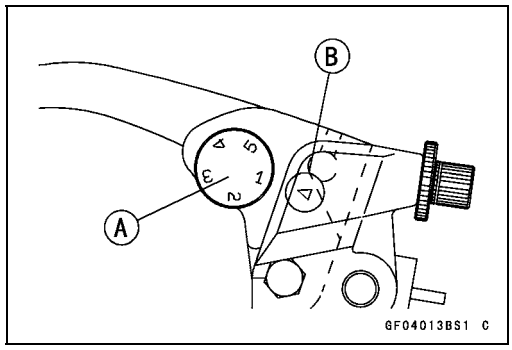
Clutch Lever and Cable

Clutch Lever Position Adjustment

The adjuster has 5 position so that the clutch lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B] on the lever holder.

○The distance from the grip to the released lever is minimum at number 5 and maximum at number 1.

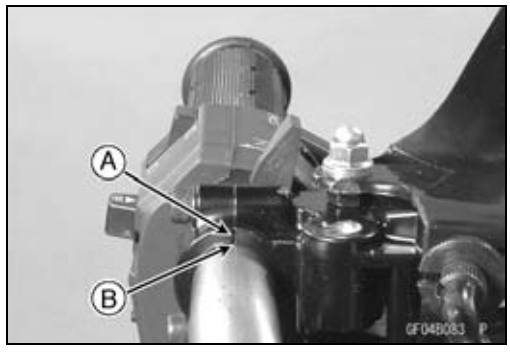


Clutch Cable Inspection

- Refer to the Clutch Cable Inspection in the Periodic Maintenance chapter.

Clutch Lever Installation

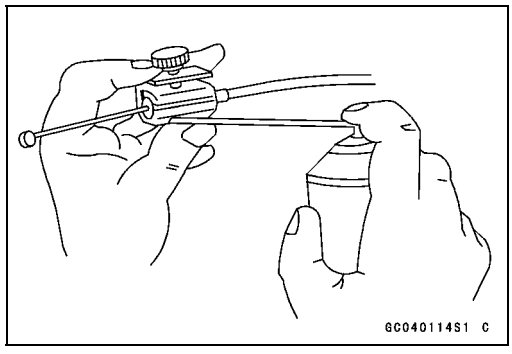
- Install the clutch lever so that the mating surface [A] of the lever holder is aligned with the punch mark [B] on the handlebar.



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.

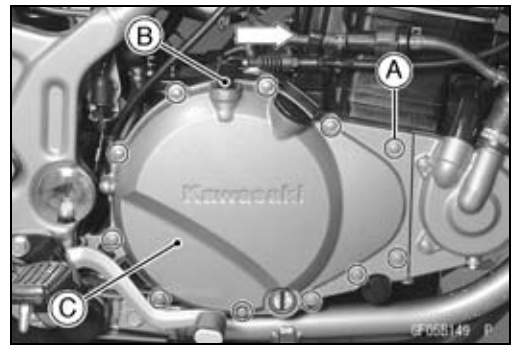


Right Engine Cover

Clutch Cover Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).

- Remove:
  Clutch Cable
  Engine Guard (see Engine Guard Removal in the Frame chapter)
  Clutch Cover Bolts [A]
- Turn the release lever [B] toward the front as shown, and remove the clutch cover [C].

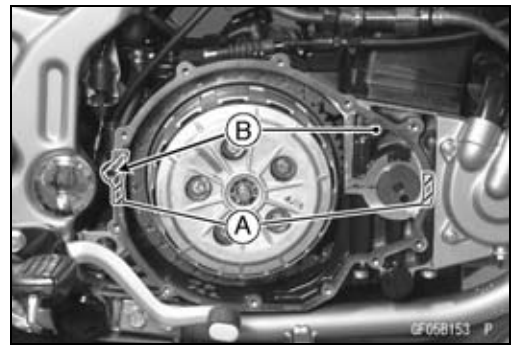


Clutch Cover Installation

- Apply silicone sealant to the area [A] where the mating surface of the crankcase touches the clutch cover gasket.

  Sealant - Kawasaki Bond (Silicone Sealant): 56019-120
- Install the knock pins [B], and replace the cover gasket with a new one.
- Tighten the cover bolts.

  Torque - Clutch Cover Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)



Clutch Release Removal

NOTE

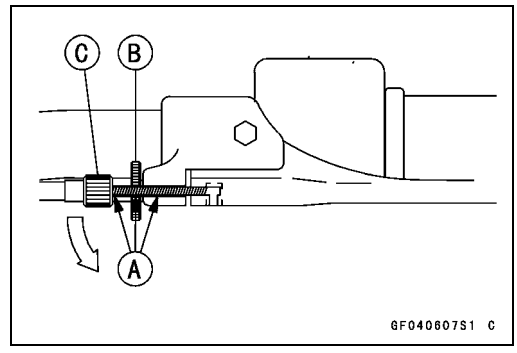
○*Do not pull out the clutch release shaft for clutch cover removal.*

CAUTION

Clutch release shaft removal damages the oil seal in the clutch cover necessitating the oil seal replacement.

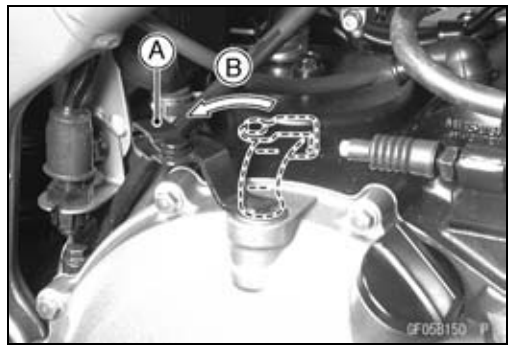
- Slide the dust cover at the clutch cable lower end out of place.
- Loosen the nuts, and slide the lower end of the clutch cable to give the cable plenty of play.

- Loosen the knurled locknut [B] at the clutch lever, and screw in the adjuster [C].
- Remove the left handlebar cover.
- Line up the slots [A] in the clutch lever, knurled locknut, and adjuster, and then free the cable from the lever.



Right Engine Cover

- Free the clutch inner cable tip from the clutch release lever [A].
- Turn the release lever toward the rear [B] as shown in the figure.
- Pull the lever and shaft assembly out of the clutch cover.



Clutch Release Installation

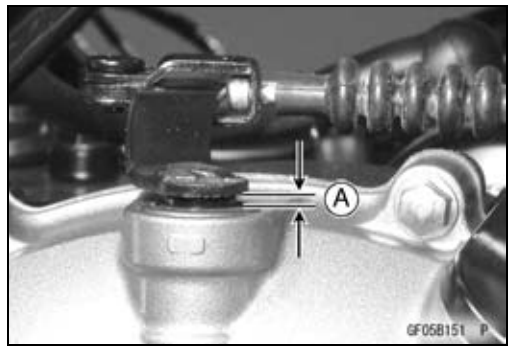
CAUTION
Always install a new oil seal when the clutch release shaft is removed.

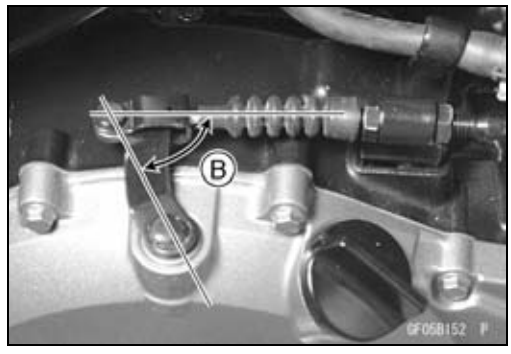
- Apply high temperature grease to the oil seal lips in the clutch cover.
- Apply engine oil to the bearings in the hole of the clutch cover.
- Apply engine oil to the release shaft.
- Turning the release lever toward the rear, insert the release shaft straight into the hole of the clutch cover.

CAUTION
When inserting the release shaft, be careful not to remove the spring of the oil seal.

- Install the clutch inner cable tip in the release lever.
- Turn the release lever clockwise until it becomes hard to turn.

○The release lever should have proper clearance and angle as shown.
[A] 1 ~ 3 mm
[B] 80° ~ 90°

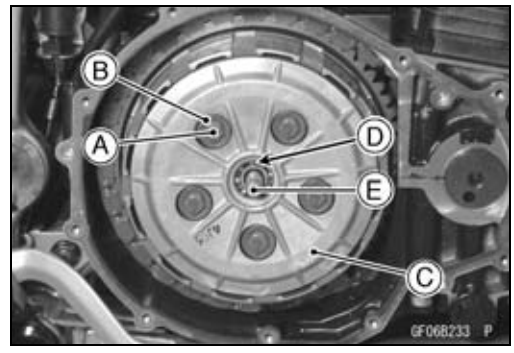




Clutch

Clutch Removal

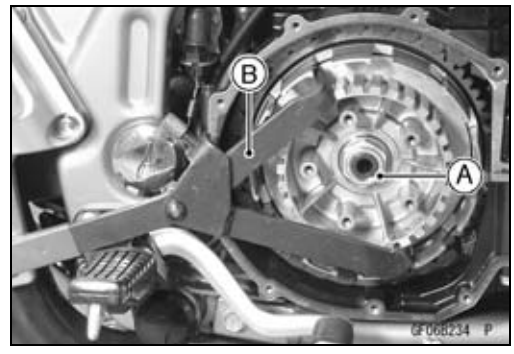
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the clutch cover (see Clutch Cover Removal).
- Remove the clutch spring bolts [A], washers [B] and springs.
- Remove the clutch spring plate [C] with the thrust ball bearing [D] and pusher [E].
- Remove the friction plates and steel plates.



- When loosening the clutch hub self-locking nut [A], use the clutch holder [B] to keep the clutch hub from turning as shown.

  Special Tool - Clutch Holder: 57001-1243

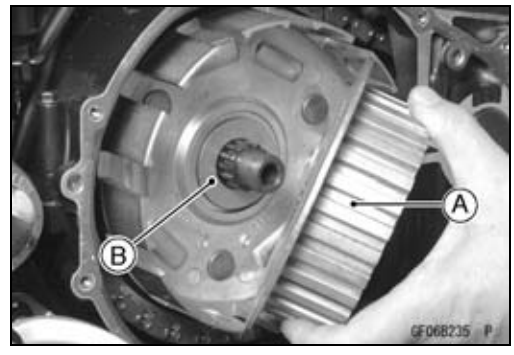
- Remove the clutch hub self-locking nut and washer.



- Pull out the clutch hub [A] and thrust washer [B].

NOTE

○*The clutch housing can not be removed without major disassembly work (see Crankshaft/Transmission chapter).*



Clutch Installation

- Install the thrust washer and clutch hub.
- Install the washer.
- Discard the used clutch hub self-locking nut, and install a new self-locking nut with the projected side facing outward.
- Install the clutch holder to keep the clutch hub from turning and tighten the clutch hub self-locking nut.

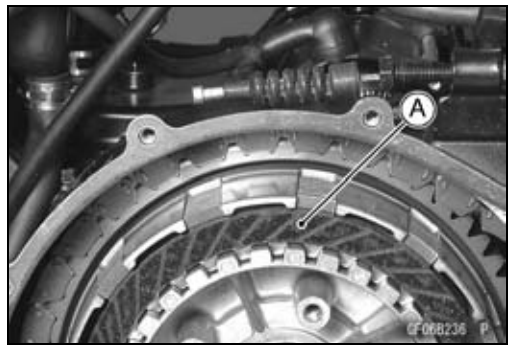
  Special Tool - Clutch Holder: 57001-1243

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

- Install the friction plates and steel plates, starting with a friction plate and alternating them.

Clutch

○The grooves [A] on the friction plate surfaces are cut tangentially and radially, install the friction plates so that the grooves run toward the center in the direction of the clutch housing rotation (counterclockwise viewed from the engine right side).



CAUTION

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

- Apply engine oil to the thrust ball bearing.
- Apply molybdenum disulfide grease to the rubbing portion of clutch spring plate pusher.
- Tighten the clutch spring bolts.

Torque - Clutch Spring Bolts: 9.3 N·m (0.95 kgf·m, 82 in·lb)

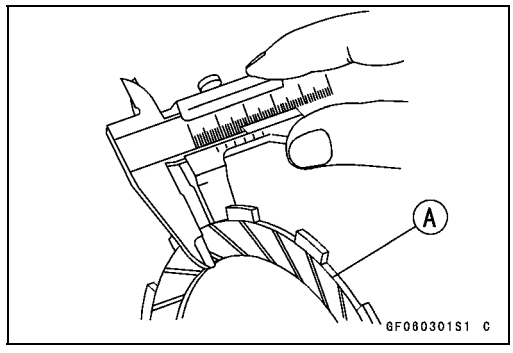
Clutch Plate Wear, Damage Inspection

- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.

★If any plates show signs of damage, replace the friction plates and steel plates as a set.

- Measure the thickness of the friction plate [A] at several points.

★If any of the measurements is less than the service limit, replace the friction plate.



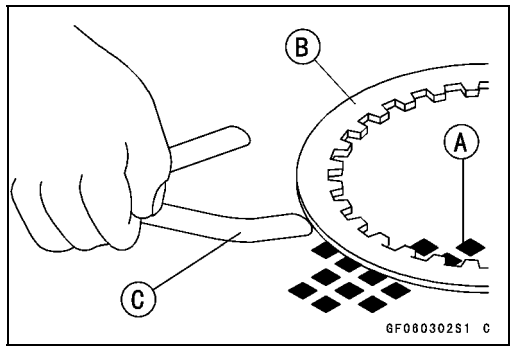
Friction Plate Thickness

Standard:	**2.9 ~ 3.1 mm (0.114 ~ 0.122 in.)**
Service Limit:	**2.75 mm (0.1082 in.)**

Clutch Plate Warp Inspection

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

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



Friction and Steel Plate Warp

Standard:	**less than 0.2 mm (0.008 in.)**
Service Limit:	**0.3 mm (0.012 in.)**

Clutch

Clutch Spring Free Length Measurement

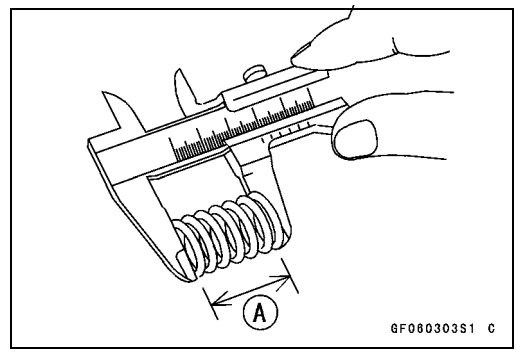
- Measure the free length of the clutch spring [A].

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

Clutch Spring Free Length

Standard: 34.2 mm (1.346 in.)

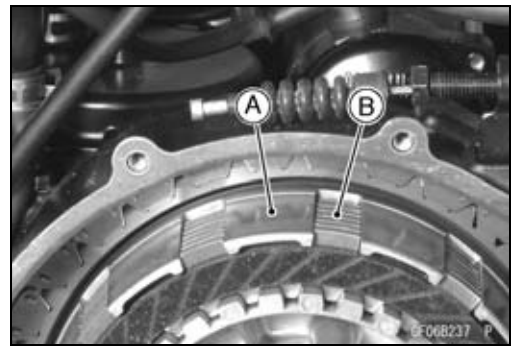
Service Limit: 33.1 mm (1.303 in.)



Clutch Housing Finger Inspection

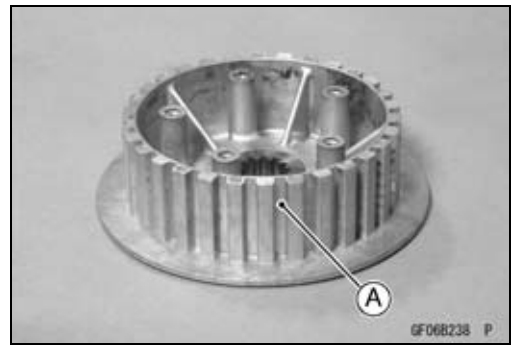
- Visually inspect the fingers [A] of the clutch housing where the tangs [B] of the friction plates hit them.

★If they are badly worn or if there are grooves cut where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



Clutch Hub Spline Inspection

- Visually inspect where the teeth on the steel plates wear against the splines [A] of the clutch hub
- If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



Engine Lubrication System

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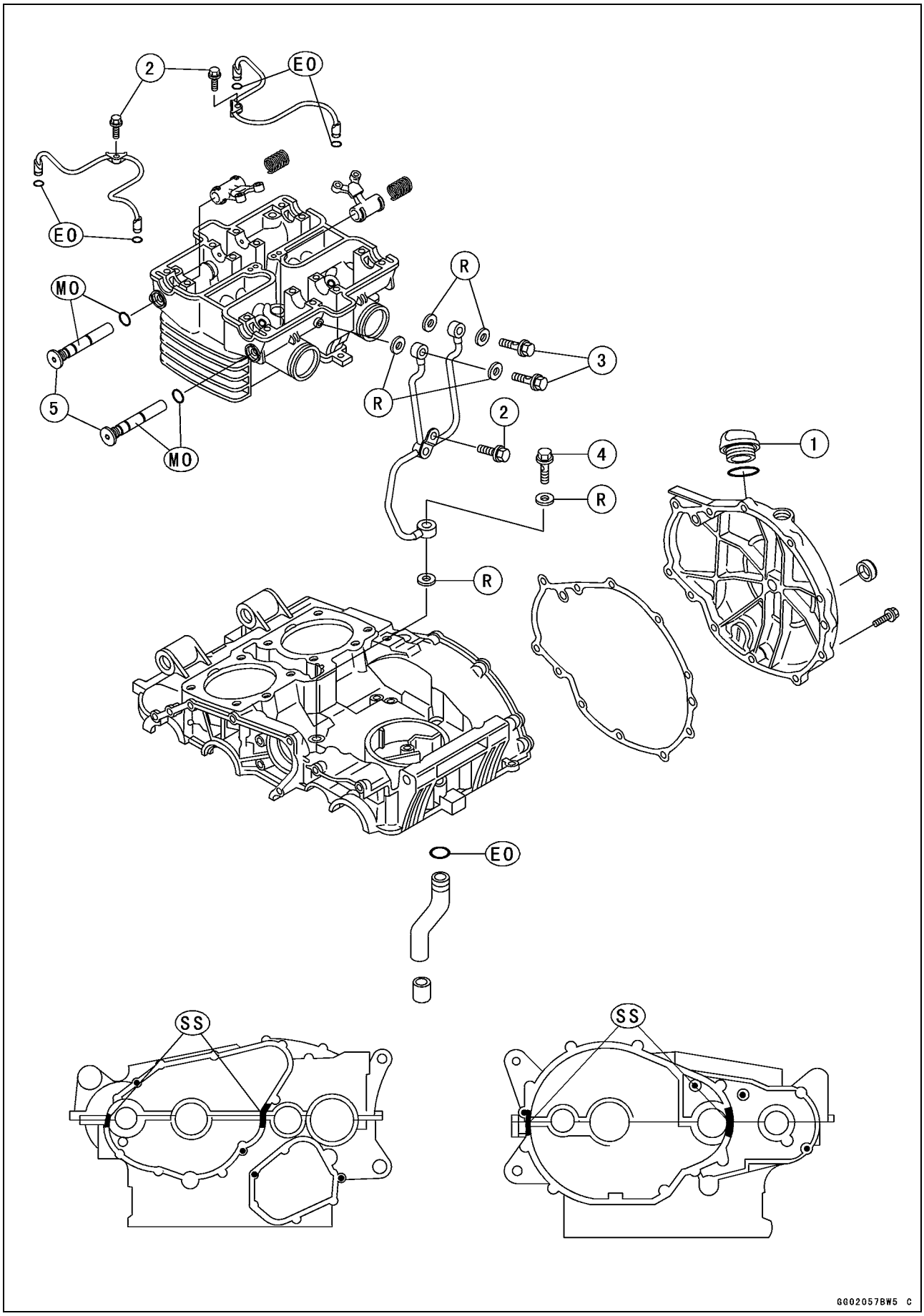
Exploded View

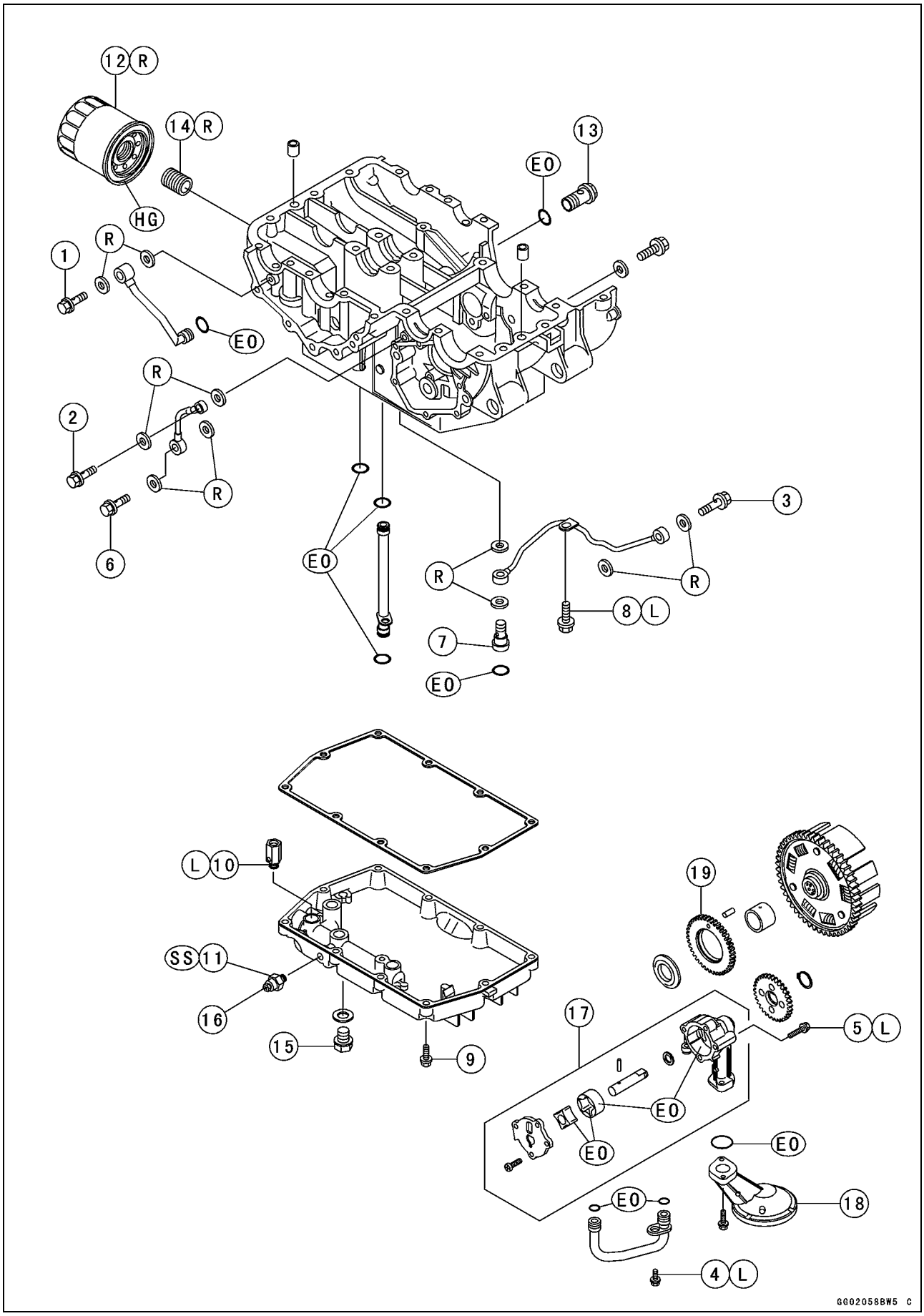


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Filler Plug	1.5	0.15	13 in·lb	
2	Main Oil Pipe Mounting Bolt	11	1.1	95 in·lb	
3	Main Oil Pipe Upper Banjo Bolt	12	1.2	104 in·lb	
4	Main Oil Pipe Lower Banjo Bolt	20	2.0	14.5	
5	Rocker Shafts	39	4.0	29	

EO: Apply engine oil.
MO: Apply molybolenum disulfide oil.
R: Replacement Parts
SS: Apply silicone sealant.

Exploded View



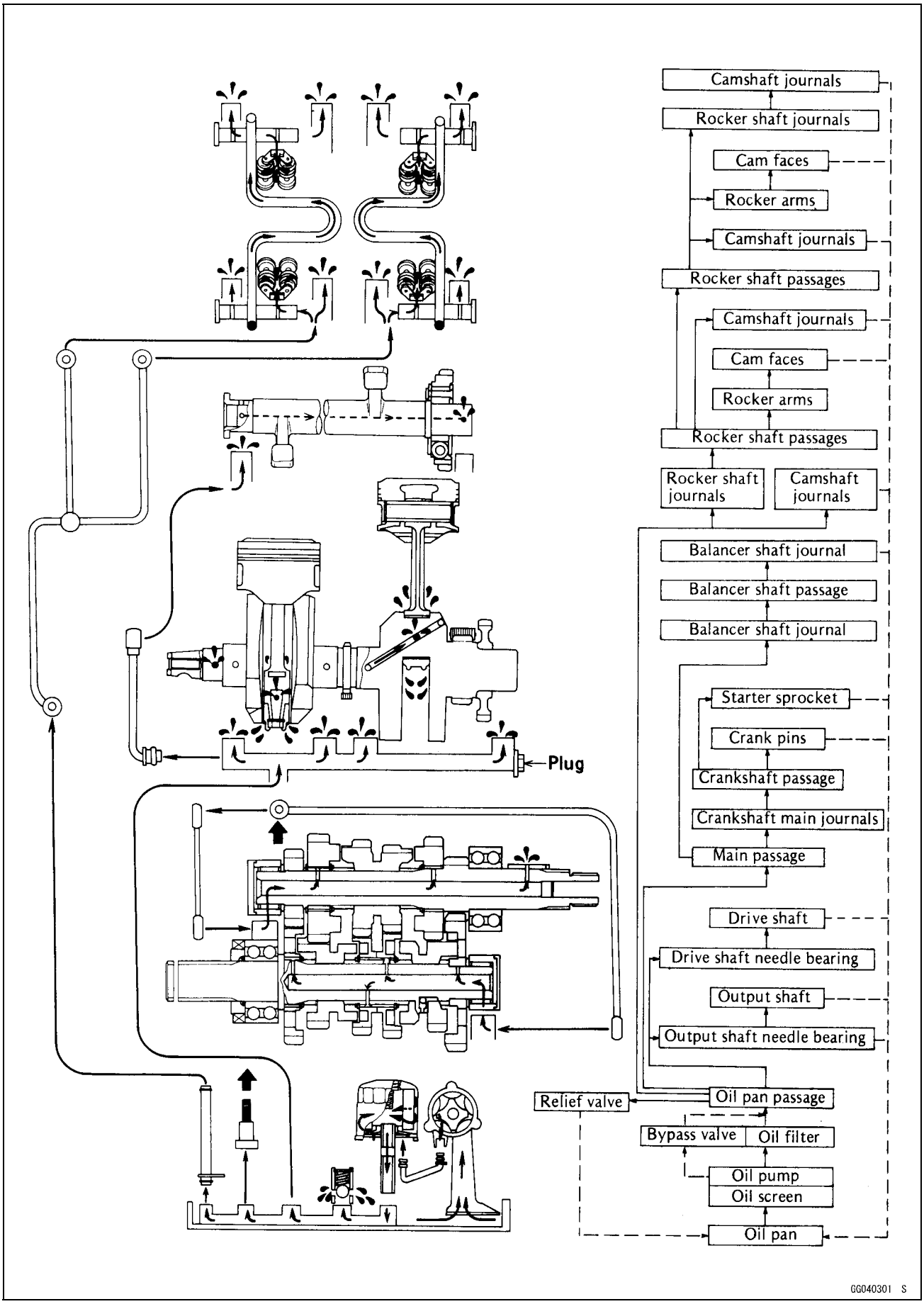
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Pipe for Balancer Shaft Banjo Bolt	7.8	0.80	69 in·lb	
2	Oil Pipe for Drive Shaft Upper Banjo Bolt	7.8	0.80	69 in·lb	
3	Oil Pipe for Output Shaft Upper Banjo Bolt	7.8	0.80	69 in·lb	
4	Oil Pump Outer Oil Pipe Bolts	11	1.1	95 in·lb	L
5	Oil Pump Mounting Bolts	11	1.1	95 in·lb	L
6	Oil Pipe for Drive Shaft Lower Banjo Bolt	12	1.2	104 in·lb	
7	Oil Pipe for Output Shaft Lower Banjo Bolt	12	1.2	104 in·lb	
8	Oil Pipe for Output Shaft Mounting Bolt	11	1.1	95 in·lb	L
9	Oil Pan Mounting Bolts	11	1.1	95 in·lb	
10	Relief Valve	15	1.5	11	L
11	Oil Pressure Switch	15	1.5	11	SS
12	Oil Filter	17	1.7	12.5	R
13	Oil Passage Plug	18	1.8	13	
14	Oil Filter Mounting Stud	25	2.5	18	L
15	Engine Oil Drain Bolt	29	3.0	22	
16	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	

17. Oil Pump
18. Oil Screen
19. Oil Pump Drive Gear

EO: Apply engine oil.
HG: Apply high temperature grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
SS: Apply Silicone Sealant.

Engine Oil Flow Chart

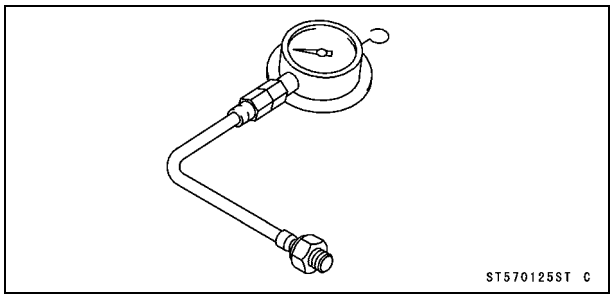


Specifications

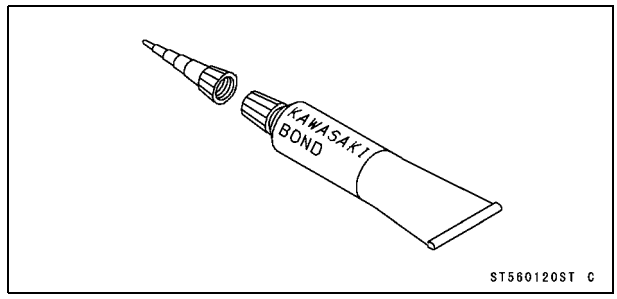
Item	Standard
Engine Oil	
Grade	API SE, SF, SG or API SH or SJ JASO MA
Viscosity	SAE 10W-40
Capacity	2.8 L (when filter is not removed) 3.0 L (when filter is removed) 3.4 L (when engine is completely dry)
Level	Between upper and lower level lines
Oil Pressure Measurement	
Oil pressure @4 000 r/min (rpm), oil temperature 90°C (194°F)	275 ~ 335 kPa (2.8 ~ 3.4 kgf/cm², 40 ~ 48 psi)

Special Tools and Sealant

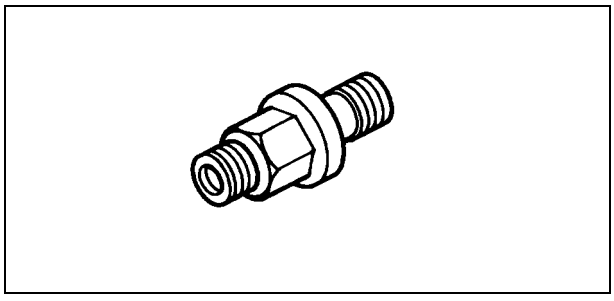
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



Kawasaki Bond (Silicone Sealant):
56019-120



Oil Pressure Gauge Adapter, M14 × 1.5:
57001-1209



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

- If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.

CAUTION

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

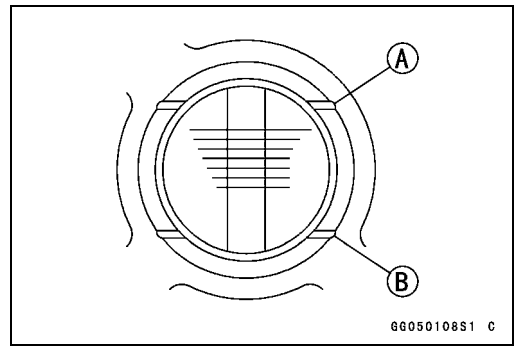
- If the motorcycle has just been used, wait several minutes for all the oil to drain down.

- Situate the motorcycle so that it is perpendicular to the ground, and check the engine oil level through the oil level gauge.

★The oil level should come up between the upper [A] and lower level lines [B].

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.



NOTE

○*If the engine oil type and make are unknown, use any brand of the specified oil to top up the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*

CAUTION

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.

Engine Oil Change

- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

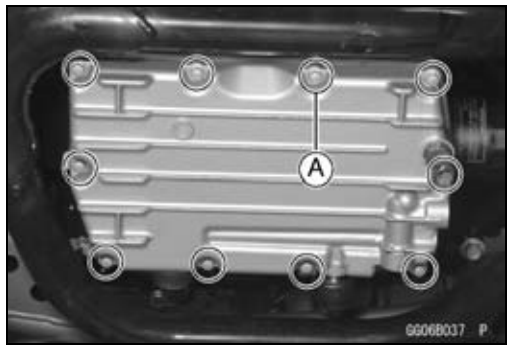
Oil Filter Replacement

- Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

Oil Pan and Relief Valve

Oil Pan Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the engine guard (see Engine Guard Removal in the Frame chapter).
- Disconnect the oil pressure switch lead.
- Remove the oil pan mounting bolts [A] and the oil pan from the crankcase.

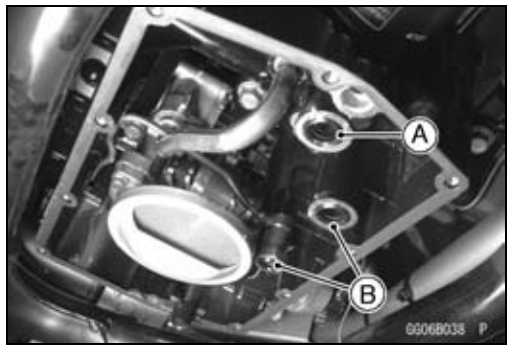


Oil Pan Installation

- Check that the O-rings for the outlet side [A] and inlet side [B] are in good condition.

★If they are damaged, replace them with new ones.

○The O-rings between the oil pan and the lower case oil passage must be installed so that flat side faces the lower case oil passage.



- Apply a small amount of engine oil to the O-rings.
- Install the oil pan and tighten its mounting bolts.

Torque - Oil Pan Mounting Bolts: 11 N·m (1.1 kgf·m, 95 ft·lb)

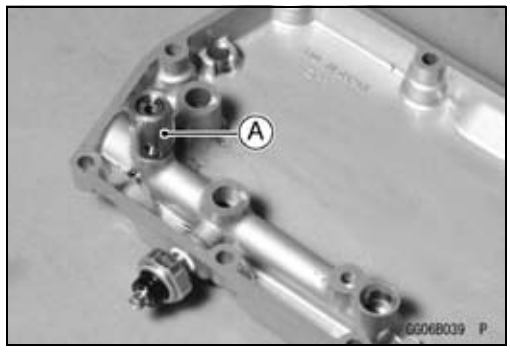
- Connect the oil pressure switch lead.

Torque - Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

- Fill the engine with the specified oil.

Relief Valve Removal

- Remove the oil pan (see Oil Pan Removal).
- Remove the relief valve [A] from the oil passage on the oil pan.



Oil Pan and Relief Valve

Relief Valve Installation

- Apply a non-permanent locking agent to the threads of the relief valve, and tighten it.

Torque - Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

CAUTION

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

- Install the oil pan.

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

Relief Valve Inspection

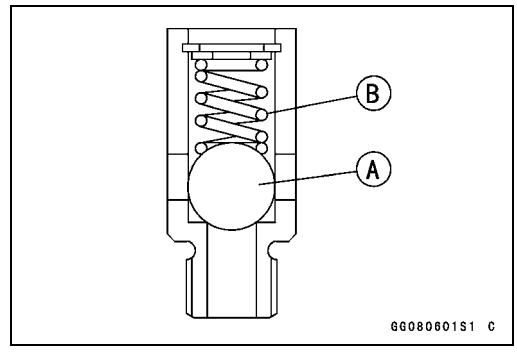
- Remove the relief valve.
- Check to see if the steel ball inside the valve slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by valve spring pressure.

NOTE

○*Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.*

- If any rough spots are found during above inspection, wash the valve clean in a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

[A] Valve
[B] Spring



⚠ WARNING

Clean the parts 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.

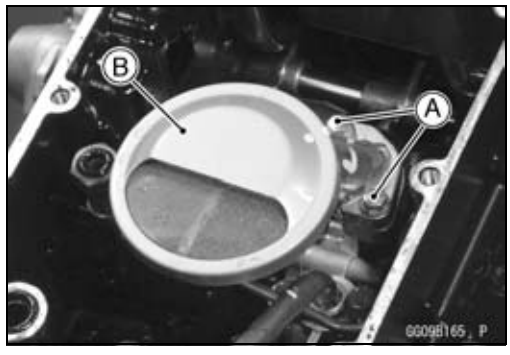
★If cleaning does not solve the problem, replace the relief valve as an assembly. The relief valve is precision made with no allowance for replacement of individual parts.

Oil Pump

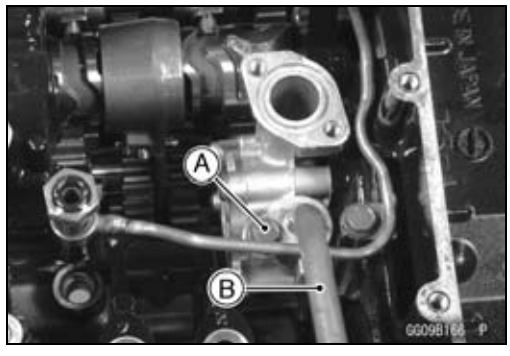
Oil Pump Removal

- Drain the coolant (see Coolant change in the Periodic Maintenance chapter).
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Remove:
  Water Pump (see Water Pump Removal in the Cooling System chapter)
  Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
  Alternator Cover with Shift Change Link and Pedal (see Alternator Rotor/Starter Clutch Removal in the Electrical System chapter)
  Chain Guide (see Primary Chain Guide Wear Inspection in the Crankshaft/Transmission chapter)
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
  Upper Crank Case Mounting Bolts

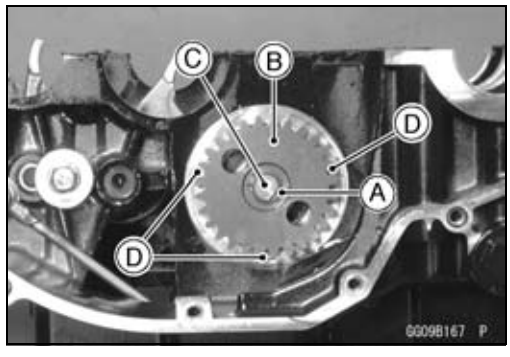
- Turn the engine upside down and remove the following:
  Oil Pan (see Oil Pan Removal)
  Oil Screen Bolts [A]
  Oil Screen [B]



  Oil Pump Outer Oil Pipe Bolt [A]
  Oil Pump Outer Oil Pipe [B]
  Lower Crank Case Mounting Bolts
  Lower Crank Case

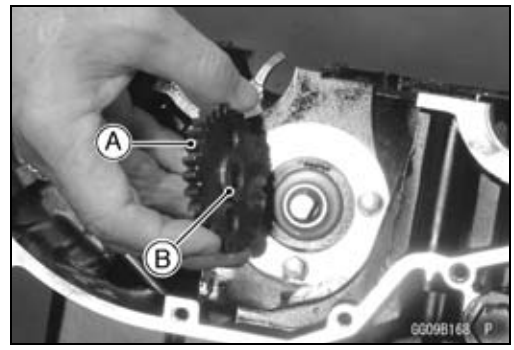


- Remove the circlip [A] that holds the oil pump gear [B] on the oil pump shaft [C].
- Remove the oil pump gear.
- Take off the oil pump mounting bolts [D].
- Remove the oil pump from the lower case.



Oil Pump

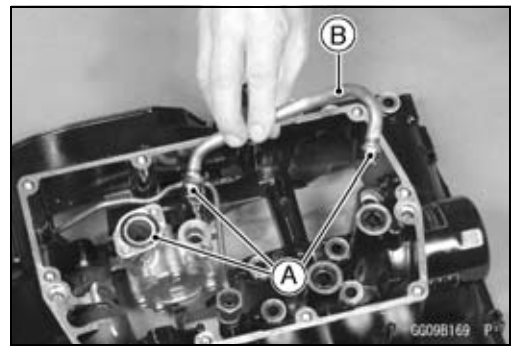
Oil Pump Installation



- Fill the pump with engine oil turning the pump shaft before installation.
- Apply a non-permanent locking agent to the threads of the oil pump mounting bolts and tighten them.

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

- Install the oil pump gear [A] so that the projection [B] side faces inward.
- Install a new circlip.



- Be sure to install the oil pump and outer oil pipe O-rings [A], and apply engine oil to them.
- Install the oil pump outer oil pipe [B] and oil screen.

○Apply a non-permanent locking agent to the oil pipe bolt and tighten it.

Torque - Oil Pump Outer Oil Pipe Bolt: 11 N·m (1.1 kgf·m, 95 in·lb)

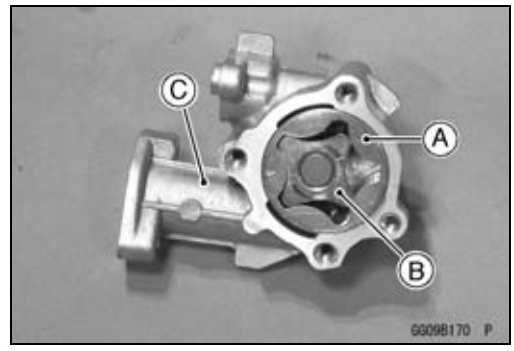
- Install:

Upper Crank Case Mounting Bolts
Starter Motor (see Starter Motor Installation in the Electrical System chapter)
Chain Guide (see Primary Chain Guide Wear in the Crankshaft/Transmission chapter)
Alternator Cover with Gear Change Link and Pedal (see Alternator Rotor/Starter Clutch Installation in the Electrical System chapter)
Clutch Cover (see Clutch Cover Installation in the Clutch chapter)
Water Pump (see Water Pump Installation in the Cooling System chapter)
Engine (see Engine Installation in the Engine Removal/Installation chapter)

- Fill the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the coolant (see Coolant Filling in the Periodic Maintenance chapter).

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

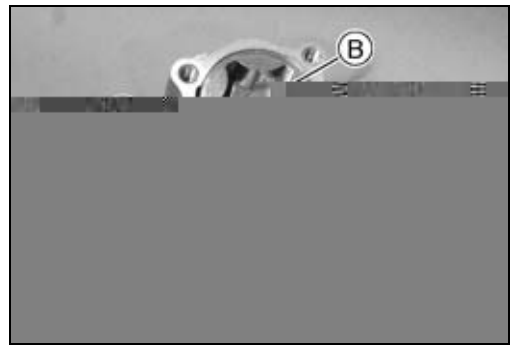
Oil Pump Disassembly



- Remove the oil pump from the lower case.
- Take off the oil pump cover screws.
- Remove the oil pump cover.
- Drop the outer rotor [A] and inner rotor [B] out of the oil pump body [C].

Oil Pump

- Pull the pin [A] out of the pump shaft.
- Pull the oil pump shaft [B] out of the body.
- Remove the washer.



Oil Pump Assembly

- Assembly of the oil pump is the reverse of disassembly.
- Before installing the oil pump, be sure the shaft and rotors turn freely.

Oil Screen Cleaning and Inspection

- Clean the oil pump screen 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.

NOTE

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

- Check the screen carefully for any damage: holes and broken wires.

★If the screen is damaged, replace the oil screen assembly.

Crankshaft/Connecting Rods

Connecting Rod Big End Bearing Insert/Crankpin Clearance

- Measure the bearing insert/crankpin clearance using a plastigage.

○Remove the connecting rod big end caps and wipe each bearing insert and crankpin surface clean of oil.

○Cut strips of plastigage to bearing insert width, and place a strip on the crankpin for each connecting rod parallel to the crankshaft so that the plastigage will be compressed between the crankpin and the bearing insert.

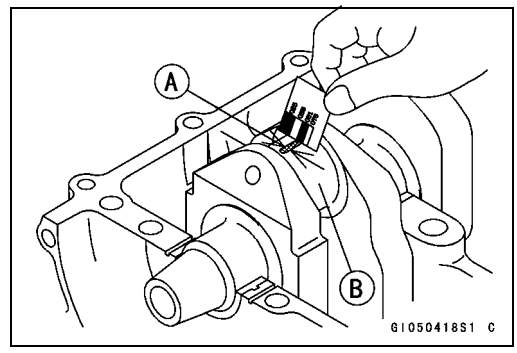
Install the connecting rod big end caps and tighten the big end cap nuts to the specified torque.

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

NOTE

○*Do not move the connecting rod and crankshaft during clearance measurement.*

○Remove the connecting rod big end caps, and measure the plastigage width [A] to determine the bearing insert/crankpin [B] clearance.



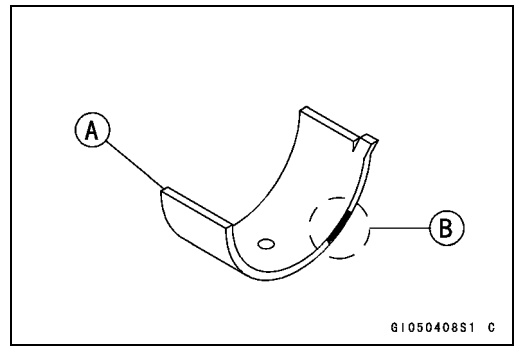
Connecting Rod Big End Bearing Insert/Crankpin Clearance

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 insert replacement is required.

★If the clearance is between 0.066 mm (0.0026 in.) and the service limit (0.10 mm, 0.0039 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/crankpin clearance with a plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.



★If the clearance exceeds the service limit, measure the diameter of the crankpins.

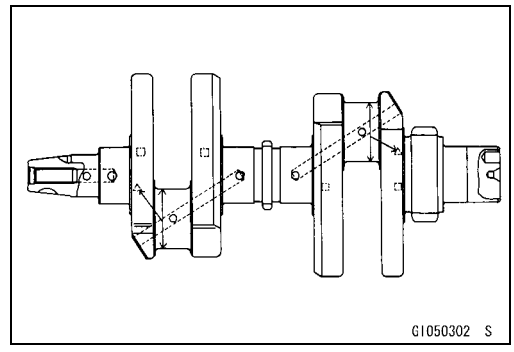
Crankpin Diameter

Standard: 37.984 ~ 38.000 mm (1.4954 ~ 1.4961 in.)

Service Limit: 37.97 mm (1.4949 in.)

★If any crankpin has worn past the service limit, replace the crankshaft with a new one.

★If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, write new marks on it.



Crankpin Diameter Marks

None: 37.984 ~ 37.994 mm (1.4954 ~ 1.4958 in.)

○: 37.995 ~ 38.000 mm (1.4959 ~ 1.4961 in.)

Δ: Crankpin Diameter Marks, "○" mark or no mark.

Crankshaft/Connecting Rods

● Put the connecting rod big end caps on the rods and tighten the nuts to the specified torque.

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

● Measure the bore diameter, and mark each connecting rod big end in accordance with the bore diameter.

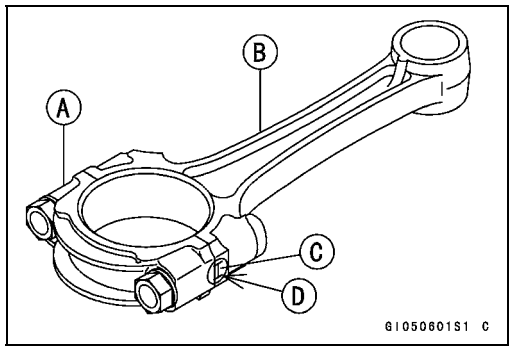
NOTE

○*The mark already on the big end should almost coincide with the measurement.*

Connecting Rod Big End Bore Diameter Marks

None: 41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)

○: 41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)



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

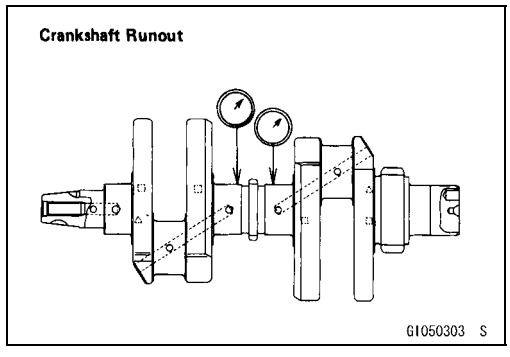
● Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft coding.
● Install the new insert in the connecting rod and check insert/journal clearance with a plastigage.

Connecting Rod Big End Bearing Insert Selection

Con-rod Bore Diameter Mark	Crankpin Diameter Mark	Bearing Insert	
		Size Color	Part Number
○	○	Black	92028-1349
None	None		
○	None	Blue	92028-1348
None	○	Brown	92028-1350

Crankshaft Runout

● Measure the crankshaft runout.
○Set the crankshaft in 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 readings (TIR) is the amount of runout.
★If the measurement exceeds the service limit, replace the crankshaft.



Crankshaft Runout

Service Limit: 0.05 mm (0.0020 in.) TIR

Crankshaft Main Bearing Insert/Journal Clearance

● Measure the bearing insert/journal clearance using a plastigage.
○Split the crankcase and wipe each bearing insert and journal surface clean of oil.
○Cut strips of plastigage to bearing insert width, and place a strip on each journal parallel to the crankshaft so that the plastigage will be compressed between the journal and the bearing insert.

Crankshaft/Connecting Rods

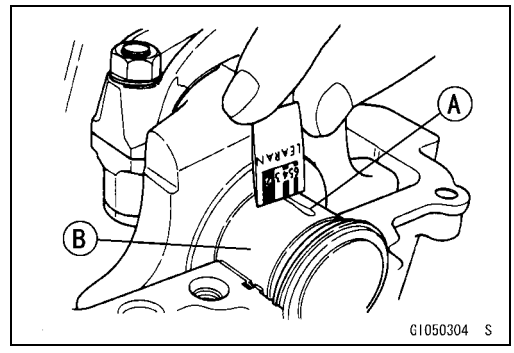
○Install the lower crankcase half, and tighten the case bolts to the specified torque.

Torque - Crankcase 8 mm Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)
Crankcase 6 mm Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

NOTE

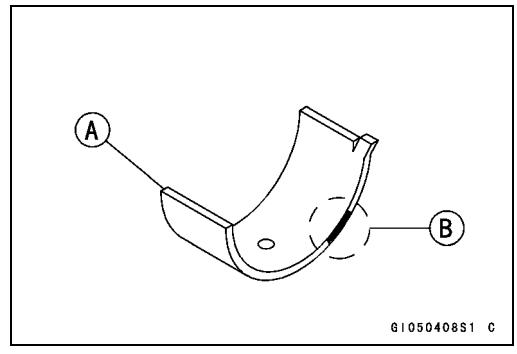
○*Do not turn the crankshaft during clearance measurement.*

○Remove the lower crankcase half and measure the plastigage width [A] to determine the bearing insert/journal [B] clearance.



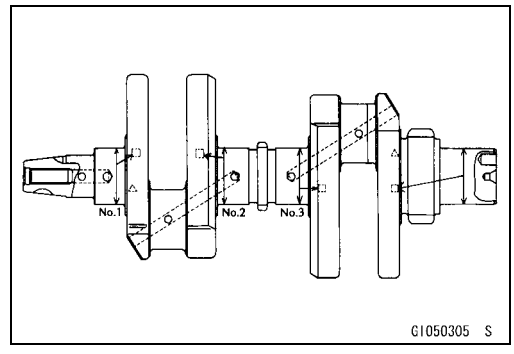
Crankshaft Main Bearing Insert/Journal Clearance
Standard: 0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in.)
Service Limit: 0.08 mm (0.0032 in.)

★If the clearance is within the standard, no bearing insert replacement is required.
★If the clearance is between 0.044 mm (0.0017 in.) and the service limit 0.08 mm (0.0032 in.), replace the bearing inserts [A] with inserts painted blue [B] Check insert/journal clearance with a plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



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

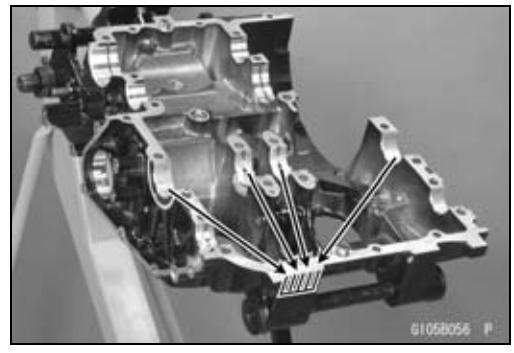
★If any journal has worn past the service limit, replace the crankshaft with a new one.
★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, write a new mark on it.



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.)

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

● Put the lower crankcase half on the upper crankcase half without bearing inserts, and tighten the case bolts to the specified torque and sequence (see Crankcase Assembly).
● Measure the crankcase main bearing bore diameter, and mark the upper crankcase half in accordance with the bore diameter.



NOTE

○*The mark already on the upper crankcase half should almost coincide with the measurement.*

Crankshaft/Connecting Rods

Crankcase Main Bearing Bore Diameter Marks

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

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

□□ □□: Crankcase Main Bearing Bore Diameter Marks, "○" mark or no mark.

- Select the proper bearing insert in accordance with the combination of the crankcase and the crankshaft coding.
- Install the new inserts in the crankcase halves and check insert/journal clearance with a plastigage.

Crankshaft Main Bearing Insert Selection

Crankcase Main Bearing Bore Diameter Mark	Crankshaft Main Journal Diameter Mark	Bearing Insert*		
		Size Color	Part Number	Journal Nos
○	1	Brown	92028-1102	2, 3
			92028-1274	1, 4
None	None	Blue	92028-1100	2, 3
			92028-1272	1, 4
○	None	Black	92028-1101	2, 3
None	1		92028-1273	1, 4

*: The bearing inserts for Nos. 2 and 3 journals have oil grooves.

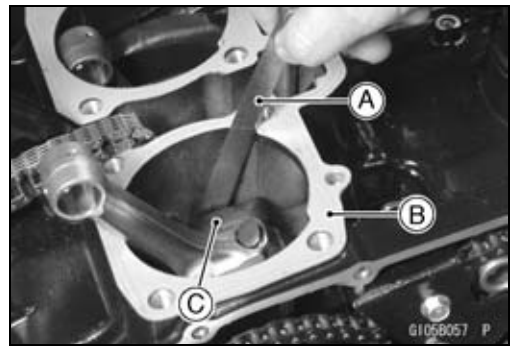
Crankshaft Side Clearance

- Measure the crankshaft side clearance.

○Install the lower crankcase half on the upper crankcase half, and turn the crankcase upside down.

○Insert a thickness gauge [A] between the upper crankcase [B] and the crank web [C] at the No.2 and No.3 journals to determine clearance.

★If the clearance exceeds the service limit, replace the crankcase halves as set.



CAUTION

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

Crankshaft Side Clearance

Standard: 0.05 ~ 0.25 mm (0.0020 ~ 0.0098 in.)

Service Limit: 0.40 mm (0.0157 in.)

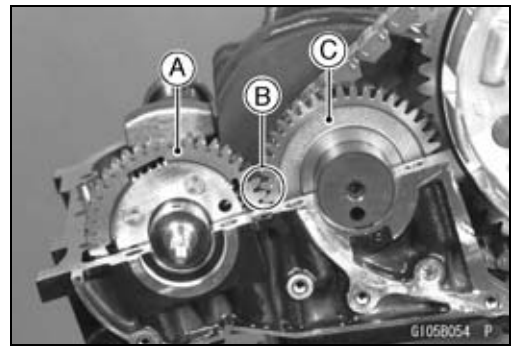
Balancer

Balancer Removal

- Split the crankcase (see Crankcase Splitting).
- Pull the balancer shaft with the balancer gear out of the crankcase.

Balancer Installation

- Apply oil to the inside of the balancer shaft bearing insert.
- Align the timing mark [B] on the balancer gear [A] with the timing mark [B] on the balancer drive gear [C] of the crankshaft.
- Assemble the crankcase (see Crankcase Assembly).



Balancer Shaft Bearing Insert/Journal Clearance

- Measure the bearing insert/journal clearance using a plastigage.

○Split the crankcase and wipe each bearing insert and journal surface clean of oil.

○Cut strips of plastigage to bearing insert width, and place a strip on each journal parallel to the balancer shaft so that the plastigage will be compressed between the journal and the bearing insert.

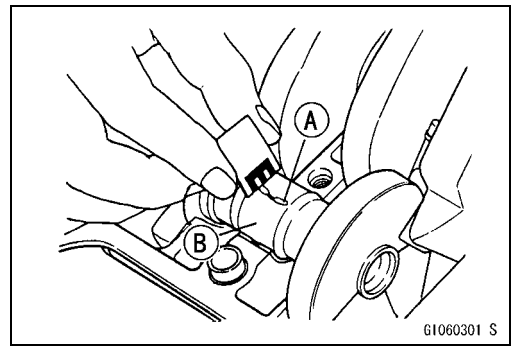
○Install the lower crankcase half, and tighten the case bolts to the specified torque.

Torque - Crankcase 8 mm Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)
Crankcase 6 mm Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

NOTE

○*Do not turn the balancer shaft during clearance measurement.*

○Remove the lower crankcase half and measure the plastigage width [A] to determine the bearing insert/journal [B] clearance.

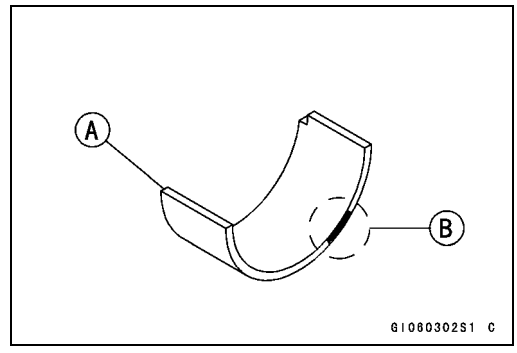


Balancer Shaft Bearing Insert/Journal Clearance
Standard: 0.020 ~ 0.050 mm (0.0008 ~ 0.0020 in.)
Service Limit: 0.09 mm (0.0035 in.)

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

★If the clearance is between 0.050 mm (0.0020 in.) and the service limit 0.09 mm (0.0035 in.), replace the bearing inserts [A] with inserts painted blue [B] Check insert/journal clearance with a plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

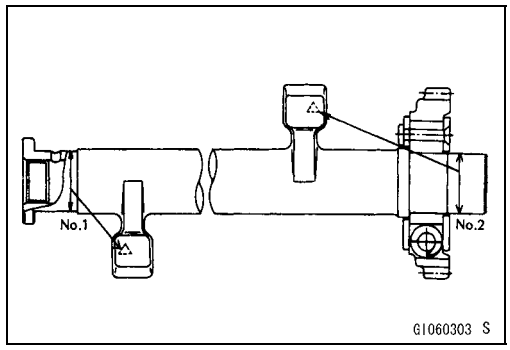
★If the clearance exceeds the service limit, measure the diameter of the balancer shaft journal.



Balancer Shaft Journal Diameter
Standard: 27.987 ~ 28.000 mm (1.1019 ~ 1.1024 in.)
Service Limit: 27.96 mm (1.1008 in.)

Balancer

★If either journal has worn past the service limit, replace the balancer shaft with a new one.
★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the balancer shaft, write new marks on it.



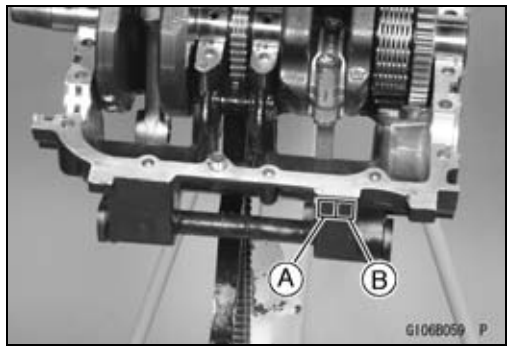
Balancer Shaft Diameter Marks

None: 27.987 ~ 27.993 mm (1.1019 ~ 1.1021 in.)

○: 27.994 ~ 28.000 mm (1.1021 ~ 1.1024 in.)

Δ: Balancer Shaft Journal Diameter Marks, "○" mark or no mark.

- Put the lower crankcase half on the upper crankcase half without bearing inserts, and tighten the case bolts to the specified torque and sequence (see Crankcase Assembly).
- Measure the crankcase bearing bore diameter for the balancer shaft, and mark the upper crankcase half in accordance with the bore diameter.



NOTE

○*The mark already on the upper crankcase half should almost coincide with the measurement.*

Crankcase Bearing Bore Diameter Marks

○: 31.008 ~ 31.016 mm (1.2208 ~ 1.2211 in.)

None: 31.017 ~ 31.024 mm (1.2211 ~ 1.2214 in.)

□□: Crankcase Bearing Bore Diameter Marks, "○" mark or no mark.

[A] No. 1 Journal
[B] No. 2 Journal

- Select the proper bearing insert in accordance with the combination of the crankcase and the balancer shaft coding.
- Install the new inserts in the crankcase and check insert/journal clearance with a plastigage.

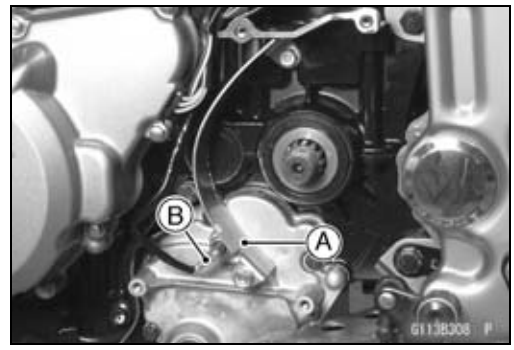
Balancer Shaft Bearing Insert Selection

Crankcase Main Bearing Bore Diameter Mark	Crankshaft Main Journal Diameter Mark	Bearing Insert*		
		Size Color	Part Number	
			L.H.	R.H.
○	○	Brown	92028-1497	92028-1692
None	None	Blue	92028-1495	92028-1690
○	None	Black	92028-1496	92028-1691
None	○			

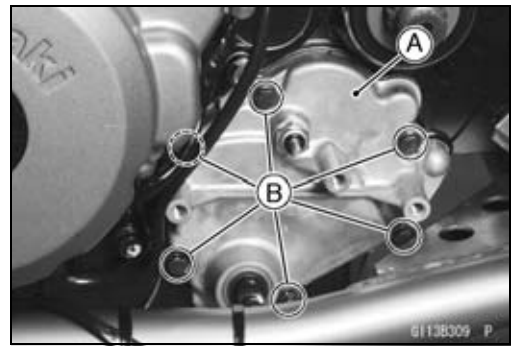
Transmission

External Shift Mechanism Removal

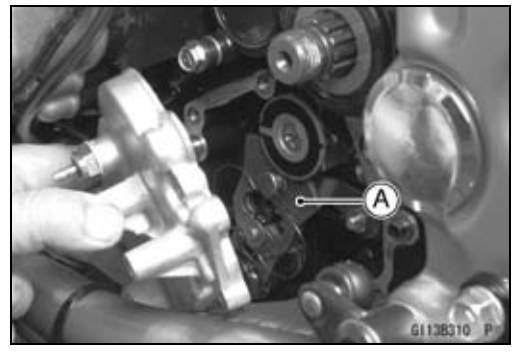
- Remove:
  Left Front Footpeg
  Shift Pedal Link Lever
  Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)
  Chain Guard [A]
  Neutral Switch Lead Connector [B]



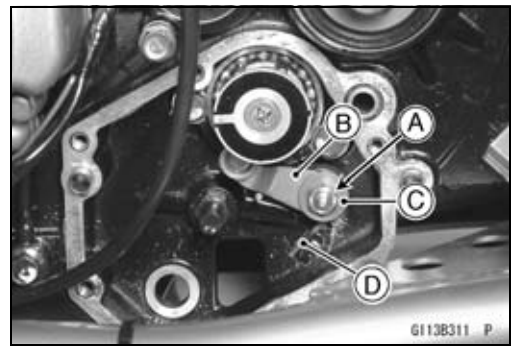
- Place an oil pan beneath the external shift mechanism cover [A].
- Remove the external shift mechanism cover bolts [B].



- Pull the cover.
- Remove the cover with the shift shaft assembly while pushing the shift mechanism arm [A] down..



- Remove the nut [A] and take off the gear positioning lever [B] The lever has a collar [C], spring [D], and washer.



External Shift Mechanism Installation

○The small diameter side of the collar in the gear positioning lever must face toward the crankcase.

- Tighten the positioning lever nut [A].

Torque - Gear Positioning Lever Nut: 11 N·m (1.1 kgf·m, 95 in·lb)

- Check that the return spring pin [B] is not loose.

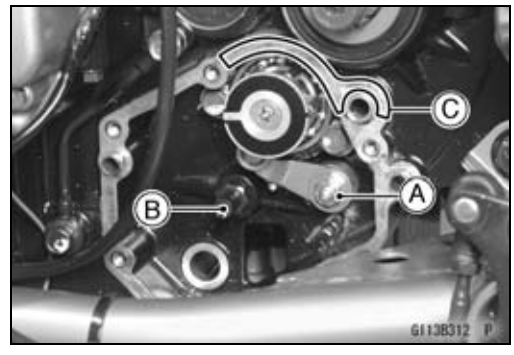
★If it is loose, remove it, apply a non-permanent locking agent to the threads, and tighten it.

Torque - Return Spring Pin: 20 N·m (2.0 kgf·m, 14.5 ft·lb)

- Apply silicone sealant to the area [C].

Sealant - Kawasaki Bond (Silicone Sealant): 56129-120

- Replace the cover gasket with a new one.

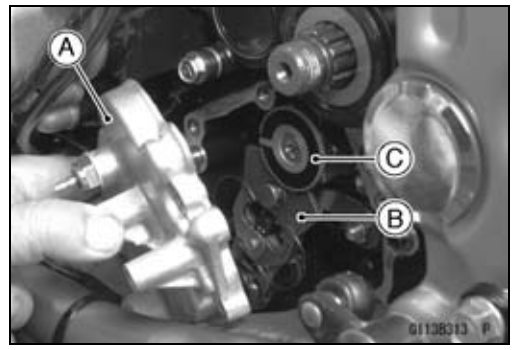


Transmission

- Apply high temperature grease to the seal lips.
- Insert the shift shaft into the crankcase half and fit the shift mechanism arm [A] to the shift drum [B].
- Install the external shift mechanism cover.
- Tighten the cover bolts.

Torque - External Shift Mechanism Cover Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)

- Check:
  Engine Oil Level (see Engine Oil Level Inspection in the Engine Lubrication System chapter)
  Drive Chain Slack (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)



External Shift Mechanism Inspection

- Examine the shift shaft for any damage.

○Check the shift shaft for bending or damage to the splines [A].

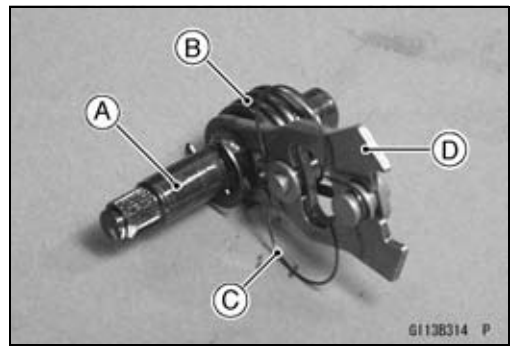
★If the shaft is bent, straighten or replace it. If the splines are damaged, replace the shaft.

○Check the return spring [B] and arm spring [C] for breaks or distortion.

★If the springs are damaged in any way, replace them.

○Check the shift mechanism arm [D] for distortion.

★If the shift mechanism arm is damaged in any way, replace the arm.



- Check that 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.

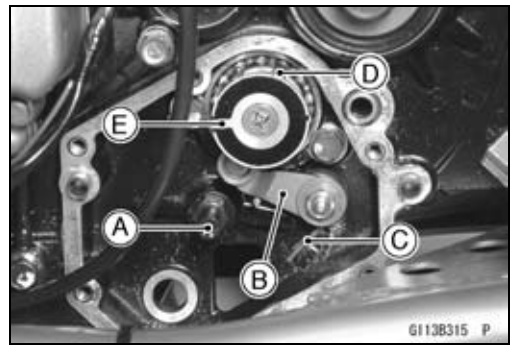
Torque - Return Spring Pin: 20 N·m (2.0 kgf·m, 14.5 ft·lb)

- Check the gear positioning levers [B], and their springs [C] for break or distortion.

★If the levers or springs are damaged in any way, replace them.

- Visually inspect the shift drum cam [D] and pin plate [E].

★If they are badly worn or if they show any damage, replace them.



Transmission Shaft Removal

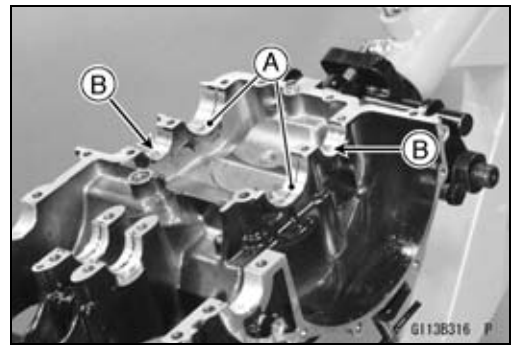
- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Split the crankcase (see Crankcase Splitting).
- Take out the output shaft assembly.
- Lift up the drive shaft assembly, and pull the shaft assembly out of the clutch housing. Leave the clutch housing and primary chain in place.

Transmission Shaft Installation

- With a high flash-point solvent, clean off the outer circumferences of the transmission ball bearings and needle bearings, and their bearing housings, and wipe dry.

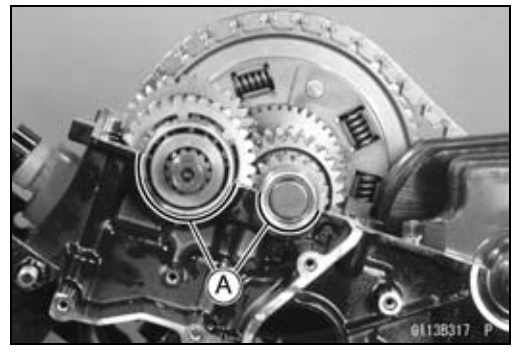
Transmission

- Check to see that the set rings [A] and set pins [B] are in place in the transmission bearing housings.



- Lift up the clutch housing and primary chain, insert the drive shaft assembly into the clutch housing, and install the drive shaft assembly in the upper crankcase half.
- Install the output shaft assembly in the upper crankcase half.

○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they match properly, there is no clearance [A] between the crankcase and the bearing outer races.



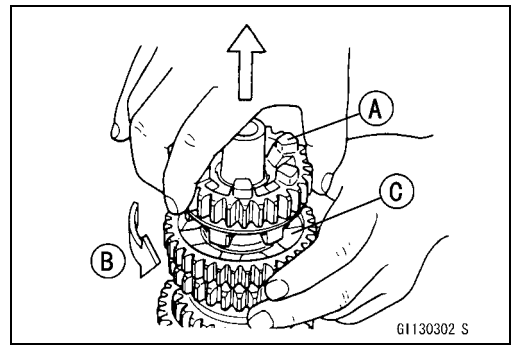
- Assemble the crankcase.
- Install the engine.

Transmission Shaft Disassembly

- Remove the transmission shaft.
- Using the outside circlip pliers to remove the circlips, disassemble the transmission shafts.

Special Tool - Outside Circlip Pliers: 57001-144

- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. To remove this gear from the shaft, quickly spin [B] the shaft in a vertical position while holding the 3rd gear [C], and pull off the 5th gear upwards.

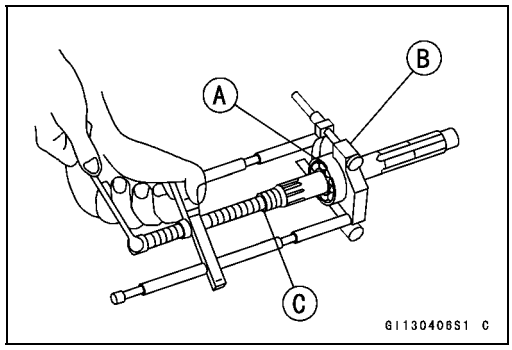


Transmission

● The ball bearings and collar are press-fit on the transmission shafts. To remove the bearings [A], use a press or the bearing puller [B] and bearing puller adapter [C].

Special Tools - Bearing Puller: 57001-135
Bearing Puller Adapter: 57001-317

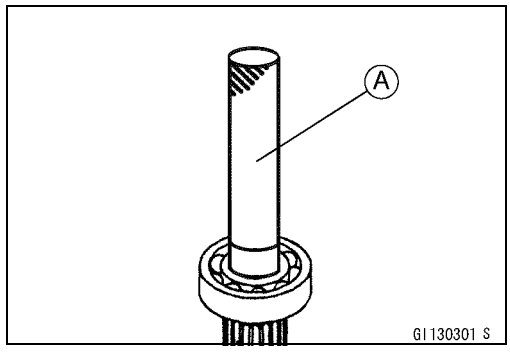
○The output shaft ball bearing, O-ring and collar ought to be removed together.
○No need for the bearing puller adapter at output shaft.



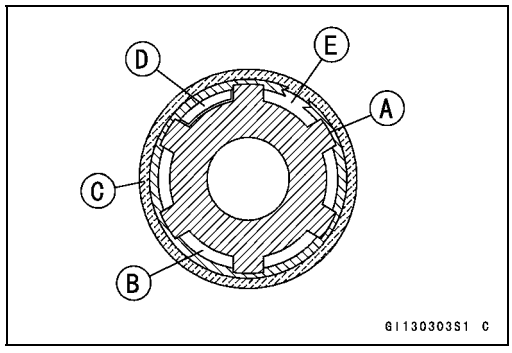
Drive Shaft Assembly

● Apply engine oil liberally to the drive shaft, gears, bearings and bushing.
● Install the drive shaft ball bearing using the bearing driver [A].

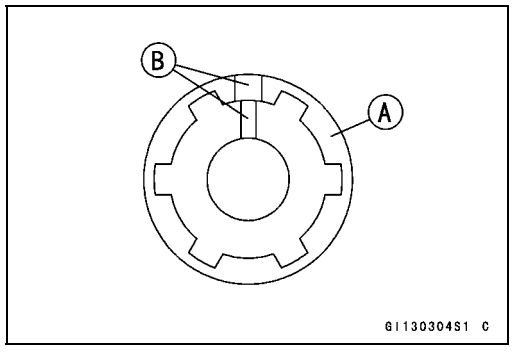
Special Tool - Bearing Driver, ϕ32: 57001-382



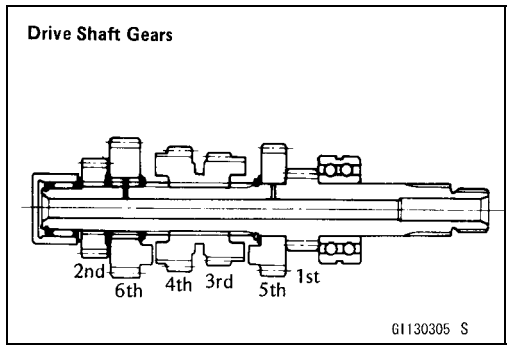
● Replace any circlips that were removed with new ones.
○Always install circlips [A] so that the opening is aligned with a spline groove [B], and install toothed washers [C] so that the teeth [D] are not aligned with the circlip opening [E]. To install a circlip without damage, fit the circlip onto the shaft expanding it just enough to install it, and use a suitable gear to push the circlip into place.



● When assembling the drive shaft 6th gear bushing [A] onto the shaft, align its oil hole [B] with the hole in the shaft.



● The drive shaft gears can be identified by size: the smallest diameter gear is 1st gear, and the largest is 6th. Be sure that all parts are put back in the correct sequence, facing the proper direction, and all circlips and washers are properly in place.
● Proper sequence starting with 1st gear (part of drive shaft) is: 1st gear, 5th gear (face the flat side of the gear to the right), washer, circlip, 3rd/4th gear (face 3rd gear side to the right), circlip, toothed washer, bushing (align the oil hole with the hole in the shaft), 6th gear (face the dogs to the right), toothed washer, circlip, 2nd gear, spacer, needle bearing, needle bearing outer race, and plug.
○The toothed washer before the bushing has slightly smaller teeth than the last one.



Transmission

- Install the spacer onto the drive shaft, facing the chamfered side to the ball bearing.
- Check that each gear spins or slides freely on the drive shaft without binding.

Output Shaft Assembly

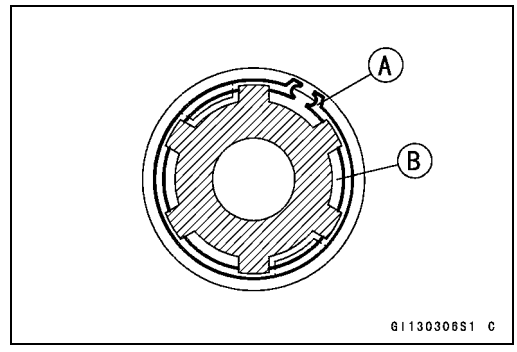
- Assembly is the reverse of disassembly. Note the following.
- Apply engine oil liberally to the output shaft, gears, bearings, bushing and O-ring.
- Install the output shaft ball bearing, O-ring and collar using the bearing driver.

Special Tool - Bearing Driver, ϕ32: 57001-382

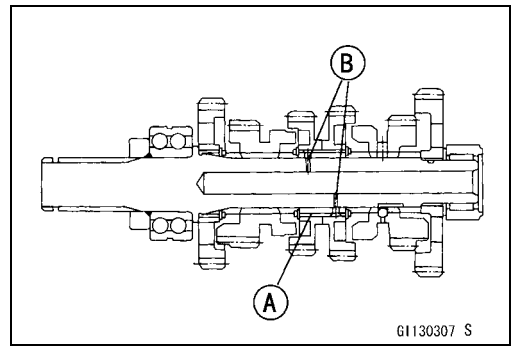
○The ball bearing, O-ring and collar ought to be installed individually.

- Replace any circlips that were removed with new ones.

○Always install circlips so that the opening is aligned with a spline groove. To install a circlip without damage, fit the circlip onto the shaft expanding it only enough to install it, and use a suitable gear to push the circlip into place.
[A] Circlip
[B] Toothed Washer



- When assembling the output shaft 3rd/4th gear bushing [A] to the shaft, align its oil holes [B] with the holes in the shaft.



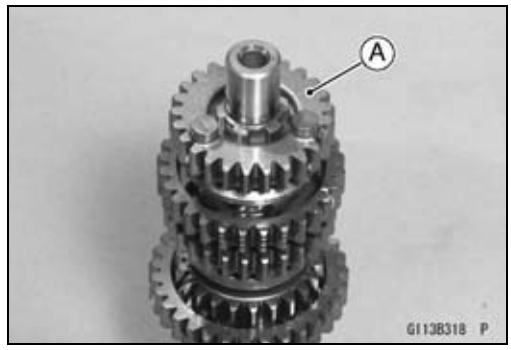
CAUTION

When installing the 5th 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.

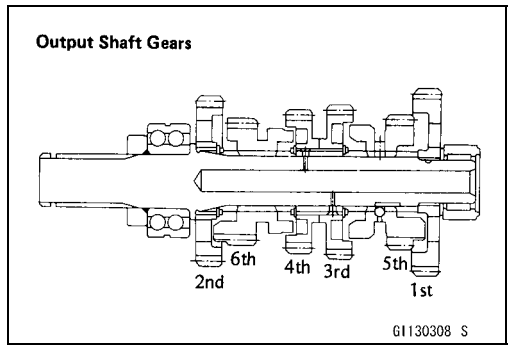
Transmission

- Check the effect of ball-locking, after assembling the 5th gear and steel balls on the output shaft.

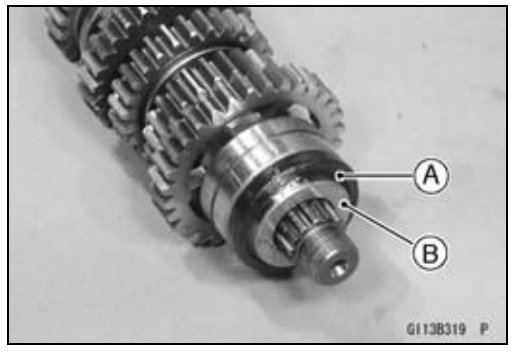
○Check that the 5th gear [A] does not come out of the output shaft when moving it up and down by hand.



- The output shaft gears can be identified by size: the largest diameter gear is 1st gear, and the smallest is 6th. Be sure that all parts are put back in the correct sequence and facing the proper direction, and that all circlips and washers are properly in place.
- Proper sequence starting with 2nd gear is: 2nd gear (face the flat side of the gear to the left), toothed washer, circlip, 6th gear (face the fork groove side to the right), circlip, toothed washer, bushing (align the oil holes with the holes in the shaft), 4th gear (face the side with the dog recesses to the left), 3rd gear (face the side with the dog recesses to the right), toothed washer, circlip, 5th gear (face the fork groove side to the left) with steel balls (3), 1st gear (face the flat side of the gear to the right), spacer, needle bearing, and needle bearing outer race.

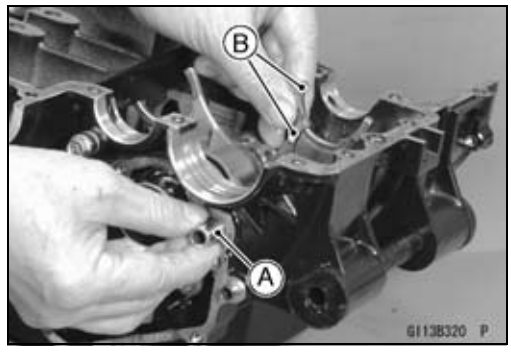


- Press the oil seal [A] onto the collar [B] so it is flush with the end of collar.
- Check that each gear spins or slides freely on the output shaft without binding.



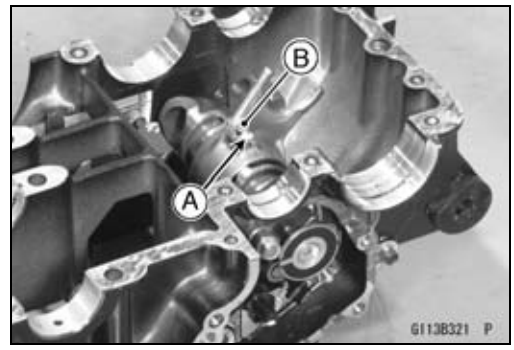
Shift Drum and Fork Removal

- Remove:
  Lower Crankcase Half (see Crankcase Splitting)
  External Shift Mechanism (see External Shift Mechanism Removal)
- Pull out the shift rod [A], and remove the two shift forks [B] in the lower crankcase half.

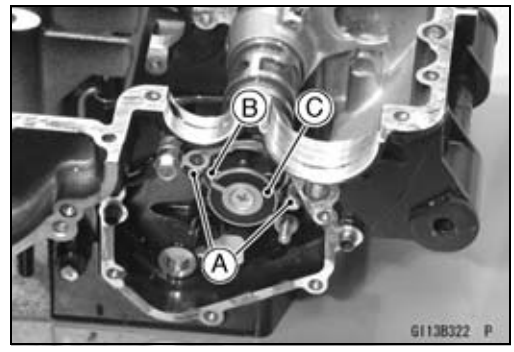


Transmission

- Remove the cotter pin [A], and pull out the 3rd/4th shift fork guide pin [B].

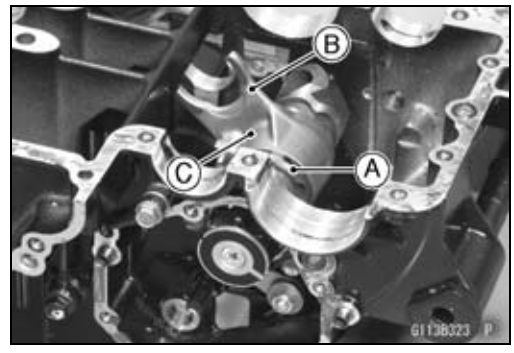


- Remove the bolts [A] holding the shift drum ball bearing [B].
- Pull out the shift drum [C] slightly, and remove the 3rd/4th shift fork. Pull the shift drum free from the crankcase.



Shift Drum and Fork Installation

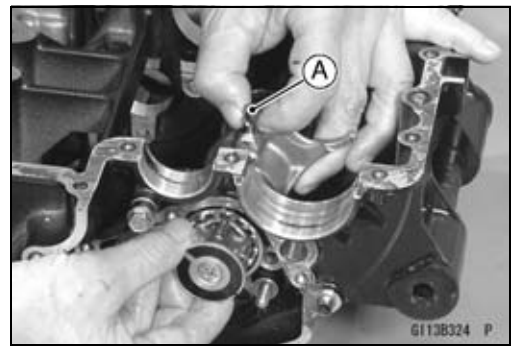
- Insert the shift drum [A] into the crankcase part way, install the 3rd/4th shift fork [B] with the longer side [C] facing the neutral switch, i.e., the longer side goes onto the drum first.



- Push the shift drum in the rest of the way.
- Apply a non-permanent locking agent to the threads of the holding bolts, and tighten them.

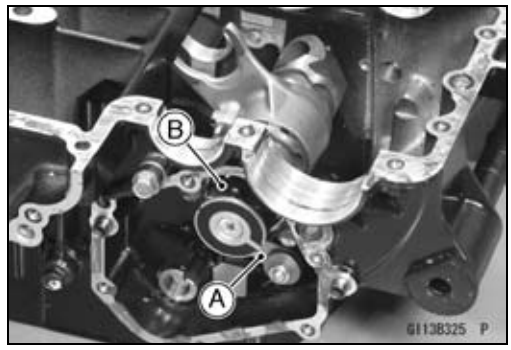
Torque - Shift Drum Bearing Holding Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)

- Put the shift fork guide pin [A] with the pin hole upward into the 3rd/4th shift fork. The guide pin rides in the middle groove of the three shift drum grooves.
- Insert a new cotter pin through the 3rd/4th shift fork and guide pin from the shorter side of the shift fork, and spread the cotter pin longer side.

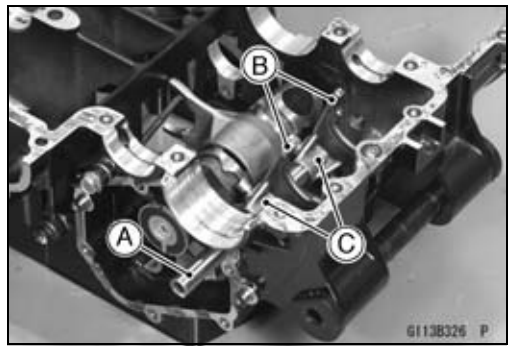


Transmission

- Install the washer, spring, gear positioning lever, collar and nut.
- Set the shift drum in the neutral position, that is, fit the gear positioning lever [A] into the detent on the shift drum cam [B].

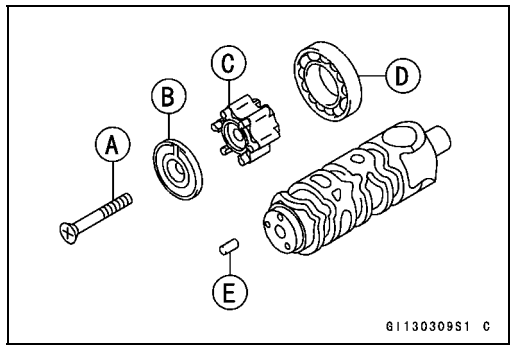


- Install the shift shaft.
- Apply a little engine oil to the shift rod and shift fork ears. Insert the shift rod [A], running it through the shift forks [B], fitting each shift fork guide pin into the shift drum groove. The shift forks are identical, and must be installed with their longer sides [C] facing toward the external shift mechanism.



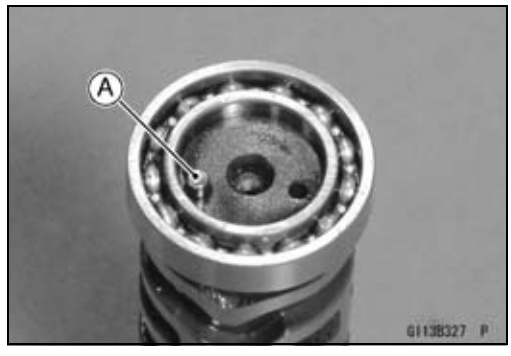
Shift Drum Disassembly

- Remove the screw [A] and the pin plate [B].
- Pull out the shift drum cam [C].
- Take off the ball bearing [D].
- Pull off the dowel pin [E].

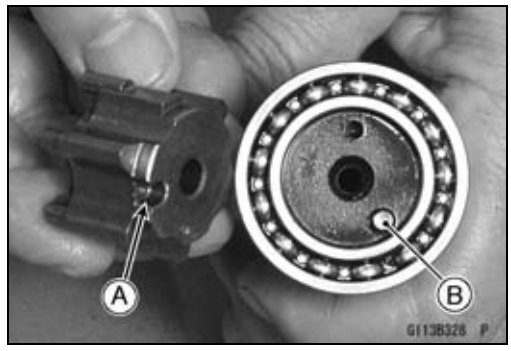


Shift Drum Assembly

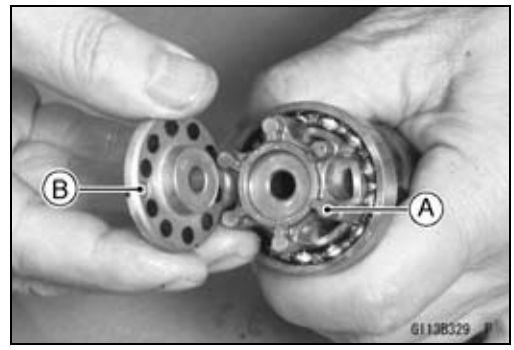
- Set the dowel pin [A] into larger hole of the two which is the farthest hole from the center.



- Install the shift drum cam aligning its groove [A] with the dowel pin [B].



Transmission



- There are six points on the shift drum cam. The highest point [A] must be fitted into the back of the pin plate [B]. If these parts are assembled in the wrong position, the neutral indicator light will not light when the gears are in neutral.
- Apply a non-permanent locking agent to the threads of the pin plate screw.
- Tighten the pin plate screw.

Ball and Needle Bearing Wear

- Check the following ball bearings: shift drum LH, drive shaft RH, and output shaft LH.

○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 the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

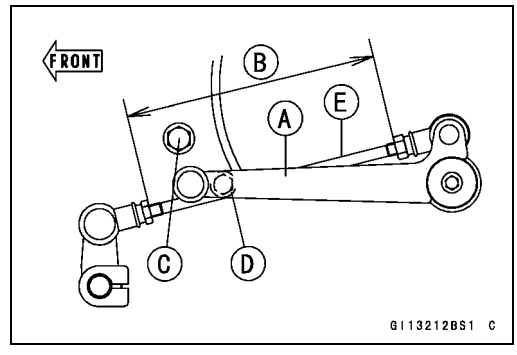
- Check the following needle bearings: drive shaft LH and output shaft RH.

○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.

Shift Pedal Installation

- Install the shift pedal [A] adjusting the length [B] of the shift rod [E] so that the height of the tip (a part of rubber) of shift pedal is almost same as the one of the drive chain guide installation lower bolt [D].



NOTE

○*Tighten the shift pedal link lever mounting bolt before the muffler shall be installed.*

Torque - Shift Pedal Link Lever Mounting Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

123 ±2 mm (4.8 ±0.08 in.) [B]
Neutral Switch [C]

Wheels/Tires

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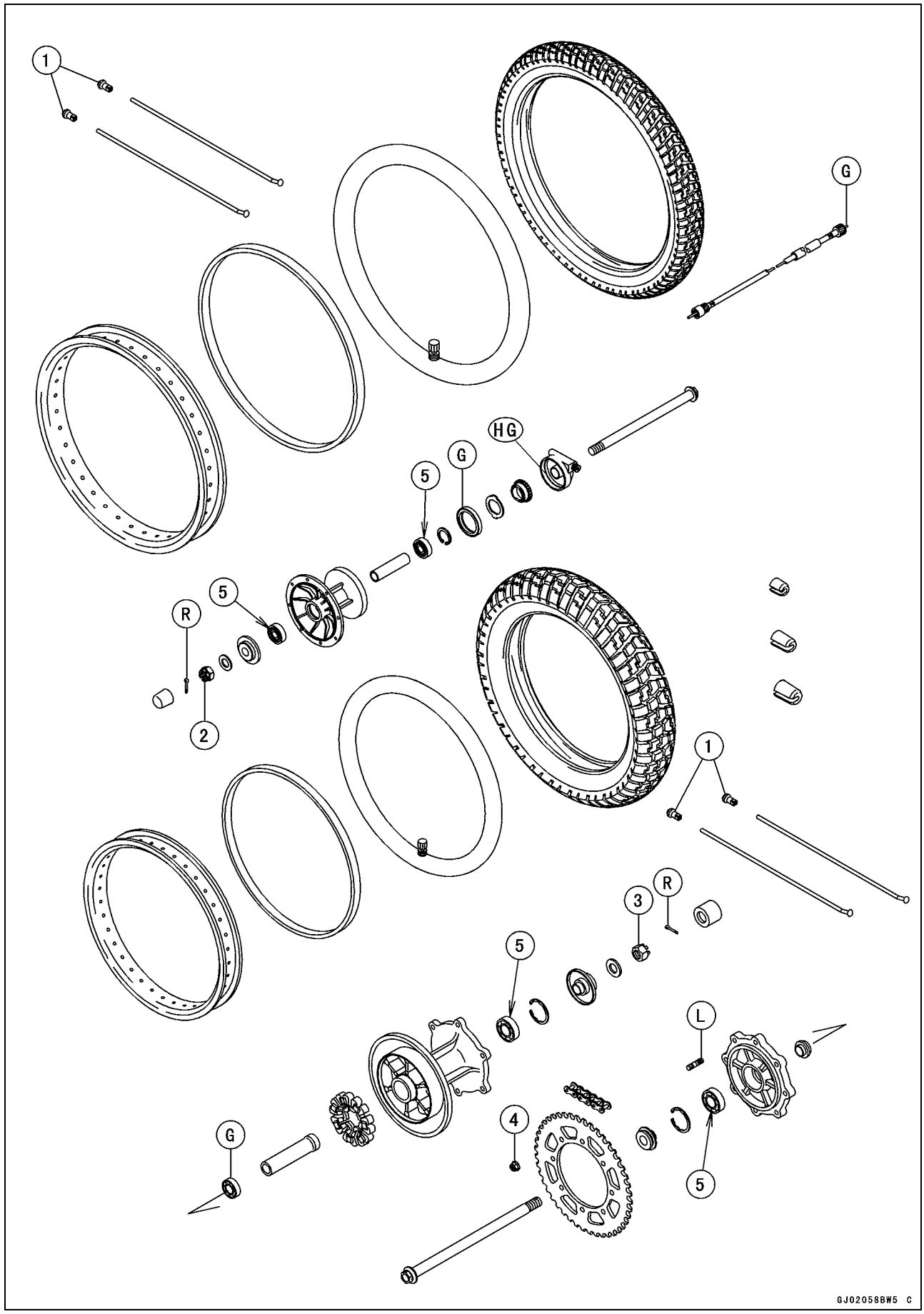
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Spoke Nipple	2.0 ~ 3.9	0.2 ~ 0.4	17 ~ 35 in·lb	
2	Front Axle Nut	88	9.0	65	
3	Rear Axle Nut	108	11	80	
4	Rear Sprocket Nut	33	3.4	24	

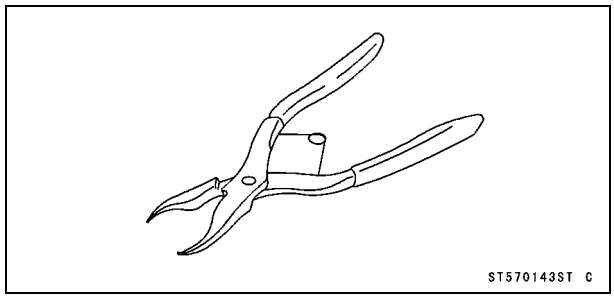
5. Sealed Side
G: Apply grease.
HG: Apply high temperature grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Specifications

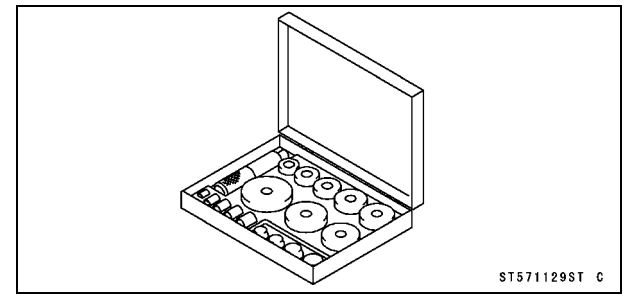
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Radial	0.5 mm (0.02 in.)	1.5 mm (0.06 in.)
Axial	0.8 mm (0.03 in.)	1.5 mm (0.06 in.)
Axle Runout/100 mm (3.94 in.)	Under 0.05 mm (0.002 in.)	0.2 mm (0.008 in.)
Balance Weight	10 g (0.35), 20 g (0.71), 30 g (1.06); (US oz)	– – –
Tires		
Air pressure (cold):		
Front	150 kPa (1.5 kgf/cm², 21 psi)	– – –
Rear	225 kPa (2.25 kgf/cm², 32 psi)	– – –
Tread depth		
Front:		
Dunlop	6.9 mm (0.27 in.)	1 mm (0.04 in.)
Bridgestone	6.0 mm (0.24 in.)	
Rear:		2 mm (0.08 in.) (Up to 130 km/h (80 mph))
Dunlop	8.8 mm (0.35 in.)	3 mm (0.12 in.) (Over 130 km/h (80 mph))
Bridgestone	8.5 mm (0.33 in.)	
Standard Tires		
Front:		
Make, Type	Dunlop, TRAILMAX	Bridgestone, TRAIL WING 101
Size	90/90-21 M/C 54S	90/90-21 54H
Rear:		
Make, Type	Dunlop, TRAILMAX G	Bridgestone, TRAIL WING 152 RADIAL
Size	130/80-17 M/C 65S	130/80 R17 65H

Special Tools

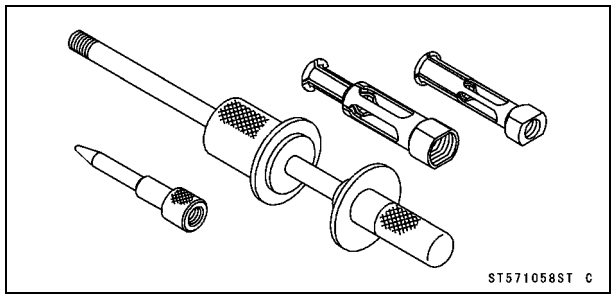
Inside Circlip Pliers:
57001-143



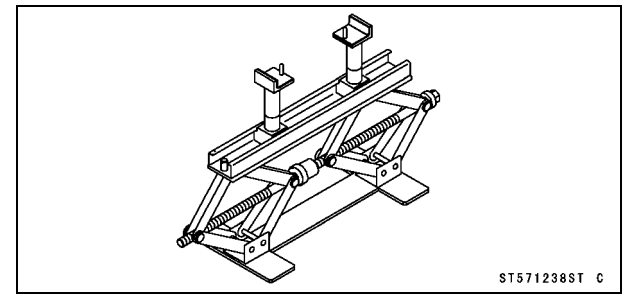
Bearing Driver Set:
57001-1129



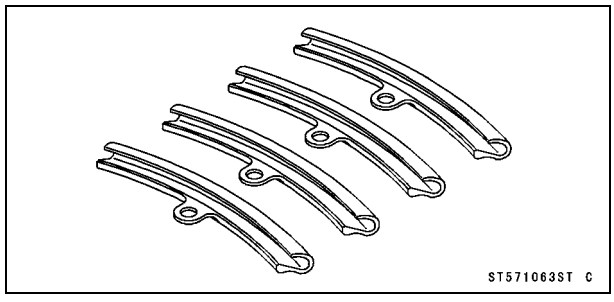
Oil Seal & Bearing Remover:
57001-1058



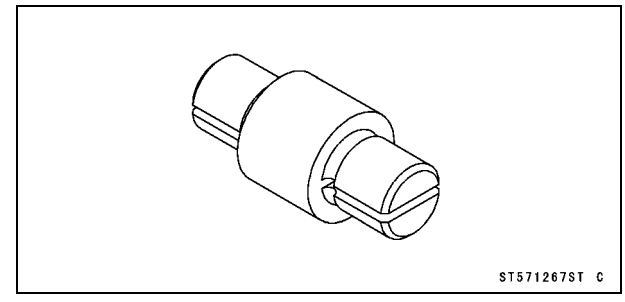
Jack:
57001-1238



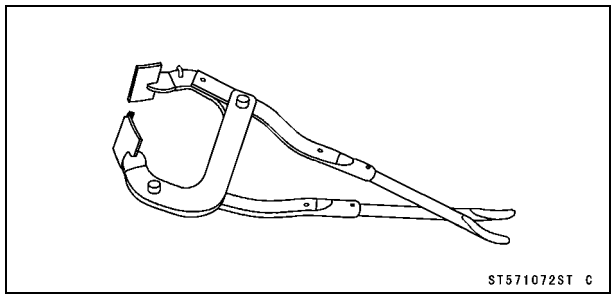
Rim Protector:
57001-1063



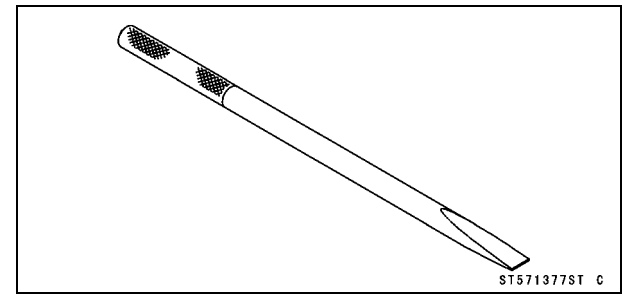
Bearing Remover Head, ϕ15 × ϕ17:
57001-1267



Bead Breaker Assembly:
57001-1072



Bearing Remover Shaft, ϕ13:
57001-1377

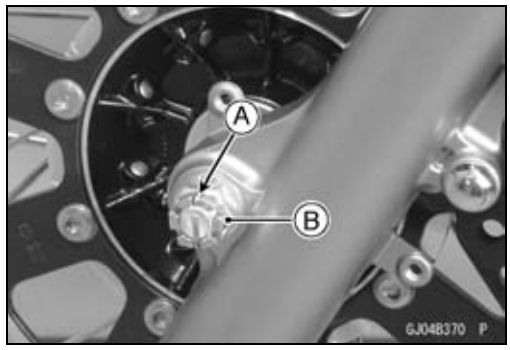


Wheels (Rims)

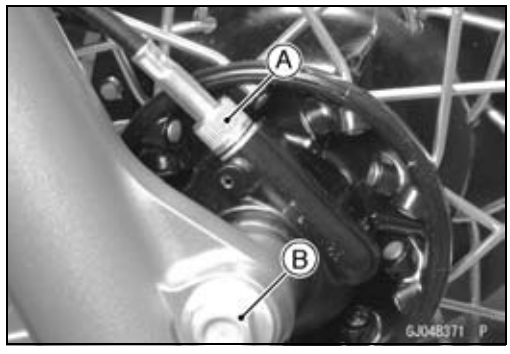
Front Wheel Removal

- Remove the cap.
- Remove the cotter pin [A] and loosen the front axle nut [B].
- Raise the front wheel off the ground using the jack.

Special Tool - Jack: 57001-1238



- Remove the speedometer cable lower end [A].
- Remove the nut and pull out the axle [B] to the right, and remove the front wheel, speedometer gear housing, and collars.

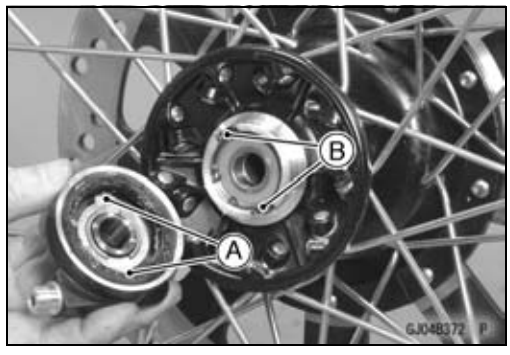


CAUTION

Do not lay the front wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation

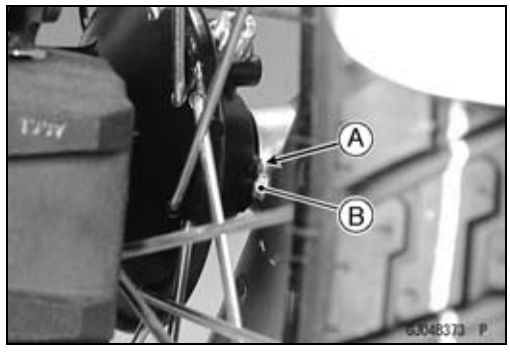
- Install the speedometer gear housing so that its projections [A] fit into the gear drive notches [B] in the wheel hub.
- Fit the collar on the right hand side of the hub.



- Fit the speedometer gear housing stop [A] to the fork leg stop [B].
- Tighten the axle nut.

Torque - Front Axle Nut: 88 N·m (9.0 kgf·m, 65 ft·lb)

- Install the speedometer cable lower end.
- Check the front brake.

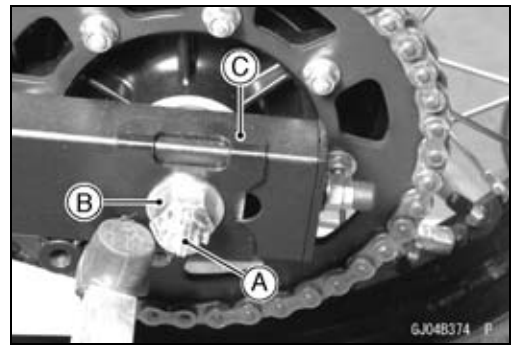


⚠ WARNING

Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

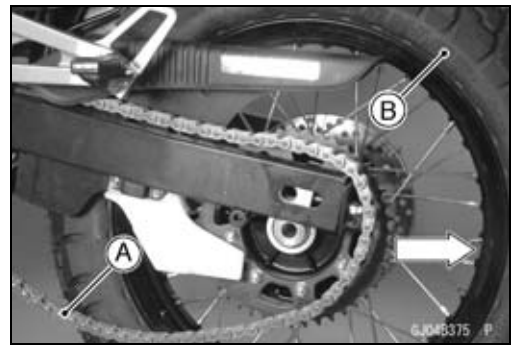
Wheels (Rims)

Rear Wheel Removal



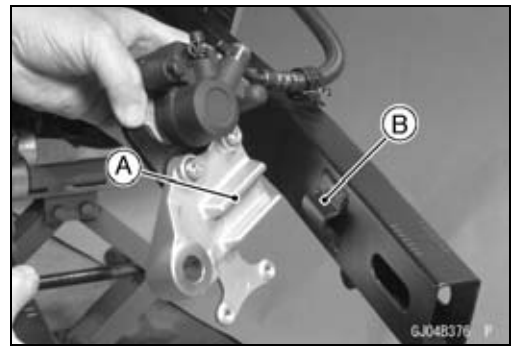
- Remove:
  Rubber Cap
  Cotter Pin [A]
  Rear Axle Nut [B] (loosen)
- Raise the rear wheel off the ground using the jack.

  Special Tool - Jack: 57001-1238
- Remove:
  Rear Axle Nut and Washer
  Indicators [C]
- Pull out the rear axle to the right and drop the rear wheel holding the rear brake caliper with caliper holder on the swingarm so that the rear caliper does not tall.
- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel [B] back and remove it.



Rear Wheel Installation

- Engage the drive chain with the rear sprocket.
- Fit the rear brake caliper to the brake disc.
- Hold the rear brake caliper holder aligning the holder stop [A] to the swing arm stop [B], and insert the axle from the right side of the wheel through both indicators and adjusters.



- Spin the wheel, and apply the rear brake, and then tighten the axle nut to the specified torque.

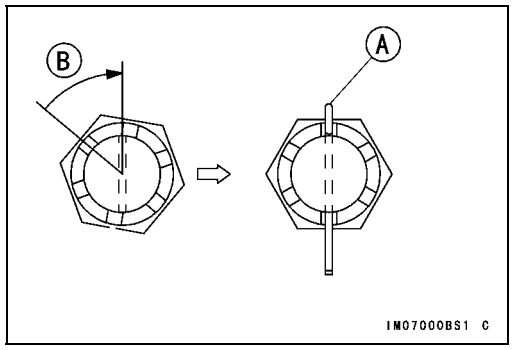
  Torque - Rear Axle Nut: 108 N·m (11 kgf·m, 80 ft·lb)
- Check the drive chain slack and adjust it if necessary.
- Install the removed parts.

Wheels (Rims)

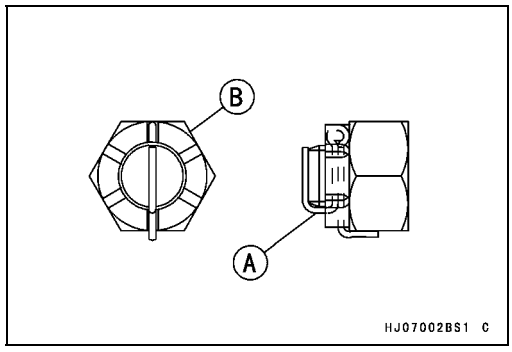
● Insert a new cotter pin [A].

NOTE

○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axel, 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 [B].



● Check the rear brake effectiveness.
● Check the rear brake light switch timing, and adjust it if necessary (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).

Wheel Inspection

● Raise the front or rear wheel and turn it by hand to check that it turns smoothly without making a noise.

Special Tool - Jack: 57001-1238

★If any abnormal condition is found, replace the hub bearing.

Spoke Inspection

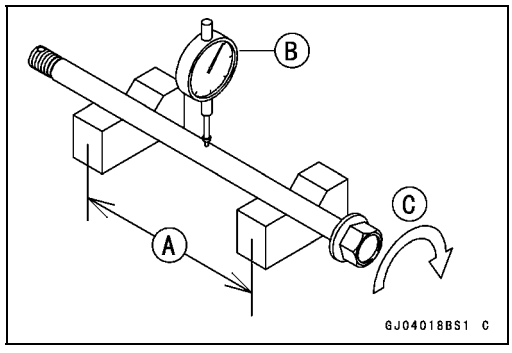
● Refer to the Spoke Tightness and Rim Runout Inspection in the Periodic Maintenance chapter.

Rim Inspection

● Refer to the Spoke Tightness and Rim Runout Inspection in the Periodic Maintenance chapter.

Axle Inspection

● Visually inspect the front and rear axle for damages.
★If the axle is damaged or bent, replace it.
● Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial gauge reading is the amount of runout.
★If the axle runout exceeds the service limit, replace the axle.



Axle Runout/100 mm (3.94 in.)

Standard:	**less than 0.1 mm (0.004 in.)**
Service Limit:	**0.2 mm (0.008 in.)**

Wheels (Rims)

Wheel Balance

To improve stability and decrease vibration at high speed, the front and rear wheels must be kept balanced.

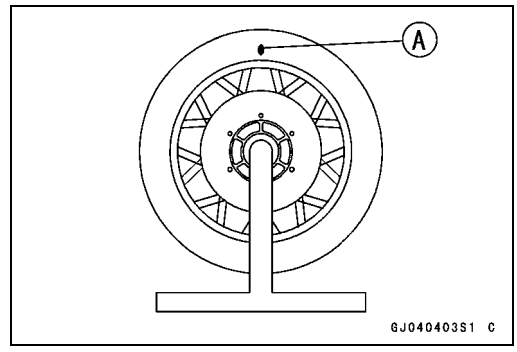
Check and balance the wheels when required, or when a tire is replaced with a new one.

Balance Inspection

- Remove the wheel.
- Support the wheel on a wheel balancer so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

★If the wheel always stops in one position, adjust the wheel balance.

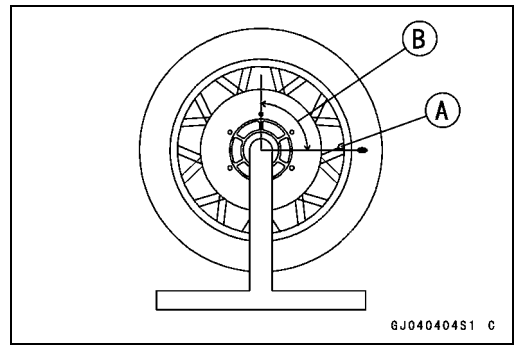


Balance Adjustment

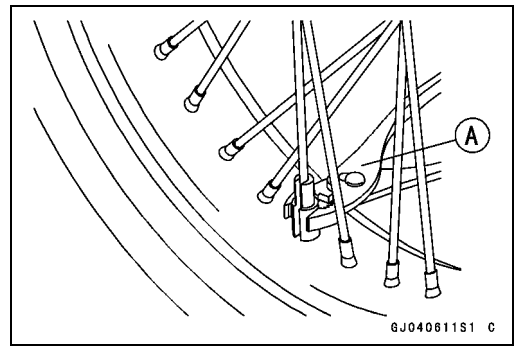
- If the wheel always stops in one position, provisionally attach a balance weight [A] on the spoke at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the stops in this position. If it does, the correct balance weight is being used.

★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.

- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.



- Once proper balance has been achieved, permanently install the balance weight using a pliers [A].



Balance Weight

Part Number	Weight: g (US oz)
41075-0011A	10 (0.35)
41075-0012A	20 (0.71)
41075-0013A	30 (1.06)

NOTE

○*Balance weights are available from Kawasaki dealers in 10, 20 g (0.35, 0.71 US oz), and 30 g (1.06 US oz) sizes. An imbalance of less than 10 grams (0.35 US oz) will not usually affect running stability.*

○*Do not use four or more balance weight (more than 90 gram (3.17 US oz)). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.*

Tires

Air Pressure Inspection/Adjustment

- Refer to the Air Pressure Inspection/Adjustment in the Periodic Maintenance chapter.

Tire Wear Inspection

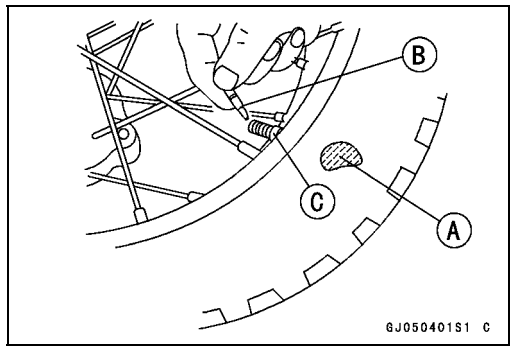
- Refer to the Tire Wear Inspection in the Periodic Maintenance chapter.

Tire Removal

CAUTION

Do not lay the front wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

- Remove the wheel (see Front, Rear Wheel Removal).
- 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]



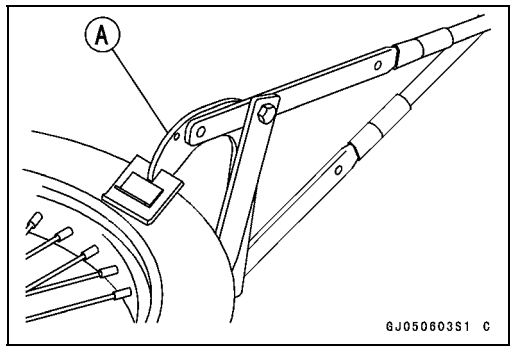
- Remove the valve stem nut.
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

CAUTION

Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.

- Break the beads away from both sides of the rim with the bead breaker [A].

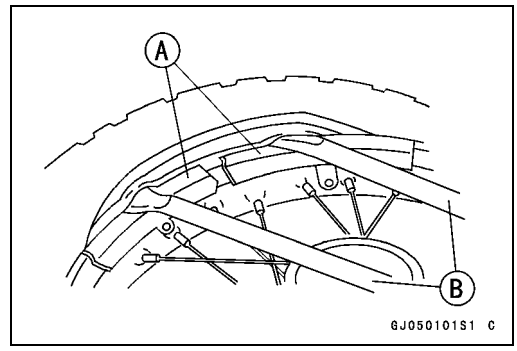
Special Tool - Bead Breaker Assembly: 57001-1072



Tires

● Step on the side of the tire opposite valve stem, and pry the tire off the rim with the tire iron [B] of the bead breaker protecting the rim with rim protectors [A].

Special Tools - Rim Protector: 57001-1063
Bead Breaker Assembly: 57001-1072



CAUTION

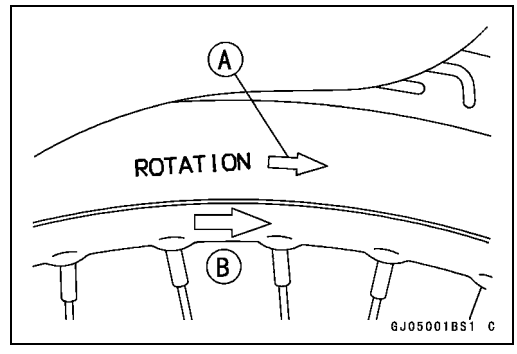
Take care not to insert the tire irons so deeply that the tube gets damaged.

● Remove the tube when one side of the tire is pried off.
● Pry the tire off the rim.
● Remove the rim protector.

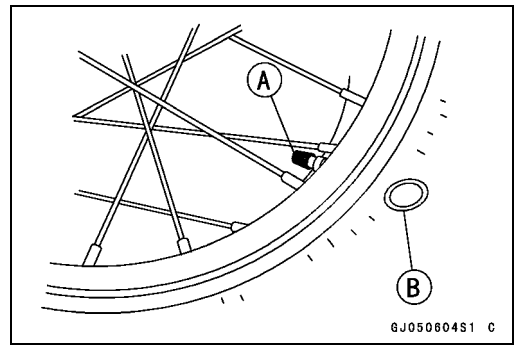
Tire Installation

● Inspect the rim and the tire before installing the tire, and replace them if necessary.
● Apply a soap and water solution or rubber lubricant to both the tire bead and the rim flange.

● Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.
Rotation Direction [A]
Tire Rotation Mark [B]



● Install the tire in the reverse order of removal.
○Position the tire on the rim so that the valve stem [A] is at the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).
○Adjust the air pressure to the specified pressure (see Air Pressure Inspection/Adjustment in the Periodic Maintenance chapter).
● Tighten the value stem nut securely.



● Install the air valve cap.
● Install the brake disc(s) so that the marked side faces out (see Brakes Disk Installation in the Brakes chapter).
● Adjust the wheel balance.

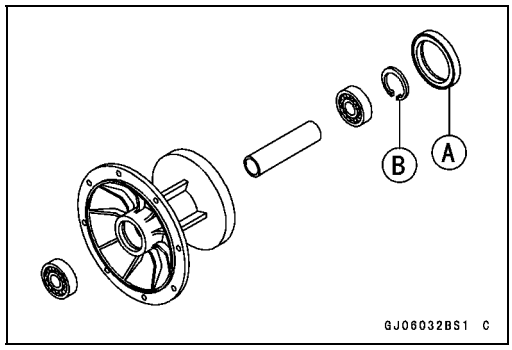
Hub Bearing

Hub Bearing Removal

● Remove the wheel, and take out the following.

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.



Front

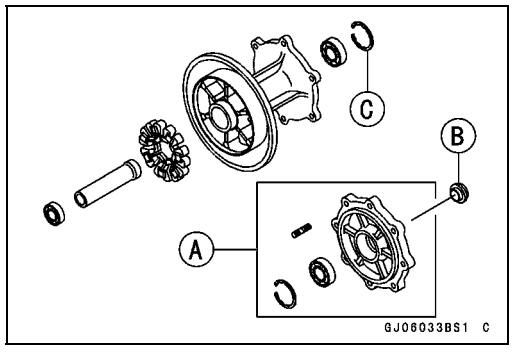
Grease Seal [A]
Circlips [B]

Special Tool - Inside Circlip Pliers: 57001-143

Rear

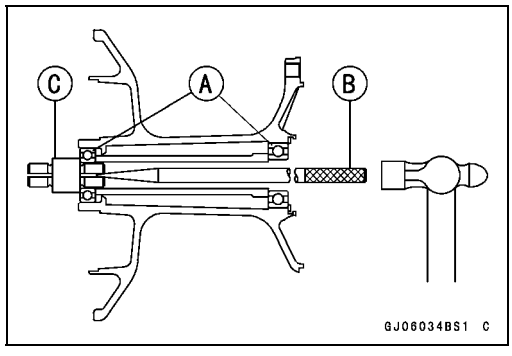
Coupling [A]
Collar [B]
Circlip [C]

Special Tool - Inside Circlip Pliers: 57001-143



● Take the bearings [A] out of the hub, using the bearing remover.

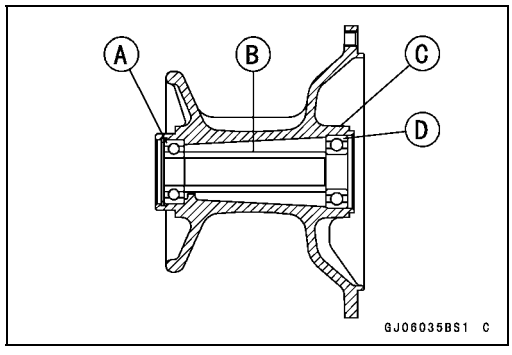
Special Tools - Bearing Remove Shaft: 57001-1377 [B]
Bearing Remover Head, ϕ15 × ϕ17: 57001-1267 [C]
Oil Seal & Bearing Remover: 57001-1058



Hub Bearing Installation

● Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
● Replace the bearings with new ones.
● Install the front bearings in the following sequence.
○Press in the left side bearing [A] until it is bottomed.
○Insert the collar [B] in the hub [C].
○Press in the right side bearing [D] until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129



● Install the rear bearings in the following sequence.
○Press in the right side bearing until it is bottomed.
○Insert the collar in the hub.
○Press in the left side bearing until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129

NOTE

○*Install the bearings so that the marked side or sealed side faces out.*

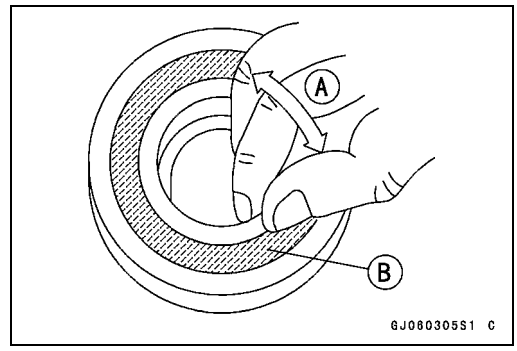
● Replace the circlips with new ones.

Special Tool - Inside Circlip Pliers: 57001-143

Hub Bearing

Hub Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance cannot normally be measured.



NOTE

○*Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.

★If bearing play roughness, or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

Hub Bearing Lubrication

- Clean and grease the rear left side hub bearing in accordance with the Periodic Maintenance chapter.

NOTE

○*Since the front and rear hub bearings are packed with grease and sealed, lubrication is not required.*

Speedometer Gear

Disassembly and Assembly

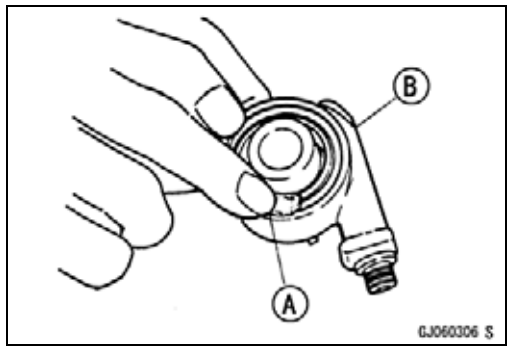
NOTE

○*It is recommended that the assembly be replaced rather than attempting to repair the components.*

- Install the speedometer gear so that it fits in the speedometer gear drive notches (see Front Wheel Installation).

Lubrication

- Clean and grease [A] the speedometer gear housing [B] in accordance with the Periodic Maintenance chapter.



Final Drive

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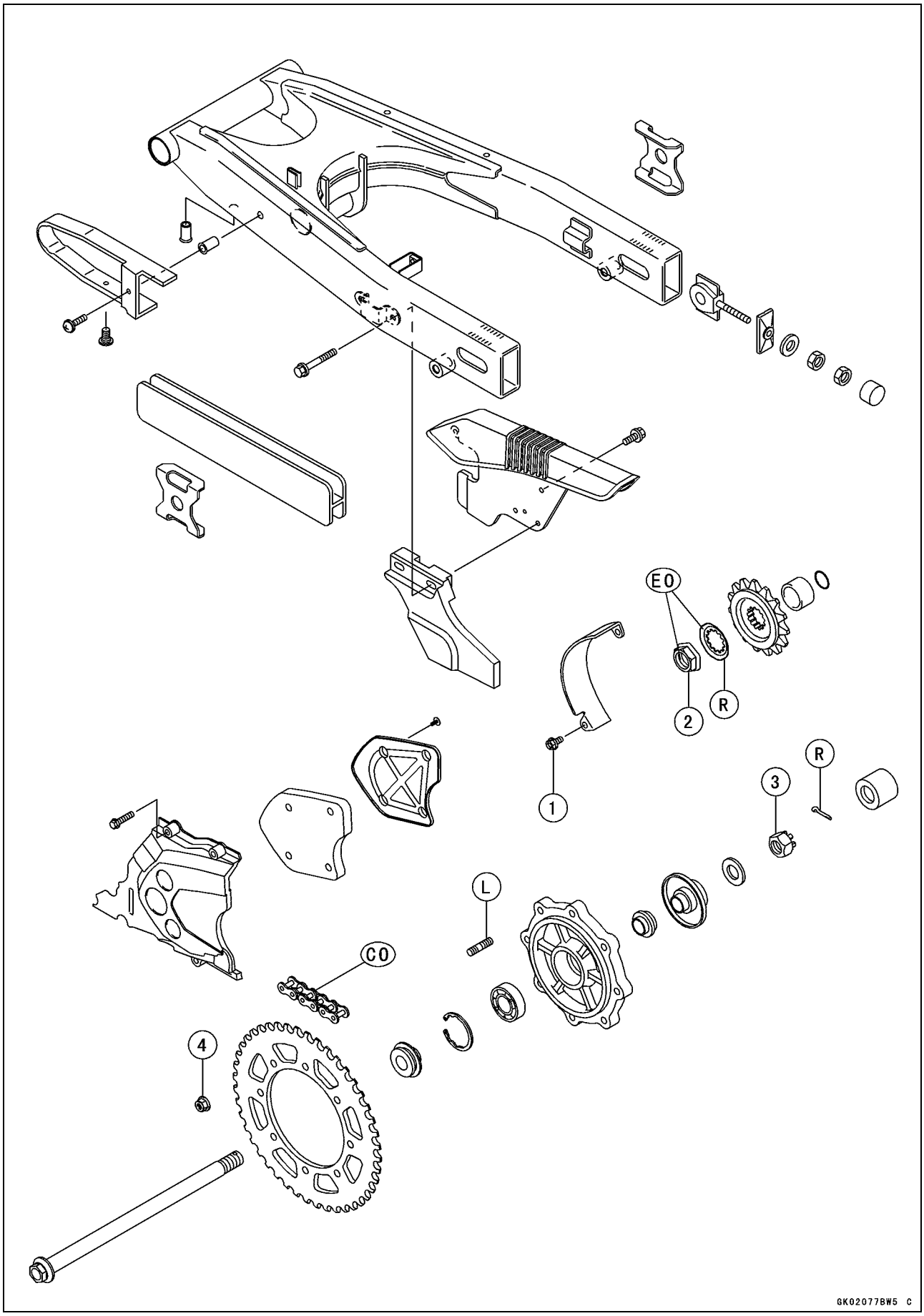
Exploded View



Exploded View

No.	Fastener	Torque			Re-marks
		N·m	kgf·m	ft·lb	
1	Drive Chain Guide Bolts	11	1.1	95 in·lb	
2	Engine Sprocket Nuts	127	13	94	EO
3	Rear Axle Nuts	108	11	80	
4	Rear Sprocket Nuts	33	3.4	24	

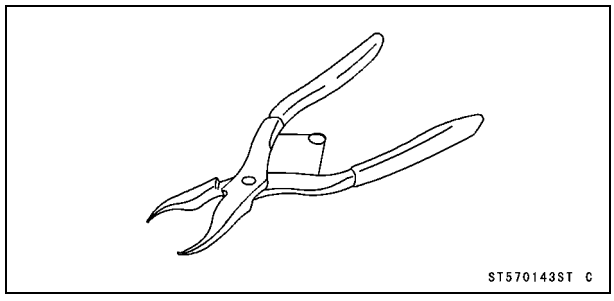
CO: Apply chain oil.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Specifications

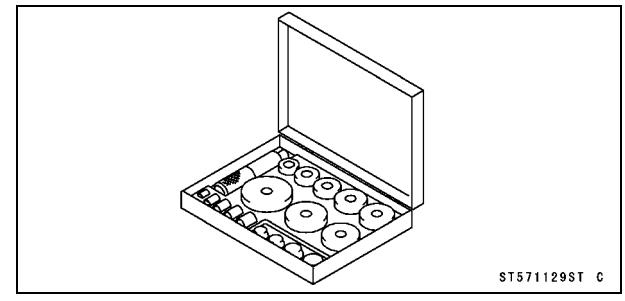
Item	Standard	Service Limit
Drive Chain		
Chain Slack	35 ~ 45 mm (1.4 ~ 1.8 in.)	– – –
20-link Length	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Standard Chain		
Make	DAIDO KOGYO	– – –
Type	DID520VL2	– – –
Link	108 links	– – –
Sprockets		
Rear Sprocket Warp	0.4 mm (0.016 in.) or less	0.5 mm (0.020 in.)

Special Tools and Sealants

Inside Circlip Pliers:
57001-143



Bearing Driver Set:
57001-1129



Drive Chain

Drive Chain Slack Inspection

- Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter.

Wheel Alignment Inspection/Adjustment

- Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter.

Drive Chain Wear Inspection

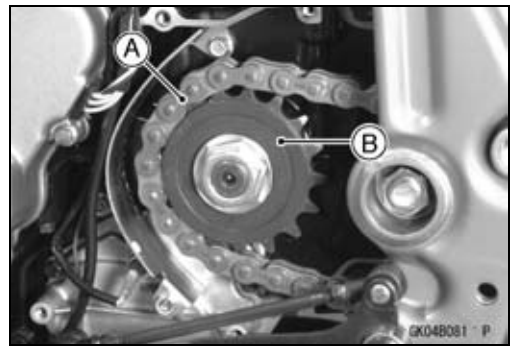
- Refer to the Drive Chain Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Lubrication

- Refer to the Drive Chain Lubrication in the Periodic Maintenance chapter.

Drive Chain Removal

- Remove:
  Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  Swingarm (see Swingarm Removal in the Suspension chapter)
  Engine Sprocket Cover
  Drive Chain Guide
- Disengage the drive chain [A] from the engine sprocket [B], and take it off the chassis.



Drive Chain Installation

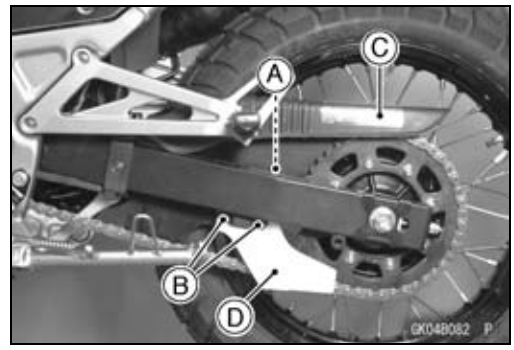
- Engage the drive chain with the engine sprocket.
- Install:
  Swingarm (see Swingarm Installation in the Suspension chapter)
  Rear Wheel (see Rear Wheel Installation in the Wheels/Tires chapter)
  Engine Sprocket Cover
  Drive Chain Guide

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

- Adjust the chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

Drive Chain

Drive Chain Case and Chain Guide Removal



- Remove the dvive chain case mounting bolts [A], [B], and then removed the chain case [C].
- The chain guide [D] is installed together with the chain case with chain case mounting bolts [B].

NOTE

○*Fit the chain case cover to the bracket groove on the swingarm at installing the chain case.*

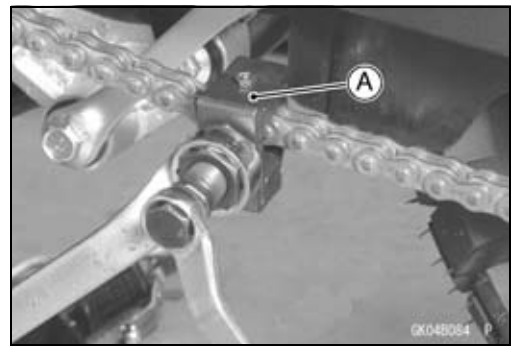
Drive Chain Replacement

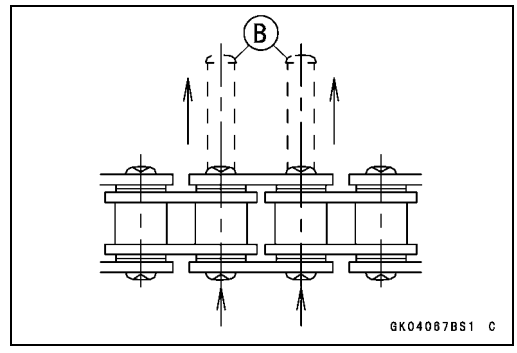
NOTE

○*Since the drive chain is installed through the swingarm, the chain cannot be removed other than by cutting it. Prepare the new link pin, link plate, O-ring, and tools for rejoining the chain.*

- Remove:
  Engine Sprocket Cover
  Drive Chain Guide

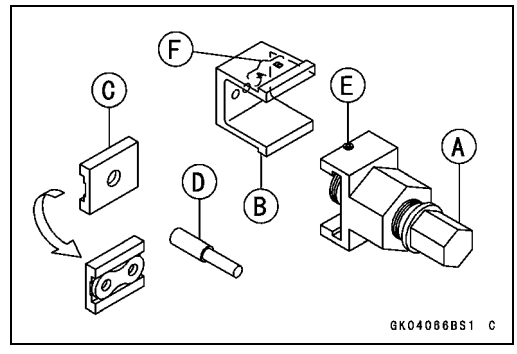
- Using the chain joint “ZJ” tool [A], cut the drive chain by removing the link pins [B]





Recommended Tool
DID Chain Joint “ZJ”
Type: DID KASHIMARU
Make: DAIDO KOGYO

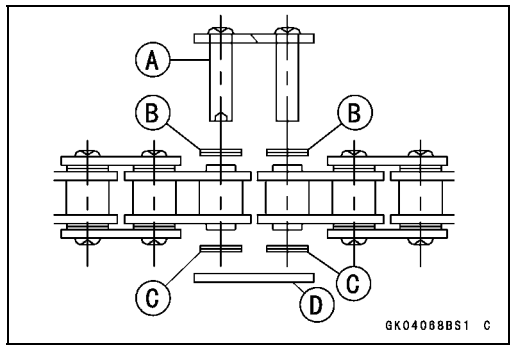
Pin Holder [A]
U type Holder [B]
Plate Holder [C]
Cutting and Rivetting Pin [D]
Adjusting Pin [E]
Aligning Mark [F]



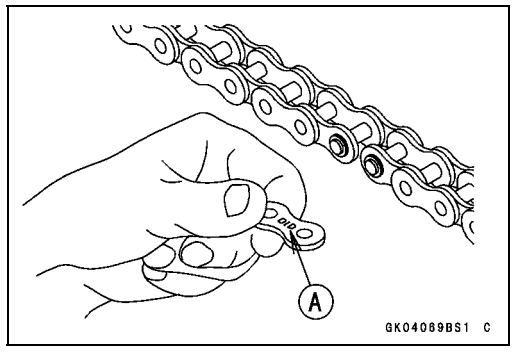
Drive Chain

Drive Chain Installation

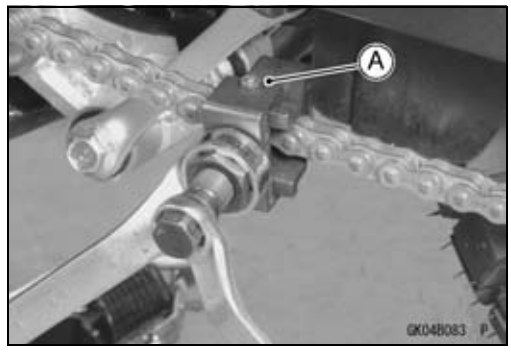
- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease seals.
- Engage the drive chain on the engine and rear sprockets through the swingarm.
- Install the grease seals [B] on the link pins.
- Insert the link pins in the drive chain ends.
- Install:
  Grease Seals [C]
  Link Plate [D]



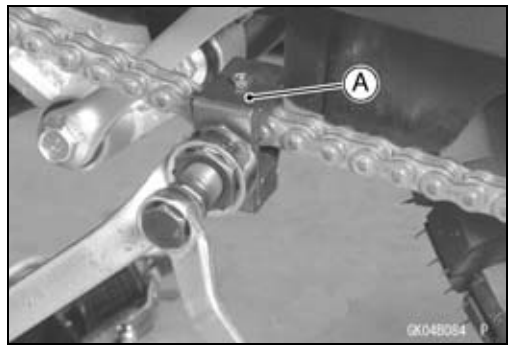
○Install the link plate so that the mark [A] faces out.



- Using the chain joint “ZJ” tool [A], press in the link plate to the link pins after aligning the adjusting pin with the “A” mark on the U type holder.



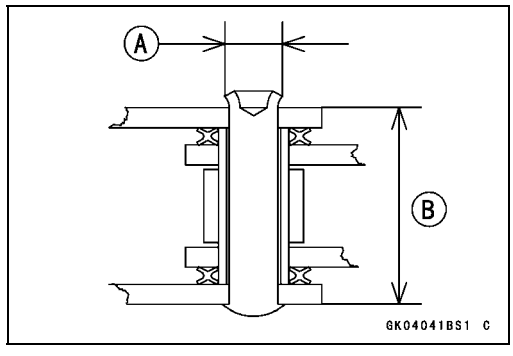
- Using the chain joint “ZJ” tool [A], stake the link pin ends projecting from the plate after aligning the adjusting pin with the “B” mark on the U type holder.



- After staking, measure the outside diameter [A] of the link pin and link plates width [B].

Link Pin Outside Diameter
Standard: 5.5 ~ 5.8 mm (0.217~ 0.228 in.)

Link Plates Outside Width
Standard: 17.9 ~ 18.1 mm (0.705 ~ 0.713 in.)



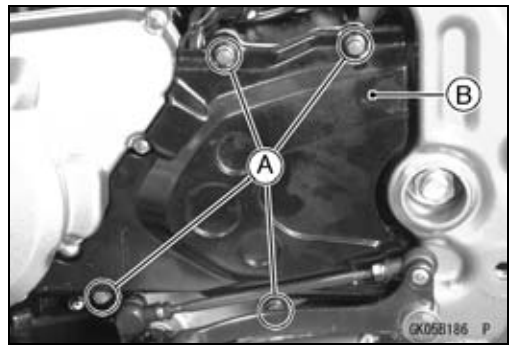
★If the reading exceeds the specified length, cut and rejoin the chain again.

- Check:
  Movement of the Rollers
- Adjust the chain slack after installing the chain (See Drive Chain Slack Inspection in the Periodic Maintenance chapter).

Sprocket, Coupling

Engine Sprocket Removal

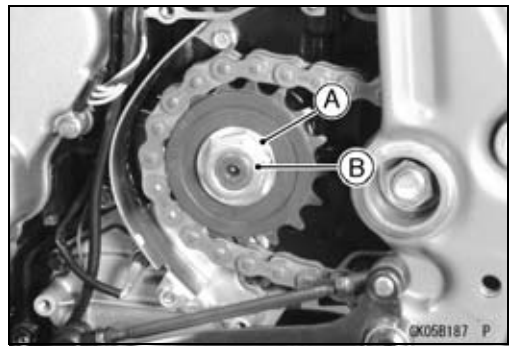
- Remove the bolts [A].
- Pull the engine sprocket cover [B].



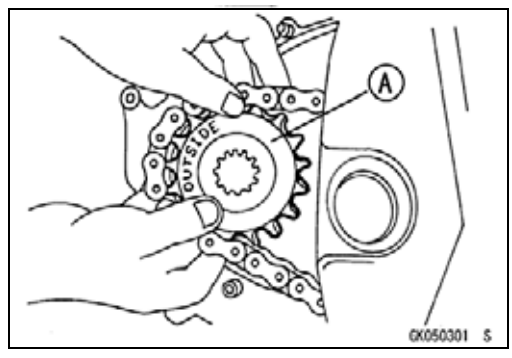
- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

NOTE

○*When loosening the engine sprocket nut, hold the rear brake on.*

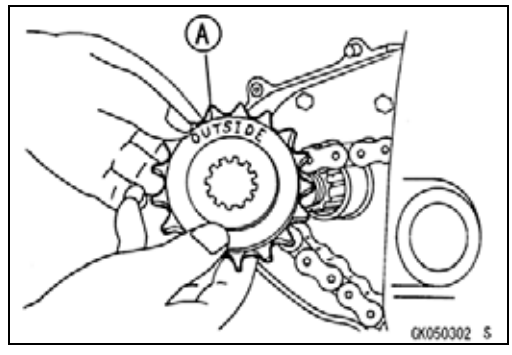


- Loosen the drive chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- Pull the engine sprocket [A] off the output shaft along with the chain.
- Remove the engine sprocket.



Engine Sprocket Installation

- Replace the sprocket washer with a new one.
- Install the engine sprocket so that the "OUTSIDE" mark [A] faces out.
- Be sure to fit the sprocket washer onto the output shaft splines.



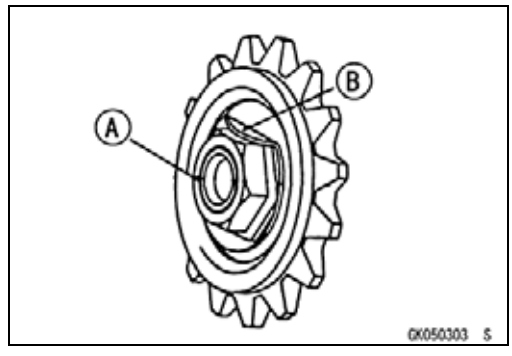
- Apply oil to the threads of the output shaft [C] and the seating surface of the engine sprocket nut.
- After torquing the engine sprocket nut [A], bend the one side [B] of the washer over the nut.

NOTE

○*Tighten the nut while applying the rear brake.*

Torque - Engine Sprocket Nut: 127 N·m (13.0 kgf·m, 94 ft·lb)

- Install the engine sprocket cover.
- Adjust the drive chain slack after installing the sprocket (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).



Sprocket, Coupling

Rear Sprocket Removal

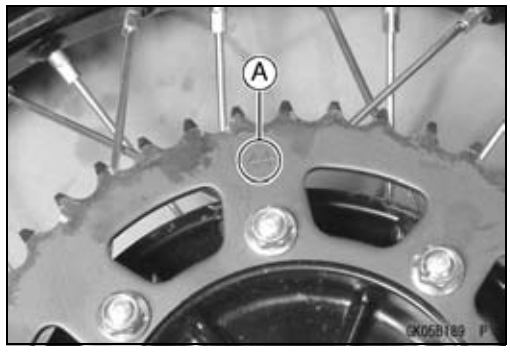
- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the rear sprocket nuts [A].
- Remove the rear sprocket [B].

Rear Sprocket Installation

- Install the sprocket facing the tooth number marking [A] outward.
- Tighten the rear sprocket nuts.

Torque - Rear Sprocket Nuts: 33 N·m (3.4 kgf·m, 24 ft·lb)

- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).
- Adjust the drive chain slack after installing the sprocket (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).

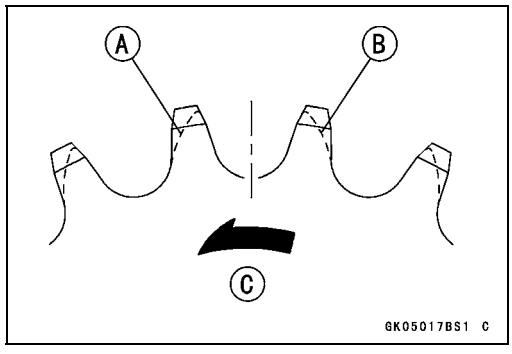


Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.

★If the teeth are worn as illustrated, replace the sprocket with a new one, and inspect the drive chain wear (see Drive Chain Wear Inspection in the Periodic Maintenance chapter).

[A] Worn Tooth (Engine Sprocket)
[B] Worn Tooth (Rear Sprocket)
[C] Direction of Rotation



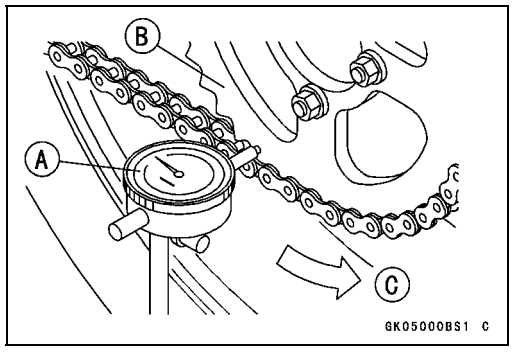
NOTE

○*If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.*

Rear Sprocket Warp Inspection

- Raise the rear wheel off the ground 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.



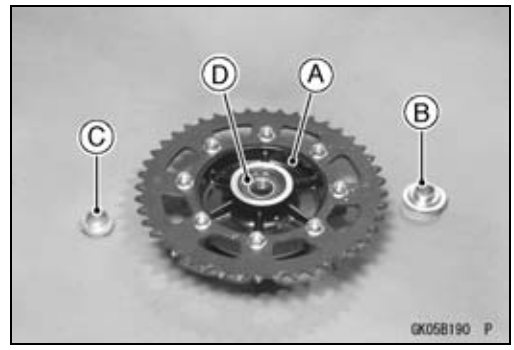
Rear Sprocket Warp

Standard:	**less than 0.4 mm (0.016 in.)**
Service Limit:	**0.5 mm (0.020 in.)**

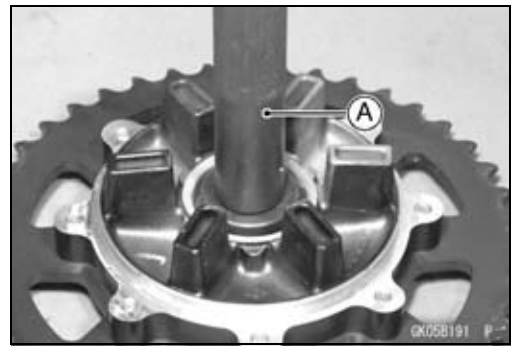
Sprocket, Coupling

Coupling Bearing Removal

● Remove:
Coupling [A]
Collar [B]
Sleeve [C]
Circlip [D]



● Remove the bearing by tapping from the hub side.
Special Tool - Bearing Driver Set: 57001-1129 [A]

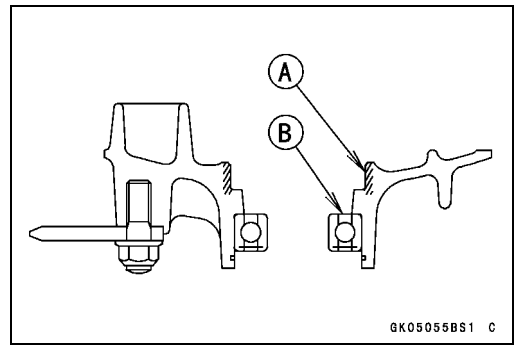


Coupling Bearing Installation

● 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

Coupling Installation

● Grease the following and install the coupling.
Coupling Internal Surface [A]
Ball Bearing [B]



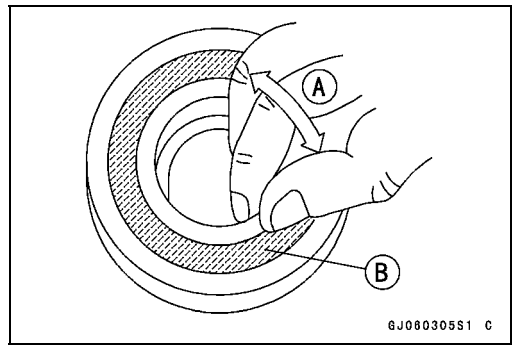
Coupling Bearing Inspection and Lubrication

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.*

Sprocket, Coupling

- Spin [A] the bearing by hand to check its condition.
- ★If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
- Examine the bearing seal [B] for tears or leakage.
- ★If the seal is torn or is leaking, replace the bearing.
- 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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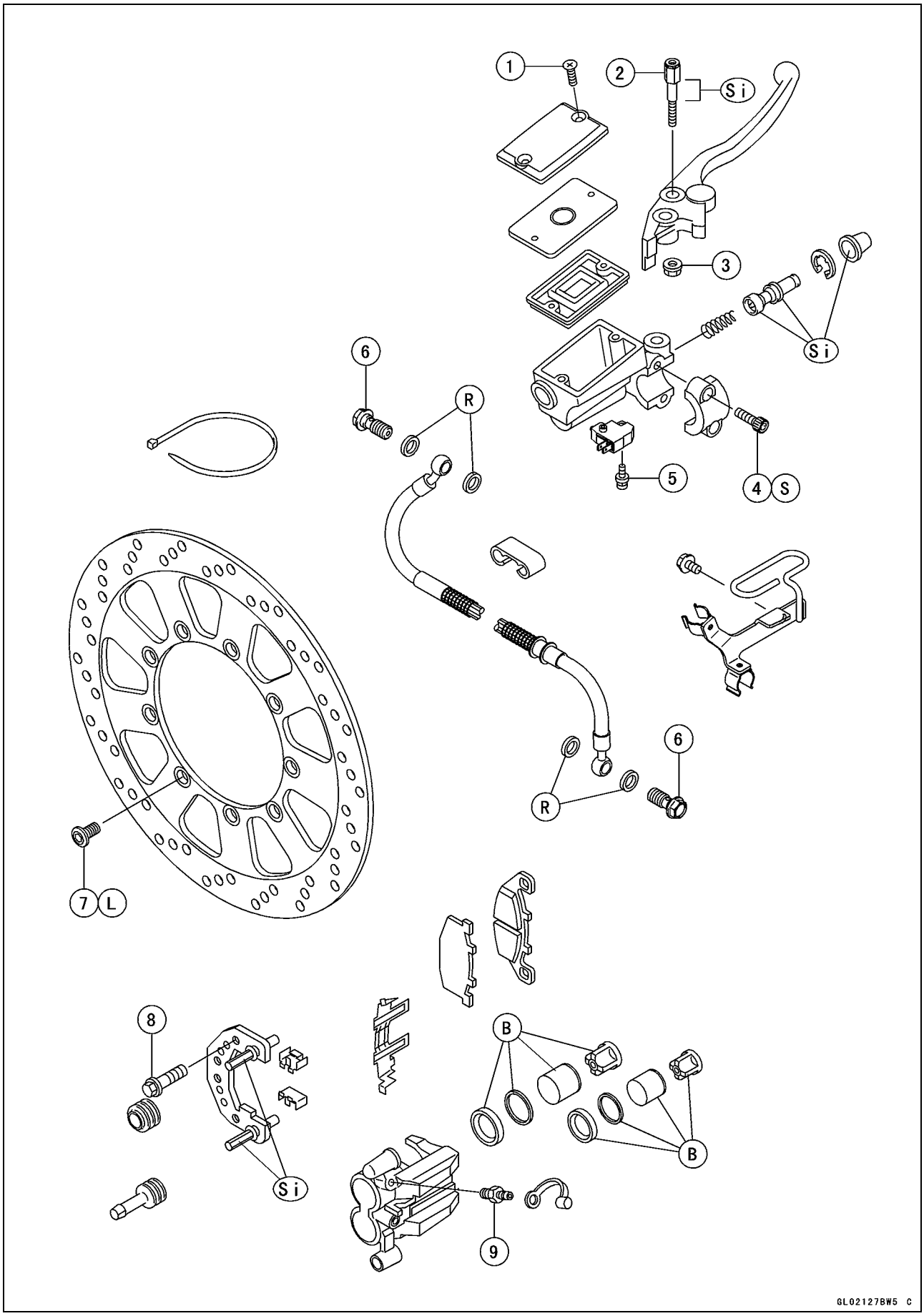
Exploded View

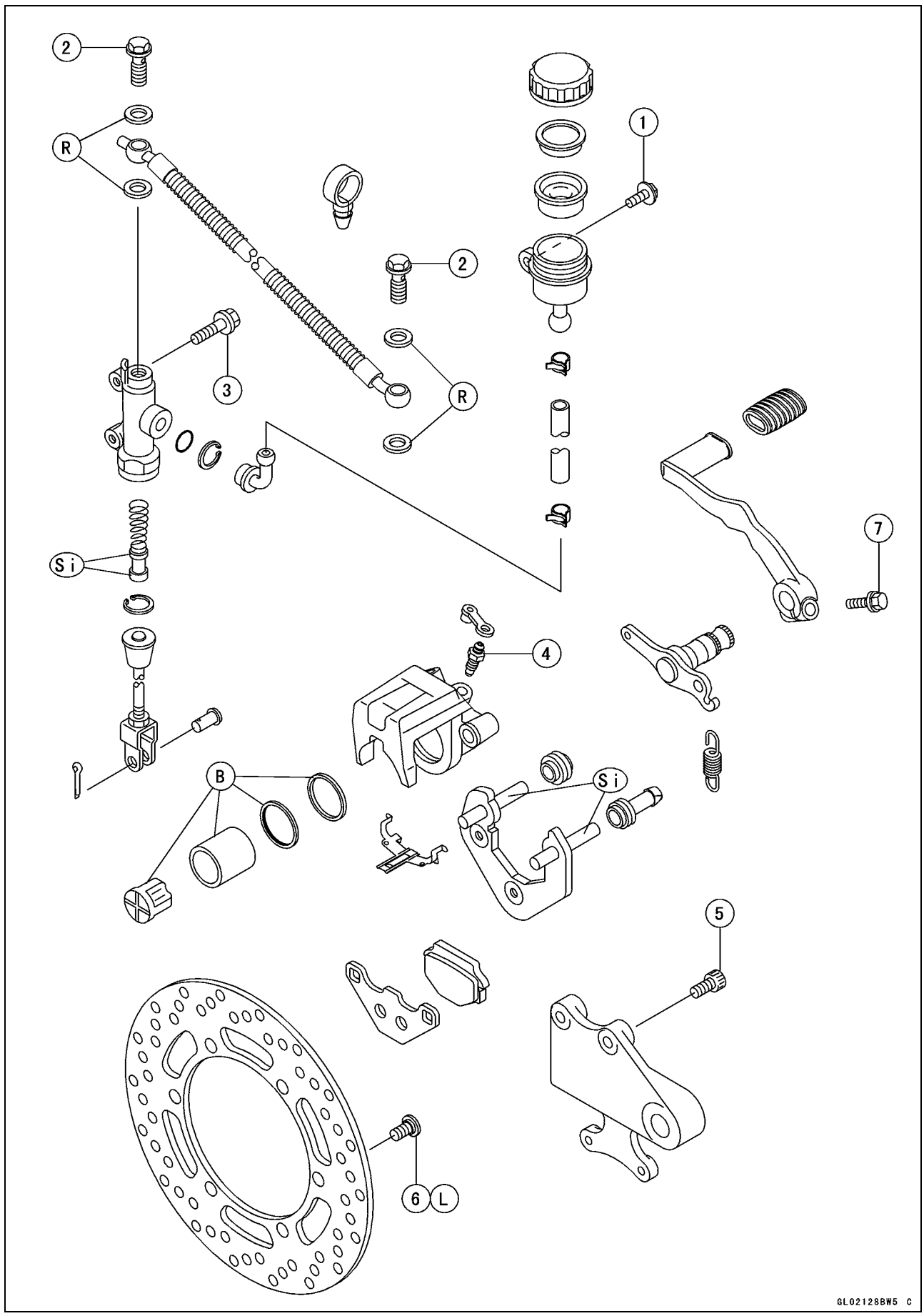


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Reservoir Cap Screws	1.5	0.15	13 in·lb	
2	Brake Lever Pivot Bolt	1.0	0.10	9 in·lb	
3	Brake Lever Pivot Locknut	5.9	0.60	52 in·lb	
4	Front Master Cylinder Clamp Bolts	11	1.1	95 in·lb	S
5	Front Brake Light Switch Mounting Screw	1.2	0.12	10 in·lb	
6	Brake Hose Banjo Bolts	34	3.5	25	
7	Brake Disc Mounting Bolts	23	2.3	16.5	L
8	Front Caliper Mounting Bolts	34	3.5	25	
9	Caliper Bleed Valve	7.8	0.80	69 in·lb	

B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement parts
S: Follow the specific tightening sequence.
Si: Apply silicone grease, or PBC grease.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Reservoir Mounting Bolt	5.9	0.60	52 in·lb	
2	Brake Hose Banjo Bolts	34	3.5	25	
3	Rear Master Cylinder Mounting Bolts	25	2.5	18	
4	Caliper Bleed-Valve	7.8	0.80	69 in·lb	
5	Rear Caliper Mounting Bolts	25	2.5	18	
6	Brake Disc Mounting Bolts	23	2.3	16.5	
7	Brake Pedal Bolt	25	2.5	18	

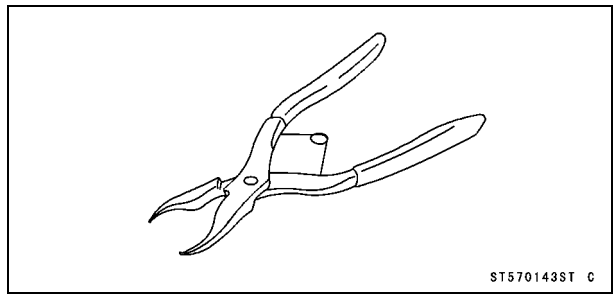
B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement parts
Si: Apply silicone grease, or PBC grease.

Specifications

Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	4-way adjustable (to suit rider)	– – –
Brake Pedal Position	30 ~ 40 mm (1.2 ~ 1.6 in.) below footpeg top	– – –
Free Play	Non-adjustable	– – –
Brake Pad Thickness		
Front	5.5 mm (0.22 in.)	1 mm (0.04 in.)
Rear	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Brake Disc Thickness		
Front	4.8 ~ 5.1 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Rear	4.8 ~ 5.1 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Brake Disc Runout	0.1 mm (0.004 in.)	0.2 mm (0.008 in.)
Brake Fluid		
Grade	DOT4	

Special Tool

Inside Circlip Pliers:
57001-143



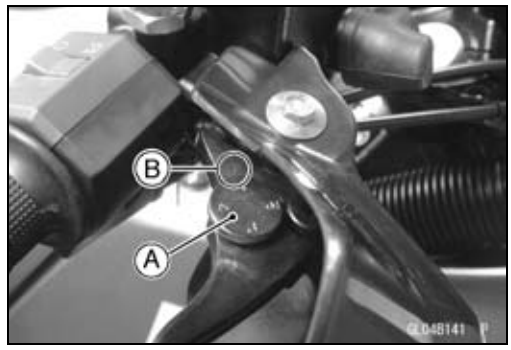
Brake Lever and Brake Pedal

Brake Lever Position Adjustment

The adjuster has 4 positions so that the brake lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the Arrow mark [B] on the lever holder.

○The distance from the grip to the released lever is minimum at Number 4 and maximum at number 1.



Brake Pedal Position Inspection

- With the brake pedal [A] in the correct position, inspect the brake pedal position [B] as shown.

Footpeg [C]

Pedal Position

Standard: 30 ~ 40 mm (1.2 ~ 1.6 in.) below footpeg (from Top of the footpeg to Top of the brake Pedal)

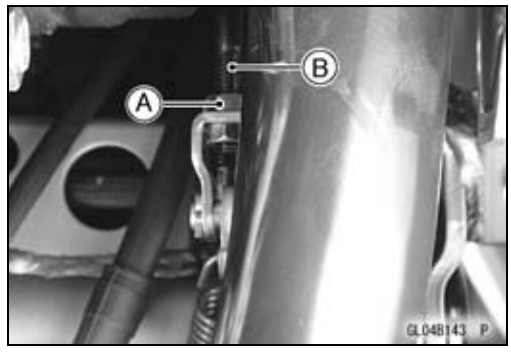
★If it is incorrect, adjust the brake pedal position.

Brake Pedal Position Adjustment

NOTE

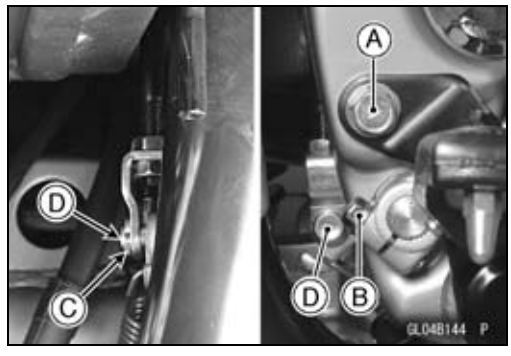
○*Usually it is not necessary to adjust the pedal position, but always adjust it when push rod locknut has been loosened.*

- Loosen the locknut [A], and turn the push rod [B] in or out to adjust the brake pedal position.
- Tighten the locknut.
- After adjusting brake pedal position, check the rear brake light switch timing, and adjust them if necessary (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).



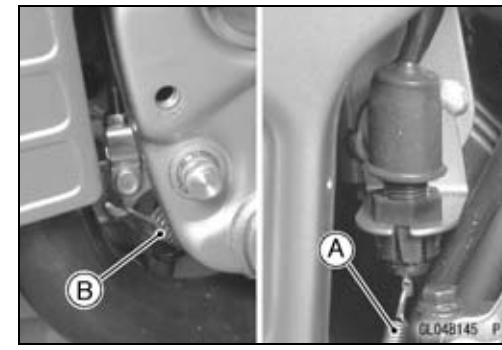
Brake Pedal and Shaft Removal

- Remove the front right footpeg bolt [A].
- Remove the brake pedal bolt [B], and remove the brake pedal.
- Remove the cotter pin [C], and pull out the pin [D] to separate the brake pedal shaft and master cylinder brake rod.



Brake Lever and Brake Pedal

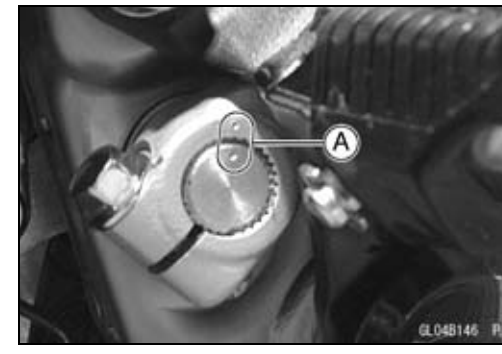
- Remove brake light switch spring [A] and shaft spring [B].



Brake Pedal and Shaft Installation

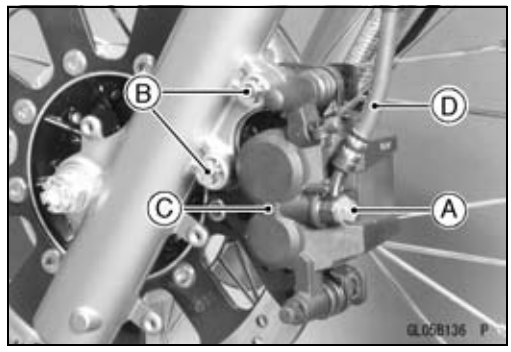
- Install the brake shaft and connect the brake rod and brake shaft with pin.
- Install the new cotter pin and bend the end of it surely.
- Connect the rear brake light switch spring.

- Install the brake pedal aligning the punch marks [A] on the brake lever and brake shaft.



Caliper

Front Caliper Removal



- Drain the brake fluid.
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, remove the piston using the following steps before disconnecting the brake hose from the caliper.*

○*Remove the pads (see Pad Removal).*

○*Pump the brake lever to remove the caliper piston.*

CAUTION
Immediately wash away any brake fluid that spills.

Front Caliper Installation

- Install the caliper and brake hose lower end.

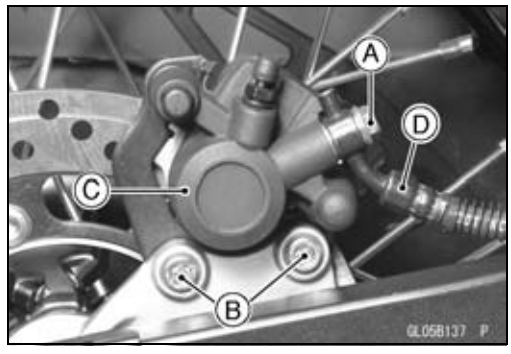
○Replace the washers that are on each side of hose fitting with new ones.

- Tighten the caliper mounting bolts and banjo bolt.

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 reservoir, and bleed the brake line (see Bleeding the Brake Line).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Rear Caliper Removal



- Drain the brake fluid.
- Loosen the banjo bolt [A] at the caliper side, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, remove the piston using the following steps before disconnecting the brake hose from the caliper.*

○*Remove the pad (see Pad Removal).*

○*Pump the brake lever to remove the caliper piston.*

CAUTION
Immediately wash away any brake fluid that spills.

Caliper

Rear Caliper Installation

- Install the caliper and rear side brake hose.

○Replace the washers that are on each side of hose fitting with new ones.

- Tighten the caliper mounting bolts and banjo bolt.

Torque - Caliper Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Check the fluid level in the brake reservoir, and bleed the brake line (see Bleeding the Brake Line).
- 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 is obtained by pumping the brake lever until the pads are against the disc. The brakes will not function on the first application of the lever if this is not done.

Caliper Disassembly

- Loosen the banjo bolt at the brake hose lower end, and tighten it loosely.
- Remove the caliper by taking off the mounting bolts and banjo bolt.

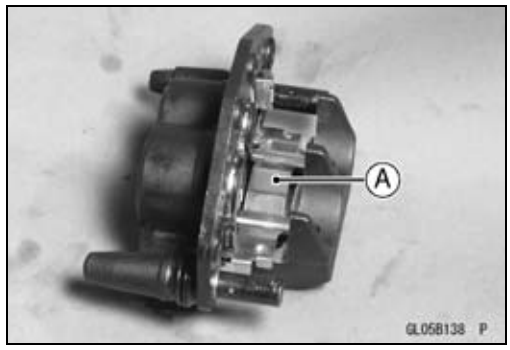
CAUTION

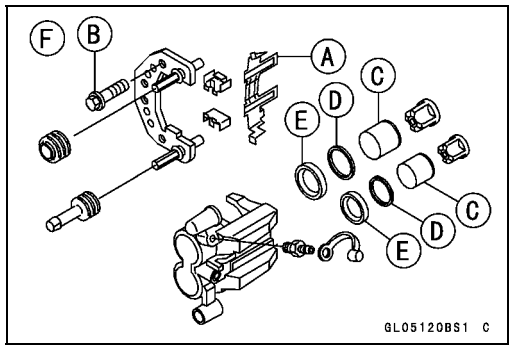
Immediately wash away any brake fluid that spills.

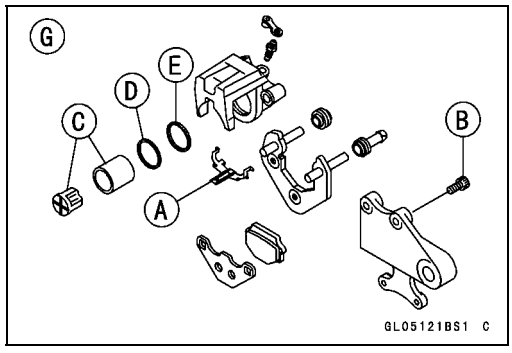
- Remove the pads.

Caliper

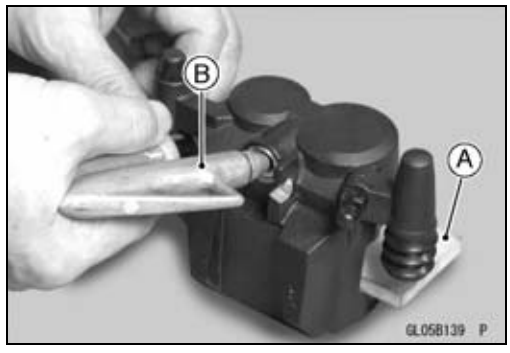
Remove:
Anti-rattle spring [A]
Caliper Mounting Bolts [B]
Piston [C]
Dust Seal [D]
Fluid Seal [E]
Front Caliper [F]
Rear Caliper [G]







● The pistons can be removed by compressed air as follows.
○Remove the banjo bolt and take off the caliper.
○Remove the pads and spring (see Pad Removal).
○Insert a wooden board [A] 5 mm thick inside the caliper opening.
○Lightly apply compressed air [B] to the hose joint opening until the pistons hit the wooden board.
○Remove the board and pull out the pistons by hand.



⚠ WARNING

To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

CAUTION

Immediately wash away any brake fluid that spills.

Caliper

Caliper Assembly

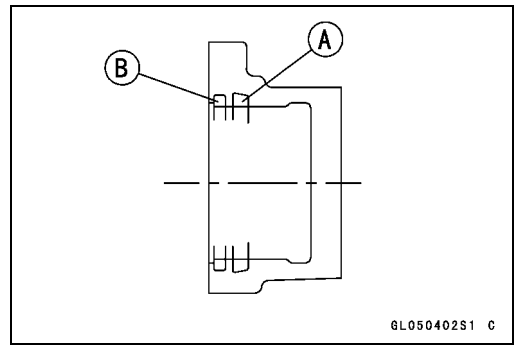
● Clean the caliper parts except for the pads.

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

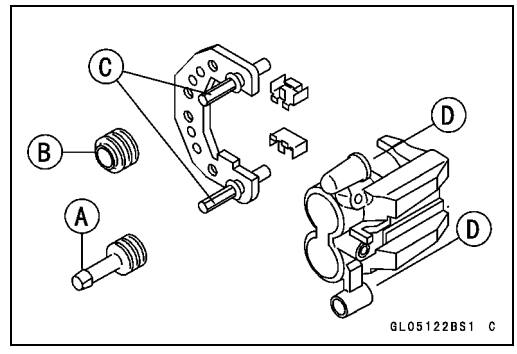
● Install the bleed valve and rubber cap.

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

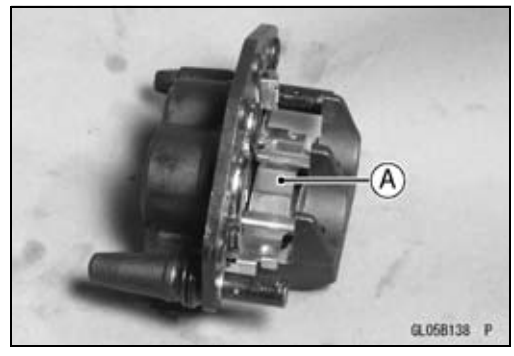
● Replace the fluid seal [A] with a new ones.
○Apply brake fluid to the fluid seal, and install it into the cylinder by hand.
● Replace the dust seal [B] with a new one if it is damaged.
○Apply brake fluid to the dust seal, and install it into the cylinder by hand.



● Apply brake fluid to the outside of the piston, and push the piston into the cylinder by hand. Take care that neither the cylinder nor the piston skirt get scratched.
● Replace the shaft rubber friction boot [A] and dust cover [B] with new ones if they are damaged.
● Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts [C] and holder holes [D] (PBC is a special high temperature, water-resistant grease).



● Install the anti-rattle spring [A] in the caliper body as shown.
● Install the piston insulator.
● Install the pads.
● Wipe up any spilled brake fluid on the caliper with wet cloth.



Caliper

Caliper Fluid Seal and Dust Seal Inspection

Fluid Seal Damage

The fluid seal [A] around the piston maintains the proper pad/disc clearance. If this seal is not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

- Replace the fluid seal under any of the following conditions:

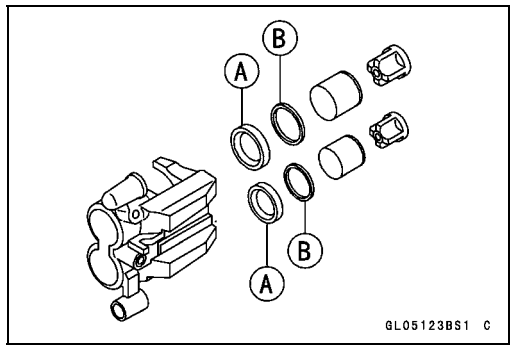
○Fluid leakage around the pad.
○Brakes overheat.
○There is a large difference in left and right pad wear.
○The seal is stuck to the piston.

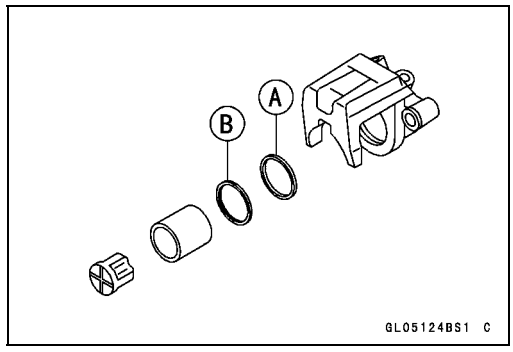
★If the fluid seal is replaced, replace the dust seal as well.

Dust Seal Damage

- Check that the dust seal [B] is not cracked, worn, swollen, or otherwise damaged.

★If it shows any damage, replace it.

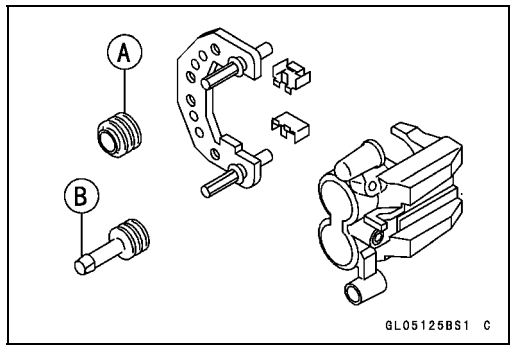


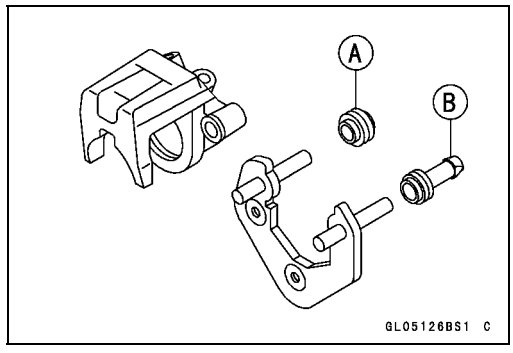


Caliper Dust Boot and Friction Boot Damage

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen or otherwise damaged.

★If they show any damage, replace it.





Piston and Cylinder Damage

- Visually inspect the piston and cylinder surfaces.

★Replace the cylinder and piston if they are badly scored or rusty.

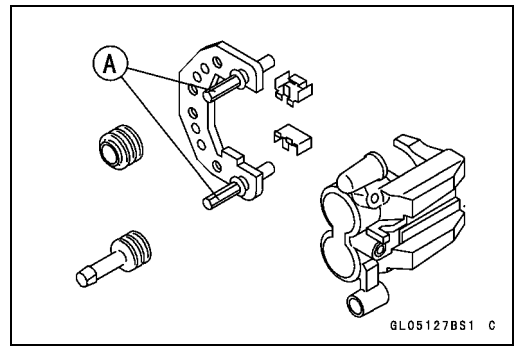
Caliper

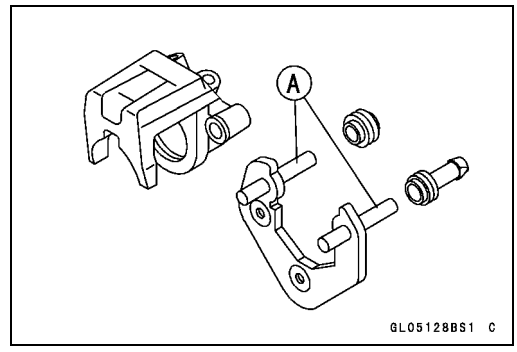
Caliper Holder Shaft Wear

The caliper body must slide smoothly on the caliper holder shafts [A]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see if the caliper holder shafts are not badly worn or stepped, or rubber friction boot are not damaged.

★ If the shafts and rubber friction boot are damaged, replace the rubber friction boot and the caliper holder.

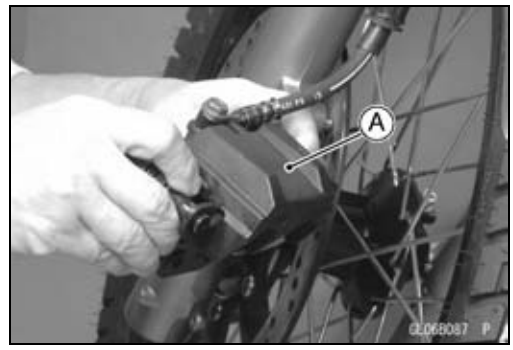




Brake Pads

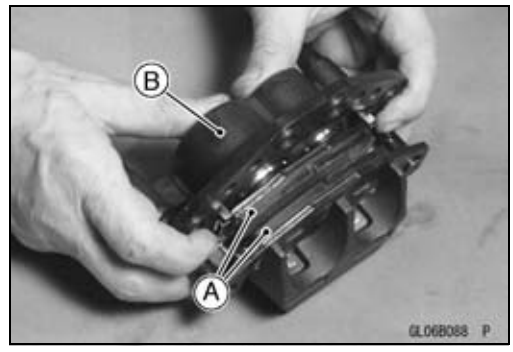
Brake Pad Removal

- Remove the caliper [A] with the hose installed.
- Remove the pads pushing the caliper holder at both side holding the caliper body, so, the inner pad can be removed first and then outer pad.



- Remove the caliper [B] (see caliper Removal).
- Remove the pads [A] pushing the caliper at both side holding the caliper body, so, the inner pad can be removed first and then outer pad.

○In case of removing the caliper, the bleeding of the brake line is reguired, and do not attempt to drive the motorcycle until a full brake lever (pedal) is obtained by pumping the brake lever (pedal) .



Brake Pad Installation

- Push the caliper piston in by hand as far as it will go.
- Install the anti-rattle spring in place.
- Install the brake pads.
- Be sure to install the pad pin clip.
- Install the caliper (see Caliper Installation).

⚠ WARNING

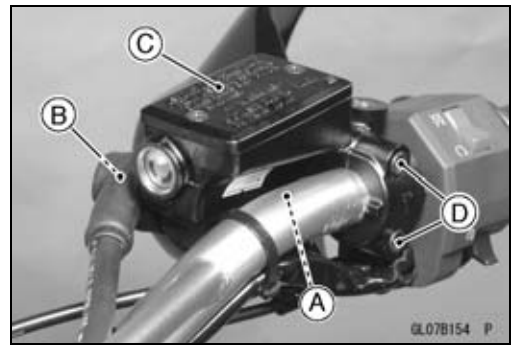
Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

Brake Pad Wear Inspection

- Refer to the Brakes Pad Wear Inspection in the Periodic Maintenance chapter.

Master Cylinder

Front Master Cylinder Removal

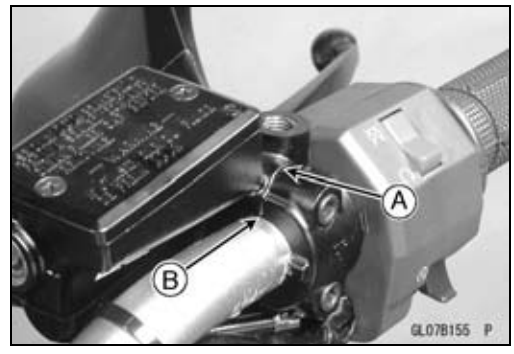


- Disconnect the front brake switch connectors [A].
- Remove the banjo bolt [B] to disconnect the upper brake hose end from the master cylinder [C]. There is a flat washer on each side of the hose fitting.
- Remove the clamp bolts [D] and take off the master cylinder as an assembly with the reservoir, brake lever, and brake switch installed.

CAUTION

Immediately wipe up any brake fluid that spills.

Front Master Cylinder Installation



- Apply grease to the extreme end of the clamp bolts.
- Install the master cylinder clamp so that the upper mating surface [A] of the clamp is aligned with the punch mark [B] on the handlebar.
- Tighten the upper clamp bolt first, and then the lower clamp bolt. There will be a gap at the lower part of the clamp after tightening.

Torque - Master Cylinder Clamp Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)

- Use a new flat washer on each side of the brake hose fitting.
- Tighten the banjo bolt.

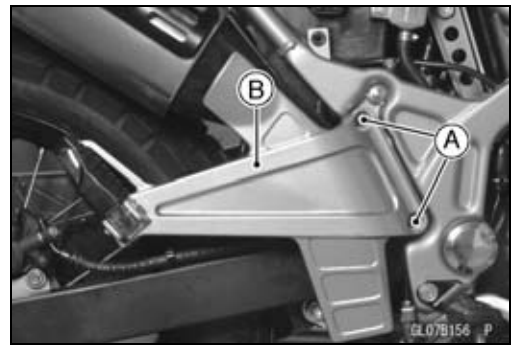
Torque - Brake Hose Banjo Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Bleed the brake line after master cylinder installation (see Bleeding the Brake Line).
- Check the brake for weak braking power, brake drag, and fluid leakage.

⚠ 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.

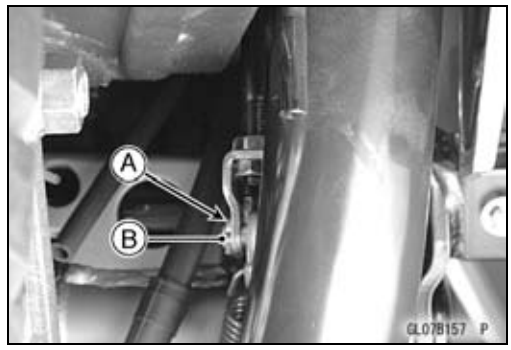
Rear Master Cylinder Removal



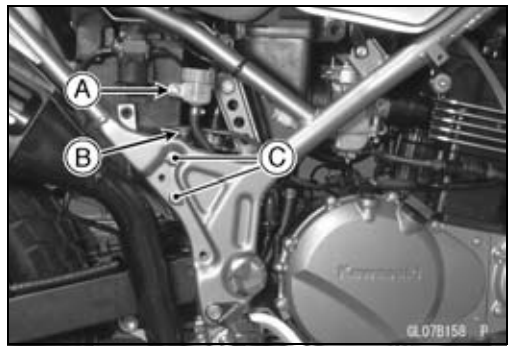
- Remove the right side cover.
- Remove the muffler cover bolts [A] and muffler cover [B].

Master Cylinder

- Pull out the cotter pin [A] from the pin [B] fixing the pin so that it does not turn, and remove the pin.



- Remove the reservoir mounting bolt [A].
- Remove the brake hose banjo bolt [B].
- Remove the rear master cylinder mounting bolts [C] and pull up the master cylinder with the reservoir tank.



CAUTION

Immediately wipe up any brake fluid that spills.

Rear Master Cylinder Installation

- Install the removed parts in order to the reverse of removal.
- Install the new cotter pin and bend it the end of it enoughly after connecting the connecting rad and pin.

Torque - Brake Hose Banjo Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)
Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 188 in·lb)

- Bleed the brake line after master cylinder installation (see Bleeding the Brake Line).

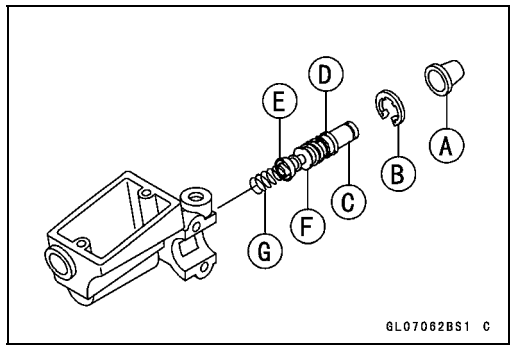
⚠ WARNING

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.

Front Master Cylinder Disassembly

- Remove the master cylinder from the handlebar.
- Remove the reservoir cap and diaphragm, and pour the brake fluid into a container.
- Remove the locknut and pivot bolt, and remove the brake lever.
- Push the dust cover [A] out of place, and remove the circlip [B].

Special Tool - Inside Circlip Pliers: 57001-143



- Pull out the piston assembly [C] and return spring [G].
  Piston [D]
  Secondary Cup [E]
  Primary Cup [F]

CAUTION

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

Master Cylinder

Rear Master Cylinder Disassembly

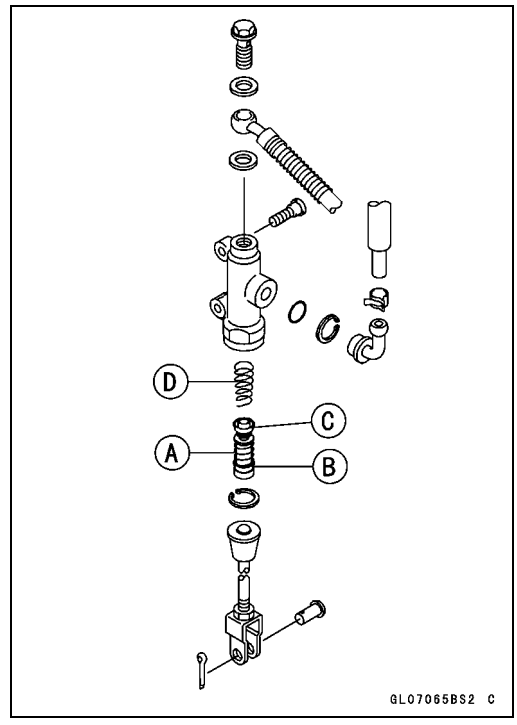
NOTE

○*Do not remove the push rod clevis for master cylinder disassembly since removal requires brake pedal position adjustment.*

- Remove the rear master cylinder (see Rear Master Cylinder Removal).
- Slide the dust cover on the push rod out of place, and remove the circlip.

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the push rod with the piston stop.
- Take off the piston [A], secondary cup [B], primary cup [C], and 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 including the master cylinder with brake fluid or alcohol.

CAUTION

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

- Apply brake fluid to the removed parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Tighten the 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 Nut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

Master Cylinder

Master Cylinder Inspection (Visual Inspection)

- Disassemble the master cylinder (see Front/Rear Master Cylinder Disassembly).
- Check that there are no scratches, rust or pitting on the inner wall of the master cylinder [A] and on the outside of the piston [B].

★If the master cylinder or piston shows any damage, replace them.

- Inspect the primary [C] and secondary [D] cups.

★If a cup is worn, damaged, softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.

- Check the dust cover [E] for damage.

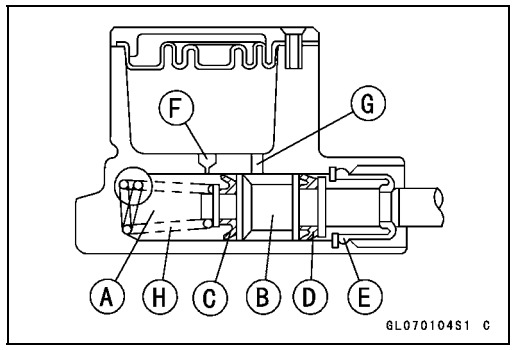
★If it is damaged, replace it.

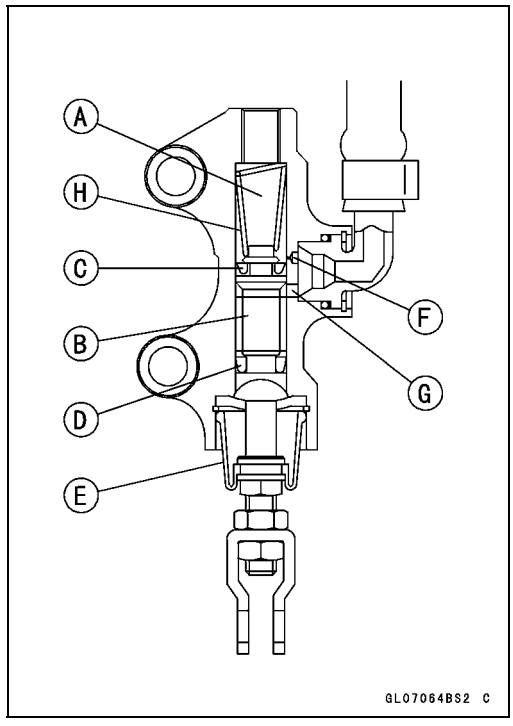
- Check that the relief [F] and supply [G] ports are not plugged.

★If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

- Check the piston return spring [H] for any damage.

★If the spring is damaged, replace it.

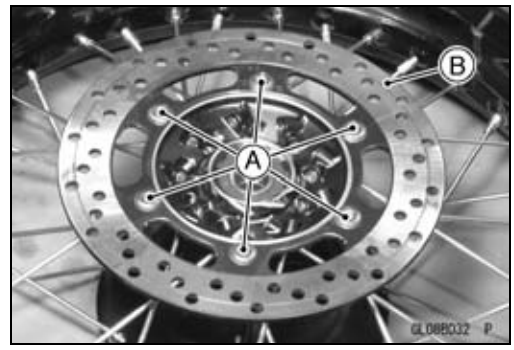




Brake Disc

Brake Disc Removal

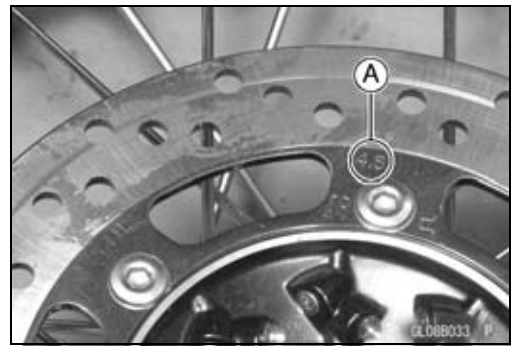
- Remove the wheel (see Front Wheel Rear Wheel Removal in the Wheels/Tires chapter).
- Unscrew the mounting Allen bolts [A], and take off the disc [B].



Brake Disc Installation

- Install the brake disc on the wheel so that the marked side [A] faces out.
- Tighten the mounting Allen bolts.

Torque - Brake Disc Mounting Bolts: 23 N·m (2.3 kgf·m, 16.5 ft·lb)



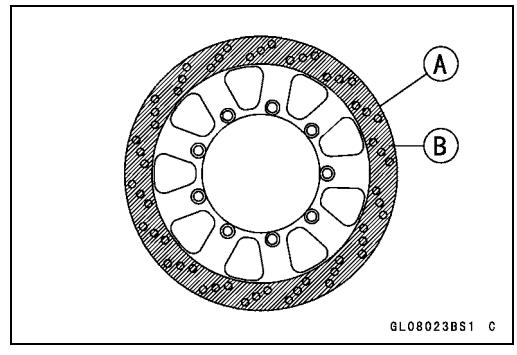
Brake Disc Wear

- Measure the thickness of the disc at the point where it has worn the most.

★Replace the disc [A] if it has worn past the service limit.
Measuring Area [B]

Disc Thickness

Standard:	**4.8 ~ 5.1 mm (0.19 ~ 0.20 in.)**
Service Limit:	**4.5 mm (0.18 in.)**



Brake Disc Warp

- Jack up the motorcycle so that the front wheel is off the ground.

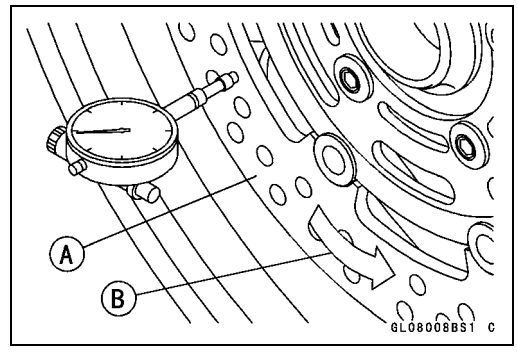
Special Tool - Jack: 57001-1238

- Turn the handlebar fully to one side.
- Set up a dial gauge against the disc [A] as shown and measure disc runout.
- Turn [B] the wheel by hand.

★If runout exceeds the service limit, replace the disc.

Disc Runout

Standard:	**Less than 0.1 mm (0.004 in.)**
Service Limit:	**0.2 mm (0.008 in.)**



Brake Fluid

Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Brake Fluid Change

- Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

Bleeding the Brake Line

- Refer to the Bleeding the Brake Line in the Periodic Maintenance chapter.

⚠ 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 of brake parts. Do not use any other fluid for cleaning of 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.**

Brake Hose

Brake Hoses and Connections Inspection

- Refer to the Brakes Hoses and Connections in the Periodic Maintenance chapter.

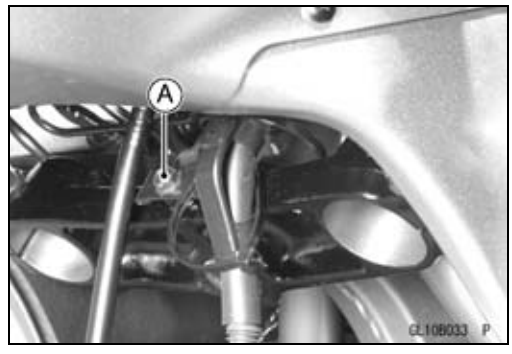
Brake Hose Replacement

- Refer to the Brakes Hoses Replacement in the Periodic Maintenance chapter.

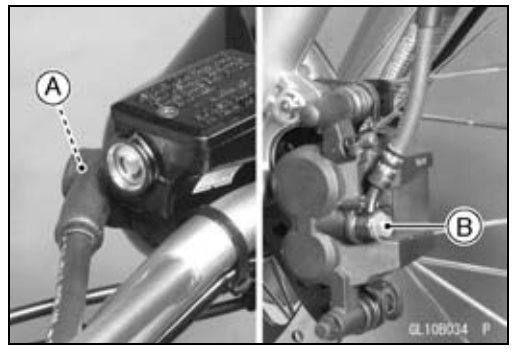
Front Brake Hose Removal

- Cut the brake hose bands binded to the left front fork.
- Remove brake hose clamp bolts [A].

- Remove the brake hose clamp bolts [A] at steering stem.



- Remove the waster cylinder banjo bolt [A] .
- Remove the caliper banjo bolt [B] .



CAUTION

Immediately wipe up any brake fluid that spills.

⚠ 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.

Brake Hose Installation Note

- Replace the both washers with new one.
- Install the brake hose with a specified torque.

Torque - Brake Hose Banjo Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

Suspension

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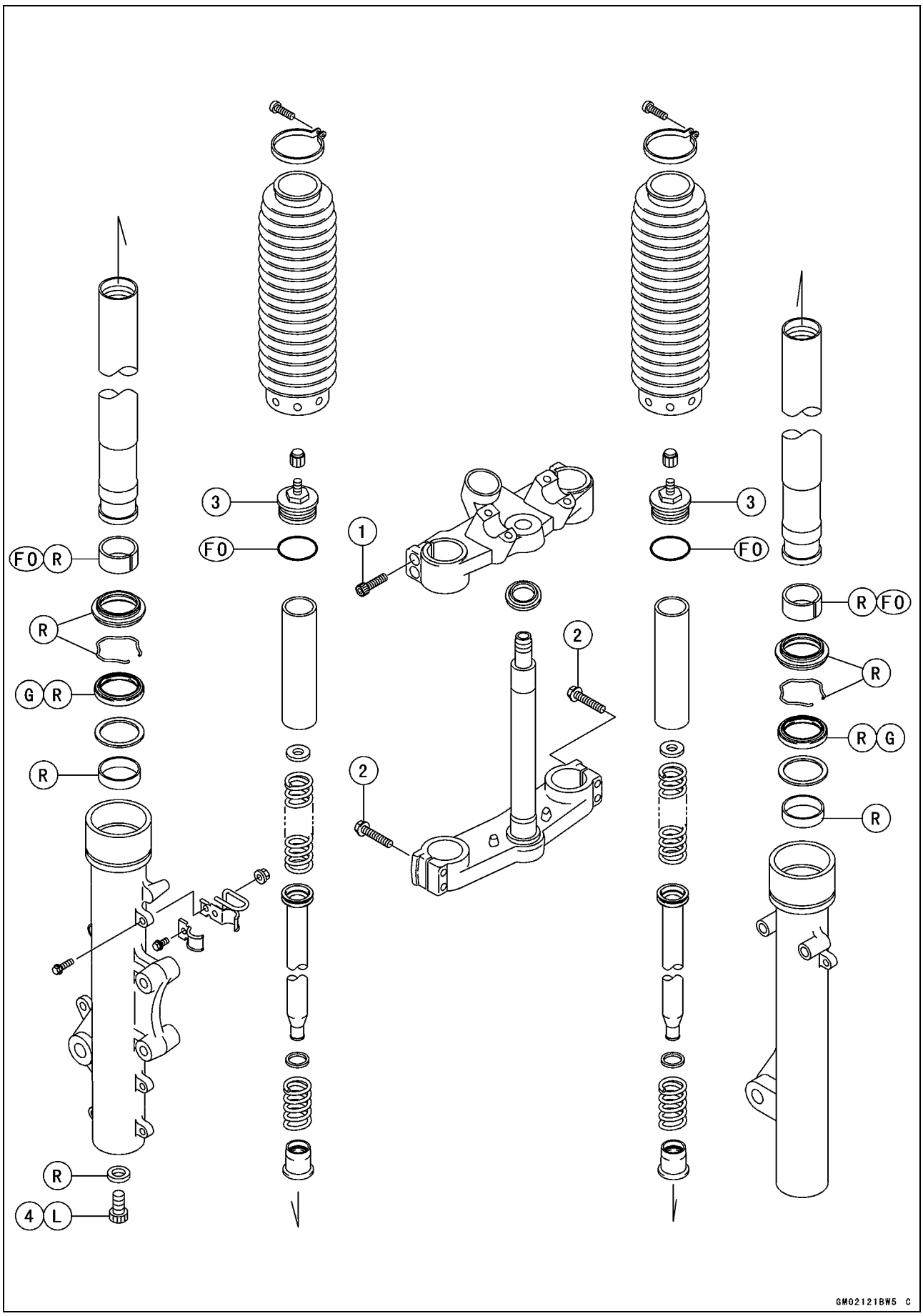
Exploded View

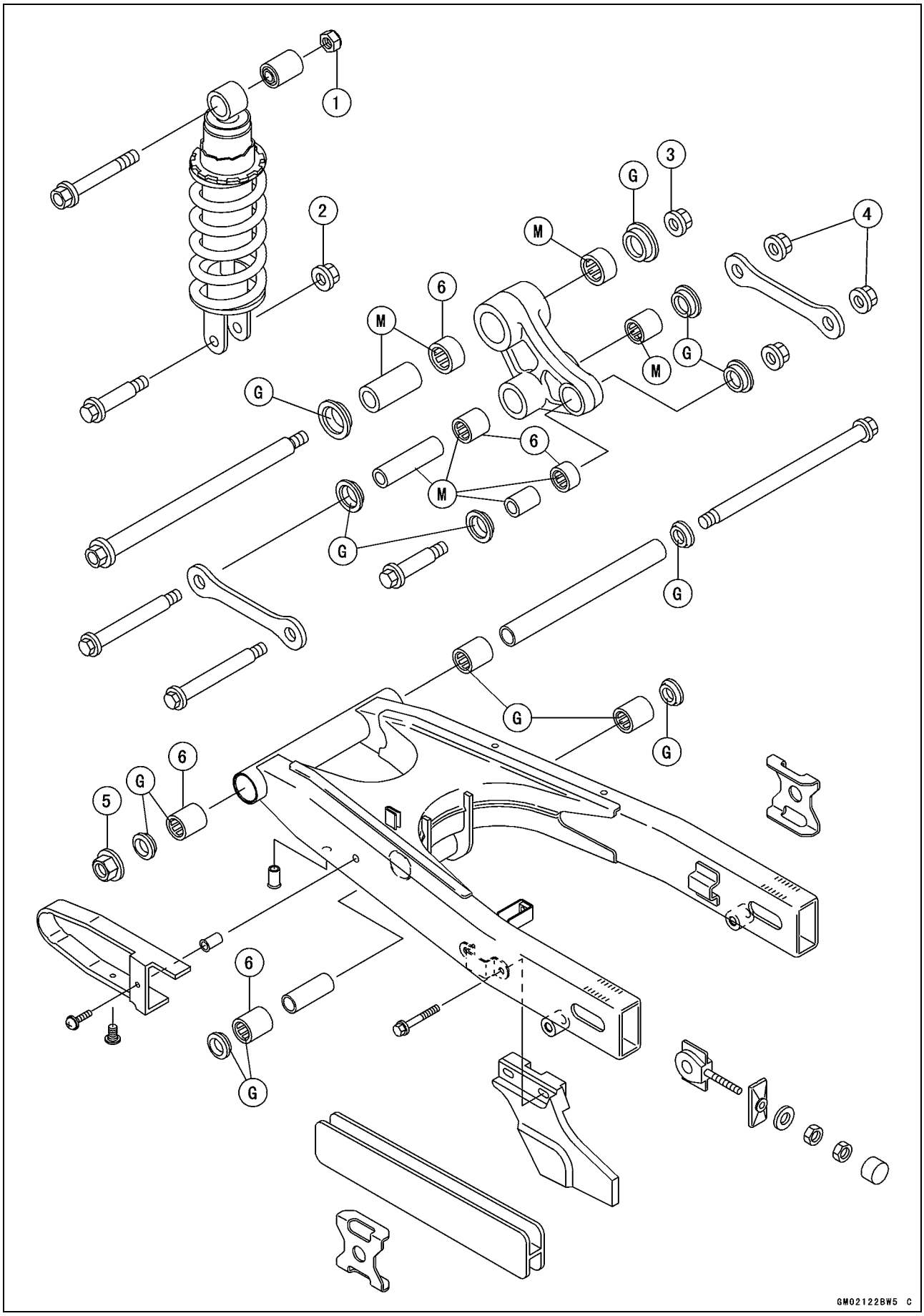


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Upper Clamp Bolts	25	2.5	18	S
2	Front Fork Lower Clamp Bolts	23	2.3	16.5	
3	Front Fork Top Bolts	30	3.1	22	
4	Front Fork Bottom Allen Bolts	30	3.1	22	L

FO: Apply front oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specific tightening sequence.
SS: Apply Silicone Sealant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Shock Absorber Upper Mounting Nut	59	6.0	43	
2	Rear Shock Absorber Lower Mounting Nut	98	10	72	
3	Rocker Arm Pivot Nut	98	10	72	
4	Tie-rod Mounting Nuts	98	10	72	
5	Swingarm Pivot Nut	118	12	87	

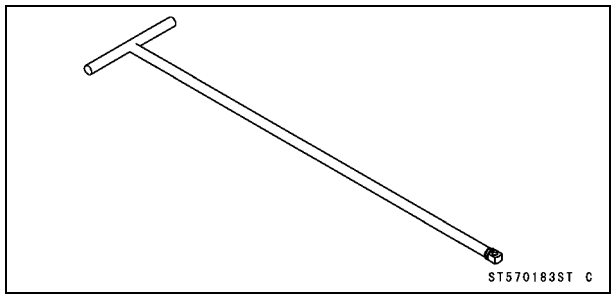
6. Needle Bearings: Face the mark side of it to outside.
G: Apply grease.
M: Apply molybdenum dislfide grease.

Specifications

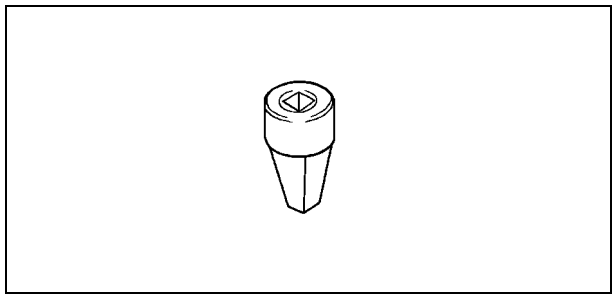
Item	Standard	Service Limit
Front Fork (per one unit)		
Fork Inner Tube Diameter	ϕ41 mm (1.61 in.)	– – –
Fork Spring Setting	Non-adjustable	– – –
Air Pressure	0 kPa (Adjustable)	– – –
Rebound Damper Setting	Non-adjustable	– – –
Compression Damper Setting	Non-adjustable	– – –
Fork Oil Viscosity	KAYABA KHL34–G10 or equivalent	– – –
Fork Oil Capacity:		
Completely Dry	530 ±4 mL (17.91 ±0.14 US oz.)	– – –
When Changing Oil	approx. 453 mL (5.31 US oz.)	– – –
Fork Oil Level	Fully compressed, without fork spring, below from inner tube top 194 ±2 mm (7.64 ±0.08 in.)	– – –
Fork Spring Free Length	522.5 mm (20.57 in.)	512 mm (20.16 in.)
Rear Shock Absorber		
Rebound Damper Set	Non-adjustable	– – –
Compression Damper Set	Non-adjustable	– – –
Spring Setting Position	No. 2 of 5 positions	– – –
Gas Pressure	980 kPa (10 kgf/cm²)	– – –

Special Tools and Sealant

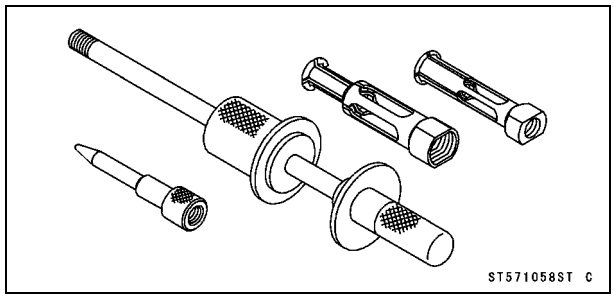
Fork Cylinder Holder Handle:
57001-183



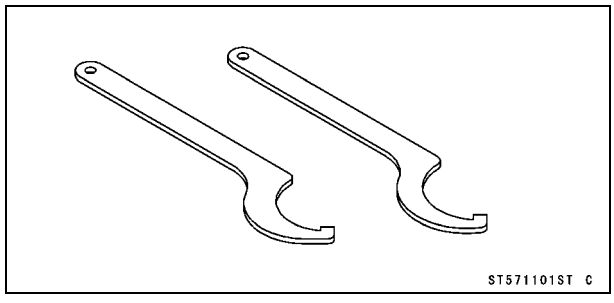
Fork Cylinder Holder Adapter:
57001-1057



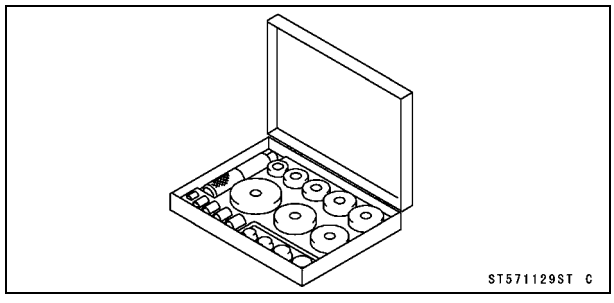
Oil Seal & Bearing Remover:
57001-1058



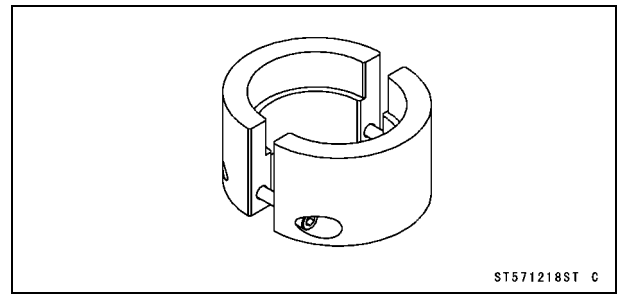
Hook Wrench R37.5, R42:
57001-1101



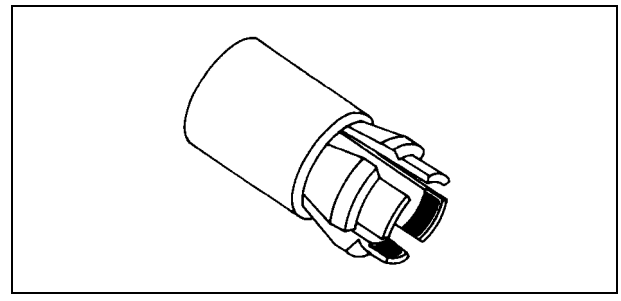
Bearing Driver Set:
57001-1129



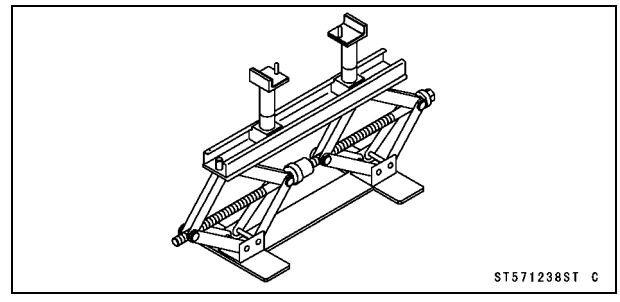
Fork Outer Tube Weight:
57001-1218



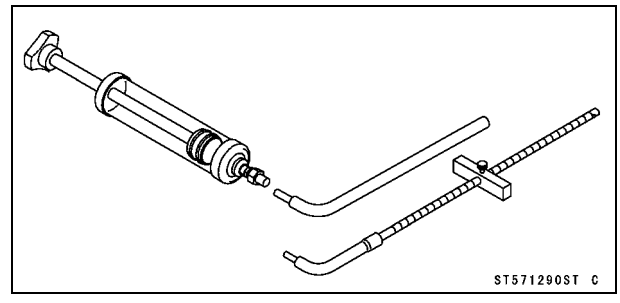
Front Fork Oil Seal Driver:
57001-1219



Jack:
57001-1238



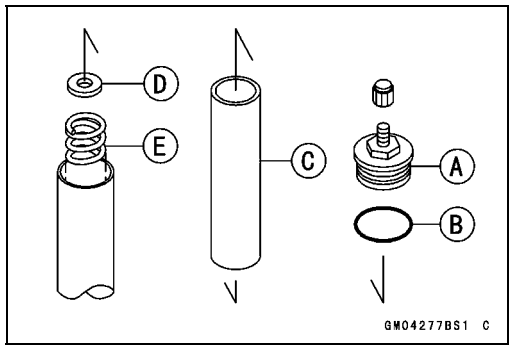
Fork Oil Level Gauge:
57001-1290



Front Fork

Front Fork Oil Change

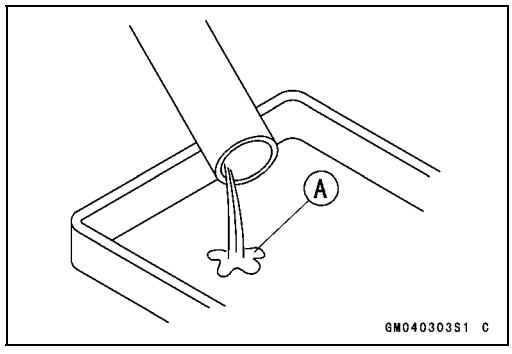
- Remove the front fork (see Front Fork Removal).
- Remove the fork boot from the front fork.
- Hold the outer tube vertically in a vise.
- Remove:
  Top Bolt [A] and O-ring [B]
  Spacer [C]
  Fork Spring Seat [D]
  Fork Spring [E]



- Pour out the fork oil [A] with the fork upside down.
- Fill the front fork with the specified oil.

Fork Oil Viscosity: KAYABA KHL34-G10 or equivalent

Fork Oil Capacity (when changing oil):
Approx. 453 mL (15.31 US oz.)

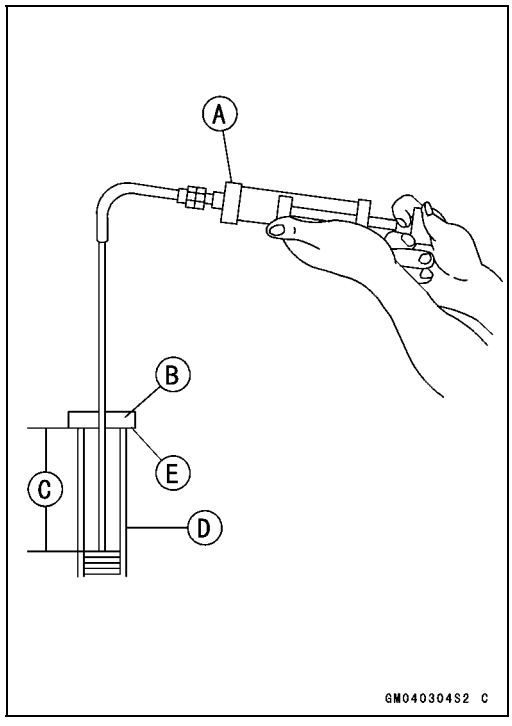


- Wait for about five minutes so that any suspended air bubbles can surface.
- Measure the oil level, using the fork oil level gauge [A].

Special Tool - Fork Oil Level Gauge: 57001-1290

○Set the gauge stopper [B] so that its lower side shows the oil level distance specified [C].
○Insert the gauge tube into the inner tube [D] and position the stopper across the top of the inner tube [E].
○Pull the handle slowly to draw out the excess oil until no more oil comes up the tube.
★If no oil is drawn out, there is not enough oil in the fork. Pour in some more oil, then draw out the excess.

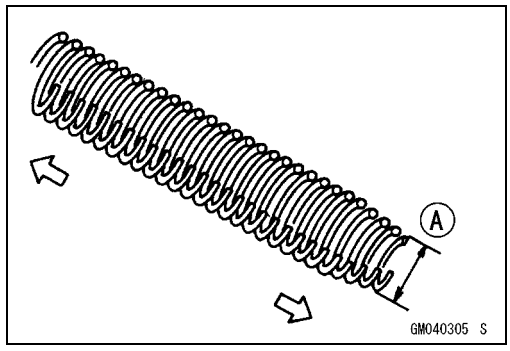
Front Fork Oil Level (Fully compressed without fork spring)
Standard: 194 ±2 mm (7.64 ±0.08 in.)



- Install the fork spring with the smaller diameter end [A] facing down.
- Install:
  Fork Spring Seat
  Spacer
- Install the top bolt with a specified torque.

Torque - Front Fork Top Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)

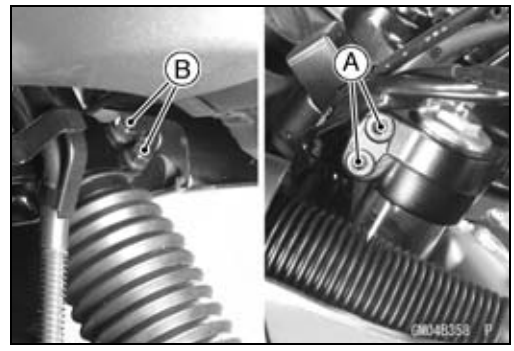
- Install the fork boot to the front fork.
- Install the front fork (see Front Fork Installation).
- Repeat the same procedure for another front fork.



Front Fork

Front Fork Removal

- Remove:
  Brake Hose Clamps (Left Front Fork only)
  Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  Front Fender (see Front Fender Removal in the Frame chapter)
  Front Brake Caliper Mounting Bolts
  Front Brake Hose Clamp Mounting Bolt
  Speedometer Cable Clamp Mounting Bolt
- Loosen the upper [A] and lower [B] fork clamp bolts.
- It is necessary to loosen the front fork top bolt, if the front fork shall be disassembled.
- With a twisting motion, work the fork leg down and out.

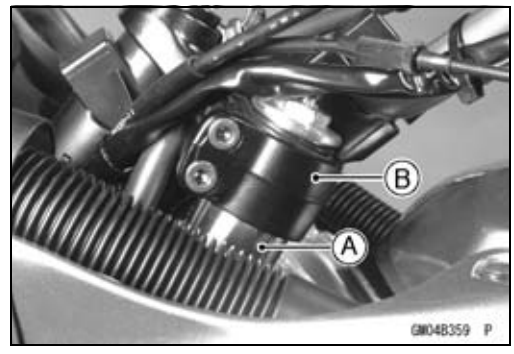


Front Fork Installation

- Install the fork tube so that the top of the fork inner tube [A] is aligned with the upper surface of the steering stem head [B].

NOTE

○*Tighten the two clamp bolts alternately two times to ensure even tightening torque.*



- Run the cables, wires, and hoses as shown in the Cable, Wire and Hose Routing in the Appendix chapter.
- Install the front wheel (see Front Wheel Installation in the Wheels/Tires chapter).

Torque - Upper Fork Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Lower Fork Clamp Bolts: 23 N·m (2.3 kgf·m, 16.5 ft·lb)
Brake Caliper Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Check the front brake effectiveness after installation.

⚠ WARNING

Do not attempt to ride 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.

- Install the fork boot to the front fork.

Front Fork

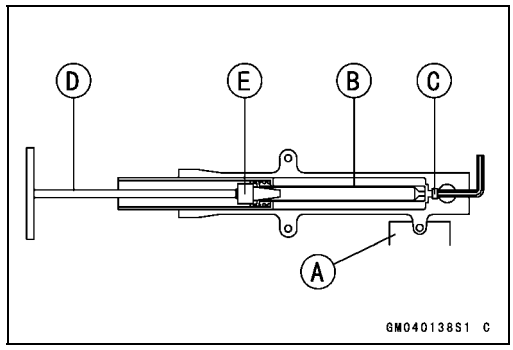
Front Fork Disassembly

- Remove the front fork (see Front Fork Removal).
- Drain the fork oil (see Front Fork Oil Change).

○The following parts are removed during draining the fork oil.
Top Bolt and O-ring
Spacer
Fork Spring Seat
Fork Spring

- Hold the front fork horizontally in a vise [A].
- Stop the cylinder unit [B] from turning by using the special tools.
- Unscrew the Allen bolt [C], and take the gasket out of the bottom of the outer tube.

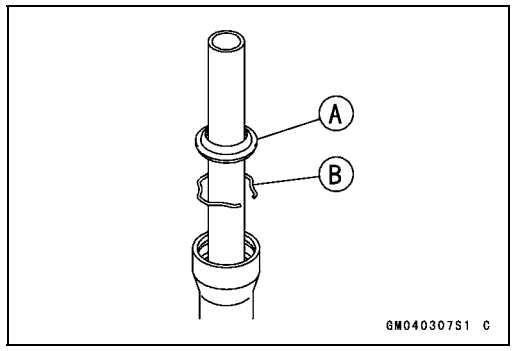
Special Tools - Fork Cylinder Holder Handle: 57001-183 [D]
Fork Cylinder Holder Adapter: 57001-1057 [E]



- Take the cylinder unit out of the inner tube.

- Separate the inner tube from the outer tubes as follows:

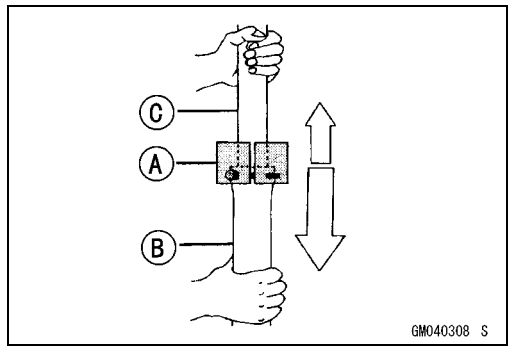
○Remove the dust seal [A] from the outer tube.
○Remove the retaining ring [B] from the outer tube.



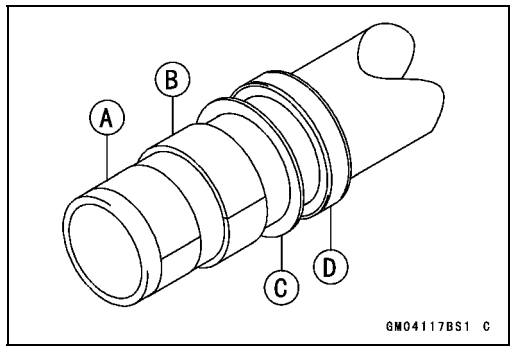
○Use the fork outer tube weight [A] to separate the outer tube [B] from the inner tube [C] Holding the inner tube by hand, pull the outer tube several times to pull out the inner tube.

Special Tool - Fork Outer Tube Weight: 57001-1218

○Take out the cylinder base out of the outer tube.



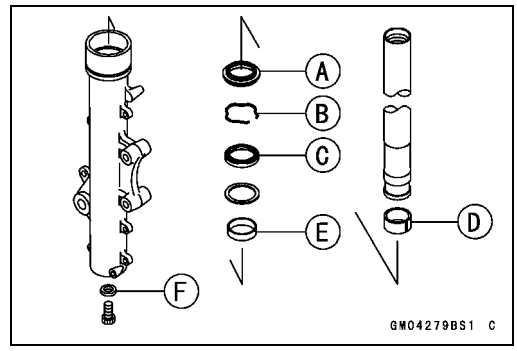
- Remove the guide bushings [A], outer tube guide bushing [B], washer [C], and oil seal [D] from the inner tube.



Front Fork

Front Fork Assembly

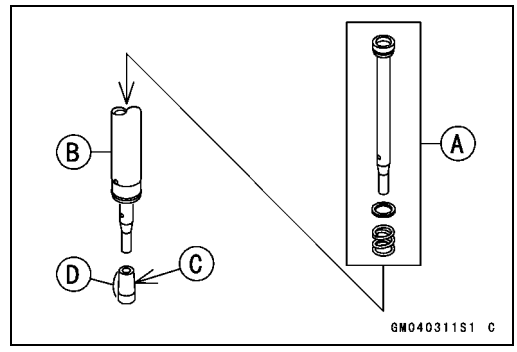
- Replace the following parts with new ones after removal.
  Dust Seal [A]
  Retaining Ring [B]
  Oil Seal [C]
  Inner Guide Bushing [D]
  Outer Guide Bushing [E]
  Bottom Allen Bolt Gasket [F]



- Put the cylinder unit [A] with the spring into the inner tube [B] protruding from the inner tube, and install the cylinder base [C] onto the bottom end of the cylinder unit.

○Install the cylinder base with the tapered end [D] up.

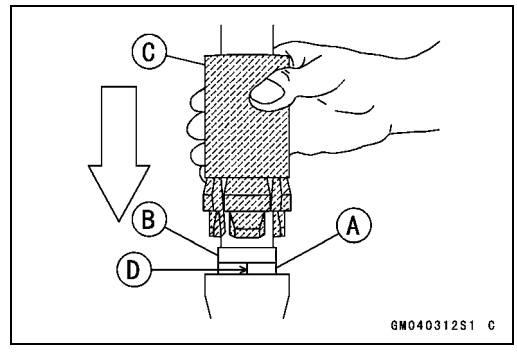
- Install the inner tube, cylinder unit, and cylinder base as a set into the outer tube.



- Install the new guide bushing [A] with a used guide bushing [B] on it by tapping the used guide bushing with the fork oil seal driver [C] until it stops.

○The split [D] of the bushing should face toward the side of the vehicle.

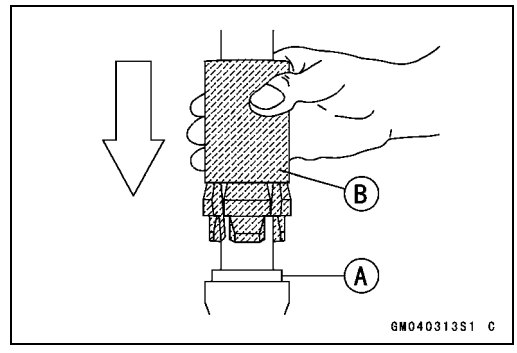
Special Tool - Front Fork Oil Seal Driver: 57001-1219



- Apply grease to the oil seal lips and install the washer and the oil seal [A] into the outer tube.

Special Tool - Front Fork Oil Seal Driver: 57001-1219 [B]

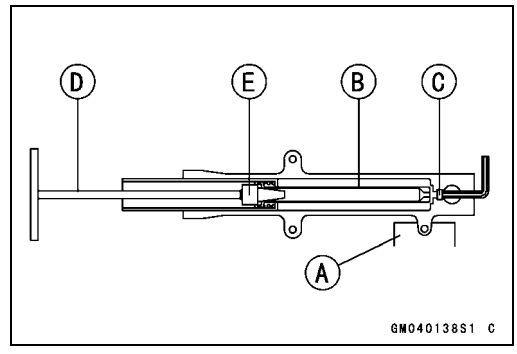
- Install:
  Retaining Ring
  Dust Seal



- Hold the front fork horizontally in a vise [A].
- Apply a non-permanent locking agent to the threads of the Allen bolt and screw the Allen bolt into the bottom of the outer tube.
- Hold the cylinder unit [B] with the special tools and tighten the Allen bolt [C].

Special Tools - Fork Cylinder Holder Handle: 57001-183 [D]
Fork Cylinder Holder Adapter: 57001-1057 [E]

Torque - Bottom Allen Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)



Front Fork

- Pour in the specified type of oil and install the parts removed (see Front Fork Oil Change).

Fork Oil Viscosity: KAYABA KHL34-G10 or equivalent

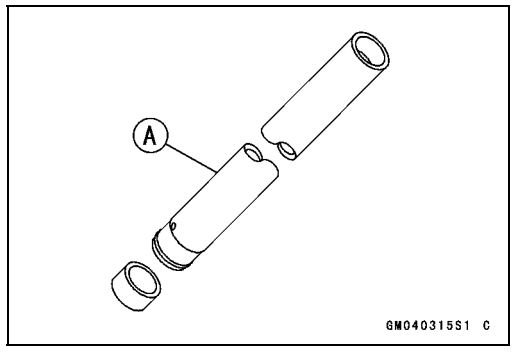
Fork Oil Capacity (completely dry):

530 ±4 mL (17.91 ±0.14 US oz.)

Inner Tube, Outer Tube Inspection

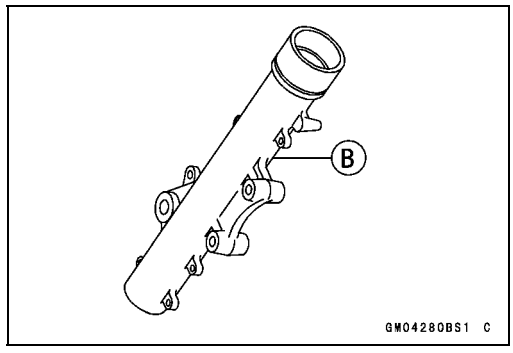
- Visually inspect the inner tube [A] for scoring or scratches on the outer surface of it and repair any damage.
- Nick or rust damage can sometimes be repaired by using a wet- stone to remove sharp edges or raised areas which cause seal damage.

★If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.



CAUTION

If the inner tune is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.



- Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

★If you feel binding or catching, the inner and outer tubes must be replaced.

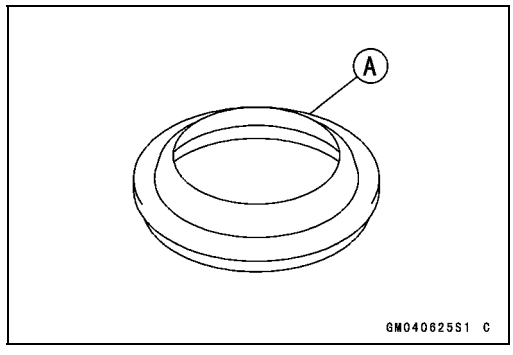
⚠ WARNING

A straightened inner or outer fork tube [B] may fail in use, possibly, causing an accident. Replace a badly bent or damaged inner or outer tube, and inspect the other tube carefully before reusing it.

Dust Seal Inspection

★Inspect the dust seal [A] for any signs of deterioration or damage.

★Replace them if necessary.

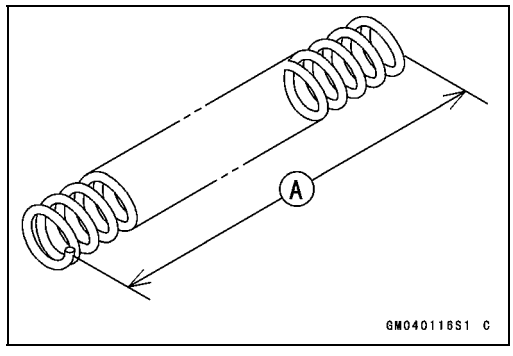


Spring Tension

- Since the spring becomes shorter as it weakens, check its free length [A] to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced.

★If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.



Spring Free Length

Standard: 522.5 mm (20.57 in.)

Service Limit: 512 mm (20.16 in.)

Rear Shock Absorber

Spring Preload Adjustment

The spring preload adjuster on the rear shock absorber has 5 positions so that the spring tension can be adjusted for different road and loading conditions.

- Using the hook wrench [A], turn the adjuster to adjust the spring tension.

Spacial Tool - Hook Wrench: 57001-1101

○The standard adjuster position for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is 2nd step from the weakest position.

★If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

Spring Preload Adjustment

Position	Spring Force	Setting	Load	Road	Speed
1	Strong	Soft	Light	Good	Low
2	↑	↑	↑	↑	↑
3	¦	¦	¦	¦	¦
4	↓	↓	↓	↓	↓
5	Weak	Hard	Heavy	Bad	High

Rear Shock Absorber Removal

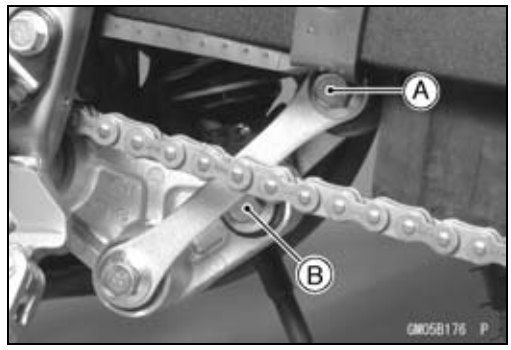
- Squeeze the brake lever slowly and hold it with a band [A].
- Set the jack under the engine and raise the rear wheel.

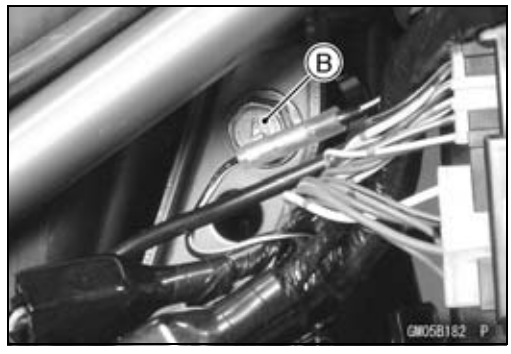
Special Tool - Jack: 57001-1238

- Remove the seat (see Seat Removal in the Frame chapter).
- Remove the Side Covers (see Side Cover Removal in the Frame chapter).
- Remove the upper tie-rod bolt [A] and nut.
- Remove the mounting bolts [B] and pull off the rear shock absorber [C].

Rear Shock Absorber

- Remove the upper tie-rod bolt [A] and nut.
- Remove the mounting bolts [B] and pull off the rear shock absorber [C].





Rear Shock Absorber Installation

- Tighten the mounting bolts.

Torque - Rear Shock Absorber Upper Mounting Nut: 59 N·m (6.0 kgf·m, 43 ft·lb)
Rear Shock Absorber Lower Mounting Nut: 98 N·m (10 kgf·m, 72 ft·lb)

- Adjust the rear shock absorber position (see Rear Shock Absorber Adjustment).

Rear Shock Absorber Wear

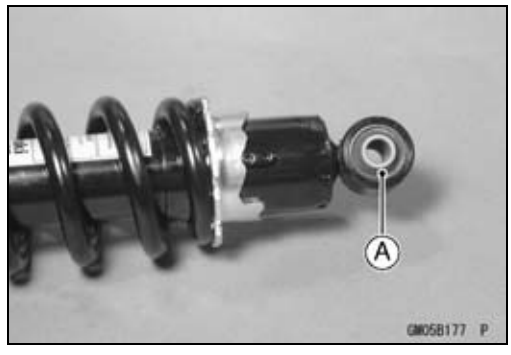
- Remove the rear shock absorbers (see Rear Shock Absorber Removal).
- Compress each rear shock absorber.
- Visually inspect the following items.
  Compression Stroke
  Oil Leakage
  Other Damage

★If there is any damage to the rear shock absorber, replace the shock absorbers.

Bushing Wear

- Visually inspect the rubber bushing [A].

★If it shows any signs of damage, replace it.



Rear Shock Absorber Oil Leak Inspection

- Refer to the Rear Shock Absorber Oil Leak Inspection in the Periodic Maintenance chapter.

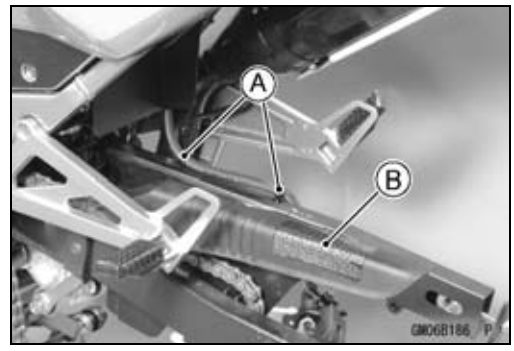
Swingarm

CAUTION

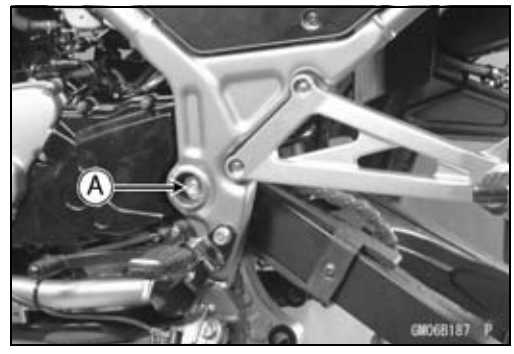
Do not tap the swingarm pivot shaft when removing or installing. Push or pull the pivot shaft while turning the shaft. Tapping on the shaft could damage the needle bearings in the swingarm.

Swingarm Removal

● Remove:
Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
Upper Tie Rod Bolt and Nut
Rear Brake Hose Clamps [A]
Rear Shock Absorber Lower Mounting Bolts and Nut
Chain Cover [B] and Chain Guide
Pivot Shaft Caps



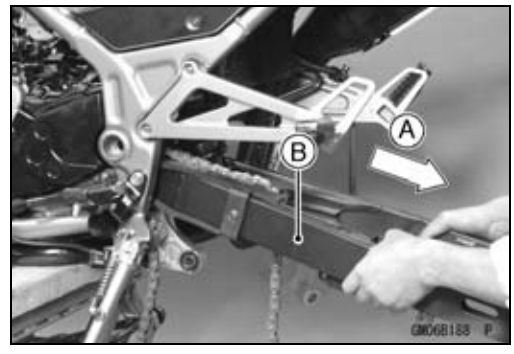
● Remove the pivot shaft nut [A], and pull out the pivot shaft from right side.



● Move back [A] the swingarm [B] and take off the swingarm.

NOTE

○*Make sure the swingarm dose not catch the Rear Brake Switch.*



Swingarm Sleeve and Needle Bearing Wear

CAUTION

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

● 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 bearing as a set.

Swingarm

Swingarm Installation

- Installation is the reverse of removal.

NOTE

○*Loosen the rocker arm pivot nut while installing the pivot shaft.*

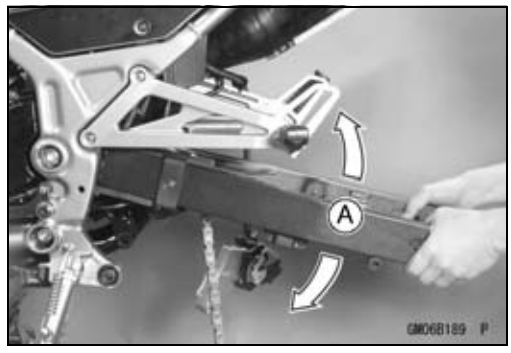
- Tighten the pivot shaft nut.

Torque - Swingarm Pivot Nut: 118 N·m (12 kgf·m, 87 ft·lb)

- Tighten the torque link nut.

Torque - Torque Link Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Move the swingarm up and down [A] to check for abnormal friction.



Swingarm Disassembly/Assembly

- Remove the needle bearing using the oil seal and bearing remover.

Special Tool - Oil Seal & Bearing Remover: 57001-1058

- Insert the needle bearing using the bearing driver set so that the marked side faces outside.

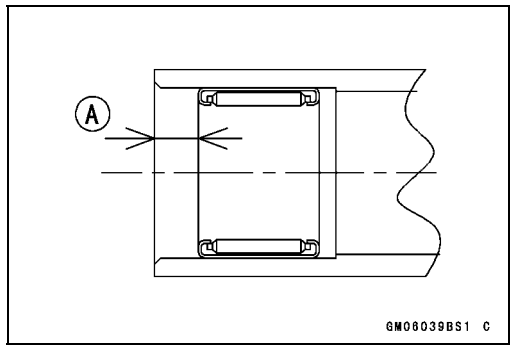
Special Tool - Bearing Driver Set: 57001-1129

- Apply a thin coat of a the grease to the lips of the grease seals.

Swingarm Bearing Installation

- Apply plenty of grease to the new needle bearings, and sleeve.
- Be sure to install the needle bearings so that the manufacturer's marks are faced out. This prevents bearing damage.
- Position the bearings as shown, using a suitable bearing driver in the bearing driver set.
  7 mm (0.28 in.) [A]

Special Tool - Bearing Driver Set: 57001-1129



Swingarm Needle Bearing Lubrication

- Refer to the Swingarm Needle Bearing Lubrication in the Periodic Maintenance chapter.

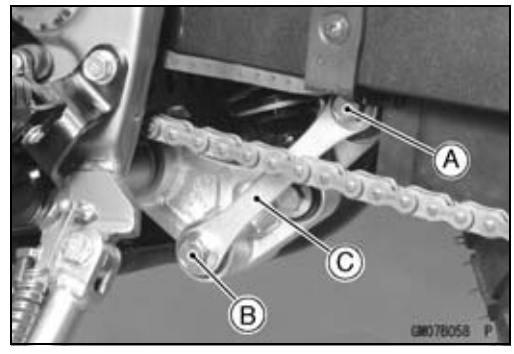
Tie-Rod, Rocker Arm

Tie-Rod Removal

- Squeeze the brake lever slowly and hold it with a band [A].

- Using the jack, raise the rear wheel off the ground.

  Special Tool - Jack: 57001-1238



- Remove the upper tie-rod bolt [A] pushing the rocker arm sleeve and swingarm sleeve for upper tie-rod a little in after removing the nut.
- Remove:
  Lower Tie-rod Bolt and Nut [B]
  Tie-Rods [C]

Tie-Rod Installation

- Install the tie-rods so that the chamfered side faces the bolts and nuts.
- Tighten:

  Torque - Tie-Rod Nuts: 98 N·m (10 kg·m, 72 ft·lb)

Rocker Arm Removal

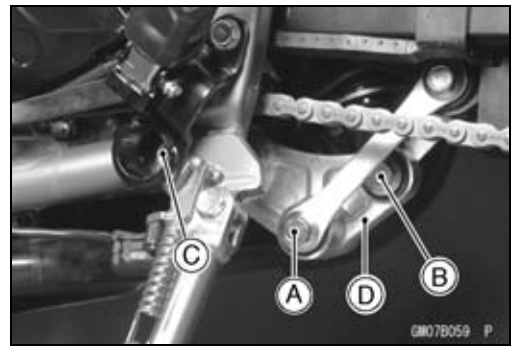
- Squeeze the brake lever slowly and hold it with a band [A].
- Using the jack, raise the rear wheel off the ground.

  Special Tool - Jack: 57001-1238

- Remove:
  Left and Right Front Footpeg

NOTE

○*Loosen the swingarm pivot nut when installing the rocker arm bolt.*



Lower Tie-Rod Bolt and Nut [A]
Lower Rear Shock Absorber Bolt and Nut [B]
Rocker Arm Bolt and Nut [C]
Rocker Arm [D]

Tie-Rod, Rocker Arm

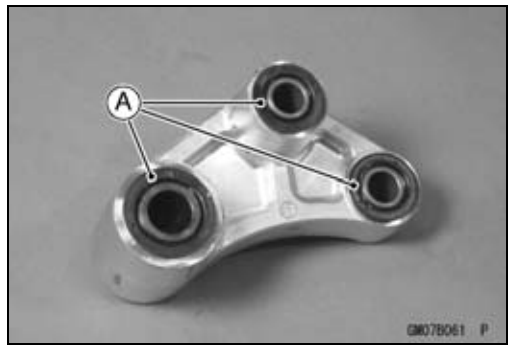
Rocker Arm Installation

- Apply grease to the inside of the needle bearings grease seals.
- Tighten:

Torque - Rocker Arm Pivot Nut: 98 N·m (10 kg·m, 72 ft·lb)
Tie-Rod Nut: 98 N·m (10 kg·m, 72 ft·lb)
Rear Shock Absorber Lower Mounting Nut: 98 N·m (10 kg·m, 72 ft·lb)
Front Footpeg Brackets Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

Rocker Arm Bearing, Sleeve Inspection

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



- Visually inspect the rocker arm grease seals, sleeves and needle bearings [A].
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of any of the needle bearings or sleeve, replace the sleeve, and needle bearings as a set.

Rocker Arm Lubrication

- Refer to the Rocker Arm Bearings and Sleeves Lubrication in the Periodic Maintenance chapter.

Steering

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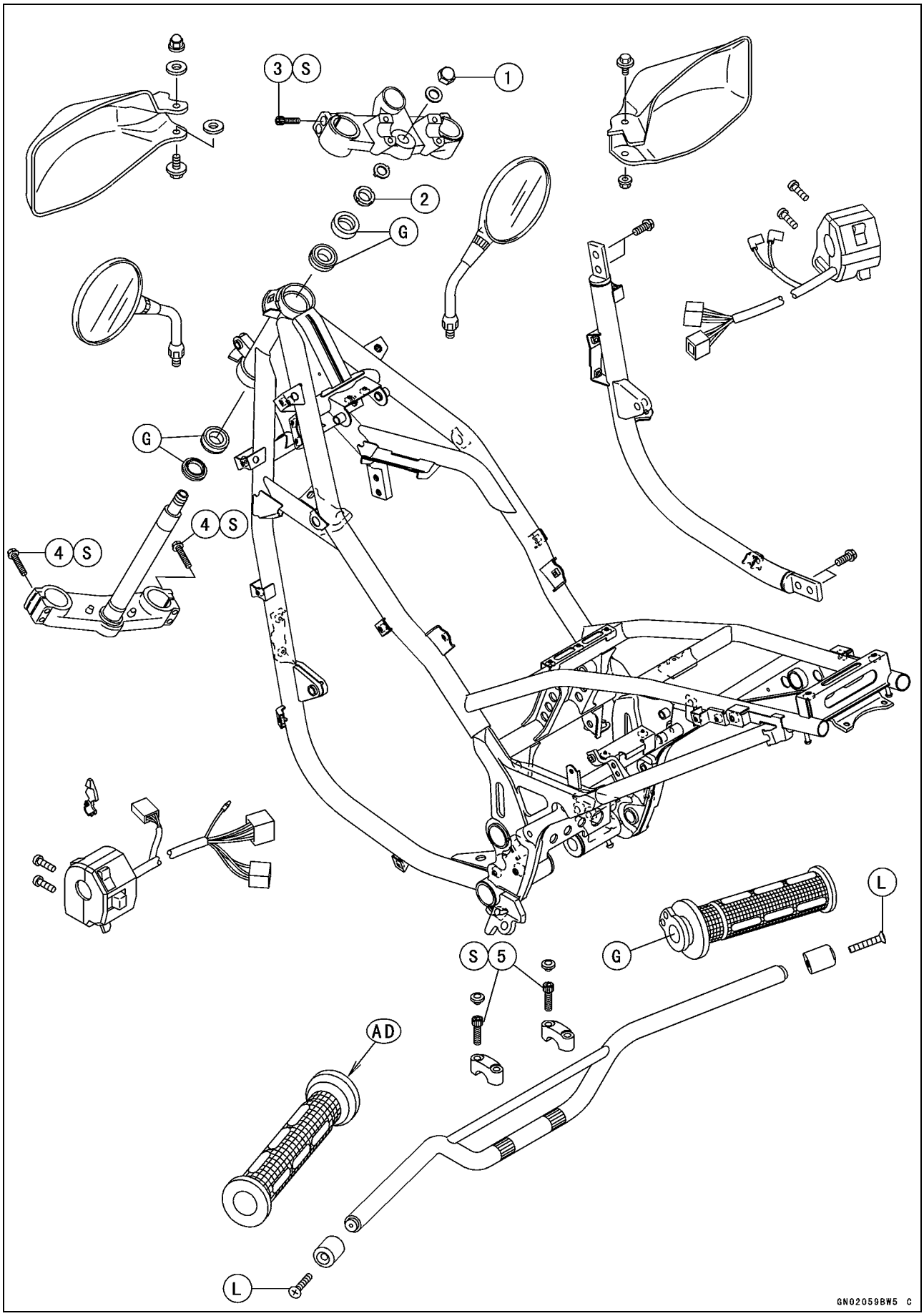
Exploded View



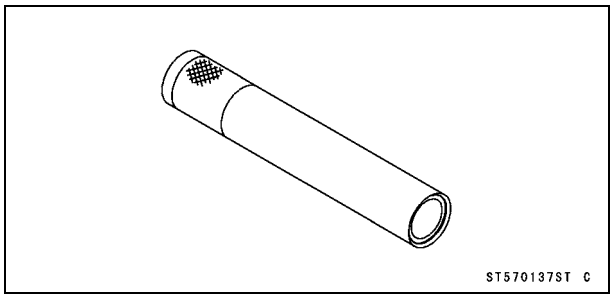
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Steering Stem Head Nut	39	4.0	29	
2	Steering Stem Locknut	Hand Tighten (about 4.9)	Hand Tighten (about 0.5)	Hand Tighten (about 43 in ·lb)	
3	Front Fork Upper Clamp Allen Bolts	25	2.5	18	S
4	Front Fork Lower Clamp Bolts	23	2.3	16.5	S
5	Handlebar Clamp Bolts	25	2.5	18	S

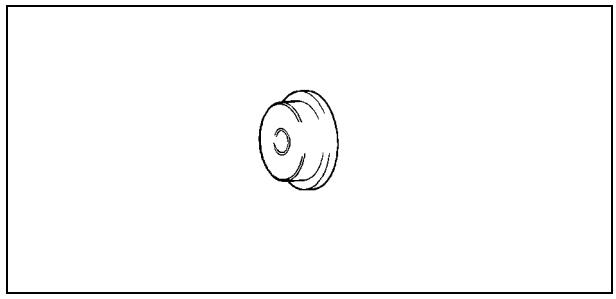
AD: Apply adhesive.
G: Apply grease.
L: Apply a non-permanent locking agent.
S: Follow the specific tightening sequence.

Special Tools

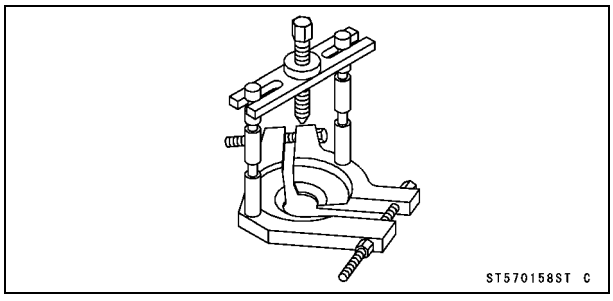
Steering Stem Bearing Driver:
57001-137



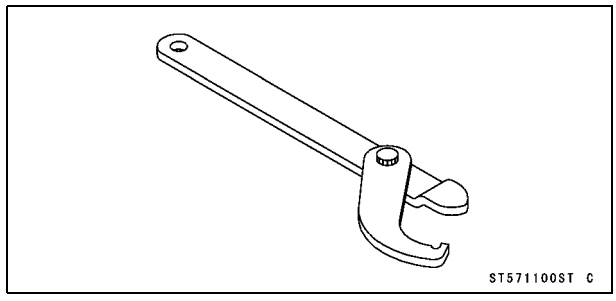
Head Pipe Outer Race Driver, ϕ51.5:
57001-1076



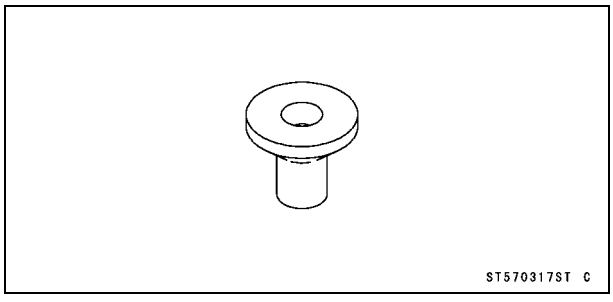
Bearing Puller:
57001-158



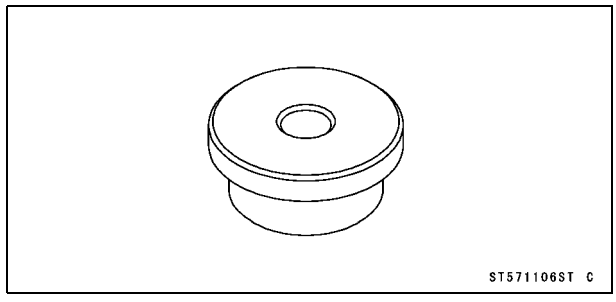
Steering Stem Nut Wrench:
57001-1100



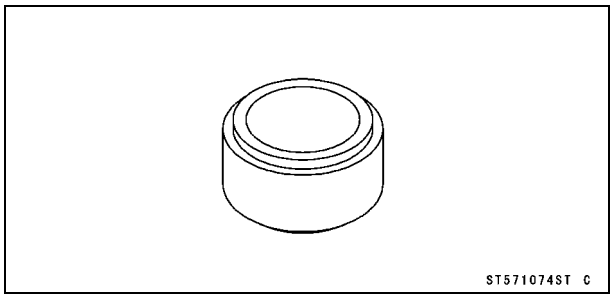
Bearing Puller Adapter:
57001-317



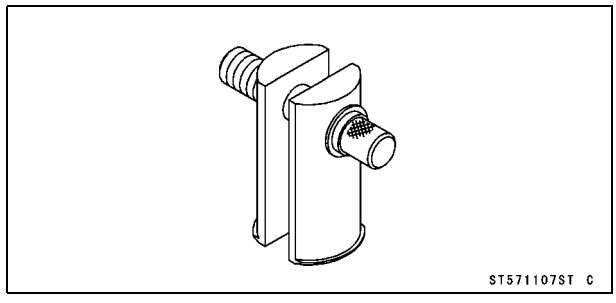
Head Pipe Outer Race Driver, ϕ46.5:
57001-1106



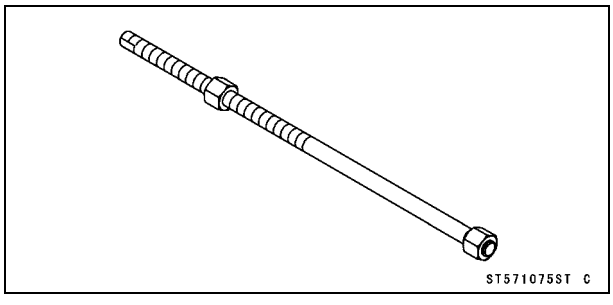
Steering Stem Bearing Driver Adapter, ϕ34.5:
57001-1074



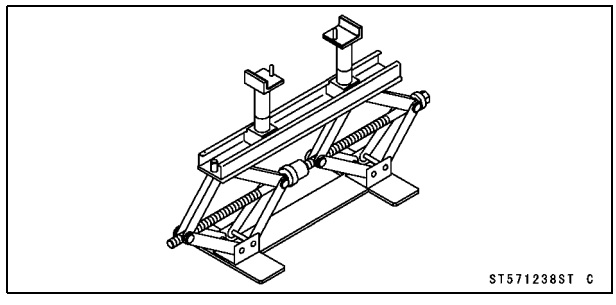
Head Pipe Outer Race Remover ID > 37 mm:
57001-1107



Head Pipe Outer Race Press Shaft:
57001-1075

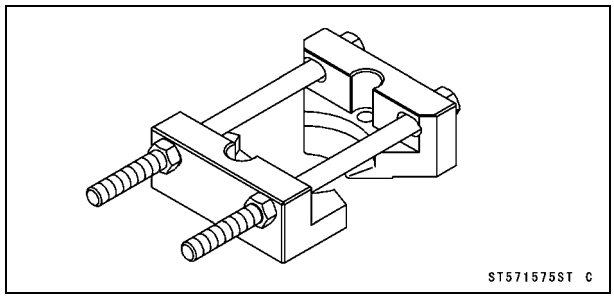


Jack:
57001-1238



Special Tools

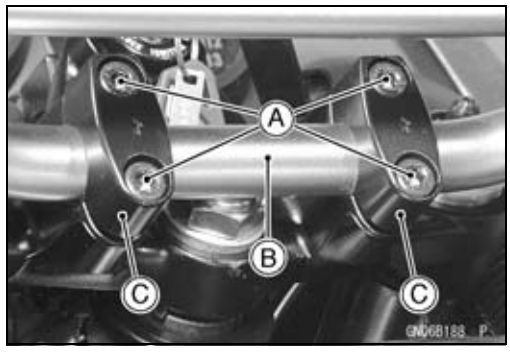
Bearing Puller:
57001-1575



Handlebar

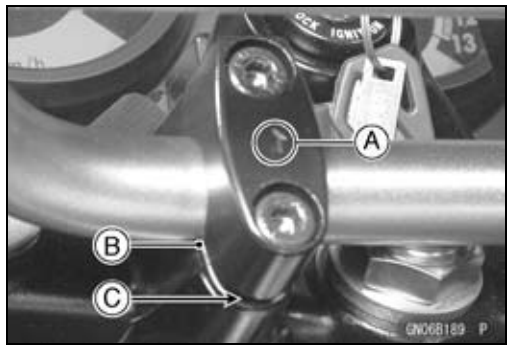
Handlebar Removal

- Remove:
  Plugs
  Clutch Lever (see Clutch Lever Removal in the Clutch chapter)
  Right and Left Handlebar Switch Housing
  Throttle Grip
  Front Brake Master Cylinder (see Front Brake Master Cylinder Removal in the Brakes chapter)
- Unscrew the handlebar mounting bolts [A] and remove the handlebar [B] and clamp [C].



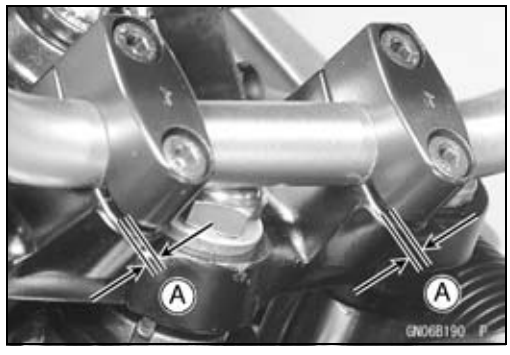
Handlebar Installation

- Install the handlebar clamps so that the arrow [A] on the clamp points to the front.
- Set the handlebar to match its punched mark [B] to the lower mating face [C] of the clamp rear part.

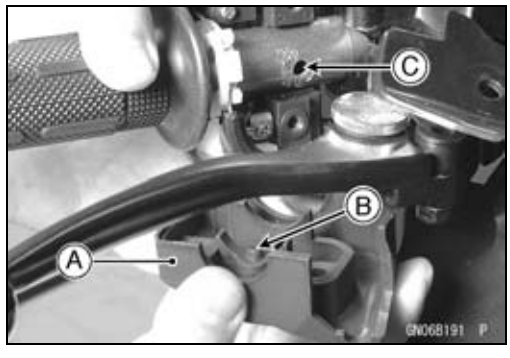


- Tighten the front clamp bolts first, and then the rear clamp bolts. There will be a gap [A] at the rear part of the clamp after tightening.

  Torque - Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



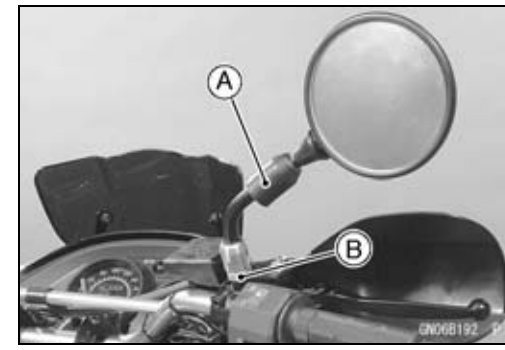
- The front half of the right and left switch housings [A] has a small projection [B]. Fit the projection into the small hole [C] in the handlebar.
- Install the handlebar switch housing.
- Install:
  Front Master Cylinder (see Front Brake Master Cylinder Installation in the Brakes chapter)
  Clutch Lever (see Clutch Lever Installation in the Clutch chapter)



Handlebar

Rear View Mirror Removal

- Slide the rubber cap [A] up.
- Loosen the adapter nut [B] for tightening to remove the rear view mirror from the holder.



Rear View Mirrors (Left and Right) Installation

- Screw the rear view mirror into the holder all the way, and tighten the adapter nut securely.
- Slide back the rubber cap in place.

Steering

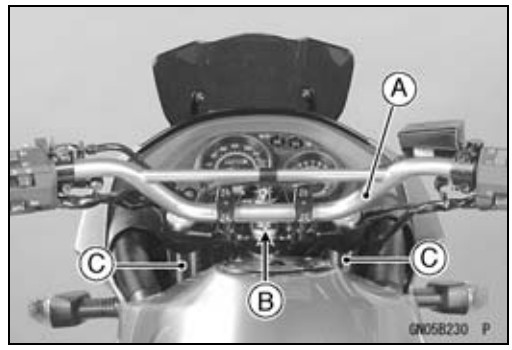
Steering Play Inspection

- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

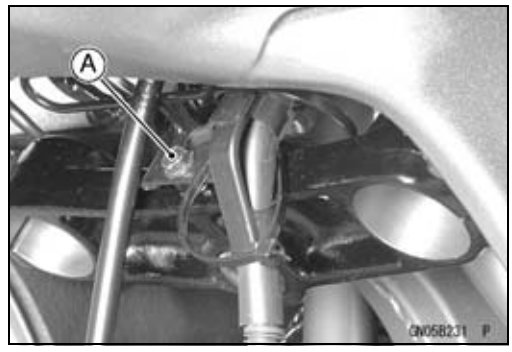
Steering Stem

Steering Stem Removal

- Remove the handlebar [A] (see Handlebar Removal).
- Loosen the stem head nut [B].
- Remove the front fork [C] (see Front Fork Removal in the Suspension chapter).



- Remove:
  Front Brake Hose and Speedometer Cable Clamp Mounting Bolt [A]

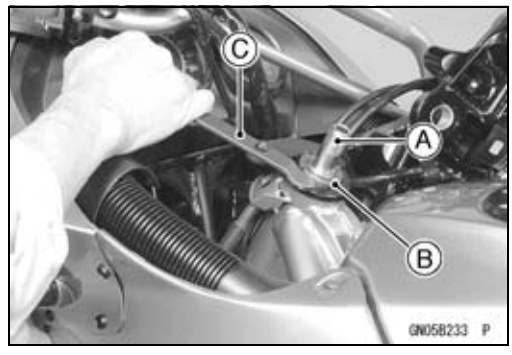


- Remove the stem head nut [A], washer and lift up the steering stem head [B].

- Remove the toothed washer.
- Push up the steering stem [A] from underside, and remove the steering stem nut [B] using the steering stem nut wrench [C], then remove the steering stem base.

  Special Tool - Steering Stem Nut Wrench: 57001-1100

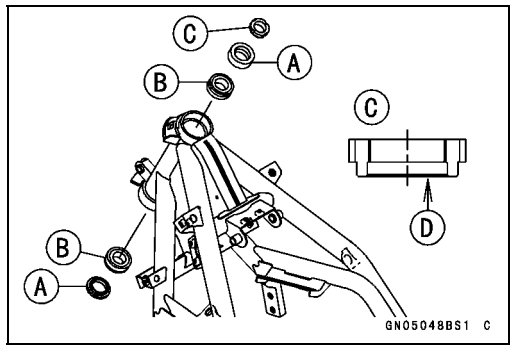
- Remove the oil seals and tapered roller bearings from upper head pipe and steering stem.



Steering Stem Installation

- Route the cables, wires, and hoses as shown in the Cable, Wire, and Hose Routing in the Appendix chapter.

Steering Stem



- Install the oil seals [A] and tapered roller bearing inner races [B] to the upper and lower head pipe.
- Install the stem through the head pipe, and hand tighten the stem nut [C].

Torque - Steering Stem Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb, for reference)

NOTE

○*Install the steering stem nut so that the recess side [D] faces down.*

- Install the front fork (see Front Fork Installation in the Suspension chapter).

NOTE

○*Tighten the fork upper champ bolts first, next the stem head bolt, last the fork lower clamp bolts.*

Torque - Front Fork Upper Clamp Allen Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Steering Stem Head Nut: 39 N·m (4.0 kgf·m, 29 ft·lb)
Front Fork Lower Clamp Bolts: 23 N·m (2.3 kgf·m, 16.5 ft·lb)

NOTE

○*Tighten the two clamp bolts alternately two times to ensure even tightening torque.*

- Install:
  Front Wheel (see Front Wheel Installation in the Wheels/Tires chapter)
- Check and adjust the following items after installation.
  Steering
  Throttle Cables (see Throttle Cable Inspection in the Periodic Maintenance chapter)
  Choke Cable
  Headlight Aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter)
  Rear View Mirrors
- Check the front brake effectiveness.

⚠ WARNING

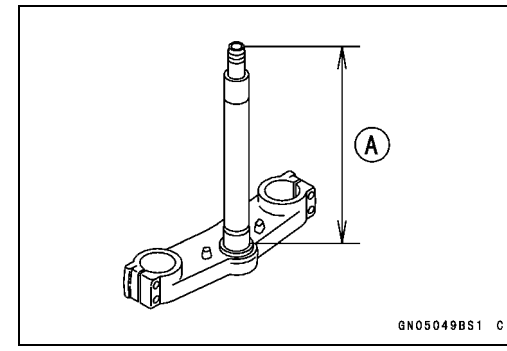
Do not attempt to ride the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brakes will not function on the first application of the lever if this is not done.

Steering Stem

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 shaft [A] is bent, replace the steering stem.



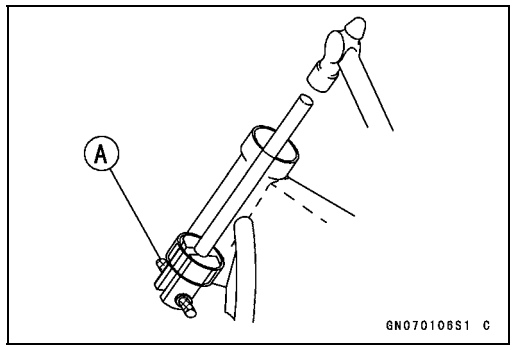
Steering Stem Bearing

Stem Bearing Removal

- Remove the steering stem (see Steering Stem Removal).
- Drive out the bearing outer races from the head pipe.

○Remove the outer races pressed into the head pipe using the head pipe outer race remover [A], and hammer the head pipe outer race remover to drive it out.

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

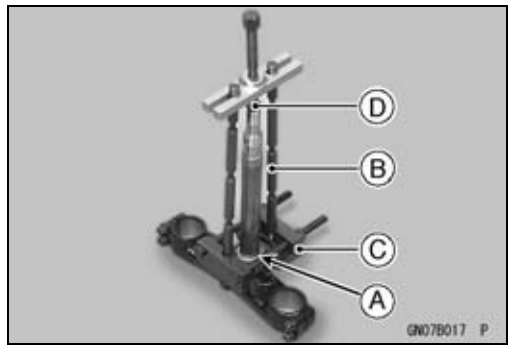


NOTE

○*If either steering stem bearing is damaged it is recommended that both the upper and lower bearing (including outer races) should be replaced with new ones.*

- Remove the lower inner race [A] (with its grease seal) which is pressed onto the steering stem, with the steering stem bearing puller [B], [C] and adapter [D].

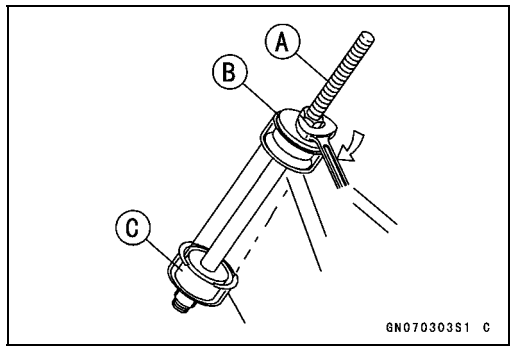
Special Tools - Bearing Puller: 57001-158
Bearing Puller Adapter: 57001-317
Bearing Puller: 57001-1575



Stem Bearing Installation

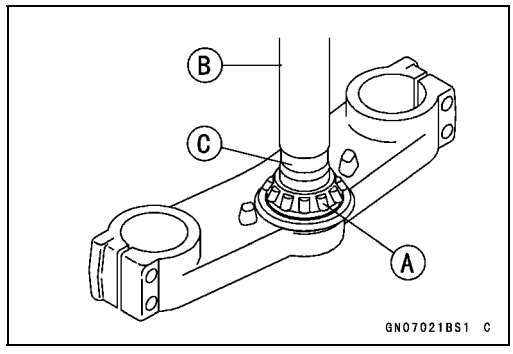
- Replace the outer races with new ones.
- Apply grease to the outer race, and drive them into the head pipe using the drivers and press shaft [A].

Special Tools - Head Pipe Outer Race Press Shaft: 57001-1075 [A]
Head Pipe Outer Race Driver, ϕ46.5: 57001-1106 [B]
Head Pipe Outer Race Driver, ϕ51.5: 57001-1076 [C]



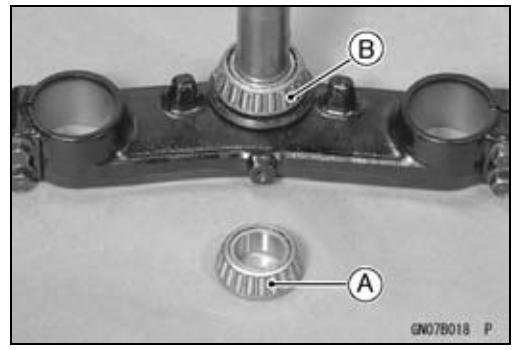
- Replace the inner races with new ones.
- Apply grease to the lower inner race [A], and drive it onto the stem using the driver and adapter.

Special Tools - Steering Stem Bearing Driver: 57001-137 [B]
Steering Stem Bearing Driver Adapter, ϕ34.5: 57001-1074 [C]



Steering Stem Bearing

- Apply grease to the upper [A] and lower [B] bearings.
- Apply grease to the upper inner race, and install it in the head pipe.

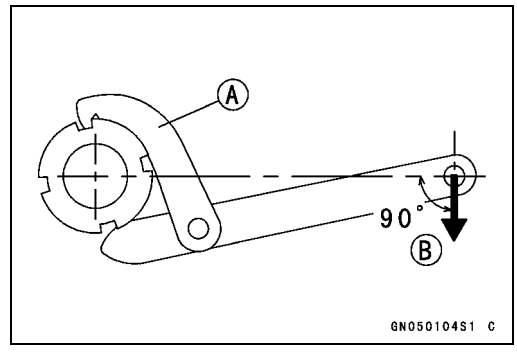


- Install the steering stem through the head pipe and upper bearing, and hand tighten the stem nut [A] while pushing up the steering stem.

- Settle the inner races in place as follows.

○Using the steering stem nut wrench, tighten the stem nut **39 N·m (4.0 kgf·m, 29 ft·lb)** of torque. To tighten the steering stem nut to the specified torque, hook the wrench on the stem nut, and pull the wrench at the hole by **220 N (22 kgf, 49 lb)** of force [B] in the direction shown.

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



○Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.

○Back out the stem nut a fraction of a turn until it turns lightly.

○Turn the steering stem nut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tighten.

Torque - Steering Stem Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb, for reference)

Stem Bearing Lubrication

- Refer to the Stem Bearing Lubrication in the Periodic Maintenance chapter.

Stem Bearing Wear, Damage

- Using a high-flash point solvent, wash the upper and lower tapered roller in the cages, and wipe the upper and lower outer races which are pressed into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and rollers.

★If they show the damage, replace the bearing assemblies with new ones.

Frame

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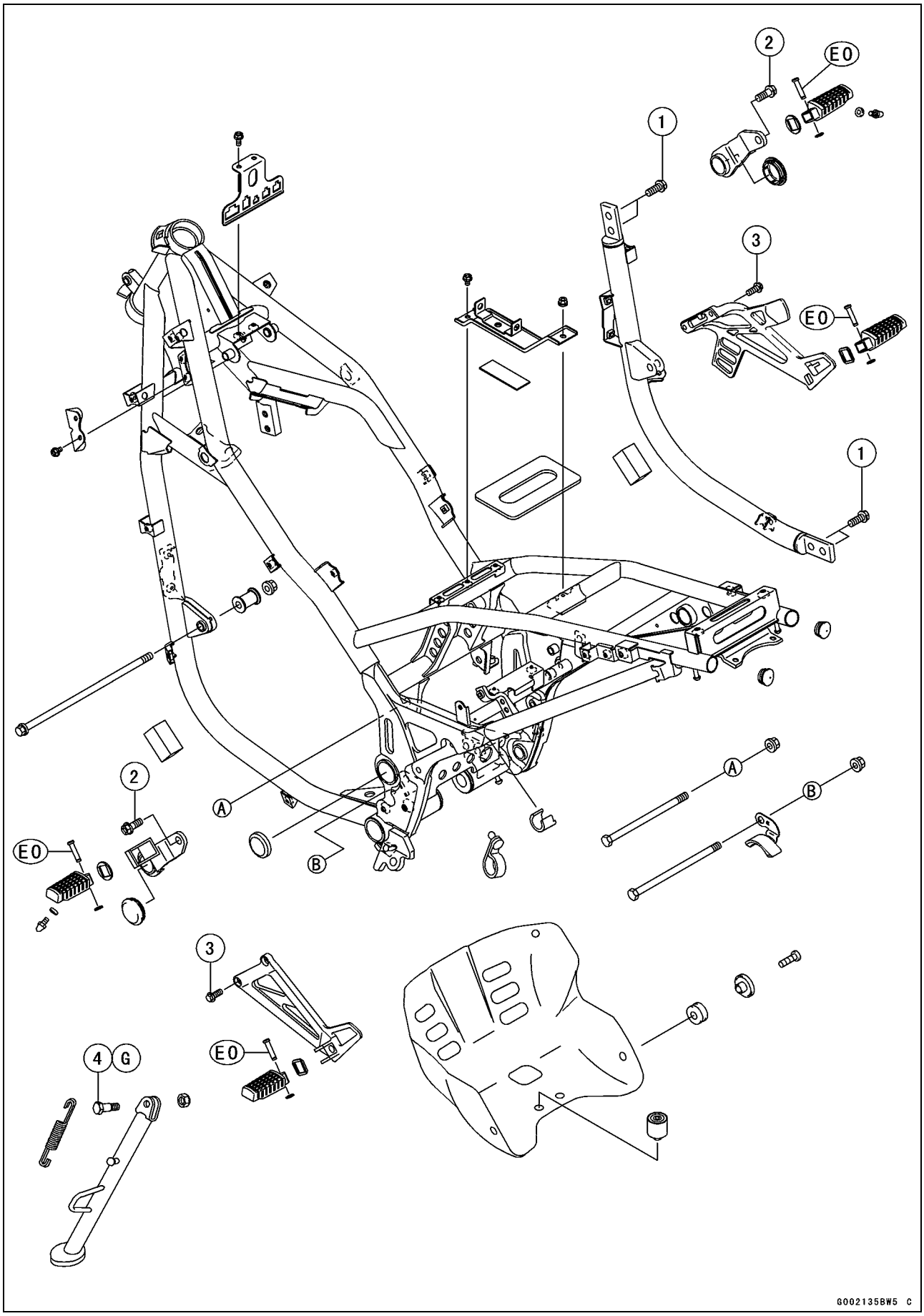
Exploded View

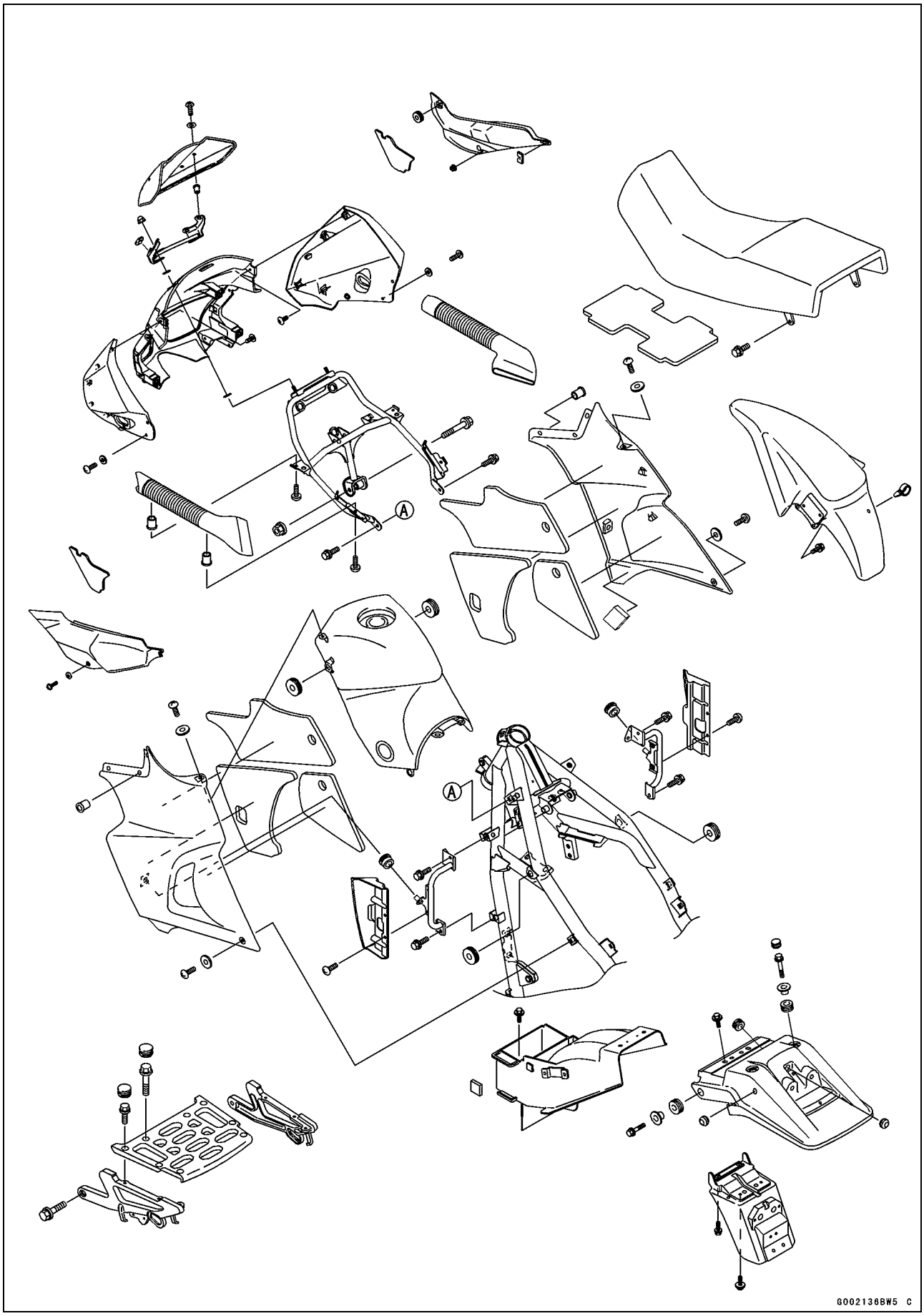


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Frame Down Tube Mounting Bolts	44	4.5	33	
2	Front Footpeg Bracket Bolts	34	3.5	25	
3	Rear Footpeg Bracket Bolts	25	2.5	18	
4	Sidestand Bolt and Nut	44	4.5	33	

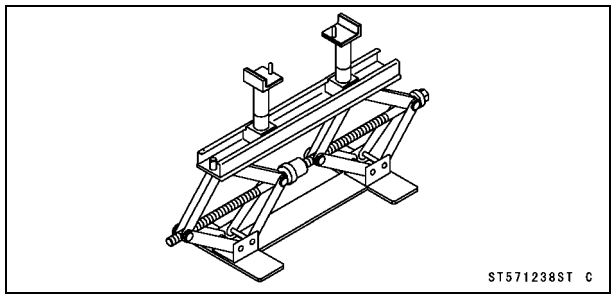
EO: Apply engine oil.
G: Apply grease.

Exploded View



Specifications

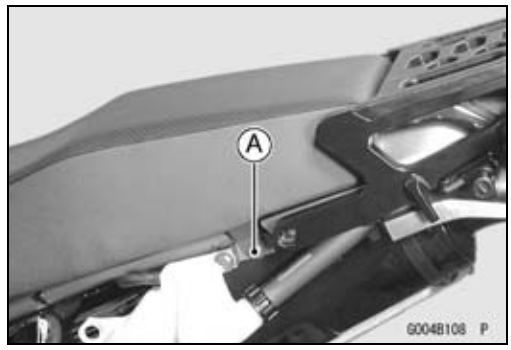
Jack:
57001-1238



Seat

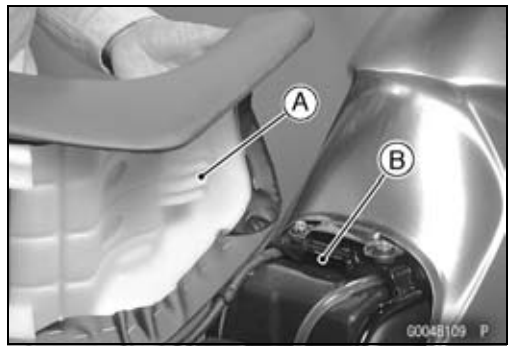
Seat Removal

- Remove the side covers (see Side Cover Removal).
- Remove the seat mounting bolts [A].



Seat Installation

- Slip the hook [A] of the seat under the brace [B] on the fuel tank.

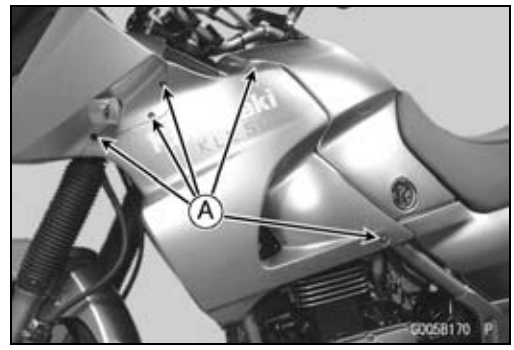


- Install the seat mounting bolts.
- Install the side covers (see Side Cover Installation).

Fairing

Lower Fairings Removal

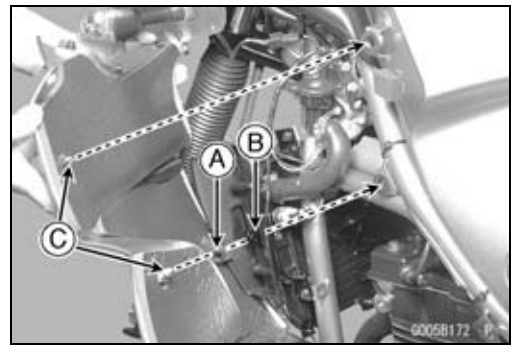
- Remove the fairing mounting screws [A] in both side.



- Pull the rear side [A] of the fairing a little to outside to clear the stoppers [B] and then remove the fairing pushing [C] it to forward.

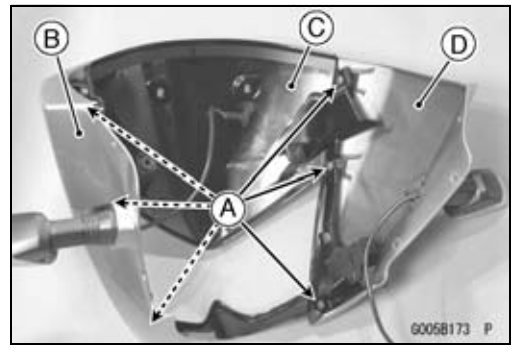
Lower Fairings Installation

- Insert the fairing hole [A] into the drawing mounting bracket pipe [B] from front side, and push the fairing from outside to inside to fit the stoppers [C].
- Install the screws.



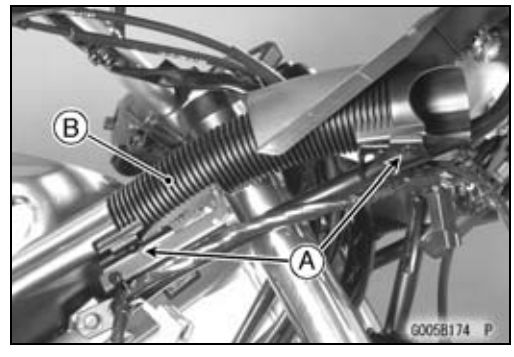
Upper Fairing Removal

- Remove the headlight unit/housing (see Headlight Unit/Housing Removal in the Electrical System chapter).
- Remove the screws [A], and separate the left [B], center [C] and right [D] upper fairing each other.



Air Duct Removal

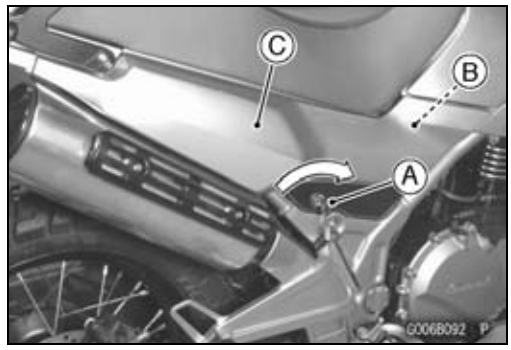
- Remove the headlight unit/housing (see Headlight Unit/Housing Removal in the Electrical System chapter).
- Remove the air duct mounting screws [A], and remove the air ducts [B].



Side Covers

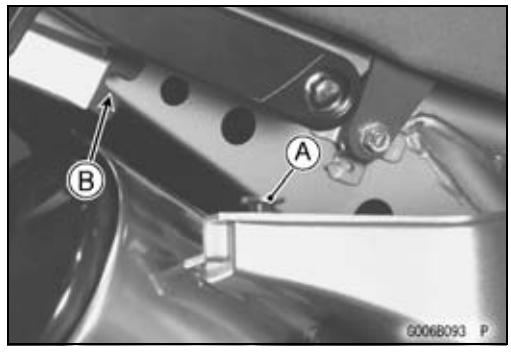
Right Side Cover Removal

- Insert the ignition switch key [A] into the seat lock.
- Turn the ignition switch key clockwise and pull the front of side cover outward to clear the stopper [B].
- Remove the right side cover [C] pulling it forward.



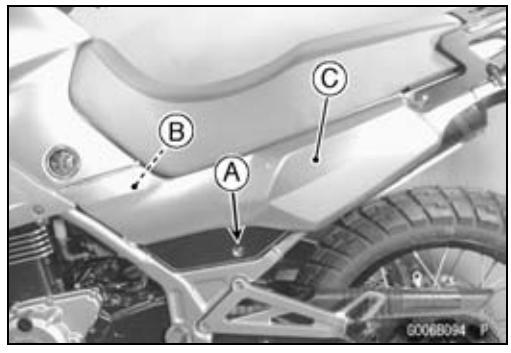
Right Side Cover Installation

- Align the projection [A] of the sidecover to the notch [B] of the frame, and push it to backward and then insert the stopper.
- Turn the ignition switch key counterclockwise to lock the seat lock.



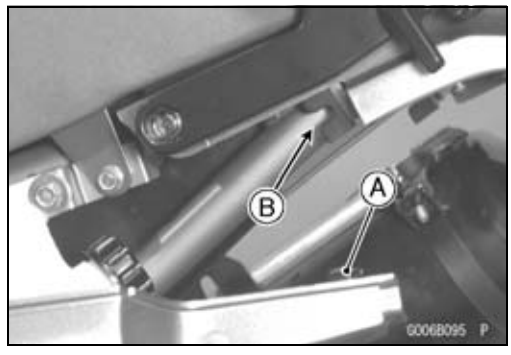
Left Side Cover Removal

- Remove the screw [A] and pull the front of side cover outward to clear the stopper [B].
- Remove the left side cover [C] pulling it forward.



Left Side Cover Installation

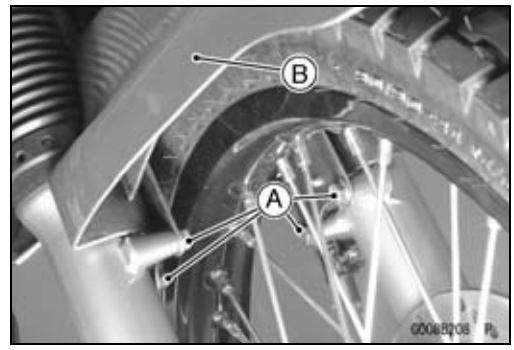
- Align the projection [A] of the side cover to the notch [B] of the frame, and push it to backward and then insert the stopper.
- Screw in the side cover mounting screw.



Fenders

Front Fender Removal

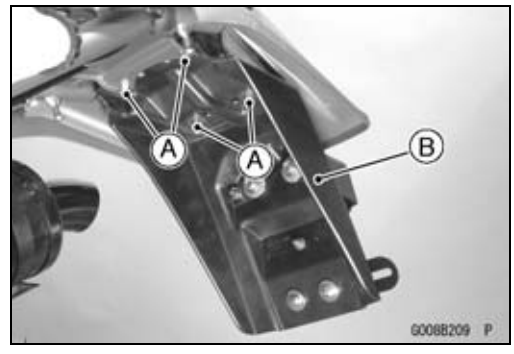
- Remove the speedometer clamp from front fender.
- Remove the bolts [A] and take off the front fender [B] upward from rearward.



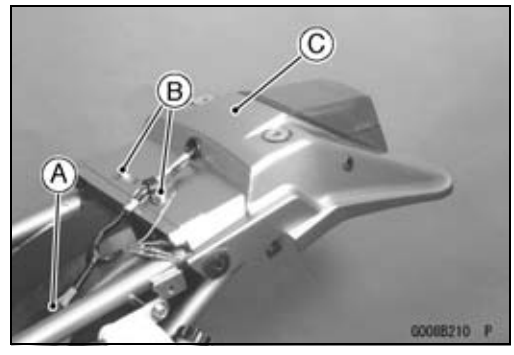
Rear Fender Removal

- Remove:
  Side Covers (see Side Cover Removal)
  Seat (see Seat Removal)
  Carrier (see Carrier Removal)

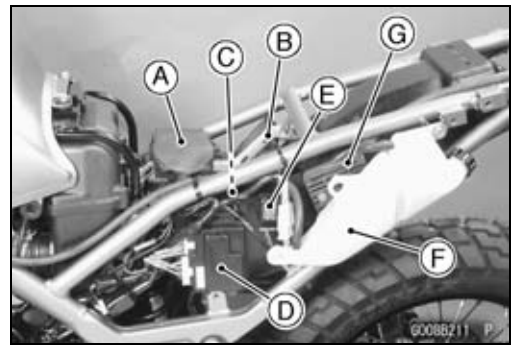
- Remove the rear fender mounting bolts [A].
- Disconnect the license light lead connector, and remove the rear fender rear [B].



- Disconnect the tail/brake light plugs [A].
- Remove the fender mounting bolts [B], and remove the rear fender [C] with tail/brake light.

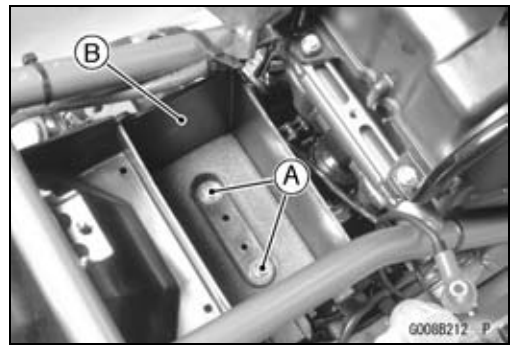


- Remove:
  IC Igniter [A]
  Battery Pusher Plate [B]
  Battery [C]
  Junction Box [D]
  Turn Signal Relay [E]
  Coolant Reserve Tank [F]
  Regulator/Rectifier [G]
  Starter Relay
  Rear Brake Reservoir



Fenders

- Remove the fender mounting bolts [A], and remove the rear fender front [B] backward.



Fender Installation Note

- Fender installation is the reverse of removal.
- Connect the tail/brake light leads and licence light lead correctly.

Frame

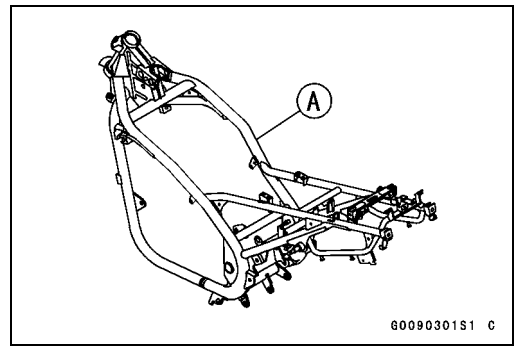
Frame Inspection

- Visually inspect the frame [A] for cracks, dents, bending, or warp.

★If there is any damage to the frame, replace it.

⚠ WARNING

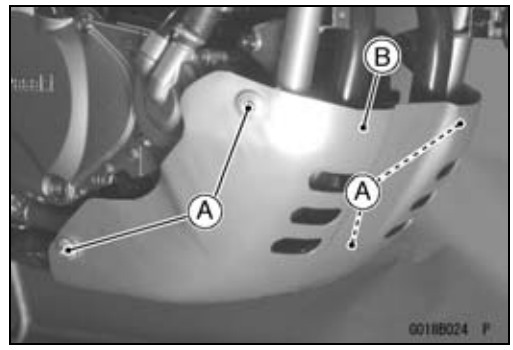
A repaired frame may fail in use, possibly causing an accident. If the frame is bent, dented, cracked, or warped, replace it.



Guard, Carrier

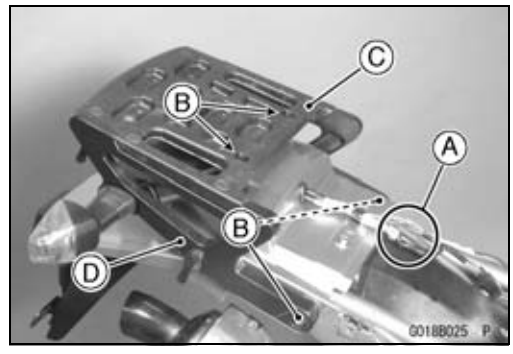
Engine Guard Removal

- Remove the engine guard mounting bolts [A], and remove the engine guard [B].



Carrier Removal

- Remove the seat (see Seat Removal).
- Disconnect the turn signal connectors [A].
- Remove the carrier mounting bolts [B], and remove the carrier [C] with the turn signals installed to the carrier stays [D].



Carrier Installation

- Connect the turn signal lead correctly as follows.

Left Turn Signal Leads – BK/Y-BK/Y
G-G

Right Turn Signal Leads – BK/Y-BK/Y
G-GY

Torque - Carrier Stay Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

Electrical System

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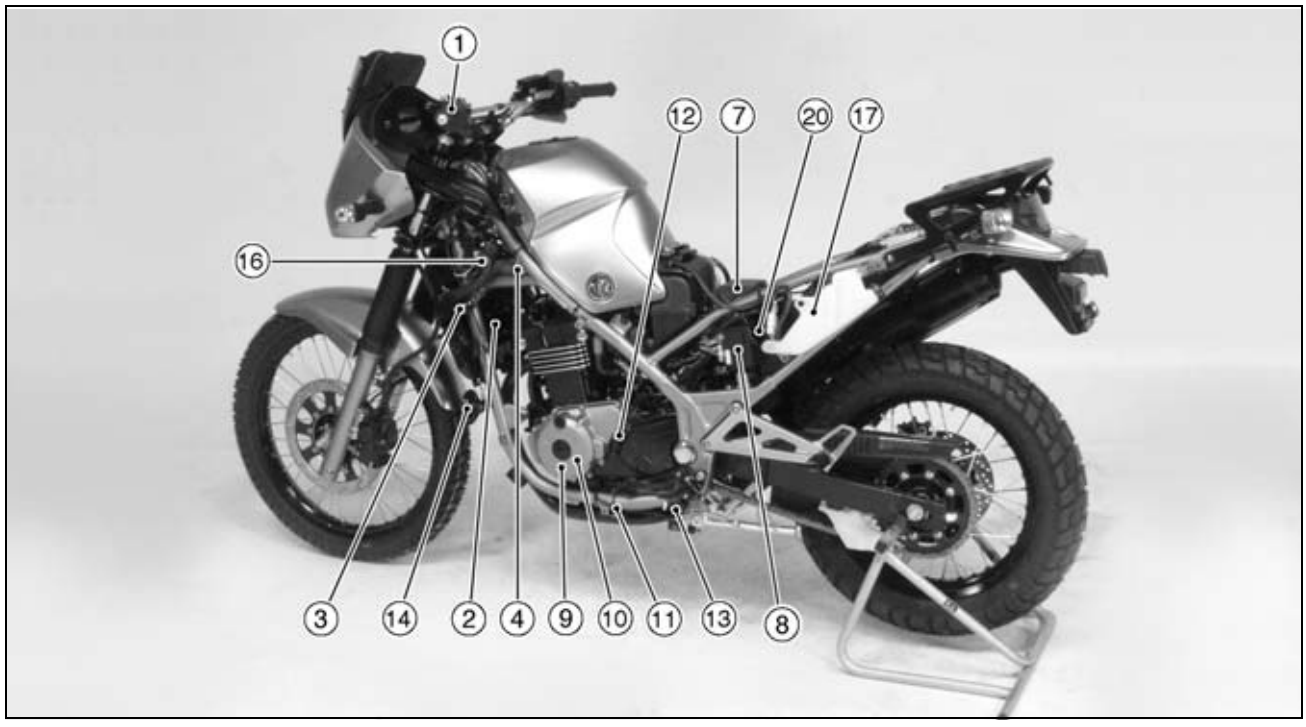
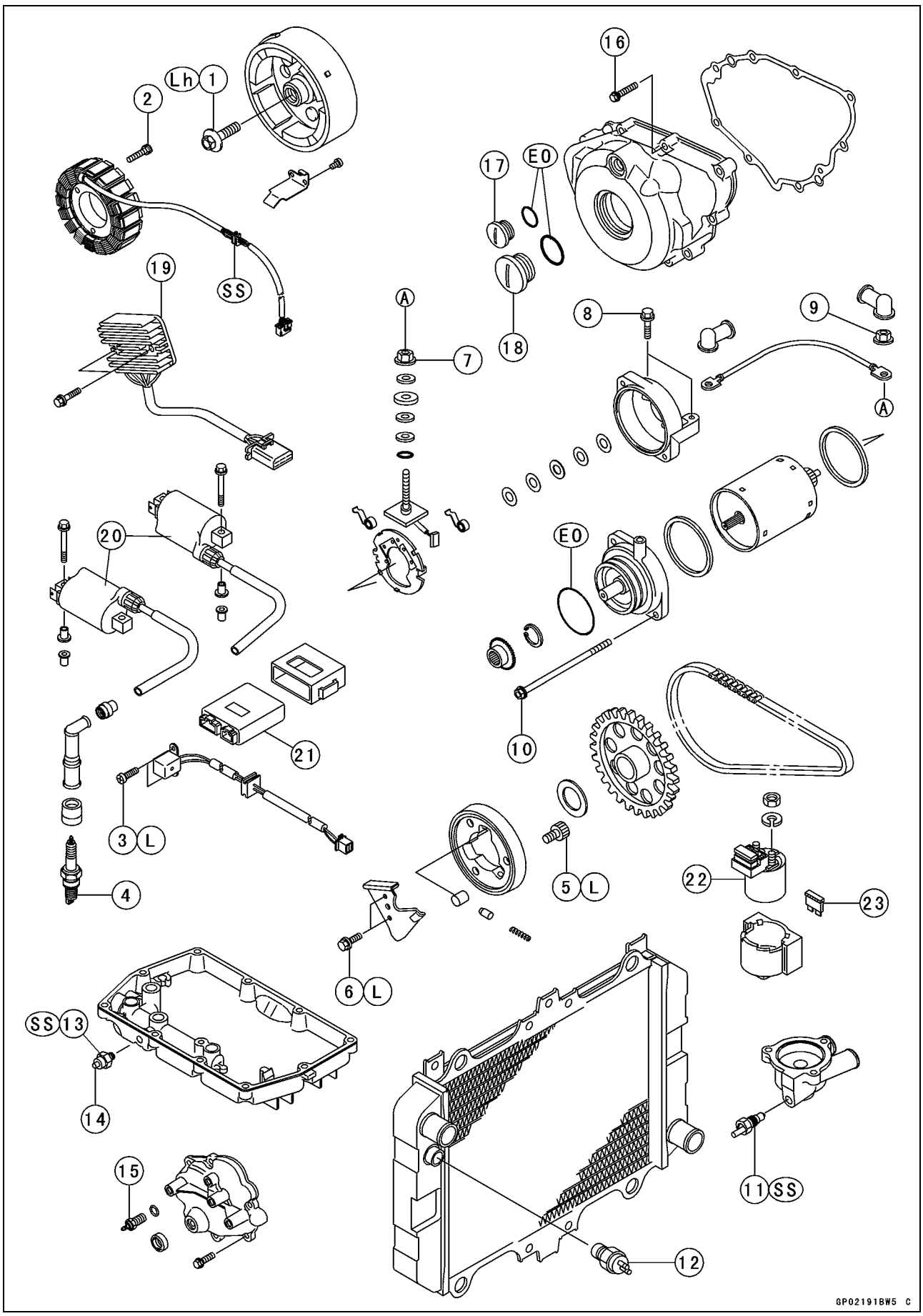
Parts Location



1. Starter Lockout Switch
2. Radiator Fan
3. Radiator Fan Switch
4. #1 Ignition Coil
5. Starter Motor
6. Sealed Battery
7. IC Igniter
8. Junction Box
9. alternator
10. Crankshaft Sensor
11. Oil Pressure Switch
12. Neutral Switch
13. Sidestand Switch
14. Horn
15. Spark Plugs
16. Water Temperature Switch
17. Regulator/Rectifier
18. Main Fuse 30 A
19. Starter Relay
20. Turn Signal Relay
21. Rear Brake Light Switch
22. Front Brake Light Switch
23. Ignition Switch
24. #2 Ignition Coil

Exploded View



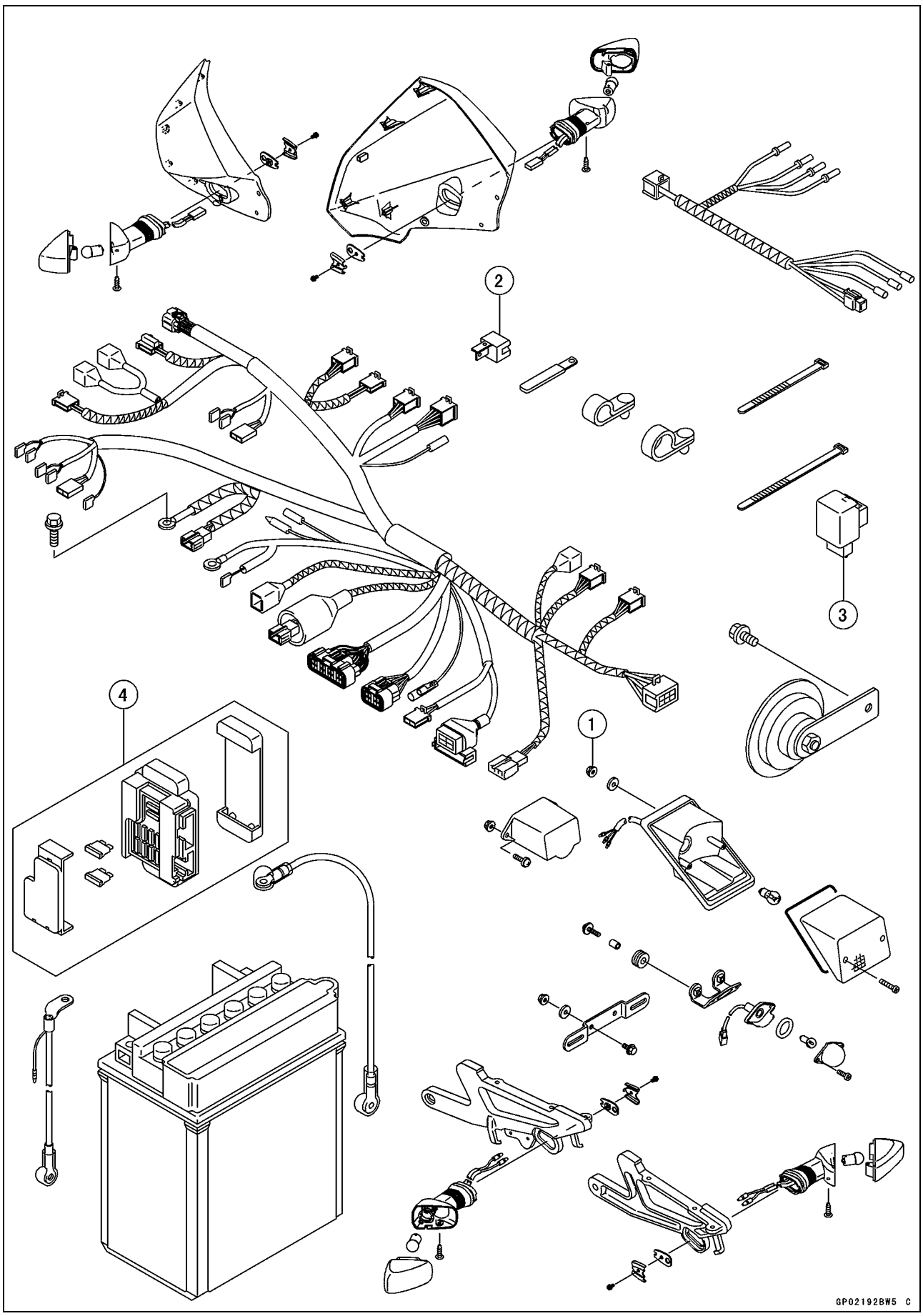
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Alternator Rotor Bolt	69	7.0	51	Lh
2	Alternator Stator Allen Bolts	12	1.2	104 in·lb	
3	Crankshaft Sensor Mounting Screws	8.3	0.85	74 in·lb	L
4	Spark Plugs	14	1.4	10	
5	Starter Clutch Allen Bolts	34	3.5	25	L
6	Starter Chain Guide Bolts	4.9	0.5	43 in·lb	L
7	Starter Motor Terminal Nut	4.9	0.5	43 in·lb	
8	Starter Motor Mounting Bolts	11	1.1	95 in·lb	
9	Starter Motor Lead Clamp Nut	4.9	0.5	43 in·lb	
10	Starter Motor Through Bolts	6.9	0.7	65 in·lb	
11	Water Temperature Switch	7.8	0.8	69 in·lb	SS
12	Radiator Fan Switch	18	1.8	13	
13	Oil Pressure Switch	15	1.5	11	SS
14	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	
15	Neutral Switch	15	1.5	11	
16	Alternator Cover Bolts	11	1.1	95 in·lb	
17	Timing Inspection Plug	2.5	0.25	22 in·lb	
18	Alternator Rotor Bolt Plug	1.5	0.15	13 in·lb	

19. Regulator/Rectifier
20. Ignition Coils
21. IC Igniter
22. Starter Relay
23. Main Fuse 30 A

EO: Apply engine oil.
L: Apply a non-permanent locking agent.
Lh: Left-hand Thread
SS: Apply Silicone Sealant.

Exploded View

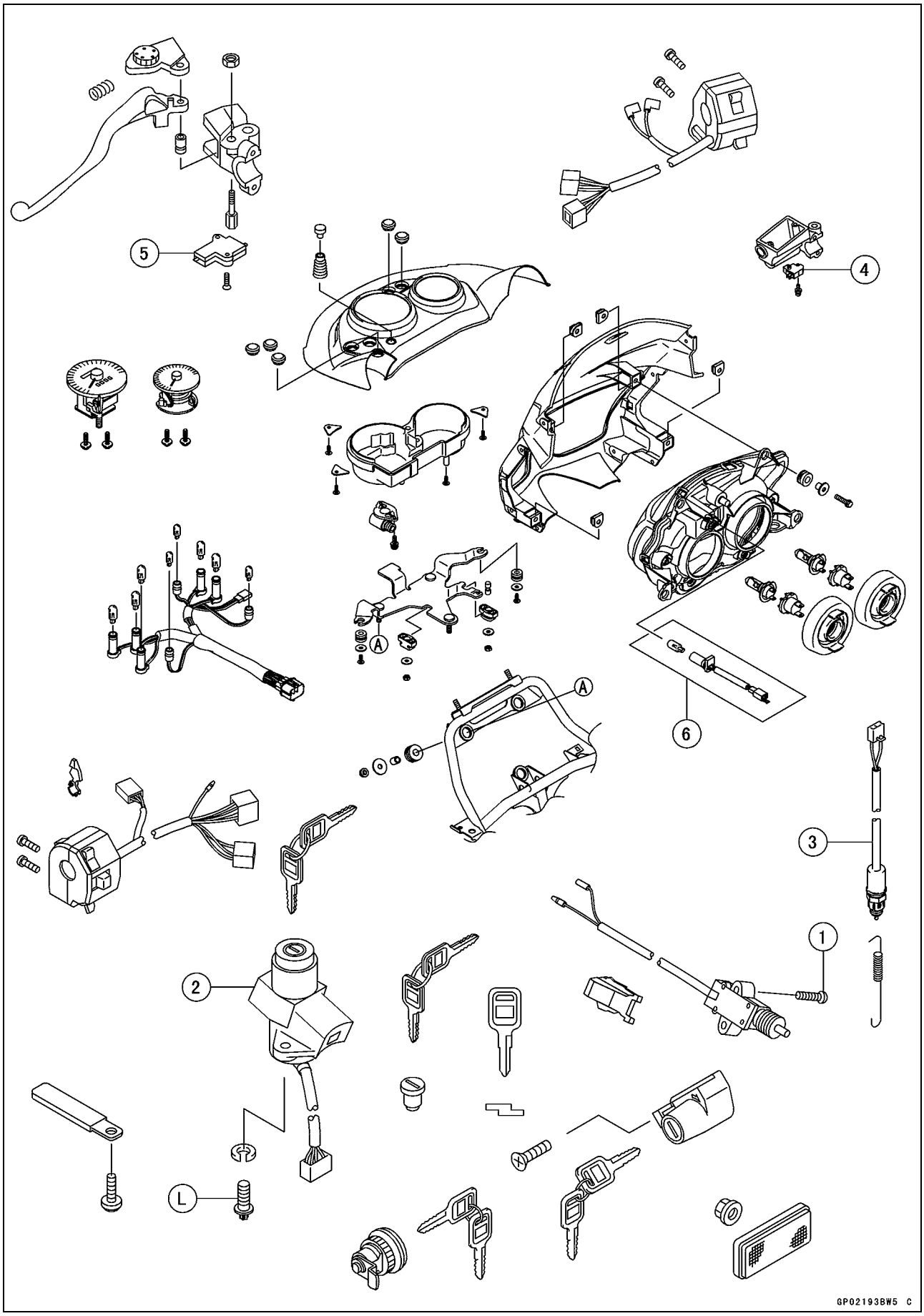


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Tail Light Mounting Nuts	5.9	0.6	52 in·lb	

2. Rectifier
3. Turn Signal Relay
4. Junction Box

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Side Stand Switch Mounting Screw	3.9	0.4	35 in·lb	L

2. Ignition Switch
3. Rear Brake Light Switch
4. Front Brake Light Switch
5. Starter Lockout Switch
6. City Light

L: Apply a non-permanent locking agent.

Specifications

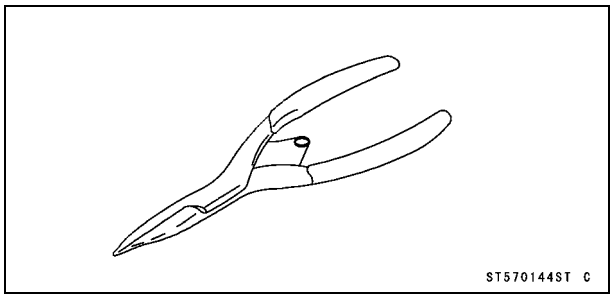
Item	Standard	Service Limit
Battery		
Type	Sealed Battery	– – –
Capacity	12 V 10 Ah	– – –
Voltage	12.8 V or more	– – –
Charging System		
Alternator Type	Three-phase AC	– – –
DC Battery Charging Voltage	14 ~ 15 V @4 000 r/min (rpm)	– – –
Alternator Output Voltage	46 ~ 64 V @4 000 r/min (rpm)	– – –
Stator Coil Resistance	0.37 ~ 0.46 Ω (× 1 Ω)	– – –
Regulator/rectifier		
Type	Load dumping regulator with full-wave rectifier	– – –
Resistance	in the text	– – –
Ignition System		
Crankshaft Sensor Resistance	113 ~ 139 Ω (× 100 Ω)	– – –
Crankshaft Sensor Peak Voltage	3 V or more	– – –
Ignition Coil:		
3 Needle Arcing Distance	8 mm (0.32 in.) or more	– – –
Primary Winding Resistance	2.6 ~ 3.1 Ω (×1 Ω)	– – –
Secondary Winding Resistance	13.5 ~ 16.5 kΩ (× 1 kΩ)	– – –
Primary Peak Voltage	100 V or more	– – –
Spark Plug:		
Standard	NGKDR9EA, NDX27ESR-U	– – –
Spark Plug Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in.)	– – –
Spark Plug Cap Resistance	3.0 ~ 7.5 kΩ (× 1 kΩ)	– – –
Electric Starter System		
Starter Motor:		
Brush Length	12.0 ~ 12.5 mm (0.47 ~ 0.49 in.)	8.5 mm (0.34 in.)
Commutator Diameter	28 mm (1.10 in.)	27 mm (1.06 in.)
Switch and Sensor		
Front Brake Light Switch Timing	ON after about 10 mm (0.39 in.) lever travel	– – –
Rear Brake Light Switch Timing	ON after about 15 mm (0.59 in.) pedal travel	– – –
Engine Oil Pressure Switch Connections	When engine is stopped: ON	– – –
	When engine is running: OFF	– – –
Radiator Fan Switch connections:		
Rising Temperature	From OFF to ON @96 ~ 100°C (205 ~ 212°F)	– – –
Falling Temperature	From ON to OFF @91°C (196°F) ~ temperature less than ON temperature	– – –
	ON: less than 0.5 Ω	
	OFF: More than 1 MΩ	
Water Temperature Switch Connections:		
Rising Temperature	From OFF to ON @113 ~ 117°C (235 ~ 243°F)	– – –

Specifications

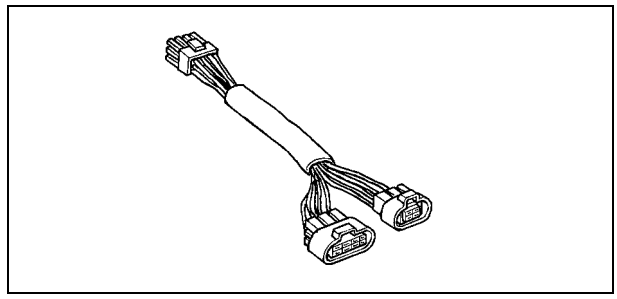
Item	Standard	Service Limit
Falling Temperature	From ON to OFF @108°C (226°F) ~ temperature less than ON ON: Less than 0.5 Ω OFF: More than 1 MΩ	– – –

Special Tools and Sealant

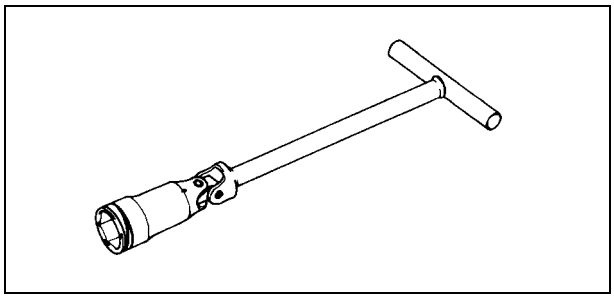
Outside Circlip Pliers:
57001-144



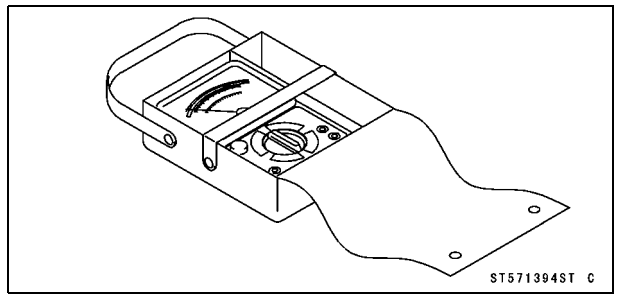
Harness Adapter #1:
57001-1381



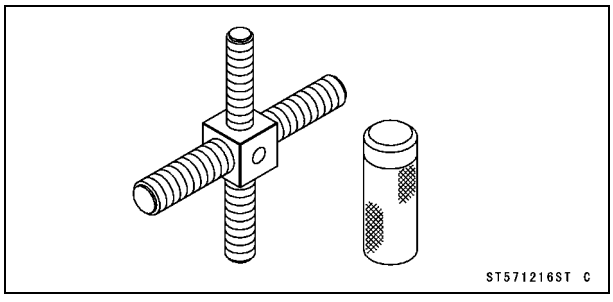
Spark Plug Wrench, Hex 18:
57001-1024



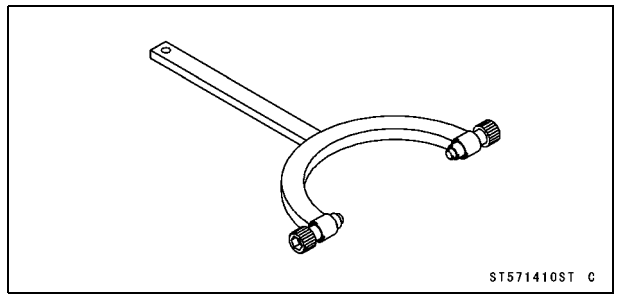
Hand Tester:
57001-1394



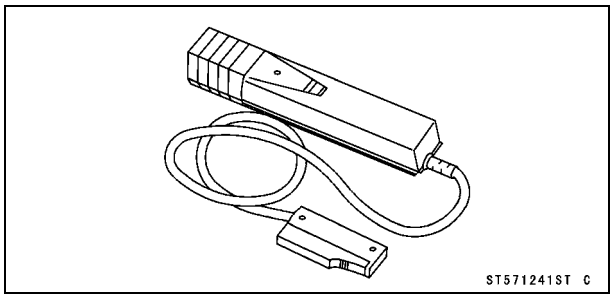
Rotor Puller, M16/M18/M20/M22 × 1.5:
57001-1216



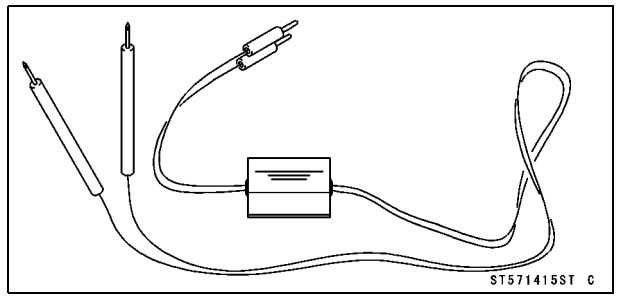
Flywheel Holder:
57001-1410



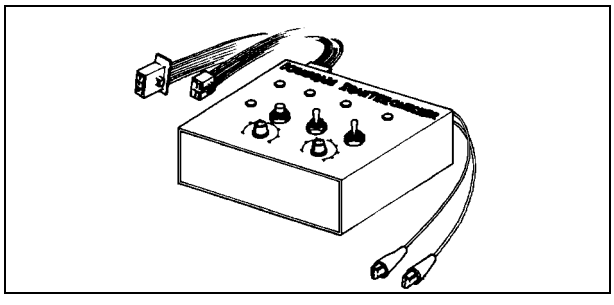
Timing Light:
57001-1241



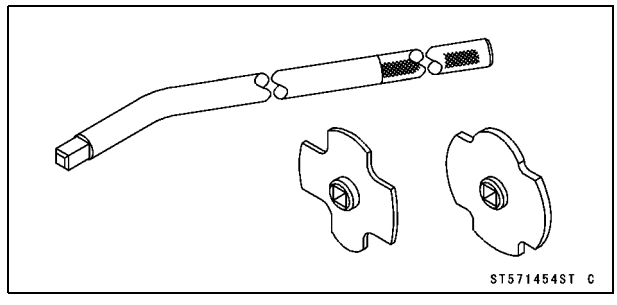
Peak Voltage Adapter:
57001-1415



Igniter Checker Assembly:
57001-1378

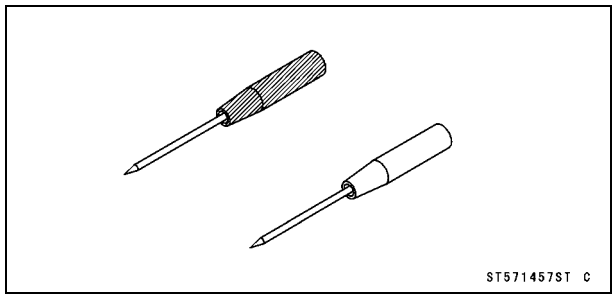


Filler Cap Driver:
57001-1454

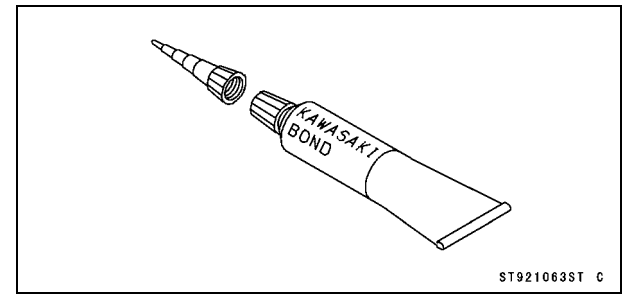


Special Tools and Sealant

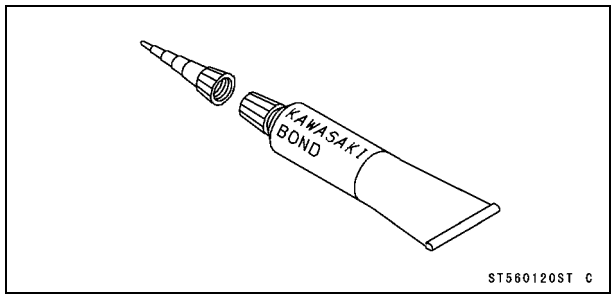
Needle Adapter Set:
57001-1457



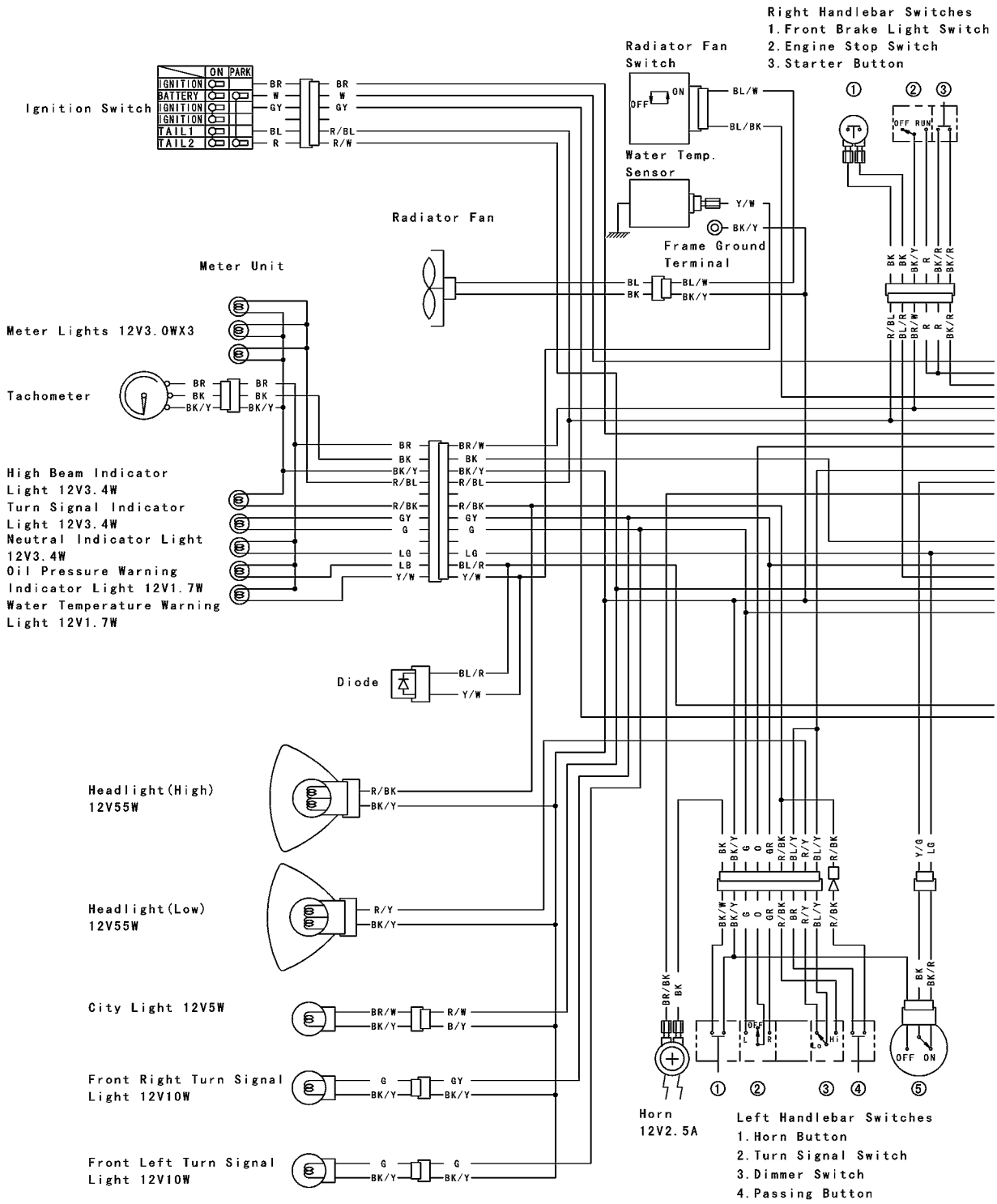
Kawasaki Bond (Liquid Gasket - Gray):
92104-1063



Kawasaki Bond (Silicone Sealant):
56019-120



KLE500-B1 Wiring Diagram



LEFT HANDLEBAR SWITCH CONNECTIONS																	
Horn Button			Turn Signal Switch				Dimmer Switch				Passing Button			Starter Lockout Switch			
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	BL/Y	R/BK	Color	BR	R/BK	Color	BK/Y	BK	BK/R
Push	○—●		L	○—●			LO	○—●			Push	○—●		Clutch Lever			
Released			OFF(Push)								Released			Released		○—●	
			R		○—●		HI		○—●					Pulled in	○—●		

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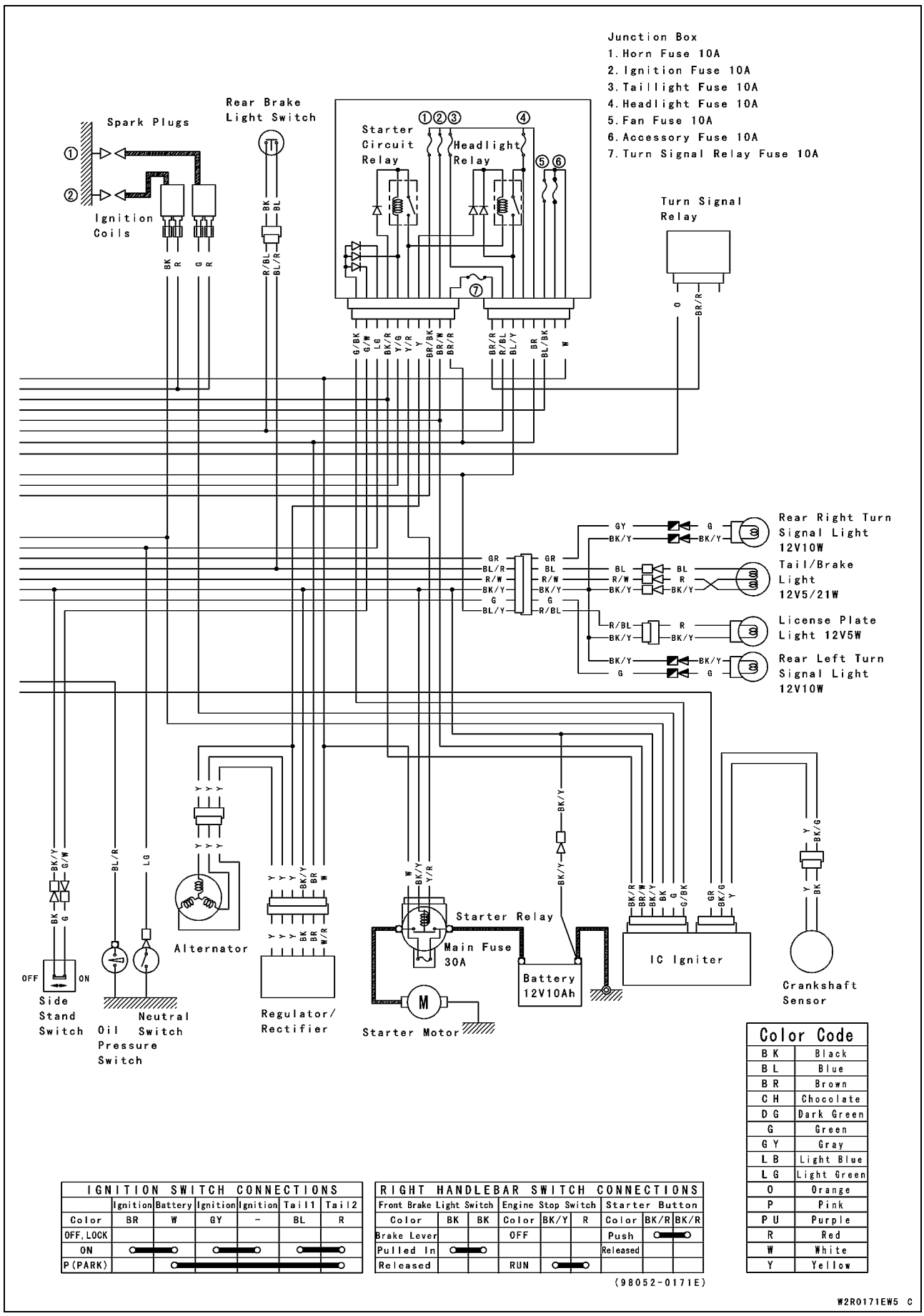
KLE500-B1 Wiring Diagram



IGNITION SWITCH CONNECTIONS						
	Ignition	Battery	Ignition	Ignition	Tail1	Tail2
Color	BR	W	GY	–	BL	R
OFF, LOCK						
ON	●	●	●		●	
P (PARK)		●				●

RIGHT HANDLEBAR SWITCH CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	BK/Y	R	Color	BK/R	BK/R
Brake Lever			OFF			Push	●	●
Pulled In	●	●				Released		
Released			RUN	●				

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

(98052-0171E)

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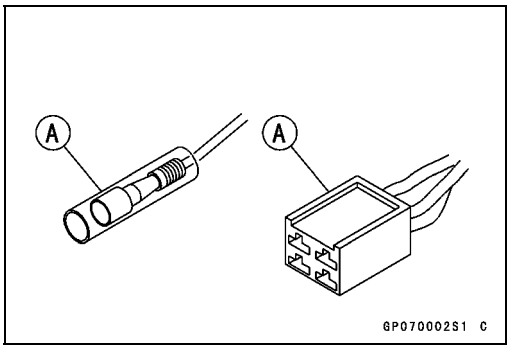
Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery lead connections. This will burn out the diodes in 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 leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Do not use a meter illumination bulb rated for other than voltage or wattage specified in the wiring diagram, as the meter or gauge panel could be warped by excessive heat radiated from the bulb.
- Take care not to short the leads 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

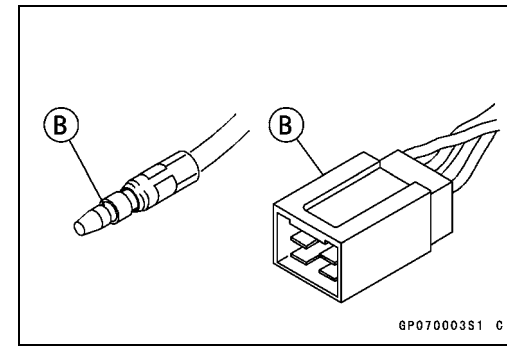
BK: Black	G: Green	P: Pink
BL: Blue	GY: Gray	PU: Purple
BR: Brown	LB: Light blue	R: Red
CH: Chocolate	LG: Light green	W: White
DG: Dark green	O: Orange	Y: Yellow

- Electrical Connectors
  Female Connectors [A]



Precautions

Male Connectors [B]



Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.

★If any wiring is in poor condition, replace the damaged wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

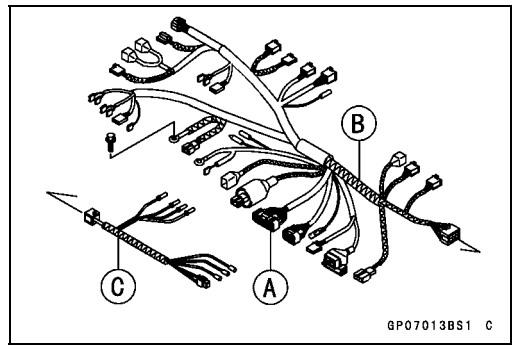
- Check the wiring for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect an ohmmeter between the ends of the leads.

○Set the meter to the × 1 Ω range, and read the meter.

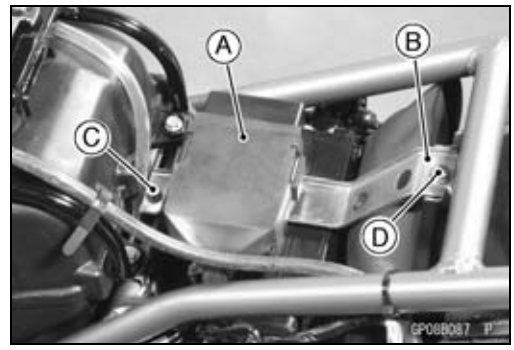
★If the meter does not read 0 Ω, the lead is defective. Replace the lead or the wiring harness [B], [C] if necessary.



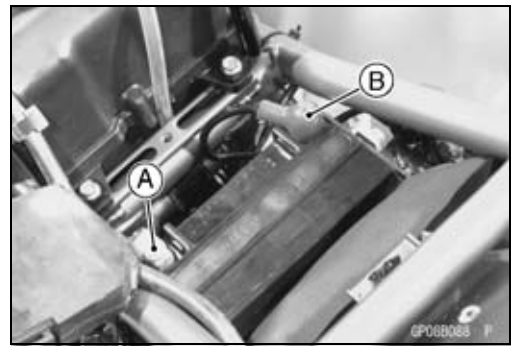
Battery

Battery Removal/Installation

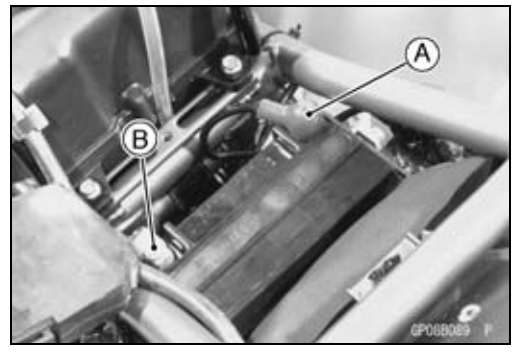
- Remove:
  Seat (see Seat Removal in the Frame Chapter)
- Remove the rubber IC igniter cover [A] with the igniter connected.
- Remove the battery pusher [B] by taking off the bolt [C] and nut [D].



- Remove the negative (–) lead [A] from the battery first.
- Remove the positive (+) lead [B] from the battery and pull out the battery.



- When installing, connect the positive (+) lead first [A], then the negative (–) lead [B] to the battery.

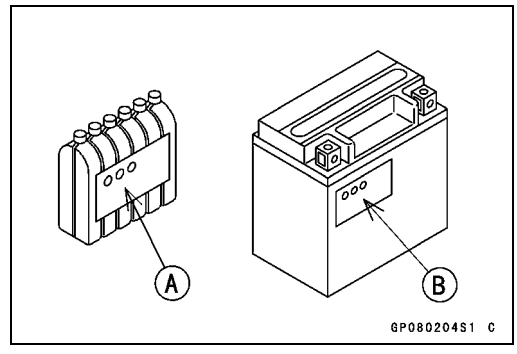


Battery Activation

Electrolyte Filling

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name for LE500B: YTX12-BS



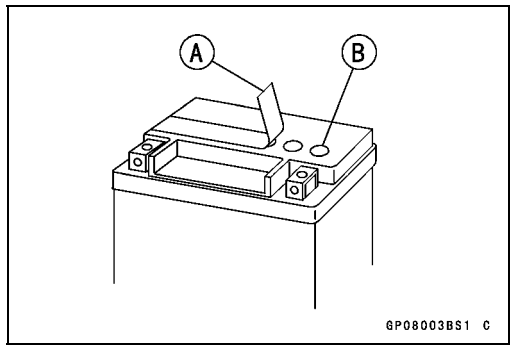
CAUTION

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

CAUTION

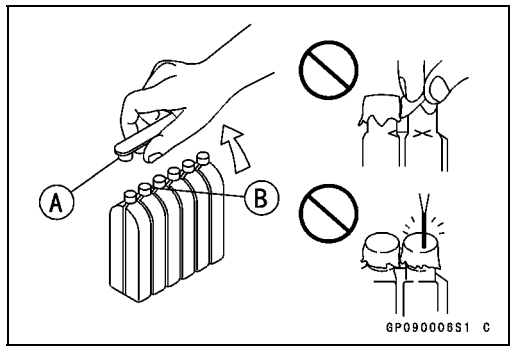
Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.



- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

NOTE

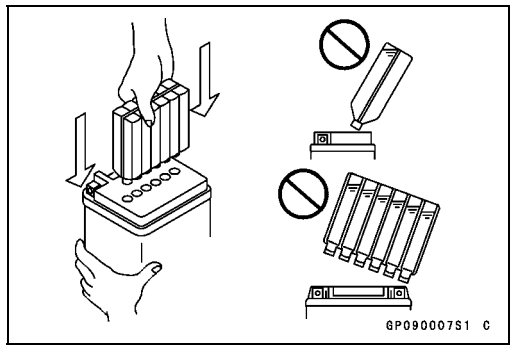
○*The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.*



- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

NOTE

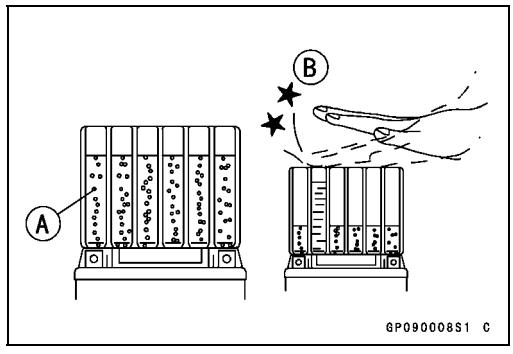
○*Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.*



- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

NOTE

○*Do not tilt the electrolyte container*



- Check the electrolyte flow.

★If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.

- Keep the container in place for **20** minutes or more. Don't remove the container from the battery until it's empty, the battery requires all the electrolyte from the container for proper operation.

CAUTION

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the electrolyte container until it is completely empty and 20 minutes have elapsed.

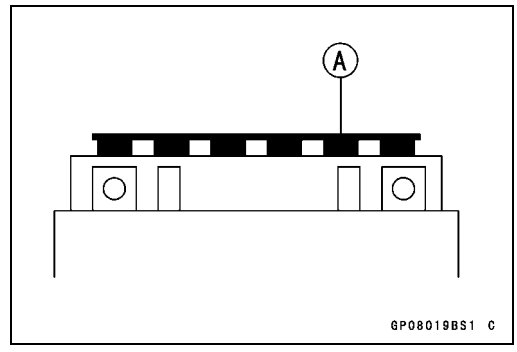
Battery

- Gently remove the container from the battery.
- Let the battery sit for **60** minutes prior to charging to allow the electrolyte to permeate into the plates for optimum performance.

NOTE

○*Charging the battery immediately after filling can shorten service life. Let the battery sit for at least **60** minutes after filling.*

Initial Charge



- Place the strip [A] of caps loosely over the filler ports.
- Newly activated sealed batteries require an initial charge.

Standard Charge 1.2 A × 5 ~ 10 hours

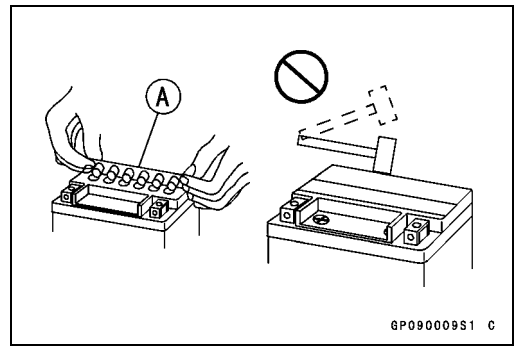
★If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:
Optimate III
Yuasa 1.5 Amp Automatic Charger
Battery Mate 150-9

★If the above chargers are not available, use equivalent one.

NOTE

○*Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. If it is not at least 12.8 volts, repeat charging cycle.*



- After charging is completed, press down firmly with both hands to seat the strip of caps [A] into the battery (don't pound or hammer). When properly installed, the strip of the caps will be level with the top of the battery.

CAUTION

Once the strip of the caps [A] is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.

NOTE

○*To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds.*
Re-check voltage and if less than 12.8 volts repeat the charging cycle and load test. If still below 12.8 volts, the battery is defective.

Precautions

1) No need of topping-up
No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.
2) Refreshing charge
If an engine will not start, a horn sounds weak, or lights are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).

Battery

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 safety valve operates to keep the battery safe.

3) When you do not use the motorcycle for months:
Give a refresh charge before you store the motorcycle and store it with the negative 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

The sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace the sealed battery only on a motorcycle which was originally equipped with the 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.

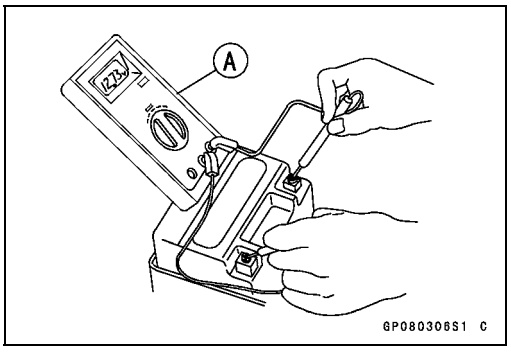
Charging Condition Inspection

Battery charging condition can be checked by measuring battery terminal voltage.

- Remove the seat (see Seat Removal in the Frame chapter).
- Disconnect the battery terminals.

CAUTION

Be sure to disconnect the negative terminal first.



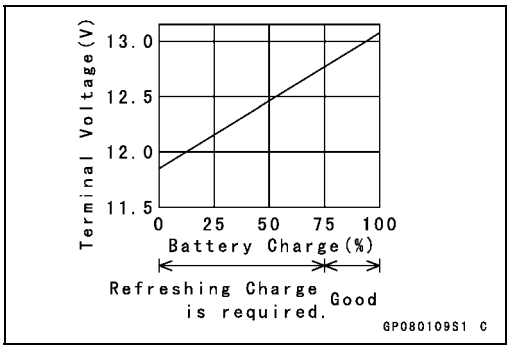
- Measure the battery terminal voltage.

NOTE

○*Measure with a digital voltmeter [A] which can be read one decimal place voltage.*

★If the reading is below the specified, refreshing charge is required.

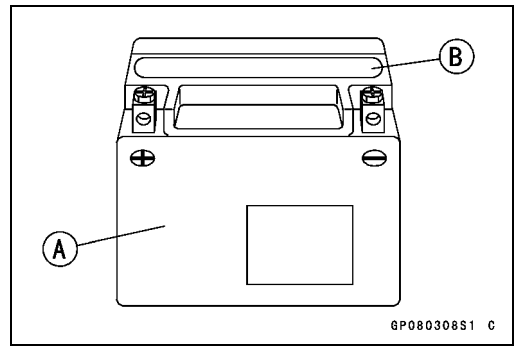
Battery Terminal Voltage
Standard: 12.8 V or more



Battery

Refreshing Charge

- Disconnect the battery terminals (see Charging Condition Inspection).
- Remove the battery [A].
- 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.

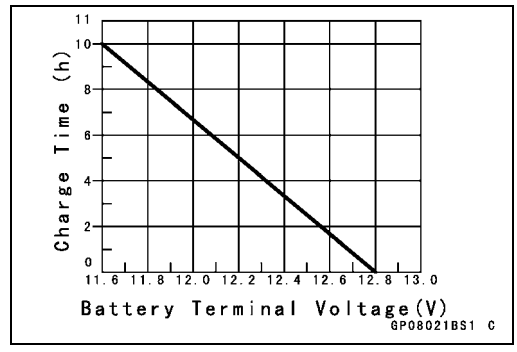
Terminal Voltage: 11.5 ~ less than 12.8 V

Standard Charge

1.2 A × 5 ~ 10 h (see following chart)

Quick Charge

5.0 A × 1.0 h



CAUTION

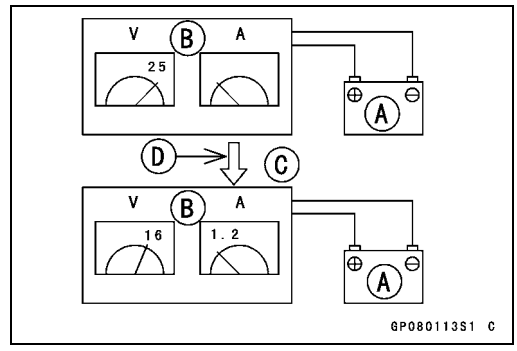
If possible, do not quick charge. If the quick charge is done due to unavoidable circumstances, do standard charge later on.

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 battery condition after refreshing charge.

○Determine the condition of the battery 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

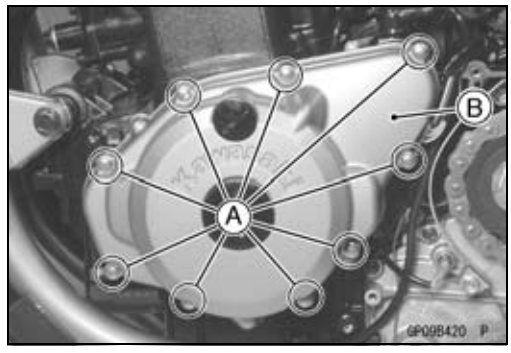
Criteria	Judgement
12.8 V or higher	Good
12.0 ~ less than 12.8 V	Charge insufficient → Recharge.
less than 12.0 V	Unserviceable → Replace

Charging System

Alternator Rotor/Starter Clutch Removal

- Remove the engine sprocket cover (see Engine Sprocket Removal in the Final Drive chapter).
- Remove the engine guard (see Engine Guard Removal in the Frame chapter).
- Remove the shift pedal.
- Remove the circlip and washer from the shift shaft.
- Remove the left side cover.
- Slide the air cleaner housing.
- Disconnect the alternator lead connectors.
- Place an oil pan beneath the alternator cover.

- Remove the alternator cover bolts [A], and pull off the alternator cover [B] and gasket. There are two knock pins in the cover mating surface.

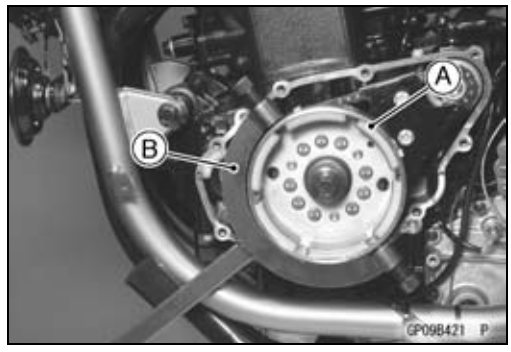


- Hold the alternator rotor [A] steady with the flywheel holder [B], and remove the rotor bolt.

Special Tool - Flywheel Holder: 57001-1410

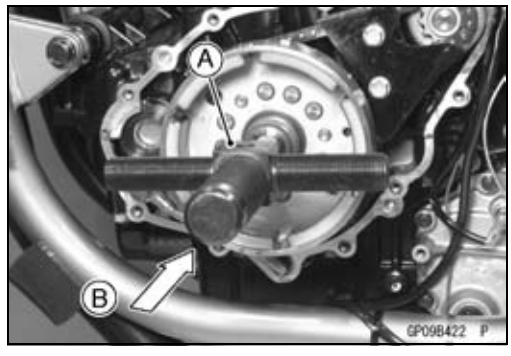
NOTE

○*The rotor bolt has left-handed threads, therefore it must be turned clockwise in removing.*



- Using the rotor puller [A], remove the alternator rotor and starter clutch assembly from the crankshaft. There is a spacer between the starter clutch sprocket and the alternator rotor. The woodruff key may come out with the alternator rotor and starter clutch assembly.

Special Tool - Rotor Pulier, M16/M18/M20/M22 × 1.5: 57001 -1216

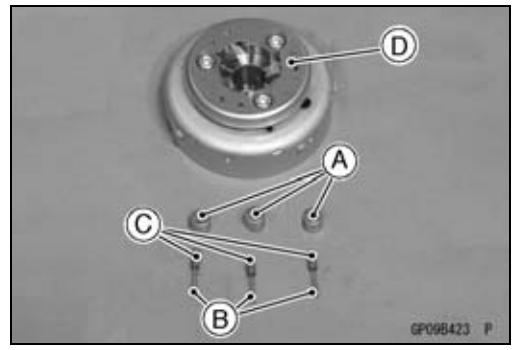


CAUTION

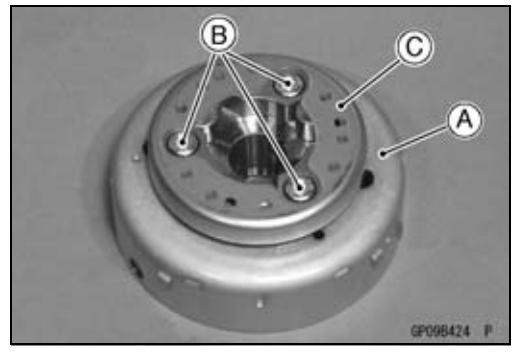
If the rotor is difficult to remove, turn the puller shaft using a wrench while tapping [B] the head of the puller shaft with a hammer. Do not attempt to strike the grab bar or the alternator rotor itself. Striking the bar or the rotor can cause the bar to bend or the magnets to lose their magnetism.

Charging System

● Remove the rollers [A], springs [B], and spring caps [C] from the starter clutch [D].



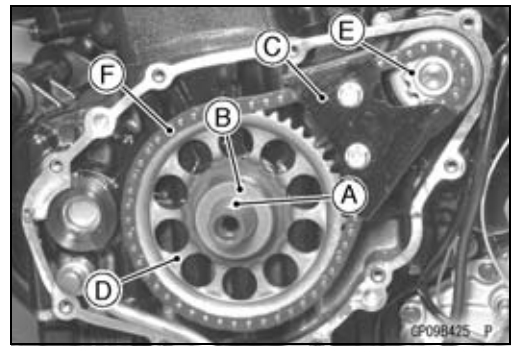
● Holding the rotor [A] steady, remove the Allen bolts [B] to separate the rotor and starter clutch [C].



Starter Clutch Sprocket Removal

● Remove:
Alternator cover (see Alternator Rotor/Starter Clutch Removal)
Alternator rotor with Starter Clutch (see Alternator Rotor/Starter Clutch Removal)

● Remove the woodruff key [A] and spacer [B].
● Remove the starter chain guide [C].
● Remove the starter clutch sprocket [D], starter motor sprocket [E] and starter chain [F] as a set.
● In case that the starter motor has been removed, do the following:
○Remove the starter motor sprocket.
○Remove the alternator rotor with the starter clutch, starter clutch sprocket and starter chain as a set.



Starter Clutch Sprocket Installation

● Apply a thin coat of molybdenum disulfide grease to the frictional surface between the crankshaft and the starter clutch sprocket.
● If the starter motor has been removed, install it first.
● Install the starter clutch sprocket, starter motor sprocket and starter chain as a set.
● Install the alternator rotor with the starter clutch and alternator cover.

Torque - Alternator Rotor Bolt: 69 N·m (7.0 kgf·m, 51 ft·lb)
Alternator Cover Bolt: 11 N·m (1.1 kgf·m, 95 in·lb)

Charging System

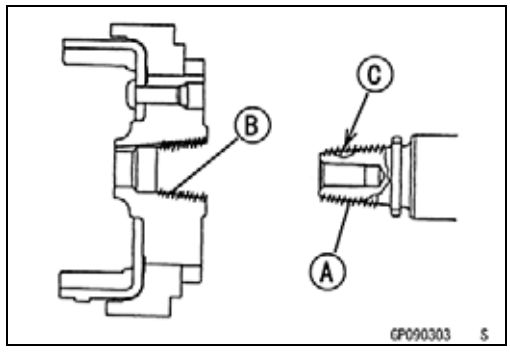
Alternator Rotor/Starter Clutch Installation

- Apply a non-permanent locking agent to the threads of the starter clutch Allen bolts, and tighten them to the specified torque in assembling the starter clutch onto the alternator rotor.

  Torque - Starter Clutch Allen Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

○Be careful that the rollers do not drop out of the starter clutch during assembly.

- Using a high flash-point solvent, clean off any oil or dirt that may be on the crankshaft taper [A] and rotor tapered hole [B].
- Fit the woodruff key securely in the slot [C] in the crankshaft before installing the rotor assembly on the crankshaft.



- Tighten the rotor bolt while holding the rotor steady with the flywheel holder, and turn the rotor bolt counterclockwise to install it.

  Torque - Alternator Rotor Bolt: 69 N·m (7.0 kgf·m, 51 ft·lb)

  Special Tool - Flywheel Holder: 57001-1410

- Apply silicone sealant to the area [A] where the mating surface ends of the crankcase touch the alternator cover gasket.

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

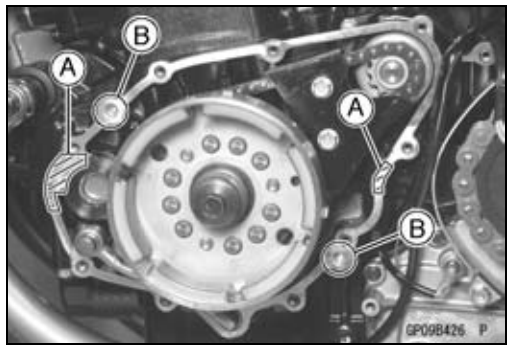
- Apply silicone sealant around the circumference of the wiring grommets before setting it in the notch in the alternator cover.

  Sealant - Kawasaki Bond (Liquid Gasket): 92104-1063

- Check that knock pins [B] are in place on the crankcase.
- Tighten the alternator cover bolts.

  Torque - Alternator Cover Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)

- Install the other removed parts.
- Check the engine oil level, and add if necessary (see Engine Oil Level Inspection in the Engine Lubrication System chapter).



Alternator Stator Removal

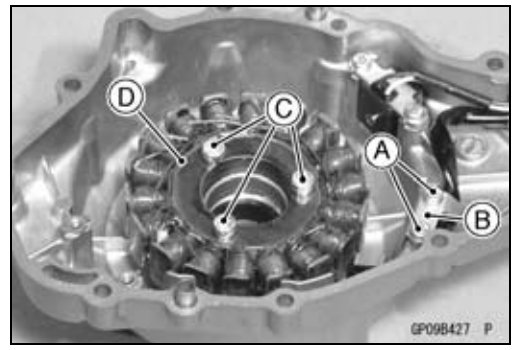
NOTE

○*To keep the loss of engine oil to a minimum, set the motorcycle vertically.*

- Remove the alternator cover (see Alternator Rotor and Starter Clutch Removal).

Charging System

- Remove the screws [A] and the holding plate [B] for the stator wiring.
- Unscrew the Allen bolts [C] and remove the stator [D].
- Remove the grommet for the crankshaft sensor lead.

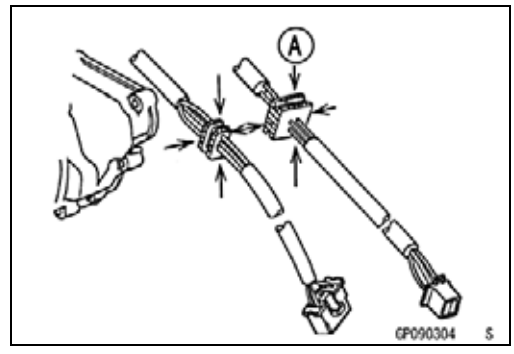


Alternator Stator Installation

- Apply silicone sealant [A] around the circumference of the wiring grommets before setting them in the notch in the alternator cover.

Sealant - Kawasaki Bond (Liquid Gasket): 92104-1063

- Install the grommet for the stator wiring and crankshaft sensor lead in this order.



CAUTION

The stator wiring has to be installed along the alternator cover without rising away from its surface. If the wires touch the rotor, they will be damaged.

- Tighten the Allen bolts.

Torque - Alternator Stator Allen Bolts: 12 N·m (1.2 kgf·m, 8.5 ft·lb)

- Install the alternator cover (see Alternator Rotor/Starter Clutch Installation).

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

- To check the alternator output voltage, do the following procedures. Refer to the appropriate chapters and Charging System Wiring Diagram.

○Turn off the ignition switch.
○Remove the left side cover.
○Disconnect the alternator lead connector [A].
○Connect the hand tester as shown in the table 1.

Special Tool - Hand Tester: 57001-1394

○Start the engine.
○Run it at the rpm given in the table 1.
○Note the voltage readings (total 3 measurements).

Charging System

Voltage

Tester Range	Connectings		Reading @4 000 rpm
	Tester (+) to	Tester (–) to	
250 V AC	One yellow lead	Another yellow lead	About 60 V

★If the output voltage shows the value in the table 1, the alternator operates properly and the regulator/rectifier is damaged. A much lower reading than that given in the table indicates that the alternator is defective.

- Check the stator coil resistance as follows:

○Stop the engine.
○Connect the hand tester as shown in the table 2.
○Note the readings (total 3 measurements).

Table 2 Stator Coil Resistance

Tester Range	Connectings		Reading
	Tester (+) to	Tester (–) to	
× 1Ω	One yellow lead (Connector 3)	Another yellow lead (Connector 3)	0.37 ~ 0.46 Ω

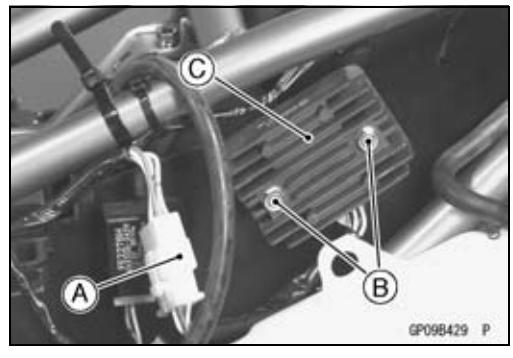
★If there is more resistance than shown in the table, or no meter reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

- Using the highest resistance range of the hand tester, measure the resistance between each of the yellow leads and chassis ground. Any hand tester reading less than infinity (∞) indicates a short, necessitating stator replacement.

★If the stator coil has normal resistance, but the voltage check shows the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

Regulator/Rectifier Removal

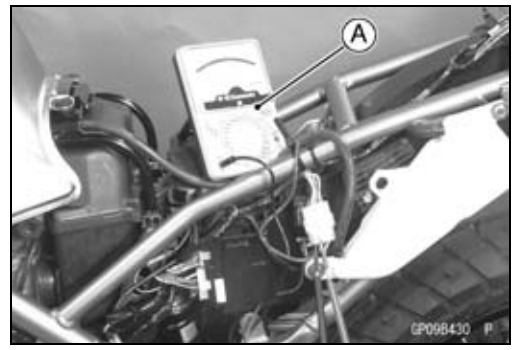
- Remove the left side cover.
- Remove the coolant reserve tank.
- Disconnect the regulator/rectifier connector [A].
- Unscrew two mounting bolts [B] and remove the regulator/rectifier [C] from the battery case.



Regulator/Rectifier Output Voltage Inspection

- Check the battery condition (see Battery section).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the right side cover (see Side Cover Removal in the Frame chapter).

Charging System



- Check that the ignition switch is turned off, and connect the hand tester [A] as shown in the table.

Special Tool - Hand Tester:57001-1394

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. 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.

Regulator/Rectifier Output Voltage

Tester Range	Connectings		Reading
	Tester (+) to	Tester (–) to	
25 V DC	White	Black/Yellow	Battery Voltage 14 ~ 15 V

- 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.

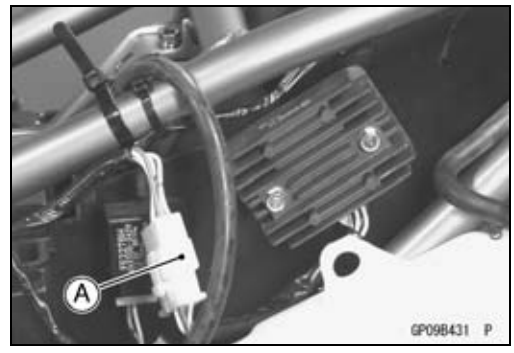
★If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the battery voltage does not rise as the engine speed increases, 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.

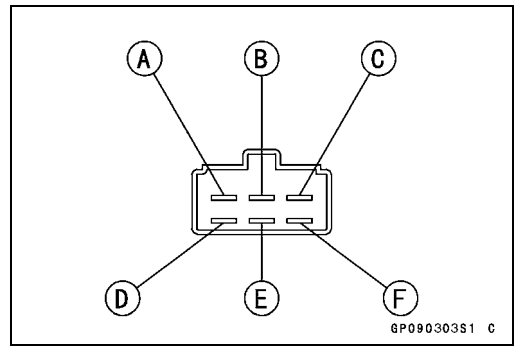
Regulator/Rectifier Inspection

Rectifier circuit check

- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Disconnect the regulator/rectifier lead connector [A].



Brown Lead Terminal [A]
White/Red Lead Terminal [B]
Black Lead Terminal [C]
Yellow 1 Lead Terminal [D]
Yellow 2 Lead Terminal [E]
Yellow 3 Lead Terminal [F]



Charging System

- 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/Red 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/R	∞	× 10 Ω or × 100 Ω
2	Y2			
3	Y3			
4	Y1	BK	Approximately 1/2 of the entire graduation	
5	Y2			
6	Y3			
7	W/R	Y1		
8		Y2		
9		Y3		
10	BK	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.*

Regulator Circuit Check

- Prepare the following:

Test Light Bulb: one 12 V 3.4 W bulb
Batteries: three 12 V batteries
Wires: six 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.

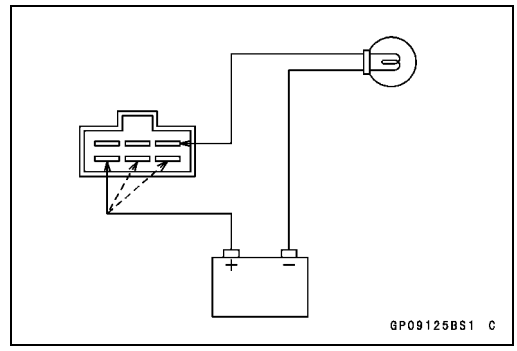
- Check to be sure the rectifier circuit is normal before continuing.

Charging System

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.

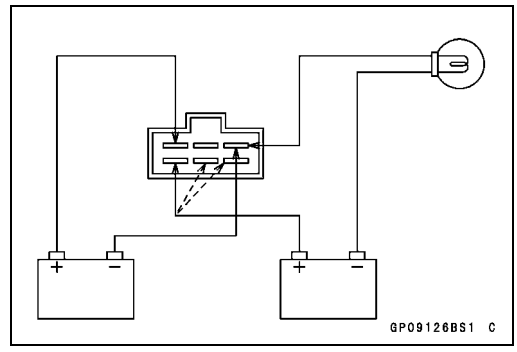
★If the test light does not turn on, continue the test.



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.

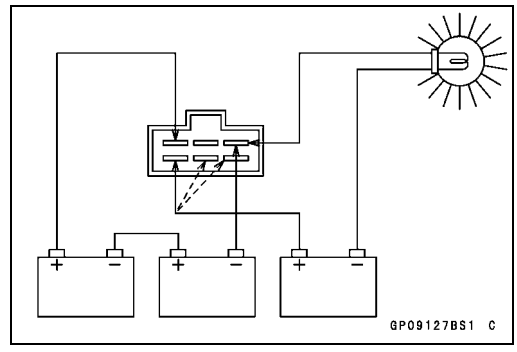
★If the test light does not turn on, continue the test.



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.

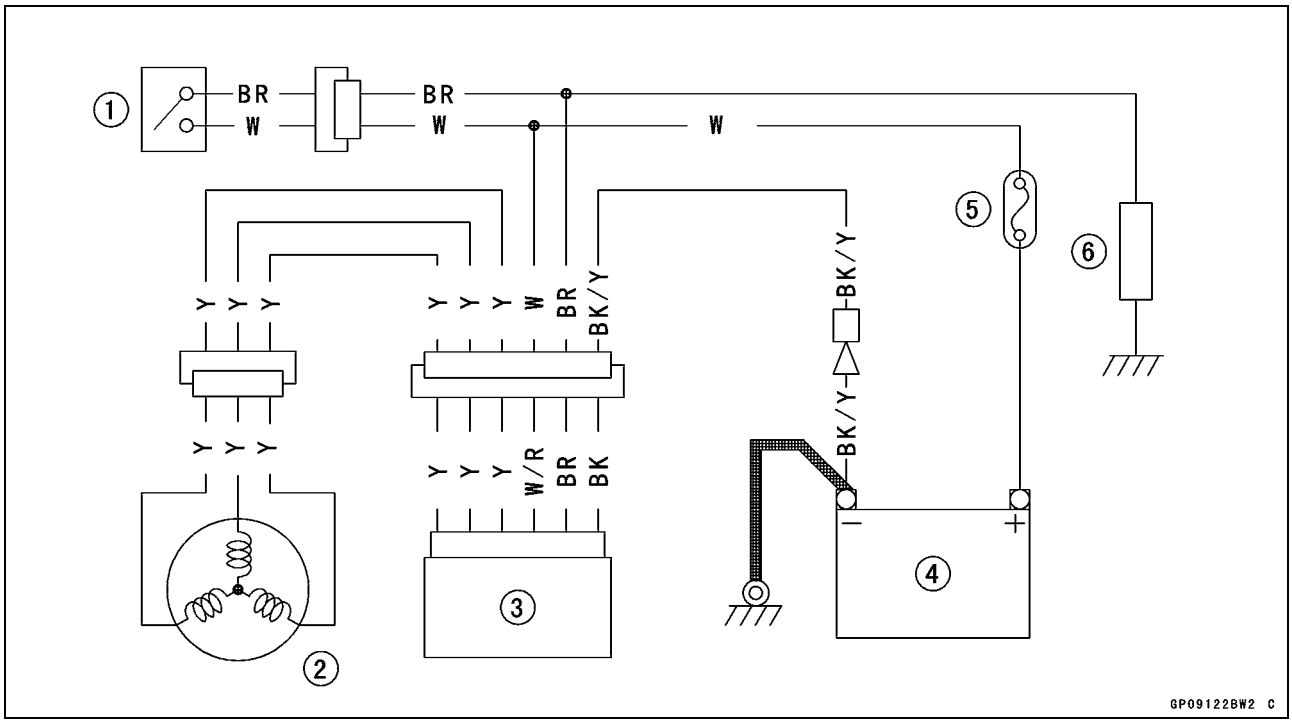


★If the test light did not light when the 24 V was applied momentarily to the BR terminal, the regulator/rectifier is defective. Replace it.

★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

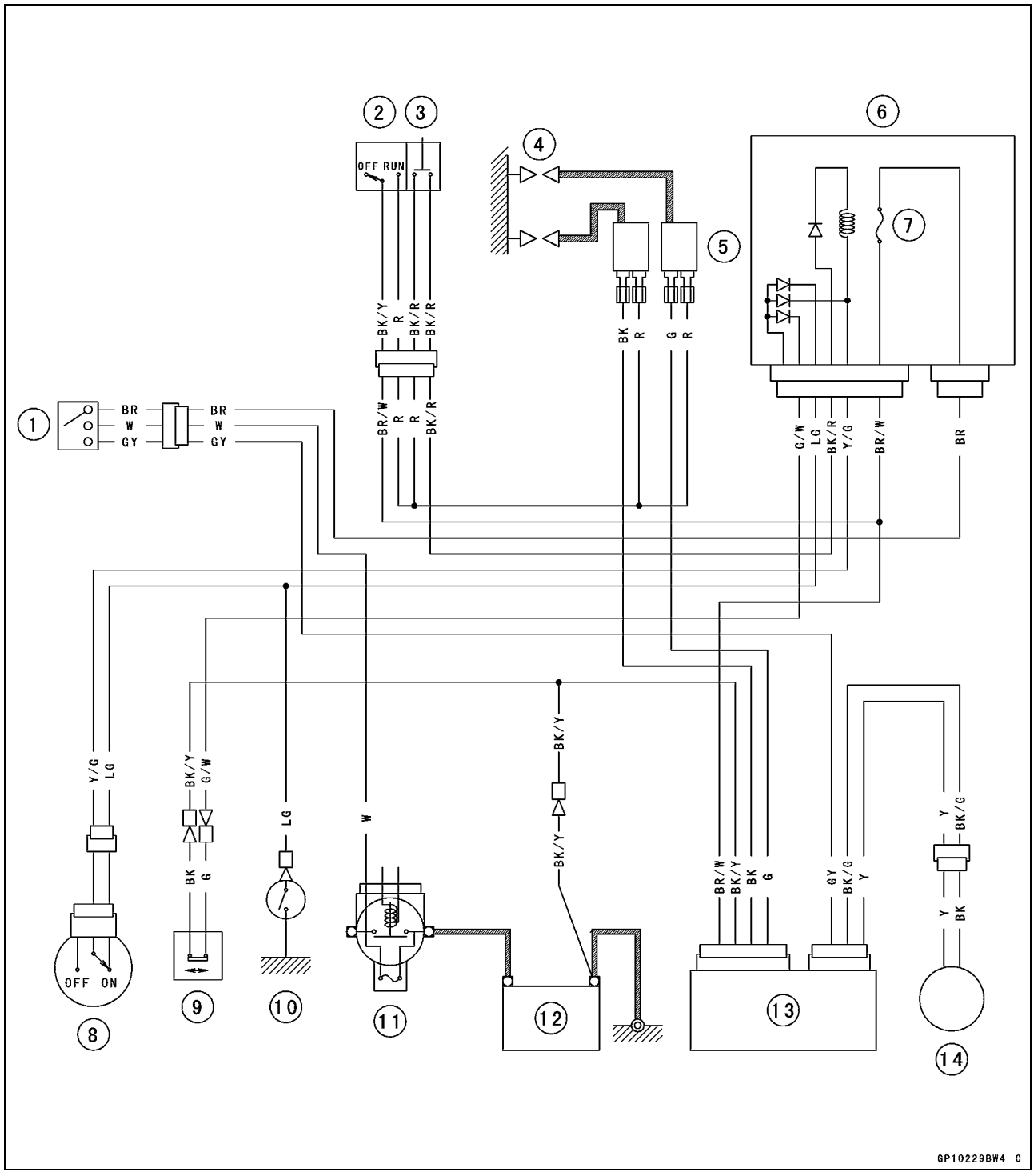
Charging System Circuit



1. Ignition Switch
2. Alternator
3. Regulator/Rectifier
4. Battery
5. Main Fuse 30 A
6. Load

Ignition System

Ignition System Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Spark Plugs
5. Ignition Coils
6. Junction Box
7. Ignition Fuse 10 A
8. Starter Lockout Switch
9. Side Stand Switch
10. Neutral Switch
11. Main Fuse 30 A
12. Battery 12 V 10 AH
13. IC Igniter
14. Crankshaft Sensor

Ignition System

⚠ WARNING

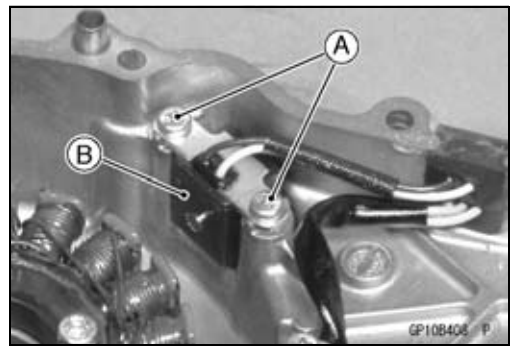
The ignition system produces extremely high voltage. Do not touch the spark plugs, ignition coils, or spark plug leads while the engine is running, or you could receive a severe electrical shock.

CAUTION

Do not disconnect the battery leads 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

Crankshaft Sensor Removal

- Remove:
  Alternator Cover (see Alternator Rotor/Starter Clutch Removal)
  Mounting Screws [A]
  Crankshaft Sensor [B]



Crankshaft Sensor Installation

- Tighten the crankshaft sensor screws.

Torque - Crankshaft Sensor Screws: 8.3 N·m (0.85 kgf·m, 74 in·lb)

- Install the crankshaft sensor lead on the alternator cover (see Stator Coil Installation).

Crankshaft Sensor Inspection

- Disconnect the crankshaft sensor connector [A].
- Set the hand tester to the × 100 Ω range and connect it to the crankshaft sensor leads.

★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

Crankshaft Sensor Resistance
113 ~ 139 Ω

- Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads and chassis ground.

★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor assembly.

Ignition System

Ignition Coil Removal/Installation

- Remove the Lower Fairings (see Lower Fairing Removal in the Frame chapter).
- Disconnect the leads and remove the ignition coils.
- Install the ignition coils. Note the following.

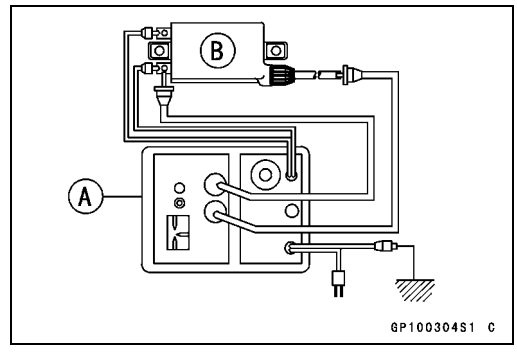
○Connect the primary winding leads to the ignition coiled terminals as shown.

R Lead → #1 Ignition Coil Terminal
BK Lead → #1 Ignition Coil Terminal

R Lead → #2 Ignition Coil Terminal [A]
G Lead → #2 Ignition Coil Terminal [A]

Ignition Coil Inspection

Measuring arcing distance



- Remove the ignition coil (see Ignition Coil Removal/Installation).
- Measure the arcing distance with a suitable commercially available coil tester [A] to check the condition of the ignition coil [B].
- Connect the ignition coil (with the spark plug cap left attached to each end of the spark plug lead) to the tester in the manner prescribed by the manufacturer and measure the arcing distance.

Ignition Coil Arcing Distance
8 mm (0.32 in.) or more

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the coil or lead.

★If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.

- To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil.

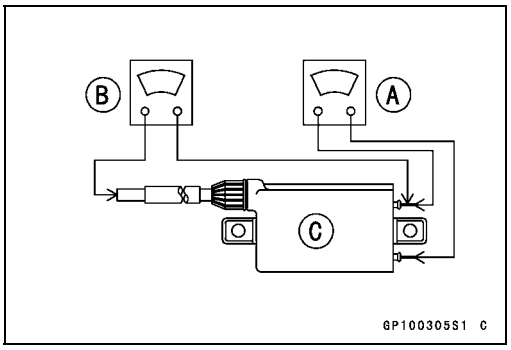
★If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug cap.

★If the arcing tester is not available, the coil can be checked for a broken or badly shorted winding with the hand tester.

Ignition System

NOTE

○*The hand tester cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.*



- Disconnect the primary leads from the coil terminals.
- Measure the primary winding resistance [A] as follows:

○Connect the hand tester between the coil terminals.
○Set the tester to the × 1Ω range, and read the tester.

- Measure the secondary winding resistance [B] as follows:

○Pull the spark plug cap off the lead.
○Connect the hand tester between the spark plug lead and black or green lead terminal.
○Set the tester to the × 1 kΩ range, and read the tester.

Ignition Coil Winding Resistance

Primary windings:	**2.6 ~ 3.1 Ω**
Secondary windings:	**13.5 ~ 16.5 kΩ**

★If the tester does not read as specified, replace the coil [C].
★If the tester reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.

- Check the spark plug leads for visible damage.

★If any spark plug lead is damaged, replace the coil.

Ignition Timing Inspection

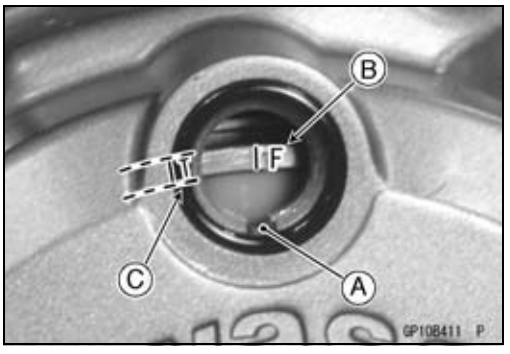
- Remove the ignition timing inspection plug.
- Attach the timing light [A] in the manner prescribed by the manufacturer.

Special Tool - Timing Light: 57001-1241
Filler Cap Driver: 57001-1454

- Start the engine and aim the timing light at the ignition timing mark on the alternator rotor.
- Run the engine at the speeds specified and note the alignment of the ignition timing marks.

Ignition Timing

Engine speed r/min (rpm)	Notch [A] aligns with:
1500 and below	F mark [B] on alternator rotor



NOTE

○*Do not mix up the ignition timing marks with the top mark "T" [C].*

★If the ignition timing is incorrect, inspect the IC igniter and the crankshaft sensor.

Spark Plug Removal/Installation

- Refer to the Spark Plug Replacement in Replacement Parts in the Periodic Maintenance chapter.

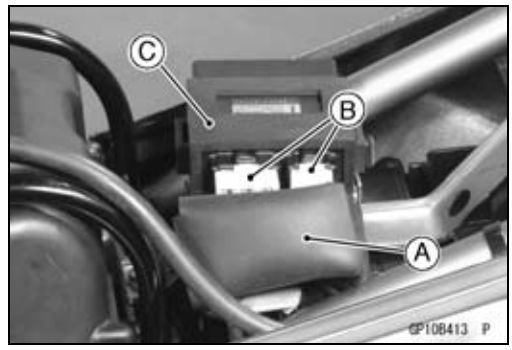
Spark Plug Gap Inspection

- Refer to the Spark Plug Gap Inspection in the Periodic Maintenance chapter.

Ignition System

IC Igniter Removal

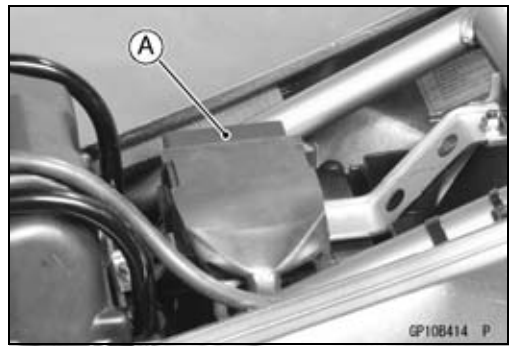
- Remove the seat (see Seat Removal in the Frame chapter).
- Slide the rubber IC igniter cover [A].
- Disconnect the IC igniter connectors [B], and remove the igniter [C].



IC Igniter Inspection

CAUTION

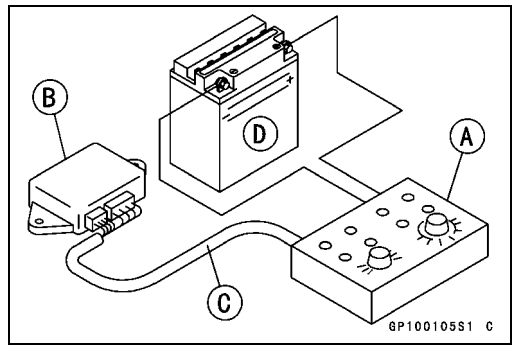
When inspecting the IC igniter [A], observe the following to avoid damage to the IC Igniter.
Do not disconnect the IC igniter with the ignition switch on. This may damage the IC igniter.
Do not disconnect the battery leads while the engine is running. This may damage the IC igniter.



- 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: 57001-1381 [C]

IC Igniter [B]
Battery [D]



○Set the select knob to position “A”.

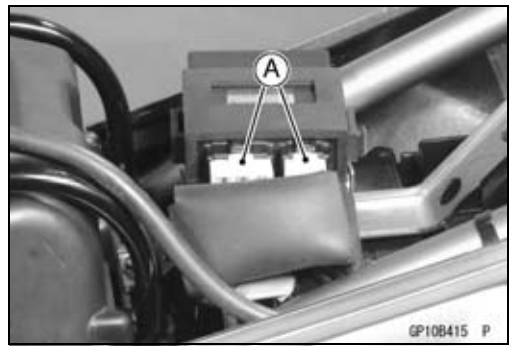
NOTE

○*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 relating 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.

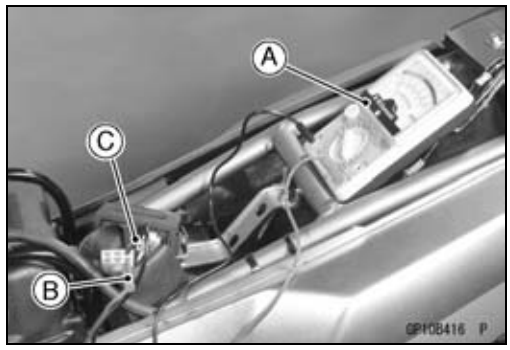
IC Igniter Operation Voltage Check

- Remove the seat (see Seat Removal in the Frame chapter).
- Disconnect the IC igniter connector [A].



● Set the Hand Tester [A] to the × 25 V DC range, and connect it to the connector come from harness side as follows.
Tester (+) terminal [B] → BR/W lead
Tester (–) terminal [C] → BK/Y lead

Special Tool - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457



● Turn the ignition switch on , and read the voltage.

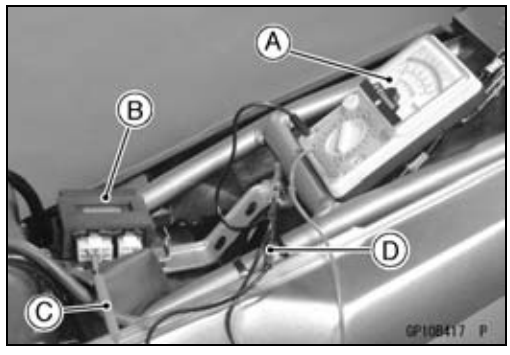
IC Igniter Operation Voltage: Battery Voltage

★If the tester reading is not specified one, check the battery voltage, ignition switch and ignition fuse.

Starter Button Operation Check

● Remove the seats (see Seat Removal in the Frame chapter).
● Set the Hand Tester [A] to the × 25 V DC range, connect it to the IC igniter [B] lead as follows.
Hand Tester (+) Terminal [C] → BK/R Lead
Hand Tester (–) Terminal [D] → Frame Ground

Special Tool - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457



● Turn the ignition switch on and push the starter button.
● Read the voltage.

Starter Button Voltage: Battery Voltage

★If the tester reading is not specified one, replace the IC igniter.

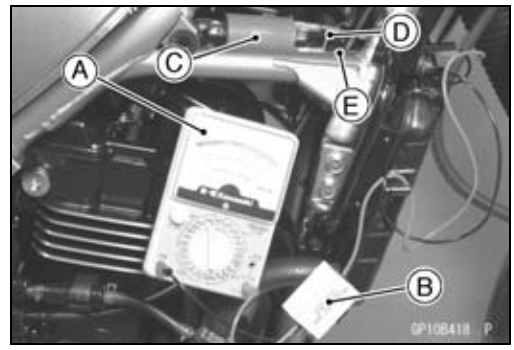
Ignition Coil Primary Peak Voltage Inspection

● Remove:
Side Covers (see Side Cover Removal in the Frame chapter)
Lower Fairings (see Lower Fairing Removal in the Frame chapter)
● Remove the spark plug caps from the spark plugs.
● Attach a good spark plugs to the removed spark plug caps and ground them to the engine.

NOTE

○*To obtain a correct measurement, the wires as well as the wire 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.*

Ignition System



- Set the tester to the DC 250 V range. Connect the peak voltage adapter [B] to the tester [A], and connect the adapter terminals to the respective terminals of the ignition coil [C].

○Keep the terminals connected.

Special Tool - Kawasaki Hand Tester: 57001-1394
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

Connect
#1
Adapter's positive (+) → terminal black wire terminal [D]
Adapter's negative (–) → red wire terminal [E] terminal
#2
Adapter's positive (+) → green wire terminal terminal
Adapter's negative (–) → red wire terminal terminal

- Turn the ignition switch ON.
- Shift the gears to neutral, and run the engine stop switch.
- Turn the starter motor for several seconds and read the maximum value on the tester.

Ignition Coil Primary Peak Voltage
Standard: DC100 V or more

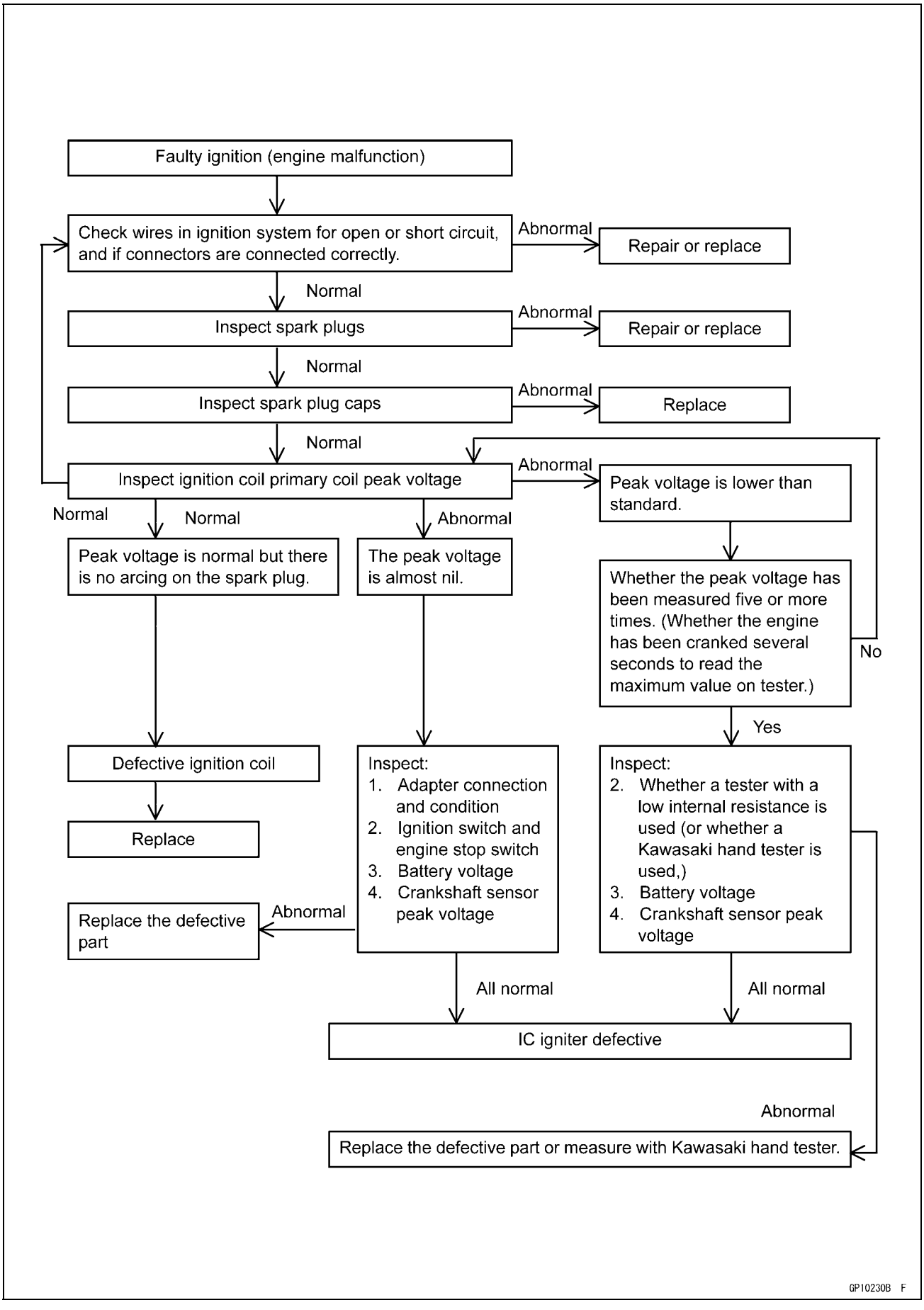
⚠ WARNING

To avoid high-voltage electrical shocks, do not touch the adapter terminals or leads.

★If the peak voltage is lower than the standard, refer to the next page.

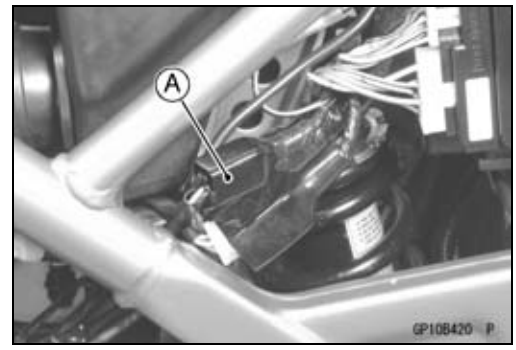
Ignition System

Troubleshooting



Ignition System

Crankshaft Sensor Peak Voltage Inspection



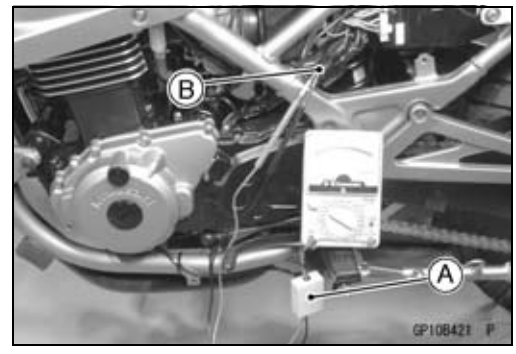
- Measure the peak voltage of the crankshaft sensor as follows:

○Remove the left side cover.

○Remove the crankshaft sensor connector [A].

NOTE

○*To obtain a correct measurement, the wires as well as the wire connections must be correct. Take the voltage measurement with the proper cylinder compression (with the spark plugs in the cylinder head). Without proper compression, a correct measurement cannot be obtained.*



○Set the tester to the DC10 V range.

○Connect the peak voltage adapter [A] to the tester, and connect the adapter terminal to the crankshaft sensor connector [B] terminal.

Special Tool - Kawasaki Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

Connect
Adapter's positive (+) terminal → yellow wire terminal
Adapter's negative (–) terminal → black wire terminal

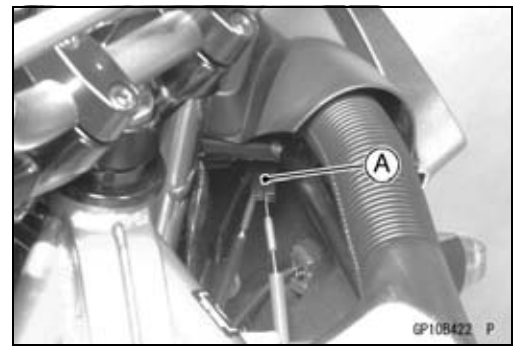
○Turn the starter motor for several seconds and read the maximum value on the tester.

Crankshaft Sensor Peak Voltage
Standard: DC 3 V or more

★If the peak voltage is lower than the standard, inspect the crankshaft sensor.

Diodes Inspection

- Remove:
  Lower Right Fairing (see Lower Fairing Removal in the Frame chapter)



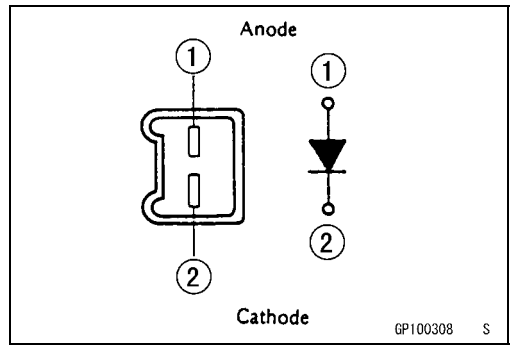
- Disconnect the diode assembly [A].
- Zero the hand tester, and connect it to the diode terminal to check the resistance in both directions.

★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the diode assembly must be replaced.

Ignition System

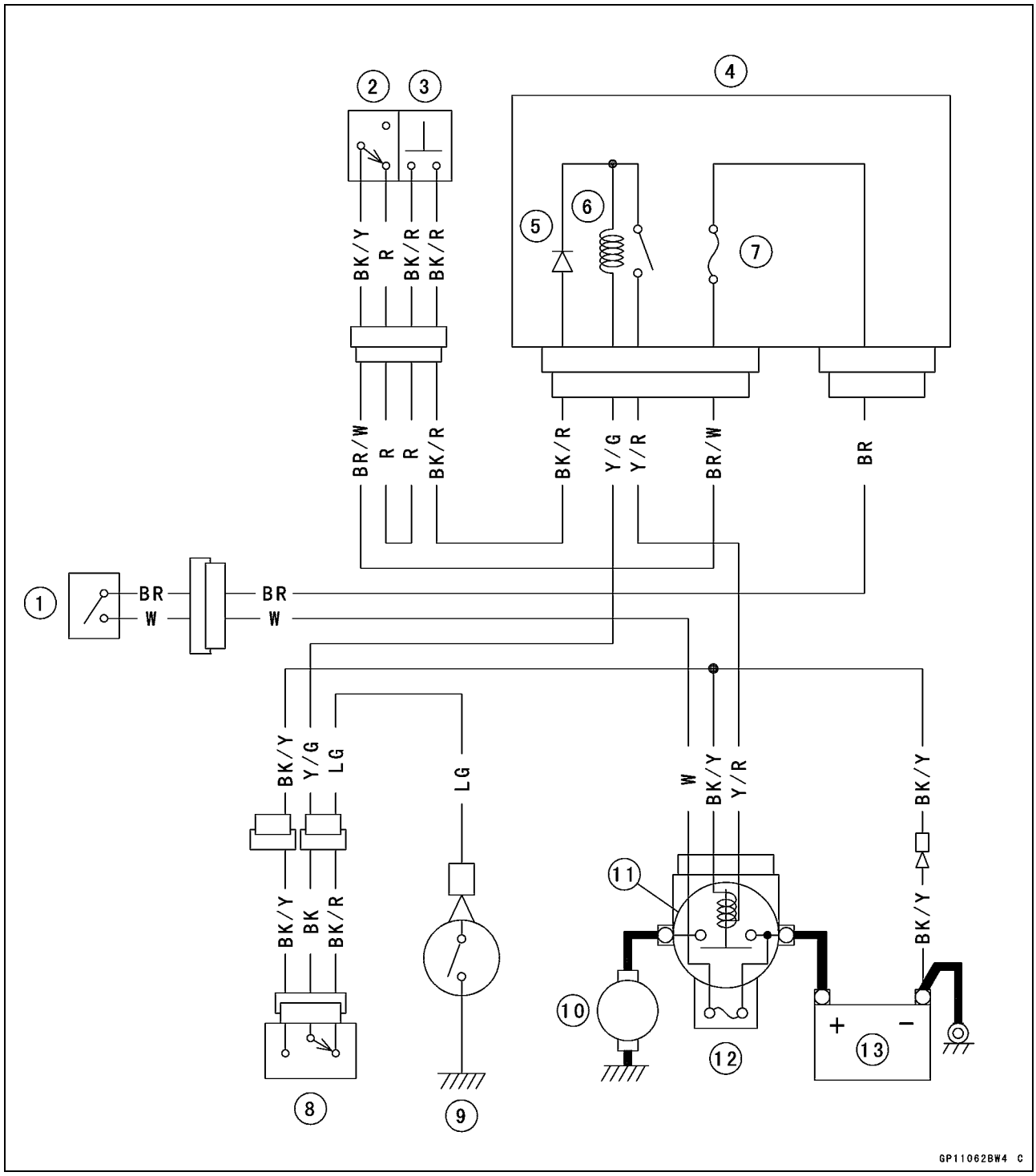
NOTE

○*The actual meter reading varies with the meter used and the individual diode, but, generally speaking, the lower reading should be from zero to one half the scale.*



Electric Starter System

Electric Starter Circuit

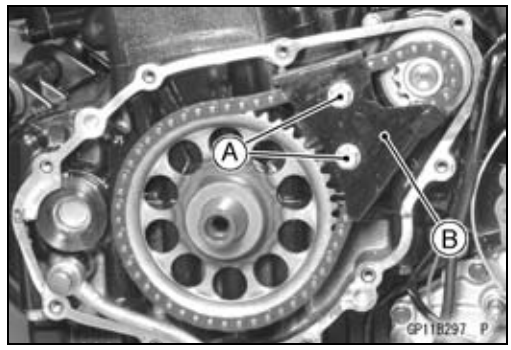


1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Junction Box
5. Diode
6. Starter Circuit Relay
7. Ignition Fuse 10 A
8. Starter Lockout Switch
9. Neutral Switch
10. Starter Motor
11. Starter Relay
12. Main Fuse 30 A
13. Battery 12 V 10 AH

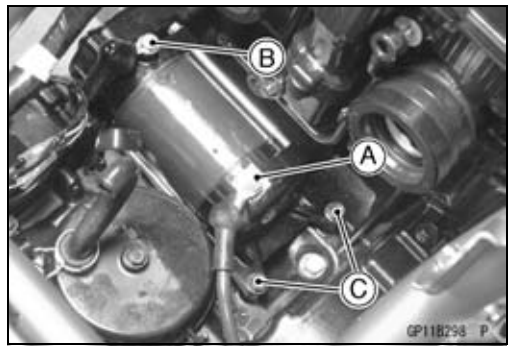
Electric Starter System

Starter Motor Removal

- Remove the alternator cover (see Alternator Cover Removal).
- Remove the starter chain guide bolts [A] and remove the starter chain guide [B].



- Disconnect the starter motor lead [A] and negative lead [B].
- Remove the starter motor mounting bolts [C].
- Remove the starter motor to right side.

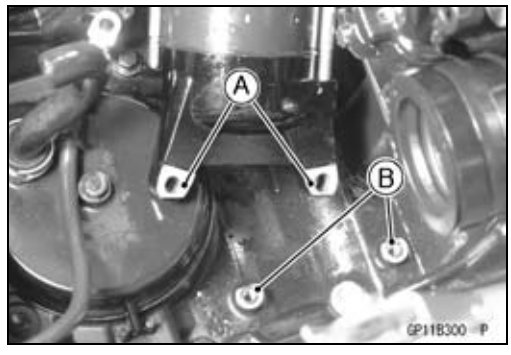


Starter Motor Installation

- Install the starter motor in the reverse order of removal.
- Clean the starter motor lugs [A] and crankcase where the starter motor is grounded [B].
- Replace the O-ring with a new one, if it is deteriorated or damaged, and apply a little oil to it.
- Tighten the starter motor mounting bolts with the ground lead.

Torque - Starter Motor Mounting Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)

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

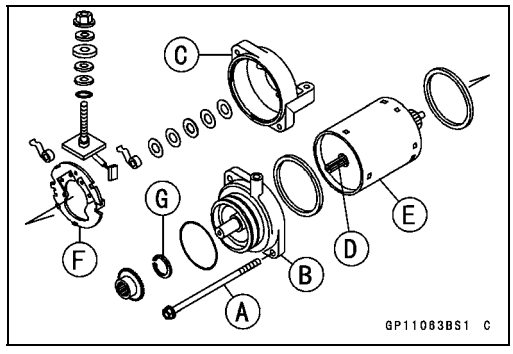


Starter Motor Disassembly

- Unscrew the starter motor through bolts [A] and remove the circlip [G].

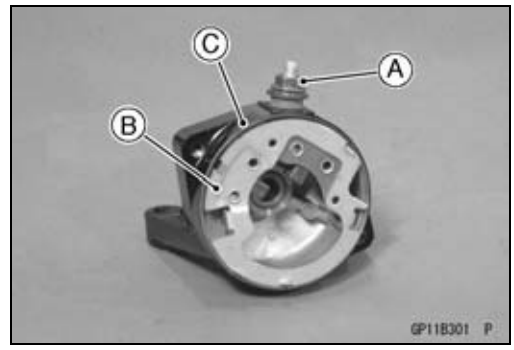
Special Tool - Outside Circlip Pliers: 57001-144

- Pull off the gear cover [B] and the end cover [C].
- Pull the armature [D] out of the yoke housing [E], and remove the end bracket [F].



Electric Starter System

- Remove the terminal nut [A], and take the brush plate [B] off the end cover [C].

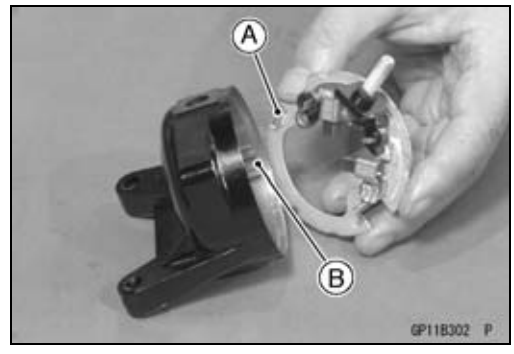


Starter Motor Assembly

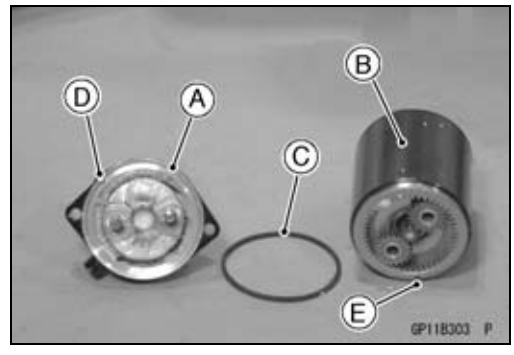
- Replace any O-ring removed with a new one.
- Install the terminal bolt.
- Tighten the terminal nut.

Torque - Starter Motor Terminal Nut: 6.9 N·m (0.7 kgf·m, 61 in·lb)

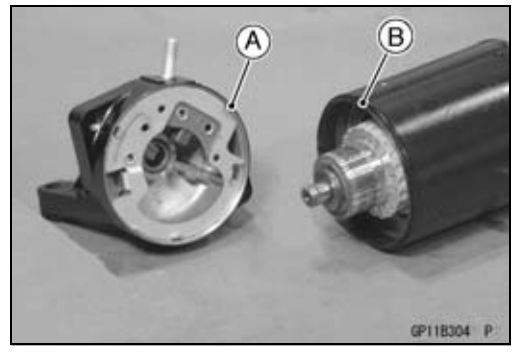
- Install the brush plate on the end cover, align the tab [A] on the plate with the slot [B] in the cover.



- Insert the armature into the yoke.
- Install the end gear cover [A] and O-ring [C] on the yoke housing [B], and align the projection [D] on the housing with the notches [E] in the gear housing.



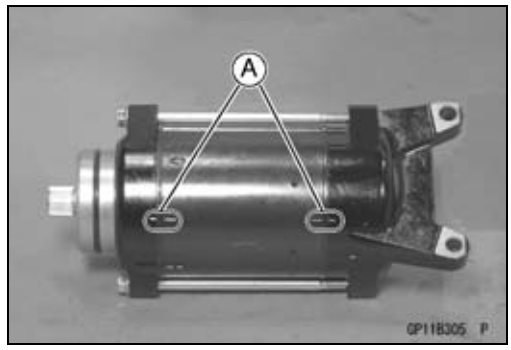
- Install the end cover on the yoke housing, and align the short and wide tab [A] on the brush plate with the notch [B] in the housing.



Electric Starter System

- Make sure that the marks [A] on the covers and yoke housing align with each other.
- Tighten the through bolts.

Torque - Starter Motor Through Bolts: 6.9 N·m (0.7 kgf·m, 65 in·lb)



Brush Inspection

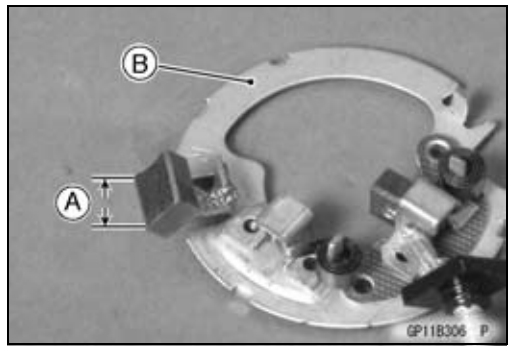
- Measure the length [A] of each brush.

★If any is worn down to the service limit, replace the brush plate assembly [B].

Starter Motor Brush Length

Standard: 12.0 ~ 12.5 mm (0.47 ~ 0.49 in.)

Service Limit: 8.5 mm (0.34 in.)



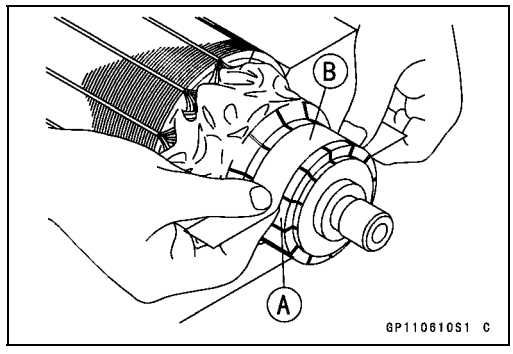
Brush Spring Inspection

- Check that the brush springs are in place and will snap the brushes firmly into place.

★If not, reinstall or replace the spring.

Commutator Cleaning and Inspection

- Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.



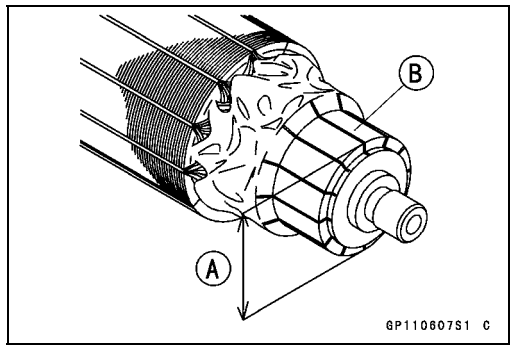
- Measure the diameter [A] of the commutator [B].

★Replace the starter motor with a new one if the commutator diameter is less than the service limit.

Commutator Diameter

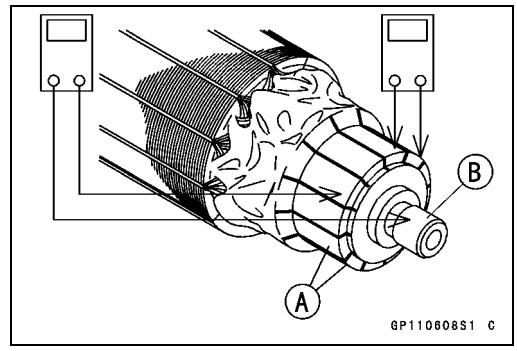
Standard: 28 mm (1.10 in.)

Service Limit: 27 mm (1.06 in.)



Electric Starter System

Armature Inspection



- Using the × 1 Ω hand tester range, measure the resistance between any two commutator segments [A].

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

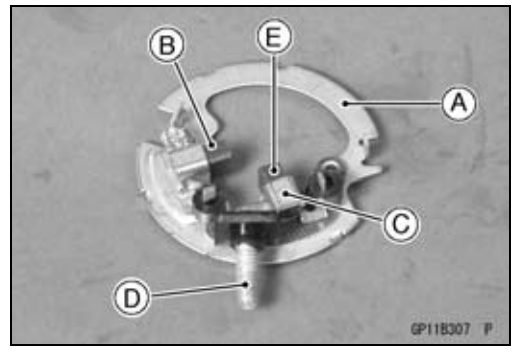
- Using the highest hand tester range, measure the resistance between the segments and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

NOTE

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

Brush Plate Inspection



- Using the × 1 Ω hand tester range, measure the resistance between the brush plate [A] and the negative brush [B].

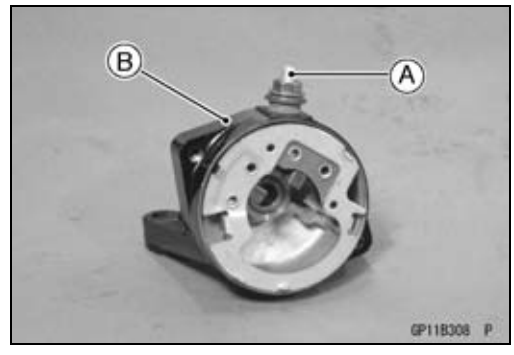
★If there is not close to zero ohm, the brush plate has an open. Replace the brush plate assembly.

- Using the highest hand tester range, measure the resistance between the brush plate and the positive brush holder [C].

★If there is any reading at all, the brush holder has a short. Replace the brush plate assembly.

- Using the × 1 Ω hand tester range, measure the resistance between the terminal bolt [D] and the positive brush [E].

★If there is a high resistance or no reading (∞), a lead is open and the brush plate must be replaced.



- Using the highest hand tester range, measure the resistance between the terminal bolt [A] and the end cover [B].

★If there is any reading at all, the insulation is faulty and the brush plate must be replaced. Replace the terminal assembly.

Starter Chain Guide Wear

- Visually inspect the rubber on the guide.

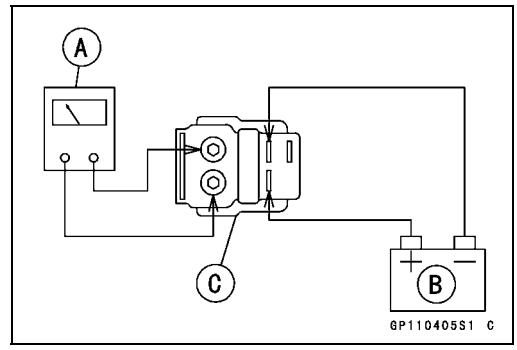
★If the rubber is cut or damaged in any way, replace the guide.

Electric Starter System

Starter Relay Inspection

- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Remove the starter relay.
- Connect a hand tester [A] and one 12 V battery [B] to the starter relay [C] as shown.

★If the relay does not work as specified, the relay is defective. Replace the relay.



Testing Relay

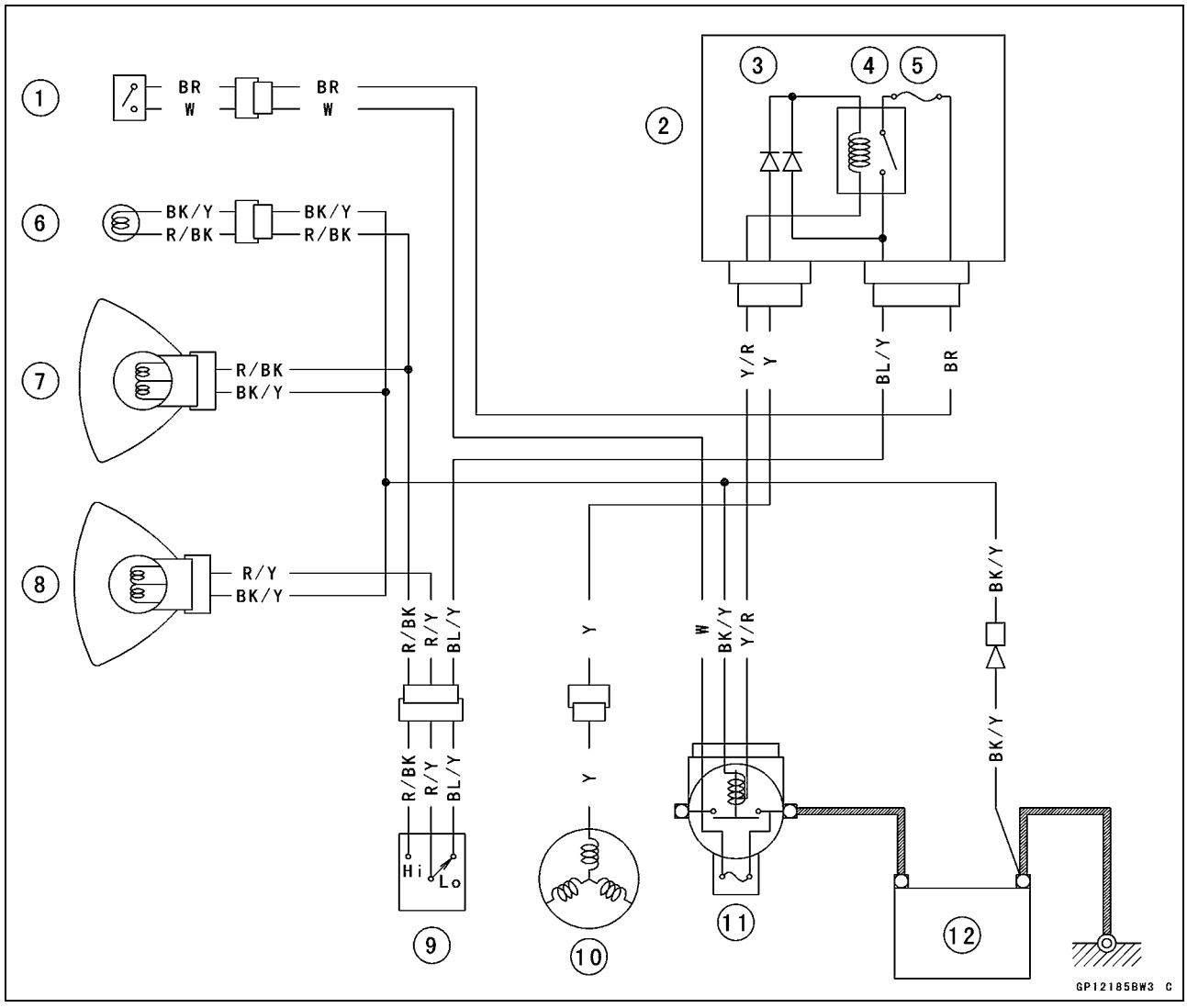
Meter range: **× 1 Ω**

Criteria: **When battery is connected → 0 Ω**

When battery is disconnected → ∞ Ω

Lighting System

Headlight Circuit



1. Ignition Switch
2. Junction Box
3. Diode
4. Headlight Relay
5. Headlight Fuse 10 A
6. High Beam Indicator Light
7. Headlight (High Beam)
8. Headlight (Low Beam)
9. Dimmer Switch
10. Alternator
11. Main Fuse 30 A
12. Battery 12 V 10 Ah

Headlight Beam Horizontal Adjustment

- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

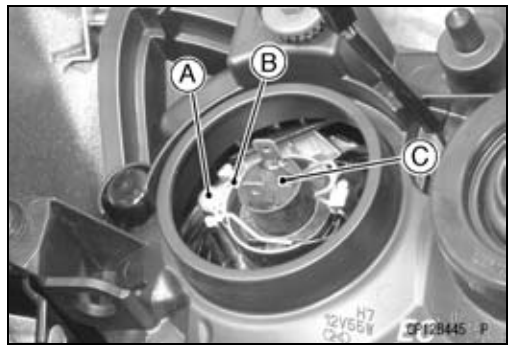
Headlight Beam Vertical Adjustment

- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Lighting System

Headlight Bulb Replacement

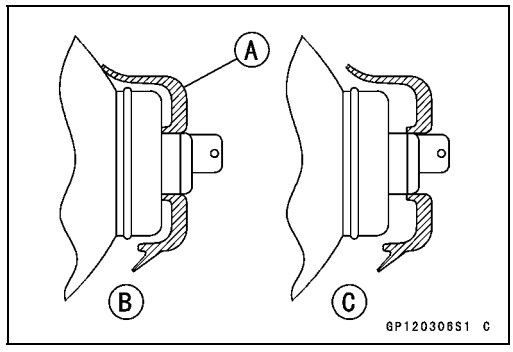
- Remove the headlight unit with upper fairing (see Headlight Unit/Housing Removal).
- Remove the dust cover.
- Remove the screw [A] and remove the retaining spring [B].
- Remove the headlight bulb [C] and replace it.



CAUTION

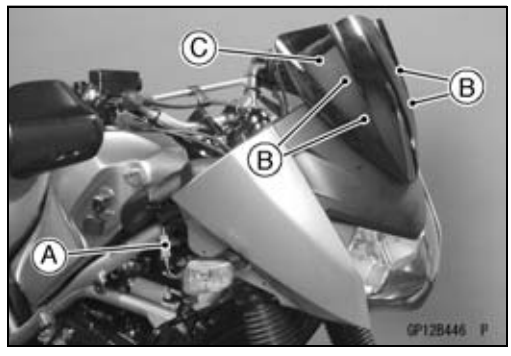
When handling the quartz-hologen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

- Fit the dust cover [A] with the marked side downward onto the bulb firmly as shown in the figure.
  Good [B]
  Bad [C]
- After installation, adjust the headlight aim.

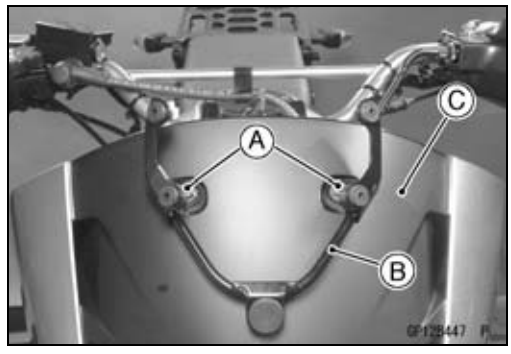


Headlight Unit/Housing Removal

- Remove the left and right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the left and right turn signal lead connectors [A].
- Remove the wind shield mounting bolts [B] and wind shield [C].

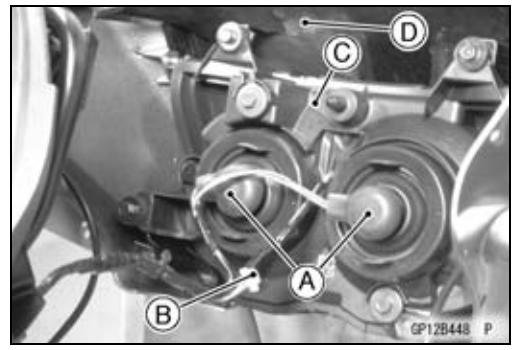


- Remove the wind shield mounting stay nut [A], and remove the mounting stay [B] and headlight unit/housing with the upper fairings [C] installed left and right turn signal lights.

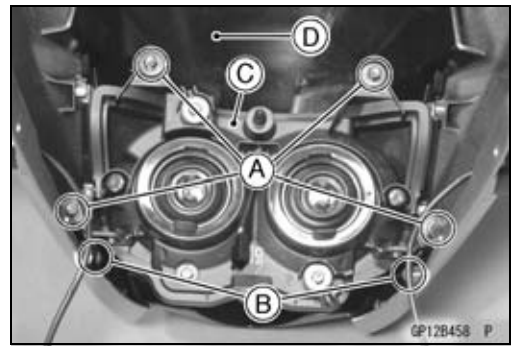


Lighting System

- Disconnect the headlight lead couplers [A], city light lead connector [B], and free the headlight unit/housing [C] and upper fairings [D] assembly.



- Remove the 4-bolts [A] and two-screws [B], and separate the headlight unit/housing [C] and upper fairings [D].

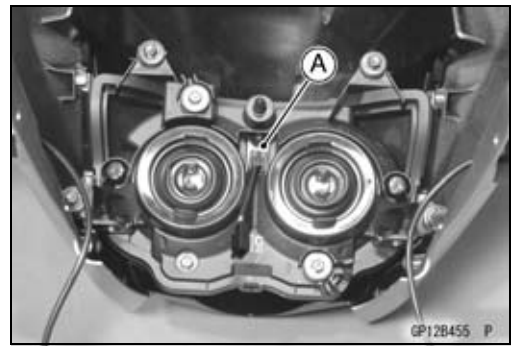


Headlight Unit/Housing Installation

- Headlight unit/housing installation is the reverse of removal

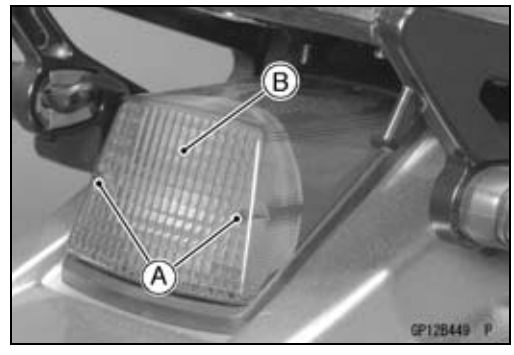
City Light Bulb Replacement

- Remove the headlight unit/housing (see Headlight Unit/Housing Removal).
- Pull out the city light socket [A] with the bulb.
- Remove the bulb and replace it.



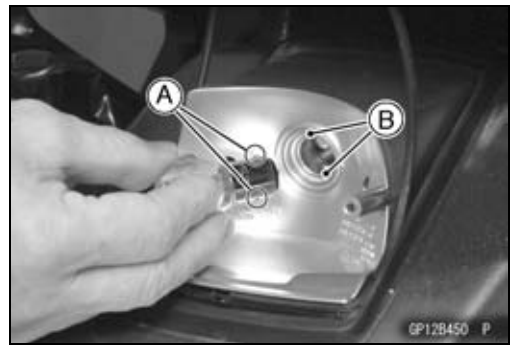
Tail/Brake Light Bulb Replacement

- Remove the tail/brake light lens screws [A] and lens [B].



Lighting System

- Insert the new bulb by aligning the pins [A] with the grooves [B] in the walls of the socket so that the pin closest to the bulb base is to the upper right.
- Turn the bulb clockwise pushing it into the bulb base.



Tail/Brake Light Lens Removal/Installation

- Be careful not to overtighten the lens mounting screws.

Turn Signal Light Bulb Replacement

- Refer to the Tail/Brake Light Bulb Replacement section.

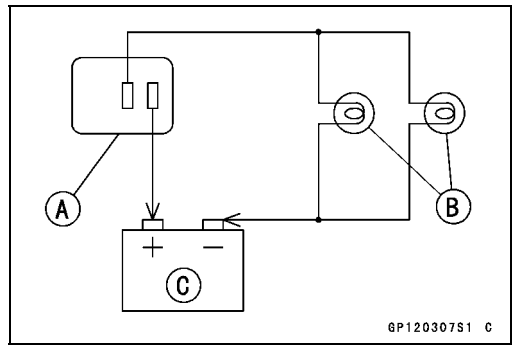
○Be careful not to overtighten the lens mounting screws.

Turn Signal Relay Inspection

- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Connect one 12 V battery and turn signal lights as indicated in the figure, and count how many times the lights flash for one minute.

  Turn Signal Relay [A]
  Turn Signal Lights [B]
  12 V Battery [C]

★If the lights do not flash as specified, replace the turn signal relay.



Testing Turn Signal Relay

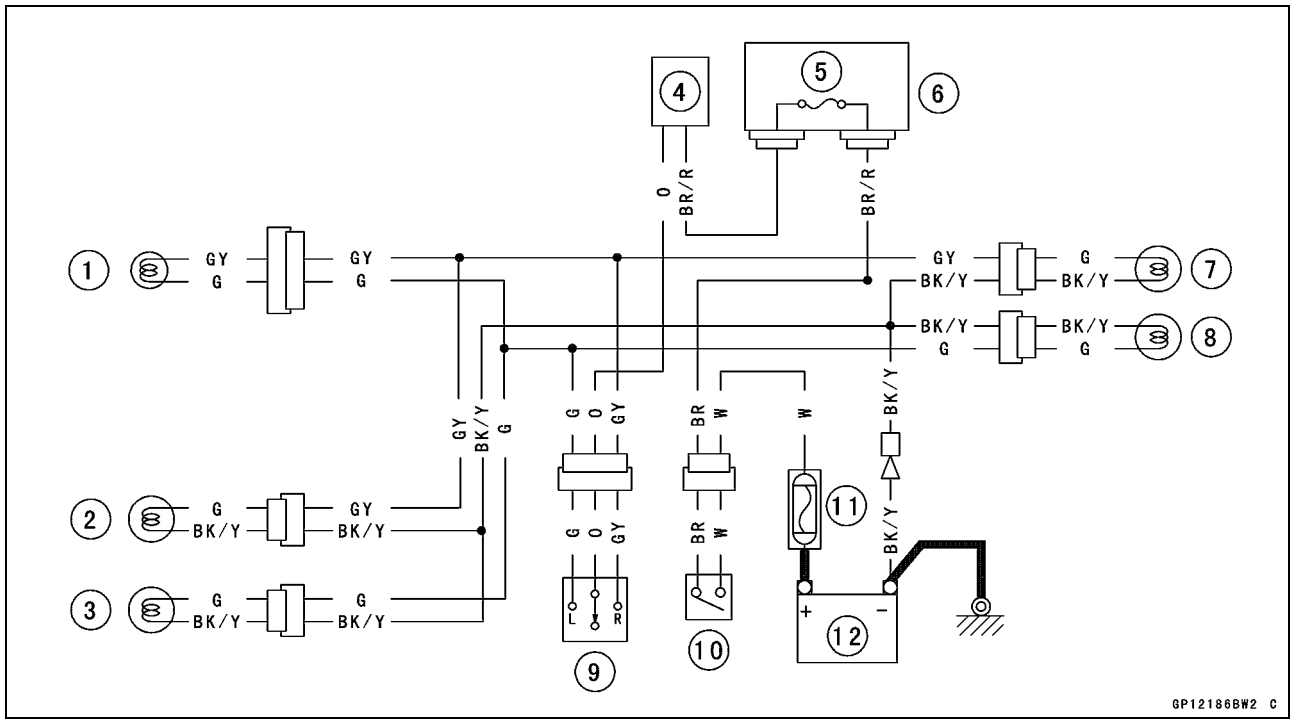
Load		Flashing times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	140 ~ 250
2	20	75 ~ 95

*: Cycle(s) per minute

**: Corresponds to “light burned out”.

Lighting System

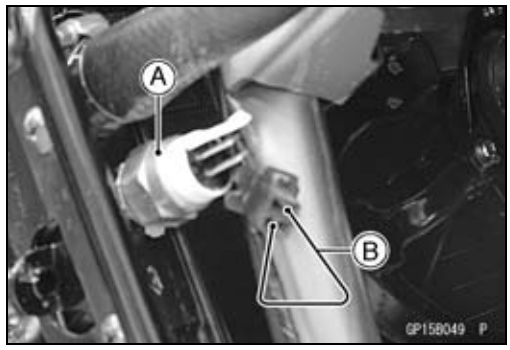
Turn Signal Light Circuit



1. Turn Signal Indicator Light
2. Front Right Turn Signal Light
3. Front Left Turn Signal Light
4. Turn Signal Relay 10 W
5. Turn Signal Fuse 10 A
6. Junction Box
7. Rear Right Turn Signal Light
8. Rear Left Turn Signal Light
9. Turn Signal Switch
10. Ignition Switch
11. Main Fuse 30 A
12. Battery 12 V 10 Ah

Radiator Fan System

Fan System Circuit Inspection



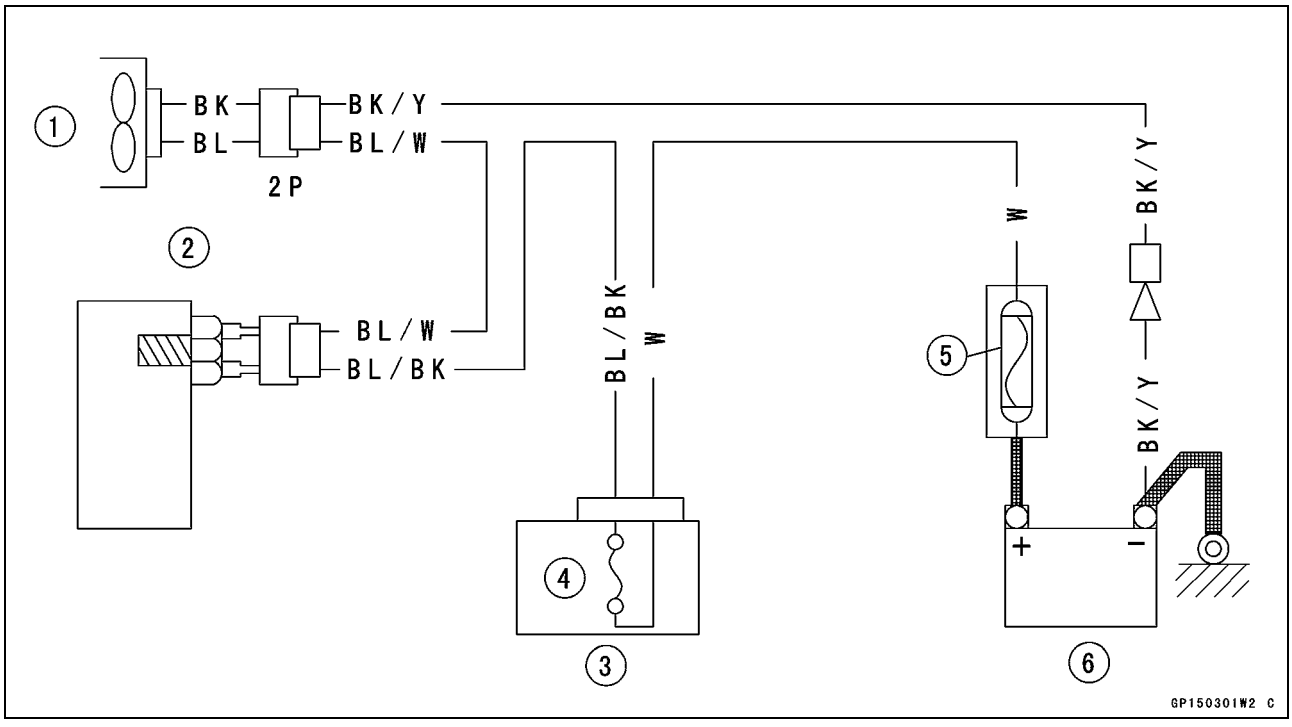
- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the connector from the radiator fan switch [A].
- Using an auxiliary wire [B], connect the radiator fan switch connector.

★If the fan turns, inspect the fan switch.

★If the fan does not turn, inspect the following.

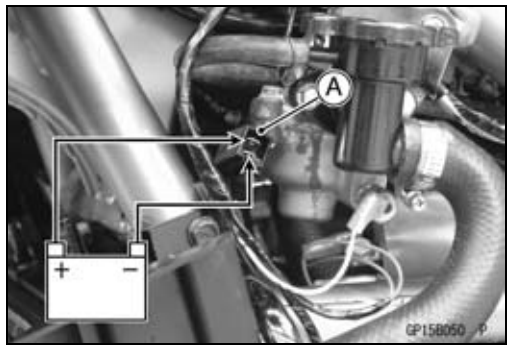
Lead and Connectors
Main Fuse and Fan Fuse
Fan Motor

Radiator Fan Circuit



1. Radiator Fan
2. Radiator Fan Switch
3. Junction Box
4. Fan Fuse 10 A
5. Main Fuse 30 A
6. Battery 12 V 10 Ah

Fan Motor Inspection



- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the fan motor lead connector [A].
- Using two auxiliary wires, supply battery power to the fan.

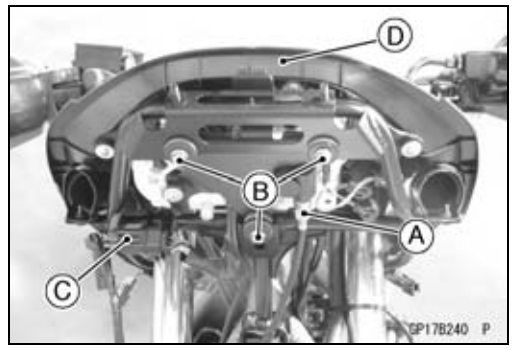
Wire Connectors
Blue Lead ←→ Battery (+)
Black Lead ←→ Battery (–)

★If the fan does not turn at this time, the fan is defective and must be replaced.

Meter Unit

Meter Unit Removal

- Remove the headlight unit and housing (see Headlight Unit/Housing Removal).
- Remove the speedometer cable upper end [A] and the mounting nuts [B].
- Disconnect the meter connectors [C] and take off the meter unit [D].

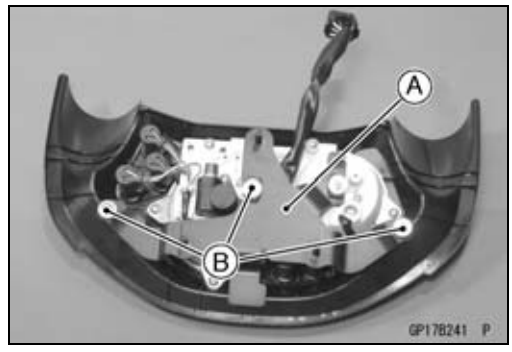


CAUTION

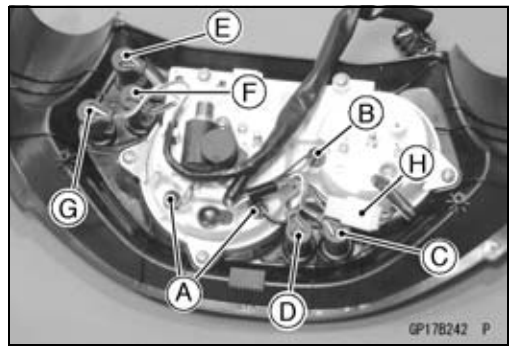
Place the meter unit so that the face is up. If a meter unit is left upside down or sideways for any length of time, it will malfunction.

Meter Unit Disassembly

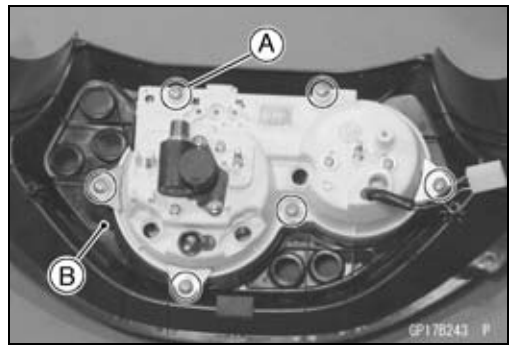
- Remove the meter unit (see Meter Unit Removal).
- Remove the bracket [A] by taking off three nuts [B].



- Remove the following meter indicator leads.
  Speedometer Lights [A]
  Tachometer Light [B]
  Neutral Indicator Light [C]
  Turn Signal Indicator Light [D]
  Oil Pressure Warning Light [E]
  High Beam Indicator Light [F]
  Water Temperature Warning Light [G]
  Tachometer Connector [H]

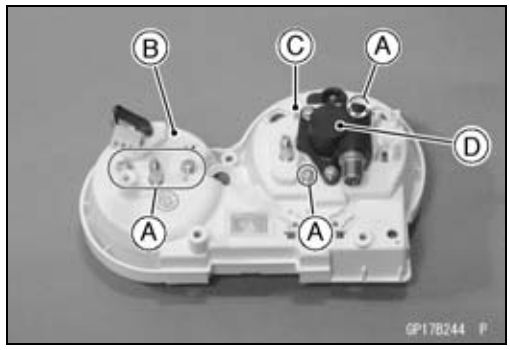


- Remove the screws [A] and take off the front cover [B].



Meter Unit

● Remove the screws [A] for removal of each unit.
Tachometer [B]
Speedometer [C]
Speedometer Gear [D]



NOTE

○*Turns out the trip knob counterclockwise before removing the speedometer mounting screws.*

Tachometer Inspection

● Check the tachometer circuit wiring (see Wiring Inspection).

★If all wiring and components other than the tachometer unit check out good, the unit is suspect. Check the unit as shown.

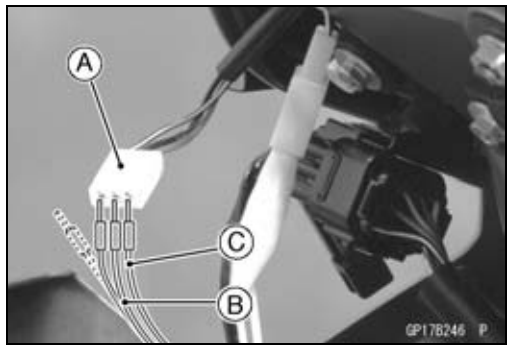
○Remove: upper fairing headlight body (see Headlight Unit/Housing Removal).

○Disconnect the tachometer connector [A].

○Connect the tachometer connector using an auxiliary wires for BR [B] and BK/Y [C] leads.

○Turn the ignition switch ON.

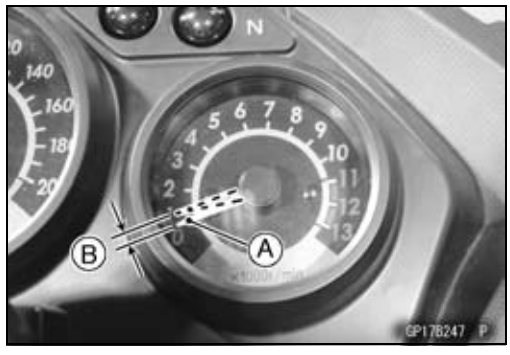
○Open and connect the BR lead to the BK tachometer lead repeatedly.



○Then the tachometer needle [A] should flick [B].

○Turn the ignition switch OFF.

★If the needle does not flick, replace the tachometer unit.

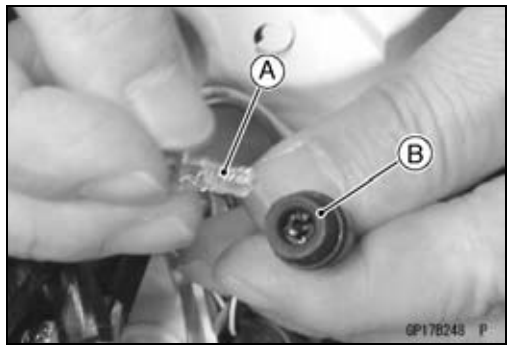


Bulb Replacement

● To remove the wedge-base type bulb [A], pull the bulb out of the socket [B].

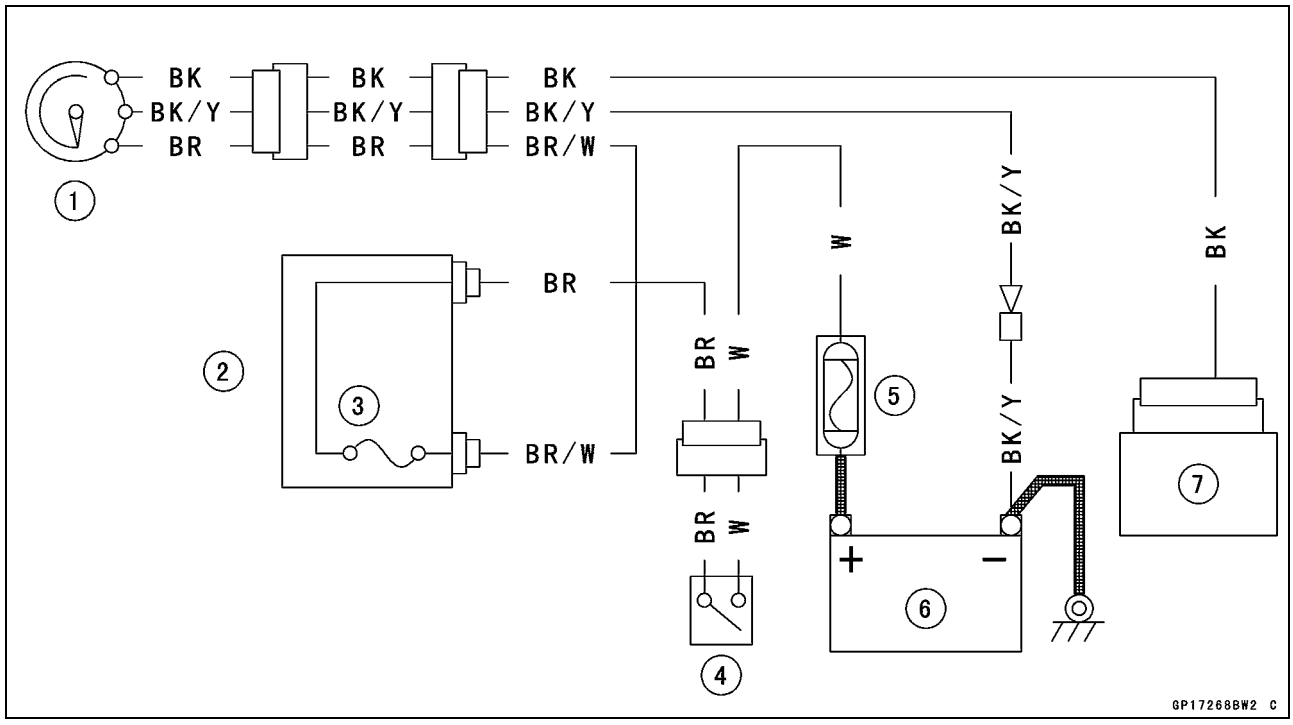
CAUTION

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.



Meter Unit

Tachometer Circuit



1. Tachometer
2. Junction Box
3. Ignition Fuse 10 A
4. Ignition Switch
5. Main Fuse 30 A
6. Battery 12 V 10 AH
7. IC Igniter

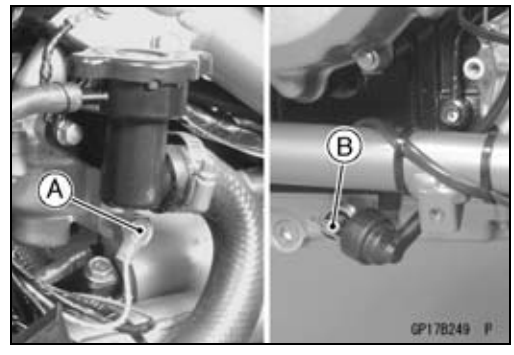
Water Temperature Warning System Inspection

The water temperature warning light goes on when the ignition switch is turned on and goes off soon after the engine starts running (oil pressure switch off) to ensure that its circuit functions properly. The warning light also goes on whenever the coolant temperature rises to **113 ~ 117°C (235 ~ 243°F)** when the motorcycles is in operation. If it stays on, stop the engine and check the coolant level in the reserve tank after the engine cools down.

- Inspect the water temperature warning light and the system wiring (see Wiring Inspection).
- Turn on the ignition switch.
- Disconnect the water temperature switch lead [A] and oil pressure switch lead, then ground them together to the frame or engine using auxiliary lead.

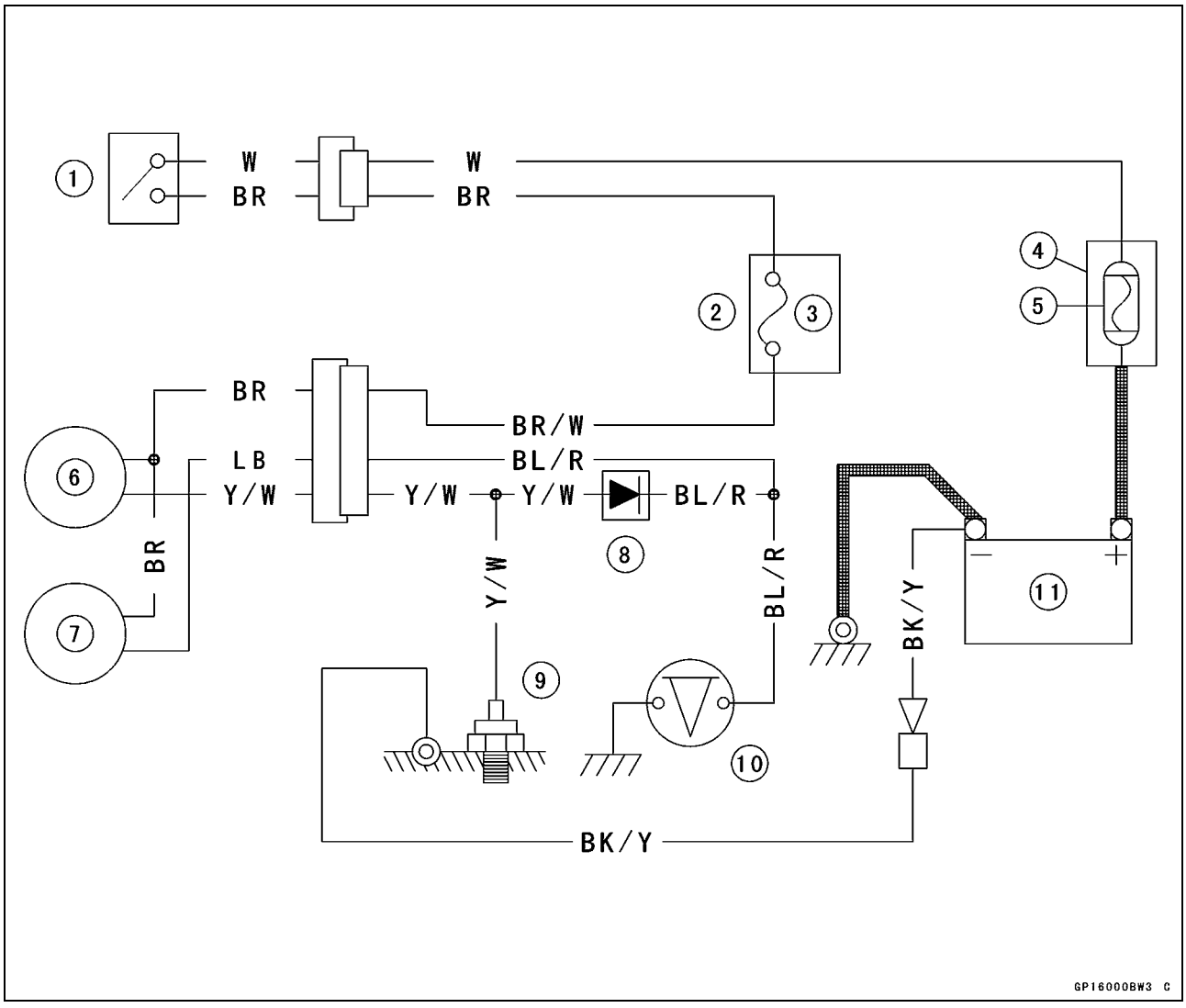
★If the warning light is lit, inspect the water temperature switch (see Specifications) and the oil pressure switch [B]. Replace any switch if damaged.

★If the warning light is not lit, check the warning light bulb.



Meter Unit

Water Temperature Warning System



1. Ignition Switch
2. Junction Box
3. Ignition Fuse 10 A
4. Starter Relay
5. Main Fuse 30 A
6. Water Temperature Warning Light
7. Oil Pressure Warning Light
8. Rectifier
9. Water Temperature Switch
10. Oil Pressure Switch
11. Battery 12 V 10 AH

Switches and Sensors

Brake Light Switch Inspection

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

- Using the hand tester, check to see that only connections shown in the table have continuity (about zero ohm).

○For the handlebar switches and the ignition switch refer to the tables in the Wiring Diagram.

★If the switch has an open or short, repair it or replace it with a new one.

Special Tool - Hand Tester: 57001-1394

Neutral Switch Connections

	SW. Terminal	⏚
When transmission is in neutral	○———	———○
When transmission is not in neutral		

Rear Brake Light Switch Connections

	BR	BL
When brake pedal is pushed down	○—	—○
When brake pedal is released		

Oil Pressure Switch Connections*

	SW. Terminal	⏚
When engine is stopped	○———	———○
When engine is running		

*: Engine lubrication system is in good condition

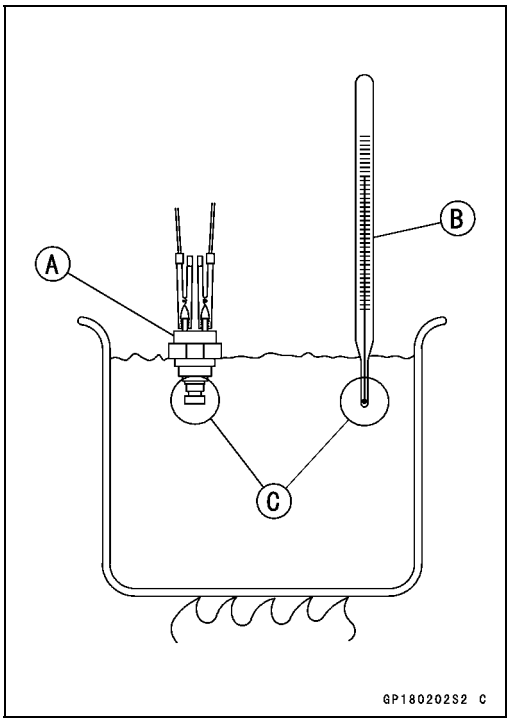
Side Stand Switch Connections*

	BK/Y	G/W
When side stand is up	○—	—○
When side stand is down		

Switches and Sensors

Radiator Fan Switch Inspection

- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the fan switch (see Radiator Fan Switch Removal in the Cooling System chapter).
- Suspend the switch [A] in a container of coolant so that the temperature-sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer [B] in the coolant so that the sensitive portions [C] are located in almost the same depth.



NOTE

○*The switch and thermometer must not touch the container sides or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.
- Using the hand tester, measure the internal resistance of the switch across the terminals at the temperatures shown in the table.

★If the hand tester does not show the specified values, replace the switch.

Radiator Fan Switch Resistance

Rising temperature:

From OFF to ON at 96 ~ 100°C (205 ~ 212°F)

Falling temperature:

From ON to OFF at 91°C (196°F)

Less than temperature at ON

ON: Less than 0.5 Ω

OFF: More than 1 MΩ

Switches and Sensors

Water Temperature Switch Inspection

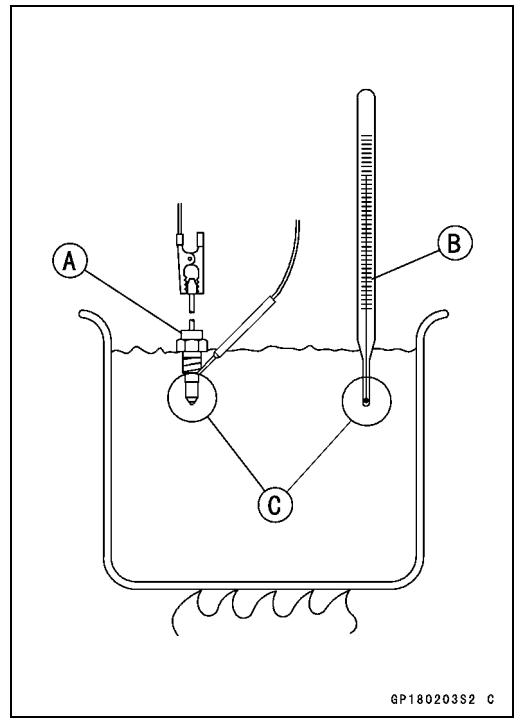
- Remove the water temperature switch (see Water Temperature Switch Removal in the Cooling System chapter).
- Suspend the switch [A] in a container of coolant so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer [B] in the coolant so that the sensitive portions [C] are located in almost the same depth.

NOTE

○*The switch and thermometer must not touch the container sides or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the switch across the terminal and the body at the temperatures shown in the table.

★If the hand tester does not show the specified values, replace the switch.



Water Temperature Switch Connections

Rising temperature:

From OFF to ON at 113 ~ 117°C (235 ~ 243°F)

Falling temperature:

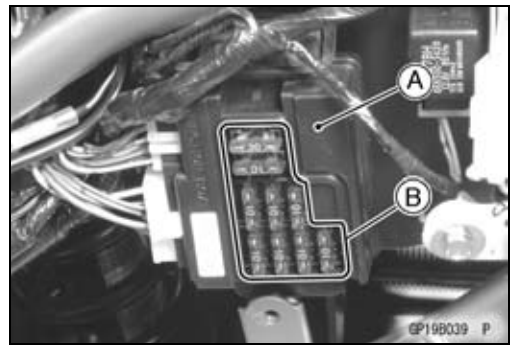
From ON to OFF at 108°C (226°F) temperature less than ON temperature

ON: Less than 0.5 Ω

OFF: More than 1 MΩ

Junction Box

The junction box [A] has fuses [B], relays, and diodes. The relays and diodes can not be removed.



Junction Box Fuse Circuit Inspection

- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Remove the junction box.
- Pull off the connectors from the junction box.
- Make sure all connector terminals are clean and tight, and none of them have been bent.

★Clean the dirty terminals, and straighten slightly-bent terminals.

- Check conductivity of the numbered terminals with the hand tester.

★If the tester does not read as specified, replace the junction box.

Special Tool - Hand Tester: 57001-1394

Fuse Circuit Inspection

Tester Connection	Tester Reading (Ω)	Tester Connection	Tester Reading (Ω)
1 - 1A	0	1A - 8	∞
1 - 2	0	2 - 8	∞
3A - 4	0	3A - 8	∞
6 - 5	0	6 - 2	∞
6 - 10	0	6 - 3A	∞
6 - 7	0	17 - 3A	∞
6 - 17	0		

Starter Circuit/Headlight Relay Inspection

- Remove the left side cover (see Side Lover Removal in the Frame chapter).
- Remove the junction box.
- Check conductivity of the following numbered terminals by connecting the hand tester and one 12 V battery to the junction box as shown.

★If the tester does not read as specified, replace the junction box.

Special Tool - Hand Tester: 57001-1394

Junction Box

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)		Tester Connection	Tester Reading (Ω)
Headlight Relay	7-8	∞	Starter Circuit Relay	9 -11	∞
	7-13	∞		12 -13	∞
	(+) (–) 13 -9	Not ∞ *		(+) (–) 13-11	∞
				(+) (–) 12 -11	Not ∞ *

(*): The actual reading varies with the hand tester used.
(+): Apply tester positive lead.
(–): Apply tester negative lead.

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (–)	Tester Connection	Tester Reading (Ω)
Headlight Relay	9 - 13	7 - 8	0
Starter Circuit Relay	11 - 12	(+) (–) 13 - 11	Not ∞*

(*): The actual reading varies with the hand tester used.
(+): Apply tester positive lead.
(–): Apply tester negative lead.

Diode Circuit Inspection

- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Remove the junction box.
- Check conductivity of the following pairs of terminals.

Diode Circuit Inspection

Tester Connection	13-8, 13-9, 12-11, 12-14, 15-14, 16-14

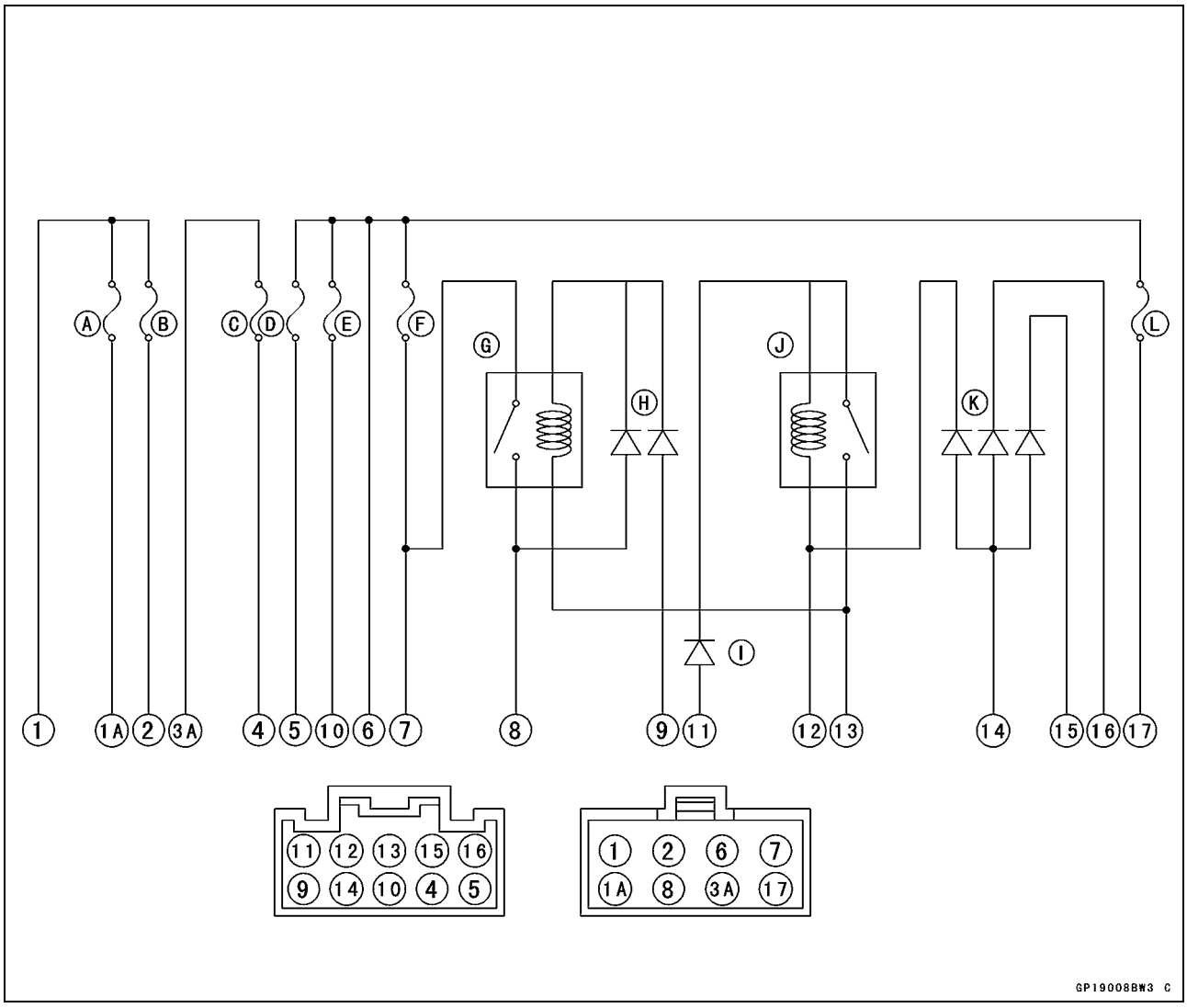
★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the junction box must be replaced.

NOTE

○*The actual meter reading varies with the meter used and the individual diodes, but, generally speaking, the lower reading should be from zero to one half the scale.*

Junction Box

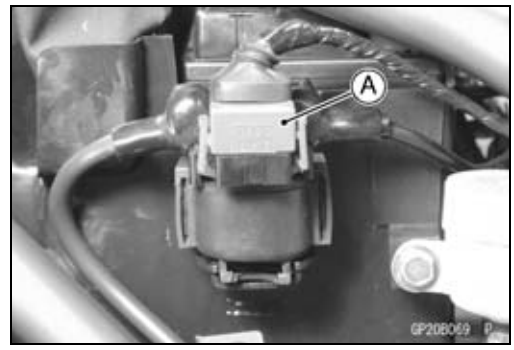
Junction Box Internal Circuit



A: Accessory Fuse 10 A
B: Radiator Fan Fuse 10 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: Starter Lock Out Diodes
L: Taillight Fuse 10 A

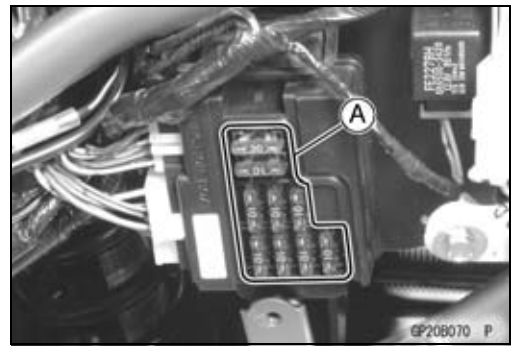
Fuses

30 A Main Fuse Removal



- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Unlock the hook to lift up the lids of the main fuse cover [A].
- Pull up the main fuse cover with the starter relay connector.

Junction Box Fuse Removal

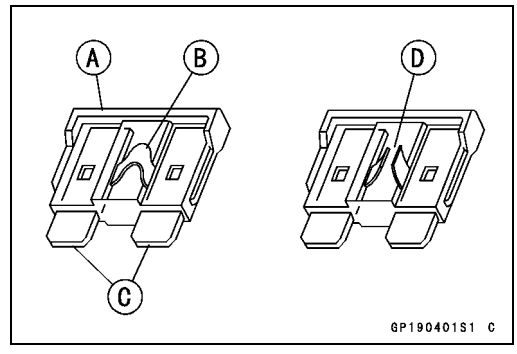


- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Unlock the hook to lift up the lid from the junction box.
- Pull the fuses [A] straight up from the junction box with the nose plier.

Junction Box Fuse Installation

- If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.
- Install the junction box fuses on the original position as specified on the lid.

Fuse Inspection



- Remove the fuse.
- Inspect the fuse element.
- If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

  Housing [A]
  Fuse Element [B]
  Terminals [C]
  Blown Element [D]

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.

Appendix

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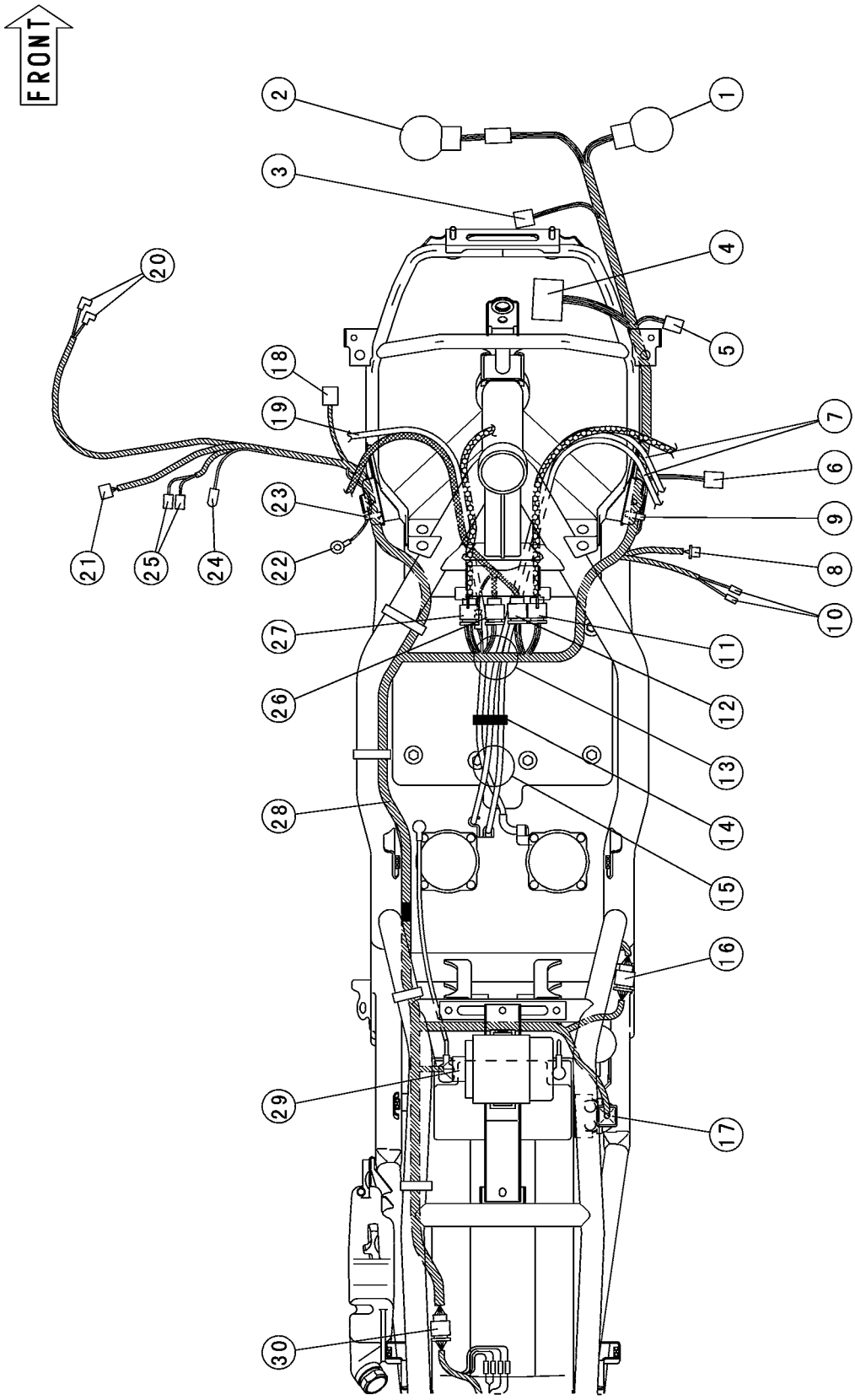
Troubleshooting Guide 17-16

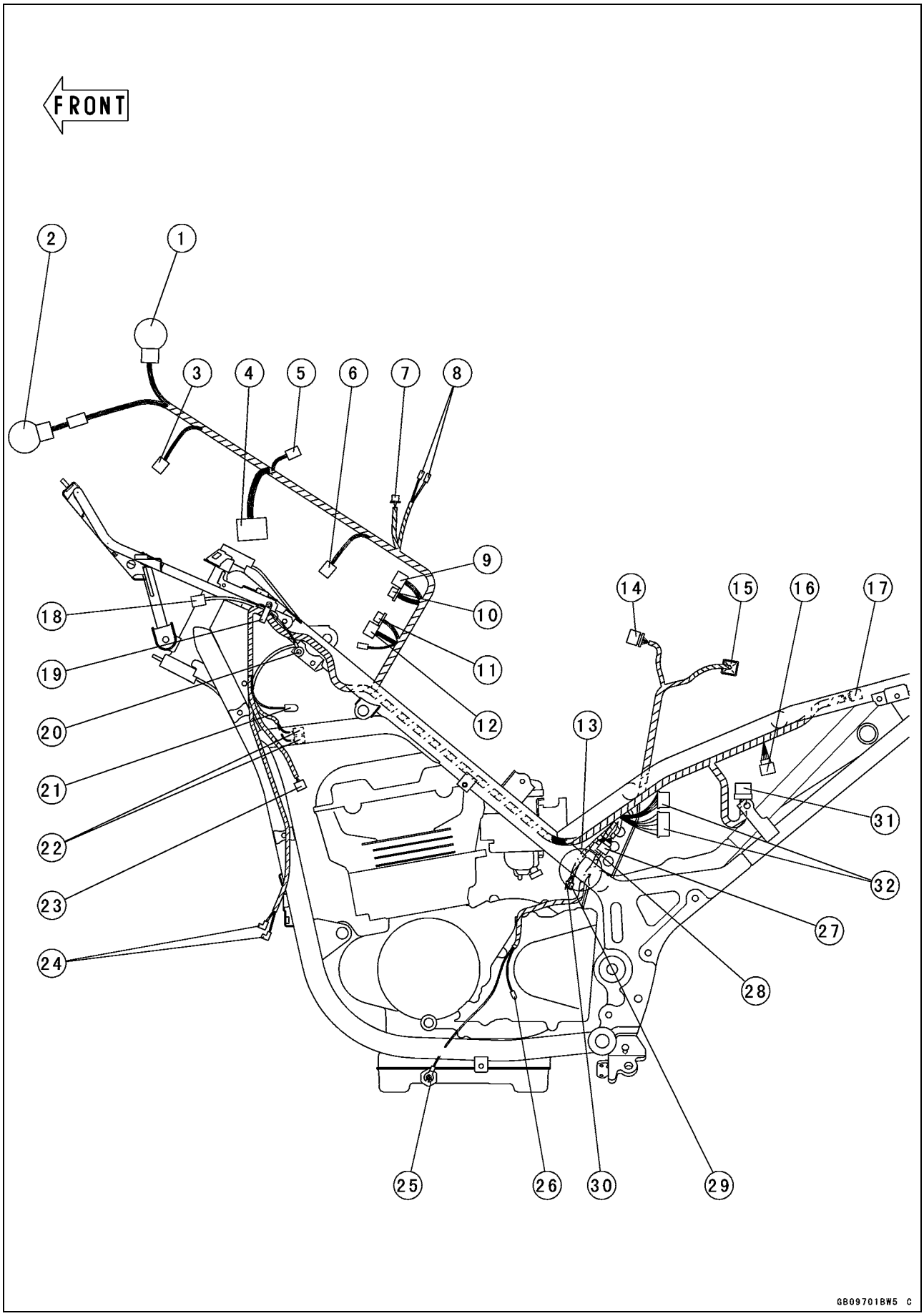
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Headlight Lead Connector (High Beam)
2. Headlight Lead Connector (Low Beam)
3. City Light Lead Connector
4. Meter Assembly Connector
5. Rectifier Lead Connector
6. Front Right Turn Signal Light Lead Connector
7. Throttle Cables
8. Radiator Fan Motor Lead Connector
9. Clamp (Clamp the main harness with turn signal light lead)
10. Ignition Coil Lead Connector (Right)
11. Handlebar Switch Lead Connector (Right)
12. Starter Lockout Switch Lead Connector
13. Route the throttle cables under the main harness.
14. Clamp
15. Route the choke cable under the throttle cables.
16. Rear Brake Light Switch Lead Connector
17. Starter Relay Connector
18. Front Left Turn Signal Light Lead Connector
19. Choke Cable
20. Horn Lead Connectors
21. Thermostat Lead Connector
22. Frame Ground Lead Terminal
23. Clamp (Clamp the frame ground lead with the main harness.)
24. Water Temperature Sensor Lead Connector
25. Ignition Coil Lead Connectors (Left)
26. Ignition Switch Lead Connector
27. Handlebar Switch Lead Connector (Left)
28. Main Harness
29. IC Igniter Lead Connector
30. Rear Harness Connector

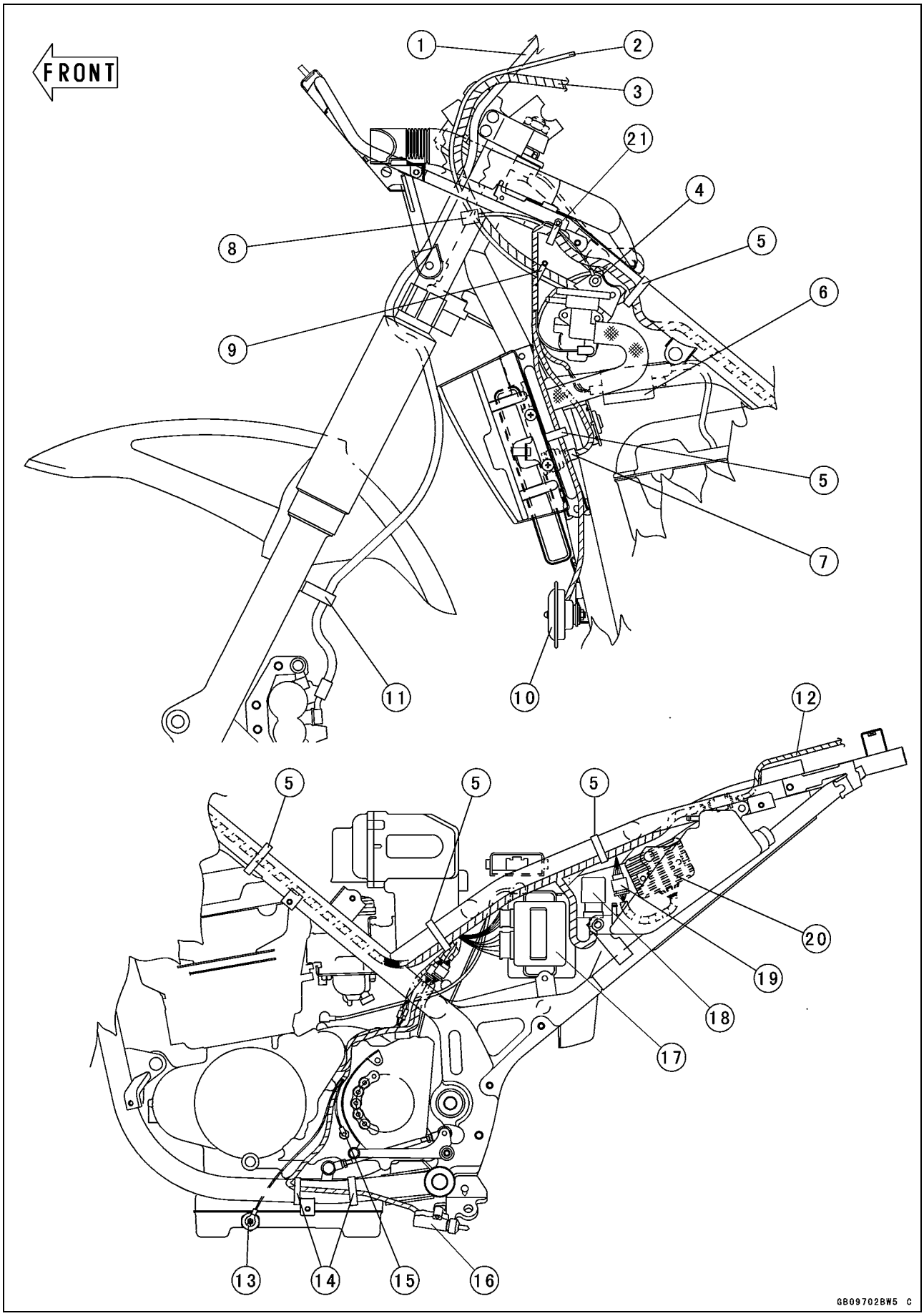
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Headlight Lead Connector (High Beam)
2. Headlight Lead Connector (Low Beam)
3. City Light Lead Connector
4. Meter Assembly
5. Diode Lead Connector
6. Front Right Turn Signal Light Lead Connector
7. Radiator Fan Motor Lead Connector
8. Ignition Coil Lead Connectors (Right)
9. Handlebar Switch Lead (Right)
10. Starter Lockout Switch Lead Connector
11. Ignition Switch Lead Connector
12. Handlebar Switch Lead (Left)
13. Route the leads over the frame cross pipe.
14. Rear Brake Light Switch Lead Connector
15. Starter Relay Lead
16. Regulator/Rectifier Lead Connector
17. Rear Harness
18. Front Left Turn Signal Light Lead Connector
19. Clamp (Clamp the harness with frame ground lead.)
20. Frame Ground Lead Terminal
21. Water Temperature Sensor Lead
22. Ignition Coil Lead Connectors (Left)
23. Radiator Fan Switch Lead
24. Horn Lead Connectors
25. Oil Pressure Switch Lead Terminal
26. Neutral Switch Lead
27. Crankshaft Sensor Lead Connector
28. Alternator Lead Connector
29. Neutral Switch Lead Connector
30. Oil Pressure Switch Lead Connector
31. Turn Signal Relay
32. Junction Box Lead Connectors

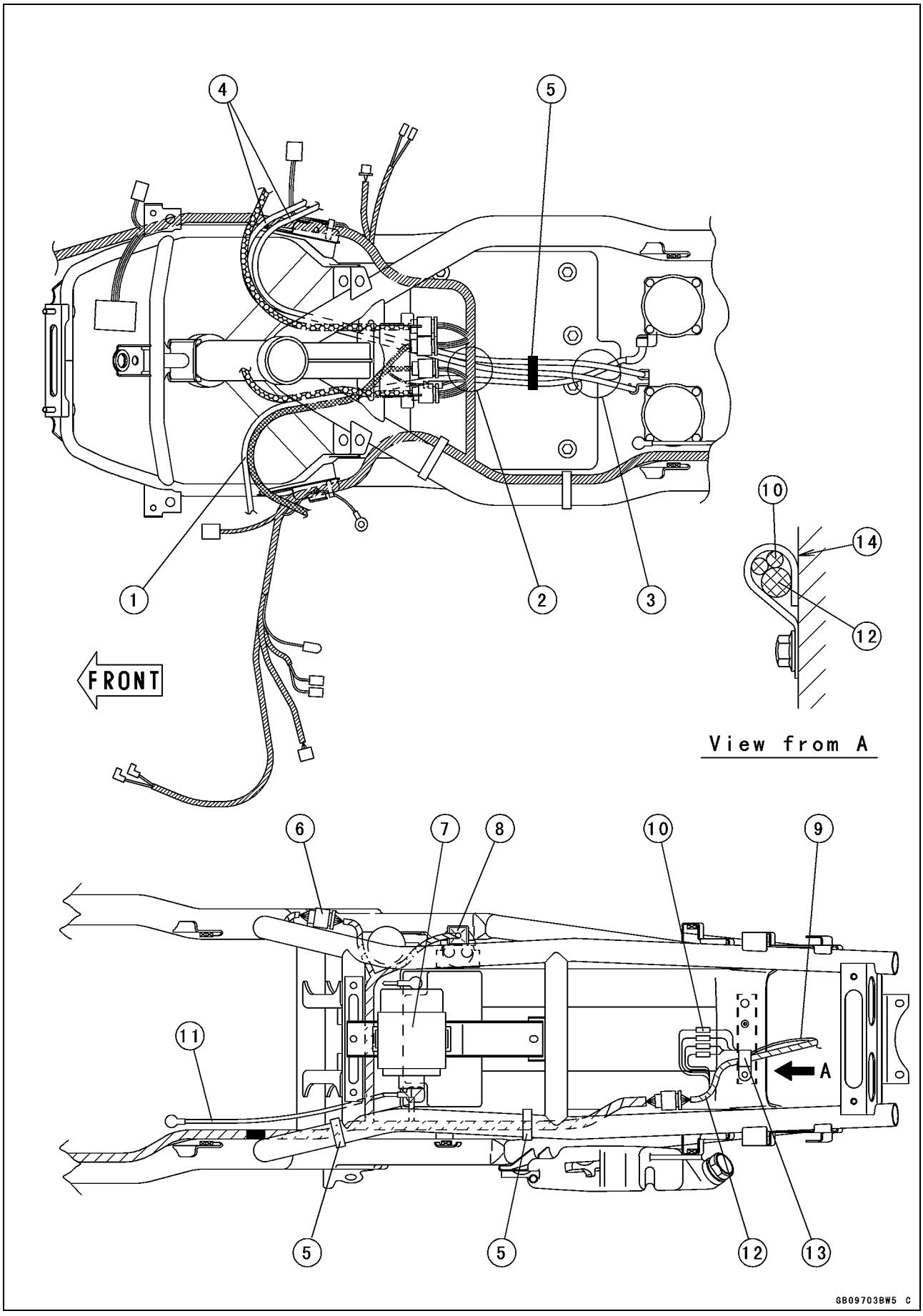
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Front Brake Hose
2. Choke Cable
3. Handlebar Switch Lead (Left)
4. Frame Ground Lead Terminal
5. Band
6. Ignition Coil (Left)
7. Radiator Fan Switch
8. Front Left Turn Signal Light Lead Connector
9. Clamp (Clamp the left handlebar switch lead, choke cable and ignition switch lead.)
10. Horn
11. Front Brake Hose Guide
12. Rear Harness
13. Oil Pressure Switch
14. Bands (Clamp the side stand switch lead so that it does not contact the exhaust pipe)
15. Neutral Switch
16. Side Stand Switch
17. Junction Box (Insert it to the rear fender)
18. Turn Signal Relay
19. Connect the regulator/rectifier lead connector inside of the reserve tank hose.
20. Regulator/Rectifier
21. Clamp (Clamp the left turn signal lead and frame ground lead)

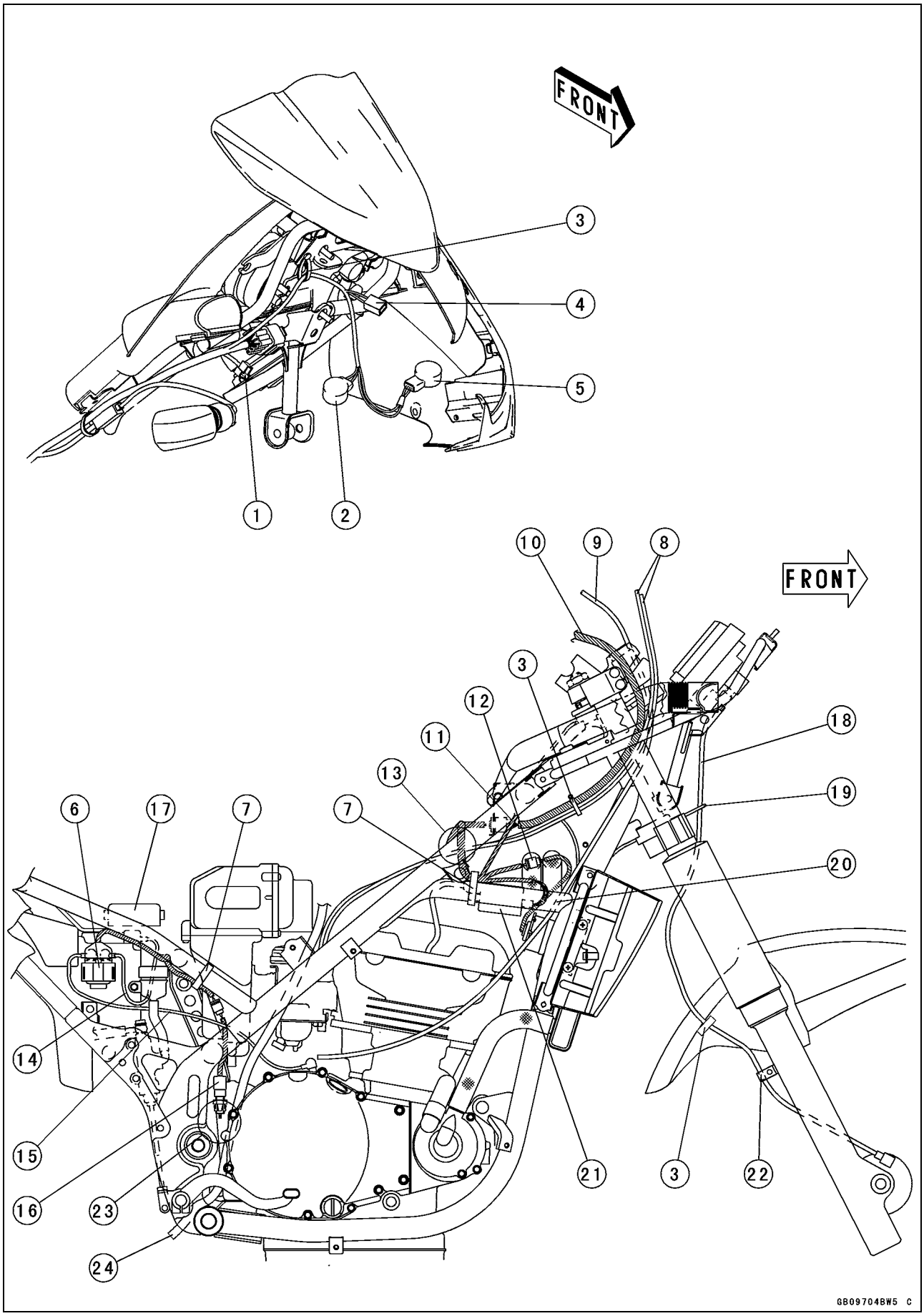
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Choke Cable
2. Route the choke cable and throttle cables under the main harness.
3. Run the choke cable under the throttle cables.
4. Throttle Cables
5. Band
6. Rear Brake Light Switch
7. IC Igniter
8. Starter Relay
9. Route the rear turn signal light lead through the grommet hole of the rear fender.
10. Rear Turn Signal Lead Connectors
11. Battery Negative (–) Lead
12. Rear Harness
13. Clamp (Install the clamp with the rear fender rear)
14. Rear Fender Rear

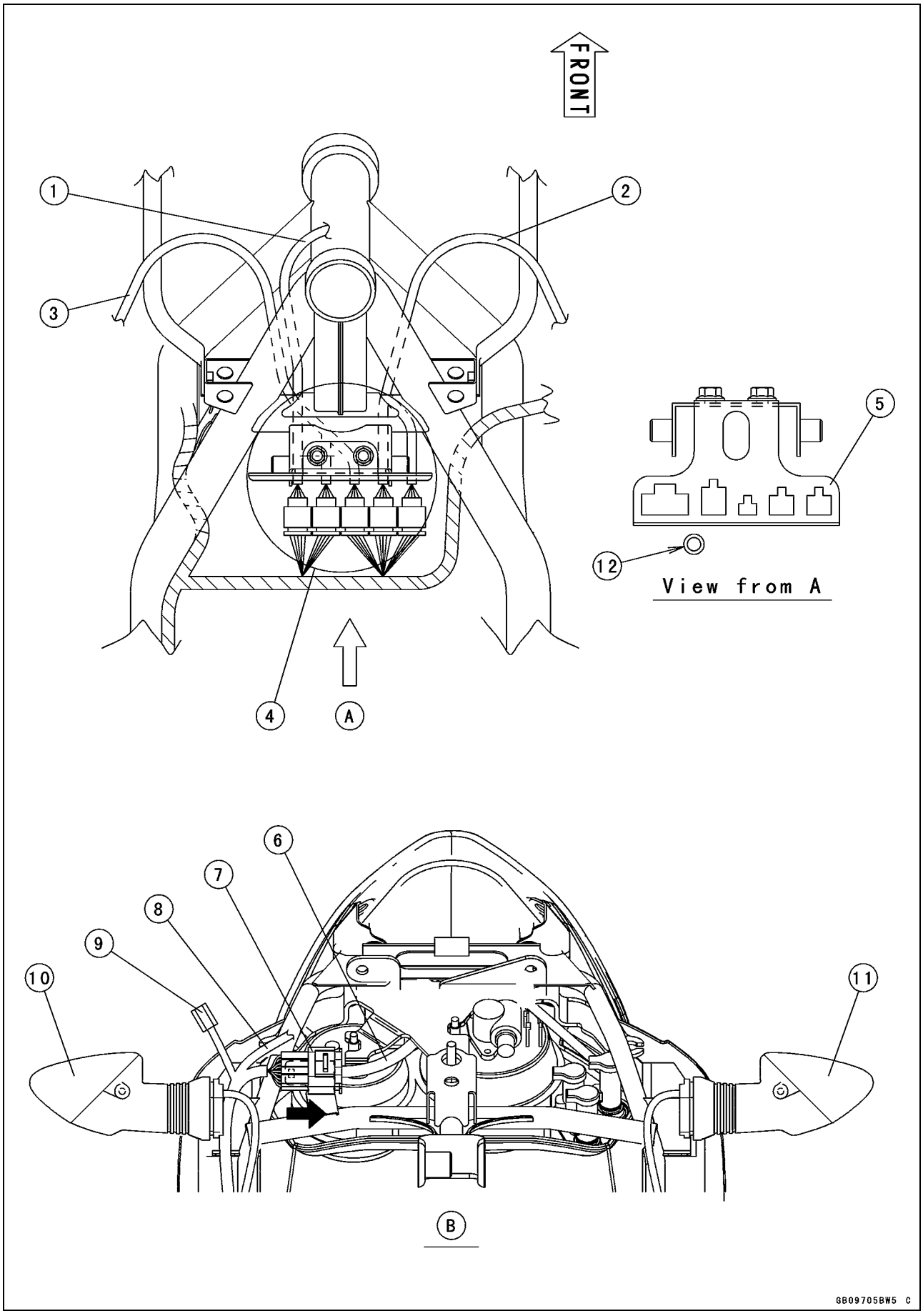
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Diode
2. Headlight Lead Connector (High Beam)
3. Clamp
4. City Light
5. Headlight Lead Connector (Low Beam)
6. Starter Relay
7. Band
8. Throttle Cables
9. Clutch Cable
10. Handlebar Switch Lead Connector (Right)
11. Headlight, City Light, Right Turn Signal Light and Meter Leads
12. Radiator Fan Motor
13. Route the throttle cables under the main harness.
14. Battery Positive (+) Lead
15. Starter Motor Lead (Route it between the air cleaner housing and frame through the front of the air cleaner housing.)
16. Rear Brake Light Switch
17. Insert the igniter cover into the battery holder bracket.
18. Speedometer Cable
19. Guide (Run the meter cable through the guide.)
20. Route the clutch cable inside of the frame.
21. Ignition Coil (Right)
22. Guide (Run the speedometer cable through the guide)
23. Drain tube shall not lap with the rear brake light switch.
24. Drain Tube

Cable, Wire, and Hose Routing

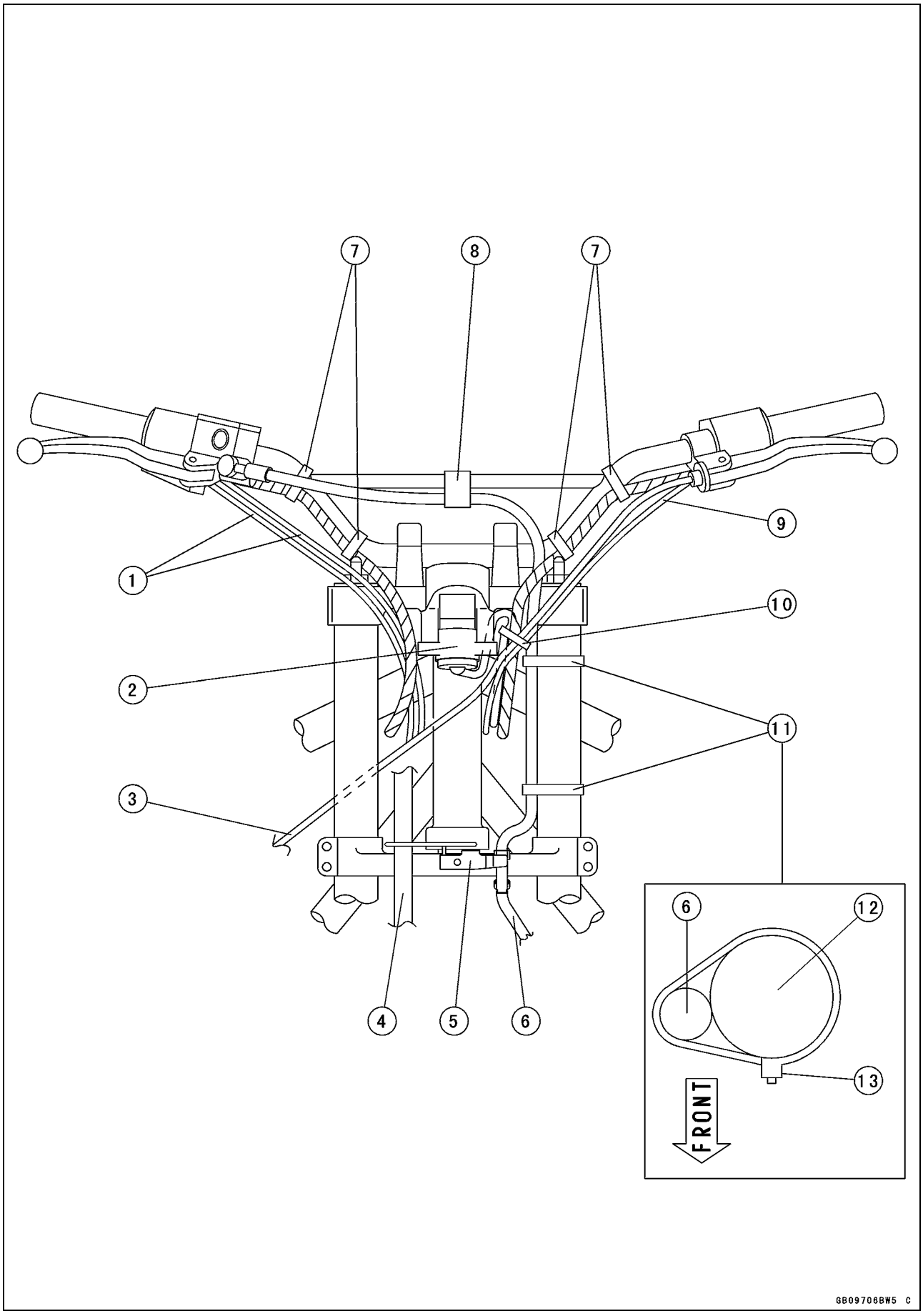


Cable, Wire, and Hose Routing

1. Ignition Switch Lead
2. Handlebar Switch Lead (Right)
3. Handlebar Switch Lead (Left)
4. Fix the connector with bracket (5).
5. Bracket
6. Meter Leads
7. Insert the connector to arrow direction.
8. to Headlight
9. Diode Connector
10. Front Right Turn Signal Light
11. Front Left Turn Signal Light
12. Left handlebar switch terminal shall be connected under the bracket.

A. View from A
B. View from under the upper fairing.

Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Throttle Cables
2. Ignition Switch
3. Clutch Cable
4. Route the speedometer cable through the clamp (5).
5. Clamp
6. Front Brake Hose
7. Band
8. Clamp
9. Choke Cable
10. Band (Fix the choke cable, clutch cable, left handlebar switch lead and ignition switch leads with the band)
11. Band (Clamp the brake hose inside of the front fork inner tube, and shall not lap with the choke cable, clutch cable and left handlebar switch lead.)
12. Front Fork
13. Cutting of the band position to forward.

Troubleshooting Guide

NOTE

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Starter lockout 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
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Balancer bearing seizure

No fuel flow:
- No fuel in tank
- Fuel tap vacuum hose clogged
- 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 side stand 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:
- 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
- Air cleaner 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

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 vacuum piston doesn't slide smoothly
Carburetor vacuum piston diaphragm damage
Engine oil viscosity too high
Drive train trouble
Brake dragging
Air suction valve trouble
Vacuum switch valve trouble
Coasting enricher trouble

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug cap or high tension wiring trouble
Spark plug cap shorted or not in good contact
Spark plug incorrect
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 clogged, poorly sealed, or missing
Air cleaner duct loose
Air cleaner O-ring damaged
Water or foreign matter in fuel
Carburetor holder loose
Fuel tank 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
Coasting enricher trouble
Balancer mechanism malfunctioning

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 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

Troubleshooting Guide

Coolant incorrect:
Coolant level too low
Coolant deteriorated
Cooling system component incorrect:
Radiator fin damaged
Radiator clogged
Thermostat trouble
Radiator cap trouble
Radiator fan switch trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Cooling system component incorrect:
Radiator fan switch trouble
Thermostat trouble

Clutch Operation Faulty:

Clutch slipping:
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch hub or housing unevenly worn
No clutch lever play
Clutch inner cable trouble
Clutch release mechanism trouble
Clutch not disengaging properly:
Clutch plate warped or too rough
Clutch spring compression uneven
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch hub nut loose
Clutch hub spline damaged
Clutch friction plate installed wrong
Clutch lever play excessive
Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Gear positioning lever binding
Shift return spring weak or broken
Shift return spring pin loose
Shift mechanism arm spring broken
Shift mechanism arm broken
Jumps out of gear:
Shift fork ear worn, bent
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Gear positioning lever spring weak or broken
Shift fork pin worn
Drive shaft, output shaft, and/or gear splines worn
Overshifts:
Gear positioning lever spring weak or broken
Shift mechanism arm spring 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
Rocker arm worn
Rocker shaft worn
Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring worn, broken, or stuck
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mounts loose
Crankshaft bearing worn
Primary chain worn
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Air suction valve damaged
Vacuum switch valve damaged
Alternator rotor loose
Balancer gear worn or chipped
Balancer shaft position maladjusted
Balancer bearing worn
Starter chain, sprocket, guide worn

Abnormal Drive Train Noise:

Clutch noise:
Clutch housing/friction plate clearance excessive

Troubleshooting Guide

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

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 level too low
Engine oil viscosity too low
Camshaft bearing worn
Crankshaft bearings worn
Balancer bearings worn
Oil pressure switch damaged
Wiring faulty
Relief valve stuck open
O-ring at the oil passage in the crankcase damaged

Exhaust Smokes Excessively:

White smoke:
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Cylinder head gasket damaged
Engine oil level too high
Black smoke:
Air cleaner 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 loose
Steering stem head bolt loose
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 absorber adjustment too soft
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking

Brake Doesn't Hold:

Disc brake:
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 (e.g., plates sulphated, shorted through sedimentation, electrolyte insufficient)
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
Battery faulty