

Kawasaki
BAJAJ

Pulsar 200 NS
Rouser 200 NS



Motorcycle Service Manual

Quick Reference Guide

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

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

Pulsar 200 NS

Rouser 200 NS

Motorcycle

Service Manual

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

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

LIST OF ABBREVIATIONS

A	ampere(s)	km/h	kilometers per hour
ABDC	after bottom dead center	L	liter(s)
AC	alternating current	lb	pound(s)
Ah	ampere hour	LCD	Liquid Crystal Display
ATDC	after top dead center	LED	Light Emitting Diode
BBDC	before bottom dead center	m	meter(s)
BDC	bottom dead center	min	minute(s)
BTDC	before top dead center	mph	miles per hour
°C	degree(s) Celsius	N	newton(s)
CDI	capacitive discharge ignition	oz	ounce(s)
cmHg	centimeters of mercury	Pa	pascal(s)
cu in	cubic inch(es)	PS	horsepower
DC	direct current	psi	pound(s) per square inch
F	farad(s)	qt	quart(s)
°F	degree(s) Fahrenheit	r	revolution
ft	foot, feet	r/min, rpm	revolution(s) per minute
g	gram(s) (mass)	s	second(s)
gal	gallon(s)	SOHC	single overhead camshaft
h	hour(s)	TDC	top dead center
HP	horsepower(s)	TIR	total indicator reading
in.	inch(es)	V	volt(s)
kg	(mass)	W	watt(s)
kgf	(force)	Ω	ohm(s)

COUNTRY AND AREA CODES

ID	Indonesia	PH	Philippines
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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-Bajaj Motorcycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki-Bajaj motorcycles are introduced by the Service Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use This Manual

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

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

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

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

DANGER

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

WARNING

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

NOTICE

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

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

NOTE

○ *NOTE indicates information that may help or guide you in the operation or service of the vehicle.*

- 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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1-2 GENERAL INFORMATION

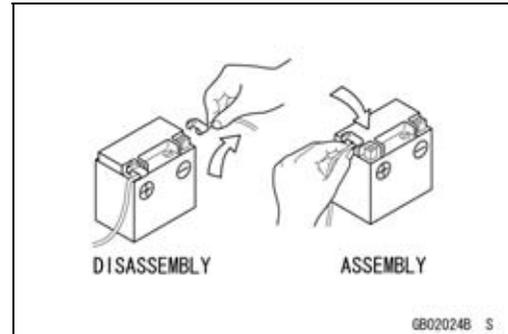
Before Servicing

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

Especially note the following.

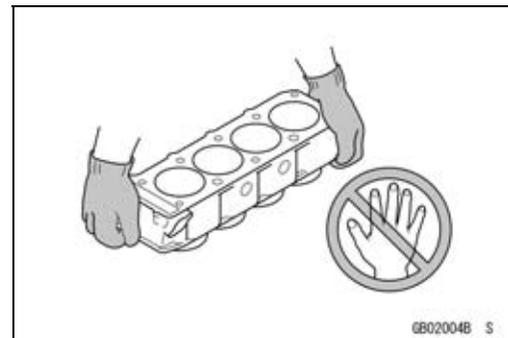
Battery Ground

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



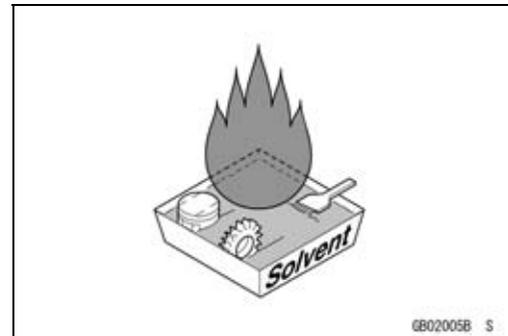
Edges of Parts

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



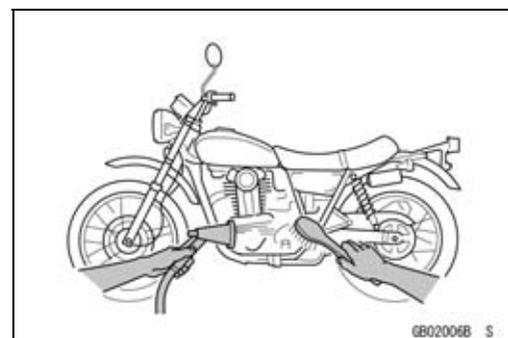
Solvent

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



Cleaning Vehicle before Disassembly

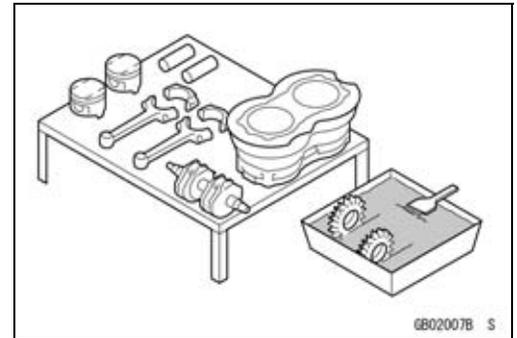
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

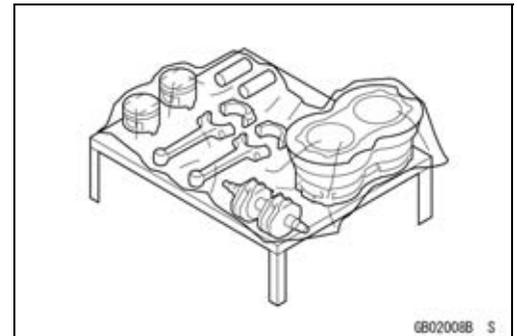
Arrangement and Cleaning of Removed Parts

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



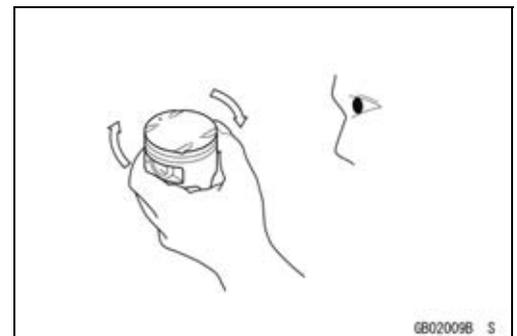
Storage of Removed Parts

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



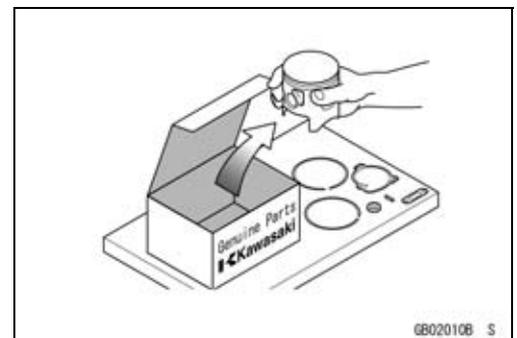
Inspection

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



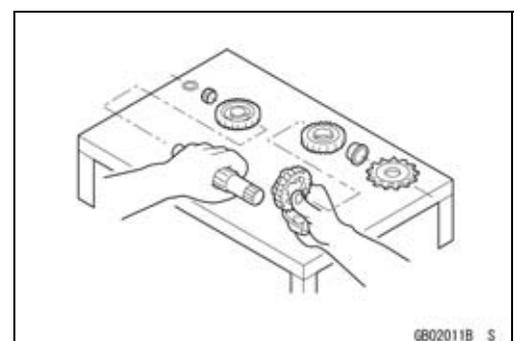
Replacement Parts

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



Assembly Order

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

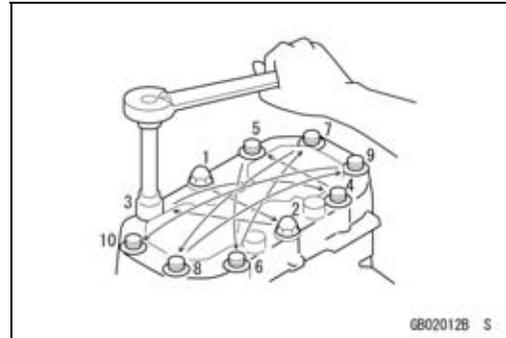


1-4 GENERAL INFORMATION

Before Servicing

Tightening Sequence

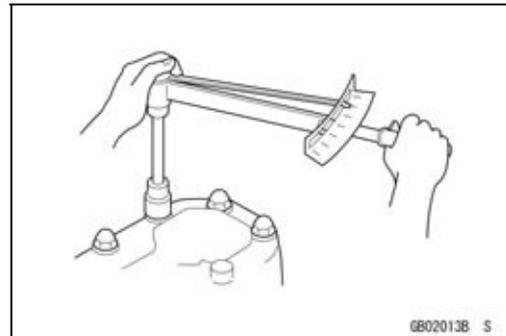
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or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



Tightening Torque

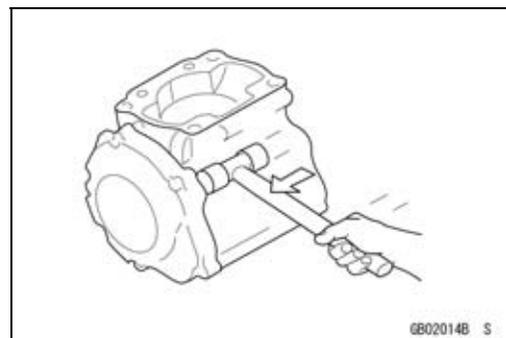
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.

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



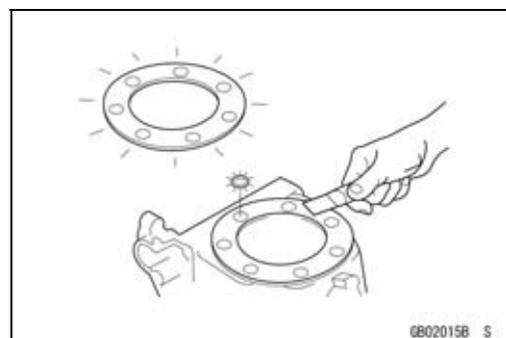
Force

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



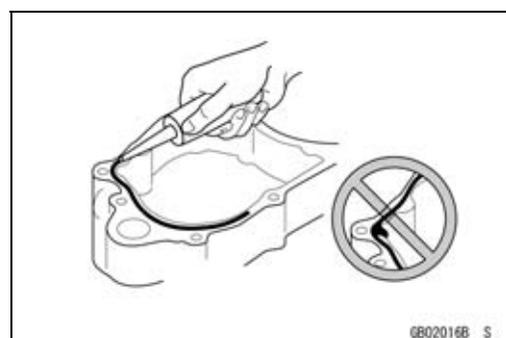
Gasket, O-ring

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



Liquid Gasket, Non-permanent Locking Agent

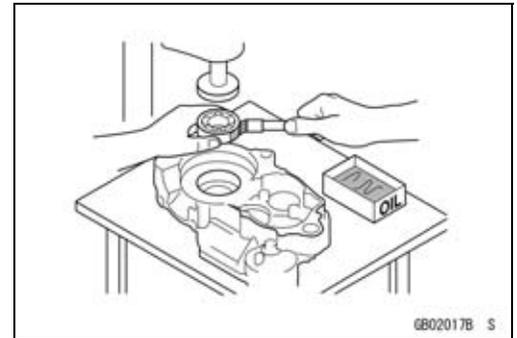
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

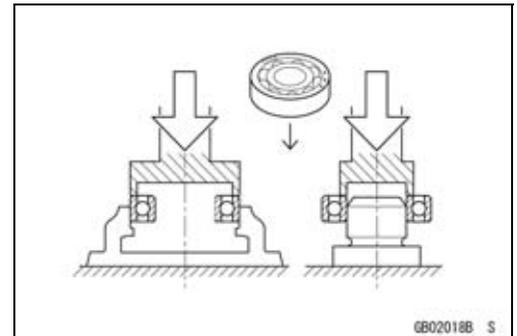
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

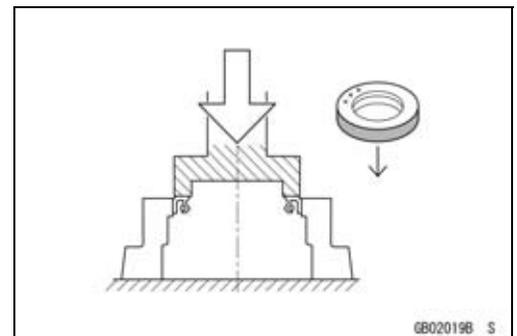
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

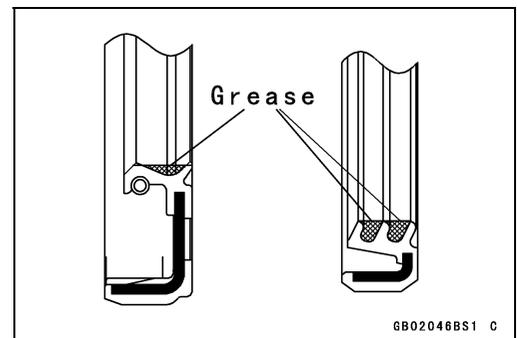


Oil Seal, Grease Seal

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

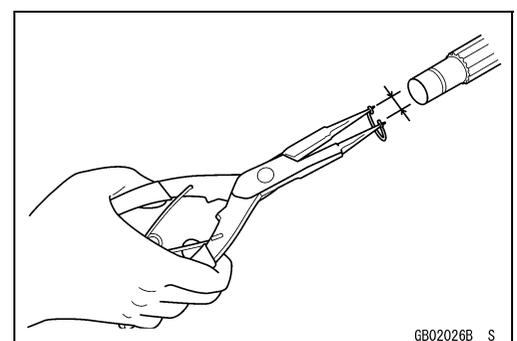


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

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

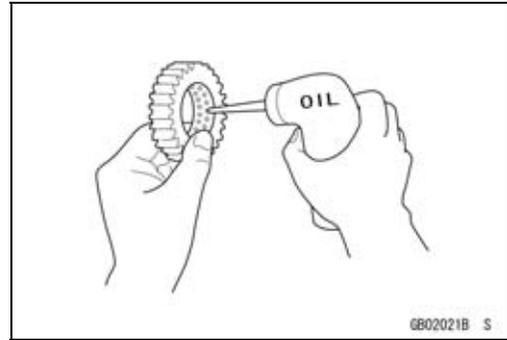


1-6 GENERAL INFORMATION

Before Servicing

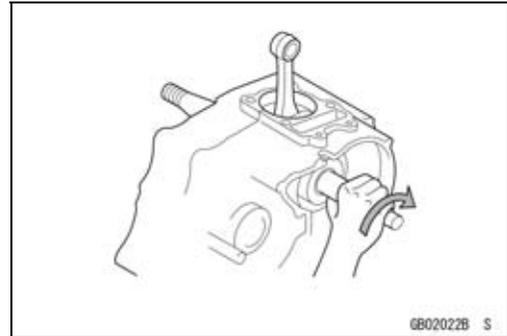
Lubrication

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



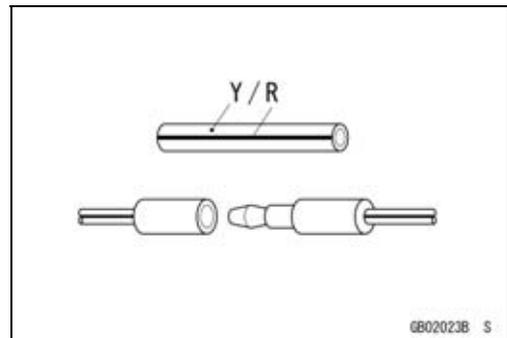
Direction of Engine Rotation

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



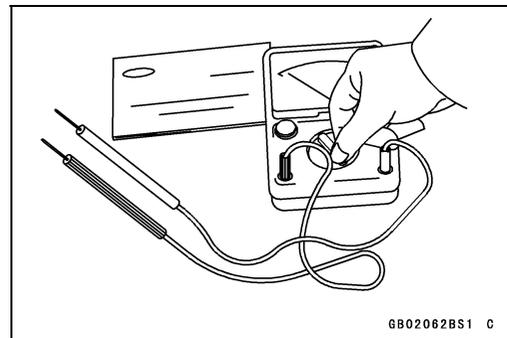
Electrical Leads

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



Instrument

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



Model Identification

BR200AD Left Side View



BR200AD Right Side View



Frame Number



Engine Number



1-8 GENERAL INFORMATION

Model Identification

BR200AE Left Side View



BR200AE Right Side View



General Specifications

Items	BR200AD/AE
Dimensions Overall Length Overall Width Overall Height Wheelbase Road Clearance Seat Height Curb Mass: Front Rear Fuel Tank Capacity	1 965 mm (77.36 in.) 810 mm (31.9 in.) 1 055 mm (41.54 in.) 1 360 mm (53.54 in.) 165 mm (6.50 in.) 805 mm (31.7 in.) 145 kg (320 lb) (PH) 150 kg (331 lb) 71 kg (157 lb) (PH) 75 kg (165 lb) 74 kg (163 lb) (PH) 75 kg (165 lb) 12 L (3.2 US gal)
Performance Minimum Turning Radius	2.5 m (8.2 ft)
Engine Type Cooling System Bore and Stroke Displacement Compression Ratio Maximum Horsepower Maximum Torque Fuel System Minimum Octane Rating: Research Octane Number (RON) Starting System Ignition System Timing Advance Ignition Timing Spark Plug: Center Left/Right Valve Timing: Intake: Open Close Duration Exhaust: Open Close Duration Lubrication System	4-stroke, SOHC, single cylinder Liquid-cooled 72.0 × 49.0 mm (2.83 × 1.93 in.) 200 cm ³ (12.2 cu in.) 11:1 17 kW (23 PS) at 9 500 r/min (rpm) 18 N·m (1.8 kgf·m, 13 ft·lb) at 8 000 r/min (rpm) Carburetor, UCAL UCD33 91 Electric starter CDI Electronically advanced 5° BTDC at 1 500 r/min (rpm) to 36° BTDC at 10 000 r/min (rpm) BOSCH VR5NE CHAMPION P-RG6HCC 0° (ATDC) 30° (ABDC) 210° 35° (BBDC) 0° (ATDC) 215° Forced lubrication (wet sump)

1-10 GENERAL INFORMATION

General Specifications

Items	BR200AD/AE
Engine Oil: Type Viscosity Capacity	API SL with JASO MA2 SAE 20W-50 1.4 L (1.5 US qt)
Drive Train Primary Reduction System: Type Reduction Ratio Clutch Type Transmission: Type Gear Ratios: 1st 2nd 3rd 4th 5th 6th Final Drive System: Type Reduction Ratio Overall Drive Ratio	Gear 3.273 (72/22) Wet multi disc 6-speed, constant mesh, return shift 2.833 (34/12) 2.067 (31/15) 1.556 (28/18) 1.238 (26/21) 1.045 (23/22) 0.917 (22/24) Chain drive 2.786 (39/14) 8.357 at Top gear
Frame Type Caster (Rake Angle) Trail Front Tire: Type Size Rim Size Rear Tire: Type Size Rim Size Front Suspension: Type Wheel Travel Rear Suspension: Type Wheel Travel Brake Type: Front Rear	Pressed steel, Perimeter type 26° 85 mm (3.3 in.) Tubeless 100/80-17M/C 52P J17M/C × MT2.50 Tubeless 130/70-17M/C 62P (IRC) 130/70-17M/C 62S J17M/C × MT3.50 Telescopic fork 130 mm (5.12 in.) Swingarm 120 mm (4.72 in.) Single disc Single disc

General Specifications

Items	BR200AD/AE
Electrical Equipment	
Battery	12 V 8 Ah
Headlight:	
Type	Semi-sealed beam
Bulb:	
High Beam	12 V 60 W
Low Beam	12 V 55 W
Tail/Brake Light	LED
Alternator:	
Type	Three-phase AC
Maximum Output	14.5 A/15.0 V at 8 000 r/min (rpm)

Specifications are subject to change without notice.

1-12 GENERAL INFORMATION

Unit Conversion Table

Prefixes for Units:

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

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

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

Units of Force:

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

Units of Length:

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

Units of Torque:

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

Units of Pressure:

kPa	×	0.01020	=	kgf/cm ²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg
kgf/cm ²	×	98.07	=	kPa
kgf/cm ²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

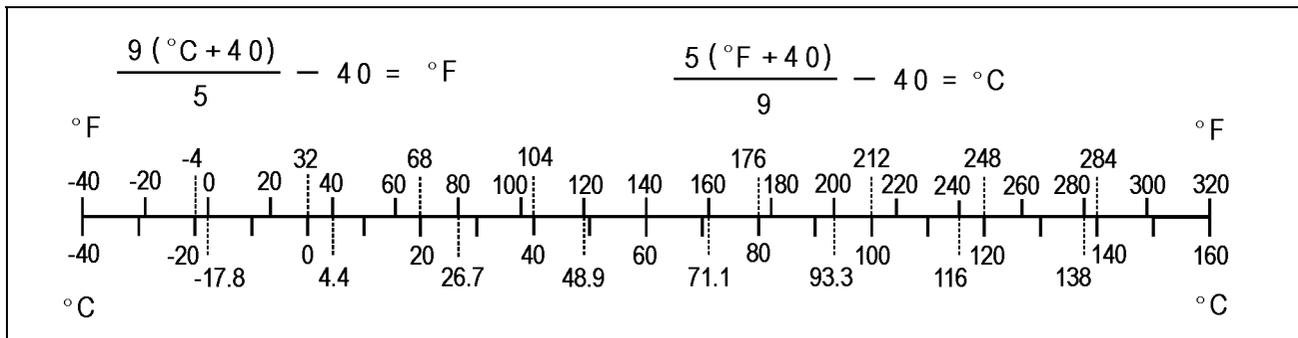
Units of Speed:

km/h	×	0.6214	=	mph
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Units of Power:

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

Units of Temperature:



Periodic Maintenance

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Periodic Maintenance Chart

Servicing: 1st 500 ~ 750 km/30 ~ 45 days, 2nd onward at every 5 000 km

C: Check, A: Adjust, CL: Clean, R: Replace, T: Tighten, L: Lubricate

*: More frequent cleaning may be required when driving in dusty condition.

**: Whichever occurs earlier

Operation	RECOMMENDED FREQUENCY								Subsequent	See Page
	Servicing	1st	2nd	3rd	4th	5th	6th	7th		
	Km x 100	5 ~ 7.5	45 ~ 50	95 ~ 100	145 ~ 150	195 ~ 200	245 ~ 250	295 ~ 300		
Air cleaner element*	CL, R	CL	CL	CL	R	CL	CL	R	Replace at every 15 000 km	2-14
Idle speed	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A		2-15
Throttle control system (play, smooth return, no drag)	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	At every service or 1 year**	2-16
Choke operation	C	Check in 1st service & at every 10 000 km or 1 year *								2-17
Carburetor	CL, A			CL, A		CL, A		CL, A		2-17
Carburetor holder	C, R					C, R			Check & replace if required	2-17
Fuel hoses	C, R	C	C	C	R	C	C	R	Replace at every 15 000 km or 2 years**	2-17
Fuel filter	R				R			R		2-18
Coolant level	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A		2-19
Water hose damage/clamps/leakage	C, R		C, R	C, R	C, R	C, R	C, R	C, R	Check & replace if required	2-19
Water hose	R	Replace at every 35 000 km or 3 years**								2-19
Coolant	R	Replace at every 30 000 km or 2 years**								2-19
Valve clearance	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A		2-21
Air suction system			C	C	C	C	C	C		2-23
Air suction system hose						C				2-23
Clutch operation (play, engagement, disengagement)	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A		2-24
Engine oil	C, R	R	C	R	C	R	C	R	Replace at every 10 000 km or 1 year**	2-25
Oil strainer	CL	CL		CL		CL		CL		2-26
Engine oil filter	R	R		R		R		R	At every oil change	2-26
Tire air pressure	C	Check at every 10 000 km or 1 year**								2-27

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

Operation	Servicing	RECOMMENDED FREQUENCY							Subsequent	See Page
		1st	2nd	3rd	4th	5th	6th	7th		
		Km x 100	5 ~ 7.5	45 ~ 50	95 ~ 100	145 ~ 150	195 ~ 200	245 ~ 250		
Wheel and tires	C, R		C, R	C, R	C, R	C, R	C, R	C, R	Check at every service or 1 year**/replace if required	2-27
Wheel bearing	C, R		C, R	C, R	C, R	C, R	C, R	C, R	Check & replace if required	2-28
Drive chain lubrication	L	Lubricate at every 500 km								2-29
Drive chain slackness	C, A	Check and adjust at every 1 000 km								2-29
Drive chain wear	C		C	C	C	C	C	C		2-30
Drive chain guide wear	C			C		C		C		2-31
Brake system (leak, damage, installation condition)	C	C	C	C	C	C	C	C		2-31
Brake operation (effectiveness, no drag)	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	At every service or 1 year**	2-32
Brake fluid level	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	Check & top up if required in ever service or 6 months**	2-32
Brake fluid	R	Replace at every 20 000 km or 2 years**								2-33
Brake hose/rubber parts of brake master cylinder and caliper	R	Replace at every 30 000 km or 2 years**								2-35, 2-36
Brake pad wear	C, R	C, R	C, R	C, R	C, R	C, R	C, R	C, R	Check & replace if required	2-39
Brake light switch operation	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A		2-40
Suspension system	C			C		C		C		2-40
Steering play	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A		2-41
Steering stem bearing*	C, CL, L, R			C, CL, L, R		C, CL, L, R		C, CL, L, R	Check & replace if required/Lubricate at every 10 000 km or 2 years**	2-42
Electrical system	C	Check at every 10 000 km or 1 year**								2-43
Spark plugs	R	Replace at every 20 000 km								2-46

2-6 PERIODIC MAINTENANCE

Torque and Locking Agent

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

Letters used in the "Remarks" column mean:

L: Apply a non-permanent locking agent.

Lh: Left-hand Threads

R: Replacement Parts

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Fuel Tap Mounting Bolts	3.9	0.40	35 in·lb	
Fuel Tank Cap Bolts	4.9	0.50	43 in·lb	
Fuel Tank Bolts	20	2.0	15	
Throttle Sensor Mounting Bolt	5.0	0.51	44 in·lb	
Cooling System				
Radiator Mounting Nuts	11	1.1	97 in·lb	
Water Temperature Sensor	13	1.3	115 in·lb	
Thermostat Cover Bolts	9.8	1.0	87 in·lb	L
Radiator Fairing Bolts	8.8	0.90	78 in·lb	
Radiator Bracket Bolts	11	1.1	97 in·lb	
Water Pump Cover Bolts	11	1.1	97 in·lb	
Coolant Drain Bolt	9.8	1.0	87 in·lb	
Water Pump Impeller Nut	7.8	0.80	69 in·lb	L
Water Pipe Bolts	9.8	1.0	87 in·lb	L
Engine Top End				
Vacuum Switch Valve Bracket Bolts (PH Model)	11	1.1	97 in·lb	
Vacuum Switch Valve Bolts (PH Model)	8.8	0.90	78 in·lb	
Vacuum Switch Valve Pipe Bolts (PH Model)	5.9	0.60	52 in·lb	
Vacuum Switch Valve Pipe Mounting Bolt (PH Model)	12	1.2	106 in·lb	
Cylinder Head Cover Bolts	11	1.1	97 in·lb	
Cylinder Head Bolts (M10)	46	4.7	34	
Spark Plugs	14	1.4	10	
Cylinder Head Bolts (M6)	11	1.1	97 in·lb	
Camshaft Sprocket Bolt	25	2.5	18	L
Camshaft Chain Tensioner Cap Bolt	11	1.1	97 in·lb	
Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in·lb	
Timing Inspection Cap	11	1.1	97 in·lb	
Exhaust Pipe Holder Studs	23	2.3	17	
Rear Camshaft Chain Guide Mounting Bolt	11	1.1	97 in·lb	L
Exhaust Pipe Holder Nuts	23	2.3	17	
Muffler Body Mounting Bolts (Upper)	11	1.1	97 in·lb	
Muffler Body Clamp Bolt	15	1.5	11	
Muffler Body Mounting Bolts (Lower)	11	1.1	97 in·lb	
Exhaust Pipe Cover Screws	6.9	0.70	61 in·lb	L

PERIODIC MAINTENANCE 2-7

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Muffler End Cover Screws	6.9	0.70	61 in·lb	L
Clutch				
Clutch Cover Bolts	11	1.1	97 in·lb	L, Lh
Clutch Hub Nut	69	7.0	51	
Clutch Stopper Bolts	11	1.1	97 in·lb	
Oil Seal Retaining Plate Bolts	9.8	1.0	87 in·lb	L
Engine Lubrication System				
Oil Pressure Switch	13	1.3	115 in·lb	
Oil Filter Cap Bolts	6.9	0.70	61 in·lb	L
Oil Pump Mounting Bolts	11	1.1	97 in·lb	L
Oil Strainer Cap	8.8	0.90	78 in·lb	
Engine Removal/Installation				
Engine Bracket Bolts	25	2.5	18	
Front Engine Mounting Bolt	34	3.5	25	
Rear Engine Mounting Bolts	27	2.8	20	
Crankshaft/Transmission				
Starter Motor Clutch Bolts	15	1.5	11	L
Balancer Drive Gear Nut	59	6.0	44	L
Primary Gear Nut	59	6.0	44	L
Balancer Driven Gear Bolt	23	2.3	17	L
Crankcase Bolts (L = 40 mm)	11	1.1	97 in·lb	
Crankcase Bolts (L = 60 mm)	11	1.1	97 in·lb	L
Crankshaft Bearing Retaining Plate Screw	9.8	1.0	87 in·lb	
Shift Drum Bearing Retaining Plate Bolt	11	1.1	97 in·lb	L
Connecting Rod Big End Bolts	23	2.3	17	
Breather Plate Screws	6.9	0.70	61 in·lb	L
Balancer Bearing Retaining Plate Bolt	9.8	1.0	87 in·lb	L
Chain Guide Screws	11	1.1	97 in·lb	L
Oil Jet Nozzle	5.9	0.60	52 in·lb	L
Starter Motor Clutch Gear Retaining Plate Bolt	11	1.1	97 in·lb	L
Gear Positioning Lever Bolt	11	1.1	97 in·lb	L
Shift Drum Cam Bolt	11	1.1	97 in·lb	L
Shift Pedal Mounting Bolt	20	2.0	15	
Shift Shaft Return Spring Pin	21	2.1	15	L
Shift Lever Bolt	12	1.2	106 in·lb	
Wheels/Tires				
Front Axle Nut	98	10.0	72	R
Rear Axle Nut	108	11.0	79.7	R
Final Drive				
Engine Sprocket Bolts	11	1.1	97 in·lb	L
Engine Sprocket Cover Bolts	11	1.1	97 in·lb	
Chain Guide Screws	11	1.1	97 in·lb	L
Rear Axle Nut	108	11.0	79.7	R

2-8 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Rear Sprocket Stud Bolts	34	3.5	25	L
Brakes				
Front Caliper Mounting Bolts	25	2.5	18	L
Front Brake Disc Mounting Bolts	28	2.9	21	L
Rear Brake Disc Mounting Bolts	9.8	1.0	87 in·lb	L
Brake Pedal Clamp Bolt	20	2.0	15	
Brake Light Switch Bracket Bolt	4.9	0.50	43 in·lb	
Suspension				
Front Fork Clamp Bolts (Upper)	19	1.9	14	
Front Fork Clamp Bolts (Lower)	27	2.8	20	
Front Fork Top Plugs	27	2.8	20	
Front Fork Bottom Allen Bolts	24	2.4	18	L
Rear Shock Absorber Bolts	34	3.5	25	L
Swingarm Pivot Shaft Nut	137	14.0	101	
Steering				
Handlebar Holder Bolts	19	1.9	14	
Handlebar Weight Bolts	9.8	1.0	87 in·lb	
Steering Stem Head Bolt	49	5.0	36	
Front Fork Clamp Bolts (Upper)	19	1.9	14	
Steering Stem Nut	4.9	0.50	43 in·lb	
Front Fork Clamp Bolts (Lower)	27	2.8	20	
Frame				
Fuel Tank Cover Bolts (Front)	4.9	0.50	43 in·lb	
Fuel Tank Cover Bolts (Side)	8.8	0.90	78 in·lb	
Fuel Tank Cover Bracket Bolts	4.4	0.45	39 in·lb	
Side Stand Bracket Bolts	20	2.0	15	
Side Stand Bolt	27	2.8	20	
Center Stand Bolts	20	2.0	15	
Front Fender Bolts	8.8	0.90	78 in·lb	
Front Fender Bracket Bolts	19	1.9	14	
Front Footpeg Bracket Bolts	20	2.0	15	
Flap Mounting Bolts	20	2.0	15	
Mud Guard Bolts (Front)	8.8	0.90	78 in·lb	
Side Cover Screws	8.8	0.90	78 in·lb	
Seat Cover Bolts (Side)	8.8	0.90	78 in·lb	
Seat Cover Bolts (Top)	8.8	0.90	78 in·lb	
Battery Case Bolts	18	1.8	13	
Front Seat Bolts	9.8	1.0	87 in·lb	
Grab Rail Mounting Bolts	20	2.0	15	
Seat Lock Mounting Bolts	19	1.9	14	
License Plate Mounting Bolts	6.9	0.70	61 in·lb	
Rear Footpeg Bracket Bolts	20	2.0	15	
Rear Footpeg Guard Bolts	6.9	0.70	61 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Rear Fender Bolts	4.9	0.50	43 in·lb	
Electrical System				
Spark Plugs	14	1.4	10	
Alternator Rotor Bolt	58	5.9	43	L
Stator Coil Bolts	7.4	0.75	65 in·lb	L
Water Temperature Sensor	13	1.3	115 in·lb	
Starter Motor Mounting Bolts	11	1.1	97 in·lb	
Alternator Cover Bolts	11	1.1	97 in·lb	
Throttle Sensor Mounting Bolt	5.0	0.51	44 in·lb	
Oil Pressure Switch	13	1.3	115 in·lb	
Neutral Switch Bolts	5.9	0.60	52 in·lb	
Neutral Switch Lead Holding Plate Bolts	5.9	0.60	52 in·lb	L
Neutral Switch Lead Holding Plate Screw	5.9	0.60	52 in·lb	L
Alternator Lead Holding Plate Bolts	4.9	0.50	43 in·lb	L
Starter Motor Clutch Bolts	15	1.5	11	L
Horn Mounting Bolt	20	2.0	15	
Regulator/Rectifier Bolts	11	1.1	97 in·lb	
Ignition Switch Bolts	11	1.1	97 in·lb	

2-10 PERIODIC MAINTENANCE

Torque and Locking Agent

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

Basic Torque for General Fasteners

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

Specifications

Item	Standard	Service Limit
Fuel System		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	---
Idle Speed	1 350 ~ 1 450 r/min (rpm)	---
Air Cleaner Element	Dry paper type	---
Cooling System		
Coolant:		
Type (Recommended)	Permanent type of antifreeze	---
Color	Green	---
Mixed Ratio	Soft water 50%, coolant 50%	---
Freezing Point	-35°C (-31°F)	---
Total Amount	1.0 L (1.1 US qt)	---
Engine Top End		
Valve Clearance:		
Exhaust	0.07 ~ 0.09 mm (0.0028 ~ 0.0035 in.)	---
Intake	0.04 ~ 0.06 mm (0.0016 ~ 0.0024 in.)	---
Clutch		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	---
Engine Lubrication System		
Engine Oil:		
Type	DTS-i 10000 API SL with JASO MA2	---
Viscosity	SAE 20W-50	---
Capacity	1.2 L (1.3 US qt)	---
	1.4 L (1.5 US qt) (when engine is completely dry)	---
Level	Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)	---
Wheels/Tires		
Tread Depth:		
Front	5.0 mm (0.20 in.)	1 mm (0.04 in.)
Rear	6.0 mm (0.24 in.)	1 mm (0.04 in.)
Air Pressure (when Cold):		
Front	Up to 130 kg (287 lb) load: 175 kPa (1.75 kgf/cm ² , 25 psi)	---
Rear	Up to 65 kg (143 lb) load: 200 kPa (2.00 kgf/cm ² , 29 psi)	---
	65 ~ 130 kg (143 ~ 287 lb) load: 225 kPa (2.25 kgf/cm ² , 33 psi)	---
Final Drive		
Drive Chain Slack	15 ~ 25 mm (0.59 ~ 0.98 in.)	---
Drive Chain Wear (19-link Length)	301.6 ~ 302.1 mm (11.87 ~ 11.89 in.)	307 mm (12.09 in.)
Standard Chain:		
Make	LGB	---
Type	520 series	---
Link	108 links	---

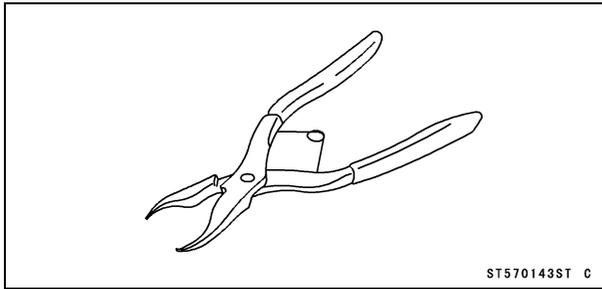
2-12 PERIODIC MAINTENANCE

Specifications

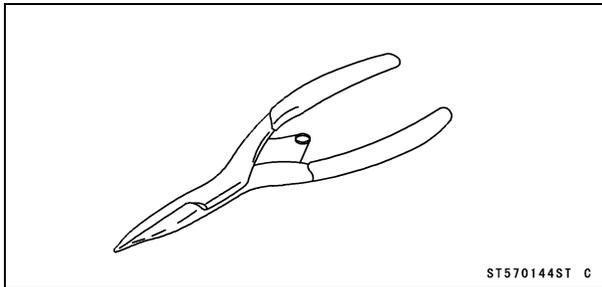
Item	Standard	Service Limit
Brakes		
Brake Fluid:		
Grade	DOT3 or DOT4	---
Brake Pad Lining Thickness:		
Front	6.35 mm (0.250 in.)	1 mm (0.04 in.)
Rear	6.0 mm (0.236 in.)	1 mm (0.04 in.)
Brake Light Timing:		
Front	Pulled ON	---
Rear	On after about 11.5 mm (0.453 in.) of pedal travel	---
Electrical System		
Spark Plug:		
Type:		
Central	BOSCH VR5NE	---
Side	CHAMPION P-RG6HCC	---
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	---

Special Tools

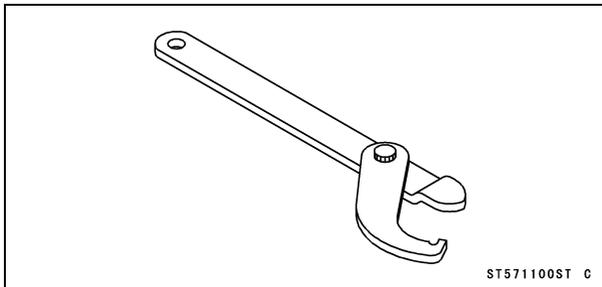
Inside Circlip Pliers:
57001-143



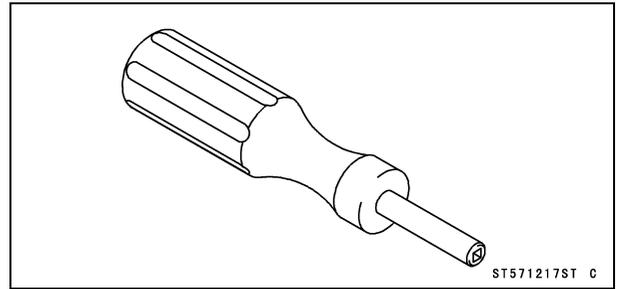
Outside Circlip Pliers:
57001-144



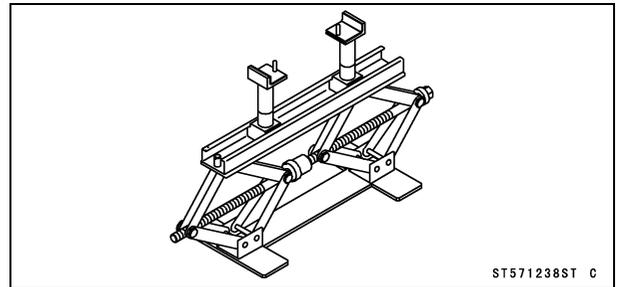
Steering Stem Nut Wrench:
57001-1100



Valve Adjusting Screw Holder:
57001-1217



Jack:
57001-1238



2-14 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

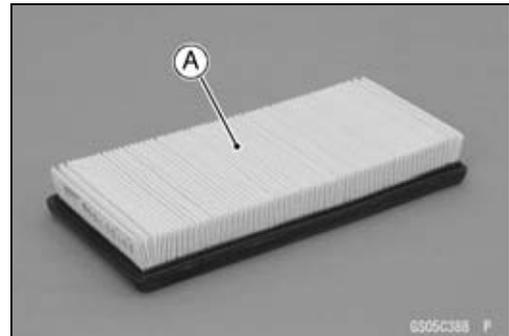
Fuel System

Air Cleaner Element Cleaning

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.
- Also, if there is a break in the element material or any other damage to the element, replace the element with a new one.

- Remove the air cleaner element (see Air Cleaner Element Removal in the Fuel System chapter).
- Clean the paper element [A] by tapping it lightly to loosen dust.
- Blow away the remaining dust by applying compressed air from the inside (clean side) to outside (dirty side).
- Check all the parts of the element for visible damage.
- ★ If the element is damaged, replace it with a new one.



Air Cleaner Element Replacement

NOTE

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

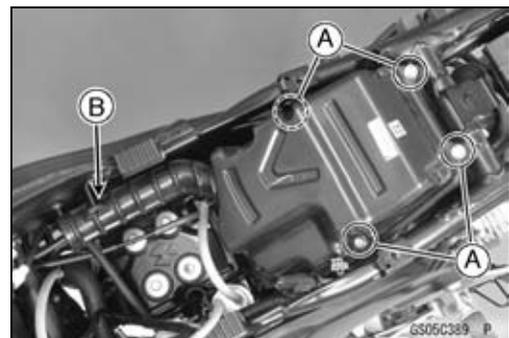
⚠ WARNING

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

NOTICE

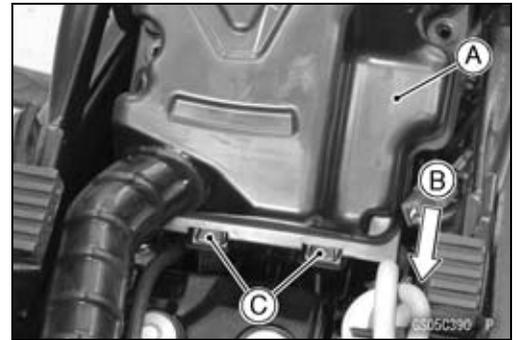
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Cover Mounting Bolts [A]
- Clear the hook [B] from the duct.

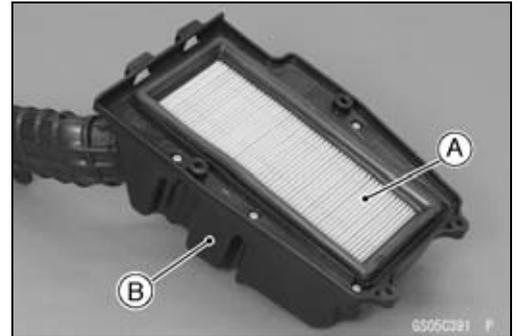


Periodic Maintenance Procedures

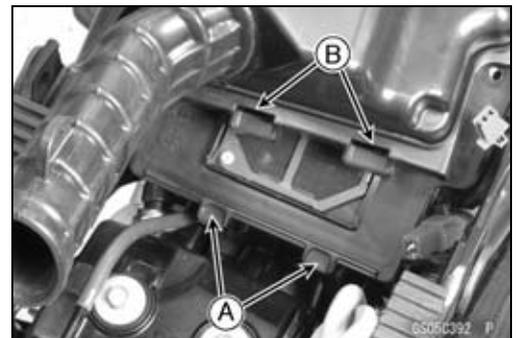
- Push the air cleaner cover [A] forward [B] to clear the tabs [C], and remove the air cleaner cover.



- Remove the air cleaner element [A] from the air cleaner cover [B].
- Replace the air cleaner element with a new one.



- Installation is the reverse of removal.
- Insert the tabs [A] into the slots [B] of the air cleaner cover.



Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides [A].
- ★ 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 (see Throttle Control System Inspection).



⚠ WARNING

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

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

Idle Speed

Standard: 1 350 ~ 1 450 r/min (rpm)

2-16 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Idle Speed Adjustment

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



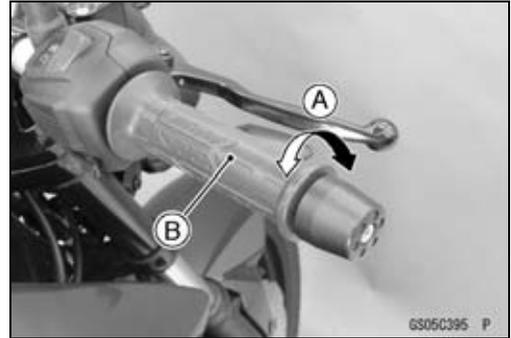
Throttle Control System Inspection

- Check the throttle grip free play [A].
- ★ If the free play is incorrect, adjust the throttle cable.

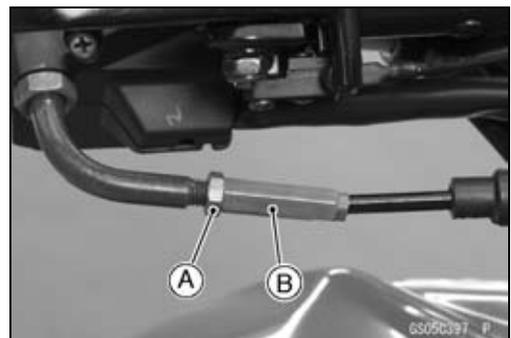
Throttle Grip Free Play

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

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



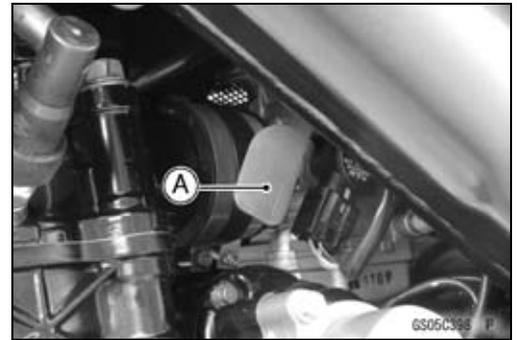
- Loosen the locknut [A].
- Turn the adjuster [B] until the proper amount of throttle grip play is obtained.
- Tighten the locknut.



Periodic Maintenance Procedures

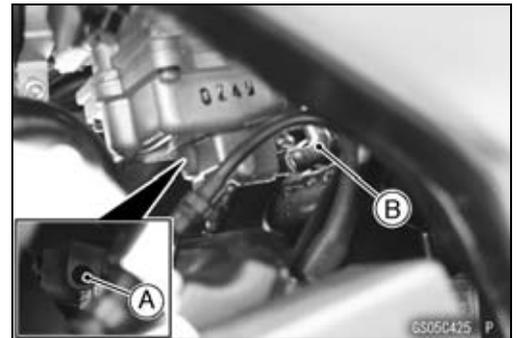
Choke Operation Inspection

- Check that the choke lever [A] moves smoothly.
- ★ If the choke lever does not move smoothly, inspect the choke plunger damage (see Carburetor Disassembly/Assembly in the Fuel System chapter).
- ★ If the choke plunger is damaged, replace it with a new one (see Carburetor Disassembly/Assembly in the Fuel System chapter).



Carburetor Cleaning (Fuel Draining)

- Loosen the fuel drain screw [A], and drain the fuel from the carburetor through the drain hose [B] to refresh the fuel in the carburetor.



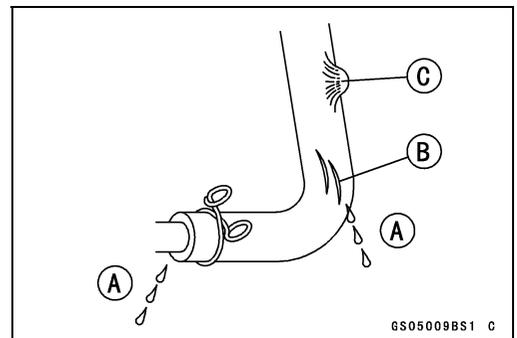
Carburetor Holder Inspection

- Visually inspect the carburetor holder [A] for cracks or cuts.
- ★ Replace the carburetor holder if any damages are noticed.

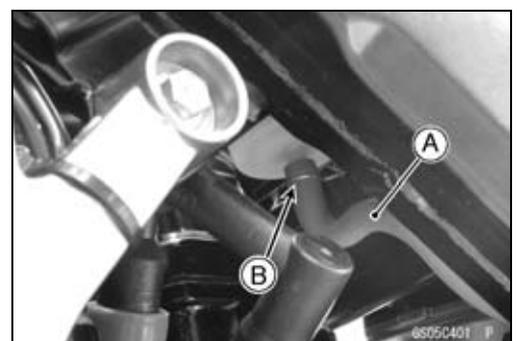


Fuel Hose Inspection (fuel leak, damage, installation condition)

- If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak [A] or the hose burst.
- ★ Replace the fuel hose if any fraying, cracks [B] or bulges [C] are noticed.



- Check that the fuel hose [A] is securely connected and clamps [B] are tightened correctly.
- Check that the fuel hose is routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- When installing the fuel hose, avoid sharp bending, kinking, flattening or twist, and run the fuel hose with a minimum of bending so that fuel flow will not be obstructed.
- ★ Replace the hose if it has been sharply bent or kinked.



2-18 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Fuel Hose Replacement

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System chapter).
- Be sure to place a piece of cloth around the fuel hose joint.
- Slide the clamps [A] and disconnect the fuel hoses [B].
- Disconnect the other fuel hose in the same way.
- Replace the fuel hose [A] with a new one.
- Fit the fuel hose onto the fitting fully and install the hose clamp [B] beyond the raised rib [C]. Do not touch the claw portion of clamp to other part.

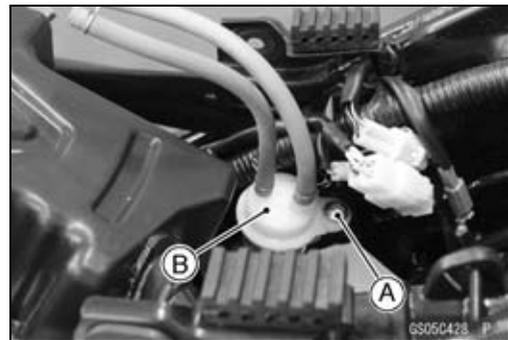
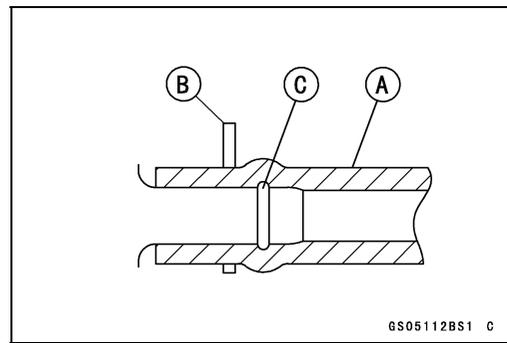
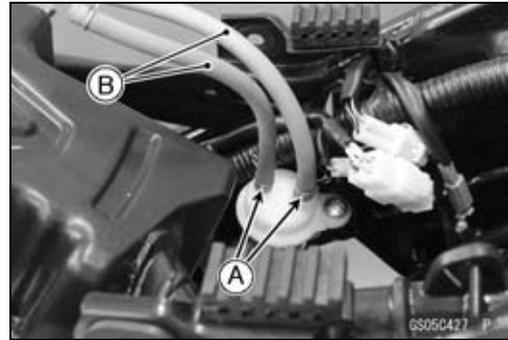
- Run the fuel hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- When installing the fuel hose, avoid sharp bending, kinking, flattening or twisting, and run the fuel hose with a minimum of bending so that the fuel flow will not be obstructed.

Fuel Filter Replacement

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Fuel Filter Mounting Screw [A]
- Disconnect:
 - Fuel Hoses
- Replace the fuel filter [B] with a new one.



Periodic Maintenance Procedures

Cooling System

Coolant Level Inspection

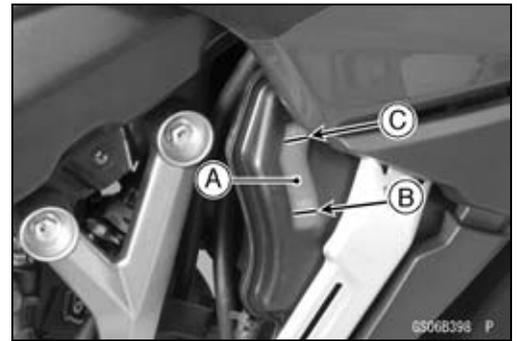
NOTE

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

- Check the coolant level in the reserve tank [A] with the motorcycle held perpendicular (Do not use the side stand).
- ★ If the coolant level is lower than the “MIN” level line [B], remove the fuel tank cover (see Fuel Tank Cover Removal in the Frame chapter), and then unscrew the reserve tank cap and add coolant to the “MAX” level line [C].

“MIN”: Low

“MAX”: Full

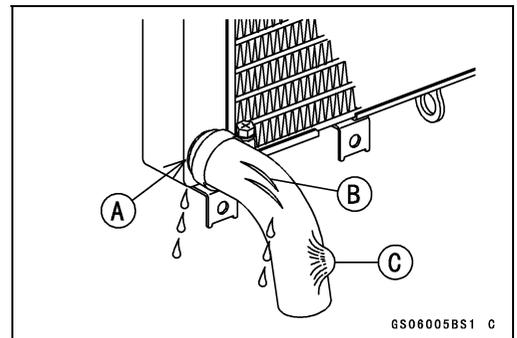


NOTICE

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

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

- 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.



Coolant Change

⚠ WARNING

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

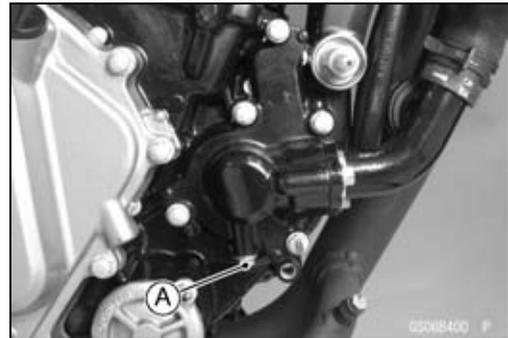
2-20 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

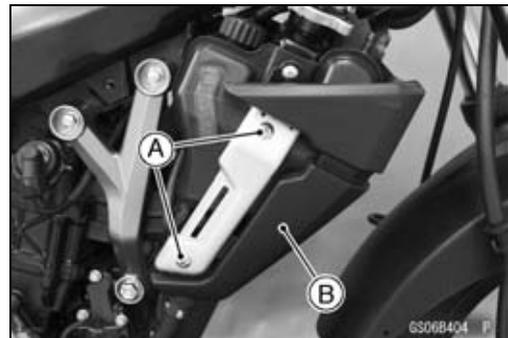
- Remove:
 - Fuel Tank Cover (see Fuel Tank Cover Removal in the Frame chapter)
 - Radiator Cap [A]
- Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.



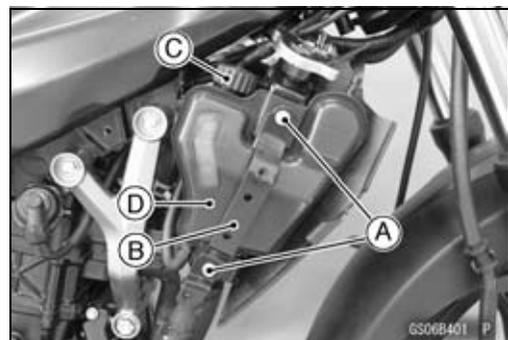
- Place a container under the drain bolt [A] of the water pump cover.
- Drain the coolant from the radiator by removing the drain bolt.



- Remove:
 - Screws [A]
 - Cover [B]



- Remove:
 - Bolts [A]
 - Bracket [B]
 - Cap [C]
- Pour the coolant into a container.
- Install the coolant reserve tank [D] and tighten the bolts.
- Tighten the drain bolt with the new gasket.



Periodic Maintenance Procedures

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

NOTICE

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

Water and Coolant Mixture Ratio (Recommended)

- Soft Water: 50%**
- Coolant: 50%**
- Freezing Point: -35°C (-31°F)**
- Total Amount: 1.5 L (1.6 US qt)**

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

NOTE

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

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



- Fill the reserve tank up to the “MAX” (full) level line with coolant and install the cap.
- Install the radiator cap.
- Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank after the engine cools down.
- ★ If the coolant level is lower than the “MIN” (low) level line, add coolant to the “MAX” level line.

NOTICE

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

Engine Top End

Valve Clearance Inspection

NOTICE

If valve clearance is left unadjusted, the wear will eventually cause the valves to remain partly open, which lowers performance, burns the valves and the valve seats, and may cause serious engine damage.

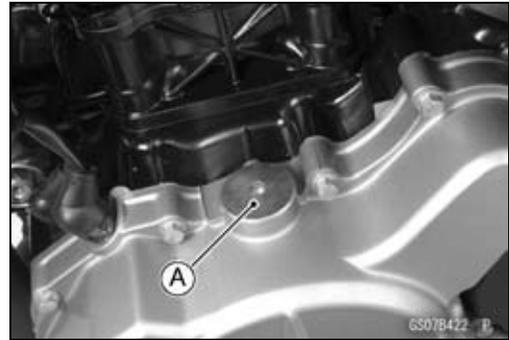
NOTE

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

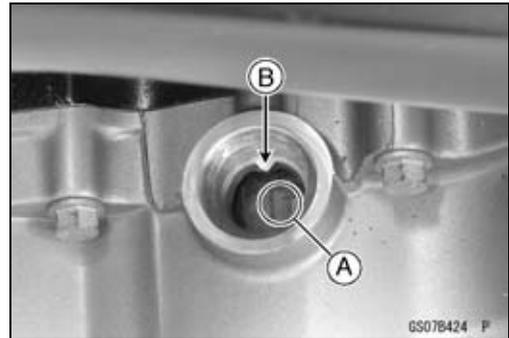
2-22 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

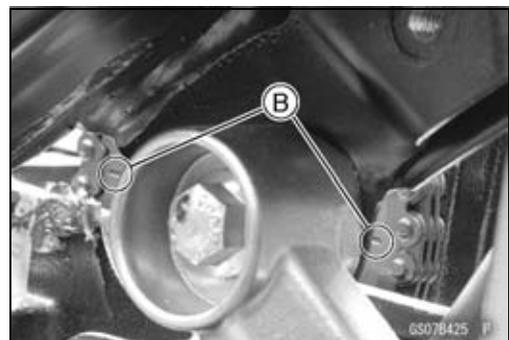
- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal in the Engine Top End chapter)
 - Timing Inspection Cap [A]



- Turn the camshaft clockwise, and align the “T” mark [A] on the alternator rotor with the projection [B] on the alternator cover.



- Check that the “T” mark [A] and lines [B] on the camshaft sprocket is in position. This shows that the piston TDC is at the end of the compression stroke.



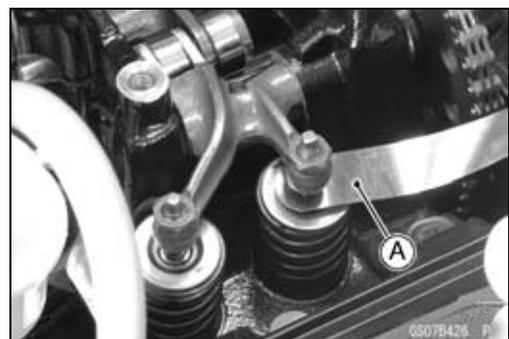
- Using a thickness gauge [A], measure the valve clearance between the adjusting screw and valve stem.
- Measure the both valves at a time.

Valve Clearance

Standard:

Exhaust	0.07 ~ 0.09 mm (0.0028 ~ 0.0035 in.)
Intake	0.04 ~ 0.06 mm (0.0016 ~ 0.0024 in.)

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



Periodic Maintenance Procedures

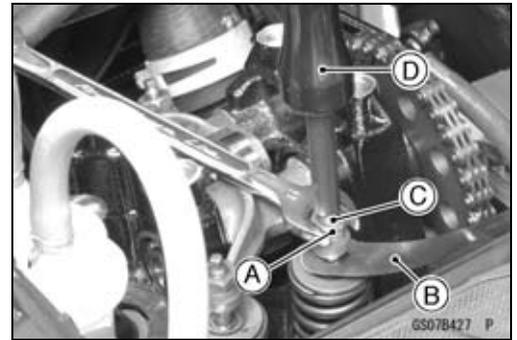
Valve Clearance Adjustment

- Loosen the valve adjusting screw locknut [A] and insert the thickness gauge [B] between the valve and adjusting screw [C], and turn the screw until the adjusting screw stops.

- Tighten the valve adjusting screw locknut.

**Special Tool - Valve Adjusting Screw Holder [D]:
57001-1217**

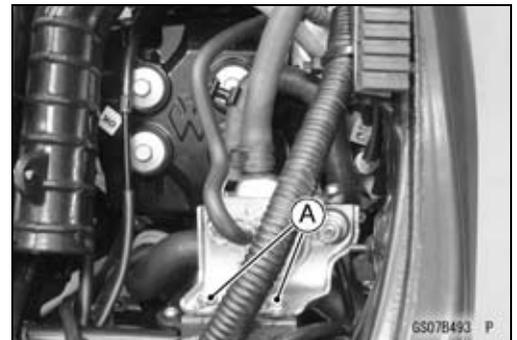
- Install the removed parts (see appropriate chapters).



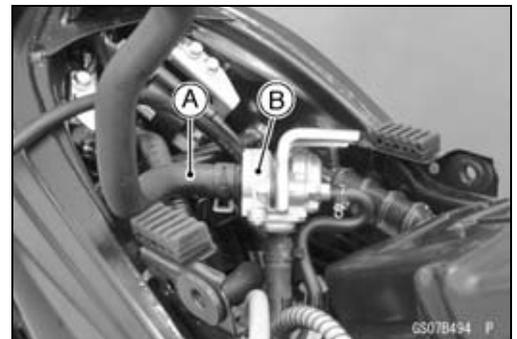
Air Suction System (PH Model)

Air Suction System Damage Inspection

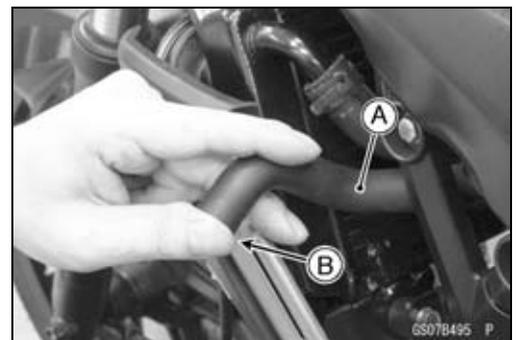
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System chapter).
- Remove the bolts [A].



- Remove the vacuum switch valve hose [A] from the vacuum switch valve [B].



- Install the suitable hose [A] to the vacuum switch valve.
- Install the fuel tank temporary (see Fuel Tank Installation in the Fuel System chapter).
- Start the engine and run it at idle speed.
- Plug the vacuum switch valve hose end [B] with your finger and feel vacuum pulsing in the hose.
- ★ If there is no vacuum pulsation, check the hose line for leak.
- ★ If there is no leak, check the vacuum switch valve (see Vacuum Switch Valve Test in the Engine Top End chapter).



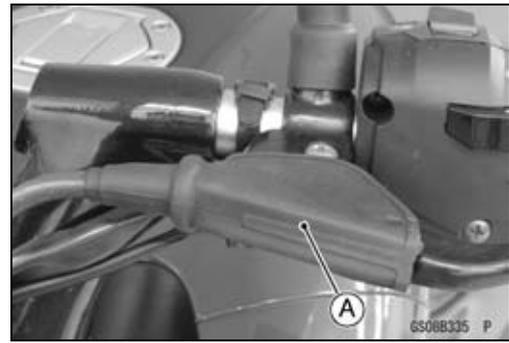
2-24 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

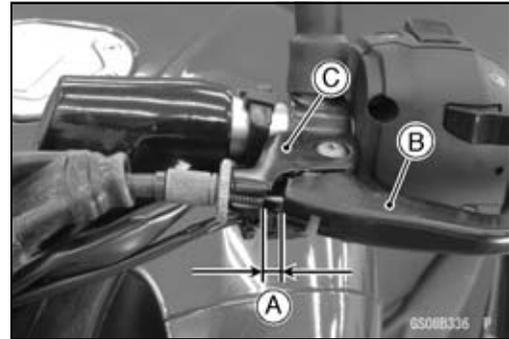
Clutch

Clutch Operation Inspection

- Slide the dust cover [A].



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

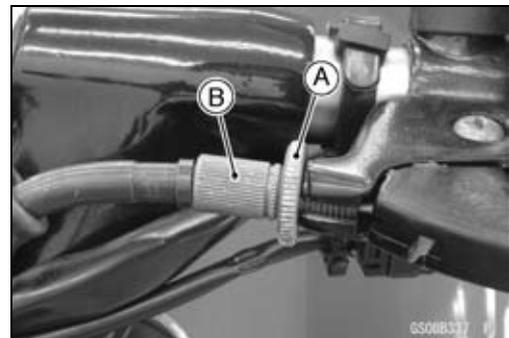


Clutch Lever Free Play

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

Clutch Cable Adjustment

- Loosen the locknut [A].
- Turn the adjuster [B] so that the clutch lever will have the proper play.
- Tighten the locknut.
- ★ If the clutch cable adjustment cannot be done at the clutch lever side, use the adjuster at the lower end of the clutch cable.



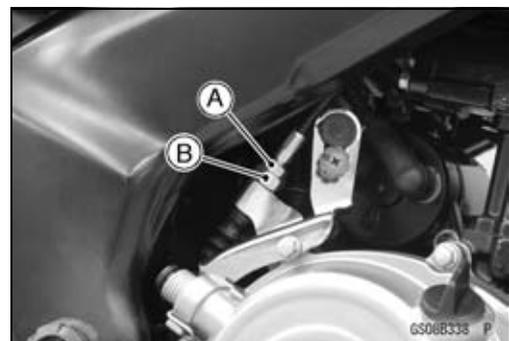
⚠ WARNING

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

- Loosen the locknut [A].
- Turn the adjuster [B] so that the clutch lever will have the proper play.
- Tighten the locknut.

⚠ WARNING

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



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

Periodic Maintenance Procedures

Engine Lubrication System

Engine Oil Change

- Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily. Then stop the engine.
- Place an oil pan beneath the engine.
- Remove the oil filler cap [A].



- Remove the oil strainer cap [A] from the bottom of the engine.



- Remove the oil strainer [A], and let the oil drain completely.
- Replace the O-rings of the oil strainer and oil strainer cap with new ones.
- Apply grease to the new O-rings.
- Install the oil strainer.
- Install the oil strainer cap.
- Tighten:

Torque - Oil Strainer Cap: 8.8 N·m (0.90 kgf·m, 78 ft·lb)



- Pour in the specified type and amount of oil.

Recommended Engine Oil

**Type: DTS-i 10000
API SL with JASO MA2**

Viscosity: SAE 20W-50

**Capacity: 1.2 L (1.3 US qt)
1.4 L (1.5 US qt) (when engine is completely dry)**

NOTE

Do not add any chemical additive to the oil. Oils fulfilling the above requirements are fully formulated and provide adequate lubrication for both the engine and the clutch.

- Check the oil level (see Oil Level Inspection in the Engine Lubrication System chapter).
- Replace the oil filler cap O-ring with a new one.
- Apply grease to the O-ring.
- Tighten the oil filler cap securely.

2-26 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Oil Strainer Cleaning

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

NOTE

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

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the screen in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the screen.

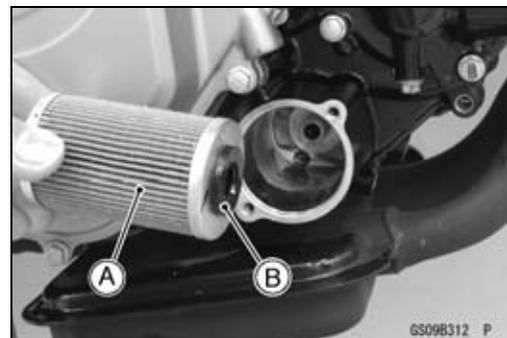
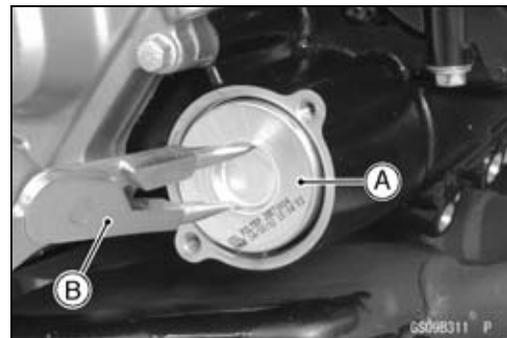
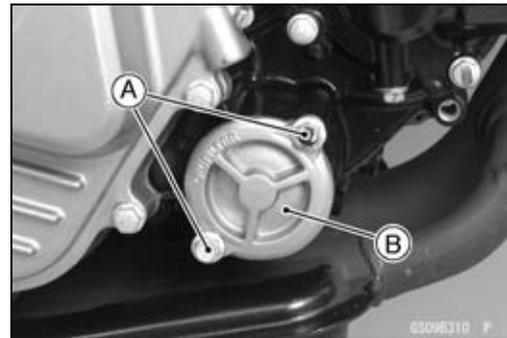
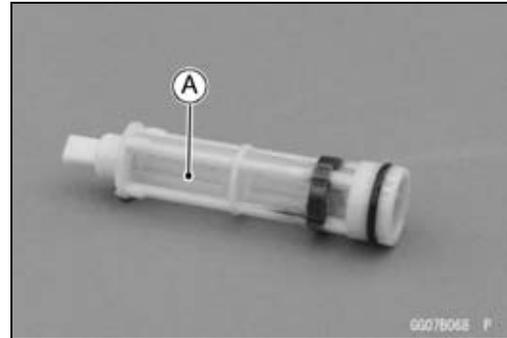
- Check the screen carefully for any damage, holes, and broken wires.
- ★ If the screen is damaged, replace it.

Oil Filter Replacement

- Drain the engine oil (see Engine Oil Change).
- Remove:
 - Oil Filter Cap Bolts [A]
 - Oil Filter Cap [B]

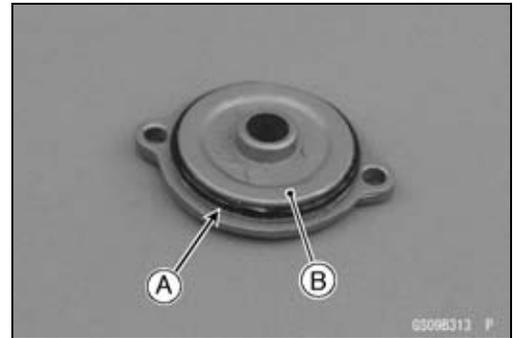
- Remove the oil filter [A] with the outside circlip pliers [B].
Special Tool - Outside Circlip Pliers: 57001-144

- Replace the oil filter [A] with a new one.
- Apply engine oil to the grommet [B].
- Install the oil filter.



Periodic Maintenance Procedures

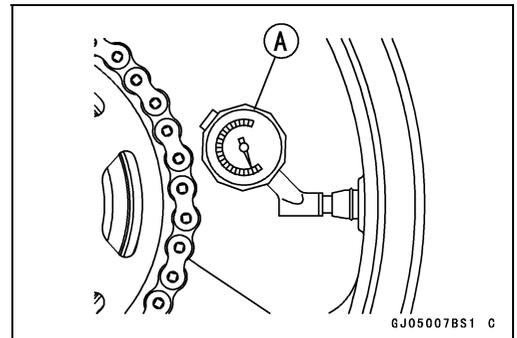
- Replace the oil filter cap O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install the oil filter cap [B].
- Tighten:
 - Torque - Oil Filter Cap Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)**
- Pour in the specified type and amount of oil (see Engine Oil Change).



Wheels/Tires

Air Pressure Inspection

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



Air Pressure (when Cold)

Front: Up to 130 kg (287 lb) load:

175 kPa (1.75 kgf/cm², 25 psi)

Rear: Up to 65 kg (143 lb) load:

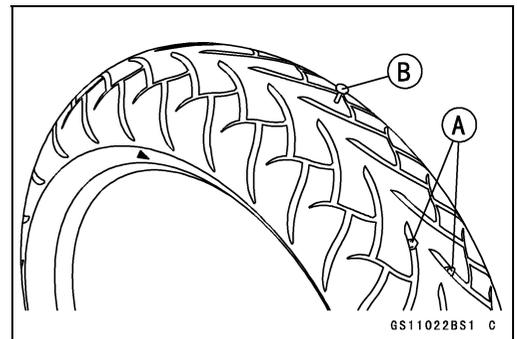
200 kPa (2.00 kgf/cm², 29 psi)

65 ~ 130 kg (143 ~ 287 lb) load: 225 kPa (2.25 kgf/cm², 33 psi)

Wheels and Tires

Wheel/Tire Damage Inspection

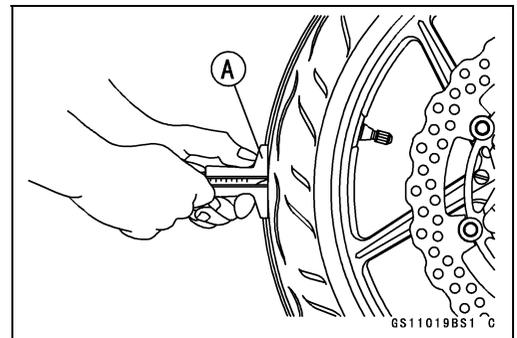
- Remove any imbedded stones [A] or other foreign particles [B] from tread.
- Visually inspect the tire for cracks and cuts, and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.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



Tire Tread Wear Inspection

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

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



2-28 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Tread Depth

Standard:

Front 5.0 mm (0.20 in.)

Rear 6.0 mm (0.24 in.)

Service Limit:

Front 1 mm (0.04 in.)

Rear 1 mm (0.04 in.)

⚠ WARNING

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

NOTE

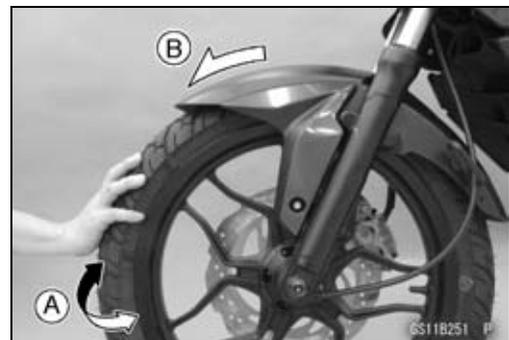
- Most countries may have their own regulations a minimum tire tread depth: be sure to follow them.
- Check and balance the wheel when a tire is replaced with a new one.

Wheel Bearing Damage Inspection

- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).

Special Tool - Jack: 57001-1238

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



Periodic Maintenance Procedures

Final Drive

Drive Chain Lubrication Condition Inspection

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

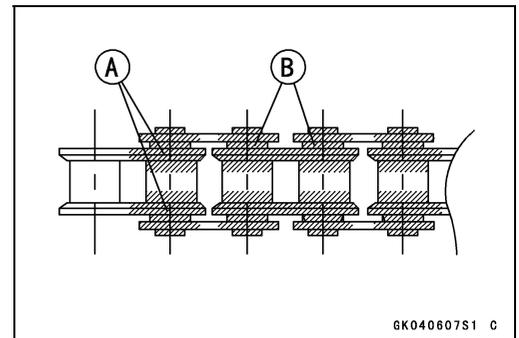
Use a lubricant for sealed chains to prevent deterioration of chain seals. If the chain is especially dirty, clean it using a cleaner for sealed chains following the instructions supplied by the chain cleaner manufacturer.

NOTICE

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

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

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



Drive Chain Slack Inspection

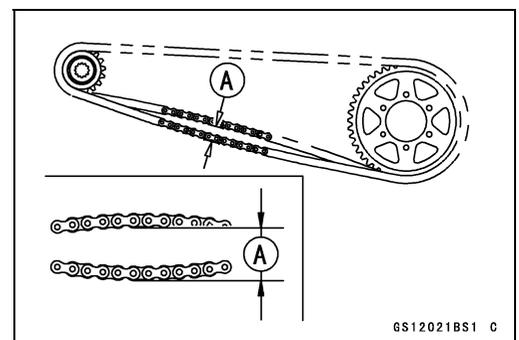
NOTE

- Check the slack with the motorcycle setting on its side stand.
- Clean the chain if it is dirty, and lubricate it if it appears dry.

- Check the wheel alignment (see Wheel Alignment Inspection).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the sprockets.
- ★ If the chain slack exceeds the standard, adjust it.

Chain Slack

Standard: 15 ~ 25 mm (0.59 ~ 0.98 in.)

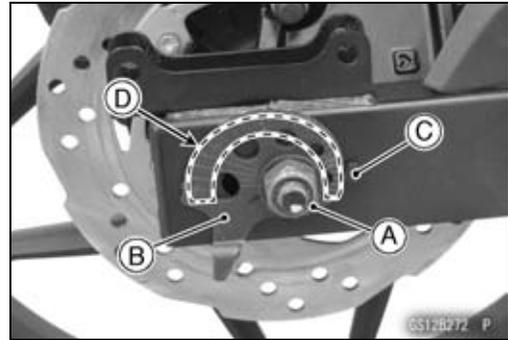


2-30 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Drive Chain Slack Adjustment

- Loosen the rear axle nut [A].
- Turn both chain adjusters [B] evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the projection [C] on the swingarm and the mark [D] on the chain adjuster are in the same position on both sides.



⚠ WARNING

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

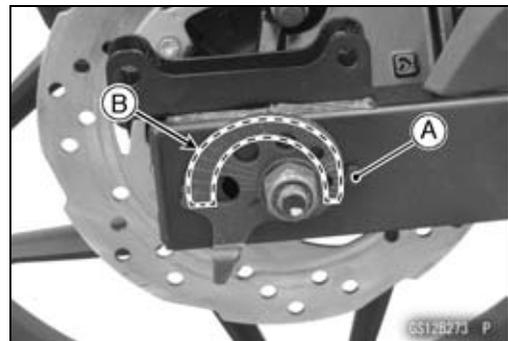
- Replace the rear axle nut with a new one.
- Tighten the rear axle nut.
Torque - Rear Axle Nut: 108 N·m (11.0 kgf·m, 79.7 ft·lb)
- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

Wheel Alignment Inspection

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

NOTE

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

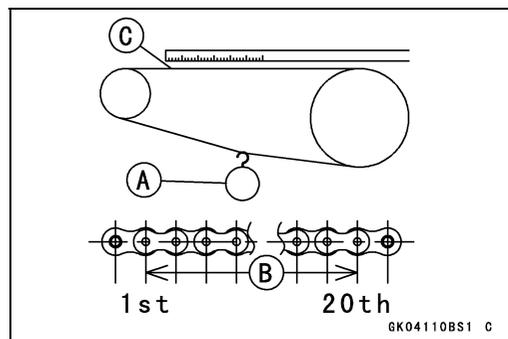


⚠ WARNING

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

Drive Chain Wear Inspection

- Remove the mud guard (see Mud Guard Removal in the Frame chapter).
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.
- ★ If there is any irregularity, replace the drive chain.
- ★ Lubricate the drive chain if it appears dry.
- Stretch the chain taut by hanging a 10 kg (22 lb) weight [A] on the chain.
- Measure the length of 19 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 20th 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 19-link Length

Standard: 301.6 ~ 302.1 mm (11.87 ~ 11.89 in.)

Service Limit: 307 mm (12.09 in.)

Periodic Maintenance Procedures

⚠ WARNING

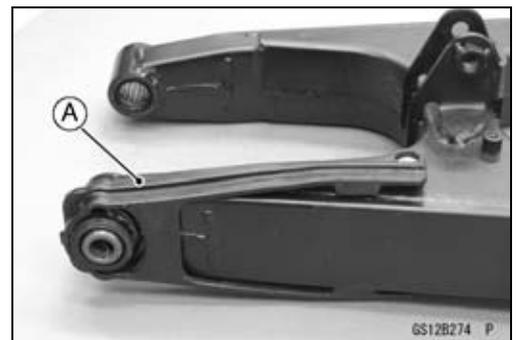
A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with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

Standard Chain

- Make:** LGB
- Type:** 520 series
- Link:** 108 links

Chain Guide Wear Inspection

- Remove the swingarm (see Swingarm Removal in the Suspension chapter).
- Visually inspect the chain guide [A].
- ★ Replace the chain guide if it shows any signs of abnormal wear or damage.

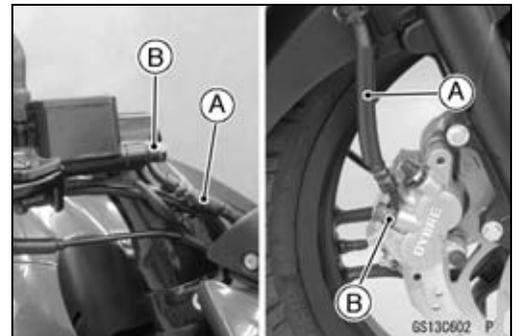


Brakes

Brake System Inspection

Brake Fluid Leak Inspection

- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A] and fittings [B].
- ★ If the brake fluid leaked from any position, inspect or replace the problem part.

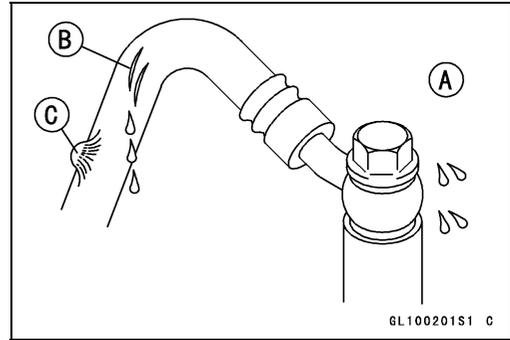


2-32 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Brake Hose Installation Condition Inspection

- Inspect the brake hoses 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 crack [B], bulge [C] or leakage is noticed.
- ★ Tighten any brake hose banjo bolts.
- Inspect the brake hose routing.
- ★ If any brake hose routing is incorrect, run the brake hose according to Cable, Wire, and Hose Routing section in the Appendix chapter.



Brake Operation Inspection

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

⚠ WARNING

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

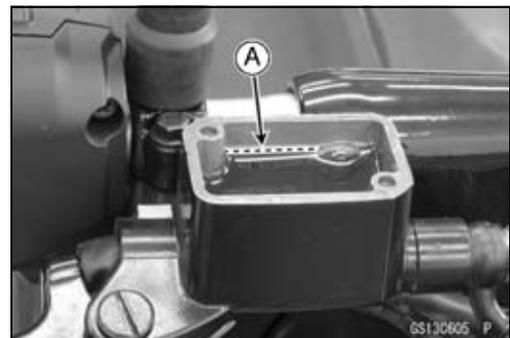
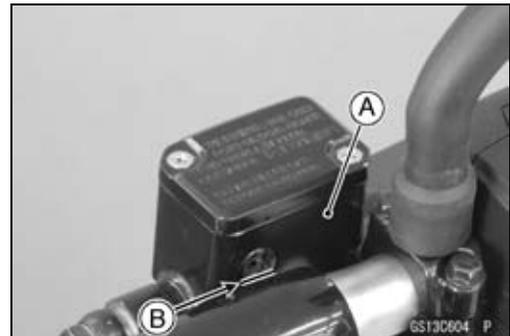
Brake Fluid Level Inspection

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

NOTE

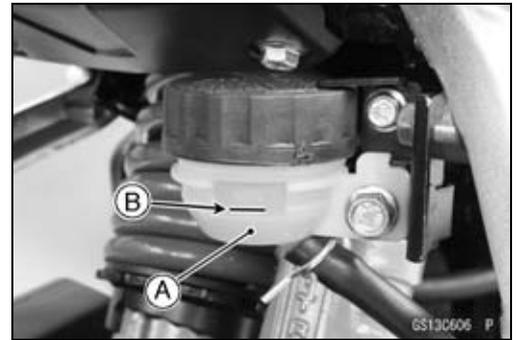
○ Hold the reservoir horizontal by turning the handlebar when checking brake fluid level.

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



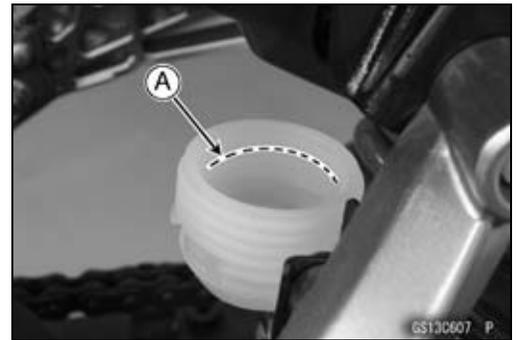
Periodic Maintenance Procedures

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



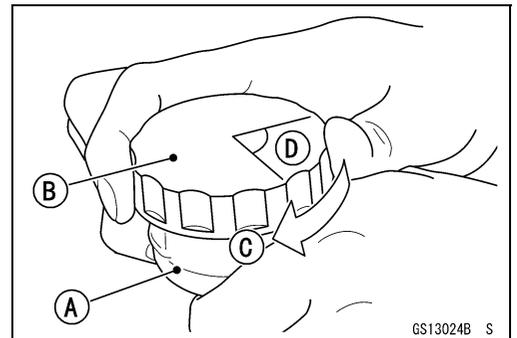
- ★ If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [A].

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



Recommended Disc Brake Fluid
Grade: DOT3 or DOT4

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



Brake Fluid Change

NOTE

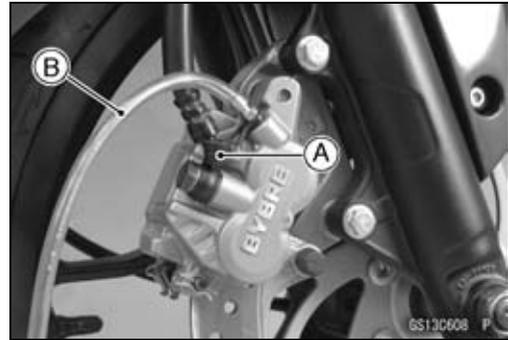
○ The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.

- Level the brake fluid reservoir.
- Remove the reservoir cap and diaphragm.

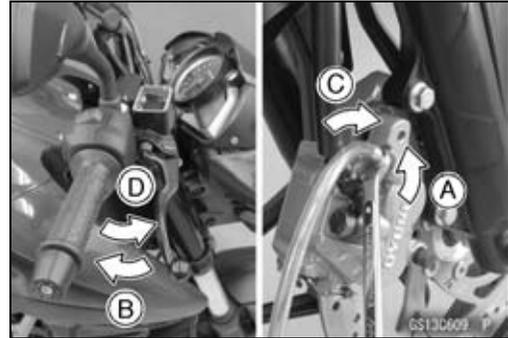
2-34 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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



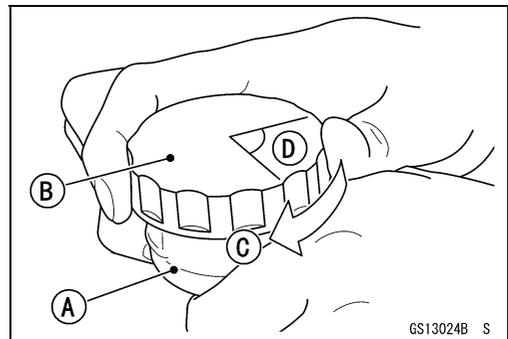
- Change the brake fluid.
- Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.
 1. Open the bleed valve [A].
 2. Apply the brake and hold it [B].
 3. Close the bleed valve [C].
 4. Release the brake [D].



NOTE

○ *The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.*

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



- Tighten the bleed valve, and install the rubber cap.
- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.
- ★ If necessary, bleed the air from the lines.

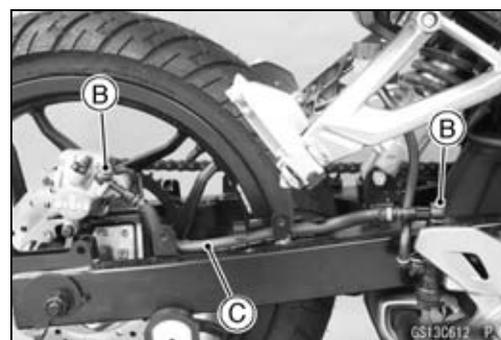
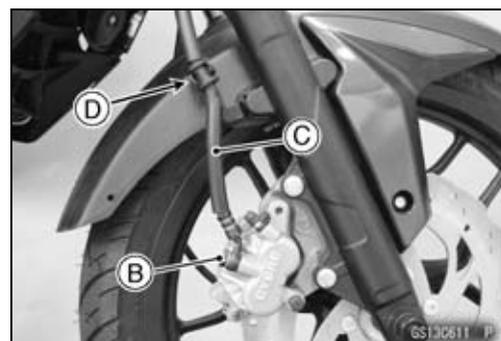
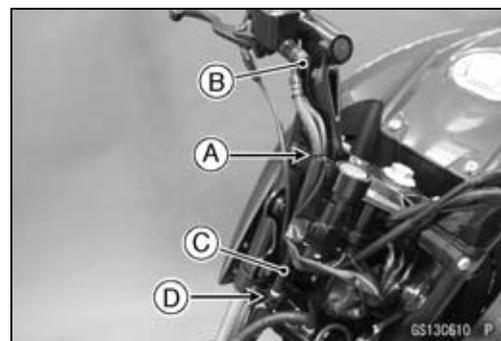
Periodic Maintenance Procedures

Brake Hose Replacement

NOTICE

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

- Remove:
 - Headlight Assy (see Headlight Cover Removal in the Frame chapter)
 - Mud Guard (Mud Guard Removal in the Frame chapter)
 - Band [A]
 - Brake Hose Banjo Bolts [B]
- Clear the brake hoses [C] from the clamps [D].
- When removing the brake hoses, note the following.
 - Take care not to spill the brake fluid on the painted or plastic parts.
 - Temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
 - Immediately wash away any brake fluid that spills.
- When installing the brake hoses, note the following.
 - Avoid sharp bending, kinking, flattening or twisting, and run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
 - There are washers on each side of the brake hose fitting. Replace them with new ones.
- Fill the brake line after installing the brake hose (see Brake Fluid Change).



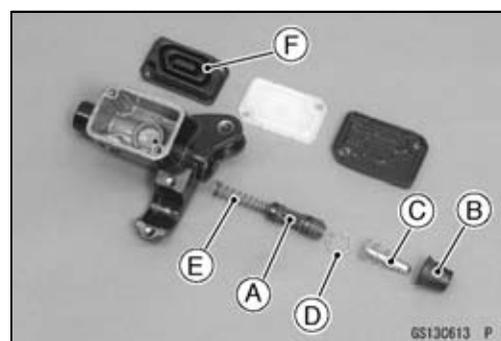
**Master Cylinder Rubber Parts Replacement
Front Master Cylinder Disassembly**

- Remove the front master cylinder (see Front Master Cylinder Removal in the Brakes chapter).
- Unscrew the locknut and pivot bolt, and remove the brake lever.
- Remove the piston assembly [A] as follows.
 - Remove the dust cover [B] and push rod [C].
 - Remove the circlip [D].

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the piston assembly.
- Remove the return spring [E].

- Replace:
 - Dust Cover
 - Circlip
 - Piston Assembly
 - Diaphragm [F]



NOTE

○ Replacement parts of the master cylinder are included in the replacement kit.

2-36 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Rear Master Cylinder Disassembly

- Remove the rear master cylinder (see Rear Master Cylinder Removal in the Brakes chapter).
- Remove the piston assembly [A] as follows.
 - Remove the dust cover [B] and push rod [C].
 - Remove the circlip [D].

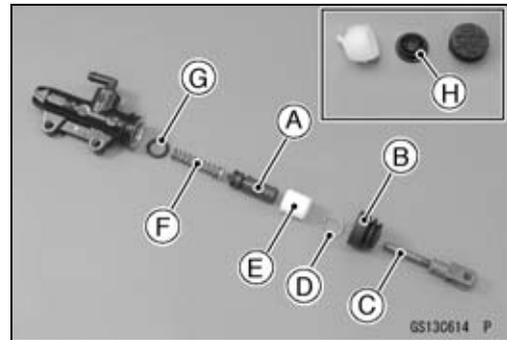
Special Tool - Inside Circlip Pliers: 57001-143

- Remove the collar [E].
- Remove the piston assembly.
- Remove the return spring [F].

- Replace:
 - Dust Cover
 - Circlip
 - Piston Assembly
 - O-ring [G]
 - Diaphragm [H]

NOTE

- Replacement parts of the master cylinder are included in the replacement kit.



Master Cylinder Assembly

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

NOTICE

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

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease to the followings.
 - Front: Brake Lever Pivot Bolt
 - Rear: Dust Cover of Push Rod Assembly

Caliper Rubber Parts Replacement

Front Caliper Disassembly

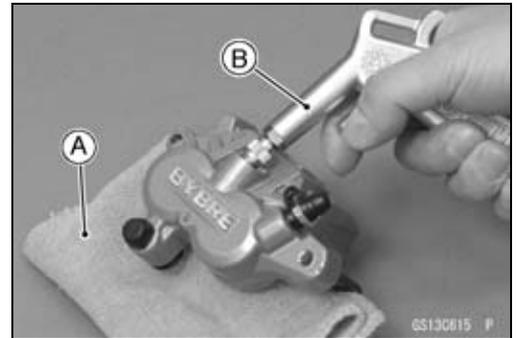
- Remove:
 - Front Caliper (see Front Caliper Removal in the Brakes chapter)
 - Brake Pads (see Front Brake Pad Removal in the Brakes chapter)
 - Pad Spring

Periodic Maintenance Procedures

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

⚠ WARNING

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



- Pull out the pistons by hand.
- Remove:
 - Caliper Holder
 - Dust Seals
 - Fluid Seals
 - Bleed Valve
 - Rubber Cap

Front Caliper Assembly

- Clean the caliper parts except for the pads.

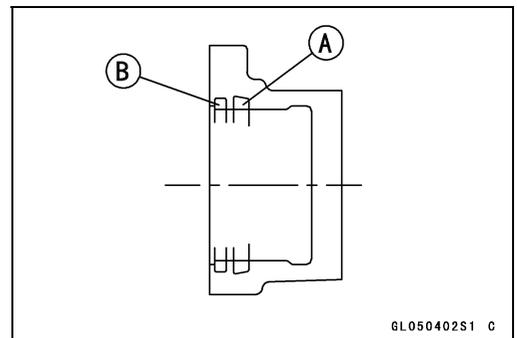
NOTICE

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

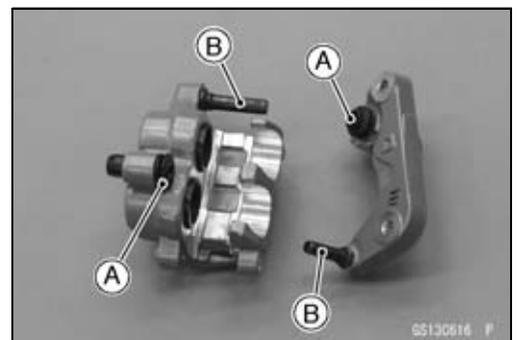
- Install the bleed valve and rubber cap.
- Replace the fluid seals [A] and the dust seals [B] with new ones.
- Apply brake fluid to the seals, and install them into the cylinders by hand.

NOTE

○ *The fluid seals and dust seals of the front caliper are included in the replacement kit.*



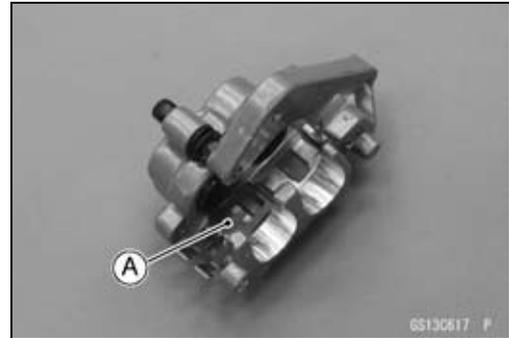
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the friction boots [A] replace them with new ones if they are damaged.
- Apply silicone grease to the caliper holder shafts [B].



2-38 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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



Rear Caliper Disassembly

- Remove:
 - Rear Caliper (see Rear Caliper Removal in the Brakes chapter)
 - Brake Pads (see Rear Brake Pad Removal in the Brakes chapter)
 - Pad Spring
- Using compressed air, remove the piston.
 - Cover the caliper opening with a clean heavy cloth [A].
 - Blow compressed air [B] into the hole for the banjo bolt to remove the piston.

⚠ WARNING

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

- Pull out the pistons by hand.

- Remove:
 - Caliper Holder
 - Dust Seal
 - Fluid Seal
 - Bleed Valve
 - Rubber Cap

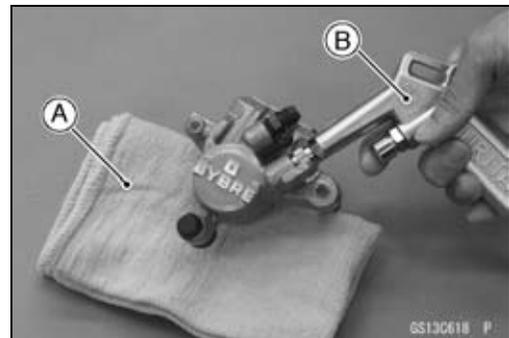
Rear Caliper Assembly

- Clean the caliper parts except for the pads.

NOTICE

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

- Install the bleed valve and rubber cap.

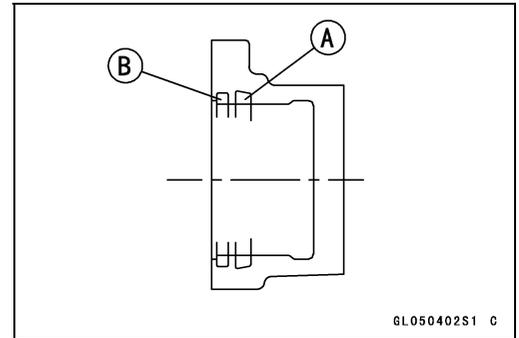


Periodic Maintenance Procedures

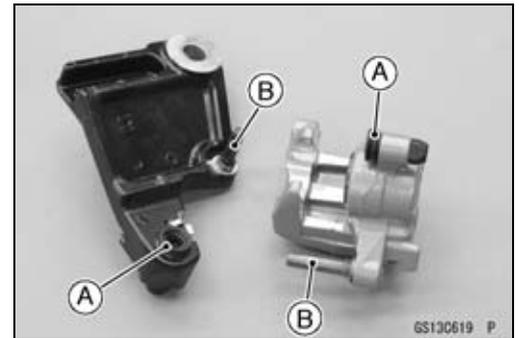
- Replace the fluid seal [A] and the dust seal [B] with new ones.
- Apply brake fluid to the seals, and install them into the cylinder by hand.

NOTE

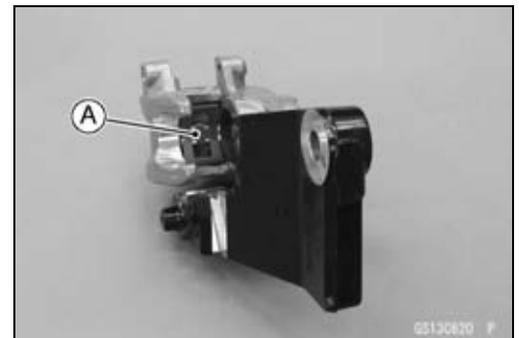
○ The fluid seal, dust seal and friction boots of the rear caliper are included in the replacement kit.



- Apply brake fluid to the outside of the piston, and push it into the cylinder by hand.
- Replace the friction boots [A] with new ones if they are damaged.
- Apply silicone grease to the caliper holder shafts [B].



- Install the pad spring [A] in the caliper as shown.
- Install the pads (see Rear Brake Pad Installation in the Brakes chapter).
- Wipe up any spilled brake fluid on the caliper with wet cloth.

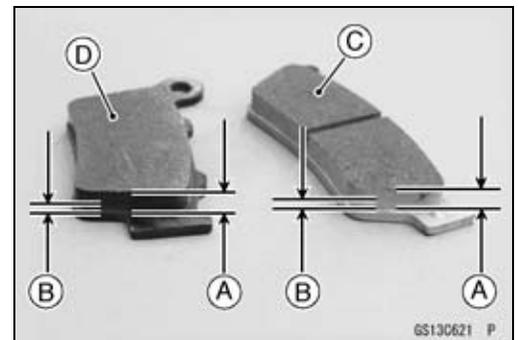


Brake Pad Wear Inspection

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

Front Brake Pad [C]

Rear Brake Pad [D]



Pad Lining Thickness

Standard:

Front 6.35 mm (0.250 in.)

Rear 6.0 mm (0.236 in.)

Service Limit:

Front 1 mm (0.04 in.)

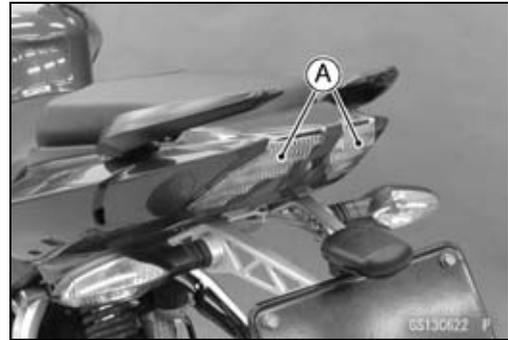
Rear 1 mm (0.04 in.)

2-40 PERIODIC MAINTENANCE

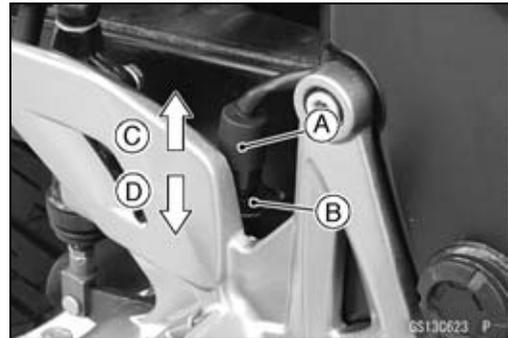
Periodic Maintenance Procedures

Brake Light Switch Operation Inspection

- Turn the ignition switch on.
- The tail/brake light (LED) [A] should go on when the brake lever is applied or after the brake pedal is depressed about 11.5 mm (0.453 in.).



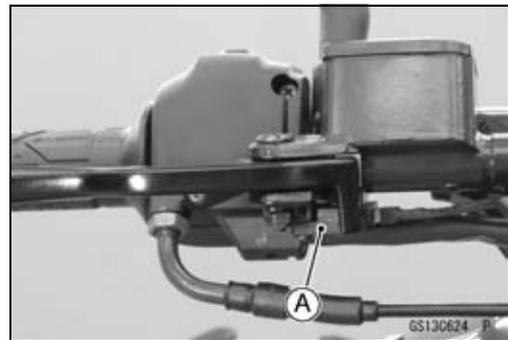
- ★ If it does not, adjust the brake light switch.
- While holding the switch body, turn the adjusting nut to adjust the switch.
 - Switch Body [A]
 - Adjusting Nut [B]
 - Light sooner as the body rises [C]
 - Light later as the body lowers [D]



NOTICE

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

- ★ If it does not go on, inspect or replace the following parts.
 - Battery (see Charging Condition Inspection in the Electrical System chapter)
 - Tail/Brake Light (LED) (see Tail/Brake Light (LED) Removal Installation in the Electrical System chapter)
 - Main Fuse 20 A (see Fuse Inspection in the Electrical System chapter)
 - Front Brake Light Switch [A] (see Switch Inspection in the Electrical System chapter)
 - Rear Brake Light Switch (see Switch Inspection in the Electrical System chapter)
 - Harness (see Wiring Inspection in the Electrical System chapter)



Suspension

Suspension System Inspection

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 oil leak (see Front Fork Oil Leak Inspection).



Periodic Maintenance Procedures

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



Front Fork Oil Leak Inspection

- Visually inspect the front forks [A] for oil leakage.
- ★ Replace or repair any defective parts, if necessary (see Front Fork Oil Change in the Suspension chapter).



Rear Shock Absorber Oil Leak Inspection

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



Steering

Steering Play Inspection

- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).

Special Tool - Jack: 57001-1238

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



NOTE

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

2-42 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Steering Play Adjustment

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
- Loosen the steering stem head bolt [A].
- Adjust the steering using the steering stem nut wrench [B].

Special Tool - Steering Stem Nut Wrench: 57001-1100

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

NOTE

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

- Tighten the steering stem head bolt.
Torque - Steering Stem Head Bolt: 49 N·m (5.0 kgf·m, 36 ft·lb)

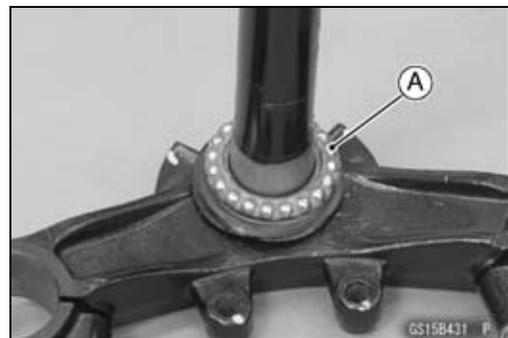
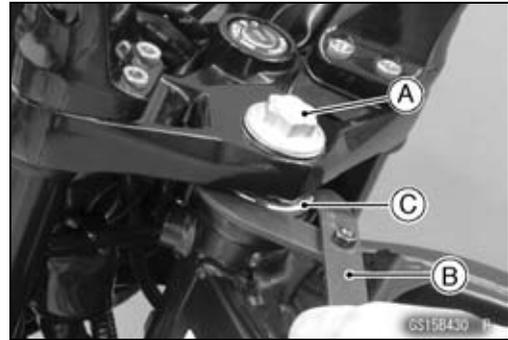
WARNING

If the handlebar does not turn to the steering stop it may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

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

Steering Stem Bearing Lubrication

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



Periodic Maintenance Procedures

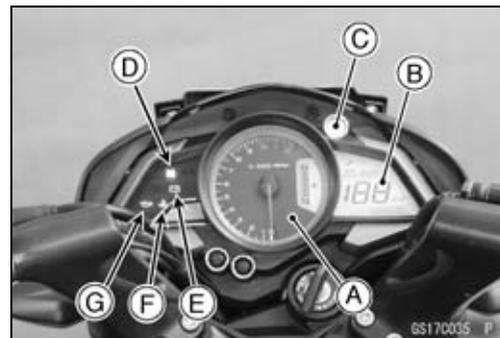
Electrical System

Lights and Switches Operation Inspection

First Step

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

Meter Panel Illumination Light (LED) [A]	Goes on (about 3 seconds)
Meter Panel LCD [B]	Goes on
Yellow Red Zone Warning Indicator Light (LED) [C]	Goes on (about 3 seconds)
Green Neutral Indicator Light (LED) [D]	Goes on
Red Battery Voltage Warning Indicator Light (LED) [E]	Goes on
Red Water Temperature Warning Indicator Light (LED) [F]	Goes on
Red Oil Pressure Warning Indicator Light (LED) [G]	Goes on



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

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

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

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

Main Fuse 20 A (see Fuse Inspection in the Electrical System chapter)

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

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

Harness (see Wiring Inspection in the Electrical System chapter)

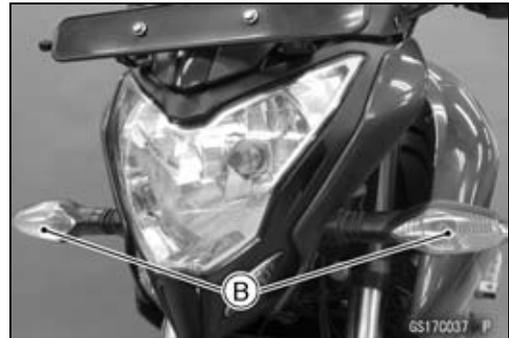
- Turn the ignition switch off.
- The all lights should go off.
- ★ If the light does not go off, replace the ignition switch.

2-44 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Second Step

- Turn the ignition switch on.
 - Turn on the turn signal switch [A] (left or right position).
 - The left or right turn signal lights [B] (front and rear) according to the switch position should blink.
 - The green turn signal indicator light (LED) [C] in the meter unit should blink.
- ★ If the each light does not blink, inspect or replace the following parts.
- Turn Signal Light Bulb (see Turn Signal Light Bulb Replacement in the Electrical System chapter)
 - Green Turn Signal Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)
 - Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
 - Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)
 - Harness (see Wiring Inspection in the Electrical System chapter)
- Push the turn signal switch.
 - The turn signal lights and green turn signal indicator light (LED) should go off.
- ★ If the light does not go off, inspect or replace the following parts.
- Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
 - Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)



Periodic Maintenance Procedures

Third Step

- Set the dimmer switch [A] to low beam position.
- Start the engine.
- The following lights should go on according to below table.

Low Beam Headlight [B]	Goes on
City Lights [C]	Go on
Tail Lights [D]	Go on
License Plate Light [E]	Go on
Meter Illumination Light	Go on

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

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

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

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

City Light Bulb (see City Light Bulb Replacement in the Electrical System chapter)

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

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

Harness (see Wiring Inspection in the Electrical System chapter)

- Set the dimmer switch to high beam position.
- The high beam headlight should go on.
- The blue high beam indicator light (LED) [F] should go on.
- ★ If the high beam headlight and/or blue high beam indicator light (LED) does not go on, inspect or replace the following parts.

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

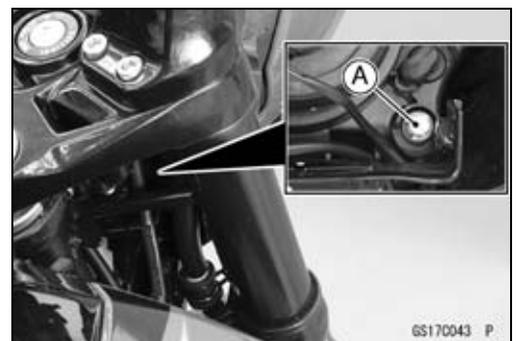
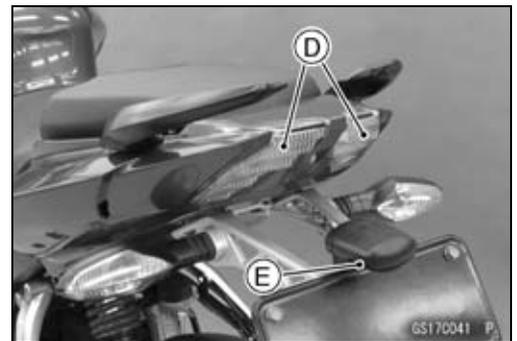
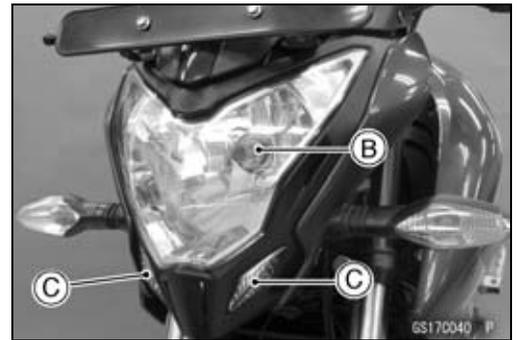
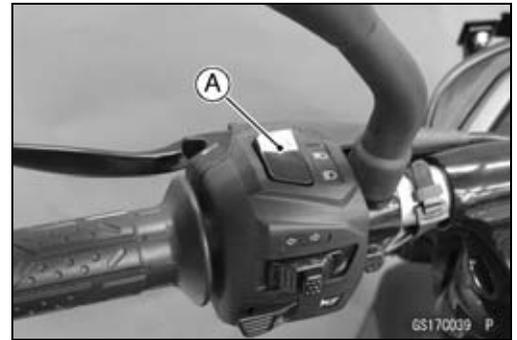
Dimmer Switch (see Switch Inspection in the Electrical System chapter)

- Turn the engine stop switch to stop position.
- The headlight should go off.
- ★ If the headlights and blue high beam indicator light (LED) does go on, inspect or replace the headlight relay (see Relay Circuit Inspection in the Electrical System chapter).

Headlight Aiming Inspection

The headlight beam is adjustable vertically. If adjusted too low, nor high beam will illuminate the road far enough ahead. If adjusted too high, the high beam will fail to illuminate the road close ahead, and the low beam will dazzle oncoming drivers.

- Inspect the headlight beam for aiming.
- Adjust the headlight up or down by turning the adjuster [A].
- After adjusting the headlight beam, make sure to tighten the adjusting bolt securely.

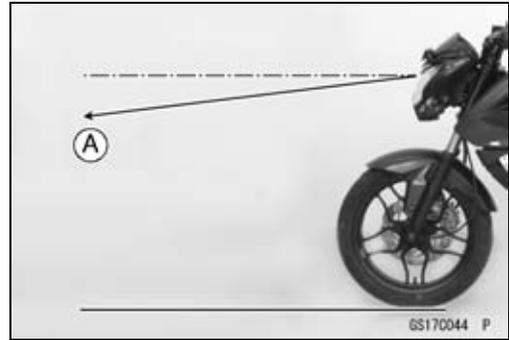


2-46 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

NOTE

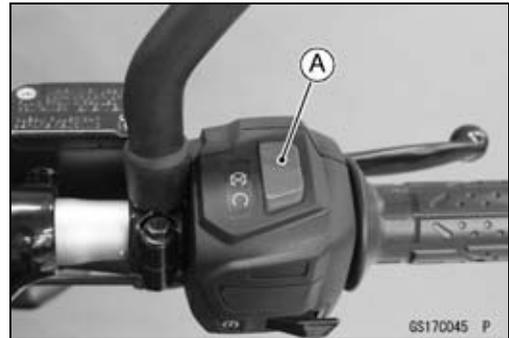
○ On high beam, the brightest point [A] should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.



Engine Stop Switch Operation Inspection

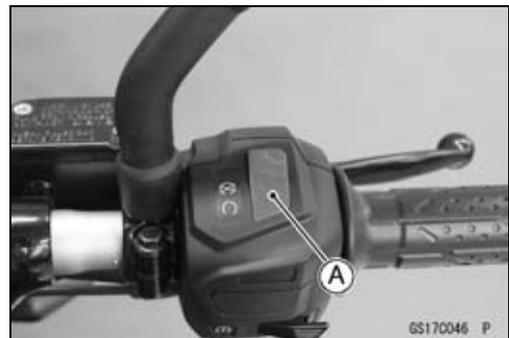
First Step

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



Second Step

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



Spark Plug Replacement

- Disconnect the spark plug cap.
- Remove the spark plugs using the plug wrench [A] vertically.

Central: 14 mm (0.55 in.) plug wrench

Side: 16 mm (0.63 in.) plug wrench

○ When removing the central spark plug, remove the left side spark plug cap.

- Replace the spark plugs with new ones.



Standard Spark Plug

Type:

Central: BOSCH VR5NE

Side: Champion P-RG6HCC

Periodic Maintenance Procedures

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

NOTICE

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

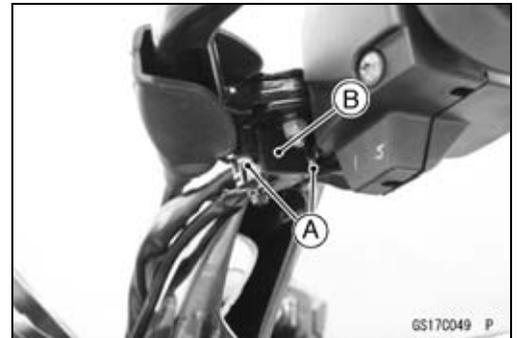
- Tighten:
 - Torque - Spark Plugs: 14 N·m (1.4 kgf·m, 10 ft·lb)**
- Install the spark plug cap.
- After installation, be sure the spark plug is installed securely by pulling up it lightly.

Starter Lockout Switch Inspection

- Remove:
 - Starter Lockout Switch Mounting Screws [A]
 - Starter Lockout Switch [B]
- Visually inspect the switch tab [A] of the starter lockout switch.
- ★ Replace the starter lockout switch if any damages are noticed.

Ignition Switch Contact Cleaning

- Spray WD-40 to the ignition key hole [A] to clean the ignition switch contact.



2-48 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Wiring Harness Inspection

- Inspect the following to avoid wiring harness failures.
 1. Ensure wiring harness is properly routed and clamped.
 2. Ensure firm connections of all connectors.
 3. Ensure wiring harness connectors are placed properly in bellows provided at headlight cover and tail/brake light side.
 4. Ensure correct routing of wiring harness which will avoid pinching of wires.
 5. Do not apply pressurized water jet on wiring harness.
 6. Do not fit extra electrical accessories. Such as –
Remote
Extra and bigger horns
Musical brake light
Buzzer
Higher wattage Headlight bulb
Turn signal light operating all 4 side indicators simultaneously
 7. Do not replace fuse with higher capacity fuse.
 8. Do not cut wiring conduit/wires midway.
 9. Never remove conduit from wiring harness.
 10. Never bypass fuse.
 11. Do not repair wiring harness instead replace for safety.
 12. Do not ground any wire for checking current-spark.

Others

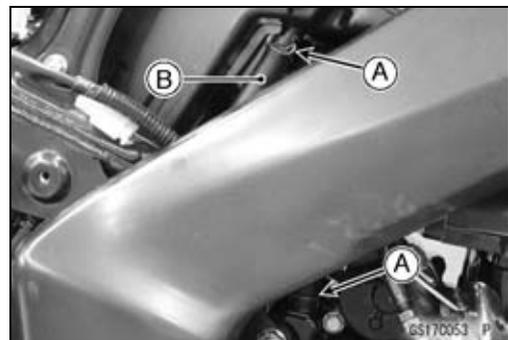
Silencer Drain Hole Cleaning

- Visually inspect the silencer drain hole [A].
- ★ If the drain hole is clogged up with the carbon, remove the carbon to open the drain hole.



Engine Breather hose Replacement

- Remove:
 - Right Side Cover (see Side Cover Removal in the Frame chapter)
 - Clutch Cable Lower End (Cable Removal in the Clutch chapter)
 - Clutch Cable Bracket (Clutch Cover Removal in the Clutch chapter)
 - Clamps [A]
 - Engine Breather Hose [B]
- Replace the engine breather hose with a new one.
- Install the removed parts (see appropriate chapters).



Periodic Maintenance Procedures

Chassis Parts Lubrication

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

NOTE

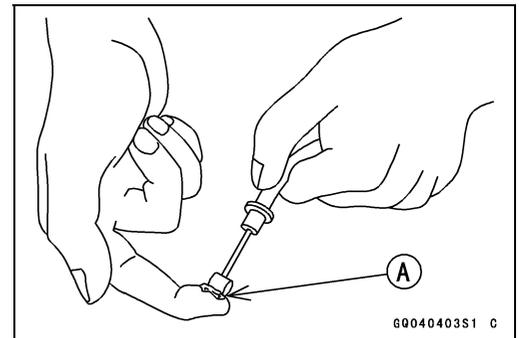
○ *Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.*

Pivots: Lubricate with Grease.

- Brake Lever
- Brake Pedal
- Clutch Lever
- Rear Master Cylinder Push Rod Joint Pin
- Side Stand

Points: Lubricate with Grease.

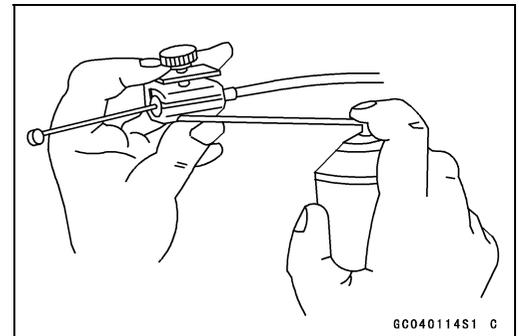
- Clutch Inner Cable Upper and Lower Ends [A]
- Throttle Inner Cable Upper and Lower Ends



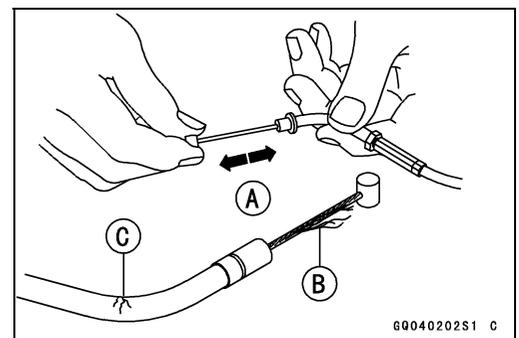
Cables: Lubricate with Rust Inhibitor.

- Clutch Cable
- Throttle Cable

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



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



2-50 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Condition of Bolts, Nuts and Fasteners Tightness Inspection

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

NOTE

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

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

Bolt, Nut and Fastener to be checked

Engine:

Clutch Lever Pivot Bolt Locknut
Engine Mounting Bolts and Nuts
Exhaust Pipe Holder Nuts
Muffler Body Clamp Bolt
Muffler Body Mounting Bolt
Radiator Bolts and Nuts

Wheels:

Front Axle Nut
Rear Axle Nut

Brakes:

Brake Lever Pivot Bolt Locknut
Brake Pedal Bolt
Caliper Mounting Bolts
Front Master Cylinder Clamp Bolt
Rear Master Cylinder Mounting Bolts
Rear Master Cylinder Push Rod Joint Cotter Pin

Suspension:

Front Fork Clamp Bolt (Upper)
Front Fork Clamp Bolt (Lower)
Rear Shock Absorber Bolts
Swingarm Pivot Shaft Nut

Steering:

Handlebar Holder Bolts
Steering Stem Head Bolt

Others:

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

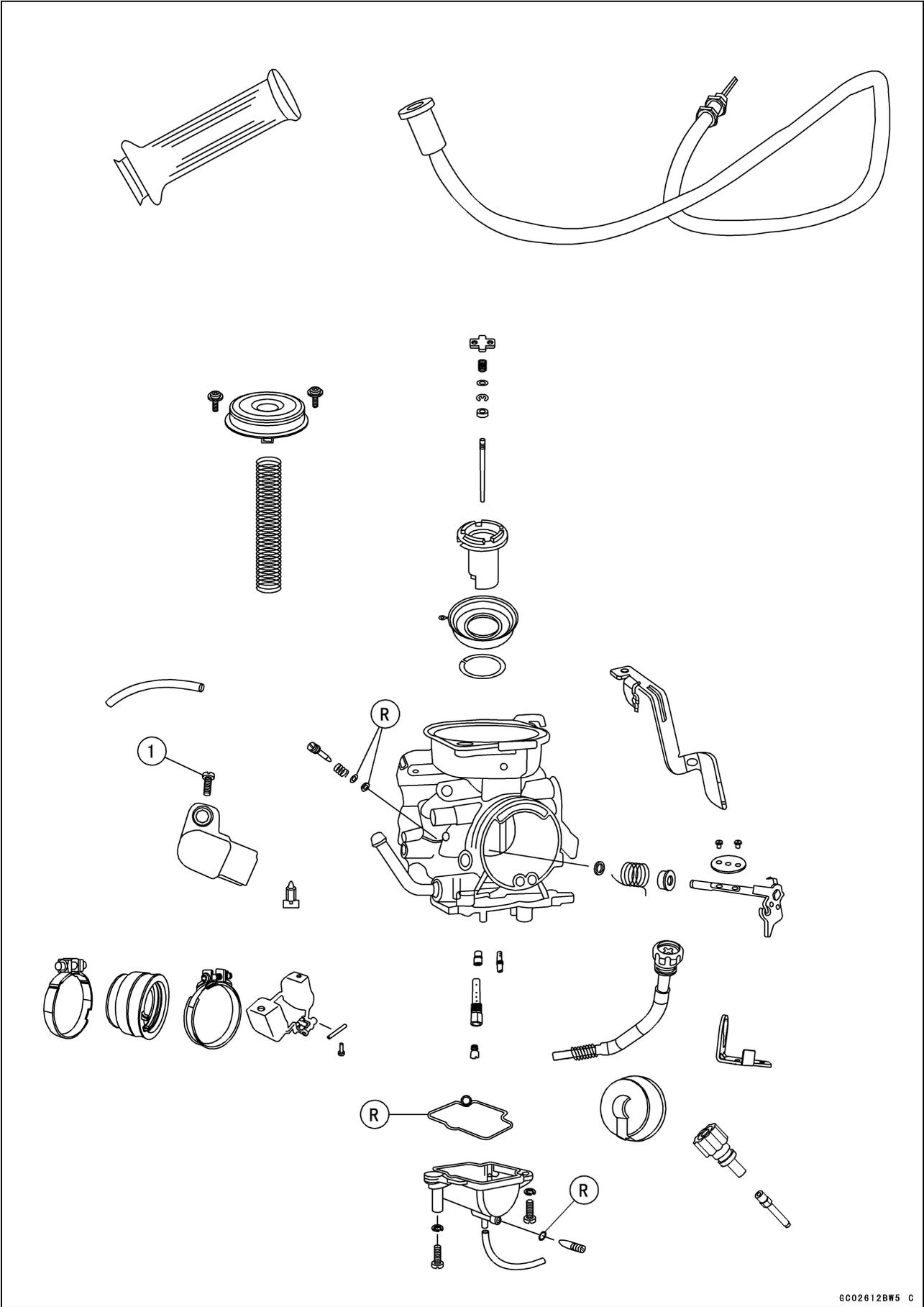
Fuel System

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3-2 FUEL SYSTEM

Exploded View



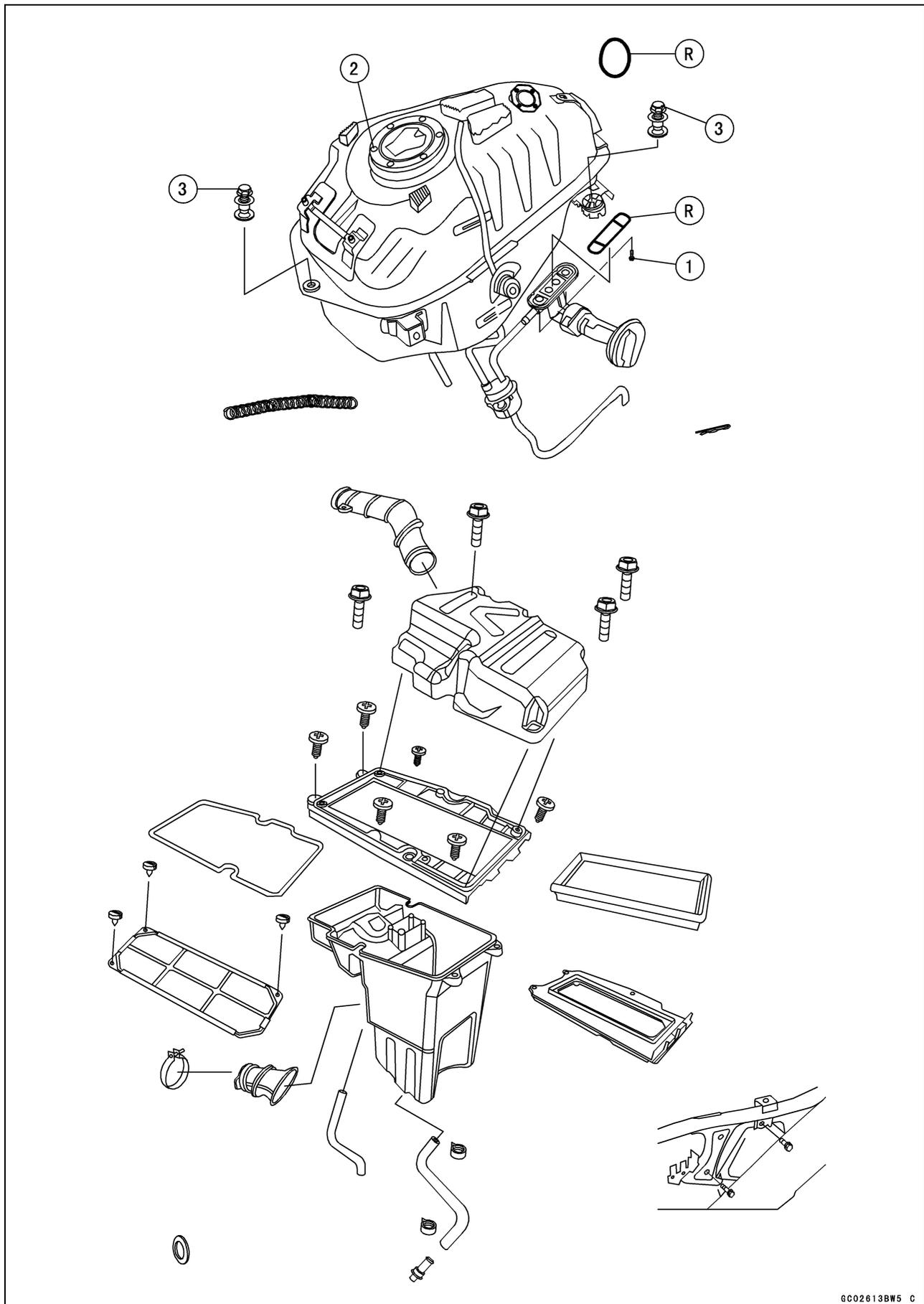
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Throttle Sensor Mounting Bolt	5.0	0.51	44 in·lb	

R: Replacement Parts

3-4 FUEL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Tap Mounting Bolts	3.9	0.40	35 in·lb	
2	Fuel Tank Cap Bolts	4.9	0.50	43 in·lb	
3	Fuel Tank Bolts	20	2.0	15	

R: Replacement Parts

3-6 FUEL SYSTEM

Specifications

Item	Standard
Throttle Grip and Cable Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Carburetor Make/Type Idle Speed Pilot Screw Float Height Main Jet Main Air Jet Jet Needle Needle Jet Pilot Jet (Slow Jet) Pilot Air Jet (Slow Air Jet) Throttle Valve Mark	UCAL/UCD33 1 400 ±50 r/min (rpm) 2 turns out (for reference) 7.1 ±1 mm (0.28 ±0.04 in.) #115 #1.3 T-UFSC7072 O-9M #15 #1.4 105
Air Cleaner Element	Dry paper type

Throttle Grip and Cable

Free Play Inspection

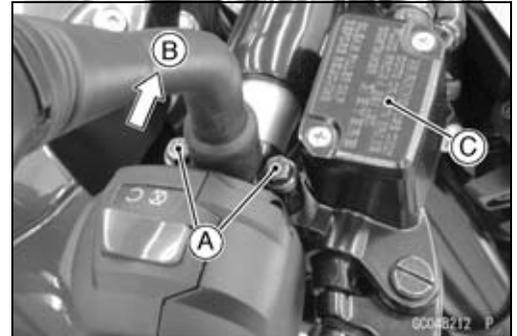
- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter.

Free Play Adjustment

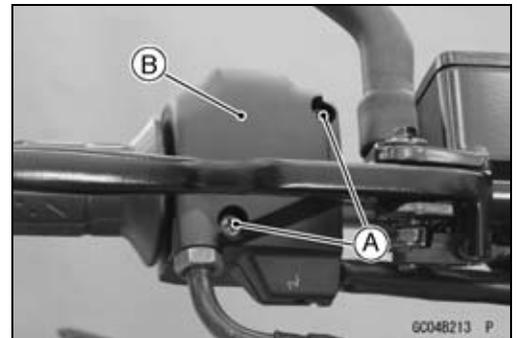
- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter.

Throttle Cable Removal

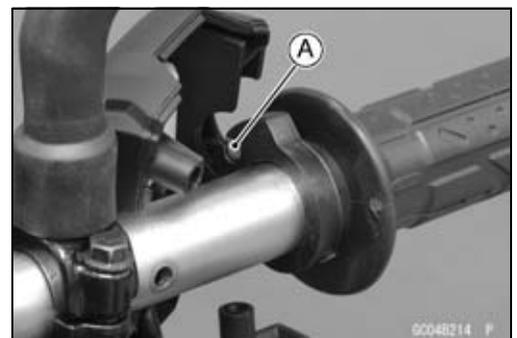
- Loosen the front master cylinder clamp bolts [A].
- Move [B] the front master cylinder [C].



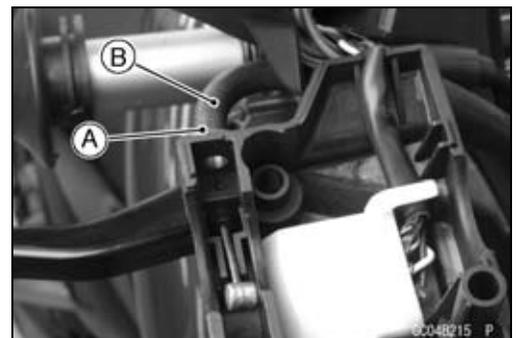
- Remove the switch housing screws [A].
- Separate the right switch housing [B].



- Remove the throttle cable tip (upper) [A].



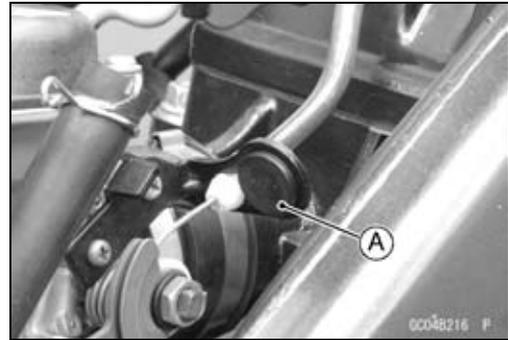
- Loosen the throttle cable locknut [A].
- Remove the throttle cable [B] from the right switch housing.



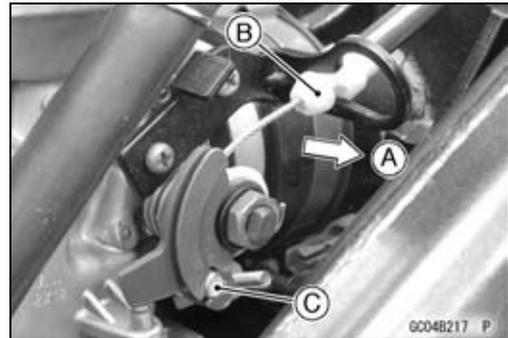
3-8 FUEL SYSTEM

Throttle Grip and Cable

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System chapter)
 - Plug [A]

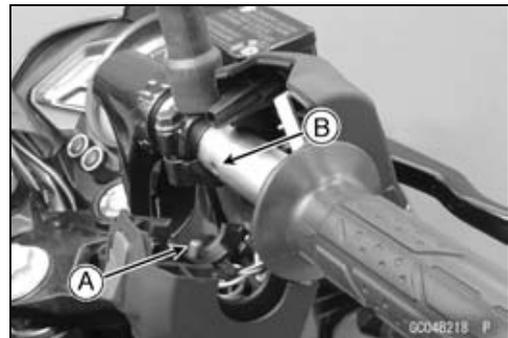


- Remove [A] the throttle cable [B].
- Remove the throttle cable tip (lower) [C].
- Remove the throttle cable from the frame.



Throttle Cable Installation

- Installation is the reverse of removal.
- Apply grease to the throttle cable tips.
- Run the throttle cable in accordance with the Cable, Wire, and Hose Routing section in the Appendix chapter.
- Fit the projection [A] into a hole [B] of the handlebars to install the right switch housing.
- After installation, adjust the throttle cable free play (see Throttle Control System Inspection in the Periodic Maintenance chapter).



⚠ WARNING

Operation with incorrectly routed or improperly adjusted cable could result in an unsafe riding condition. Be sure the cable is routed correctly and properly adjusted.

Throttle Cable Lubrication

- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

Carburetor

Idle Speed Inspection

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

Idle Speed Adjustment

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

Pilot Screw Adjustment

NOTICE

The pilot screw [A] is set at the factory and should not be removed. But if necessary, remove the pilot screw as follows.

- Turn in the pilot screw by using a flat tip screwdriver and count the number of turns until it seats fully but not tightly.
- Remove the pilot screw.
- To install, turn in the pilot screw until it seats fully but not tightly, and then back it out the same number of turns counted during disassembly. This is to set the screw to its original position.

NOTE

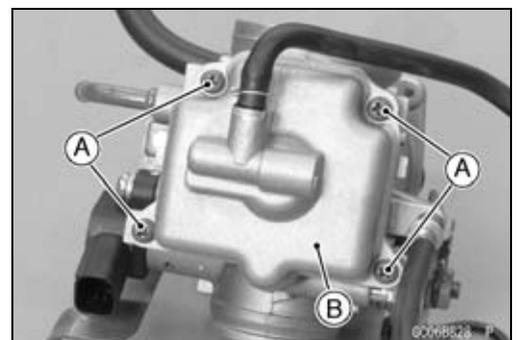
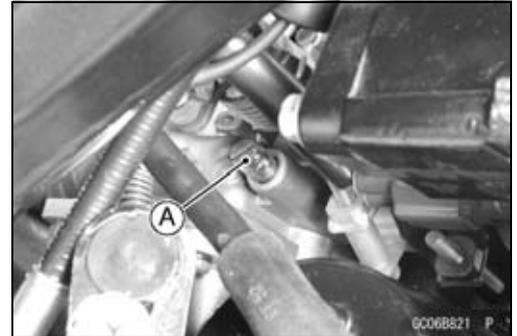
○The number of turns of pilot screw has various value in individual carburetor. The values given in the Specifications should be used only when the original number of the turns is unavailable.

Float Height Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetor (see Carburetor Removal).
- Drain the fuel of the carburetor.
- Remove the screws [A] and float bowl [B].



3-10 FUEL SYSTEM

Carburetor

- Measure the height [A] between the float bowl mating surface [B] and the float upper surface [C].

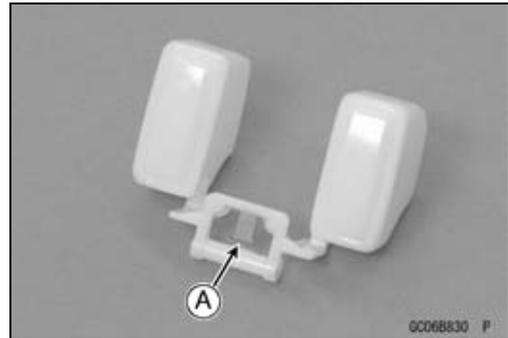
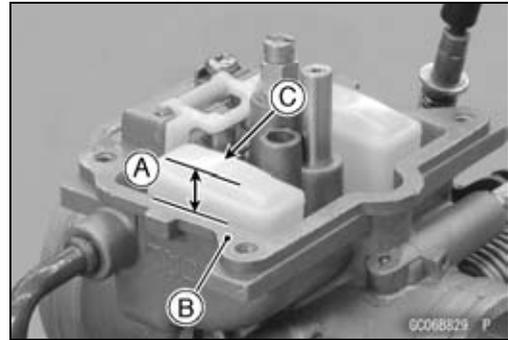
NOTE

- Measure the height with the carburetor upside down.
- Do not push the needle rod in during the float height measurement.

Float Height

Standard: 7.1 ±1 mm (0.28 ±0.04 in.)

- ★ If the float level is incorrect, adjust the float level as follows.
- Bend the tang [A] on the float arm very slightly to change the float height. Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.
- ★ If the float level cannot be adjusted by this method, the float or the float valve is damaged.
- Install the removed parts (see appropriate chapters).

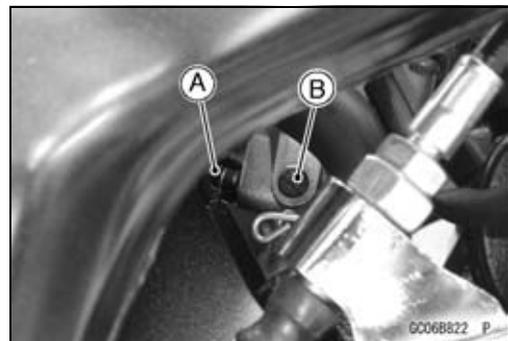


Fuel System Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Turn the fuel tap to "OFF."
- Place a suitable container beneath the carburetor drain hose [A].
- Using a flat tip screwdriver, turn out the drain screw [B] a few turns and drain the fuel to a suitable container and check to see if water or dirt come out.
- ★ If any water or dirt appears during the above inspection, clean the fuel system (see Carburetor Cleaning, Fuel Tap and Fuel Tank Cleaning).
- Tighten the drain screw securely.



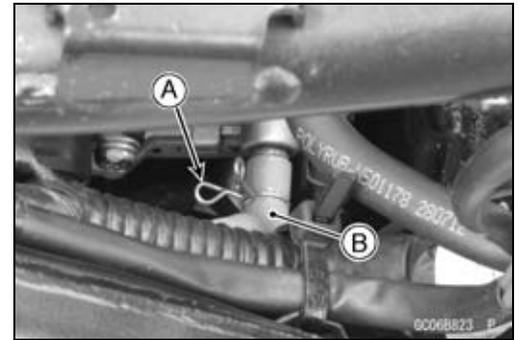
Carburetor Removal

⚠ WARNING

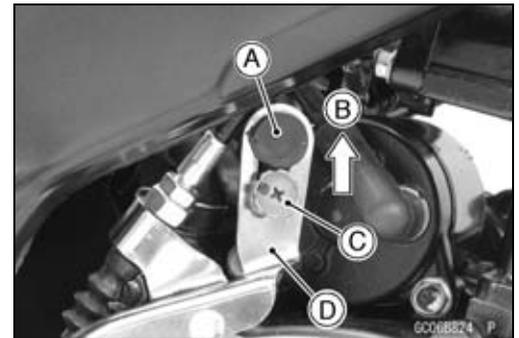
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

Carburetor

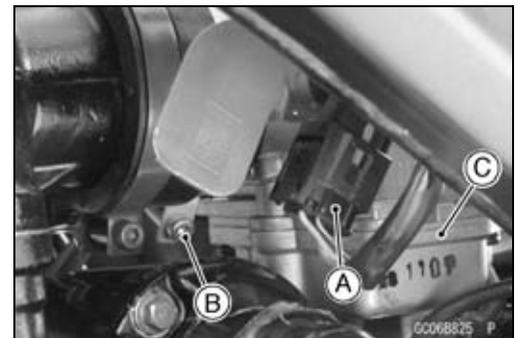
- Turn the fuel tap to “OFF.”
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System chapter)
 - Throttle Cable Tip (Lower) (see Throttle Cable Removal)
- Slide the clamp [A].
- Disconnect the fuel hose [B].



- Remove the plug [A].
- Move [B] the idle adjusting screw [C] from the clutch cable bracket [D].



- Disconnect the throttle sensor connector [A].
- Loosen the carburetor holder clamp screw (rear) [B].
- Remove the carburetor [C].



- After removing the carburetor, stuff pieces of lint-free, clean cloth into the carburetor holder to keep dirt out of the engine.

⚠ WARNING

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

NOTICE

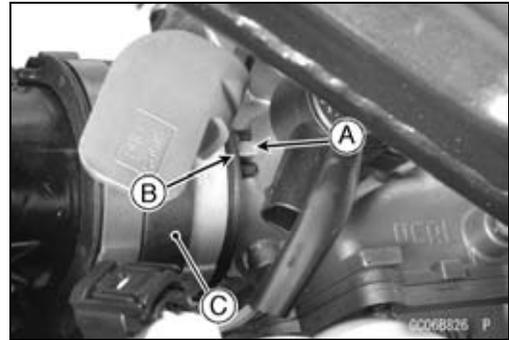
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

3-12 FUEL SYSTEM

Carburetor

Carburetor Installation

- Installation is the reverse of removal.
- Fit the carburetor projection [A] into the groove [B] of the carburetor holder [C].
- Check that the carburetor is installed horizontally.
- Tighten the carburetor holder clamp screw (rear) securely.



- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Turn the fuel tap to “ON or RES”, and check for fuel leakage from the carburetor.

⚠ WARNING

Fuel spilled from the carburetor is hazardous.

- Adjust the following items if necessary.
 - Throttle Cable (see Throttle Control System Inspection in the Periodic Maintenance chapter)
 - Idle Speed (see Idle Speed Inspection in the Periodic Maintenance chapter)

Carburetor

Carburetor Disassembly

- Remove the carburetor (see Carburetor Removal).
- Remove the following parts from the carburetor body.
- Remove the float bowl (see Float Height Inspection).

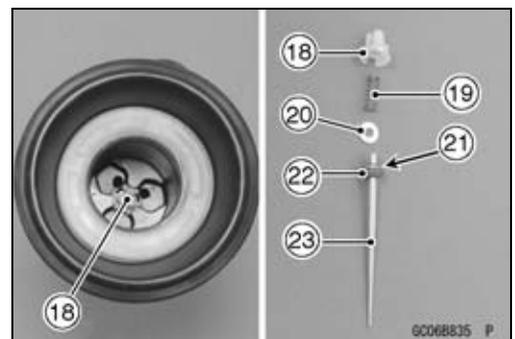
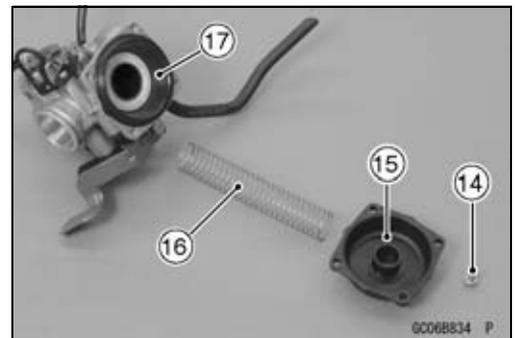
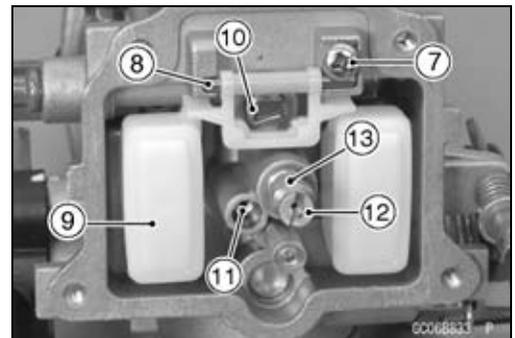
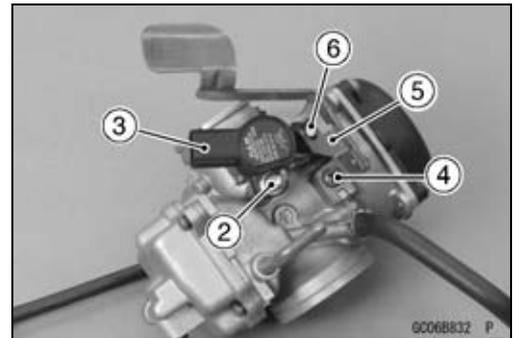
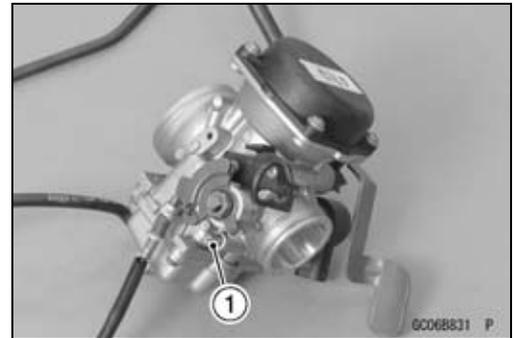
NOTICE

The pilot screw is set at the factory and should not be removed. But if necessary, refer to the Pilot Screw Adjustment to remove the pilot screw.

NOTE

○ Before removing the throttle sensor, mark the carburetor body and sensor so that it can be installed later in the same position.

- Pilot Screw [1]
- Throttle Sensor Screw [2]
- Throttle Sensor [3]
- Choke Lever Screw [4]
- Choke Lever [5]
- Choke Plunger [6]
- Float Pin Screw [7]
- Float Pin [8]
- Float [9]
- Float Valve Needle [10]
- Pilot Jet (Slow Jet) [11]
- Main Jet [12]
- Needle Jet Holder [13]
- Chamber Cover Screws [14]
- Chamber Cover [15]
- Spring [16]
- Vacuum Piston with Diaphragm [17]
- Spring Seat [18]
- Spring [19]
- Washer [20]
- Snap Ring [21]
- Collar [22]
- Jet Needle [23]



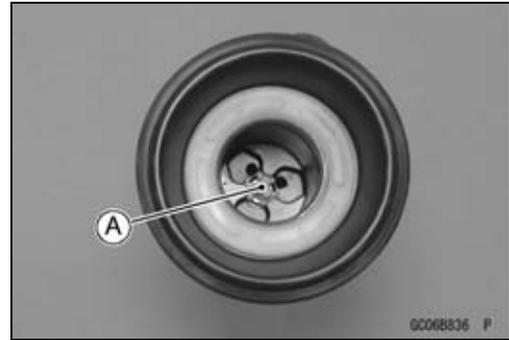
Carburetor Assembly

- Assembly is the reverse of disassembly.
- Clean the disassembly parts before assembling.

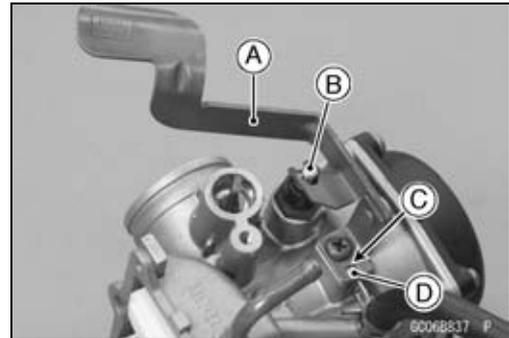
3-14 FUEL SYSTEM

Carburetor

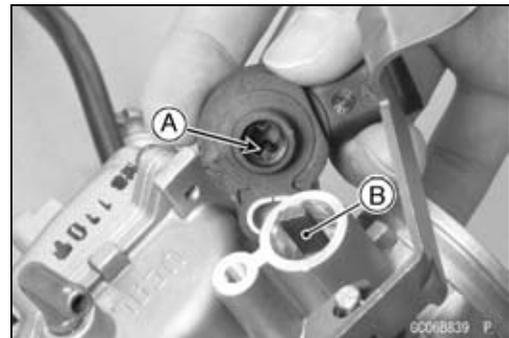
- Install:
 - Jet Needle
 - Washer
 - Spring
 - Spring Seat [A]
- Install the spring seat by turning it.



- Fit the choke lever [A] to the choke plunger [B].
- Fit the groove [C] of the choke lever to the projection [D] of the carburetor.
- Tighten the choke lever screw securely.



- Engage the groove [A] of the throttle sensor to the throttle shaft [B].
- Adjust the throttle sensor position (see Throttle Sensor Inspection in the Electrical System chapter).

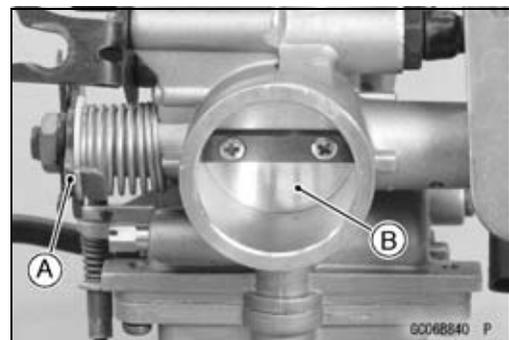


Carburetor Inspection

⚠ WARNING

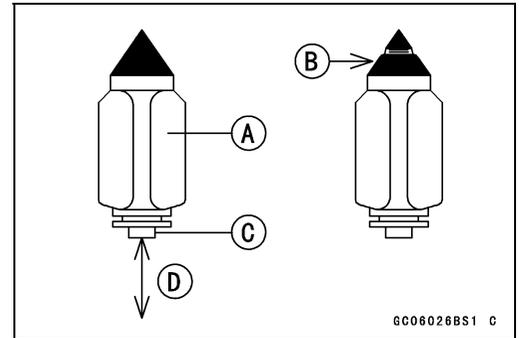
Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetor (see Carburetor Removal).
- Turn the throttle pulley [A] to check that the throttle valve [B] moves smoothly and returns by spring pressure.
- ★ If the throttle valve does not move smoothly, replace the carburetor.
- Before disassembling the carburetor, check the fuel level (see Service Fuel Level Inspection).
- ★ If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.
- Disassemble the carburetor (see Carburetor Disassembly).
- Clean the carburetor (see Carburetor Cleaning).

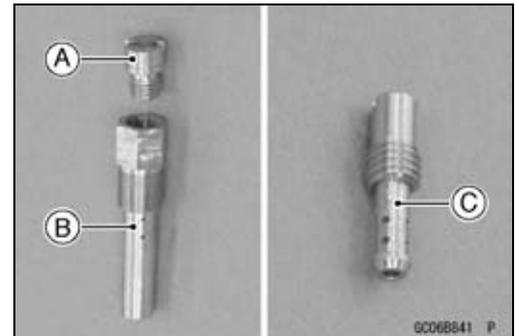


Carburetor

- Check the float valve needle [A]. It should be smooth without any grooves, scratches, or tears.
 - ★ If the tip is damaged [B], replace the float valve needle.
 - Push the rod [C] in the float valve needle, then release it.
 - ★ If the rod does not come out fully by spring tension, replace the float valve needle.
- Push and Release [D]



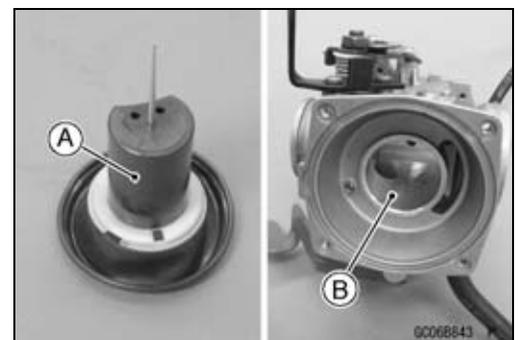
- Check the main jet [A], needle jet holder [B] and pilot jet [C] for any damage.
- ★ If they are damaged, replace them with new ones.



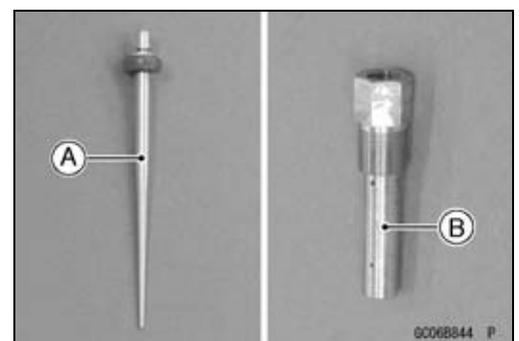
- Check the choke plunger [A] for any damage.
- ★ If the choke plunger is damaged, replace the carburetor.



- Inspect the vacuum piston [A] for scratches and abnormal wear.
- ★ If it is badly scratched or worn, replace the vacuum piston.
- Inspect the inside of the carburetor body [B] for these same faults.
- ★ If it is badly scratched or worn, replace the carburetor.



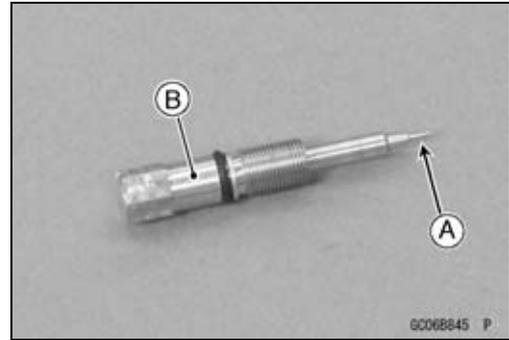
- Check the jet needle [A] and needle jet holder [B] for wear.
- ★ A worn jet needle or needle jet holder should be replaced.



3-16 FUEL SYSTEM

Carburetor

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



Carburetor Cleaning

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

NOTICE

Do not use compressed air on an assembled carburetor, the float may be deformed by the pressure. Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution.

This will prevent damage or deterioration of the parts.

Do not use a strong carburetor cleaning solution which could attack the plastic parts; instead, use a mild high flash-point cleaning solution safe for plastic parts.

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

- Disassemble the carburetor (see Carburetor Disassembly).
- Immerse all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- After the parts are cleaned, dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Assemble the carburetor (see Carburetor Assembly).

Air Cleaner

Air Cleaner Element Removal/Installation

- Refer to the Air Cleaner Element Replacement in the Periodic Maintenance chapter.

Air Cleaner Element Cleaning and Inspection

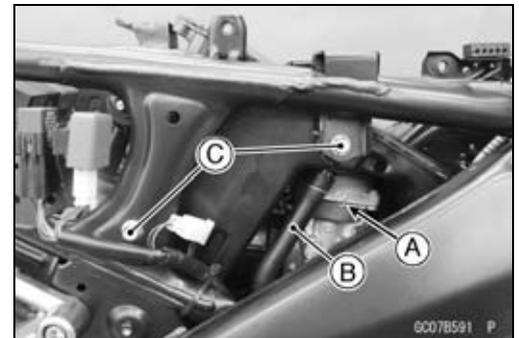
- Refer to the Air Cleaner Element Cleaning in the Periodic Maintenance chapter.

Air Cleaner Housing Removal

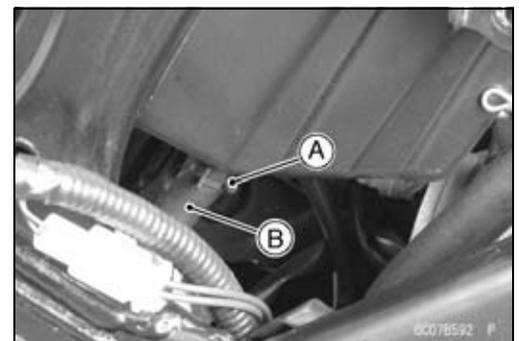
- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Air Cleaner Cover (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
 - Fuel Filter (see Fuel Filter Removal)
- Loosen the air cleaner duct clamp screw [A].
- Move the air cleaner duct clamp screw backward.



- Slide the clamp [A].
- Disconnect the breather hose [B].
- Remove the air cleaner housing mounting bolts [C].

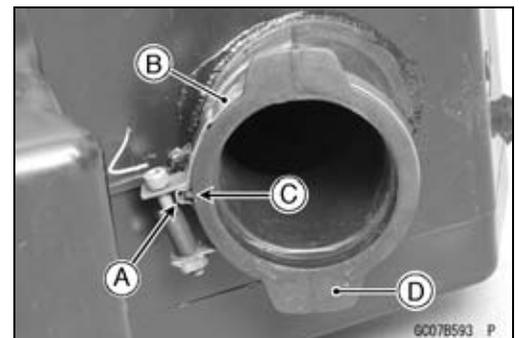


- Slide the clamp [A].
- Disconnect the air cleaner drain hose [B].
- Remove the air cleaner housing.



Air Cleaner Housing Installation

- Installation is the reverse of removal.
- Fit the groove [A] of the air cleaner duct clamp [B] to the projection [C] of the air cleaner housing [D].
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

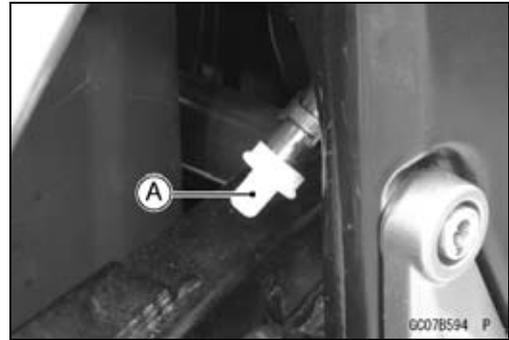


3-18 FUEL SYSTEM

Air Cleaner

Air Cleaner Drain Cap Inspection

- Visually check the drain plug [A] if the water or oil accumulates.
- ★ If any water or oil accumulates in the drain plug, remove the drain plug and drain it.



Fuel Tank

Fuel Tank Removal

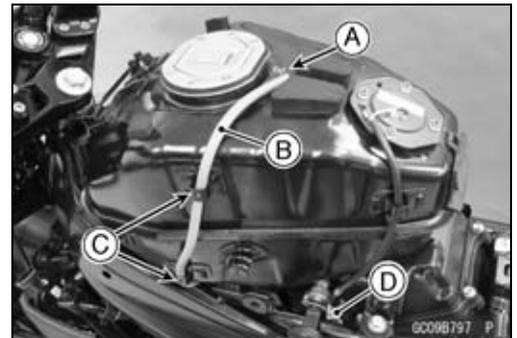
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (-) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Turn the fuel tap [A] to “OFF.”



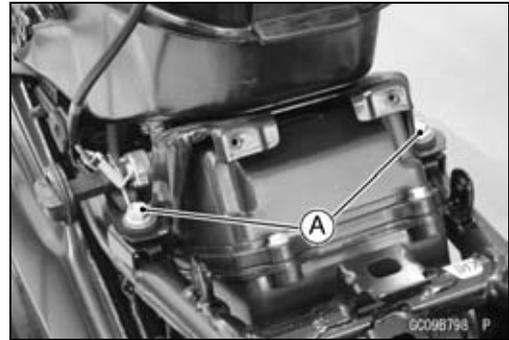
- Remove the fuel tank cover (see Fuel Tank Cover Removal in the Frame chapter).
- Remove the side covers (see Side Cover Removal in the Frame chapter).
- Slide the clamp [A].
- Disconnect the fuel tank breather hose [B].
- Free the fuel tank breather hose from the clamps [C].
- Disconnect the fuel level sensor lead connector [D].



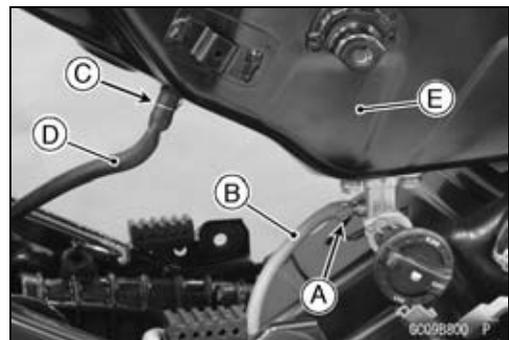
3-20 FUEL SYSTEM

Fuel Tank

- Remove the fuel tank bolts [A].



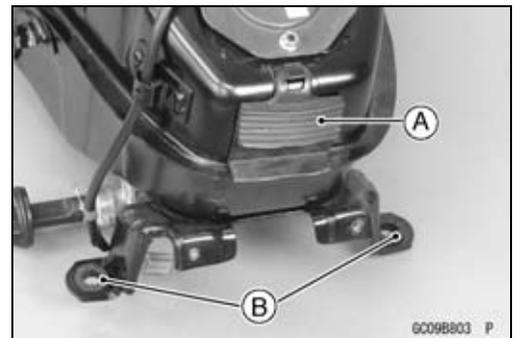
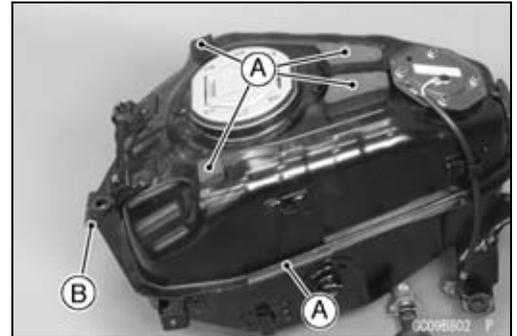
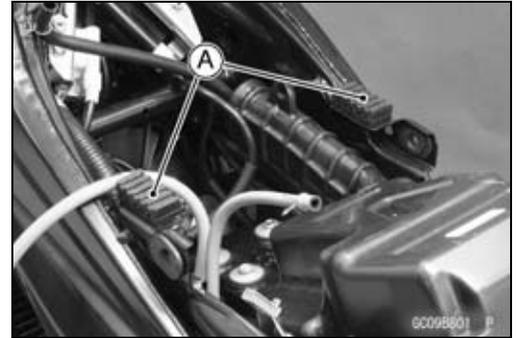
- Slide the clamp [A].
 - Disconnect the fuel hose [B].
 - Slide the clamp [C].
 - Disconnect the fuel tank drain hose [D].
 - Remove the fuel tank [E].
 - Drain the fuel.
- Place a suitable container under the fuel tank.
- Turn the fuel tap to “RES” and drain the fuel.



Fuel Tank

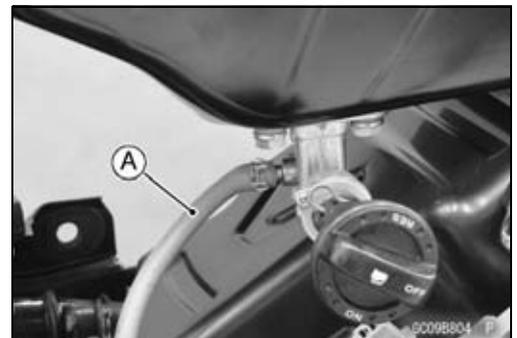
Fuel Tank Installation

- Installation is the reverse of removal.
- Check that the dampers [A] and grommets [B] are in place on the flame and fuel tank.
- ★ If the dampers and grommets are damaged or deteriorated, replace them.



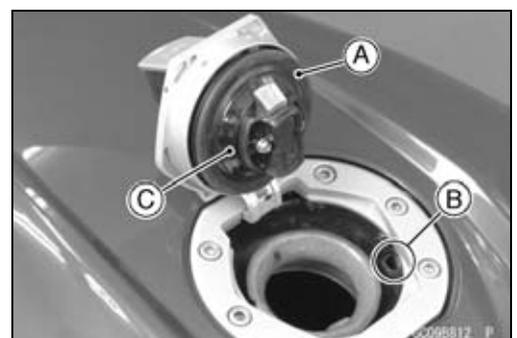
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Be sure clamp the fuel hose [A] to the fuel tap.
- Install the removed parts (see appropriate chapters).

Torque - Fuel Tank Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)



Fuel Tank Cap Inspection

- Open the tank cap.
- Visually inspect the gasket [A] on the tank cap for any damage.
- ★ Replace the cap if the gasket is damaged.
- Check to see if the water drain pipe [B] in the tank is not clogged.
- ★ If it is clogged, remove the tank and drain it, and then blow the pipe with compressed air.
- Check that the tank cap [C] to move smoothly.
- ★ If the tank cap does not move smoothly or noise is found, replace it with a new one.

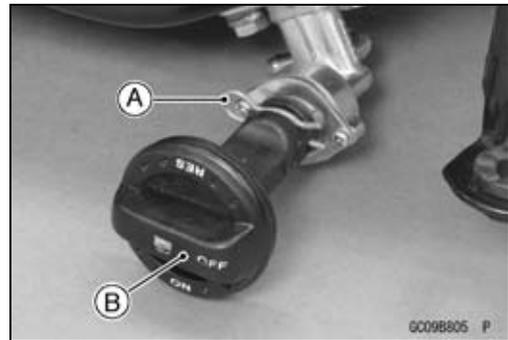


3-22 FUEL SYSTEM

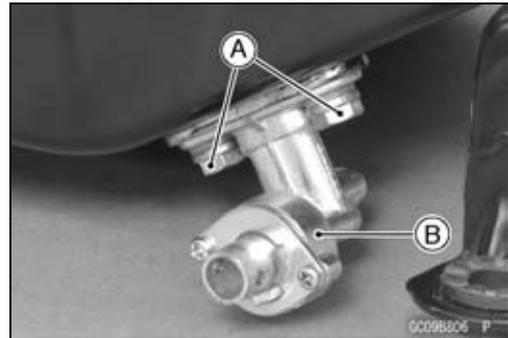
Fuel Tank

Fuel Tap Removal

- Remove the fuel tank (see Fuel Tank Removal).
- Remove the snap pin [A] and knob [B].

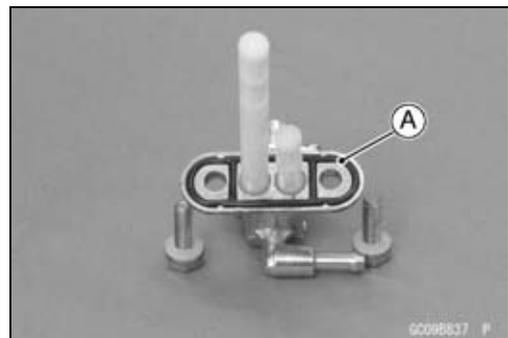


- Remove the fuel tap mounting bolts [A] with nylon washers and take out the fuel tap [B].



Fuel Tap Installation

- Replace the O-ring [A] with a new one.
Torque - Fuel Tap Mounting Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)



Fuel Tap Inspection

- Remove the fuel tap (see Fuel Tap Removal).
- Check the fuel tap filter screens [A] for any breaks or deterioration.
- ★ If the fuel tap screens have any breaks or deterioration, they may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap with a new one.



Fuel Tank

Fuel Tap and Fuel Tank Cleaning

 WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the tank.

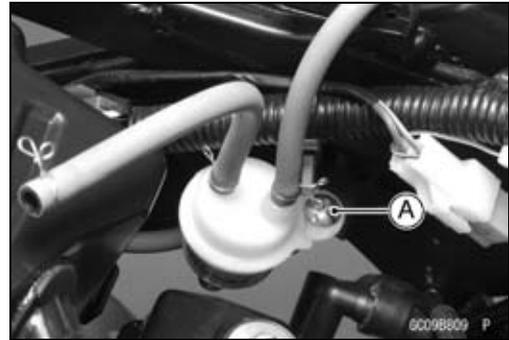
- Remove the fuel tank and drain the fuel (see Fuel Tank Removal).
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Draw the solvent out of the tank.
- Remove the fuel tap from the tank (see Fuel Tap Removal).
- Clean the fuel tap filter screens in a high flash-point solvent.
- Pour high flash-point solvent through the tap in all lever positions.
- Dry the tank and tap with compressed air.
- Install the fuel tap on the fuel tank (see Fuel Tap Installation).

3-24 FUEL SYSTEM

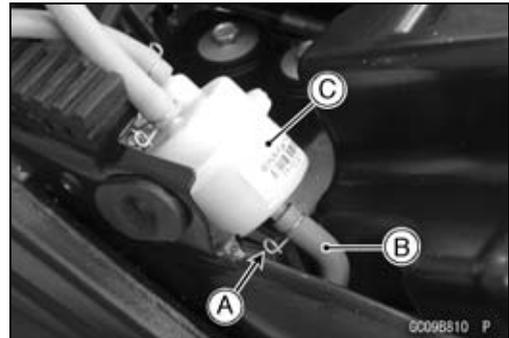
Fuel Filter

Fuel Filter Removal

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Fuel Filter Screw [A]



- Slide the clamp [A].
- Disconnect the fuel hose [B].
- Remove the fuel filter [C].

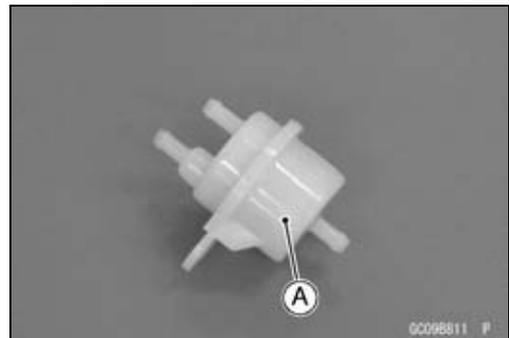


Fuel Filter Installation

- Installation is the reverse of removal.

Fuel Filter Inspection

- Visually inspect the fuel filter [A].
- ★ If the filter is clear with no signs of dirt or other contamination, it is OK and need not be replaced.
- ★ If the filter is dark or looks dirty, replace it with a new one. Also check the rest of the fuel system for contamination.



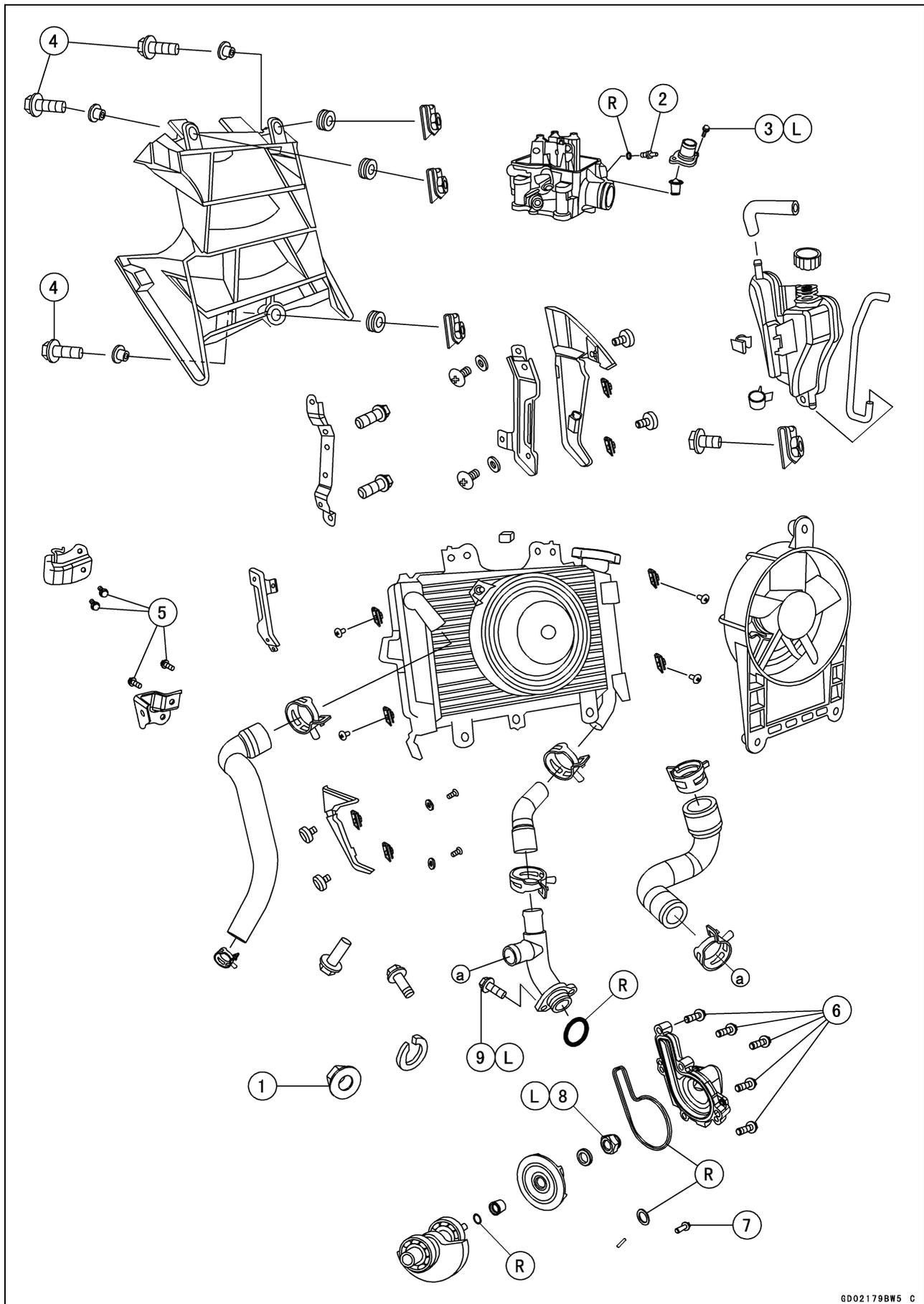
Cooling System

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4-2 COOLING SYSTEM

Exploded View



Exploded View

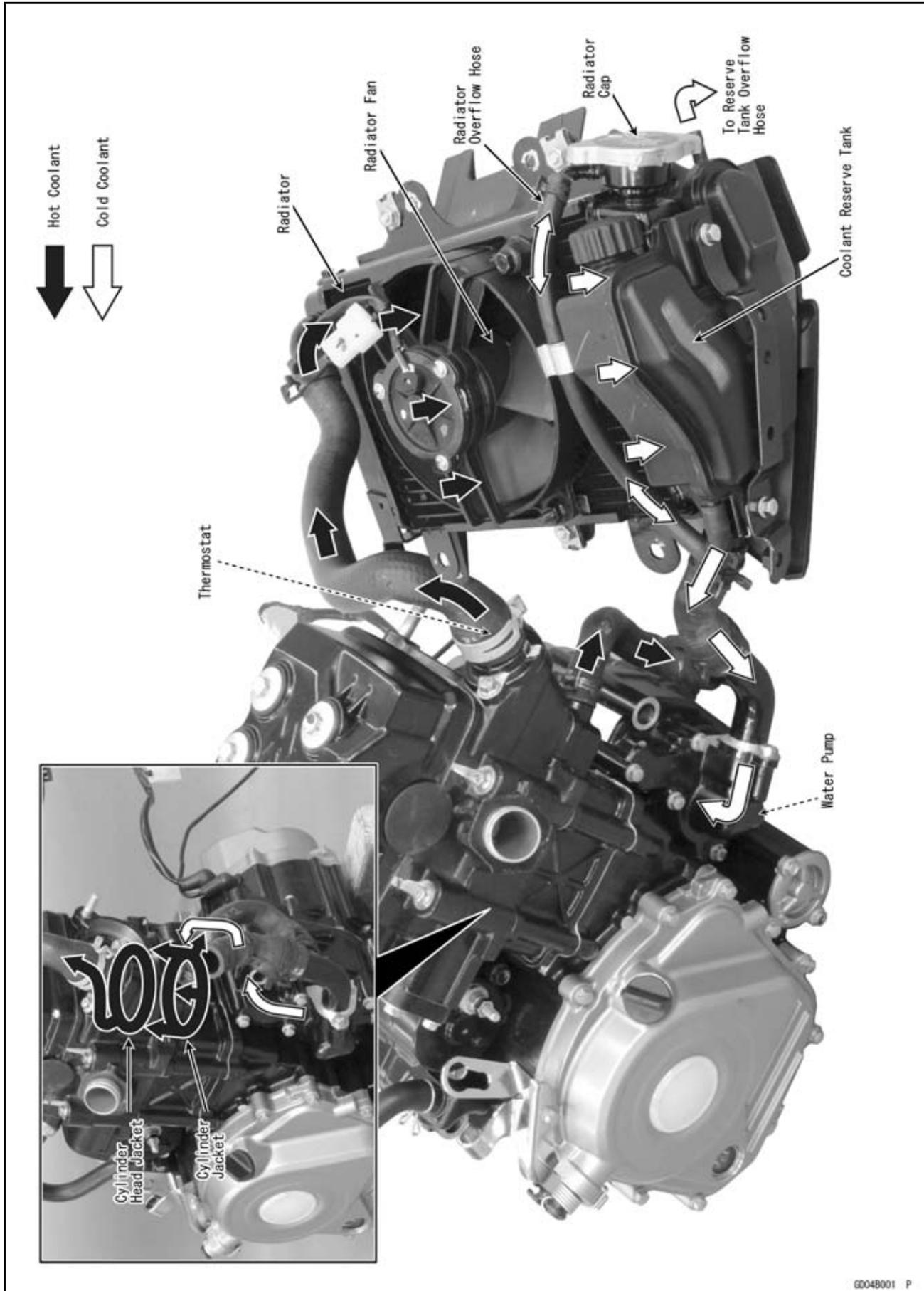
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Radiator Mounting Nuts	11	1.1	97 in·lb	
2	Water Temperature Sensor	13	1.3	115 in·lb	
3	Thermostat Cover Bolts	9.8	1.0	87 in·lb	L
4	Radiator Fairing Bolts	8.8	0.90	78 in·lb	
5	Radiator Bracket Bolts	11	1.1	97 in·lb	
6	Water Pump Cover Bolts	11	1.1	97 in·lb	
7	Coolant Drain Bolt	9.8	1.0	87 in·lb	
8	Water Pump Impeller Nut	7.8	0.80	69 in·lb	L
9	Water Pipe Bolts	9.8	1.0	87 in·lb	L

L: Apply a non-permanent locking agent.

R: Replacement Parts

4-4 COOLING SYSTEM

Coolant Flow Chart



Specifications

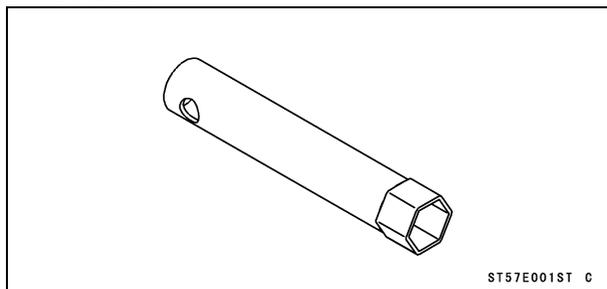
Item	Standard
<p>Coolant Provided when Shipping</p> <p>Type (Recommended)</p> <p>Color</p> <p>Mixed Ratio</p> <p>Freezing Point</p> <p>Total Amount</p>	<p>Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)</p> <p>Green</p> <p>Soft water 50%, coolant 50%</p> <p>-35°C (-31°F)</p> <p>1.0 L (1.1 US qt) (Reserve tank full level, including radiator and engine)</p>
<p>Radiator Cap</p> <p>Relief Pressure</p>	<p>137 kPa (1.4 kgf/cm², 20 psi)</p>
<p>Thermostat</p> <p>Valve Opening Temperature</p> <p>Valve Full Opening Lift</p>	<p>86 ~ 90°C (187 ~ 194°F)</p> <p>Full open: 94 ~ 98°C (201 ~ 208°F)</p> <p>6 mm (0.24 in.) or more at 96°C (205°F)</p>

4-6 COOLING SYSTEM

Special Tool

Box Wrench, 18 mm:

57001-E001



Coolant

Coolant Deterioration Inspection

- Visually inspect the coolant in the coolant reserve tank [A].
- ★ If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.
- ★ If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.



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.

Pressure Testing

- Remove:
 - Fuel Tank Cover (see Fuel Tank Cover Removal in the Frame chapter)
 - Radiator Cap [A]



- Install the cooling system pressure tester [A] on the filler neck.

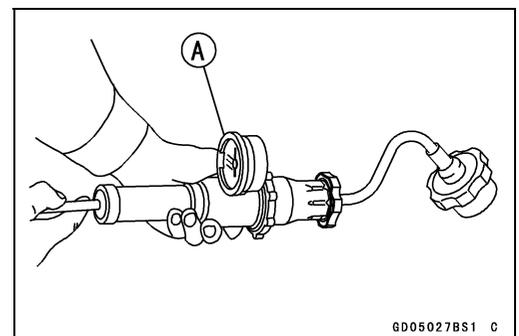
NOTE

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

- Build up pressure in the system carefully until the pressure reaches 137 kPa (1.4 kgf/cm², 20 psi).

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 137 kPa (1.4 kgf/cm², 20 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 water pump.
- Remove the pressure tester, replenish the coolant, and install the radiator cap.
- Install the fuel tank cover (see Fuel Tank Cover Installation in the Frame chapter).

4-8 COOLING SYSTEM

Coolant

Cooling System Flushing

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

- Drain the cooling system (see Coolant Change in the Periodic Maintenance chapter).
- Fill the cooling system with fresh water mixed with a flushing compound.

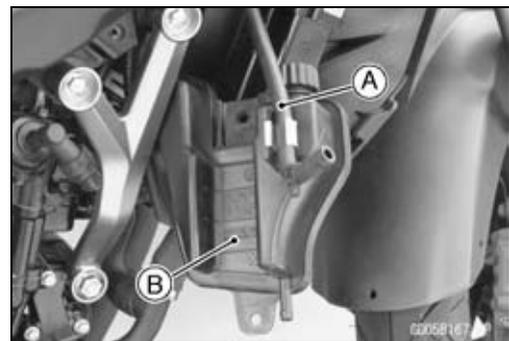
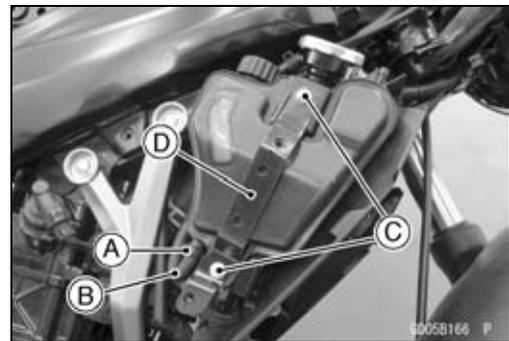
NOTICE

Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

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

Coolant Reserve Tank Removal

- Remove:
 - Fuel Tank Cover (see Fuel Tank Cover Removal in the Frame chapter)
 - Right Radiator Cover (see Radiator and Radiator Fan Removal)
- Slide the clamp [A].
- Disconnect the radiator overflow hose [B].
- Remove:
 - Bracket Bolts [C]
 - Bracket [D]
- Pour the coolant into a container.
- Remove:
 - Radiator Overflow Hose [A]
 - Coolant Reserve Tank [B]



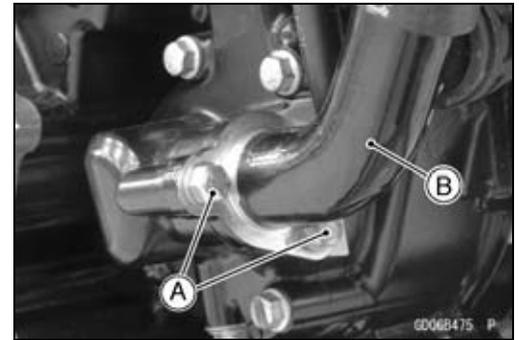
Coolant Reserve Tank Installation

- Installation is the reverse of removal.
- Run the hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Fill the coolant reserve tank with coolant (see Coolant Change in the Periodic Maintenance chapter).

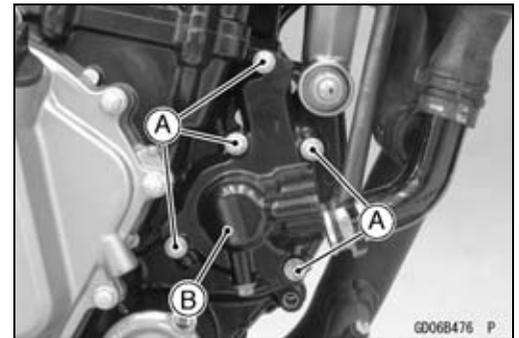
Water Pump

Water Pump Cover Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the water pipe bolts [A].
- Disconnect the water pipe [B].

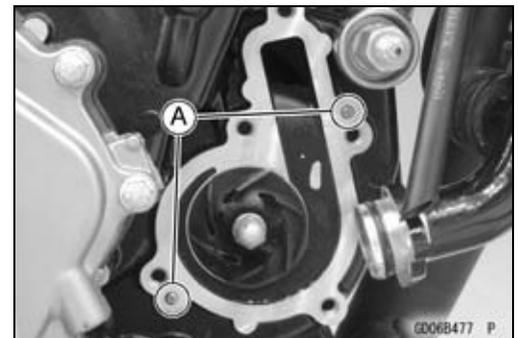


- Remove:
 - Water Pump Cover Bolts [A]
 - Water Pump Cover [B]



Water Pump Cover Installation

- Check that dowel pins [A] are in place.



- Replace the O-ring [A] with a new one.
- Install the water pump cover.
- Tighten:
 - Torque - Water Pump Cover Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**



- Replace the O-ring [A] with a new one.
- Install the water pipe.
- Apply a non-permanent locking agent to the threads of the water pipe bolts and tighten them.
 - Torque - Water Pipe Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Fill the cooling system (see Coolant Change in the Periodic Maintenance chapter).

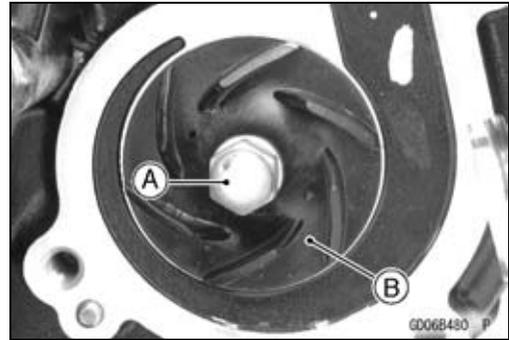


4-10 COOLING SYSTEM

Water Pump

Impeller Removal

- Remove:
 - Water Pump Cover (see Water Pump Cover Removal)
 - Water Pump Impeller Nut [A] and Washer
 - Impeller [B]

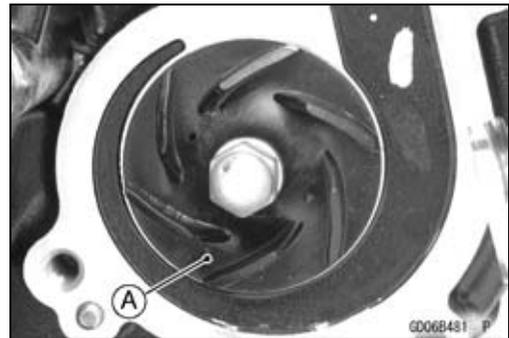


Impeller Installation

- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the threads of the water pump impeller nut and tighten it.
- Torque - Water Pump Impeller Nut: 7.8 N·m (0.80 kgf·m, 69 in·lb)**
- Install the water pump cover (see Water Pump Cover Installation).

Impeller Inspection

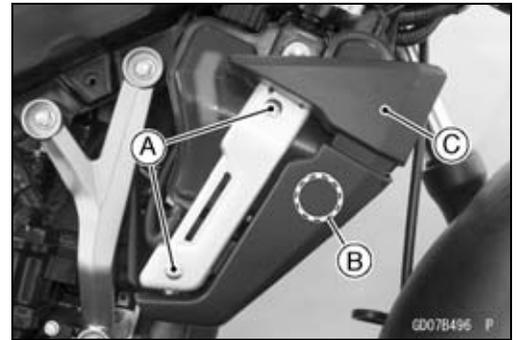
- Remove the water pump cover (see Water Pump Cover Removal).
- Visually inspect the impeller [A].
- ★ If the surface is corroded or if the blades are damaged, replace the impeller.



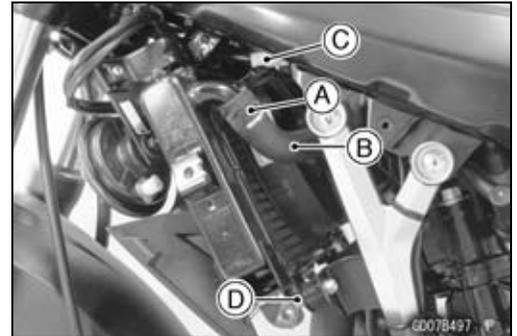
Radiator

Radiator and Radiator Fan Removal

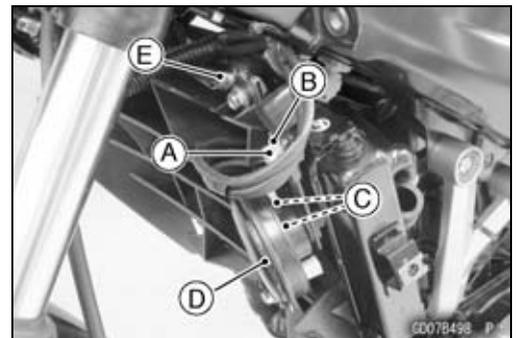
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the right radiator cover screws [A].
- Clear the projection [B] and remove the right radiator cover [C].
- Remove the left radiator cover in the same manner as the right radiator cover.
- Remove the coolant reserve tank (see Coolant Reserve Tank Removal).



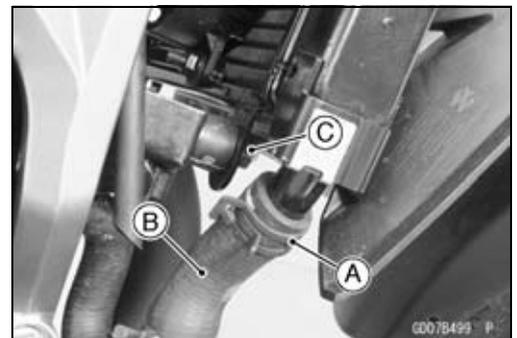
- Slide the clamp [A].
- Disconnect:
 - Water Hose [B]
 - Radiator Fan Motor Lead Connector [C]
- Remove the radiator mounting nut [D] and washer.



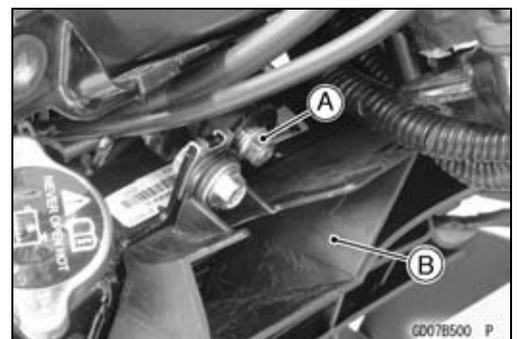
- Remove:
 - Horn Bracket Bolt [A]
 - Washer [B]
- Disconnect:
 - Horn Connectors [C]
- Remove:
 - Horn [D] with Horn Bracket
 - Radiator Mounting Nut [E] and Washer



- Slide the clamp [A].
- Disconnect the water hose [B].
- Remove the radiator mounting nut [C] and washer.



- Remove:
 - Radiator Mounting Nut [A] and Washer
 - Radiator [B]



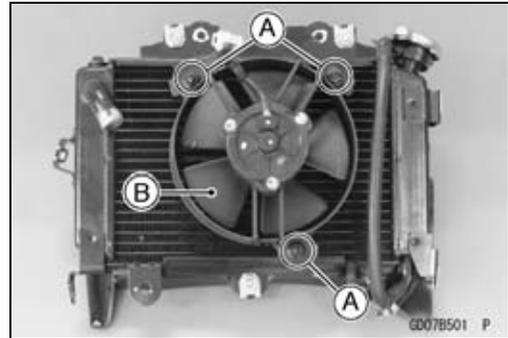
NOTICE

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

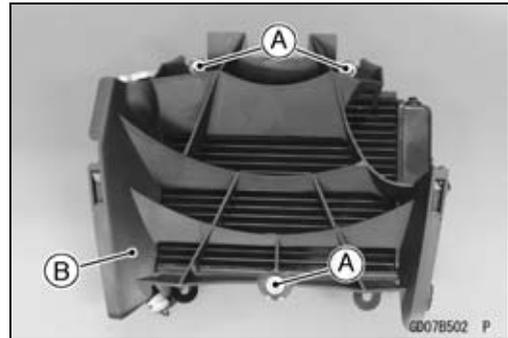
4-12 COOLING SYSTEM

Radiator

- Remove:
 - Radiator Fan Mounting Nuts [A]
 - Radiator Fan [B]



- Remove:
 - Radiator Fairing Bolts [A]
 - Radiator Fairing [B]

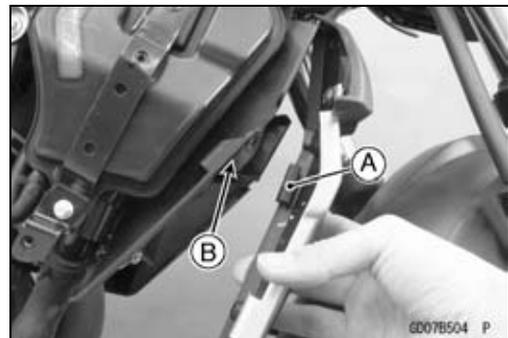


Radiator and Radiator Fan Installation

- Installation is the reverse of removal.
- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:
 - Torque - Radiator Fairing Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
 - Radiator Mounting Nuts: 11 N·m (1.1 kgf·m, 97 in·lb)**
- Check that the damper [A] is in place on the radiator cover.



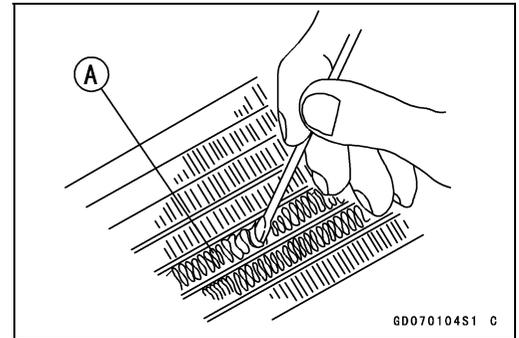
- Fit the damper [A] to the groove [B].
- Tighten the radiator cover screws securely.
- Install the removed parts (see appropriate chapters).



Radiator

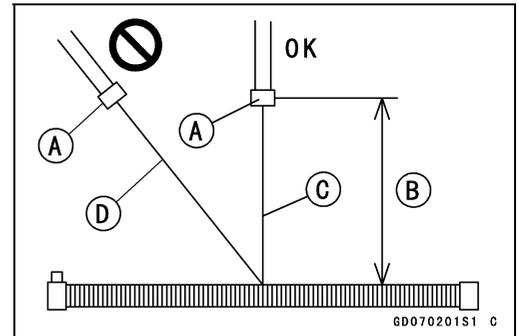
Radiator Inspection

- Remove the radiator (see Radiator and Radiator Fan Removal).
- Check the radiator core.
- ★ If there are obstructions to air flow, remove them.
- ★ If the corrugated fins [A] are deformed, carefully straighten them.
- ★ If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.



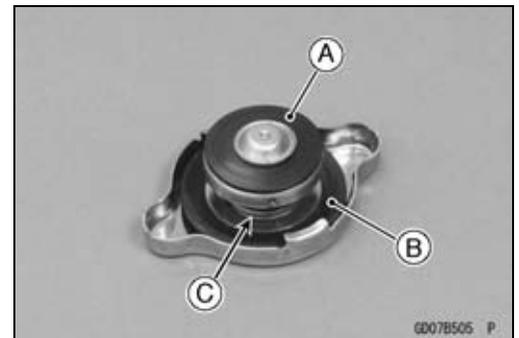
NOTICE

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage: Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core. Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface. Run the steam gun, following the core fin direction.



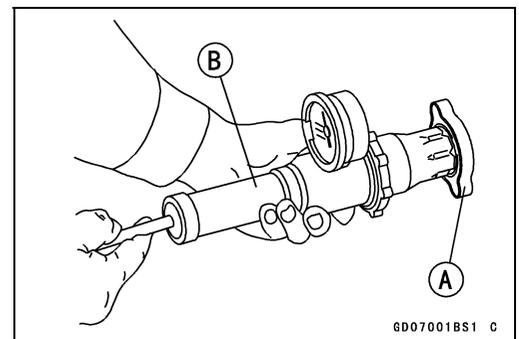
Radiator Cap Inspection

- Remove:
 - Fuel Tank Cover (see Fuel Tank Cover Removal in the Frame chapter)
 - Radiator Cap
 - Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].
 - ★ If any one of them shows visible damage, replace the radiator with a new one.
- Install the cap [A] on a cooling system pressure tester [B].



NOTE

- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle flicks downward. Stop pumping and measure leak time at once. The relief valve must open within the specified range in the table below and the gauge hand must remain within the same range at least 6 seconds.



Radiator Cap Relief Pressure

Standard: 137 kPa (1.4 kgf/cm², 20 psi)

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

4-14 COOLING SYSTEM

Radiator

Radiator Filler Neck Inspection

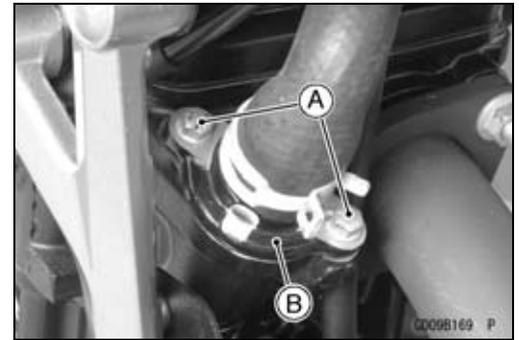
- Remove:
 - Fuel Tank Cover (see Fuel Tank Cover Removal in the Frame chapter)
 - Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.



Thermostat

Thermostat Removal

- Remove:
 - Radiator (see Radiator and Radiator Fan Removal)
 - Thermostat Cover Bolts [A]
 - Thermostat Cover [B]



- Remove:
 - Thermostat [A]

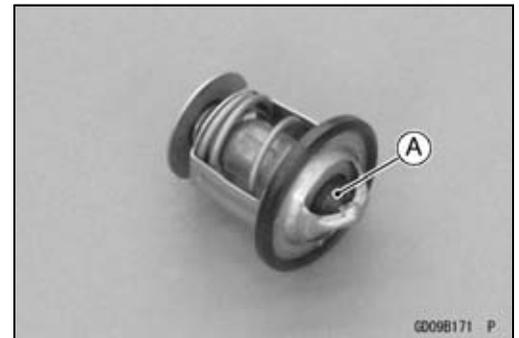


Thermostat Installation

- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the threads of the thermostat cover bolts and tighten them.
 - Torque - Thermostat Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install the removed parts (see appropriate chapters).

Thermostat Inspection

- Remove the thermostat (see Thermostat Removal).
- Inspect the thermostat valve [A] at room temperature.
- ★ If the valve is open, replace the thermostat with a new one.



4-16 COOLING SYSTEM

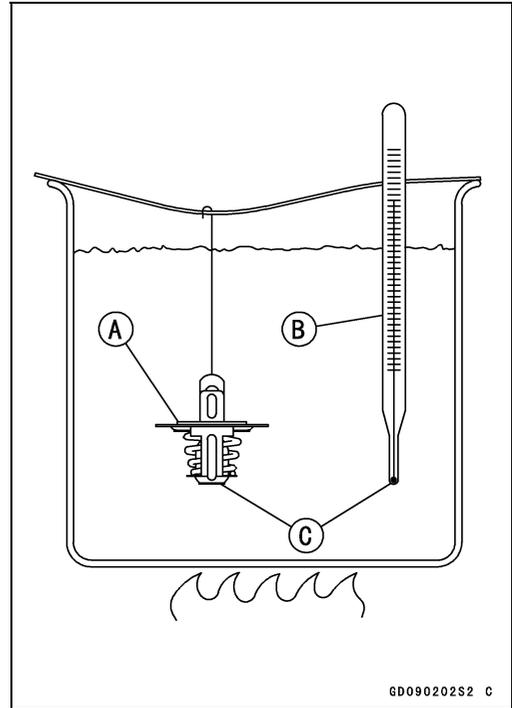
Thermostat

- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.
- The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.
- ★ If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature

86 ~ 90°C (187 ~ 194°F)

Full open: 94 ~ 98°C (201 ~ 208°F)

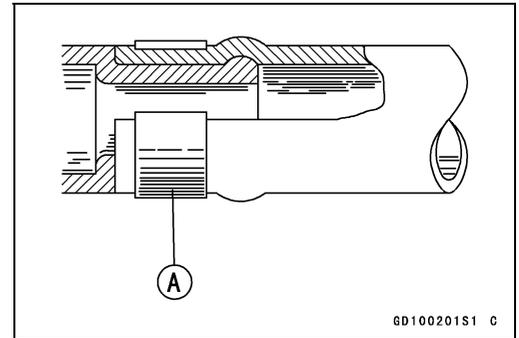


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Hoses and Pipes

Hose Installation

- Install the hoses and pipes, being careful to follow bending direction. Avoid sharp bending, kinking, flattening or twisting.
- Run the hoses (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the clamp [A] as near as possible to the hose end to clear the raised rib of the fitting. This will prevent the hoses from working loose.



Hose Inspection

- Refer to the Radiator Hose and Pipe Inspection in the Periodic Maintenance chapter.

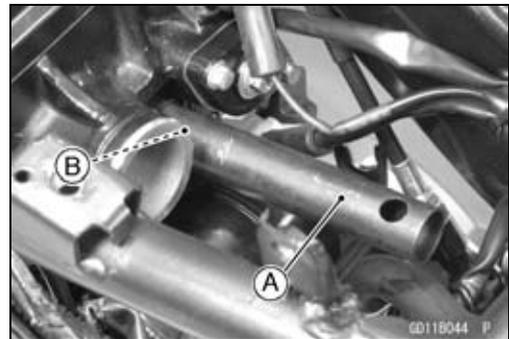
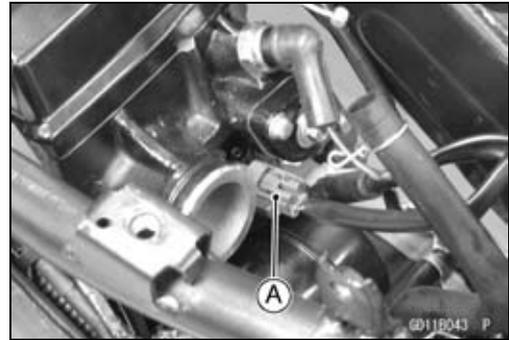
4-18 COOLING SYSTEM

Water Temperature Sensor

Water Temperature Sensor Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System chapter)
 - Carburetor (see Carburetor Removal in the Fuel System chapter)
 - Carburetor Holder (see Carburetor Holder Removal in the Engine Top End chapter)
- Disconnect the water temperature sensor connector [A].
- Using the box wrench (special tool) [A], remove the water temperature sensor [B].

Special Tool - Box Wrench, 18 mm: 57001-E001



Water Temperature Sensor Installation

- Installation is the reverse of removal.
 - Using the box wrench (special tool), tighten the water temperature sensor.
- Special Tool - Box Wrench, 18 mm: 57001-E001**
- Torque - Water Temperature Sensor: 13 N·m (1.3 kgf·m, 115 in·lb)**
- Install the removed parts (see appropriate chapters).

Water Temperature Sensor Inspection

- Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.

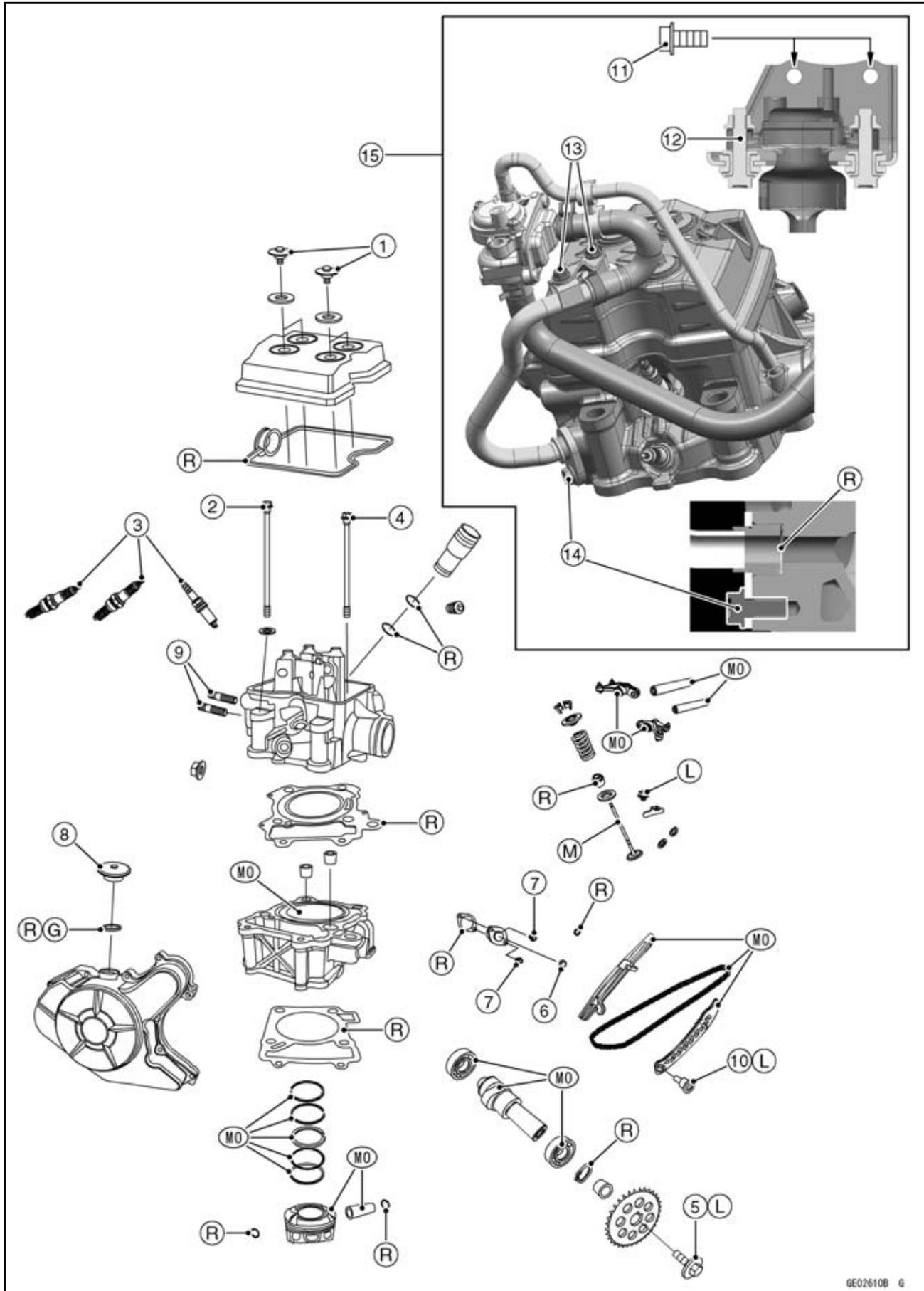
Engine Top End

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5-2 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Cylinder Head Cover Bolts	11	1.1	97 in·lb	
2	Cylinder Head Bolts (M10)	46	4.7	34	
3	Spark Plugs	14	1.4	10	
4	Cylinder Head Bolts (M6)	11	1.1	97 in·lb	
5	Camshaft Sprocket Bolt	25	2.5	18	L
6	Camshaft Chain Tensioner Cap Bolt	11	1.1	97 in·lb	
7	Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in·lb	
8	Timing Inspection Cap	11	1.1	97 in·lb	
9	Exhaust Pipe Holder Studs	23	2.3	17	
10	Rear Camshaft Chain Guide Mounting Bolt	11	1.1	97 in·lb	L
11	Vacuum Switch Valve Bracket Bolts (PH Model)	11	1.1	97 in·lb	
12	Vacuum Switch Valve Bolts (PH Model)	8.8	0.90	78 in·lb	
13	Vacuum Switch Valve Pipe Bolts (PH Model)	5.9	0.60	52 in·lb	
14	Vacuum Switch Valve Pipe Mounting Bolt (PH Model)	12	1.2	106 in·lb	

15. PH Model

G: Apply grease.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

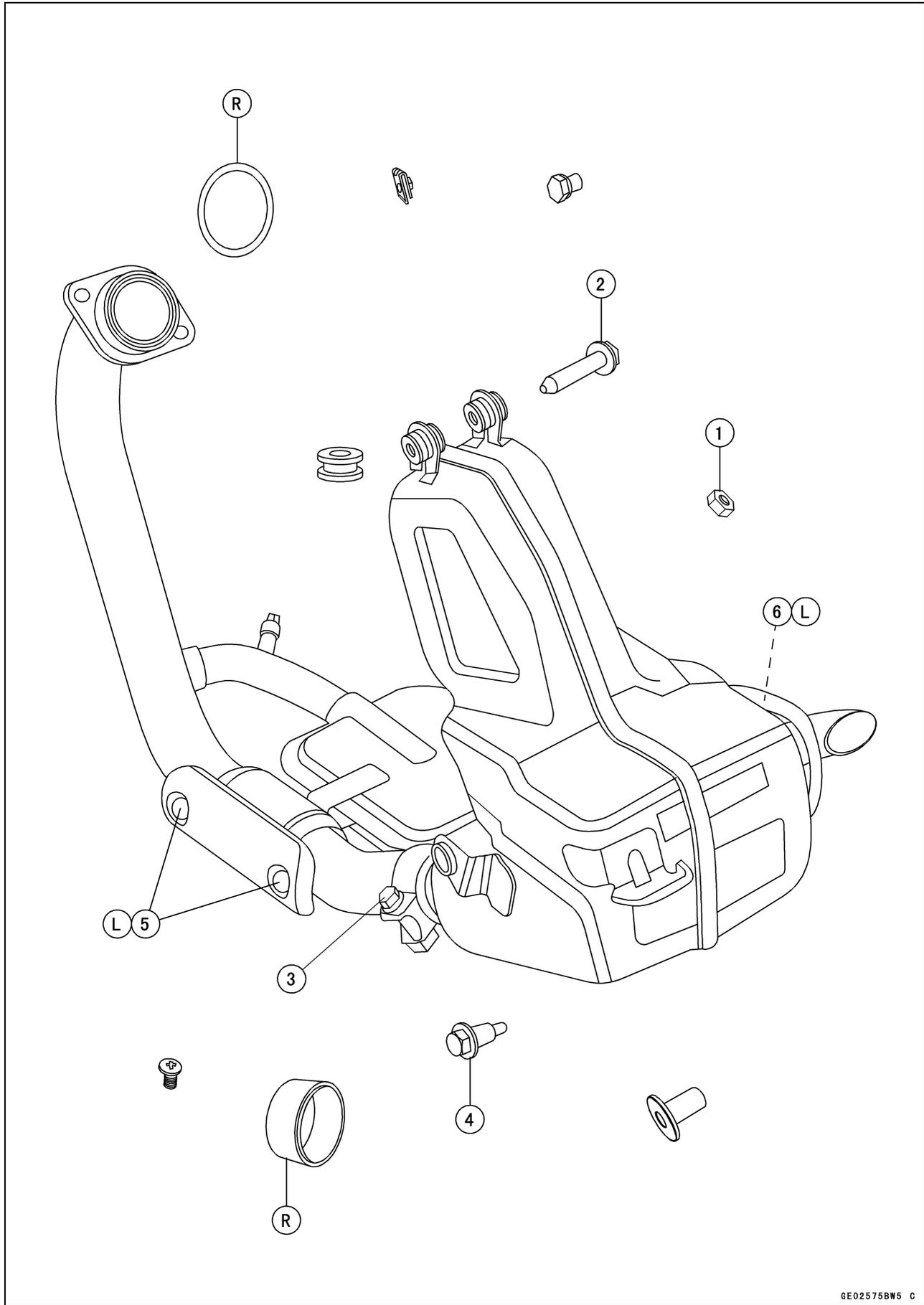
MO: Apply molybdenum disulfide oil solution.

(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

R: Replacement Parts

5-4 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust Pipe Holder Nuts	23	2.3	17	
2	Muffler Body Mounting Bolts (Upper)	11	1.1	97 in·lb	
3	Muffler Body Clamp Bolt	15	1.5	11	
4	Muffler Body Mounting Bolts (Lower)	11	1.1	97 in·lb	
5	Exhaust Pipe Cover Screws	6.9	0.70	61 in·lb	L
6	Muffler End Cover Screws	6.9	0.70	61 in·lb	L

L: Apply a non-permanent locking agent.

R: Replacement Parts

5-6 ENGINE TOP END

Specifications

Item	Standard	Service Limit
Clean Air System		
Vacuum Switch Valve	Open → Close	---
Closing Pressure	54.7 ~ 66.7 kPa (410 ~ 500 mmHg)	
Camshaft		
Cam Height:		
Exhaust	30.29 mm (1.193 in.)	30.24 mm (1.191 in.)
Intake	30.34 mm (1.194 in.)	30.29 mm (1.193 in.)
Rocker Arm Inside Diameter	10.000 ~ 10.012 mm (0.39370 ~ 0.39417 in.)	10.03 mm (0.3949 in.)
Rocker Shaft Diameter	9.974 ~ 9.987 mm (0.3927 ~ 0.3932 in.)	9.96 mm (0.392 in.)
Cylinder Head		
Cylinder Compression	(Usable Range) 1 079 ~ 1 275 kPa (11 ~ 13 kgf/cm ² , 156 ~ 185 psi) at 320 r/min (rpm)	---
Cylinder Head Warp	---	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.07 ~ 0.09 mm (0.0028 ~ 0.0035 in.)	---
Intake	0.04 ~ 0.06 mm (0.0016 ~ 0.0024 in.)	---
Valve Head Thickness:		
Exhaust	0.5 mm (0.020 in.)	0.45 mm (0.018 in.)
Intake	0.5 mm (0.020 in.)	0.45 mm (0.018 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.)	TIR 0.015 mm (0.00059 in.)
Valve Stem Diameter:		
Exhaust	4.455 ~ 4.470 mm (0.1754 ~ 0.1760 in.)	4.445 mm (0.1750 in.)
Intake	4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in.)	4.465 mm (0.1758 in.)
Valve Guide Inside Diameter:		
Exhaust	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.522 mm (0.1780 in.)
Intake	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.522 mm (0.1780 in.)
Valve Seat Cutting Angle	30°, 45°, 60°	---
Valve Seating Surface:		
Outside Diameter:		
Exhaust	23.4 ~ 23.6 mm (0.921 ~ 0.929 in.)	---
Intake	23.4 ~ 23.6 mm (0.921 ~ 0.929 in.)	---
Width:		
Exhaust	0.9 ~ 1.1 mm (0.035 ~ 0.043 in.)	---
Intake	0.9 ~ 1.1 mm (0.035 ~ 0.043 in.)	---
Valve Spring Free Length:		
Exhaust	38.9 mm (1.53 in.)	37.9 mm (1.49 in.)
Intake	38.9 mm (1.53 in.)	37.9 mm (1.49 in.)
Cylinder, Piston		
Cylinder Inside Diameter	72.006 ~ 72.013 mm (2.8349 ~ 2.8352 in.)	72.043 mm (2.8363 in.)
Piston Diameter	71.964 ~ 71.976 mm (2.8332 ~ 2.8337 in.)	---

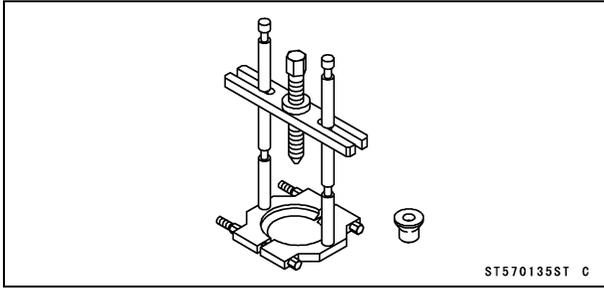
Specifications

Item	Standard	Service Limit
Piston/Cylinder Clearance	0.03 ~ 0.049 mm (0.0012 ~ 0.0019 in.)	0.09 mm (0.0035 in.)
Piston Ring/Groove Clearance:		
Top	0.020 ~ 0.055 mm (0.0008 ~ 0.0022 in.)	— — —
Second	0.020 ~ 0.060 mm (0.0008 ~ 0.0024 in.)	— — —
Oil	0.035 ~ 0.110 mm (0.0014 ~ 0.0043 in.)	— — —
Piston Ring Groove Width:		
Top	1.01 ~ 1.03 mm (0.040 ~ 0.041 in.)	— — —
Second	1.01 ~ 1.03 mm (0.040 ~ 0.041 in.)	— — —
Piston Ring Thickness:		
Top	0.97 ~ 0.99 mm (0.038 ~ 0.039 in.)	— — —
Second	0.97 ~ 0.99 mm (0.038 ~ 0.039 in.)	— — —
Piston Ring End Gap:		
Top	0.015 ~ 0.030 mm (0.0006 ~ 0.0012 in.)	— — —
Second	0.030 ~ 0.050 mm (0.0012 ~ 0.0020 in.)	— — —
Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	— — —
Piston Pin Diameter	16.992 ~ 16.997 mm (0.66898 ~ 0.66917 in.)	— — —
Piston Pin Hole Diameter	17.005 ~ 17.011 mm (0.66949 ~ 0.66972 in.)	17.03 mm (0.6704 in.)
Connecting Rod Small End Inside Diameter	17.005 ~ 17.016 mm (0.66949 ~ 0.66992 in.)	17.03 mm (0.6704 in.)

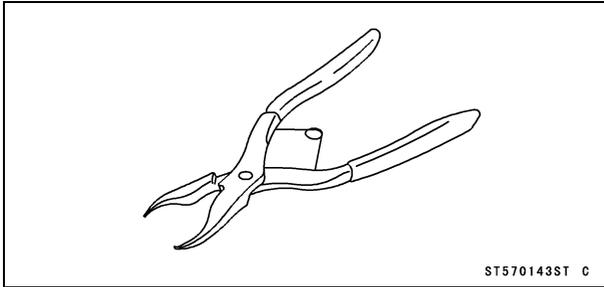
5-8 ENGINE TOP END

Special Tools

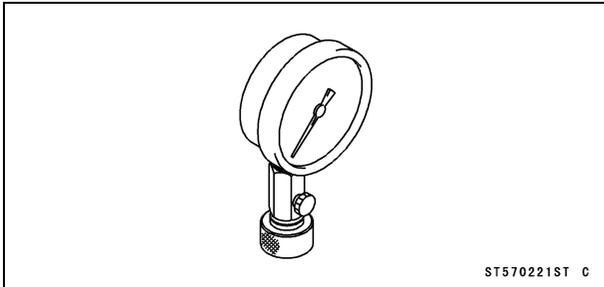
Bearing Puller:
57001-135



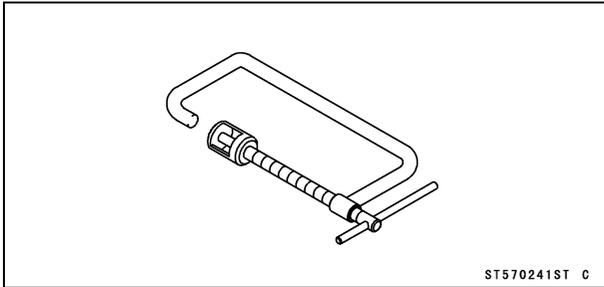
Inside Circlip Pliers:
57001-143



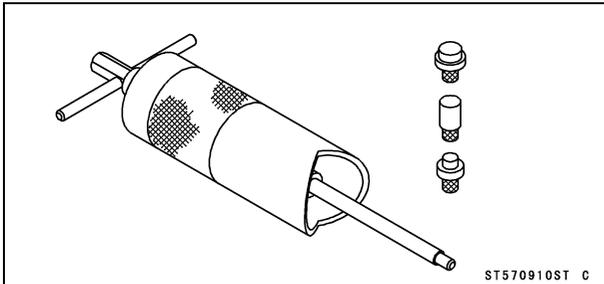
Compression Gauge, 20 kgf/cm²:
57001-221



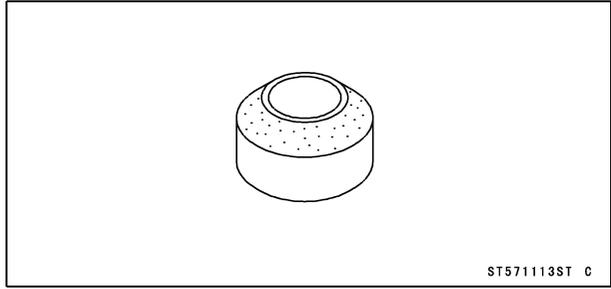
Valve Spring Compressor Assembly:
57001-241



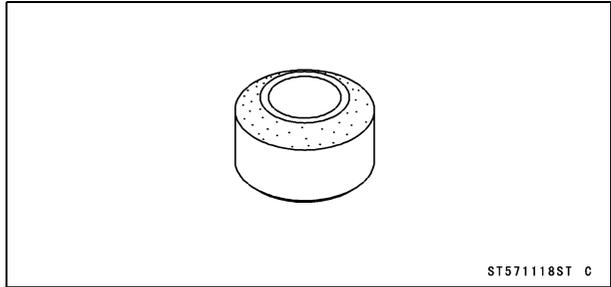
Piston Pin Puller Assembly:
57001-910



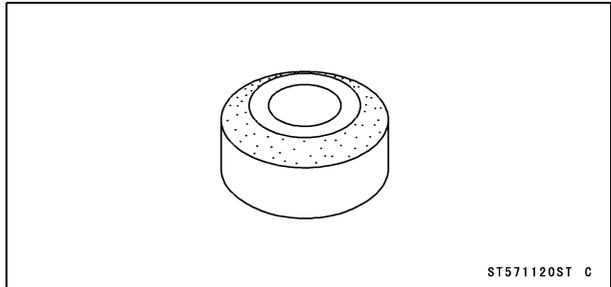
Valve Seat Cutter, 45° - ϕ 24.5:
57001-1113



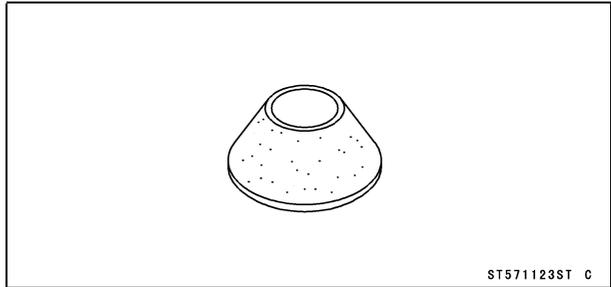
Valve Seat Cutter, 32° - ϕ 25:
57001-1118



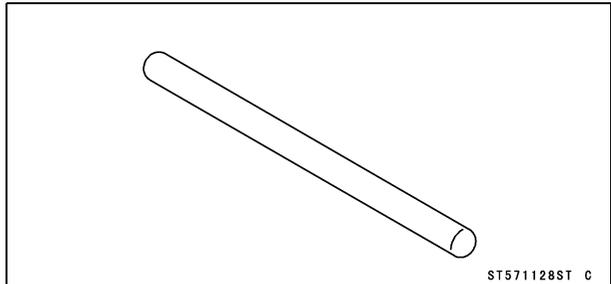
Valve Seat Cutter, 32° - ϕ 30:
57001-1120



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

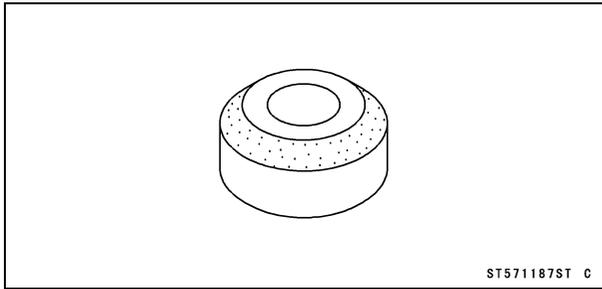


Valve Seat Cutter Holder Bar:
57001-1128

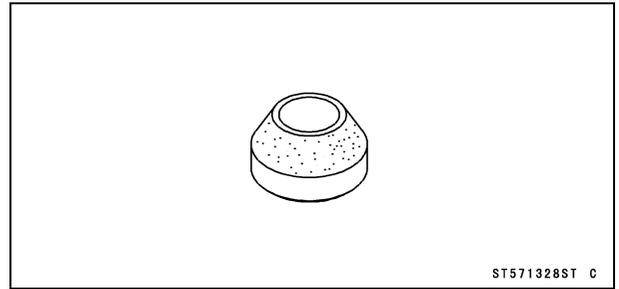


Special Tools

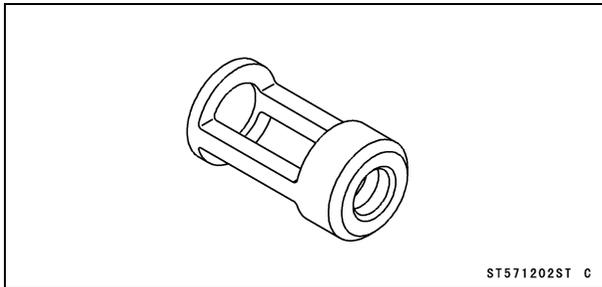
Valve Seat Cutter, 45° - ϕ 30:
57001-1187



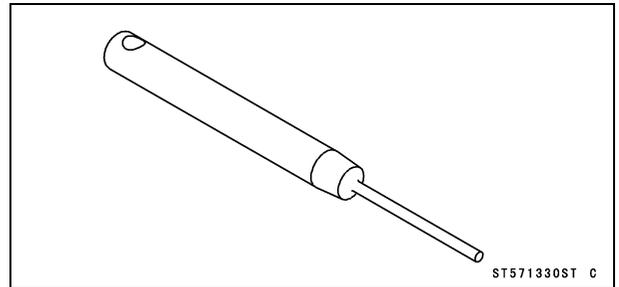
Valve Seat Cutter, 60° - ϕ 25:
57001-1328



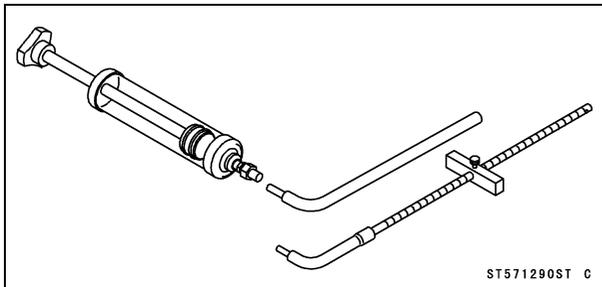
Valve Spring Compressor Adapter, ϕ 22:
57001-1202



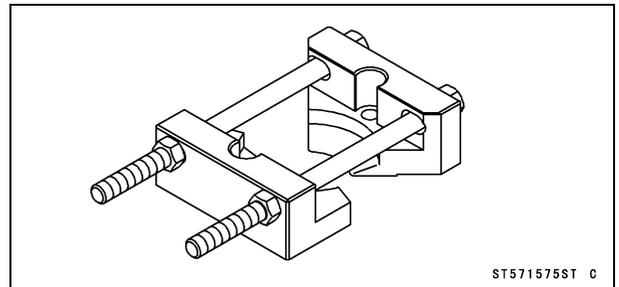
Valve Seat Cutter Holder, ϕ 4.5:
57001-1330



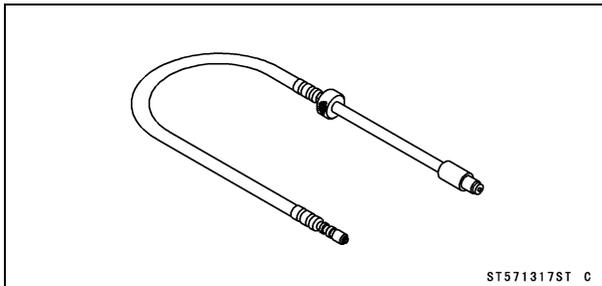
Fork Oil Level Gauge:
57001-1290



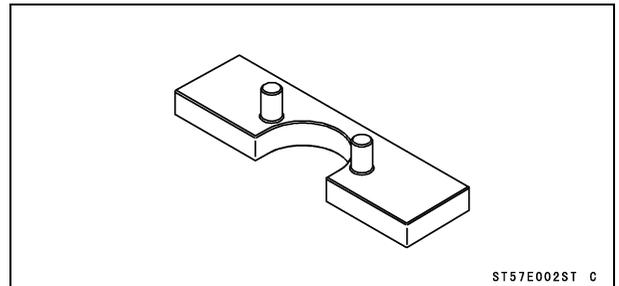
Bearing Puller:
57001-1575



Compression Gauge Adapter, M10 \times 1.0:
57001-1317



Camshaft Sprocket Holder:
57001-E002

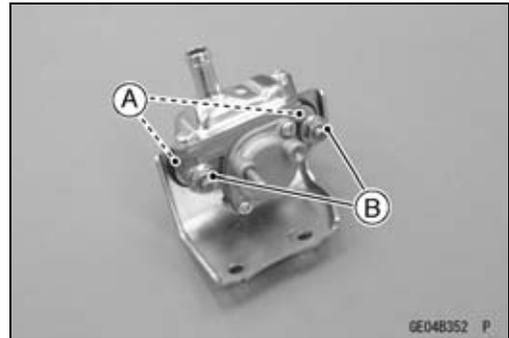
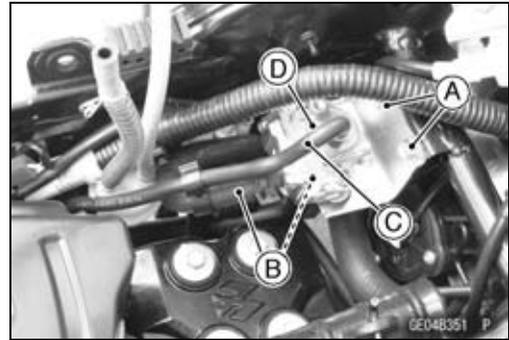


5-10 ENGINE TOP END

Clean Air System (PH Model)

Vacuum Switch Valve Removal

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter).
 - Bolts [A]
 - Disconnect:
 - Air Hoses [B]
 - Vacuum Hose [C]
 - Remove the vacuum switch valve [D] and bracket.
-
- Remove the bolts [A] and nuts [B].



Vacuum Switch Valve Installation

- Install the vacuum switch valve to the bracket.
- Tighten:
 - Torque - Vacuum Switch Valve Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Install the air hoses and vacuum hose to the vacuum switch valve.
- Install the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

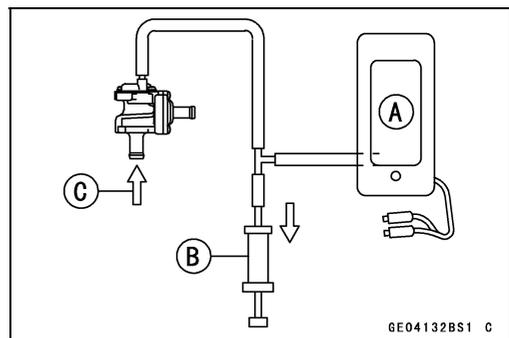
Vacuum Switch Valve Operation Inspection

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

Vacuum Switch Valve Inspection

- Remove the vacuum switch valve (see Vacuum Switch Valve Removal).
- Connect a commercially available vacuum gauge [A] and syringe [B] or the fork oil level gauge to the vacuum hoses as shown.

Special Tool - Fork Oil Level Gauge: 57001-1290
Air Flow [C]



Clean Air System (PH Model)

- 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 is raised to the valve closing pressure, the valve should stop air flow.

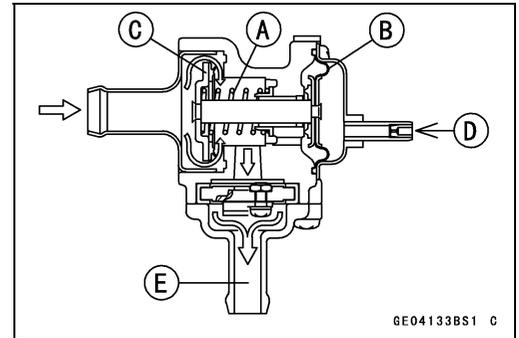
Spring [A]

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

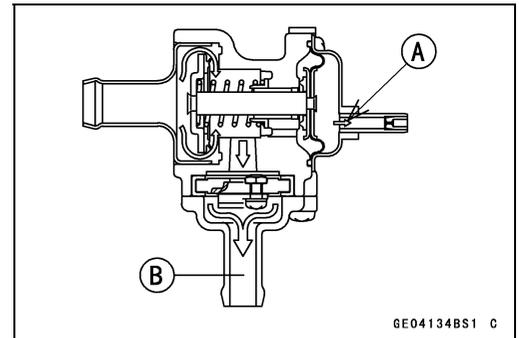
- To check air flow through the vacuum switch valve, just blow through the air cleaner hose.

Vacuum Switch Valve Closing Pressure (Open → Close)

Standard: 54.7 ~ 66.7 kPa (410 ~ 500 mmHg)

High Vacuum [A]

Secondary Air Cannot Flow [B]



Clean Air System Hoses Inspection

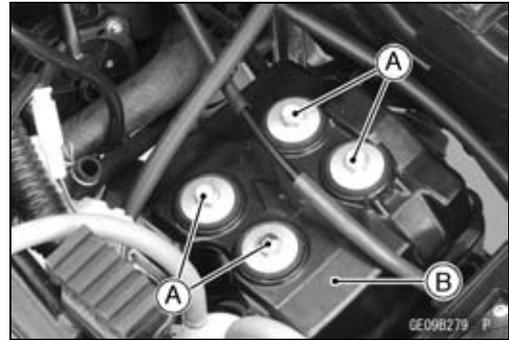
- Visually inspect the hoses for damage or connection.
- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, vacuum switch valve, carburetor holder.
- ★ If they are not, correct them. Replace them if they are damaged.

5-12 ENGINE TOP END

Cylinder Head Cover

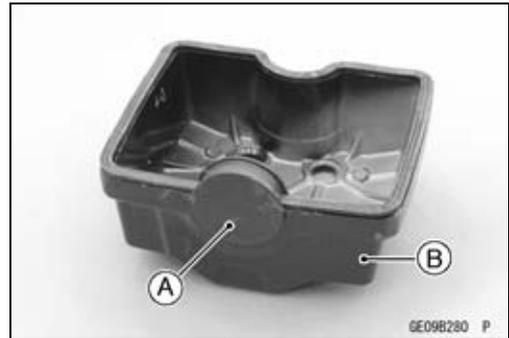
Cylinder Head Cover Removal

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Cover (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
 - Cylinder Head Cover Bolts [A] and Washers
 - Cylinder Head Cover [B]
 - Cylinder Head Cover Gasket

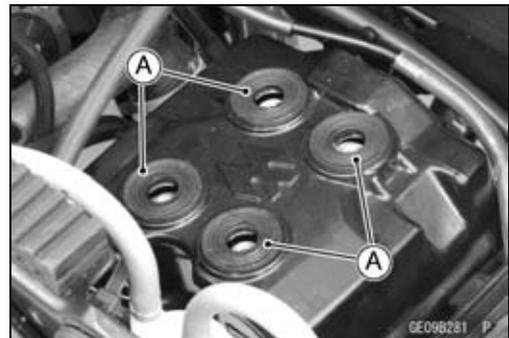


Cylinder Head Cover Installation

- Replace the cylinder head cover gasket with a new one.
- Install the new cylinder head cover gasket [A] on the cylinder head cover [B].
- Install the cylinder head cover.



- Install the cylinder head cover bolt washers [A].
- Tighten:
 - Torque - Cylinder Head Cover Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**
- Install the removed parts (see appropriate chapters).



Camshaft Chain Tensioner

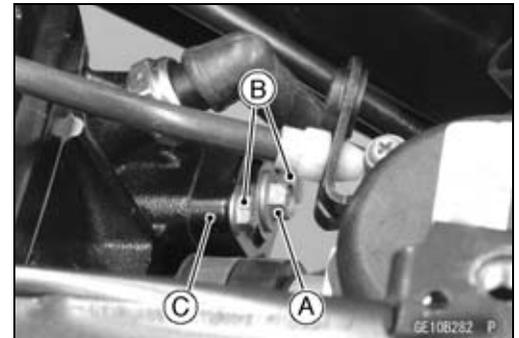
Camshaft Chain Tensioner Removal

NOTICE

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up 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 "Camshaft Chain Tensioner Installation". Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove:
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System chapter)
 - Camshaft Chain Tensioner Cap Bolt [A]
 - Camshaft Chain Tensioner Mounting Bolts [B]
 - Camshaft Chain Tensioner [C]

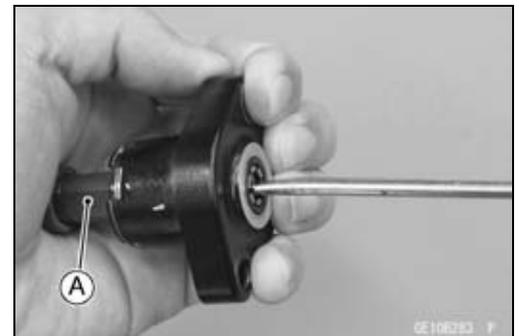


Camshaft Chain Tensioner Installation

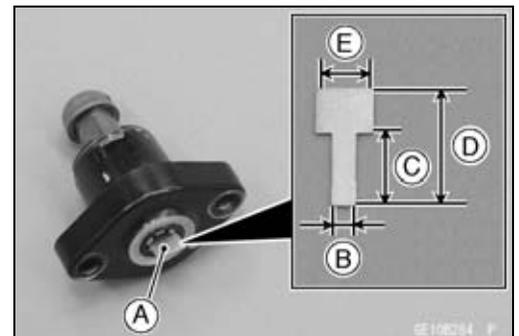
- While compressing the push rod [A], turn it clockwise with a suitable screwdriver until the rod stopped.

NOTICE

Do not turn the rod counterclockwise before installing the tensioner. This could detach the rod and the tensioner cannot be reinstalled.



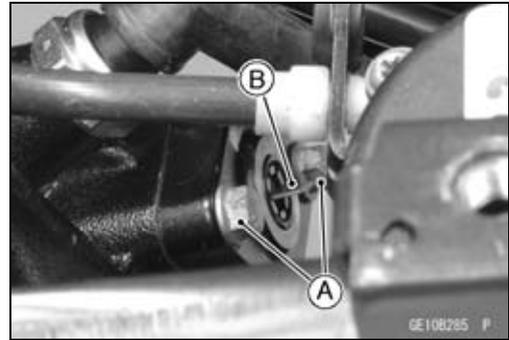
- Replace the chain tensioner gasket with a new one.
- While holding the rod in position with a suitable push rod holder plate [A] install the tensioner on the cylinder block.
 - 3.5 mm (0.14 in.) [B]
 - 11 mm (0.43 in.) [C]
 - 18 mm (0.71 in.) [D]
 - 8.5 mm (0.33 in.) [E]



5-14 ENGINE TOP END

Camshaft Chain Tensioner

- Tighten:
Torque - Camshaft Chain Tensioner Mounting Bolts [A]: 11 N·m (1.1 kgf·m, 97 in·lb)
- Take out the holder plate [B].
- Replace the tensioner cap bolt O-ring with a new one.
- Tighten:
Torque - Camshaft Chain Tensioner Cap Bolt: 11 N·m (1.1 kgf·m, 97 in·lb)

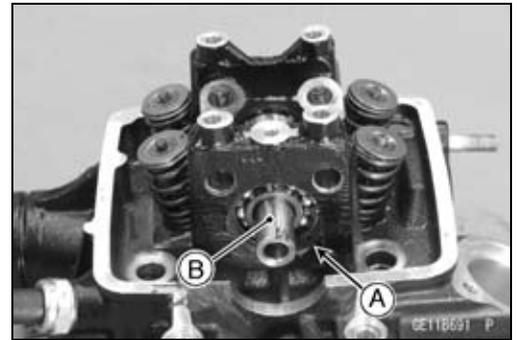


Camshaft

Camshaft Removal

- Remove:
 - Cylinder Head (see Cylinder Head Removal)
 - Rocker Arms (see Rocker Arm Removal)
 - Circlip [A]
 - Camshaft [B]

Special Tool - Inside Circlip Pliers: 57001-143



Camshaft Installation

- Apply molybdenum disulfide oil solution to all cam parts, journal and bearing.
- Install the camshaft into the cylinder head.
- Replace the circlip with a new one.
- Install the new circlip.

Special Tool - Inside Circlip Pliers: 57001-143

- Install the removed parts (see appropriate chapters).
- Check and adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).

Cam Wear Inspection

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

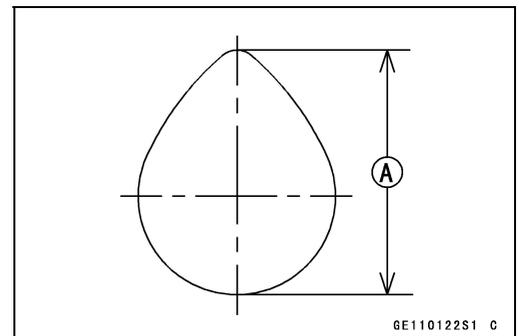
Cam Height

Standard:

Exhaust	30.29 mm (1.193 in.)
Intake	30.34 mm (1.194 in.)

Service Limit:

Exhaust	30.24 mm (1.191 in.)
Intake	30.29 mm (1.193 in.)



Camshaft Bearing Inspection

- Visually inspect each camshaft bearing [A].
- ★ If there is any damage, replace the bearing.
- Turn the bearing back and forth while checking for roughness or binding.
- ★ If roughness or binding is found, replace the bearing.
- ★ If it is noisy, does not spin smoothly, or has any rough spots, replace the bearing.



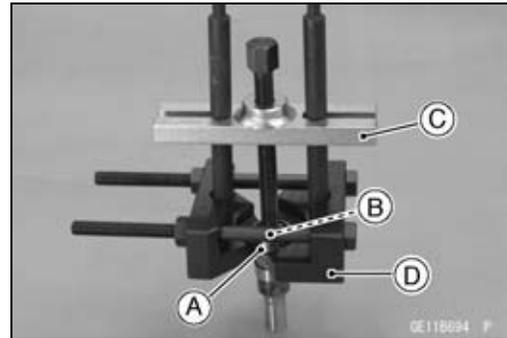
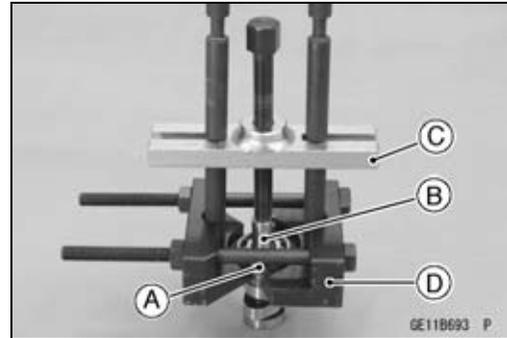
5-16 ENGINE TOP END

Camshaft

Camshaft Bearing Removal

- Remove the bearings [A] from the camshaft [B].

Special Tools - Bearing Puller [C]: 57001-135
Bearing Puller [D]: 57001-1575



Camshaft Bearing Installation

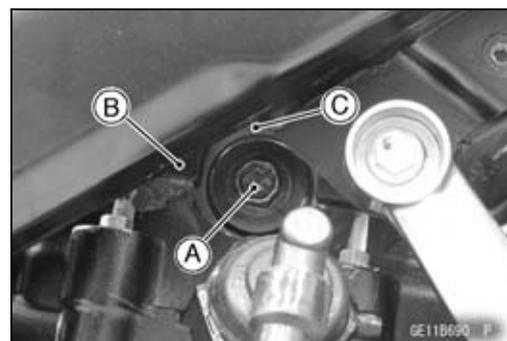
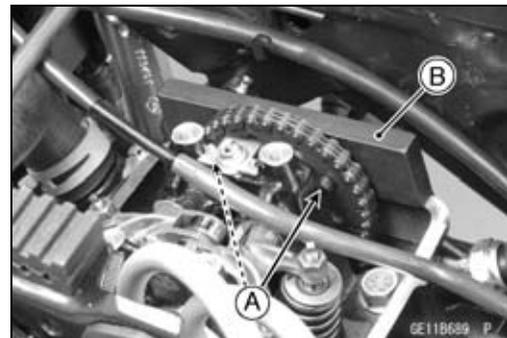
- Using a press, install the bearings.

Camshaft Sprocket Removal

- Bring the piston to the TDC of the compression stroke (see Valve Clearance Inspection in the Periodic Maintenance chapter).
- Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal).
- Set the projections [A] of the camshaft sprocket holder [B] in the holes of the camshaft sprocket.

Special Tool - Camshaft Sprocket Holder: 57001-E002

- Remove:
 - Camshaft Sprocket Bolt [A]
 - Camshaft Sprocket Holder (Special Tool) [B]



NOTICE

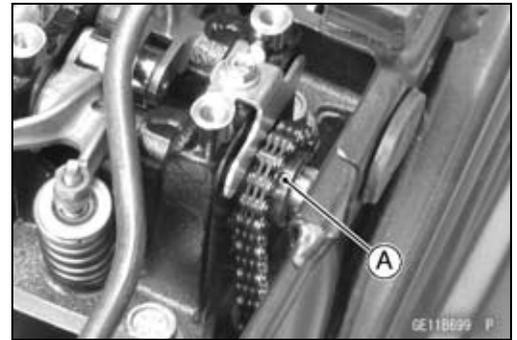
Always strain the camshaft chain while turning the crankshaft when the camshaft chain is loose. This avoids kinking the chain on the camshaft chain drive sprocket. A kinked chain could damage both the chain and the sprocket.

- Remove the camshaft sprocket [C], and disengage the chain.
- Using a suitable tool or wire to keep the chain from falling down into the cylinder block.

Camshaft

Camshaft Sprocket Installation

- Bring the piston to the TDC of the compression stroke (see Valve Clearance Inspection in the Periodic Maintenance chapter).
- Be sure that the spacer [A] is in position.



- Engage the camshaft chain with the camshaft sprocket.
- Set the projection [A] of the camshaft sprocket [B] to the groove [C] of the camshaft.
- Align the timing marks [D] on the camshaft sprocket with the cylinder head upper surface [E].

“T” Mark [F]

In this photo [G], the engine has been removed for clarity.

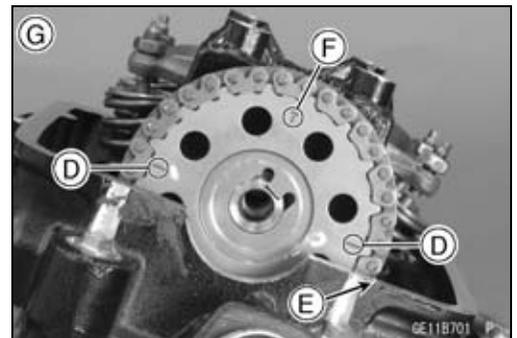
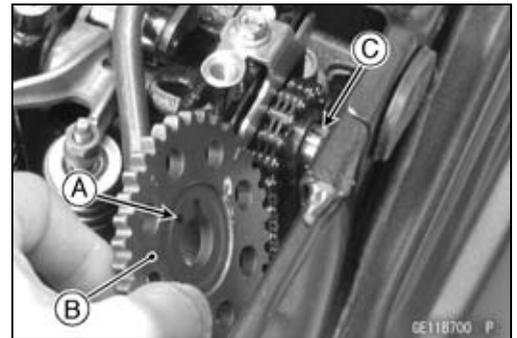
- Set the camshaft sprocket holder to the camshaft sprocket.

Special Tool - Camshaft Sprocket Holder: 57001-E002

- Apply a non-permanent locking agent to the threads of the camshaft sprocket bolt and tighten it.

Torque - Camshaft Sprocket Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).
- Turn the crankshaft 2 turns counterclockwise to allow the tensioner to expand and recheck the camshaft chain timing.



NOTICE

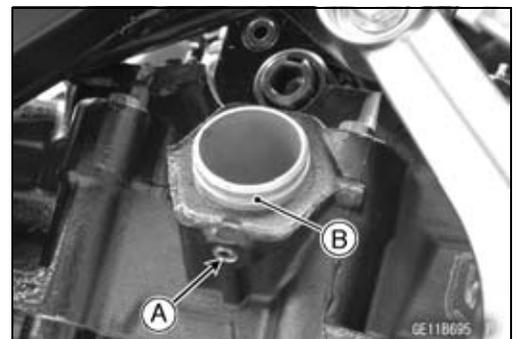
Rotation of the crankshaft with improper camshaft timing could cause the valve to contact each other or the piston, and bend.

If any resistance is felt when turning the crankshaft, stop immediately, and check the camshaft chain timing.

- Install the removed parts (see appropriate chapters).

Camshaft Chain Removal

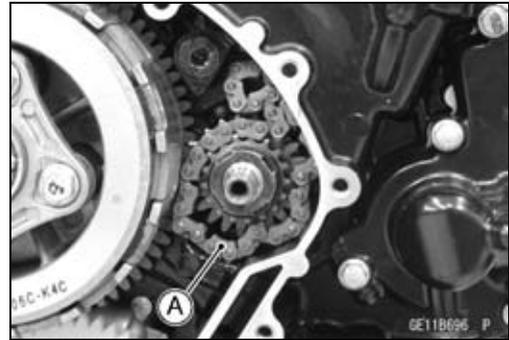
- Remove:
 - Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
 - Camshaft Sprocket (see Camshaft Sprocket Removal)
 - Grub Screw [A]
 - Sleeve [B]



5-18 ENGINE TOP END

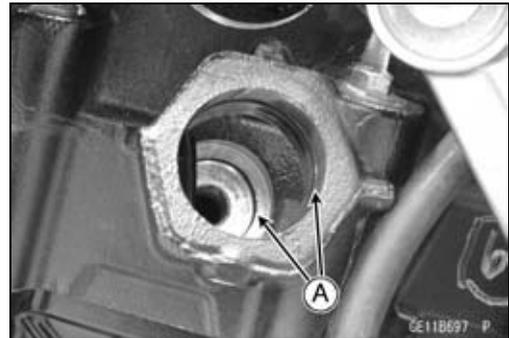
Camshaft

- Disengage and remove the camshaft chain [A] downward.



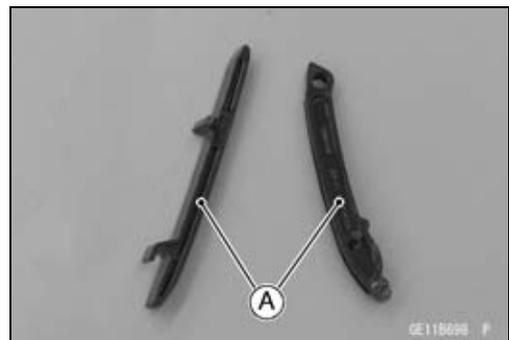
Camshaft Chain Installation

- Replace the O-rings [A] with new ones.
- Engage the camshaft chain to the camshaft chain drive sprocket.
- Using a suitable tool or wire to keep the chain from falling down into the cylinder block.
- Install the sleeve and tighten the grub screw securely.
- Install the removed parts (see appropriate chapters).



Camshaft Chain Guide Wear Inspection

- Visually inspect the guides [A].
- ★ If the guide is damaged, replace the guide.

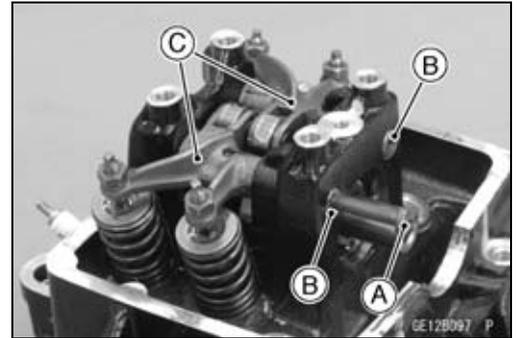
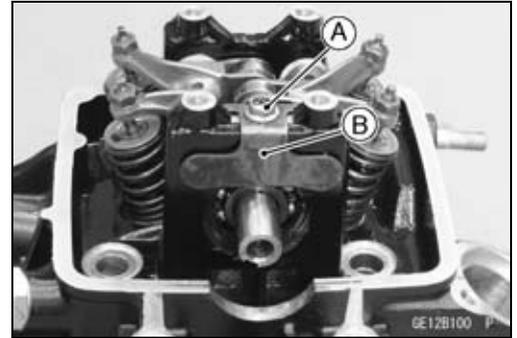


Rocker Arm, Rocker Shaft

Rocker Arm Removal

- Remove:
 - Cylinder Head (see Cylinder Head Removal)
 - Stopper Bolt [A]
 - Stopper [B]

- Using the 5 mm (0.20 in.) screw [A], remove the rocker shafts [B] and rocker arms [C].
- Mark and record the rocker arm locations so that the rocker arm can be reinstalled in their original positions.



Rocker Arm Installation

- Clean the rocker arms and rocker shafts with high flash -point solvent.
- Apply molybdenum disulfide oil solution to the rocker shaft outside and rocker arm cam parts.
- Turn the camshaft so that the cam lobes point downward.
- Install each rocker shaft to the cylinder head, inserting it into each rocker arm.
- Install the rocker shaft so that the screw thread faces outside.
- Install the stopper.
- Apply a non-permanent locking agent to the threads of the stopper bolt and tighten it securely.
- Install the removed parts (see appropriate chapters).
- Check and adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).

Rocker Arm and Rocker Shaft Wear Inspection

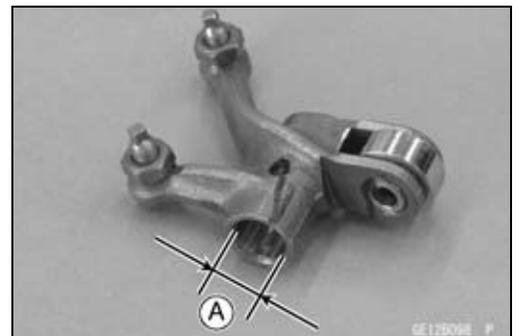
- Visually inspect the area on the rocker arm where the cam rubs.
- ★ If there is any damage or uneven wear, replace the arm.
- Measure the inside diameter [A] of each rocker arm.

Rocker Arm Inside Diameter

Standard: 10.000 ~ 10.012 mm (0.39370 ~ 0.39417 in.)

Service Limit: 10.03 mm (0.3949 in.)

- ★ If it exceeds the service limit, replace the rocker arm.



5-20 ENGINE TOP END

Rocker Arm, Rocker Shaft

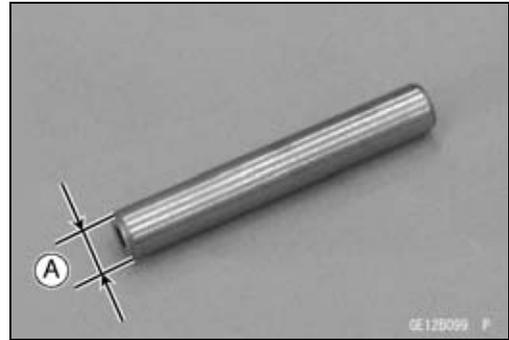
- Measure the outside diameter [A] of each rocker shaft where the rocker fits.

Rocker Shaft Diameter

Standard: 9.974 ~ 9.987 mm (0.3927 ~ 0.3932 in.)

Service Limit: 9.96 mm (0.392 in.)

- ★ If the diameter falls below the service limit, replace the rocker shaft.

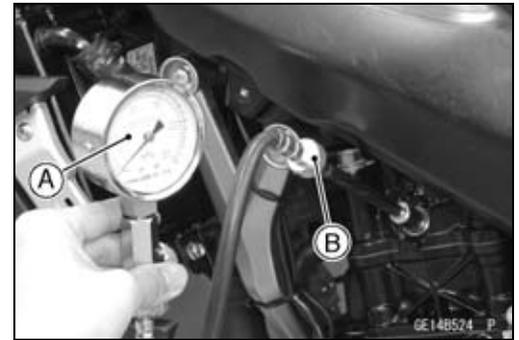


Cylinder Head

Cylinder Compression Measurement

- Warm up the engine thoroughly.
- Stop the engine.
- Disconnect the spark plug caps (see Ignition Coil Removal in the Electrical System chapter).
- Remove the left spark plug (see Spark Plug Replacement in the Periodic Maintenance chapter).
- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.

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



- 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

○Use the battery which is fully charged.

Cylinder Compression

Usable Range: 1 079 ~ 1 275 kPa (11 ~ 13 kgf/cm², 156 ~ 185 psi) at 320 r/min (rpm)

- Install the left spark plug (see Spark Plug Replacement in the Periodic Maintenance chapter).

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

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

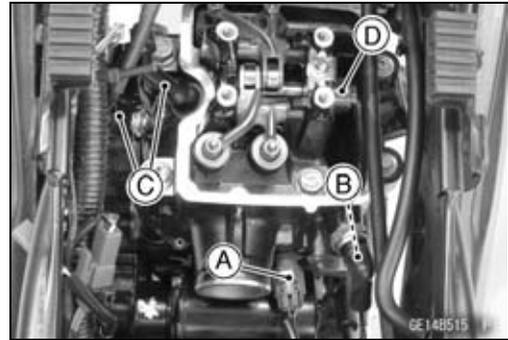
Cylinder Head Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Camshaft Sprocket (see Camshaft Sprocket Removal)
 - Carburetor (see Carburetor Removal in the Fuel System chapter)
 - Exhaust Pipe (see Exhaust Pipe Removal)

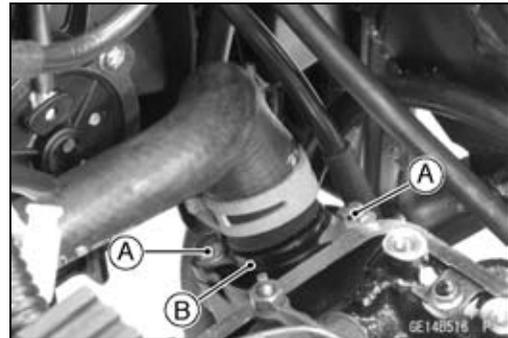
5-22 ENGINE TOP END

Cylinder Head

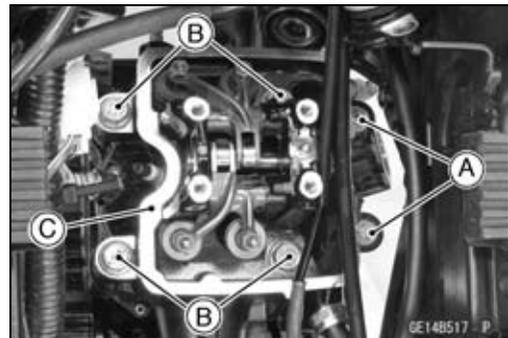
- Disconnect:
 - Water Temperature Sensor Connector [A]
 - Oil Pressure Switch Lead [B] (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
 - Spark Plug Caps [C]
- Remove the spacer [D].



- Remove the thermostat cover bolts [A].
- Remove the thermostat cover [B] from the cylinder head.

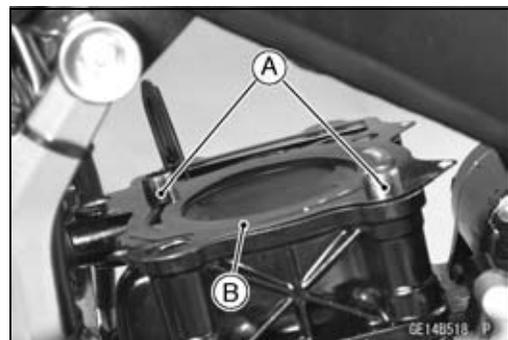


- Remove the cylinder head bolts (M6) [A] first, then remove the cylinder head bolts (M10) [B] and cylinder head [C].

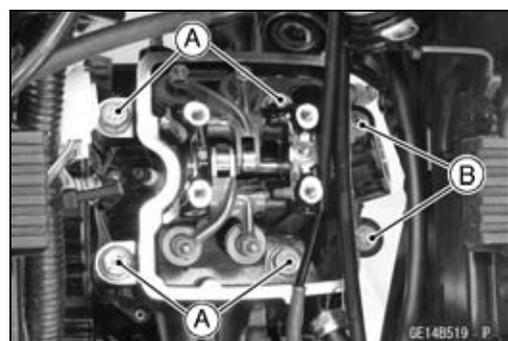


Cylinder Head Installation

- Check to see that the two dowel pins [A] are in place on the cylinder.
- Replace the cylinder head gasket [B] with a new one.
- Install the new cylinder head gasket.



- Install the cylinder head.
- Tighten the cylinder head bolts (M10) [A].
Torque - Cylinder Head Bolts (M10): 46 N·m (4.7 kgf·m, 34 ft·lb)
- Tighten the cylinder head bolts (M6) [B].
Torque - Cylinder Head Bolts (M6): 11 N·m (1.1 kgf·m, 97 in·lb)
- Install the removed parts (see appropriate chapters).



Cylinder Head

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 the carbon out of the combustion chamber and exhaust port with a suitable tool [A].
- Clean the cylinder head in a bath of high flash-point solvent.
- Using compressed air, blow out any particles which may obstruct the oil passage in the cylinder head.
- Install the valves (see Valve Installation).



Cylinder Head Warp Inspection

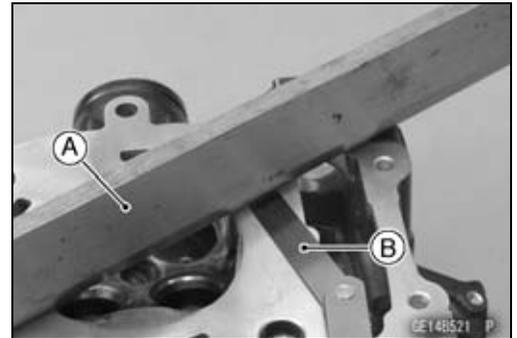
- Clean the cylinder head (see Cylinder Head Cleaning).
- Lay a straightedge [A] across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [B] to measure the space between the straightedge and the cylinder head.

Cylinder Head Warp

Standard: - - -

Service Limit: 0.05 mm (0.002 in.)

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



5-24 ENGINE TOP END

Valves

Valve Clearance Inspection

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

Valve Clearance Adjustment

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

Valve Removal

- Remove:
 - Cylinder Head (see Cylinder Head Removal)
 - Rocker Arms and Rocker Shafts (see Rocker Arm Removal)
 - Camshaft (see Camshaft Removal)
- Using the valve spring compressor assembly [A] and adapter [B], remove the valve.

Special Tools - Valve Spring Compressor Assembly: 57001-241

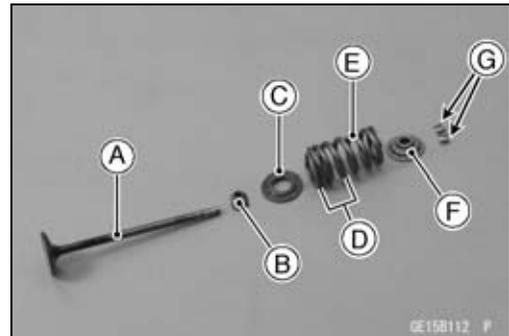
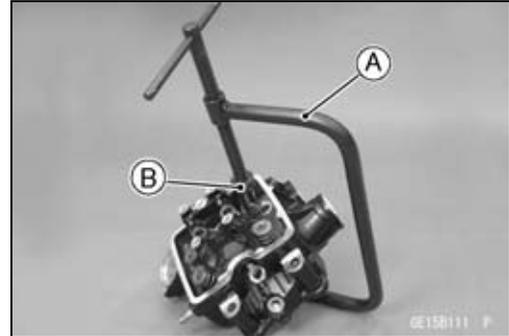
Valve Spring Compressor Adapter, $\phi 22$: 57001-1202

NOTE

- Mark and record the valve locations so that they can be installed in their original positions to keep the valve clearance unchanged.

Valve Installation

- Replace the oil seal with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the spring so that the closed coil end faces downwards.
 - Valve Stem [A]
 - Oil Seal [B]
 - Spring Seat [C]
 - Closed Coil End [D]
 - Valve Spring [E]
 - Retainer [F]
 - Split Keepers [G]



Valves

Valve Seat Inspection

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

Valve Seating Surface Outside Diameter

Standard:

Exhaust 23.4 ~ 23.6 mm (0.921 ~ 0.929 in.)

Intake 23.4 ~ 23.6 mm (0.921 ~ 0.929 in.)

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

Good [F]

- ★ If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

Valve Seating Surface Width

Standard:

Exhaust 0.9 ~ 1.1 mm (0.035 ~ 0.043 in.)

Intake 0.9 ~ 1.1 mm (0.035 ~ 0.043 in.)

Valve Seat Repair

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

Special Tools - Valve Seat Cutter Holder Bar [B]: 57001-1128

Valve Seat Cutter Holder, ϕ 4.5 [C]: 57001-1330

[For Exhaust Valve Seat]

Valve Seat Cutter, 45° - ϕ 24.5: 57001-1113

Valve Seat Cutter, 32° - ϕ 25: 57001-1118

Valve Seat Cutter, 60° - ϕ 25: 57001-1328

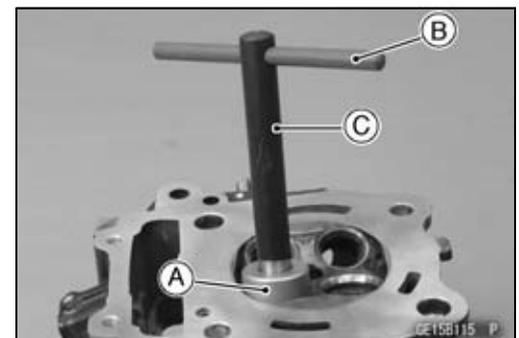
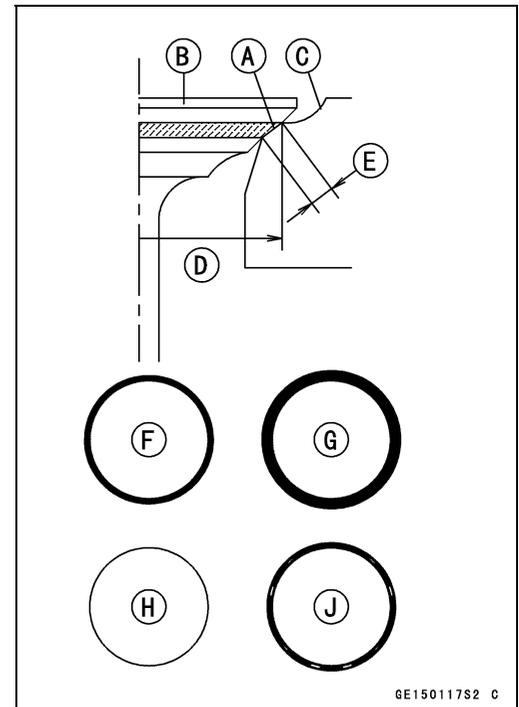
[For Intake Valve Seat]

Valve Seat Cutter, 45° - ϕ 30: 57001-1187

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

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

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



5-26 ENGINE TOP END

Valves

Seat Cutter Operation Care

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

NOTE

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

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

NOTE

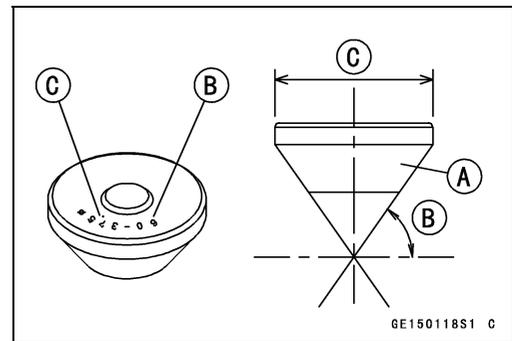
○Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.

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

Marks Stamped on the Cutter

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

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



Operating Procedures

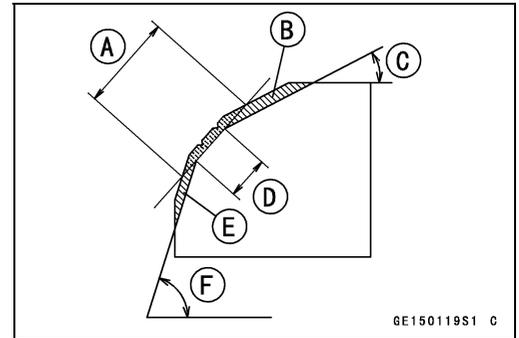
- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

NOTICE

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

Valves

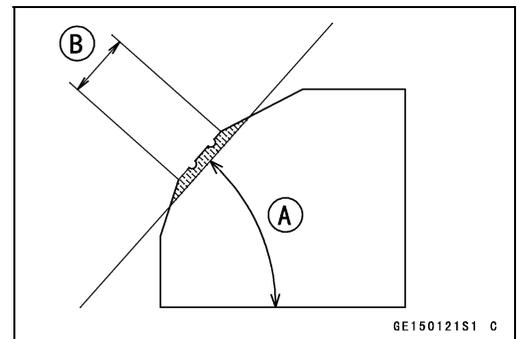
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
 - Widened Width [A] of engagement by machining with 45° cutter
 - Ground Volume [B] by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



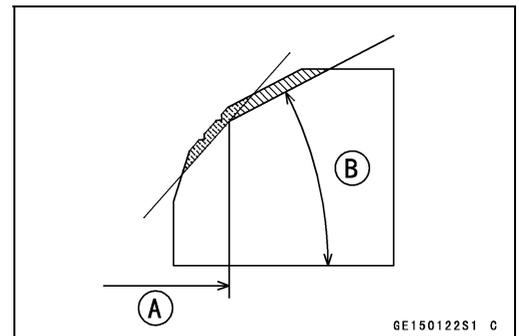
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.
 - Original Seating Surface [B]

NOTE

- Remove all pittings of flaws from 45° ground surface.
- After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 60° grinding operation easier.



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



NOTICE

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

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

5-28 ENGINE TOP END

Valves

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

Correct Width [B]

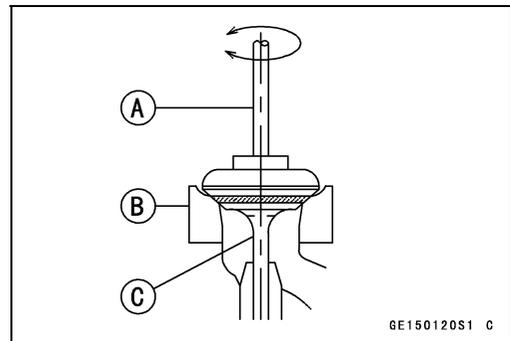
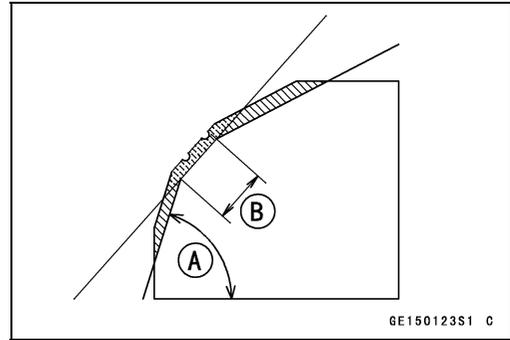
- Lap the valve to the valve seat, once the seat width and outside diameter are within the ranges specified above.
- Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
- Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
- Repeat the process with a fine grinding compound.

Lapper [A]

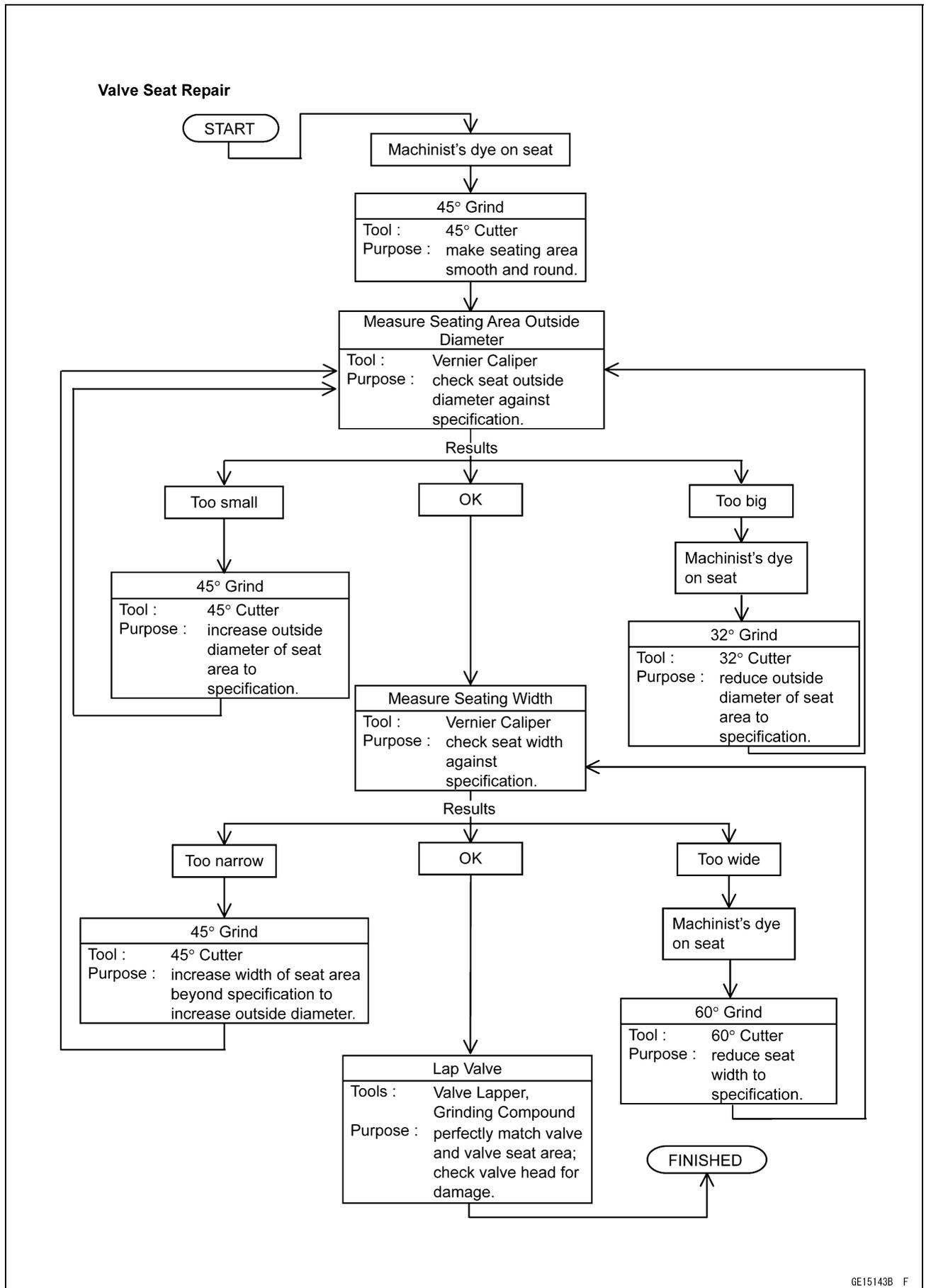
Valve Seat [B]

Valve [C]

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



Valves

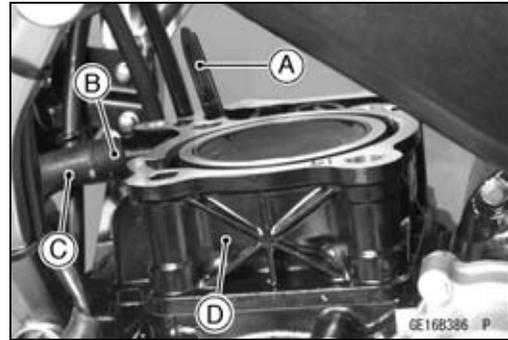


5-30 ENGINE TOP END

Cylinder, Piston

Cylinder Removal

- Remove:
 - Cylinder Head (see Cylinder Head Removal)
 - Front Camshaft Chain Guide [A]
- Slide the clamp [B].
- Disconnect the water hose [C].
- Remove the cylinder [D].

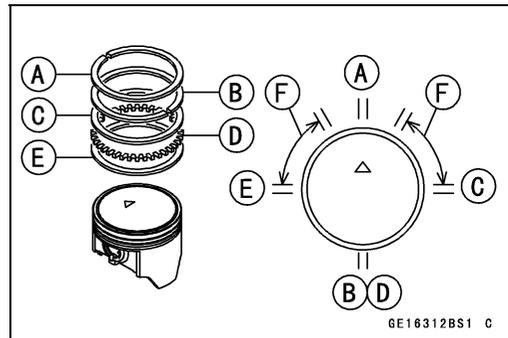
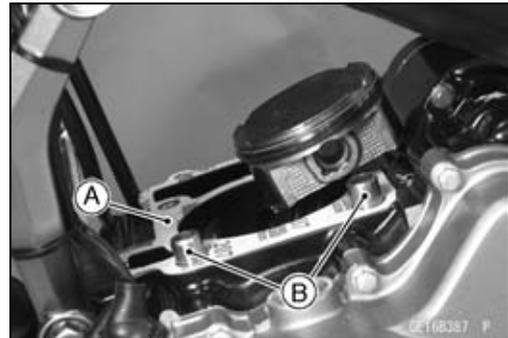


Cylinder Installation

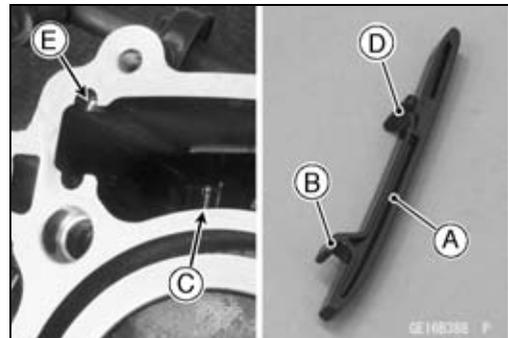
NOTE

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

- Replace the cylinder base gasket [A] with a new one.
 - Install the new cylinder base gasket.
 - Be sure that two dowel pins [B] are properly fitted in the crankcase.
-
- Position the piston ring opening as follows.
 - Top Ring [A]
 - Second Ring [B]
 - Upper Steel Rail [C]
 - Expander [D]
 - Lower Steel Rail [E]
 - About 30 ~ 90° [F]



- Apply molybdenum disulfide oil solution to the piston and cylinder bore.
- Apply molybdenum disulfide oil solution to the piston rings (see Piston Installation).
- Install the cylinder while compressing the piston rings with your fingers.
- Install the front camshaft chain guide [A] securely.
 - Fit the hook [B] to the projection [C].
 - Fit the projection [D] to the groove [E].
- Install the removed parts (see appropriate chapters).



Piston Removal

- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the piston.
- Remove the snap ring [A].

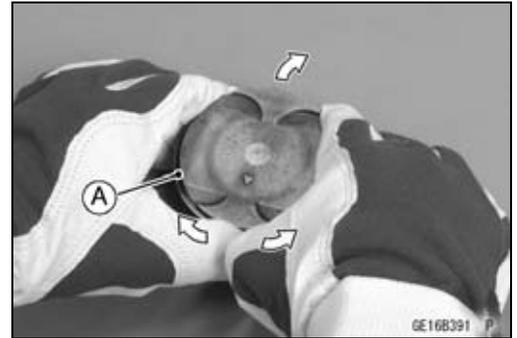


Cylinder, Piston

- Remove the piston pin.
 - **Special Tool - Piston Pin Puller Assembly [A]: 57001-910**
- Remove the piston.

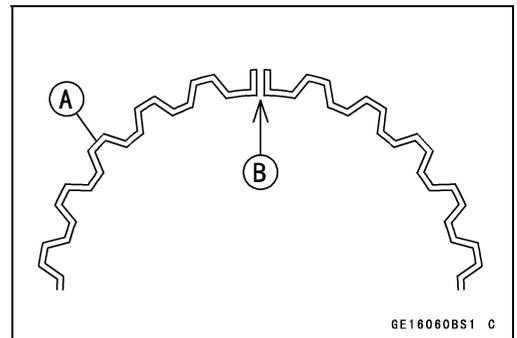


- Carefully spread the piston ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Piston Installation

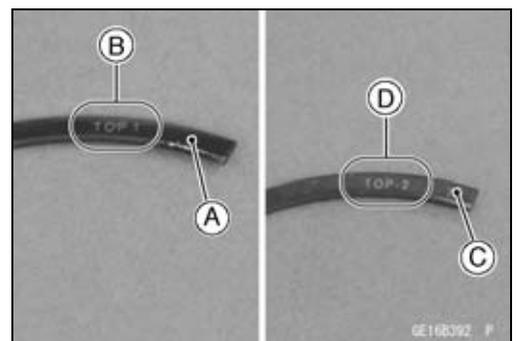
- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.
- Spread the rail with your thumbs, but only enough to fit the rail over the piston.
- Release the rail into the bottom piston ring groove.



NOTE

- *The oil ring rails have no “top” or “bottom”.*

- Apply molybdenum disulfide oil solution to the piston rings.
- Do not mix up the top and second ring.
- Install the top ring [A] so that the “TOP1” mark [B] faces up.
- Install the second ring [C] so that the “TOP2” mark [D] faces up.



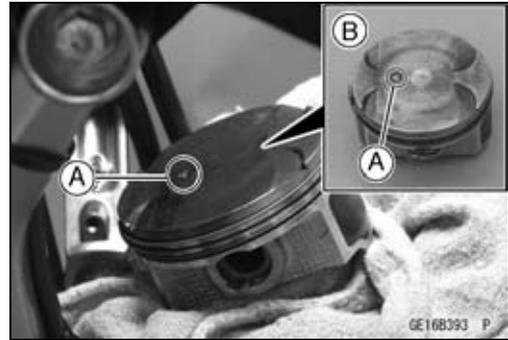
5-32 ENGINE TOP END

Cylinder, Piston

NOTE

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

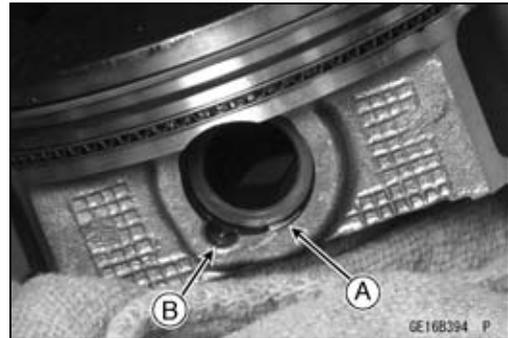
- Install the piston with its triangle mark [A] facing forward.
- In this photo [B], the piston has been removed for clarity.



- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.
- Apply molybdenum disulfide oil solution to the piston pin and piston journals.
- When installing the piston pin snap ring, compress it only enough to install it and no more.

NOTICE

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



- Install the cylinder (see Cylinder Installation).

Cylinder Wear Inspection

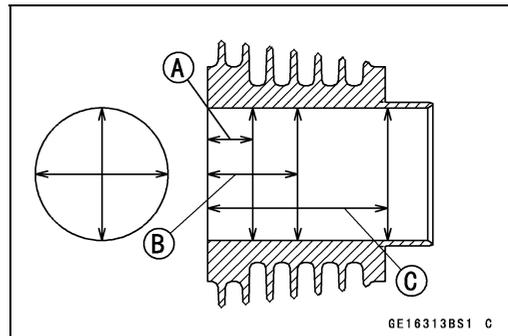
- Since there is a difference in cylinder wear in different directions, take a side to side and a front to back measurement at each of the 3 locations (total of 6 measurements) shown.
- ★ If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

Cylinder Inside Diameter

Standard: 72.006 ~ 72.013 mm (2.8349 ~ 2.8352 in.) and less than 0.01 mm (0.0004 in.) difference between any two measurements

Service Limit: 72.043 mm (2.8363 in.) or 0.05 mm (0.002 in.) difference between any two measurements

- 10 mm (0.39 in.) [A]
- 20 mm (0.79 in.) [B]
- 40 mm (1.57 in.) [C]



Cylinder, Piston

Piston Wear Inspection

- Measure the outside diameter [A] at a right angle to the direction of the piston pin.
- ★ If the measurement exceeds the standard, replace the piston.

Piston Diameter

Standard: 71.964 ~ 71.976 mm (2.8332 ~ 2.8337 in.)



Piston/Cylinder Clearance Inspection

The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values. Measure the piston diameter as just described, and measure the cylinder diameter at the very bottom of the cylinder.

Piston/Cylinder Clearance

Standard: 0.03 ~ 0.049 mm (0.0012 ~ 0.0019 in.)

Service Limit: 0.09 mm (0.0035 in.)

NOTE

- Whenever the piston or cylinder has been replaced with a new one, the motorcycle must be broken in the same as with a new machine.

Piston Ring, Piston Ring Groove Wear Inspection

- Check for uneven groove wear by inspecting the ring seating.
- ★ The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.
- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.

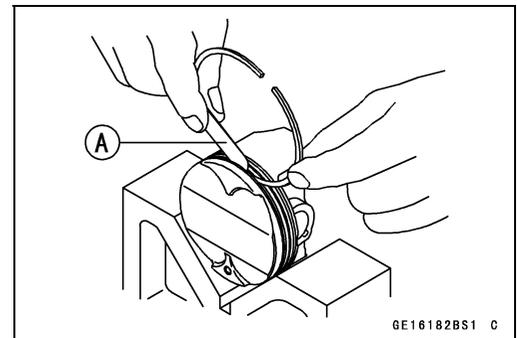
Piston Ring/Groove Clearance

Standard:

Top 0.020 ~ 0.055 mm (0.0008 ~ 0.0022 in.)

Second 0.020 ~ 0.060 mm (0.0008 ~ 0.0024 in.)

Oil 0.035 ~ 0.110 mm (0.0014 ~ 0.0043 in.)



Piston Ring Groove Width Inspection

- Measure the piston ring groove width.
- Use a vernier caliper at several points around the piston.

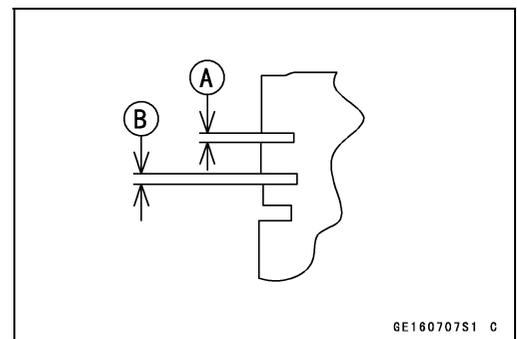
Piston Ring Groove Width

Standard:

Top [A] 1.01 ~ 1.03 mm (0.040 ~ 0.041 in.)

Second [B] 1.01 ~ 1.03 mm (0.040 ~ 0.041 in.)

- ★ If the width of any of the two grooves is wider than the standard at any point, replace the piston.



5-34 ENGINE TOP END

Cylinder, Piston

Piston Ring Thickness Inspection

- Measure the piston ring thickness.
- Use the micrometer to measure at several points around the ring.

Piston Ring Thickness

Standard:

Top [A] 0.97 ~ 0.99 mm (0.038 ~ 0.039 in.)

Second [B] 0.97 ~ 0.99 mm (0.038 ~ 0.039 in.)

- ★ If any of the measurements is less than the standard on either of the rings, replace all the rings.

NOTE

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

Piston Ring End Gap Inspection

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

Piston Ring End Gap

Standard:

Top 0.015 ~ 0.030 mm (0.0006 ~ 0.0012 in.)

Second 0.030 ~ 0.050 mm (0.0012 ~ 0.0020 in.)

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

- ★ If the end gap of either ring is greater than the standard, replace all the rings.

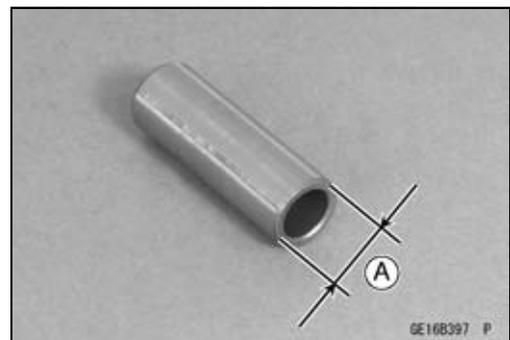
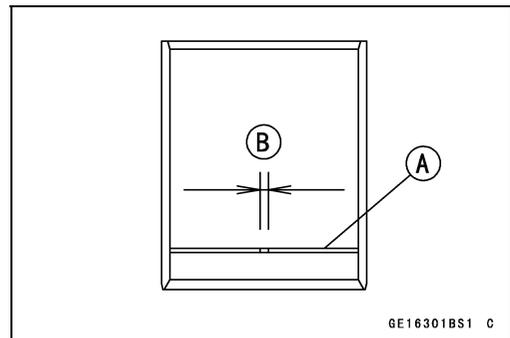
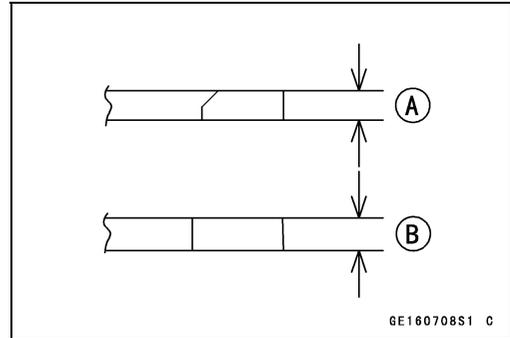
Piston, Piston Pin, Connecting Rod Wear Inspection

- Measure the diameter [A] of the piston pin with a micrometer.

Piston Pin Diameter

Standard: 16.992 ~ 16.997 mm (0.66898 ~ 0.66917 in.)

- ★ If the piston pin diameter is less than the standard at any point, replace the piston pin.



Cylinder, Piston

- Using a cylinder gauge, measure the diameter [A] of both piston pin holes in the piston and the inside diameter [B] of the connecting rod small end.

Piston Pin Hole Diameter

Standard: 17.005 ~ 17.011 mm (0.66949 ~ 0.66972 in.)

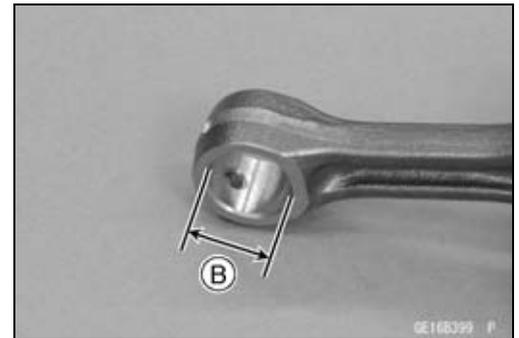
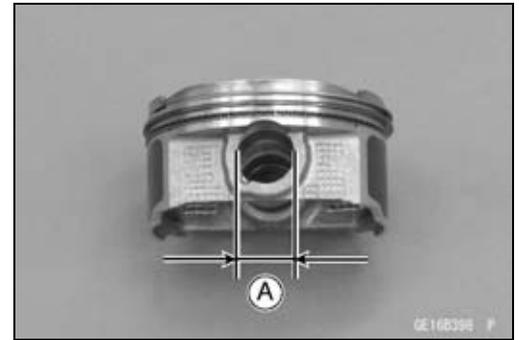
Service Limit: 17.03 mm (0.6704 in.)

Connecting Rod Small End Inside Diameter

Standard: 17.005 ~ 17.016 mm (0.66949 ~ 0.66992 in.)

Service Limit: 17.03 mm (0.6704 in.)

- ★ If either piston pin hole diameter exceeds the service limit, replace the piston.
- ★ If the pin hole groove shows excessive wear, replace the piston.
- ★ If the connecting rod small end inside diameter exceeds the service limit, replace the connecting rod.

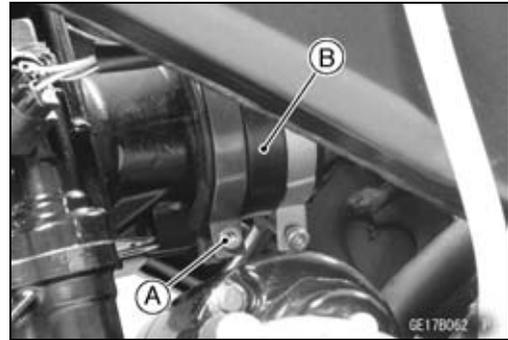


5-36 ENGINE TOP END

Carburetor Holder

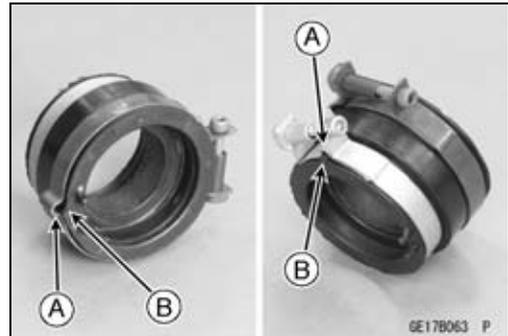
Carburetor Holder Removal

- Remove the carburetor (see Carburetor Removal in the Fuel System chapter).
- Loosen the carburetor holder clamp screw (front) [A].
- Remove the carburetor holder [B].

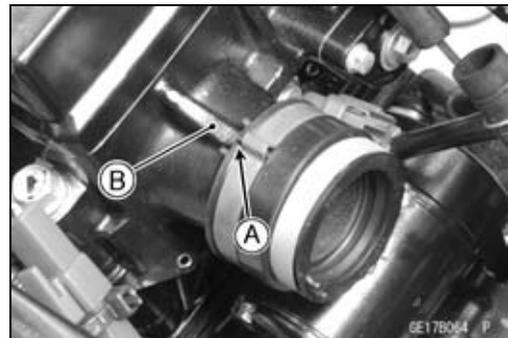


Carburetor Holder Installation

- Fit the grooves [A] of the clamp screws to the projections [B] of the carburetor holder.



- Fit the groove [A] of the carburetor holder to the boss [B] of the cylinder head.
- Tighten the carburetor holder clamp screw (front) securely.
- Install the removed parts (see appropriate chapters).



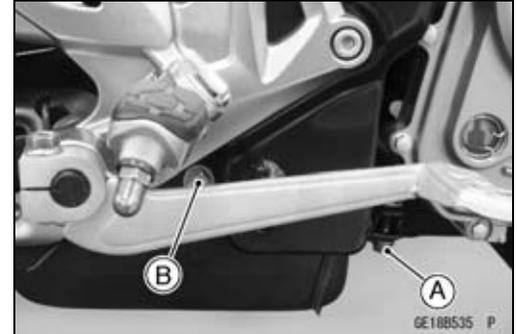
Muffler

⚠ WARNING

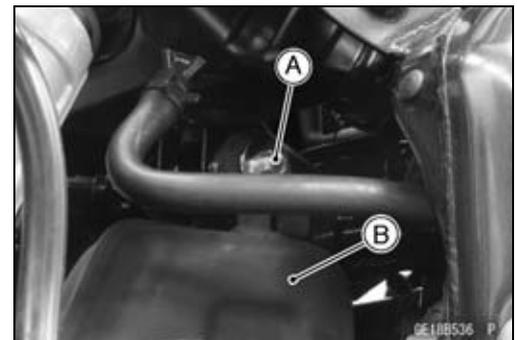
The muffler can become extremely hot during normal operation and cause severe burns. Do not remove the muffler while it is hot.

Muffler Body Removal

- Loosen the muffler body clamp bolt [A].
- Remove the muffler body mounting bolts (lower) [B] on both sides.

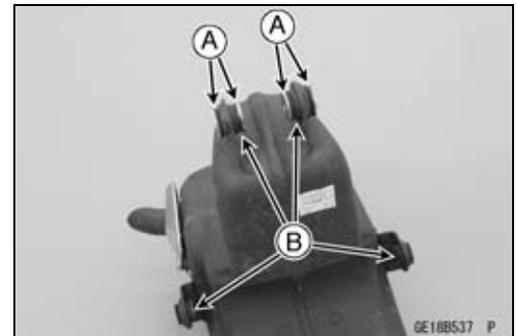


- Remove:
Muffler Body Mounting Bolts (Upper) [A] (Both Sides)
Muffler Body [B]



Muffler Body Installation

- Replace the muffler body gasket with a new one.
- Install the new muffler body gasket (see Exhaust Pipe Installation).
- Be sure that the bushings [A] and dampers [B] are in position.



- Install the muffler body.
- Tighten:
 Torque - Muffler Body Mounting Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)
 Muffler Body Clamp Bolt: 15 N·m (1.5 kgf·m, 11 ft·lb)
- Thoroughly warm up the engine, wait until the engine cools down, and then retighten all bolts.

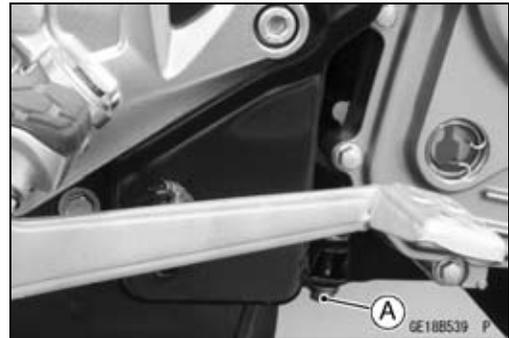
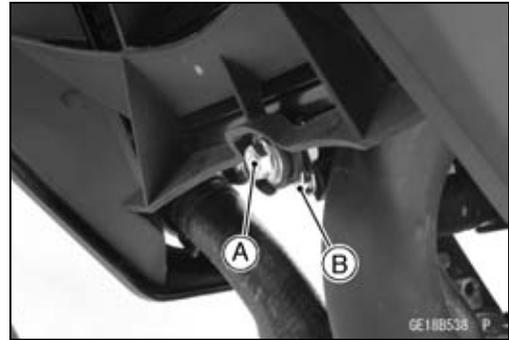
5-38 ENGINE TOP END

Muffler

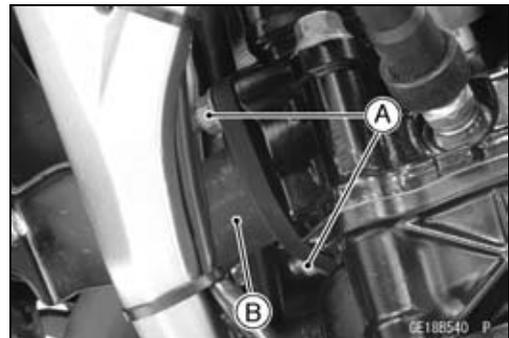
Exhaust Pipe Removal

- Remove:
 - Radiator Fairing Bolt [A]
 - Clip Nut [B]

- Loosen the muffler body clamp bolt [A].



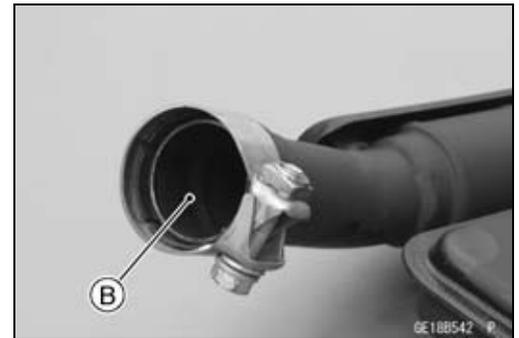
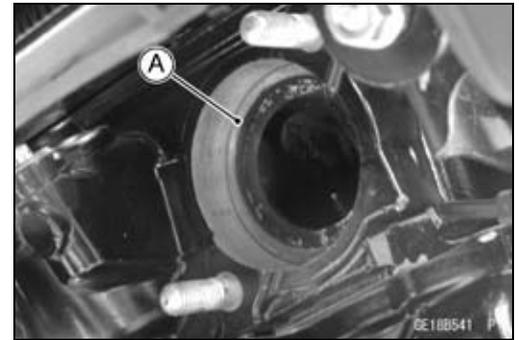
- Remove:
 - Exhaust Pipe Holder Nuts [A]
 - Exhaust Pipe [B]



Muffler

Exhaust Pipe Installation

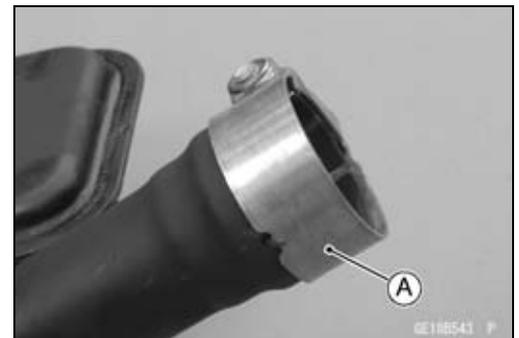
- Replace the exhaust pipe gasket [A] and muffler body gasket [B] with new ones.
- Install the new exhaust pipe gasket.
- Install the new muffler body gasket to the exhaust pipe until it stops at the bottom.



- Install the muffler body clamp [A] as shown.
- Install the exhaust pipe.
- Tighten:

Torque - Exhaust Pipe Holder Nuts: 23 N·m (2.3 kgf·m, 17 ft·lb)

Muffler Body Clamp Bolt: 15 N·m (1.5 kgf·m, 11 ft·lb)



- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolt and nuts.
- Install the removed parts (see appropriate chapters).

Clutch

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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Cover Bolts	11	1.1	97 in·lb	
2	Clutch Hub Nut	69	7.0	51	L, Lh
3	Clutch Stopper Bolts	11	1.1	97 in·lb	
4	Oil Seal Retaining Plate Bolts	9.8	1.0	87 in·lb	L

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

Lh: Left-hand Threads

M: Apply molybdenum disulfide grease.

R: Replacement Parts

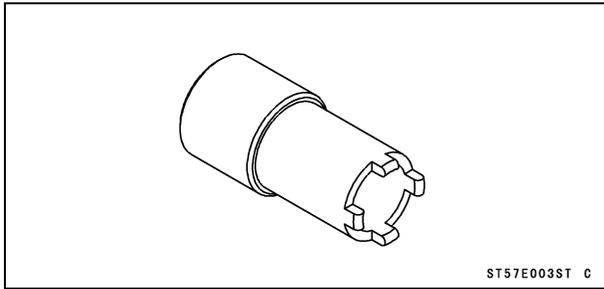
6-4 CLUTCH

Specifications

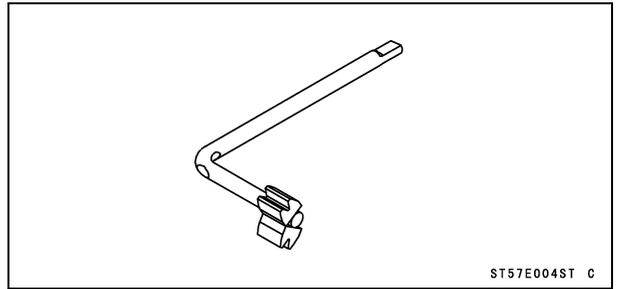
Item	Standard	Service Limit
Clutch Lever and Cable		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	— — —
Clutch		
Friction Plate Thickness	2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)	2.72 mm (0.107 in.)
Steel Plate Thickness	1.52 ~ 1.68 mm (0.0598 ~ 0.0661 in.)	1.45 mm (0.0571 in.)
Friction and Steel Plate Warp	0.1 mm (0.004 in.)	— — —
Clutch Spring Free Length	38.4 mm (1.51 in.)	37.3 mm (1.47 in.)
Clutch Hub Height	28.8 ~ 29.0 mm (1.134 ~ 1.142 in.)	28.7 mm (1.130 in.)

Special Tools

**Clutch Hub Nut Wrench:
57001-E003**



**Primary Gear Holder:
57001-E004**



6-6 CLUTCH

Clutch Lever and Cable

Clutch Lever Free Play Inspection

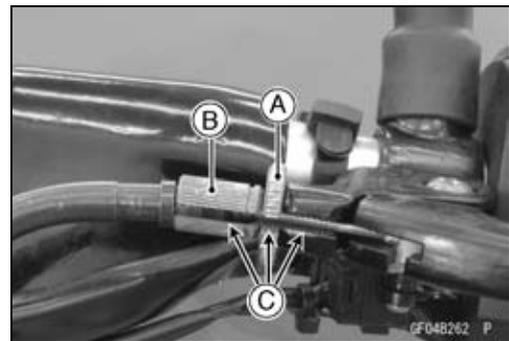
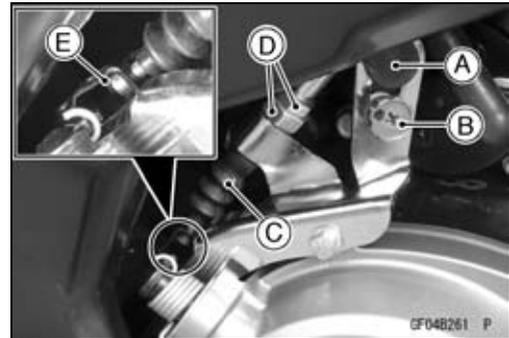
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment

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

Cable Removal

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Cover (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
 - Plug [A]
- Remove the idle adjusting screw [B] from the cable bracket.
- Slide the dust cover [C].
- Loosen the nuts [D], and slide the lower end of the clutch cable to give the cable plenty of play.
- Bend the stopper [E] straighten.
- Loosen the locknut [A] and turn the adjuster [B].
- Line up the slots [C] in the clutch lever, locknut and adjuster, and then free the cable from the lever.
- Free the clutch inner cable tip from the clutch release lever.
- Remove the clutch cable.



Cable Installation

- Run the clutch cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Be sure to bend the stopper after installing the clutch cable.
- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

Cable Lubrication

- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

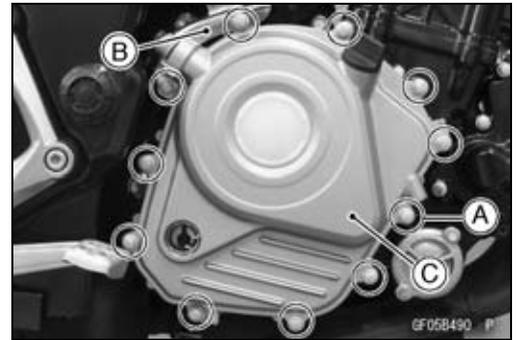
Clutch Lever Assembly Removal/Installation

- Refer to the Handlebar Removal/Installation in the Steering chapter).

Clutch Cover

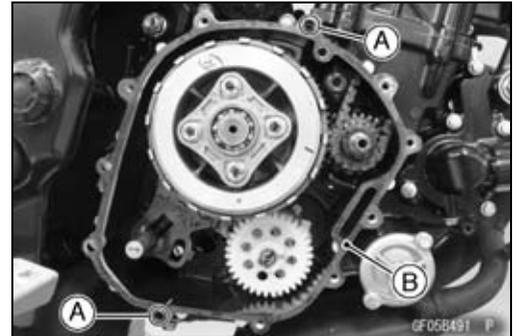
Clutch Cover Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Clutch Cable Lower End (see Cable Removal)
 - Clutch Cover Bolts [A]
 - Cable Bracket [B]
 - Clutch Cover [C]



Clutch Cover Installation

- Be sure that the dowel pins [A] are in position.
- Replace the clutch cover gasket [B] with a new one.
- Install the new clutch cover gasket, clutch cover and cable bracket.
- Tighten:
 - Torque - Clutch Cover Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**
- Install the removed parts (see appropriate chapters).



Release Shaft Removal

NOTICE

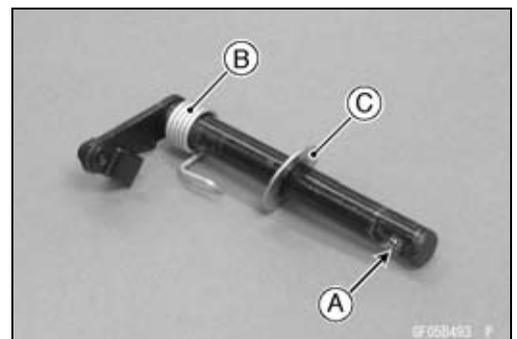
Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.

- Remove the clutch cover (see Clutch Cover Removal).
- Turn the release lever and shaft assembly [A], and then remove the push rod [B].
- Remove the release lever and shaft assembly straight out.



Release Shaft Installation

- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply molybdenum disulfide grease to the push rod-holding portion [A] on the release shaft.
- Install the spring [B] and washer [C].



6-8 CLUTCH

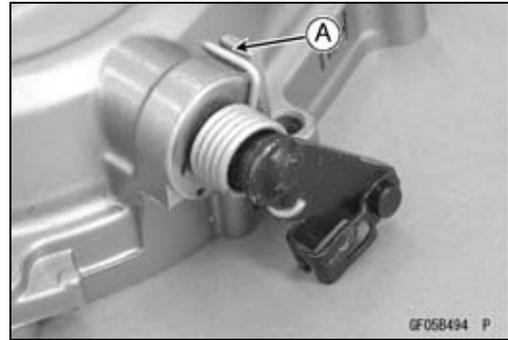
Clutch Cover

- Insert the release shaft straight into the upper hole of the clutch cover.

NOTICE

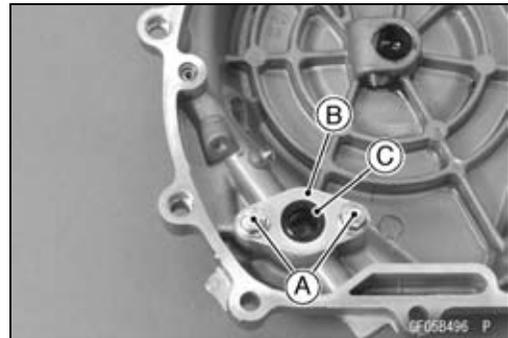
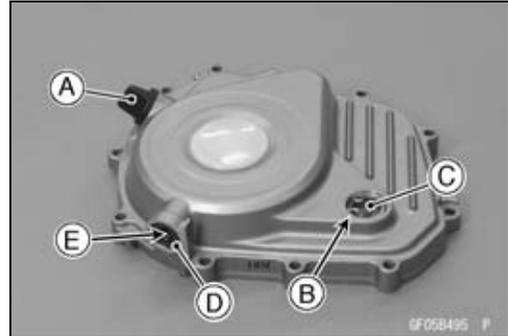
When inserting the release shaft, be careful not to remove the spring of the oil seal.

- Fit the spring [A].
- Turn the release lever and shaft assembly, and then install the push rod.



Clutch Cover Disassembly

- Remove:
 - Clutch Cover (see Clutch Cover Removal)
 - Release Lever and Shaft Assembly (see Release Shaft Removal)
 - Oil Filler Plug [A]
 - Circlip [B]
 - Oil Level Inspection Window [C]
 - Oil Seal [D]
 - Needle Bearing [E]
- Remove:
 - Oil Seal Retaining Plate Bolts [A]
 - Oil Seal Retaining Plate [B]
 - Oil Seal [C]

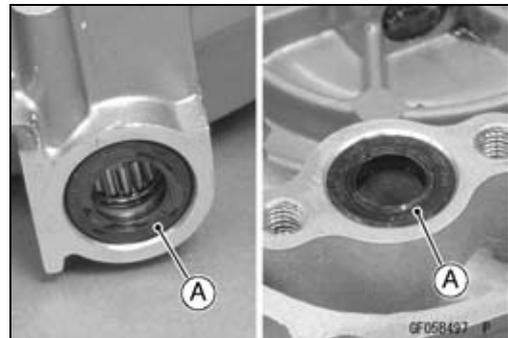


Clutch Cover Assembly

- Replace the needle bearing, oil seals [A] and circlip with new ones.
- Install the needle bearing.
- Install the oil seals so that the oil seal surface is flush with the housing end of the clutch cover.
- Apply grease to the oil seal lips.
- Install the oil seal retaining plate.
- Apply a non-permanent locking agent to the threads of the oil seal retaining plate bolts and tighten them.

Torque - Oil Seal Retaining Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).



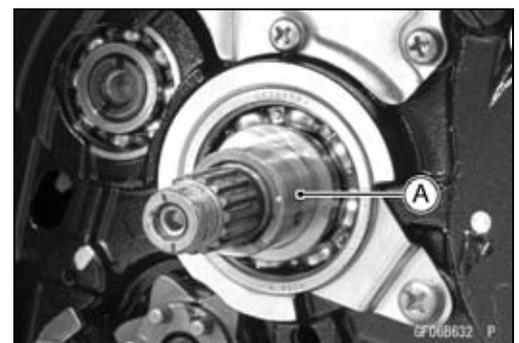
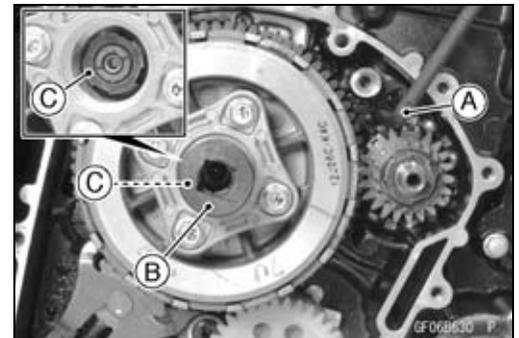
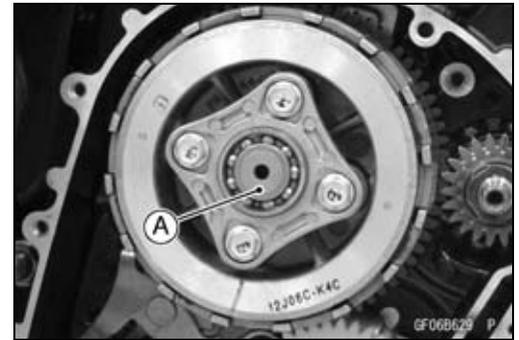
Clutch

Clutch Removal

NOTE

If the primary gear is to be removed, remove the primary gear nut before clutch removal (see Primary Gear Removal in the Crankshaft/Transmission chapter).

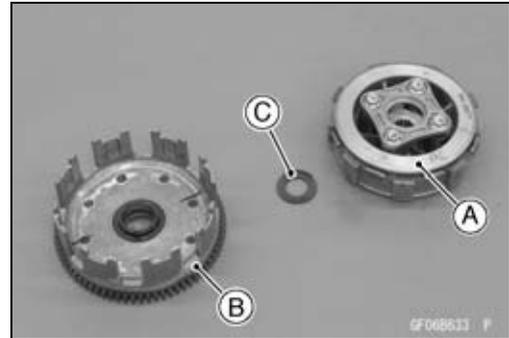
- Remove:
 - Clutch Cover (see Clutch Cover Removal)
 - Camshaft Chain (see Camshaft Chain Removal in the Engine Top End chapter)
 - Rear Camshaft Chain Guide (see Cylinder Head Removal in the Engine Top End chapter)
 - Ball Bearing [A]
- Using the primary gear holder [A], hold the clutch housing gear and primary gear.
 - Special Tool - Primary Gear Holder: 57001-E004**
- Using the clutch hub nut wrench [B], remove the clutch hub nut [C] (left-hand threads).
 - Special Tool - Clutch Hub Nut Wrench: 57001-E003**
- Remove:
 - Washer [A]
 - Clutch Plate Assembly [B] with Clutch Housing [C]
- Remove the bushing [A].



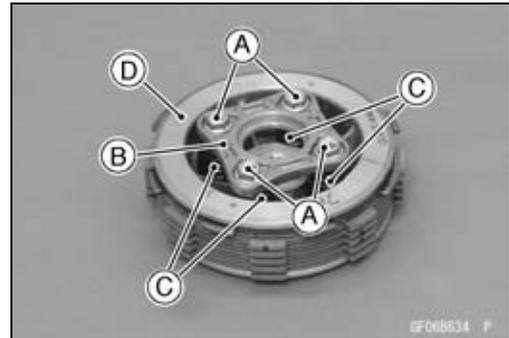
6-10 CLUTCH

Clutch

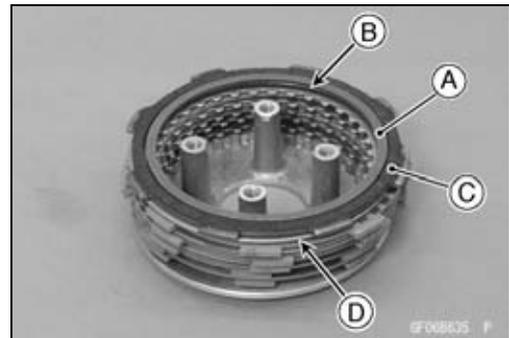
- Remove:
Clutch Plate Assembly [A]
Clutch Housing [B]
Washer [C]



- Remove:
Clutch Stopper Bolts [A]
Clutch Stopper [B]
Clutch Springs [C]
Clutch Hub [D]

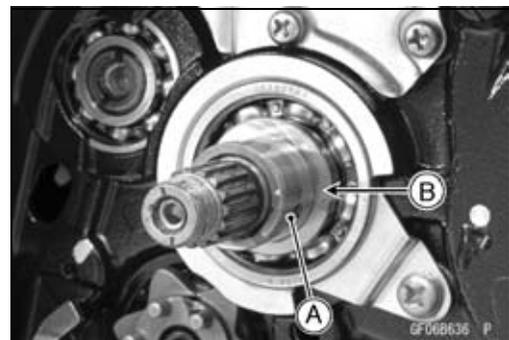


- Remove:
Spring Seat [A]
Spring [B]
Friction Plates [C]
Steel Plates [D]

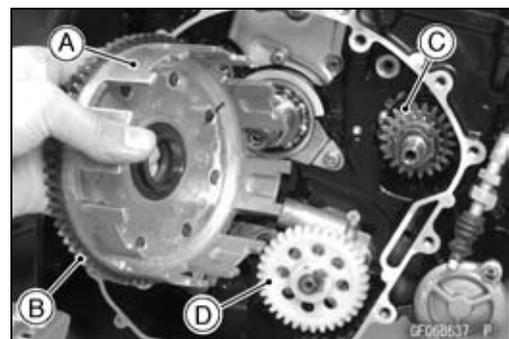


Clutch Installation

- Apply engine oil to the bushing [A].
- Install the bushing as shown.
Stepped Side [B]



- Install the clutch housing [A].
○ Be sure the clutch housing gear [B], primary gear [C] and oil pump gear [D] mesh properly.



Clutch

- Install the spring seat [A] on the clutch hub.
- Install the spring [B] so that the chamfer side [C] faces clutch hub.
- Install the friction plates and steel plates alternately.

NOTICE

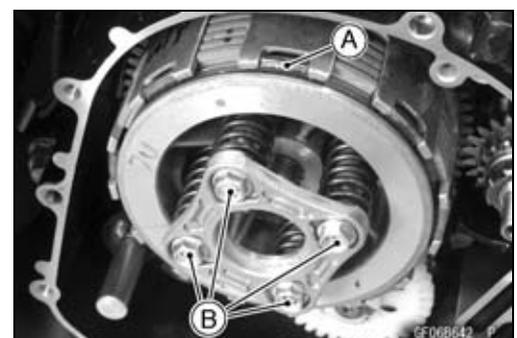
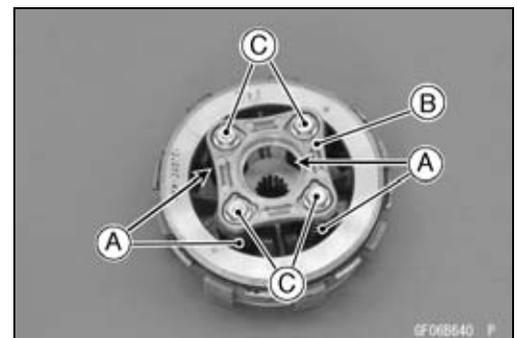
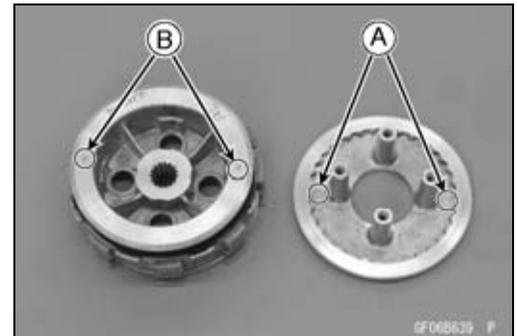
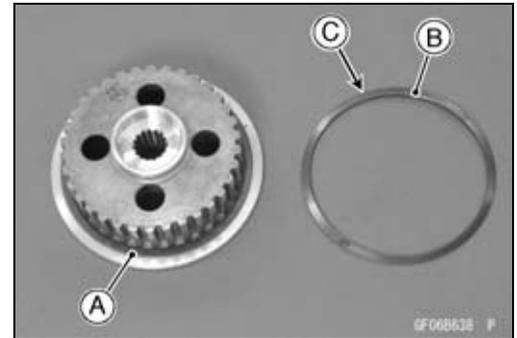
If new dry friction plates and steel plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

- Align the marks [A] on the clutch wheel plate with the marks [B] on the clutch hub.

- Install:
 - Clutch Springs [A]
 - Clutch Stopper [B]
- Tighten the clutch stopper bolts [C] temporary.

- Install the washer [A].

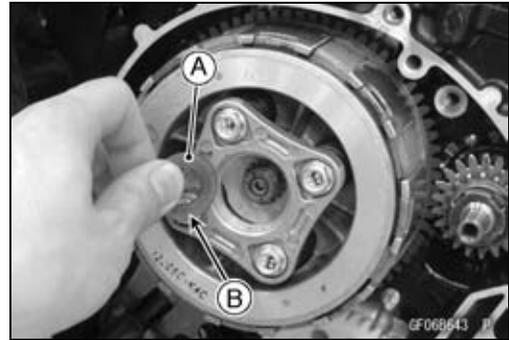
- Install the clutch plate assembly on the clutch housing.
- Install the outside friction plate so that the tangs [A] fit into the grooves in the housing.
- Tighten:
 - Torque - Clutch Stopper Bolts [B]: 11 N·m (1.1 kgf·m, 97 in·lb)



6-12 CLUTCH

Clutch

- Install the washer [A] so that the chamfer side [B] faces outside.



- Using the primary gear holder [A], hold the clutch housing gear and primary gear.

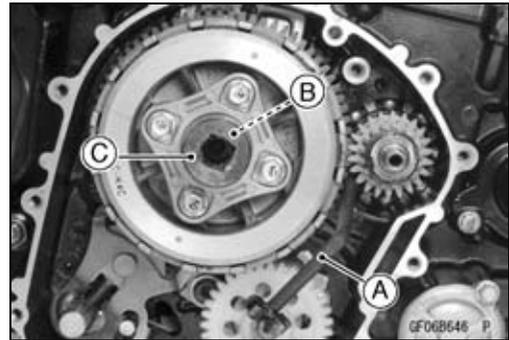
Special Tool - Primary Gear Holder: 57001-E004

- Apply a non-permanent locking agent to the threads of the clutch hub nut [B].
- Using the clutch hub nut wrench [C], tighten the clutch hub nut (left-hand threads).

Special Tool - Clutch Hub Nut Wrench: 57001-E003

Torque - Clutch Hub Nut: 69 N·m (7.0 kgf·m, 51 ft·lb)

- Install the removed parts (see appropriate chapters).



Clutch Plate, Wear, Damage Inspection

- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] and steel plate at several points.
- ★ If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

Friction Plate Thickness

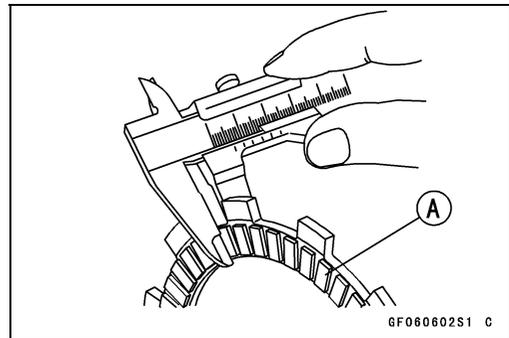
Standard: 2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)

Service Limit: 2.72 mm (0.107 in.)

Steel Plate Thickness

Standard: 1.52 ~ 1.68 mm (0.0598 ~ 0.0661 in.)

Service Limit: 1.45 mm (0.0571 in.)

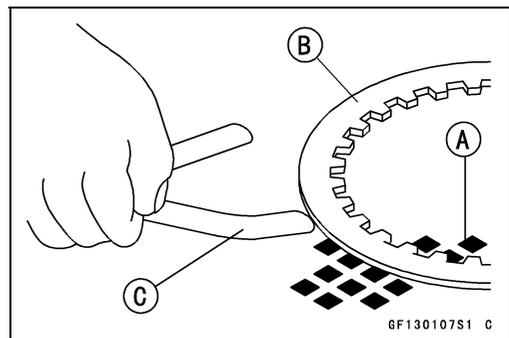


Clutch Plate Warp Inspection

- 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 standard, replace it with a new one.

Friction and Steel Plate Warp

Standard: 0.1 mm (0.004 in.)



Clutch

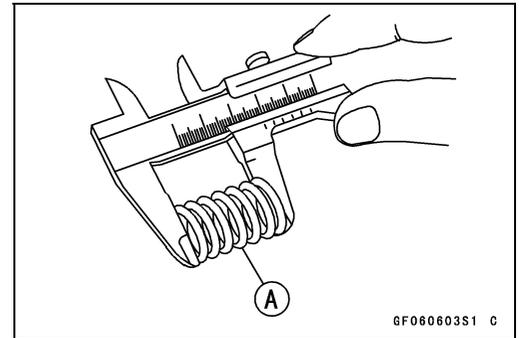
Clutch Spring Free Length Measurement

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

Clutch Spring Free Length

Standard: 38.4 mm (1.51 in.)

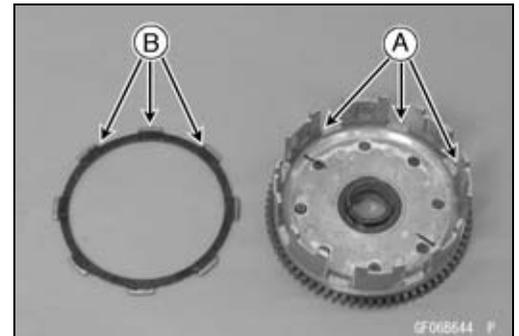
Service Limit: 37.3 mm (1.47 in.)



GF060603S1 C

Clutch Hub Finger Inspection

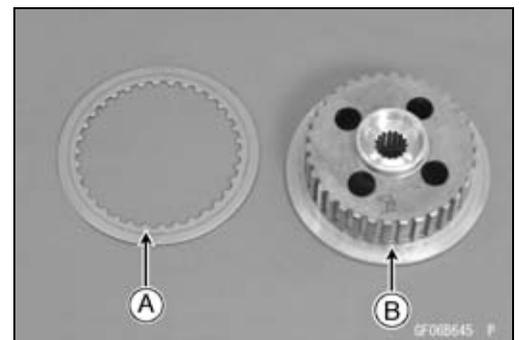
- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit them.
- ★ If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



GF060544 F

Clutch Hub Spline Inspection

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



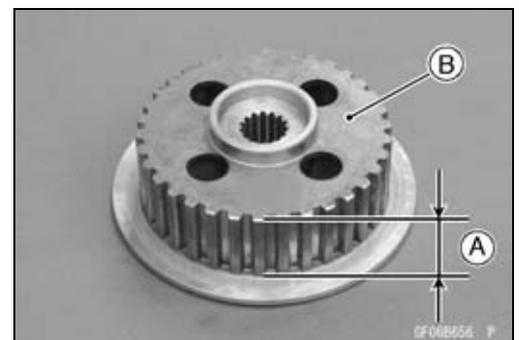
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- Measure the clutch hub height [A].
- ★ If it exceeds the service limit, replace the clutch hub [B].

Clutch Hub Height

Standard: 28.8 ~ 29.0 mm (1.134 ~ 1.142 in.)

Service Limit: 28.7 mm (1.130 in.)



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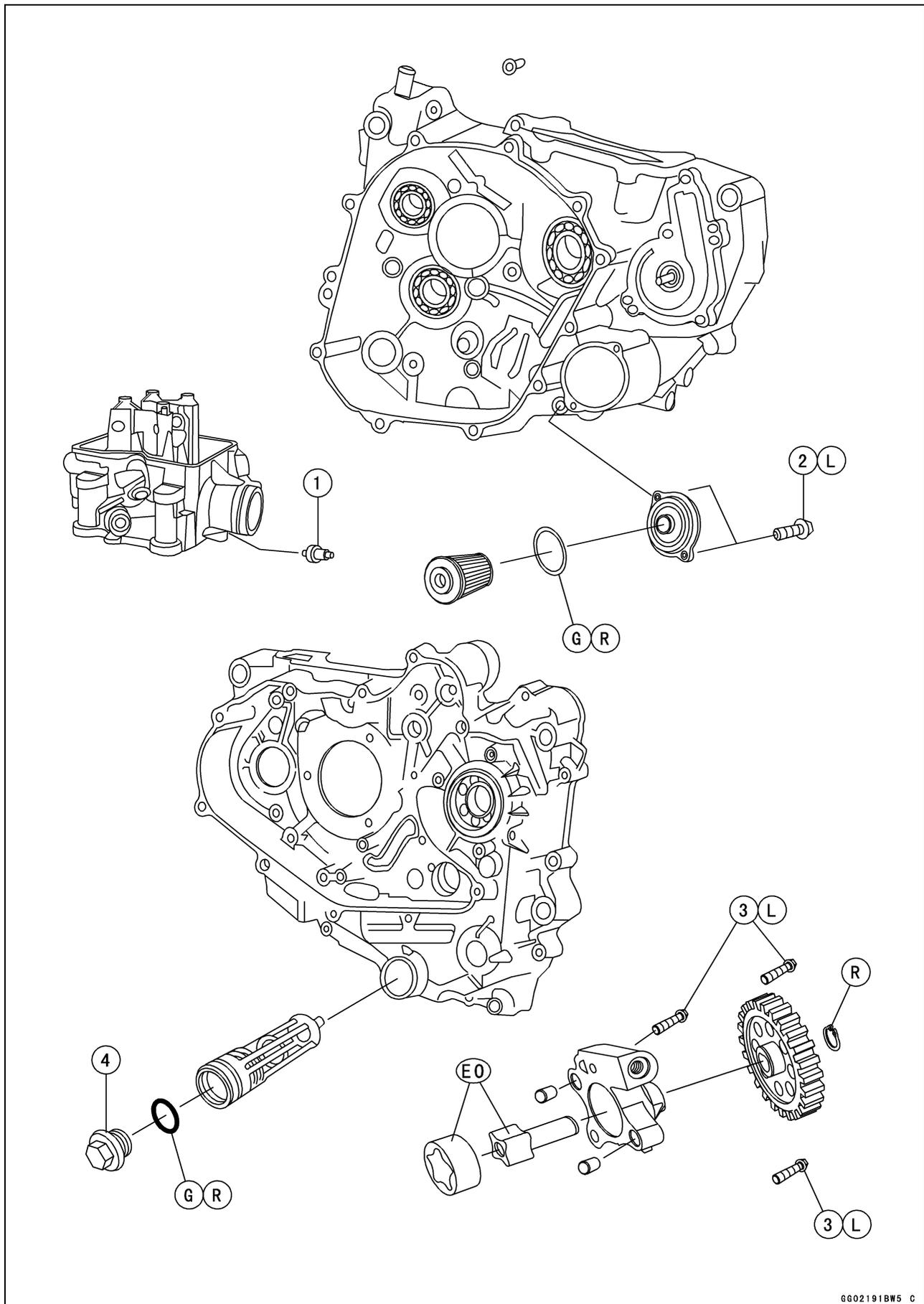
Engine Lubrication System

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7-2 ENGINE LUBRICATION SYSTEM

Exploded View



ENGINE LUBRICATION SYSTEM 7-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Pressure Switch	13	1.3	115 in·lb	
2	Oil Filter Cap Bolts	6.9	0.70	61 in·lb	L
3	Oil Pump Mounting Bolts	11	1.1	97 in·lb	L
4	Oil Strainer Cap	8.8	0.90	78 in·lb	

EO: Apply engine oil.

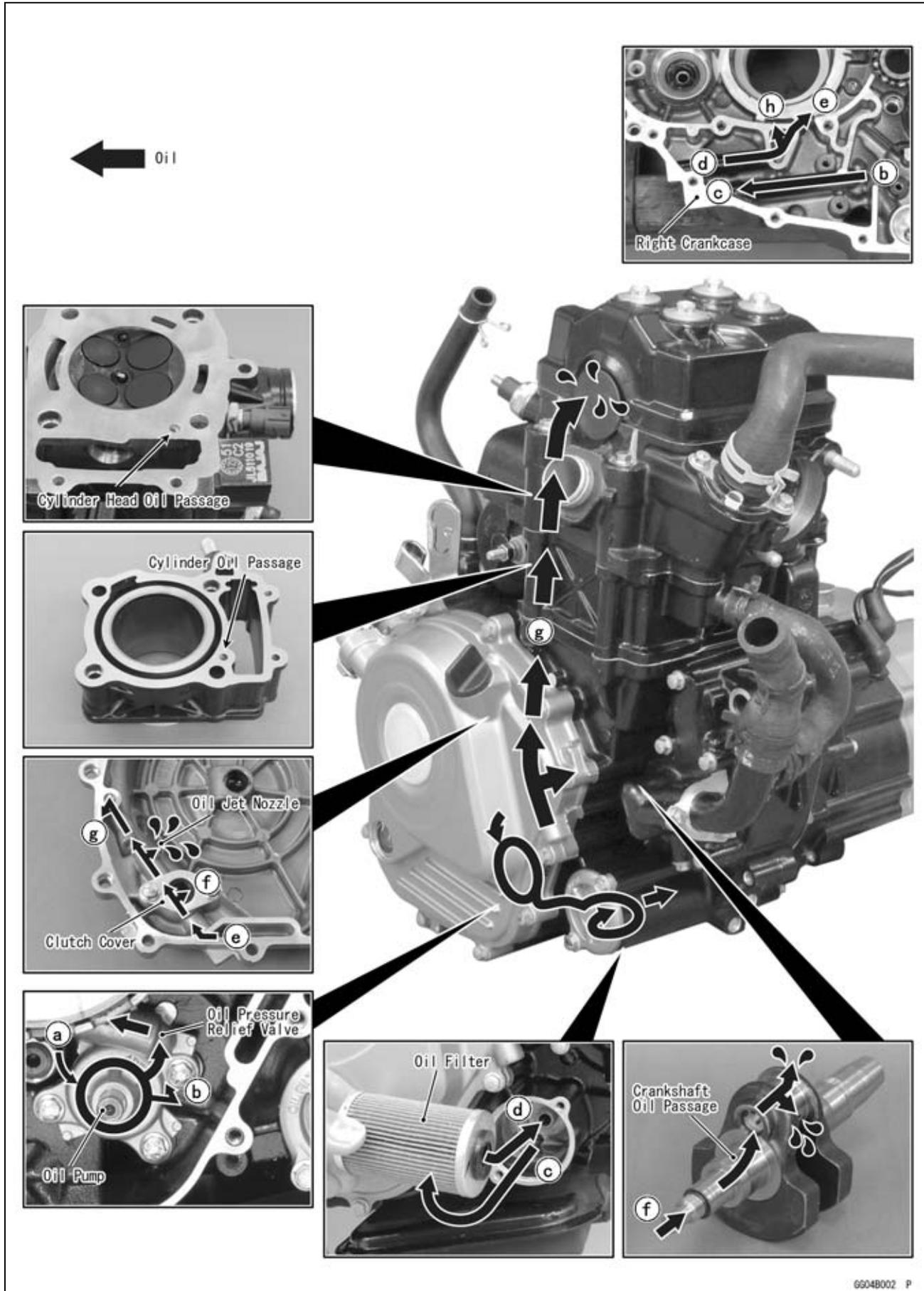
G: Apply grease.

L: Apply a non-permanent locking agent.

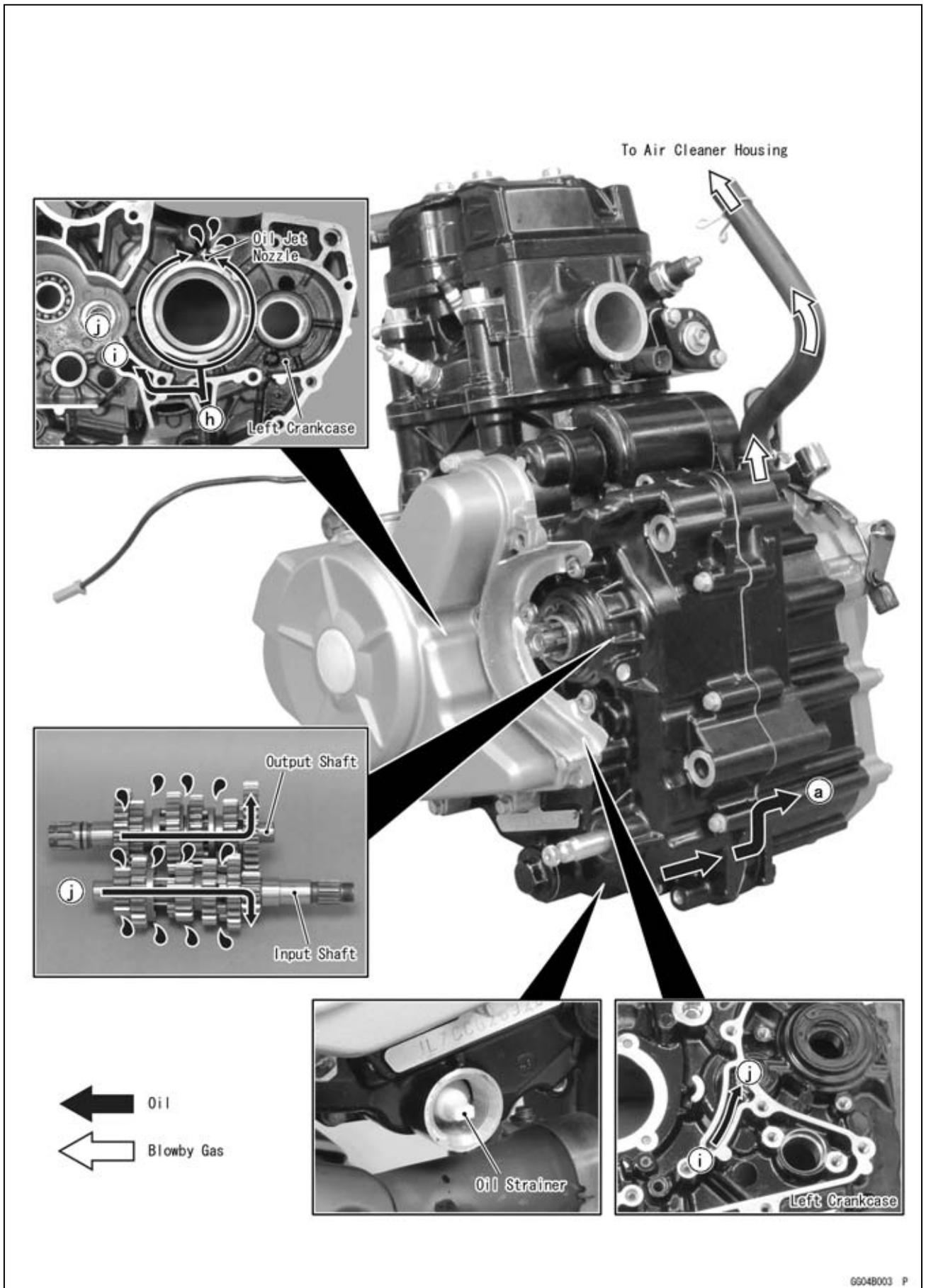
R: Replacement Parts

7-4 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



Engine Oil Flow Chart



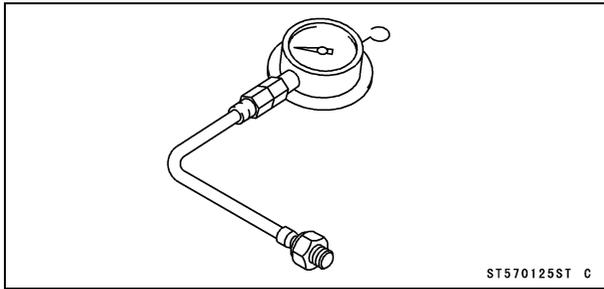
7-6 ENGINE LUBRICATION SYSTEM

Specifications

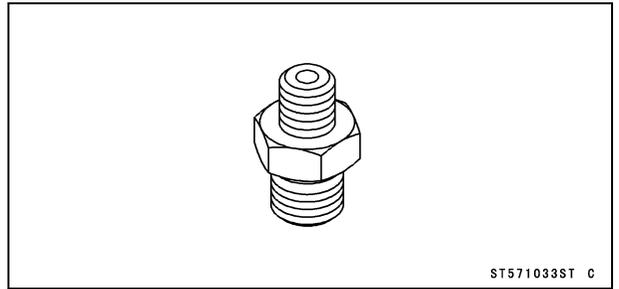
Item	Standard
Engine Oil Type Viscosity Capacity Level	DTS-i 10000 API SL with JASO MA2 SAE 20W-50 1.2 L (1.3 US qt) 1.4 L (1.5 US qt) (when engine is completely dry) Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)
Oil Pressure Measurement Oil Pressure	60 ~ 100 kPa (0.61 ~ 1.02 kgf/cm ² , 8.7 ~ 14.5 psi) at 1 300 ~ 1 500 r/min (rpm), Oil Temperature 50°C (122°F)

Special Tools

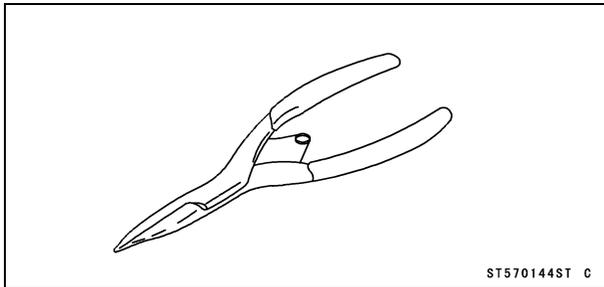
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



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



Outside Circlip Pliers:
57001-144



7-8 ENGINE LUBRICATION SYSTEM

Engine Oil and Oil Filter

⚠ WARNING

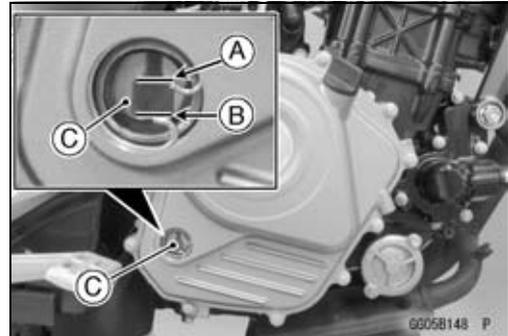
Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection

- Check that the engine oil level is between the upper [A] and lower [B] levels in the oil level inspection window [C].

NOTE

- Situate the motorcycle so that it is perpendicular to the ground.
- If the motorcycle has just been used, wait several minutes for all the oil to drain down.
- If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.



NOTICE

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

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

- ★ If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- ★ If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

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

Engine Oil Change

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

Oil Filter Replacement

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

Oil Strainer Removal

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

Oil Strainer Installation

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

Engine Oil and Oil Filter

Oil Strainer Cleaning

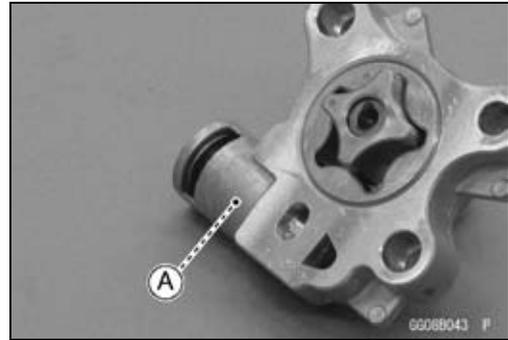
- Refer to the Oil Strainer Cleaning in the Periodic Maintenance chapter.

7-10 ENGINE LUBRICATION SYSTEM

Oil Pressure Relief Valve

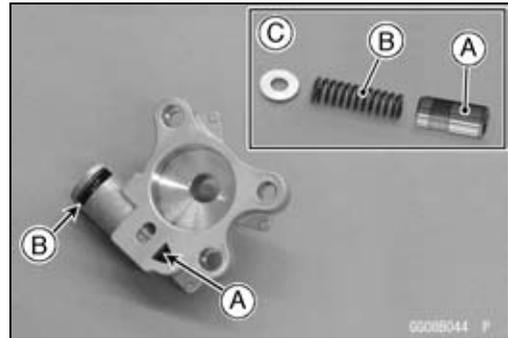
Oil Pressure Relief Valve Removal/Installation

- The oil pressure relief valve [A] is built in the oil pump assembly.
- Refer to the Oil Pump Removal.



Oil Pressure Relief Valve Inspection

- Remove the oil pump assembly (see Oil Pump Removal).
- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.
- This photo [C] is intended to show the structure. Do not disassemble.



NOTE

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

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

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the oil pressure relief valve.

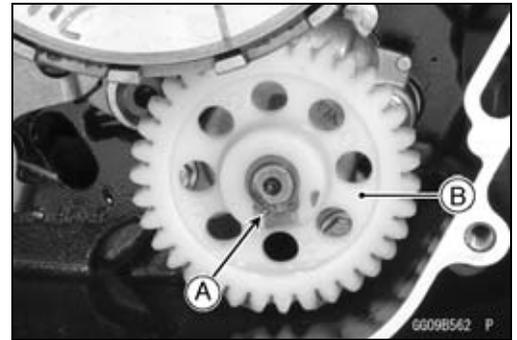
- ★If cleaning does not solve the problem, replace the oil pump assembly. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

Oil Pump

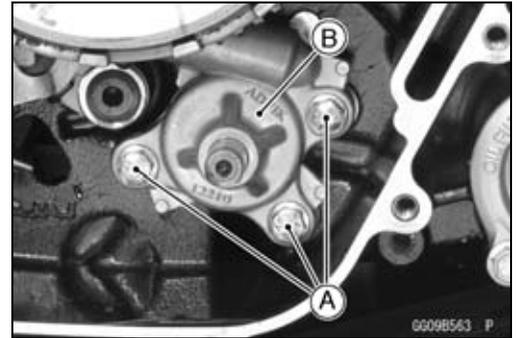
Oil Pump Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
 - Circlip [A]
 - Oil Pump Gear [B]

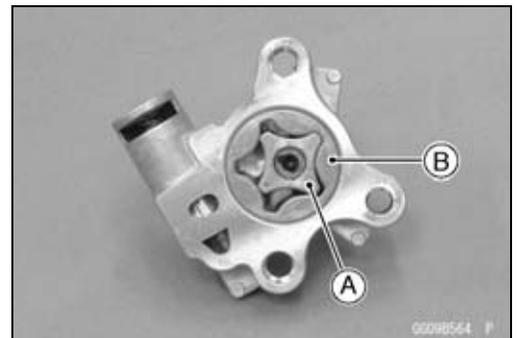
Special Tool - Outside Circlip Pliers: 57001-144



- Remove:
 - Oil Pump Mounting Bolts [A]
 - Oil Pump Assembly [B]

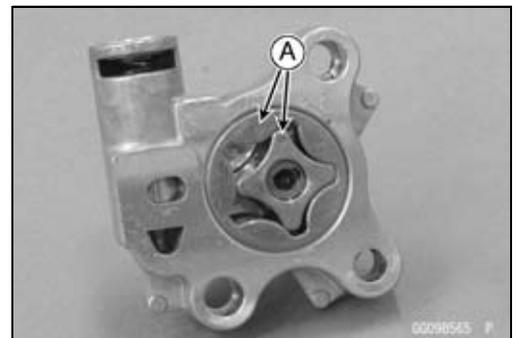


- Remove:
 - Inner Rotor [A]
 - Outer Rotor [B]

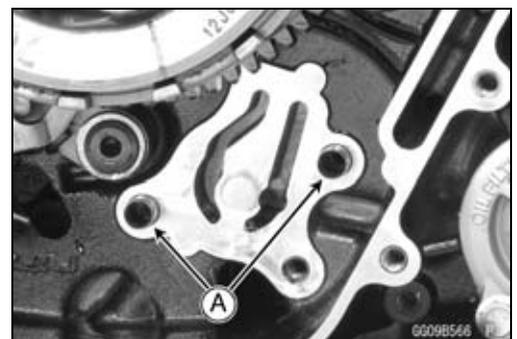


Oil Pump Installation

- Install the inner and outer rotors so that marks [A] faces outside.



- Install the dowel pins [A].

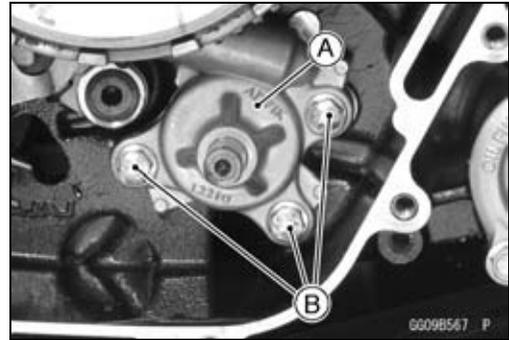


7-12 ENGINE LUBRICATION SYSTEM

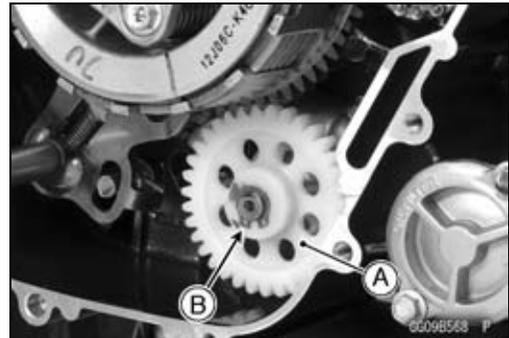
Oil Pump

- Install the oil pump assembly [A].
- Apply a non-permanent locking agent to the threads of the oil pump mounting bolts [B] and tighten them.

Torque - Oil Pump Mounting Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

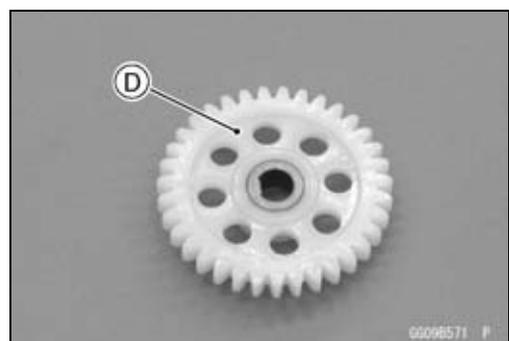
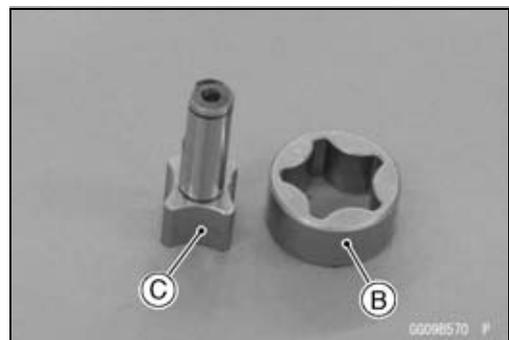
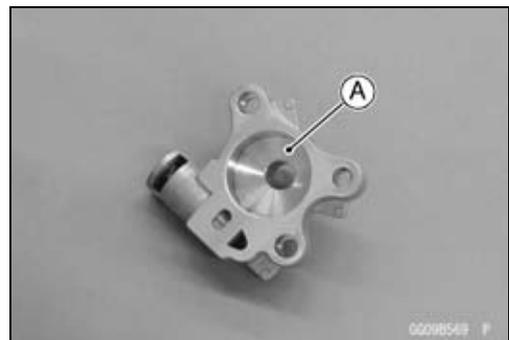


- Install the oil pump gear [A].
 - Be sure the oil pump gear and clutch housing gear mesh properly.
 - Replace the circlip [B] with a new one.
 - Install the new circlip.
- Special Tool - Outside Circlip Pliers: 57001-144**
- Install the removed parts (see appropriate chapters).



Oil Pump Inspection

- Remove the outer and inner rotors (see Oil Pump Removal).
- Visually inspect the oil pump body [A], outer [B] and inner [C] rotors and gear [D].
- ★ If there is any damage or uneven wear, replace the oil pump body, rotors, gear or the oil pump assembly.



Oil Pressure Measurement

Oil Pressure Measurement

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System chapter)
 - Oil Pressure Switch (see Oil Pressure Switch Removal)
- Attach the adapter [A] and gauge [B].

Special Tools - Oil Pressure Gauge, 5 kgf/cm²: 57001-125
Oil Pressure Gauge Adapter, PT 1/8: 57001-1033

- Install:
 - Air Cleaner Housing (see Air Cleaner Housing Installation in the Fuel System chapter)
 - Fuel Tank (see Fuel Tank Installation in the Fuel System chapter)
- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

Oil Pressure

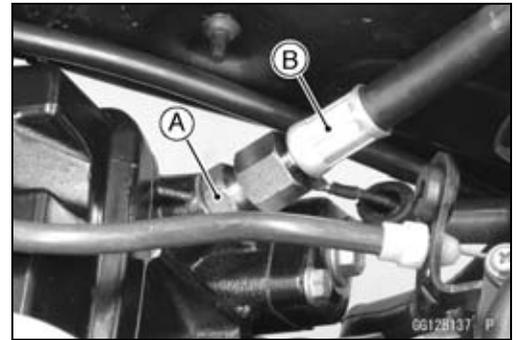
Standard: 60 ~ 100 kPa (0.61 ~ 1.02 kgf/cm², 8.7 ~ 14.5 psi) at 1 300 ~ 1 500 r/min (rpm), Oil Temperature 50°C (122°F)

- ★ If the reading is much lower than the standard, check the oil pump, oil pressure relief valve and crankshaft oil seal of the clutch cover.
- ★ If the reading is much higher than the standard, check the oil passages for clogging.
- Stop the engine.
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System chapter)
- Remove the oil pressure gauge and adapter.

⚠ WARNING

Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the oil pressure gauge adapter is removed.

- Install the removed parts (see appropriate chapters).



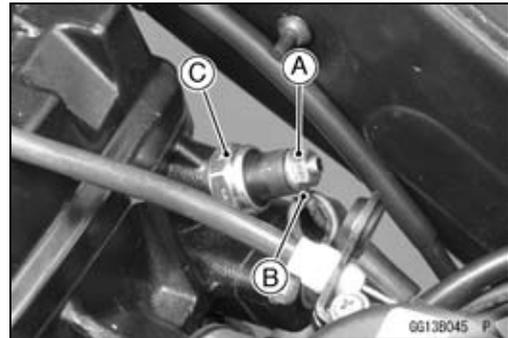
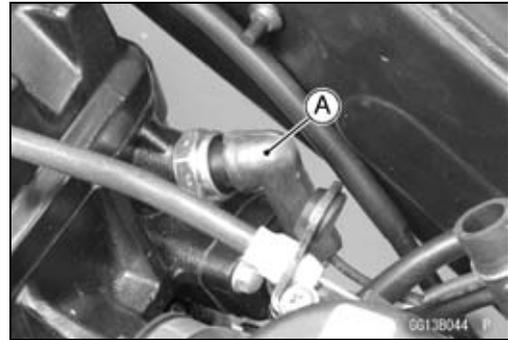
7-14 ENGINE LUBRICATION SYSTEM

Oil Pressure Switch

Oil Pressure Switch Removal

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System chapter)
- Slide the switch cover [A].

- Remove:
 - Switch Terminal Nut [A]
 - Oil Pressure Switch Lead [B]
 - Oil Pressure Switch [C]



Oil Pressure Switch Installation

- Tighten:
 - Torque - Oil Pressure Switch: 13 N·m (1.3 kgf·m, 115 in·lb)**
- Install the switch lead and tighten the switch terminal nut.
- Install the switch cover.
- Install the removed parts (see appropriate chapters).

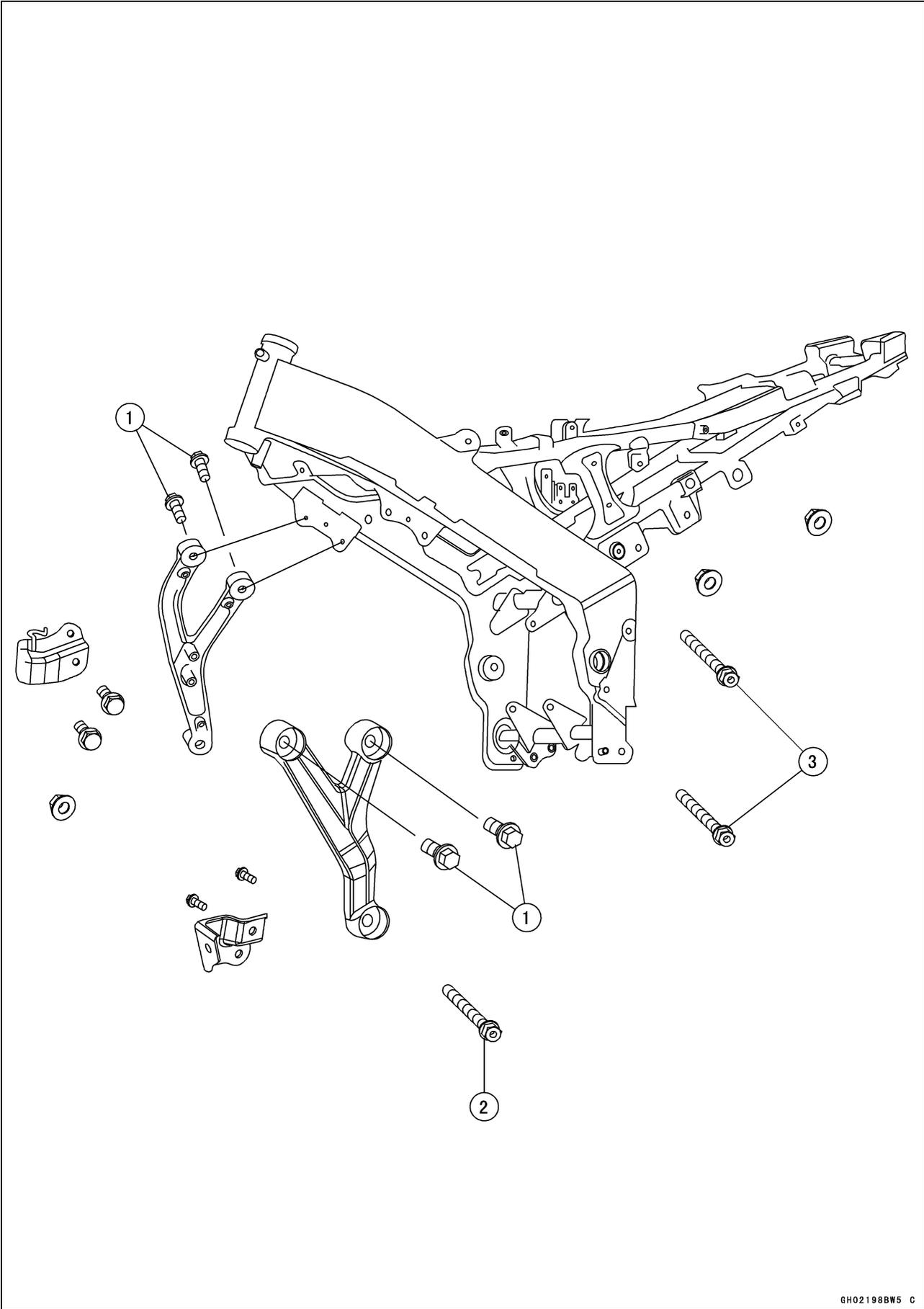
Engine Removal/Installation

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8-2 ENGINE REMOVAL/INSTALLATION

Exploded View



ENGINE REMOVAL/INSTALLATION 8-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Bracket Bolts	25	2.5	18	
2	Front Engine Mounting Bolt	34	3.5	25	
3	Rear Engine Mounting Bolts	27	2.8	20	

8-4 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

Engine Removal

- Support the rear part of the swingarm with a stand.
- Squeeze the brake lever slowly and hold it with a band [A].

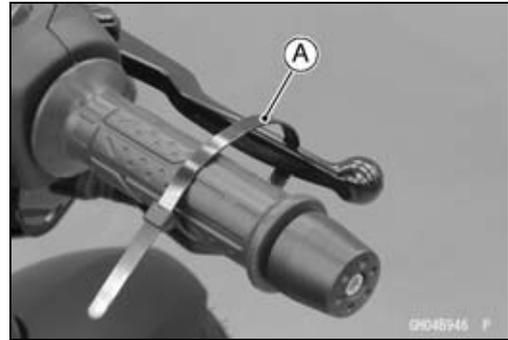
⚠ WARNING

Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the engine.

NOTICE

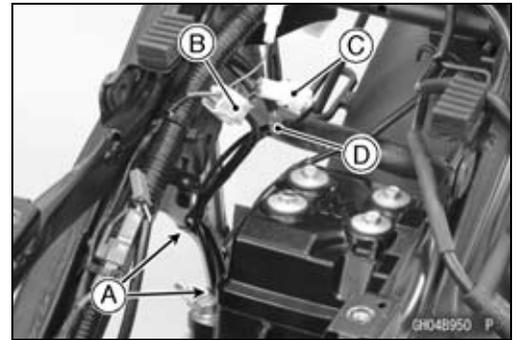
Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

- Drain:
 - Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
 - Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
 - Fuel Tank Cover (see Fuel Tank Cover Removal in the Frame chapter)
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Fuel Filter (see Fuel Filter Removal in the Fuel System chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System chapter)
 - Carburetor (see Carburetor Removal in the Fuel System chapter)
 - Clutch Cable Lower End (see Clutch Cable Removal in the Clutch chapter)
 - Coolant Reserve Tank (see Coolant Reserve Tank Removal in the Cooling System chapter)
 - Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
 - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
 - Muffler (see Muffler Removal in the Engine Top End chapter)
 - Shift Lever (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
 - Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)

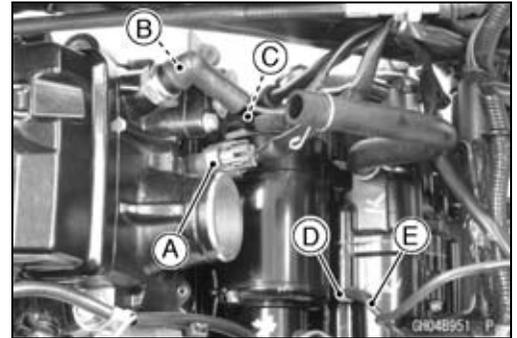


Engine Removal/Installation

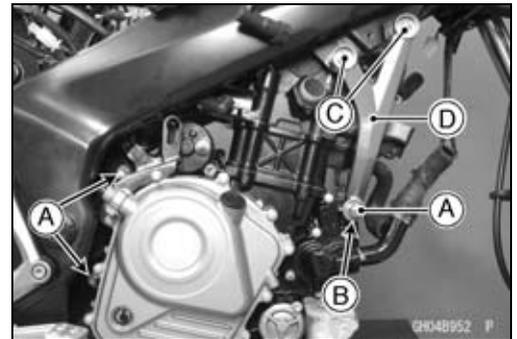
- Disconnect the spark plug caps (see Ignition Coil Removal in the Electrical System chapter).
- Cut the bands [A].
- Disconnect:
 - Alternator Lead Connector [B]
 - Crankshaft Sensor Lead Connector [C]
 - Neutral Switch Lead Connector [D]



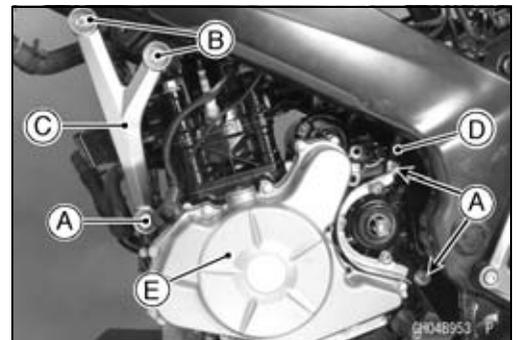
- Disconnect:
 - Water Temperature Sensor Connector [A]
 - Oil Pressure Switch Lead [B] (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
 - Starter Motor Cable Terminal [C] (see Starter Motor Removal in the Electrical System chapter)
- Remove the crankcase bolt (L = 40 mm) [D] and engine ground terminal [E].



- Support the engine with a suitable stand.
- Put a plank onto the suitable stand for engine balance.
- Remove:
 - Engine Mounting Nuts [A]
 - Washers [B]
 - Engine Bracket Bolts [C]
 - Engine Bracket [D]



- Remove:
 - Engine Mounting Bolts [A]
 - Engine Bracket Bolts [B]
 - Engine Bracket [C]
 - Frame Ground Terminal [D]
- While raising the engine, pull out the engine mounting bolts.
- Remove the engine [E].

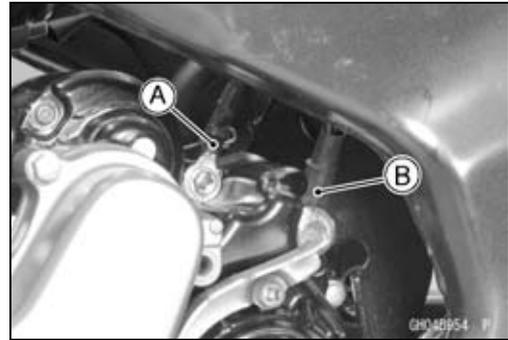


8-6 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

Engine Installation

- Install the engine.
- Install the engine brackets and tighten all bolts and nuts temporarily.
- Be sure to install the engine ground terminal [A] with crankcase bolt (L = 40 mm).
- Be sure to install the frame ground terminal [B] with rear engine mounting bolt (upper).
- Tighten:
 - Torque - Rear Engine Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)**
 - Engine Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
 - Front Engine Mounting Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)**
 - Crankcase Bolt (L = 40 mm): 11 N·m (1.1 kgf·m, 97 in·lb)**
- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:
 - Throttle Cable (see Throttle Control System Inspection in the Periodic Maintenance chapter)
 - Clutch Cable (see Clutch Operation Inspection in the Periodic Maintenance chapter)
 - Drive Chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).



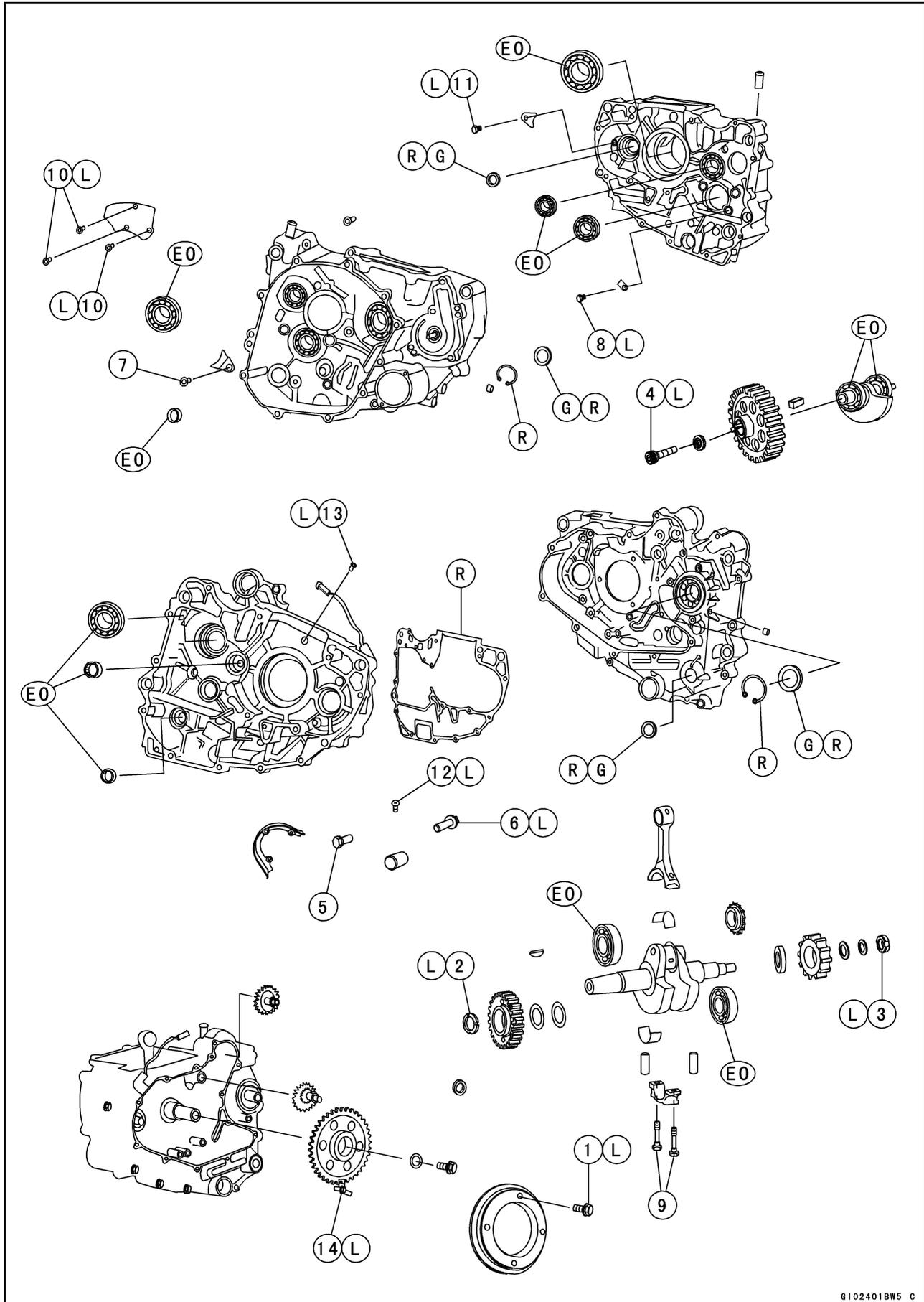
Crankshaft/Transmission

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9-2 CRANKSHAFT/TRANSMISSION

Exploded View



CRANKSHAFT/TRANSMISSION 9-3**Exploded View**

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Starter Motor Clutch Bolts	15	1.5	11	L
2	Balancer Drive Gear Nut	59	6.0	44	L
3	Primary Gear Nut	59	6.0	44	L
4	Balancer Driven Gear Bolt	23	2.3	17	L
5	Crankcase Bolts (L = 40 mm)	11	1.1	97 in·lb	
6	Crankcase Bolts (L = 60 mm)	11	1.1	97 in·lb	L
7	Crankshaft Bearing Retaining Plate Screw	9.8	1.0	87 in·lb	
8	Shift Drum Bearing Retaining Plate Bolt	11	1.1	97 in·lb	L
9	Connecting Rod Big End Bolts	23	2.3	17	
10	Breather Plate Screws	6.9	0.70	61 in·lb	L
11	Balancer Bearing Retaining Plate Bolt	9.8	1.0	87 in·lb	L
12	Chain Guide Screws	11	1.1	97 in·lb	L
13	Oil Jet Nozzle	5.9	0.60	52 in·lb	L
14	Starter Motor Clutch Gear Retaining Plate Bolt	11	1.1	97 in·lb	L

EO: Apply engine oil.

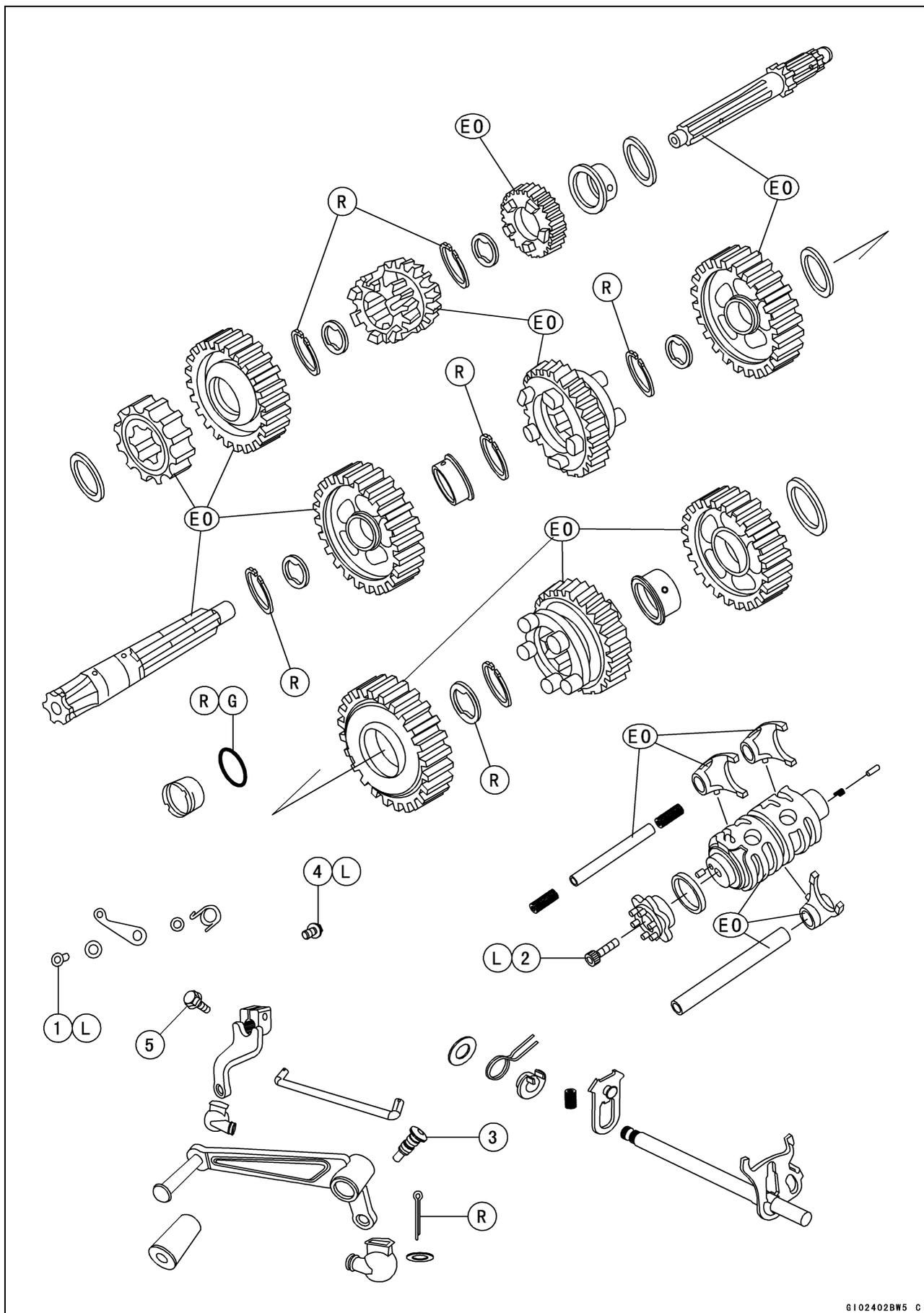
G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

9-4 CRANKSHAFT/TRANSMISSION

Exploded View



CRANKSHAFT/TRANSMISSION 9-5

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Gear Positioning Lever Bolt	11	1.1	97 in·lb	L
2	Shift Drum Cam Bolt	11	1.1	97 in·lb	L
3	Shift Pedal Mounting Bolt	20	2.0	15	
4	Shift Shaft Return Spring Pin	21	2.1	15	L
5	Shift Lever Bolt	12	1.2	106 in·lb	

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

9-6 CRANKSHAFT/TRANSMISSION

Specifications

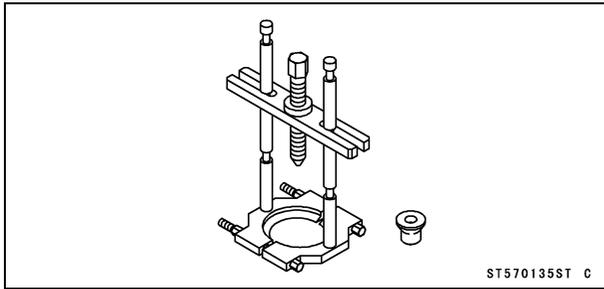
Item	Standard	Service Limit
Crankshaft, Connecting Rod		
Connecting Rod:		
Big End Side Clearance	0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)	0.45 mm (0.018 in.)
Crankpin Diameter:	29.995 ~ 30.011 mm (1.1809 ~ 1.1815 in.)	29.98 mm (1.1803 in.)
Marking:		
A	29.995 ~ 30.003 mm (1.1809 ~ 1.1812 in.)	---
B	30.004 ~ 30.011 mm (1.1813 ~ 1.1815 in.)	---
Connecting Rod Big End Inside Diameter:	33.000 ~ 33.016 mm (1.2992 ~ 1.2998 in.)	---
Marking:		
1	33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)	---
2	33.009 ~ 33.016 mm (1.2996 ~ 1.2998 in.)	---
Connecting Rod Big End Bearing Insert Thickness:		
Green	1.483 ~ 1.487 mm (0.05839 ~ 0.05854 in.)	---
None	1.487 ~ 1.491 mm (0.05854 ~ 0.05870 in.)	---
Blue	1.491 ~ 1.495 mm (0.05870 ~ 0.05886 in.)	---
Crankshaft Runout	TIR 0.02 mm (0.0008 in.)	TIR 0.08 mm (0.0031 in.)
Transmission		
Shift Fork Ear Thickness	4.93 ~ 5.00 mm (0.194 ~ 0.197 in.)	4.73 mm (0.186 in.)
Gear Groove Width	5.08 ~ 5.18 mm (0.200 ~ 0.204 in.)	5.38 mm (0.212 in.)
Shift Fork Guide Pin Diameter	4.46 ~ 4.49 mm (0.176 ~ 0.177 in.)	4.44 mm (0.175 in.)
Shift Drum Groove Width	4.60 ~ 4.70 mm (0.181 ~ 0.185 in.)	4.73 mm (0.186 in.)
Shift Fork Hole Diameter	12.000 ~ 12.027 mm (0.47244 ~ 0.47350 in.)	12.04 mm (0.4740 in.)
Shift Rod Diameter	11.966 ~ 11.984 mm (0.47110 ~ 0.47181 in.)	11.950 mm (0.47047 in.)

Connecting Rod Big End Bearing Insert Selection

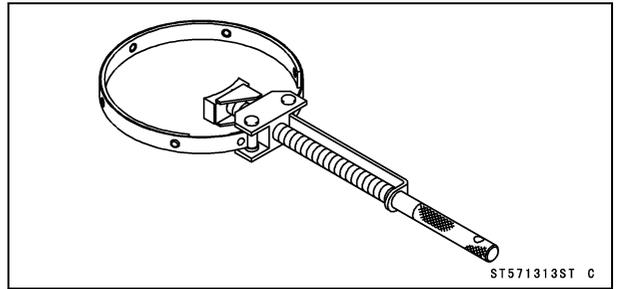
Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert
		Size Color
1	B	Green
1	A	None
2	B	
2	A	Blue

Special Tools

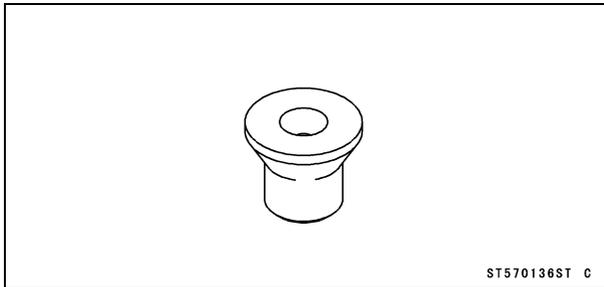
Bearing Puller:
57001-135



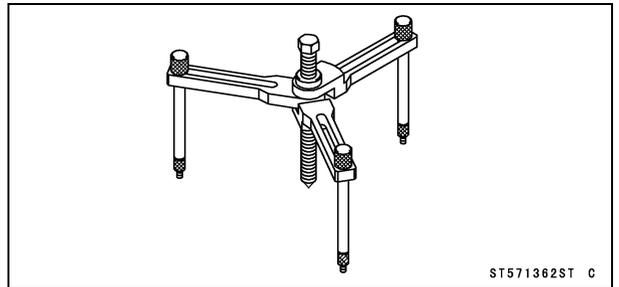
Flywheel Holder:
57001-1313



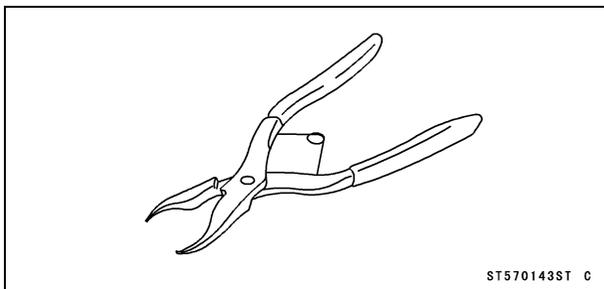
Bearing Puller Adapter:
57001-136



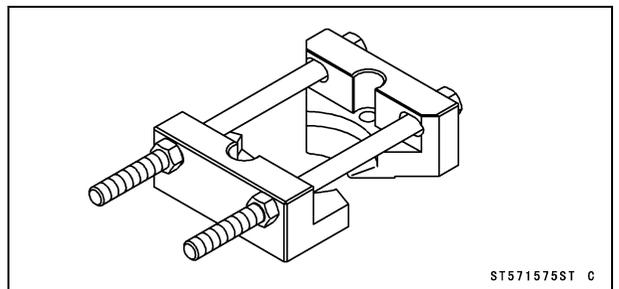
Crankcase Splitting Tool Assembly:
57001-1362



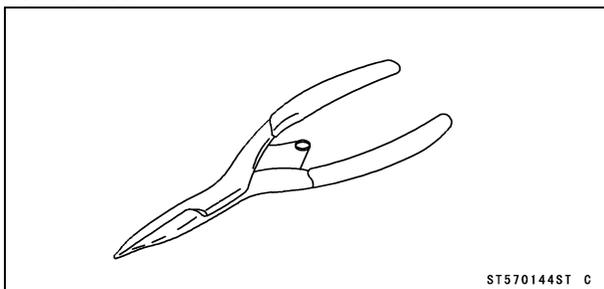
Inside Circlip Pliers:
57001-143



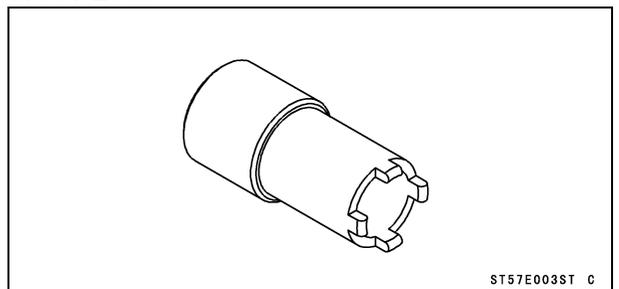
Bearing Puller:
57001-1575



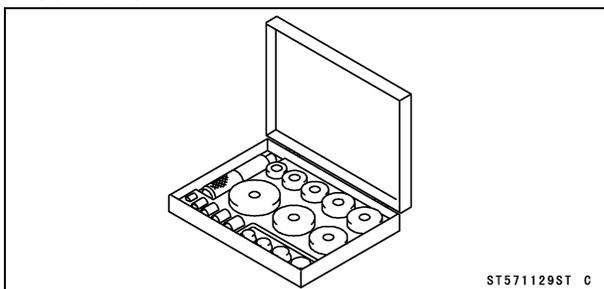
Outside Circlip Pliers:
57001-144



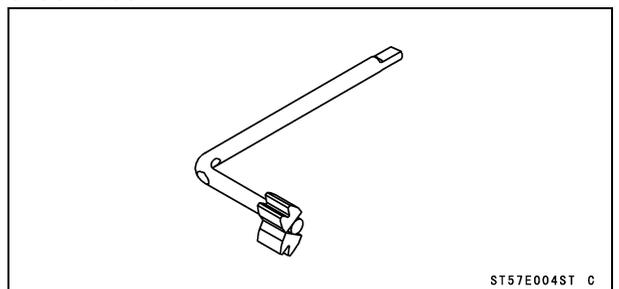
Clutch Hub Nut Wrench:
57001-E003



Bearing Driver Set:
57001-1129



Primary Gear Holder:
57001-E004

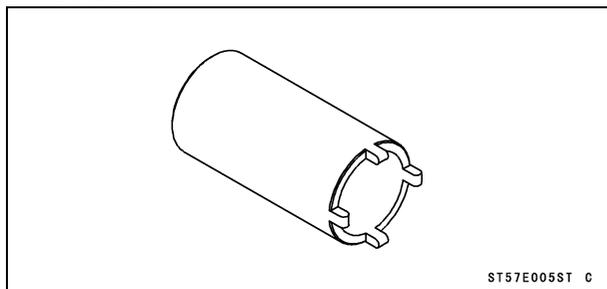


9-8 CRANKSHAFT/TRANSMISSION

Special Tools

Balancer Gear Nut Wrench:

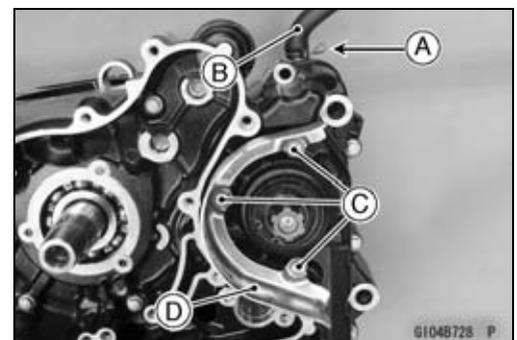
57001-E005



Crankcase

Crankcase Splitting

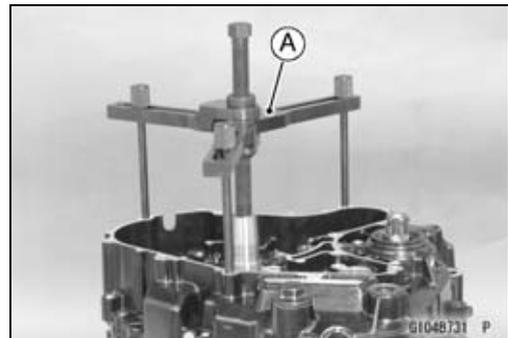
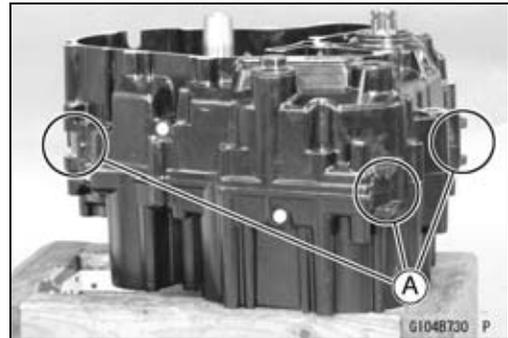
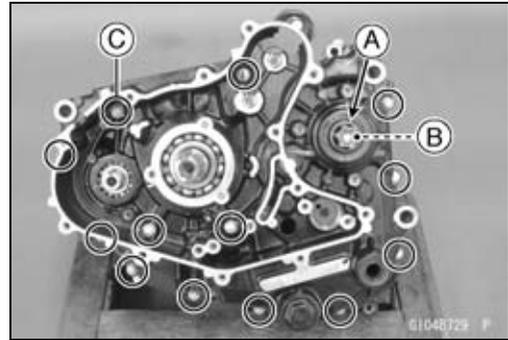
- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
 - Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
 - Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
 - Starter Motor Clutch Gear (see Starter Motor Clutch Gear Removal)
 - Neutral Switch (see Neutral Switch Removal in the Electrical System chapter)
 - Balancer Drive Gear (see Balancer Drive Gear Removal)
 - Balancer Driven Gear (see Balancer Driven Gear Removal)
 - Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
 - Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
 - Primary Gear (see Primary Gear Removal)
 - Clutch (see Clutch Removal in the Clutch chapter)
 - Gear Positioning Lever (see External Shift Mechanism Removal)
 - External Shift Mechanism (see External Shift Mechanism Removal)
 - Starter Motor (see Starter Motor Removal in the Electrical System chapter)
 - Cylinder Head (see Cylinder Head Removal in the Engine Top End chapter)
 - Cylinder (see Cylinder Removal in the Engine Top End chapter)
 - Piston (see Piston Removal in the Engine Top End chapter)
- Slide the clamp [A].
- Remove:
 - Breather Hose [B]
 - Chain Guide Screws [C]
 - Chain Guide [D]



9-10 CRANKSHAFT/TRANSMISSION

Crankcase

- Remove:
 - Output Shaft Sleeve [A]
 - O-ring [B]
 - Crankcase Bolts [C]
- Tap lightly the points [A] with a plastic mallet to split the crankcase halves apart evenly. There are two dowel pins on the crankcase mating surface. Pull off the left crankcase half.
- The crankcase may also be split, using the crankcase splitting tool assembly [A].
 - Special Tool - Crankcase Splitting Tool Assembly: 57001-1362**
 - Tighten the center bolt on the crankcase splitting tool to split the crankcase. Constantly check the alignment of the two halves. The front and rear of the crankcase must be pulled apart evenly.



NOTICE

Do not remove the bearings and oil seals unless it is necessary. Removal may damage them.

Crankcase Assembly

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the crankcase in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the crankcase.

- Chip off the old gasket from the mating surfaces of the crankcase halves, and clean off the crankcase, transmission and crankshaft with a high flash-point solvent. After cleaning, apply engine oil to the transmission gears, bearings, shift drum, shift rod, shift forks and so on.
- Be sure to replace any oil seal and ball bearing removed with a new one.

Crankcase

- Using a bearing driver set, install the following parts in the right crankcase.

- Oil Seal [A] (Flush)
- Ball Bearings [B] (Contact with Bottom)
- Needle Bearing [C] (Middle Position from Ends)

Special Tool - Bearing Driver Set: 57001-1129

- Install the shift drum bearing retaining plate [D].
- Apply a non-permanent locking agent to the threads of the shift drum bearing retaining plate bolt [E] and tighten it.

Torque - Shift Drum Bearing Retaining Plate Bolt: 11 N·m (1.1 kgf·m, 97 in·lb)

- Install the crankshaft bearing retaining plate [F].
- Tighten the crankshaft bearing retaining plate screw [G].

Torque - Crankshaft Bearing Retaining Plate Screw: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the breather plate [H].
- Apply a non-permanent locking agent to the threads of the breather plate screws [I] and tighten them.

Torque - Breather Plate Screws: 6.9 N·m (0.70 kgf·m, 61 in·lb)

- Replace the circlip [J] with a new one.
- Install the new circlip and sleeve [K].

Special Tool - Inside Circlip Pliers: 57001-143

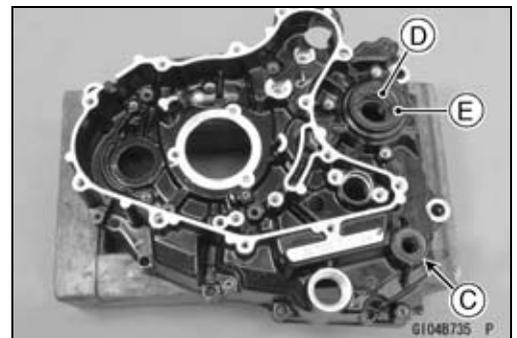
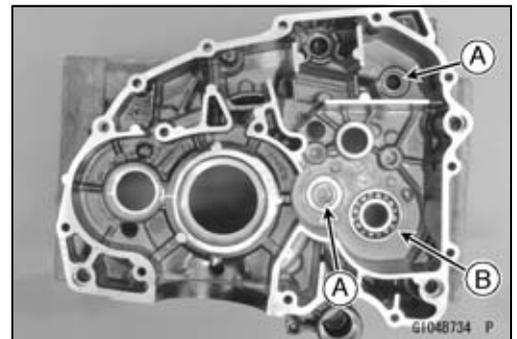
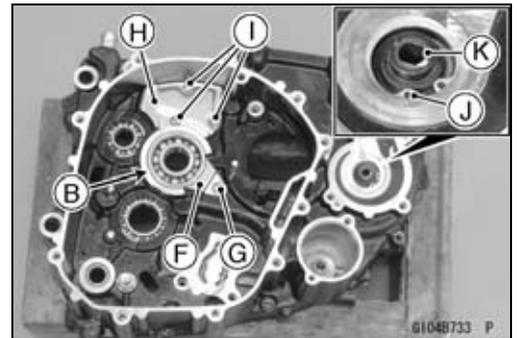
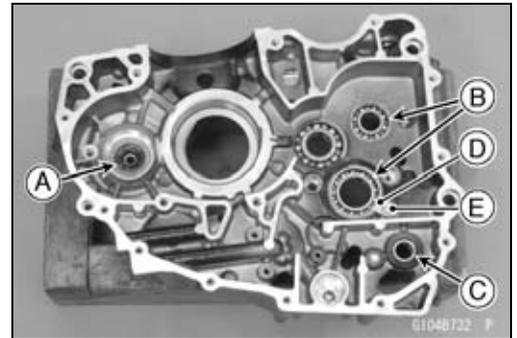
- Using a bearing driver set, install the following parts in the left crankcase.

- Needle Bearings [A] (Flush)
- Ball Bearing [B] (Flush)
- Oil Seal [C] (Flush)
- Oil Seal [D] (Flush with Groove)

Special Tool - Bearing Driver Set: 57001-1129

- Replace the circlip [E] with a new one.
- Install the new circlip.

Special Tool - Inside Circlip Pliers: 57001-143



9-12 CRANKSHAFT/TRANSMISSION

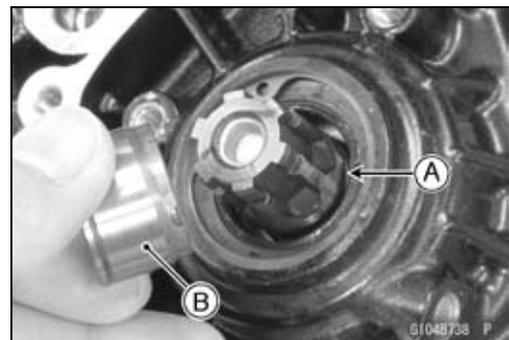
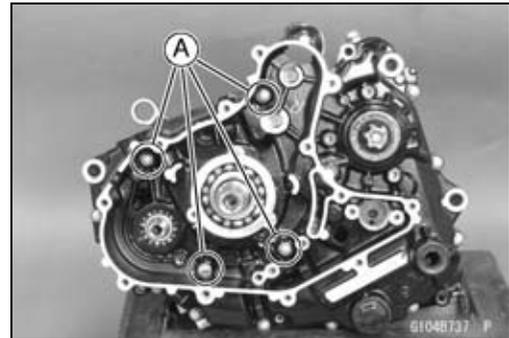
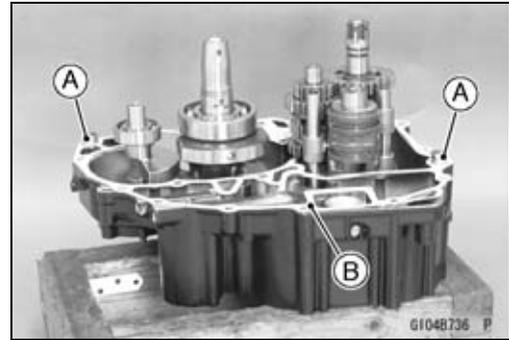
Crankcase

- Install the crankshaft (see Crankshaft Installation).
- Install the shift drum, transmission shafts, and shift forks in the right crankcase (see Transmission Shaft Installation).
- Install the balancer (see Balancer Installation).
- Check to see that the neutral holder is on the shift drum (see Shift Drum Installation).
- Check to see that the crankcase dowel pins [A] are in place on the right crankcase half.
- Replace the gasket [B] with a new one.

- Install the left crankcase.
- Apply a non-permanent locking agent to the threads of the crankcase bolts (L = 60 mm) [A].
- Tighten the crankcase bolts starting with the ones around the crankshaft, and then the other ones.

Torque - Crankcase Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

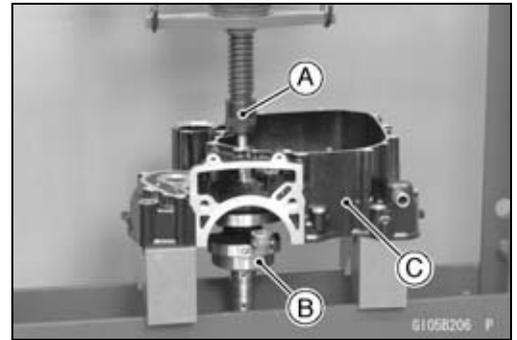
- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring and install it on the output shaft.
- Install the output shaft sleeve [B].
- Check to see that the crankshaft, balancer, input shaft, and output shaft all turn freely (in the neutral position).
- Spinning the output shaft, shift the transmission through all the gears to make certain there is no binding and that all the gears shift properly.



Crankshaft, Connecting Rod

Crankshaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the shift drum (see Shift Drum Removal).
- Remove the balancer (see Balancer Removal).
- Using a press [A], remove the crankshaft [B] from the right crankcase [C].
- Remove the connecting rod (see Connecting Rod Removal).

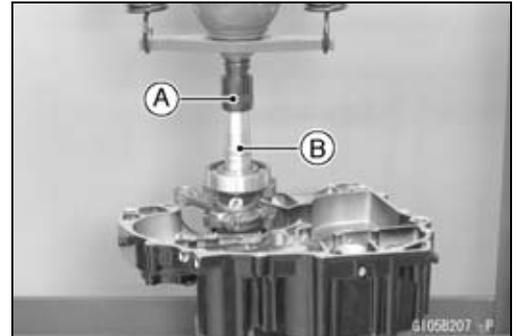


Crankshaft Installation

NOTE

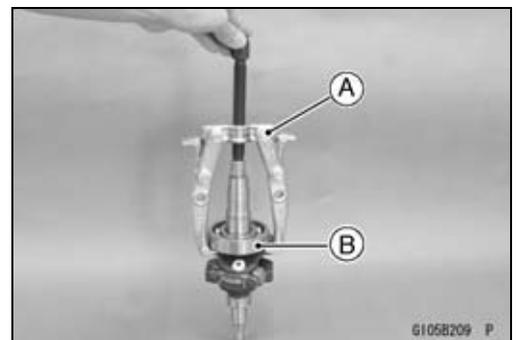
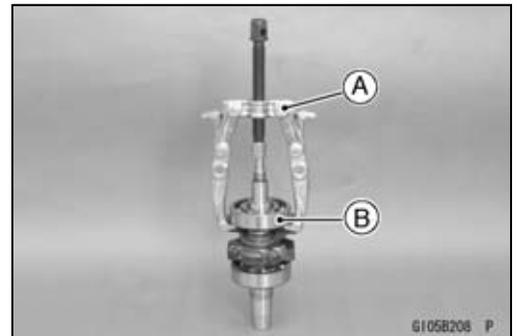
○ If the crankshaft is replaced with a new one, refer to the Connecting Rod Big End Bearing/Crankshaft Main Bearing Insert Selection in the Specifications.

- Install the connecting rod (see Connecting Rod Installation).
- Using a press [A], install the crankshaft [B] into the right crankcase.



Crankshaft Ball Bearing Removal

- Using a commercially available bearing puller [A], remove the ball bearings [B].



Crankshaft Ball Bearing Installation

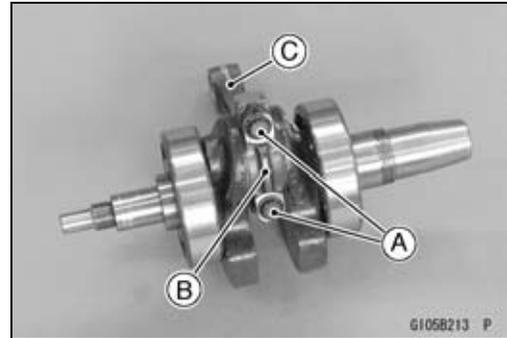
- Using a press, install the ball bearings.

9-14 CRANKSHAFT/TRANSMISSION

Crankshaft, Connecting Rod

Connecting Rod Removal

- Remove:
 - Crankshaft (see Crankshaft Removal)
 - Connecting Rod Big End Bolts [A]
 - Connecting Rod Big End Cap [B]
 - Connecting Rod [C]



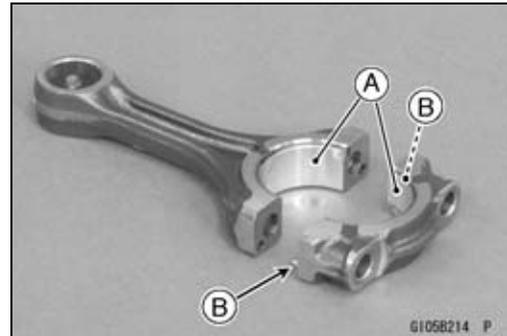
Connecting Rod Installation

NOTE

○ If the connecting rod is replaced with a new one, refer to the Connecting Rod Big End Bearing/Crankshaft Main Bearing Insert Selection in the Specifications.

- Install the inserts [A] so that their nails are on the same side and fit them into the recess of the connecting rod and cap.
- Install the dowel pins [B].
- Remove debris and clean the surface of inserts.
- Install the connecting rod and cap to the crankshaft.
- Tighten the connecting rod big end bolts.

Torque - Connecting Rod Big End Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)



Crankshaft/Connecting Rod Cleaning

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

Connecting Rod Big End Side Clearance Inspection

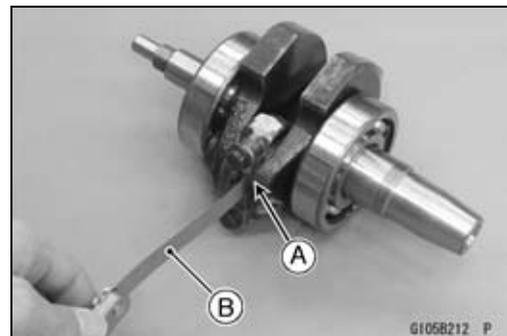
- Measure connecting rod big end side clearance [A].
- Insert a thickness gauge [B] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance

Standard: 0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)

Service Limit: 0.45 mm (0.018 in.)

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



Crankshaft, Connecting Rod

Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection

- Measure the diameter [A] of the crankpin.

Crankpin Diameter

Standard: 29.995 ~ 30.011 mm (1.1809 ~ 1.1815 in.)

Service Limit: 29.98 mm (1.1803 in.)

- ★ If the crankpin has worn past the service limit, replace the crankshaft with a new one.
- ★ If the measured crankpin diameter is not less than the service limit, but do not coincide with the original diameter marking [B] on the crankshaft, make new mark on it.

Crankpin Diameter Marks

A 29.995 ~ 30.003 mm (1.1809 ~ 1.1812 in.)

B 30.004 ~ 30.011 mm (1.1813 ~ 1.1815 in.)

Crankpin Diameter Mark: A or B

- Measure the connecting rod big end inside diameter, and mark of the connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end bolts to the specified torque (see Connecting Rod Installation).

NOTE

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

Connecting Rod Big End Inside Diameter Marks

1 33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)

2 33.009 ~ 33.016 mm (1.2996 ~ 1.2998 in.)

Big End Cap [A]

Connecting Rod [B]

Diameter Mark [C]: 1 or 2

- Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft coding.

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert
		Size Color
1	B	Green
1	A	None
2	B	
2	A	Blue

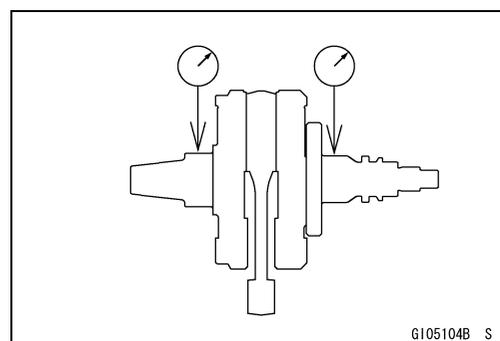
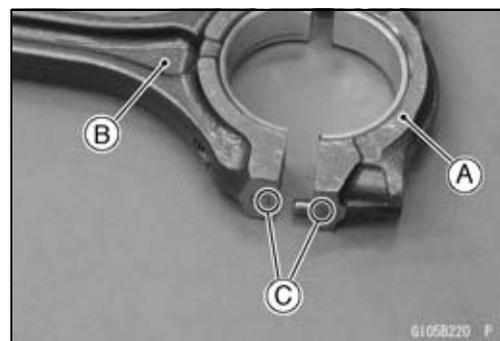
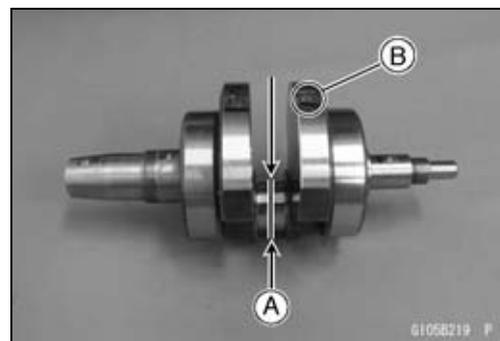
Crankshaft Runout Inspection

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

Crankshaft Runout

Standard: TIR 0.02 mm (0.0008 in.)

Service Limit: TIR 0.08 mm (0.0031 in.)



9-16 CRANKSHAFT/TRANSMISSION

Primary Gear

Primary Gear Removal

- Remove:
 - Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
 - Camshaft Chain (see Camshaft Chain Removal in the Engine Top End chapter)
- Using the primary gear holder [A] and clutch hub nut wrench [B], remove the primary gear nut [C].

Special Tools - Clutch Hub Nut Wrench: 57001-E003
Primary Gear Holder: 57001-E004

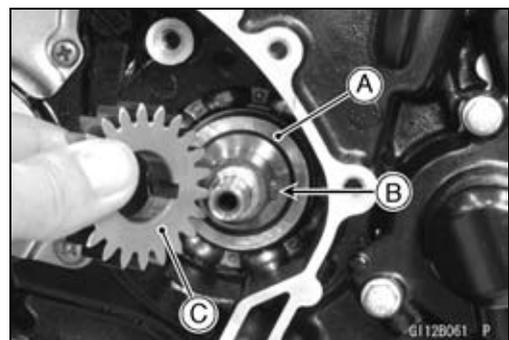
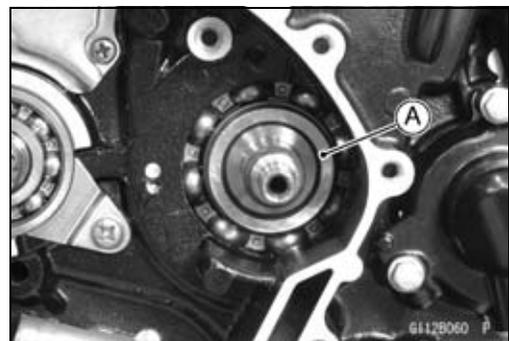
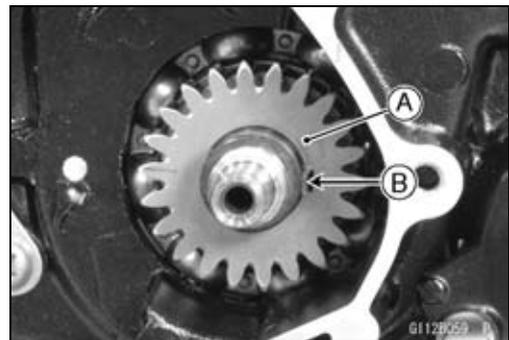
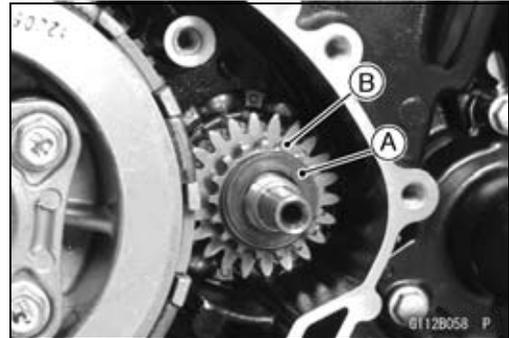
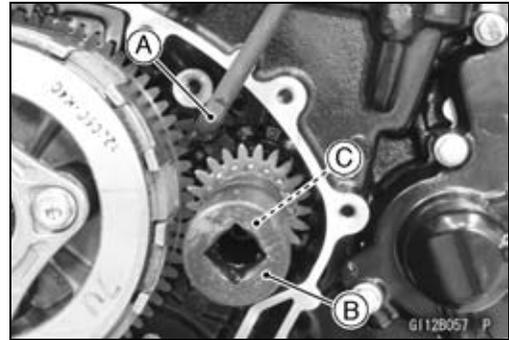
- Remove:
 - Washer [A]
 - Camshaft Chain Drive Sprocket [B]
 - Clutch (see Clutch Removal in the Clutch chapter)

- Remove:
 - Primary Gear [A]
 - Woodruff Key [B]

- Remove the spacer [A].

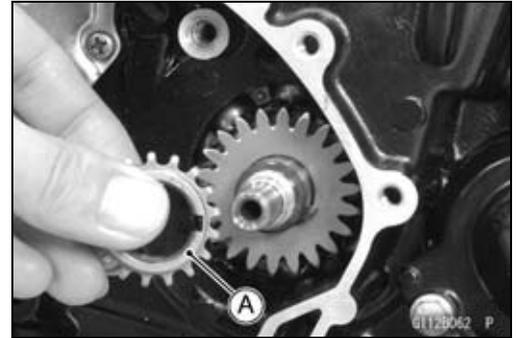
Primary Gear Installation

- Install the spacer [A].
- Install the woodruff key [B] into the crankshaft key way.
- Align the woodruff key on the crankshaft with groove on the primary gear [C].

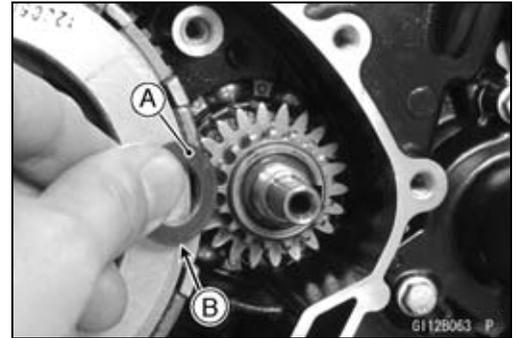


Primary Gear

- Align the woodruff key on the crankshaft with groove on the camshaft chain drive sprocket [A].



- Install the clutch (see Clutch Installation in the Clutch chapter).
- Install the washer [A] so that the chamfer side [B] faces outward.

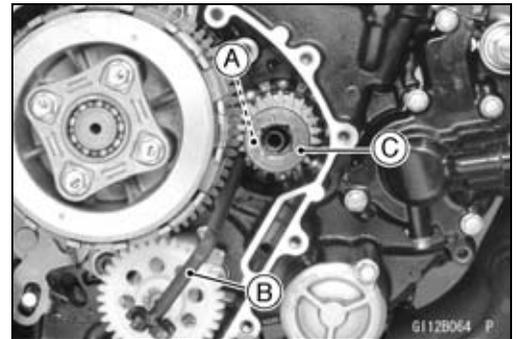


- Apply a non-permanent locking agent to the threads of the primary gear nut [A].
- Using the primary gear holder [B] and clutch hub nut wrench [C], tighten the primary gear nut to the specified torque.

Special Tools - Clutch Hub Nut Wrench: 57001-E003
Primary Gear Holder: 57001-E004

Torque - Primary Gear Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the removed parts (see appropriate chapters).



9-18 CRANKSHAFT/TRANSMISSION

Starter Motor Clutch

Starter Motor Clutch Removal

- Refer to the Alternator Rotor Removal in the Electrical System chapter.

Starter Motor Clutch Installation

- Refer to the Alternator Rotor Installation in the Electrical System chapter.

Starter Motor Clutch Inspection

- Remove:
 - Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
 - Torque Limiter Gear
- Turn the starter motor clutch gear [A] by hand. The starter clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].
- ★ If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.
- Disassemble the starter motor clutch, and visually inspect the clutch parts.
- ★ If there is any worn or damaged part, replace it.

NOTE

○ Examine the starter motor clutch gear as well. Replace it if it is worn or damaged.

Starter Motor Clutch Disassembly

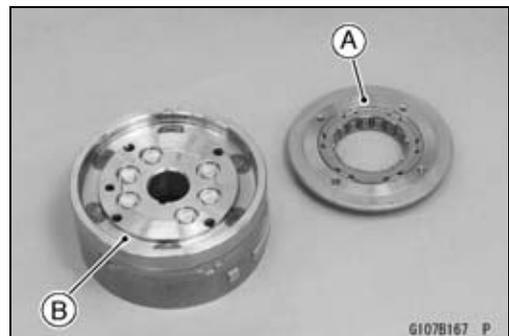
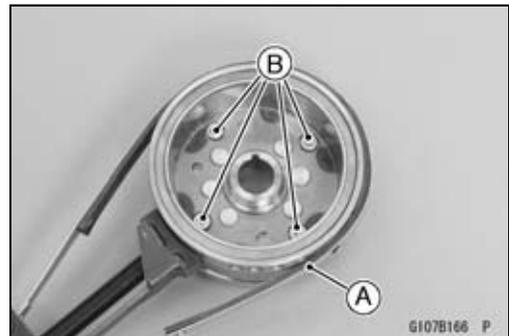
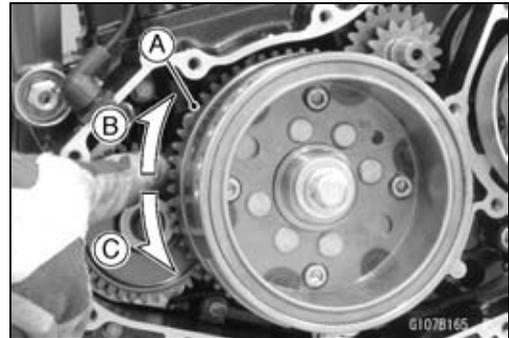
- Remove the alternator rotor (see Alternator Rotor Removal in the Electrical System chapter).
- Holding the alternator rotor by flywheel holder [A], remove the starter motor clutch bolts [B].

Special Tool - Flywheel Holder: 57001-1313

NOTICE

Do not hold the rotor at pick-up portion with the flywheel holder.

- Remove the starter motor clutch [A] from the alternator rotor [B].



Starter Motor Clutch Assembly

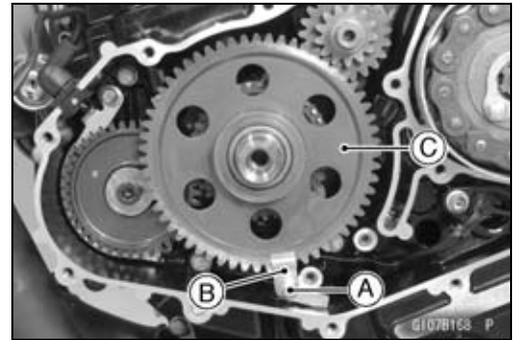
- Holding the alternator rotor by flywheel holder.
 - Special Tool - Flywheel Holder: 57001-1313**
- Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

Torque - Starter Motor Clutch Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

Starter Motor Clutch

Starter Motor Clutch Gear Removal

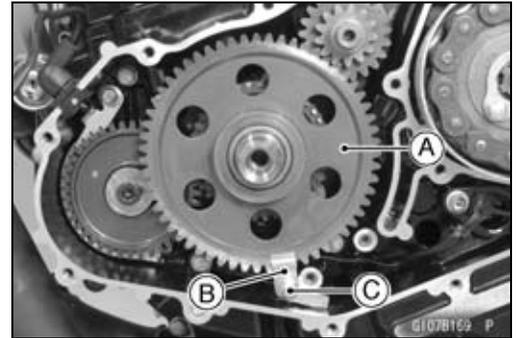
- Remove:
 - Starter Motor Clutch Gear Retaining Plate Bolt [A]
 - Starter Motor Clutch Gear Retaining Plate [B]
 - Starter Motor Clutch Gear [C]



Starter Motor Clutch Gear Installation

- Install the starter motor clutch gear [A] and retaining plate [B].
- Apply a non-permanent locking agent to the threads of the starter motor clutch gear retaining plate bolt [C] and tighten it.

Torque - Starter Motor Clutch Gear Retaining Plate Bolt: 11 N·m (1.1 kgf·m, 97 in·lb)

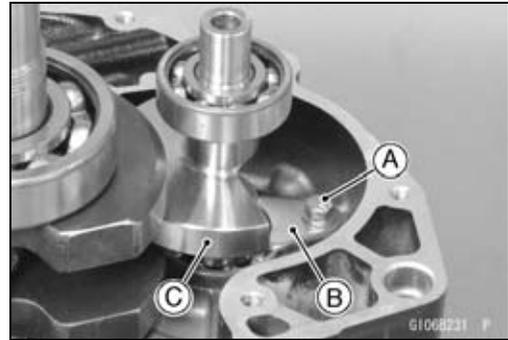


9-20 CRANKSHAFT/TRANSMISSION

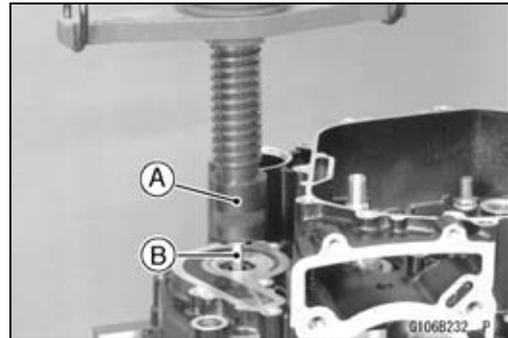
Balancer

Balancer Removal

- Remove:
 - Shift Forks and Transmission Shafts (see Transmission Shaft Removal)
 - Balancer Bearing Retaining Plate Bolt [A]
 - Balancer Bearing Retaining Plate [B]
- Turn the balancer, and free the weight [C] from the crank web.



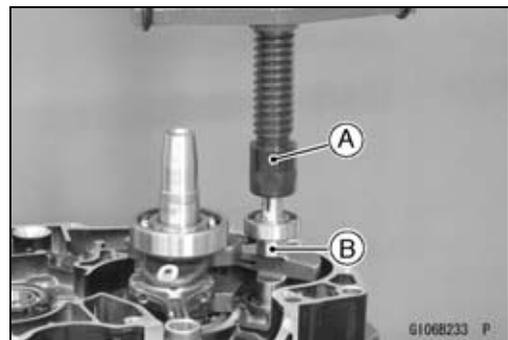
- Using a press [A], remove the balancer [B].



Balancer Installation

- Using a press [A], install the balancer [B].
- Install the balancer bearing retaining plate.
- Apply a non-permanent locking agent to the threads of the balancer bearing retaining plate bolt, and tighten it.

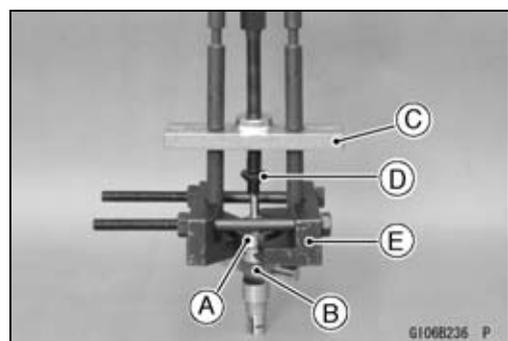
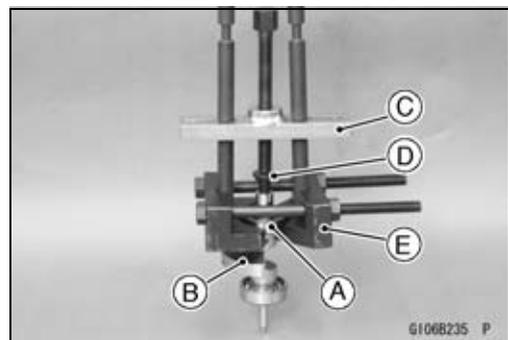
**Torque - Balancer Bearing Retaining Plate Bolt: 9.8 N·m
(1.0 kgf·m, 87 in·lb)**



Balancer Ball Bearing Removal

- Remove the ball bearings [A] from the balancer [B].

**Special Tools - Bearing Puller [C]: 57001-135
Bearing Puller Adapter [D]: 57001-136
Bearing Puller [E]: 57001-1575**



Balancer Ball Bearing Installation

- Using a press, install the ball bearings.

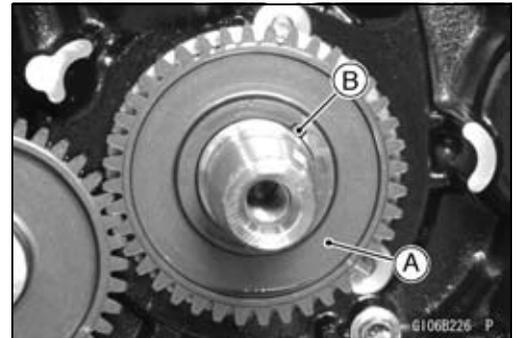
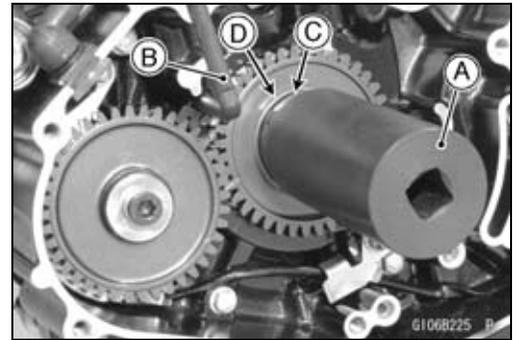
Balancer

Balancer Drive Gear Removal

- Remove the starter motor clutch gear (see Starter Motor Clutch Gear Removal).
- Using the balancer gear nut wrench [A] and primary gear holder [B], remove the balancer drive gear nut [C] and washer [D].

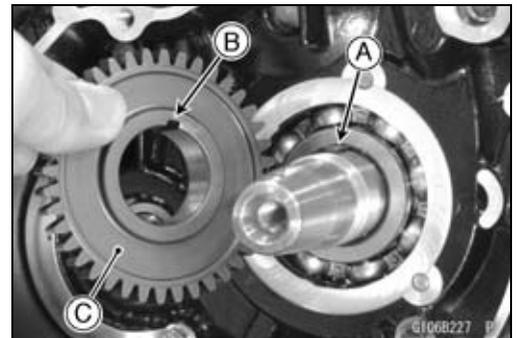
**Special Tools - Primary Gear Holder: 57001-E004
Balancer Gear Nut Wrench: 57001-E005**

- Remove the balancer driven gear bolt and washer (see Balancer Driven Gear Removal).
- Remove:
Balancer Drive Gear [A]
Woodruff Key [B]

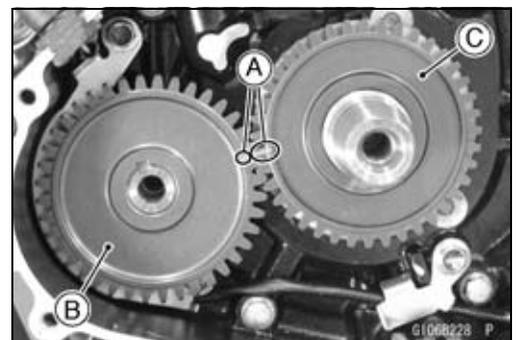


Balancer Drive Gear Installation

- Remove the balancer driven gear temporarily.
- Fit the woodruff key [A] securely in the slot of the crankshaft.
- Align the woodruff key on the crankshaft with groove [B] on the balancer drive gear [C].



- Align the timing marks [A] on the balancer driven gear [B] and balancer drive gear [C].
- Install the washer and balancer driven gear bolt (see Balancer Driven Gear Installation).



- Install the washer [A] so that the chamfer side [B] faces outside.



9-22 CRANKSHAFT/TRANSMISSION

Balancer

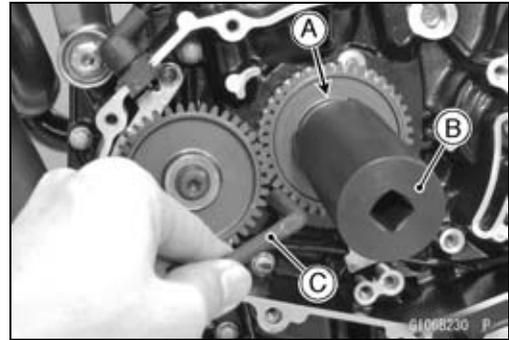
- Apply a non-permanent locking agent to the threads of the balancer drive gear nut [A].
- Using the balancer gear nut wrench [B] and primary gear holder [C], tighten the balancer drive gear nut.

Special Tools - Primary Gear Holder: 57001-E004

Balancer Gear Nut Wrench: 57001-E005

Torque - Balancer Drive Gear Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the removed parts (see appropriate chapters).

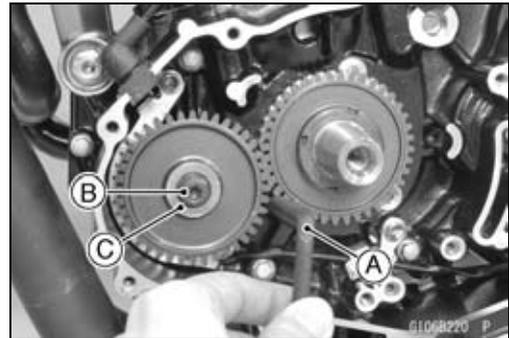


Balancer Driven Gear Removal

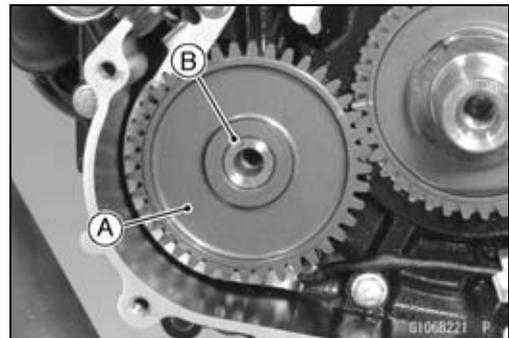
- Remove the starter motor clutch gear (see Starter Motor Clutch Gear Removal).
- Using the primary gear holder [A], remove the balancer driven gear bolt [B].

Special Tool - Primary Gear Holder: 57001-E004

- Remove the washer [C].

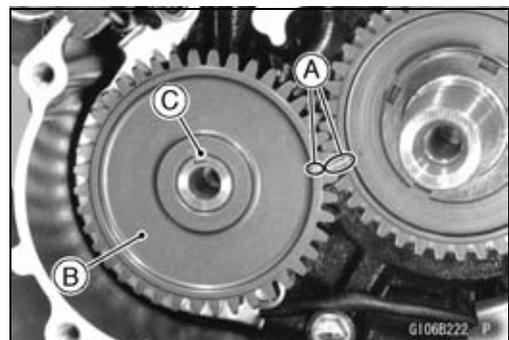


- Remove:
 - Balancer Driven Gear [A]
 - Woodruff Key [B]

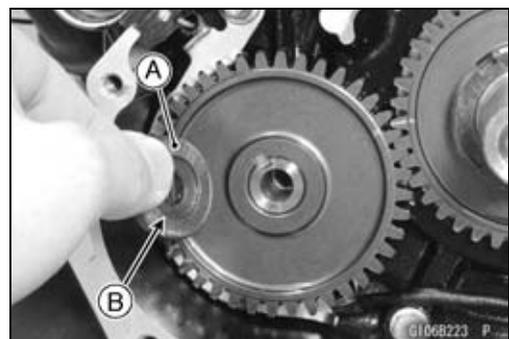


Balancer Driven Gear Installation

- Align the timing marks [A] on the balancer driven gear [B] and balancer drive gear.
- Install the woodruff key [C].



- Install the washer [A] so that the stepped side [B] faces inside.



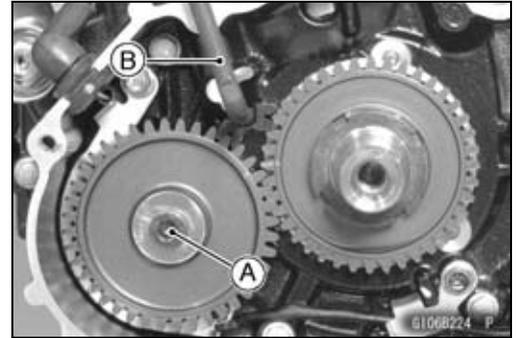
Balancer

- Apply a non-permanent locking agent to the threads of the balancer driven gear bolt [A].
- Using the primary gear holder [B], tighten the balancer driven gear bolt.

Special Tool - Primary Gear Holder: 57001-E004

Torque - Balancer Driven Gear Bolt: 23 N·m (2.3 kgf·m, 17 ft·lb)

- Install the removed parts (see appropriate chapters).



9-24 CRANKSHAFT/TRANSMISSION

External Shift Mechanism

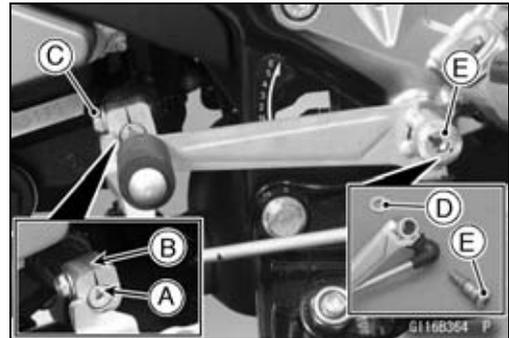
Shift Pedal Removal

- Remove:
 - Shift Lever Bolt [A]
 - Shift Pedal Mounting Bolt [B]
 - Shift Pedal [C]



Shift Pedal Installation

- Align the punch mark [A] on the shift shaft with the slit [B] of the shift lever.
- Tighten the shift lever bolt [C].
Torque - Shift Lever Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)
- Install the washer [D].
- Tighten the shift pedal mounting bolt [E].
Torque - Shift Pedal Mounting Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)

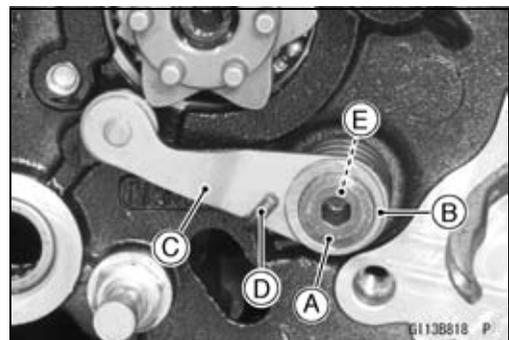


External Shift Mechanism Removal

- Remove:
 - Shift Pedal (see Shift Pedal Removal)
 - Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
 - Clutch (see Clutch Removal in the Clutch chapter)
 - Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
 - Shift Shaft [A]

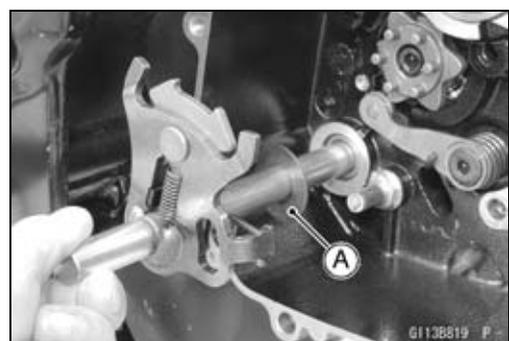


- Remove:
 - Bolt [A] and Washer [B]
 - Gear Positioning Lever [C]
 - Spring [D]
 - Washer [E]



External Shift Mechanism Installation

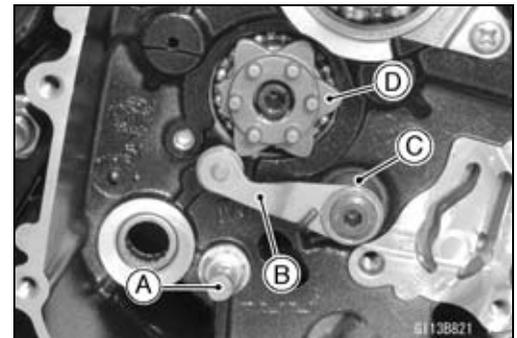
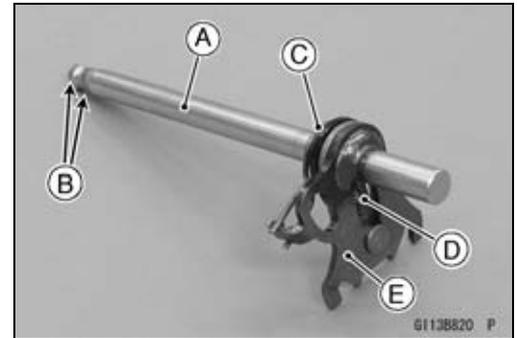
- Before installing the shift shaft, apply grease to the oil seal lips.
- Install:
 - Washer
 - Spring
 - Gear Positioning Lever
 - Washer
- Apply a non-permanent locking agent to the threads of the gear positioning lever bolt and tighten it.
Torque - Gear Positioning Lever Bolt: 11 N·m (1.1 kgf·m, 97 in·lb)
- Install the washer [A] and shift shaft.



External Shift Mechanism

External Shift Mechanism Inspection

- Check the shift shaft [A] for bending or damage to the serration [B].
 - ★ If the shaft is bent, repair or replace it. If the serration is damaged, replace the shaft.
 - Check the return spring [C] and arm spring [D] for cracks or distortion.
 - ★ If the springs are damaged in any way, replace them.
 - Check the shift mechanism arm [E] for distortion.
 - ★ If the shift mechanism arm is damaged in any way, replace the arm.
-
- Check that the shift shaft return spring pin [A] is not loose.
 - ★ If it is loose, remove it, apply a non-permanent locking agent to the threads, and tighten it.
- Torque - Shift Shaft Return Spring Pin: 21 N·m (2.1 kgf·m, 15 ft·lb)**
- Check the gear positioning lever [B], and its spring [C] for cracks or distortion.
 - ★ If the lever or spring is damaged in any way, replace them.
 - Visually inspect the shift drum cam [D].
 - ★ If it is badly worn or if it shows any damage, replace it.

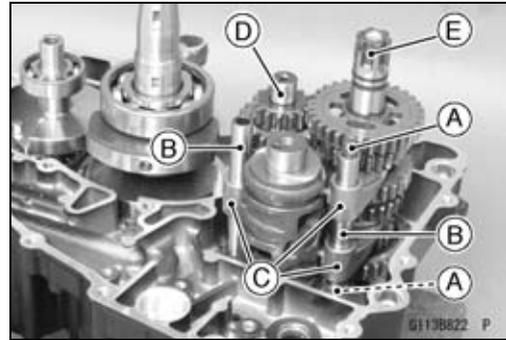


9-26 CRANKSHAFT/TRANSMISSION

Transmission

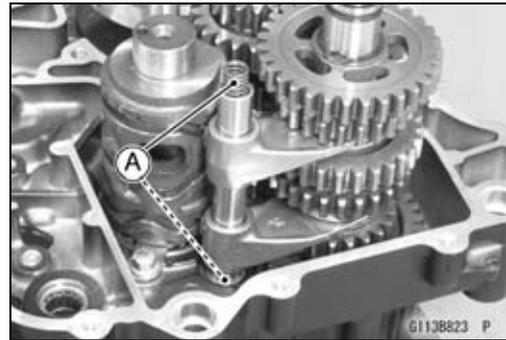
Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the springs [A].
- Pull out the shift rods [B].
- Disengage the shift fork guide pins from the shift drum grooves.
- Remove the shift forks [C] from the transmission gears.
- Take out the input shaft [D] and output shaft [E] together with their gear meshed.



Transmission Shaft Installation

- Apply engine oil liberally to the transmission gears, bearings, shaft journals, and shift fork fingers.
- Hold the input shaft and output shaft together, with their gears meshed, and fit them into the right crankcase half.
- Install each shift fork into the groove of the proper gear so that the shift fork guide pin is in the proper groove on the shift drum.
- Be careful not to confuse the shift forks.
- Apply engine oil to the shift rods, and install the rods.
- Be sure that two springs [A] are properly installed on the shift rods.
- Assemble the crankcase (see Crankcase Assembly).



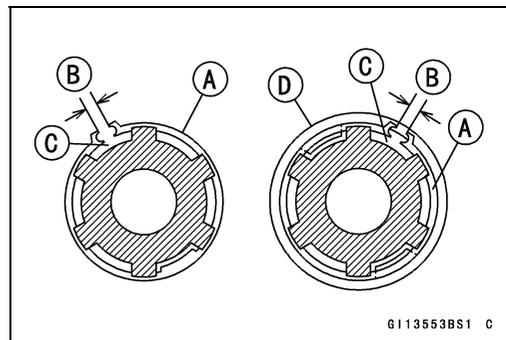
Transmission Shaft Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Using circlip pliers to remove the circlips, disassemble the transmission shafts.

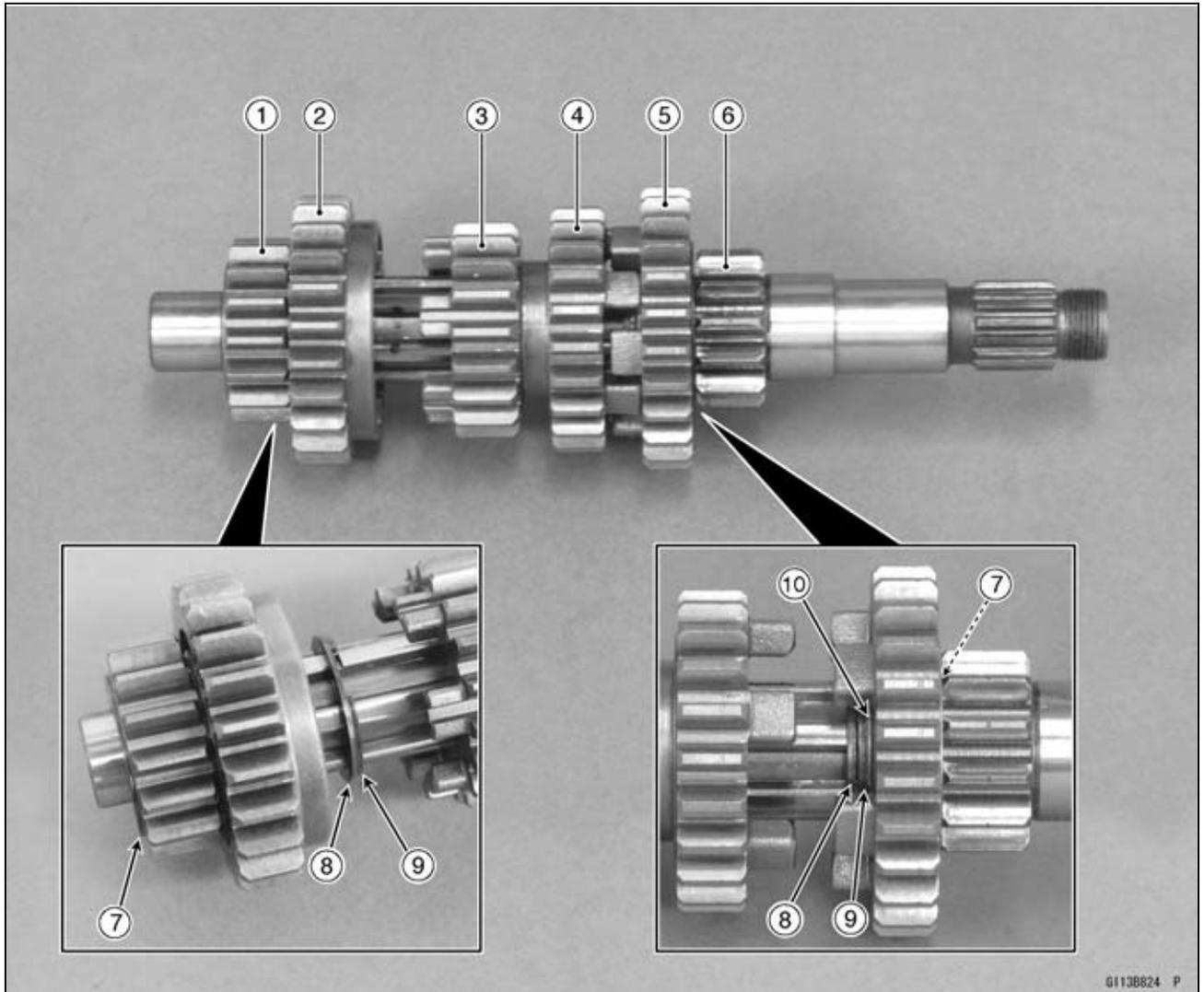
Special Tool - Outside Circlip Pliers: 57001-144

Transmission Shaft Assembly

- Apply engine oil to the transmission shaft and gears.
- Install the shafts and gear bushings with their holes aligned.
- Replace any circlips that were removed with new ones.
- Always install circlips [A] so that the opening [B] is aligned with a spline groove [C], and install the toothed washer [D] so that the teeth are not aligned with the circlip opening.
- The input 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 that all circlips, bushing and washer are properly in place.
- 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, facing the proper direction, and that all circlips, bushing and washer are properly in place.
- Check that each gear spins or slides freely on the transmission shaft without binding after assembly.



Transmission

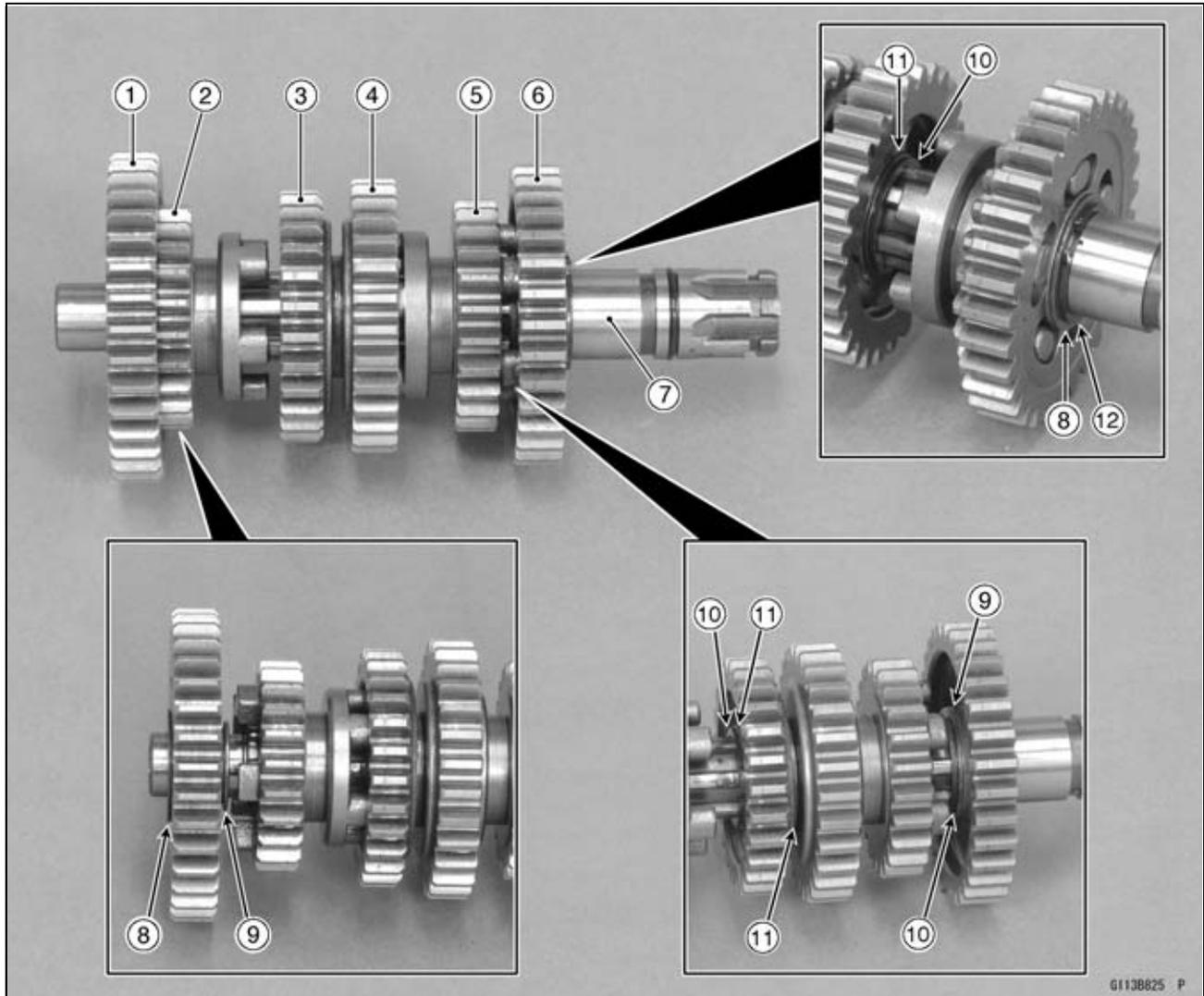


- 1. 2nd Gear
- 2. 5th Gear
- 3. 3rd Gear
- 4. 4th Gear
- 5. 6th (Top) Gear

- 6. Input Shaft (with 1st Gear)
- 7. Washer
- 8. Circlip
- 9. Toothed Washer
- 10. Bushing

9-28 CRANKSHAFT/TRANSMISSION

Transmission

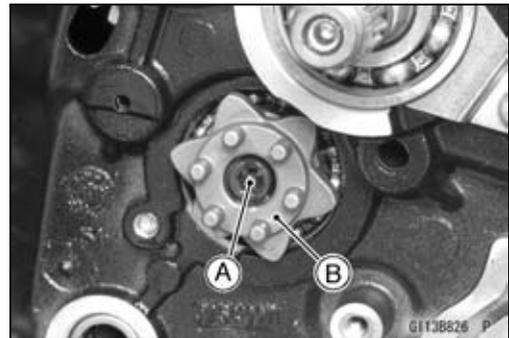


G1138825 P

- 1. 1st Gear
- 2. 6th (Top) Gear
- 3. 4th Gear
- 4. 3rd Gear
- 5. 5th Gear
- 6. 2nd Gear
- 7. Output Shaft
- 8. Washer
- 9. Bushing
- 10. Snap Ring
- 11. Toothed Washer
- 12. Circlip

Shift Drum Removal

- Remove the shift forks and transmission shafts (see Transmission Shaft Removal).
- While holding the shift drum by inserting a bar into the drum, remove the shift drum cam bolt [A] and drum cam [B].
- Remove the spacer and dowel pin.
- Remove the shift drum.

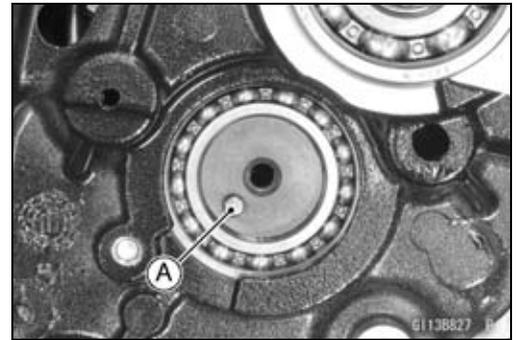


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Transmission

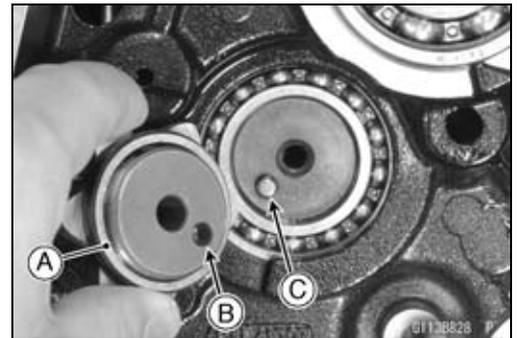
Shift Drum Installation

- Install the shift drum.
- Install the dowel pin [A] on the shift drum.



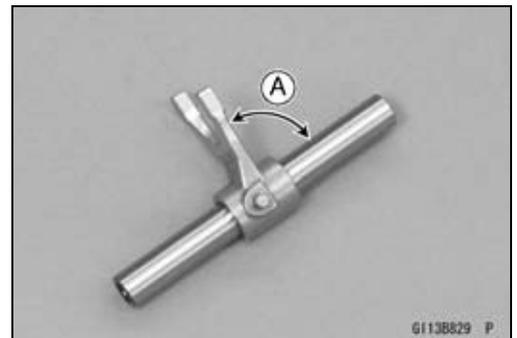
- Install the spacer [A].
- Fit the hole [B] of the shift drum cam to the dowel pin [C].
- Apply a non-permanent locking agent to the threads of the shift drum cam bolt.
- While holding the shift drum body, tighten the shift drum cam bolt.

Torque - Shift Drum Cam Bolt: 11 N·m (1.1 kgf·m, 97 in·lb)



Shift Fork Bending Inspection

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power. 90° [A]



Shift Fork/Gear Groove Wear Inspection

- Measure the thickness of the shift fork ear [A], and measure the width of the gear grooves [B].
- ★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness

Standard: 4.93 ~ 5.00 mm (0.194 ~ 0.197 in.)

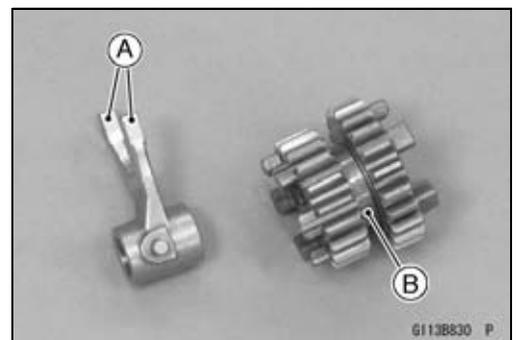
Service Limit: 4.73 mm (0.186 in.)

- ★ If the gear groove is worn over the service limit, the gear must be replaced.

Gear Groove Width

Standard: 5.08 ~ 5.18 mm (0.200 ~ 0.204 in.)

Service Limit: 5.38 mm (0.212 in.)



9-30 CRANKSHAFT/TRANSMISSION

Transmission

Shift Fork Guide Pin/Shift Drum Groove Wear Inspection

- Measure the diameter of each shift fork guide pin [A] and measure the width of each shift drum groove [B].
- ★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter

Standard: 4.46 ~ 4.49 mm (0.176 ~ 0.177 in.)

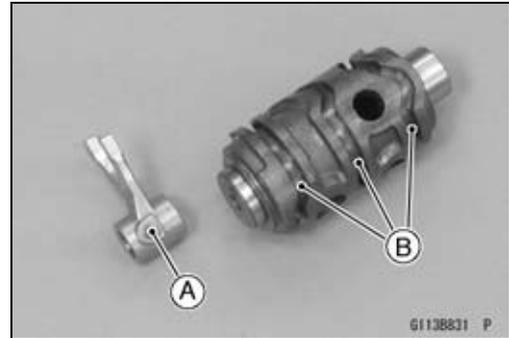
Service Limit: 4.44 mm (0.175 in.)

- ★ If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width

Standard: 4.60 ~ 4.70 mm (0.181 ~ 0.185 in.)

Service Limit: 4.73 mm (0.186 in.)



Shift Fork/Shift Rod Wear Inspection

- Measure the diameter [A] of each shift fork hole and measure the diameter [B] of each shift rod.
- ★ If the shift fork hole diameter exceeds the service limit, replace the shift fork.

Shift Fork Hole Diameter

Standard: 12.000 ~ 12.027 mm (0.47244 ~ 0.47350 in.)

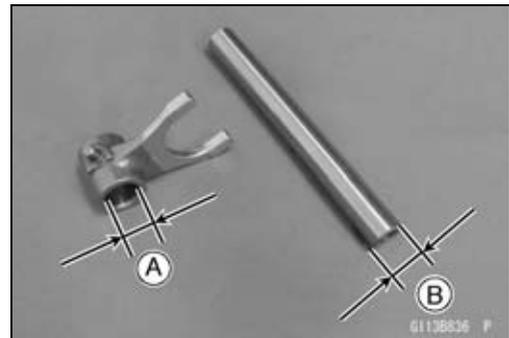
Service Limit: 12.04 mm (0.4740 in.)

- ★ If the shift rod exceeds the service limit, replace the shift rod.

Shift Rod Diameter

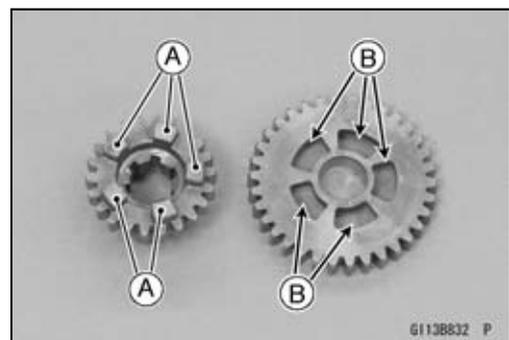
Standard: 11.966 ~ 11.984 mm (0.47110 ~ 0.47181 in.)

Service Limit: 11.950 mm (0.47047 in.)



Gear Dog/Gear Dog Hole Damage Inspection

- Visually inspect the gear dogs [A] and gear dog holes [B].
- ★ Replace any damaged gears or gears with excessively worn dogs or dog holes.



Transmission

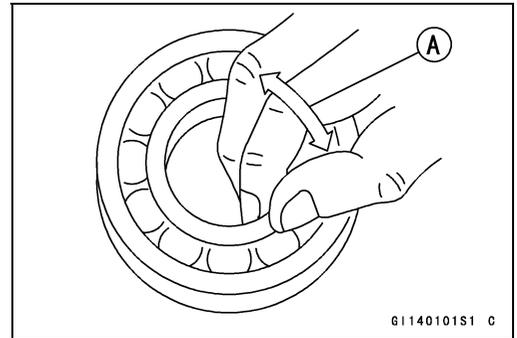
Ball Bearing Wear Inspection**NOTICE**

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

- Inspect the ball bearings.
- Since the ball bearings are made to extremely close tolerance, 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.
- Turn [A] the bearing by hand to check its condition.
- ★ If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

Oil Seal Inspection

- ★ Replace the oil seal if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.



Wheels/Tires

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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Nut	98	10.0	72	R
2	Rear Axle Nut	108	11.0	79.7	R

HG: Apply high-temperature grease.

R: Replacement Parts

WL: Apply soap and water solution or rubber lubricant.

10-4 WHEELS/TIRES

Specifications

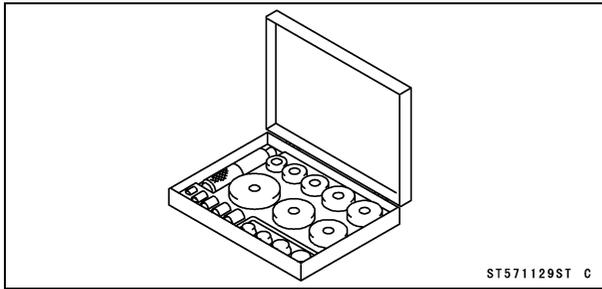
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 1.0 mm (0.04 in.) or less	TIR 2.0 mm (0.08 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 2.0 mm (0.08 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.1 mm (0.004 in.) or less	TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less	— — —
Balance Weights	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)	— — —
Rim Size:		
Front	J17M/C × MT2.50	— — —
Rear	J17M/C × MT3.50	— — —
Tires		
Air Pressure (when Cold):		
Front	Up to 130 kg (287 lb) load: 175 kPa (1.75 kgf/cm ² , 25 psi)	— — —
Rear	Up to 65 kg (143 lb) load: 200 kPa (2.00 kgf/cm ² , 29 psi) 65 ~ 130 kg (143 ~ 287 lb) load: 225 kPa (2.25 kgf/cm ² , 33 psi)	— — —
Tread Depth:		
Front	5.0 mm (0.20 in.)	1 mm (0.04 in.)
Rear	6.0 mm (0.24 in.)	1 mm (0.04 in.)
Standard Tires:	Make, Type	Size
Front	EUROGRIP, ATT625 MRF, NYLOGRIP ZAPPER-FY IRC, ROAD WINNER RX-01F	100/80-17M/C 52P 100/80-17M/C 52P 100/80-17M/C 52P
Rear	EUROGRIP, ATT925 MRF, NYLOGRIP ZAPPER-S IRC, ROAD WINNER RX-01R	130/70-17M/C 62P 130/70-17M/C 62P 130/70-17M/C 62S

WARNING

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

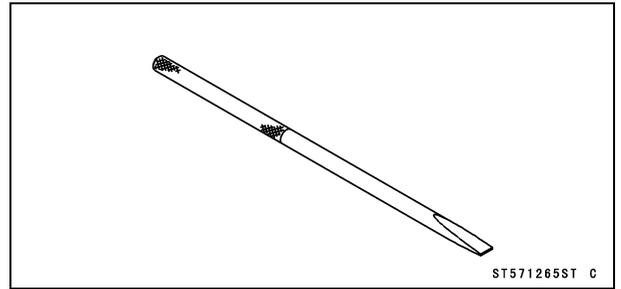
Special Tools

Bearing Driver Set:
57001-1129



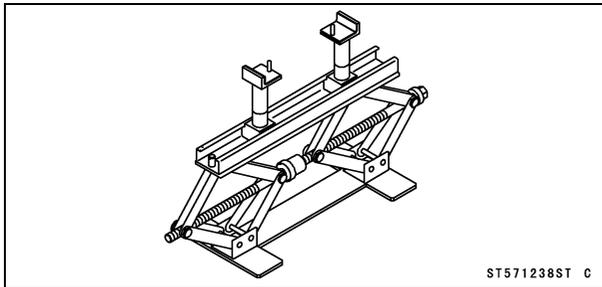
ST571129ST C

Bearing Remover Shaft, $\phi 9$:
57001-1265



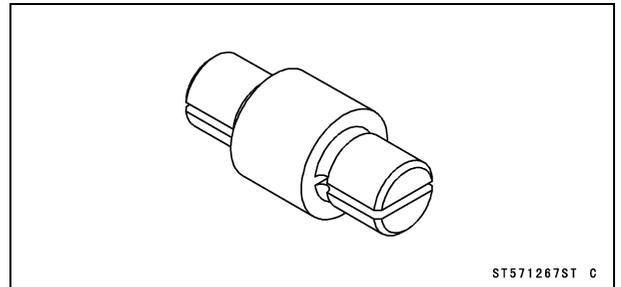
ST571265ST C

Jack:
57001-1238



ST571238ST C

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



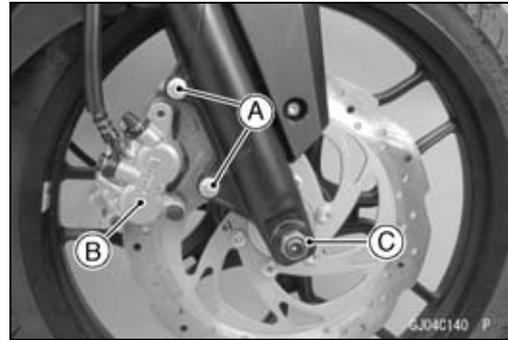
ST571267ST C

10-6 WHEELS/TIRES

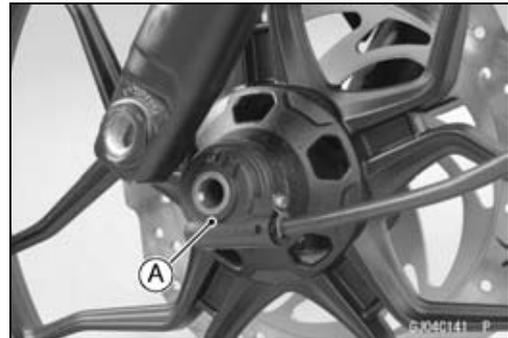
Wheels (Rims)

Front Wheel Removal

- Remove:
 - Front Caliper Mounting Bolts [A]
 - Front Caliper [B]
- Loosen:
 - Front Axle Nut [C]



- Raise the front wheel off the ground with jack.
 - Special Tool - Jack: 57001-1238**
- Remove the front axle nut and washer.
- Pull out the front axle to the left side and take the front wheel off the front forks.
- Remove the speed sensor [A].



NOTICE

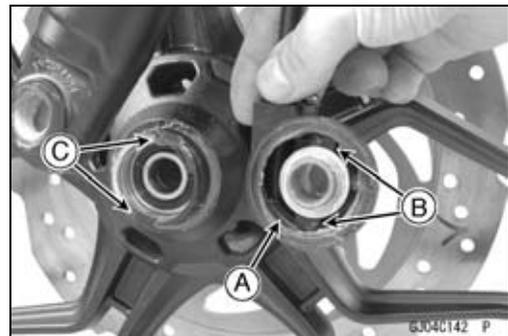
Do not lay the front wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation

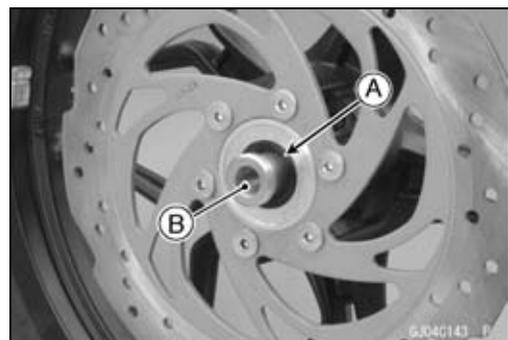
- Apply high-temperature grease to the grease seal lips [A].
- Insert the projections [B] of the speed sensor to the notches [C] of the wheel hub.

NOTICE

Unless the speed sensor is properly installed on the wheel, you will damage the speed sensor in tightening the front axle.

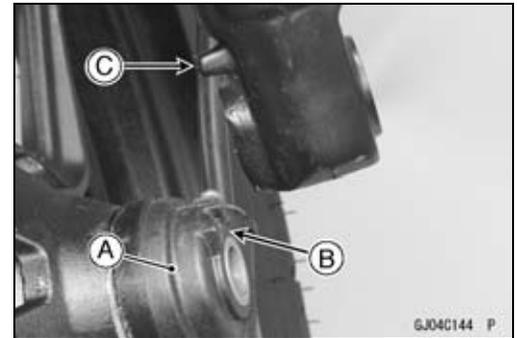


- Apply high-temperature grease to the grease seal lips [A].
- Fit the collar [B] on the wheel hub.

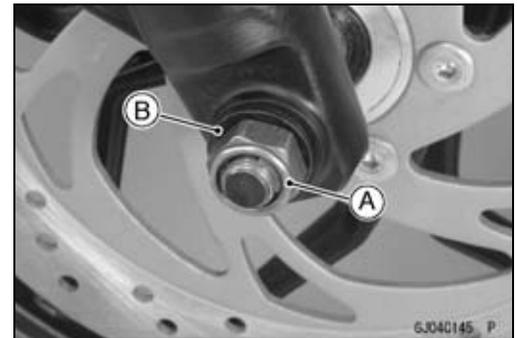


Wheels (Rims)

- Set the speed sensor [A].
- Fit the stopper [B] on the projection [C] of the left fork leg.



- Replace the front axle nut [A] with a new one.
- Insert the front axle from the left side of the wheel, and install the front axle nut and washer [B].
- Tighten:
 - Torque - Front Axle Nut: 98 N·m (10.0 kgf·m, 72 ft·lb)
- Install the removed parts (see appropriate chapters).
- Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).



⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Rear Wheel Removal

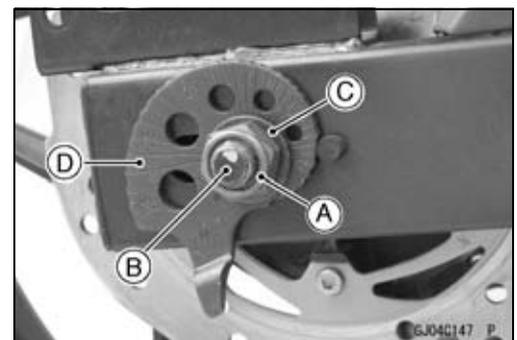
- Raise the rear wheel off the ground with the stand [A].

NOTICE

Be sure to hold the front brake when removing the rear wheel, or the motorcycle may fall over. The rear wheel or the motorcycle could be damaged.



- Remove:
 - Rear Axle Nut [A]
 - Rear Axle [B] (from Right Side)
 - Washer [C] (Both Sides)
 - Indicator [D] (Both Sides)
 - Spacer



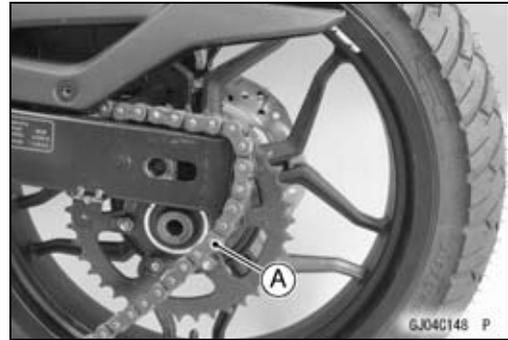
10-8 WHEELS/TIRES

Wheels (Rims)

- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel back and remove it.

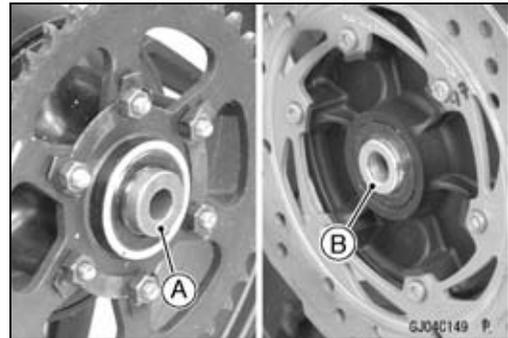
NOTICE

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

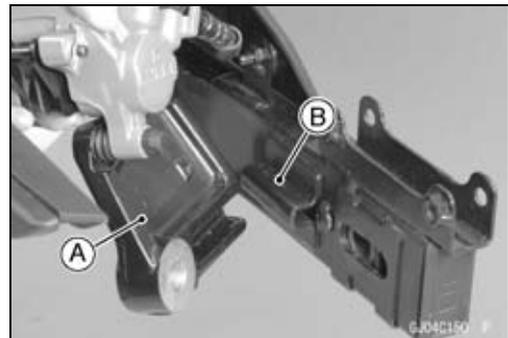


Rear Wheel Installation

- Apply high-temperature grease to the grease seal lips.
- Fit the collars on the both sides of the hub.
 - Left Side Collar [A]
 - Right Side Collar [B]



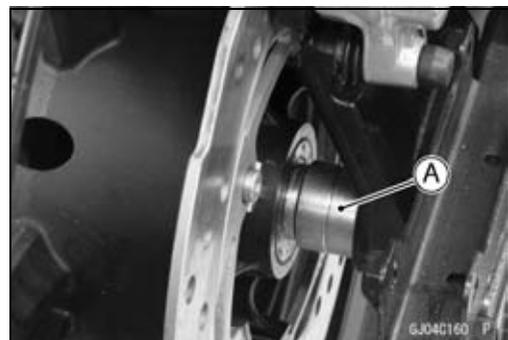
- Engage the drive chain with the rear sprocket.
- Install the caliper bracket [A] onto the stopper [B] of the swingarm.



- Install the washer and indicator (for left side) to the rear axle.
- Install the spacer [A].
- Insert the rear axle from the left side of the wheel.
- Replace the rear axle nut with a new one.
- Install the washer, indicator and rear axle nut temporarily.
- Adjust the drive chain slack before tightening the rear axle nut (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- Tighten:

Torque - Rear Axle Nut: 108 N·m (11.0 kgf·m, 79.7 ft·lb)

- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).



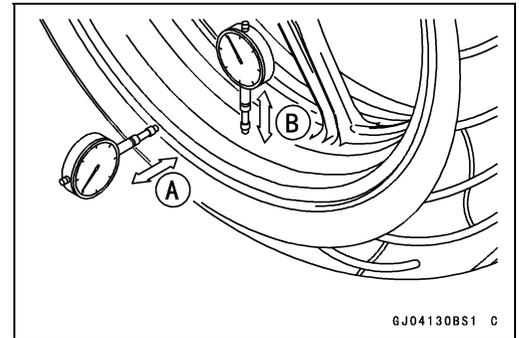
⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

Wheels (Rims)

Wheel Inspection

- Raise the front/rear wheel off the ground.
 - Special Tool - Jack: 57001-1238**
- Spin the wheel lightly, and check for roughness or binding.
- ★ If roughness or binding is found, replace the hub bearings (see Hub Bearing Removal/Installation).
- Inspect the wheel for small cracks, dents, bending, or warp.
- ★ If there is any damage to the wheel, replace the wheel.
- Remove the wheel, and support it with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.
- ★ If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection).
- ★ If the problem is not due to the bearings, replace the wheel.



Rim Runout (with tire installed)

Standard:

Axial	TIR 1.0 mm (0.04 in.) or less
Radial	TIR 0.8 mm (0.03 in.) or less

Service Limit:

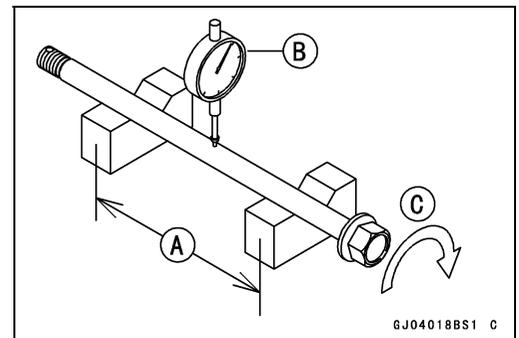
Axial	TIR 2.0 mm (0.08 in.)
Radial	TIR 2.0 mm (0.08 in.)

⚠ WARNING

Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

Axle Inspection

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



Axle Runout/100 mm (3.94 in.)

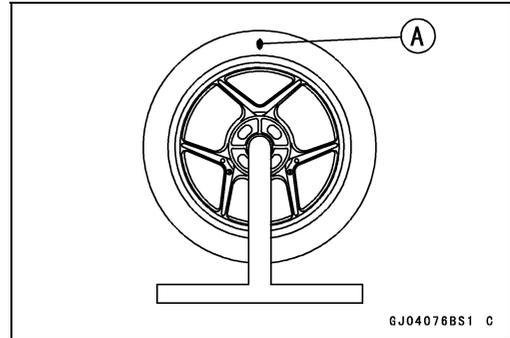
Standard:	TIR 0.1 mm (0.004 in.) or less
Service Limit:	TIR 0.2 mm (0.008 in.)

10-10 WHEELS/TIRES

Wheels (Rims)

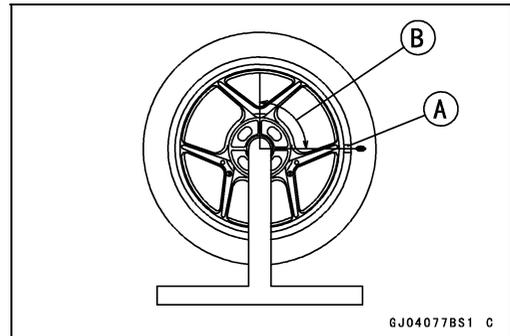
Balance Inspection

- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.
- Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.
- ★ If the wheel always stops in one position, adjust the wheel balance (see Balance Adjustment).



Balance Adjustment

- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.
- ★ If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.
- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.



Balance Weight Removal

- Remove the balance weights [A].
- Discard the used balance weight.



Balance Weight Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on balance weight installing area.
- Install the balance weight(s).

⚠ WARNING

Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, it means it is not installed securely on the rim and it could fly off during riding. Replace the loose balance weight. Do not reuse the used balance weight.

Wheels (Rims)

Balance Weight

Weight
10 g (0.35 oz.)
20 g (0.71 oz.)
30 g (1.06 oz.)

NOTE

- *Use the commercially available balance weights of 10, 20 and 30 grams (0.35, 0.71 and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.*
- *Do not use four or more balance weight (more than 90 gram, 3.2 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.*

10-12 WHEELS/TIRES

Tires

Air Pressure Inspection/Adjustment

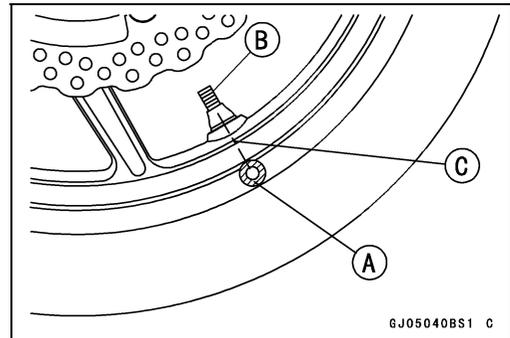
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

Tire Inspection

- Refer to the Wheel/Tire Damage Inspection in the Periodic Maintenance chapter.

Tire Removal

- Remove:
 - Wheels (see Front/Rear Wheel Removal)
 - Valve Core (Let out the air)
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
 - Chalk Mark or Painted Mark [A]
 - Valve Stem [B]
 - Align [C]



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

NOTICE

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

- Remove the tire from the rim using a suitable commercially available tire changer.

NOTE

○ *The tires cannot be removed with hand tools because they fit the rims too tightly.*

Tire Installation

⚠ WARNING

Mixing tire brands and types can adversely affect handling and cause an accident resulting in injury or death. Always use the same manufacturer's tires on both front and rear wheels.

- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

NOTICE

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

Tires

- Install a new valve in the rim.
- Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.

NOTICE

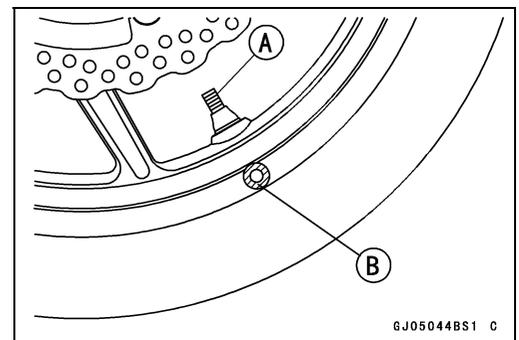
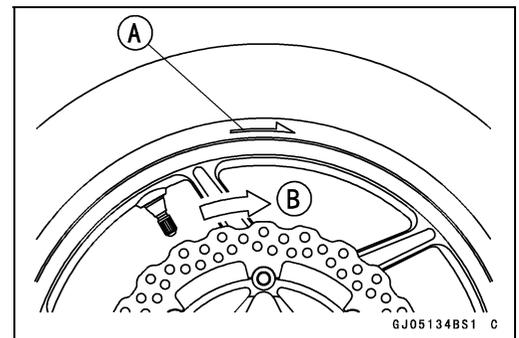
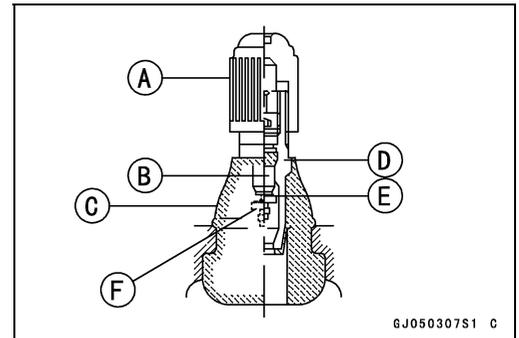
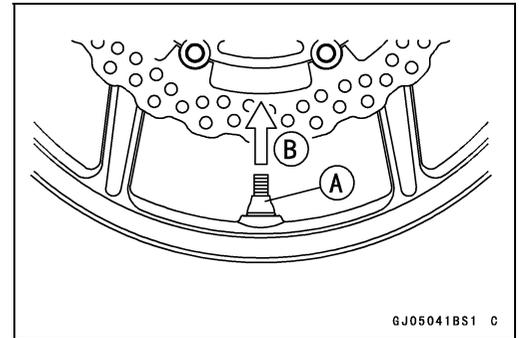
Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

- The air valve is as shown.

- Valve Cap [A]
- Valve Core [B]
- Stem Seal [C]
- Valve Stem [D]
- Valve Seat [E]
- Valve Opened [F]

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

- Position the tire on the rim so that the valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the painted mark on a new tire).
- Install the tire bead over the rim flange using a suitable commercially available tire changer.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.



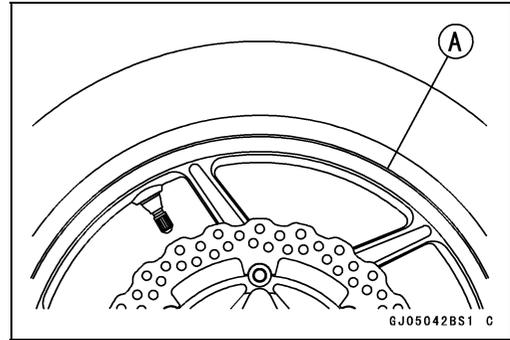
⚠ WARNING

Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi).

10-14 WHEELS/TIRES

Tires

- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.
- ★ If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.
- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.
- Inflate the tire slightly above standard inflation.
- Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.
- Adjust the air pressure to the specified pressure (see Air Pressure Inspection in the Periodic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).



Tire Repair

Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

Hub Bearing

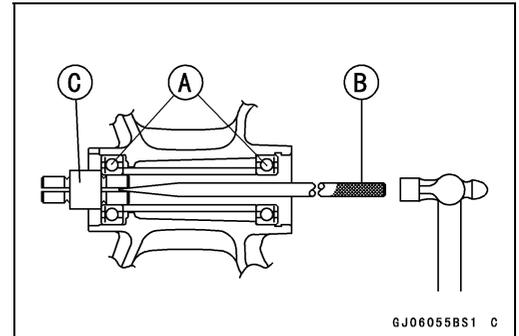
Hub Bearing Removal

- Remove the wheels (see Front/Rear Wheel Removal), and take out the following.
 - Collars
 - Coupling (Out of rear hub)
 - Grease Seals
- Use the bearing remover to remove the hub bearings [A].

NOTICE

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

Special Tools - Bearing Remover Shaft, $\phi 9$ [B]: 57001-1265
 Bearing Remover Head, $\phi 15 \times \phi 17$ [C]: 57001-1267



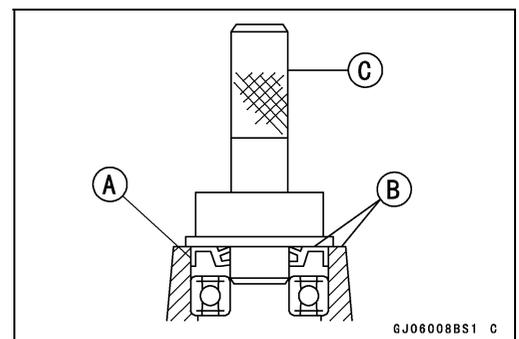
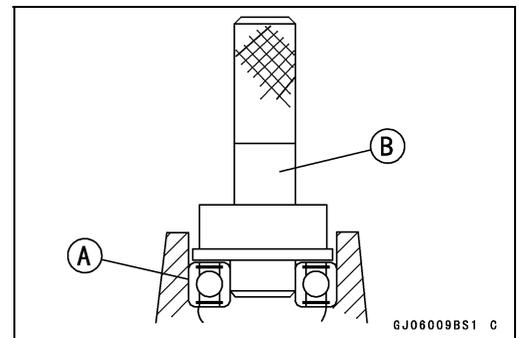
Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.
- Press in the bearings [A] until they are bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.
- Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set [C]: 57001-1129



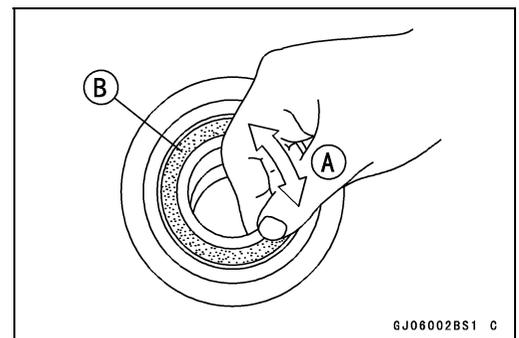
Hub Bearing Inspection

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

NOTE

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

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.
- ★ If bearing play, roughness or binding is found, replace the bearing.
- Examine the bearing seal [B] for tears or leakage.
- ★ If the seal is torn or is leaking, replace the bearing.



10-16 WHEELS/TIRES

Hub Bearing

Hub Bearing Lubrication

NOTE

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

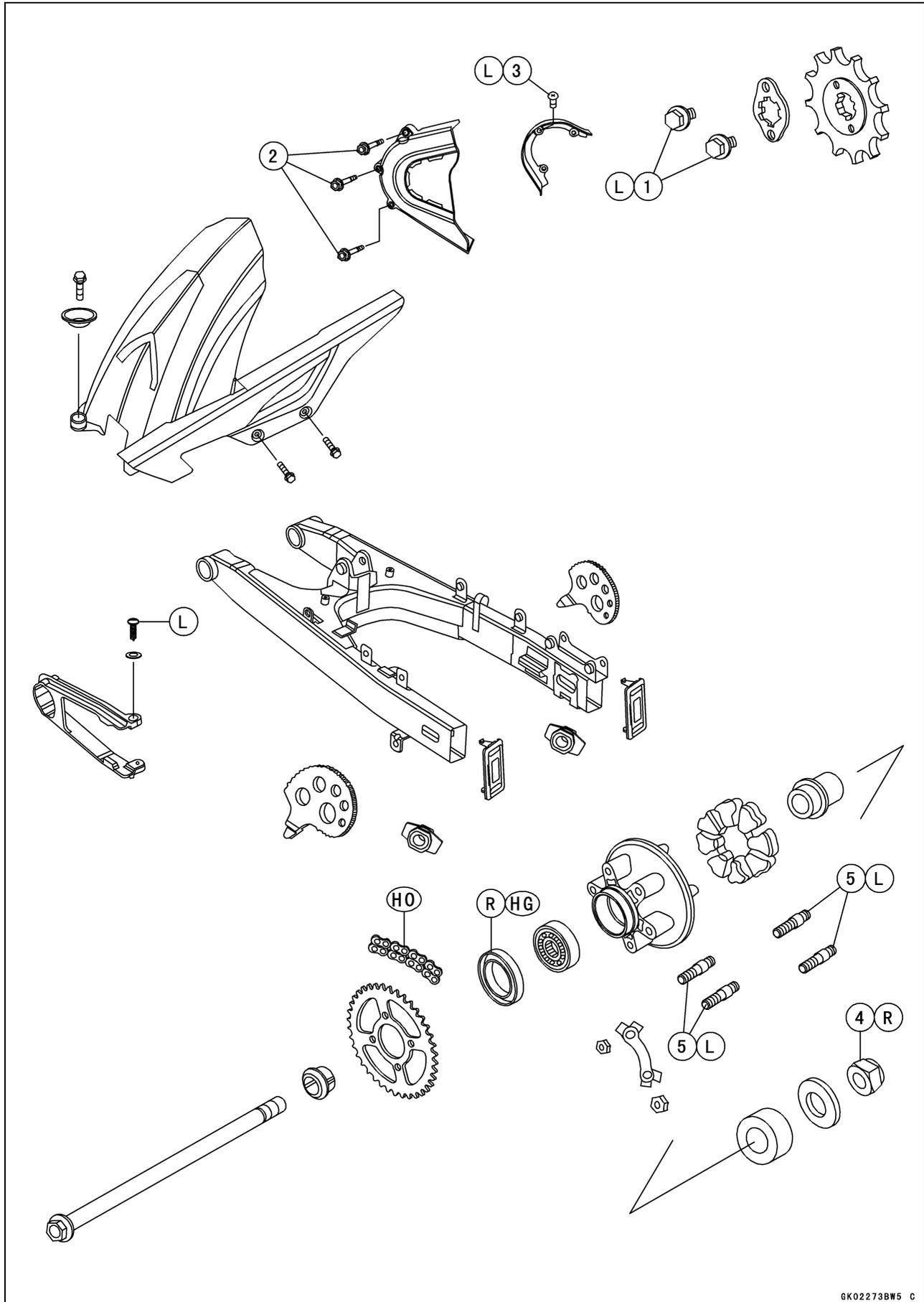
Final Drive

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11-2 FINAL DRIVE

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Bolts	11	1.1	97 in·lb	L
2	Engine Sprocket Cover Bolts	11	1.1	97 in·lb	
3	Chain Guide Screws	11	1.1	97 in·lb	L
4	Rear Axle Nut	108	11.0	79.7	R
5	Rear Sprocket Stud Bolts	34	3.5	25	L

HG: Apply high-temperature grease.

HO: Apply heavy oil.

L: Apply a non-permanent locking agent.

R: Replacement Parts

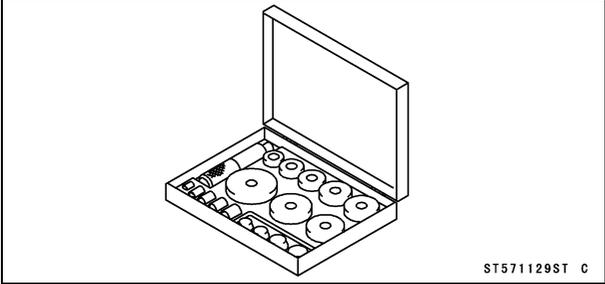
11-4 FINAL DRIVE

Specifications

Item	Standard	Service Limit
Drive Chain		
Drive Chain Slack	15 ~ 25 mm (0.59 ~ 0.98 in.)	— — —
Drive Chain Wear (19-link Length)	301.6 ~ 302.1 mm (11.87 ~ 11.89 in.)	307 mm (12.09 in.)
Standard Chain:		
Make	LGB	— — —
Type	520 series	— — —
Link	108 links	— — —
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tool

Bearing Driver Set:
57001-1129



11-6 FINAL DRIVE

Drive Chain

Drive Chain Slack Inspection

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

Drive Chain Slack Adjustment

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

Wheel Alignment Inspection/Adjustment

- Refer to the Wheel Alignment Inspection in the Periodic Maintenance chapter.

Drive Chain Wear Inspection

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

Drive Chain Lubrication

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

Drive Chain Guide Wear Inspection

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

Drive Chain Removal

- Remove:
 - Mud Guard (see Mud Guard Removal in the Frame chapter)
 - Swingarm (Swingarm Removal in the Suspension chapter)
 - Engine Sprocket (see Engine Sprocket Removal)
- Remove the drive chain from the frame.

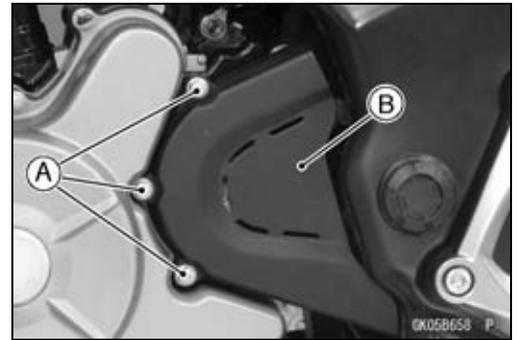
Drive Chain Installation

- Installation is the reverse of removal.

Sprocket, Coupling

Engine Sprocket Removal

- Remove:
 - Engine Sprocket Cover Bolts [A]
 - Engine Sprocket Cover [B]

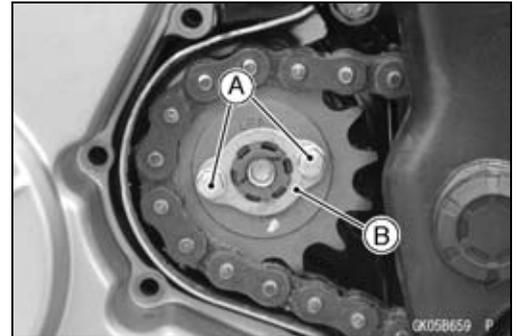


- Remove the engine sprocket bolts [A].

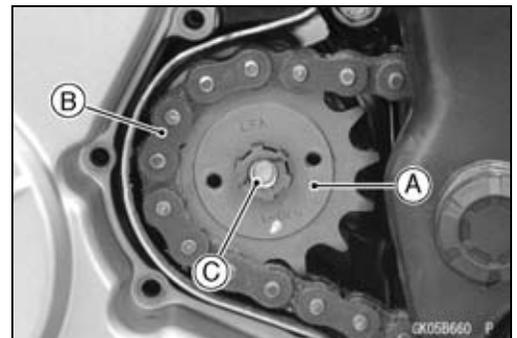
NOTE

○When loosening the engine sprocket bolts, hold the rear brake on.

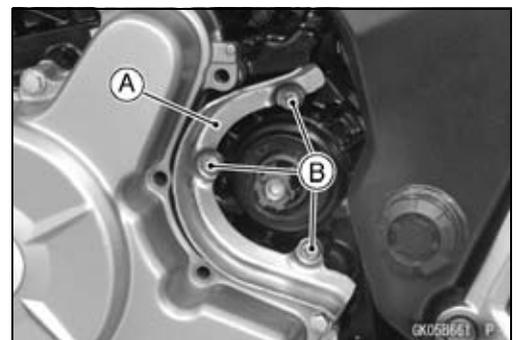
- Rotate the plate [B] and remove it.



- Raise the rear wheel off the ground with the stand.
- Loosen the drive chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Pull the engine sprocket [A] with drive chain [B] off the output shaft [C].
- Disengage the drive chain from the engine sprocket.



- If necessary, remove the chain guide [A] by removing the chain guide screws [B].



11-8 FINAL DRIVE

Sprocket, Coupling

Engine Sprocket Installation

- When removing the chain guide, install it.
- Apply a non-permanent locking agent to the chain guide screws, and tighten them.

Torque - Chain Guide Screws: 11 N·m (1.1 kgf·m, 97 in·lb)

- Install the engine sprocket [A] onto the output shaft, and engage the drive chain.
- Install the plate [B] and rotate it to lock the engine sprocket.
- Apply a non-permanent locking agent to the engine sprocket bolts, and tighten them.

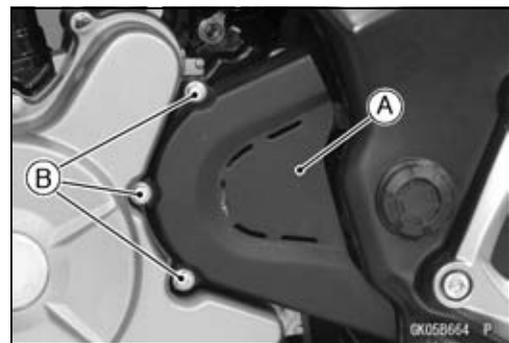
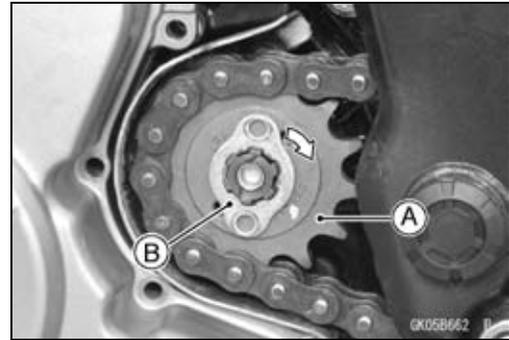
Torque - Engine Sprocket Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

NOTE

○ Tighten the engine sprocket bolts while applying the rear brake.

- Adjust the drive chain slack after installing the engine sprocket (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install:
 - Engine Sprocket Cover [A]
 - Engine Sprocket Cover Bolts [B]

Torque - Engine Sprocket Cover Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)



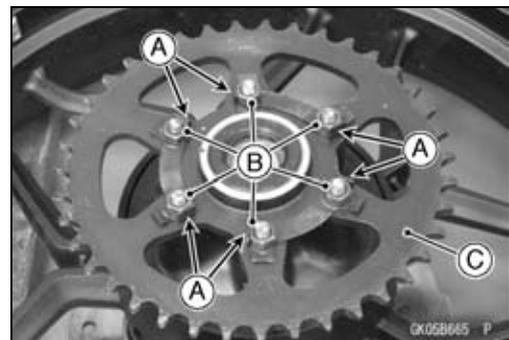
Rear Sprocket Removal

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

NOTICE

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

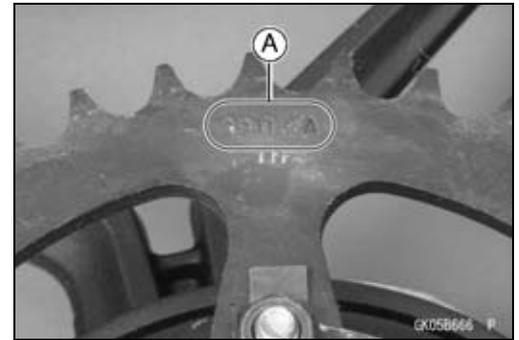
- Bend the plates [A] to remove the rear sprocket nuts [B].
- Remove:
 - Rear Sprocket Nuts
 - Plates
 - Rear Sprocket [C]



Sprocket, Coupling

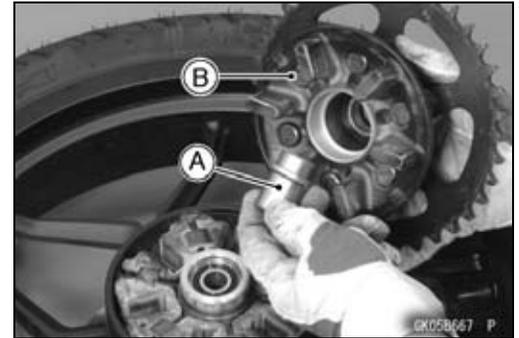
Rear Sprocket Installation

- Install the sprocket facing the tooth number marking [A] outward.
- Install:
 - Plates
 - Rear Sprocket Nuts
- Bend the plates to lock the rear sprocket nuts.
- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).



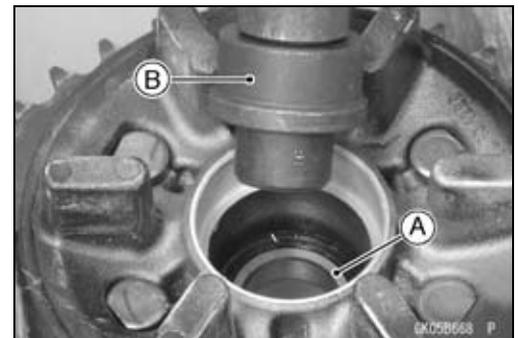
Coupling Installation

- Install:
 - Collar [A]
 - Coupling [B]



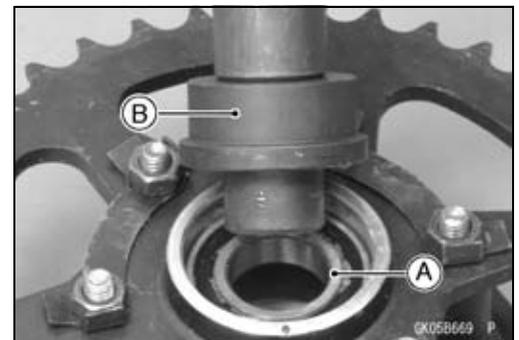
Coupling Bearing Removal

- Remove:
 - Coupling
 - Grease Seal
- Remove the bearing [A] by tapping from the wheel side.
 - Special Tool - Bearing Driver Set [B]: 57001-1129



Coupling Bearing Installation

- Replace the bearing with a new one.
- Press in the bearing [A] until it is bottomed.
 - Special Tool - Bearing Driver Set [B]: 57001-1129
- Replace the grease seal with a new one.
- Press in the grease seal so that the seal surface is flush with the end of the hole.
- Apply high-temperature grease to the grease seal lips.
 - Special Tool - Bearing Driver Set: 57001-1129

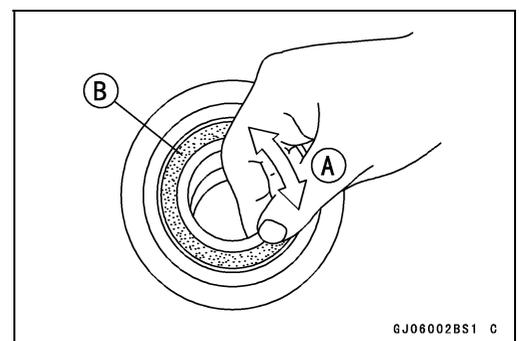


Hub Bearing Inspection

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

NOTE

- Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.
- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.
- ★ If bearing play, roughness, or binding is found, replace the bearing.
- Examine the bearing seal [B] for tears or leakage.
- ★ If the seal is torn or is leaking, replace the bearing.



11-10 FINAL DRIVE

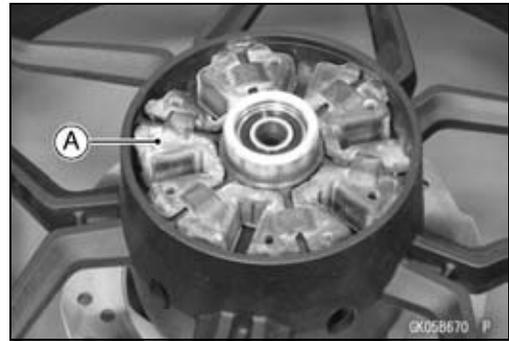
Sprocket, Coupling

Coupling Bearing Lubrication

- Pack the bearing with high-temperature grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.

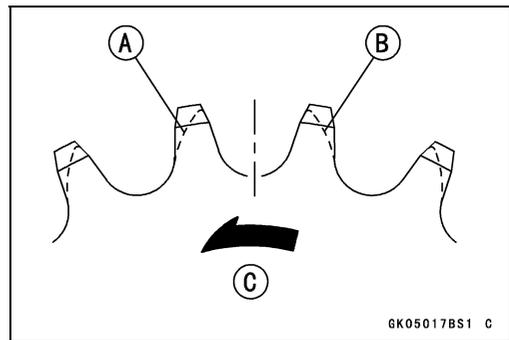
Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber damper [A].
- Replace the damper if it appears damaged or deteriorated.



Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.
- ★ If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection in the Periodic Maintenance chapter).
 - Worn Tooth (Engine Sprocket) [A]
 - Worn Tooth (Rear Sprocket) [B]
 - Direction of Rotation [C]

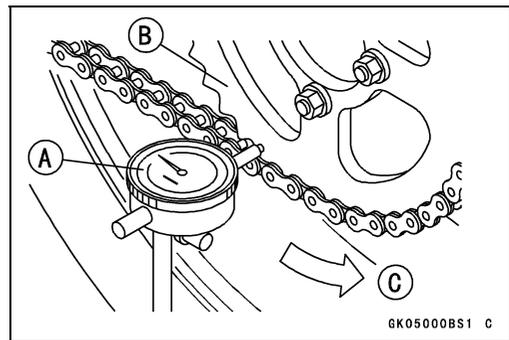


NOTE

○ If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.

Rear Sprocket Warp Inspection

- Raise the rear wheel off the ground with the stand so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).
- ★ If the runout exceeds the service limit, replace the rear sprocket.



Rear Sprocket Warp

Standard: TIR 0.4 mm (0.016 in.) or less

Service Limit: TIR 0.5 mm (0.020 in.)

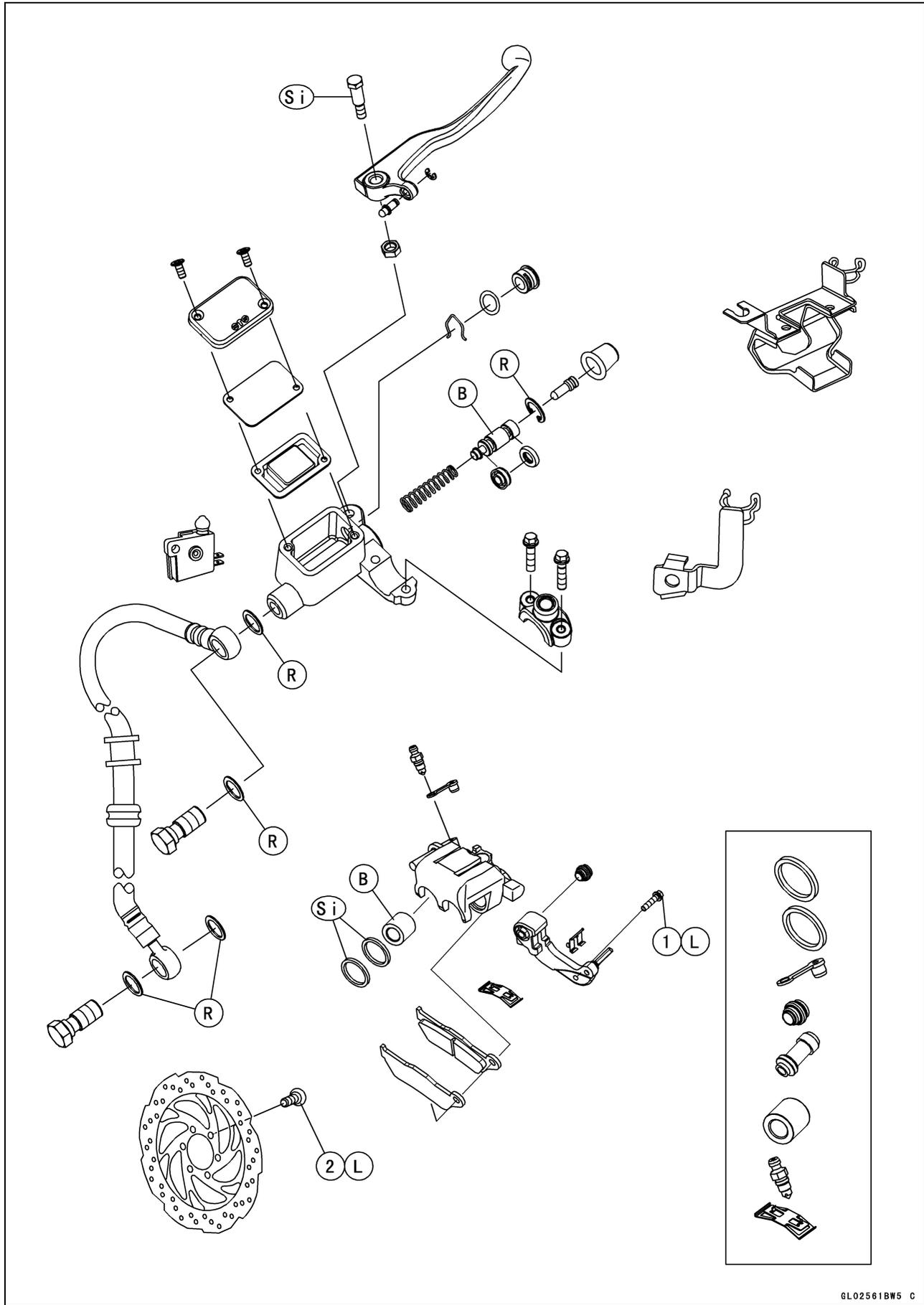
Brakes

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12-2 BRAKES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Caliper Mounting Bolts	25	2.5	18	L
2	Front Brake Disc Mounting Bolts	28	2.9	21	L

B: Apply brake fluid.

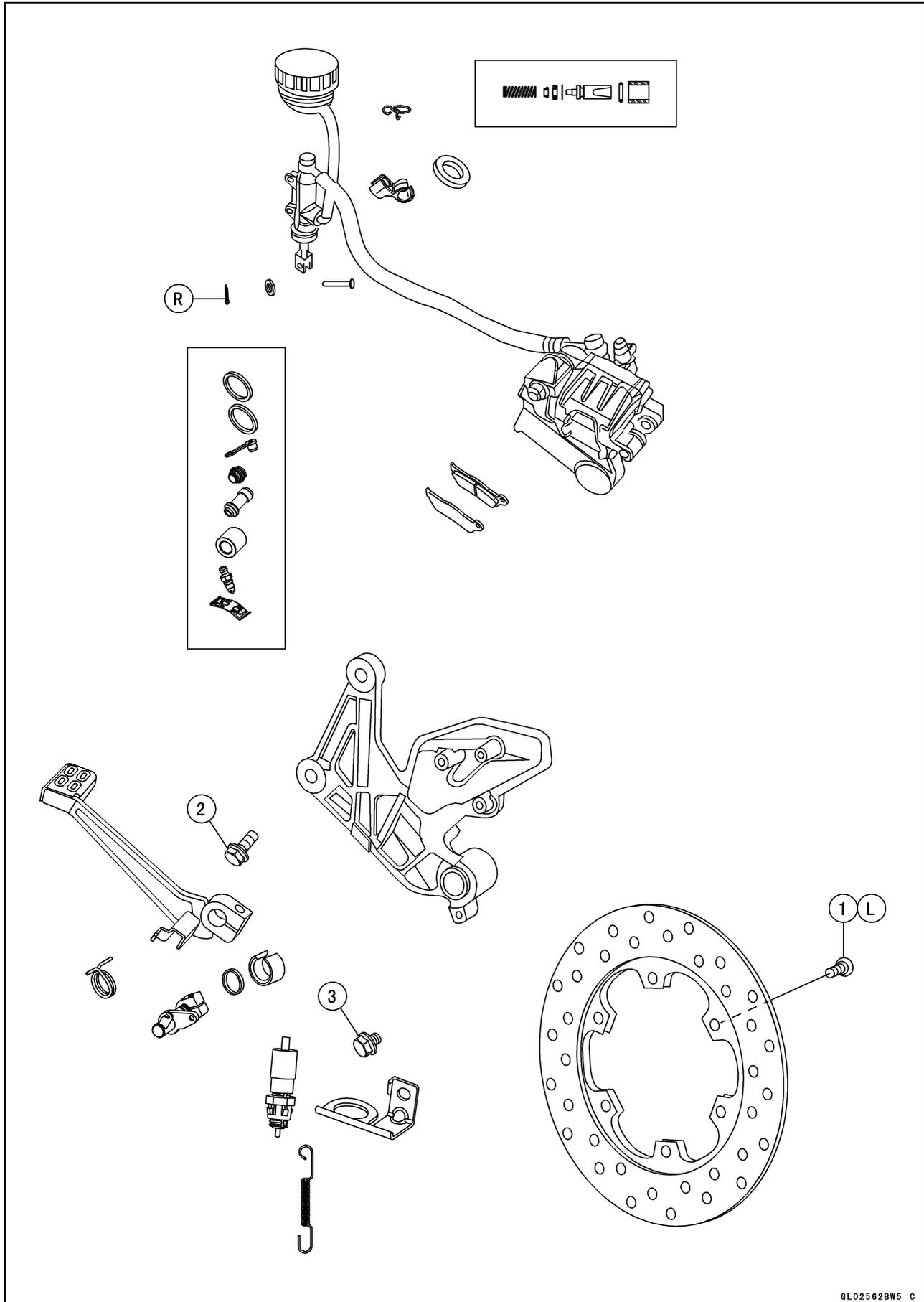
L: Apply a non-permanent locking agent.

R: Replacement Parts

Si: Apply silicone grease.

12-4 BRAKES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Brake Disc Mounting Bolts	9.8	1.0	87 in·lb	L
2	Brake Pedal Clamp Bolt	20	2.0	15	
3	Brake Light Switch Bracket Bolt	4.9	0.50	43 in·lb	

L: Apply a non-permanent locking agent.

R: Replacement Parts

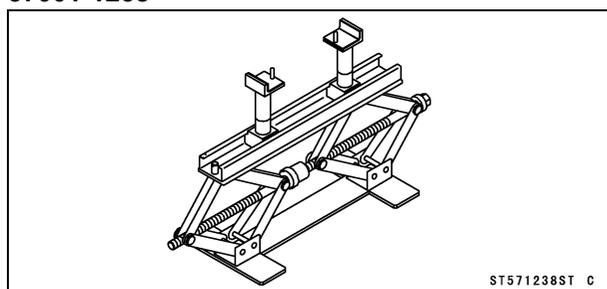
12-6 BRAKES

Specifications

Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Free Play	Non-adjustable	---
Pedal Free Play	20 ~ 25 mm (0.79 ~ 0.98 in.)	---
Pedal Position	About 48 mm (1.89 in.) below top of footpeg	---
Brake Fluid		
Grade	DOT3 or DOT4	---
Brake Pads		
Lining Thickness:		
Front	6.35 mm (0.250 in.)	1.0 mm (0.04 in.)
Rear	6.0 mm (0.236 in.)	1.0 mm (0.04 in.)
Brake Discs		
Thickness:		
Front	3.8 ~ 4.2 mm (0.15 ~ 0.17 in.)	3.6 mm (0.14 in.)
Rear	3.8 ~ 4.2 mm (0.15 ~ 0.17 in.)	3.6 mm (0.14 in.)
Runout:		
Front	TIR 0.15 mm (0.006 in.) or less	TIR 0.3 mm (0.01 in.)
Rear	TIR 0.15 mm (0.006 in.) or less	TIR 0.3 mm (0.01 in.)

Special Tool

Jack:
57001-1238



12-8 BRAKES

Brake Lever, Brake Pedal

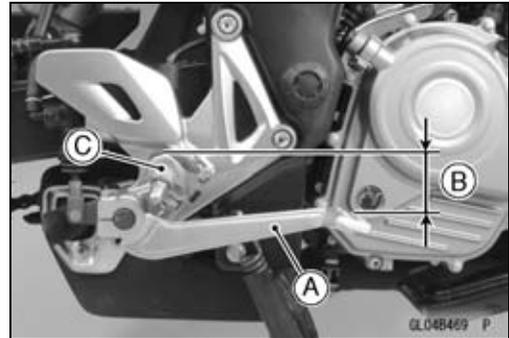
Brake Pedal Position Inspection

- Check that the brake pedal [A] is in the correct position.

Pedal Position

Standard: About 48 mm (1.89 in.) [B] below top of footpeg [C]

- ★ If it is incorrect, adjust the brake pedal position.

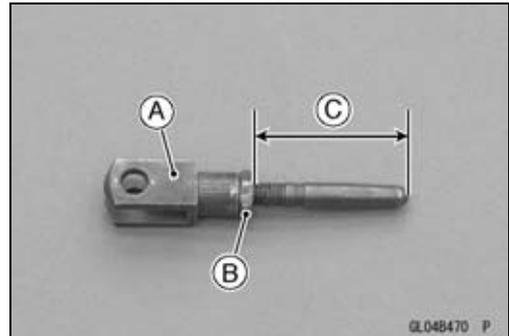


Brake Pedal Position Adjustment

NOTE

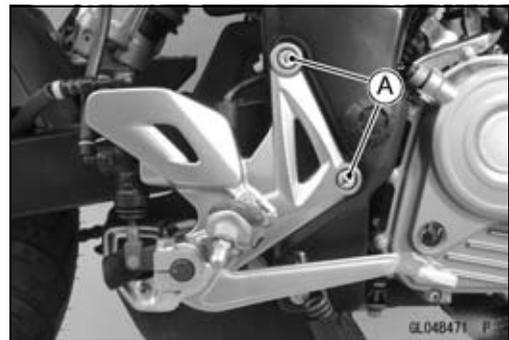
○ Usually it is not necessary to adjust the pedal position, but always adjust it when push rod locknut has been loosened.

- Remove the push rod [A] (see Brake Pedal Bracket Removal).
- Loosen the locknut [B] and turn the push rod to adjust the correct length.
- ★ If the length [C] shown is 31.5 ± 3 mm (1.24 ± 0.12 in.), the pedal position will be within the standard range.
- Tighten the locknut.
- Install the removed parts (see Brake Pedal Bracket Installation).
- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).

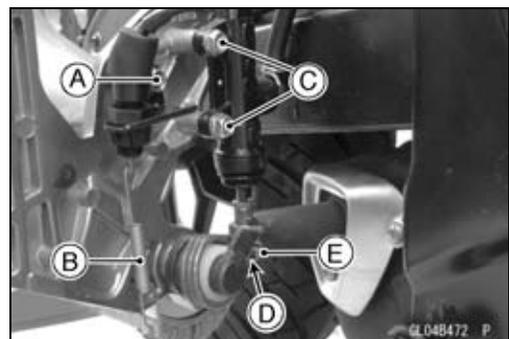


Brake Pedal Bracket Removal

- Remove the front footpeg bracket bolts [A].

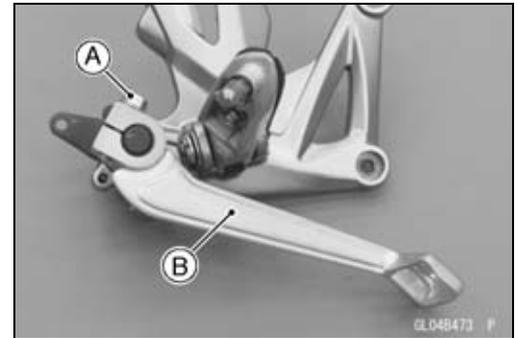


- Remove:
 - Rear Brake Light Switch Bracket Bolt [A]
 - Rear Brake Light Switch Spring [B]
 - Rear Master Cylinder Mounting Bolts [C]
 - Cotter Pin [D]
 - Joint Pin [E] and Washer
- Remove the brake pedal bracket.

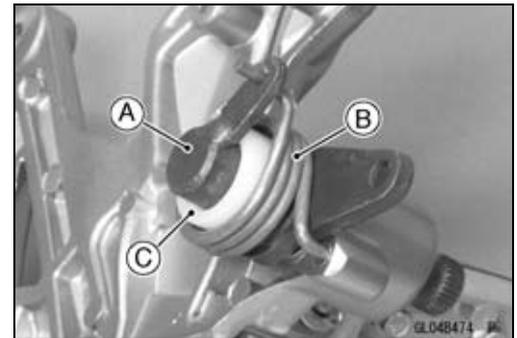


Brake Lever, Brake Pedal

- Remove:
 - Brake Pedal Clamp Bolt [A]
 - Brake Pedal [B]

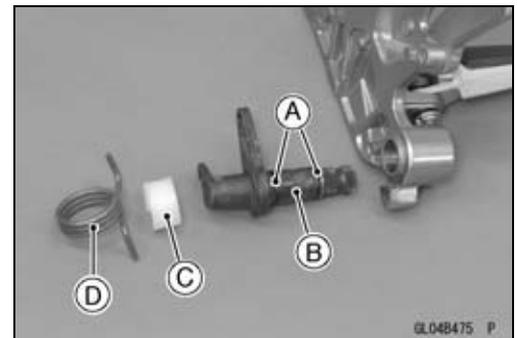


- Remove:
 - Pivot Shaft [A]
 - Spring [B]
 - Collar [C]

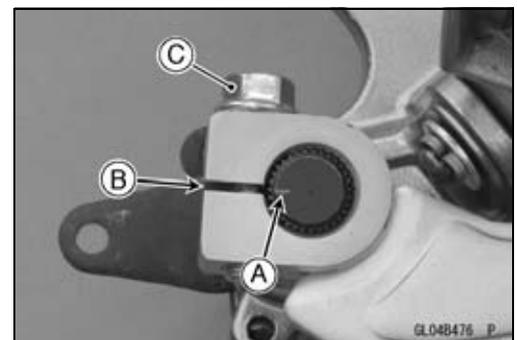


Brake Pedal Bracket Installation

- Replace the O-rings [A] with new ones.
- Apply grease to the O-rings and the sliding surface of the pivot shaft [B].
- Install:
 - Collar [C]
 - Spring [D]
 - Pivot Shaft

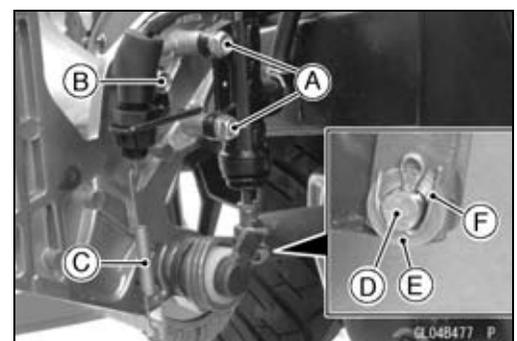


- Install the brake pedal so that the punch mark [A] on the pivot shaft aligns with the slit [B] of the brake pedal.
- Tighten:
 - Torque - Brake Pedal Clamp Bolt [C]: 20 N·m (2.0 kgf·m, 15 ft·lb)**



- Install:
 - Rear Master Cylinder Mounting Bolts [A]
 - Rear Brake Light Switch Bracket Bolt [B]
 - Rear Brake Light Switch Spring [C]
- Torque - Brake Light Switch Bracket Bolt: 4.9 N·m (0.50 kgf·m, 43 in·lb)**

- Install the joint pin [D] and washer [E].
- Replace the cotter pin [F] with a new one.
- Insert the cotter pin and bend the pin ends.
- Install the brake pedal bracket and tighten the brake pedal bracket bolts.
- Check the brake pedal position (see Brake Pedal Position Inspection).



12-10 BRAKES

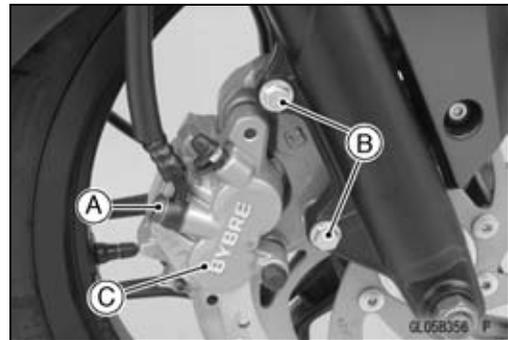
Calipers

Front Caliper Removal

- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [B], and remove the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

NOTICE

Immediately wash away any brake fluid that spills.

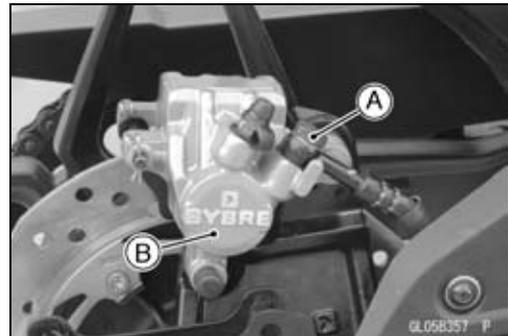


Rear Caliper Removal

- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the rear caliper [B].
- Unscrew the banjo bolt and remove the brake hoses from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

NOTICE

Immediately wash away any brake fluid that spills.



Caliper Installation

- Install the caliper and brake hose lower end.
- Replace the washers on each side of hose fitting with new ones.
- Apply a non-permanent locking agent to the front caliper mounting bolts.
- Tighten:
 - Torque - Front Caliper Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Install the removed parts (see appropriate chapters).
- Check the fluid level in the brake reservoirs.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

After servicing, it takes several applications of the brake lever or pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever or pedal is obtained by pumping the lever or pedal until the pads are against the disc.

Front Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Front Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Calipers

Rear Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Caliper Fluid Seal Damage Inspection

The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- Replace the fluid seal if it exhibits any of the conditions listed below.
 - Brake fluid leakage around the pad.
 - Brakes overheat.
 - Considerable difference in inner and outer pad wear.
 - Seal and piston are stuck together.
- ★ If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.

NOTE

- The fluid seals and dust seals are included in the replacement kit.

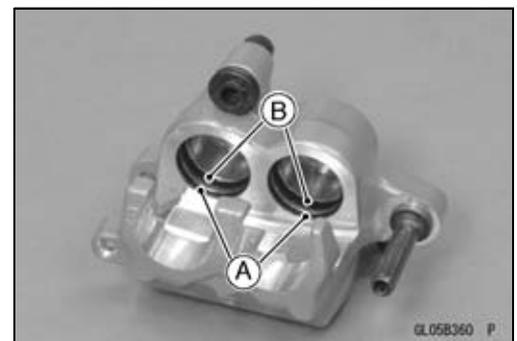
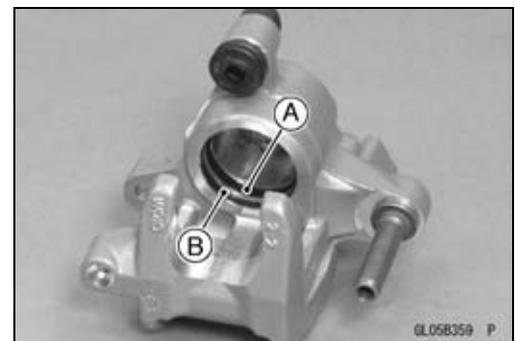
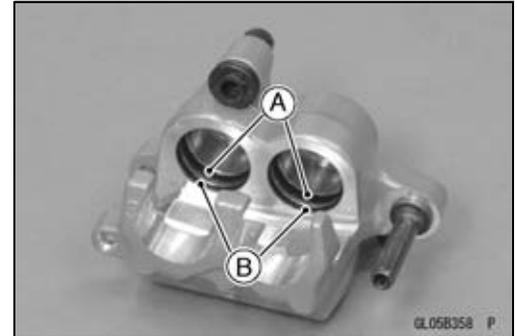
Caliper Dust Seal Damage Inspection

- Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.
- ★ If they show any damage, replace the dust seals with new ones.

Fluid Seals [B]

NOTE

- The fluid seals and dust seals are included in the replacement kit.



12-12 BRAKES

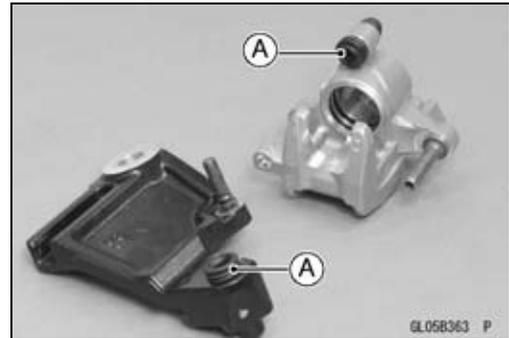
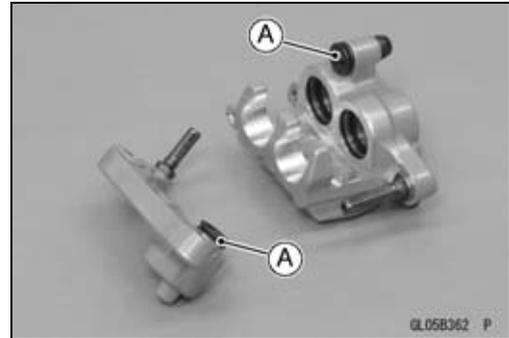
Calipers

Caliper Friction Boot Damage Inspection

- Check that the friction boots [A] are not cracked, worn, swollen, or otherwise damaged.
- ★ If they show any damage, replace it.

NOTE

- The friction boots of the rear caliper are included in the replacement parts.

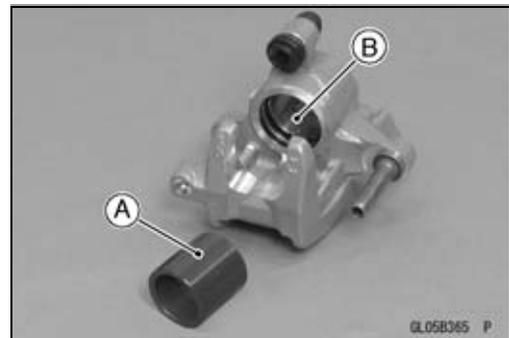
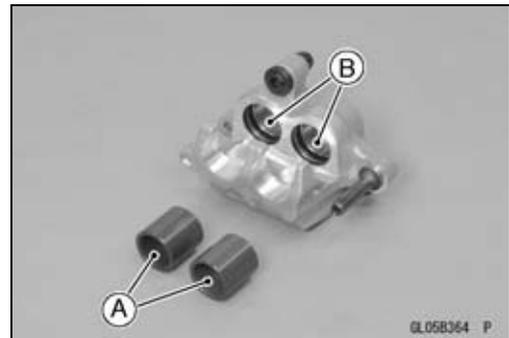


Caliper Piston and Cylinder Damage Inspection

- Visually inspect the pistons [A] and cylinder surfaces [B].
- ★ Replace the caliper if the cylinder and piston are badly scored or rusty.

NOTE

- The caliper pistons are included in the replacement kit.

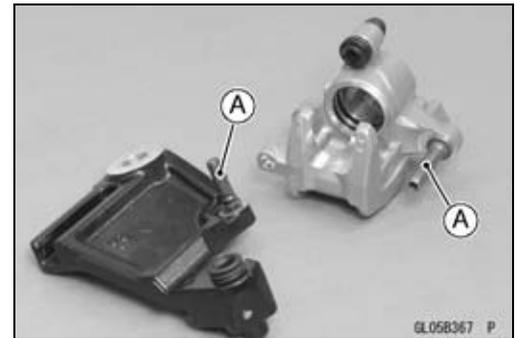
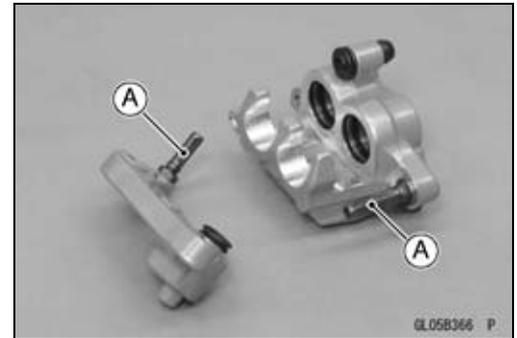


Calipers

Caliper Holder Shaft Wear Inspection

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 that the caliper holder shafts are not badly worn or stepped, and that the friction boots are not damaged.
- ★ If the caliper holder shaft is damage, replace the caliper.

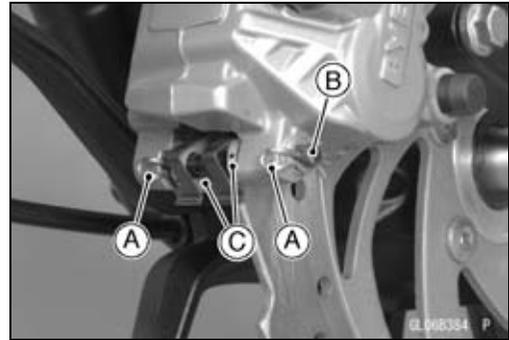


12-14 BRAKES

Brake Pads

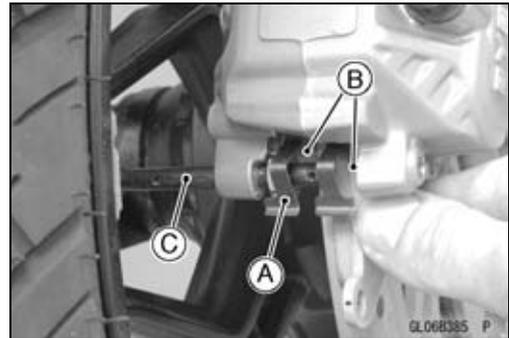
Front Brake Pad Removal

- Remove:
 - Snap Pins [A]
 - Pad Pin [B]
 - Brake Pads [C]



Front Brake Pad Installation

- Push the caliper pistons in as far as they will go.
- Check that the pad spring [A] is in place on the caliper.
- Install the brake pads [B] and insert the pad pin [C].
- Install the snap pins.

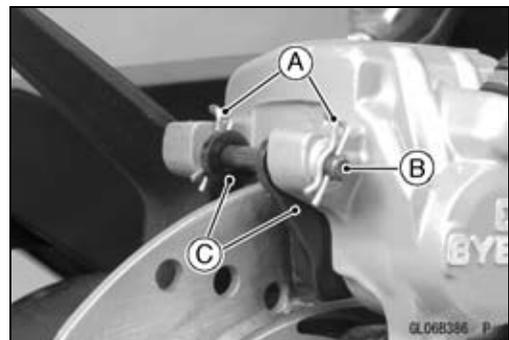


⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Rear Brake Pad Removal

- Remove:
 - Snap Pins [A]
 - Pad Pin [B]
 - Brake Pads [C]

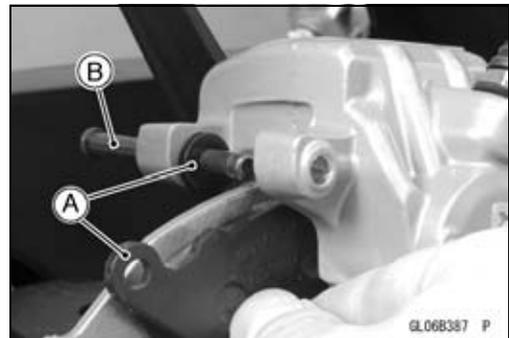


Rear Brake Pad Installation

- Push the caliper piston in as far as it will go.
- Install the brake pads [A] and insert the pad pin [B].
- Install the snap pins.

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.



Brake Pads

Brake Pad Wear Inspection

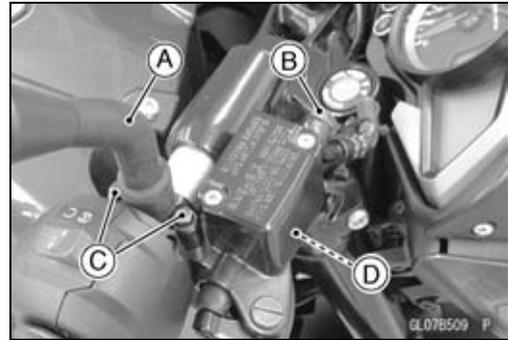
- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

12-16 BRAKES

Master Cylinder

Front Master Cylinder Removal

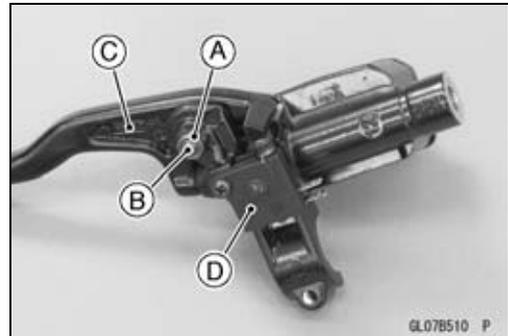
- Remove the rear view mirror [A] (see Rear View Mirror Removal in the Frame chapter).
- Remove the banjo bolt [B] and remove the brake hose from the master cylinder (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).
- Remove the clamp bolts [C], and take off the master cylinder as an assembly with the reservoir, brake lever, and front brake light switch installed.
- Disconnect the front brake light switch connectors [D].



NOTICE

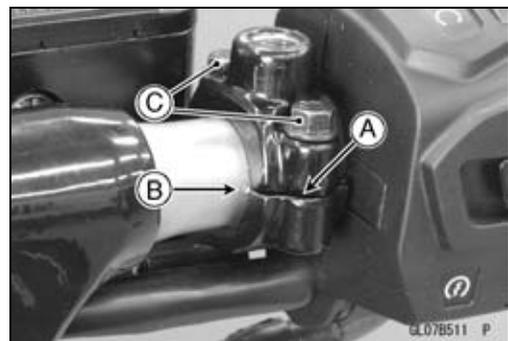
Immediately wash away any brake fluid that spills.

- Remove:
 - Brake Lever Pivot Bolt Locknut [A]
 - Brake Lever Pivot Bolt [B]
 - Brake Lever [C]
 - Front Brake Light Switch [D]



Front Master Cylinder Installation

- Apply silicone grease to the sliding surface of the brake lever pivot bolt.
- Install the brake lever and tighten the brake lever pivot bolt.
- Replace the brake lever pivot bolt locknut with a new one, and tighten it.
- Install the front brake light switch.
- Set the front master cylinder to match its mating surface [A] to the punch mark [B] of the handlebar.
- Tighten the clamp bolts [C].
- Connect the front brake light switch connectors.
- Replace the washers that are on each side of the hose fitting with new ones.
- Install the brake hose.
- Tighten the brake hose banjo bolt.
- Install the rear view mirror (see Rear View Mirror Installation).
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.



Master Cylinder

Rear Master Cylinder Removal

- Remove the clamp [A].
- Unscrew the brake hose banjo bolt [B] and remove the brake hose (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).
- Open the clamp [C] and disconnect the reservoir hose lower end [D].

NOTICE

Immediately wash away any brake fluid that spills.

- Remove:
 - Cotter Pin [A]
 - Joint Pin [B] and Washer
 - Rear Master Cylinder Mounting Bolts [C]
 - Rear Master Cylinder [D]

Rear Master Cylinder Installation

- Apply a non-permanent locking agent to the rear master cylinder mounting bolts [A].
 - Install the rear master cylinder, and tighten their bolts.
 - Install the joint pin [B] and washer [C].
 - Replace the cotter pin [D] with a new one.
 - Insert the cotter pin and bend the pin ends.
 - Install the reservoir hose lower end to the rear master cylinder.
- Replace the washers that are on each side of hose fitting with new ones.
 - Install the brake hose and tighten the brake hose banjo bolt so that the brake hose [A] is not in contact with the mud guard [B].
 - Angle [C]: About 10°
 - Bleed the brake line (see Brake Line Bleeding).
 - Check the brake for good braking power, no brake drag, and no fluid leakage.

Front Master Cylinder Disassembly

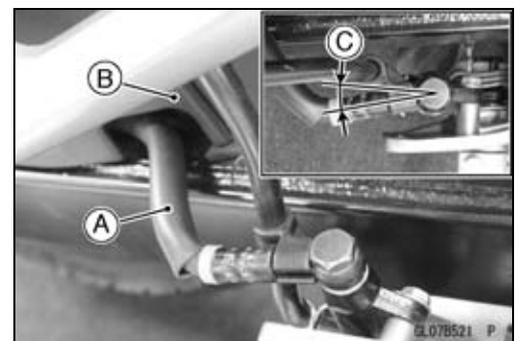
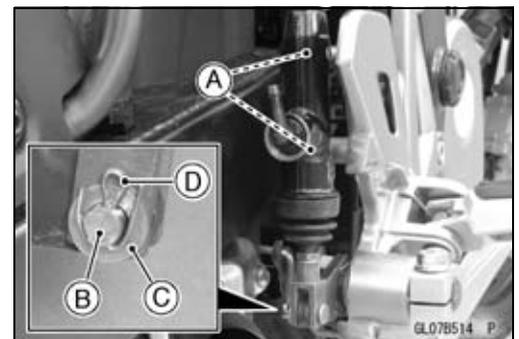
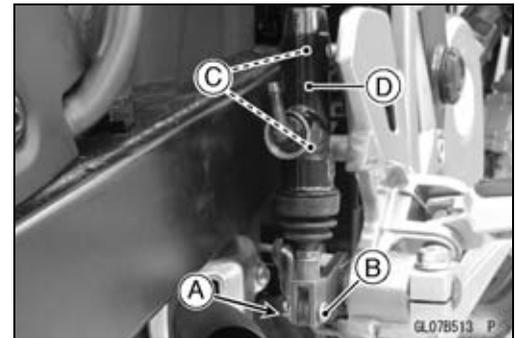
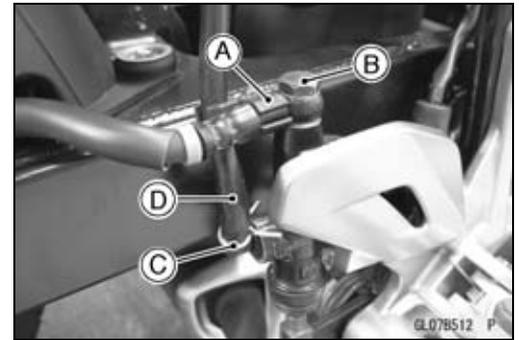
- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.



12-18 BRAKES

Master Cylinder

Master Cylinder Inspection (Visual Inspection)

- Remove the master cylinders (see Front/Rear Master Cylinder Removal).
- Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter).
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].
- ★ If a master cylinder or piston shows any damage, replace them.

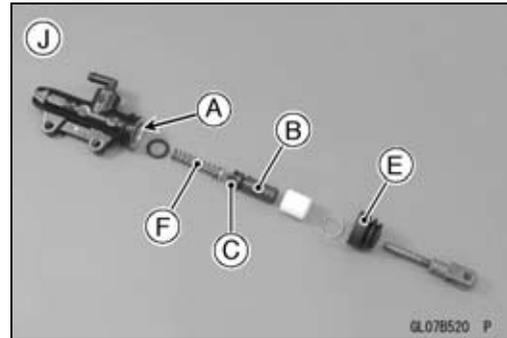
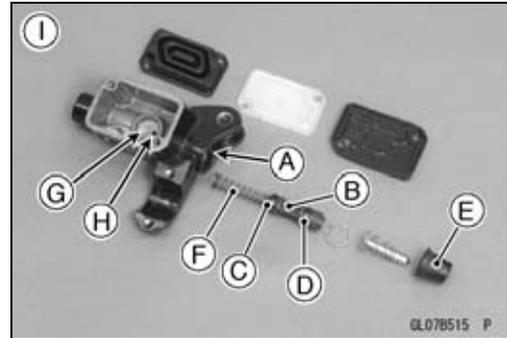
NOTE

○ Replacement parts of the master cylinder are included in the replacement kit.

- Inspect the primary cup [C] and secondary cup [D].
- ★ If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.
- ★ If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.
- Check the dust covers [E] for damage.
- ★ If they are damaged, replace them.
- Check the piston return springs [F] for any damage.
- ★ If the springs are damaged, replace them.
- Check that relief port [G] and supply port [H] are not plugged.
- ★ If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Front Master Cylinder [I]

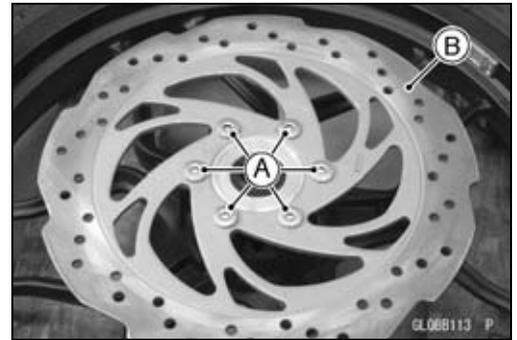
Rear Master Cylinder [J]



Brake Disc

Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the brake disc mounting bolts [A], and take off the disc [B].

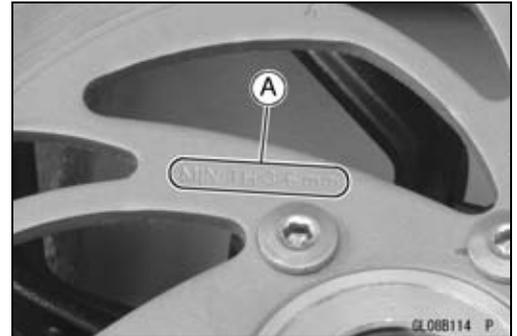


Brake Disc Installation

- Install the brake disc on the wheel so that the marked side [A] faces out.
- Apply a non-permanent locking agent to the threads of the brake disc mounting bolts.
- Tighten:

Torque - Front Brake Disc Mounting Bolts: 28 N·m (2.9 kgf·m, 21 ft·lb)

Rear Brake Disc Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Brake Disc Wear Inspection

- Measure the thickness of the disc [A] at the point where it has worn the most.
 - ★ If the disc has worn past the service limit, replace it.
- Measuring Area [B]

Brake Disc Thickness

Standard:

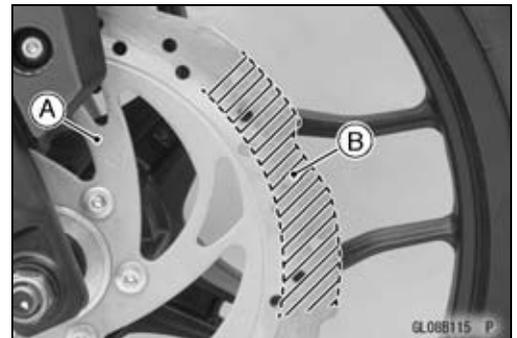
Front 3.8 ~ 4.2 mm (0.15 ~ 0.17 in.)

Rear 3.8 ~ 4.2 mm (0.15 ~ 0.17 in.)

Service Limit:

Front 3.6 mm (0.14 in.)

Rear 3.6 mm (0.14 in.)



Brake Disc Warp Inspection

- Raise the wheel off the ground with the center stand or jack.
- Special Tool - Jack:** 57001-1238
- For front disc inspection, turn the handlebar fully to one side.
- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.
- ★ If runout exceeds the service limit, replace the disc.

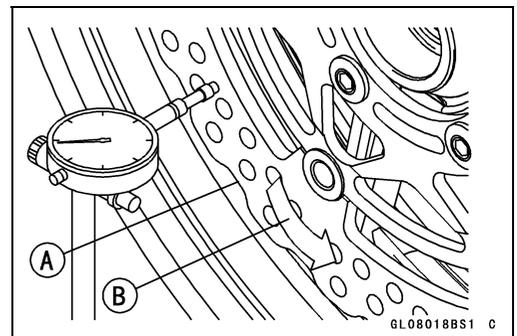
Brake Disc Runout

Standard:

Front TIR 0.15 mm (0.006 in.) or less

Rear TIR 0.15 mm (0.006 in.) or less

Service Limit: TIR 0.3 mm (0.01 in.)



12-20 BRAKES

Brake Fluid

Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Brake Fluid Change

- Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

Brake Line Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

⚠ WARNING

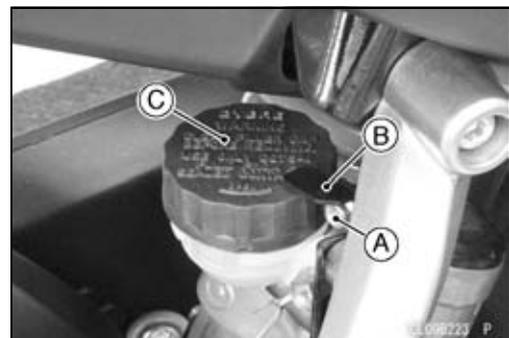
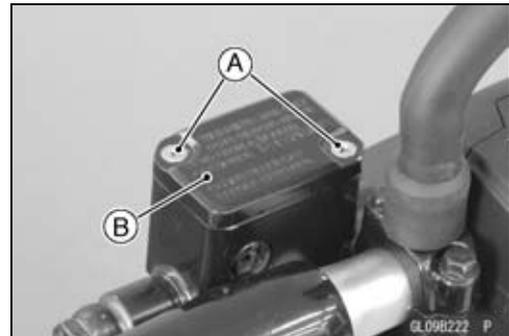
Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever or pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTE

- *The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

- Remove:
 - Screw [A]
 - Front Brake Reservoir Cap [B]

- Remove:
 - Bolt [A]
 - Stopper [B]
 - Rear Brake Reservoir Cap [C]

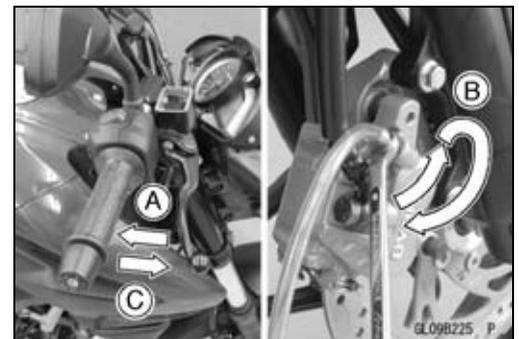


Brake Fluid

- Remove:
 - Diaphragm Plate
 - Diaphragm
- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.
- Remove the rubber cap [A] from the bleed valve on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.



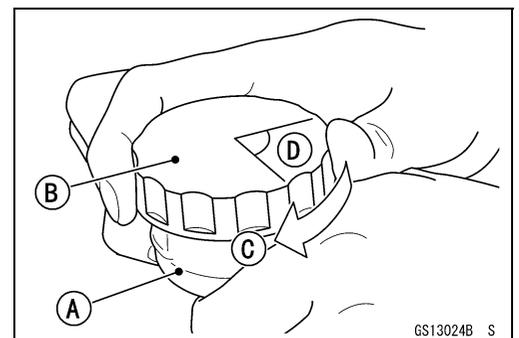
- Bleed the brake line and the caliper.
- Repeat this operation until no more air can be seen coming out into the plastic hose.
 1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
 2. Quickly open and close [B] the bleed valve while holding the brake applied.
 3. Release the brake [C].



NOTE

- *The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*
- *Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*

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



12-22 BRAKES

Brake Fluid

- Tighten the bleed valve, and install the rubber cap.
- Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
- After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

WARNING

When working with the disc brake, observe the precautions listed below.

- **Never reuse old brake fluid.**
- **Do not use fluid from a container that has been left unsealed or that has been open for a long time.**
- **Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.**
- **Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.**
- **Don't change the fluid in the rain or when a strong wind is blowing.**
- **Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning of the brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.**
- **When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.**
- **Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.**
- **If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE LINE.**

Brake Hose

Brake Hose Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

Brake Hose Inspection

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

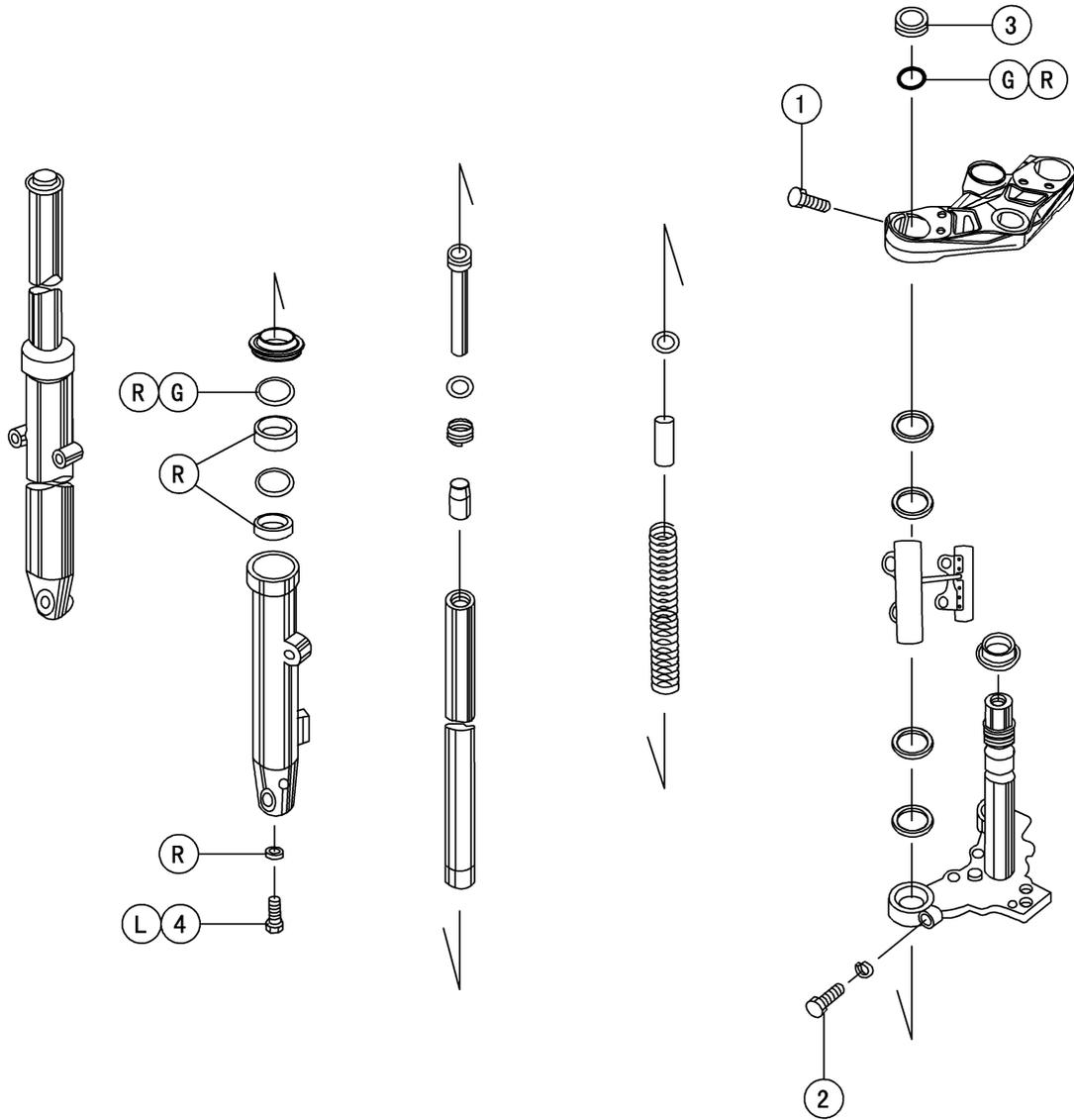
Suspension

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13-2 SUSPENSION

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Clamp Bolts (Upper)	19	1.9	14	
2	Front Fork Clamp Bolts (Lower)	27	2.8	20	
3	Front Fork Top Plugs	27	2.8	20	
4	Front Fork Bottom Allen Bolts	24	2.4	18	L

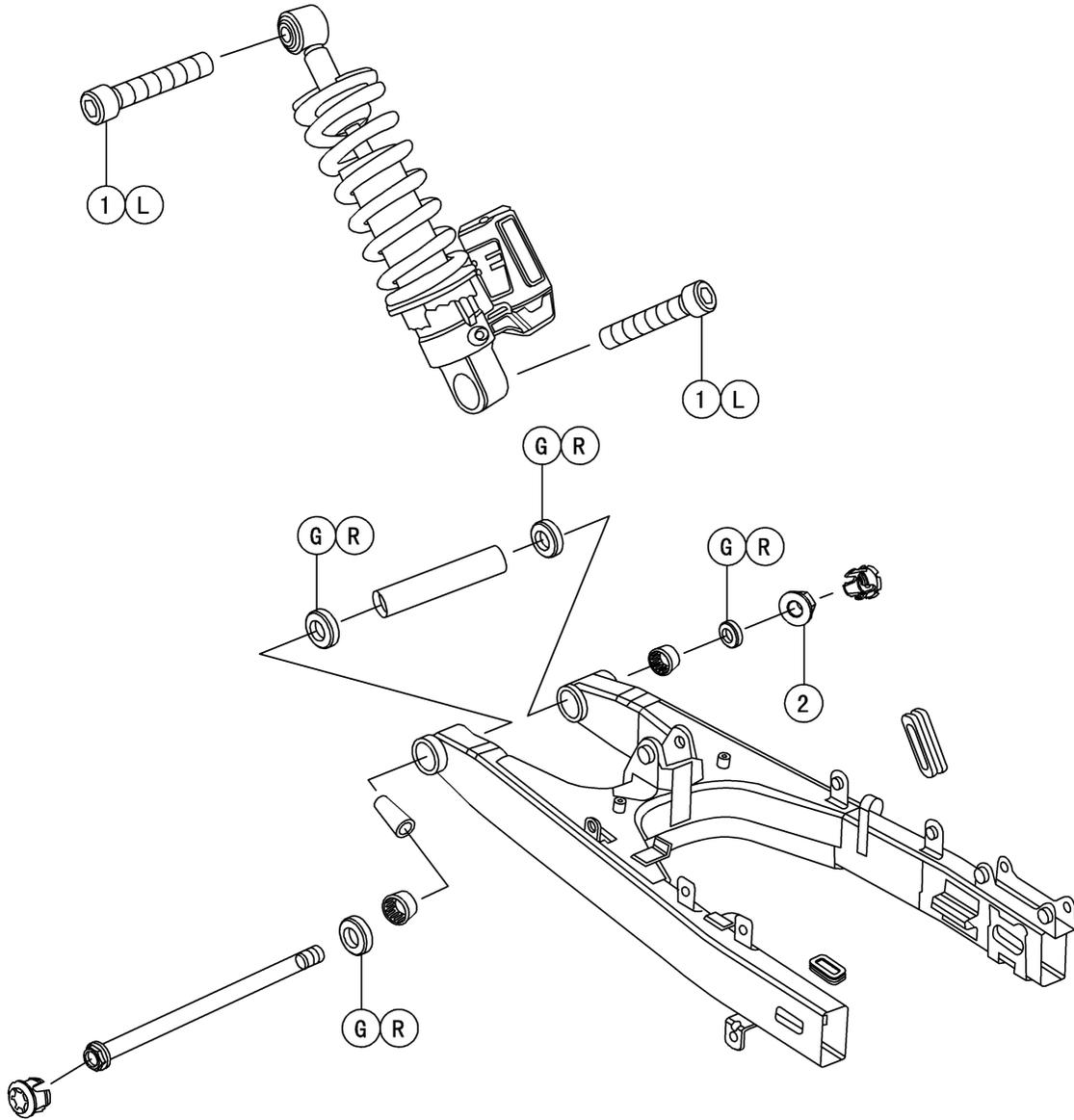
G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

13-4 SUSPENSION

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Shock Absorber Bolts	34	3.5	25	L
2	Swingarm Pivot Shaft Nut	137	14.0	101	

G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

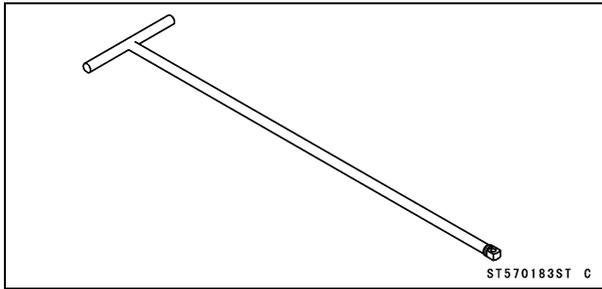
13-6 SUSPENSION

Specifications

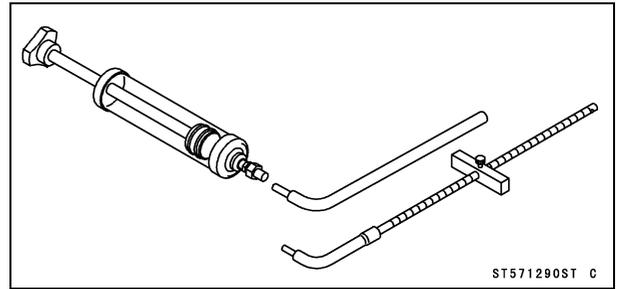
Item	Standard
Front Fork (Per One Unit) Fork Inner Tube Diameter Air Pressure Damper Setting Fork Spring Setting Suspension Oil: Recommended Oil Amount Fork Oil Level Fork Spring Free Length	$\phi 37$ mm (1.5 in.) Atmospheric pressure (Non-adjustable) Non-adjustable Non-adjustable SAE 10W20 Endurance 2F Approx. 270 mL (9.13 US oz.) (when changing oil) 285 \pm 2.5 mL (9.64 \pm 0.09 US oz.) (after disassembly and completely dry) 195 mm (7.68 in.) (below from inner tube top with fully compressed, without fork spring) 478 mm (18.81 in.) (Service Limit: 468.5 mm (18.44 in.))
Rear Shock Absorber Damper Setting Spring Preload Setting Position Gas Pressure	Non-adjustable 2nd position (Adjustable Range: 1st ~ 9th position) 1 500 ~ 1 700 kPa (15.3 ~ 17.3 kgf/cm ² , 218 ~ 247 psi, Non-adjustable)

Special Tools

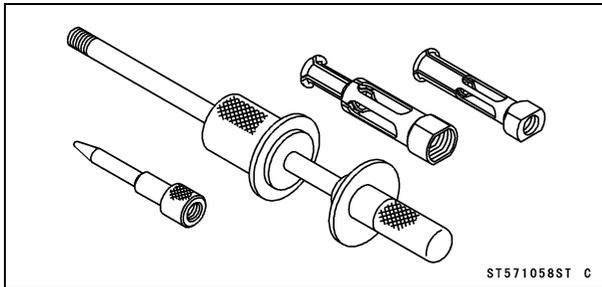
Fork Cylinder Holder Handle:
57001-183



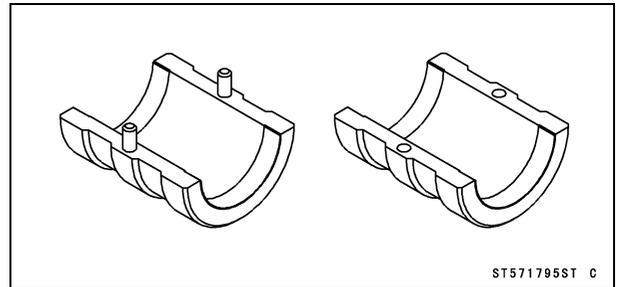
Fork Oil Level Gauge:
57001-1290



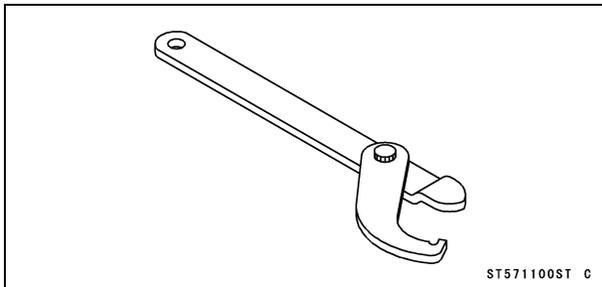
Oil Seal & Bearing Remover:
57001-1058



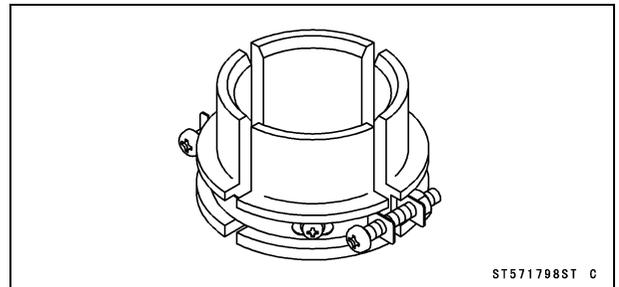
Fork Oil Seal Driver Weight, $\phi 26 \sim \phi 46$:
57001-1795



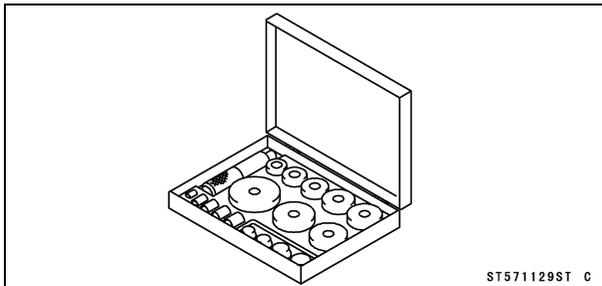
Steering Stem Nut Wrench:
57001-1100



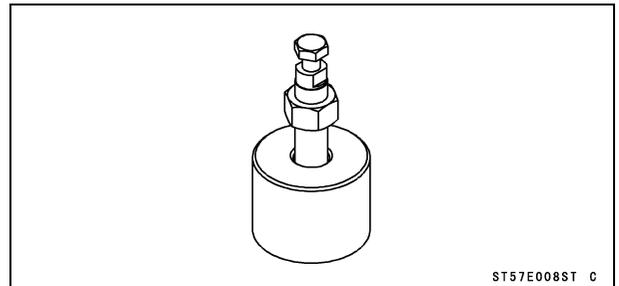
Fork Oil Seal Driver Attachment, $\phi 36 \sim \phi 46$:
57001-1798



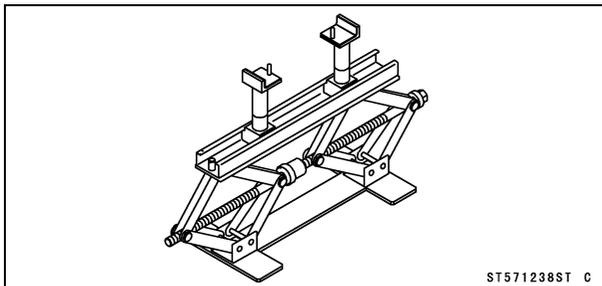
Bearing Driver Set:
57001-1129



Bushing Remover
57001-E008



Jack:
57001-1238



13-8 SUSPENSION

Front Fork

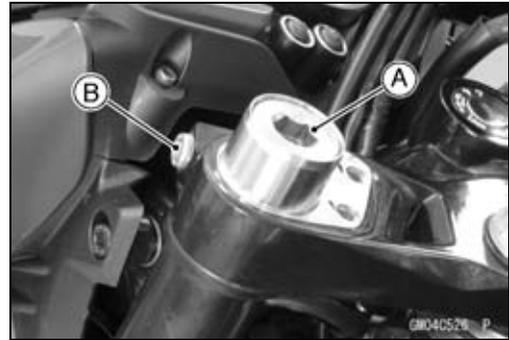
Front Fork Removal (Each Fork Leg)

- Remove:
 - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
 - Front Fender (see Front Fender Removal in the Frame chapter)
- ★ If the fork leg is to be disassembled, do the following procedures.
- Remove the handlebar holder (see Handlebar Holder Removal in the Steering chapter).
- Loosen the front fork top plug [A].

NOTE

- Loosen the top plug after loosening the upper front fork clamp bolt [B].

- Loosen:
 - Front Fork Clamp Bolt (Upper) [A]
 - Front Fork Clamp Bolt (Lower) [B]
- With a twisting motion, work the fork leg down and out.

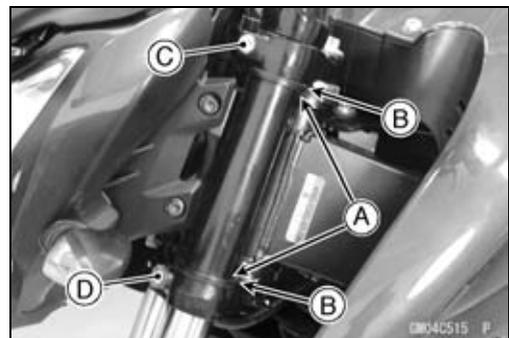


Front Fork Installation (Each Fork Leg)

- ★ If the fork leg was to be disassembled, do the following procedures.
- Install the fork leg and tighten the lower front fork clamp bolt temporarily.
- Tighten the front fork top plug [A].
- Torque - Front Fork Top Plug: 27 N·m (2.8 kgf·m, 20 ft·lb)
- Install the handlebar holder (see Handlebar Holder Installation in the Steering chapter).



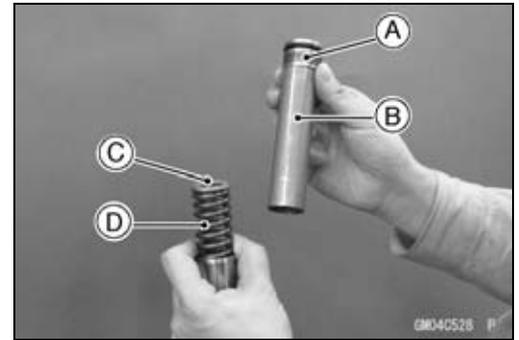
- Make sure that the collars [A] and rubber dampers [B] are in position.
- Install the fork leg so that its top end touches the handlebar holder.
- Tighten:
 - Torque - Front Fork Clamp Bolt (Upper) [C]: 19 N·m (1.9 kgf·m, 14 ft·lb)
 - Front Fork Clamp Bolt (Lower) [D]: 27 N·m (2.8 kgf·m, 20 ft·lb)
- Install the removed parts (see appropriate chapters).



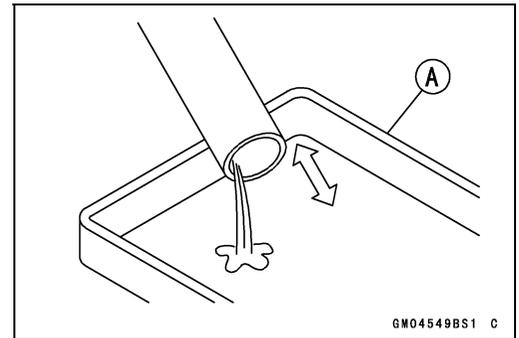
Front Fork

Front Fork Oil Change

- Remove:
 - Front Fork (see Front Fork Removal (Each Fork Leg))
 - Top Plug [A]
 - Collar [B]
 - Fork Spring Seat [C]
 - Fork Spring [D]



- Drain the fork oil into a suitable container [A].
- Pump the outer tube up and down at least ten times to expel the oil from the fork.



- Hold the fork tube upright, press the inner tube.
- Pour in the type and amount of fork oil specified.

Suspension Oil

Recommended Oil:

SAE 10W20 Endurance 2F

Amount (Per Side):

When changing oil:

Approx. 270 mL (9.13 US oz.)

After disassembly and completely dry:

285 ±2.5 mL (9.64 ±0.09 US oz.)

- Measure the oil level as follows.
 - Hold the outer tube vertically in a vise.
 - Pump the inner tube several times to expel air bubbles.
 - Wait until the oil level settles.
 - With the fork fully compressed, insert a tape measure or rod into the inner tube, and measure the distance from the top of the inner tube to the oil.

Oil Level (fully compressed without spring)

Standard: 195 mm (7.68 in.)

13-10 SUSPENSION

Front Fork

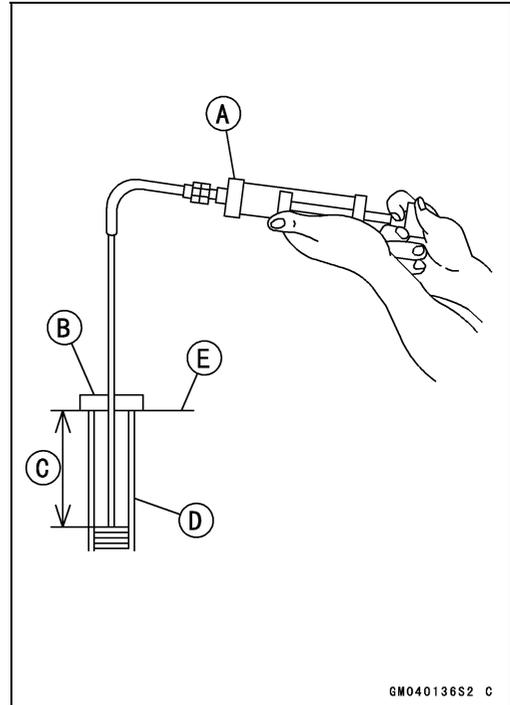
- ★ If the oil is above or below the specified level, remove or add oil and recheck the oil level.

NOTE

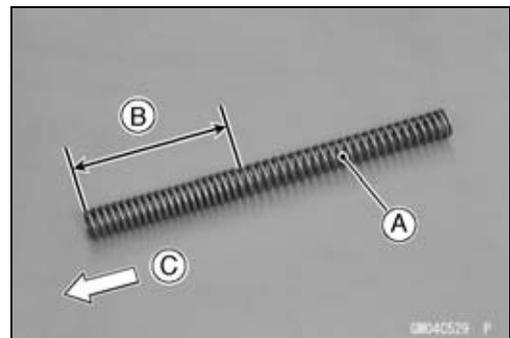
- Fork oil level may also be measured using the fork oil level gauge [A] as follows.

Special Tool - Fork Oil Level Gauge: 57001-1290

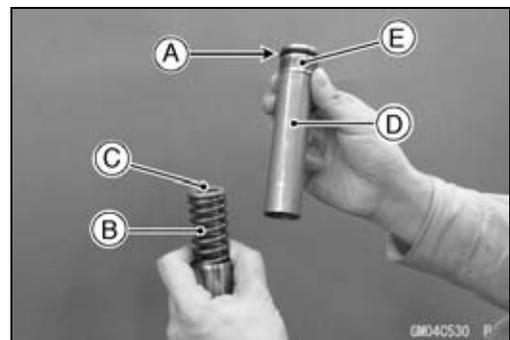
- Set the oil gauge stopper [B] so that its lower side shows the oil level distance specified [C].
- Insert the gauge tube into the inner tube [D] and position the stopper across the inner tube top end [E].
- Pull the handle slowly to draw out the excess oil until no more oil comes up the tube.
- ★ If no oil is drawn out, there is not enough oil in the inner tube. Pour in some more oil, then draw out the excess.



- Install the fork spring [A] so that the closed coil end [B] faces downward [C].



- Replace the O-ring [A] with a new one.
- Install:
 - Fork Spring [B]
 - Fork Spring Seat [C]
 - Collar [D]
 - Top Plug [E] with new O-ring
 - Front Fork (see Front Fork Installation (Each Fork Leg))



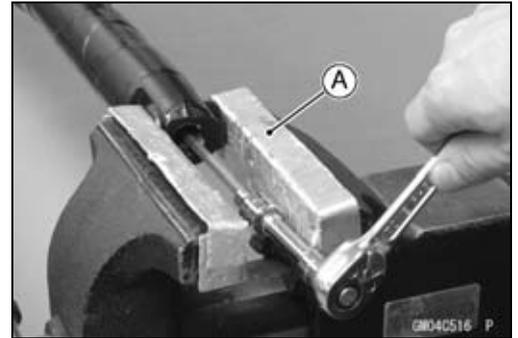
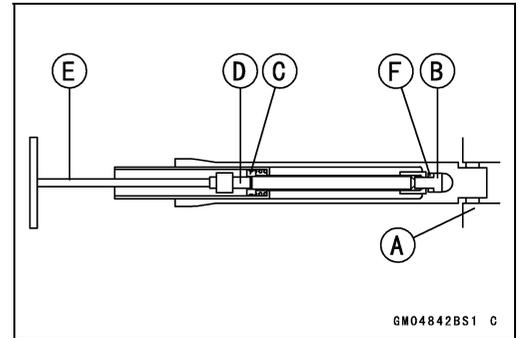
Front Fork

Front Fork Disassembly

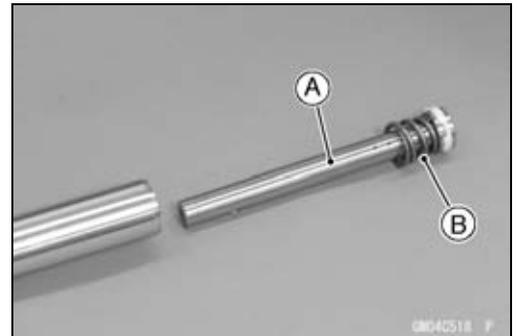
- Remove the front fork and drain the fork oil (see Front Fork Oil Change).
- Hold the fork leg horizontally in a vise [A].
- Loosen the front fork bottom Allen bolt [B] while holding the cylinder unit [C] with a commercially available 16 mm (5/8 in.) Allen socket [D] and fork cylinder holder handle [E].

Special Tool - Fork Cylinder Holder Handle: 57001-183

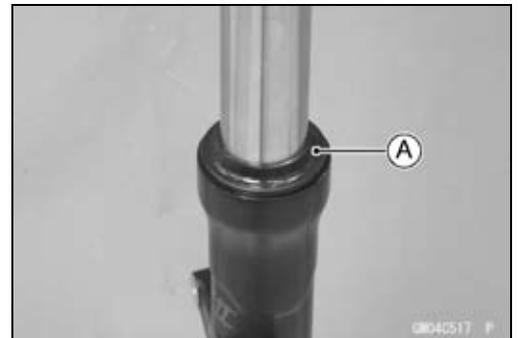
- Remove the front fork bottom Allen bolt and gasket [F].



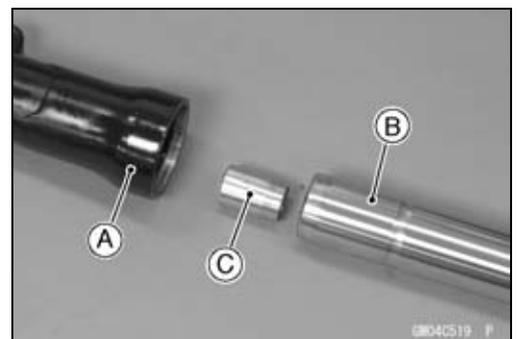
- Remove:
Cylinder Unit [A]
Spring [B]



- Remove the dust seal [A].



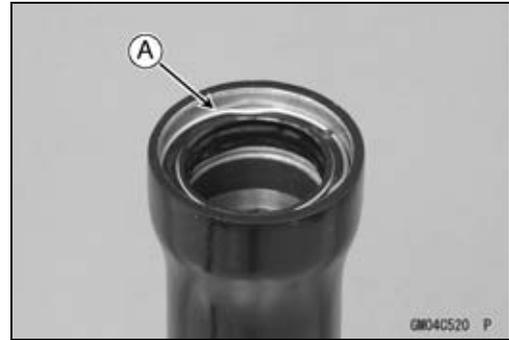
- Separate the outer tube [A] and the inner tube [B].
- Remove the cylinder base [C].



13-12 SUSPENSION

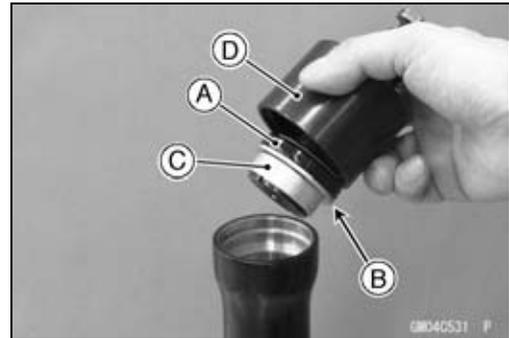
Front Fork

- Remove the retaining ring [A] from the outer tube.



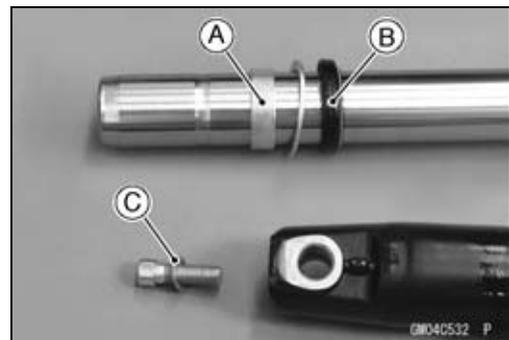
- Remove the oil seal [A], washer [B] and bushing [C] as a set with bushing remover [D].

Special Tool - Bushing Remover: 57001-E008

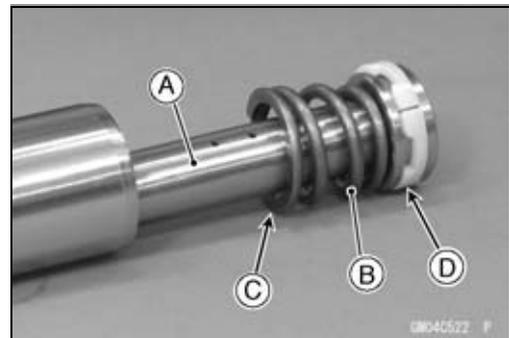


Front Fork Assembly

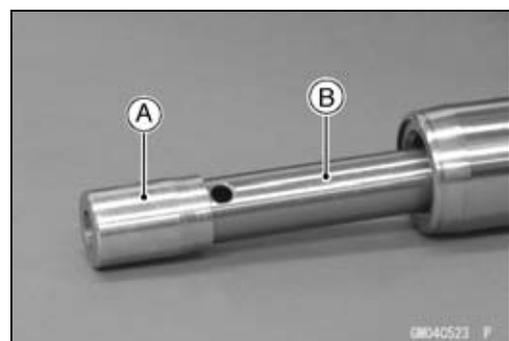
- Replace the following parts with new ones.
 - Bushing [A]
 - Oil Seal [B]
 - Bottom Allen Bolt Gasket [C]



- Install the cylinder unit [A] and spring [B] to the inner tube so that the large diameter [C] of the spring is downward.
- ★ If the collar [D] is damaged, replace it with a new one.



- Install the cylinder base [A] to the cylinder unit [B].
- Install the inner tube to the outer tube.

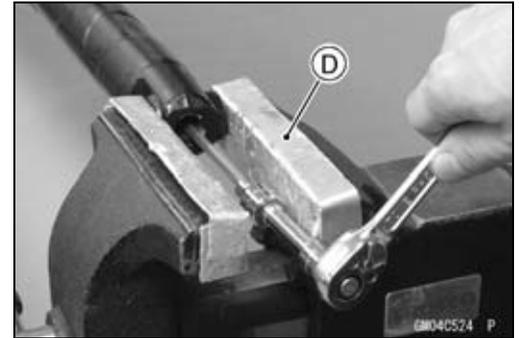
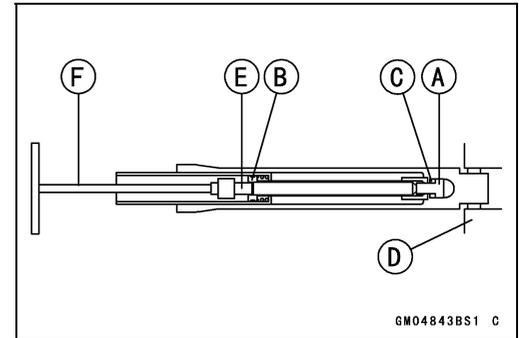


Front Fork

- Apply non-permanent locking agent to the threads of the front fork bottom Allen bolt [A] and screw it to the cylinder unit [B] with the new gasket [C].
- Hold the front fork horizontally in a vise [D].
- Tighten the front fork bottom Allen bolt while holding the cylinder unit with a commercially available 16 mm (5/8 in.) Allen socket [E] and fork cylinder holder handle [F].

Special Tool - Fork Cylinder Holder Handle: 57001-183

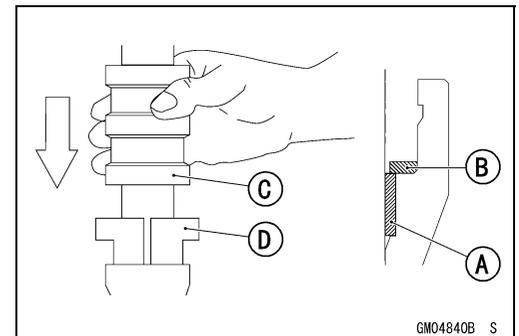
Torque - Front Fork Bottom Allen Bolt: 24 N·m (2.4 kgf·m, 18 ft·lb)



- Install the new bushing [A] and washer [B] into the outer tube using the special tools, until the washer is bottomed.

Special Tools - Fork Oil Seal Driver Weight, $\phi 26 \sim \phi 46$ [C]: 57001-1795

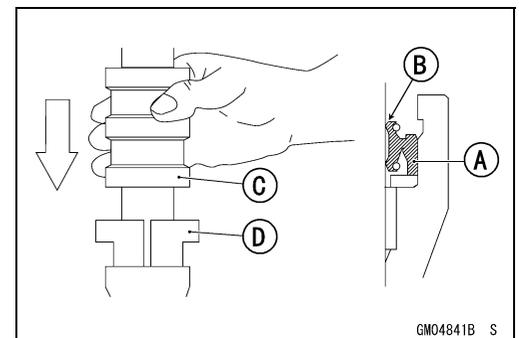
Fork Oil Seal Driver Attachment, $\phi 36 \sim \phi 46$ [D]: 57001-1798



- Apply grease to the oil seal lips, and install the oil seal [A] to the inner tube from the top.
- Install the oil seal with its lip side [B] facing up.
- Install the oil seal into the bottom case using the special tools until the oil seal is bottomed.

Special Tools - Fork Oil Seal Driver Weight, $\phi 26 \sim \phi 46$ [C]: 57001-1795

Fork Oil Seal Driver Attachment, $\phi 36 \sim \phi 46$ [D]: 57001-1798



- Install:
 - Retaining Ring
 - Dust Seal
- Pour in the specified type of oil (see Front Fork Oil Change).

13-14 SUSPENSION

Front Fork

Inner Tube, Outer Tube Inspection

- Visually inspect the inner tube [A].
- ★ If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.

NOTICE

If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

- Temporarily assemble the inner [A] and outer [B] tubes, and pump [C] them back and forth manually to check for smooth operation.
- ★ If you feel binding or catching, the inner and outer tubes must be replaced.

⚠ WARNING

A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Dust Seal Inspection

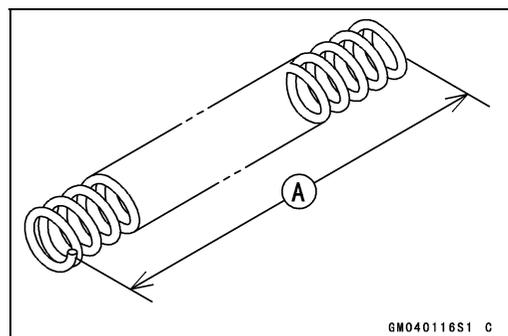
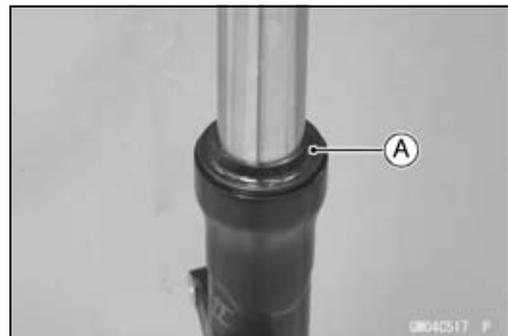
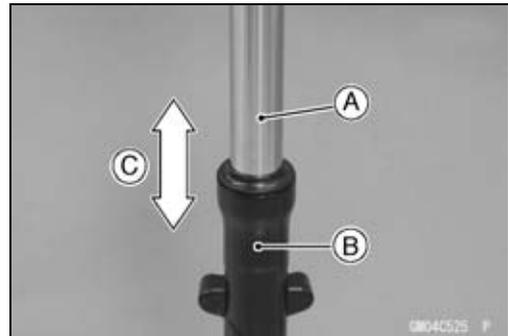
- Inspect the dust seal [A] for any signs of deterioration or damage.
- ★ Replace it if necessary.

Spring Tension Inspection

- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.
- ★ If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Fork Spring Free Length

Standard:	478 mm (18.81 in.)
Service Limit:	468.5 mm (18.44 in.)



Rear Shock Absorber

Spring Preload Adjustment

- Set the motorcycle up on its center stand.
- Using the wrench [A], turn the adjusting nut to adjust the spring preload.

Rear Shock Absorber [B]

Special Tool - Steering Stem Nut Wrench: 57001-1100

Spring Preload Setting

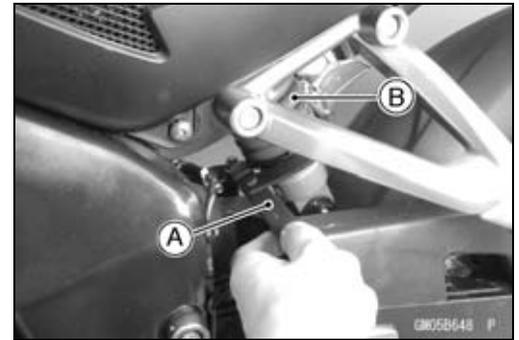
Standard Position: 2nd position

Adjustable Range: 1st ~ 9th position

- ★ If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

Spring Preload Adjustment

Adjuster Position	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
9th	Strong	Hard	Heavy	Bad	Highway

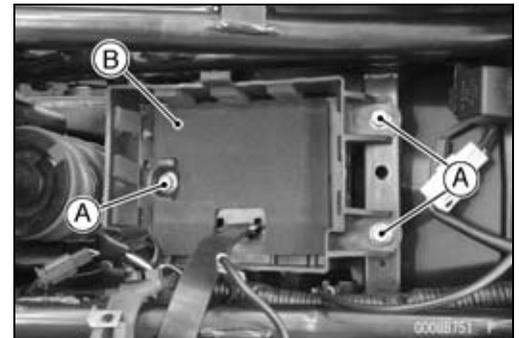


Rear Shock Absorber Removal

- Raise the rear wheel off the ground with the jack.

Special Tool - Jack: 57001-1238

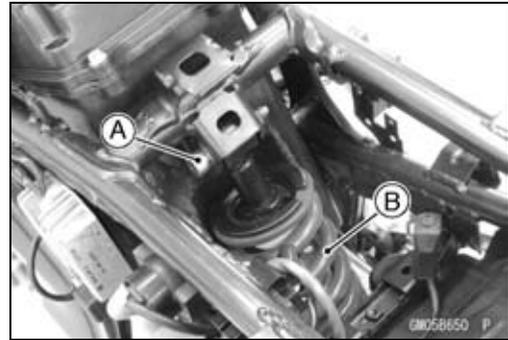
- Remove:
 - Side Covers (see Side Cover Removal in the Frame chapter)
 - Battery (see Battery Removal in the Electrical System chapter)
 - Battery Case Bolts [A]
 - Battery Case [B]
- Remove the rear shock absorber bolt (lower) [A].



13-16 SUSPENSION

Rear Shock Absorber

- Remove the rear shock absorber bolt (upper) [A], and remove the rear shock absorber [B] upward.



Rear Shock Absorber Installation

- Apply a non-permanent locking agent to the rear shock absorber bolts.
- Install the rear shock absorber, and tighten the rear shock absorber bolts.

Torque - Rear Shock Absorber Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

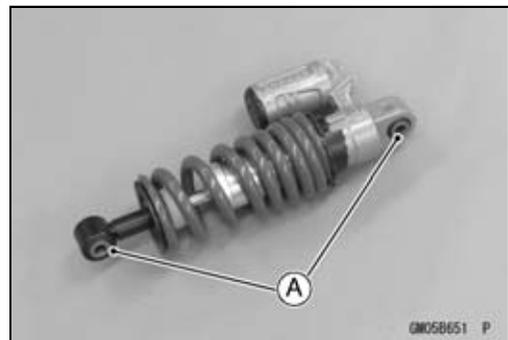
- Install the battery case.

Torque - Battery Case Bolts: 18 N·m (1.8 kgf·m, 13 ft·lb)

- Install the removed parts (see appropriate chapters).

Rear Shock Absorber Inspection

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
 - Oil Leakage
 - Crack or Dent
- ★ If there is any damage to the rear shock absorber replace it.
- Visually inspect the rubber bushings [A].
- ★ If they show any signs of damage, replace the rear shock absorber.

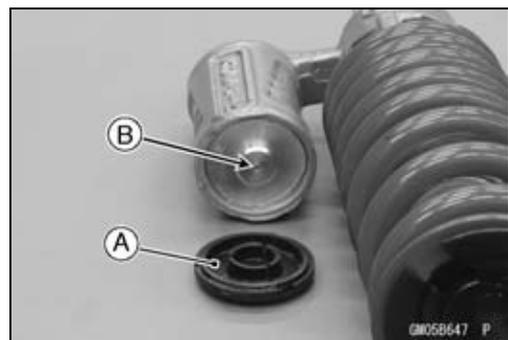


Rear Shock Absorber Scrapping

⚠ WARNING

Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen.

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Remove the cap [A].
- Drill the hole [B] of the reservoir tank using about 2 mm (0.08 in.) drillbit.



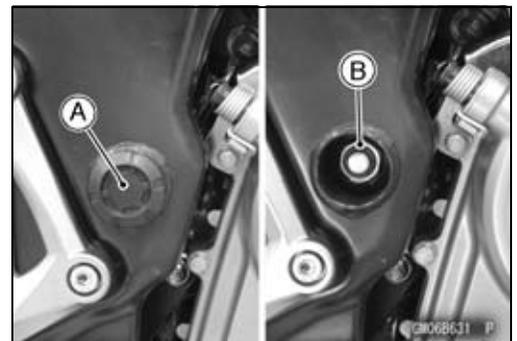
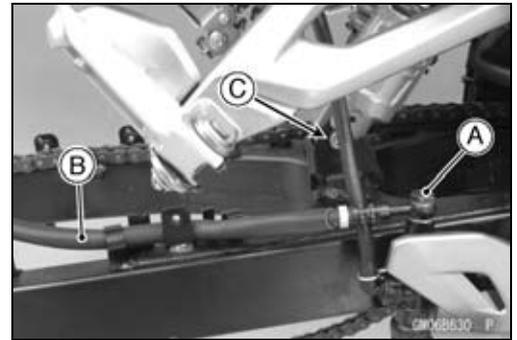
⚠ WARNING

Pressurized gas can cause injury. Do not point the drill toward your face or body.

Swingarm

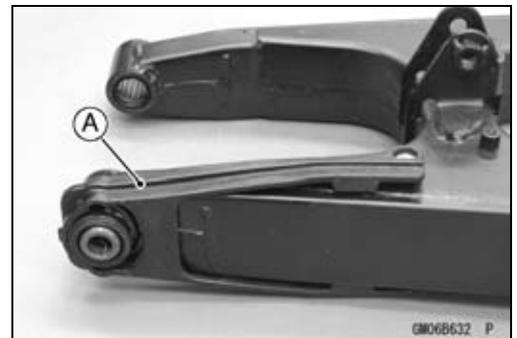
Swingarm Removal

- Raise the rear wheel off the ground with the jack.
 - Special Tool - Jack: 57001-1238**
- Remove:
 - Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
 - Mud Guard (see Mud Guard Removal in the Frame chapter)
- Remove the brake hose banjo bolt [A], and remove the brake hose [B].
- Remove the rear shock absorber bolt (lower) [C].
- Remove:
 - Cap [A] (Both Sides)
 - Swingarm Pivot Shaft Nut [B]
- Pull out the swingarm pivot shaft to the left side, and remove the swingarm.



Swingarm Installation

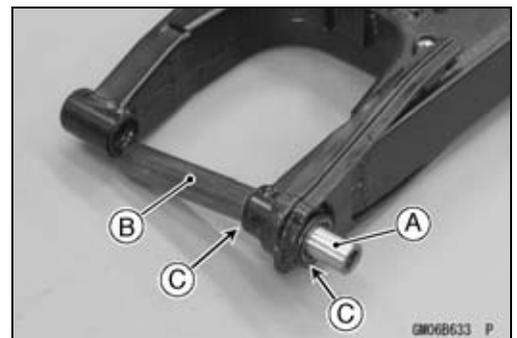
- Visually inspect the chain guide [A].
- ★ Replace the chain guide if it shows any signs of abnormal wear or damage.
- Install the swingarm, and insert the swingarm pivot shaft from the left side.
- Tighten:
 - Torque - Swingarm Pivot Shaft Nut: 137 N·m (14.0 kgf·m, 101 ft·lb)**



○ Install the removed parts (see appropriate chapters).

Swingarm Bearing Removal

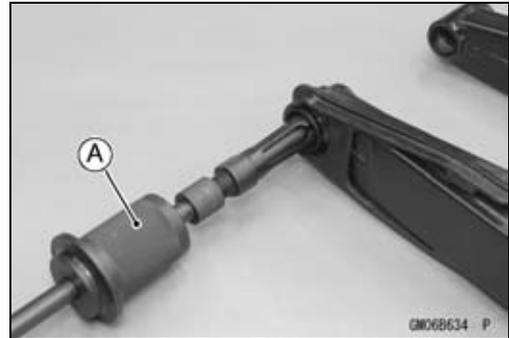
- Remove:
 - Swingarm (see Swingarm Removal)
 - Sleeve [A]
 - Spacer [B]
 - Oil Seals [C]



13-18 SUSPENSION

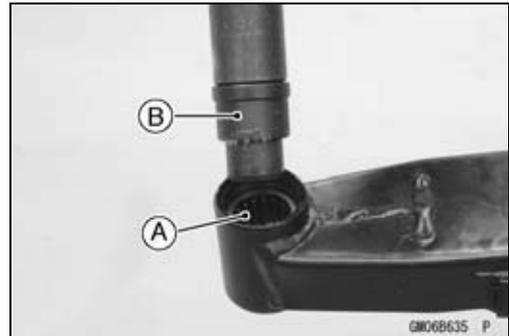
Swingarm

- Remove the needle bearing.
Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058

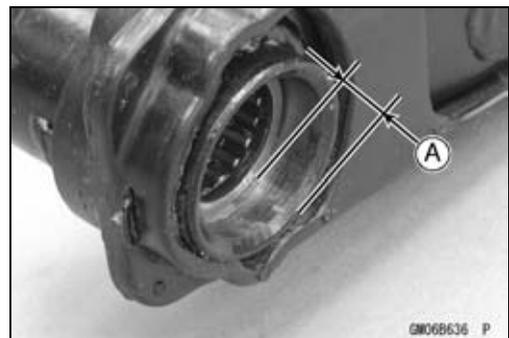


Swingarm Bearing Installation

- Replace the needle bearing [A] with a new one.
- Press in the needle bearing.
Special Tool - Bearing Driver Set [B]: 57001-1129



- Install the needle bearing position as shown.
About 9 mm (0.35 in.) [A]

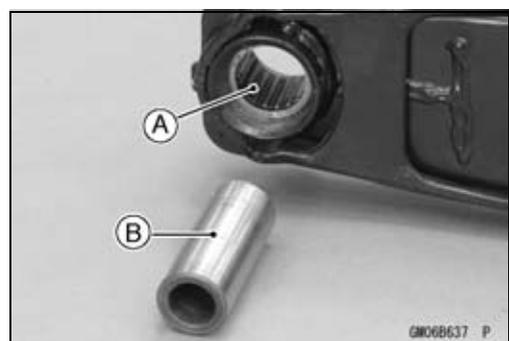


Swingarm Bearing, Sleeve Inspection

NOTICE

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

- Inspect the needle bearing [A] installed in the swingarm.
 - The rollers in a bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.
 - ★ If the needle bearing, and sleeve [B] show any signs of abnormal wear, discoloration, or damage, replace them as a set.



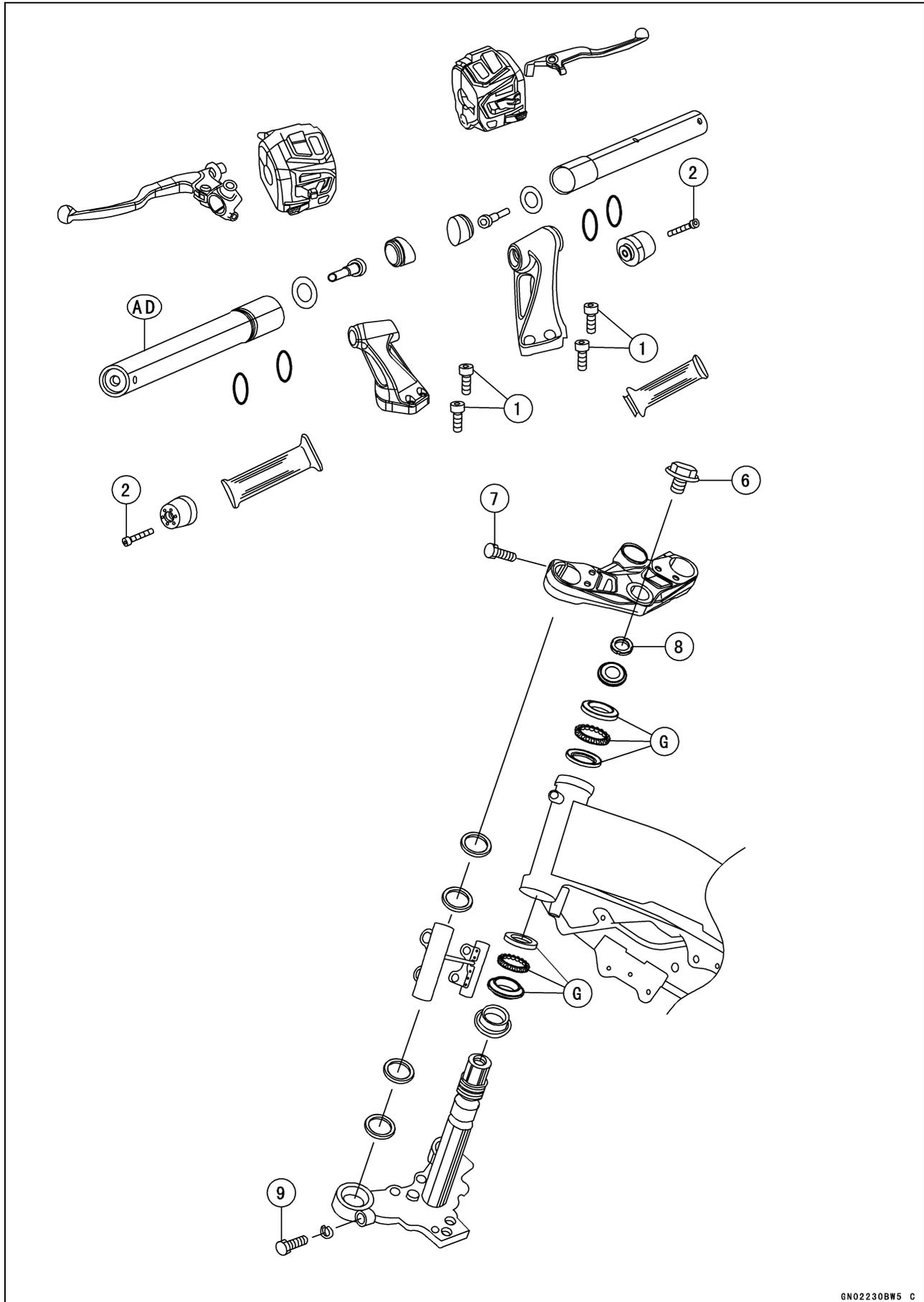
Steering

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14-2 STEERING

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Holder Bolts	19	1.9	14	
2	Handlebar Weight Bolts	9.8	1.0	87 in·lb	
6	Steering Stem Head Bolt	49	5.0	36	
7	Front Fork Clamp Bolts (Upper)	19	1.9	14	
8	Steering Stem Nut	4.9	0.50	43 in·lb	
9	Front Fork Clamp Bolts (Lower)	27	2.8	20	

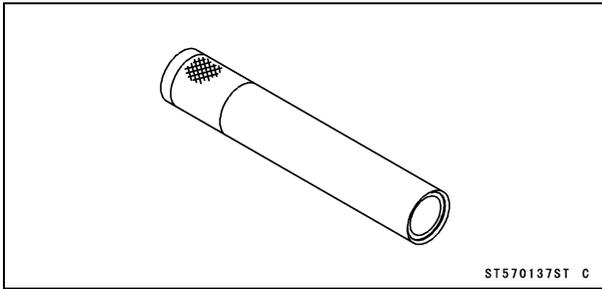
AD: Apply adhesive.

G: Apply grease.

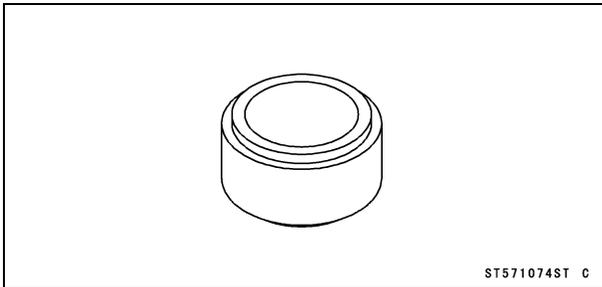
14-4 STEERING

Special Tools

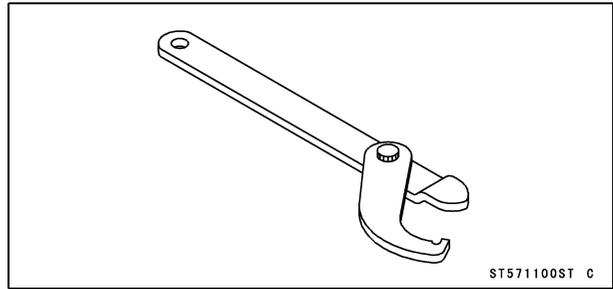
Steering Stem Bearing Driver:
57001-137



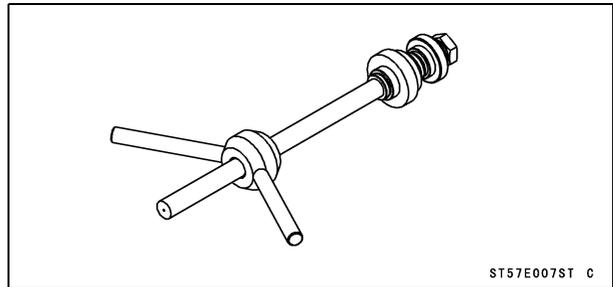
Steering Stem Bearing Driver Adapter, ϕ 34.5:
57001-1074



Steering Stem Nut Wrench:
57001-1100



Head Pipe Outer Race Press Shaft:
57001-E007



Steering

Steering Inspection

- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

Steering Adjustment

- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

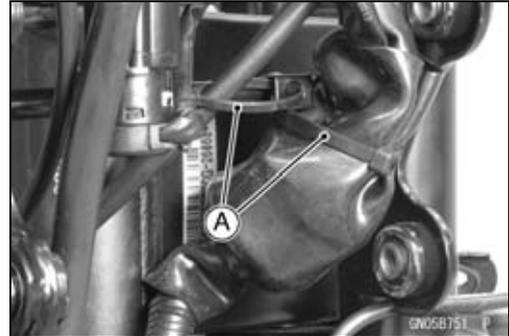
14-6 STEERING

Steering Stem

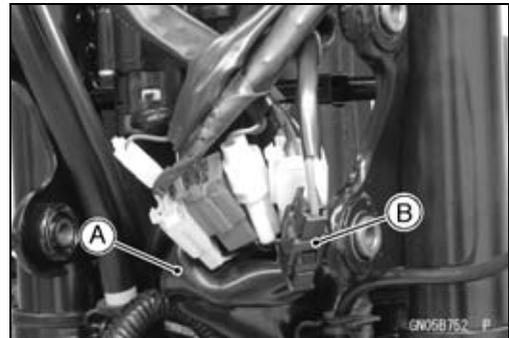
Stem, Stem Bearing Removal

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Headlight Assy (see Headlight Cover Removal in the Frame chapter)
 - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
 - Front Fender (see Front Fender Removal in the Frame chapter)
 - Handlebars (see Handlebar Removal)

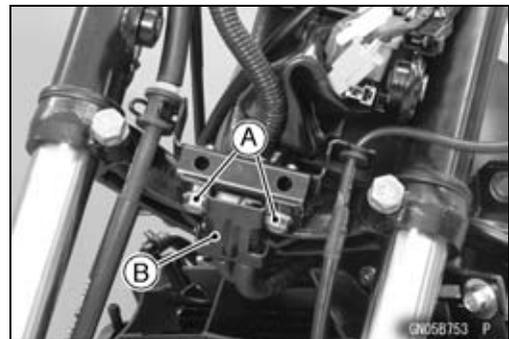
- Remove the bands [A].



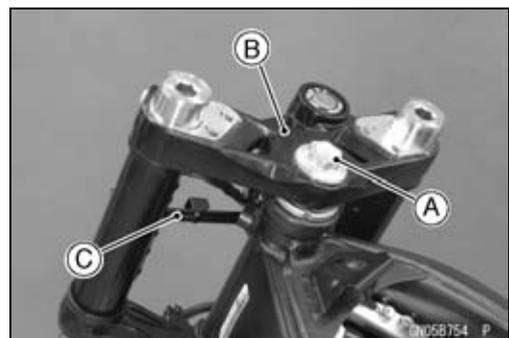
- Slide the dust cover [A], and disconnect the ignition switch lead connector [B].



- Remove:
 - Bolts [A]
 - Bracket [B]



- Remove:
 - Steering Stem Head Bolt [A]
 - Steering Stem Head [B]
 - Headlight Bracket [C] with Collars and Dampers
 - Front Fork (see Front Fork Removal in the Suspension chapter)

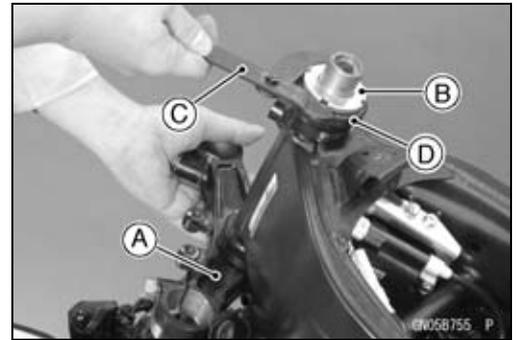


Steering Stem

- Pushing up the stem base [A], and remove the steering stem nut [B].

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

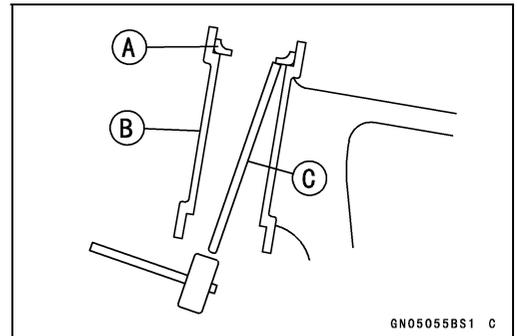
- Remove:
 - Steering Stem
 - Stem Cap [D]
 - Upper Ball Bearing Inner Race and Ball Bearing



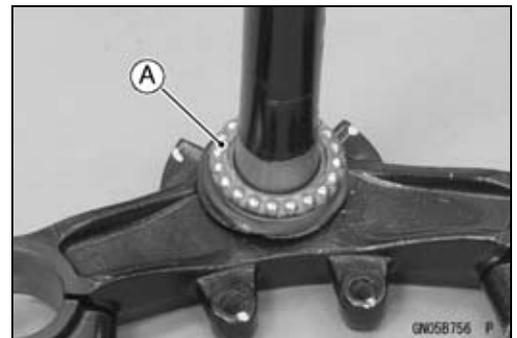
- To remove the ball bearing outer races [A] pressed into the head pipe [B], insert a bar [C] into the recesses of head pipe, and applying it to both recess alternately hammer it to drive the race out.

NOTE

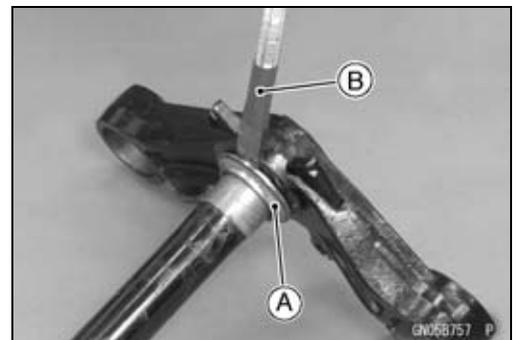
○If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.



- Remove the lower ball bearing [A] from the steering stem.



- Remove the lower bearing inner race (with its grease seal) [A] which is pressed onto the steering stem with a suitable commercially available chisel [B].



Stem, Stem Bearing Installation

- Replace the bearing outer races with new ones.
- Drive them into the head pipe at the same time.

Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-E007

- Apply grease to the outer races.



14-8 STEERING

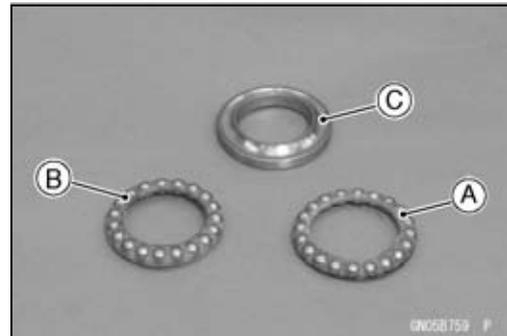
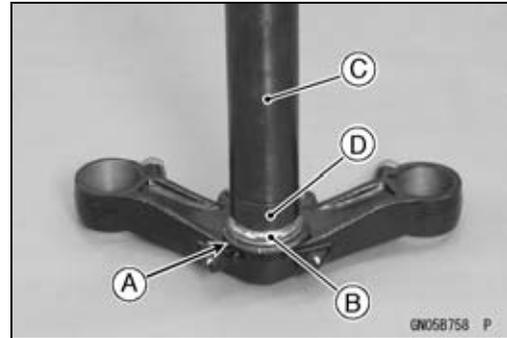
Steering Stem

- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Install the oil seal [A] on the steering stem, and drive the lower ball bearing inner race [B] applied the grease onto the stem.

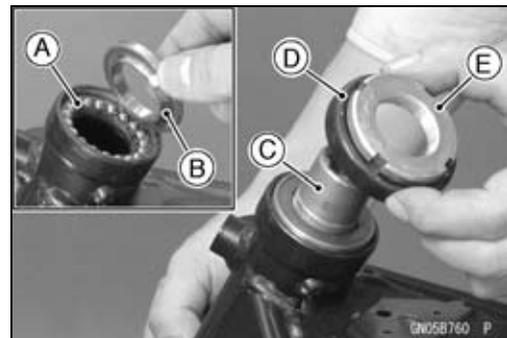
Special Tools - Steering Stem Bearing Driver [C]: 57001-137

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

- Apply grease to the lower ball bearing [A], and install it onto the steering stem.
- Apply grease to the upper ball bearing [B] and inner race [C].



- Install the upper bearing [A] and inner race [B] on the head pipe.
- Install the steering stem [C] through the head pipe.
- Install:
 - Stem Cap [D]
 - Steering Stem Nut [E]

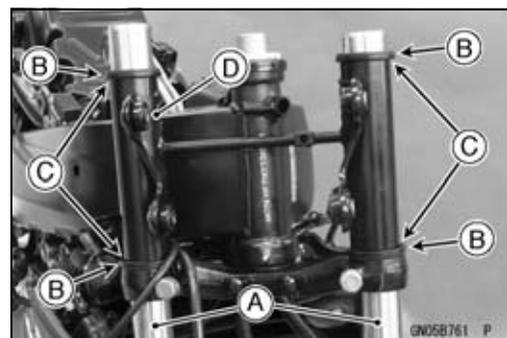
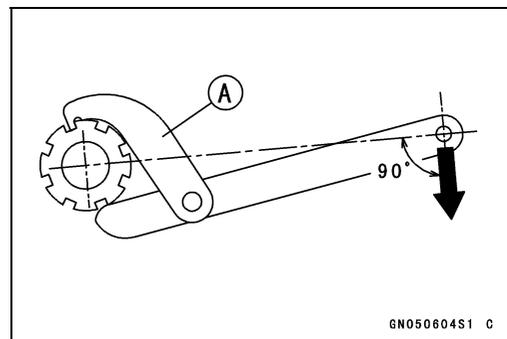


- Settle the bearings in place as follows.
 - Tighten the steering stem nut with 44 N·m (4.5 kgf·m, 32 ft·lb) of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a steering stem nut wrench [A].
 - Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.

Special Tool - Steering Stem Nut Wrench: 57001-1100

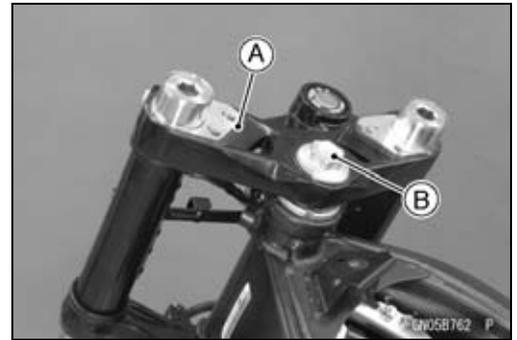
Torque - Steering Stem Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb)

- Install the front forks [A] temporary, and tighten the lower front fork clamp bolts.
- Install:
 - Dampers [B]
 - Collars [C]
 - Headlight Bracket [D]



Steering Stem

- Install:
 - Steering Stem Head [A]
 - Steering Stem Head Bolt [B]
- Torque - Steering Stem Head Bolt: 49 N·m (5.0 kgf·m, 36 ft·lb)**



- Install the removed parts (see appropriate chapters).

⚠ WARNING

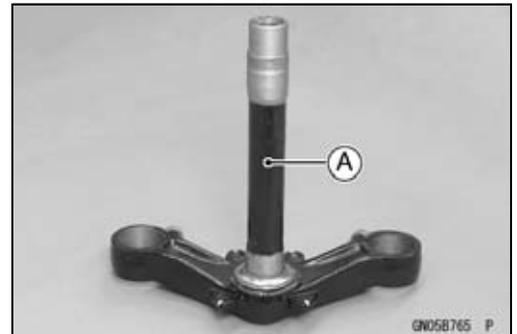
If the handlebar does not turn to the steering stop it may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Steering Stem Bearing Lubrication

- Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem Warp Inspection

- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.
- ★ If the steering stem [A] is bent, replace the steering stem.



Stem Cap Deterioration, Damage Inspection

- ★ Replace the stem cap if its seal lip [A] shows damage.

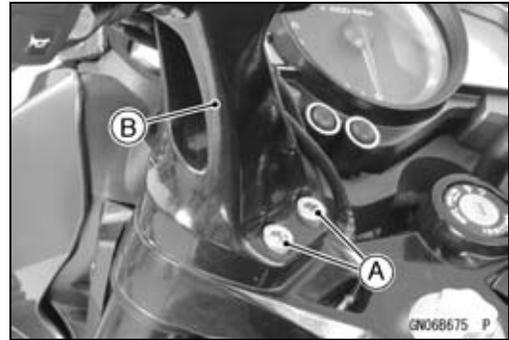


14-10 STEERING

Handlebar

Handlebar Holder Removal

- Remove:
 - Handlebar Holder Bolts [A]
 - Handlebar Holder [B]

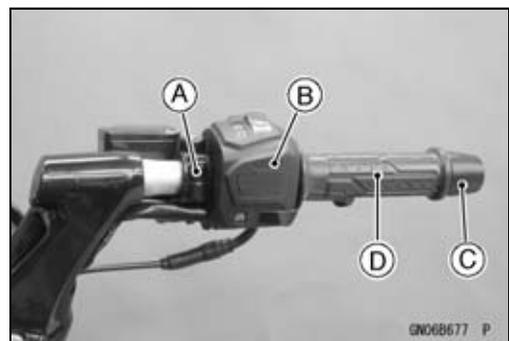
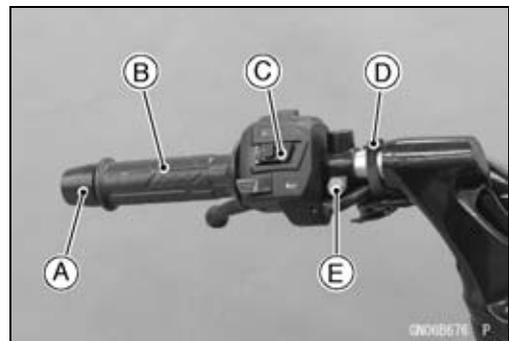


Handlebar Holder Installation

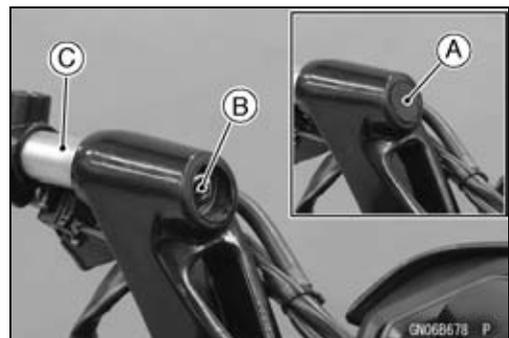
- Install:
 - Handlebar Holder
 - Handlebar Holder Bolts
- Torque - Handlebar Holder Bolts: 19 N·m (1.9 kgf·m, 14 ft·lb)**

Handlebar Removal

- Remove the rear view mirrors (see Rear View Mirror Removal in the Frame chapter).
- Remove (Left Side):
 - Handlebar Weight [A]
 - Left Handlebar Grip [B]
 - Left Switch Housing [C]
 - Band [D]
- Loosen the clutch holder bolts [E].
- Remove (Right Side):
 - Front Master Cylinder [A] (see Front Master Cylinder Removal in the Brake chapter)
 - Right Switch Housing [B]
 - Handlebar Weight [C]
 - Throttle Grip [D]



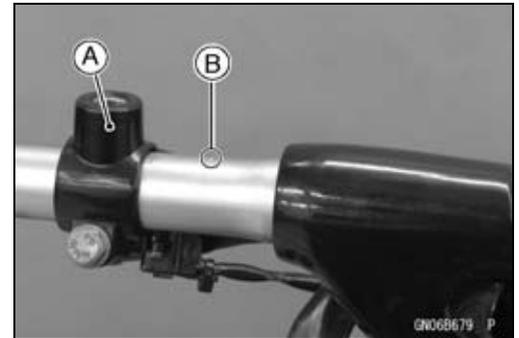
- Remove (Both Sides):
 - Cap [A]
 - Handlebar Bolt [B] and Washer
 - Handlebar [C]
- For left handlebar, remove the clutch holder.



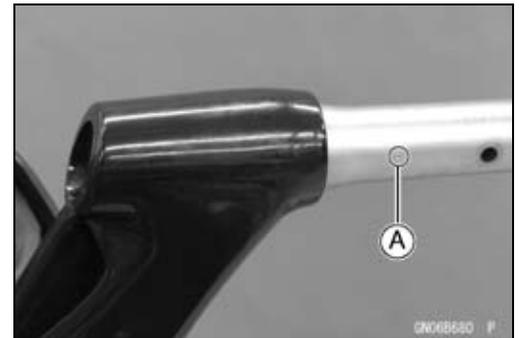
Handlebar

Handlebar Installation

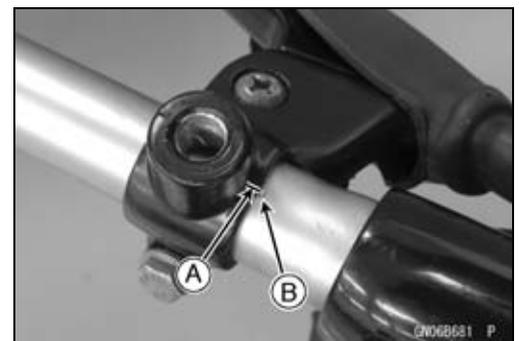
- Install the clutch holder [A] to the left handlebar.
- Install the left handlebar so that the punch mark [B] on the handlebar faces upward.
- Apply a non-permanent locking agent to the handlebar bolt, and tighten it together with washer.
- Install the cap.



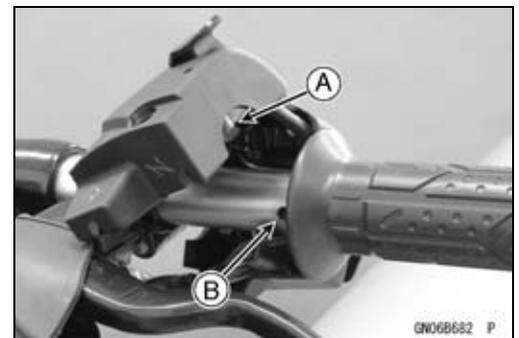
- Install the right handlebar so that the punch mark [A] on the handlebar faces backward.
- Apply a non-permanent locking agent to the handlebar bolt, and tighten it together with washer.
- Install the cap.



- Run the cables and leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Apply adhesive cement to the inside of the left handlebar grip, and install it.
- Set the clutch holder to match the notch [A] of the clutch holder to the punch mark [B] of the handlebar, and tighten the holder bolt.



- Fit the projection [A] on the left switch housing into a hole [B] on the handlebar, and tighten the screws.
- Install the band, and hold the left switch housing lead.



- Install:
 - Front Master Cylinder (see Front Master Cylinder Installation in the Brake chapter)
 - Right Switch Housing (see Throttle Cable Installation in the Fuel System chapter)
- Install (Both Sides):
 - Handlebar Weight
 - Handlebar Weight Bolt

Torque - Handlebar Weight Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

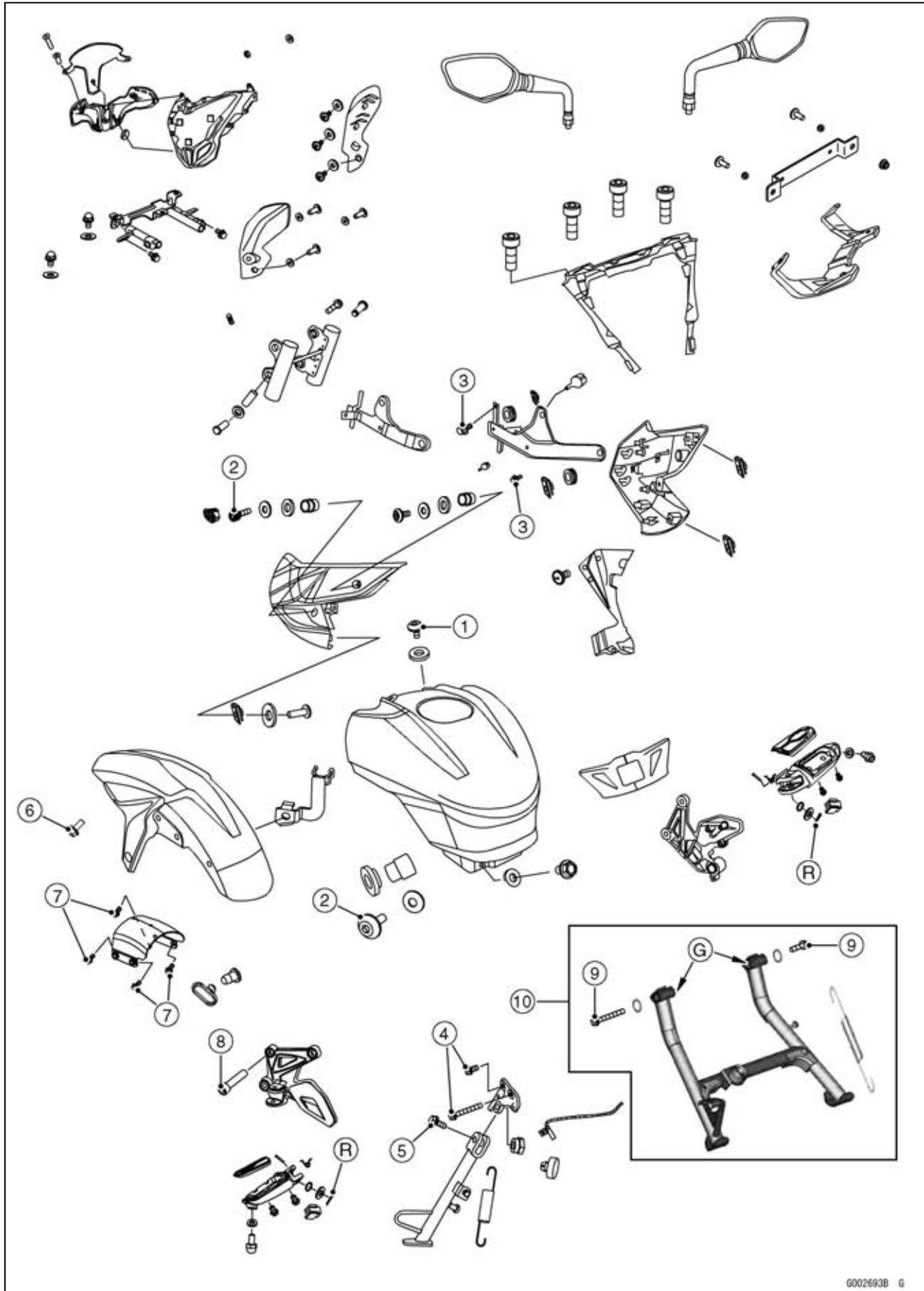
Frame

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15-2 FRAME

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Tank Cover Bolts (Front)	4.9	0.50	43 in·lb	
2	Fuel Tank Cover Bolts (Side)	8.8	0.90	78 in·lb	
3	Fuel Tank Cover Bracket Bolts	4.4	0.45	39 in·lb	
4	Side Stand Bracket Bolts	20	2.0	15	
5	Side Stand Bolt	27	2.8	20	
6	Front Fender Bolts	8.8	0.90	78 in·lb	
7	Front Fender Bracket Bolts	19	1.9	14	
8	Front Footpeg Bracket Bolts	20	2.0	15	
9	Center Stand Bolts	20	2.0	15	

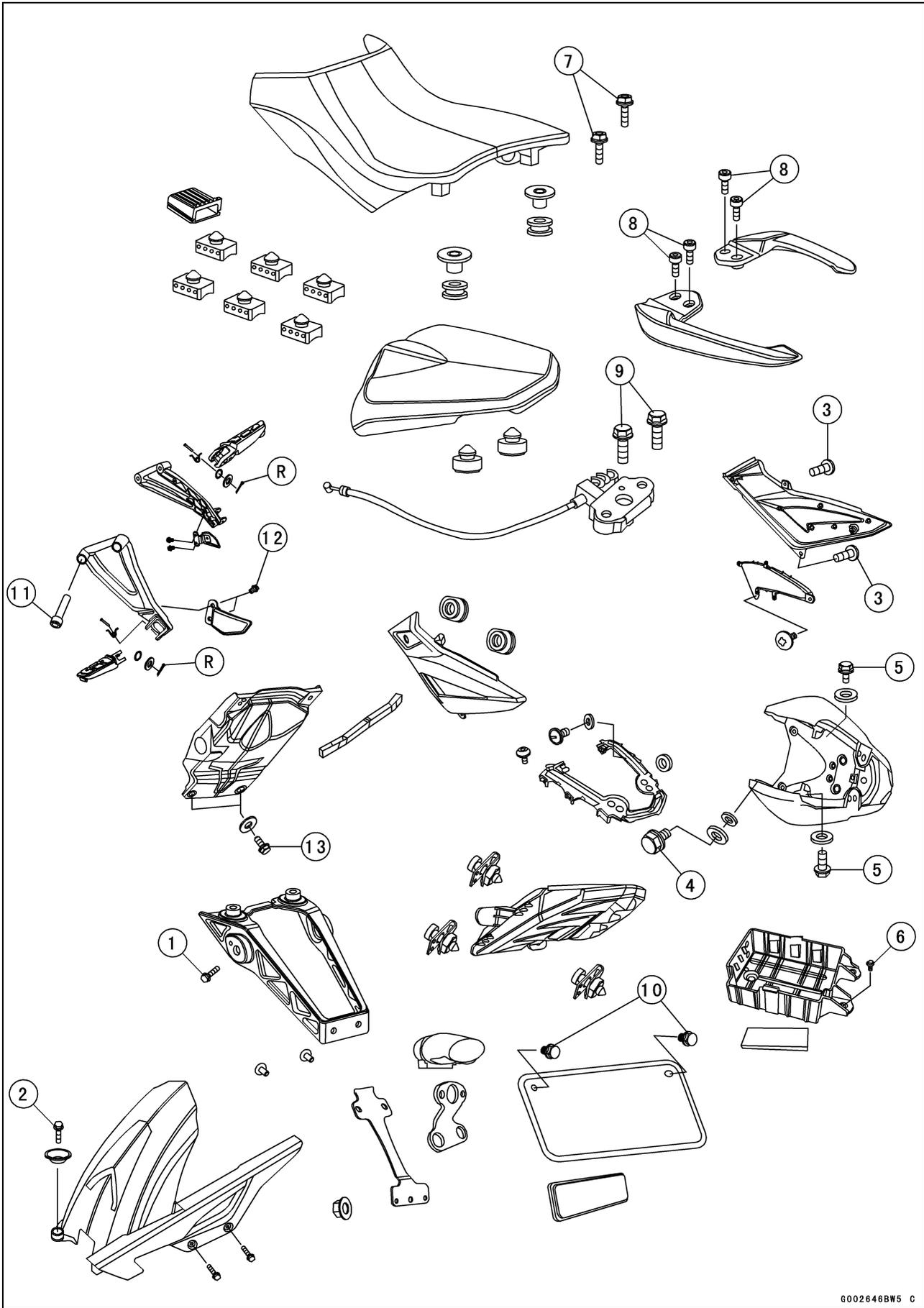
10. PH Model

G: Apply grease.

R: Replacements Parts

15-4 FRAME

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Flap Mounting Bolts	20	2.0	15	
2	Mud Guard Bolts (Front)	8.8	0.90	78 in·lb	
3	Side Cover Screws	8.8	0.90	78 in·lb	
4	Seat Cover Bolts (Side)	8.8	0.90	78 in·lb	
5	Seat Cover Bolts (Top)	8.8	0.90	78 in·lb	
6	Battery Case Bolts	18	1.8	13	
7	Front Seat Bolts	9.8	1.0	87 in·lb	
8	Grab Rail Mounting Bolts	20	2.0	15	
9	Seat Lock Mounting Bolts	19	1.9	14	
10	License Plate Mounting Bolts	6.9	0.70	61 in·lb	
11	Rear Footpeg Bracket Bolts	20	2.0	15	
12	Rear Footpeg Guard Bolts	6.9	0.70	61 in·lb	
13	Rear Fender Bolts	4.9	0.50	43 in·lb	

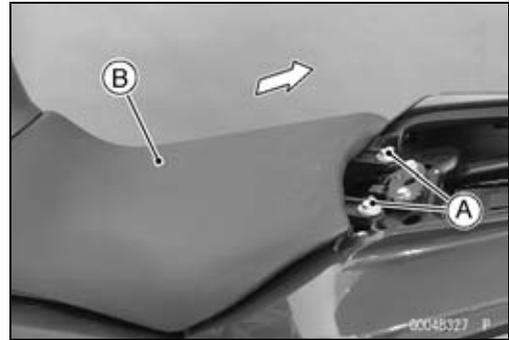
R: Replacements Parts

15-6 FRAME

Seats

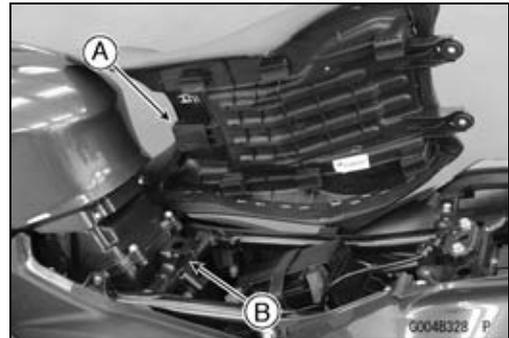
Front Seat Removal

- Remove:
 - Rear Seat (see Rear Seat Removal)
 - Front Seat Bolts [A]
- Remove the front seat [B] backward.



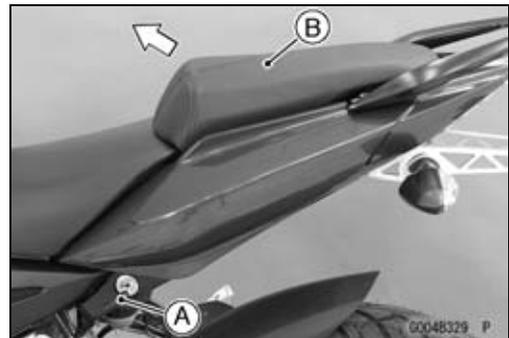
Front Seat Installation

- Slip the seat hook [A] under the rib [B] on the frame.
- Tighten the front seat bolts.
Torque - Front Seat Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Rear Seat Removal

- Insert the ignition switch key [A] into the seat lock.
- Pull up the front part of the rear seat [B] upward while turning the key clockwise, and remove it forward.



Rear Seat Installation

- Slip the seat hook [A] under the guide [B] on the frame.
- Insert the seat latch [C] into the latch hole [D].
- Push down the rear seat until the lock clicks.



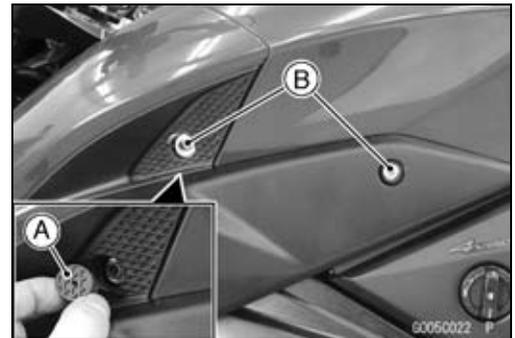
Fairings

Fuel Tank Cover Removal

- Remove the front seat (see Front Seat Removal).
- Remove the fuel tank cover bolts (rear) [A] and washers.



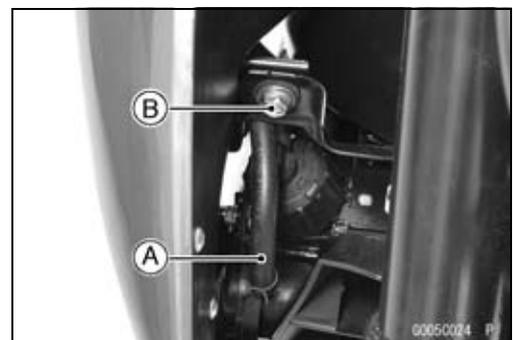
- Remove (Both Sides):
 Cap [A]
 Fuel Tank Cover Bolts (Side) [B] and Washers



- Remove the fuel tank cover bolts (front) [A] and washers.



- Open the clamp and disconnect the hose [A].
- Remove the fuel tank cover bolt (lower) [B] and collar (both sides).



- Remove the fuel tank cover [A] upward.

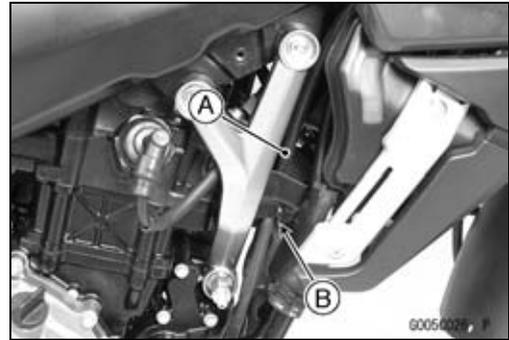


15-8 FRAME

Fairings

Fuel Tank Cover Installation

- Installation is the reverse of removal.
- Run the hose [A] into the guide [B].
- Tighten:
 - Torque - Fuel Tank Cover Bolts (Front): 4.9 N·m (0.50 kgf·m, 43 in·lb)
 - Fuel Tank Cover Bolts (Side): 8.8 N·m (0.90 kgf·m, 78 in·lb)

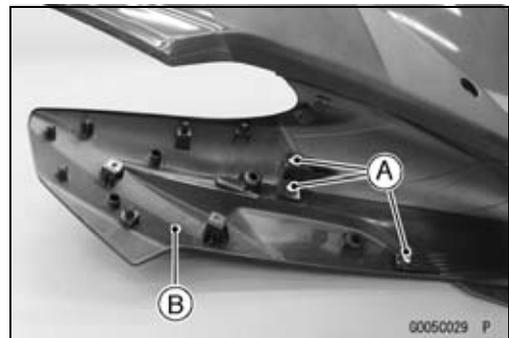
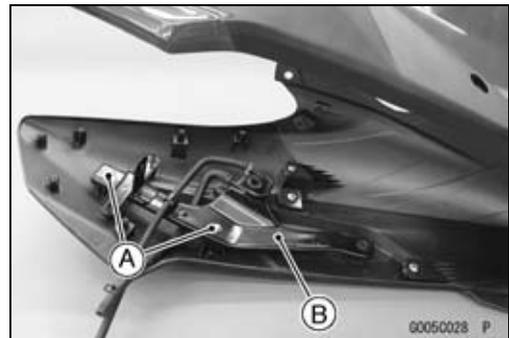
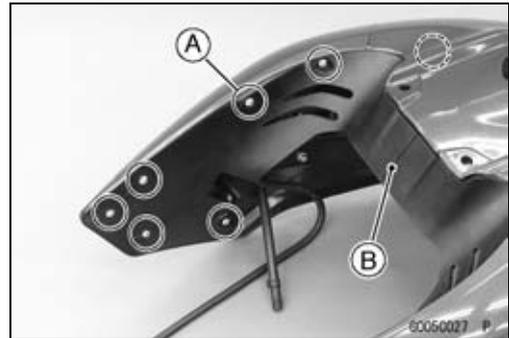


Fuel Tank Cover Disassembly

- Remove:
 - Screws [A] (Both Sides)
 - Inner Cover [B]

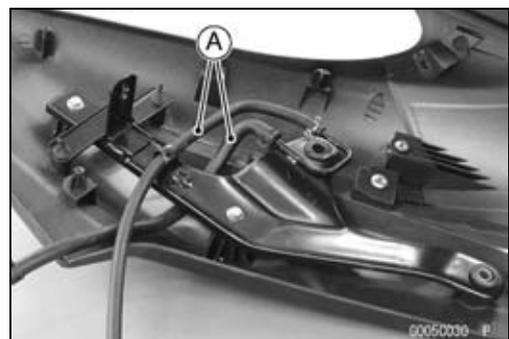
- Remove (Both Sides):
 - Fuel Tank Cover Bracket Bolts [A]
 - Bracket [B]

- Remove (Both Sides):
 - Screws [A] and Washers
 - Cover [B]



Fuel Tank Cover Assembly

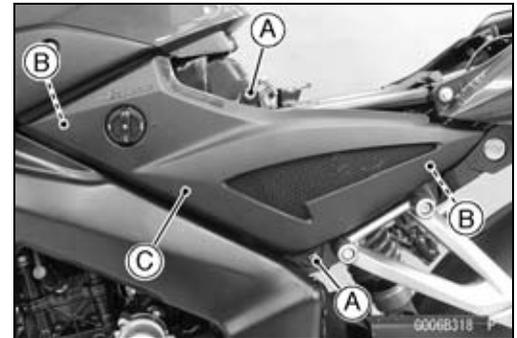
- Assembly is the reverse of the disassembly.
- Run the hoses [A] of the right bracket as shown.
- Tighten:
 - Torque - Fuel Tank Cover Bracket Bolts: 4.4 N·m (0.45 kgf·m, 39 in·lb)



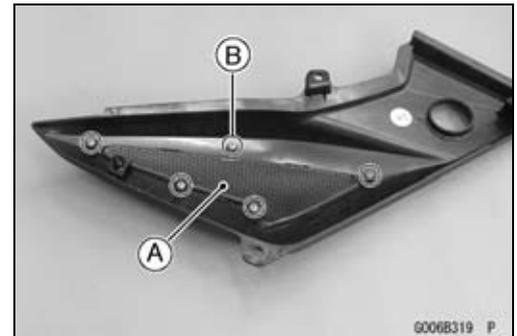
Side Covers

Side Cover Removal

- Remove the front seat (see Front Seat Removal).
- Remove the side cover screws [A].
- Clear the projections [B] and remove the side cover [C].



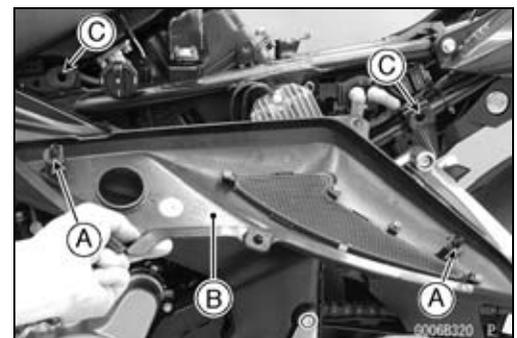
- If necessary, remove the mesh cover [A] by removing the screws [B].



Side Cover Installation

- Insert the projections [A] on the side cover [B] into the holes [C], and tighten the side cover screws.

Torque - Side Cover Screws: 8.8 N·m (0.90 kgf·m, 78 in·lb)

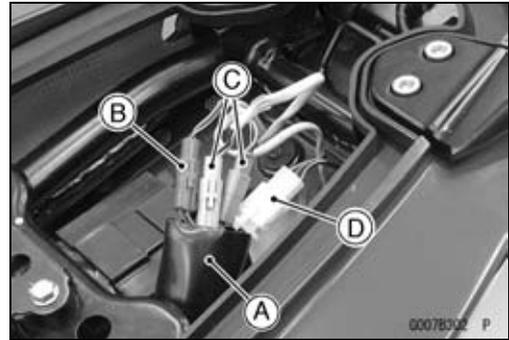


15-10 FRAME

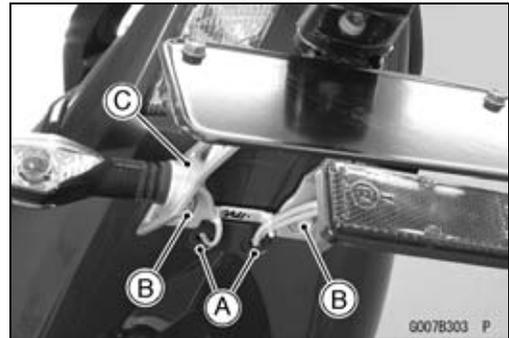
Seat Cover

Seat Cover Removal

- Remove the seats (see Front/Rear Seat Removal).
- Slide the rubber cover [A].
- Disconnect:
 - License Plate Light Lead Connector [B]
 - Turn Signal Light Lead Connectors [C]
 - Tail/Brake Light Lead Connector [D]



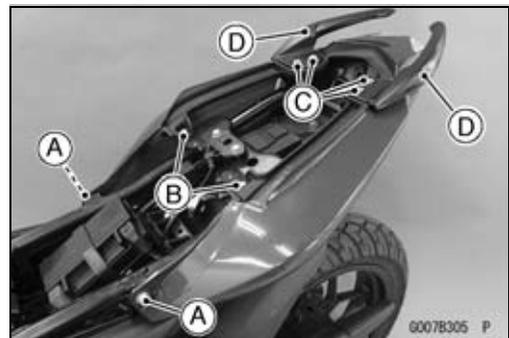
- Remove:
 - Grommets [A]
 - Flap Mounting Bolts [B]
 - Flap [C]



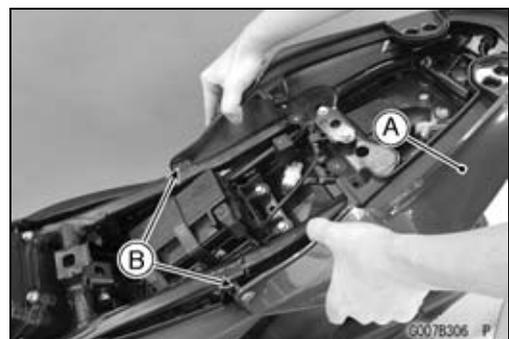
- Remove the seat cover bolts (lower) [A].



- Remove:
 - Seat Cover Bolts (Side) [A]
 - Seat Cover Bolts (Top) [B] and Washer
 - Grab Rail Bolts [C]
 - Grab Rails [D]



- Pull the seat cover [A] outward to clear the projections [B], and remove the seat cover backward.



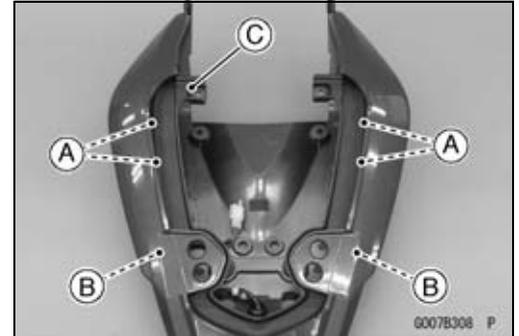
Seat Cover

Seat Cover Installation

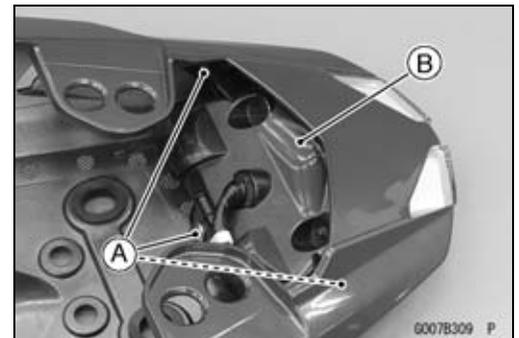
- Installation is the reverse of removal.
- Tighten:
 - Torque - Flap Mounting Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
 - Seat Cover Bolts (Top): 8.8 N·m (0.90 kgf·m, 78 in·lb)
 - Seat Cover Bolts (Side): 8.8 N·m (0.90 kgf·m, 78 in·lb)

Seat Cover Disassembly

- Remove the screws [A] and washers.
- Clear the projections [B] and remove the inner cover [C].

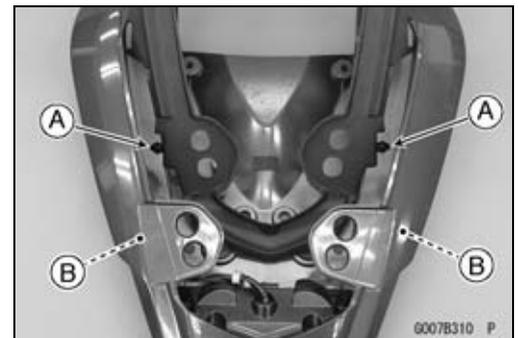


- Remove:
 - Screws [A]
 - Tail/Brake Light Assy [B]



Seat Cover Assembly

- Assembly is the reverse of the disassembly.
- Insert the projections [A] on the inner cover into the hole [B].

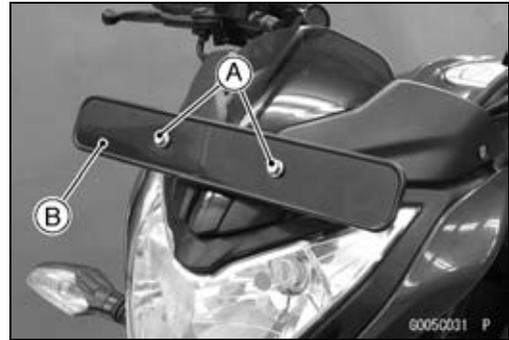


15-12 FRAME

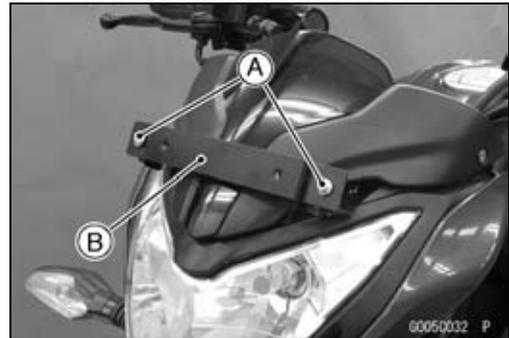
Headlight Cover

License Plate Bracket Removal

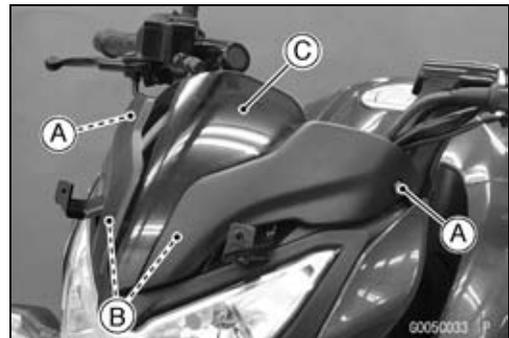
- Remove:
Bolts [A] and Washers
Plate (Number Plate) [B]



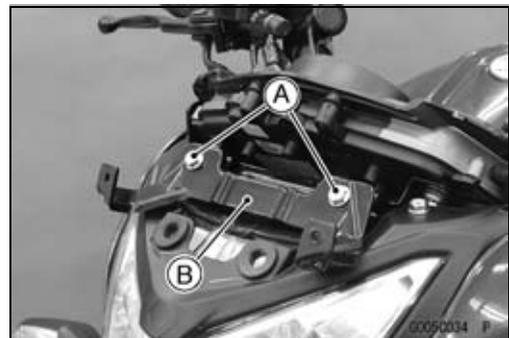
- Remove:
Bolts [A] and Nuts
Holder [B]



- Remove the bolts [A] and washers.
- Clear the projections [B] and remove the cover [C].

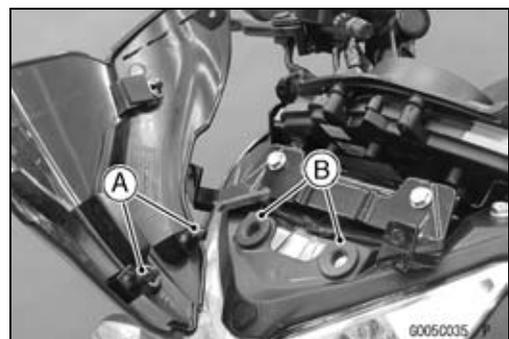


- Remove:
Bolts [A]
Bracket [B]



License Plate Bracket Installation

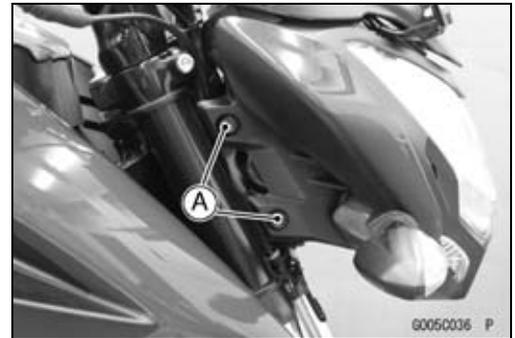
- Installation is the reverse of removal.
- Insert the projections [A] on the cover into the holes [B].



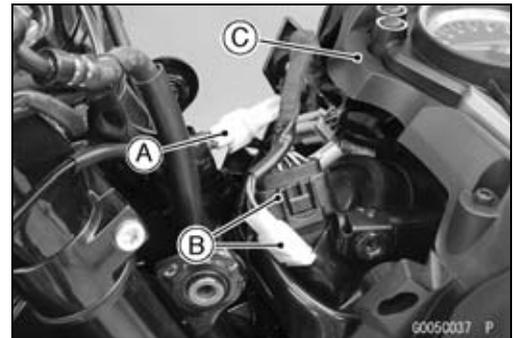
Headlight Cover

Headlight Cover Removal

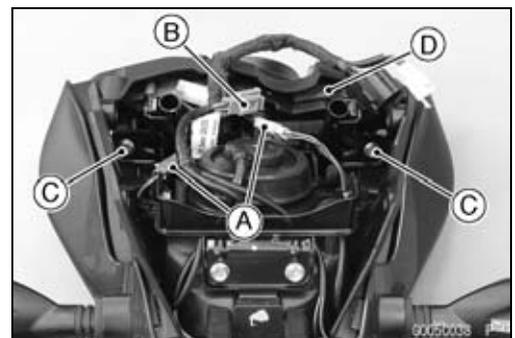
- Remove the bolts [A] and collars (both sides).



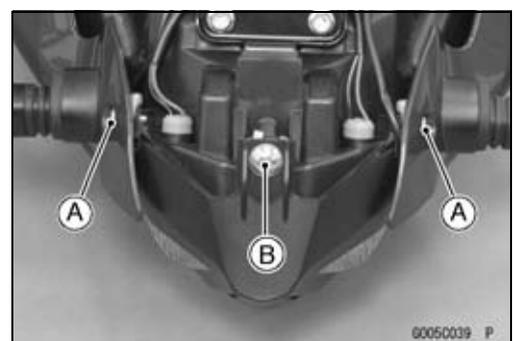
- Disconnect:
 - Speed Sensor Lead Connector [A]
 - Main Harness Connectors [B]
- Remove the headlight assy [C].



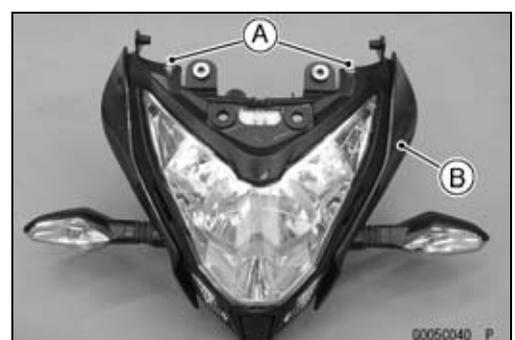
- Remove the license plate bracket (see License Plate Bracket Removal).
- Disconnect:
 - Turn Signal Light Lead Connectors [A]
 - Headlight/City Light Lead Connector [B]
- Remove:
 - Bolts [C]
 - Meter Assy [D]



- Remove:
 - Screws [A] and Washers
 - Screw [B]



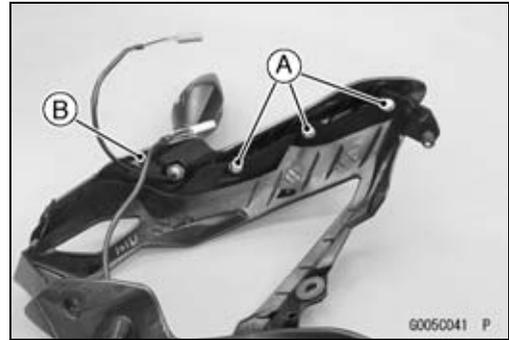
- Remove:
 - Bolts [A]
 - Headlight Cover Assy [B]



15-14 FRAME

Headlight Cover

- Remove the screws [A] and washers, and remove the cover [B].



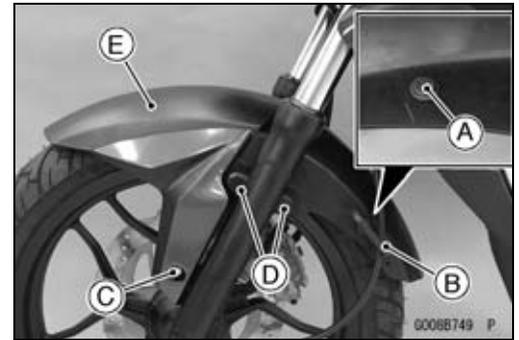
Headlight Cover Installation

- Installation is the reverse of removal.

Fenders

Front Fender Removal

- Remove the pin [A] and remove the guide [B].
- Remove:
 - Front Fender Bolts [C] (Both Sides)
 - Front Fender Bracket Bolts [D] (Both Sides)
 - Brake Hose Bracket (Right Side)
 - Front Fender [E]



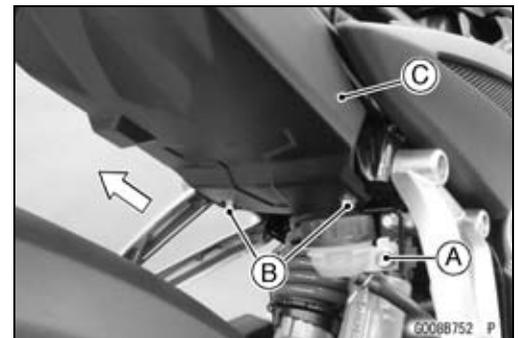
Front Fender Installation

- Installation is the reverse of removal.
- Install the brake hose bracket [A] to the right side of the fender.
- Tighten:
 - Torque - Front Fender Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
 - Front Fender Bracket Bolts: 19 N·m (1.9 kgf·m, 14 ft·lb)



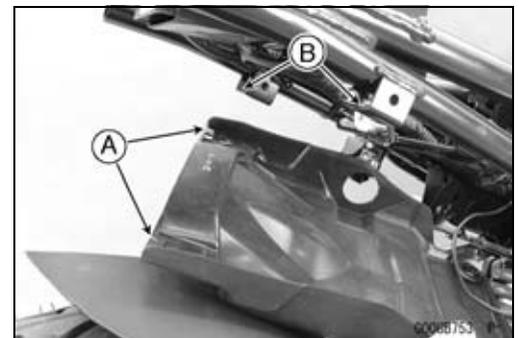
Rear Fender Removal

- Remove:
 - Seat Cover (see Seat Cover Removal)
 - Rear Master Cylinder Mounting Bolt [A]
 - Rear Fender Bolts [B] and Washers
- Remove the rear fender [C] backward.



Rear Fender Installation

- Installation is the reverse of removal.
- Hang the hooks [A] on the frame brackets [B].
- Tighten:
 - Torque - Rear Fender Bolts: 4.9 N·m (0.50 kgf·m, 43 in·lb)

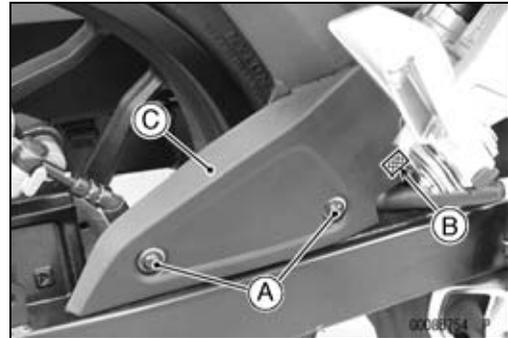


15-16 FRAME

Guard

Mud Guard Removal

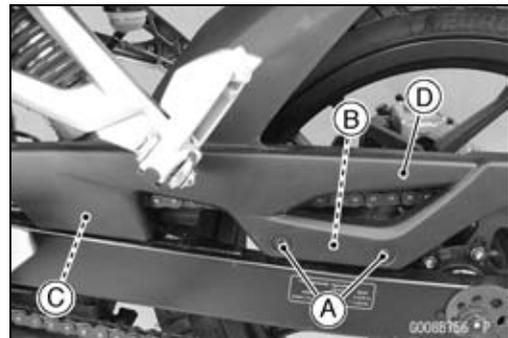
- Remove the mud guard cover bolts [A].
- Detach the hook fastener [B] and remove the mud guard cover [C].



- Remove the mud guard bolts (front) [A] and collars.

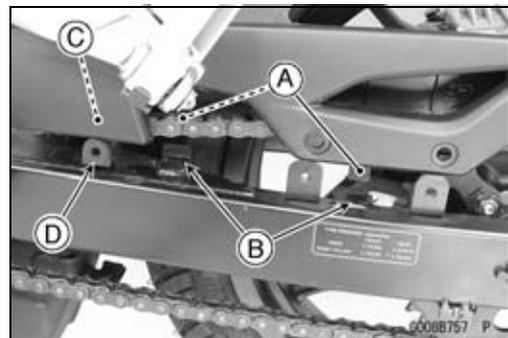


- Remove the mud guard bolts (side) [A].
- Clear the hook [B] and projection [C], and remove the mud guard [D].

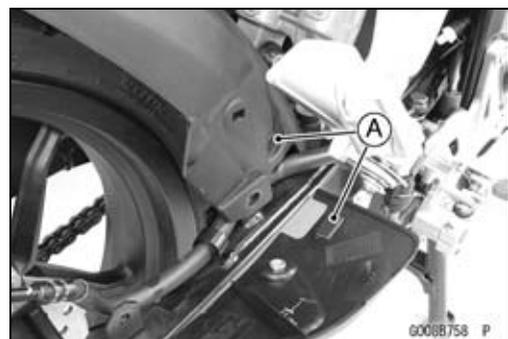


Mud Guard Installation

- Installation is the reverse of removal.
- Insert the hooks [A] into the slits [B], and insert the projection [C] into the hole [D].



- Fit the hook fasteners [A].
- Tighten:
Torque - Mud Guard Bolts (Front): 8.8 N·m (0.90 kgf·m, 78 in·lb)



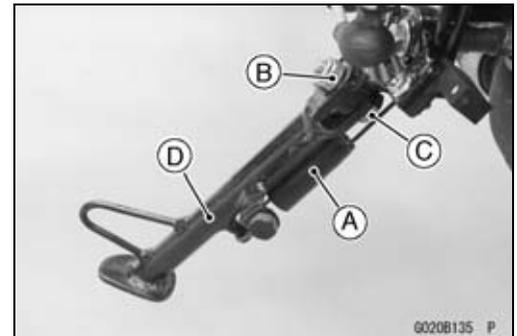
Side Stand

Side Stand Removal

- Raise the rear wheel off the ground with the stand [A].



- Remove:
 - Spring [A]
 - Side Stand Nut [B]
 - Side Stand Bolt [C]
 - Side Stand [D]

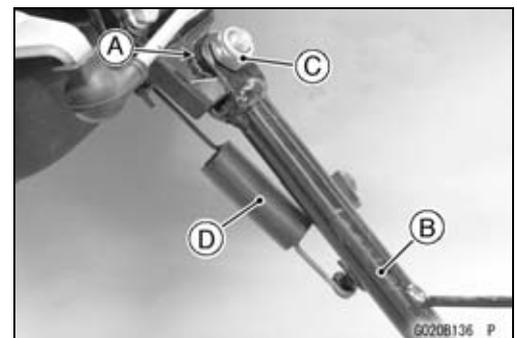


Side Stand Installation

- Apply grease to the sliding area [A] of the side stand [B].
- Replace the side stand nut [C] with a new one.
- Tighten the side stand bolt, and then lock it with the side stand nut.

Torque - Side Stand Bolt: 27 N·m (2.8 kgf·m, 20 ft·lb)

- Install the spring [D] as shown.

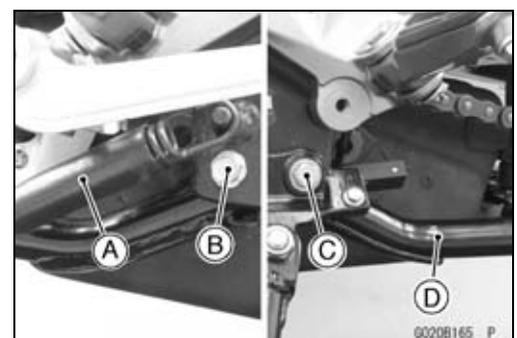


Center Stand Removal

- Raise the rear wheel off the ground with the stand [A].



- Remove:
 - Shift Pedal (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
 - Spring [A]
 - Right Center Stand Bolt [B]
 - Left Center Stand Bolt and Washer [C]
- Slide the center stand [D] downward and forward to clear the side stand switch lead.

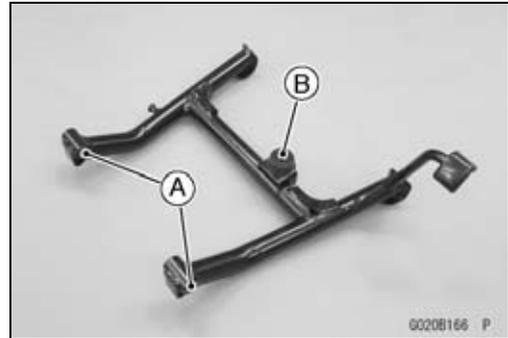


15-18 FRAME

Side Stand

Center Stand Installation

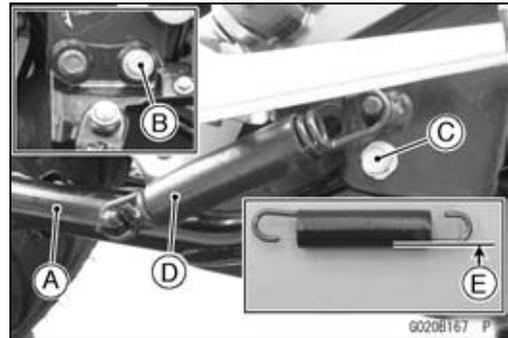
- Be sure that the collars [A] are in position.
- Apply grease to the inside of the collars.
- ★ If the damper [B] is damaged, replace it.



- Install the center stand [A].
- Tighten the left center stand bolt [B] together with the washer, and right center stand bolt [C].

Torque - Center Stand Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Hook the spring [D] so that the straight side [E] of it faces forward.
- Install the shift pedal (see Shift Pedal Installation in the Crankshaft/Transmission chapter).



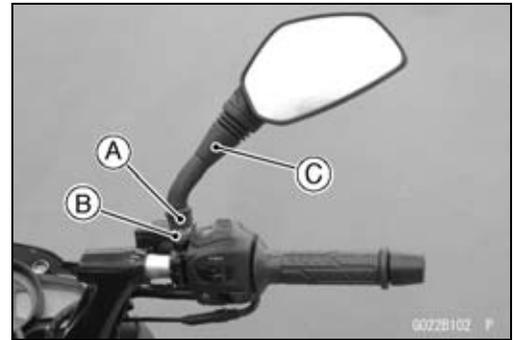
Rear View Mirrors

Rear View Mirrors Removal

- Slide the rubber cover [A].
- Loosen the locknut [B], and remove the rear view mirror [C].

NOTE

- *The right rear view mirror stay and lock nut are left-hand threads.*



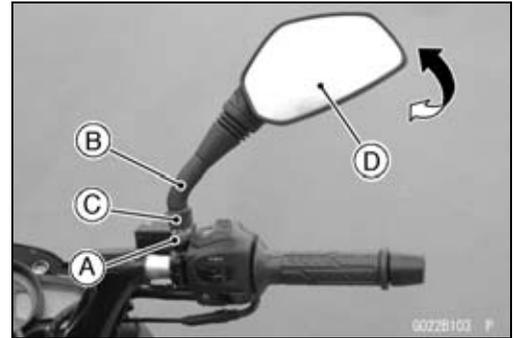
Rear View Mirrors Installation

- Install the rear view mirror, and tighten the locknut [A].
- Turn the stay [B] to assure the safe conditions of the rear with operator sat on the motorcycle.

NOTE

- *The right rear view mirror stay and lock nut are left-hand threads.*

- Install the rubber cover [C].
- Adjust the rear view mirror slightly with its mirror [D].
- Installation and adjustment of the left side are common with those of the right side. Follow the procedure specified at the right side.



15-20 FRAME

Frame

Frame Inspection

- Visually inspect the frame for cracks, dents, bending, or warp.
- ★ If there is any damage to the frame, replace it.

 WARNING
--

A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

Electrical System

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16-2 ELECTRICAL SYSTEM

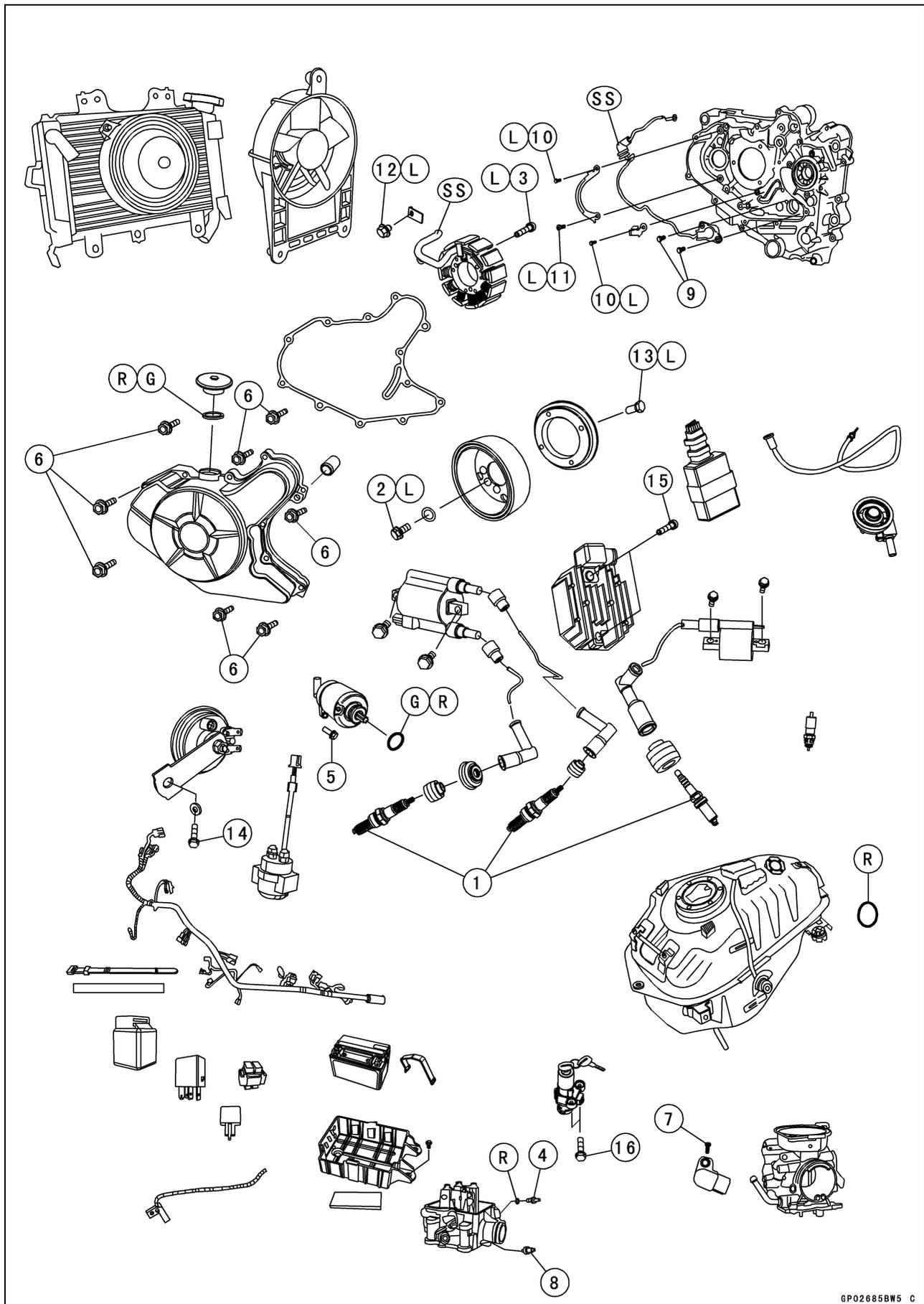
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Exploded View

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16-4 ELECTRICAL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Spark Plugs	14	1.4	10	
2	Alternator Rotor Bolt	58	5.9	43	L
3	Stator Coil Bolts	7.4	0.75	65 in·lb	L
4	Water Temperature Sensor	13	1.3	115 in·lb	
5	Starter Motor Mounting Bolts	11	1.1	97 in·lb	
6	Alternator Cover Bolts	11	1.1	97 in·lb	
7	Throttle Sensor Mounting Bolt	5.0	0.51	44 in·lb	
8	Oil Pressure Switch	13	1.3	115 in·lb	
9	Neutral Switch Bolts	5.9	0.60	52 in·lb	
10	Neutral Switch Lead Holding Plate Bolts	5.9	0.60	52 in·lb	L
11	Neutral Switch Lead Holding Plate Screw	5.9	0.60	52 in·lb	L
12	Alternator Lead Holding Plate Bolt	4.9	0.50	43 in·lb	L
13	Starter Motor Clutch Bolts	15	1.5	11	L
14	Horn Mounting Bolt	20	2.0	15	
15	Regulator/Rectifier Bolts	11	1.1	97 in·lb	
16	Ignition Switch Bolts	11	1.1	97 in·lb	

G: Apply grease.

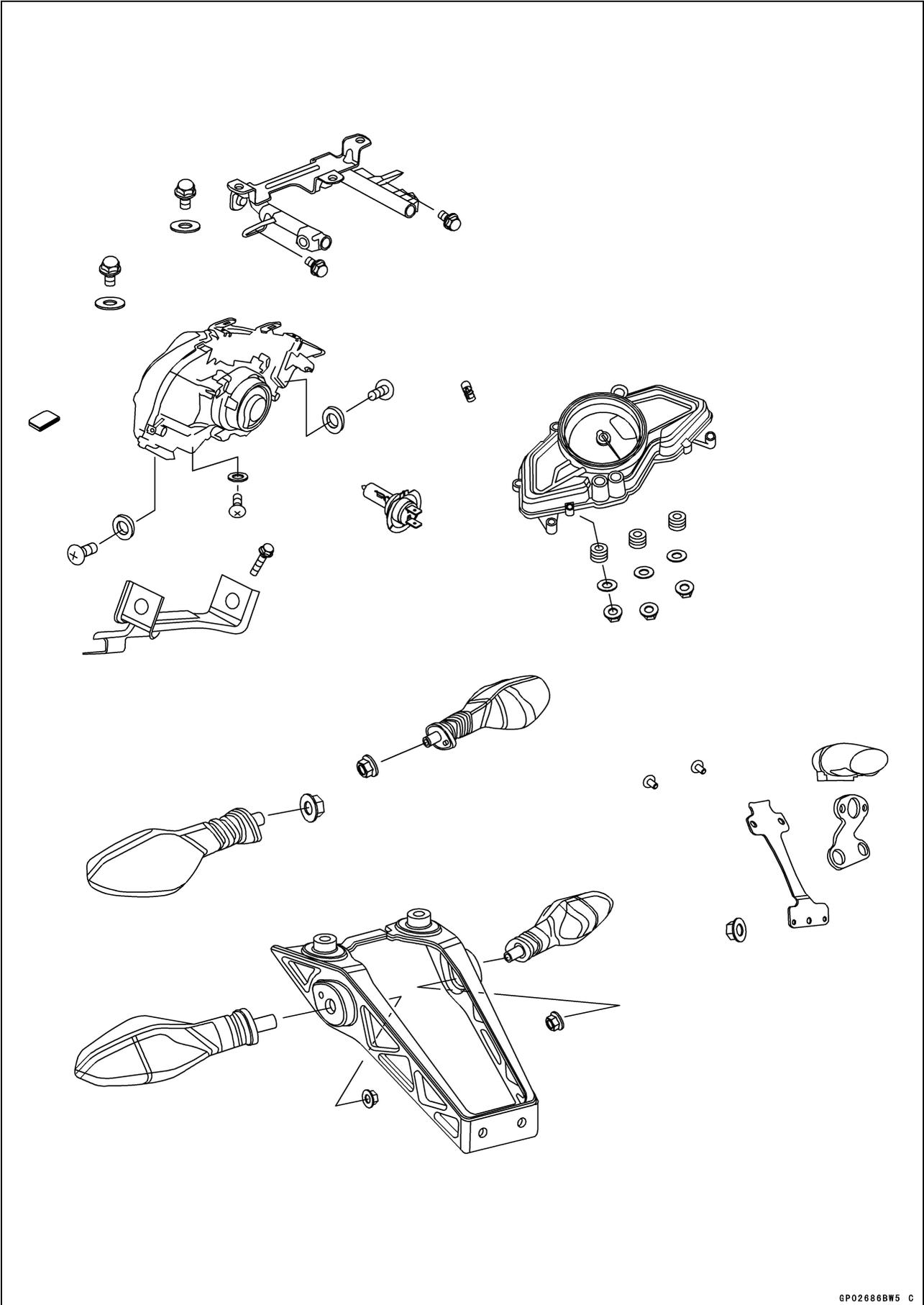
L: Apply a non-permanent locking agent.

R: Replacement Parts

SS: Apply silicone sealant.

16-6 ELECTRICAL SYSTEM

Exploded View



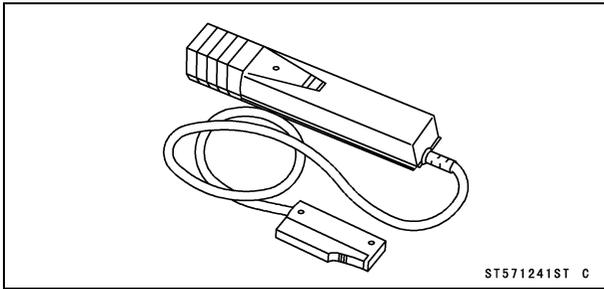
Specifications

Item	Standard
Battery Type Model Name Capacity Voltage	Sealed Battery ETZ-9-BS 12 V 8 Ah 12.6 V or more
Charging System Type Alternator Output Voltage Stator Coil Resistance Charging Voltage (Regulator/Rectifier Output Voltage)	Three-phase AC 55 V or more at 4 000 r/min (rpm) 0.8 \pm 0.1 Ω at 25°C (77°F) 14.4 \pm 0.3 V at 1 500 r/min (rpm)
Ignition System Crankshaft Sensor: Resistance Peak Voltage Gap Ignition Coil: Central: Primary Winding Resistance Secondary Winding Resistance Primary Peak Voltage Side: Primary Winding Resistance Secondary Winding Resistance Primary Peak Voltage Spark Plug: Type: Central Side Gap	195 ~ 235 Ω at 25°C (77°F) 1.0 V or more 0.5 ~ 0.7 mm (0.02 ~ 0.03 in.) 0.3 ~ 0.5 Ω 4.5 ~ 6.5 k Ω 100 ~ 300 V 0.4 ~ 0.6 Ω 5.5 ~ 7.5 k Ω 100 ~ 300 V BOSCH VR5NE CHAMPION P-RG-6HCC 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Switches and Sensors Rear Brake Light Switch Timing Water Temperature Sensor Resistance: Fuel Level Sensor Resistance: Full Position Empty Position Radiator Relay Resistance Main Throttle Sensor: Input Voltage Output Voltage Resistance	ON after about 11.5 mm of pedal travel 1.88 ~ 2.12 Ω at 25°C 10 \pm 3 Ω 110 \pm 5 Ω 89 ~ 110 Ω DC 5 ~ 10 V DC 0.65 ~ 0.75 V at idle throttle opening DC 3.4 ~ 3.8 V at full throttle opening (for reference) 5 k Ω

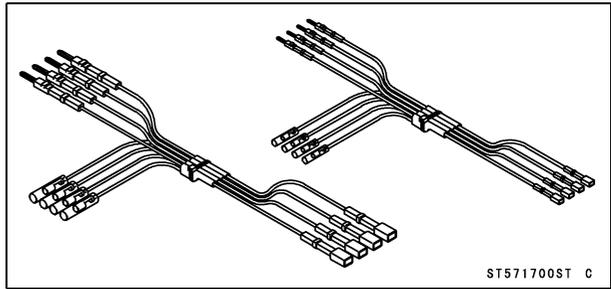
16-8 ELECTRICAL SYSTEM

Special Tools and Sealant

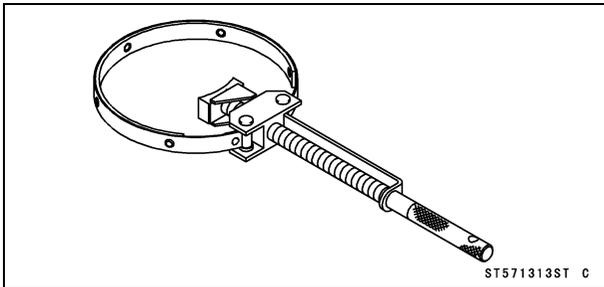
Timing Light:
57001-1241



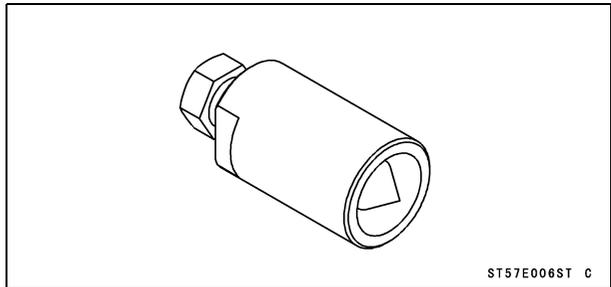
Measuring Adapter:
57001-1700



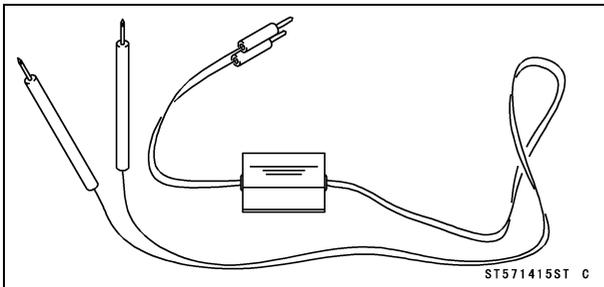
Flywheel Holder:
57001-1313



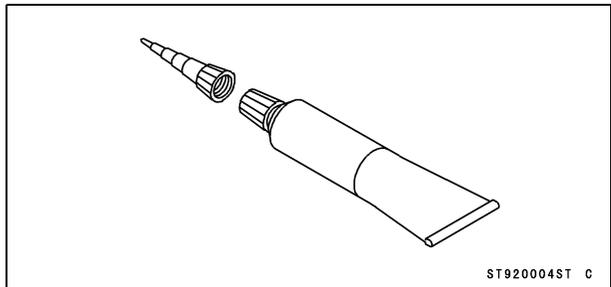
Flywheel Puller Assembly:
57001-E006



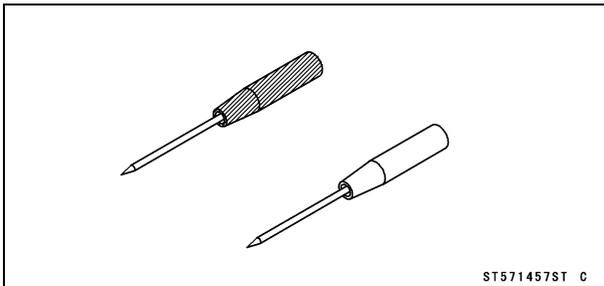
Peak Voltage Adapter:
57001-1415



Liquid Gasket, TB1211F:
92104-0004

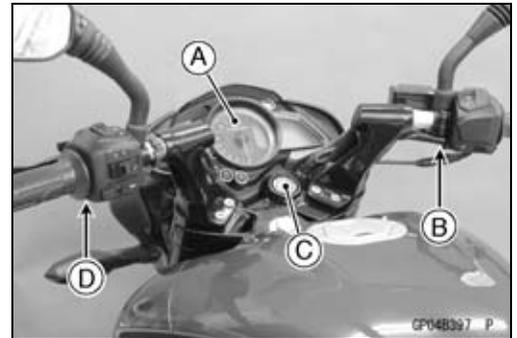


Needle Adapter Set:
57001-1457

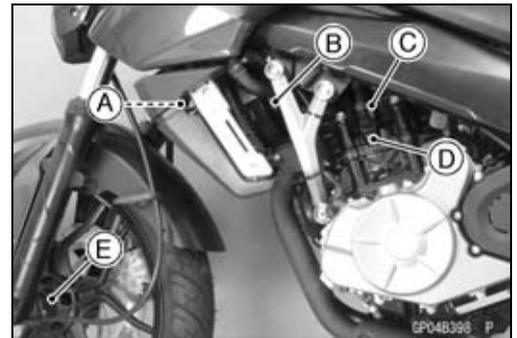


Parts Location

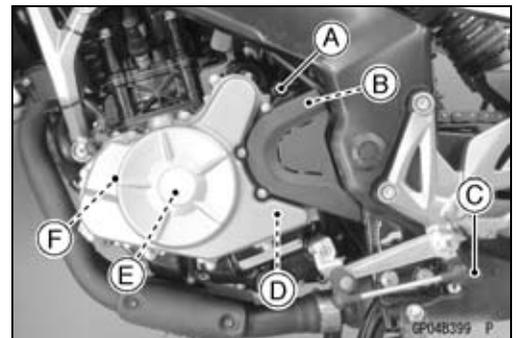
- Meter Unit [A]
- Front Brake Light Switch [B]
- Ignition Switch [C]
- Starter Lockout Switch [D]



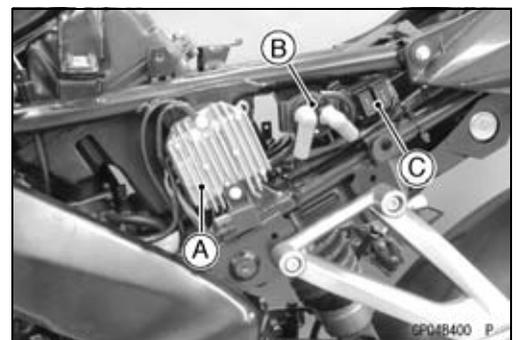
- Horn [A]
- Radiator Fan Motor [B]
- Central Spark Plug [C]
- Side Spark Plug (Left) [D]
- Speed Sensor [E]



- Engine Ground [A]
- Frame Ground [B]
- Side Stand Switch [C]
- Neutral Switch [D]
- Alternator [E]
- Crankshaft Sensor [F]



- Regulator/Rectifier [A]
- Starter Relay [B]
- Fuse Box [C]



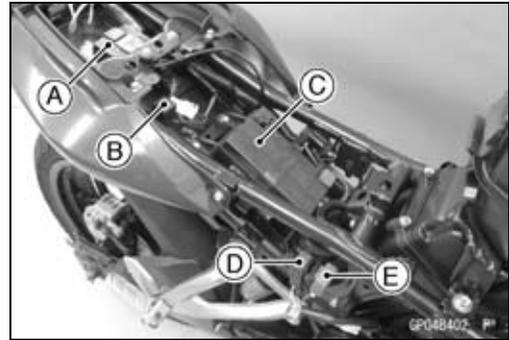
- Fuel Level Sensor [A]



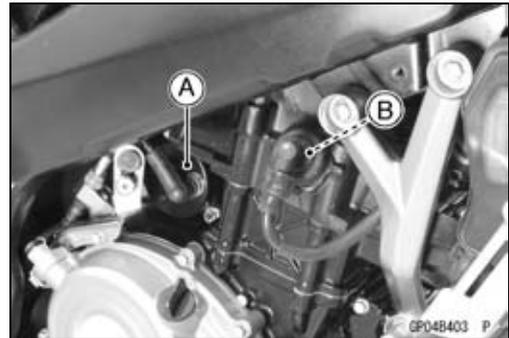
16-10 ELECTRICAL SYSTEM

Parts Location

CDI Unit [A]
Headlight Relay [B]
Battery [C]
Radiator Fan Relay [D]
Turn Signal Light Relay [E]



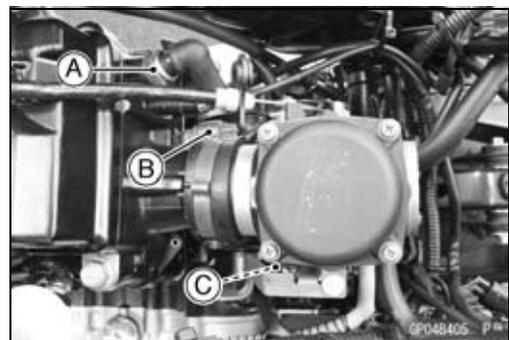
Starter Motor [A]
Side Spark Plug (Right) [B]



Rear Brake Light Switch [A]



Oil Pressure Switch [A]
Water Temperature Sensor [B]
Throttle Sensor [C]

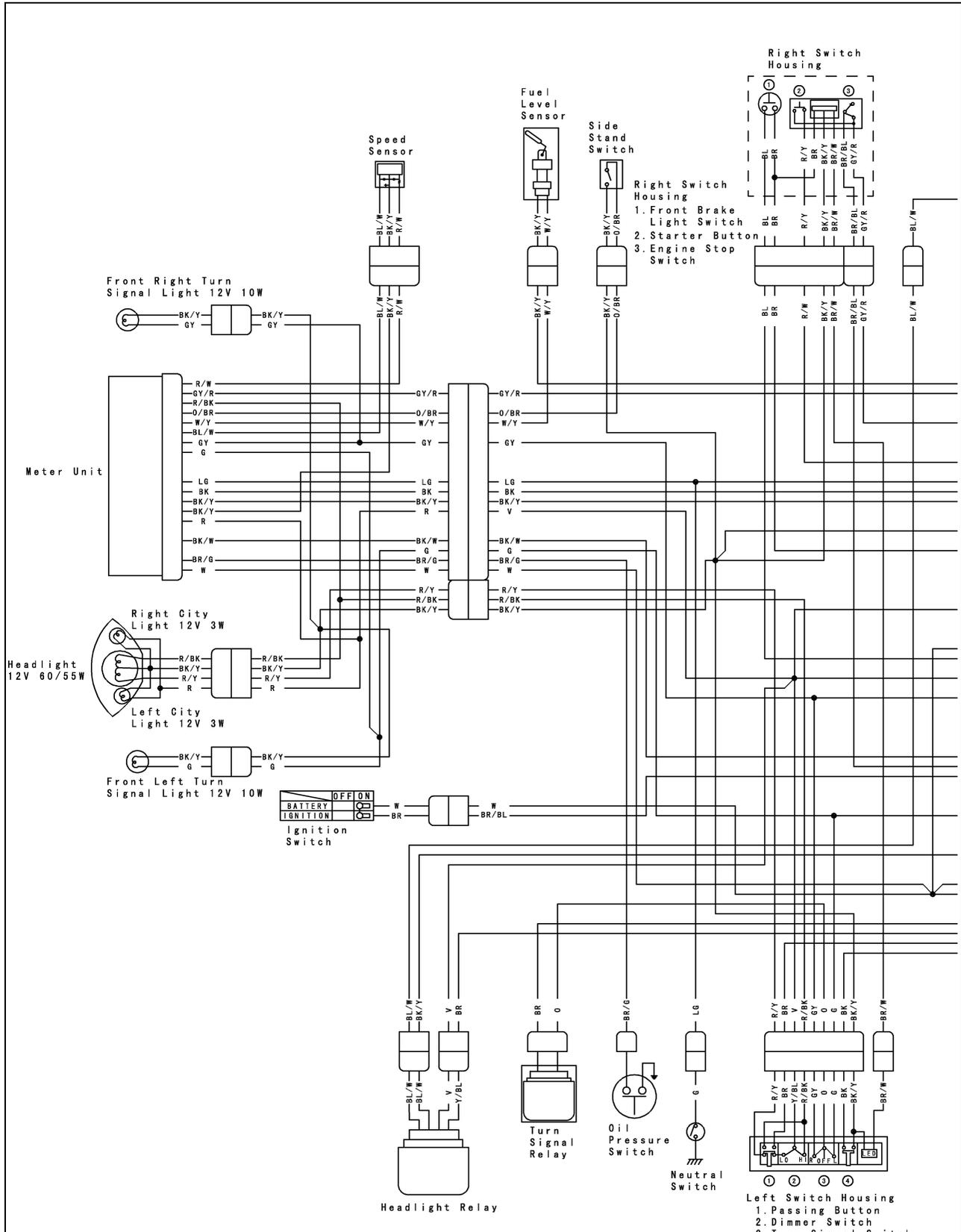


Parts Location

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16-12 ELECTRICAL SYSTEM

Wiring Diagram

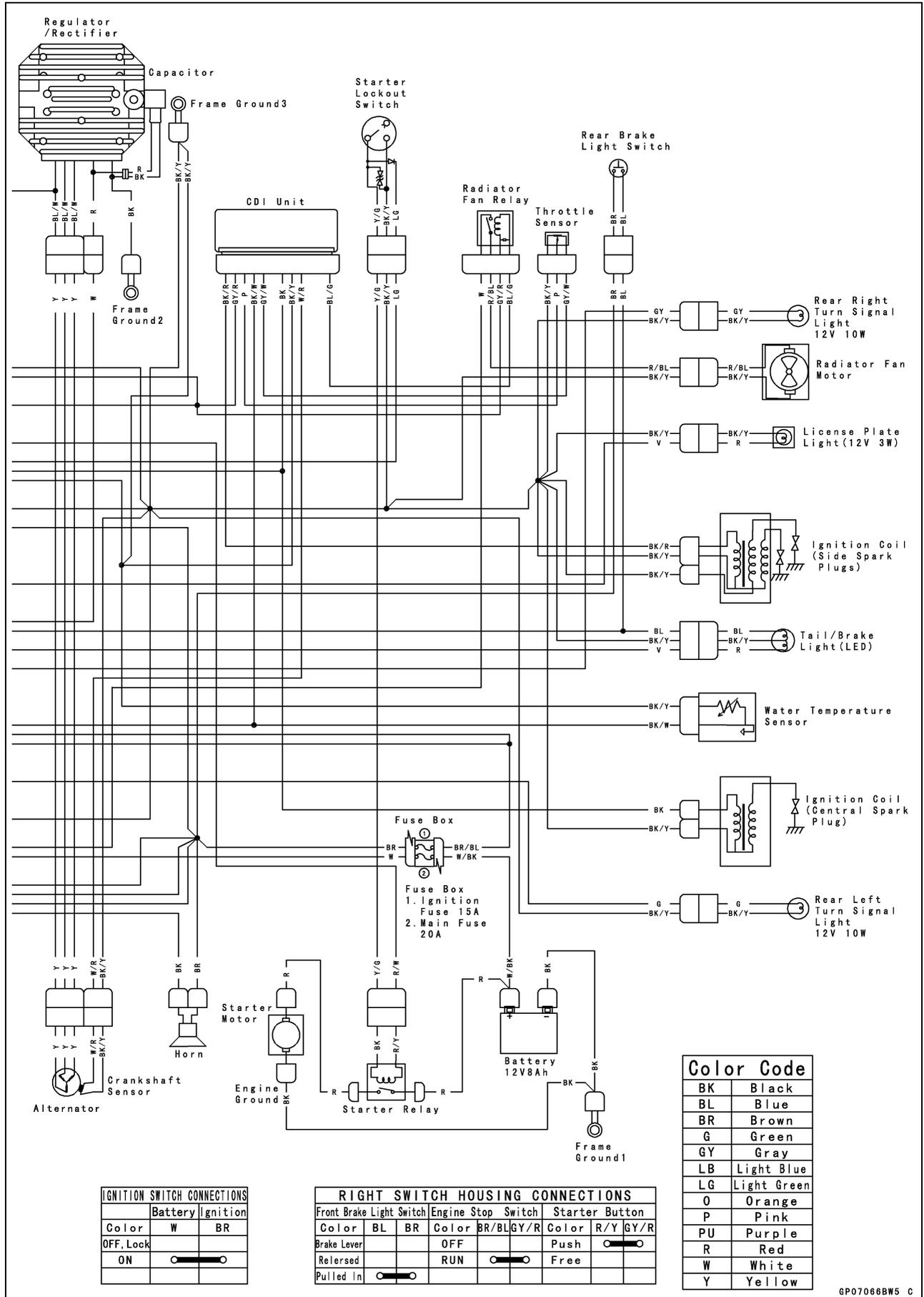


LEFT SWITCH HOUSING CONNECTIONS

Horn Button		Turn Signal Switch			Dimmer Switch			Passing Button							
Color	BK	BK/Y	Color	G	O	GY	Color	R/Y	Y/BL	R/BK	Color	R/Y	Y/BL	BR	R/BK
Push	●	●	L	●	●	●	HI	●	●	●	Push	●	●	●	●
Released			R				LO				Free	●	●		

- Left Switch Housing**
1. Passing Button
 2. Dimmer Switch
 3. Turn Signal Switch
 4. Horn Button

Wiring Diagram



16-14 ELECTRICAL SYSTEM

Precautions

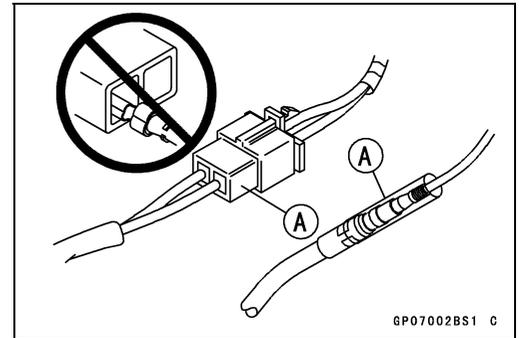
There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch 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.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning, fraying, etc. Poor leads and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect a tester between the ends of the leads.
- ★ If the tester does not read about 0Ω , the lead is defective. Replace the lead or the wiring harness [A] if necessary.



16-16 ELECTRICAL SYSTEM

Battery

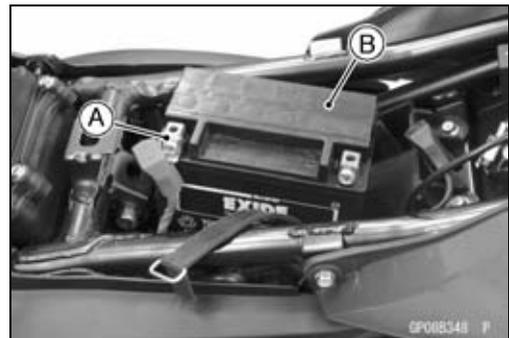
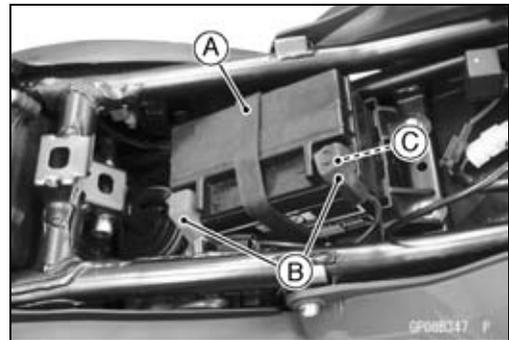
Battery Removal

- Turn the ignition switch off.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Remove the rubber band [A].
- Slide the caps [B].
- Disconnect the negative (-) cable [C].

NOTICE

Be sure to disconnect the negative (-) cable first.

- Disconnect the positive (+) cable [A], and remove the battery [B].

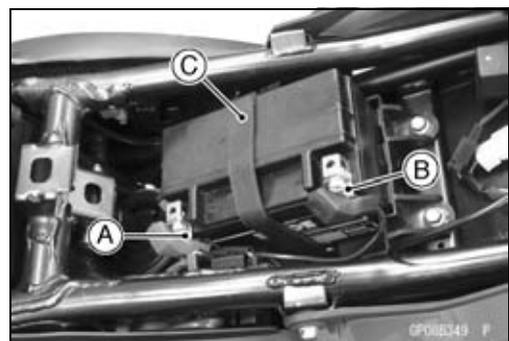


Battery Installation

- Visually inspect the surface of the battery container.
- ★ If any signs of cracking or electrolyte leakage from the sides of the battery.
- Put the battery into the battery case so that the positive (+) terminal faces front side of the motorcycle.
- Connect the positive (+) cable [A] (red cap) to the positive (+) terminal first, and then the negative (-) cable [B] (black cap) to the negative (-) terminal.
- Apply a light coat of grease on the terminals to prevent corrosion.
- Cover the terminals with the caps.
- Install the rubber band [C].

NOTICE

If each battery cable is not correctly disconnected or connected, sparks can arise at electrical connections, causing damage to electrical parts.



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

BR200A: ETZ-9-BS

NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.

NOTICE

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.

⚠ DANGER

Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

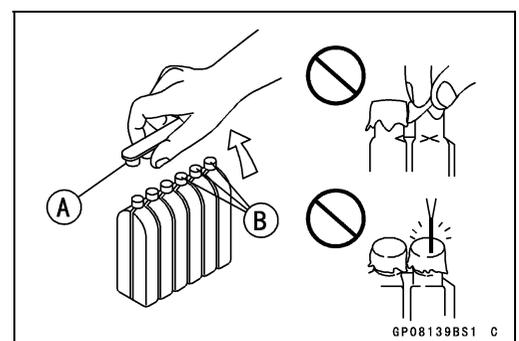
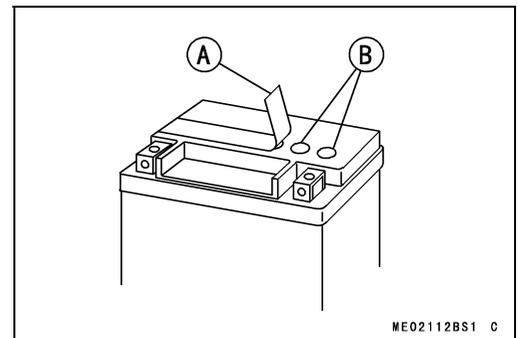
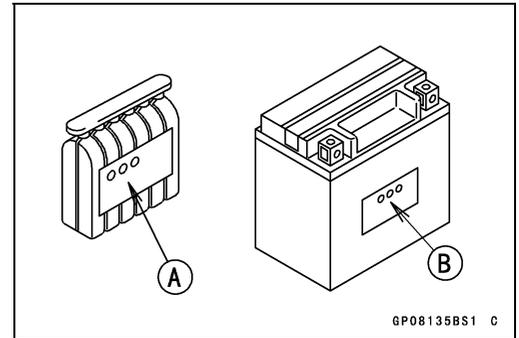
NOTE

○The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.

- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

NOTE

○Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.



16-18 ELECTRICAL SYSTEM

Battery

- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

NOTE

○Do not tilt the electrolyte container.

- Check the electrolyte flow.
- ★ If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.

NOTE

○Be careful not to have the battery fall down.

- Keep the container in place. Don't remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.

NOTICE

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.

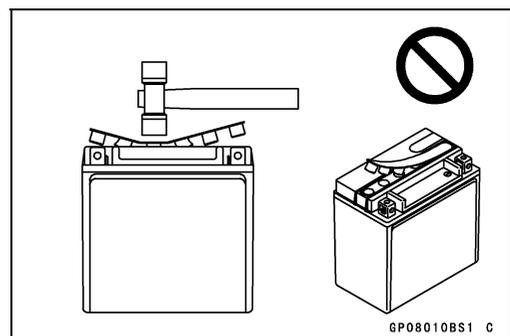
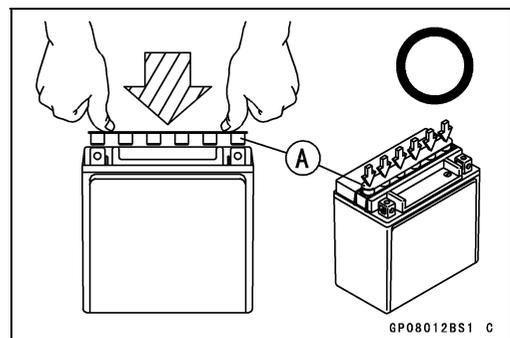
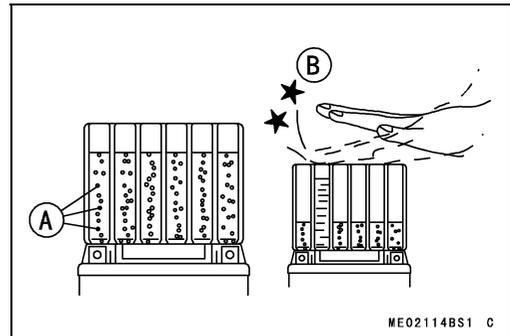
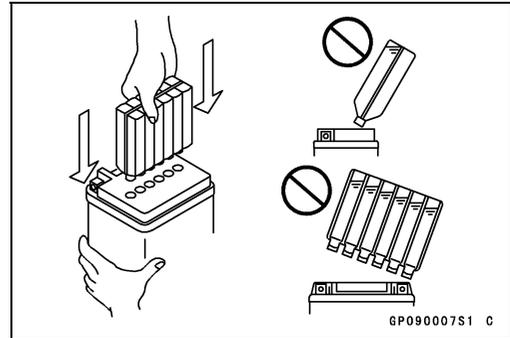
- After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.
- Make sure that the container cells have emptied completely, and remove the container from the battery.
- Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.

NOTICE

Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.

NOTE

○Charging the battery immediately after filling can shorten service life.



Battery

Initial Charge

- Newly activated sealed batteries require an initial charge.

Standard Charge: 0.8 A × 5 ~ 10 hours

- ★ If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:

Battery Mate 150-9

OptiMate PRO 4-S/PRO S/PRO2

Yuasa MB-2040/2060

Christie C10122S

- ★ If the above chargers are not available, use equivalent one.
- Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

NOTE

- *Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.6 V, repeat charging cycle.*
- *To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds. Re-check voltage and if less than 12.6 V repeat the charging cycle and load test. If still below 12.6 V the battery is defective.*

Precautions

- 1) No need of topping-up
No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.
- 2) Refreshing charge
If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).
When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.

If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

- 3) When you do not use the motorcycle for months.
Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge **once a month** during storage.
- 4) Battery life
If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

16-20 ELECTRICAL SYSTEM

Battery

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medical attention for more severe burns.

Interchange

A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

Charging Condition Inspection

- Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].
- Remove the battery (see Battery Removal).
- Measure the battery terminal voltage.

NOTE

○ Measure with a digital voltmeter which can be read one decimal place voltage.

★ If the reading is 12.6 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

Battery Terminal Voltage

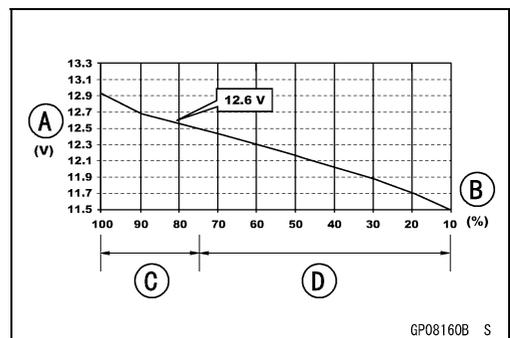
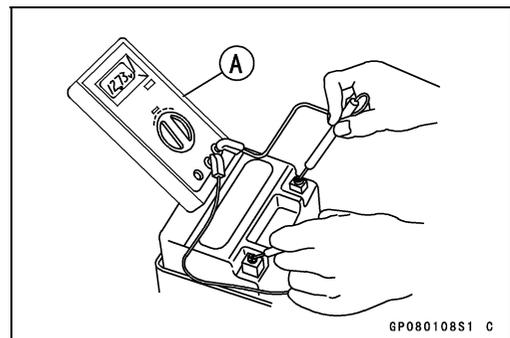
Standard: 12.6 V or more

Terminal Voltage (V) [A]

Battery Charge Rate (%) [B]

Good [C]

Refresh charge is required [D]

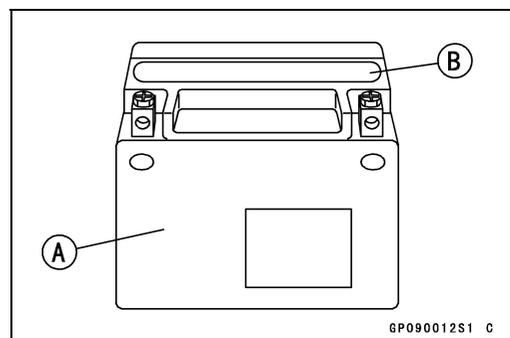


Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



Battery

Terminal Voltage: 11.5 ~ less than 12.6 V
 Standard Charge 0.8 A × 5 ~ 10 h (see following chart)
 Quick Charge 4 A × 1 h

NOTICE

If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

Terminal Voltage: less than 11.5 V
 Charging Method: 0.8 A × 13 ~ 15 h

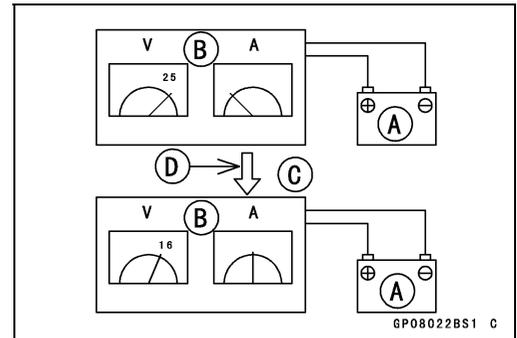
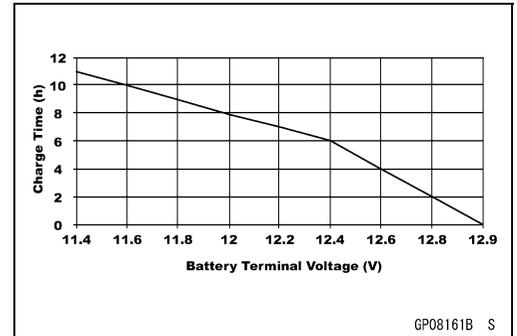
NOTE

○ Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.

Battery [A]
 Battery Charger [B]
 Standard Value [C]
 Current starts to flow [D]

- Determine the battery condition after refresh charge.
- Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Criteria	Judgement
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

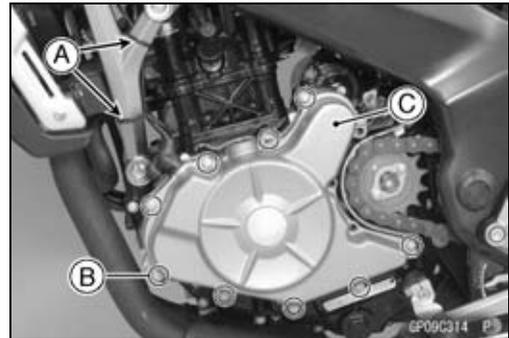
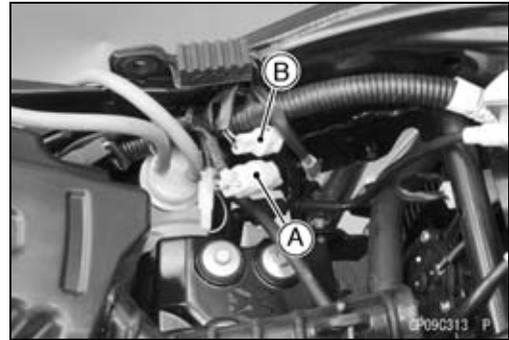


16-22 ELECTRICAL SYSTEM

Charging System

Alternator Cover Removal

- Remove:
 - Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect:
 - Alternator Lead Connector [A]
 - Crankshaft Sensor Lead Connector [B]
- Remove:
 - Bands [A]
 - Alternator Cover Bolts [B]
 - Alternator Cover [C]



Alternator Cover Installation

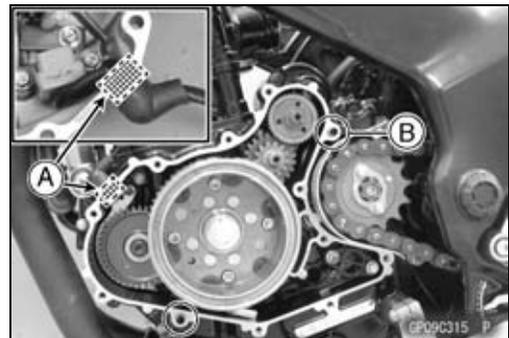
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the grommets [A] on the crankcase and the alternator cover.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Check that the dowel pins [B] are in place on the crankcase.
- Replace the alternator cover gasket with a new one.
- Tighten:

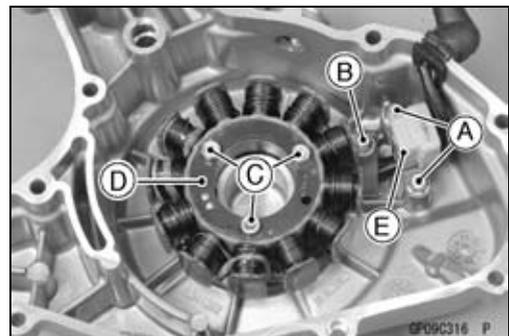
Torque - Alternator Cover Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).



Stator Coil Removal

- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Crankshaft Sensor Bolts [A]
 - Alternator Lead Holding Plate Bolt [B] and Plate
 - Alternator/Crankshaft Sensor Lead Grommet
 - Stator Coil Bolts [C]
- Remove the stator coil [D] and crankshaft sensor [E] from the alternator cover.



Charging System

Stator Coil Installation

- Apply a non-permanent locking agent to the threads of the stator coil bolts and tighten them.

Torque - Stator Coil Bolts: 7.4 N·m (0.75 kgf·m, 65 in·lb)

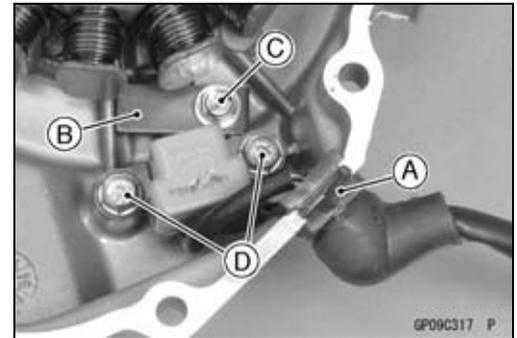
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the alternator/crankshaft sensor lead grommet [A], and fit the grommet into the notch of the cover securely.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Hold the alternator lead with a holding plate [B], and apply a non-permanent locking agent to the threads of the plate bolt [C] and crankshaft sensor bolts [D], and tighten them.

Torque - Alternator Lead Holding Plate Bolt: 4.9 N·m (0.50 kgf·m, 43 in·lb)

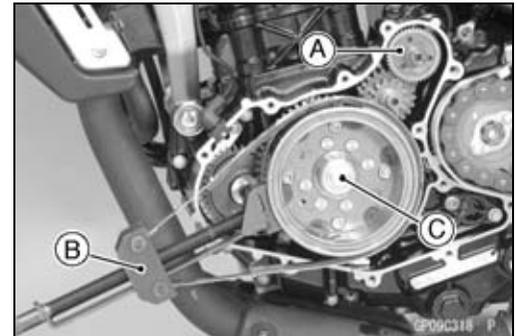
- Install the alternator cover (see Alternator Cover Installation).



Alternator Rotor Removal

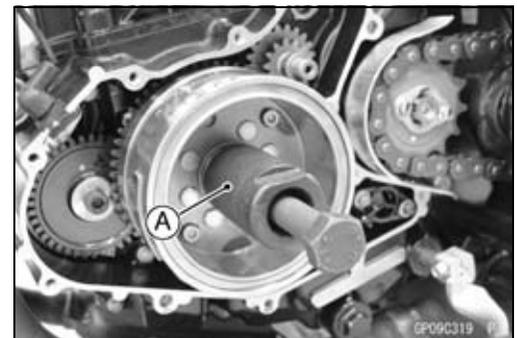
- Remove the alternator cover (see Alternator Cover Removal).
- Remove the torque limiter gear [A].
- Hold the alternator rotor steady with the flywheel holder [B], and remove the rotor bolt [C] and washer.

Special Tool - Flywheel Holder: 57001-1313



- Using the flywheel puller [A], remove the alternator rotor from the crankshaft.

Special Tool - Flywheel Puller Assembly: 57001-E006

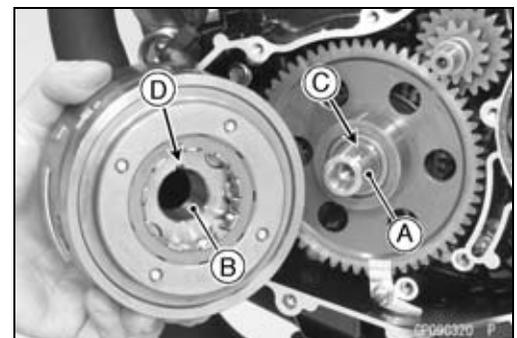


NOTICE

Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Alternator Rotor Installation

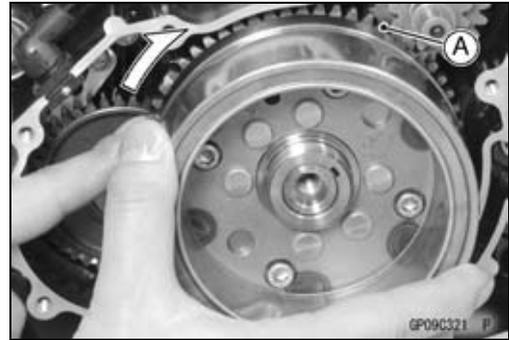
- Apply grease to the starter clutch gear.
- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
 - Crankshaft Tapered Portion [A]
 - Alternator Rotor Tapered Portion [B]
- Fit the woodruff key [C] securely in the slot of the crankshaft.
- Align the woodruff key on the crankshaft with groove [D] on the alternator rotor.



16-24 ELECTRICAL SYSTEM

Charging System

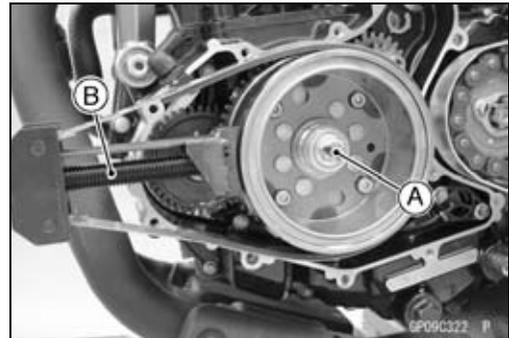
- Push the alternator rotor while turning the starter clutch gear [A] clockwise until it engaged into the starter clutch case.



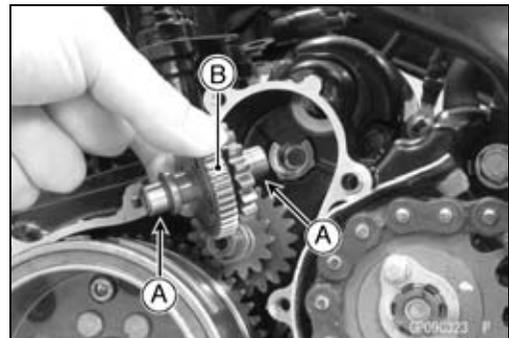
- Apply a non-permanent locking agent to the alternator rotor bolt.
- Install the washer and rotor bolt.
- Tighten the alternator rotor bolt [A] while holding the alternator rotor steadily with the flywheel holder [B].

Special Tool - Flywheel Holder: 57001-1313

Torque - Alternator Rotor Bolt: 58 N·m (5.9 kgf·m, 43 ft·lb)



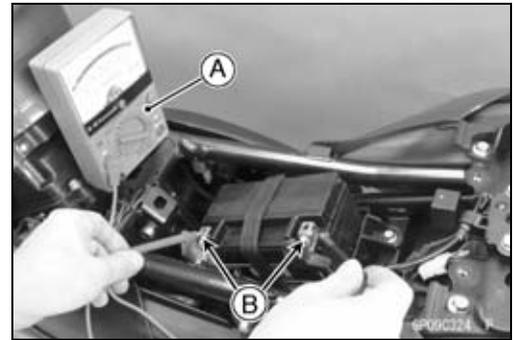
- Apply molybdenum disulfide grease [A] to the torque limiter gear [B], and install it.
- Install the alternator cover (see Alternator Cover Installation).



Charging System

Charging Voltage Inspection

- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Check that the ignition switch is turned off, and connect a tester [A] to the battery terminals [B].
- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.



Charging Voltage at 1 500 r/min (rpm)

Connections		Reading
Tester (+) to	Tester (-) to	
Battery (+)	Battery (-)	DC 14.4 ±0.3 V

- Turn off the ignition switch to stop the engine, and disconnect the tester.
- ★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★ If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

16-26 ELECTRICAL SYSTEM

Charging System

- To check the alternator output voltage, do the following procedures.
- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System chapter).
- Disconnect the alternator lead connector [A].
- Connect a tester as shown in the table 1.
- Install the fuel tank temporarily (see Fuel Tank Installation in the Fuel System chapter).
- Start the engine.
- Run it at the rpm given in the table 1.
- Note the voltage reading (total 3 measurements).

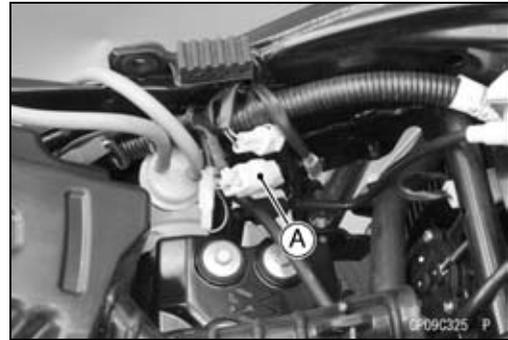


Table 1 Alternator Output Voltage at 4 000 r/min (rpm)

Connections		Reading
Tester (+) to	Tester (-) to	
One Y lead	Another Y lead	AC 55 V or more

- ★ If the output voltage shows the value in the table, the alternator operates properly. The regulator/rectifier is damaged.
- ★ If the output voltage shows a much lower reading than that given in the table, stop the engine and inspect the stator coil resistance.
- Check the stator coil resistance as follows.
- Stop the engine.
- Connect a tester as shown in the table 2.
- Note the reading (total 3 measurements).

Table 2 Stator Coil Resistance at 25°C (77°F)

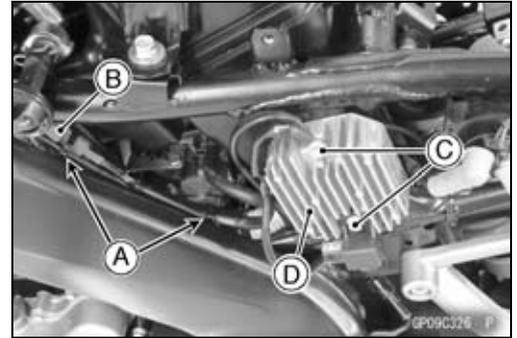
Connections		Reading
Tester (+) to	Tester (-) to	
One Y lead	Another Y lead	0.8 ±0.1 Ω

- ★ If there is more resistance than shown in the table, or no tester reading (infinity), the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
- Measure the resistance between each of the Y leads and chassis ground.
- ★ Any tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
- ★ If the stator coil has normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

Charging System

Regulator/Rectifier Removal

- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Remove the bands [A].
- Disconnect the connector [B].
- Remove:
 - Regulator/Rectifier Bolts [C]
 - Regulator/Rectifier [D]



Regulator/Rectifier Installation

- Installation is the reverse of removal.
- Tighten:
 - Torque - Regulator/Rectifier Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

Charging System Troubleshooting

- Before inspection, remove all accessories that consume electrical power.

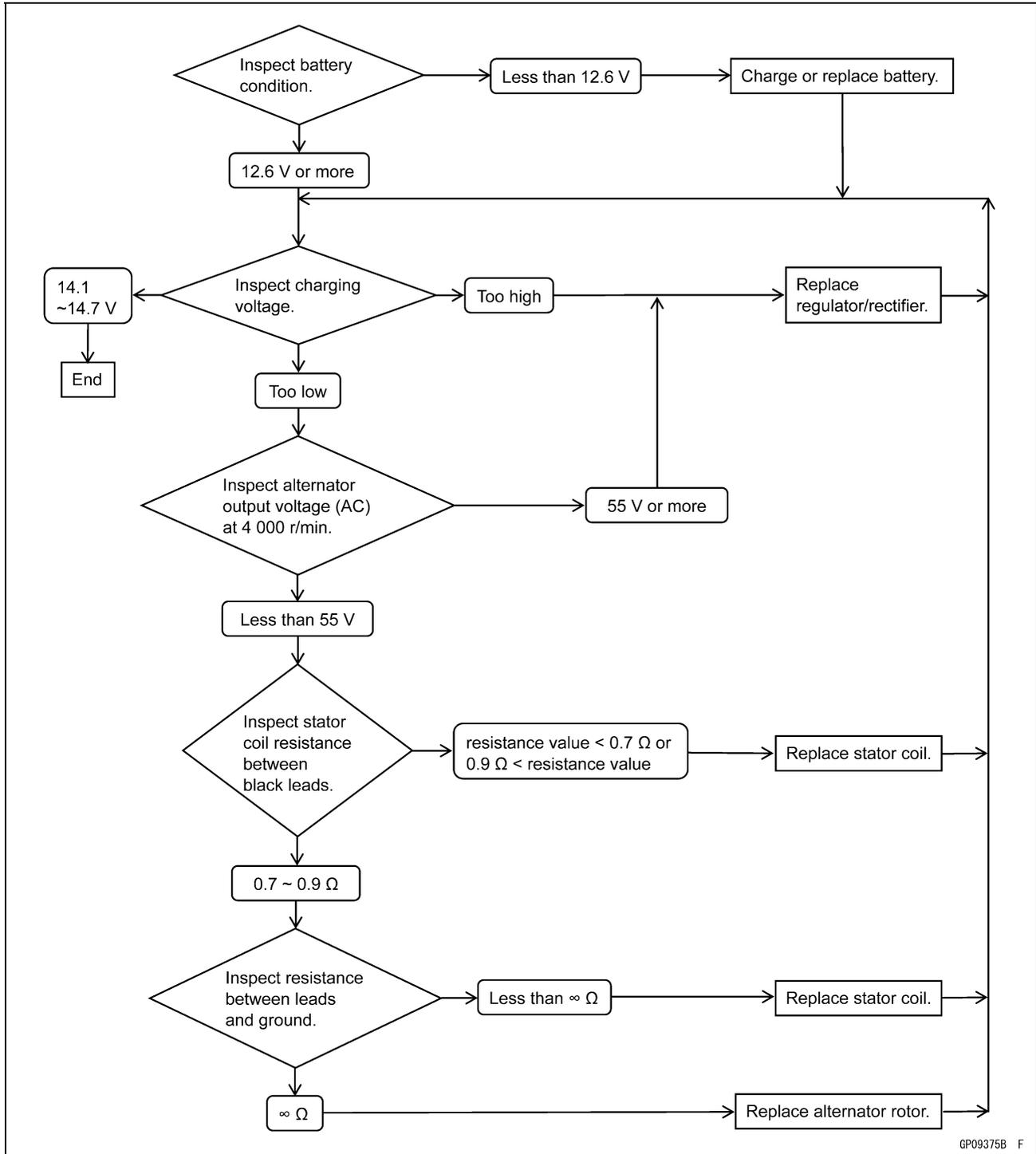
NOTE

○ *Even when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.*

- Pay attention to riding conditions and the customer's riding habits which could affect the charging system such as:
 - Frequent use at low engine speed → Battery discharged
 - Frequent and unnecessary brake pedal dragging → Battery discharged
- Recharge the battery if it is discharged.

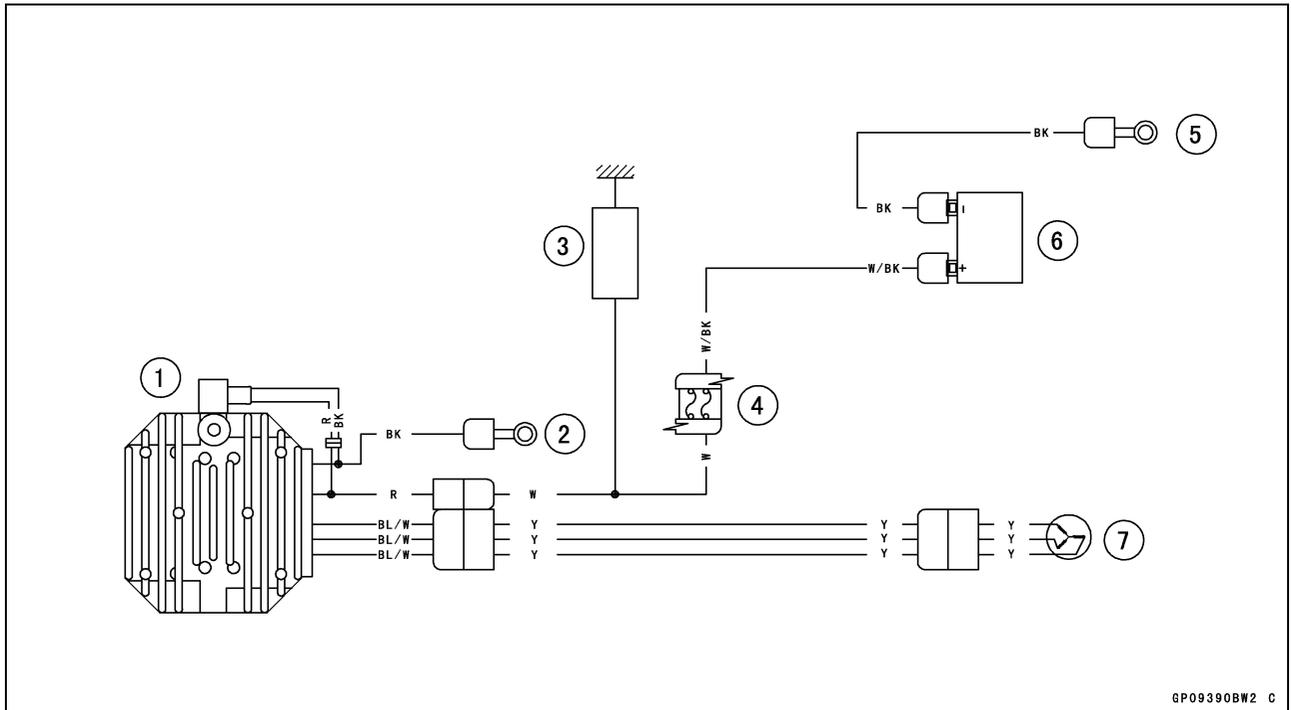
16-28 ELECTRICAL SYSTEM

Charging System



Charging System

Charging System Circuit



GP09390BW2 C

1. Regulator/Rectifier
2. Frame Ground 3
3. Load
4. Main Fuse 20 A
5. Frame Ground 4
6. Battery 12 V 8 Ah
7. Alternator

16-30 ELECTRICAL SYSTEM

Ignition System

⚠ WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or ignition coil lead while the engine is running, or you could receive a severe electrical shock.

NOTICE

Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent CDI unit damage.

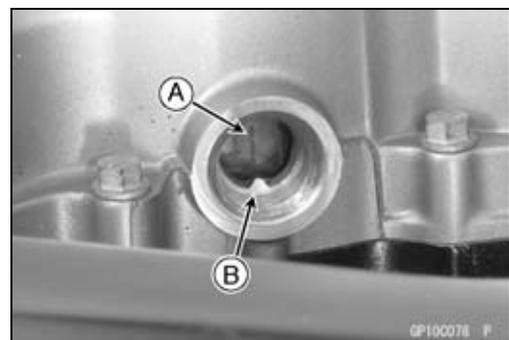
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and CDI unit.

Ignition Timing Inspection

- Remove:
 - Timing Inspection Cap [A]
- Attach the timing light [A] to the central ignition coil lead in the manner prescribed by the manufacturer.
Special Tool - Timing Light: 57001-1241



- Start the engine and aim the timing light at the ignition timing mark [A] on the rotor.
- Run the engine at the speeds specified and note the alignment of the ignition timing mark.
- Check the engine speed, using the engine revolution tester for high accuracy.



Ignition Timing

Engine speed [r/min (rpm)]	Projection [B] in hole aligns with:
1 400	T mark on alternator rotor

- ★ If the ignition timing is incorrect, check the crankshaft sensor (see Crankshaft Sensor Inspection).
- ★ If the crankshaft sensor are normal, replace the CDI unit.
- Tighten the timing inspection cap.

Crankshaft Sensor Removal

- Refer to the Stator Coil Removal.

Ignition System

Crankshaft Sensor Installation

- Refer to the Stator Coil Installation.

Crankshaft Sensor Resistance Inspection

- Disconnect the crankshaft sensor lead connector [A] (see Alternator Cover Removal).
- Set a tester, and connect it to the crankshaft sensor lead connector.

Crankshaft Sensor Resistance Connections:

Meter (+) → W/R lead

Meter (-) → BK/Y lead

Standard: 195 ~ 235 Ω at 25°C (77°F)

- ★ 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.
- 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.

Crankshaft Sensor Peak Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

○ Using the peak voltage adapter [A] is more reliable way to determine the condition of the crankshaft sensor than crankshaft sensor internal resistance measurements.

- Disconnect the crankshaft sensor lead connector [B] (see Alternator Cover Removal).
- Set a tester [C], and connect it peak voltage adapter.

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

- Connect the adapter to the terminals of the crankshaft sensor lead connector.

Connections:

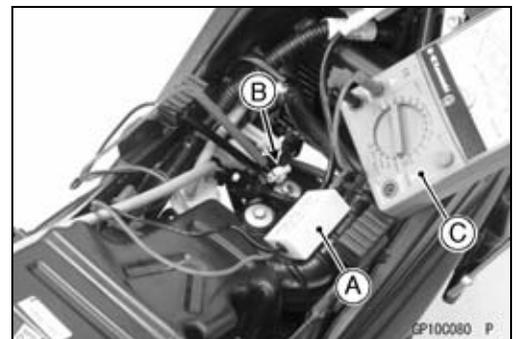
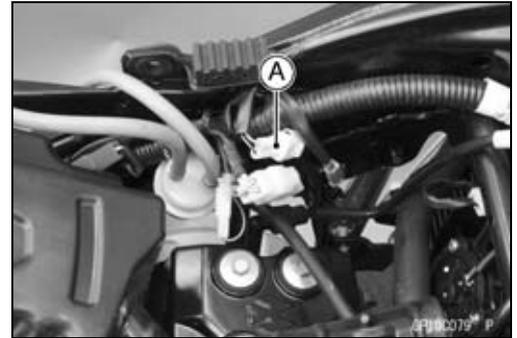
Crankshaft Sensor Lead Connector	Peak Voltage Adapter	Tester
W/R lead	← R lead →	(+)
BK/Y lead	← BK lead →	(-)

- Turn the engine stop switch to run position.
- Turn the ignition switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurements 5 or more times.

Crankshaft Sensor Peak Voltage

Standard: 1.0 V or more

- ★ If the reading is less than the standard, inspect the crankshaft sensor (see Crankshaft Sensor Resistance Inspection).



16-32 ELECTRICAL SYSTEM

Ignition System

Ignition Coil Removal

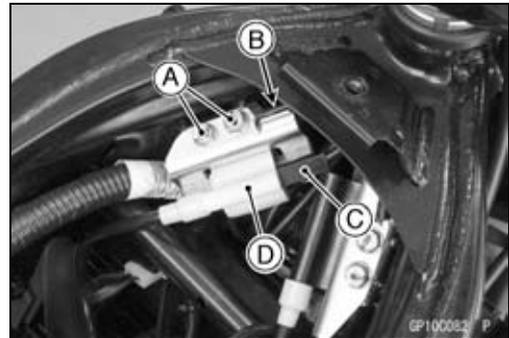
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System chapter).

Ignition Coil for Central Spark Plug

- Disconnect the central spark plug cap [A].



- Remove:
 - Bolts [A]
 - Ground Terminal Lead [B]
- Disconnect the ignition coil lead connector [C], and remove the ignition coil [D] for central spark plug.

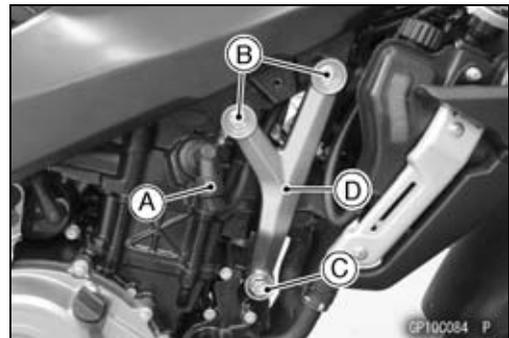


Ignition Coil for Side Spark Plugs

- Disconnect the left side spark plug cap [A].

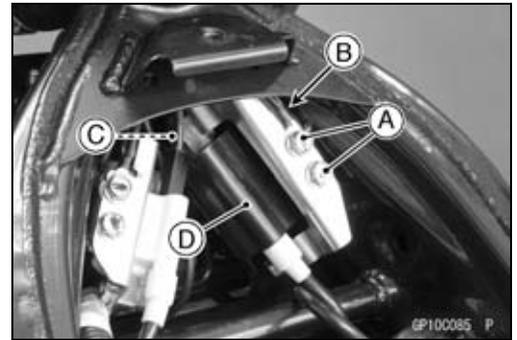


- Disconnect the right side spark plug cap [A].
- Remove:
 - Engine Bracket Bolts [B]
 - Front Engine Mounting Nut [C] and Washer
- Free the engine bracket [D].



Ignition System

- Remove:
 - Bolts [A]
 - Ground Terminal Lead [B]
- Disconnect the ignition coil lead connector [C], and remove the ignition coil [D] for side spark plugs.



Ignition Coil Installation

- Installation is the reverse of removal.
- Fit the plug caps securely.
- Pull up the spark plug caps lightly to make sure of the installation of the spark plug caps.
- After installation the right side spark plug, tighten the upper engine bracket bolts and front engine mounting nut.

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

Front Engine Mounting Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)

Ignition Coil Inspection

- Remove the ignition coil (see Ignition Coil Removal).
- Measure the primary winding resistance [A] as follows.
 - For the ignition coil [B] of the central spark plug, connect a tester between the coil terminal and the ground terminal.
 - For the ignition coil [C] of the side spark plugs, connect a tester between the coil terminals.
- Measure the secondary winding resistance [D] as follows.
 - Remove the spark plug cap from the spark plug lead.
 - For the ignition coil of the central spark plug, connect the hand tester between the high tension lead and the ground terminal.
 - For the ignition coil of the side spark plugs, connect a tester between the high tension lead and the coil terminal.

Ignition Coil Winding Resistance (for Central Spark Plug)

Primary Windings: 0.3 ~ 0.5 Ω

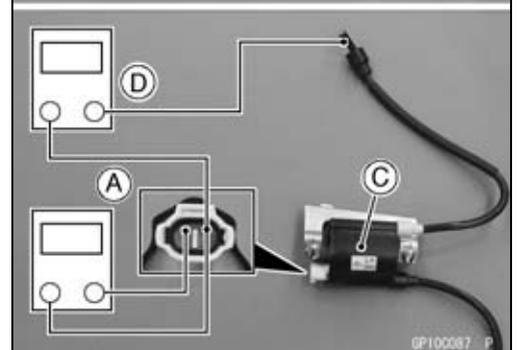
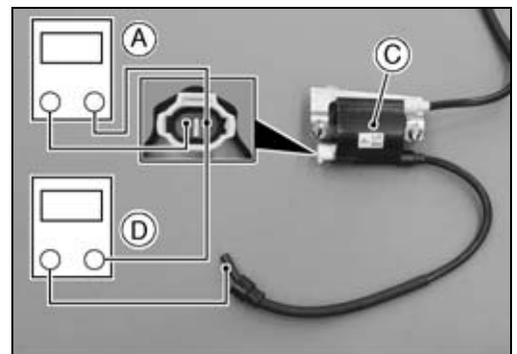
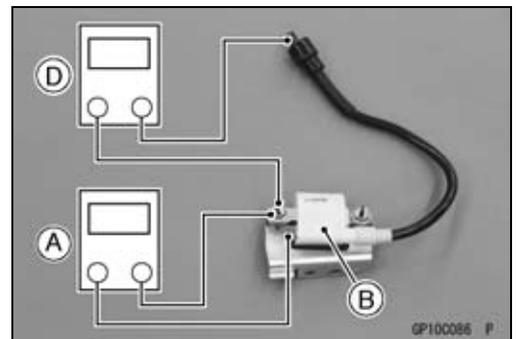
Secondary Windings: 4.5 ~ 6.5 k Ω

Ignition Coil Winding Resistance (for Side Spark Plugs)

Primary Windings: 0.4 ~ 0.6 Ω

Secondary Windings: 5.5 ~ 7.5 k Ω

- ★ If the tester does not read as specified, replace the ignition coil.



16-34 ELECTRICAL SYSTEM

Ignition System

★ 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, replace the coil with one known to be good.

● Check the spark plug lead for visible damage.

★ If the spark plug lead is damaged, replace the ignition coil.

● Install the spark plug cap to the spark plug lead securely.

Ignition Coil Primary Peak Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

● Disconnect the spark plug cap (see Ignition Coil Removal).

○ Do not remove the spark plug.

● Measure the primary peak voltage as follows.

○ Install the new spark plug [A] into the spark plug cap [B], and ground it.

○ Connect the peak voltage adapter [C] into a tester [D].

CDI Unit [E]

Battery [F]

Ignition Coil [G] (for Center Spark Plug)

Ignition Coil [H] (for Side Spark Plug)

Special Tools - Measuring Adapter [I] : 57001-1700

Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

Connections:

Adapter (R, +) → Ignition Coil Primary Lead Terminal

Adapter (BK, -) → Ground

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
- Repeat the measurements 5 or more times.

Ignition Coil Primary Peak Voltage

Standard: 100 ~ 300 V

★ If the reading is less than the specified value, check the following.

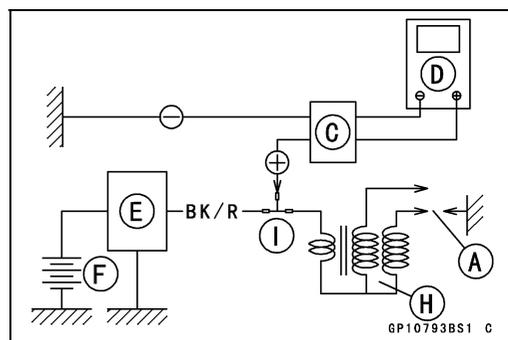
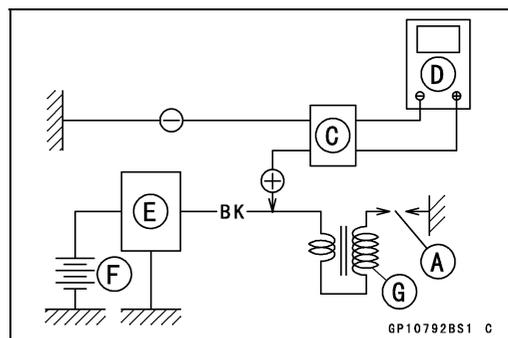
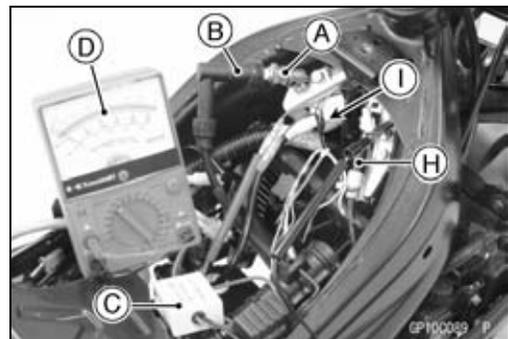
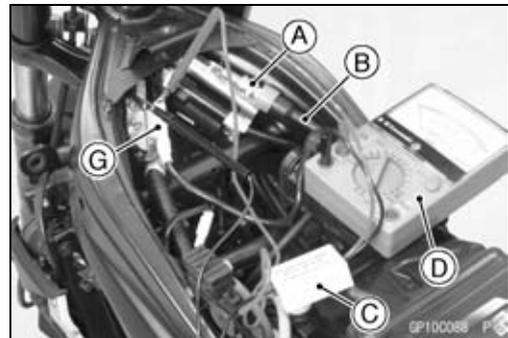
Ignition Coil (see Ignition Coil Inspection)

Crankshaft Sensor (see Crankshaft Sensor Inspection)

CDI Unit (see CDI Unit Inspection)

Spark Plug Removal

- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.



Ignition System

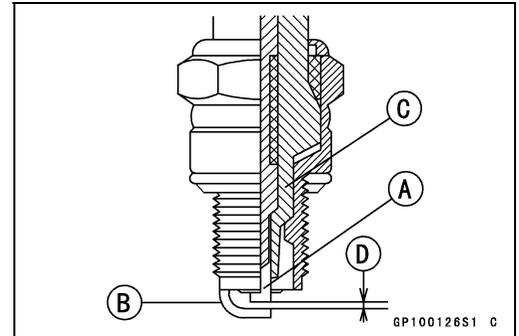
Spark Plug Installation

- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Spark Plug Condition Inspection

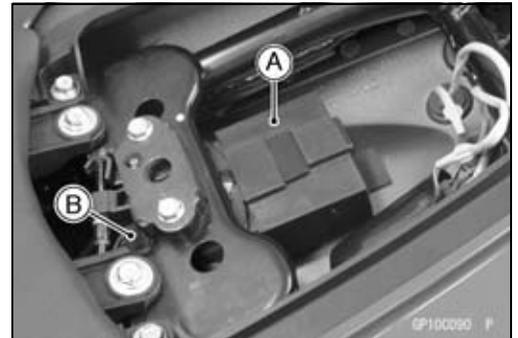
- ★ If the spark plug is oily or has carbon built up on it, clean it. The plug may also be cleaned using high flash-point solvent and nonmetal brush (nylon etc.).
- ★ If the spark plug center electrode [A] and/or side electrode [B] are corrected or damaged, or if the insulator [C] is cracked, replace the plug.
- Use the standard spark plug or its equivalent.
- Measure the gap [D] with a wire-type thickness gauge.
- ★ If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.

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



CDI Unit Removal

- Remove:
 - Rear Seat (see Rear Seat Removal in the Frame chapter)
 - CDI Unit [A] and Damper
- Disconnect the CDI unit connector [B].



CDI Unit Installation

- Installation is the reverse of removal.

CDI Unit Inspection

NOTICE

When inspecting the CDI unit, observe the following to avoid damage to the CDI unit.

Do not disconnect the CDI unit with the ignition switch on. This may damage the CDI unit.

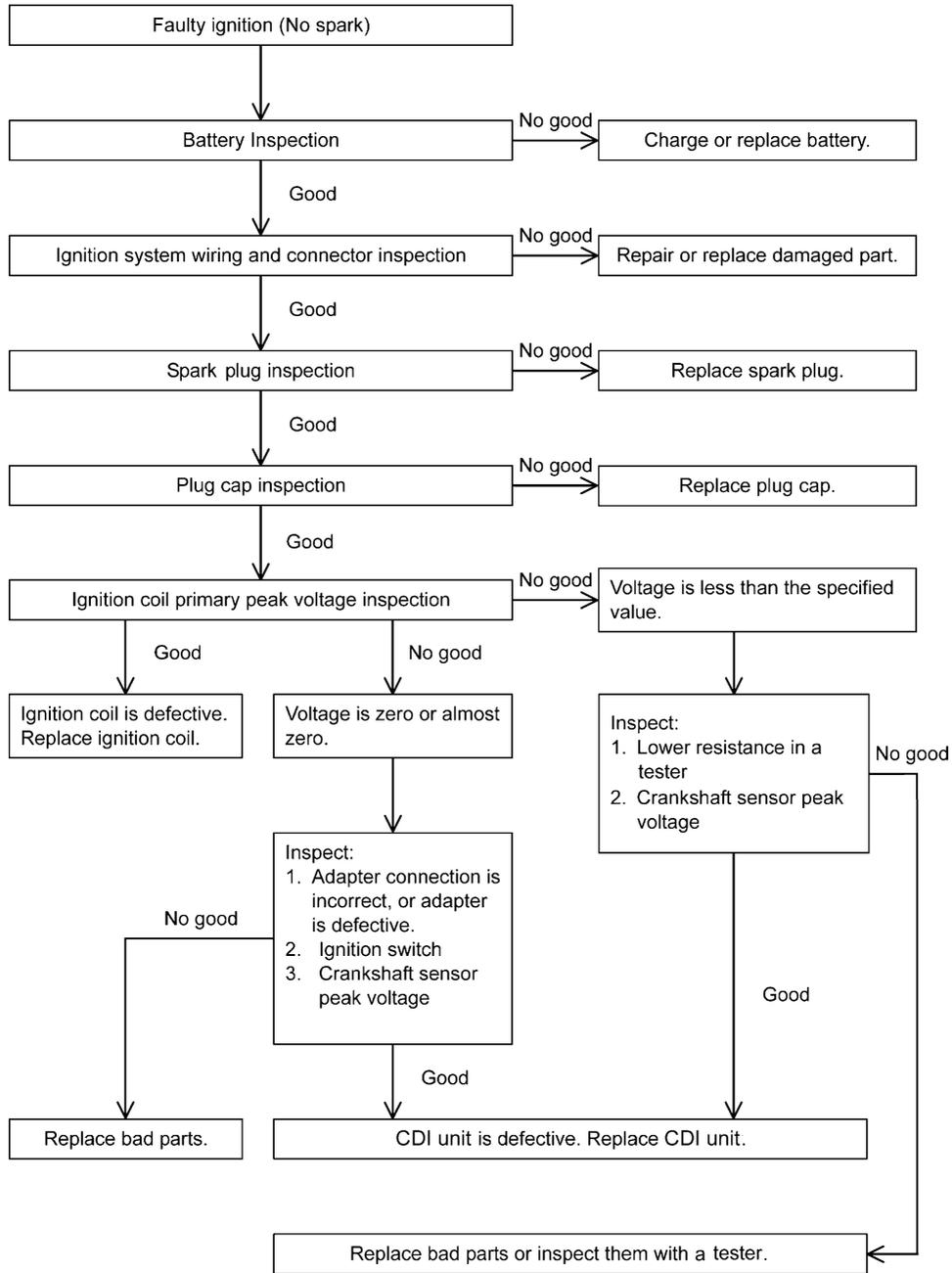
Do not disconnect the battery cables while the engine is running. This may damage the CDI unit.

- Refer to the Ignition System Troubleshooting.

16-36 ELECTRICAL SYSTEM

Ignition System

Ignition System Troubleshooting

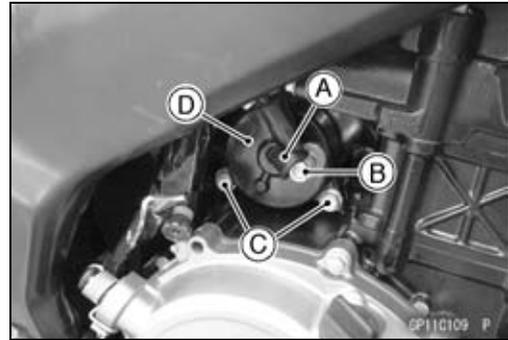


16-38 ELECTRICAL SYSTEM

Electric Starter System

Starter Motor Removal

- Remove the clutch cable bracket (see Clutch Cover Removal in the Clutch chapter).
- Slide out the rubber cap [A].
- Remove the starter motor cable terminal nut [B] and washers.
- Remove the starter motor mounting bolts [C].
- Remove the starter motor [D] from the right side of the motorcycle.



Starter Motor Installation

NOTICE

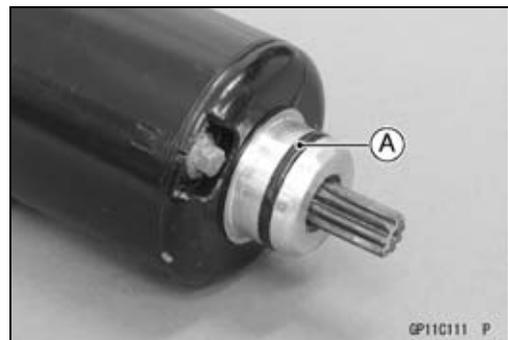
Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Clean the starter motor legs [A] and crankcase [B] where the starter motor is ground.

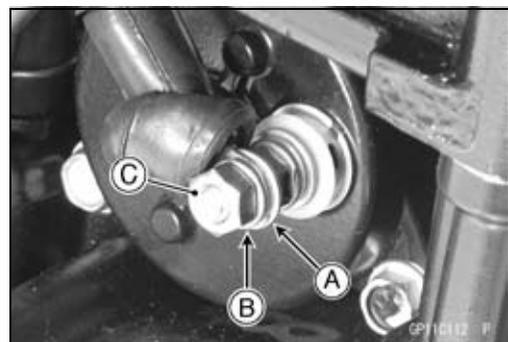


- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Tighten the starter motor mounting bolts.

Torque - Starter Motor Mounting Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)



- Install the washer [A] and starter motor cable.
- Install:
 - Spring Washer [B]
 - Nut [C]
- Slide back the rubber cap to the original position.
- Install the removed parts (see appropriate chapters).



Electric Starter System

Starter Motor Inspection

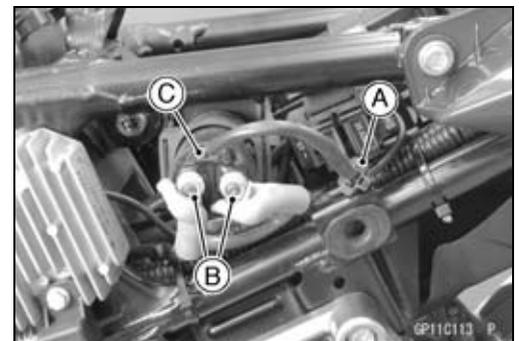
- Turn the ignition switch on and push the starter button.
- ★ If the starter motor does not turn, check the following.
 - Main Fuse (see Fuse Inspection)
 - Battery Condition (see Charging Condition Inspection)
 - Starter Relay (see Starter Relay Inspection)
 - Starter Lockout Switch (see Starter Locknut Switch Circuit Inspection)
 - Neutral Switch (see Switch Inspection)
 - Ignition Switch (see Wiring Diagram)
 - Right Switch Housing (see Wiring Diagram)
- ★ If no abnormality is found in these checks, replace the starter motor.

NOTE

○ The starter motor cannot be disassembled. If necessary, replace the starter motor as an assembly.

Starter Relay Inspection

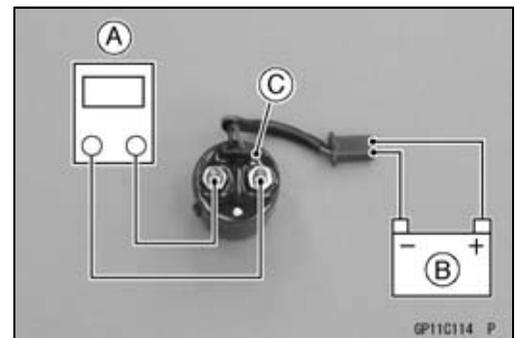
- Remove the battery negative (–) cable from the battery negative (–) terminal (see Battery Removal).
- Disconnect the connector [A].
- Remove:
 - Nuts [B]
 - Starter Relay [C]



- Connect a tester [A] and 12 V battery [B] to the starter relay [C] as shown.
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

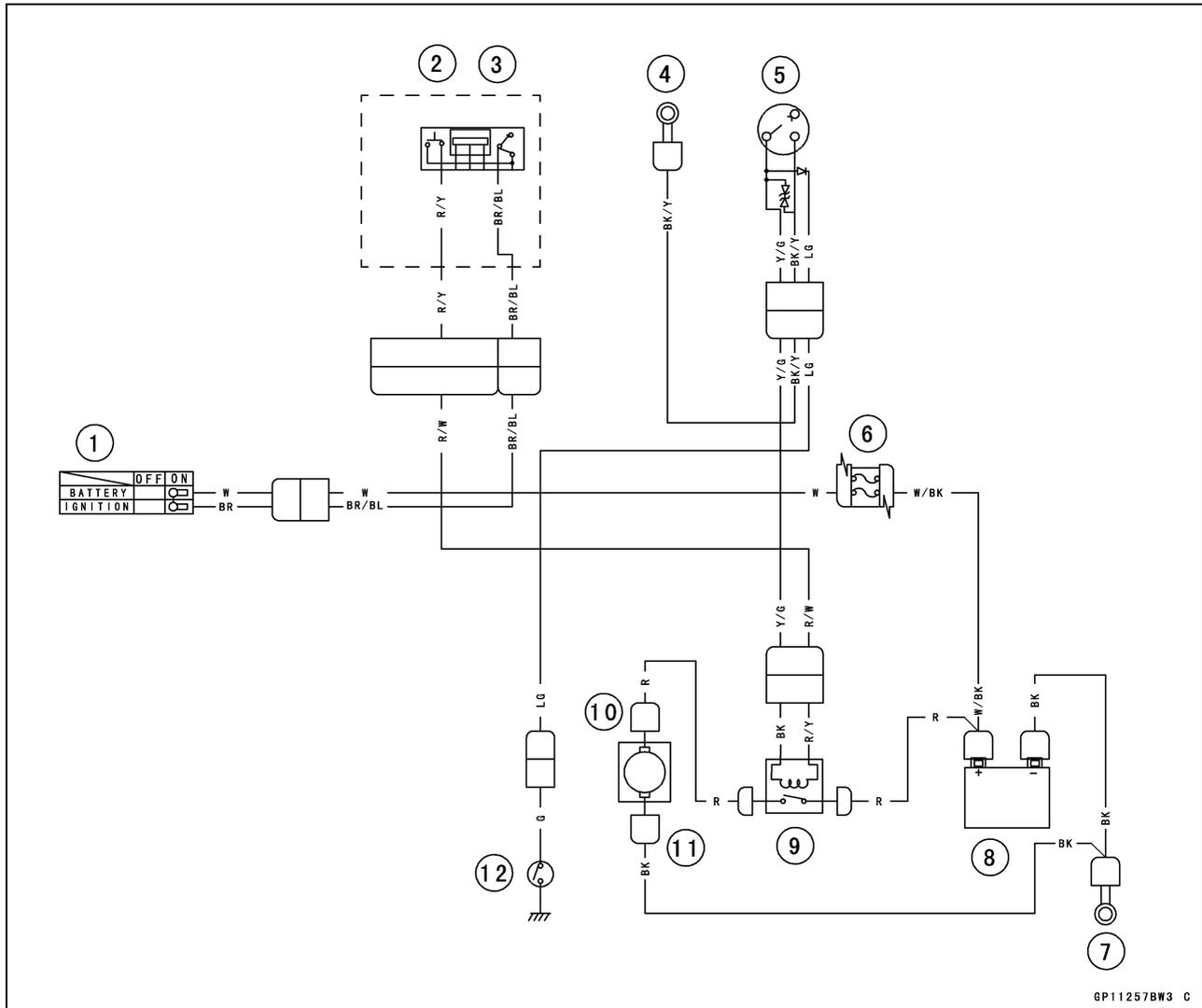
Criteria: When battery is connected → about 0 Ω
 When battery is disconnected → ∞ Ω



16-40 ELECTRICAL SYSTEM

Electric Starter System

Electric Starter Circuit



GP11257BW3 C

1. Ignition Switch
2. Starter Button
3. Engine Stop Switch
4. Frame Ground 3
5. Starter Lockout Switch
6. Main Fuse 20 A
7. Frame Ground 1
8. Battery 12 V 8 Ah
9. Starter Relay
10. Starter Motor
11. Engine Ground
12. Neutral Switch

Lighting System

Headlight Aiming Inspection

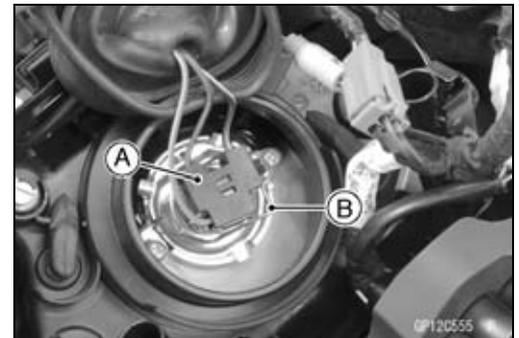
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Bulb Replacement

- Remove the headlight assy (see Headlight Cover Removal in the Frame chapter).
- Disconnect:
Dust Cover [A]



- Disconnect:
Headlight Connector [A]
Hook [B]
- Remove:
Headlight Bulb



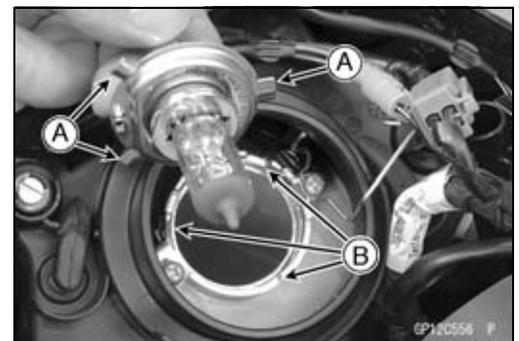
NOTICE

When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode. Use the correct type of headlight bulb with specified voltage and wattage only.

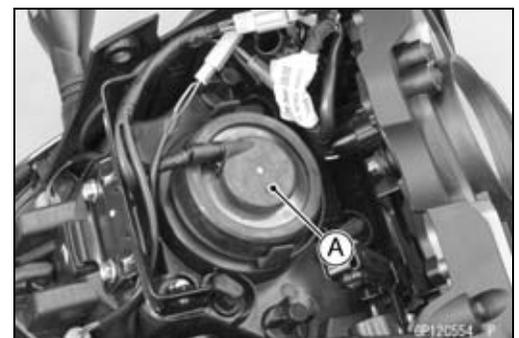
NOTE

○Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.

- Replace the headlight bulb with a new one.
- Fit the projections [A] of the bulb in the hollows [B] of the headlight.
- Install the hook.



- Connect the headlight connector.
- Install the dust cover [A].
- After installation, adjust the headlight aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter).

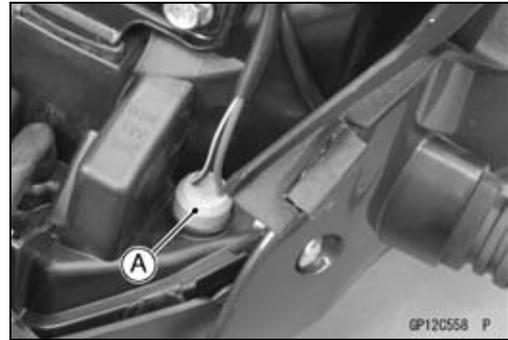


16-42 ELECTRICAL SYSTEM

Lighting System

City Light Bulb Replacement

- Remove the headlight assy (see Headlight Cover Removal in the Frame chapter).
- Pull out the socket [A] together with the bulb.

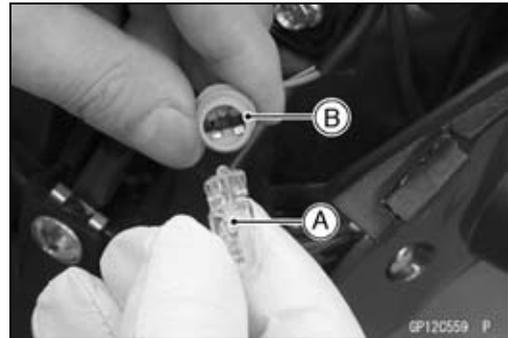


- Pull the bulb [A] out of the socket [B].

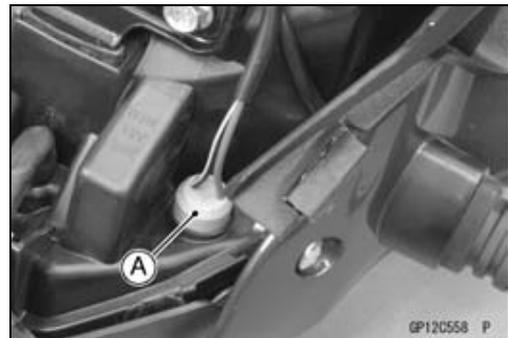
NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.

- Replace the bulb with a new one.



- Insert the socket [A] to the headlight.
- Other Bulb: Repeat the above steps.



Headlight Removal/Installation

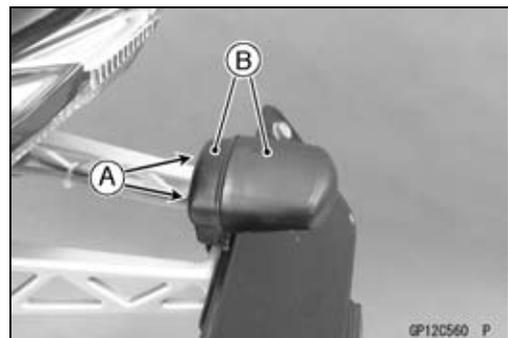
- Refer to the Headlight Cover Removal/Installation in the Frame chapter.

Tail/Brake Light (LED) Removal/Installation

- Refer to the Seat Cover Disassembly/Assembly in the Frame chapter.

License Plate Light Bulb Replacement

- Remove:
 - Screws [A]
 - License Plate Light Covers [B]



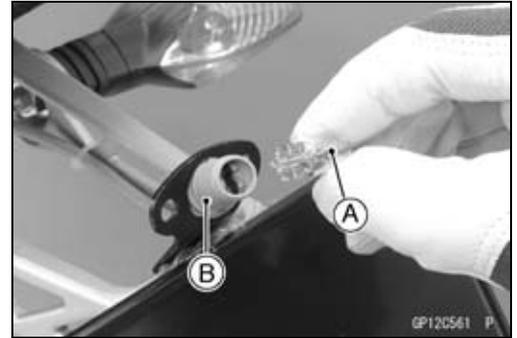
Lighting System

- Pull the bulb [A] out of the socket [B].

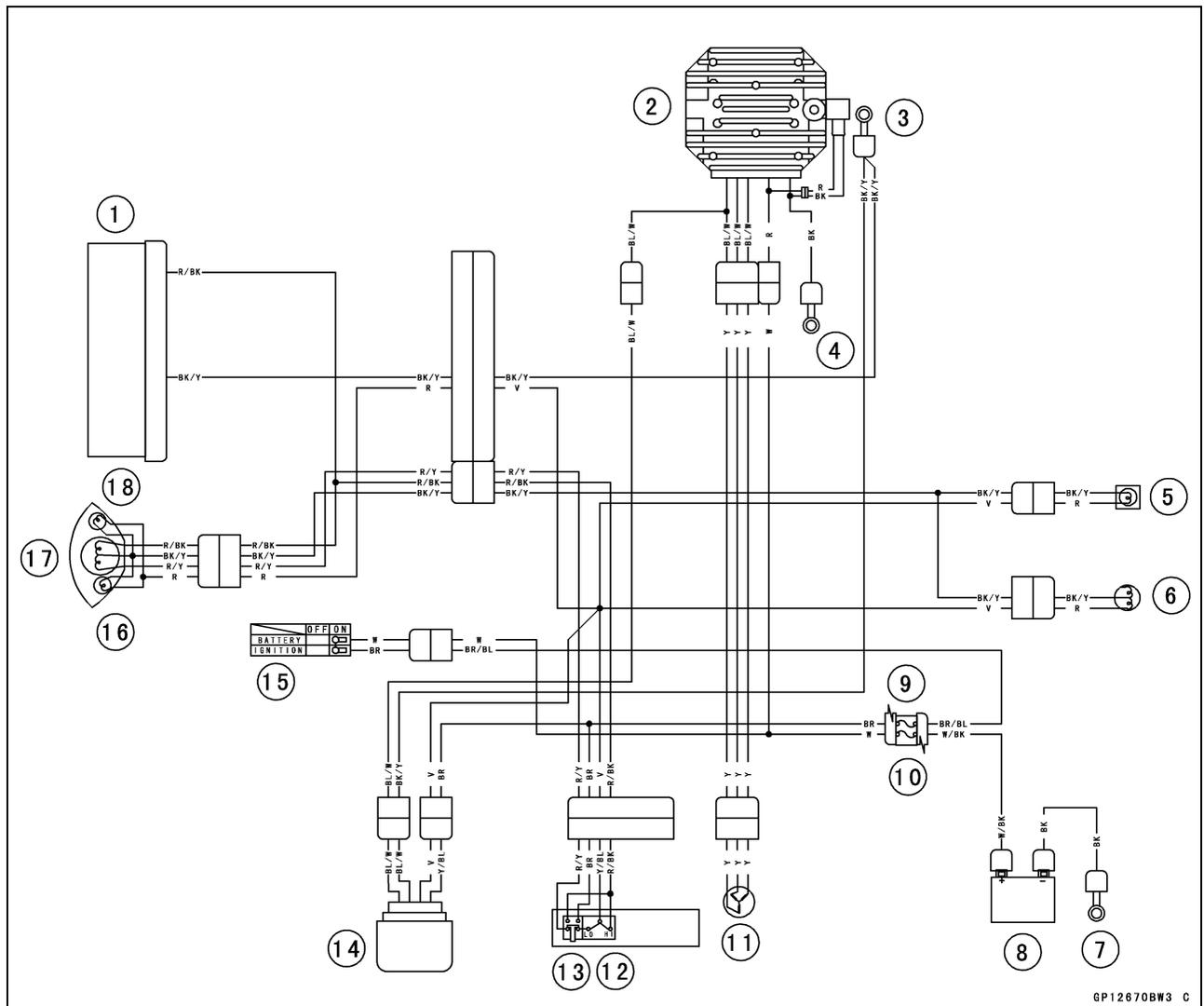
NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.

- Replace the bulb with a new one.



Headlight/Tail Light Circuit



- | | |
|---------------------------------|-------------------------------|
| 1. Meter Unit | 10. Main Fuse 20 A |
| 2. Regulator/Rectifier | 11. Alternator |
| 3. Frame Ground 3 | 12. Dimmer Switch |
| 4. Frame Ground 2 | 13. Passing Button |
| 5. License Plate Light 12 V 3 W | 14. Headlight Relay |
| 6. Tail/Brake Light (LED) | 15. Ignition Switch |
| 7. Frame Ground 1 | 16. Left City Light 12 V 3 W |
| 8. Battery 12 V 8 Ah | 17. Headlight 12 V 60 W/55 W |
| 9. Ignition Fuse 15 A | 18. Right City Light 12 V 3 W |

16-44 ELECTRICAL SYSTEM

Lighting System

Turn Signal Light Bulb Replacement

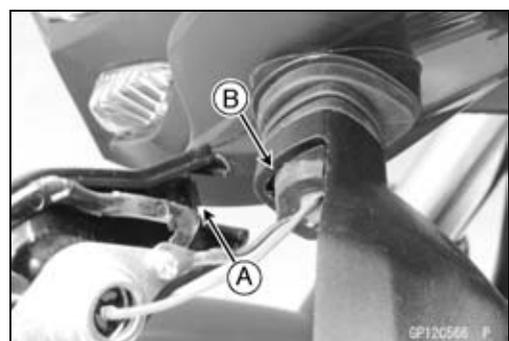
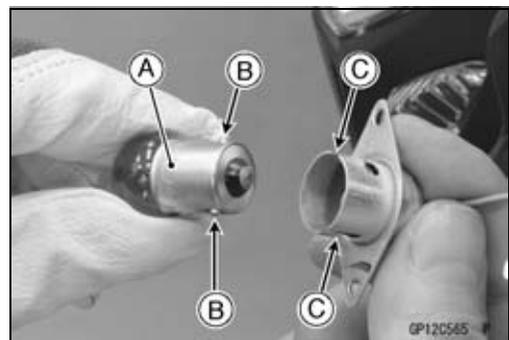
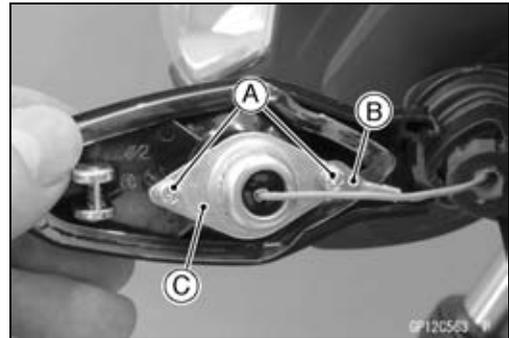
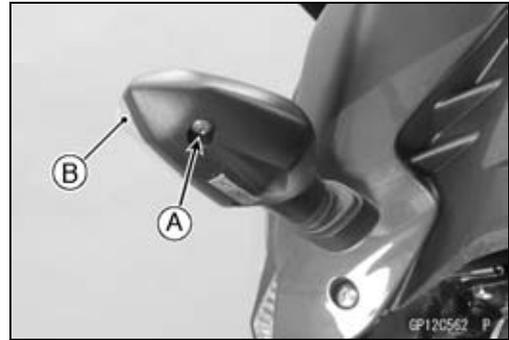
- Remove:
 - Screw [A]
 - Turn Signal Light Lens [B]

- Remove:
 - Screws [A]
 - Ground Terminal [B]
 - Socket [C]

- Push and turn the turn signal light bulb [A] counterclockwise and remove it.
- Replace the bulb with a new one.

- Insert the new bulb [A] by aligning its pins [B] with the grooves [C] in the socket, and turn the bulb clockwise.

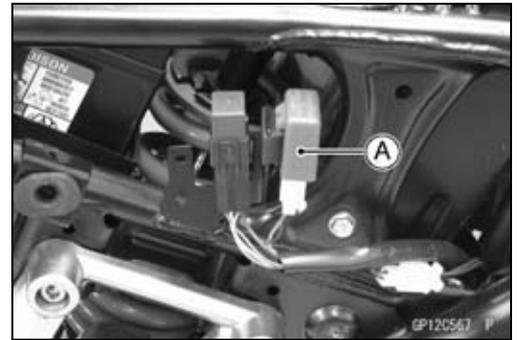
- Install the socket to the turn signal lens, and tighten the screws together with the ground terminal.
- Fit the hook [A] of the lens into the groove [B].
- Tighten the screw.
- Other Bulb: Repeat the above steps.



Lighting System

Turn Signal Relay Inspection

- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Remove the turn signal relay [A].
- Disconnect the connector.



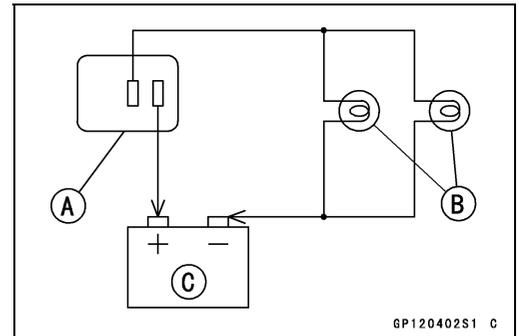
- Connect one 12 V battery and turn signal lights as indicated, and count how many times the lights blink for one minute.

Turn Signal Relay [A]

Turn Signal Lights [B]

12 V Battery [C]

- ★ If the lights do not blink as specified, replace the turn signal relay.



Testing Turn Signal Relay

Load		Blinking Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	140 or more
2	20	80 ~ 100

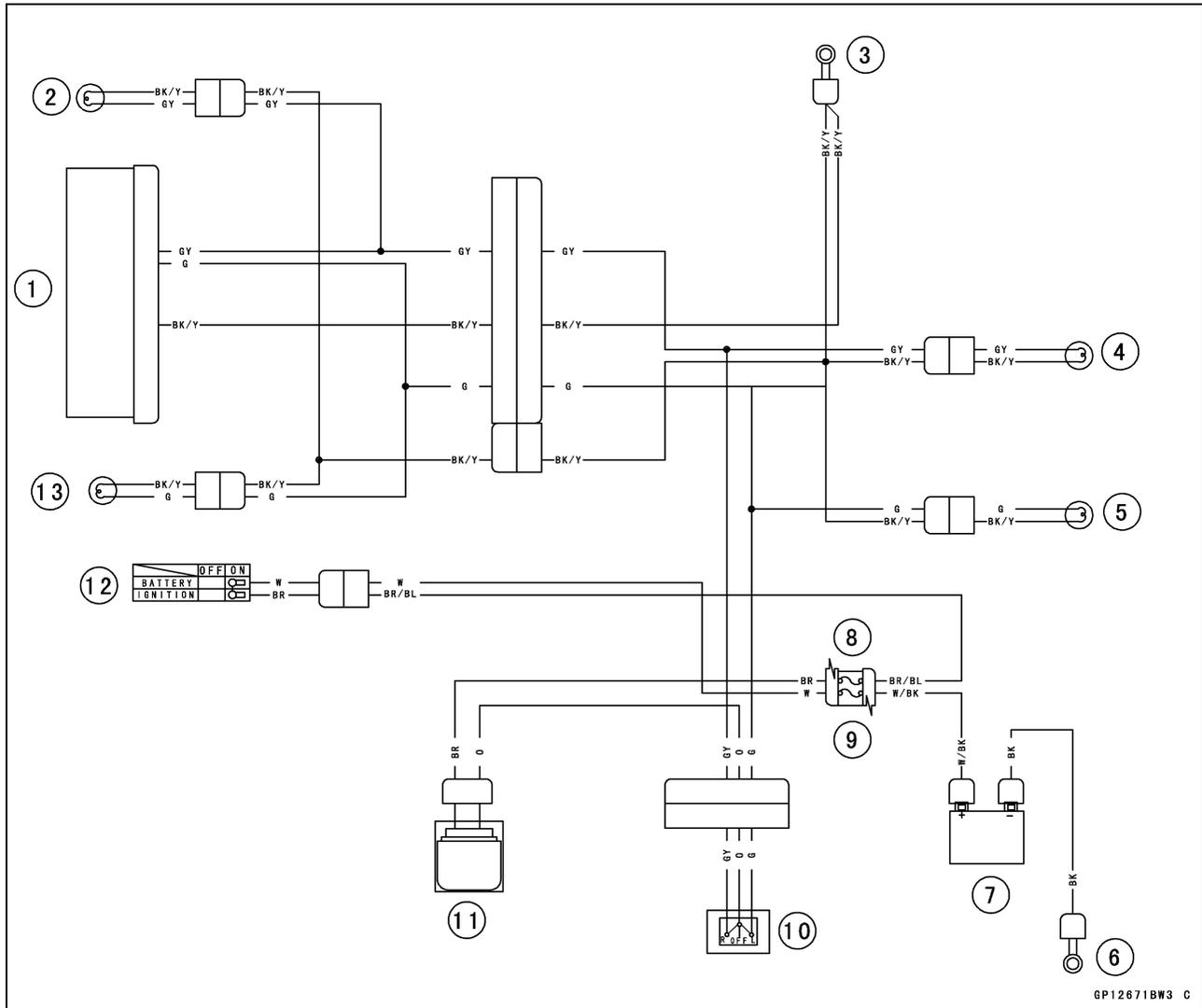
(*): Cycle(s) per minute

(**): Corrected to "one light burned out".

16-46 ELECTRICAL SYSTEM

Lighting System

Turn Signal Light Circuit

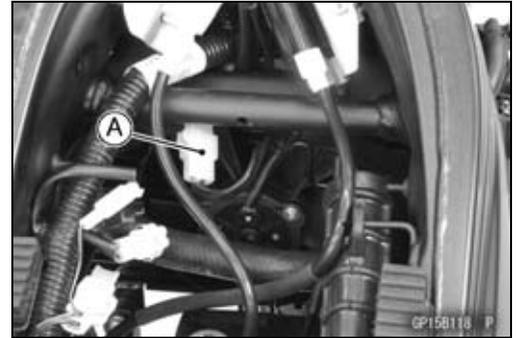


1. Meter Unit
2. Front Right Turn Signal Light 12 V 10 W
3. Frame Ground 3
4. Rear Right Turn Signal Light 12 V 10 W
5. Rear Left Turn Signal Light 12 V 10 W
6. Frame Ground 1
7. Battery 12 V 8 Ah
8. Ignition Fuse 15 A
9. Main Fuse 20 A
10. Turn Signal Switch
11. Turn Signal Relay
12. Ignition Switch
13. Front Left Turn Signal Light 12 V 10 W

Radiator Fan System

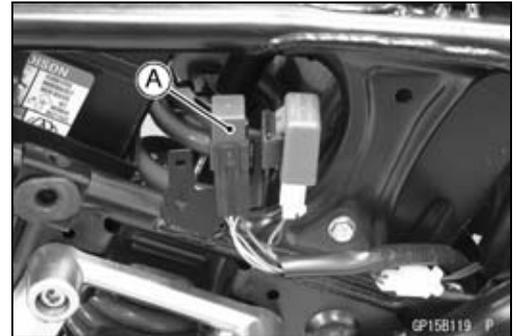
Fan Motor Inspection

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
 - Disconnect the fan motor lead connector [A].
 - Using an auxiliary leads, supply battery power to the fan motor.
- ★ If the fan does not rotate, the fan motor is defective and must be replaced.



Fan Motor Relay Inspection

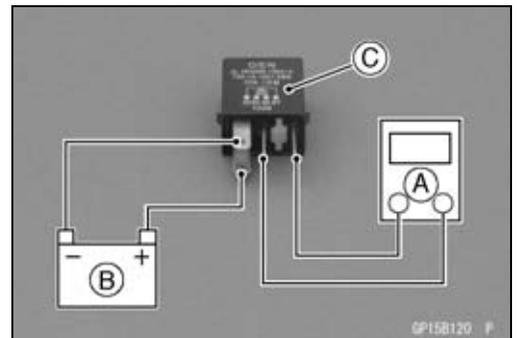
- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Disconnect the connector and remove the fan motor relay [A].



- Connect a tester [A] and 12 V battery [B] to the fan motor relay [C] as shown.
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

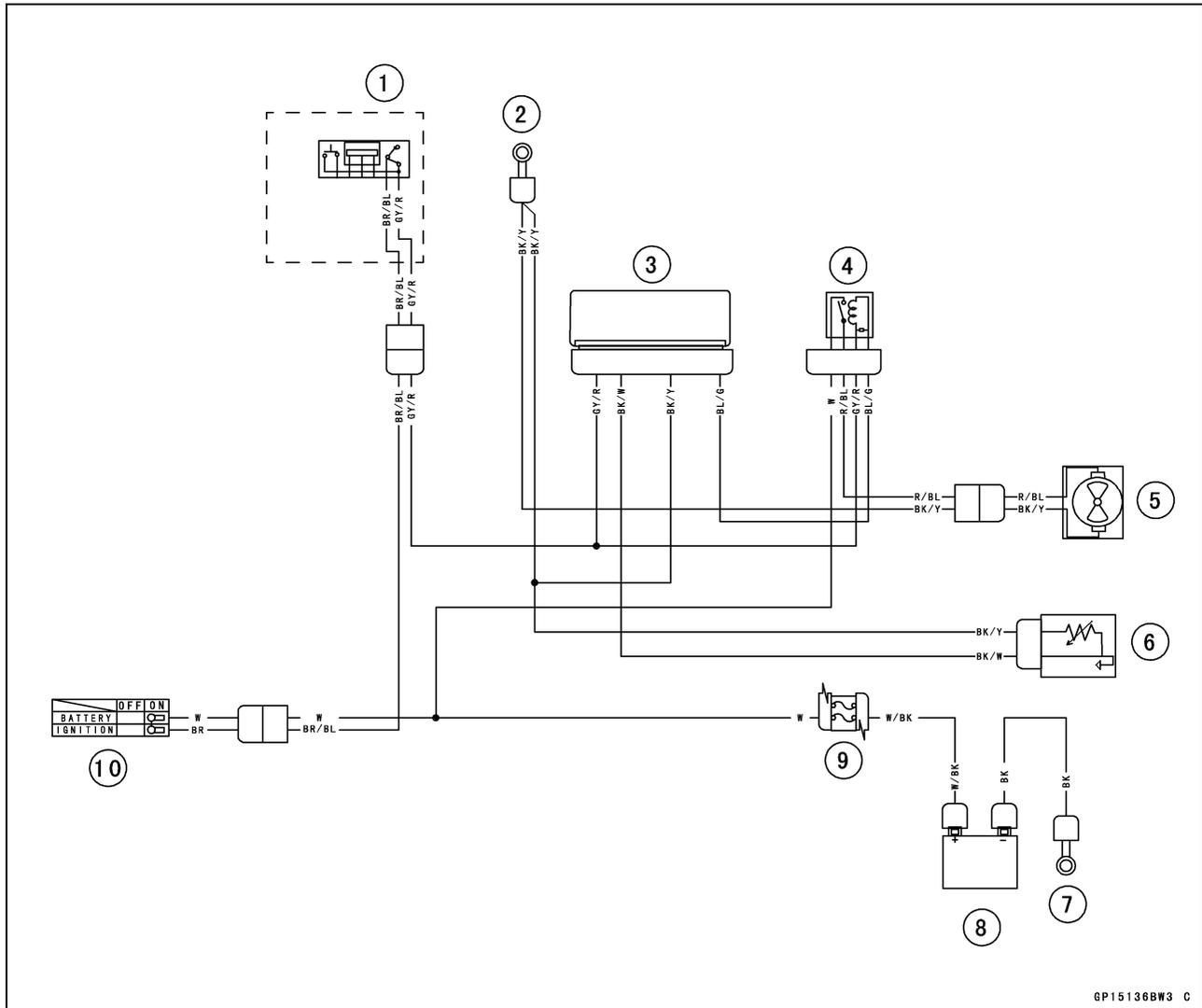
- Criteria: **When battery is connected → about 0 Ω**
 When battery is disconnected → ∞ Ω



16-48 ELECTRICAL SYSTEM

Radiator Fan System

Radiator Fan Circuit



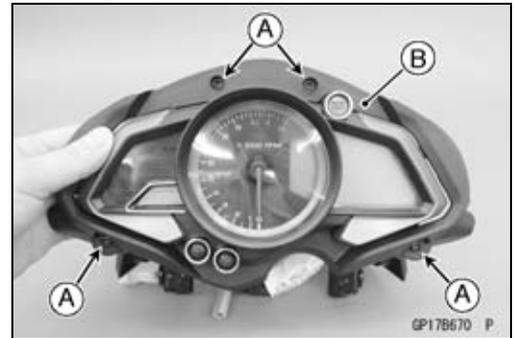
GP15136BW3 C

1. Engine Stop Switch
2. Frame Ground 3
3. CDI Unit
4. Radiator Fan Relay
5. Radiator Fan Motor
6. Water Temperature Sensor
7. Frame Ground 1
8. Battery 12 V 8 Ah
9. Main Fuse 20 A
10. Ignition Switch

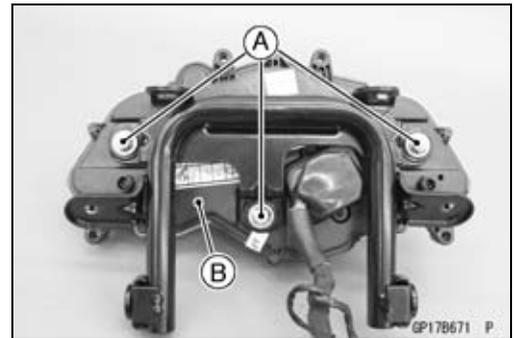
Meter, Gauge, Indicator Unit

Meter Unit Removal/Installation

- Remove the meter unit assy (see Headlight Cover Removal in the Frame chapter).
- Remove:
 - Bolts [A]
 - Meter Cover [B]



- Remove:
 - Nuts [A] and Washers
 - Meter Unit [B]



NOTICE

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.

- Installation is the reverse of removal.

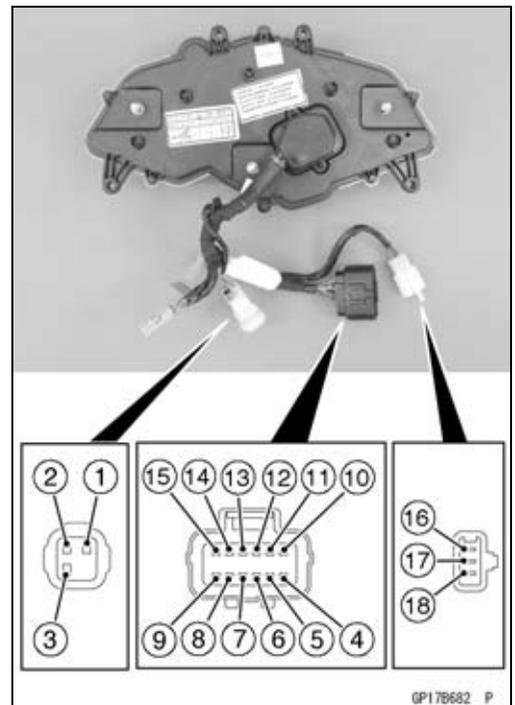
Meter Unit Disassembly

NOTE

○The meter unit cannot be disassembled. If necessary, replace the meter unit as an assembly.

Electronic Combination Meter Unit Inspection

- Remove the meter unit.
 - [1] Speed Sensor Supply (+): R/W
 - [2] Speed Sensor Pulse: BL/W
 - [3] Ground (-): BK/Y
 - [4] Green Turn Signal Indicator Light (LED) (+) for Left: G
 - [5] Meter Illumination Light (LED) (+): R
 - [6] Ground (-): BK/Y
 - [7] Side Stand Symbol (-): O/BR
 - [8] Oil Pressure Switch: BR/G
 - [9] Ignition (+): GY/R
 - [10] Green Turn Signal Indicator Light (LED) (+) for Right: GY
 - [11] Green Neutral Indicator Light (LED) (-): LG
 - [12] Water Temperature Sensor: BK/W
 - [13] Battery (+): W
 - [14] Tachometer Pulse: BK
 - [15] Fuel Level Sensor: W/Y
 - [16] Headlight (+): R/Y
 - [17] Blue High Beam Indicator Light (LED) (+): R/BK
 - [18] Headlight (-): BK/Y



NOTICE

Do not drop the meter unit. Place the meter unit so that it faces upward. If the meter unit is left upside down or sideways for a long time or dropped, it will malfunction. Do not short each terminals.

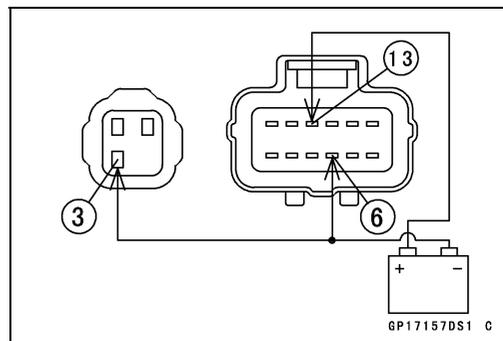
16-50 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

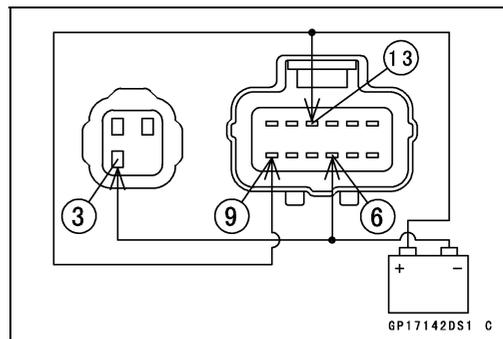
Check 1: Meter Unit Primary Operation Check

● Using the auxiliary leads, the 12 V battery to the meter unit connector as follows.

- Connect the battery positive (+) terminal to the terminal [13].
- Connect the battery negative (-) terminal to the terminals [6] [3].

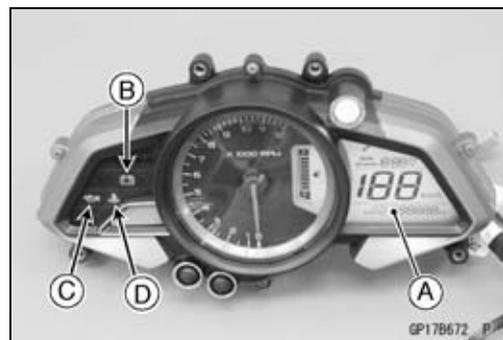


- Connect the terminal [9] to the battery (+) terminal.



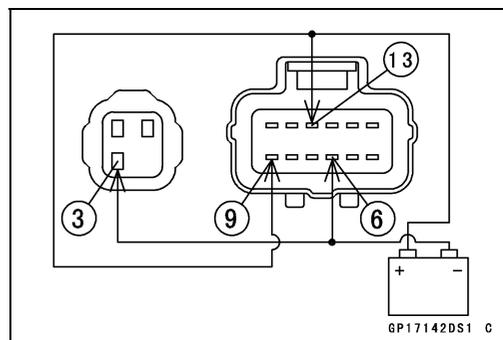
● Check the following items.

- The tachometer needle momentarily points their last readings and back to the minimum position.
- All the LCD (Liquid Crystal Display) segments [A] and meter illumination light (LED) go on for a few seconds.
- The red battery voltage warning indicator light (LED) [B], red oil pressure warning indicator light (LED) [C] and red water temperature warning indicator light (LED) [D] go on.
- ★ If the meter unit does not work, replace the meter unit.

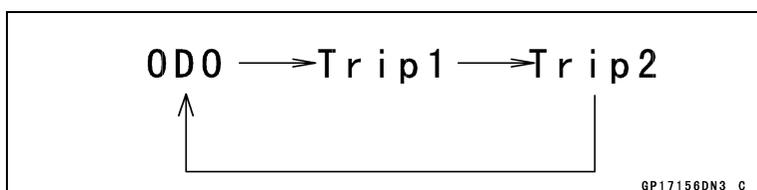


Check 2: MODE Button Operation Check

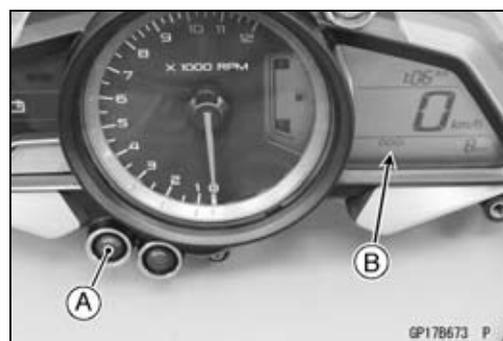
- Connect the leads in the same circuit as Check 1.



- By pushing the MODE button [A] for less than 2 seconds, check that the display [B] changes as follows.



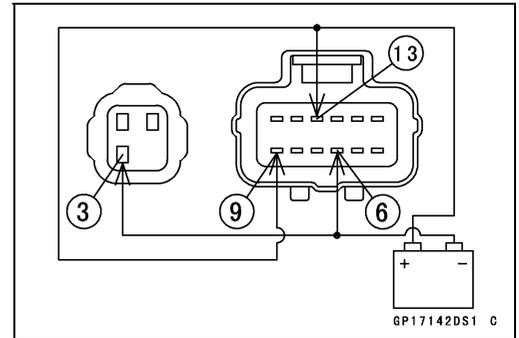
- ★ If the display function does not work, replace the meter unit.



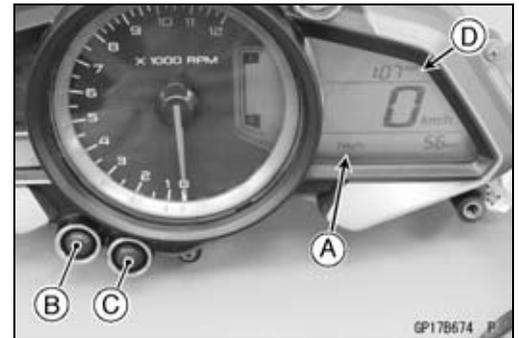
Meter, Gauge, Indicator Unit

Check 3: Clock Setting Check

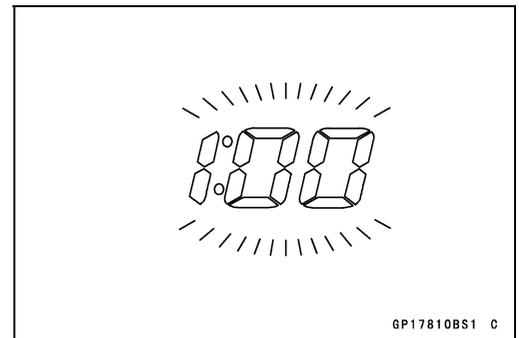
- Connect the leads in the same circuit as Check 1.



- Set the Trip1 mode [A] by pushing the MODE button [B] for less than 2 seconds.
- Push the MODE button and SET button [C] simultaneously for more than 2 seconds.
- The clock setting menu (hour and minute) [D] should blink.



- By pushing the MODE button for less than 1 second, check that the hour display changes.
- By pushing the SET button for less than 1 second, check that the minute display changes.
- Push the MODE button and SET button simultaneously for more than 2 second. The displays stop blinking and the clock starts working.



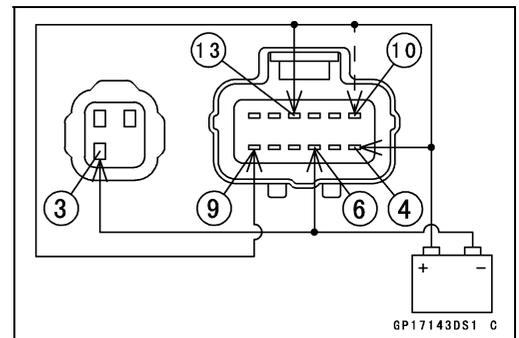
NOTE

○ If no editing is carried out for more than 5 seconds, the clock set mode finished and the set value cannot be saved.

★ If the display function does not work, replace the meter unit.

Check 4: Green Turn Signal Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [10] (right) or [4] (left) to the battery (+) terminal.



16-52 ELECTRICAL SYSTEM

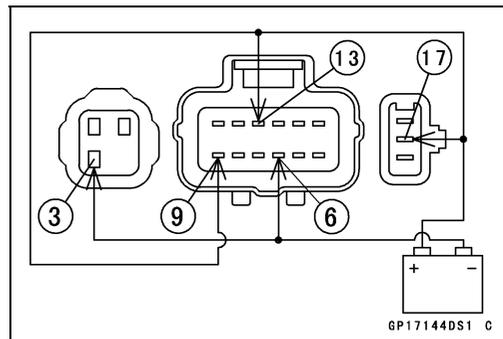
Meter, Gauge, Indicator Unit

- Check that the green turn signal indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter unit.

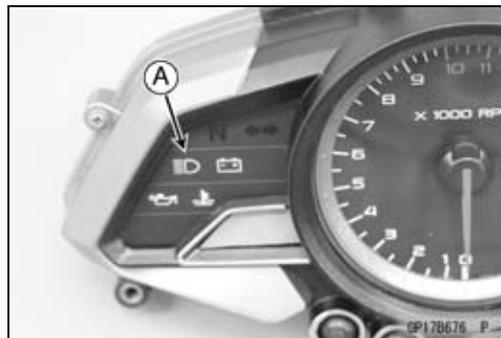


Check 5: Blue High Beam Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [17] to the battery (+) terminal.

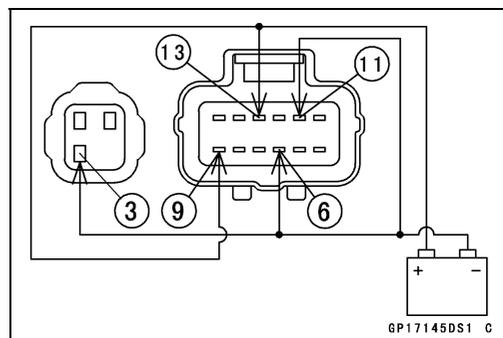


- Check that the blue high beam indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter unit.



Check 6: Green Neutral Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [11] to the battery (-) terminal.



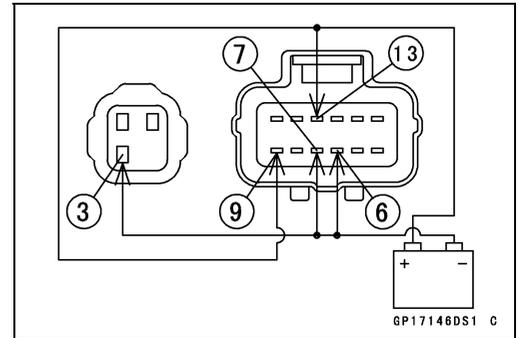
- Check that the green neutral indicator light (LED) [A] goes on.
- ★ If the indicator light (LED) does not go on, replace the meter unit.



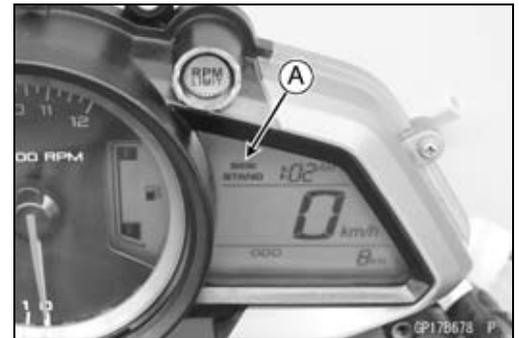
Meter, Gauge, Indicator Unit

Check 7: Side Stand Symbol Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [7] to the battery (-) terminal.

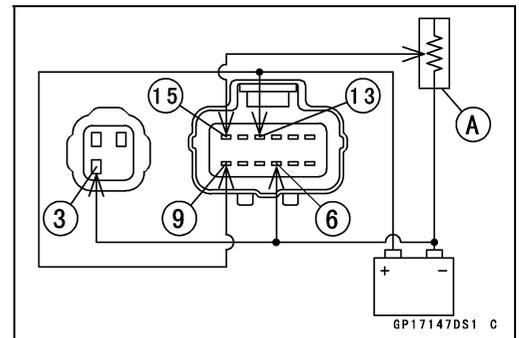


- Check that the side stand symbol [A] goes on.
- ★ If the symbol does not go on, replace the meter unit.



Check 8: Fuel Level Gauge Inspection

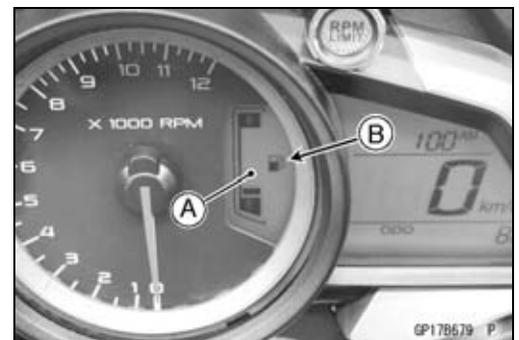
- Connect the leads in the same circuit as Check 1.
- The all segments of the fuel gauge in the display will flash.
- Connect the variable rheostat [A] to the terminal [15] and the battery (-) terminal.



- Check that the segments number of the fuel level gauge [A] matches the resistance value of the variable rheostat.
- When the terminal [15] is connected, one segment in the fuel level gauge should appear about every 30 seconds.

Variable Rheostat Resistance (Ω)	Display Condition
10	all segments go on
about 50	5 segment goes on
110	Fuel Symbol [B] blinks

- ★ If the display function does not work, replace the meter unit.



16-54 ELECTRICAL SYSTEM

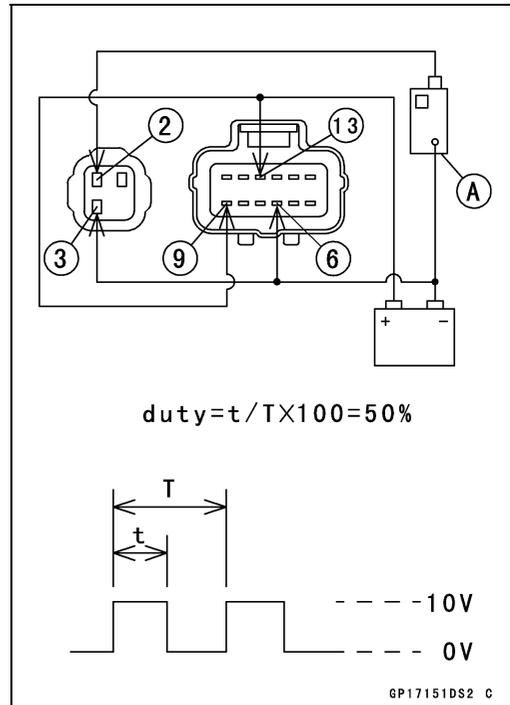
Meter, Gauge, Indicator Unit

Check 9: Speedometer Inspection

- Connect the leads in the same circuit as Check 1.
- The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [2].
- Indicates approximately 60 km/h if the input frequency is approximately 72 Hz.
- ★ If the meter function does not work, replace the meter unit.

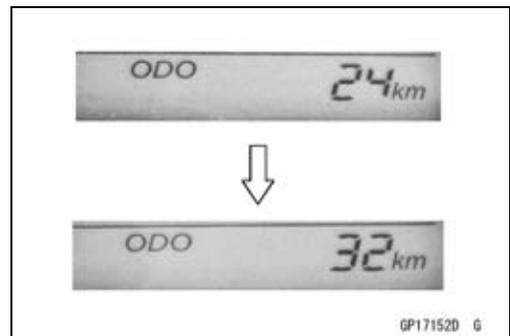
NOTE

- The input frequency of the oscillator adds the integrated value of the odometer.



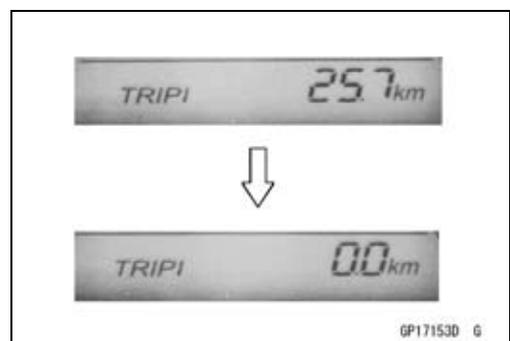
Check 10: Odometer Check

- Check the odometer with the speedometer check in the same way.
- ★ If value indicated in the odometer is not added, replace the meter unit.



Check 11: Trip 1/Trip 2 Meter Check

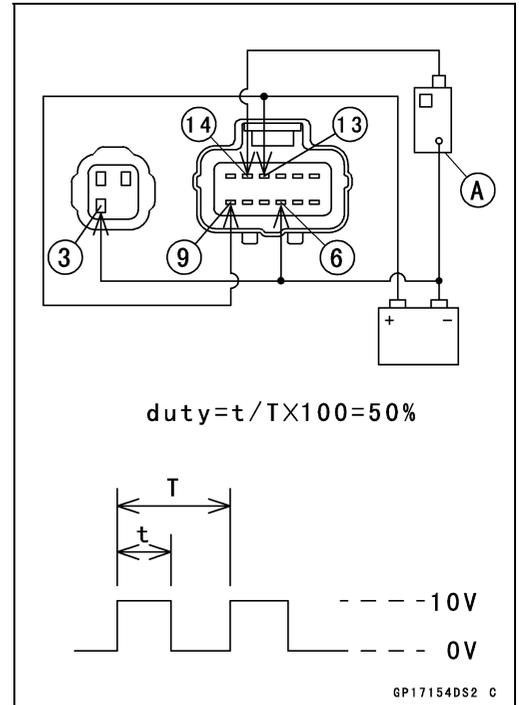
- Check the trip meter with the speedometer in the same way.
- ★ If value indicated in the trip meter is not added, replace the meter unit.
- Check that when the SET button is pushed for more than 5 seconds, the figure display turns to 0.0.
- ★ If the figure display does not indicate 0.0, replace the meter unit.



Meter, Gauge, Indicator Unit

Check 12: Tachometer Inspection

- Connect the leads in the same circuit as Check 1.
- The engine speed (rpm) equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [14].
- Indicates approximately 4 000 rpm if the input frequency is approximately 65 Hz.
- The yellow red zone warning indicator light blinks when the engine speed reaches 10 000 rpm or more. (The input frequency is approximately 170 Hz.)
- ★ If the meter function does not work, replace the meter unit.

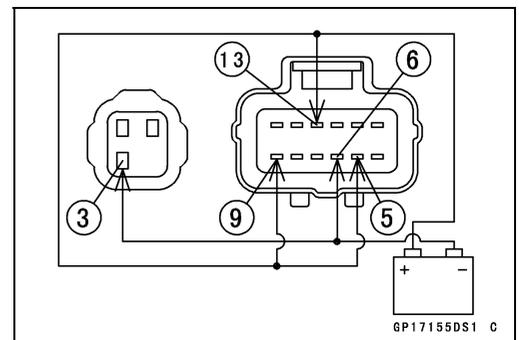


- Disconnect the terminal [14].
 - Check that the tachometer needle [A] back to the minimum (0) position.
 - ★ If the meter unit does not work, replace the meter unit.
- Yellow Red Zone Warning Indicator Light (LED) [B]

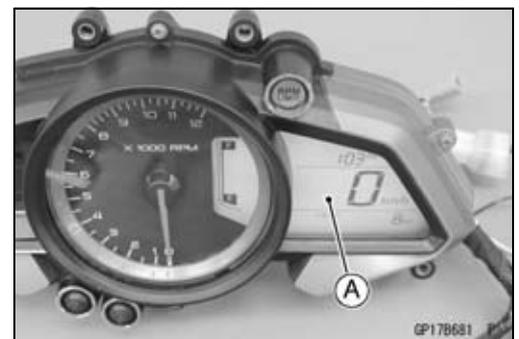


Check 13: Meter Illumination Light (LED) Inspection

- Connect the leads in the same circuit as Check 1.
- Connect the terminal [5] to the battery (+) terminal.



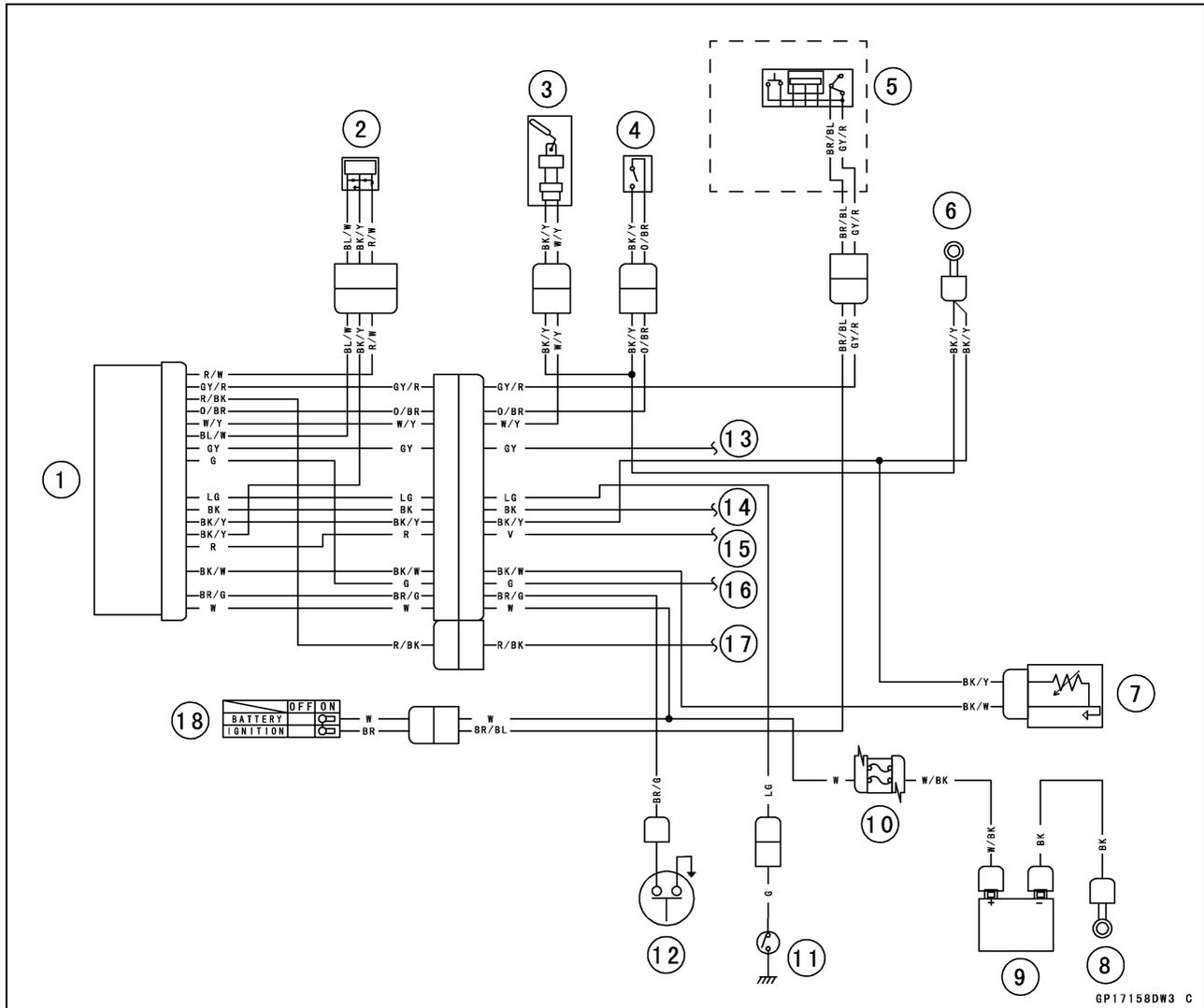
- Check that the meter illumination light (LED) [A] goes on.
- ★ If the light (LED) does not go on, replace the meter unit.



16-56 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

Meter Circuit



- | | |
|-----------------------------|---|
| 1. Meter Unit | 10. Main Fuse 20 A |
| 2. Speed Sensor | 11. Neutral Switch |
| 3. Fuel Level Sensor | 12. Oil Pressure Switch |
| 4. Side Stand Switch | 13. to Turn Signal Light Switch (Right) |
| 5. Engine Stop Switch | 14. to Frame Ground |
| 6. Frame Ground 3 | 15. to Tail/Brake Light |
| 7. Water Temperature Sensor | 16. to Turn Signal Light Switch (Left) |
| 8. Frame Ground 1 | 17. to Dimmer Switch and Passing Button |
| 9. Battery 12 V 8 Ah | 18. Ignition Switch |

Switches and Sensors

Water Temperature Sensor Inspection

- Remove the water temperature sensor (see Water Temperature Sensor Removal in the Cooling System chapter).
- Suspend the sensor [A] in a container of coolant so that the temperature-sensing projection [C] is submerged.
- Suspend an accurate thermometer [B] with temperature-sensing projection located in almost the same depth with the sensor.

NOTE

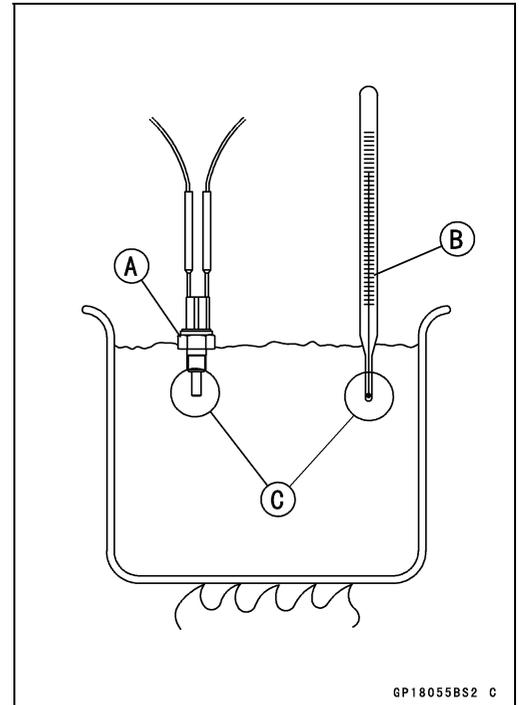
○ The sensor and thermometer must not touch the container side or bottom.

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the sensor.
- ★ If the hand tester does not show the specified values, replace the sensor.

Water Temperature Sensor Resistance

Temperature	*Resistance (kΩ)
0°C (32°F)	5.71
10°C (50°F)	3.68
20°C (68°F)	2.43
25°C (77°F)	2.00
30°C (86°F)	1.65
40°C (104°F)	1.14
50°C (122°F)	0.80

*: Reference Information

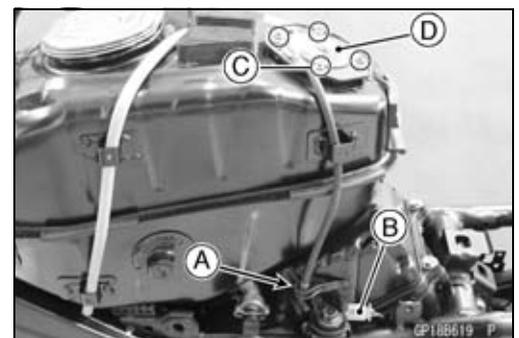


Fuel Level Sensor Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Remove:
 - Fuel Tank Cover (see Fuel Tank Cover Removal in the Frame chapter)
 - Left Side Cover (Side Cover Removal in the Frame chapter)
- Open the clamp [A].
- Disconnect the fuel level sensor lead connector [B].
- Remove:
 - Nuts [C]
 - Fuel Level Sensor [D]

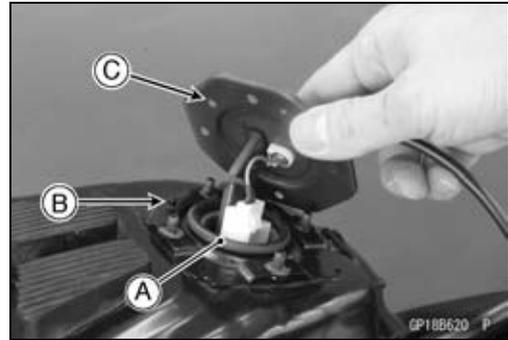


16-58 ELECTRICAL SYSTEM

Switches and Sensors

Fuel Level Sensor Installation

- Replace the O-ring [A] with a new one.
- Insert the projection [B] of the fuel tank into the hole [C] of the fuel level sensor.
- Tighten the nut securely.
- Connect the fuel level sensor lead connector.
- Install the removed parts.



Fuel Level Sensor Inspection

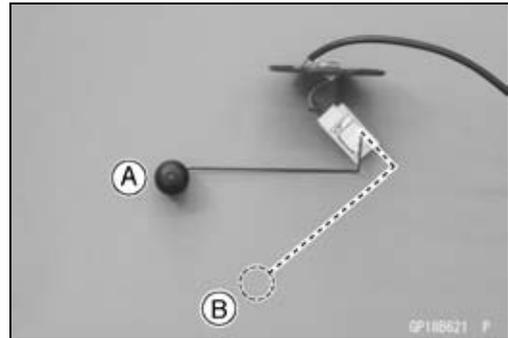
- Remove the fuel level sensor (see Fuel Level Sensor Removal).
- Set a tester, and connect it to the fuel level sensor lead connector as shown.

Fuel Level Sensor Resistance

Full Position [A]: $10 \pm 3 \Omega$

Empty Position [B]: $110 \pm 5 \Omega$

- ★ If the tester does not read as specified, replace the fuel level sensor.



Throttle Sensor Inspection

NOTE

○ Be sure the battery is fully charged.

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

Idle Speed

Standard: 1 350 ~ 1 450 r/min (rpm)

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

Step1: Throttle Sensor Resistance Inspection

- Remove the CDI unit (see CDI unit Removal).
- Connect a digital meter to the terminals in the CDI unit connector [A].
- Measure the throttle sensor resistance.

Throttle Sensor Resistance

Connection to adapter:

Digital Meter (+) → P Lead

Digital Meter (-) → GY/W Lead

Standard: 5 k Ω

- ★ If the reading is out of the standard, replace the throttle sensor.
- ★ If the reading is within the standard, check the throttle sensor output voltage inspection (see Step2: Throttle Sensor Output Voltage Inspection).



Switches and Sensors

Step2: Throttle Sensor Output Voltage Inspection

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

Special Tool - Needle Adapter Set: 57001-1457

Throttle Sensor Output Voltage

Connection to adapter:

Digital Meter (+) → P Lead

Digital Meter (-) → BK/Y Lead

- Turn the ignition switch on.
- Measure the throttle sensor output voltage by Turning the throttle grip.

Output Voltage

Standard: DC 0.65 ~ 0.75 V at idle throttle opening

DC 3.4 ~ 3.8 V at full throttle opening (for reference)

- ★ If the reading is out of the standard, adjust the throttle sensor mounting position (see Step3: Throttle Sensor Adjustment).

Step2: Throttle Sensor Adjustment

- Remove the carburetor with the throttle cable and throttle sensor connectors installed (see Carburetor Removal in the Fuel System (DFI) chapter).
- Connect a digital meter to the CDI unit connector with the needle adapter set [A].

Special Tool - Needle Adapter Set: 57001-1457

Throttle Sensor Output Voltage

Connection to adapter:

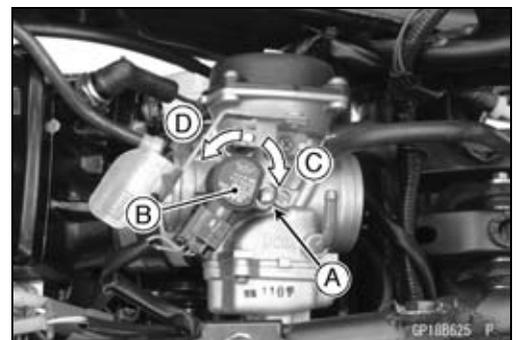
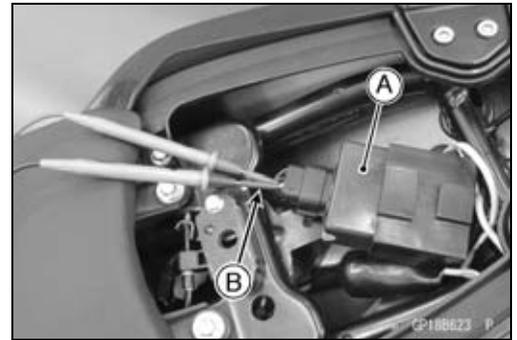
Digital Meter (+) → P Lead

Digital Meter (-) → BK/Y Lead

- Turn the ignition switch on.
- Loosen the throttle sensor mounting bolt [A].
- Set the position of the throttle sensor [B] on the carburetor by slightly rotating it until digital meter reads 0.7 V.
- Rotate the throttle sensor clockwise [C] if the output voltage is less than 0.7 V.
- Rotate the throttle sensor counterclockwise [D] if the output voltage is more than 0.7 V.
- Tighten the throttle sensor mounting bolt while holding the throttle sensor.

Torque - Throttle Sensor Mounting Bolt: 5.0 N·m (0.50 kgf·m, 44 in·lb)

- Measure the throttle sensor output voltage again by rotating the throttle pulley.
- ★ If the reading is out of the standard, adjust the throttle sensor mounting position again.

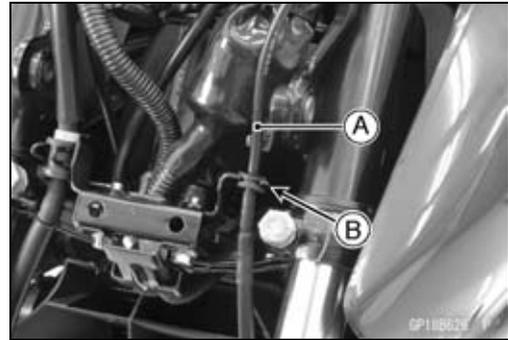


16-60 ELECTRICAL SYSTEM

Switches and Sensors

Speed Sensor Removal

- Remove:
 - Headlight Assy (see Headlight Cover Removal in the Frame chapter)
- Remove the speed sensor lead [A] from the bracket [B].

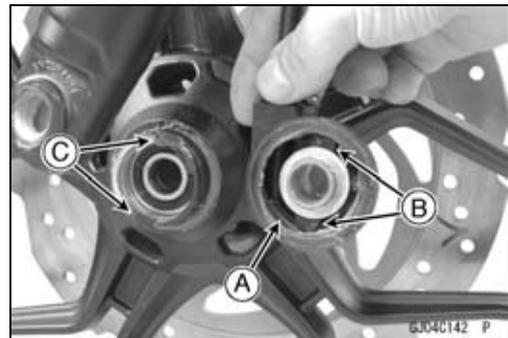


- Remove:
 - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
 - Speed Sensor [A]



Speed Sensor Installation

- Apply high-temperature grease to the speed sensor seal lip [A].
- Insert the projections [B] of the speed sensor to the notches [C] of the wheel hub.



NOTICE

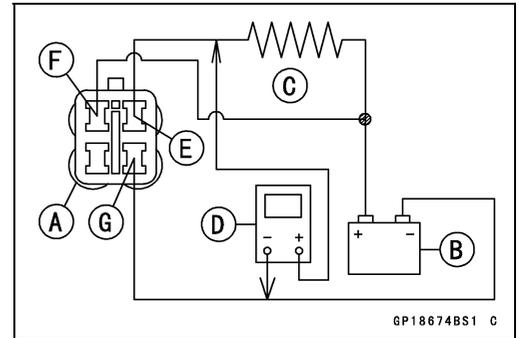
Unless the speed sensor housing is properly installed on the wheel, you will damage the speed sensor rotor in tightening the front axle.

- Install the front wheel (see Front Wheel Installation in the Wheels/Tires chapter).
- Install the speed sensor lead to the bracket, and connect the speed sensor lead connector.
- Install the headlight assy (see Headlight Cover Installation in the Frame chapter).

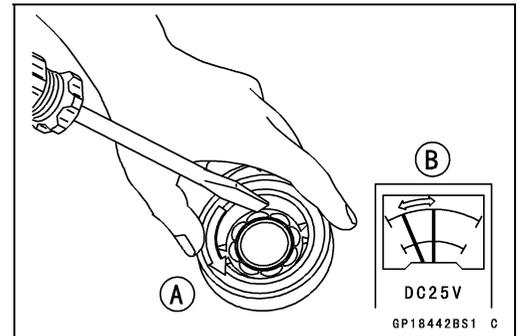
Switches and Sensors

Speed Sensor Inspection

- Remove:
 - Speed Sensor (see Speed Sensor Removal)
- Connect the speed sensor connector [A] with a battery [B], 10 kΩ resistor [C] and a tester [D] as shown.
 - R/W Lead [E]
 - BL/W Lead [F]
 - BK/Y Lead [G]

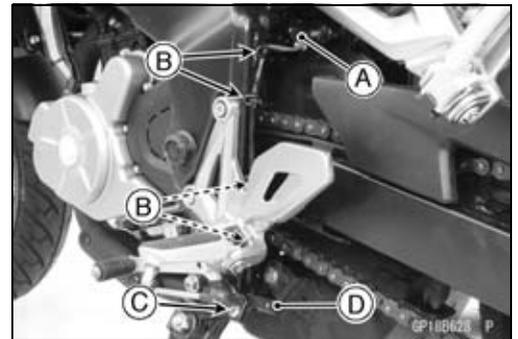


- Rotate [A] the sensor rotor of the speed sensor with a screw driver.
- Then the tester indicator should flick [B].
- ★ If the tester indicator does not flick, replace the speed sensor.



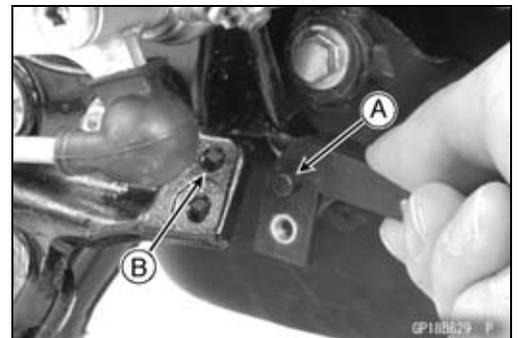
Side Stand Switch Removal

- Disconnect the side stand switch lead connector [A].
- Remove the bands [B], and open the clamps.
- Remove:
 - Bolt [C]
 - Side Stand Switch [D]



Side Stand Switch Installation

- Insert the projection [A] of the side stand switch into the hole [B], and tighten the bolt.
- Hold the side stand switch lead with the new bands and the clamps.
- Connect the sidestand switch lead connector.



Side Stand Switch Inspection

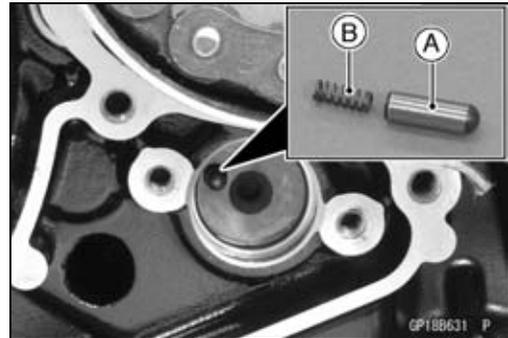
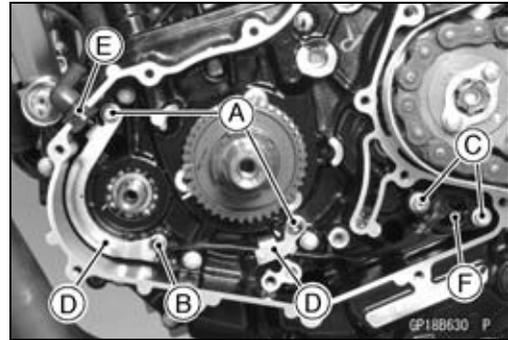
- Refer to the Switch Inspection.

16-62 ELECTRICAL SYSTEM

Switches and Sensors

Neutral Switch Removal

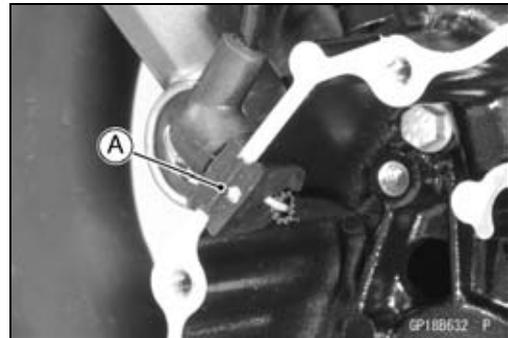
- Remove the alternator rotor (see Alternator Rotor Removal).
- Disconnect the neutral switch lead connector.
- Remove:
 - Neutral Switch Lead Holding Plate Bolts [A]
 - Neutral Switch Lead Holding Plate Screw [B]
 - Neutral Switch Bolts [C]
 - Neutral Switch Lead Holding Plates [D]
 - Grommet [E]
 - Neutral Switch [F]
- Remove the pin [A] and spring [B] from the shift drum.



Neutral Switch Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the neutral switch lead grommet [A], and fit the grommet into the notch of the cover securely.

Sealant - Liquid Gasket, TB1211F: 92104-0004



- Securely place the pin [A] and spring [B] into the hole of the shift drum.
- Apply a non-permanent locking agent to the neutral switch bolts.
- Install the neutral switch, and tighten the neutral switch bolts.

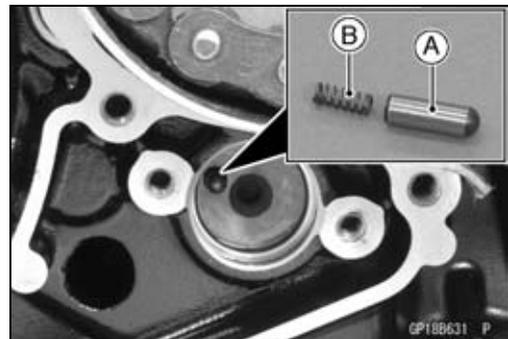
Torque - Neutral Switch Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Apply a non-permanent locking agent to the neutral switch lead holding plate bolts and screw.
- Install the holding plates, and tighten the neutral switch lead holding plate bolts and screw.

Torque - Neutral Switch Lead Holding Plate Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

Neutral Switch Lead Holding Plate Screw: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Install the removed parts (see appropriate chapters).



Neutral Switch Inspection

- Refer to the Switch Inspection.

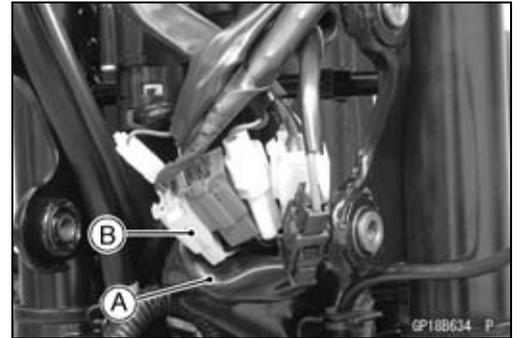
Switches and Sensors

Starter Lockout Switch Circuit Inspection

- Remove the headlight assy (see Headlight Cover Removal in the Frame chapter).
- Remove the band [A].



- Slide the dust cover [A], and disconnect the starter lockout switch lead connector [B].



- Check conductivity of the following by a tester.
Starter Lockout Switch Lead Connector [A] (Switch Side)
- Connect the tester to the starter lockout switch connector.

Switch Circuit Inspection

Connections: Y/G Lead $\leftarrow \rightarrow$ BK/Y Lead

Criteria: When clutch lever is released $\rightarrow \infty$
When clutch lever is pulled in \rightarrow about 0Ω

Diode Inspection

Connections: Y/G Lead \rightarrow LG Lead or
Y/G Lead \leftarrow LG Lead

Criteria: Confirm that there is a continuity on one side and not a continuity on other side.

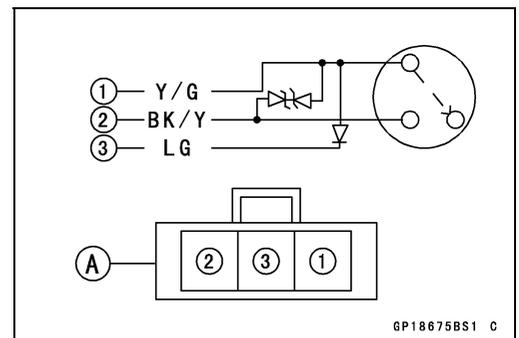
- ★ If the tester does not read as specified, replace the starter lockout switch.

Brake Light Timing Inspection

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.



16-64 ELECTRICAL SYSTEM

Switches and Sensors

Switch Inspection

- Using a tester, check to see that only the connections shown in the table have continuity.
- For the switch housings and the ignition switch, refer to the tables in the Wiring Diagram.
- ★ If the switch has an open or short, repair it or replace it with a new one.

Rear Brake Light Switch Connections

Rear Brake Light Switch Connections		
Color	BR	BL
When brake pedal is pushed down	○ ——— ○	
When brake pedal is released		

Side Stand Switch Connections

Side Stand Switch Connections		
Color	BK/Y	O/BR
When sidestand is up		
When sidestand is down	○ ——— ○	

GP18672B S

Oil Pressure Switch Connections*

Oil Pressure Switch Connections *		
Color	SW.Terminal	Ground
When engine is stopped	○ ——— ○	
When engine is running		

*: Engine lubrication system is in good condition.

Neutral Switch Connections

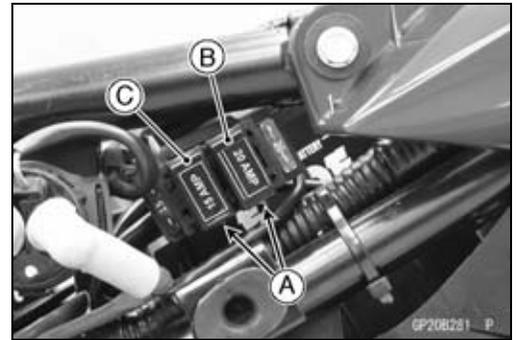
Neutral Switch Connections		
Color	SW.Terminal	Ground
When transmission is in neutral	○ ——— ○	
When transmission is not in neutral		

GP18673B S

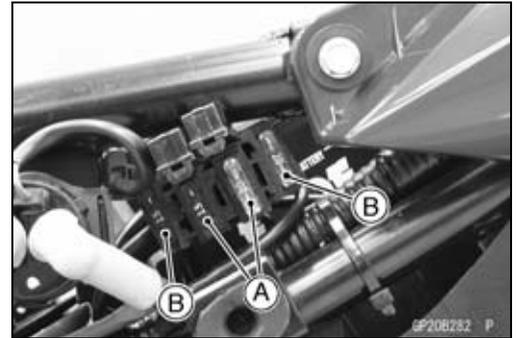
Fuse

Fuse Box Fuse Removal

- Remove the left side cover (see Side Cover Removal in the Frame chapter).
- Unlock the hooks [A] to lift up the lid.
Fuse Box (Main Fuse) [B]
Fuse Box (Ignition Fuse) [C]



- Pull the fuses [A] straight out of the fuse box with needle nose pliers.
Spare Fuses [B]

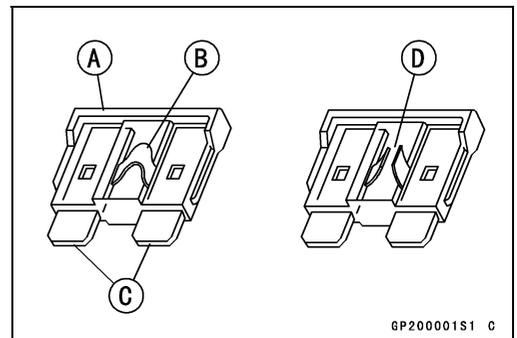


Fuse Installation

- ★ If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.
- Install the fuse box fuse on the original position as specified on the lid.

Fuse Inspection

- Remove the fuse (see Fuse Box Fuse Removal).
- Inspect the fuse element.
- ★ If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.
Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]



NOTICE

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

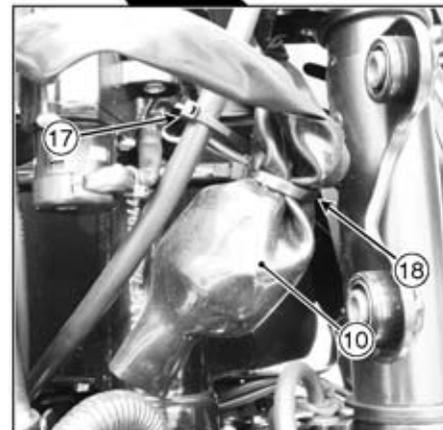
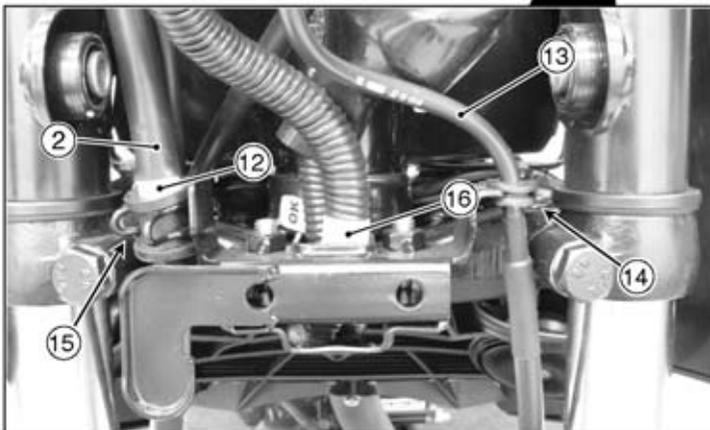
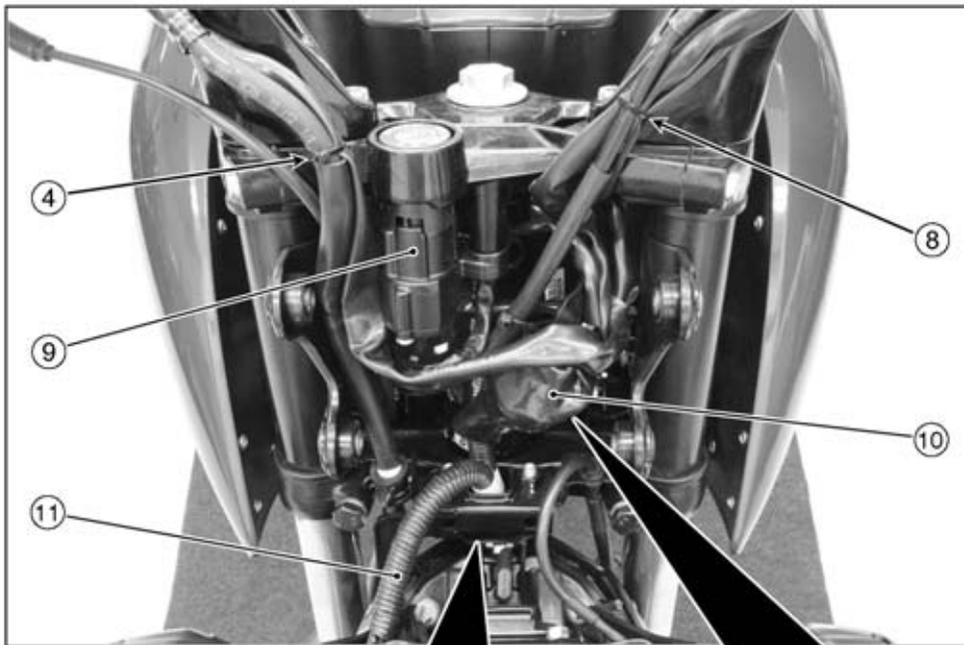
Appendix

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Cable, Wire, and Hose Routing	17-2
Troubleshooting Guide	17-23

17-2 APPENDIX

Cable, Wire, and Hose Routing

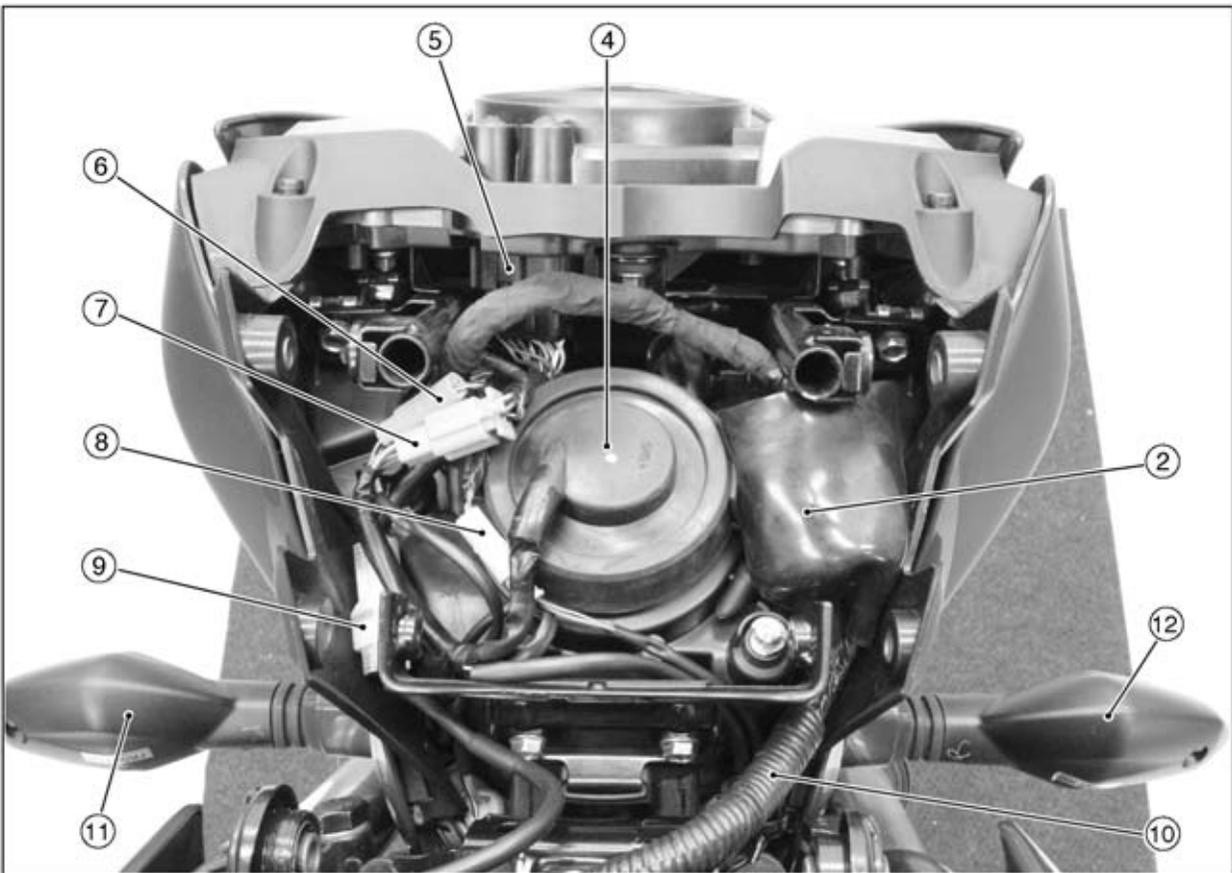
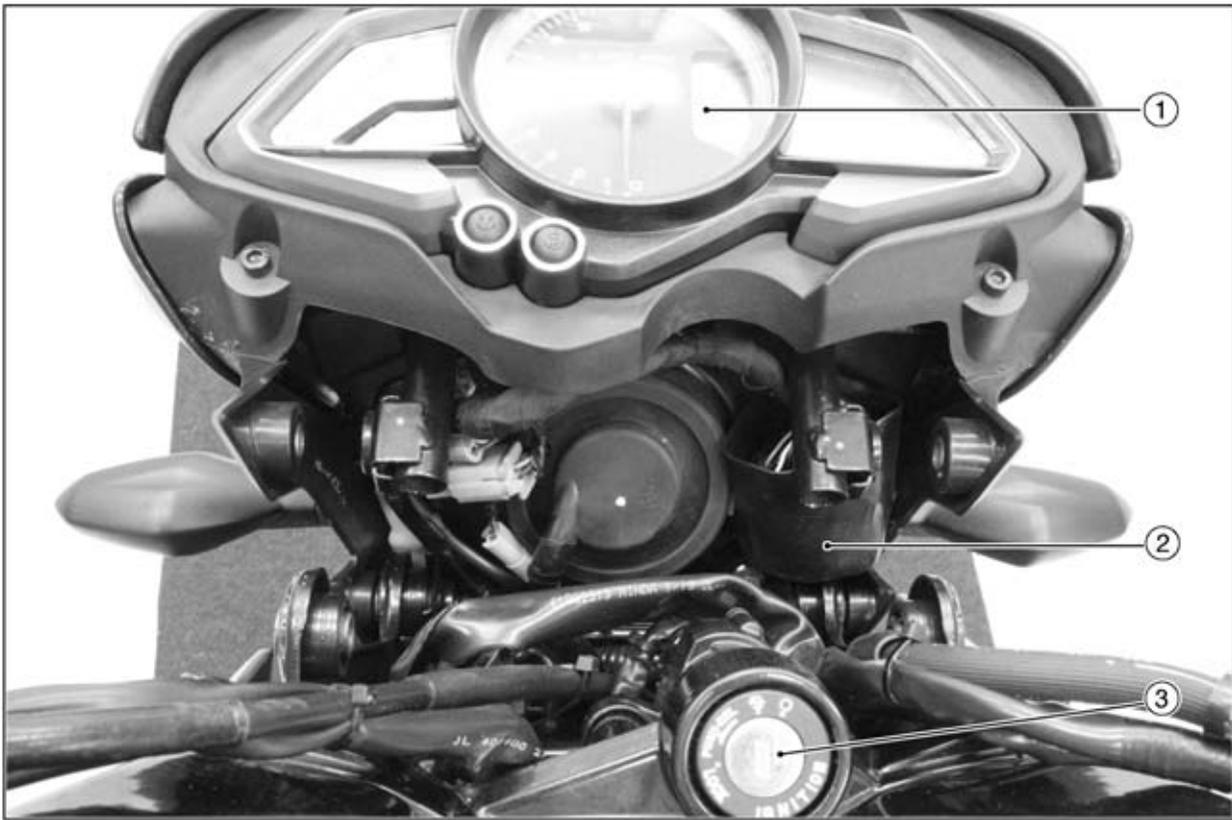


Cable, Wire, and Hose Routing

1. Throttle Cable
2. Front Brake Hose
3. Right Switch Housing Lead
4. Band (Hold the front brake hose and right switch housing lead.)
5. Left Switch Housing Lead
6. Clutch Cable
7. Starter Lockout Switch Lead
8. Band (Hold the clutch cable, left switch housing lead and starter lockout switch lead.)
9. Ignition Switch
10. Rubber Cover (Cover the left switch housing lead connector, ignition switch lead connector, left switch housing lead connector and starter lockout switch lead connector.)
11. Main harness (to the headlight assy)
12. Yellow Collar
13. Speed Sensor Lead
14. Clamp (Hold the speed sensor lead.)
15. Clamp (Hold the front brake hose.)
16. White Tape
17. Band (Hold the clutch cable.)
18. Band (Hold the rubber cover.)

17-4 APPENDIX

Cable, Wire, and Hose Routing

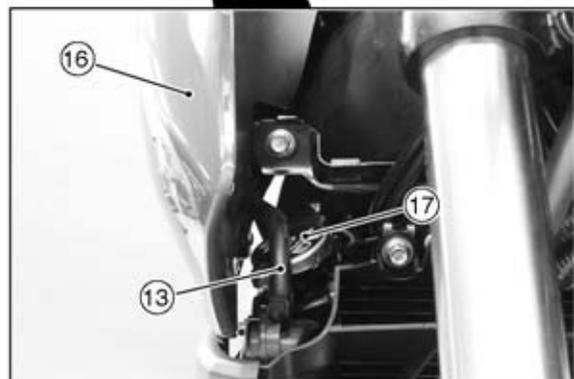
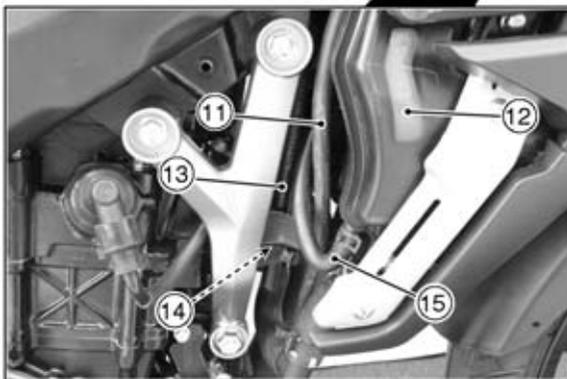
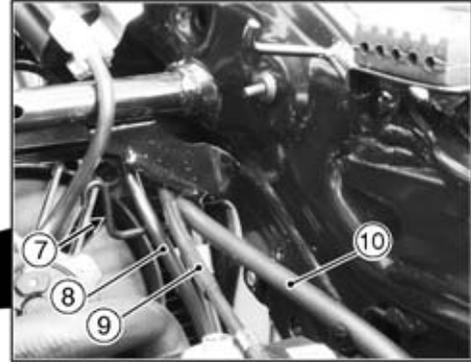
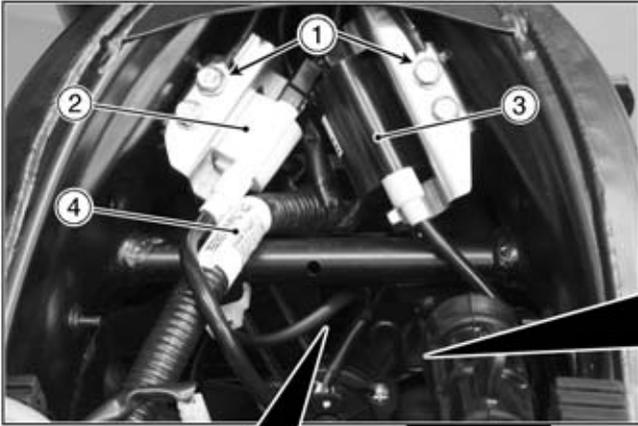


Cable, Wire, and Hose Routing

1. Meter Unit
2. Rubber Cover (Cover the main harness connectors.)
3. Ignition Switch
4. Headlight Dust Cover
5. Meter Unit Connector
6. Left Front Turn Signal Light Lead Connector
7. Headlight lead Connector
8. Right Front Turn Signal Lead Connector
9. Speed Sensor Lead Connector
10. Main Harness
11. Left Turn Signal Light
12. Right Turn Signal Light

17-6 APPENDIX

Cable, Wire, and Hose Routing

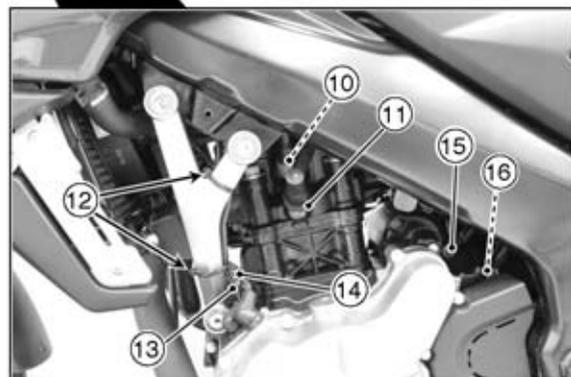
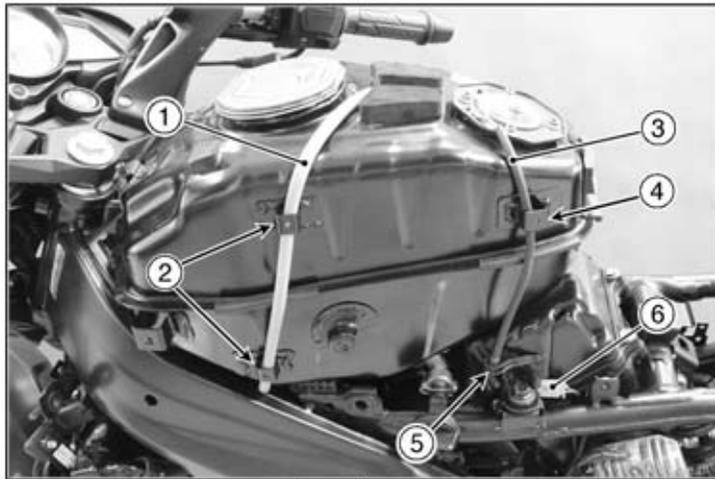


Cable, Wire, and Hose Routing

1. Ground Terminals
2. Ignition Coil for Central Spark Plug
3. Ignition Coil for Side Spark Plugs
4. Run the main harness between two ignition coils.
5. Band (Hold the radiator fan motor lead on the radiator fan casing.)
6. Radiator Fan Motor Lead Connector
7. Guide (Run the right side spark plug lead, throttle cable and clutch cable into the guide.)
8. Right Side Spark Plug Lead
9. Throttle Cable
10. Clutch Cable
11. Fuel Tank Overflow Hose
12. Coolant Reserve Tank
13. Coolant Reserve Tank Overflow Hose
14. Guide (Run the coolant reserve tank overflow hose into the guide.)
15. Radiator Overflow Hose
16. Fuel Tank Cover
17. Radiator Cap

17-8 APPENDIX

Cable, Wire, and Hose Routing

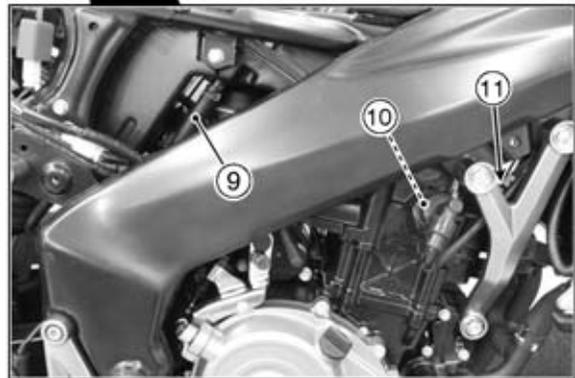
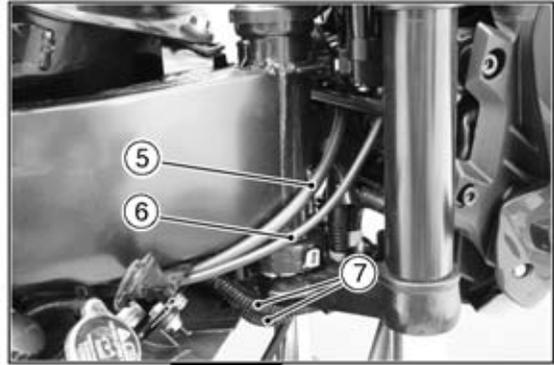
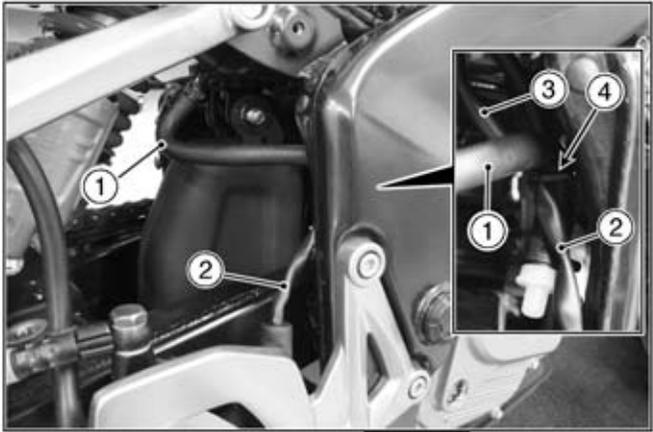


Cable, Wire, and Hose Routing

1. Fuel Tank Breather Hose
2. Guides (Run the fuel tank breather hose into the guides.)
3. Fuel Level Sensor Lead
4. Guide (Run the fuel level sensor lead into the guide.)
5. Clamp (Hold the fuel level sensor lead.)
6. Fuel Level Sensor Lead Connector
7. Band (Hold the hone leads.)
8. Horn Leads
9. Horn
10. Central Spark Plug
11. Left Side Spark Plug
12. Bands (Hold the alternator/crankshaft sensor lead and neutral switch lead.)
13. Neutral Switch Lead
14. Alternator/Crankshaft Sensor Lead
15. Engine Ground Terminal
16. Frame Ground Terminal

17-10 APPENDIX

Cable, Wire, and Hose Routing

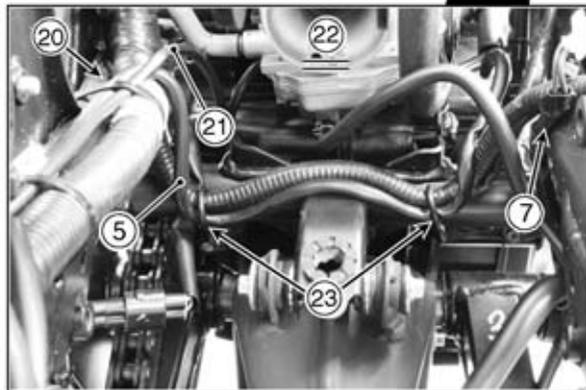
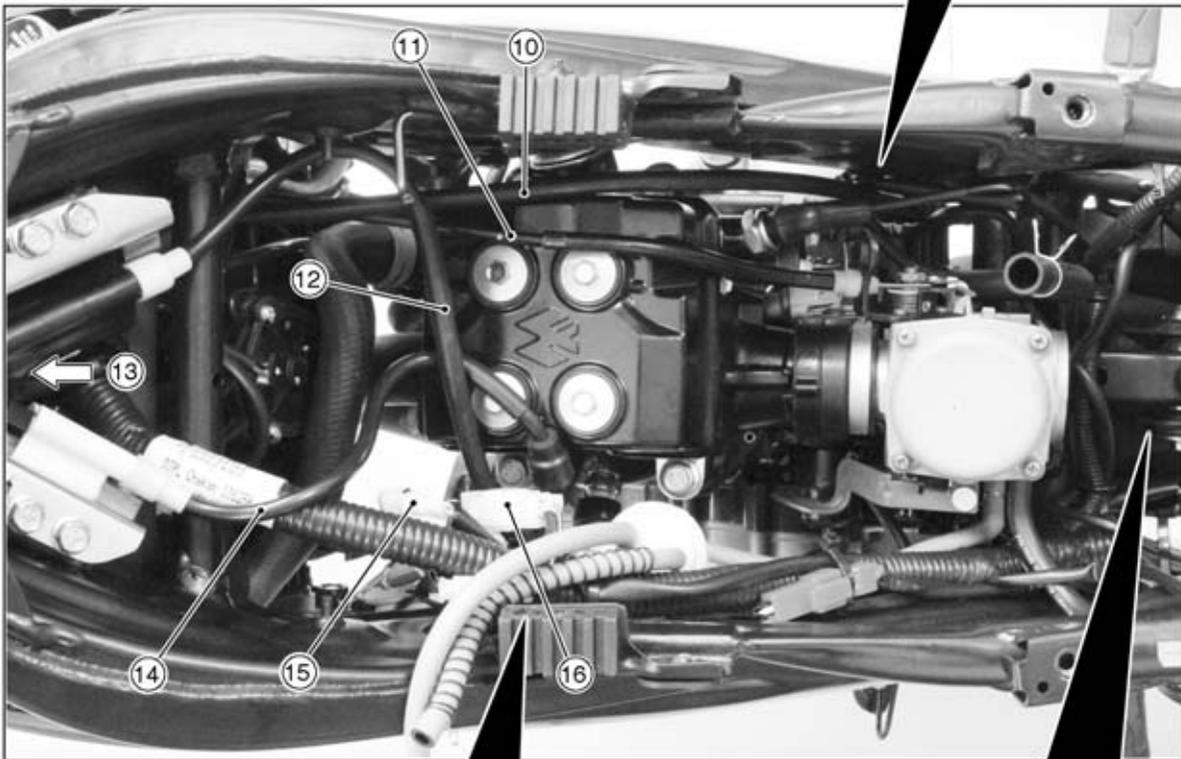
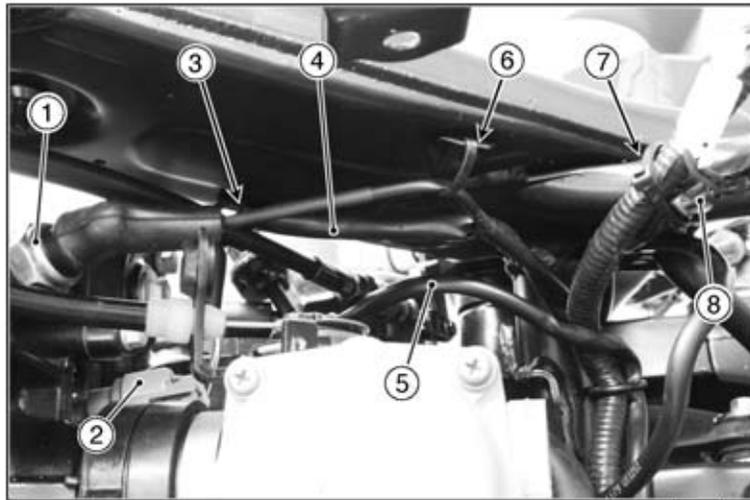


Cable, Wire, and Hose Routing

1. Air Cleaner Drain Hose
2. Rear Brake Light Switch Lead
3. Carburetor Drain Hose
4. Guide (Run the air cleaner drain hose, rear brake light switch lead and carburetor drain hose into the guide.)
5. Clutch Cable
6. Throttle Cable
7. Main Harnesses
8. Guide (Run the carburetor drain hose into the guide.)
9. Engine Breather Hose
10. Right Side Spark Plug
11. Run the spark plug lead inside the engine bracket.

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Cable, Wire, and Hose Routing

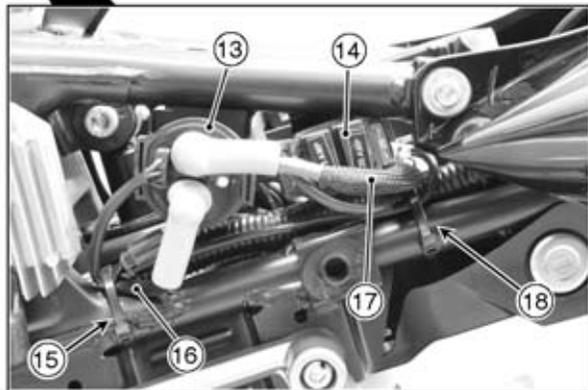
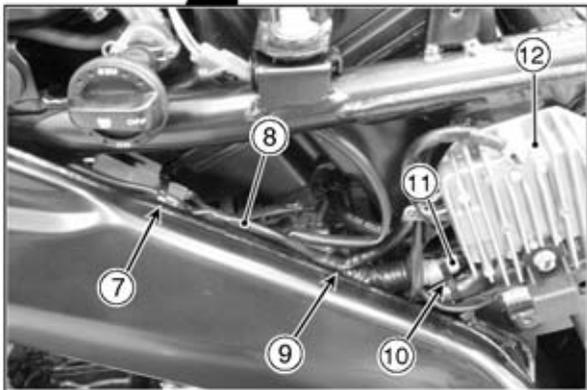
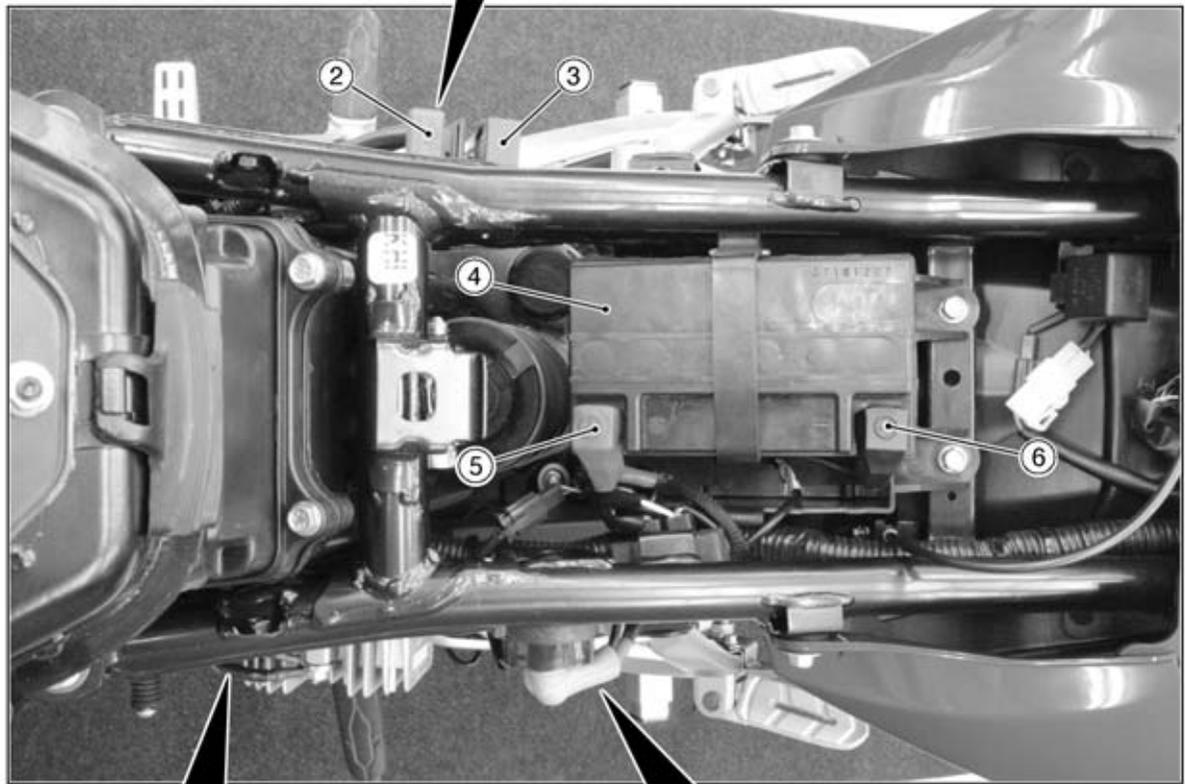
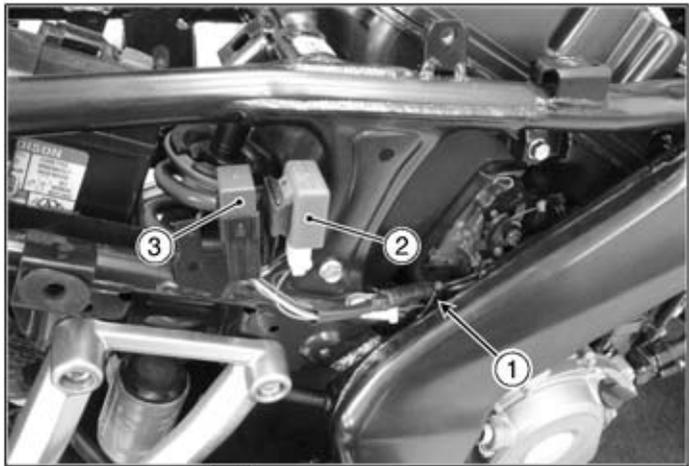


Cable, Wire, and Hose Routing

1. Oil Pressure Switch
2. Water Temperature Sensor
3. Band (Hold the water temperature sensor lead.)
4. Water Temperature Sensor Lead
5. Starter Motor Cable
6. Band (Hold the oil pressure switch lead.)
7. Band (Hold the main harness and rear brake light switch lead.)
8. Rear Brake Light Switch Lead
9. Oil Pressure Switch Lead
10. Clutch Cable
11. Throttle Cable
12. Left Side Spark Plug Lead
13. Front Side
14. Central Spark Plug Lead
15. Crankshaft Sensor Lead Connector
16. Alternator Lead Connector
17. Band (Hold the main harness and alternator lead.)
18. Band (Hold the regulator/rectifier lead connector and main harness.)
19. White Tape
20. Band (Hold the starter motor cable, battery (-) cable and main harness.)
21. Battery (-) Cable
22. View from back
23. Guides (Run the main harness and starter motor cable into the guides.)

17-14 APPENDIX

Cable, Wire, and Hose Routing

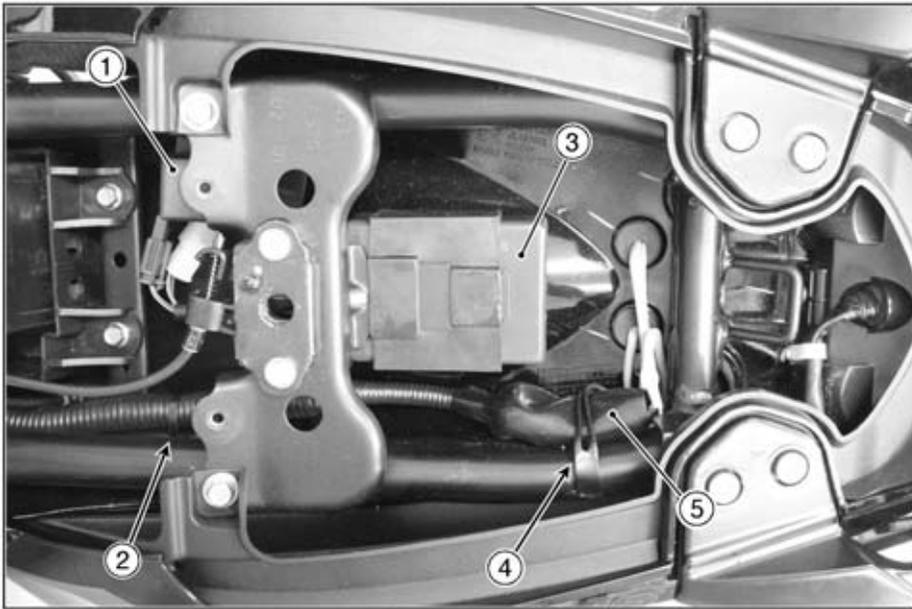


Cable, Wire, and Hose Routing

1. Band (Hold the main harness and rear brake light switch lead.)
2. Turn Signal Light Relay
3. Radiator Fan Relay
4. Battery
5. Battery (+) Terminal
6. Battery (-) Terminal
7. Band (Hold the regulator/rectifier lead connector and main harness.)
8. Regulator/Rectifier Lead
9. Band (Hold the regulator/rectifier lead and main harness.)
10. Band (Hold the starter motor cable, battery (-) cable and main harness.)
11. White Tape
12. Regulator/Rectifier
13. Starter Relay
14. Fuse Box
15. Band (Hold the starter motor cable, starter relay lead, battery (-) cable and main harness.)
16. Starter Motor Cable
17. Battery (+) Cable
18. Band (Hold battery (-) cable and main harness.)

17-16 APPENDIX

Cable, Wire, and Hose Routing



GB098056 P

1. Headlight Relay
2. Band (Hold the main harness.)
3. CDI Unit
4. Clamp (Hold the rubber cover.)
5. Rubber Cover (Cover the left rear turn signal light lead connector, right rear turn signal light lead connector, license plate light lead connector and tail/brake light lead connector.)
6. License Plate Light
7. Bands (Hold the license plate light lead.)

Cable, Wire, and Hose Routing



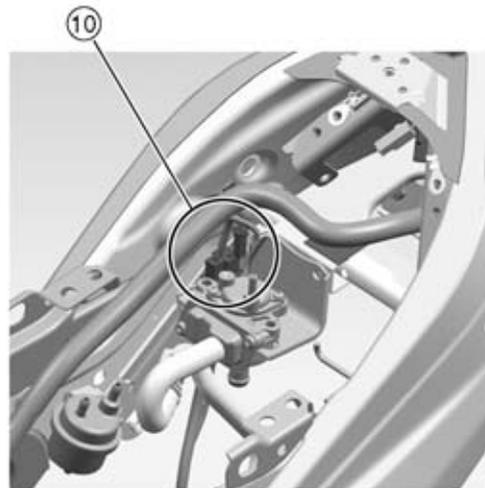
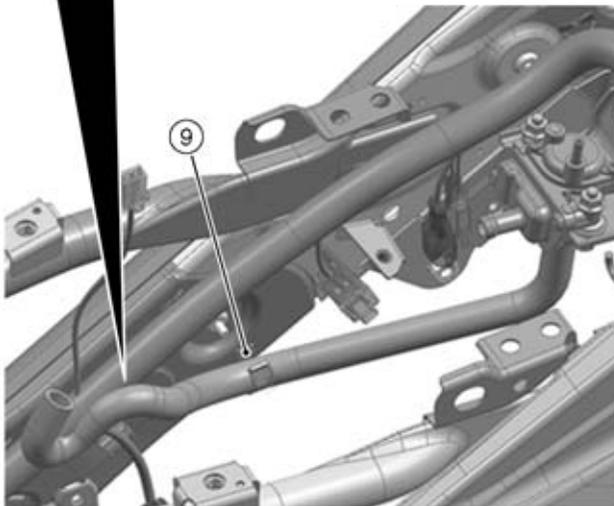
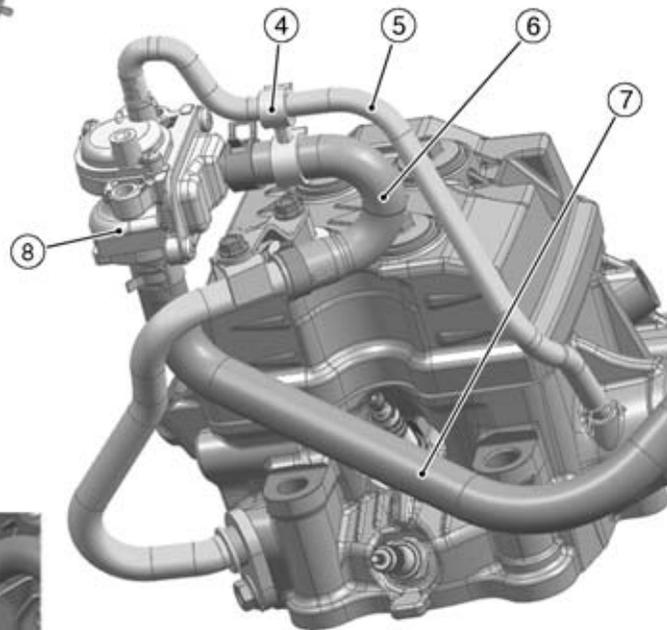
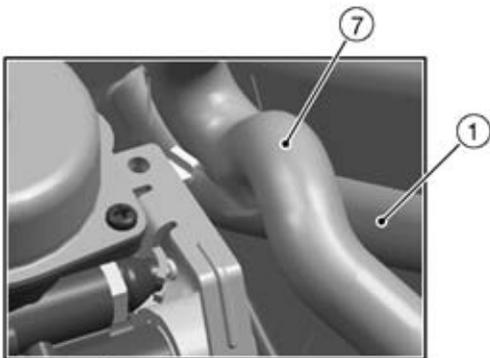
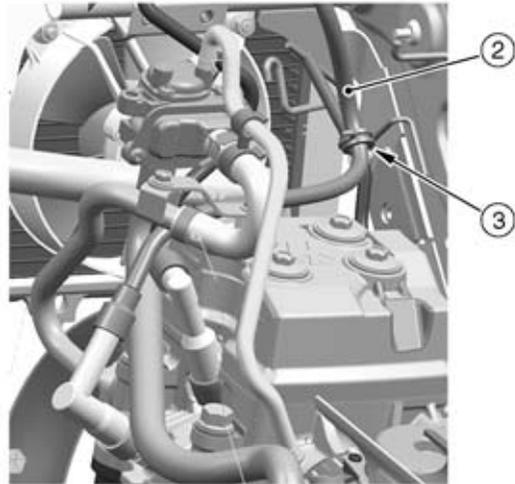
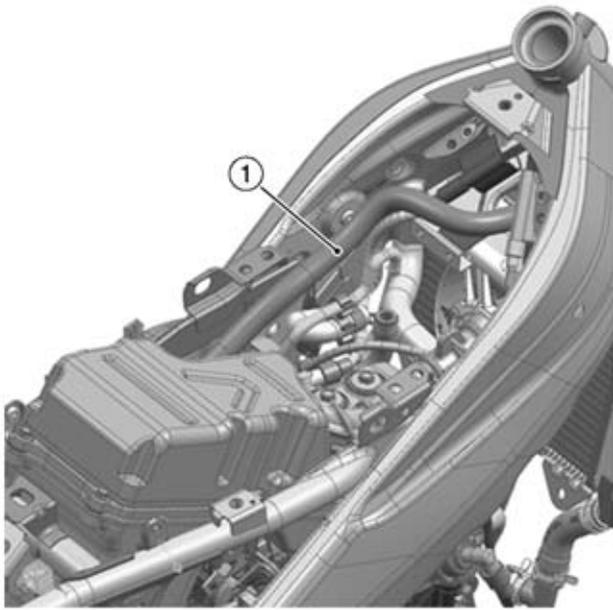
6B09B057 P

1. Speed Sensor
2. Speed Sensor Lead
3. Guide (Run the speed sensor lead into the guide.)
4. Clamp (Hold the front brake hose.)
5. Front Brake Hose
6. Front Brake Caliper
7. Rear Brake Caliper
8. Rear Brake Reservoir
9. Rear Brake Hose

17-18 APPENDIX

Cable, Wire, and Hose Routing

PH Model



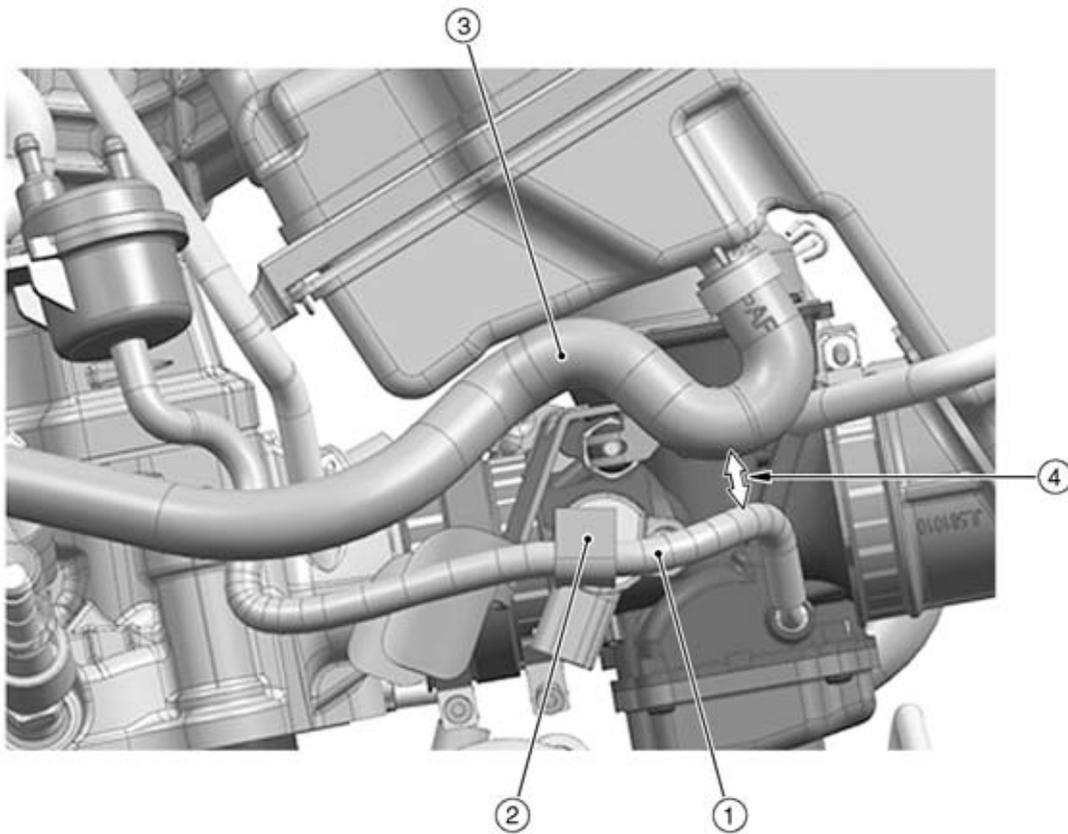
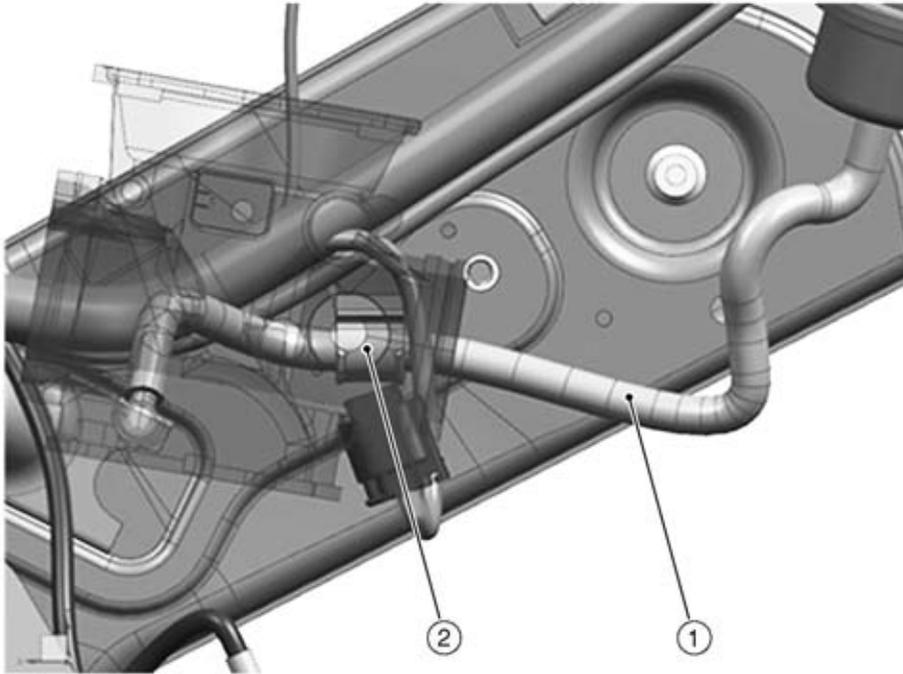
Cable, Wire, and Hose Routing

1. Main Harness
2. Left Side Spark Plug Lead
3. Clamp the left side spark plug lead.
4. Clamp the vacuum hose and air hose (to the cylinder head pipe).
5. Vacuum Hose
6. Air Hose (to the cylinder head pipe)
7. Air Hose (to the air cleaner housing)
8. Vacuum Switch Valve
9. Clamp (Hold the air hose.)
10. Alternator Lead Connector and Neutral Switch Lead Connector

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Cable, Wire, and Hose Routing

PH Model

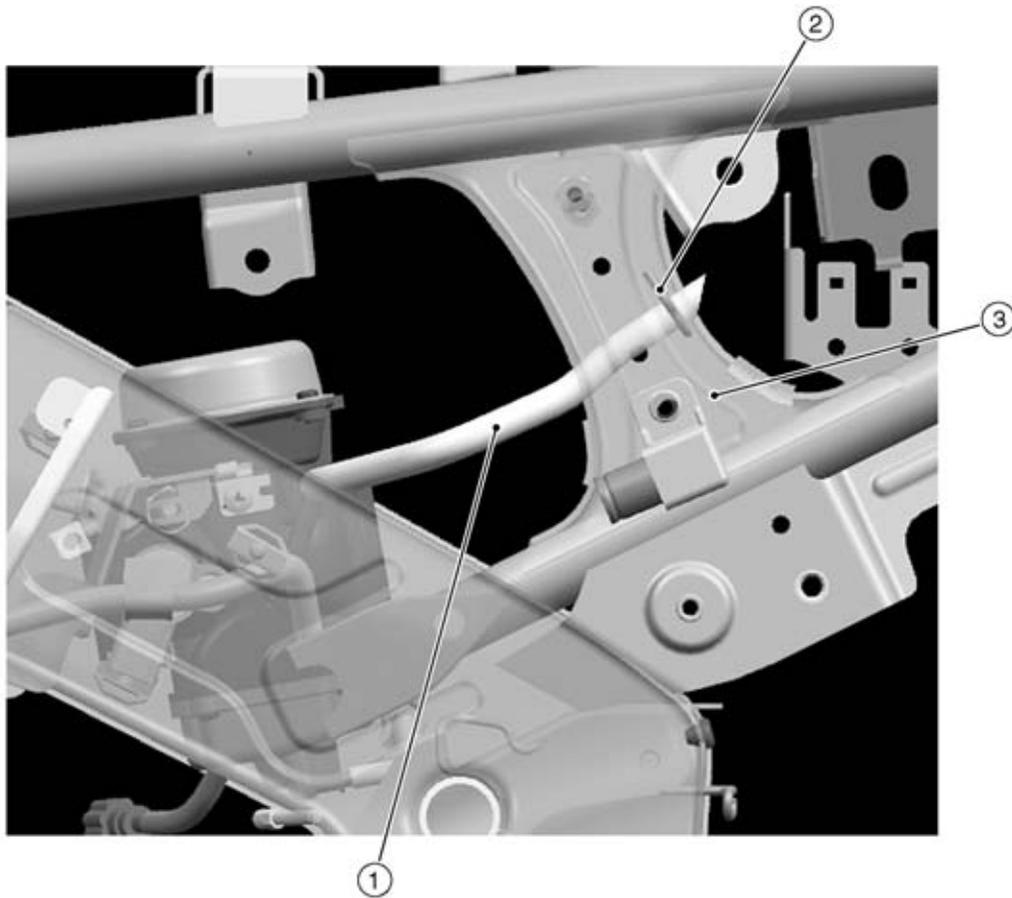


Cable, Wire, and Hose Routing

1. Fuel Hose
2. Clamp (Hold the fuel hose.)
3. Air Hose (to the air cleaner housing)
4. Minimum 10 mm (0.39 in.) between fuel hose and air hose.

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Cable, Wire, and Hose Routing



GB09573E G

1. Air Vent Hose
2. Clamp (Inside of gusset, hold the air vent hose.)
3. Gusset (Left side of rear frame)

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:

- Ignition and engine stop switch not ON
- Starter lockout switch or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Wiring shorted or open
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:

- Starter clutch trouble
- Starter idle gear 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
- Starter idle gear seizure

No fuel flow:

- No fuel in tank
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel filter 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:

- Ignition switch not ON
- Engine stop switch turned OFF
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Spark plug dirty, broken, or gap maladjusted

- Spark plug cap or high tension lead trouble
- Spark plug cap shorted or not in good contact

- Spark plug incorrect

- CDI unit trouble

- Neutral switch or starter lockout switch trouble

- Crankshaft sensor trouble

- Ignition coil trouble

- Ignition switch or engine stop switch shorted

- Wiring shorted or open

- Fuse blown

Fuel/air mixture incorrect:

- Idle adjusting screw maladjusted

- Pilot jet, or air passage clogged

- Air cleaner clogged, poorly sealed, or missing

- Air cleaner duct loose

Compression Low:

- Spark plug loose

- Cylinder head not sufficiently tightened down

- No valve clearance

- Cylinder, piston worn

- Piston ring bad (worn, weak, broken, or sticking)

- Piston ring/groove clearance excessive

- Cylinder head gasket damaged

- Cylinder head warped

- Valve spring broken or weak

- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:

- Battery voltage low

- Spark plug dirty, broken, or gap maladjusted

- Spark plug cap or high tension lead trouble
- Spark plug cap shorted or not in good contact

- Spark plug incorrect

- CDI unit trouble

- Crankshaft sensor trouble

- Ignition coil trouble

Fuel/air mixture incorrect:

- Idle adjusting screw maladjusted

- Pilot jet, or air passage clogged

- Needle jet bleed holes or needle jet clogged
- Pilot passage clogged

- Air cleaner clogged, poorly sealed, or missing

- Choke plunger stuck open

- Fuel level in carburetor float bowl too high or too low

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Troubleshooting Guide

Fuel tank air vent obstructed
Carburetor holder loose
Air cleaner duct loose
Fuel tap 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 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:

CDI unit trouble
Carburetor vacuum piston does not slide smoothly
Carburetor Vacuum piston diaphragm damage
Engine oil viscosity too high
Drive train trouble
Brake dragging
Engine overheating
Clutch slipping

Poor Running or No Power at High Speed:

Firing incorrect:

Spark plug dirty, broken, or gap maladjusted
Spark plug cap or high tension lead trouble
Spark plug cap shorted or not in good contact
Spark plug incorrect
CDI unit trouble
Crankshaft sensor trouble
Ignition coil trouble

Fuel/air mixture incorrect:

Choke plunger stuck open
Main jet clogged or wrong size
Jet needle or needle jet worn
Air jet or air passage clogged
Fuel level in carburetor float bowl too high or too low
Needle jet bleed holes or needle jet clogged
Air cleaner clogged, poorly sealed, or missing
Air cleaner duct loose
Fuel to carburetor insufficient
Water or foreign matter in fuel
Carburetor holder loose

Fuel tank air vent obstructed
Fuel tap clogged
Fuel filter 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
CDI unit trouble

Miscellaneous:

Throttle valve won't fully open
Carburetor vacuum piston does not slide smoothly
Carburetor vacuum piston diaphragm damage
Brake dragging
Clutch slipping
Engine overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Crankshaft bearing worn or damaged

Overheating:

Firing incorrect:

Spark plug dirty, broken, or maladjusted
Spark plug incorrect
CDI unit 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 clogged, poorly sealed, or missing
Choke plunger stuck open

Compression high:

Carbon built up in combustion chamber

Engine load faulty:

Clutch slipping
Engine oil level too high
Engine oil viscosity too high

Troubleshooting Guide

Drive train trouble

Brake dragging

Lubrication inadequate:

Engine oil level too low

Engine oil poor quality or incorrect

Clutch Operation Faulty:

Clutch slipping:

No clutch lever play

Clutch inner cable trouble

Friction plate worn or warped

Steel plate worn or warped

Clutch spring broken or weak

Clutch release mechanism trouble

Clutch hub or housing unevenly worn

Clutch not disengaging properly:

Clutch lever play excessive

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 release mechanism trouble

Clutch hub nut loose

Clutch hub spline damaged

Clutch friction plate installed wrong

Gear Shifting Faulty:

Doesn't go into gear shift pedal doesn't return:

Clutch not disengaging

Shift fork bent or seized

Gear stuck on the shaft

Gear positioning lever binding

Shift return spring weak or broken

Shift return spring pin loose

Shift mechanism arm spring broken

Shift mechanism arm broken

Shift drum broken

Jumps out of gear:

Shift fork ear worn, bent

Gear groove worn

Gear dogs and/or dog holes worn

Shift drum groove worn

Gear positioning lever spring weak or broken

Shift fork guide pin worn

Drive shaft, output shaft, and/or gear splines worn

Overshifts:

Gear positioning lever spring weak or broken

Shift mechanism arm spring broken

Abnormal Engine Noise:

Knocking:

CDI unit trouble

Carbon built up in combustion chamber

Fuel poor quality or incorrect

Spark plug incorrect

Engine 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 gear worn or chipped

Camshaft chain tensioner trouble

Camshaft chain, sprocket, guide worn

Alternator rotor loose

Abnormal Drive Train Noise:

Clutch noise:

Clutch damper weak or damaged

Clutch housing finger/friction plate tang worn

Clutch housing gear worn

Metal chips jammed in clutch housing gear

Transmission noise:

Bearings worn

Transmission gears worn or chipped

Metal chips jammed in gear teeth

Engine oil insufficient

Drive chain noise:

Drive chain adjusted improperly

Drive chain worn

Rear and/or engine sprocket worn

Chain lubrication insufficient

Rear wheel misaligned

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Troubleshooting Guide

Abnormal Frame Noise:

Front fork noise:

- Oil insufficient or too thin
- Spring weak or broken

Rear shock absorber noise:

- Shock absorber damaged
- Spring weak or broken

Disc brake noise:

- Pad installed incorrectly
- Pad surface glazed
- Disc warped
- Caliper trouble

Other noise:

- Bracket, nut, bolt, etc. not properly mounted or tightened

Exhaust Smokes Excessively:

White smoke:

- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

Black smoke:

- Air cleaner clogged
- Main jet too large or fallen off
- Choke 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 poorly sealed or missing

Handling and/or Stability

Unsatisfactory:

Handlebars hard to turn:

- Cable routing incorrect
- Wiring routing incorrect
- Steering stem nut too tight
- Steering stem bearing damaged
- Steering stem bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

Handlebars shakes or excessively vibrates:

- Tire worn
- Handlebar holder bolt loose
- Rim warped, or not balanced
- Wheel bearing worn

- Steering stem head bolt loose
- Front, rear axle runout excessive

Handlebars pulls to one side:

- Frame bent
- Wheel misalignment
- Swingarm bent or twisted
- Swingarm pivot shaft bent
- Steering maladjusted
- Front fork bent
- Right and left front fork oil level uneven

Shock absorption unsatisfactory:

- (Too hard)
- Front fork oil excessive
- Front fork oil viscosity too high
- Rear shock absorber adjustment too hard
- Tire air pressure too high
- Front fork bent
- (Too soft)
- Tire air pressure too low
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Rear shock adjustment too soft
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking

Brake Doesn't Hold:

- Air in the brake line
- Pad or disc worn
- Brake fluid leakage
- Disc warped
- Contaminated pad
- Brake fluid deteriorated
- Primary or secondary cup damaged in master cylinder
- Master cylinder scratched inside

Battery Trouble:

Battery discharged:

- Charge insufficient
- Battery faulty (too low terminal voltage)
- Battery cable making poor contact
- Load excessive (e.g., bulb of excessive wattage)
- Ignition switch trouble
- Alternator trouble
- Wiring faulty
- Regulator/rectifier trouble

Battery overcharged:

- Regulator/rectifier trouble
- Battery faulty

MODEL APPLICATION

Year	Model
2013	BR200AD
2014	BR200AE