



Kawasaki

KFX 700V FORCE



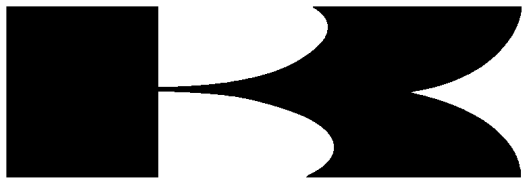
All Terrain Vehicle Service Manual

Quick Reference Guide

General Information	1
Periodic Maintenance	2
Fuel System	3
Cooling System	4
Engine Top End	5
Converter System	6
Engine Lubrication System	7
Engine Removal/Installation	8
Crankshaft / Transmission	9
Wheels / Tires	10
Final Drive	11
Brakes	12
Suspension	13
Steering	14
Frame	15
Electrical System	16
Appendix	17

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

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



Kawasaki

KFX 700 V FORCE

All Terrain Vehicle 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 dealer for the latest information on product improvements incorporated after this publication.

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

LIST OF ABBREVIATIONS

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

Read OWNER'S MANUAL before operating.

EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems in compliance with applicable regulations of the California Air Resources Board.

1. Crankcase Emission Control System

A sealed-type crankcase emission control system is used to eliminate blow-by gases. The blow-by gases are led to the breather chamber through the crankcase. Then, it is led to the air cleaner.

Oil is separated from the gases while passing through the inside of the breather chamber from the crankcase, and then returned back to the bottom of crankcase.

2. Exhaust Emission Control System

The exhaust emission control system applied to this engine family is engine modifications that consist of a modified carburetor and an ignition system having optimum ignition timing characteristics.

The carburetor has been calibrated to provide lean air/fuel mixture characteristics and optimum fuel economy with a suitable air cleaner and exhaust system.

A maintenance free ignition system provides the most favorable ignition timing and helps maintain a thorough combustion process within the engine which contributes to a reduction of exhaust pollutants entering the atmosphere.

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

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

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

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

NOTE

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

1. *Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.*

2. *Tampering could include:*

a. *Maladjustment of vehicle components such that the emission standards are exceeded.*

b. *Use of replacement parts or accessories which adversely affect the performance or durability of the vehicle.*

c. *Addition of components or accessories that result in the vehicle exceeding the standards.*

d. *Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.*

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

**PLEASE DO NOT TAMPER WITH NOISE CONTROL SYSTEM
(US MODEL only)**

To minimize the noise emissions from this product, Kawasaki has equipped it with effective intake and exhaust silencing systems. They are designed to give optimum performance while maintaining a low noise level. Please do not remove these systems, or alter them in any which results in an increase in noise level.

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 Vehicle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki vehicles are introduced by the Special Tool Catalog or Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.

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

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

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

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

WARNING

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

CAUTION

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

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

NOTE

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

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

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

General Information

TABLE OF CONTENTS

Before Servicing	1- 2
Model Identification.....	1- 5
General Specifications.....	1- 6
Unit Conversion Table	1- 9

1-2 GENERAL INFORMATION

Before Servicing

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

Especially note the following:

(1) Dirt

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

(2) Battery Ground

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

(3) Installation, Assembly

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

(4) Tightening Sequence

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

(5) Torque

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

(6) Force

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

(7) Edges

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

(8) High-Flash Point Solvent

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

(9) Gasket, O-Ring

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

Before Servicing

(10) Liquid Gasket, Locking Agent

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

(11) Press

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

(12) Ball Bearing and Needle Bearing

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

(13) Oil Seal and Grease Seal

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

(14) Circlip, Retaining Ring, and Cotter Pin

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

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

(15) Lubrication

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

(16) Direction of Engine Rotation

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

(17) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed.

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

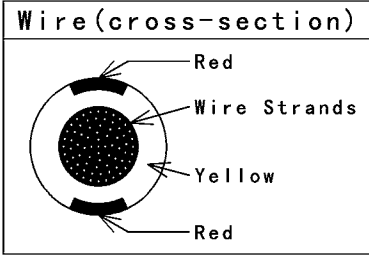

(18) Electrical Wires

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

1-4 GENERAL INFORMATION

Before Servicing

Two-Color Electrical

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

GB020601W1 C

(19) Inspection

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

Abrasion
Bent
Color change

Crack
Dent
Deterioration

Hardening
Scratch
Seizure

Warp
Wear

(20) Specifications

Specification terms are defined as follows:

"Standards" show dimensions or performances which brand-new parts or systems have.

"Service Limits" indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

Model Identification

KSV700-A1 Left Side View



KSV700-A1 Right Side View



1-6 GENERAL INFORMATION

General Specifications

Items	KSV700-A1
Dimensions: Overall length Overall width Overall height Wheelbase Ground clearance: Rear final gear case Center of frame Seat height Dry mass Curb mass: Front Rear Fuel tank capacity	1 985 mm (78.15 in.) 1 195 mm (47.05 in.) 1 170 mm (46.06 in.) 1 285 mm (50.60 in.) 160 mm (6.30 in.) 245 mm (9.65 in.) 850 mm (33.46 in.) 234 kg (516 lb) 115 kg (254 lb) 135 kg (298 lb) 12 L (3.2 US gal)
Performance: Minimum turning radius	3.2 m (10.50 ft)
Engine: Type Cooling system Bore and stroke Displacement Compression ratio Maximum horsepower Maximum torque Carburetion system Starting system Ignition system Timing advance Ignition timing Spark plug Valve timing: Inlet Open Close Duration Exhaust: Open Close Duration Lubrication system Engine oil: Type Viscosity Capacity	4-stroke, SOHC, V2-cylinders Liquid-cooled 82.0 × 66.0 mm (3.23 × 2.60 in.) 697 mL (42.5 cu in.) 9.9 : 1 36.3 kW (49.4 PS) @6 500 r/min (rpm), (US) - 59.2 N·m (6.04 kgf·m, 43.67 ft·lb) @5 000 r/min (rpm) Carburetor, Keihin CVKR-D32 Electric Starter Digital DC-CDI Electronically advanced From 5° BTDC @1 100 r/min (rpm) to 28° BTDC @5 000 r/min (rpm) NGK CR7E 20° BTDC 44° ABDC 244° 44° BBDC 20° ATDC 244° Forced lubrication (wet sump) API SF or SG API SH or SJ with JASO MA class SAE 10W-40 2.2 L (2.33 US qt)

General Specifications

Items	KSV700-A1
Drive Train:	
Primary reduction system:	
Type	Belt converter
Reduction ratio	3.122 ~ 0.635
Transmission:	
Type	1-speed and reverse
Gear ratios:	
Forward:	2.416 (29/27 × 27/20 × 20/12)
Reverse	4.285 (16/12 × 20/14 × 27/20 × 20/12)
Final drive system:	
Type	Shaft 2WD
Reduction ratio	4.375 (35/8)
Overall drive ratio:	
Forward:	32.999 ~ 6.711
Reverse	58.527 ~ 11.904
Final gear case oil:	
Type	MOBIL Fluid 424 or CITGO TRANSGARD TRACTOR HYDRAULIC FLUID
Capacity	900 mL (0.95 US qt)
Frame:	
Type	Double cradle, tubular steel
Caster (rake angle)	4.5°
Camber	-0.5°
King pin angle	12.5°
Trail	20 mm (0.79 in.)
Tread:	
Front	1 000 mm (39.37 in.)
Rear	900 mm (35.43 in.)
Front tire:	
Type	Tubeless
Size	AT22 × 7 – 10
Rear tire:	
Type	Tubeless
Size	AT22 × 11 – 10
Suspension:	
Front:	
Type	Double A-arms
Wheel travel	236 mm (9.29 in.)
Rear:	
Type	Swingarm
Wheel travel	200 mm (7.87 in.)
Brake:	
Front	Disc × 2
Rear	Enclosed wet multi-plate
Electrical Equipment:	
Battery	12 V 14 Ah
Headlight:	
Type	Semi-sealed beam
Bulb	12 V 45/45 W × 2

1-8 GENERAL INFORMATION

General Specifications

Items	KSV700-A1
Tail/brake light Alternator:	
Bulb	12 V 5/21 W
Alternator:	Three - phase AC
Type	
Rated output	25 A, 14 V @6 000 r/min (rpm)

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

US: United States model.

Unit Conversion Table

Prefixes for Units:

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

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

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

Units of Force:

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

Units of Length:

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

Units of Torque:

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

Units of Pressure:

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

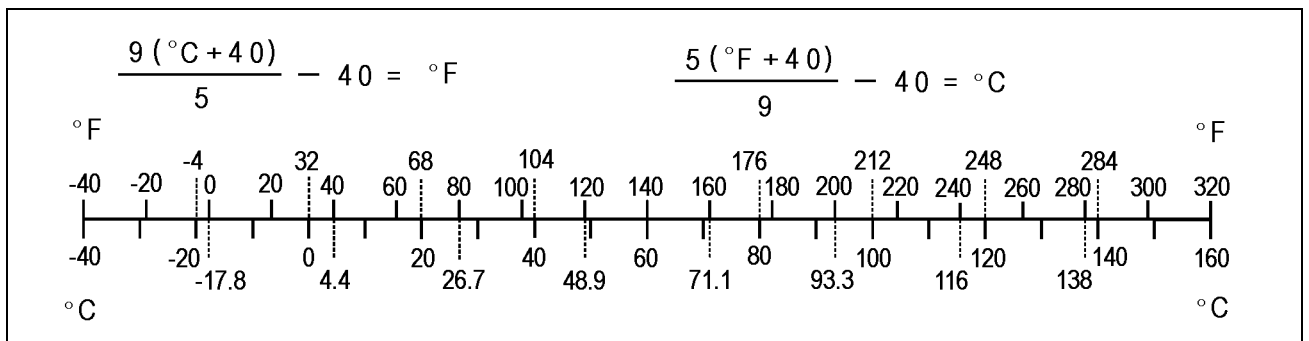
Units of Speed:

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

TABLE OF CONTENTS

Periodic Maintenance Chart	2- 3	Shift Control Grip Free Play	
Torque and Locking Agent.....	2- 5	Inspection.....	2-28
Specifications	2-11	Shift Control Grip Free Play	
Special Tools	2-13	Adjustment	2-28
Periodic Maintenance Procedures.....	2-14	Wheels/Tires	2-29
Fuel System.....	2-14	Tire Inspection	2-29
Throttle Lever Free Play		Final Drive.....	2-29
Inspection.....	2-14	Final Gear Case Oil Change.....	2-29
Throttle Lever Free Play		Propeller Shaft Joint Boot	
Adjustment	2-14	Inspection.....	2-30
Choke Lever Free Play Check.....	2-15	Brakes.....	2-30
Choke Lever Free Play		Front Brake Pad Wear Inspection.	2-30
Adjustment	2-15	Front Brake Hoses and	
Idle Speed Inspection	2-15	Connections Inspection.....	2-30
Idle Speed Adjustment.....	2-16	Front Brake Hose Replacement...	2-30
Fuel System Cleanliness		Brake Fluid Level Inspection.....	2-31
Inspection.....	2-16	Brake Fluid Change	2-31
Air Cleaner Element Cleaning and		Brake Line Air Bleeding	2-32
Inspection.....	2-16	Master Cylinder Inspection (Visual	
Air Cleaner Draining.....	2-17	Inspection).....	2-33
Fuel Hoses and Connections		Caliper Fluid Seal Replacement ...	2-34
Inspection.....	2-17	Caliper Dust Seal and Friction	
Fuel Hose and Fuel Filter		Boot Replacement.....	2-34
Replacement.....	2-18	Rear Brake Plates Replacement...	2-34
Cooling System.....	2-19	Rear Brake Lever Free Play	
Radiator Cleaning	2-19	Inspection.....	2-34
Radiator Hose and Connection		Rear Brake Pedal Free Play	
Inspection.....	2-19	Inspection.....	2-34
Coolant Change	2-20	Rear Brake Lever and Pedal Free	
Coolant Filter Cleaning	2-22	Play Adjustment	2-35
Engine Top End	2-22	Suspension	2-35
Valve Clearance Inspection	2-22	Knuckle Joint Inspection	2-35
Valve Clearance Adjustment.....	2-23	Steering	2-36
Spark Arrester Cleaning.....	2-24	Steering Inspection	2-36
Converter System	2-24	Tie Rod End Inspection.....	2-36
Drive Belt Inspection.....	2-24	Electrical System	2-37
Drive Belt Deflection Inspection ...	2-25	Spark Plug Cleaning / Inspection..	2-37
Drive Belt Deflection Adjustment ..	2-26	Spark Plug Gap Inspection	2-37
Engine Lubrication System.....	2-27	Brake Light Switch Inspection.....	2-37
Engine Oil Change.....	2-27	Brake Light Timing Adjustment.....	2-37
Oil Filter Change	2-27	General Lubrication	2-37
Crankshaft/Transmission	2-28	Lubrication	2-37

2-2 PERIODIC MAINTENANCE

Bolts and Nuts Tightening..... 2-39

Tightness Inspection 2-39

PERIODIC MAINTENANCE 2-3

Periodic Maintenance Chart

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

FREQUENCY	First Service	Regular Service				
	After 10 hrs. or 100 km (60 mi.) of use	Every 10 days or 200 km (120 mi.) of use	Every 30 days or 600 km (360 mi.) of use	Every 90 days, 1 700 km (1 100 mi.) or when belt indicator light turns on (100 hrs of use) whichever comes first	Every year of use	See page
OPERATION						
ENGINE						
Converter drive belt wear – inspect *				•		2-24
Converter drive belt deflection - inspect *				•		2-25
Air cleaner – inspect *	•	•				2-16
Throttle lever play – inspect	•	•				2-15
Cable adjustment*	•	•				2-28
Idle speed – inspect			•			2-15
Valve clearance – inspect					•	2-22
Fuel system cleanliness – inspect *	•			•		2-16
Engine oil – change *	•			•		2-27
Oil filter – replace *	•			•		2-27
Spark plug – clean and gap	•			•		2-37
Spark arrester – clean					•	2-24
Fuel hoses and connections – inspect				•		2-17
Fuel hose and fuel filter replace			4 years			2-18
Radiator – clean*	•	•				2-19
Radiator hoses, and connections – check*					•	2-19
Coolant – change*			2 years			2-20
Coolant filter of carburetor – clean					•	2-22
CHASSIS						
Joint boots – inspect *	•	•				2-30 2-35 2-36
Rear brake pedal and lever play – inspect *	•	•				2-34
Rear brake plates – change *			every 9 600 km (6 000 mi.)			2-34
Bolts and nuts – tighten	•	•				2-39

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

FREQUENCY	First Service	Regular Service				
	After 10 hrs. or 100 km (60 mi.) of use	Every 10 days or 200 km (120 mi.) of use	Every 30 days or 600 km (360 mi.) of use	Every 90 days, 1 700 km (1 100 mi.) or when belt indicator light turns on (100 hrs of use) whichever comes first	Every year of use	See page
OPERATION						
Front brake pad wear – inspect *	●		●			2–30
Brake light switch – inspect *	●		●			2–37
Steering – inspect	●			●		2–36
Tire wear – inspect *			●			2–29
Final gear case oil – change	●				●	2–29
General lubrication *			●			2–37
Front brake fluid level – inspect	●		●			2–31
Front brake fluid – change					●	2–31
Front brake master cylinder piston assembly and dust seal – replace		2 years				2–33
Front brake caliper piston seal and dust seal – replace		2 years				2–34
Front brake hoses and connections – inspect				●		2–30
Front brake hose – replace		4 years				2–30

*: Service more frequently when operated in mud, dust, or other harsh riding conditions, or when carrying heavy loads or pulling a trailer.

●: Clean, adjust, lubricate, torque, or replace parts as necessary.

PERIODIC MAINTENANCE 2-5

Torque and Locking Agent

The following tables list the tightening torque for the major fasteners, and the parts requiring use of a non-permanent locking agent or liquid gasket.

Letters used in the "Remarks" column mean:

L: Apply a non-permanent locking agent.

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

EO: Apply engine oil.

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

Lh: Left-hand Threads

R: Replacement Parts

S: Follow the specific tightening sequence.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System:				
Throttle Limiter Screw	3.7	0.38	33 in·lb	
Throttle Limiter Locknut	3.7	0.38	33 in·lb	
Throttle Case Assembly Screws	3.7	0.38	33 in·lb	
Choke Lever Mounting Screw	3.5	0.36	35 in·lb	
Left Handlebar Switches Assembly Screws	3.5	0.36	35 in·lb	
Air Cleaner Housing Bolts (M5)	5.9	0.60	52 in·lb	L
Air Cleaner Housing Bolts (M6)	8.8	0.90	78 in·lb	
Air Cleaner Element Bracket Screws	4.9	0.60	43 in·lb	
Fuel Tap Plate Screws	0.80	0.080	7 in·lb	
Fuel Tap Cover Screws	1.0	0.10	8 in·lb	
Fuel Pump Bolts	2.0	0.20	17 in·lb	
Cooling System				
Radiator Fan Switch	18	1.8	13	
Water Pump Fitting Bolt	9.8	1.0	87 in·lb	
Water Pump Impeller	7.8	0.80	69 in·lb	
Thermostat Housing Cover Bolts	8.8	0.90	78 in·lb	
Coolant Temperature Warning Light Switch	7.8	0.80	69 in·lb	SS
Radiator Fan Assembly Bolts	8.8	0.90	78 in·lb	
Radiator Mounting Bolts	8.8	0.90	78 in·lb	
Water Pump Cover Bolts	8.8	0.90	78 in·lb	
Coolant Drain Plug	8.8	0.90	78 in·lb	
Engine Top End:				
Water Pipe Bolts	9.8	1.0	87 in·lb	
Rocker Case Bolts 55 mm (2.2 in.)	8.8	0.90	78 in·lb	S
Rocker Case Bolts 130 mm (5.1 in.)	9.8	1.0	87 in·lb	S
Rocker Case Bolts 30 mm (1.2 in.)	9.8	1.0	87 in·lb	
Rocker Case Bolts 25 mm (1.0 in.)	9.8	1.0	87 in·lb	S
Cylinder Head Bolts (M10), First Torque	25	2.5	18	S, MO

2-6 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Cylinder Head Bolt (M10), Final Torque	49	5.0	36	S
Cylinder Head Bolts (M6)	9.8	1.0	87 in·lb	
Cylinder Head Jacket Plugs	20	2.0	14	
Valve Adjusting Cap Bolts	8.8	0.90	78 in·lb	
Valve Adjusting Screw Locknuts	12	1.2	104 in·lb	
Rocker Shaft Bolts	8.8	0.90	78 in·lb	
Chain Tensioner Mounting Bolts	8.8	0.90	78 in·lb	
Chain Tensioner Cap Bolt	22	2.2	16	
Intermediate Shaft Sprocket Nut	44	4.5	33	
Intermediate Shaft Chain Guide Bolts	8.8	0.90	78 in·lb	
Intermediate Shaft Chain Tensioner Bolts	8.8	0.90	78 in·lb	
Camshaft Sprocket Bolts	12	1.2	104 in·lb	L
Position Plate Bolts	8.8	0.90	78 in·lb	
Cylinder Bolts 40 mm (1.6 in.)	9.8	1.0	87 in·lb	
Cylinder Bolts 30 mm (1.2 in.)	9.8	1.0	87 in·lb	
Front Cylinder Camshaft Chain Guide Bolt	20	2.0	14	
Rear Cylinder Camshaft Chain Guide Bolt	20	2.0	14	
Exhaust Pipe Cover Bolts	8.8	0.90	78 in·lb	
Muffler Cover Bolts	8.8	0.90	78 in·lb	
Muffler Mounting Bolts	20	2.0	14	
Exhaust Pipe Clamp Bolts	8.8	0.90	78 in·lb	
Converter System:				
Converter Cover Bolts	8.8	0.90	78 in·lb	S
Driven Pulley Nut	93	9.5	69	
Ramp Weight Nuts	6.9	0.70	61 in·lb	
Spider	275	28	203	Lh
Drive Pulley Cover Bolts	13	1.3	113 in·lb	
Drive Pulley Bolt	93	9.5	69	R, Lh
Joint Duct Bolts	8.8	0.90	78 in·lb	
Engine Lubrication System:				
Engine Drain Plug	20	2.0	14	
Oil Filter	18	1.8	13	R
Oil Pressure Switch	15	1.5	11	SS
Oil Pressure Relief Valve	15	1.5	11	L
Oil Pump Bolt	8.8	0.90	78 in·lb	
Oil Pipe Bolts	8.8	0.90	78 in·lb	
Oil Filter Mounting Bolt	25	2.5	18	L (15mm)
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	
Chain Guide Bolts	8.8	0.90	78 in·lb	

PERIODIC MAINTENANCE 2-7

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Pump Drive Chain Tensioner Bolt	25	2.5	18	
Engine Removal/Installation				
Engine Mounting Bracket Bolts	52	5.3	38	
Engine Mounting Nuts	62	6.3	46	
Crankshaft/Transmission:				
Crankcase Bolts (M8)	20	2.0	14	S, L (1)
Crankcase Bolts (M6)	9.8	1.0	87 in·lb	
Shift Shaft Positioning Bolt	25	2.5	18	
Shift Shaft Spring Bolt	25	2.5	18	L
Shift Shaft Cover Bolts	8.8	0.90	78 in·lb	
Connecting Rod Big End Cap Nuts	34	3.5	25	MO
Engine Drain Plug	20	2.0	14	
Position Plate Mounting Screws	4.9	0.50	43 in·lb	L
Shift Shaft Lever Nut	8.8	0.90	78 in·lb	
Shift Shaft Lever Bolts	14	1.4	10	
Reverse Cable Bracket Mounting Bolts	8.8	0.90	78 in·lb	
Neutral Position Switch	8.8	0.90	78 in·lb	
Reverse Position Switch	15	1.5	11	
Reverse Cable Locknut	12	1.2	104 in·lb	
Cable Holder Mounting Bolts	9.8	1.0	87 in·lb	
Wheels/Tires:				
Tire Rod End Nuts	42	4.3	31	
Tie-Rod Adjusting Locknuts	22	2.2	16	
Wheel Nuts	78	8.0	58	
Front Axle Nuts	52	5.3	38	
Rear Axle Nuts	265	27	195	
Final Drive:				
(Output Bevel Gears)				
Output Driven Bevel Gear Housing Bolts	26	2.7	20	
Output Drive Bevel Gear Cover Bolts	8.8	0.90	78 in·lb	
Bearing Holder	137	14	101	L
Bevel Gear Holder Nut	157	16	116	L
Output Drive Bevel Gear Housing Bolts	26	2.7	20	
Bearing Holder	120	12	89	L
Output Shaft Holder Nut	157	16	116	L
(Final Gear Case)				
Oil Filler Cap	29	3.0	22	
Oil Drain Plug	20	2.0	14	
Final Gear Case Bolts	42	4.3	31	S

2-8 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Pinion Gear Bearing Holder	137	14	101	L
Final Gear Case Left Cover Bolts	49	5.0	36	L
Final Gear Case Right Cover Bolts (M8)	24	2.4	17	L,S
Final Gear Case Right Cover Bolts (M10)	49	5.0	36	L,S
Final Gear Case Right Cover Bolts (M12)	94	9.6	69	L,S
Pinion Gear Bearing Holder Nut	157	16	116	L
Brakes:				
Reservoir Cap Screws	1.5	0.15	13 in·lb	
Bleed Valves	7.9	0.80	69 in·lb	
Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	
Brake Switch Mounting Bolt	1.2	0.12	10 in·lb	
Brake Hose Banjo Bolts	25	2.5	18	
Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Caliper Mounting Bolts	25	2.5	18	
Disc Mounting Bolts	37	3.8	27	L
Parking Brake Lever Screw	–	–	–	L
Gasket Screws	–	–	–	L
Brake Pedal Bolt	8.8	0.90	78 in·lb	
Suspension:				
Front Shock Absorber Clamp Bolts and Nuts	47	4.8	35	
Front Shock Absorber Mounting Nuts	42	4.3	31	
Rear Shock Absorber Mounting Nuts	62	6.3	46	
Suspension Arm Pivot Bolts	42	4.3	31	
Steering Knuckle Joint Nuts	29	3.0	21	
Swingarm Pivot Right Shaft	152	15.5	112	L
Swingarm Pivot Left Shaft	20	2.0	14	L
Swingarm Pivot Left Nut	152	15.5	112	
Steering:				
Steering Stem Bottom End Nut	40	4.1	30	
Steering Stem Clamp Bolts	25	2.5	18	
Tie-Rod End Nuts	42	4.3	31	
Steering Knuckle Joint Nuts	29	3.0	22	
Tie-Rod Adjusting Locknuts	22	2.2	16	
Handlebar Lower Holder Nuts	37	3.8	27	L
Handlebar Holder Bolts	29	3.0	22	S
Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	
Frame:				
Engine Mounting Bracket Bolts	52	5.3	38	

PERIODIC MAINTENANCE 2-9

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Mounting Nut	62	6.3	46	
Footrest Mounting Bolts	44	4.5	33	
Electrical System:				
Alternator Cover Bolts	8.8	0.90	78 in·lb	
Alternator Rotor Bolts	127	13	94	
Alternator Stator Bolts	13	1.3	113 in·lb	
Alternator Cover Plugs	18	1.8	13	
Spark Plug	13	1.3	113 in·lb	
Crankshaft Sensor Mounting Bolts	5.9	0.60	52 in·lb	
Starter Motor Mounting Bolts	8.8	0.90	78 in·lb	
Starter Motor Terminal Nut	4.9	0.50	43 in·lb	
Starter Motor Terminal Locknut	6.9	0.70	61 in·lb	
Starter Motor Bolts	4.9	0.50	43 in·lb	
Starter Motor Clutch Bolts	34	3.5	25	L
Reverse Position Switch	15	1.5	11	
Neutral Position Switch	15	1.5	11	
Oil Pressure Switch	15	1.5	11	SS
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	
Radiator Fan Switch	18	1.8	13	
Coolant Temperature Warning Light Switch	6.9	0.70	61 in·lb	SS

2-10 PERIODIC MAINTENANCE

Torque and Locking Agent

The tables 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 of Engine Parts

Threads dia. mm	Mark of bolt head	Torque		
		N·m	kgf·m	ft·lb
5	4T	2.2 ~ 2.6	0.22 ~ 0.27	19 ~ 23 in·lb
6	9T	12 ~ 15	1.2 ~ 1.5	104 ~ 130 in·lb
6	7T	7.8 ~ 9.8	0.80 ~ 1.0	69 ~ 87 in·lb
6	4T	3.9 ~ 4.9	0.40 ~ 0.50	35 ~ 43 in·lb
8	7T	18 ~ 22	1.8 ~ 2.2	13 ~ 16
8	4T	10 ~ 14	1.0 ~ 1.4	87 ~ 122 in·lb
10	7T	39 ~ 44	4.0 ~ 4.5	29 ~ 33
10	4T	20 ~ 24	2.0 ~ 2.4	14 ~ 17

Basic Torque for General Fasteners of Frame Parts

Threads dia. mm	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in·lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in·lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 14
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10	54 ~ 72
16	115 ~ 155	11.5 ~ 16	83 ~ 155
18	165 ~ 225	17 ~ 23	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

Specifications

Item	Standard	Service Limit
Fuel System: Throttle lever free play Air cleaner element oil	2 ~ 3 mm (0.08 ~ 0.12 in.) High-quality foam air filter oil	--- ---
Engine Top End: Valve clearance: Exhaust Inlet	0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in.) 0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)	--- ---
Converter System: Belt height (Parallel portion) Belt deflection	1.16 ~ 3.48 mm (0.0457 ~ 0.1370 in.) 22 ~ 27 mm (0.87 ~ 1.06 in.)	0.64 mm (0.0251 in.) ---
Engine Lubrication System: Engine oil: Type Viscosity Capacity	API SF or SG API SH or SJ with JASO MA class SAE10W-40 1.7 L (1.80 US qt) (When filter is not removed) 1.9 L (2.01 US qt) (When filter is removed) 2.2 L (2.33 US qt) (When engine is completely dry)	--- --- --- --- --- ---
Wheels/Tires Tire tread depth: Front Rear Standard tire: Front Rear	--- --- AT 22 X 7-10 CARLISLE, HOLE SHOT XC AT 22 x 11-10 CARLISLE, HOLE SHOT XCT	3 mm (0.12 in.) 3 mm (0.12 in.) --- --- --- ---
Final Drive: Final Gear Case: Gear Case Oil: Type Oil level Capacity	MOBIL Fluid 424 or CITGO TRANSGARD TRACTOR HYDRAULIC FLUID Filler opening bottom 900 mL (0.95 US qt)	--- --- ---

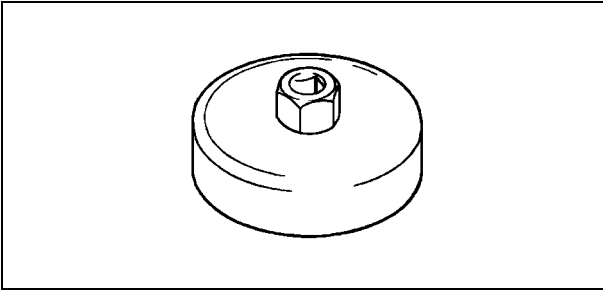
2-12 PERIODIC MAINTENANCE

Specifications

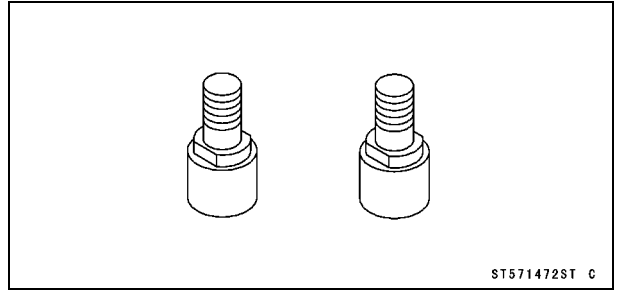
Item	Standard	Service Limit
Brakes:		
Front Brake Fluid: Type	DOT 3 or DOT 4	— — —
Front Disc Brake: Pad lining thickness	4 mm (0.16 in.)	1 mm (0.04 in.)
Rear Brake Lever, Pedal and Cables:		
Rear brake lever free play	1 ~ 2 mm (0.04 ~ 0.08 in.)	— — —
Brake pedal free play	15 ~ 25 mm (0.6 ~ 1.0 in.)	— — —
Electrical System:		
Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	— — —
Rear brake light switch timing	On after 10 mm (0.4 in.) of pedal travel	— — —

Special Tools

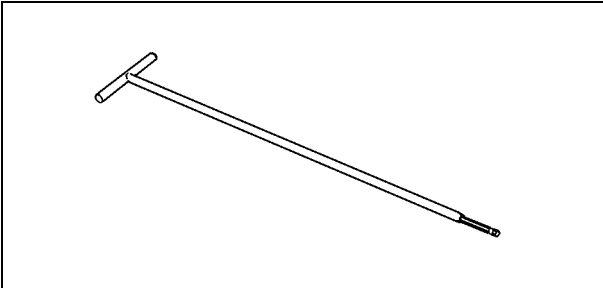
Oil Filter Wrench :
57001-1249



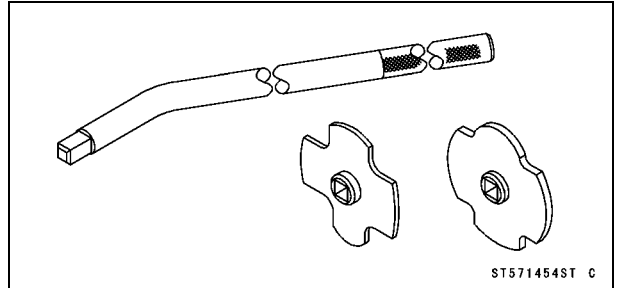
Pulley Holder Attachment :
57001-1472



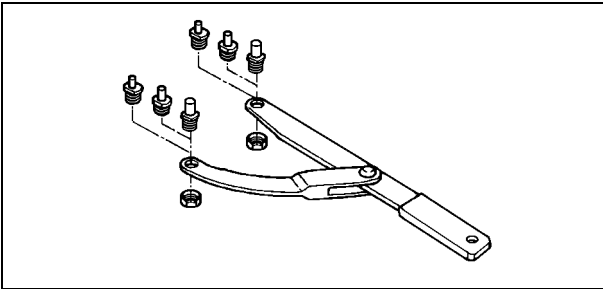
Carburetor Drain Plug Wrench, Hex 3 :
57001-1269



Filler Cap Driver:
57001-1454



Flywheel & Pulley Holder :
57001-1343



2-14 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Fuel System

Throttle Lever Free Play Inspection

- Check that the throttle lever [A] moves smoothly from full open to close, and the throttle closes quickly and completely in all steering positions by the return spring.
- ★ If the throttle lever does not return properly, check the throttle cable routing, lever free play, and possible 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 lever free play and the cable routing.
- Stop the engine and check the throttle lever free play [B].
- ★ If the free play is not within the specified range, adjust the cable.

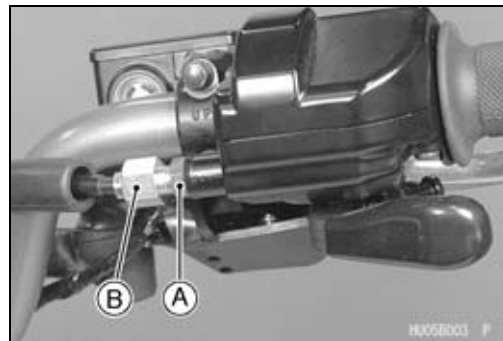
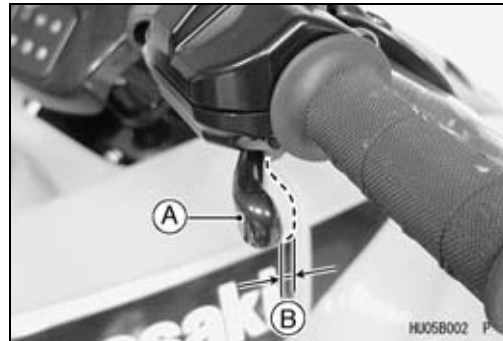
Throttle Lever Free Play

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

Throttle Lever Free Play Adjustment

- Slide the rubber cover off the adjuster at the throttle case.
- Loosen the locknut [A] and turn the throttle cable upper adjuster [B] until the cable has proper amount of play.
- Tighten the locknut and reinstall the rubber cover.

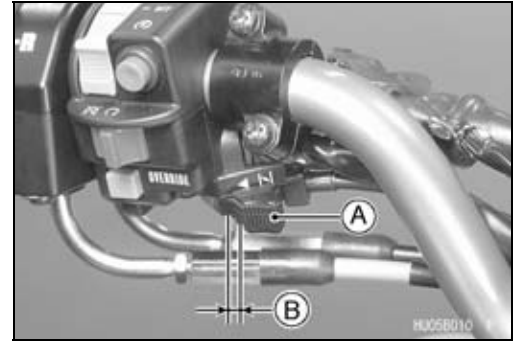
- ★ If the free play cannot be adjusted by using the upper cable adjuster, remove the air cleaner cover and then use the cable adjusting nuts [A] at the lower end of the throttle cable and make the necessary free play.



Periodic Maintenance Procedures

Choke Lever Free Play Check

- Check if the choke lever [A] returns properly and if the inner cable slides smoothly.
- Make sure that the choke lever returns to its released position all the way.
- To determine the amount of choke cable play at the lever, pull the choke lever to the left until feeling the operation of the lever tough; the amount of choke lever is equivalent to that of cable play.
- The proper amount of play ranges about 3 mm (0.12 in.) at the choke lever.
- ★ If the free play is not within the specified range, adjust the cable.

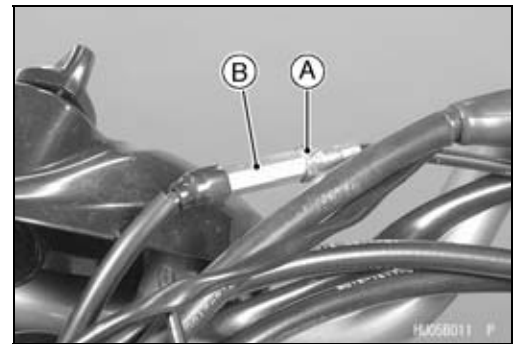


Choke Lever Free Play [B]

Standard: about 3 mm (0.12 in.)

Choke Lever Free Play Adjustment

- Loosen the locknut [A] of the choke cable.
- Turn the adjuster [B] until the cable has proper amount of play.
- Tighten the locknut securely.



Idle Speed Inspection

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

⚠ WARNING

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

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

Idle Speed

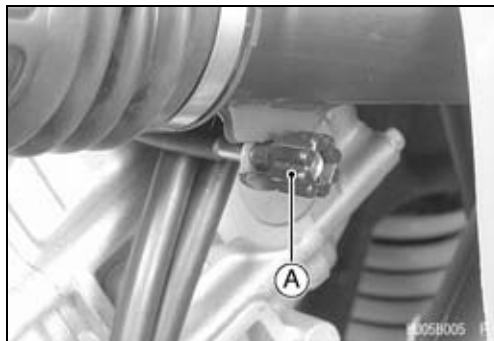
Standard: 1,100 ± 50 r/min (rpm)

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.



Fuel System Cleanliness Inspection

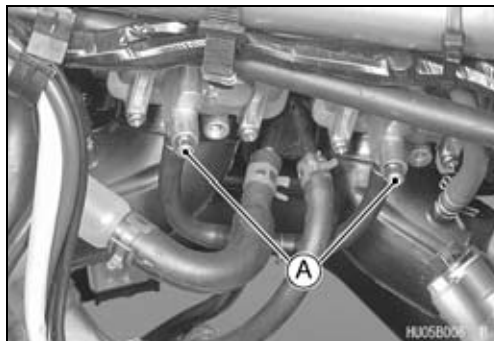
⚠ WARNING

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

- Turn the fuel tap to the OFF position.
- Place the suitable container under the drain plugs [A].
- Turn out the carburetor drain plug a few turns and drain the fuel system.

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

- Check to see if water or dirt comes out.
- Tighten the drain plug.
- ★ If any water or dirt appears during the above inspection, clean the fuel system (carburetor, fuel tank, fuel hose).



Air Cleaner Element Cleaning and Inspection

NOTE

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

⚠ WARNING

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

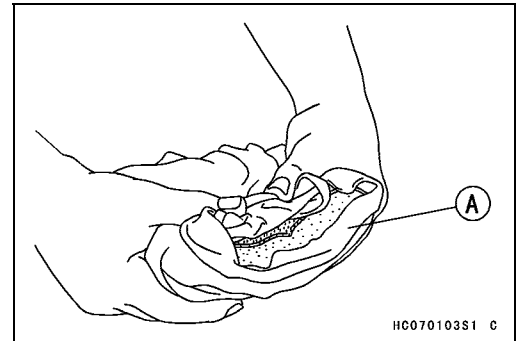
- Remove the air cleaner element (see Fuel System chapter).

Periodic Maintenance Procedures

- Clean the element [A] in a bath of high-flash point solvent.



- Squeeze it dry in a clean towel [A]. Do not wring the element or blow it dry; the element can be damaged.
- Inspect the element for damage.
- ★ If it is torn, punctured, or hardened, replace it.
- After cleaning, saturate the element with a high-quality foam-air-filter oil, squeeze out the excess oil, then wrap it in a clean rag and squeeze it as dry as possible. Be careful not to tear the element.



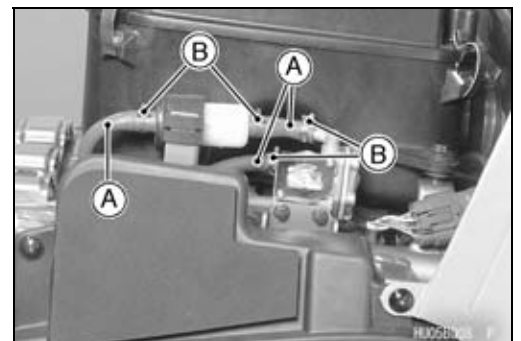
Air Cleaner Draining

- If any water or oil accumulates in the tube, drain it by taking off the tube plug [A]. After draining, be sure to install the tube plug and clamp firmly.



Fuel Hoses and Connections Inspection

- Remove the air cleaner cover (see Frame chapter)
- Turn the fuel tap to the OFF position.
- Check the fuel hoses [A].
- ★ If the fuel hose is frayed, cranked, or bulged, replace the fuel hose.
- Check that the hose is securely connected and clamps [B] are tightened.
- ★ If the fuel hose has been sharply bent or kinked, replace the fuel hose.
- ★ If the clamps are loosened or damaged, replace the clamps.
- When installing the fuel hose, route the hose according to Cable, Wire, and Hose Routing section in Appendix chapter.
- When installing the fuel hose, avoid sharp bending, kinking, flattening or twisting, and route the fuel hose with a minimum of bending so that the fuel flow will not be obstructed.



2-18 PERIODIC MAINTENANCE

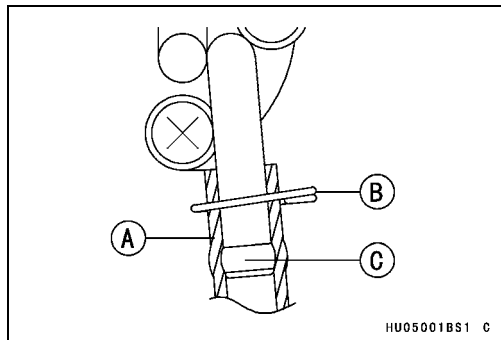
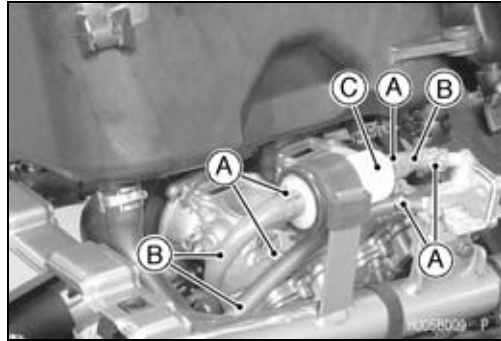
Periodic Maintenance Procedures

Fuel Hose and Fuel Filter Replacement

⚠ WARNING

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

- Remove the air cleaner cover (see Frame chapter).
- Turn the fuel tap to the OFF position.
- Remove:
 - Clamps [A]
 - Clamp (Fuel Tank Side)
 - Fuel Hoses [B]
 - Fuel Filter [C]
- Replace the fuel hoses and fuel filter with a new one.
- When installing the fuel hose, route the hose according to Cable, Wire, and Hose Routing section in Appendix chapter.
- When installing the fuel hose, avoid sharp bending, kinking, flattening or twisting, and route the fuel hose with a minimum of bending so that the fuel flow will not be obstructed.
- Fit the fuel hose [A] onto the pipe fully and install the clamps [B] beyond the raised rib [C].



HU05001BS1 C

Periodic Maintenance Procedures

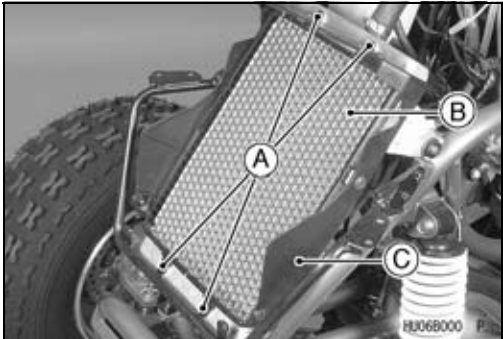
Cooling System

Radiator Cleaning

CAUTION

Clean the radiator screen and the radiator in accordance with the Periodic Maintenance Chart. In dusty areas, they should be cleaned more frequently than the recommended interval. After riding through muddy terrains, the radiator screen and the radiator should be cleaned immediately.

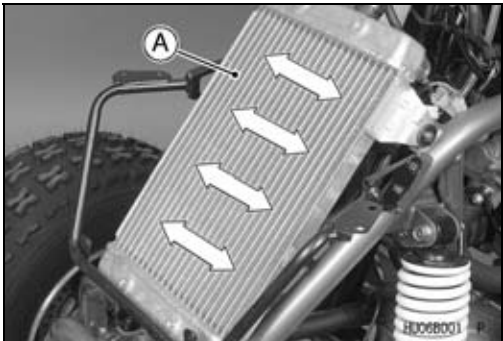
- Remove:
 - Radiator Cover (see Frame chapter)
 - Radiator Screen Mounting Screws [A]
 - Radiator Screen [B] (With the Shroud [C])
- Clean the radiator screen in a bath of tap water, and then dry it with compressed air or by shaking it.



- Clean the radiator.

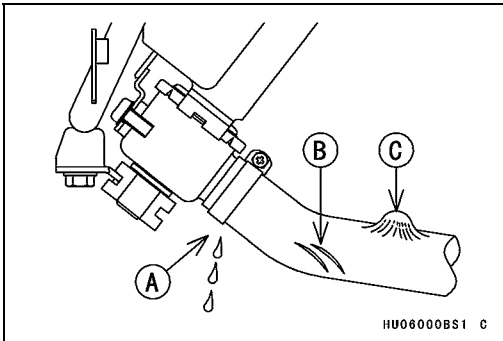
CAUTION

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage. Keep the steam gun away more than 0.5 m (20 in.) from the radiator core [A]. Hold the steam gun perpendicular to the core surface. Run the steam gun following the core fin direction.



Radiator Hose and Connection Inspection

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



2-20 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Coolant Change

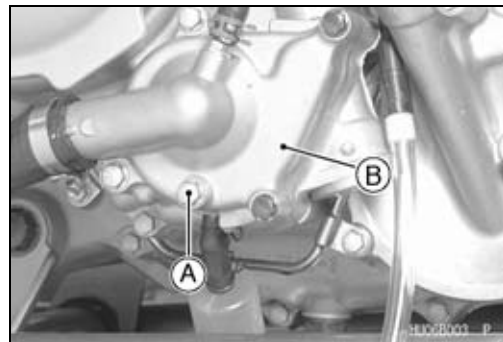
⚠ WARNING

To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.

Coolant on tires will make them slippery and can cause an accident and injury. Immediately wash away any coolant that spills on the frame, engine, or wheels.

Since coolant is harmful to the human body, do not use for drinking.

- Remove:
 - Front Fender (see Frame chapter)
 - Reserve Tank Cap
 - Place the container under the reserve tank.
 - Pull off the cooling hose [A], and drain the coolant.
-
- Place a container under the drain plug [A] at the bottom of the water pump [B], then remove the drain plug.
-
- Remove the radiator cap [A] in two steps. First turn the cap counterclockwise to the first step. Then push and turn it further in the same direction and remove the cap.
 - The coolant will drain from the radiator and engine.



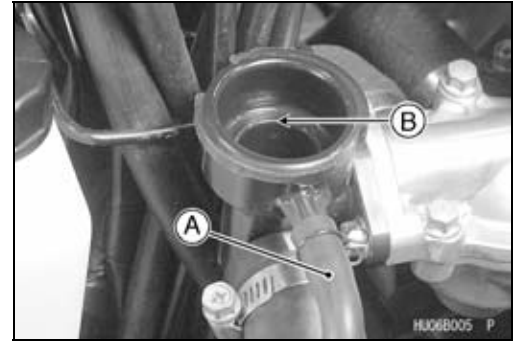
Periodic Maintenance Procedures

- Install the cooling hose [A].
- Tighten the drain plug.
- Torque - Coolant Drain Plug: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Support the vehicle on a stand or the jack so that the front wheels are off the ground. This makes air bleeding easier.
- Fill the radiator up to the radiator filler neck [B] with coolant.

NOTE

○ *Pour in the coolant slowly so that the air in the engine and radiator can escape.*

- Fill the reserve tank up to the full level line with coolant, and install the reserve tank cap.



CAUTION

Soft or distilled water must be used with antifreeze (see Specifications in this chapter) in the cooling system.
If hard water is used in the system, it causes scale accumulation in the water passages, considerably reducing the efficiency of the cooling system.

Water and Coolant Mixture Ratio (when shipping)

Soft Water:	50%
Coolant:	50%
Freezing Point:	-35°C (-31°F)
Total Amount:	2.5 L (2.64 US qt)

NOTE

○ *Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*

- Bleed the air from the cooling system as follows.
 - Start the engine with the radiator cap removed and run it until no more air bubbles [A] can be seen in the coolant.
 - Tap the radiator hoses to force any air bubbles caught inside.
 - Stop the engine and add coolant up to the radiator filler neck.
- 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 low level line, add coolant to the full level line.



CAUTION

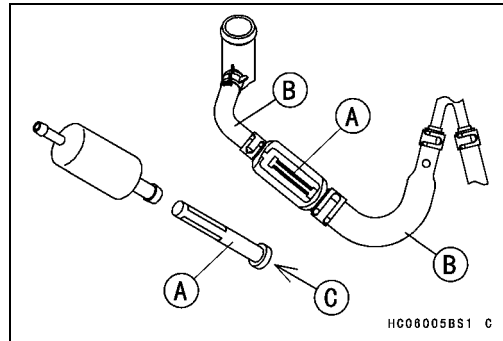
Do not add more coolant above the full level line.

2-22 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Coolant Filter Cleaning

- Drain the coolant (see Coolant change).
- Remove the filter [A] from the cooling hoses [B] of carburetor system.
- Blow [C] off dirt and sediment on the filter with compressed air.



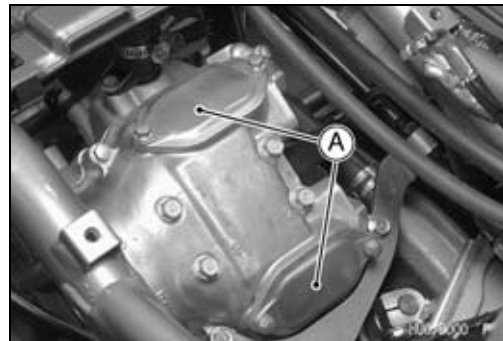
Engine Top End

Valve Clearance Inspection

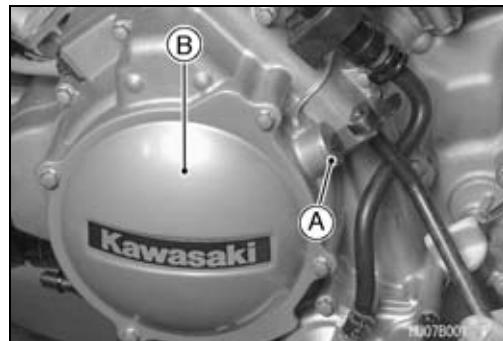
NOTE

- Check the valve clearance only when the engine is cold (at room temperature).

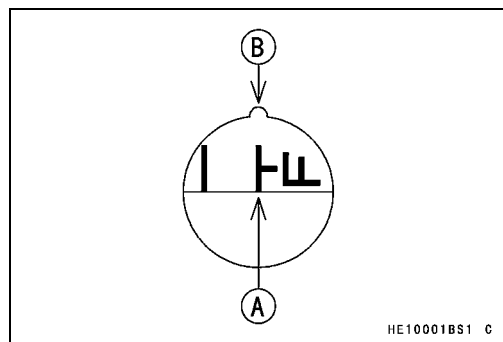
- Remove:
 - Air Cleaner Cover (see Frame chapter)
 - Air Cleaner Housing (see Fuel System chapter)
 - Front Fender (see Frame chapter)
 - Valve Adjusting Caps [A]



- Remove the timing inspection plug [A].
Special Tool - Filler Cap Driver: 57001-1454
- Remove the alternator bolt cover [B].



- Turn the crankshaft **counterclockwise** with a wrench on the alternator rotor bolt until "T-F" mark [A] on the alternator rotor aligns with the notch [B] as shown: the end of the compression stroke in the front cylinder head.



Periodic Maintenance Procedures

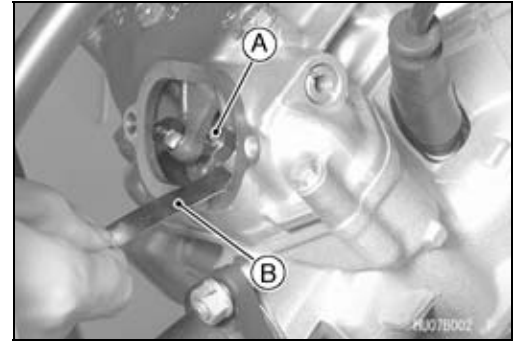
- Measure the clearance for all four valves, one at a time between the end of the valve stem and the adjusting screw [A] with the thickness gauge [B].

Valve Clearance (when cold)

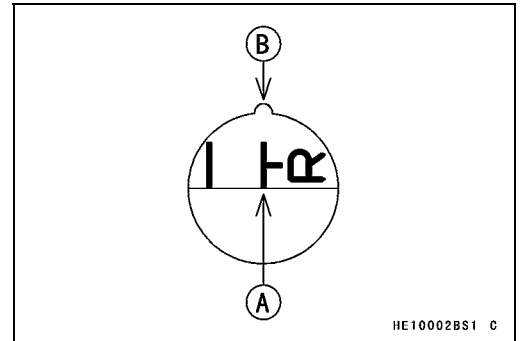
Exhaust: 0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in.)

Inlet: 0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)

- ★ If the valve clearance is not correct, adjust it (see Valve Clearance Adjustment).



- Then, turn the crankshaft **counterclockwise** with a wrench on the alternator rotor bolt until “T-R” mark [A] on the alternator rotor aligns with the notch [B] as shown: the end of the compression stroke in the rear cylinder head.
- Measure the clearance for all four valves, one at a time between the end of the valve stem and the adjusting screw with the thickness gauge.



Valve Clearance (when cold)

Exhaust: 0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in.)

Inlet: 0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)

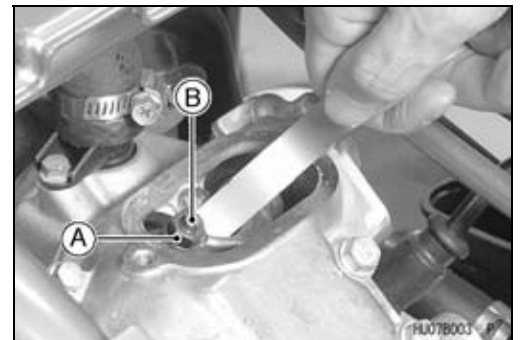
- ★ If the valve clearance is not correct, adjust it (see Valve Clearance Adjustment).

Valve Clearance Adjustment

- Remove the valve adjusting caps.
- Loosen the locknut [A] and turn the adjusting screw [B] until the clearance is correct.
- Hold the adjusting screw from turning and tighten the locknut to the specified torque.

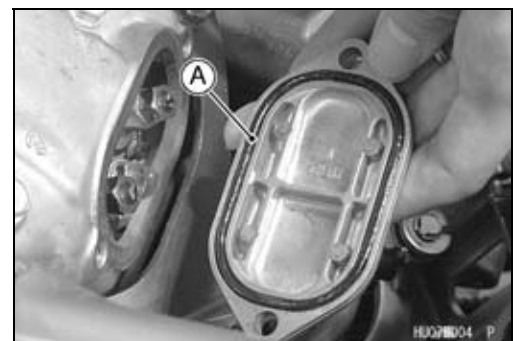
Torque - Valve Adjusting Screw Locknuts: 12 N·m (1.2 kgf·m, 104 in·lb)

- Recheck the clearance.
- ★ If the clearance is incorrect, repeat the adjustment procedure.
- ★ If the clearance is correct, perform the adjustment procedure on the other valve.



- Apply grease to the O-rings [A].

Torque - Valve Adjusting Cap Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



2-24 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Spark Arrester Cleaning

⚠ WARNING

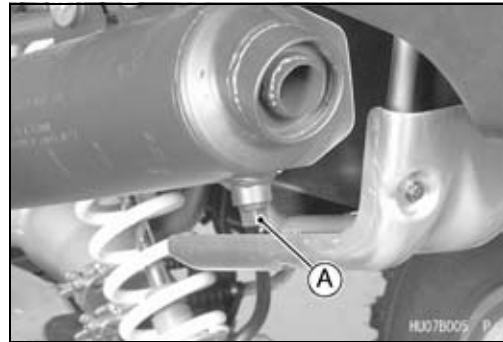
To avoid burns, wear gloves while cleaning the spark arrester. Since the engine must be run during this procedure, the muffler will become hot.

- Remove the drain plug [A] on the muffler.
- In an open area away from combustible materials, start the engine with the transmission in neutral.
- Raise and lower engine speed while tapping on the muffler with a rubber mallet until carbon particles are purged from the muffler.

⚠ WARNING

Do not run the engine in a closed area. Exhaust gases contain carbon monoxide; a colorless, odorless, poisonous gas. Breathing exhaust gas leads to carbon monoxide poisoning, asphyxiation, and death.

- Stop the engine.
- Install the drain plug.



Converter System

Drive Belt Inspection

Inspection of the drive belt is required at least every 90 days of vehicle use (average 12 mile/day) not to exceed 1,700 km (1,100 mile) or belt indicator light turn on (100 hours of use) counted by the hour meter. More frequent inspection is necessary if the vehicle is subjected to hard usage.

⚠ WARNING

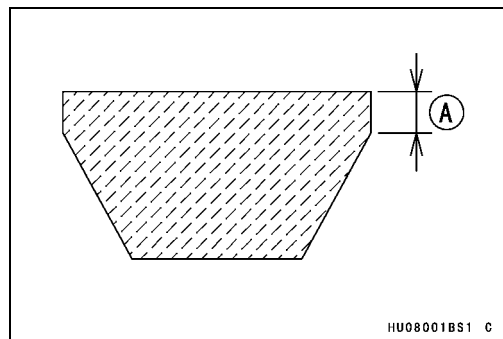
Neglect, abuse, or failure to maintain the transmission can result in a severely worn or damaged drive belt locking up the transmission and wheels. This can cause the operator to lose control and have an accident resulting in injury or death.

- Remove the torque converter cover (see Converter System chapter).
- Measure the height [A] of the belt parallel portion at several locations.
- ★ If any measurements exceed the service limit, replace the belt.

Belt Height (Parallel Portion)

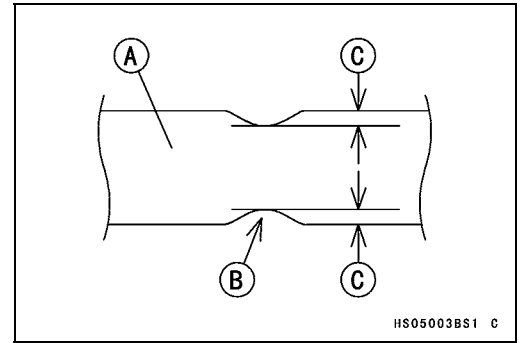
Standard: 1.16 ~ 3.48 mm (0.0457 ~ 0.1370 in.)

Service Limit: 0.64 mm (0.0251 in.)



Periodic Maintenance Procedures

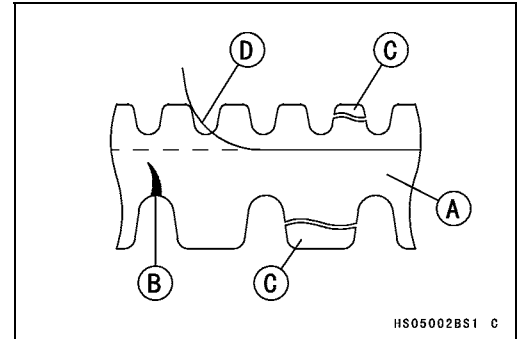
- Check the belt [A] for abnormal wear [B].
- Measure the width [C] of the belt at abnormal wear point.
- ★ If any measurements exceed 0.5 mm (0.02 in.), replace the belt.



- Check the belt for cracks, breaks, or peeling.
- ★ If necessary, replace the belt with a new one.
- Belt [A]
- Crack [B]
- Broken [C]
- Peeling [D]

NOTE

- Whenever the belt is replaced, inspect the drive and the driven pulleys.



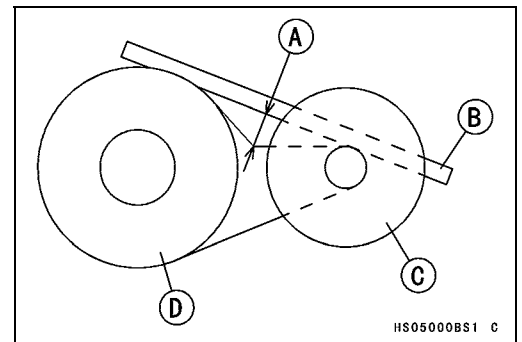
Drive Belt Deflection Inspection

- Remove the torque converter cover (see Converter System chapter).
- Put the transmission in neutral and rotate the driven pulley by hand to make sure the belt is shifted all the way to the top of the driven pulley.
- Measure the belt deflection [A] as shown:
 - Place a straightedge [B] on top of the belt between the drive pulley [C] and the driven pulley [D].
 - Use a ruler to push the belt away from the straightedge. Push hard, but with no more force than 59 N (6 kgf, 13 lb).

Belt Deflection

Standard: 22 ~ 27 mm (0.87 ~ 1.06 in.)

- ★ If the belt deflection is not within the specified range, first measure the height of the belt pralle portion (see Drive Belt Inspection). Adjust the deflection by adding or removing spacers on the fixed sheave.
- When adjusting the deflection, less is better than more. Less deflection will maintain better performance for more time as the belt width decreases by normal wear, which causes the deflection to increase with usage.

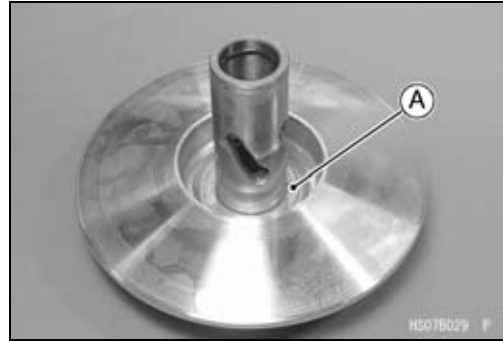


2-26 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Drive Belt Deflection Adjustment

- Disassemble the driven pulley (see Converter System chapter).
- ★ If the belt deflection is more than 27 mm (1.06 in.), remove the spacers to decrease it.
- The rule-of-thumb is: 0.1 mm (0.004 in.) change in spacer thickness equals about 1.3 mm (0.051 in.) change in belt deflection.
- ★ If the belt deflection is less than 22 mm (0.87 in.), add the spacers [A] to increase it.
- The rule-of-thumb is: 0.1 mm (0.004 in.) change in spacer thickness equals about 1.6 mm (0.063 in.) change in belt deflection.



Spacers

Part No.	Thickness
92026-1569	0.6 mm (0.024 in.)
92026-1617	0.8 mm (0.032 in.)
92026-1565	1.0 mm (0.039 in.)
92026-1570	1.4 mm (0.055 in.)

- Assemble the driven pulley (see Converter System chapter).
- With the transmission in neutral, rotate the driven pulley to allow the belt to return to the top of the sheaves before measuring the belt deflection.
- Measure the belt deflection again and repeat the above procedures until it is within the standard range.
- Using the flywheel & pulley holder and adapter, tighten the driven pulley nut.

Special Tools - Flywheel & Pulley Holder: 57001-1343

Pulley Holder Attachment: 57001-1472

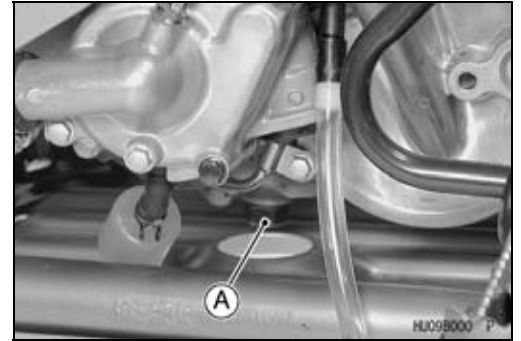
Torque - Driven Pulley Nut: 93 N·m (9.5 kgf·m, 69 ft·lb)

Periodic Maintenance Procedures

Engine Lubrication System

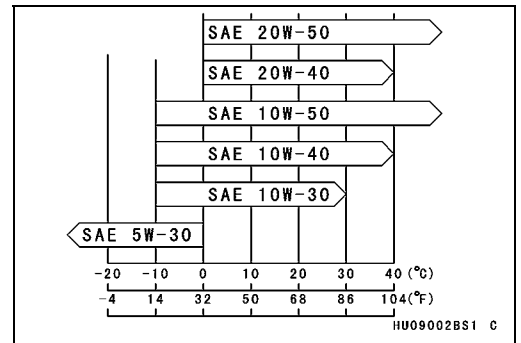
Engine Oil Change

- Support the vehicle so that it is level side to side and front to back after warming up the engine.
- Remove the engine drain plug [A] to drain the oil.
- The oil in the filter can be drained by removing the filter (see Oil Filter Change).
- ★ Replace the drain plug gasket with a new one.
- Tighten:
 - Torque - Engine Drain Plug : 20 N·m (2.0 kgf·m, 14 ft·lb)**
- Pour in the specified type and amount of oil.



Engine Oil

- Type: **API SF or SG**
API SH or SJ with JASO MA class
- Viscosity: **SAE 10W-40**
- Amount: **1.7 L (1.80 US qt)**
(When filter is not removed)
1.9 L (2.01 US qt)
(When filter is removed)
2.2 L (2.33 US qt)
(When engine is completely dry)

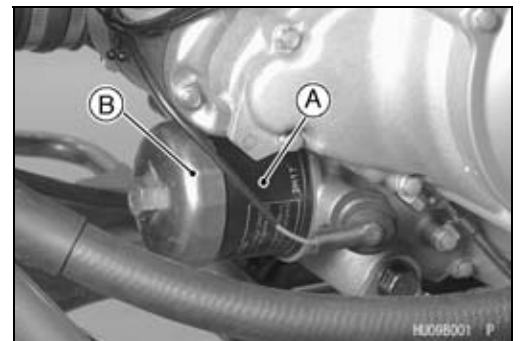


NOTE

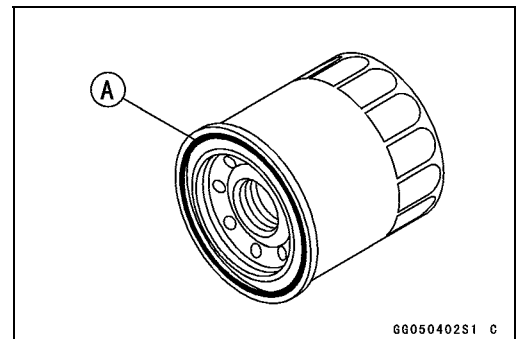
- Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.

Oil Filter Change

- Drain the engine oil.
- Remove the oil filter [A] with the oil filter wrench [B].
- Special Tool - Oil Filter Wrench : 57001-1249**



- Replace the filter with a new one.
- When installing the oil filter, be careful of the following.
 - Apply oil to the gasket [A] before installation.
 - Tighten the filter with the oil filter wrench.
- Special Tool - Oil Filter Wrench: 57001-1249**
- Torque - Oil Filter : 18 N·m (1.8 kgf·m, 13 ft·lb)**
- Pour in the specified type and amount of oil.



2-28 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Crankshaft/Transmission

Shift Control Grip Free Play Inspection

- Measure the distance the shift control grip moves with the push button depressed.
- Check the shift control cable free play of both directions.
- ★ If the free play is not within the specified range, adjust the cable.

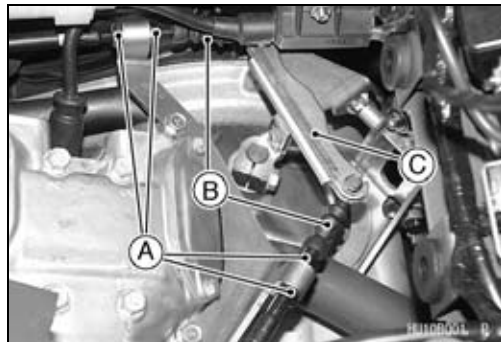
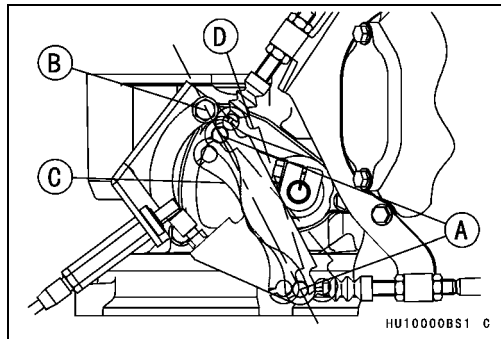
Shift Control Cable Grip Free play [A]

Standard: 0 ~ 2 mm (0 ~ 0.08 in.)

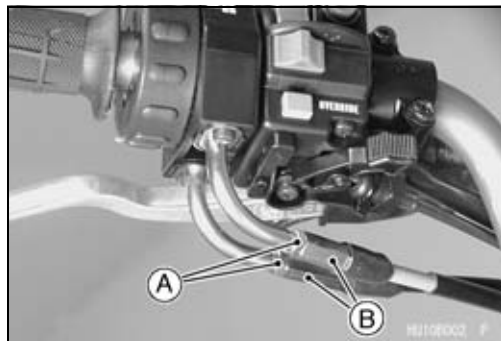


Shift Control Grip Free Play Adjustment

- Remove the battery with the battery case (see Electrical System).
- Make sure that the shift control grip is in neutral position.
- Make sure that the gear change lever is in neutral position.
- Neutral position is the shift cable lower ends [A] and reverse lock cable bracket bolt [B] aligned state.
 - Drive Position [C]
 - Reverse Position [D]
- Turn the adjusting nuts [A] at shift control cable lower end make the inner cables [B] tight with no free play.
- Turn the shift control grip from “N” to “D” and to “R” respectively and make sure the change lever [C] works correctly.
- Tighten the all adjusting nuts securely.



- Slide back the rubber covers.
- Loosen the locknuts [A] and turn the shift cable upper adjusters [B] to obtain the specified free play.
- Tighten the locknuts securely and re install the rubber covers.

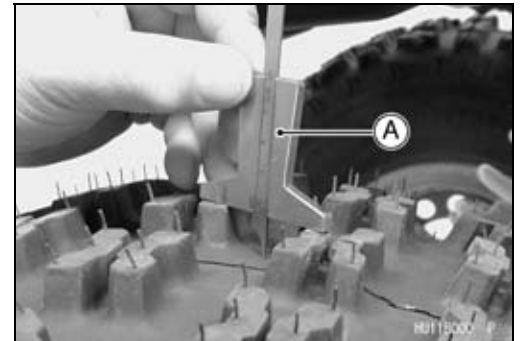


Periodic Maintenance Procedures

Wheels/Tires

Tire Inspection

- Examine the tire for damage and wear.
- ★ If the tire is cut or cracked, replace it.
- Lumps or high spots on the tread or sidewalls indicate internal damage requiring tire replacement.
- Remove any foreign objects from the tread. After removal, check for leaks with a soap and water solution.
- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurements at several places.
- ★ If any measurements are less than the service limit, replace the tire.



Tire Tread Depth

Service Limit:

- Front: 3 mm (0.12 in.)
- Rear: 3 mm (0.12 in.)

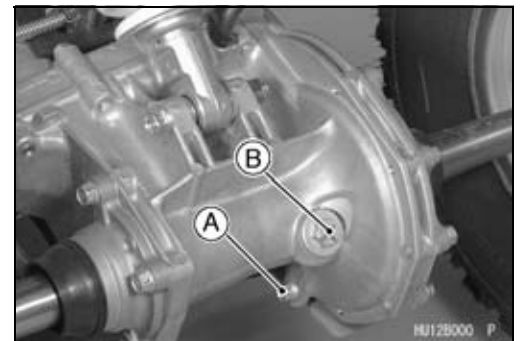
Standard Tire

- Front: AT 22 x 7 - 10 CARLISLE, HOLE SHOT XC
- Rear: AT 22 x 11 - 10 CARLISLE, HOLE SHOT XCT

Final Drive

Final Gear Case Oil Change

- Warm up the oil by running the vehicle so that the oil will pick up any sediment and drain easily. Then stop the vehicle.
- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- Place an oil pan beneath the rear final gear case and remove the drain plug [A].



⚠ WARNING

When draining or filling the final gear case, be careful that no oil gets on the tire or rim because oil will deteriorate the tire. Clean off any oil that inadvertently gets on them with a high-flash point solvent.

- After the oil has completely drained out, install the drain plug with a new aluminum gasket.
- Torque - Oil Drain Plug: 20 N·m (2.0 kgf·m, 14 ft·lb)**
- Fill the final gear case up to the bottom of filler opening with the oil specified below.

Final Gear Case Oil

Type: MOBIL Fluid 424 or CITGO TRANSGARD TRACTOR HYDRAULIC FLUID

Capacity: 900 mL (0.95 US qt)

- Be sure the O-ring is in place.

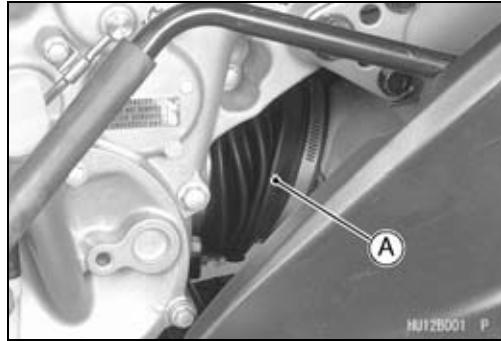
Torque - Oil Filler Cap [B]: 29 N·m (3.0 kgf·m, 22 ft·lb)

2-30 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Propeller Shaft Joint Boot Inspection

- Visually inspect the rear propeller shaft joint boot [A] in accordance with the Periodic Maintenance Chart or if the shaft is noisy during operation.
- ★ If the joint boot is torn, worn, or deteriorated, replace the joint boot and check the propeller shaft (see Final Drive chapter).



Brakes

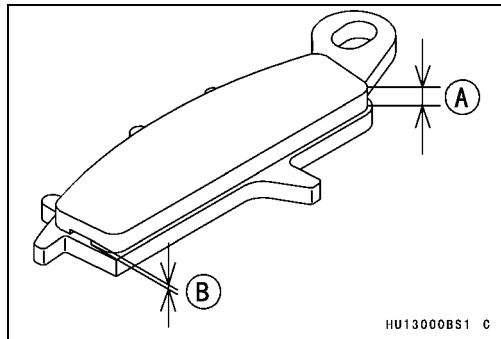
Front Brake Pad Wear Inspection

- 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.

Pad Lining Thickness

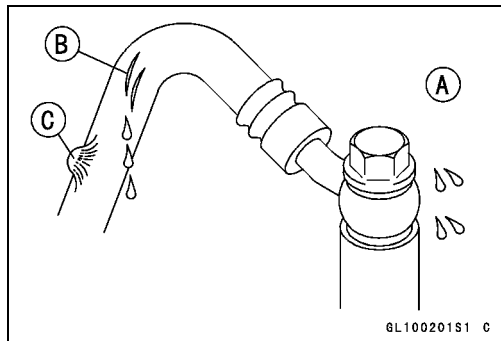
Standard: 4 mm (0.16 in.)

Service Limit: 1 mm (0.04 in.)



Front Brake Hoses and Connections Inspection

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



Front Brake Hose Replacement

- Pump the brake fluid out of the line as explained in the Brake Fluid Change.
- Remove the banjo bolts at both ends of the brake hose, and pull the hose off the vehicle.
- Immediately wipe up any brake fluid that spills.

CAUTION

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

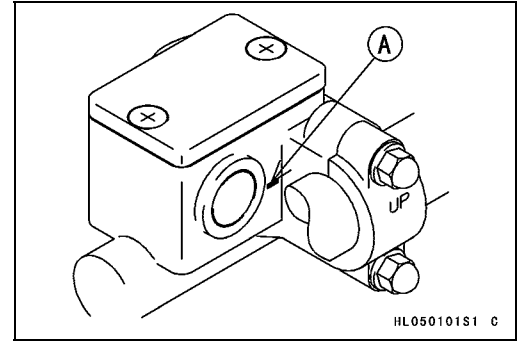
- Use a new flat washer for each side of the hose fittings.
- Install the new brake hose in its place (see Appendix chapter), and tighten the banjo bolts.

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

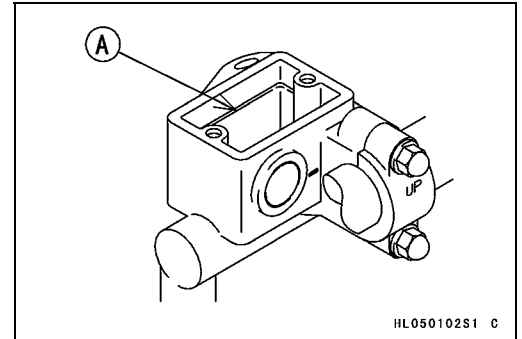
Periodic Maintenance Procedures

Brake Fluid Level Inspection

- Position the reservoir horizontal, and check that the fluid level in the reservoir is higher than the lower level line [A].
- ★ If the fluid level is lower than the lower level line, check for fluid leakage of the brake line, and add the fluid as follows:



- Remove the reservoir cap, and fill the reservoir to the upper level line [A] in the reservoir with the same type and brand of the fluid that is already in the reservoir. And then install the reservoir cap.



⚠ WARNING

Change the fluid in the brake line completely if the fluid must be refilled but the type and brand of the fluid that is already in the reservoir are unidentified.

- Tighten:
 - Torque - Reservoir Cap Screws : 1.5 N·m (0.15 kgf·m, 13 in·lb)**

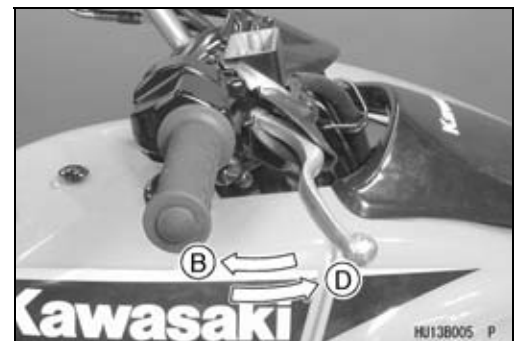
Brake Fluid Change

- Remove the reservoir cap and the rubber cap on the bleed valve.
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Fill the reservoir with new brake fluid.
- Change the brake fluid as follows:
 - Open the bleed valve [A].
 - Apply the brake lever and hold it [B].
 - Close the bleed valve [C].
 - Release the brake lever [D].
- Check the fluid level in the reservoir often, replenishing it as necessary.



NOTE

- If the fluid in the reservoir runs completely out any time during fluid changing, air will enter the line, and the system must be bled.



2-32 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Repeat this operation until fresh brake fluid comes out into the plastic hose or the color of the fluid changes.

⚠ WARNING

Do not mix two brands of 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 not known.

- Tighten:
Torque - Bleed Valves: 7.9 N·m (0.80 kgf·m, 69 in·lb)
- Apply the brake lever forcefully for a few seconds, and check for fluid leakage around the fittings.
- ★ If necessary, bleed the air from the brake line (see Brake Line Air Bleeding).

⚠ WARNING

If the brake lever has a soft or "spongy feeling" when it is applied, there might be air in the brake line or the brake may be defective. Since it is dangerous to operate the vehicle under such conditions, bleed the air from the brake line immediately.

Brake Line Air Bleeding

- Bleed the air whenever brake parts are replaced or re-assembled.
- Remove the reservoir cap and fill the reservoir with new brake fluid.
- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the hose at the bottom of the reservoir. This bleeds the air from the master cylinder and the brake line.

NOTE

- *Tap the brake hose lightly going from the caliper to the reservoir side and bleed the air off at the reservoir.*

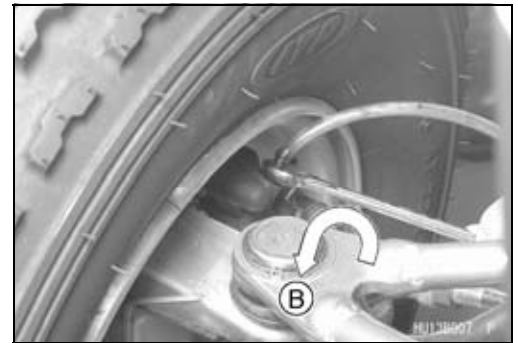
Periodic Maintenance Procedures

- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Bleed the brake line and the caliper as follows:
 - Hold the brake lever applied [A].
 - Quickly open and close the valve [B].
 - Release the brake lever [C].
- The fluid level must be checked several times during the bleeding operation and replenished as necessary.



NOTE

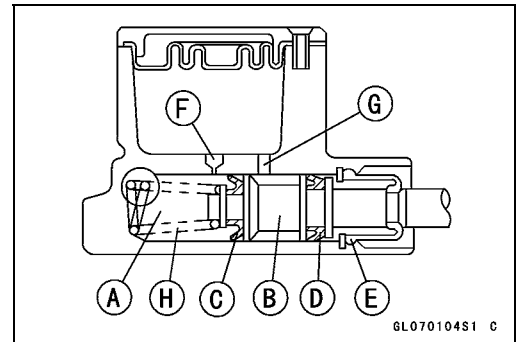
- If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.
- If the brake lever action still feels soft or "spongy", tap the brake hose from bottom to top and air will rise up to the top part of the hose. Slowly pump the brake lever in the same manner as above.



- Tighten:
 - Torque - Bleed Valves : 7.9 N·m (0.80 kgf·m, 69 in·lb)**
- Apply the brake lever forcefully for a few seconds, and check for fluid leakage around the fittings.

Master Cylinder Inspection (Visual Inspection)

- Disassemble the master cylinder (see Brakes chapter).
- Check that there are no scratches, rust or pitting on the inner wall of the master cylinder [A] and on the outside of the piston [B].
- ★ If the master cylinder or piston shows any damage, replace them.
- Inspect the primary [C] and secondary [D] cups.
- ★ If a cup is worn, damaged, softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.
- ★ If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.
- Check the dust cover [E] for damage.
- ★ If it is damaged, replace it.
- Check that the relief [F] and supply [G] ports are not plugged.
- ★ If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.
- Check the piston return spring [H] for any damage.
- ★ If the spring is damaged, replace it.



2-34 PERIODIC MAINTENANCE

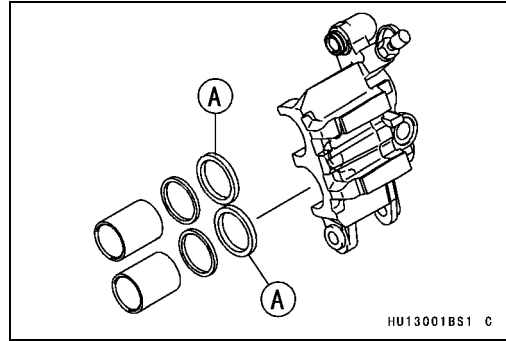
Periodic Maintenance Procedures

Caliper Fluid Seal Replacement

The fluid seals [A] around the piston maintain the proper pad/disc clearance. If the seals are not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

- Disassemble the brake caliper (see Brakes chapter).
- Replace the fluid seals under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in inner and outer pad wear; (d) the seal is stuck to the piston.

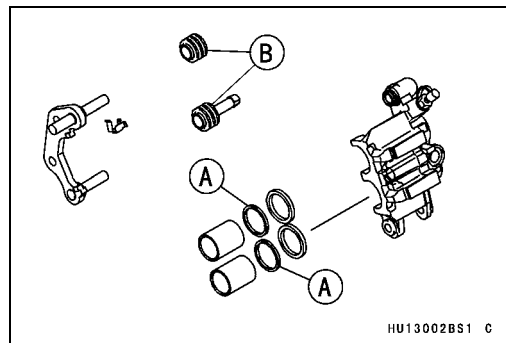
★ If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.



Caliper Dust Seal and Friction Boot Replacement

- Disassemble the brake caliper (see Brakes chapter).
- Check that the dust seals [A] and friction boots [B] are not cracked, worn swollen, or otherwise damaged.

★ If they show any damage, replace them.



Rear Brake Plates Replacement

- Disassemble the internal wet brake (see Brakes chapter).
- Replace the steel pressure plates, steel plates and friction plates in accordance with the specified interval.

Rear Brake Lever Free Play Inspection

- Check the rear brake lever free play [A].
 - Pull the rear brake lever lightly until the brake is applied.
- ★ If the play is incorrect, adjust it.

Rear Brake Lever Free Play

Standard: 1 ~ 2 mm (0.04 ~ 0.08 in.)



Rear Brake Pedal Free Play Inspection

- Check the brake pedal free play [A].
 - Depress the brake pedal lightly by hand until the brake is applied.
- ★ If the free play is incorrect, adjust it.

Brake Pedal Free Play

Standard: 15 ~ 25 mm (0.6 ~ 1.0 in.)



Periodic Maintenance Procedures

Rear Brake Lever and Pedal Free Play Adjustment

NOTE

- Since the rear brake lever and pedal free play adjustments affect each other, make them at the same time.

Rear Brake Lever:

- Loosen the knurled locknut [A] and turn the adjuster [B] at the rear brake lever in as far as it will go.
- Tighten the locknut.
- Turn the brake lever adjuster [A] at the rear end of the brake cable until the rear brake lever has the correct amount of play.

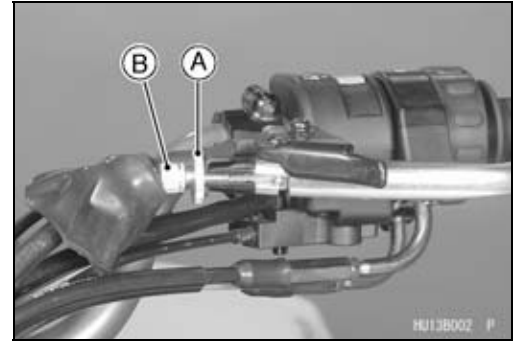
Brake Pedal:

- Turn the brake pedal adjuster [B] at the rear end of the brake cable until the brake pedal has the correct amount of play.
- Operate the pedal a few times to see that it returns to its rest position immediately upon release.
- Rotate the rear wheels to check for brake drag.
- Check braking effectiveness.
- ★ If there is any doubt as to the conditions of the brake, check the brake parts for wear or damage.

Suspension

Knuckle Joint Inspection

- Visually inspect the boot [A] of knuckle joint.
- ★ If damage, wear or deterioration is found, replace the knuckle joint.



2-36 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Steering

Steering Inspection

- Turn the handlebar left and right, and check the steering action.
- ★ If the steering action is not smooth, or if the steering binds or catches before the stop, lubricate the steering stem bearing.

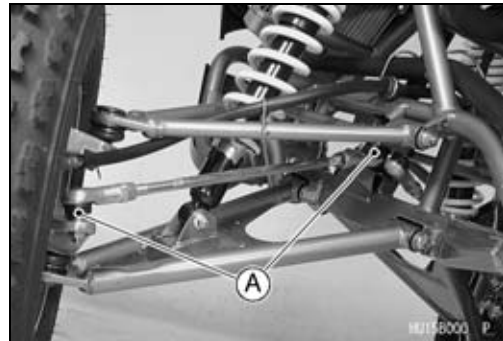
NOTE

○ *The cables and wires will have some effect on the steering action which must be taken into account.*

- Check the steering action again.
- ★ If steering stem bearing lubrication does not remedy the problem, inspect the steering stem for straightness, steering stem clamps, and tie-rod bearings.
- ★ If you feel looseness, or if the steering rattles as it turns, check the tightness of the steering bolts and nuts.
- Tighten loose bolts and nuts to the specified torque (see Steering chapter), and check the steering action again.
- ★ If the steering action does not change by tightening the bolts and nuts, inspect the steering stem clamps, steering stem bearings, tie-rod bearings, and steering knuckle joints.

Tie Rod End Inspection

- Visually inspect the grease seal [A] of tie rod end.
- ★ If damage, wear or deterioration is found, replace the tie rod end.



Periodic Maintenance Procedures

Electrical System

Spark Plug Cleaning / Inspection

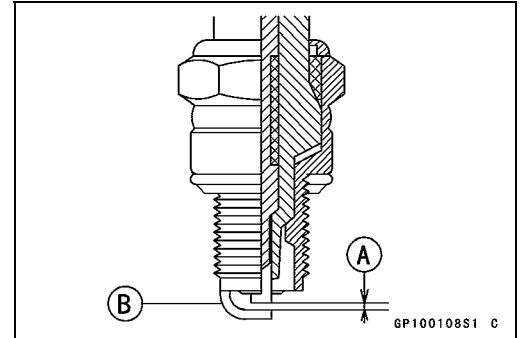
- Remove the spark plug (see Electrical System chapter).
- Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a wire brush or other suitable tool.
- ★ If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard spark plug or its equivalent.

Spark Plug Gap Inspection

- Measure the gap [A] with a wire-type thickness gauge.
- ★ If the gap is incorrect, carefully bend the side electrode [B] with a suitable tool to obtain the correct gap.

Spark Plug Gap

0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)



Brake Light Switch Inspection

- Turn on the ignition switch.
- Check the operation of the rear brake light switch by depressing the brake pedal [A].
- ★ If it does not as specified, adjust the brake light timing.

Brake Light Timing

Standard: On after about 10 mm (0.4 in.) of pedal travel [B]

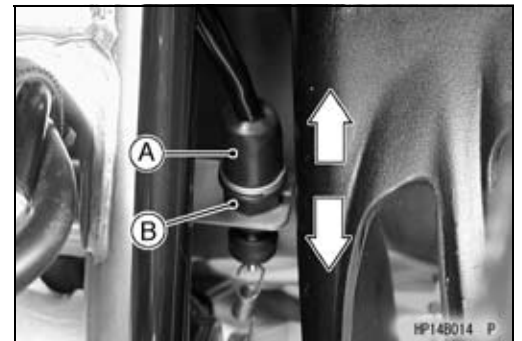


Brake Light Timing Adjustment

- Remove the foot guard (see Frame chapter).
- Adjust the brake light switch [A] up or down. To change the switch position, turn the adjusting nut [B].

CAUTION

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



General Lubrication

Lubrication

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

NOTE

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

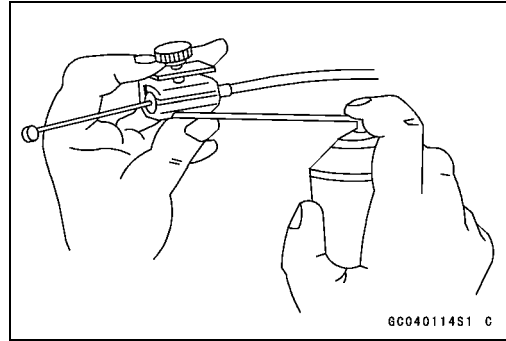
2-38 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

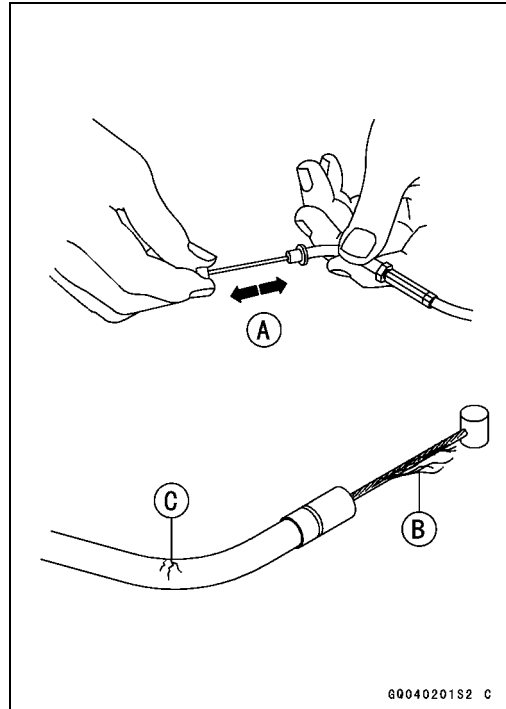
Cables: Lubricate with Cable Lubricant

Brake Cables
Throttle Cable
Choke Cable
Shift Control Cables

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

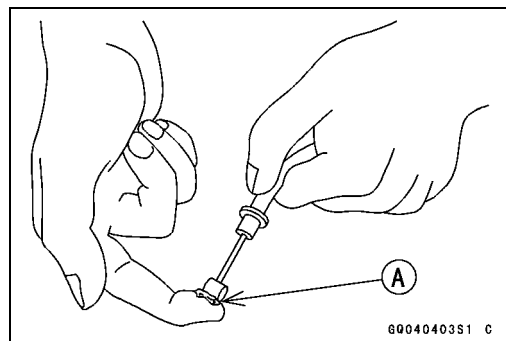


- With the cable disconnected at the both ends, the cable should move freely [A] within the cable housing.
- ★ If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



Points: Lubricate with Grease.

Throttle Inner Cable Ends [A]
Choke Cable Lower End
Brake Cable Ends
Shift Control Cable Upper Ends



Slide Points: Lubricate with Grease.

Brake Lever
Brake Pedal Pivot Shaft
Throttle Lever Shaft

Periodic Maintenance Procedures

Bolts and Nuts Tightening

Tightness Inspection

- Check the tightness of the bolts and nuts listed here in accordance with the Periodic Maintenance Chart. Also, check to see that each cotter pin is in place and in good condition.
- ★ If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not listed in the appropriate chapter, see the Basic Torque Table (see Torque and Locking Agent). For each fastener, first loosen it by 1/2 turn, then tighten it.
- ★ If cotter pins are damaged, replace them with new ones.

Bolts, Nuts, and Fasteners to be checked

Wheels:

- Front Axle Nuts and Cotter Pins
- Rear Axle Nuts and Cotter Pins
- Wheel Nuts

Brakes:

- Front Brake Master Cylinder Clamp Bolts
- Brake Lever Pivot Bolt
- Brake Lever Pivot Nut
- Front Brake Caliper Mounting Bolts
- Brake Pedal Cotter Pin

Steering/Suspension:

- Handlebar Clamp Bolts
- Stem Clamp Bolts
- Stem Bearing Housing Bolts
- Tie-Rod End Nuts and Cotter Pins
- Tie-Rod Adjusting Sleeve Locknuts
- Shock Absorber Mounting Bolts and Nuts
- Suspension Arm Pivot Bolts

Engine:

- Engine Mounting Bolts
- Engine Mounting Bracket Bolts
- Exhaust Pipe Holder Nuts
- Muffler Mounting Bolts
- Muffler Clamp Bolt

Others:

- Footrest Mounting Bolts
- Throttle Mounting Bolts

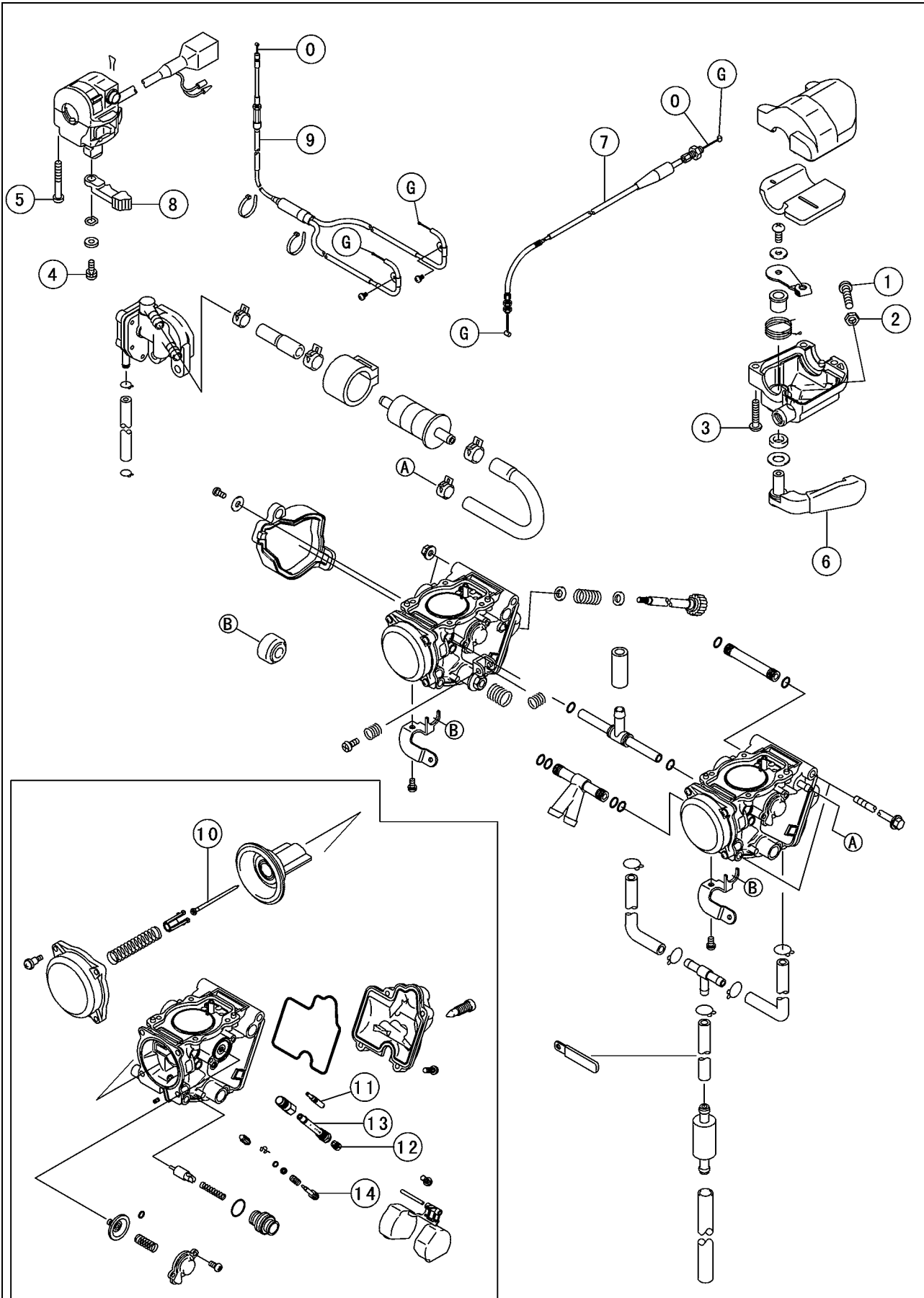
Fuel System

TABLE OF CONTENTS

Exploded View	3- 2	Carburetor Synchronization	
Specifications	3- 6	Adjustment	3-16
Special Tools	3- 7	Fuel System Cleanliness	
Throttle Lever and Cable	3- 8	Inspection.....	3-16
Throttle Lever Free Play		Carburetor Removal.....	3-16
Inspection.....	3- 8	Carburetor Installation.....	3-17
Throttle Lever Free Play		Carburetor Disassembly	3-18
Adjustment	3- 8	Carburetor Assembly	3-20
Throttle Case		Carburetor Separation	3-21
Removal/Disassembly.....	3- 8	Carburetor Joining	3-21
Throttle Case		Carburetor Cleaning.....	3-22
Assembly/Installation	3- 8	Carburetor Inspection	3-23
Throttle Cable Installation	3- 9	Air Cleaner.....	3-25
Throttle Case Inspection.....	3- 9	Air Cleaner Element Removal.....	3-25
Throttle Cable Lubrication.....	3-10	Air Cleaner Element Cleaning and	
Throttle Cable Inspection	3-10	Inspection.....	3-25
Choke Lever and Cable.....	3-11	Air Cleaner Draining.....	3-25
Choke Lever Free Play Check.....	3-11	Air Cleaner Housing Removal.....	3-25
Choke Lever Free Play		Air Cleaner Housing Installation....	3-27
Adjustment	3-11	Fuel Tank.....	3-28
Choke Lever and Cable Removal .	3-11	Fuel Tank Removal	3-28
Choke Lever and Cable		Fuel Tank Installation	3-28
Installation	3-12	Fuel Tank Cleaning	3-29
Choke Cable Lubrication.....	3-12	Fuel Tap Removal	3-29
Choke Cable Inspection.....	3-12	Fuel Tap Installation	3-30
Carburetor	3-13	Fuel Tap Inspection.....	3-30
Idling Speed Inspection.....	3-13	Fuel Pump	3-31
Idle Speed Adjustment.....	3-13	Fuel Pump Removal	3-31
Pilot Screw Adjustment.....	3-13	Pump Filter Cleaning	3-31
Service Fuel Level Inspection	3-13	Fuel Pump Installation	3-32
Service Fuel Level Adjustment	3-14	Fuel Pump Inspection	3-32
Carburetor Synchronization			
Inspection.....	3-15		

3-2 FUEL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Throttle Limiter Screw	3.7	0.38	33 in·lb	
2	Throttle Limiter Locknut	3.7	0.38	33 in·lb	
3	Throttle Case Assembly Screws	3.7	0.38	33 in·lb	
4	Choke Lever Mounting Screw	3.5	0.36	31 in·lb	
5	Left Handlebar Switches Assembly Screws	3.5	0.36	31 in·lb	

- 6. Throttle Lever
- 7. Throttle Cable
- 8. Choke Lever
- 9. Choke Cable
- 10. Jet Needle
- 11. Pilot Jet
- 12. Main Jet
- 13. Needle Jet
- 14. Pilot Screw
- O: Apply engine oil.
- G: Apply grease.

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Cleaner Housing Bolts (M5)	5.9	0.60	52 in·lb	L
2	Air Cleaner Housing Bolts (M6)	8.8	0.90	78 in·lb	
3	Air Cleaner Element Bracket Screws	4.9	0.50	43 in·lb	
4	Fuel Tap Plate Screws	0.80	0.080	7 in·lb	
5	Fuel Tap Cover Screws	1.0	0.10	8 in·lb	
6	Fuel Pump Bolts	2.0	0.20	17 in·lb	

7. Fuel Pump

8. Check Valve

L: Apply a non-permanent locking agent.

G: Apply grease.

R: Replacement Part

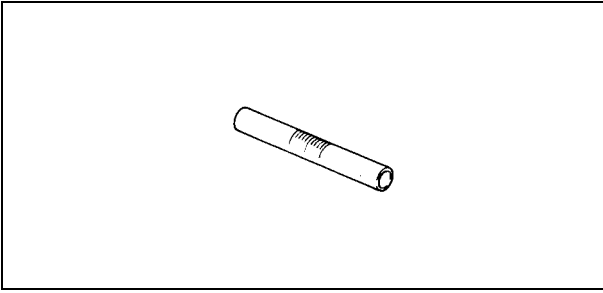
3-6 FUEL SYSTEM

Specifications

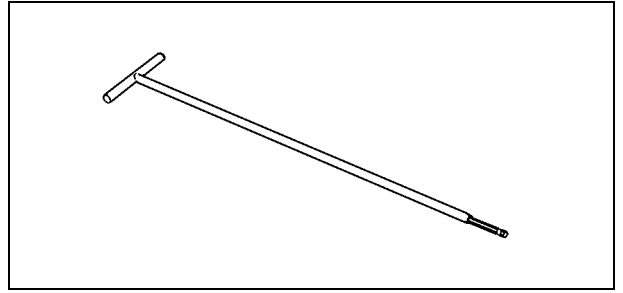
Item	Standard	Service Limit
Throttle Case and Cable:		
Throttle lever free play	2 ~ 3 mm (0.08 ~ 0.12 in.)	---
Choke Lever and Cable:		
Choke lever free play	about 3 mm (0.12 in.)	---
Carburetor:		
Make/Type	KEIHIN, CVKR-D32	---
Main jet:		
Front	#135	---
Rear	#140	---
Main air jet:	#80	---
Needle jet:	#6	---
Jet needle	NBZH	---
Pilot jet	#40	---
Pilot air jet	#130	---
Pilot screw	1 1/2 turns out	---
Carburetor synchronization vacuum	less than 2.7 kPa (2 cmHg) difference between carburetors	---
Starter jet	#95	---
Idle speed	1100 ± 50 r/min (rpm)	---
Service fuel level	12 ± 1 mm (0.47 ± 0.04 in.) below the punch mark	---
Float height	4.0 ± 1 mm (0.16 ± 0.04 in.)	---
Optional parts:		
Main jet:		
*Altitude:		
0 ~ 500 m (0 ~ 1600 ft):		
Front	#135 (92063-1014)	---
Rear	#140 (92063-1013)	---
500 ~ 1500 m (1600 ~ 4900 ft):		
Front	#132 (92063-1076)	---
Rear	#138 (92063-1015)	---
1500 ~ 2500 m (4900 ~ 8200 ft):		
Front	#130 (92063-1075)	---
Rear	#135 (92063-1014)	---
2500 ~ 3500 m (8200 ~ 11500 ft):		
Front	#128 (92063-1074)	---
Rear	#130 (92063-1075)	---
3500 ~ 4500 m (11500 ~ 14800 ft):		
Front	#120 (92063-1073)	---
Rear	#125 (92063-1069)	---
Air Cleaner:		
Air cleaner element oil	High-quality foam air filter oil	---

Special Tools

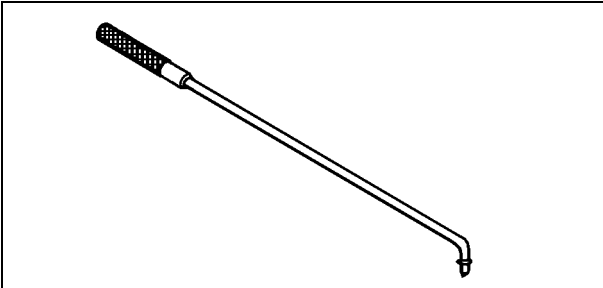
Fuel Level Gauge :
57001-1017



Carburetor Drain Plug Wrench, Hex 3 :
57001-1269



Pilot Screw Adjuster, A :
57001-1239



3-8 FUEL SYSTEM

Throttle Lever and Cable

Throttle Lever Free Play Inspection

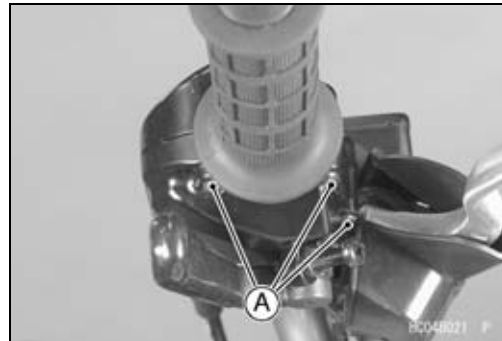
- Refer to the Fuel System in the Periodic Maintenance chapter.

Throttle Lever Free Play Adjustment

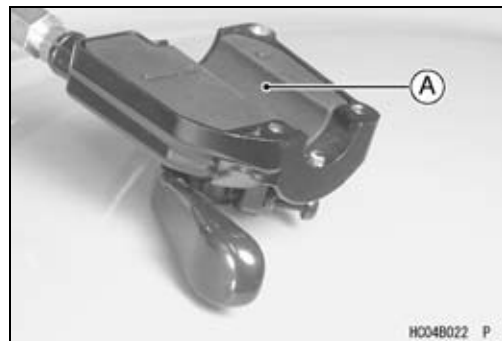
- Refer to the Fuel System in the Periodic Maintenance chapter.

Throttle Case Removal/Disassembly

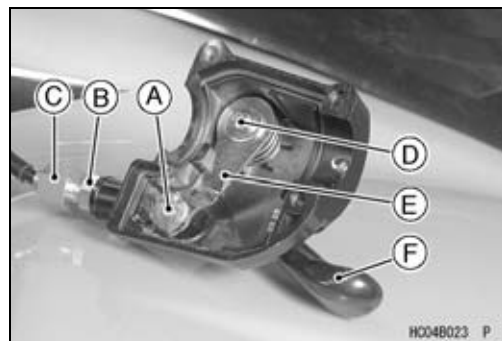
- Remove the throttle case screws [A] and pull the case open.
- Slide the cable adjuster dust cover out of place.



- Remove the rubber cover [A].



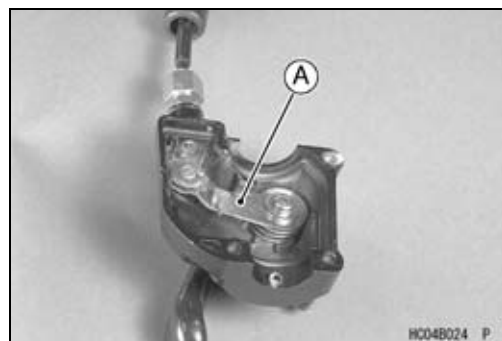
- Pull the cable tip [A] out of the throttle lever catch with the throttle lever opened.
- Loosen the locknut [B] and unscrew the adjuster [C].
- Disassemble the throttle case as follows:
 - Remove the throttle lever screw [D], lockwasher, and flat washer, and lift the throttle lever [E] and return spring from the case.
 - Pull the throttle control lever [F] out of the case.



Throttle Case Assembly/Installation

- Lubricate the throttle case and cable before assembly/installation.
- Be certain that the return spring is correctly installed on the throttle lever [A].
- Install the throttle case so that it fits the projection on the lower throttle case and hole on the handlebar.
- Tighten the throttle case assembly screws.

Torque - Throttle Case Assembly Screws: 3.7 N·m (0.38 kgf·m, 33 in·lb)



Throttle Lever and Cable

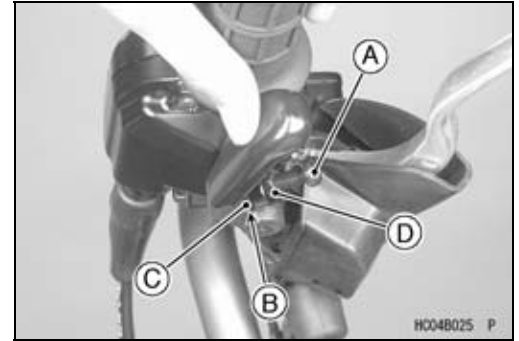
- Swing the throttle control lever so that the carburetor throttle valve is fully open. Turn the throttle limiter screw [A] until it is spaced about 1 mm (0.04 in.) [B] away from the throttle lever stop [C]. Tighten the locknut [D].

Torque - Throttle Limiter Screw: 3.7 N·m (0.38 kgf·m, 33 in·lb)

Throttle Limiter Locknut: 3.7 N·m (0.38 kgf·m, 33 in·lb)

NOTE

- Refer to the Owner's Manual for the function of the throttle limiter and adjustment procedure of it.



⚠ WARNING

Operation with an improperly assembled throttle case could result in an unsafe riding condition.

- Check the throttle lever free play (see Fuel System in Periodic Maintenance chapter).
- Slide back the cable adjuster dust cover to the original position.

Throttle Cable Installation

- Lubricate the throttle cable before installation.
- Route the cable correctly according to the Appendix chapter.

⚠ WARNING

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

- Check the throttle cable (see Fuel System in Periodic Maintenance chapter).

Throttle Case Inspection

- With the throttle cable disconnected from the throttle lever, the lever should move freely and return smoothly by spring.
- ★ If the lever is heavy, disassemble the throttle case, clean and lubricate the throttle case.
- Examine the lever and case for cracks. Replace the case assembly if it is cracked.



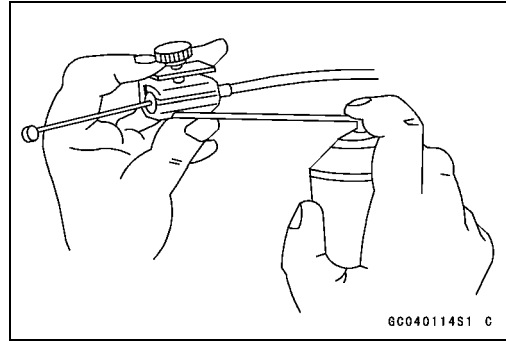
3-10 FUEL SYSTEM

Throttle Lever and Cable

Throttle Cable Lubrication

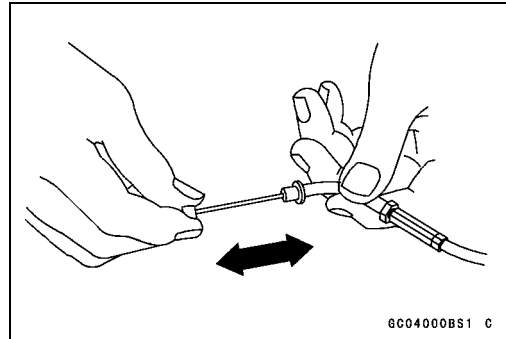
Whenever the throttle cable is removed, lubricate the cable as follows:

- Apply a small amount of multi-purpose grease to the cable both ends.
- Lubricate the cable with a penetrating rust inhibitor through the pressure cable lubber.



Throttle Cable Inspection

- With the throttle cable disconnected at both ends, the cable should move freely within the cable housing.
- ★ If the cable does not move freely after lubricating, if the cable is frayed, or if the housing is kinked, replace the cable.



Choke Lever and Cable

Choke Lever Free Play Check

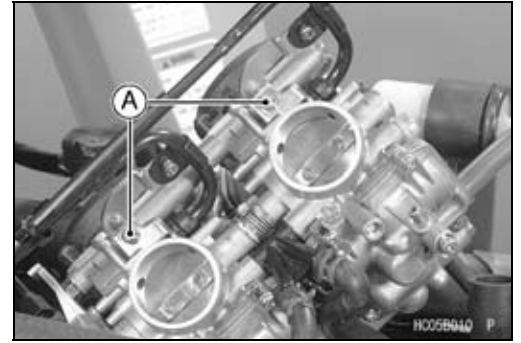
- Refer to the Fuel System in the Periodic Maintenance chapter.

Choke Lever Free Play Adjustment

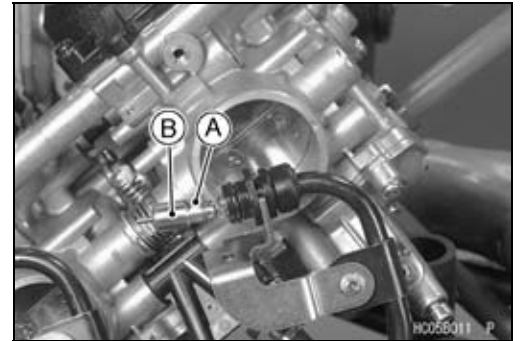
- Refer to the Fuel System in the Periodic Maintenance chapter.

Choke Lever and Cable Removal

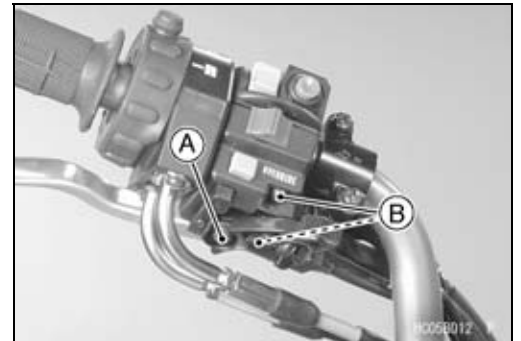
- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Remove the carburetor from the carburetor holder.
- Remove the cooling hoses and fuel hose.
- Remove the screws [A] and holder plates.
- Pull out the starter plungers.



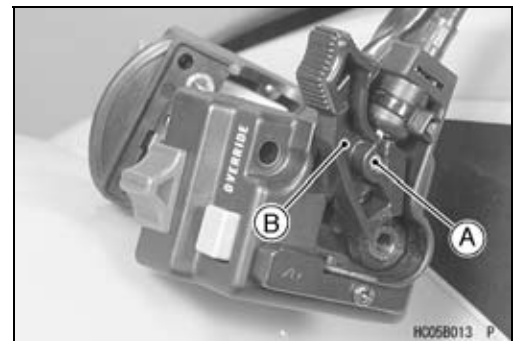
- Hold the starter plunger springs compressed, and free the choke cable lower ends [A] from the plungers [B].



- Remove:
 Choke Lever Mounting Screw [A], Plane Washer, and Wave Washer
 Switch Case Mounting Screws [B]



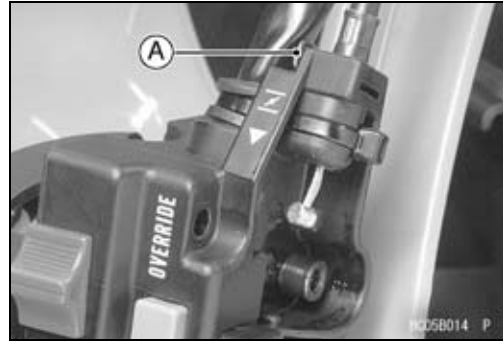
- Free the choke cable upper end [A] from the choke lever [B].



3-12 FUEL SYSTEM

Choke Lever and Cable

- Pull off the retaining clip [A].
- Pull the cable out of the vehicle.



Choke Lever and Cable Installation

- Lubricate the choke cable before installation.
- Install the wave washer, plain washer and screw in that order.
- Route the choke cable according to the Appendix chapter.

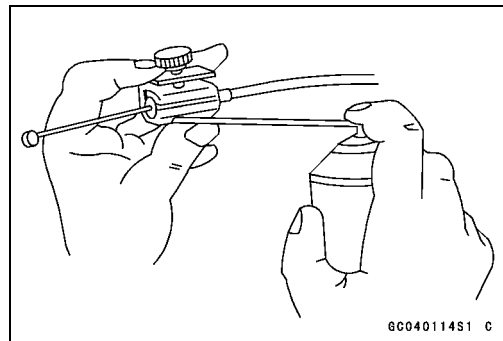
⚠ WARNING

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

Choke Cable Lubrication

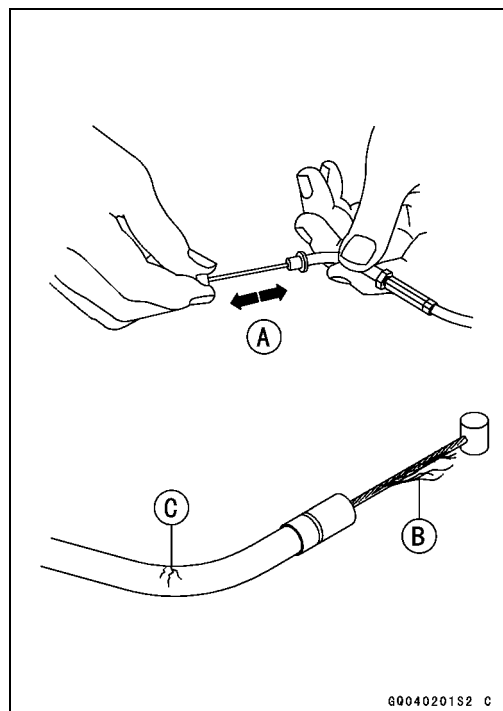
Whenever the choke cable is removed, lubricate the cable as follows:

- Lubricate the cable with a penetrating rust inhibitor through the pressure cable lubber.



Choke Cable Inspection

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



Carburetor

Idling Speed Inspection

- Refer to the Fuel System in the Periodic Maintenance chapter.

Idle Speed Adjustment

- Refer to the Fuel System in the Periodic Maintenance chapter.

Pilot Screw Adjustment

- Adjust the pilot screw if necessary.
- Remove the converter exhaust joint duct (see Converter System chapter).
- Turn the carburetor pilot screw [A] all the way in until it seats lightly.

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

CAUTION

Do not overtighten the pilot screw or the carburetor body will be damaged and require replacement.

- Back the pilot screw out the specified number of turns.

Carburetor Pilot Screw Setting

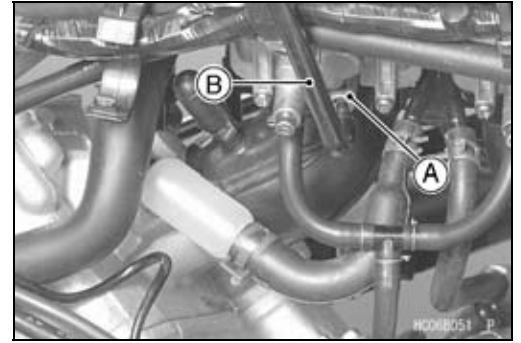
Standard: 1 1/2 turns out

Service Fuel Level Inspection

⚠ WARNING

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

- Remove the carburetor (see Carburetor Removal).



3-14 FUEL SYSTEM

Carburetor

- Set the carburetor [A], fuel level gauge [B], and fuel [C] as follows.

Special Tool - Fuel Level Gauge: 57001-1017

- Place the additional graduation [D] 10 mm (0.39 in.) higher than the top graduation [E].
- Put the carburetor horizontally and so that the outlet side faces downward.
- Connect the fuel gauge and hose to the drain fitting of the carburetor.
- Connect the fuel to the fuel inlet fitting.
 - 210 mm (8.27 in.) [F]
 - 12 mm (0.47 in.) [G]
- Hold the gauge so that the additional graduation is placed slightly higher than the punch mark [H].
- Feed the fuel into the carburetor, then loosen the carburetor drain screw.

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

- Wait until the fuel level in the gauge settles.
- Hold the gauge vertically and lower it slowly so that the additional graduation aligns with the punch mark.

NOTE

- Do not align the additional graduation on the gauge lower than the punch mark. If it is lowered and then raised, the gauge will show a fluid level that is higher than the actual level, which will require a remeasurement.

- Read the fuel level [G].
- ★ If the fuel level is incorrect, adjust it.

Service Fuel Level

Standard: 12 ± 1 mm (0.47 ± 0.04 in.) below the punch mark

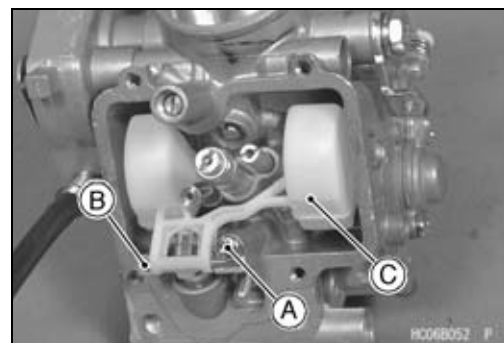
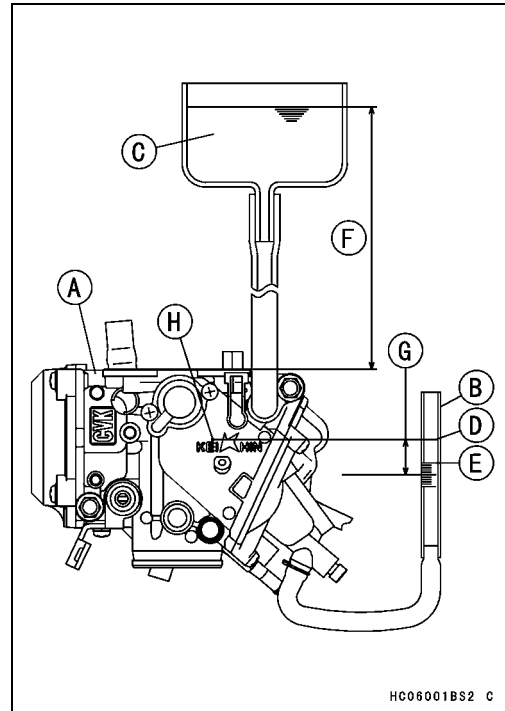
- Tighten the drain screw.
- Repeat the same procedure for the other carburetor.

Service Fuel Level Adjustment

⚠ WARNING

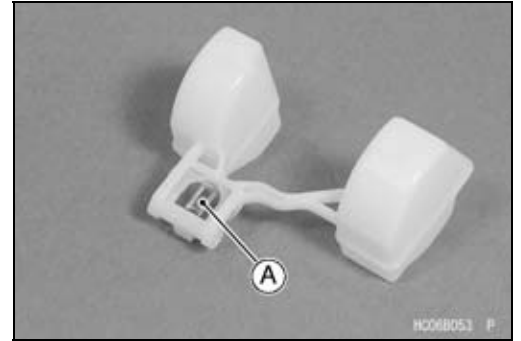
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch to OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetors, and drain the fuel.
- Remove the float chamber.
- Remove the screw [A].
- Slide out the pivot pin [B] and remove the float [C].



Carburetor

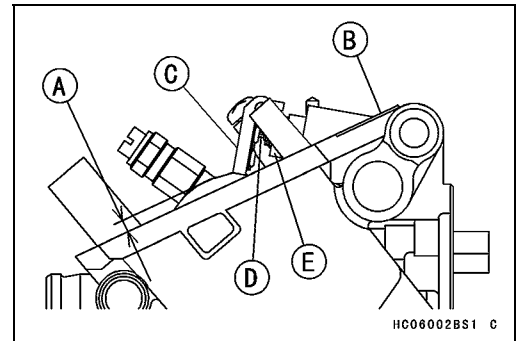
- Bend the tang [A] on the float arm very slightly to change the float height.



Float Height

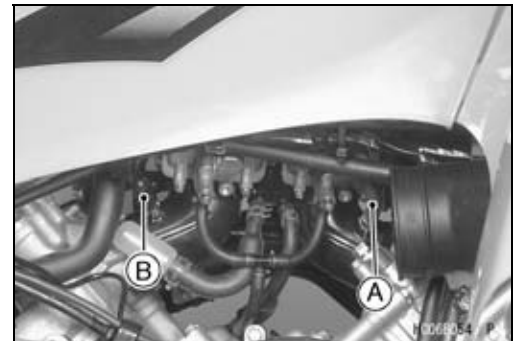
Standard: $4.0 \pm 1 \text{ mm}$ ($0.157 \pm 0.040 \text{ in.}$)

- Measure the float height [A] from the mating surface [B] of float by tilting the carburetor so that the tang of the float [C] just touches the needle rod [D]. At this time, the float valve [E] rod must not be depressed.
- Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.
- Assemble the carburetor and recheck the fuel level.
- ★ If the fuel level cannot be adjusted by this method, the float or the float valve is damaged.



Carburetor Synchronization Inspection

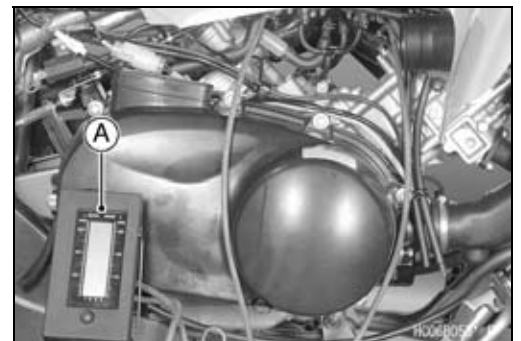
- Check idle speed.
- Remove:
 - Converter Exhaust Joint Duct (see Converter System chapter)
 - Fuel Tap Vacuum Hose [A]
 - Caps [B] on the Carburetor Holder



- Connect the battery wires to the battery.
- Attach a suitable vacuum gauge [A] to the fitting on the carburetor holder.
- Start the engine and read the intake vacuum of each carburetor when idling.
- ★ If the vacuum is out of the specified range, adjust it.

Carburetor Synchronization Vacuum

Standard: Less than 2.7 kPa (2 cmHg) difference between carburetors



3-16 FUEL SYSTEM

Carburetor

Carburetor Synchronization Adjustment

- Remove the air cleaner cover (see Frame chapter).
- Turn the adjust screw [A] to synchronize the carburetors.
- ★ If the carburetor synchronization cannot be obtained by using the adjusting screw, check for dirt or blockage, and then check the pilot screw settings.
- Check the carburetor synchronization again.

NOTE

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

- Check idle speed.

Fuel System Cleanliness Inspection

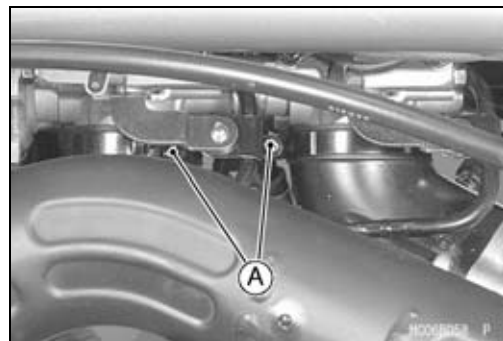
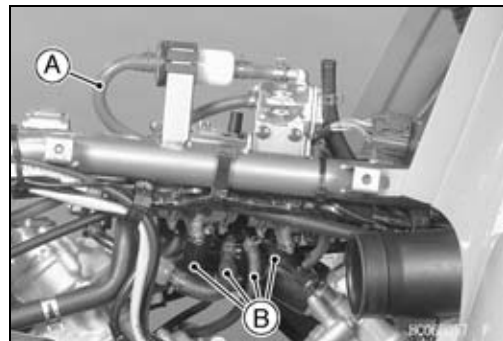
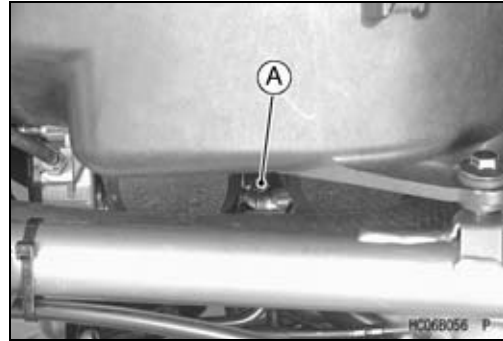
- Refer to the Fuel System in the Periodic Maintenance chapter.

Carburetor Removal

⚠ WARNING

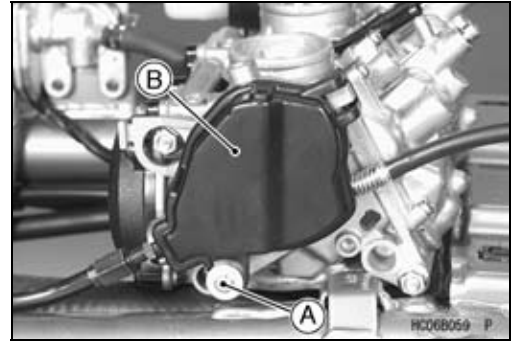
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Drain the coolant (see Cooling System chapter).
- Remove:
 - Air Cleaner Housing (see Air Cleaner Housing Removal)
 - Side Inner Cover (see Frame chapter)
 - Fuel Hose [A]
 - Coolant Hoses [B]
- Loosen the clamp screws [A] on the carburetor holders.
- Remove the carburetor out of the frame.

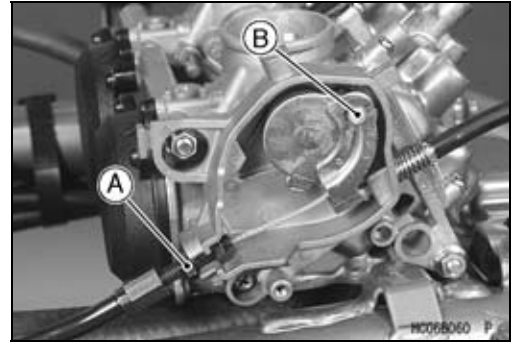


Carburetor

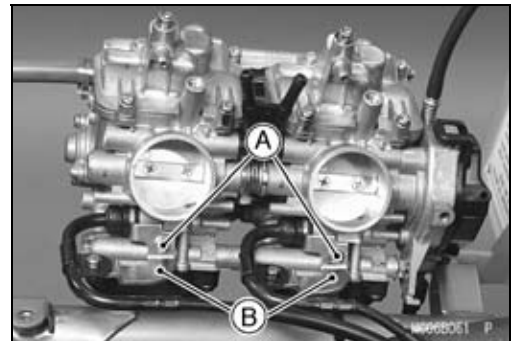
- Remove the throttle cable cover screw [A] and throttle cable cover [B].



- Loosen the nut [A] on the throttle cable.
- Remove the throttle cable lower end [B].



- Remove the screws [A] and holder plates [B].
- Pull out of the starter plungers.



Carburetor Installation

- Check fuel leakage from the carburetors.

⚠ WARNING

Fuel spilled from the carburetors is hazardous.

- Adjust the idle speed (see Fuel System in Periodic Maintenance chapter).
- Check the throttle cable (see Fuel System in Periodic Maintenance chapter).

3-18 FUEL SYSTEM

Carburetor

Carburetor Disassembly

- Remove the carburetors (see Carburetor Removal).

⚠ WARNING

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

NOTE

○ The carburetors can be disassembled in the joined state.

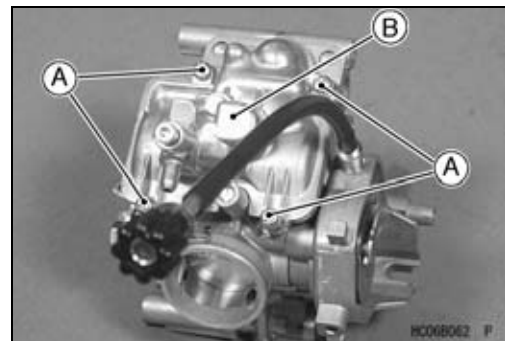
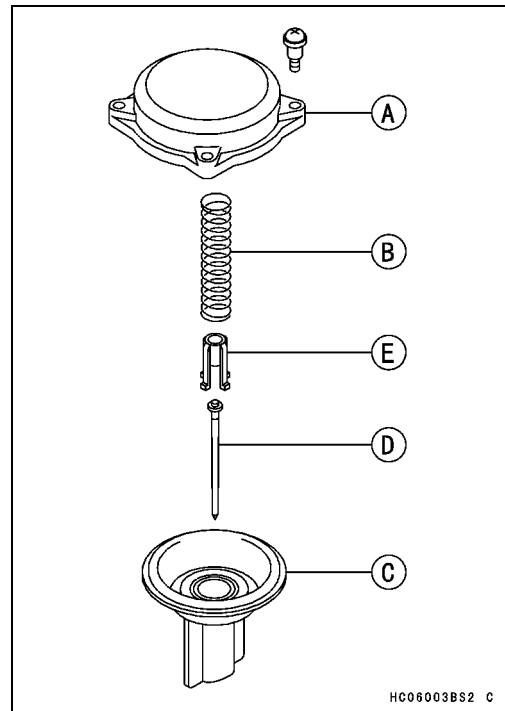
- Remove the upper chamber cover [A], spring [B], and vacuum piston [C].

CAUTION

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

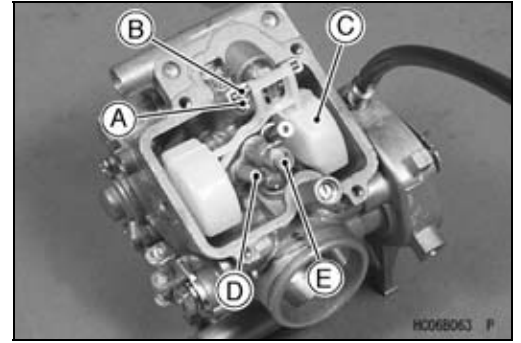
- Remove the jet needle [D] from the vacuum piston. These can be detached together with the spring seat [E].
- Do not remove the pilot screw if possible, synchronization of the carburetors is necessary if pilot screws are removed (see Pilot Screw Adjustment).

- Remove:
 - Screws [A]
 - Float Chamber [B]

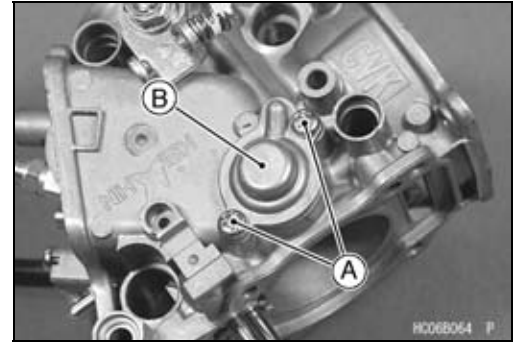


Carburetor

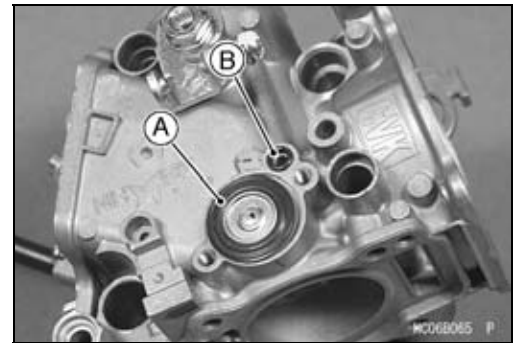
- Remove:
 - Screw [A]
 - Float Pivot Pin [B], Float [C], and Float Needle Valve
 - Pilot Jet [D]
 - Main Jet [E]



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



- Remove:
 - Diaphragm [A]
 - O-ring [B]



3-20 FUEL SYSTEM

Carburetor

Carburetor Assembly

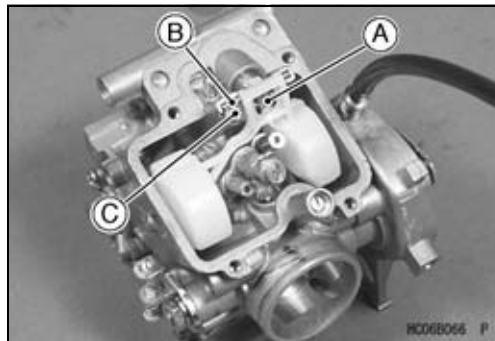
⚠ WARNING

Fuel spilled from the carburetors is hazardous.

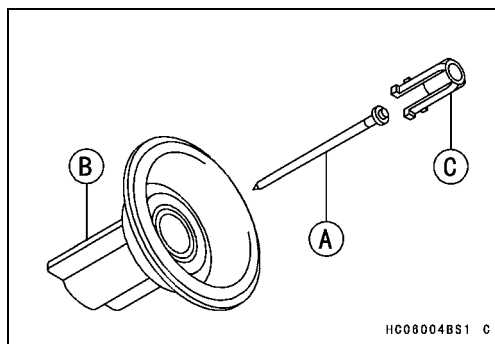
CAUTION

Do not apply force to the jet or overtighten it, or this could damage the jet or the carburetor body, requiring replacement.

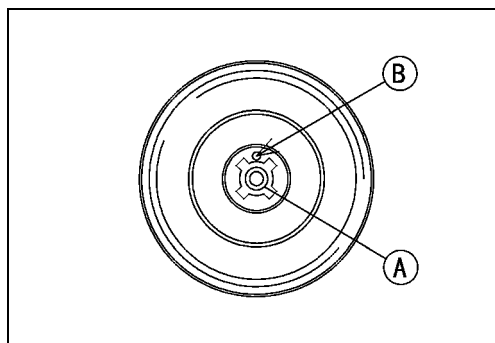
- Install the float valve needle in the valve seat and hook the needle hanger [A] onto the float tang.
- Insert the float pivot pin [B] into the pivot post and the float.
- Tighten the screw [C].
- Set the float to the standard height (see Service Fuel Level Adjustment).



- Insert the jet needle [A] into the hole in the center of the vacuum piston [B], and place the spring seat [C] over the needle.

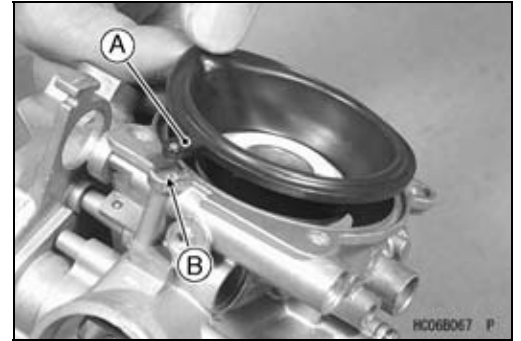


- Slip the needle through the hole in the center of the vacuum piston, and put the spring seat [A] on the top of the needle. Turn the seat so that it does not block the hole [B] at the bottom of the vacuum piston.
- After installing the upper chamber cover, check that the vacuum piston slides up and down smoothly without binding in the carburetor bore.



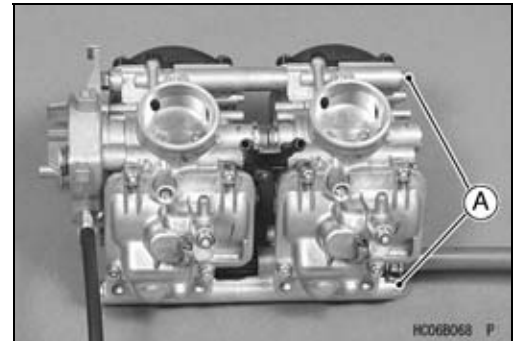
Carburetor

- Fit the projection [A] of the vacuum piston diaphragm in the recess [B] of the body.
- After installing the upper chamber cover, check to make sure that the vacuum piston moves smoothly in the carburetor body.



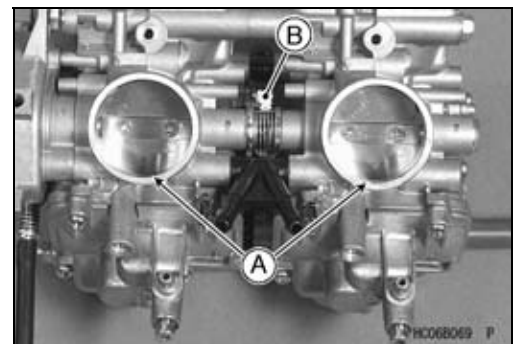
Carburetor Separation

- Remove:
 - Carburetor (see Carburetor Removal)
 - Carburetor Joining Bolts [A] and Nuts
- Separate the carburetors.



Carburetor Joining

- The center lines of the carburetor bores must be parallel both horizontally and vertically. If they are not, loosen the mounting screws and align the carburetors on a flat surface.
- Retighten the carburetor joining bolts.
- Visually synchronize the throttle (butterfly) valves.
 - Check to see that all throttle valves open and close smoothly without binding when turning the pulley.
 - Visually check the clearance [A] between the throttle valve and the carburetor bore in each carburetor.
 - ★ If there is a difference between two carburetors, turn the balance adjusting screw [B] to obtain the same clearance.
- Install the carburetors (see Carburetor Installation).
- Adjust the synchronization (see Synchronization Adjustment).



3-22 FUEL SYSTEM

Carburetor

Carburetor Cleaning

⚠ WARNING

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

CAUTION

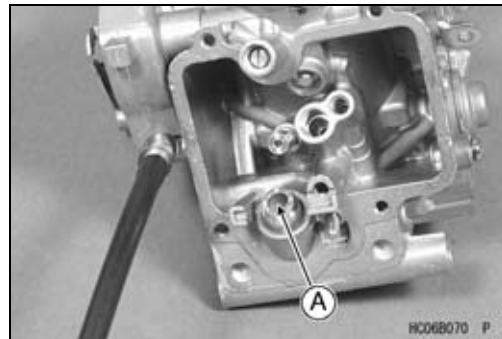
Do not use compressed air on an assembled carburetor, the float may be crushed by the pressure, and the vacuum piston diaphragm may be damaged.

Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage or deterioration of the parts.

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

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

- Disassemble the carburetor and clean all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water and dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Remove the float valve, spray cleaning solution from the valve seating surface into the fuel passage, and clean the strainer (press-fitted) with compressed air [A].
- Assemble the carburetor (see Carburetor Assembly).



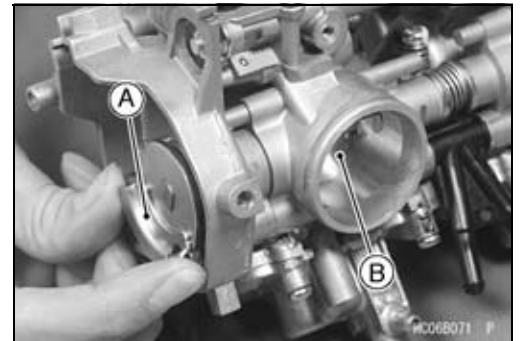
Carburetor

Carburetor Inspection

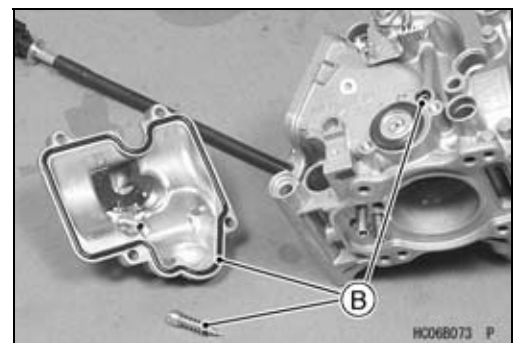
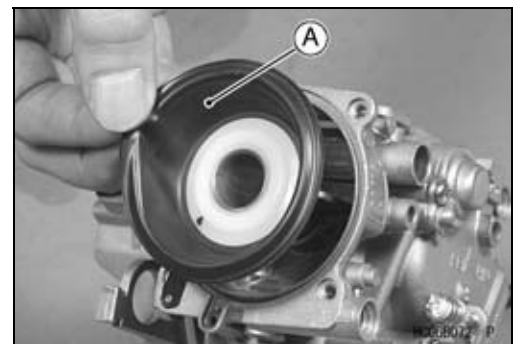
⚠ WARNING

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

- Remove the carburetor (see Carburetor Removal).
- Before disassembling the carburetors, check the fuel level (see Fuel Level Inspection).
- Turn the throttle cable pulley [A] to check that the throttle butterfly valve [B] moves smoothly and return back with the spring tension.
- ★ If the throttle valve does not move smoothly, replace the carburetor.



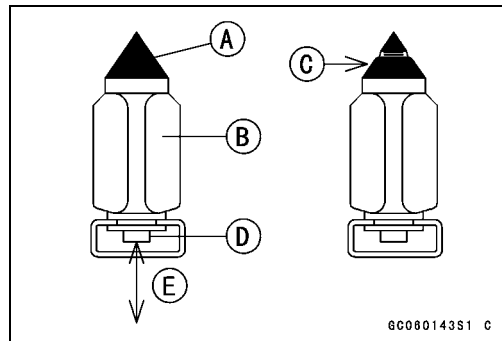
- Disassemble the carburetors (see Carburetor Disassembly).
- Clean the carburetor (see Carburetor Cleaning).
- Check the vacuum piston diaphragm [A], and the O-rings [B] on the float bowl, pilot screw, coasting enricher, and starter plunger cap.
- ★ If any of the diaphragm or O-rings are not in good condition, replace them.



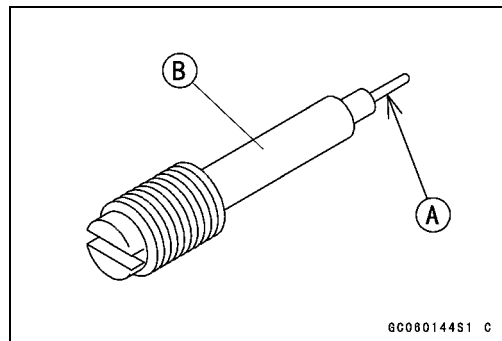
3-24 FUEL SYSTEM

Carburetor

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



- 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.

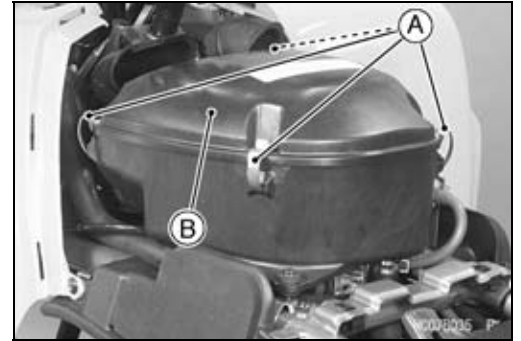


- Check that the vacuum piston moves smoothly in the carburetor body. The surface of the piston must not be excessively worn.
- ★ If the vacuum piston does not move smoothly, or if it is very loose in the carburetor body, replace both the body and the vacuum piston.

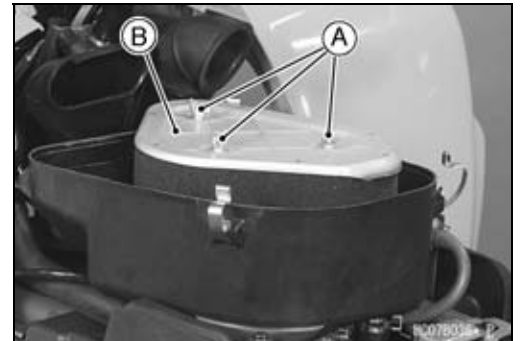
Air Cleaner

Air Cleaner Element Removal

- Remove:
 - Air Cleaner Cover (see Frame chapter)
 - Clips [A]
 - Air Cleaner Housing Cap [B]



- Remove:
 - Thumbscrews [A]
 - Metal mesh [B] with element
- After removing the element, stuff pieces of lint-free, clean cloth into the air cleaner ducts to keep dirt out of the carburetor and engine.



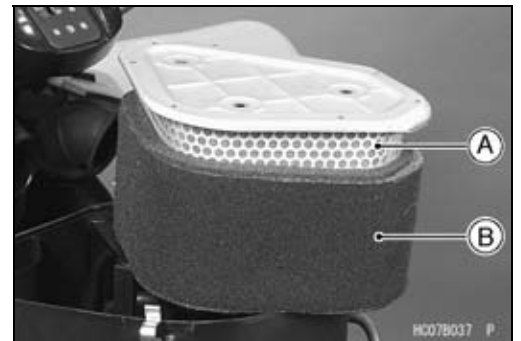
⚠ WARNING

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

CAUTION

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

- Separate metal mesh [A] and element [B].



Air Cleaner Element Cleaning and Inspection

- Refer to the Fuel System in the Periodic Maintenance chapter.

Air Cleaner Draining

- Refer to the Fuel System in the Periodic Maintenance chapter.

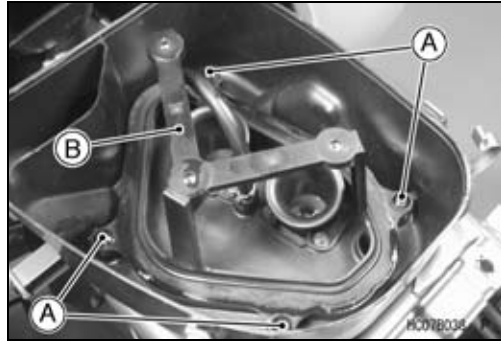
Air Cleaner Housing Removal

- Remove:
 - Air Cleaner Cover (see Frame chapter)
 - Air Cleaner Housing Cap
 - Air Cleaner Element (Air Cleaner Element Removal)

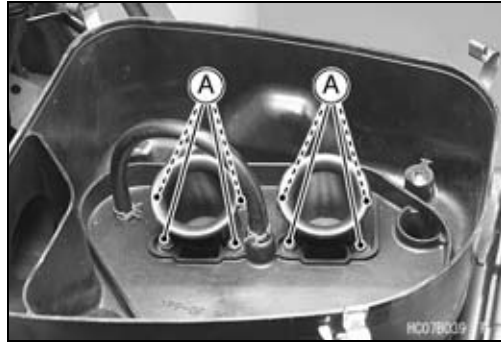
3-26 FUEL SYSTEM

Air Cleaner

- Remove:
Screws [A]
Element Bracket [B]



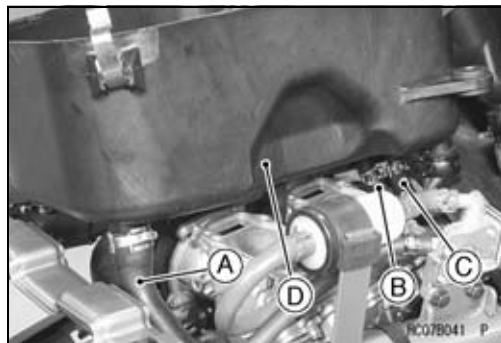
- Remove:
Air Cleaner Housing Bolts (M5) [A]



- Remove:
Air Cleaner Housing Bolts [A]



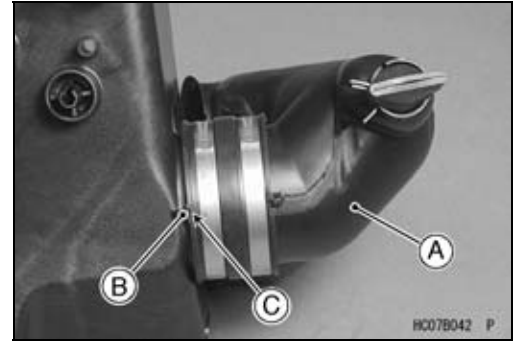
- Remove:
Breather Hose [A]
Air Vent Hose [B]
Drain Hose [C]
Air Cleaner Housing [D]



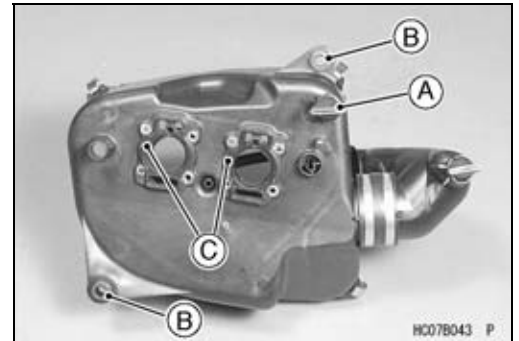
Air Cleaner

Air Cleaner Housing Installation

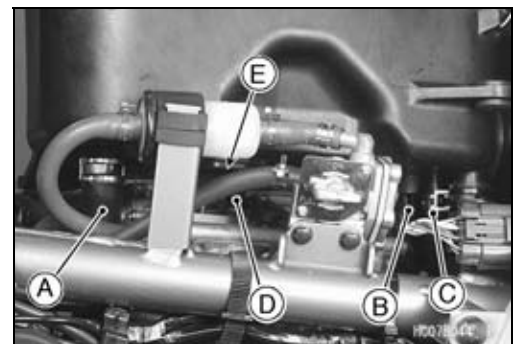
- Insert the fitting of the housing in the duct [A], and fit the projection [B] under the fitting in the groove [C] in the duct.
- Tighten the clamp screws.



- Install:
 Drain Tube [A]
 Grommets [B]
 Air Ducts [C]



- Install:
 Breather Hose [A]
 Air Vent Hose [B]
 Drain Hose [C]
- Insert the carburetor air vent tube [D] in the fitting [E] of the housing.

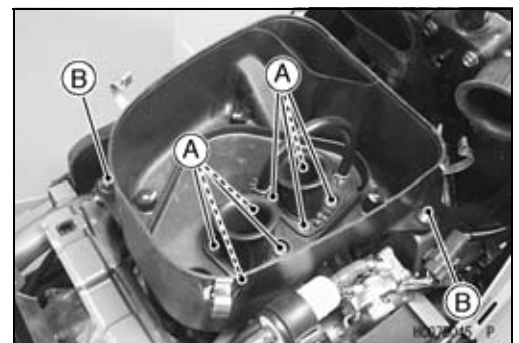


- Apply a non-permanent locking agent to the air cleaner housing bolts (M5) [A] and tighten them.

Torque - Air Cleaner Housing Bolts (M5): 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Tighten:
Torque - Air Cleaner Housing Bolts (M6) [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Install:
 Air Cleaner Element
 Air Cleaner Housing Cap

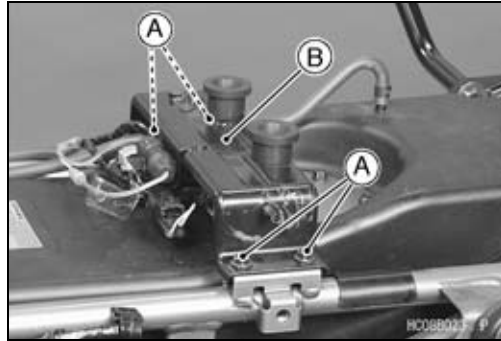


3-28 FUEL SYSTEM

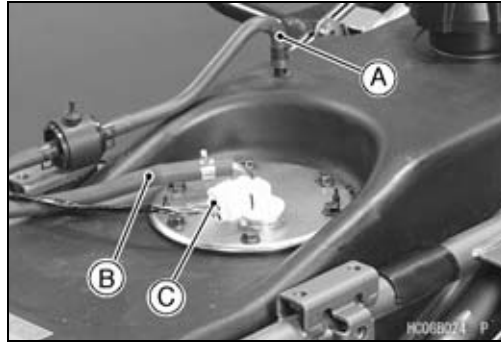
Fuel Tank

Fuel Tank Removal

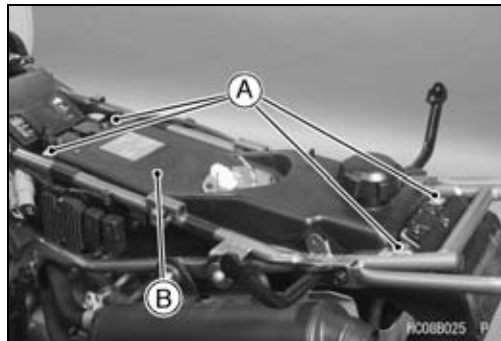
- Remove:
 - Rear Fender (see Frame chapter)
 - Bolts [A]
 - Seat Bracket [B]



- Disconnect:
 - Breather Hose [A]
 - Fuel Hose [B]
 - Fuel Pump Lead Connector [C]

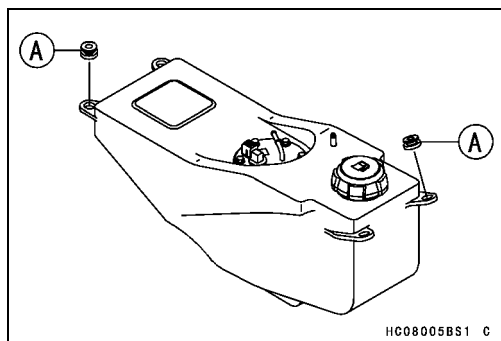


- Remove:
 - Fuel Tank Bolts [A]
 - Fuel Tank [B]



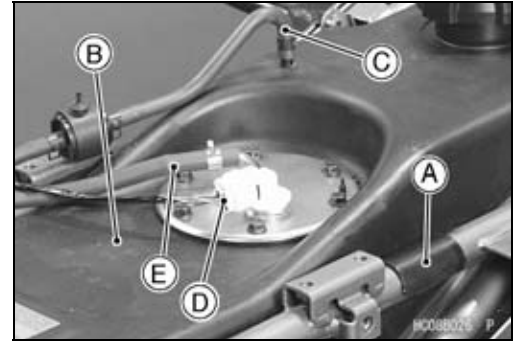
Fuel Tank Installation

- Check the rubber dampers [A].
- ★If the dampers are damaged or deteriorated, replace them.



Fuel Tank

- Install:
 - Fuel Tank Cover [A]
 - Fuel Tank [B]
 - Grommets and Collars
- Tighten the fuel tank bolts.
- Connect:
 - Breather Hose [C]
 - Fuel Pump Lead Connector [D]
 - Fuel Hose [E]
- Be sure the fuel hose is clamped to the fuel pump fitting.



Fuel Tank Cleaning

- Remove the fuel tank and drain it (see Fuel Tank Removal).
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.

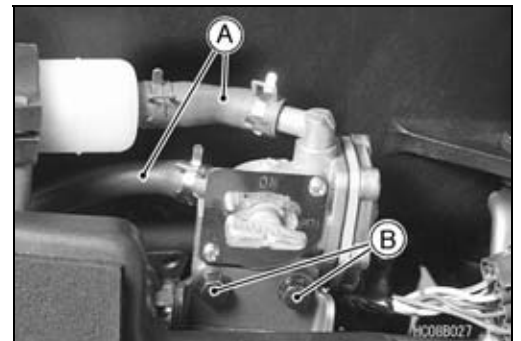
⚠ WARNING

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

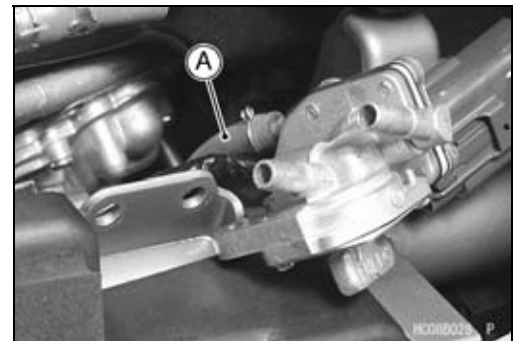
- Pour the solvent out the tank.
- Install the fuel tank (see Fuel Tank Installation).

Fuel Tap Removal

- Remove:
 - Fuel Hoses [A]
 - Fuel Tap Mounting Bolts [B]



- Remove:
 - Fuel Tap Vacuum Hose [A]

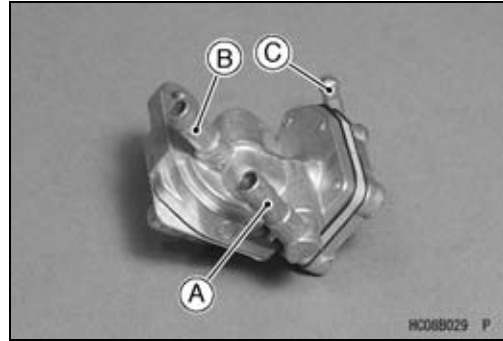


3-30 FUEL SYSTEM

Fuel Tank

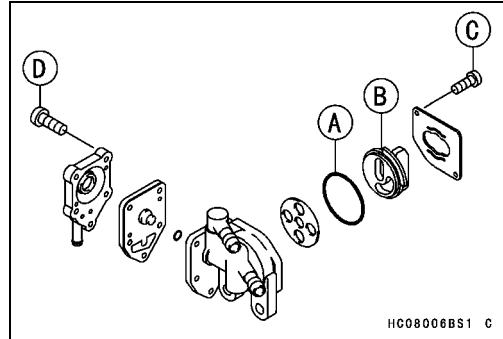
Fuel Tap Installation

- Connect the fuel hoses to the fuel tap as follows.
 - Fuel Filter Hose to Fitting [A]
 - Fuel Tank Hose to Fitting [B]
 - Fuel Tap Vacuum Hose to Fitting [C]
- Be sure to clamp the fuel hoses to the fuel tap to prevent leakage.



Fuel Tap Inspection

- Be sure the O-ring [A] is in good condition to prevent leakage.
- Apply grease to the lever [B].
- Tighten:
 - Torque - Fuel Tap Plate Screws [C]: 0.80 N·m (0.080 kgf·m, 7 in·lb)**
 - Fuel Tap Cover Screws [D]: 1.0 N·m (0.10 kgf·m, 8 in·lb)**



Fuel Pump

Fuel Pump Removal

CAUTION

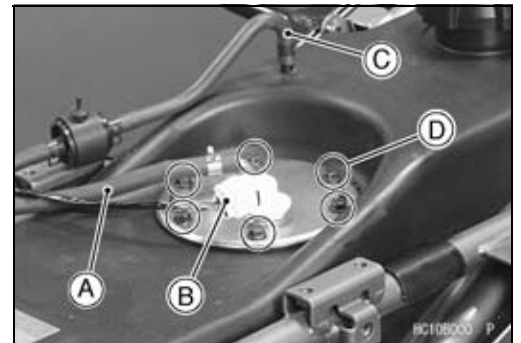
Never drop the fuel pump, especially on a hard surface. Such a shock to the pump can damage it.

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. 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 make fuel spillage minimum, draw the fuel out from the fuel tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Remove:
 - Seat Bracket
 - Fuel Hose [A]
 - Fuel Pump Lead Connector [B]
 - Breather Hose [C]
- Unscrew the fuel pump bolts [D], and take out the fuel pump assembly and gasket.
- Do not contact the fuel filter with the fuel tank.
- Discard the fuel pump gasket.

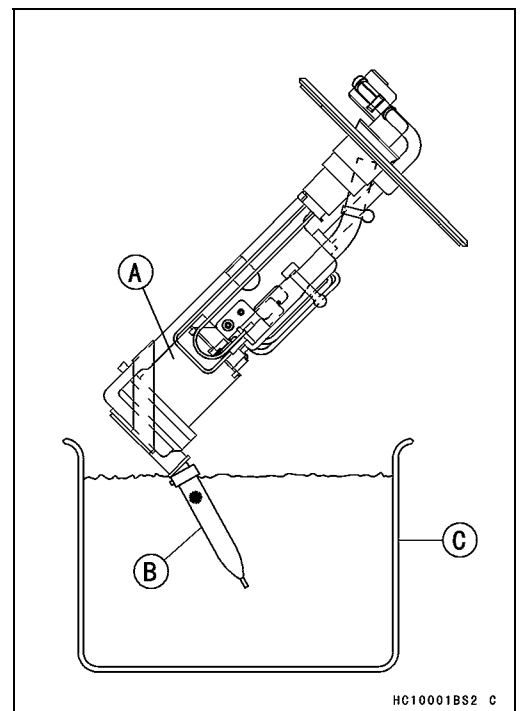


Pump Filter Cleaning

⚠ WARNING

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

- Remove the fuel pump [A] along with the pump filter [B].
- Prepare a container [C] filled with a high-flash point solvent.
- Dip and shake the fuel filter only in the solvent to remove dirt and fuel deposits from the filter.
- Dry the pump and filter by lightly applying compressed air.
- Install the fuel pump (see Fuel Pump Installation).



3-32 FUEL SYSTEM

Fuel Pump

Fuel Pump Installation

- Clean the pump filter (see Pump Filter Cleaning).
- Remove dirt or dust from the fuel pump by lightly applying compressed air.
- Replace the fuel pump gasket [A] with a new one.
- Install the fuel pump assembly so that the fuel filter do not contact with the fuel tank.



Fuel Pump Inspection

- Refer to the Electrical System chapter.

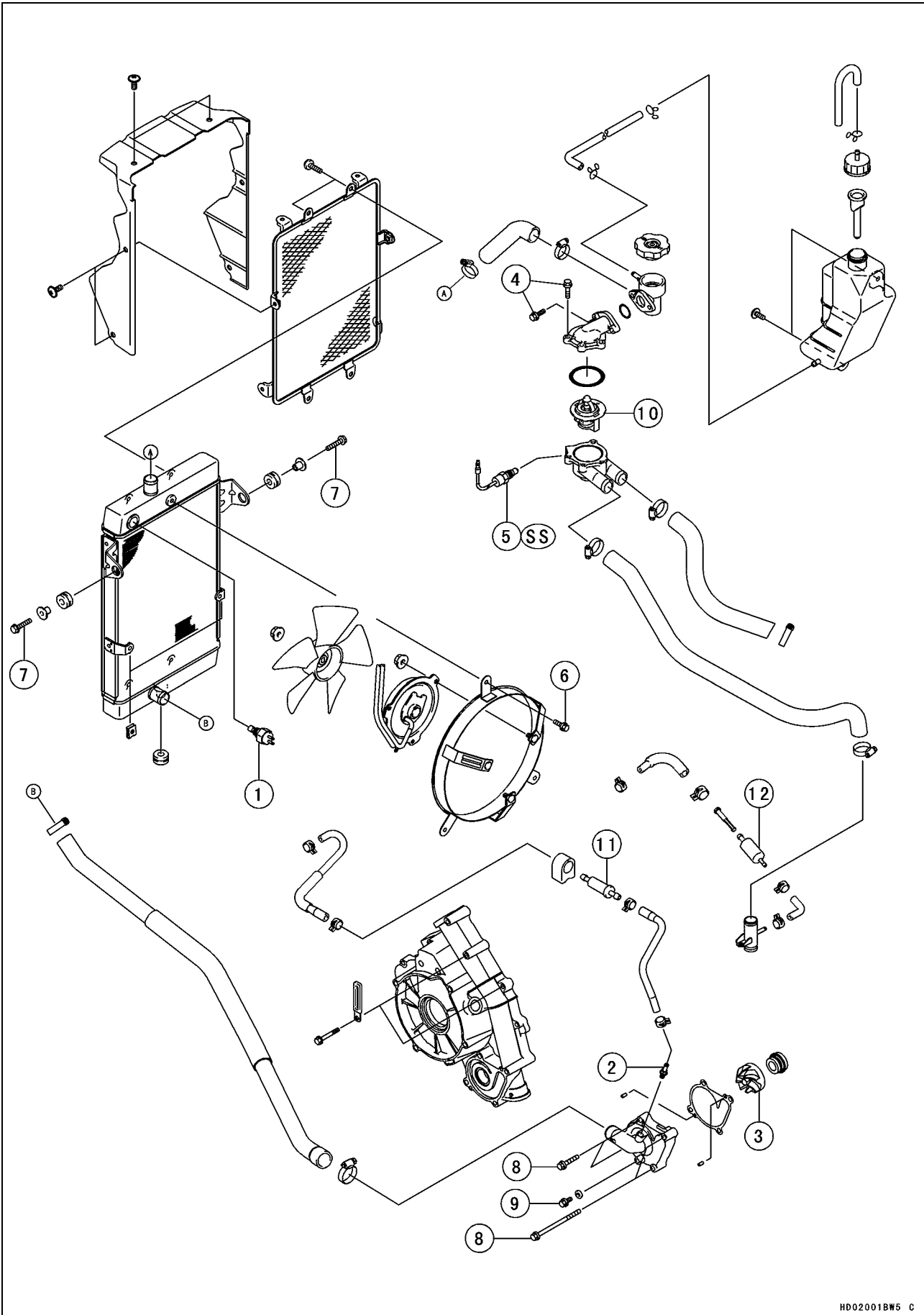
Cooling System

TABLE OF CONTENTS

Exploded View	4- 2
Coolant Flow Chart.....	4- 4
Specifications	4- 6
Special Tools and Sealant	4- 7
Coolant	4- 8
Coolant Deterioration Inspection.....	4- 8
Coolant Level Inspection.....	4- 8
Coolant Draining	4- 8
Coolant Filling	4- 8
Pressure Testing	4- 9
Water Pump.....	4-10
Water Pump Cover Removal	4-10
Water Pump Cover Installation	4-10
Impeller Removal.....	4-10
Water Pump Impeller Installation	4-10
Water Pump Impeller Inspection	4-11
Mechanical Seal Replacement	4-11
Radiator	4-13
Radiator Removal	4-13
Radiator Fan Removal.....	4-14
Radiator Fan Installation	4-14
Radiator Inspection	4-15
Radiator Cleaning	4-15
Radiator Cap Inspection	4-15
Thermostat	4-16
Thermostat Removal.....	4-16
Thermostat Installation.....	4-16
Thermostat Inspection	4-16
Radiator Fan Switch	4-18
Radiator Fan Switch Removal	4-18
Radiator Fan Switch Installation	4-18
Radiator Fan Switch Inspection	4-18
Coolant Temperature Warning Light Switch	4-19
Coolant Temperature Warning Light Switch Removal	4-19
Coolant Temperature Warning Light Switch Installation	4-19
Coolant Temperature Warning Light Switch Inspection	4-19
Coolant Filter/Valve	4-20
Coolant Filter Cleaning	4-20
Coolant Valve Inspection	4-20

4-2 COOLING SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Radiator Fan Switch	18	1.8	13	
2	Water Pump Fitting Bolt	9.8	1.0	87 in·lb	
3	Water Pump Impeller	7.8	0.80	69 in·lb	
4	Thermostat Housing Cover Bolts	8.8	0.90	78 in·lb	
5	Coolant Temperature Warning Light Switch	7.8	0.80	69 in·lb	SS
6	Radiator Fan Assembly Bolts	8.8	0.90	78 in·lb	
7	Radiator Mounting Bolts	8.8	0.90	78 in·lb	
8	Water Pump Cover Bolts	8.8	0.90	78 in·lb	
9	Coolant Drain Plug	8.8	0.90	78 in·lb	

10. Thermostat

11. Coolant Valve

12. Coolant Filter

SS: Apply silicone sealant (Kawasaki Bond: 56019–120).

4-4 COOLING SYSTEM

Coolant Flow Chart

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump (coupled with the oil pump) turns and the coolant circulates.

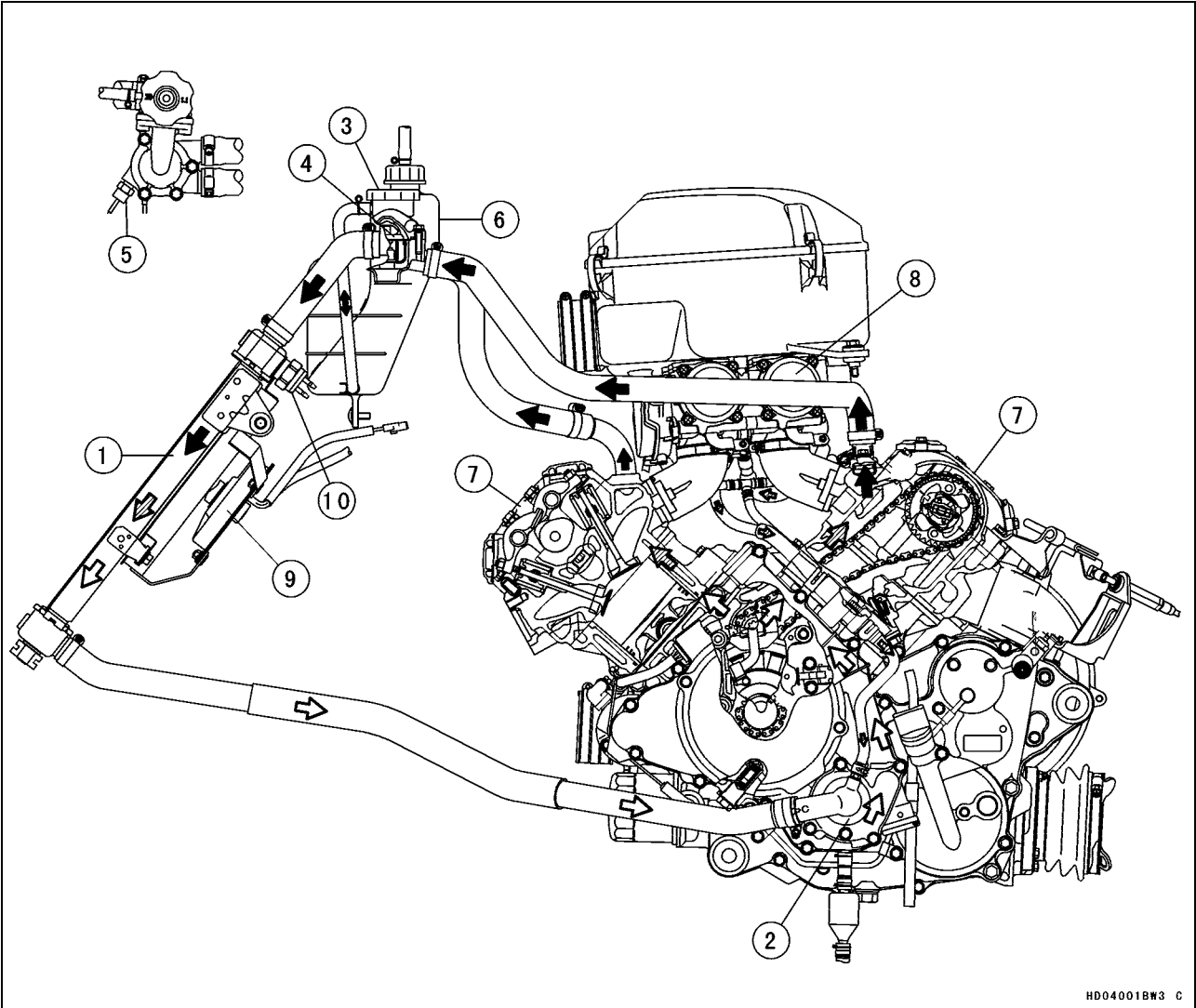
The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is below $69.5 \sim 72.5$ °C ($157 \sim 162$ °F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than $69.5 \sim 72.5$ °C ($157 \sim 162$ °F), the thermostat opens and the coolant flows. When the coolant temperature goes up beyond $96 \sim 100$ °C ($205 \sim 212$ °F), the radiator fan switch conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the temperature is below $91 \sim 95$ °C ($195 \sim 203$ °F), the fan switch opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contract, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds $93 \sim 123$ kPa ($0.95 \sim 1.25$ kgf/cm², $14 \sim 18$ psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at $93 \sim 123$ kPa ($0.95 \sim 1.25$ kgf/cm², $14 \sim 18$ psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

Coolant Flow Chart



HD04001BW3 C

- 1. Radiator
- 2. Water Pump
- 3. Radiator Cap
- 4. Thermostat
- 5. Coolant Temperature Warning Light Switch
- 6. Reserve Tank
- 7. Cylinder, Cylinder Head
- 8. Carburetor
- 9. Radiator Fan
- 10. Radiator Fan Switch

Black Painted Arrow: Hot Coolant
White Painted Arrow: Cold Coolant

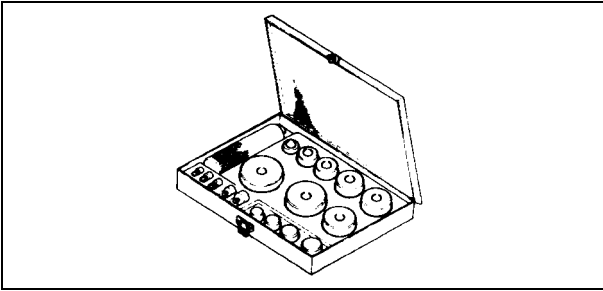
4-6 COOLING SYSTEM

Specifications

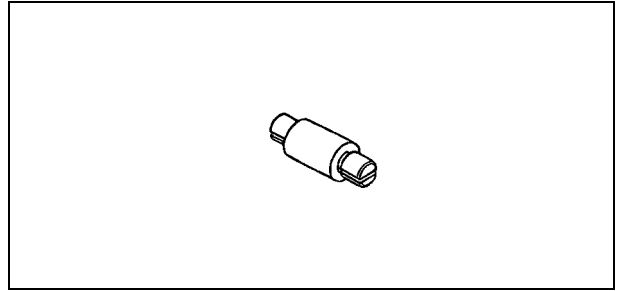
Item	Standard	Service Limit
Coolant provided when shipping: Type Color Mixed ratio Freezing point Total amount	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators) Green Soft water 50%, coolant 50% -35°C (-31°F) 2.5 L (2.64 US qt) (reserve tank full level including radiator and engine)	- - - - - - - - - - - -
Radiator cap: Relief pressure	93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm ² , 14 ~ 18 psi)	- - -
Thermostat: Valve opening temperature Valve full opening lift	69.5 ~ 72.5 °C (157 ~ 162 °F) 8 mm or more @ 85 °C (185 °F)	- - - - - -
Coolant Filter/Valve: Coolant valve closing temperature (for reference)	80 °C (176 °F) or more @ 24.5 kPa (0.25 kgf/cm ² , 3.6 psi)	- - -

Special Tools and Sealant

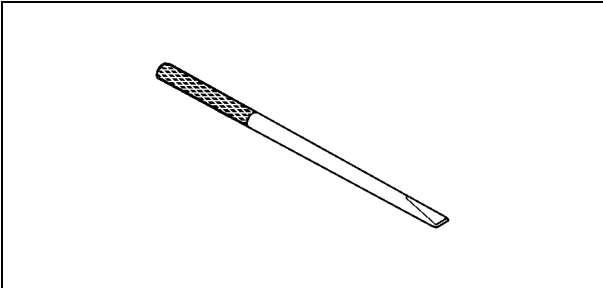
Bearing Driver Set :
57001-1129



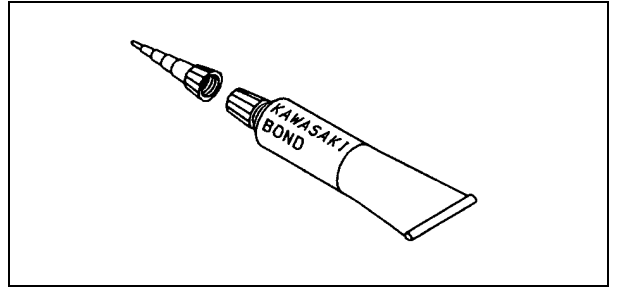
Bearing Remover Head, $\phi 10 \times \phi 12$:
57001-1266



Bearing Remover Shaft, $\phi 9$:
57001-1265



Kawasaki Bond (Silicone Sealant) :
56019-120

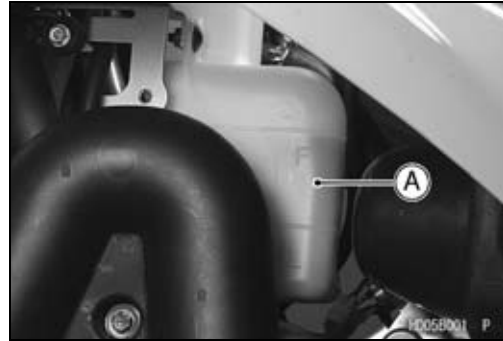


4-8 COOLING SYSTEM

Coolant

Coolant Deterioration Inspection

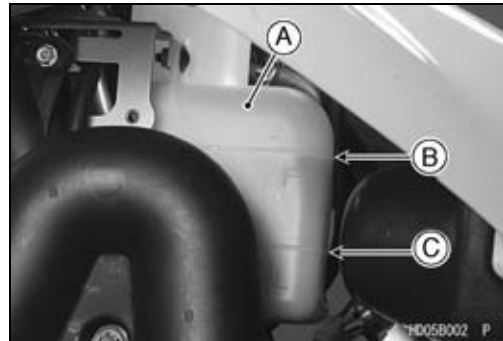
- Visually inspect the coolant in the reserve tank [A].
- ★ If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.
- ★ If the coolant gives off an abnormal smell,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



Coolant Level Inspection

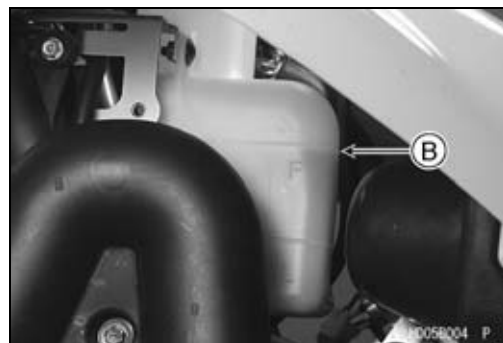
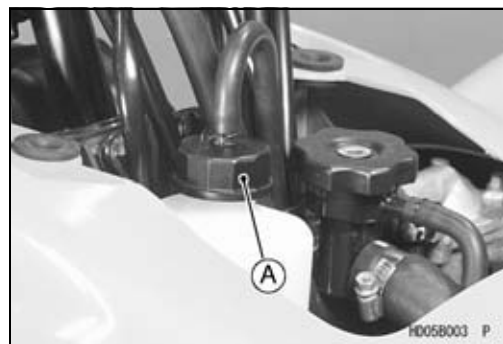
NOTE

- Check the level when the engine is cold (room or ambient temperature).
- Check the coolant level in the reserve tank with the vehicle held perpendicularly.
 - Reserve Tank [A]
 - F (full) Mark [B]
 - L (low) Mark [C]
- ★ If the coolant level is lower than the L mark, Remove the upper front cover and reserve tank cap [A], then add coolant to the F mark [B].



CAUTION

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



Coolant Draining

- Refer to the Cooling System in the Periodic Maintenance chapter.

Coolant Filling

- Refer to the Cooling System in the Periodic Maintenance chapter.

Coolant

Pressure Testing

- Remove the upper front cover and radiator cap, then install a cooling system pressure tester [A] on the radiator filler neck.

NOTE

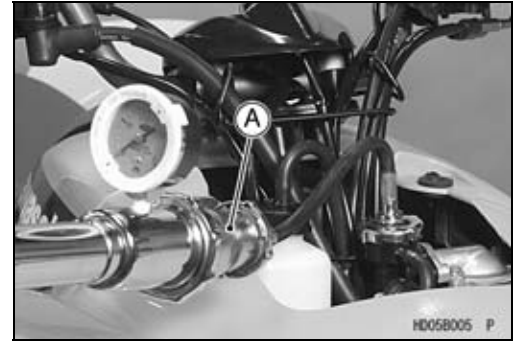
○ *Wet the cap sealing surfaces with water or coolant to prevent pressure leakage.*

- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kgf/cm², 18 psi).

CAUTION

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

- Watch the gauge for at least 6 seconds.
- ★ If the pressure holds steady, the system is alright.
- ★ If the pressure drops soon, check for leaks.

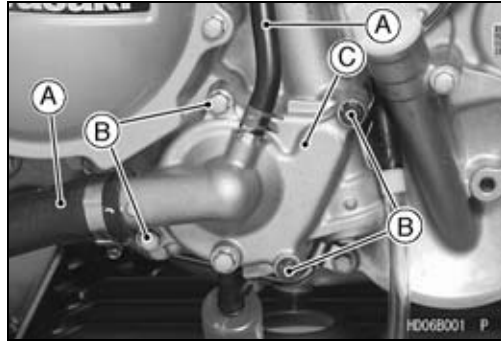


4-10 COOLING SYSTEM

Water Pump

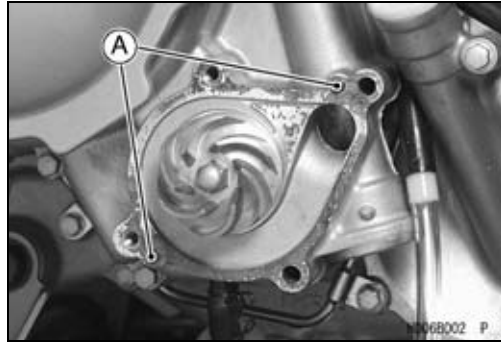
Water Pump Cover Removal

- Drain the coolant (see Cooling System in Periodic Maintenance chapter).
- Remove:
 - Foot Guards (Left Side)
 - Cooling Hoses [A]
 - Water Pump Cover Bolts [B]
 - Water Pump Cover [C]



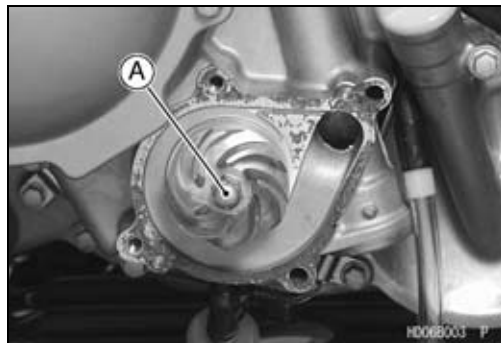
Water Pump Cover Installation

- Install:
 - Knock Pins [A]
 - New Gasket
- Tighten:
 - Torque - Water Pump Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**



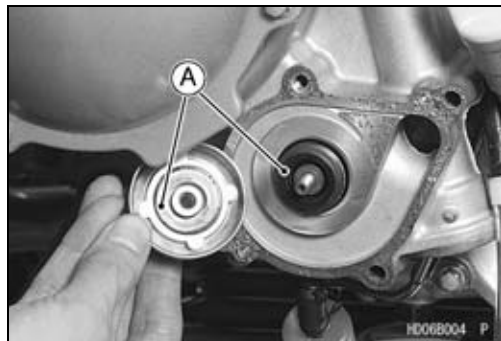
Impeller Removal

- Drain the coolant (see Cooling System in Periodic Maintenance chapter).
- Remove the water pump cover (see Water Pump Cover Removal).
- Loosen the water pump impeller [A] counterclockwise.



Water Pump Impeller Installation

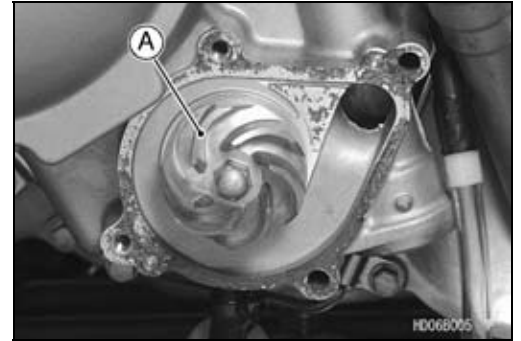
- Apply a small amount of coolant on the sliding surface [A] of the mechanical seal and the sealing seat.
- Install the impeller on the water pump shaft and tighten the impeller.
- Torque - Water Pump Impeller: 7.8 N·m (0.80 kgf·m, 69 in·lb)**



Water Pump

Water Pump Impeller Inspection

- Visually inspect the impeller [A].
- ★ If the surface is corroded or the blades are damaged, replace the impeller.



Mechanical Seal Replacement

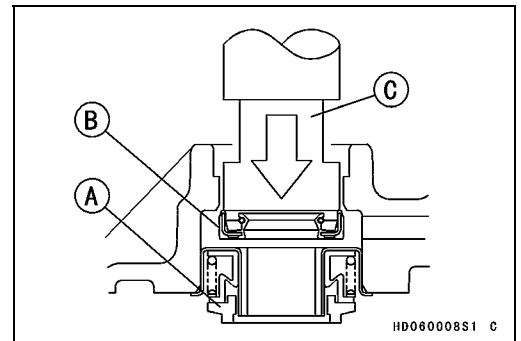
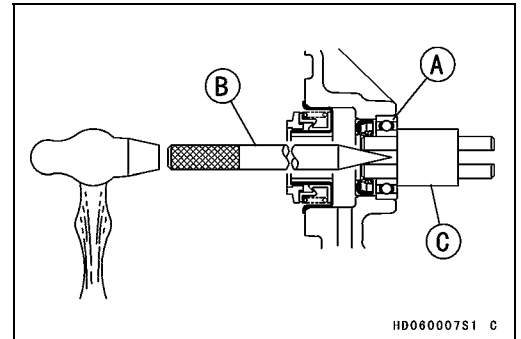
- Remove:
 - Water Pump Impeller (see Water Pump Impeller Removal)
 - Alternator Cover (see Electrical System chapter)
- Take the bearing [A] out of the alternator cover, using the bearing remover.

Special Tools - Bearing Remover Shaft, $\phi 9$: 57001-1265 [B]

Bearing Remover Head, $\phi 10 \times \phi 12$: 57001-1266 [C]

- Press out the mechanical seal [A] and oil seal [B] from the inside of the alternator cover with the bearing driver set [C].

Special Tool - Bearing Driver Set: 57001-1129

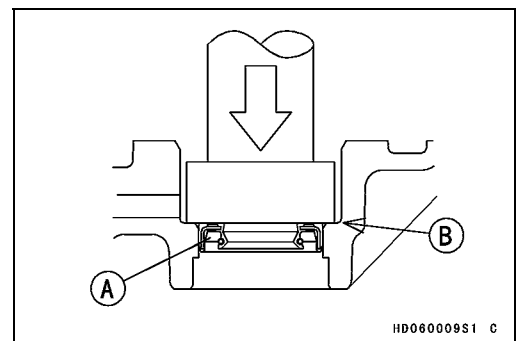


CAUTION

If either the mechanical seal, oil seal, or the ball bearing is removed, make sure to replace all of them simultaneously with a new one. Be careful not to block the inspection hole with the oil seal. If the inspection hole is blocked, the coolant may pass through the oil seal and flow into the crankcase.

- Apply heat-resistance grease on the oil seal lip.
- From outside the alternator cover, press and insert the oil seal [A] flush [B] in the direction as shown.

Special Tool - Bearing Driver Set: 57001-1129

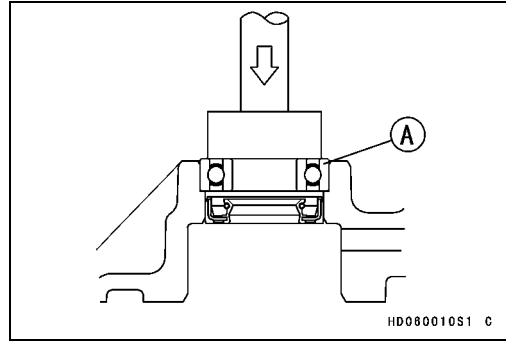


4-12 COOLING SYSTEM

Water Pump

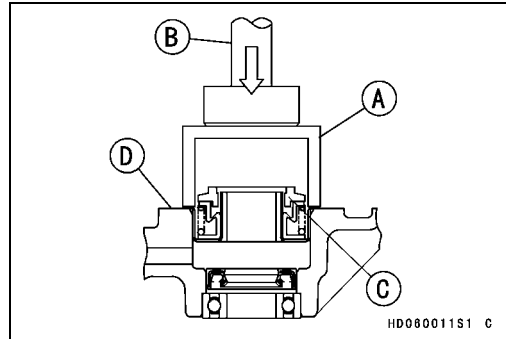
- From inside the alternator cover, press and insert the ball bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129



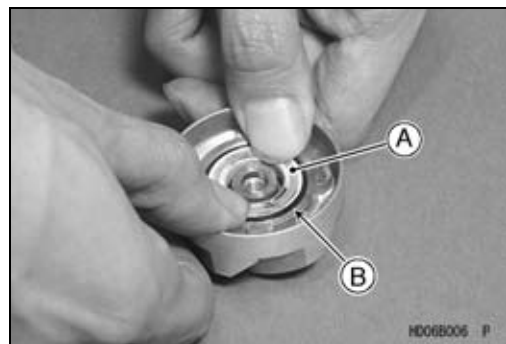
- Using a suitable socket [A] and the bearing driver [B], press and insert a new mechanical seal [C] until its flange stops at the step [D] of the hole.

Special Tool - Bearing Driver Set: 57001-1129



- Clean the sliding surface of a new mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rubber seal and sealing seat [A], and press the rubber seal [B] and sealing seat into the impeller by hand until the seat bottoms out.
- Tighten the water pump impeller by turning the bolt clockwise.

Torque - Water Pump Impeller: 7.9 N·m (0.80 kgf·m, 69 in·lb)



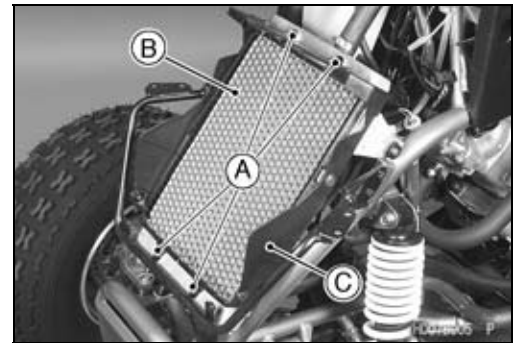
Radiator

Radiator Removal

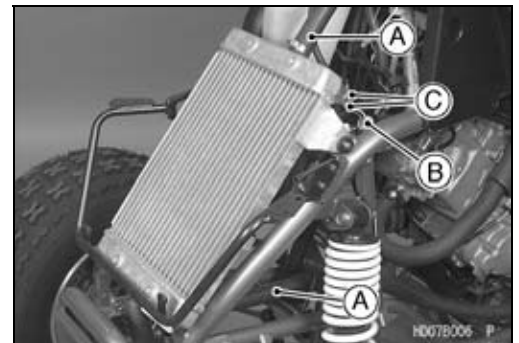
⚠ WARNING

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

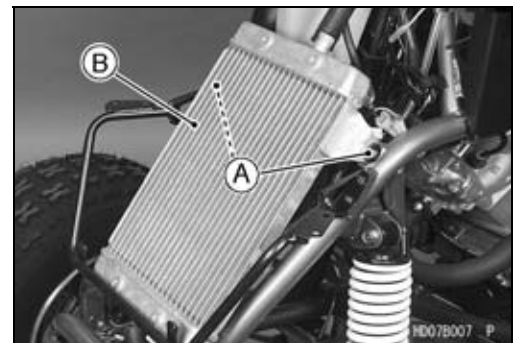
- Drain the coolant (see Cooling System in the Periodic Maintenance chapter).
- Remove:
 - Front Fender (see Frame chapter)
 - Radiator Cover (see Frame chapter)
 - Radiator Screen Mounting Screws [A]
 - Radiator Screen [B] (With the Shroud [C])



- Remove:
 - Radiator Hoses [A]
 - Radiator Fan Wire Connector [B]
 - Radiator Fan Switch Connectors [C]



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



CAUTION

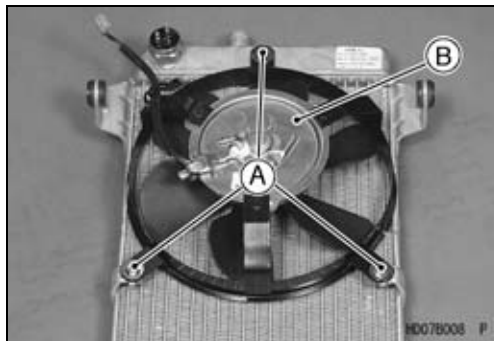
Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.

4-14 COOLING SYSTEM

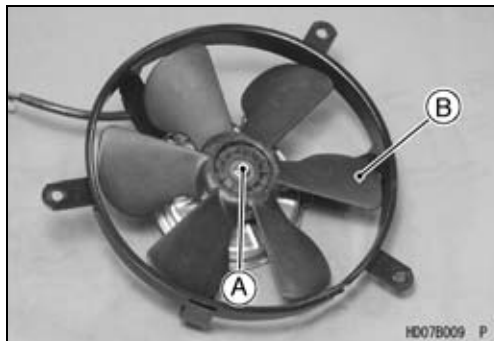
Radiator

Radiator Fan Removal

- Remove:
 - Radiator (see Radiator Removal)
 - Radiator Fan Assembly Bolts [A]
 - Fan Assembly [B]

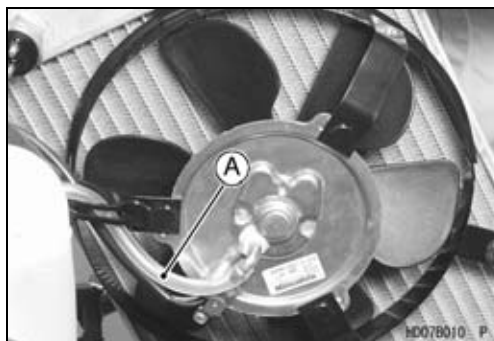


- Remove:
 - Radiator Fan Mounting Nut [A]
 - Radiator Fan [B]



NOTE

- When removing and installing the fan motor tube [A], do not crush the tube.



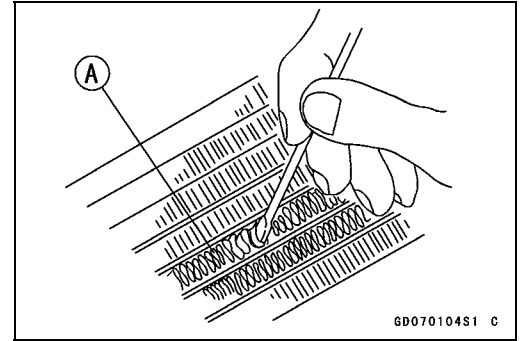
Radiator Fan Installation

- Install:
 - Radiator Fan
 - Radiator Fan Assembly
- Tighten:
 - Torque - Radiator Fan Assembly Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

Radiator

Radiator Inspection

- Check the radiator core.
- ★ If there are obstructions to air flow, remove the radiator and remove obstructions.
- ★ 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.

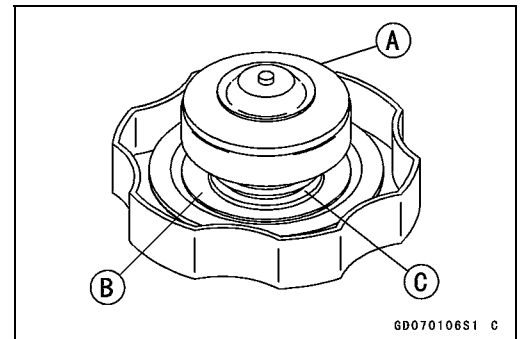


Radiator Cleaning

- Refer to the Cooling System in the Periodic Maintenance chapter.

Radiator Cap Inspection

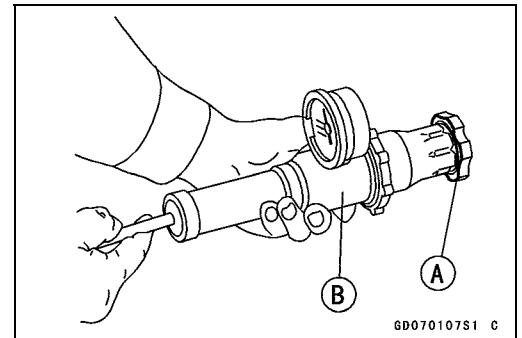
- Check the condition of the top and bottom valve seals of the radiator cap.
- ★ If any one of them shows visible damage, replace the cap.
 - Bottom Valve Seal [A]
 - Top Valve Seal [B]
 - Valve Spring [C]



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

NOTE

- Wet the cap sealing surfaces with water or coolant to prevent pressure leakage.
- Watching the pressure gauge, slowly pump the pressure tester to build up the pressure. The relief valve opens, indicated by the gauge hand flicks downward.
- The relief valve must open within the relief pressure range in the table below and the gauge hand must remain within the specified range at least 6 second.



Radiator Cap Relief Pressure

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

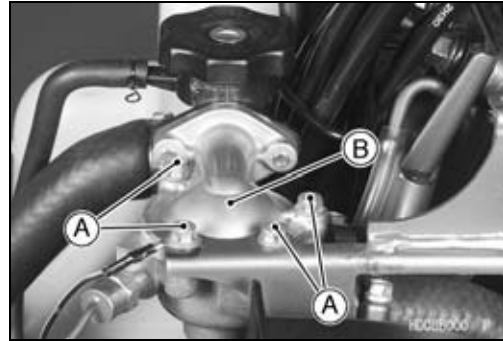
- ★ If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.

4-16 COOLING SYSTEM

Thermostat

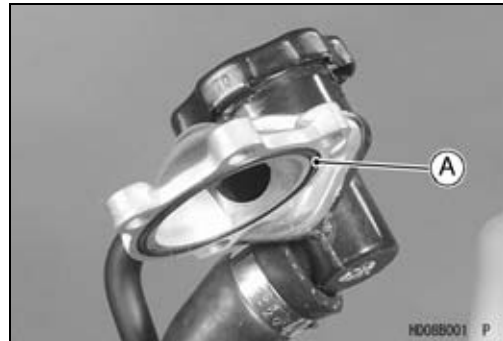
Thermostat Removal

- Drain the coolant (see Cooling System in Periodic Maintenance chapter).
- Remove:
 - Front Fender (see Frame chapter)
 - Thermostat Housing Cover Bolts [A]
 - Thermostat Housing Cover [B]

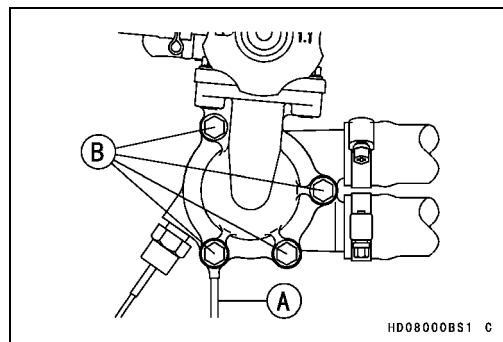


Thermostat Installation

- Be sure to install the O-ring [A] on the housing cover.

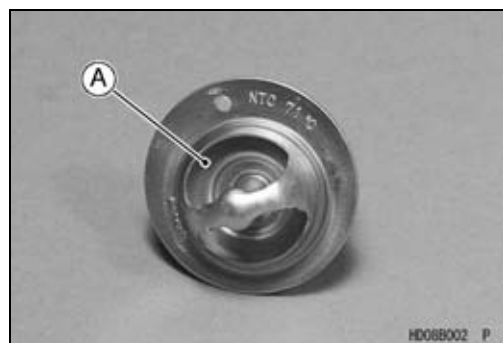


- Install the ground wire terminal [A] as shown.
- Tighten:
 - Torque - Thermostat Housing Cover Bolts [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Add coolant (see Cooling System in Periodic Maintenance chapter).



Thermostat Inspection

- Remove the thermostat, and inspect the thermostat valve [A] at room temperature.
- ★ If the valve is open, replace the valve with a new one.



Thermostat

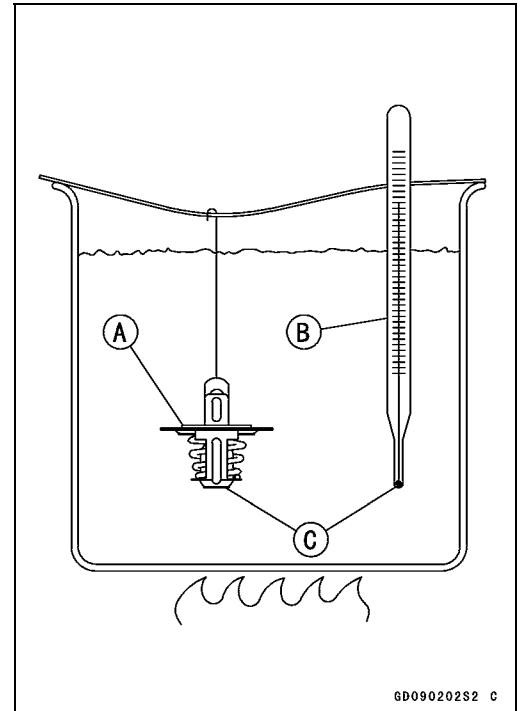
- To check valve opening temperature, suspend the thermostat [A] and an accurate thermometer [B] in a container of water with the heat-sensitive portions [C] in almost the same depth.

NOTE

- *The thermostat must be completely submerged and the thermostat and thermometer must not touch the container sides or bottom.*
- Gradually raise the temperature of the water while stirring the water gently for even temperature.
- ★ If the measurement is out of the range, replace the thermostat.

Thermostat Valve Opening Temperature

69.5 ~ 72.5 °C (157 ~ 162 °F)



6D090202S2 C

4-18 COOLING SYSTEM

Radiator Fan Switch

Radiator Fan Switch Removal

CAUTION

The fan switch should never be allowed to fall on a hard surface. Such a shock to the part can damage it.

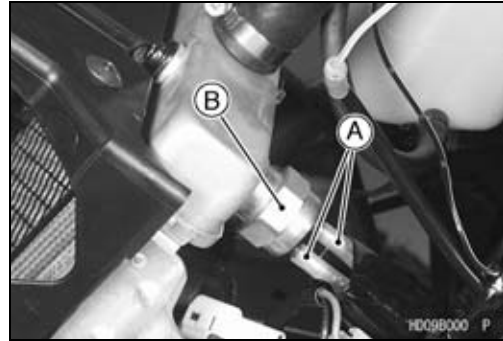
- Drain the coolant (see Cooling System in Periodic Maintenance chapter).
- Disconnect the fan switch leads [A].
- Remove the radiator fan switch [B].

Radiator Fan Switch Installation

- Tighten:
 - Torque - Radiator Fan Switch: 18 N·m (1.8 kgf·m, 13 ft·lb)**
- Fill the coolant (see Cooling System in Periodic Maintenance chapter).

Radiator Fan Switch Inspection

- Refer to the Electrical System chapter.



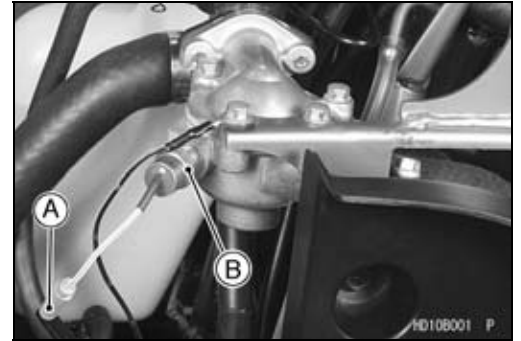
Coolant Temperature Warning Light Switch

Coolant Temperature Warning Light Switch Removal

CAUTION

The coolant temperature warning light switch should never be allowed to fall on a hard surface. Such a shock to the part can damage it.

- Drain the coolant (see Cooling System in Periodic Maintenance chapter).
- Disconnect the switch lead [A].
- Remove the switch [B].



Coolant Temperature Warning Light Switch Installation

- Apply silicone sealant to the threads of the switch and tighten it.

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

Torque - Coolant Temperature Warning Light Switch: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- Fill the coolant (see Cooling System in Periodic Maintenance chapter).

Coolant Temperature Warning Light Switch Inspection

- Refer to the Electrical System chapter.

4-20 COOLING SYSTEM

Coolant Filter/Valve

Coolant Filter Cleaning

- Refer to the Cooling System in the Periodic Maintenance chapter.

Coolant Valve Inspection

- Drain the coolant (see Cooling System in Periodic Maintenance chapter).
- Remove the coolant valve [A] on the engine left side.
- Inspect the coolant valve at room temperature.
- ★ If the valve is closed, replace the valve with a new one.
- To check valve opening just blow through the valve.

Valve Closing Temperature (for reference)

Standard: 80°C (176°F) or more at 24.5 kPa (0.25 kgf/cm², 3.6 psi)



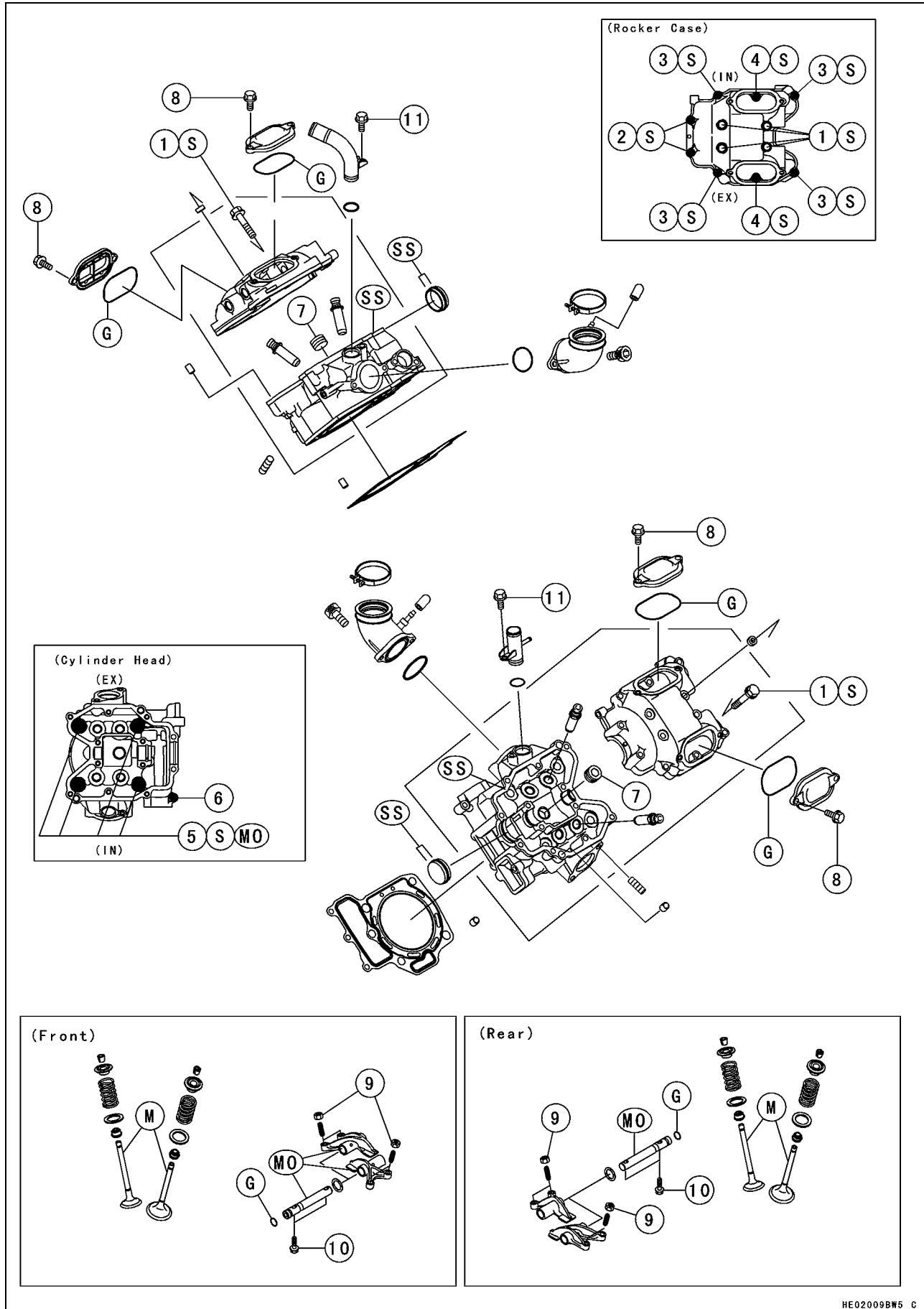
Engine Top End

TABLE OF CONTENTS

Exploded View	5- 2	Cylinder Head Cleaning	5-28
Specifications	5- 8	Cylinder Head Warp.....	5-29
Special Tools and Sealant	5-10	Valves	5-30
Camshaft Chain Tensioner	5-12	Valve Clearance Inspection	5-30
Camshaft Chain Tensioner		Valve Clearance Adjustment.....	5-30
Removal.....	5-12	Valve Removal	5-30
Camshaft Chain Tensioner		Valve Installation	5-30
Installation	5-12	Valve Guide Removal	5-31
Rocker Case.....	5-13	Valve Guide Installation	5-31
Rocker Case Removal.....	5-13	Valve-to-Guide Clearance	
Rocker Case Installation	5-14	Measurement	5-31
Rocker Arm Removal.....	5-15	Valve Seat Inspection	5-32
Rocker Arm Installation.....	5-15	Valve Seat Repair (Valve Lapping)	5-32
Rocker Arm Inspection.....	5-16	Cylinder and Piston	5-37
Rocker Shaft Diameter		Cylinder Removal.....	5-37
Measurement	5-16	Piston Removal.....	5-37
Camshaft	5-17	Cylinder, Piston Installation.....	5-37
Camshaft Removal	5-17	Cylinder Wear	5-39
Camshaft Installation	5-17	Piston Wear	5-40
Camshaft Assembly.....	5-18	Piston/Cylinder Clearance	5-40
Cam Wear.....	5-18	Piston Ring, Piston Ring Groove	
Camshaft Bearing Wear.....	5-19	Wear.....	5-40
KACR Inspection.....	5-20	Piston Ring Groove Width.....	5-40
KACR Removal.....	5-20	Piston Ring Thickness	5-41
KACR Installation.....	5-21	Piston Ring End Gap	5-41
Camshaft Chain Removal.....	5-21	Exhaust System.....	5-42
Camshaft Chain Installation	5-22	Spark Arrester Cleaning.....	5-42
Cylinder Head.....	5-27	Muffler and Exhaust Pipe	
Cylinder Compression		Removal.....	5-42
Measurement	5-27	Muffler and Exhaust Pipe	
Cylinder Head Removal.....	5-28	Installation	5-43
Cylinder Head Installation.....	5-28	Exhaust System Inspection.....	5-43

5-2 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rocker Case Bolts 55 mm (2.2 in.)	8.8	0.90	78 in·lb	S
2	Rocker Case Bolts 130 mm (5.1 in.)	9.8	1.0	87 in·lb	S
3	Rocker Case Bolts 30 mm (1.2 in.)	9.8	1.0	87 in·lb	
4	Rocker Case Bolts 25 mm (1.0 in.)	9.8	1.0	87 in·lb	S
5	Cylinder Head Bolts (M10), First Torque	25	2.5	18	S,MO
5	Cylinder Head Bolts (M10), Final Torque	49	5.0	36	S
6	Cylinder Head Bolts (M6)	9.8	1.0	87 in·lb	
7	Cylinder Head Jacket Plugs	20	2.0	14	
8	Valve Adjusting Cap Bolts	8.8	0.90	78 in·lb	
9	Valve Adjusting Screw Locknuts	12	1.2	104 in·lb	
10	Rocker Shaft Bolts	8.8	0.90	78 in·lb	
11	Water Pipe Bolts	9.8	1.0	87 in·lb	

G: Apply grease for oil seal and O-ring.

M: Apply molybdenum disulfide grease.

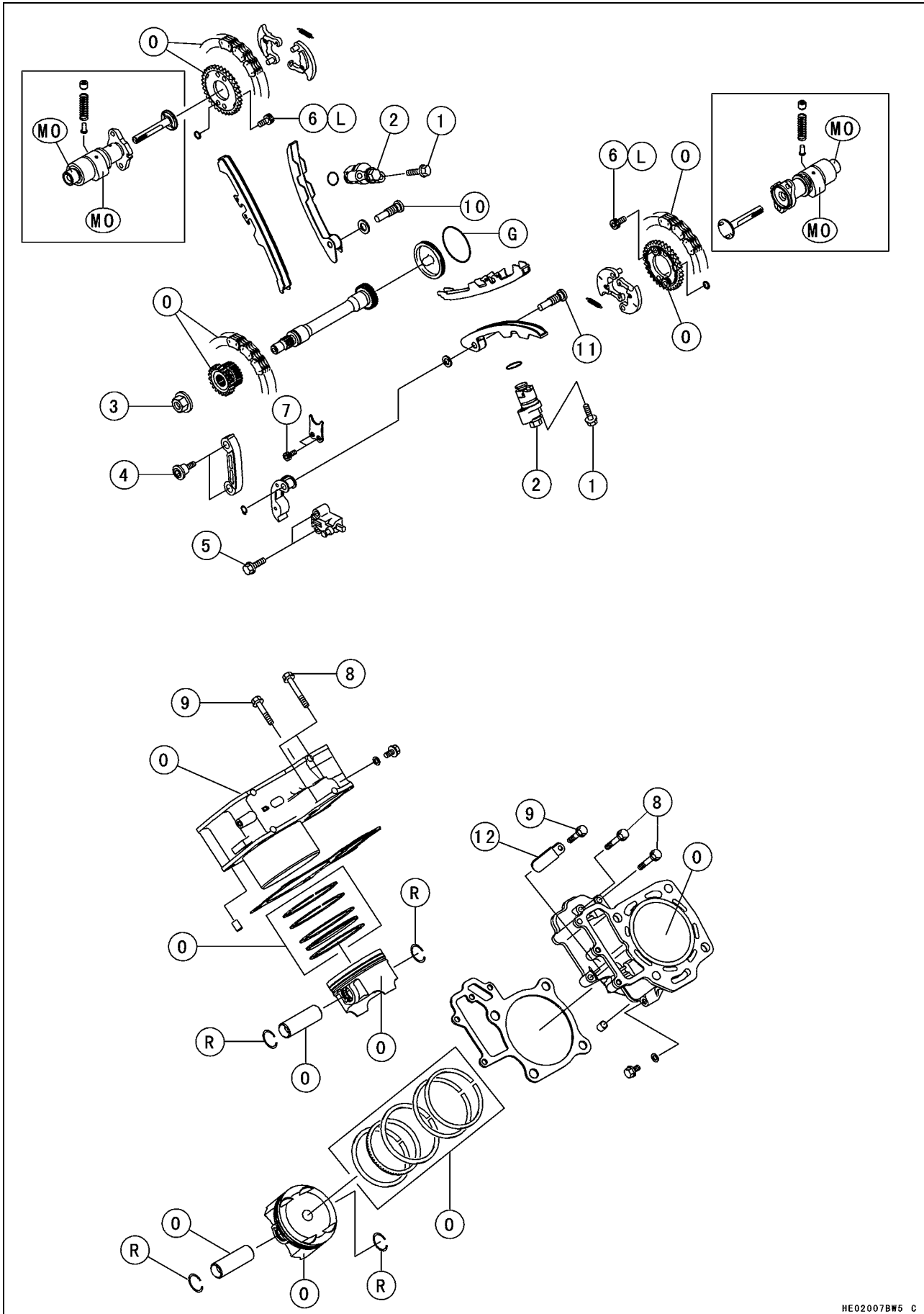
MO: Apply molybdenum disulfide oil.

SS: Apply silicone sealant (Kawasaki Bond: 56019–120)

S: Follow the specific tightening sequence.

5-4 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Chain Tensioner Mounting Bolts	8.8	0.90	78 in·lb	
2	Chain Tensioner Cap Bolt	22	2.2	16	
3	Intermediate Shaft Sprocket Nut	44	4.5	33	
4	Intermediate Shaft Chain Guide Bolts	8.8	0.90	78 in·lb	
5	Intermediate Shaft Chain Tensioner Bolts	8.8	0.90	78 in·lb	
6	Camshaft Sprocket Bolts	12	1.2	104 in·lb	L
7	Position Plate Bolts	8.8	0.90	78 in·lb	
8	Cylinder Bolts 40 mm (1.6 in.)	9.8	1.0	87 in·lb	
9	Cylinder Bolts 30 mm (1.2 in.)	9.8	1.0	87 in·lb	
10	Front Cylinder Camshaft Chain Guide Bolt	20	2.0	14	
11	Rear Cylinder Camshaft Chain Guide Bolt	20	2.0	14	

12. Clamp

G: Apply grease for oil seal and O-ring.

L: Apply a non-permanent locking agent.

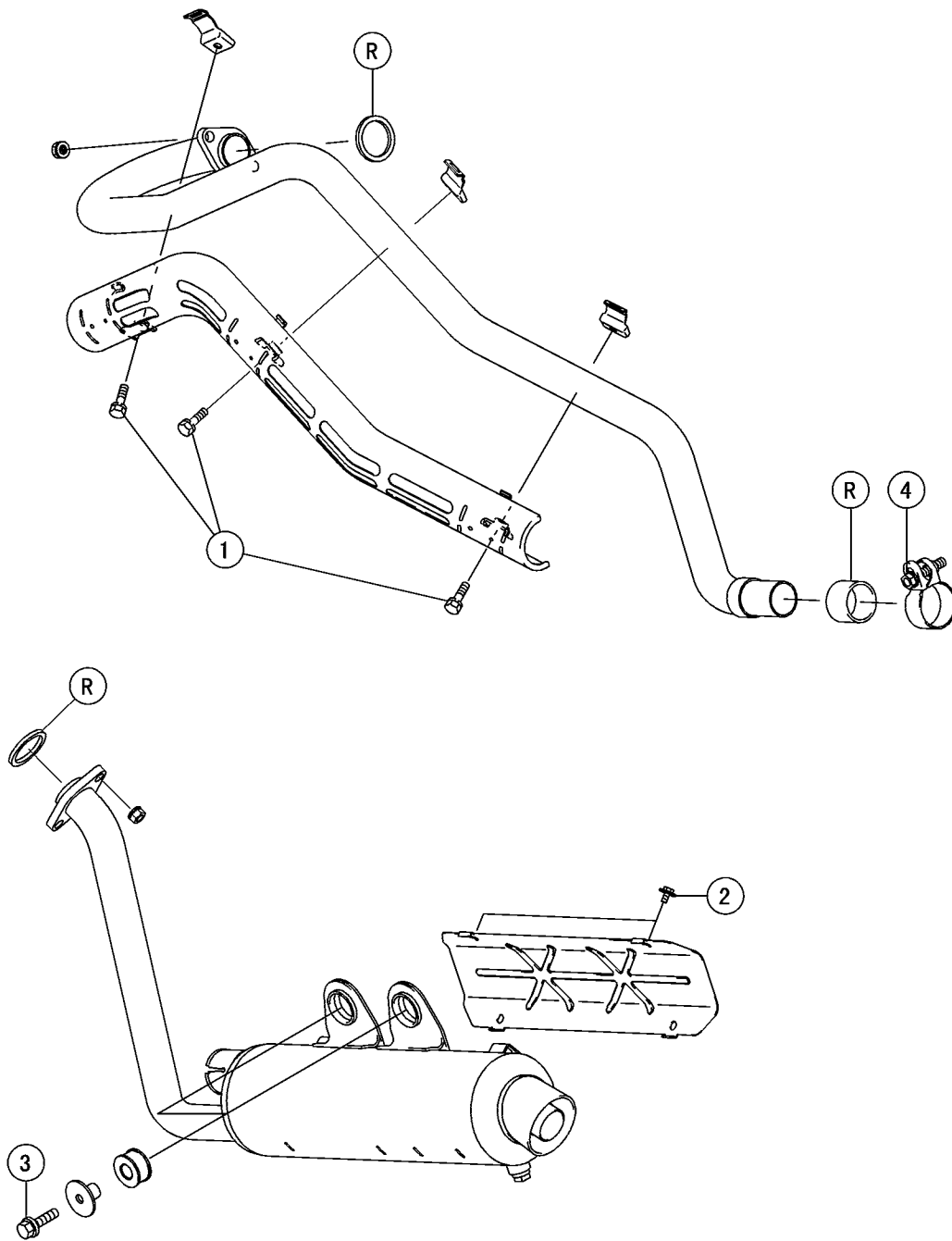
O: Apply engine oil.

MO: Apply molybdenum disulfide oil.

R: Replacement parts

5-6 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust Pipe Cover Bolts	8.8	0.90	78 in·lb	
2	Muffler Cover Bolts	8.8	0.90	78 in·lb	
3	Muffler Mounting Bolts	20	2.0	14	
4	Exhaust Pipe Clamp Bolt	8.8	0.90	78 in·lb	

R: Replacement parts

5-8 ENGINE TOP END

Specifications

Item	Standard	Service Limit
Rocker Case:		
Rocker arm inside diameter	12.000 ~ 12.018 mm (0.4724 ~ 0.4731 in.)	12.05 mm (0.474 in.)
Rocker shaft diameter	11.973 ~ 11.984 mm (0.4714 ~ 0.4718 in.)	11.95 mm (0.470 in.)
Camshafts:		
Cam height:		
Exhaust	35.363 ~ 35.477 mm (1.3932 ~ 1.3967 in.)	35.26 mm (1.388 in.)
Inlet	35.622 ~ 35.736 mm (1.4024 ~ 1.4069 in.)	35.52 mm (1.398 in.)
Camshaft bearing clearance:		
ϕ 18	0.016 ~ 0.052 mm (0.0006 ~ 0.0020 in.)	0.14 mm (0.0055 in.)
ϕ 22	0.020 ~ 0.062 mm (0.0008 ~ 0.0024 in.)	0.15 mm (0.0059 in.)
Camshaft journal diameter:		
ϕ 18	17.966 ~ 17.984 mm (0.7073 ~ 0.7080 in.)	17.94 mm (0.706 in.)
ϕ 22	21.959 ~ 21.980 mm (0.8645 ~ 0.8653 in.)	21.93 mm (0.863 in.)
Camshaft bearing inside diameter:		
ϕ 18	18.000 ~ 18.018 mm (0.7087 ~ 0.7094 in.)	18.08 mm (0.712 in.)
ϕ 22	22.000 ~ 22.021 mm (0.8661 ~ 0.8670 in.)	22.08 mm (0.870 in.)
Camshaft runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.0039 in.)
KACR (Kawasaki Automatic Compression Release):		
KACR operating engine speed	760 \pm 30 r/min (rpm)	---
Cylinder Head:		
Cylinder compression (usable range)		
Electric starter	290 ~ 520 kPa (3.0 ~ 5.3 kgf/cm ² , 43 ~ 75 psi) @ 290 r/min (rpm)	---
Cylinder head warp	---	0.05 mm (0.002 in.)
Valve:		
Valve clearance:		
Exhaust	0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in.)	---
Inlet	0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)	---
Valve head thickness:		
Exhaust	0.8 mm (0.031 in.)	0.5 mm (0.020 in.)
Inlet	0.5 mm (0.020 in.)	0.3 mm (0.012 in.)
Valve stem bend	---	TIR 0.05 mm (0.002 in.)
Valve stem diameter:		
Exhaust	4.955 ~ 4.970 mm (0.1951 ~ 0.1957 in.)	4.94 mm (0.1945 in.)
Inlet	4.975 ~ 4.990 mm (0.1959 ~ 0.1965 in.)	4.96 mm (0.1953 in.)
Valve guide inside diameter:		
Exhaust	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in.)	5.08 mm (0.20 in.)
Inlet	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in.)	5.08 mm (0.20 in.)

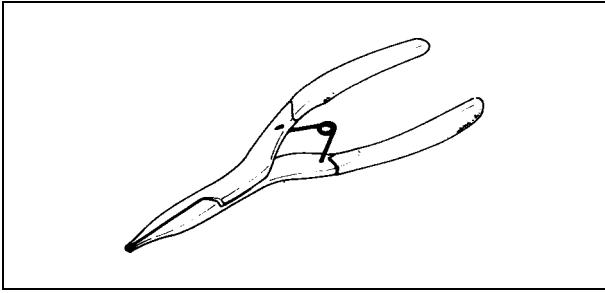
Specifications

Item	Standard	Service Limit
Valve/valve guide clearance (wobble method):		
Exhaust	0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in.)	0.34 mm (0.0133 in.)
Inlet	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)	0.28 mm (0.0110 in.)
Valve seat cutting angle	45°, 32°, 60°	---
Valve seating surface:		
Outside diameter:		
Exhaust	25.2 ~ 25.4 mm (0.992 ~ 1.000 in.)	---
Inlet	29.4 ~ 29.6 mm (1.157 ~ 1.165 in.)	---
Width:		
Exhaust	0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)	---
Inlet	0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)	---
Valve spring free length:		
Exhaust	41.3 mm (1.626 in.)	39.5 mm (1.555 in.)
Inlet	41.3 mm (1.626 in.)	39.5 mm (1.555 in.)
Cylinder, Piston:		
Cylinder inside diameter	81.994 ~ 82.006 mm (3.2281 ~ 3.2286 in.)	82.09 mm (3.232 in.)
Piston diameter	81.949 ~ 81.964 mm (3.2263 ~ 3.2269 in.)	81.80 mm (3.220 in.)
Piston/cylinder clearance	0.030 ~ 0.057 mm (0.0012 ~ 0.0022 in.)	---
Piston ring/groove clearance:		
Top	0.040 ~ 0.080 mm (0.0016 ~ 0.0032 in.)	0.18 mm (0.0071 in.)
Second	0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Piston ring groove width:		
Top	1.030 ~ 1.050 mm (0.0405 ~ 0.0413 in.)	1.13 mm (0.0445 in.)
Second	1.020 ~ 1.040 mm (0.0402 ~ 0.0409 in.)	1.12 mm (0.0441 in.)
Piston ring thickness:		
Top	0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)	0.9 mm (0.035 in.)
Second	0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)	0.9 mm (0.035 in.)
Piston ring end gap:		
Top	0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)	0.60 mm (0.0236 in.)
Second	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)	0.75 mm (0.0295 in.)
Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	1.00 mm (0.0394 in.)

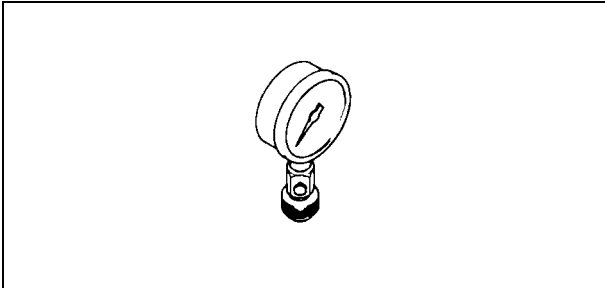
5-10 ENGINE TOP END

Special Tools and Sealant

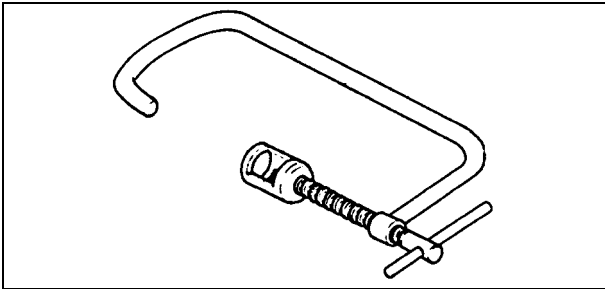
Outside Circlip Pliers :
57001-144



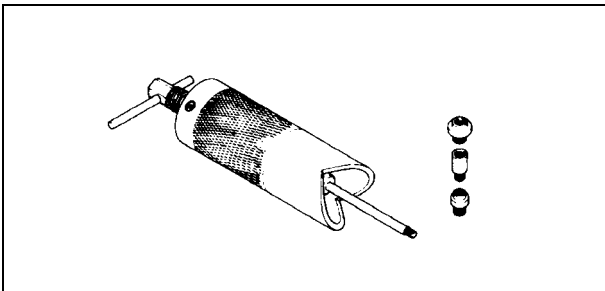
Compression Gauge :
57001-221



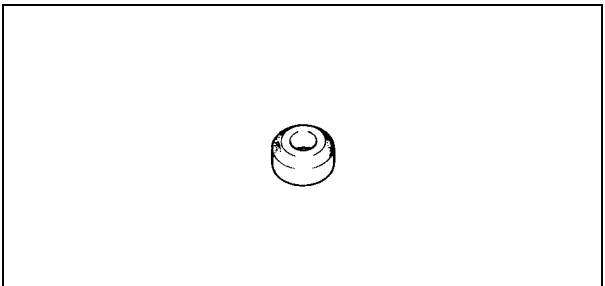
Valve Spring Compressor Assembly :
57001-241



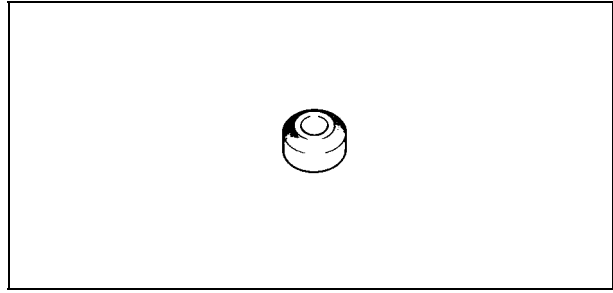
Piston Pin Puller Assembly :
57001-910



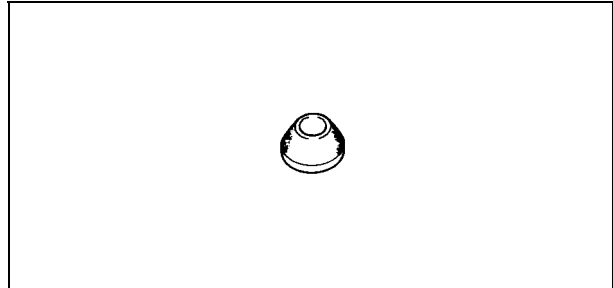
Valve Seat Cutter, 45° - $\phi 27.5$:
57001-1114



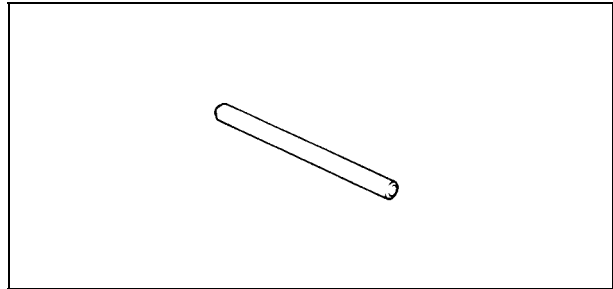
Valve Seat Cutter, 32° - $\phi 28$:
57001-1119



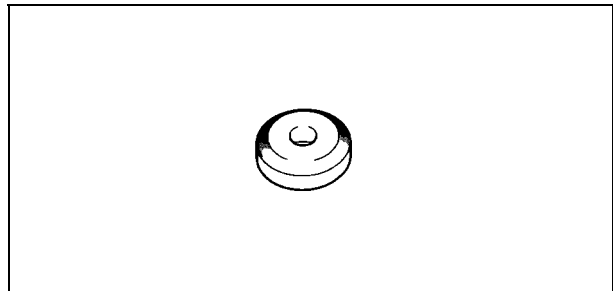
Valve Seat Cutter, 60° - $\phi 30$:
57001-1123



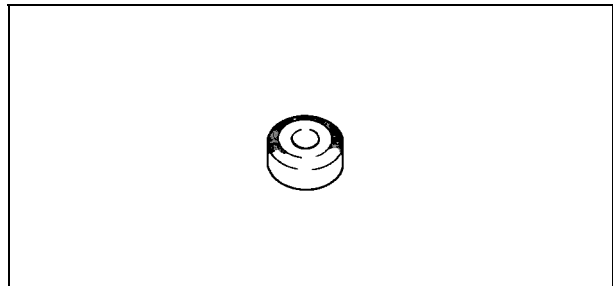
Valve Seat Cutter Holder Bar :
57001-1128



Valve Seat Cutter, 45° - $\phi 30$:
57001-1187

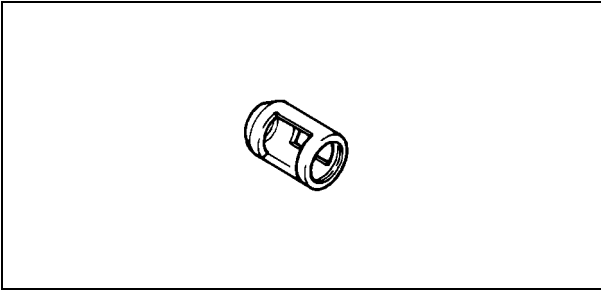


Valve Seat Cutter, 32° - $\phi 33$:
57001-1199

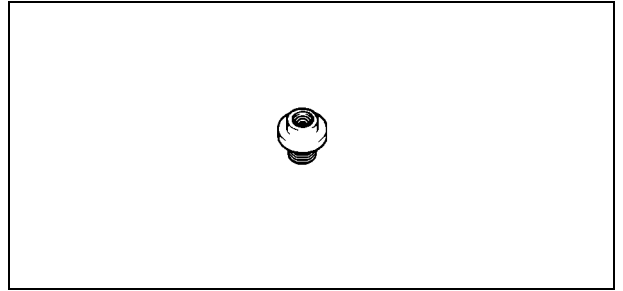


Special Tools and Sealant

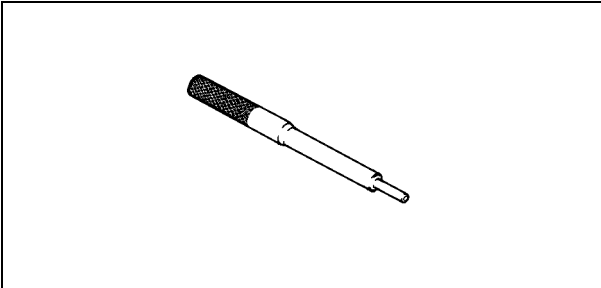
Valve Spring Compressor Adapter, $\phi 22$:
57001-1202



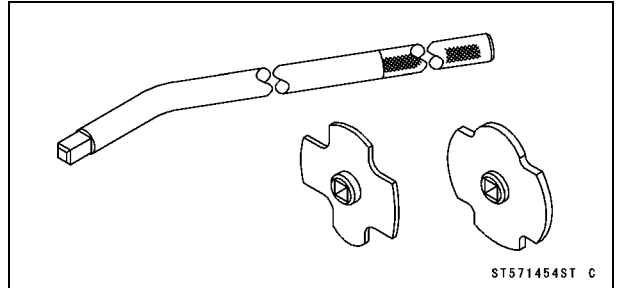
Piston Pin Puller Adapter :
57001-1211



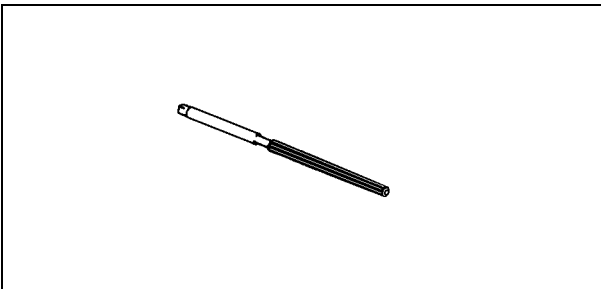
Valve Guide Arbor, $\phi 5$:
57001-1203



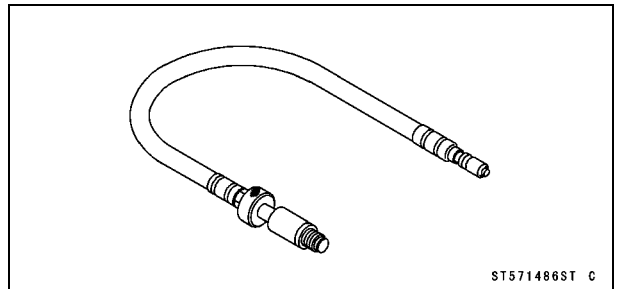
Filter Cap Driver:
57001-1454



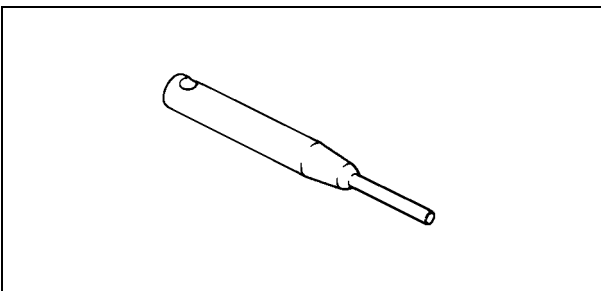
Valve Guide Reamer, $\phi 5$:
57001-1204



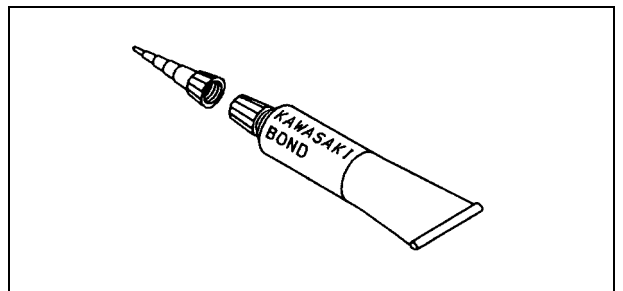
Compression Gauge Adapter, M10 \times 1.0 :
57001-1486



Valve Seat Cutter Holder, $\phi 5$:
57001-1208



Kawasaki Bond (Silicone Sealant) :
56019-120



5-12 ENGINE TOP END

Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

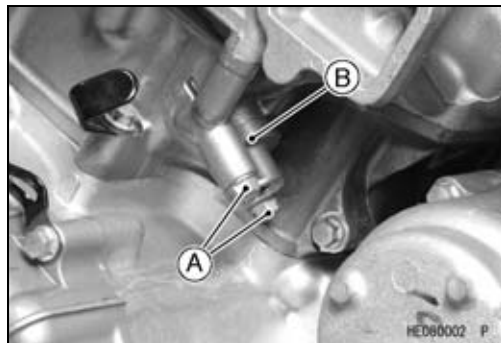
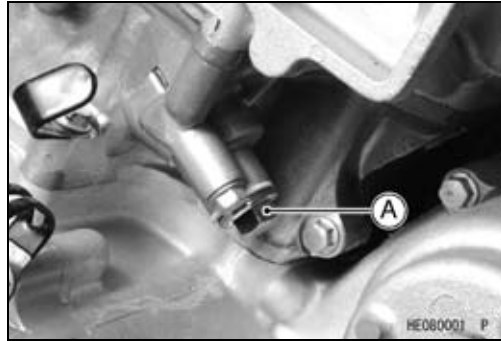
CAUTION

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

When removing the tensioner, do not take out the mounting bolts only partway. 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".

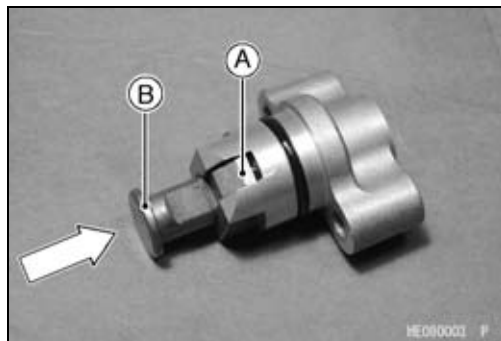
Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.

- Remove:
Cap Bolt [A] and Washer
Pin and Spring
- Remove:
Tensioner Mounting Bolts [A]
Camshaft Chain Tensioner [B]

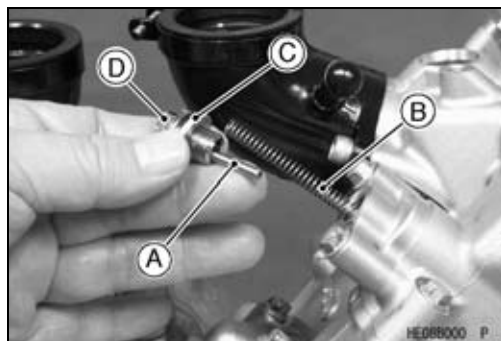


Camshaft Chain Tensioner Installation

- Push the stopper [A] to release the ratchet and push the push rod [B] into the tensioner body.



- Tighten:
Torque - Chain Tensioner Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
- Install:
Pin [A] and Spring [B]
Washer [C] and Chain Tensioner Cap Bolt [D]
- Tighten:
Torque - Chain Tensioner Cap Bolt: 22 N·m (2.2 kgf·m, 16 ft·lb)

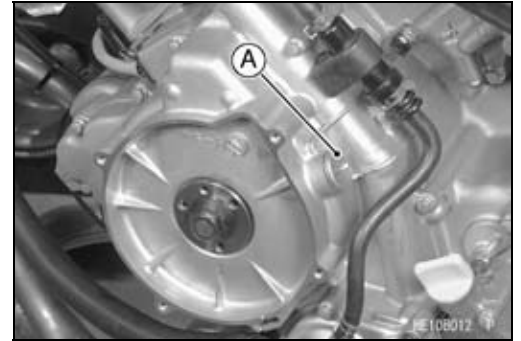


Rocker Case

Rocker Case Removal

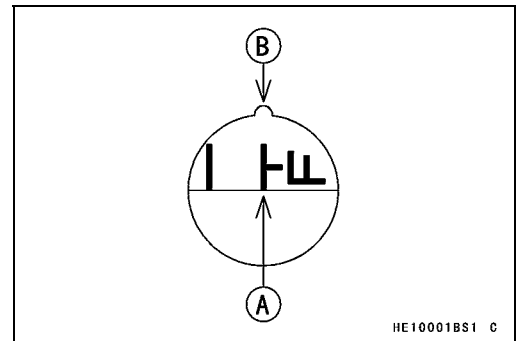
Front Rocker Case:

- Remove:
 - Air Cleaner Cover (see Frame chapter)
 - Front Fender (see Frame chapter)
 - Side Inner Cover (see Frame chapter)
 - Timing Inspection Plug [A]
 - Valve Adjusting Caps
 - Converter Intake Duct, Exhaust Duct (see Converter System)



Special Tool - Filler Cap Driver: 57001-1454

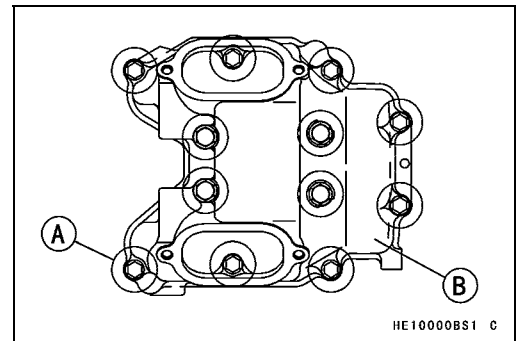
- Using a wrench on the alternator bolt, turn the crankshaft counterclockwise until “T-F” mark [A] is aligned with the notch [B] in the inspection window, and the cam lobes are pointing away from the rocker arms: the end of the compression stroke.



CAUTION

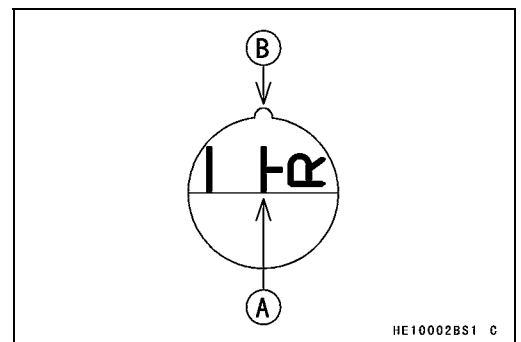
Be sure to position the crankshaft at TDC of the end of the compression stroke when removing or installing the rocker case. The rocker arms could bend the valves.

- Remove:
 - Front Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
 - Rocker Case Bolts [A]
 - Front Rocker Case [B]
- Lift the rocker case clear of the dowel pins in the cylinder head and slide the rocker case out of the frame.



Rear Rocker Case:

- Remove:
 - Front Rocker Case (see this section)
 - Converter Exhaust Joint Duct
- Using a wrench on the alternator bolt, turn the crankshaft **counterclockwise** (270°) until “T-R” mark [A] is aligned with the notch [B] in the inspection window, and the cam lobes are pointing away from the rocker arms: the end of the compression stroke.



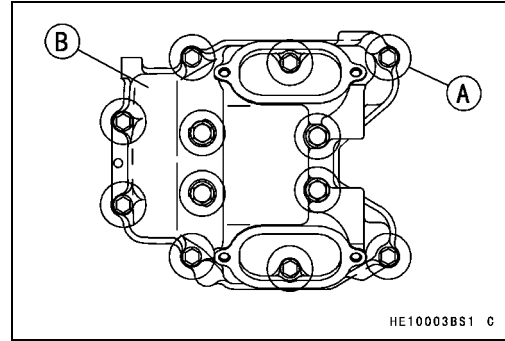
CAUTION

Be sure to position the crankshaft at TDC of the end of the compression stroke when removing or installing the rocker case. The rocker arms could bend the valves.

5-14 ENGINE TOP END

Rocker Case

- Remove:
 - Rear Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
 - Rocker Case Bolts [A]
 - Rear Rocker Case [B]
- Lift the rocker case clear of the dowel pins in the cylinder head and slide the rocker case out of the frame.



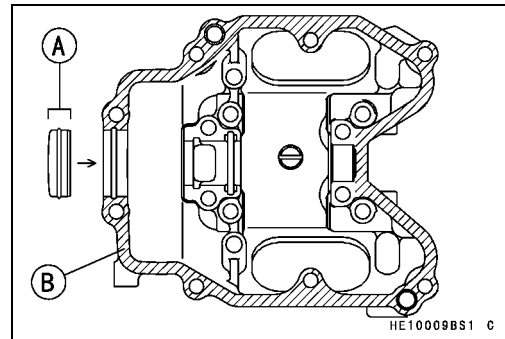
Rocker Case Installation

- Install the rear camshaft and then the front camshaft (see Camshaft Installation in this chapter).
- Check that the crankshaft is positioned at TDC and at the end of the compression stroke.

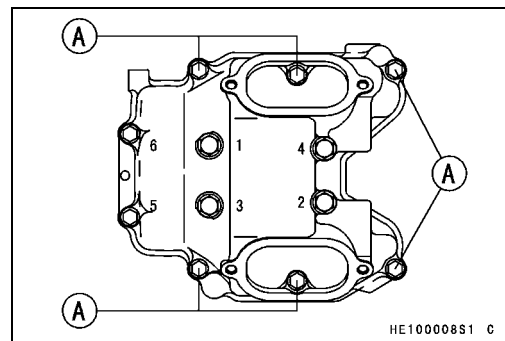
CAUTION

Be sure to position the crankshaft is at TDC of the end of the compression stroke. The rocker arms could bend the valves.

- Apply silicone sealant to the outer surface of the cap [A] and the cylinder head upper surface [B] as shown.
Sealant - Kawasaki Bond (Silicone Sealant): 56019-120

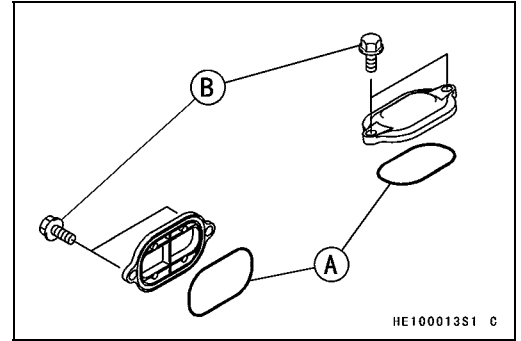


- Tighten the rocker case bolts following the tightening sequence shown.
Torque - Rocker Case Bolts [1 ~ 4, L=55 mm (2.2 in.) with washers]: 8.8 N·m (0.90 kgf·m, 78 in·lb)
Rocker Case Bolts [5 ~ 6, L=130 mm (5.1 in.)]: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Rocker Case Bolts [A] [L=30 mm (1.2 in.), L=25 mm (1.0 in.)]: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Check the valve clearance and adjust it if necessary.



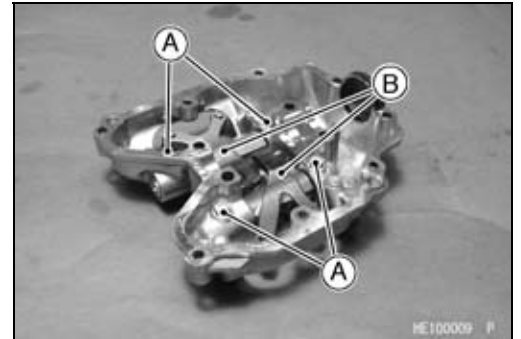
Rocker Case

- Apply grease to the O-ring [A].
- Tighten:
Torque - Valve Adjusting Cap Bolts [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)



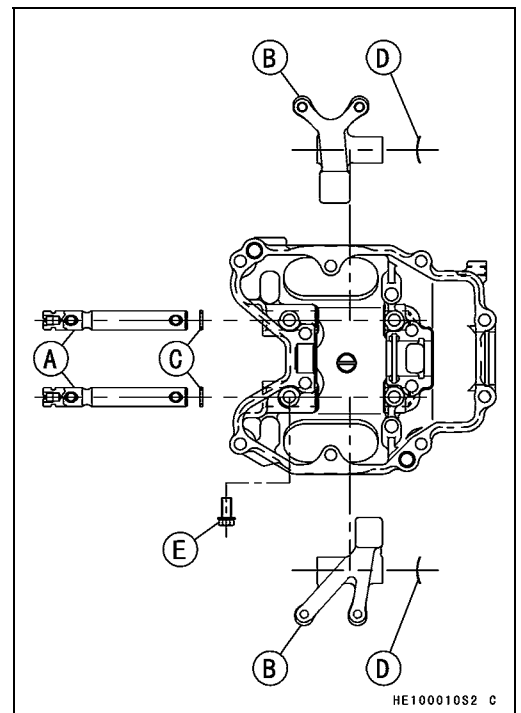
Rocker Arm Removal

- Remove:
 Rocker Case Rocker Shaft Bolts [A] (see Rocker Case Removal)
 Rocker Shaft [B]
 Washers
- Mark and record the rocker arm location so it can be installed in the original position.
- The rocker arms come off with the rocker shafts.



Rocker Arm Installation

- Apply molybdenum disulfide oil:
 Rocker Shaft [A]
 Hole in Rocker Arm [B]
- Apply grease to the O-rings [C].
- Install:
 Wave Washers [D] (as shown)
 Rocker Arms (as shown)
 Rocker Shafts and O-rings
- Tighten:
Torque - Rocker Shaft Bolts [E]: 8.8 N·m (0.90 kgf·m, 78 in·lb)



5-16 ENGINE TOP END

Rocker Case

Rocker Arm Inspection

- Inspect the area [A] on the rocker arm where the cam rubs.
- ★ If the rocker arm is scored, discolored or otherwise damaged, replace it. Also inspect the camshaft lobes.
- Inspect the end of the valve clearance adjusting screws [B] where it contacts the valve stem.
- ★ If the end of the adjusting screw is mushroomed or damaged in any way, or if the screw will not turn smoothly, replace it. Also inspect the end of the valve stem.
- Measure the inside diameter [C] of the rocker arm with a dial bore gauge.
- ★ If the rocker arm inside diameter is larger than the service limit, replace it. Also check the rocker shaft diameter (see Rocker Shaft Diameter Measurement).

Rocker Arm Inside Diameter

Standard: 12.000 ~ 12.018 mm (0.4724 ~ 0.4731 in.)

Service Limit: 12.05 mm (0.474 in.)

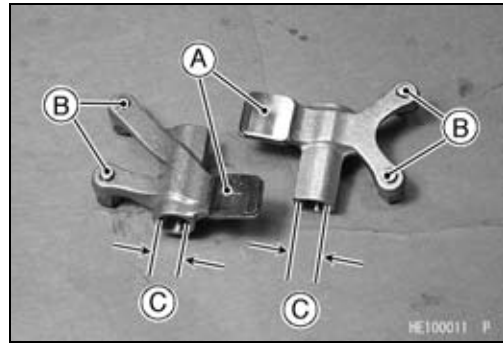
Rocker Shaft Diameter Measurement

- Measure the diameter [A] of the rocker shaft where the rocker arm pivots on it with a micrometer.
- ★ If the rocker shaft diameter is smaller than the service limit, replace it. Also check the rocker arm inside diameter (see Rocker Arm Inspection).

Rocker Shaft Diameter

Standard: 11.973 ~ 11.984 mm (0.4714 ~ 0.4718 in.)

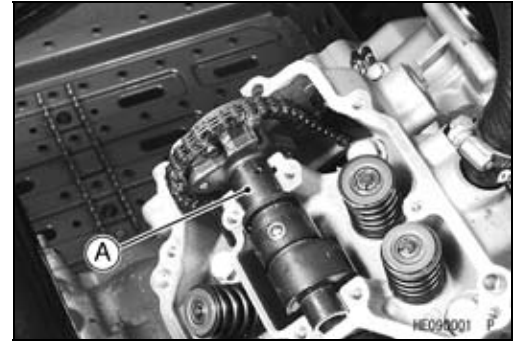
Service Limit: 11.95 mm (0.470 in.)



Camshaft

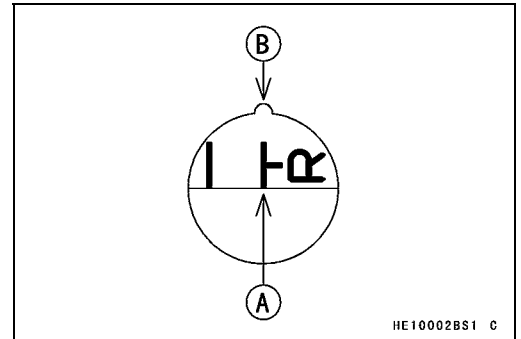
Camshaft Removal

- Remove:
 - Both Camshaft Chain Tensioners (see Camshaft Chain Tensioner Removal)
 - Both Rocker Cases (see Rocker Case Removal)
 - Both Camshafts [A]
- Support the chain using a suitable tool.

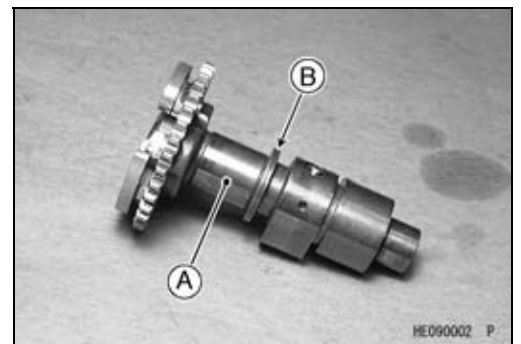


Camshaft Installation

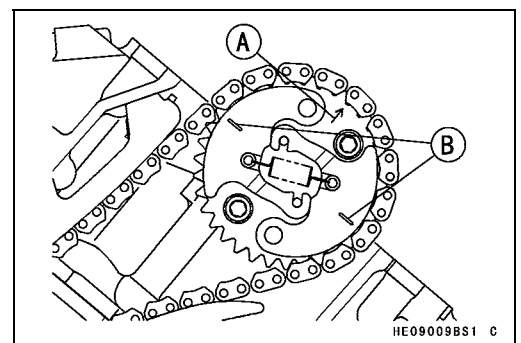
- Using a wrench on the alternator bolt, turn the crankshaft **clockwise** until “T-R” mark [A] is aligned with the notch [B] in the inspection window.



- The rear camshaft [A] has a groove [B].
- First, install the rear camshaft.



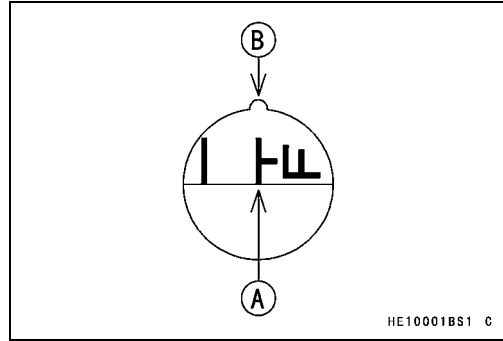
- Face the arrow [A] of the rear camshaft sprocket upward (left side view).
- Engage the rear camshaft chain with the rear camshaft sprocket.
- Align the marks [B] on the weights with the rear cylinder head upper surface.



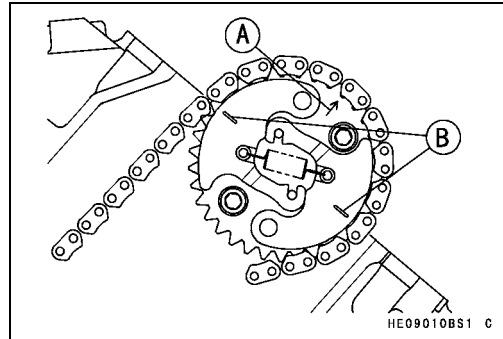
5-18 ENGINE TOP END

Camshaft

- Using a wrench on the alternator bolt, turn the crankshaft **clockwise** 270°.
- Align the “T-F” mark [A] with the notch [B] in the inspection window.



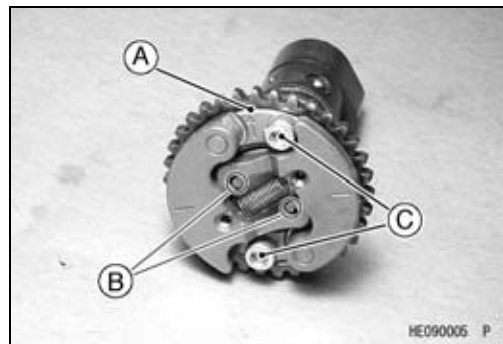
- Face the arrow [A] of the front camshaft sprocket upward (right side view).
- Engage the front camshaft chain with the front camshaft sprocket.
- Align the marks [B] on the weights with the front cylinder head upper surface.



- Install:
 - Rocker Cases (see Rocker Case Installation)
 - Camshaft Chain Tensioners (see Camshaft Chain Tensioner Installation)
- Check the valve clearance (see Valve Clearance Inspection).

Camshaft Assembly

- Install the KACR unit [A] (sprocket) on the camshaft so that the unit fits onto the camshaft pins [B].
- Apply a non-permanent locking agent to the camshaft sprocket bolts [C].
- Tighten:
 - Torque - Camshaft Sprocket Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**

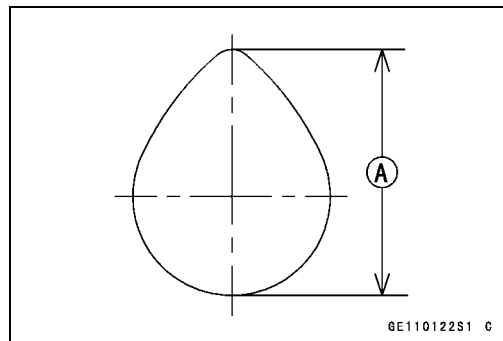


Cam Wear

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

Cam Height

	Standard	Service Limit
Exhaust	35.363 ~ 35.477 mm (1.3932 ~ 1.3967 in.)	35.26 mm (1.388 in.)
Inlet	35.622 ~ 35.736 mm (1.4024 ~ 1.4069 in.)	35.52 mm (1.398 in.)



Camshaft

Camshaft Bearing Wear

- The journal wear is measured using plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.
- Cut strips of plastigage to journal width. Place a strip on each journal parallel to the camshaft with the camshaft installed in the correct position so that the plastigage will be compressed between the journal and rocker case.
- Install the rocker case, tightening the bolts in the correct sequence to the specified torque (see Rocker Case Installation).

NOTE

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

- Remove the rocker case and measure the plastigage width [A] to determine the clearance between the journal and the rocker case. Measure the widest portion of the plastigage.

Camshaft Bearing Clearance ($\phi 18$)

Standard: 0.016 ~ 0.052 mm (0.0006 ~ 0.0020 in.)

Service Limit: 0.14 mm (0.0055 in.)

Camshaft Bearing Clearance ($\phi 22$)

Standard: 0.020 ~ 0.062 mm (0.0008 ~ 0.0024 in.)

Service Limit: 0.15 mm (0.0059 in.)

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

Camshaft Journal Diameter ($\phi 18$)

Standard: 17.966 ~ 17.984 mm (0.7073 ~ 0.7080 in.)

Service Limit: 17.94 mm (0.706 in.)

Camshaft Journal Diameter ($\phi 22$)

Standard: 21.959 ~ 21.980 mm (0.8645 ~ 0.8653 in.)

Service Limit: 21.93 mm (0.863 in.)

- ★ If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.

- ★ If the clearance still remains out of the limit, replace the cylinder head and the rocker case.



CAUTION

The cylinder head and rocker case are machined as a set, and must be replaced as a set.

5-20 ENGINE TOP END

Camshaft

KACR Inspection

The Kawasaki Automatic Compression Release (KACR) momentarily opens the exhaust valves on the compression stroke at very low speeds. This allows some of the compression pressure to escape, making it easy to turn over the engine during starting.

Due to the simplicity of the mechanism, no periodic maintenance is needed. There are only two symptoms of problems with the KACR mechanism [A]: compression is not released during starting, and compression is released during running.

(1) If compression is not released during starting, the weights are not returning to their rest position.

- Remove the camshaft (see Camshaft Removal).
- Remove the KACR unit.
- Visually inspect the spring.
- ★ If damaged, deformed, or missing, replace the spring.
- Remove the spring and move the weights back and forth.
- ★ If the weights do not move smoothly, replace the KACR unit. Also inspect the exhaust rocker arm for any damage, and replace the rocker arm if necessary.

[A] Rest Position (compression is released)

[B] Weights

[C] Spring

(2) If compression is released while the engine is running, the weights are not swinging out.

- Remove the spring and move the weights back and forth.
- ★ If the weights do not move easily from the retracted position, replace the KACR unit. Also inspect the exhaust rocker arm for any damage, and replace the rocker arm if necessary.

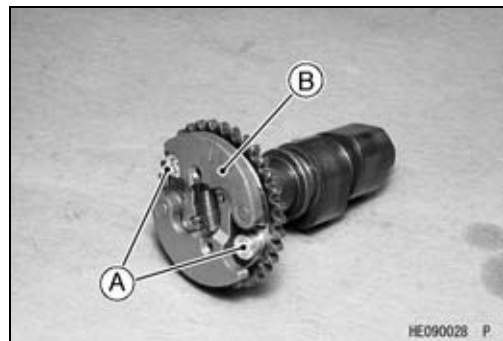
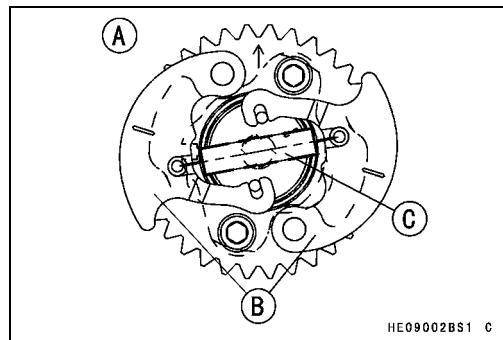
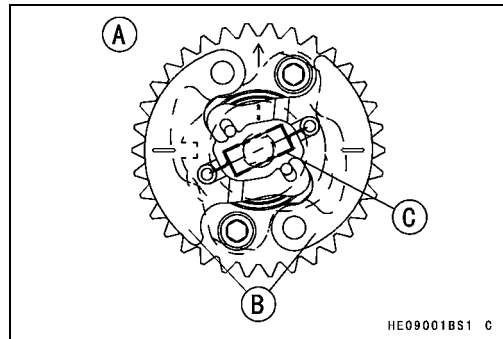
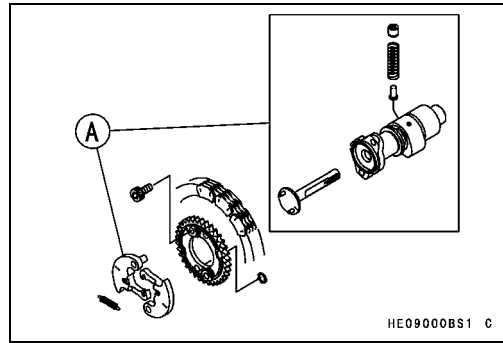
[A] Running Position (compression is not released)

[B] Weights

[C] Spring

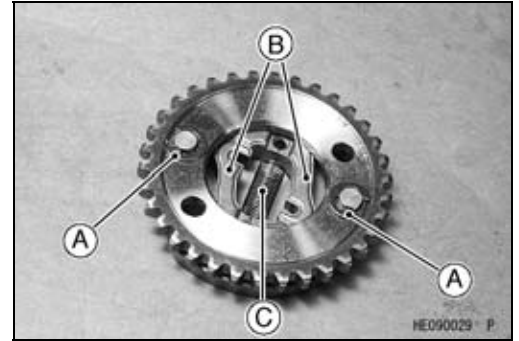
KACR Removal

- Remove:
 - Camshaft (see Camshaft Removal)
 - Camshaft Sprocket Bolts [A]
 - KACR Unit [B]



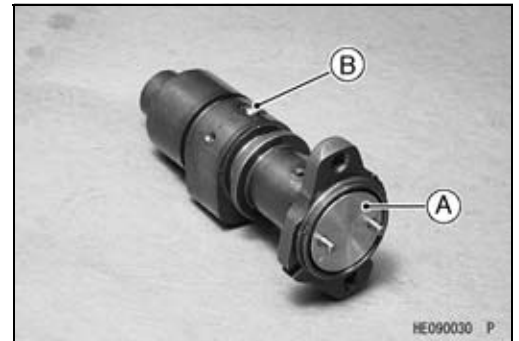
Camshaft

- Remove:
 - Circlips [A]
 - Weights [B]
 - Spring [C]



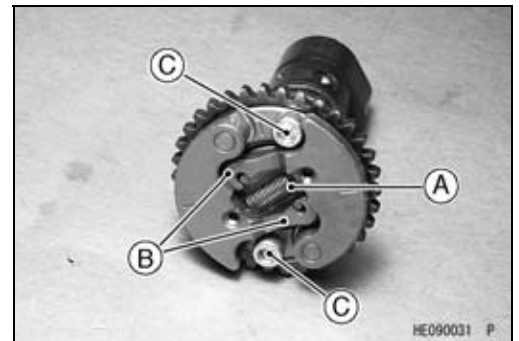
NOTE

- Do not remove the shaft [A] and pin [B].
- If the parts are removed, they cannot be reinstalled.



KACR Installation

- Install:
 - Weights
 - Circlips
 - Spring [A]
- Hook the spring from the outside with the open side of the hook inwards.
- Install:
 - KACR Unit
- Hook the arms [B] on the pins.
- Apply a non-permanent locking agent to the camshaft sprocket bolts [C] and tighten them.



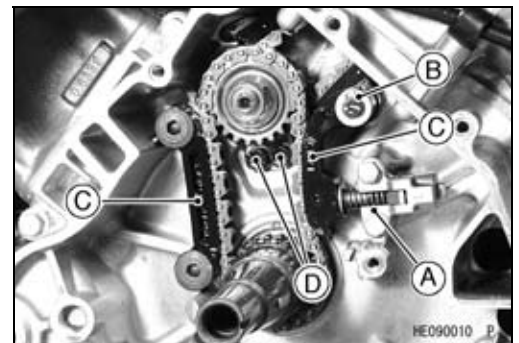
Torque - Camshaft Sprocket Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)

Camshaft Chain Removal

- Remove (left side view):
 - Rear and Front Camshafts (see Camshaft Removal)
 - Alternator Rotor (see Electrical System chapter)
 - Oil Pump (see Engine Lubrication System chapter)
 - Intermediate Shaft Chain Tensioner [A]
 - Circlip [B] and Washer

Special Tool - Outside Circlip Pliers: 57001-144

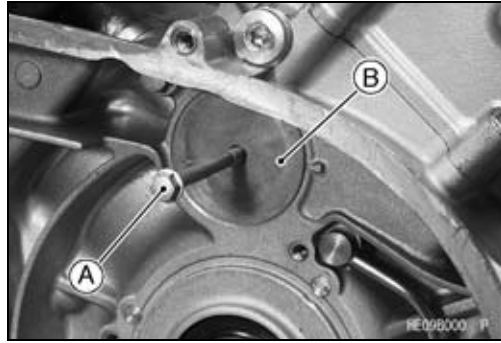
- Remove:
 - Intermediate Shaft Chain Guides [C]
 - Position Plate Bolts [D] and Position Plate



5-22 ENGINE TOP END

Camshaft

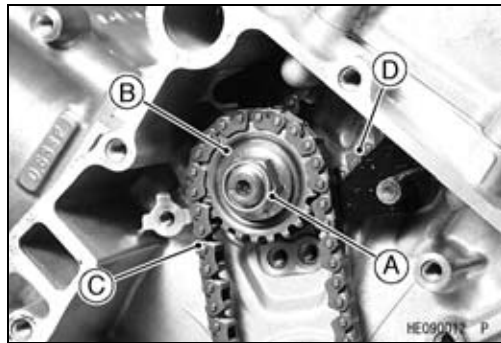
- Remove (right side view):
Torque Converter (see Converter System chapter)
- Using a M6 bolt [A], pull out the cover [B].



- Using an Allen wrench, hold the intermediate shaft [A].



- Remove (left side view):
Intermediate Shaft Sprocket Nut [A]
Intermediate Shaft Sprocket [B]
Intermediate Shaft Drive Chain [C]
Rear Camshaft Chain [D]
Front Camshaft Chain



Camshaft Chain Installation

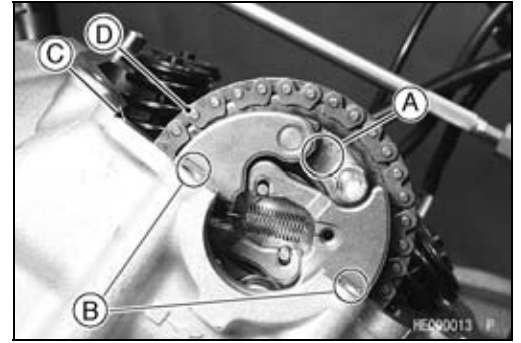
Rear Camshaft Chain:

- Align the key groove [A] on the crankshaft with the embossed line [B] on the crankcase (left side view).

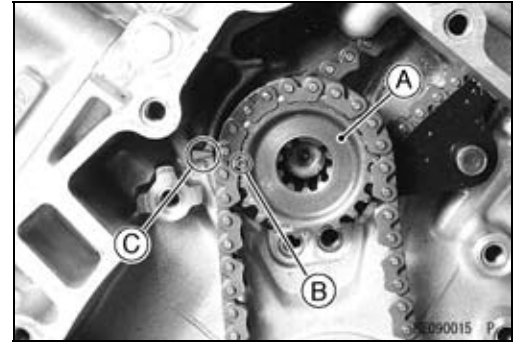


Camshaft

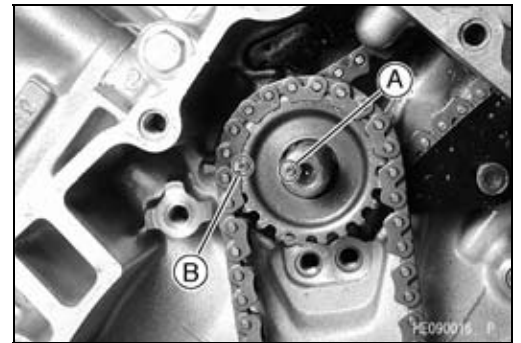
- Face the arrow [A] of the rear camshaft sprocket upward.
- Align the marks [B] on the weights with the rear cylinder head upper surface [C].
- Place the rear camshaft chain [D] onto the rear camshaft sprocket.



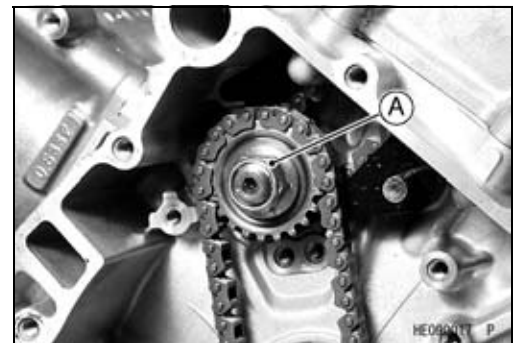
- Engage the camshaft and intermediate shaft chains on the intermediate shaft sprocket [A] (left side view).
- Align the punch mark [B] on the intermediate shaft sprocket with the embossed mark [C] on the crankcase.



- Install the intermediate shaft and align the punch mark [A] on the intermediate shaft with the punch mark [B] on the intermediate sprocket nut.



- Using an Allen wrench, hold the intermediate shaft.
- Tighten:
Torque - Intermediate Shaft Sprocket Nut [A]: 44 N·m (4.5 kgf·m, 33 ft·lb)

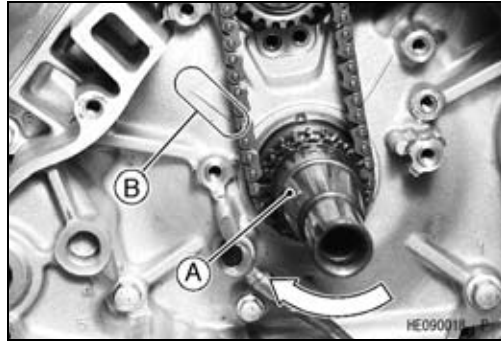


5-24 ENGINE TOP END

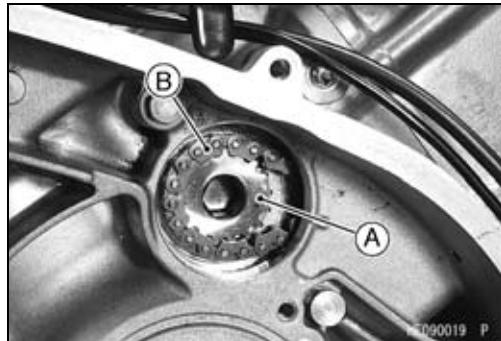
Camshaft

Front Camshaft Chain:

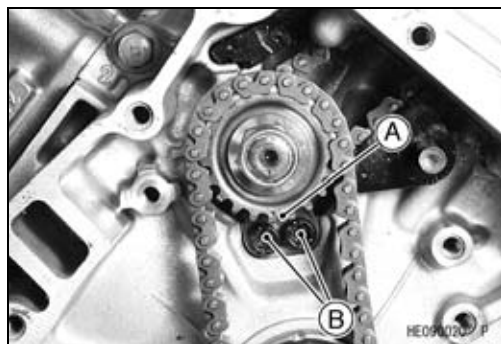
- Rotate the crankshaft **clockwise** 270°.
- Align the key groove [A] on the crankshaft with the embossed line [B] on the crankcase.



- Move the intermediate shaft [A] to the right side of the engine.
- Engage the front camshaft chain [B] with the sprocket on the intermediate shaft.



- Install (left side view):
Position Plate [A]
- Tighten:
Torque - Position Plate Bolts [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

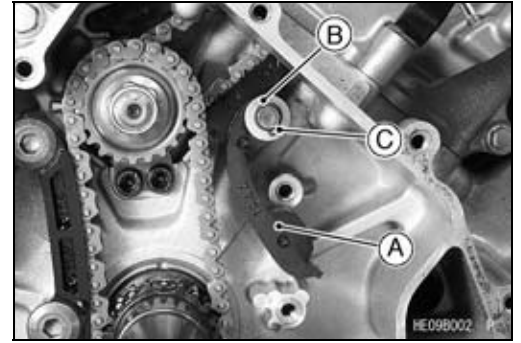


- Install:
Intermediate Shaft Chain Guide [A] (front)
- Tighten:
Torque - Intermediate Shaft Chain Guide Bolts [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

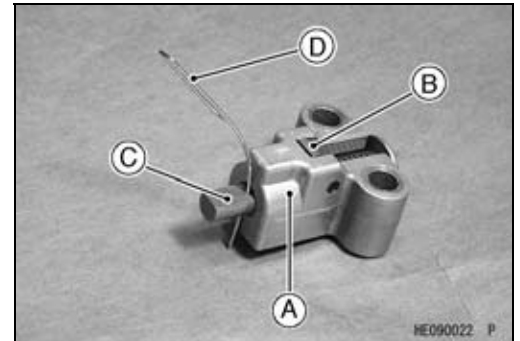


Camshaft

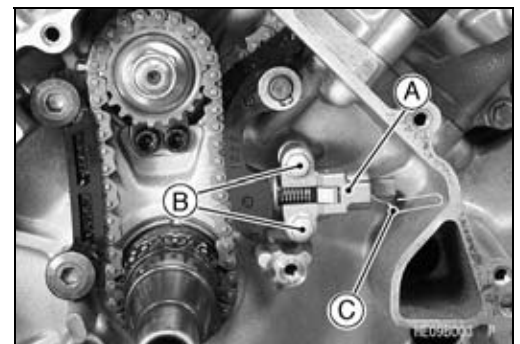
- Install:
 - Intermediate Shaft Chain Guide [A] (Rear)
 - Washer [B]
 - Circlip [C]
- Special Tool - Outside Circlip Pliers: 57001-144**



- Install the intermediate shaft chain tensioner [A] as follows:
- Release the stopper [B] and push the push rod [C] into the tensioner body.
- Insert a wire [D] into the rod hole to hold the rod in place.



- Install:
 - Intermediate Shaft Chain Tensioner [A]
- Tighten:
 - Torque - Intermediate Shaft Chain Tensioner Bolts [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Remove the wire [C] to free the push rod.



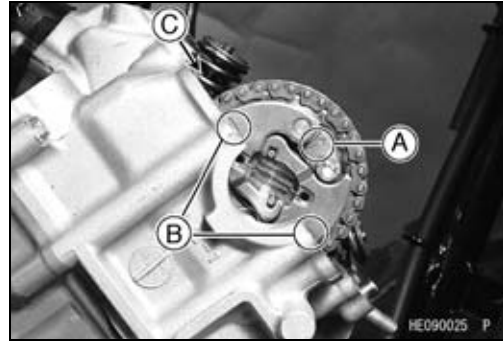
- Confirm that the punch mark [A] on the intermediate shaft sprocket (Right Side) is aligned with the embossed mark [B] on the crankcase.



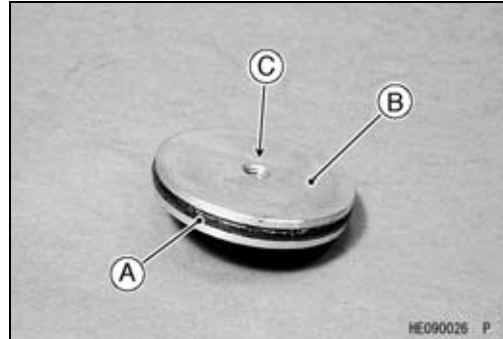
5-26 ENGINE TOP END

Camshaft

- Face the arrow mark [A] upward.
- Align the marks [B] on the weights with the front cylinder head upper surface [C].
- Place the front camshaft chain on the front camshaft sprocket.



- Apply grease to the O-ring [A] and install the cover [B] into the right side of the crankcase so that the tapped hole [C] faces outward.



- Install:
 - Both Rocker Cases (see Rocker Case Installation)
 - Both Camshaft Chain Tensioners (see Camshaft Chain Tensioner Installation)
- Check the valve clearances (see Valve Clearance Inspection).

Cylinder Head

Cylinder Compression Measurement

NOTE

○ Use the battery which is fully charged.

- Warm up the engine thoroughly, and stop the engine.
- Remove the spark plug (see Electrical System chapter).
- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.

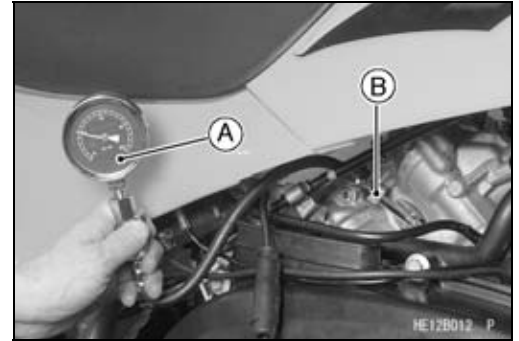
Special Tools - Compression Gauge: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1486

- Hold the throttle wide open and crank the engine with the electric starter or the recoil starter several times.

When the gauge stops rising, stop cranking and read the gauge.

Cylinder Compression (Usable Range)

Electric Starter: 290 ~ 520 kPa (3.0 ~ 5.3 kgf/cm², 43 ~ 75 psi) @290 r/min (rpm)



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

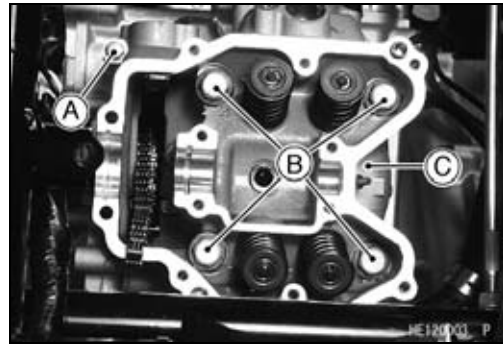
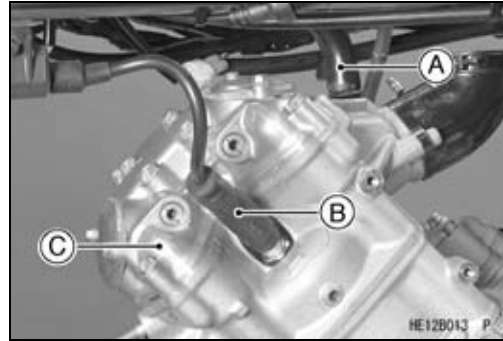
Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range	Carbon accumulation on piston, cylinder head, and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness.	Replace the gasket with a standard part.
	Damaged or missing compression release cam spring	Replace the spring.
	Compression release weights do not move smoothly.	Replace the compression release unit.
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 Piston seizure.	Replace the piston and/or cylinder
		Inspect the cylinder and liner 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.
Compression release weights do not move smoothly	Replace the compression release unit	

5-28 ENGINE TOP END

Cylinder Head

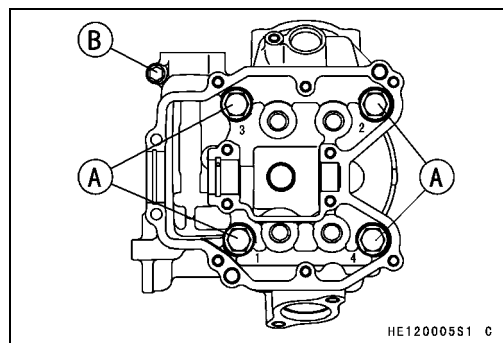
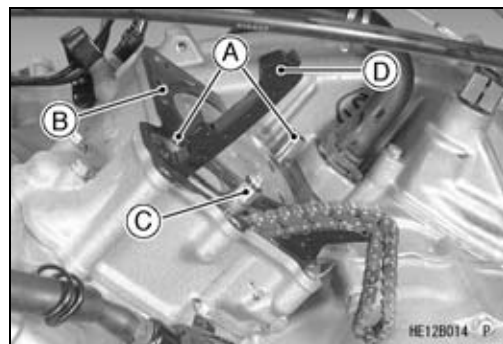
Cylinder Head Removal

- Drain the coolant (see Cooling System chapter).
- Remove:
 - Carburetor (see Fuel System chapter)
 - Exhaust Pipe (see Exhaust Pipe Removal)
 - Water Pipe [A]
 - Spark Plug Cap [B]
 - Rocker Case [C]
 - Camshaft (see Camshaft Removal)
 - Exhaust Pipe (see Exhaust System)
- Remove:
 - Cylinder Head Bolt (M6) [A]
 - Cylinder Head Bolts (M10) [B] and Washers
 - Cylinder Head [C] and Gasket
- Lift the cylinder head to clear the dowel pins in the cylinder, and slide the cylinder head out of the frame.



Cylinder Head Installation

- Install:
 - Dowel Pins [A]
 - New Cylinder Head Gasket [B]
 - Oil Pipe [C]
 - Camshaft Chain Guides [D]
- Tighten:
 - Torque - Front Cylinder Camshaft Chain Guide Bolt: 20 N·m (2.0 kgf·m, 14 ft·lb)**
- Apply molybdenum disulfide oil to the threads and seating surface of the cylinder head bolts and both sides of the washers.
- Tighten the cylinder head bolts following the tightening sequence as shown.
 - First Torque - Cylinder Head Bolts (M10) [A]: 25 N·m (2.5 kgf·m, 18 ft·lb)**
 - Final Torque - Cylinder Head Bolts (M10) [A]: 49 N·m (5.0 kgf·m, 36 ft·lb)**
- Tighten the cylinder head bolts (M6).
 - Torque - Cylinder Head Bolts (M6) [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)**



Cylinder Head Cleaning

- Remove the cylinder head (see Cylinder Head Removal).
- Scrape the carbon out of the combustion chamber and exhaust port with a suitable tool.
- Wash the head with a high flash-point solvent.
- Blow out any particles which may obstruct the oil passage in the cylinder head using compressed air.

Cylinder Head

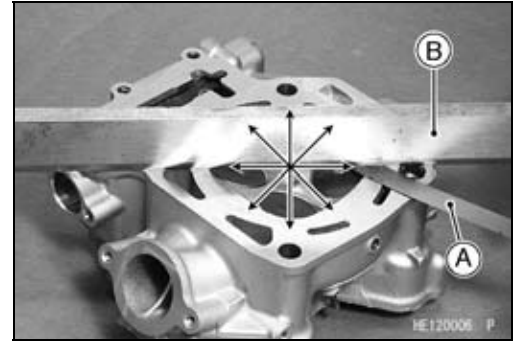
Cylinder Head Warp

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

Cylinder Head Warp

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 lapping the lower surface with emery paper secured to a surface plate (first No. 200, then No. 400).



5-30 ENGINE TOP END

Valves

Valve Clearance Inspection

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

Valve Clearance Adjustment

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

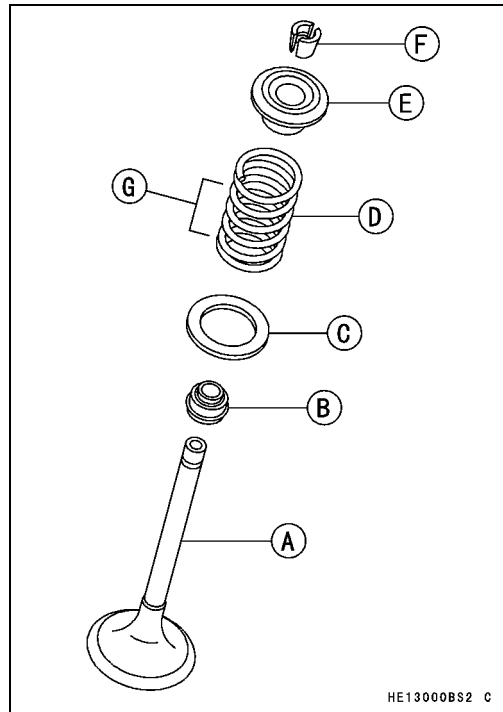
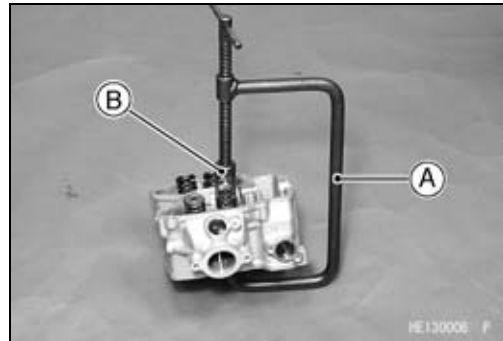
Valve Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Mark and record the valve location so it can be installed in the original position.
- Using the valve spring compressor assembly, remove the valve.

Special Tools - Valve Spring Compressor Assembly:
57001-241 [A]
Valve Spring Compressor Adapter, ϕ 22:
57001-1202 [B]

Valve Installation

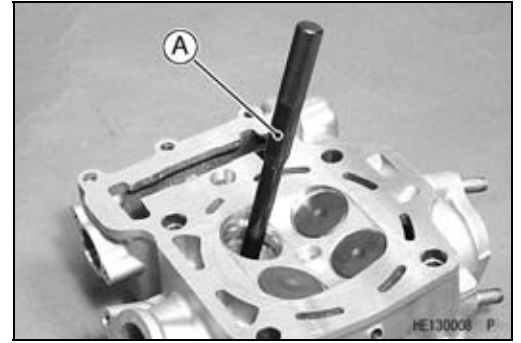
- Replace the valve stem oil seal.
 - ★ If a new valve is to be used, check the valve-to-guide clearance (see this chapter).
 - ★ If there is too little clearance, ream the valve guide (see Valve Guide Installation).
 - ★ If there is too much clearance, install a new valve guide (see Valve Guide Removal and Valve Guide Installation).
 - Check the valve seat (see Valve Seat Inspection).
 - Apply a thin coat of molybdenum disulfide grease to the valve stem.
 - Install each spring so that the closed coil end faces downwards.
 - The green paint on the spring faces upwards.
- Valve Stem [A]
Oil Seal [B]
Spring Seat [C]
Spring [D]
Retainer [E]
Split Keepers [F]
Closed Coil End [G]



Valves

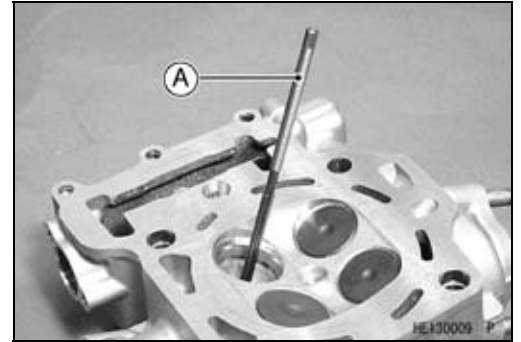
Valve Guide Removal

- Remove:
 - Valve (see Valve Removal)
 - Valve Stem Oil Seal
 - Hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.
- Special Tool - Valve Guide Arbor, $\phi 5$: 57001-1203**



Valve Guide Installation

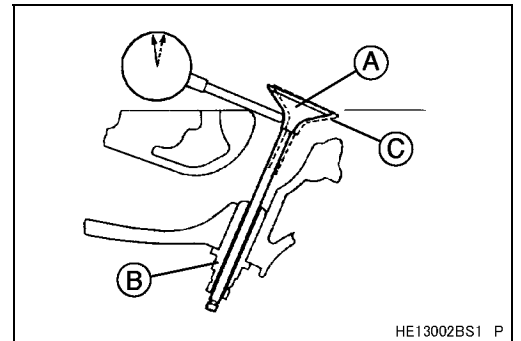
- Lightly oil the valve guide outer surface.
 - Using the valve guide arbor, drive the valve guide until its flange touches the cylinder head.
- Special Tool - Valve Guide Arbor, $\phi 5$: 57001-1203**
- Ream the valve guide with the valve guide reamer [A] , if may be necessary to ream the guide even if the old guide is reused.
- Special Tool - Valve Guide Reamer, $\phi 5$: 57001-1204**



Valve-to-Guide Clearance Measurement

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

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
 - Move [C] the stem back and forth to measure valve/valve guide clearance.
 - Repeat the measurement in a direction at a right angle to the first.
- ★If the reading exceeds the service limit, replace the guide.



NOTE

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

Valve/Valve Guide Clearance (Wobble Method)

	Standard	Service Limit
Exhaust:	0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in.)	0.34 mm (0.0133 in.)
Inlet:	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)	0.28 mm (0.0110 in.)

5-32 ENGINE TOP END

Valves

Valve Seat Inspection

- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].
- Coat the valve seat with machinist's dye.
- Push the valve into the guide.
- Rotate the valve against the seat with a lapping tool.
- Pull the valve out, and check the seating pattern on the valve head. It must be the correct width and even all the way around.
- Measure the outside diameter [D] of the seating pattern on the valve seat.
- ★ If the outside diameter of the valve seating pattern is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter

Exhaust:	25.2 ~ 25.4 mm (0.992 ~ 1.000 in.)
Inlet:	29.4 ~ 29.5 mm (1.157 ~ 1.165 in.)

NOTE

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

- ★ If the valve seating pattern is not correct, repair the seat (see Valve Seat Repair).
- Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with vernier calipers.
- ★ If the width is too wide, too narrow or uneven, repair the seat (see Valve Seat Repair).

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

Valve Seating Surface Width

Exhaust:	0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)
Inlet:	0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)

Valve Seat Repair (Valve Lapping)

- Using the valve seat cutters [A], repair the valve seat.

Special Tools - Valve Seat Cutters:

Exhaust Valves:

- Valve Seat Cutter, 45° - ϕ 27.5: 57001-1114
- Valve Seat Cutter, 32° - ϕ 28: 57001-1119
- Valve Seat Cutter, 60° - ϕ 30: 57001-1123

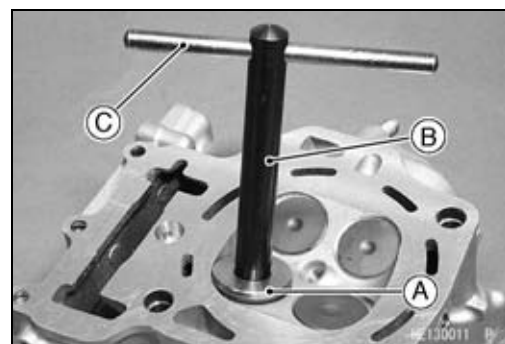
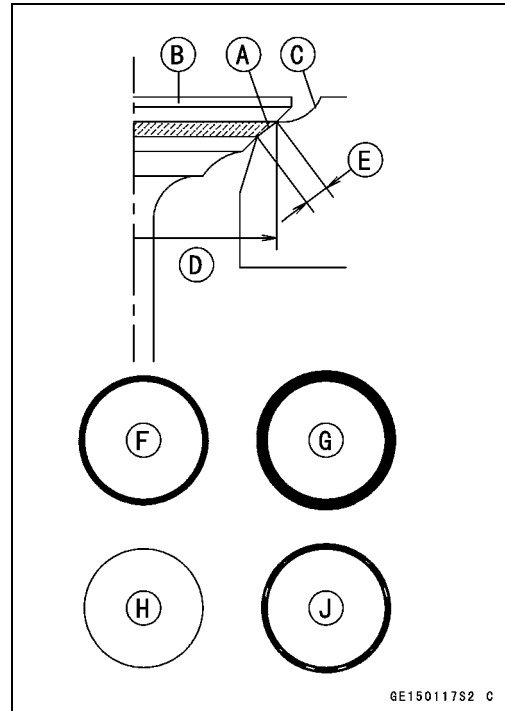
Inlet Valves:

- Valve Seat Cutter, 45° - ϕ 30: 57001-1187
- Valve Seat Cutter, 32° - ϕ 33: 57001-1199
- Valve Seat Cutter, 60° - ϕ 30: 57001-1123

Holder & Bar:

- Valve Seat Cutter Holder, ϕ 5: 57001-1208 [B]
- Valve Seat Cutter Holder Bar: 57001-1128 [C]

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



Valves

Seat Cutter Operation Care:

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

NOTE

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

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

NOTE

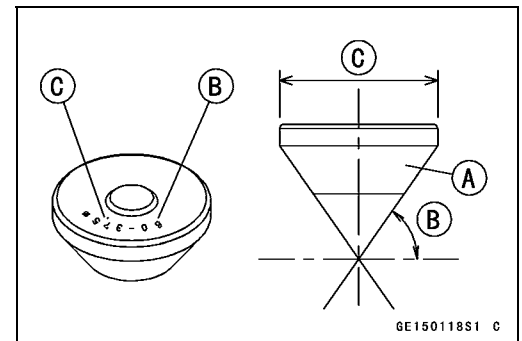
○ Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.

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

Marks Stamped on the Cutter:

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

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



Operating Procedures:

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

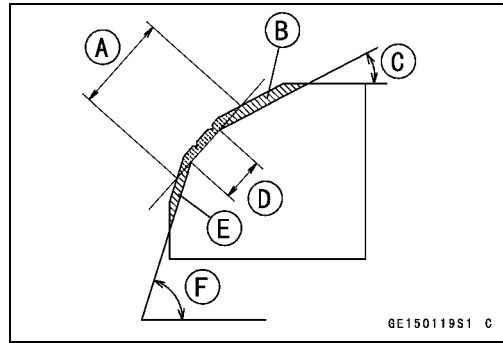
CAUTION

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

5-34 ENGINE TOP END

Valves

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]

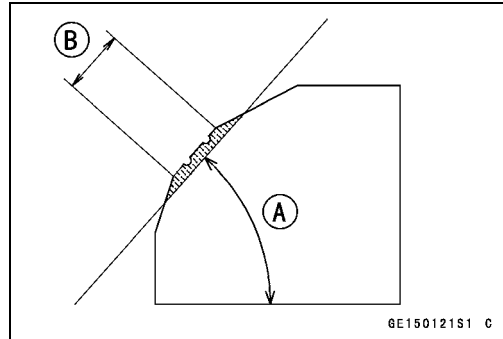


- Measure the outside diameter of the seating surface with vernier calipers.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.

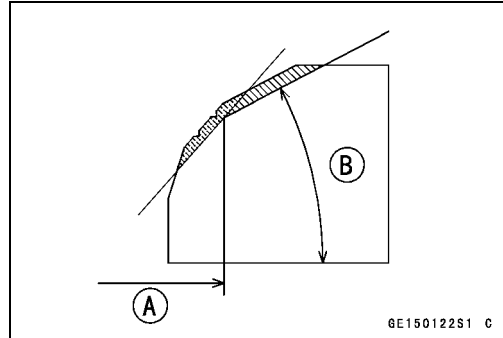
Original Seating Surface [B]

NOTE

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



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



CAUTION

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

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

Valves

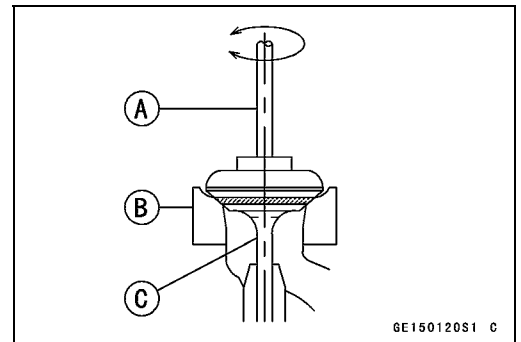
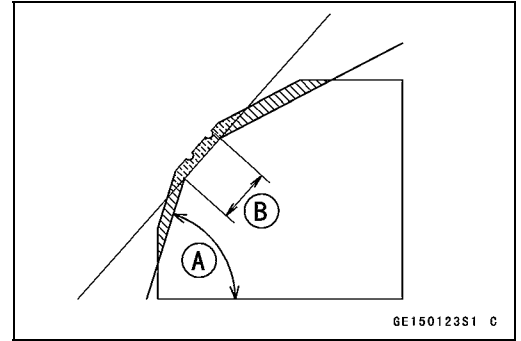
- ★ If the seat width is too wide, make the 60° [A] grind described below.
- ★ If the seat width is within the specified range, lap the valve to the seat as described below.
- Grind the seat at a 60° angle until the seat width is within the specified range.
- To make the 60° grind, fit 60° cutter into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

Correct Width [B]

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

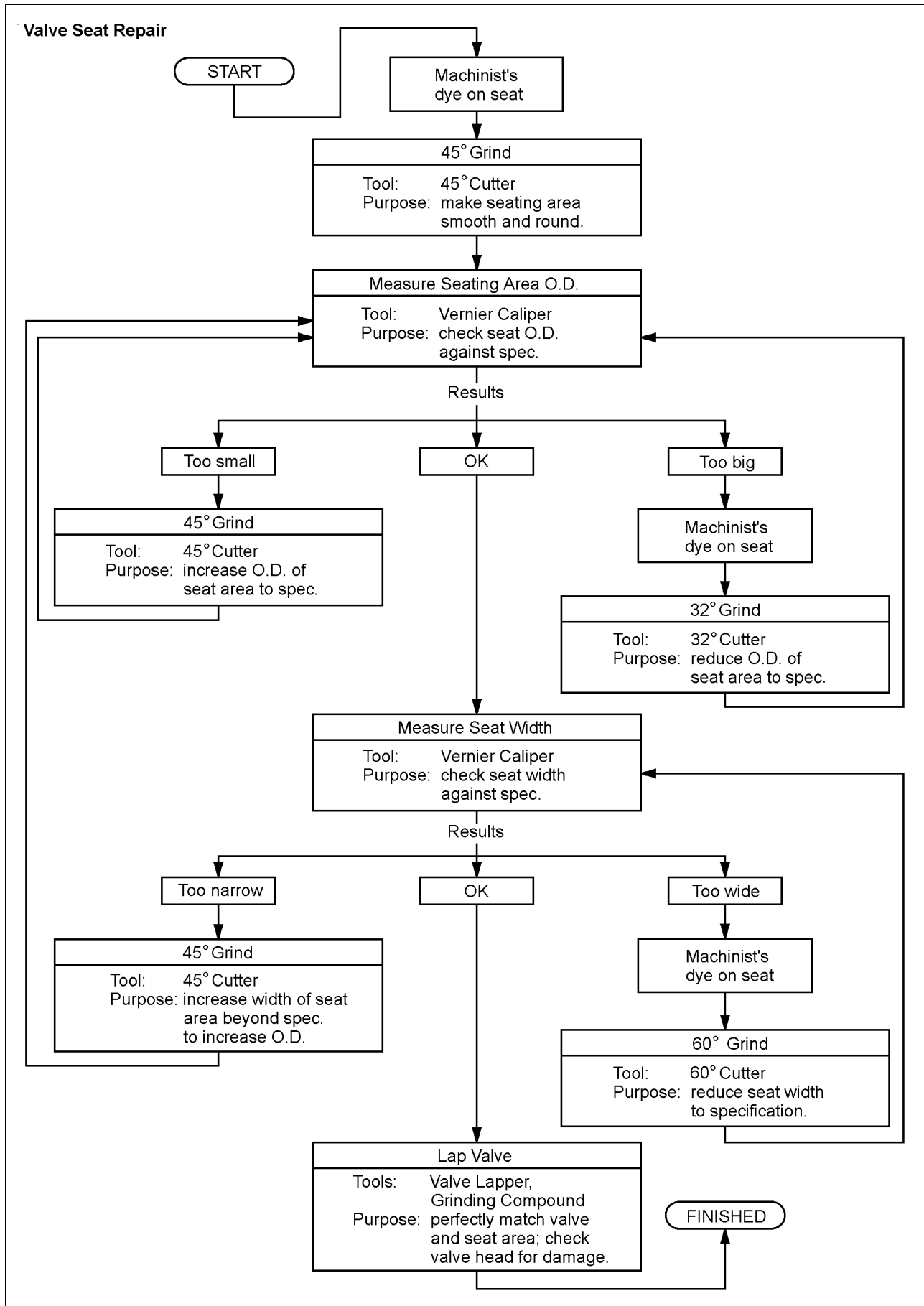
[A] Lubber
[B] Valve Seat
[C] Valve

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



5-36 ENGINE TOP END

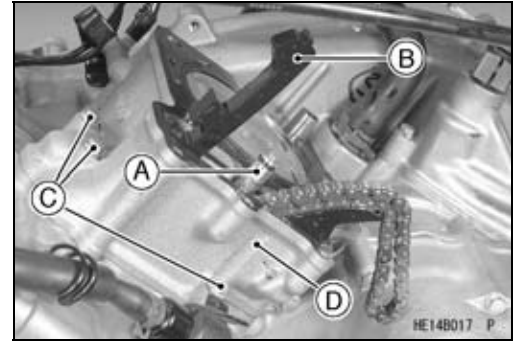
Valves



Cylinder and Piston

Cylinder Removal

- Remove:
 - Cylinder Head (see Cylinder Head Removal)
 - Oil Pipe [A]
 - Chain Guide [B]
 - Cylinder Bolts [C]
 - Cylinder [D]
 - Cylinder Base Gasket

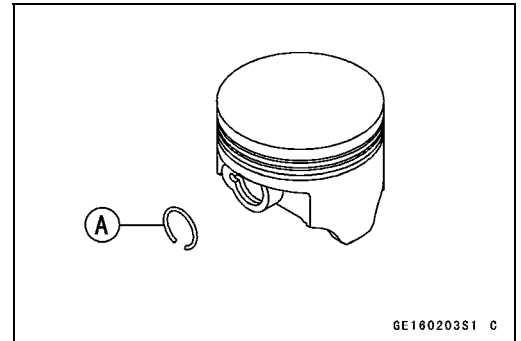


Piston Removal

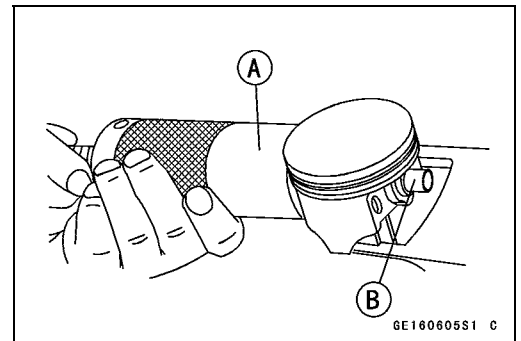
- Remove the cylinder block (see Cylinder Removal).
- Place a piece of clean cloth under the piston and remove the piston pin snap rings [A] from the outside of each piston.

CAUTION

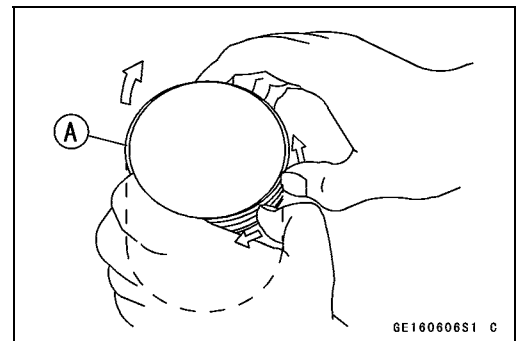
Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.



- Using the piston pin puller assembly (special tool), remove the piston pins.
 - Special Tools - Piston Pin Puller Assembly [A]: 57001-910**
 - Piston Pin Puller Adapter [B]: 57001-1211**
- Remove the piston.



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



Cylinder, Piston Installation

NOTE

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

5-38 ENGINE TOP END

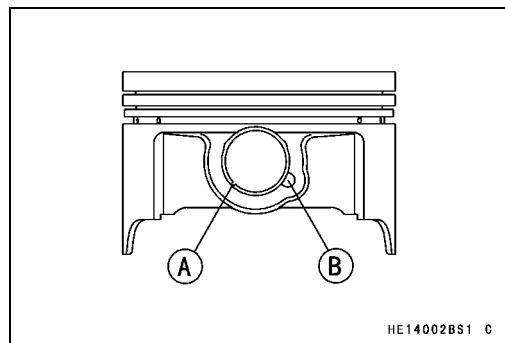
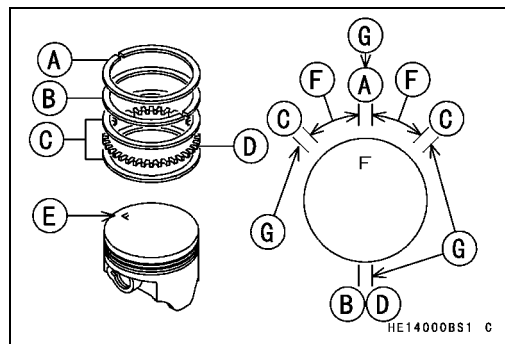
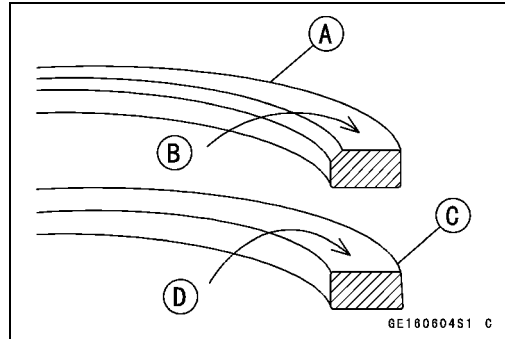
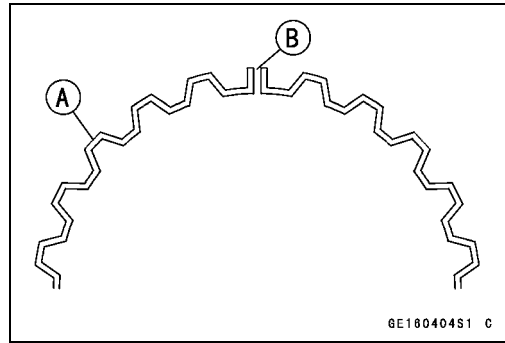
Cylinder and Piston

NOTE

- The oil ring rails have no “top” or “bottom”.
 - Install the oil ring expander [A] in the bottom piston ring groove so the ends [B] butt together.
 - Install the oil ring steel rails, one above the expander and one below it.
 - Spread the rail with your thumbs, but only enough to fit the rail over the piston.
 - Release the rail into the bottom piston ring groove.

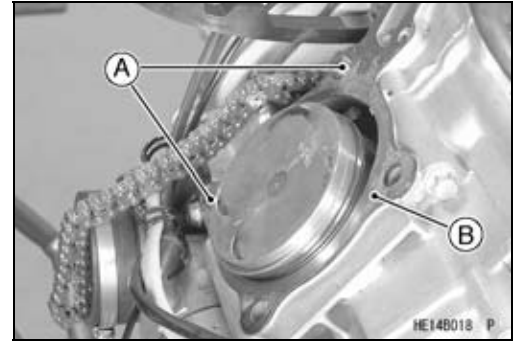
 - Do not mix up the top ring and second ring.
 - Install the top ring [A] so that the “R” mark [B] faces up.
 - Install the second ring [C] so that the “RN” mark [D] faces up.

 - The piston ring openings must be positioned as shown in the figure. The openings of the oil ring steel rails must be about $30 \sim 40^\circ$ [F] of angle from the opening of the top ring.
- Top Ring [A]
Second Ring [B]
Oil Ring Steel Rails [C]
Oil Ring Expander [D]
F mark [E] must be faced toward Front Side for front and rear pistons
Opening Positions [G]
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.
 - When installing the piston pin snap ring, compress it only enough to install it and no more.
 - Apply engine oil to the cylinder bore and, piston skirt.

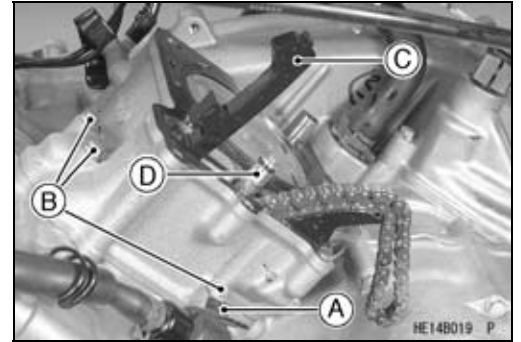


Cylinder and Piston

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

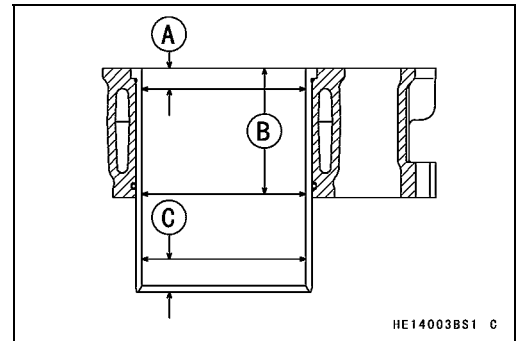


- Install:
 - Cylinder Clamp [A] (rear only)
- Tighten:
 - Torque - Cylinder Bolts [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install:
 - Chain Guide [C]
 - Oil Pipe [D]



Cylinder Wear

- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the three locations (total of six measurements) shown in the figure.
- ★ If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.
 - 10 mm (0.4 in.) [A]
 - 60 mm (2.4 in.) [B]
 - 20 mm (0.8 in.) [C]



Standard: 81.994 ~ 82.006 mm (3.2281 ~ 3.2286 in.), and less than 0.01 mm (0.0004 in.) difference between any two measurements.

Service Limit: 82.09 mm (3.232 in.), or more than 0.05 mm (0.0020 in.) difference between any two measurements.

5-40 ENGINE TOP END

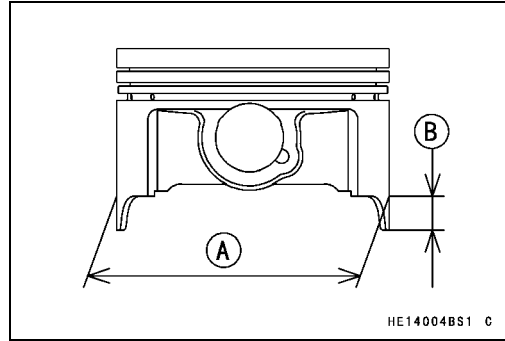
Cylinder and Piston

Piston Wear

- Measure the outside diameter [A] of each piston 5 mm (0.20 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.
- ★ If the measurement is under service limit, replace the piston.

Piston Diameter

Standard: 81.949 ~ 81.964 mm (3.2263 ~ 3.2269 in.)
Service Limit: 81.80 mm (3.220 in.)



Piston/Cylinder Clearance

- Subtract the piston diameter from the cylinder inside diameter to get the piston/cylinder clearance.

Piston/Cylinder Clearance

Standard: 0.030 ~ 0.057 mm (0.0012 ~ 0.0022 in.)

Piston Ring, Piston Ring Groove Wear

- 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:	Service Limit:
Top:	0.040 ~ 0.080 mm (0.0016 ~ 0.0032 in.)	0.18 mm (0.0071 in.)
Second:	0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)

- ★ If the piston ring groove clearance is greater than the service limit, measure the ring thickness and groove width as follows to decide whether to replace the rings, the piston or both.

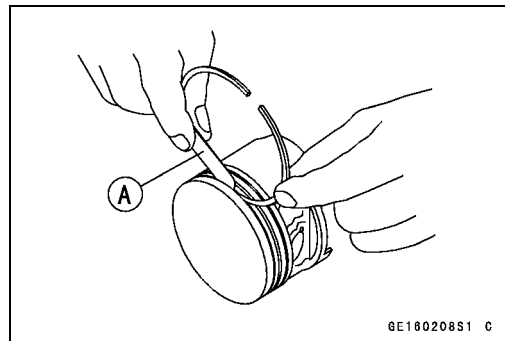
Piston Ring Groove Width

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

Piston Ring Groove Width

	Standard	Service Limit
Top:	1.030 ~ 1.050 mm (0.0405 ~ 0.0413 in.)	1.13 mm (0.0445 in.)
Second:	1.020 ~ 1.040 mm (0.0402 ~ 0.0409 in.)	1.12 mm (0.0441 in.)

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



Cylinder and Piston

Piston Ring Thickness

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

Piston Ring Thickness

	Standard	Service Limit
Top:	0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)	0.9 mm (0.035 in.)
Second:	0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)	0.9 mm (0.035 in.)

- ★ If any of the measurements is less than the service limit 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.

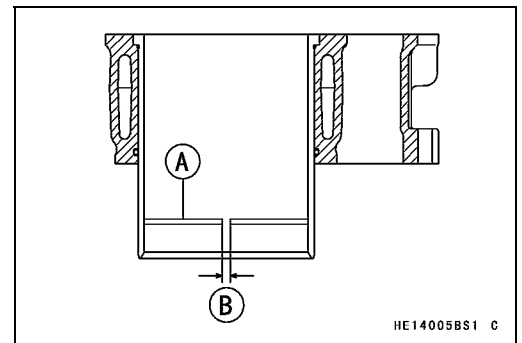
Piston Ring End Gap

- 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	Service Limit
Top:	0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)	0.60 mm (0.0236 in.)
Second:	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)	0.75 mm (0.0295 in.)
Oil:	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	1.00 mm (0.0394 in.)

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



5-42 ENGINE TOP END

Exhaust System

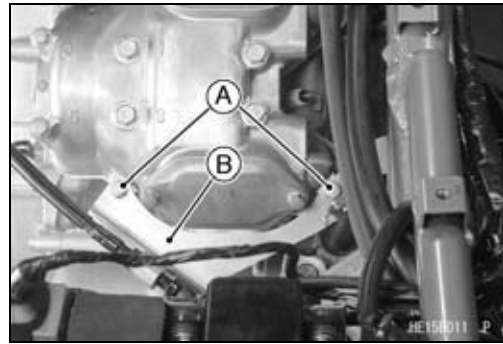
This vehicle is equipped with a spark arrester approved for off-road use by the U.S. Forest Service. It must be properly maintained to ensure its efficiency. In accordance with the Periodic Maintenance Chart, clean the spark arrester.

Spark Arrester Cleaning

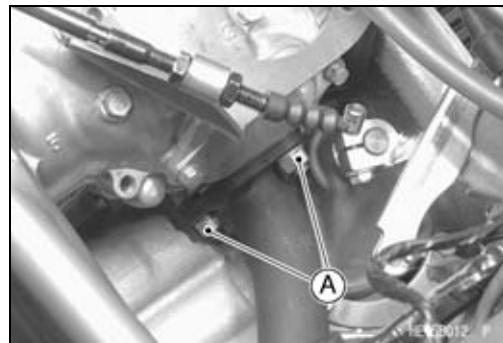
- Refer to the Engine Top End in the Periodic Maintenance chapter.

Muffler and Exhaust Pipe Removal

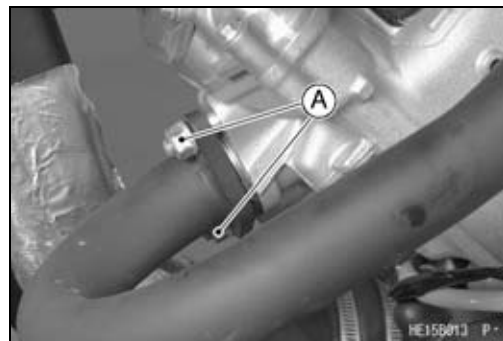
- Remove:
 - Rear Fender (see Frame chapter)
 - Battery and Battery Case (see Electrical System)
 - Left Side Inner Cover
 - Rocker Case Bolts [A]
 - Cable Holder [B]



Rear Exhaust Pipe Nuts [A]

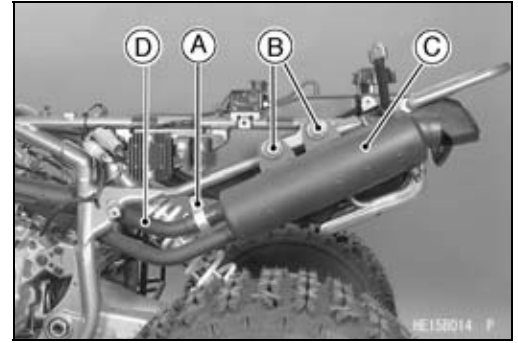


- Remove:
 - Front Exhaust Pipe Nuts [A]



Exhaust System

- Remove:
 - Muffler Clamp Bolt [A]
 - Muffler Mounting Bolts [B]
 - Muffler [C] and Rear Exhaust Pipe
 - Front Exhaust Pipe [D]



Muffler and Exhaust Pipe Installation

- If the exhaust pipe cover [A] or muffler cover [B] were removed, tighten them.

Torque - Exhaust Pipe Cover Bolts [C]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

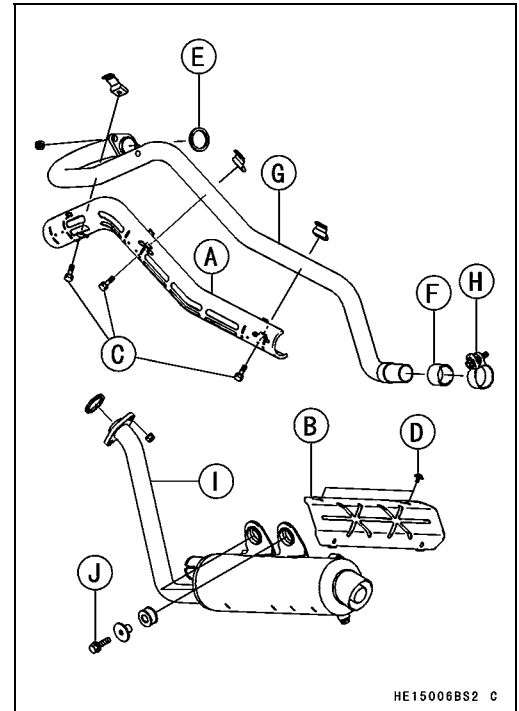
Muffler Cover Bolts [D]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

Exhaust Pipe Clamp Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Replace the exhaust pipe holder gaskets [E] and clamp gasket [F] with new ones.
- Install (But do not tighten the following nuts and bolts.):
 - Front Exhaust Pipe [G], Clamp [H], Muffler and Nuts
 - Rear Exhaust Pipe [I] and Nuts
 - Muffler Mounting Bolts [J]
- Tighten:
 - Exhaust Pipe Holder Nuts evenly
 - Muffler Clamp Bolt

Torque - Muffler Mounting Bolts: 20 N·m (2.0 kgf·m, 14 ft·lb)

Rocker Case with Cable Holder Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Exhaust System Inspection

- Before removing the exhaust system, check for signs of leakage at the exhaust pipe gasket in the cylinder head and at the muffler clamp.
- ★ If there are signs of leakage around the exhaust pipe gasket, it should be replaced. If the muffler-to-exhaust pipe joint leaks, tighten the clamp.
- Remove the exhaust pipe and muffler (see Exhaust Pipe and Muffler Removal).
- Inspect the gasket for damage and signs of leakage.
- ★ If the gasket is damaged or has been leaking, replace it.
- Check the exhaust pipe and muffler for dents, cracks, rust and holes.
- ★ If the exhaust pipe or muffler is damaged or has holes, it should be replaced for best performance and least noise.

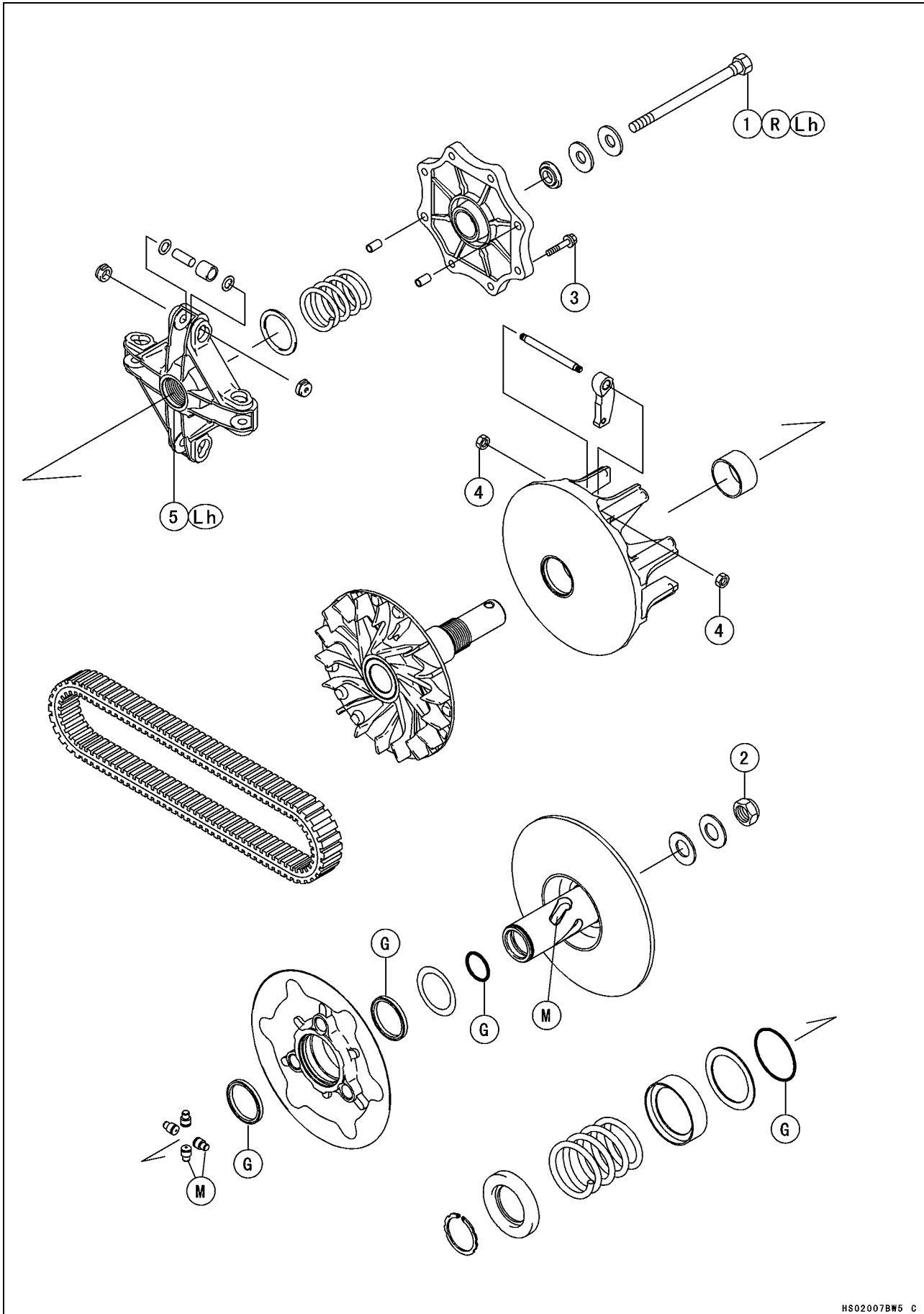
Converter System

TABLE OF CONTENTS

Exploded View	6- 2
Specifications	6- 6
Special Tools	6- 7
Torque Converter	6- 8
Torque Converter Cover Removal	6- 8
Torque Converter Cover Installation	6- 8
Converter Exhaust Duct Removal.....	6- 9
Converter Exhaust Duct Installation.....	6- 9
Converter Intake Duct Removal.....	6-10
Converter Intake Duct Installation.....	6-10
Drive Belt	6-11
Drive Belt Removal	6-11
Drive Belt Installation	6-11
Drive Belt Inspection.....	6-11
Drive Belt Deflection Inspection	6-11
Drive Belt Deflection Adjustment	6-12
Drive Pulley	6-13
Drive Pulley Removal.....	6-13
Drive Pulley Disassembly	6-14
Drive Pulley Inspection	6-15
Spider Shoe Side Clearance Adjustment.....	6-17
Drive Pulley Assembly	6-18
Drive Pulley Installation.....	6-20
Driven Pulley	6-21
Driven Pulley Removal.....	6-21
Driven Pulley Disassembly	6-21
Driven Pulley Inspection	6-22
Driven Pulley Assembly	6-24
Driven Pulley Installation.....	6-26
High Altitude Setting Information.....	6-27
Specifications.....	6-27

6-2 CONVERTER SYSTEM

Exploded View



CONVERTER SYSTEM 6-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Drive Pulley Bolt	93	9.5	69	Lh, R
2	Driven Pulley Nut	93	9.5	69	
3	Drive Pulley Cover Bolts	13	1.3	113 in·lb	
4	Ramp Weight Nuts	6.9	0.70	61 in·lb	
5	Spider	275	28	203	Lh

G: Apply grease for oil seal and O-ring.

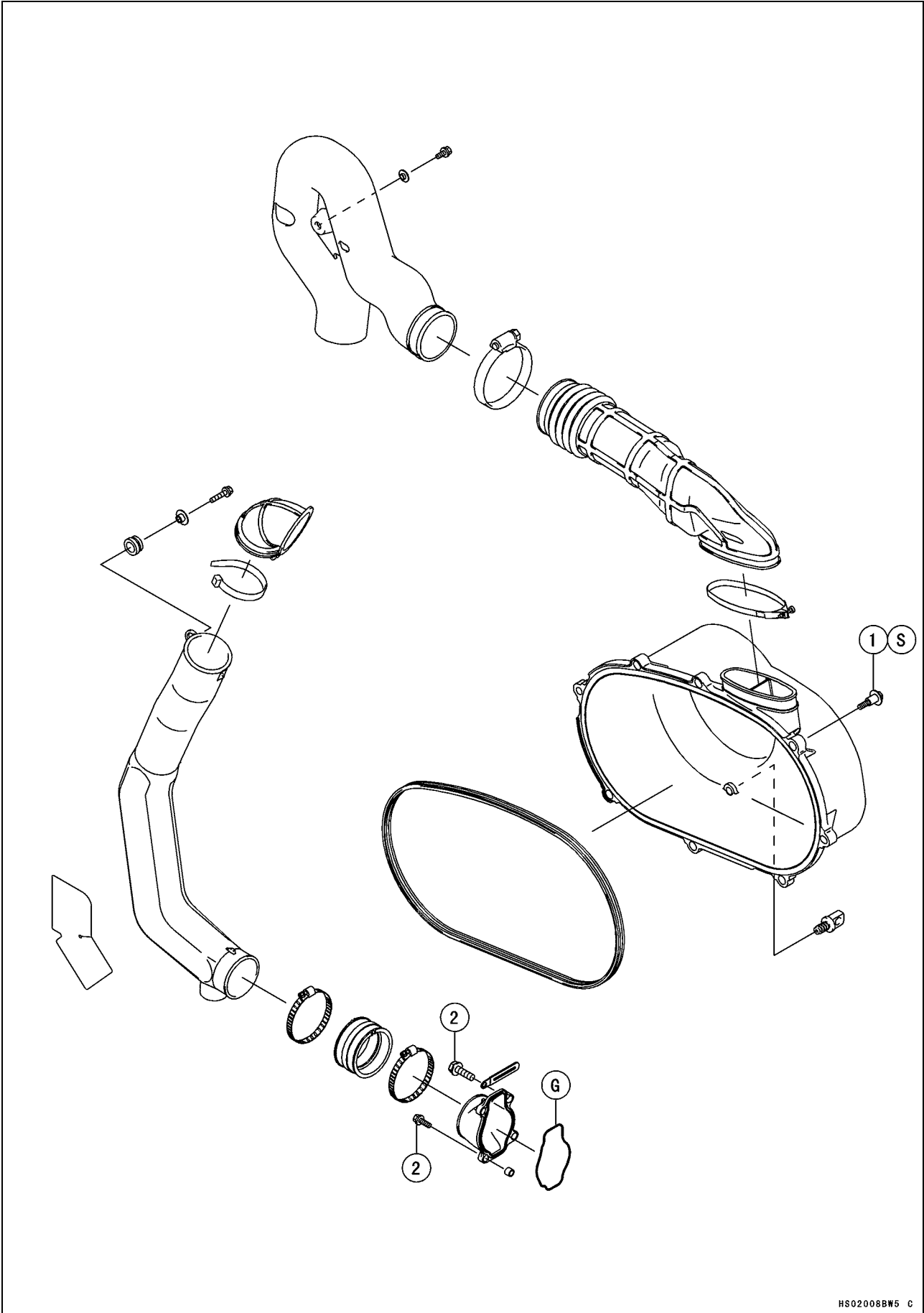
Lh: Left-hand Threads

M: Apply molybdenum disulfide grease.

R: Replacement Parts

6-4 CONVERTER SYSTEM

Exploded View



CONVERTER SYSTEM 6-5

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Converter Cover Bolts	8.8	0.90	78 in·lb	S
2	Joint Duct Bolts	8.8	0.90	78 in·lb	

G: Apply grease for oil seal and O-ring.

S: Follow the specific tightening sequence.

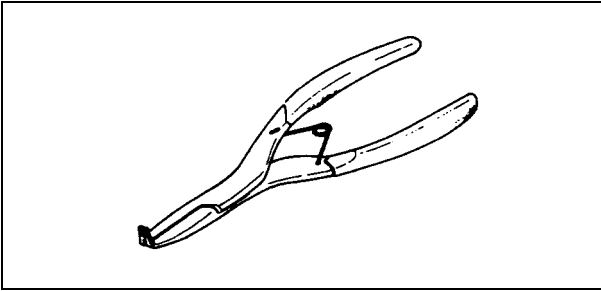
6-6 CONVERTER SYSTEM

Specifications

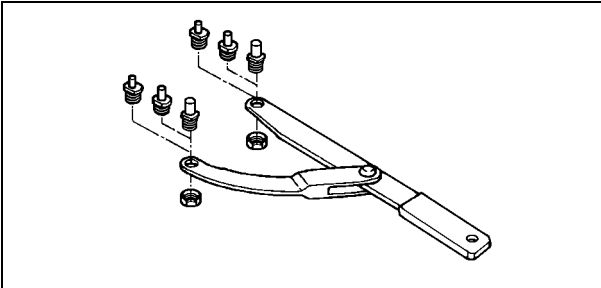
Item	Standard	Service Limit
Drive Belt:		
Belt deflection	22 ~ 27 mm (0.87 ~ 1.06 in.)	---
Belt height (Parallel portion)	1.16 ~ 3.48 mm (0.046 ~ 0.137 in.)	0.64 mm (0.0252 in.)
Drive Pulley:		
Cover bushing inside diameter	27.985 ~ 28.085 mm (1.1018 ~ 1.1057 in.)	28.12 mm (1.107 in.)
Sheave bushing inside diameter	37.985 ~ 38.085 mm (1.4955 ~ 1.4994 in.)	38.12 mm (1.501 in.)
Shoe side clearance	0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.)	---
Spring free length	60.4 mm (2.38 in.)	---
Driven Pulley:		
Sheave bushing inside diameter	40.000 ~ 40.039 mm (1.5748 ~ 1.5763 in.)	40.079 mm (1.5779 in.)
Spring free length	99.5 mm (3.92 in.)	---

Special Tools

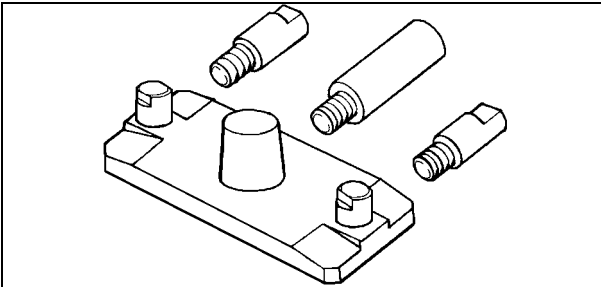
Circlip Pliers :
57001-154



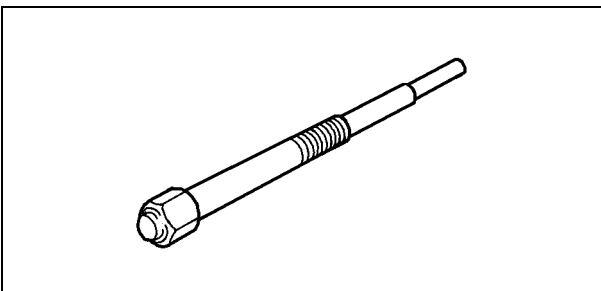
Flywheel & Pulley Holder :
57001-1343



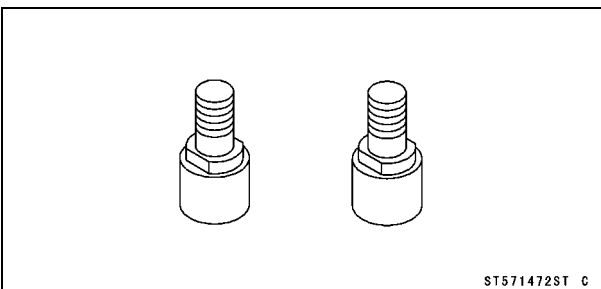
Drive & Driven Pulley Holder :
57001-1412



Drive Pulley Puller Bolt :
57001-1429

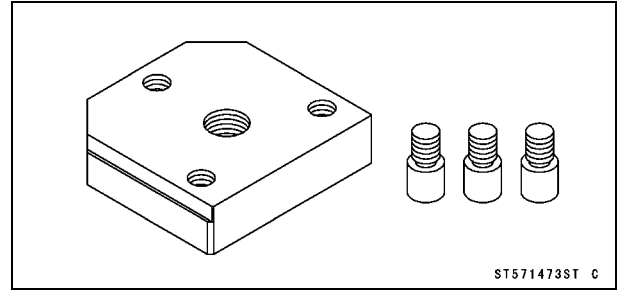


Pulley Holder Attachment :
57001-1472



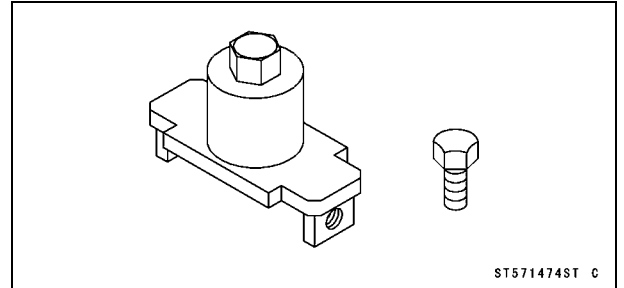
ST571472ST C

Drive Pulley Holder :
57001-1473



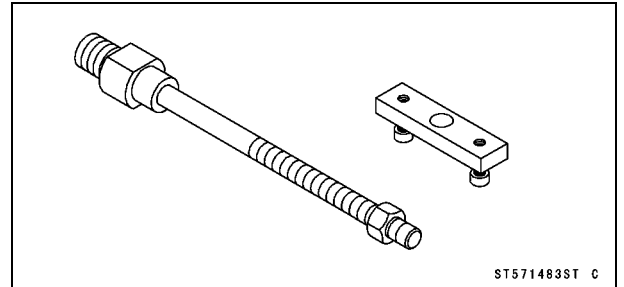
ST571473ST C

Drive Pulley Wrench :
57001-1474



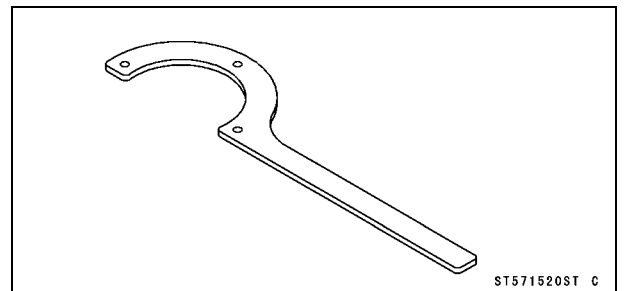
ST571474ST C

Spring Holder Set :
57001-1483



ST571483ST C

Drive Pulley Holder :
57001-1520



ST571520ST C

6-8 CONVERTER SYSTEM

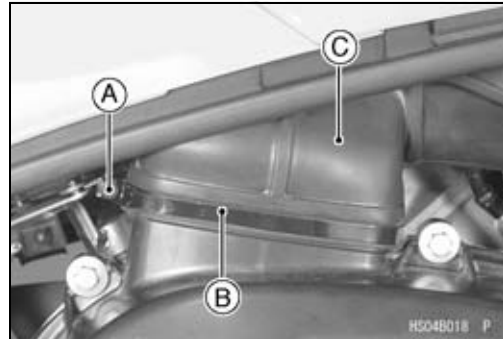
Torque Converter

⚠ WARNING

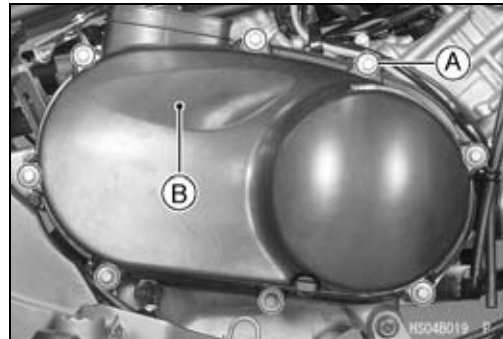
Excessive imbalance or operating rpm could cause torque converter pulley failure resulting in severe injury or death. The pulleys of the belt drive torque converter are precision balanced components designed to operate within certain rpm limits. Disassembly/assembly and servicing procedures of the pulley assemblies must be followed closely. Modifications to the engine or pulleys that increase rpm may cause failure.

Torque Converter Cover Removal

- Turn the ignition switch OFF.
- Remove:
 - Clamp Screw [A] and Clamp [B]
 - Joint Duct [C]

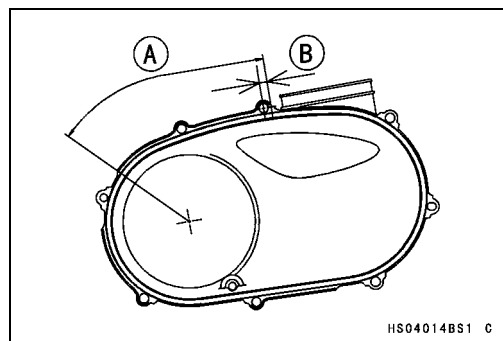


- Remove:
 - Torque Converter Cover Bolts [A]
 - Torque Converter Cover [B]



Torque Converter Cover Installation

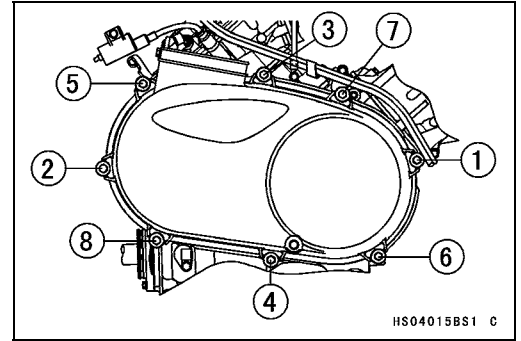
- Fit the trim seal into the converter cover.
- Set trim seal juncture in area [A] when insert trim seal in the cover.
 - 10 mm [B]



Torque Converter

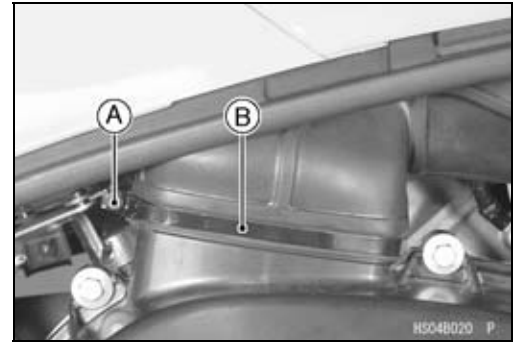
- Tighten the cover bolts following the tightening sequence as shown.

Torque - Converter Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

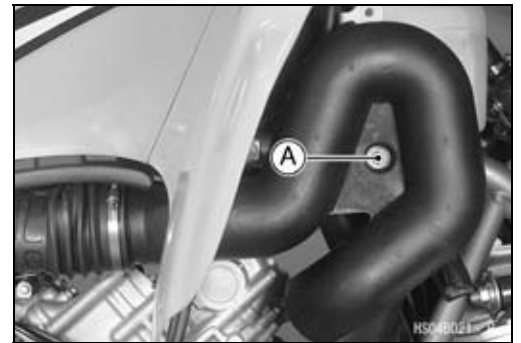


Converter Exhaust Duct Removal

- Remove:
 - Clamp Screw [A]
 - Clamp [B]
- Remove the idle adjuster from the converter exhaust duct.

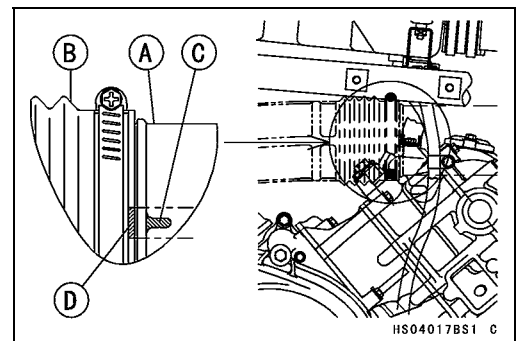


- Remove the duct mounting bolt [A] and collar.
- Remove the converter exhaust duct.



Converter Exhaust Duct Installation

- Install the converter exhaust duct, collar and tighten the duct mounting bolt.
- Install the converter exhaust duct [A] in the joint duct [B] as shown.
- When installing converter exhaust duct, fit to aligning mark.
 - Converter Exhaust Duct Aligning Mark [C]
 - Joint Duct Aligning Mark [D]
- When installing joint duct, do not twist and deformation.
- Install the joint duct to the converter cover.
- Install the clamp and tighten the clamp screw.
- Install the idle adjuster to the converter exhaust duct.
- Adjust the idle speed (see Periodic Maintenance chapter).

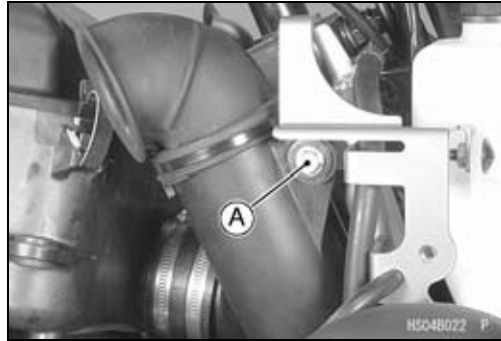


6-10 CONVERTER SYSTEM

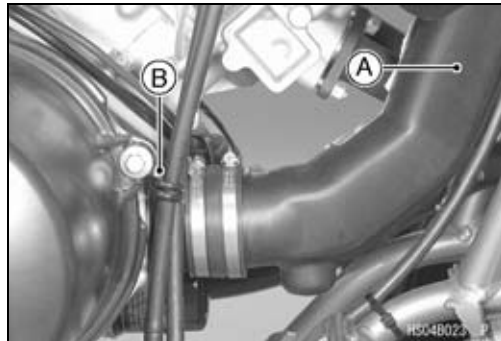
Torque Converter

Converter Intake Duct Removal

- Remove:
 - Seat and Air Cleaner Cover (see Frame chapter)
 - Front Fender (see Frame chapter)
- Remove the duct mounting bolt [A], collar and damper.

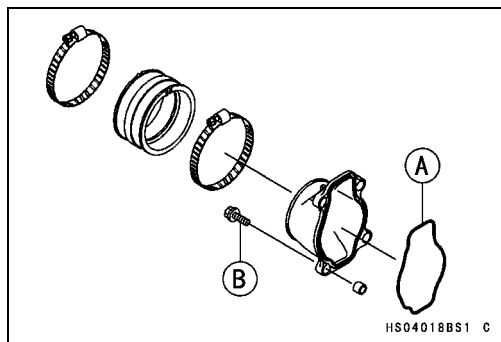


- Remove the converter intake duct [A] from the joint duct [B].
- Remove the converter intake duct.

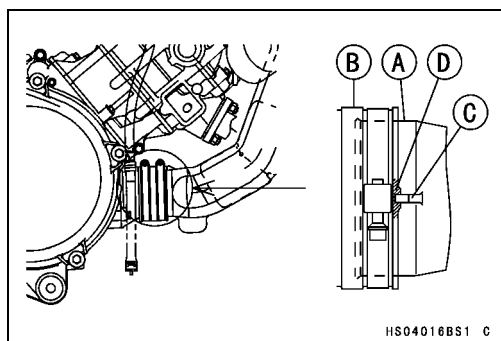


Converter Intake Duct Installation

- Apply grease to the O-ring [A].
- Install the joint duct and tighten the joint duct bolts [B].
Torque - Joint Duct Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



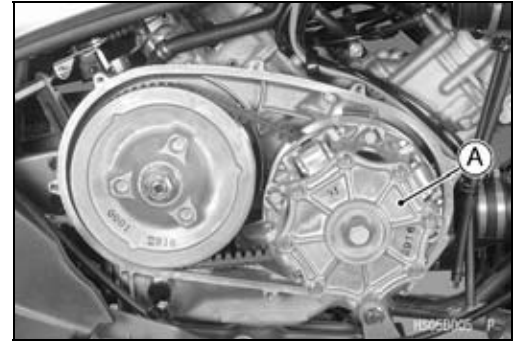
- Install the converter intake duct [A] in the joint duct [B] as shown.
- When installing converter intake duct, fit to aligning mark.
 - Converter Intake Duct Aligning Mark [C]
 - Joint duct Aligning Mark [D]
- Install the damper and collar.
- Tighten the duct mounting bolt.



Drive Belt

Drive Belt Removal

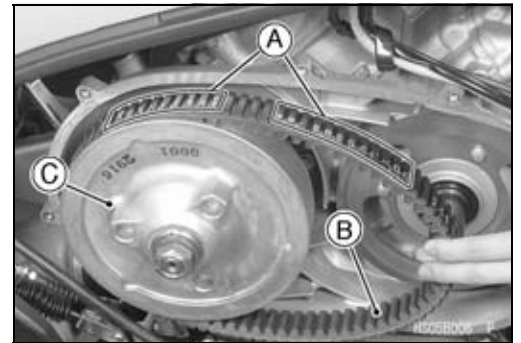
- Remove the drive pulley [A] (see Drive Pulley Removal).



NOTE

- Before removing the drive belt, observe the direction of the informations [A] (Such as manufacturers name and arrow marks) printed on the belt so that it may be reinstalled on the pulleys as originally.

- Lift the drive belt [B] off the driven pulley [C].

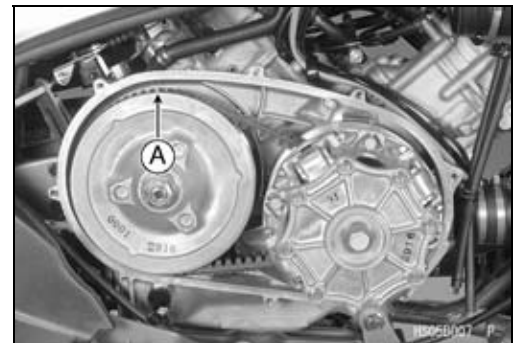
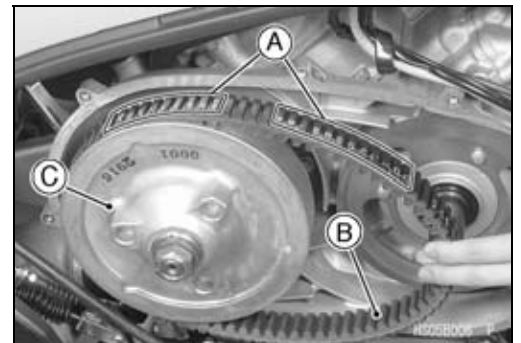


Drive Belt Installation

NOTE

- Be sure the printed information faces the same direction so the belt rotates in the same direction as originally installed. When installing a new belt, install it so the printed information [A] can be read from beside the vehicle.

- Installation is basically the reverse of removal.
- Loop the belt [B] over the driven pulley [C].
- Install the drive pulley (see Drive Pulley Installation).
- Put the transmission in neutral, and rotate the driven pulley to allow the belt to return to the top [A] of the sheaves, before measuring belt deflection.



Drive Belt Inspection

- Refer to the Converter System in the Periodic Maintenance chapter.

Drive Belt Deflection Inspection

- Refer to the Converter System in the Periodic Maintenance chapter.

6-12 CONVERTER SYSTEM

Drive Belt

Drive Belt Deflection Adjustment

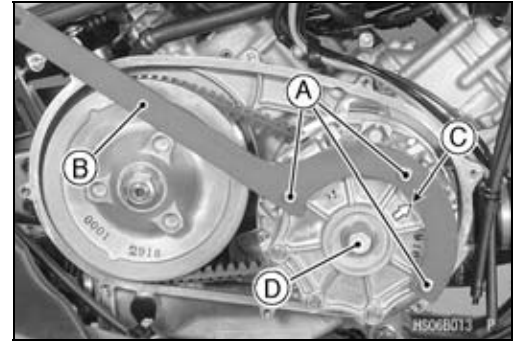
- Refer to the Converter System in the Periodic Maintenance chapter.

Drive Pulley

Drive Pulley Removal

- Remove:
 - Torque Converter Cover (see Torque Converter Cover Removal)
- Be sure to remove the three cover bolts [A] in the positions shown and install the drive pulley holder [B] in the position shown. Note the holder's relative position to the arrow mark [C].
- Tighten the three bolts.

Torque - Drive Pulley Cover Bolts: 13 N·m (1.3 kgf·m, 113 in·lb)



CAUTION

Be sure to install three bolts in the specified positions shown. Otherwise, the tapped holes will be damaged.

Special Tool - Drive Pulley Holder: 57001-1520

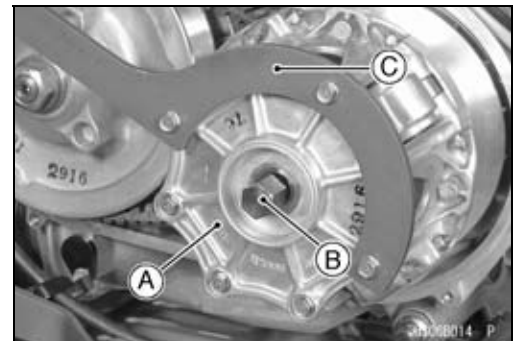
- Loosen the drive pulley bolt [D] (left-hand threads), holding the drive pulley with the drive pulley holder.
- Remove the drive pulley bolt, two washers and the stepped washer, but do not remove the drive pulley holder yet.

NOTE

○ *The drive pulley bolt has left-hand threads. Turn the wrench clockwise for loosening.*

- Remove the drive pulley [A] from the crankshaft by screwing the drive pulley puller bolt [B] clockwise, while holding the drive pulley with the drive pulley holder [C].

Special Tool - Drive Pulley Puller Bolt: 57001-1429



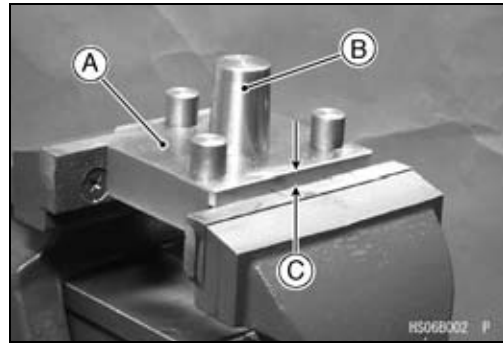
6-14 CONVERTER SYSTEM

Drive Pulley

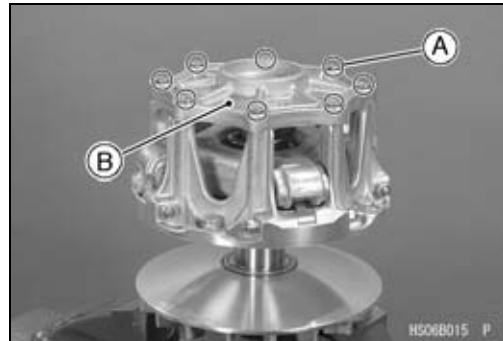
Drive Pulley Disassembly

- Hold the drive pulley holder [A] and drive & driven pulley holder [B] in a vise so that the upper surface on the holder is 7 mm (0.28 in.) [C] above the vise.

Special Tools - Drive & Driven Pulley Holder: 57001-1412
Drive Pulley Holder: 57001-1473



- Set the pulley onto the pulley holder.
- Remove:
 - Drive Pulley Cover Bolts [A]
 - Drive Pulley Cover [B]



- Remove:
 - Spring [A]
 - Spacer



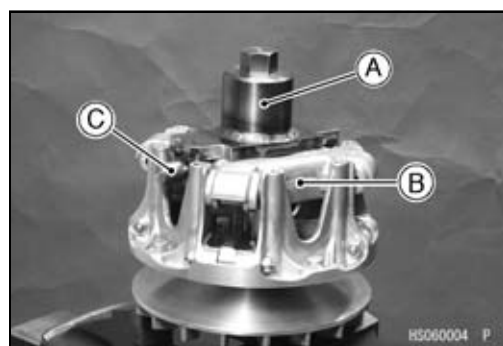
- Put the drive pulley wrench [A] on the spider [B] and tighten the bolt [C].

Special Tool - Drive Pulley Wrench: 57001-1474

- Turn the wrench clockwise and remove the spider with the movable sheave.

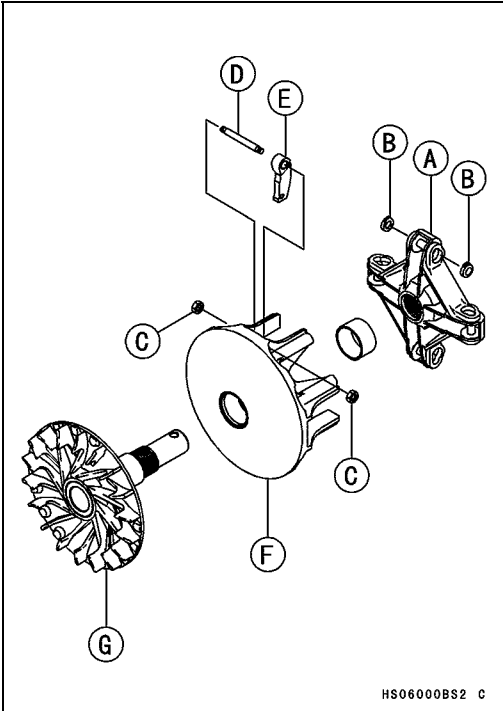
NOTE

- *The spider has left-hand threads. Turn the wrench clockwise for loosening.*



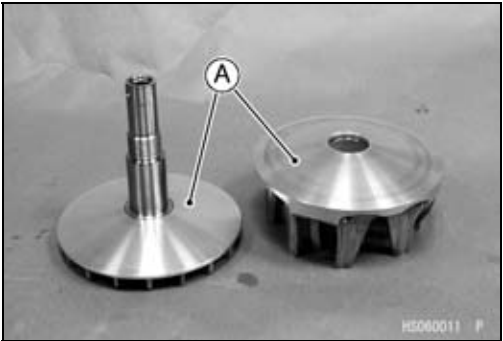
Drive Pulley

- Remove:
 - Spider [A]
 - Shoes [B]
 - Nuts [C]
 - Ramp Weight Pin [D]
 - Ramp Weight [E]
 - Movable Sheave [F]
 - Fixed Sheave [G]



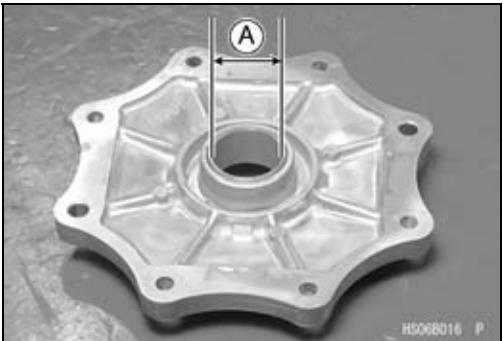
Drive Pulley Inspection

★If the sheave surfaces [A] appear damaged, replace the sheaves.



★If the cover bushing is damaged or worn, replace the drive pulley cover.

- Cover Bushing Inside Diameter [A]**
 - Standard: 27.985 ~ 28.085 mm (1.1018 ~ 1.1057 in.)
 - Service Limit: 28.12 mm (1.107 in.)



6-16 CONVERTER SYSTEM

Drive Pulley

★If the sheave bushing is damaged or worn, replace it.

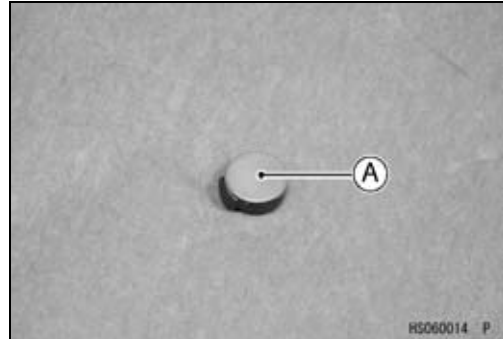
Sheave Bushing Inside Diameter [A]

Standard: 37.985 ~ 38.085 mm (1.4955 ~ 1.4994 in.)

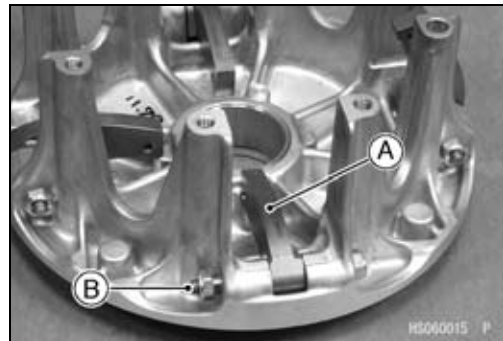
Service Limit: 38.12 mm (1.501 in.)



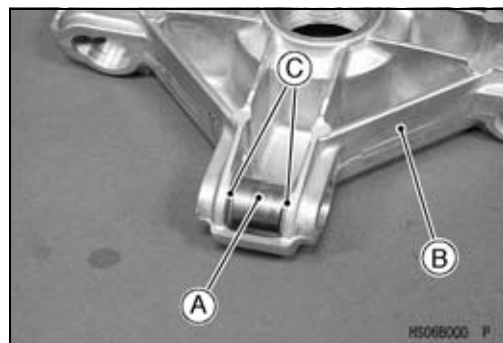
- ★If the spider shoes [A] are damaged, replace them.
- Check the spider shoe side clearance (see Spider Shoe Side Clearance Inspection).



- ★If the ramp weights [A] in the movable sheave are damaged or worn, replace them.
- ★If the pins [B] are damaged or worn, replace them.



- ★If the rollers [A] are damaged or worn, replace the spider [B].
- ★If the washers [C] are damaged or worn, replace the spider.

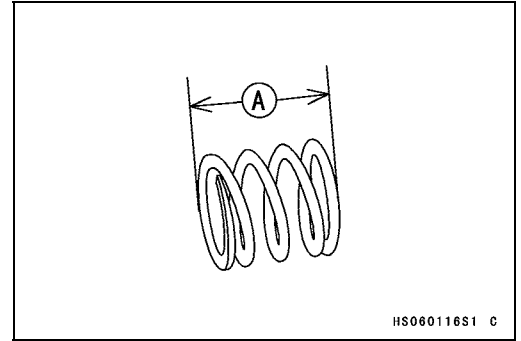


Drive Pulley

★If the spring is worn or damaged, replace the spring.

Spring Free Length [A]

Standard: 60.4 mm (2.38 in.)



HS060116S1 C

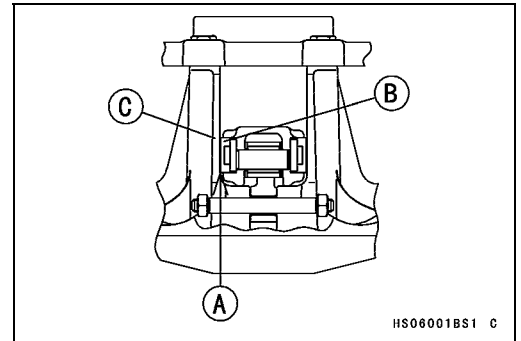
Spider Shoe Side Clearance Adjustment

- Remove:
 - Drive Pulley (see Drive Pulley Removal)
 - Drive Pulley Cover and Spring (see Drive Pulley Disassembly)
- Temporarily install:
 - Dowel Pins (2)
 - Drive Pulley Cover
 - Two Bolts (at dowel pins)
- Turn the movable sheave clockwise.
- Measure the resulting clearance [A] between the shoe [B] and the post [C] on the movable sheave at all four arms.

Shoe Side Clearance

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

★If any of the measurements are greater than the maximum, replace all shoes with standard shoes (see Drive Pulley Disassembly).



HS06001BS1 C

6-18 CONVERTER SYSTEM

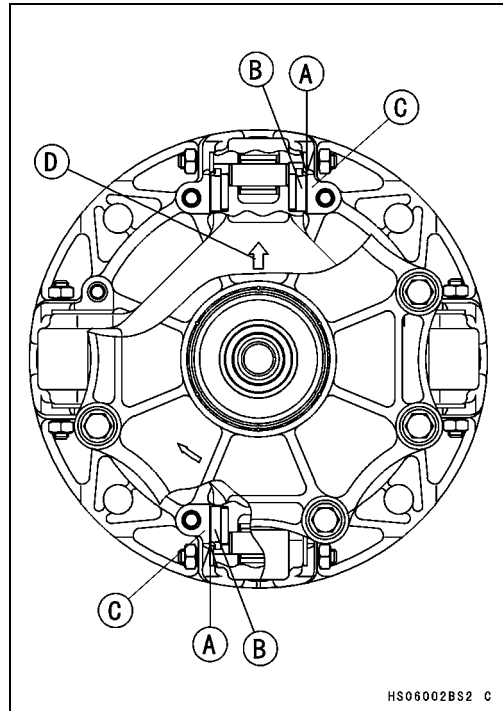
Drive Pulley

- Turn the movable sheave clockwise.
- Measure the resulting clearance [A] between the shoe [B] and the post [C] on the movable sheave at two positions as shown.

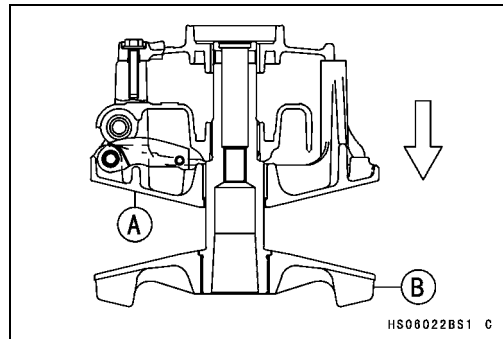
Arrow Mark [D]

- ★ If the clearance is not within the specified range, adjust it according to following chart.

Clearance Measurement	Present Shoes	
	Part Number	Thickness
Less than 0.15 mm (0.0059 in.)	49048-1087	7.2 mm (0.283 in.)
	49048-1088	7.3 mm (0.287 in.)
0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.) (standard clearance)	no change	
	49048-1089	7.4 mm (0.291 in.)
Over 0.30 mm (0.0118 in.)	49048-1090	7.5 mm (0.295 in.)
	49048-1091	7.6 mm (0.299 in.)
	49048-1092	7.7 mm (0.303 in.)
	49048-1093	7.8 mm (0.307 in.)
	49048-1094	7.9 mm (0.311 in.)
	49048-1095	8.0 mm (0.315 in.)



- Check that the movable sheave [A] moves smoothly, after the shoe side clearance adjustment.
- The movable sheave must move freely towards the fixed sheave [B].
- ★ If the movable sheave does not move smoothly, readjust the shoe side clearance.



Drive Pulley Assembly

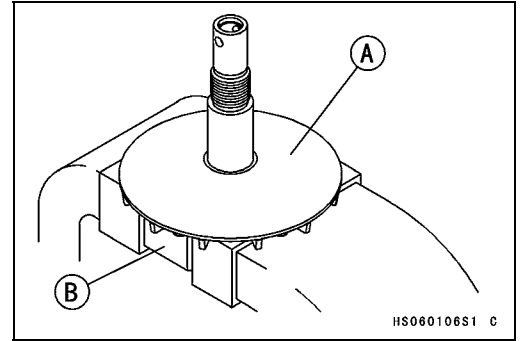
- Install the ramp weight [A] as shown.
- Tighten:
 - Torque - Ramp Weight Nuts [B]: 6.9 N·m (0.70 kgf·m, 61 in·lb)
- Check that the ramp weights swing smoothly.



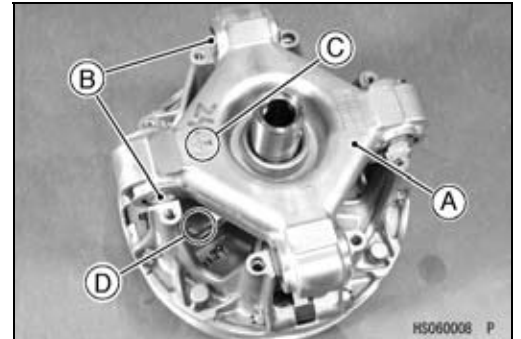
Drive Pulley

- Hold the fixed sheave [A] with the drive pulley holder [B] in a vise.

Special Tool - Drive Pulley Holder: 57001-1473



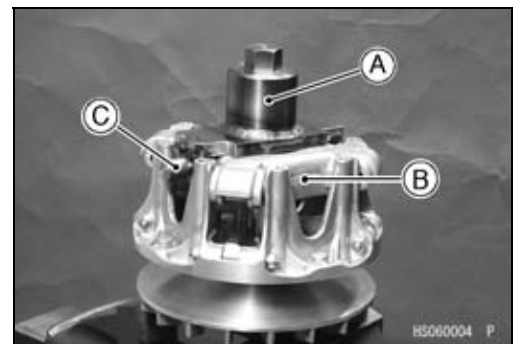
- Clean the threads of the fixed sheave and spider.
- Install:
 - Movable Sheave
 - Spider [A] and Shoes [B]
- Align the arrow [C] on the spider with the arrow [D] on the movable sheave.
- Insert the guides so that the rubber side (small diameter) faces inward.



- Put the drive pulley wrench [A] on the spider [B] and tighten the bolt [C].

Special Tool - Drive Pulley Wrench: 57001-1474

- Turn the wrench counterclockwise for tightening.
- Torque - Spider: 275 N·m (28 kgf·m, 203 ft·lb)**
- Remove the drive pulley wrench.



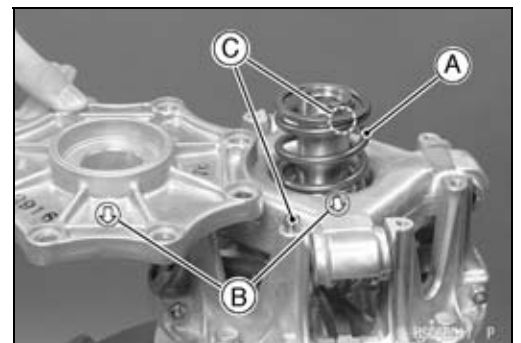
- Install the spacer.
- Put the spring [A] in the groove of the spider.
- Align the arrows [B] on the drive pulley cover and spider.

- Install:
 - Dowel Pins [C]
 - Drive Pulley Cover

- Tighten:

Torque - Drive Pulley Cover Bolts: 13 N·m (1.3 kgf·m, 113 in·lb)

- Clean the surface of the sheaves with an oil-less cleaning fluid.



6-20 CONVERTER SYSTEM

Drive Pulley

Drive Pulley Installation

- Clean the following portions with an oil-less cleaning fluid such as trichloroethylene or acetone.
 - Fixed Sheave Tapered Portion [A]
 - Crankshaft Tapered Portion [B]

⚠ WARNING

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

- Install the drive pulley, stepped washer and two washers on the drive pulley bolt as shown.
 - Crankcase Side [A]
 - Stepped Washer [B]
 - Two Washer [C]
 - Bolt Head [D]

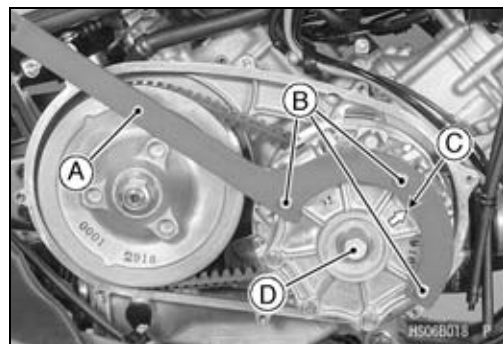
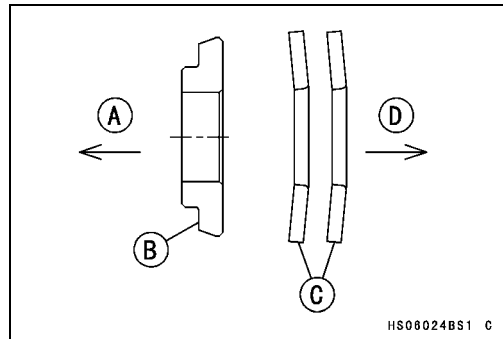
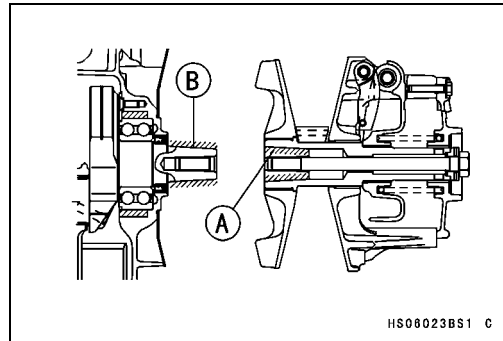
- Install the drive pulley cover and be sure to install the drive pulley holder [A] along with three cover bolts [B] in the position shown. Note the holder's relative position to the arrow mark [C].
- Tighten the three cover bolts to the specified torque.

Special Tool - Drive Pulley Holder: 57001-1520

- Tighten:

Torque - Drive Pulley Cover Bolts: 13 N·m (1.3 kgf·m, 113 in·lb)

Drive Pulley Bolt [D] (New, left-hand threads): 93 N·m (9.5 kgf·m, 69 ft·lb)



Driven Pulley

Driven Pulley Removal

- Remove:
 - Torque Converter Cover (see Torque Converter Cover Removal)
 - Drive Pulley (see Drive Pulley Removal)
 - Drive Belt (see Drive Belt Removal)
- Using a flywheel & pulley holder [A] and pulley holder attachments [B], remove the driven pulley nut [C] and washers. (Nut has R/H threads.)

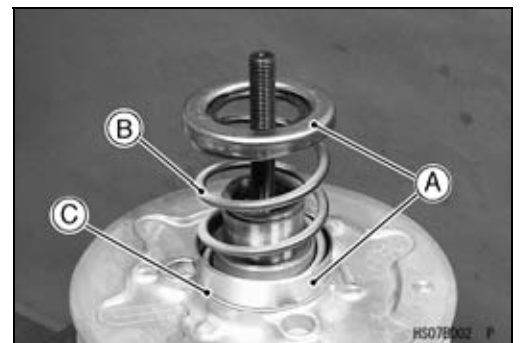
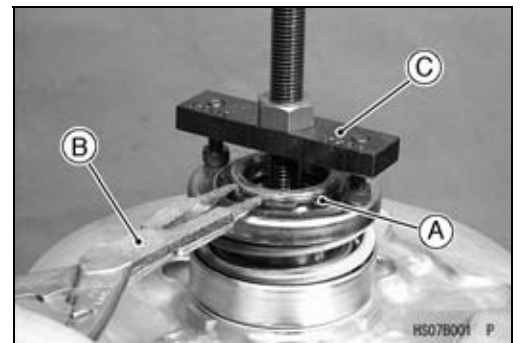
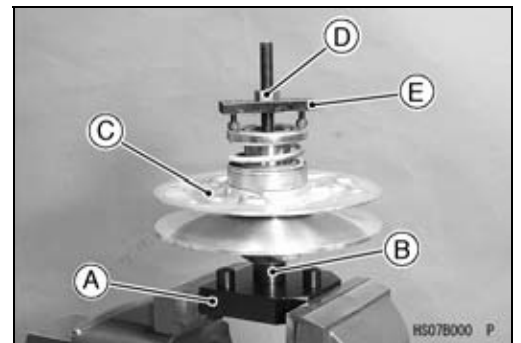
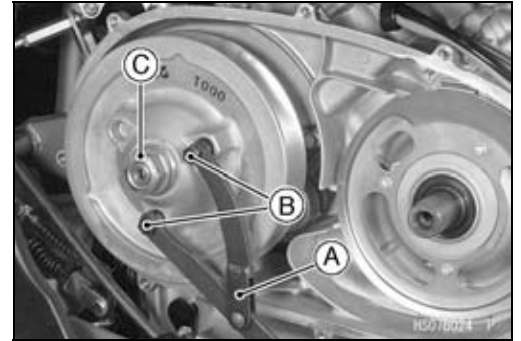
Special Tools - Flywheel & Pulley Holder: 57001-1343
Pulley Holder Attachment: 57001-1472

- Remove:
 - Driven Pulley

Driven Pulley Disassembly

- Hold the drive & driven pulley holder [A] in a vise.
 - Special Tool - Drive & Driven Pulley Holder: 57001-1473**
- Screw the guide bar [B] of the spring holder set into the holder.
- **Special Tool - Spring Holder Set: 57001-1483**
- Put the driven pulley [C] on the guide bar.
- Tighten the nut [D], and compress the spring with the spring holder [E] of the spring holder set.
- **Special Tool - Spring Holder Set: 57001-1483**
- Remove the circlip [A] with circlip pliers [B].
- **Special Tool - Circlip Pliers: 57001-154**
- Remove the nut and spring holder [C].

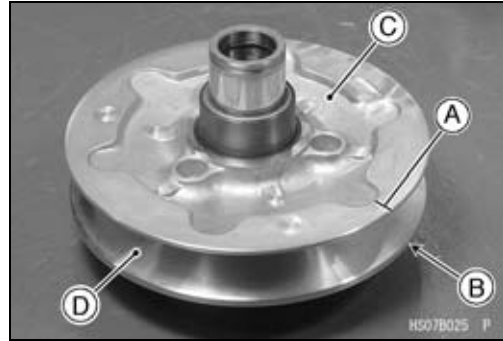
- Remove:
 - Spring Seats [A]
 - Spring [B]
 - Thrust Plate [C]



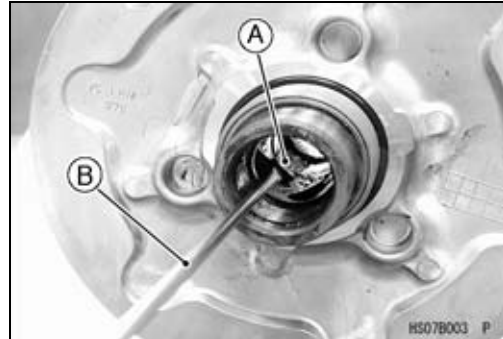
6-22 CONVERTER SYSTEM

Driven Pulley

- Make match-marks [A] and [B] on the sheaves so that it can be installed later in the same position.
 - Movable Sheave [C]
 - Fixed Sheave [D]



- Wipe off the molybdenum disulfide grease.
- Remove the four pins [A] with a thin standard tip screwdriver [B].
- Remove the movable sheave from the fixed sheave.



- Remove:
 - Spacer(s) [A] (for Drive Belt Deflection Adjustment)



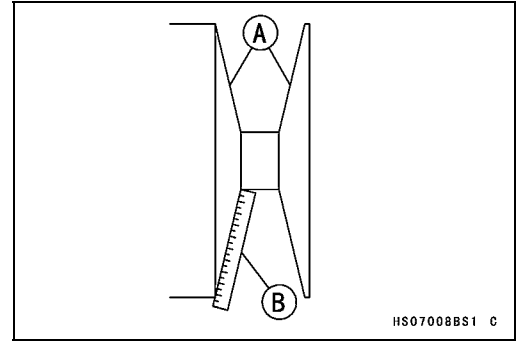
Driven Pulley Inspection

- ★ If the sheave surfaces [A] appear damaged, replace the sheaves.



Driven Pulley

- Replace the sheave with uneven wear on the belt contacting surfaces.
 Sheave Surface [A]
 Straight Edge [B]



- ★ If the sheave bushings [A] are damaged or worn, replace the movable sheave.

Sheave Bushing Inside Diameter

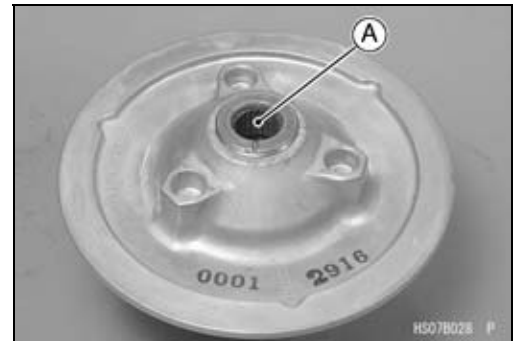
Standard: 40.000 ~ 40.039 mm (1.5748 ~ 1.5763 in.)

Service Limit: 40.079 mm (1.5779 in.)

- Inspect seals for damage.
- ★ If seals are damaged, replace the movable sheave.



- ★ If the splines [A] are damaged or worn, replace the fixed sheave.

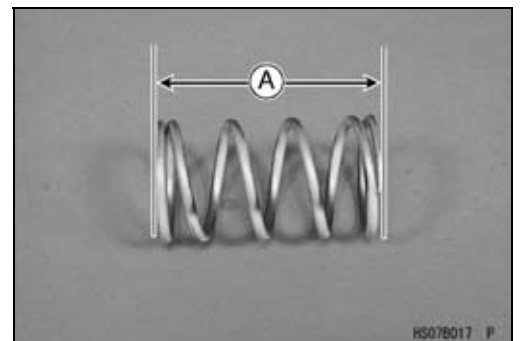


- ★ If the spring is damaged or worn, replace the spring.

Spring Free Length [A]

Standard: 99.5 mm (3.92 in.)

- ★ If the spring coils are distorted, replace the spring.

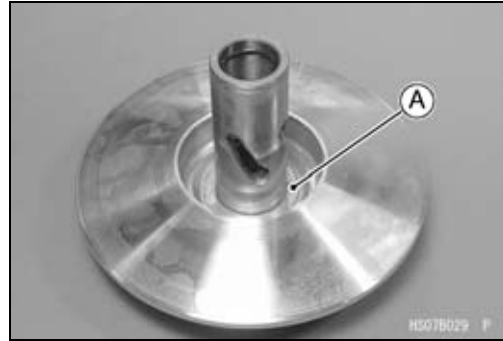


6-24 CONVERTER SYSTEM

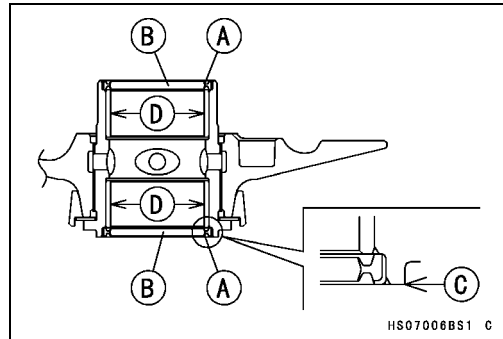
Driven Pulley

Driven Pulley Assembly

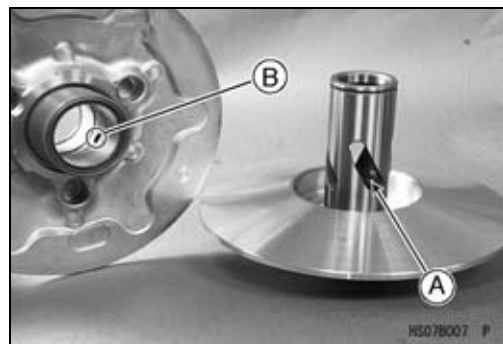
- Clean off any grease or dirt on the movable and fixed sheaves, and dry them with a clean cloth.
- Install:
 - Spacers [A] (for Drive Belt Deflection Adjustment)



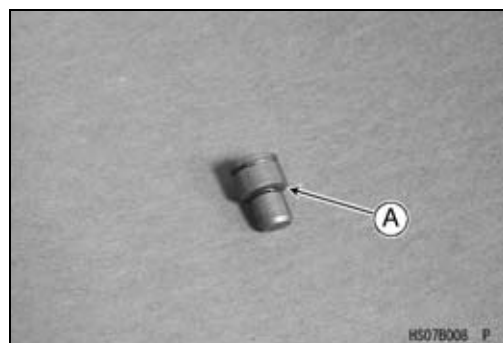
- Apply grease to the oil seal lips [A].
- Press the oil seals [B] in the movable sheave assembly so that the oil seal surface is flush [C] with the sleeve end.
- Apply [D] molybdenum disulfide grease to the inner surfaces of the bushings.



- Align the match-marks on the sheaves, made when disassembled, and the opening [A] and hole [B] will be matched easily.



- Apply molybdenum disulfide grease to the seating surface [A] of the pins, and insert them into the holes in the movable sheave.



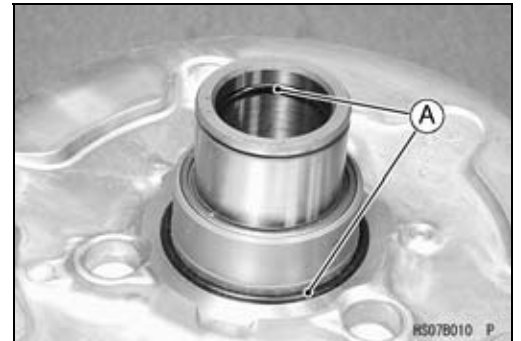
Driven Pulley

- Draw the movable sheave onto the fixed sheave, and apply molybdenum disulfide grease of 1 g (0.035 oz) to all openings [A].

NOTE

○ Do not heap up the grease out of the openings.

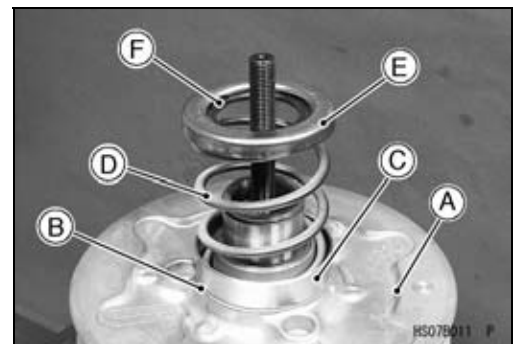
- Check that the O-rings [A] are in good condition.
- ★ If any of the O-rings are damaged, replace them.
- Apply grease to the O-rings.



- Hold the drive pulley holder in a vise.
- **Special Tool - Drive Pulley Holder: 57001- 1473**
- Screw the guide bar of the spring holder set into the holder.

● **Special Tool - Spring Holder Set: 57001-1483**

- Put the driven pulley [A] onto the guide bar.
- Put the thrust plate [B] so that the alloy side (gray) faces the movable sheave.
- Install:
 - Spring Seat [C]: 18.5 mm (0.728 in.)
 - Spring [D]
 - Spring Seat [E]: 9.3 mm (0.366 in.)
 - Circlip [F]



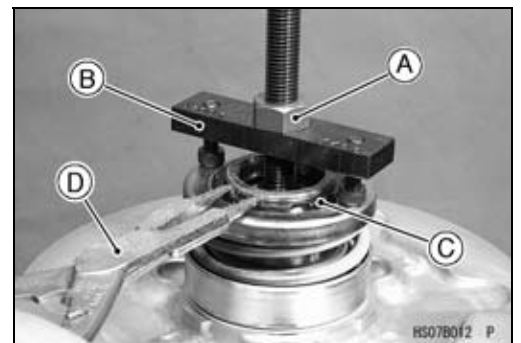
- Tighten the nut [A], and compress the spring with the spring holder [B].

● **Special Tool - Spring Holder Set: 57001-1483**

- Install the circlip [C] with the circlip pliers [D].

● **Special Tool - Circlip Pliers: 57001-154**

- Remove the driven pulley from the spring holder set.
- Clean the surface of the sheaves with an oil-less cleaning fluid.



6-26 CONVERTER SYSTEM

Driven Pulley

Driven Pulley Installation

- Clean the transmission driven shaft [A].
- Install:
 - Driven Pulley

NOTE

○ When engaging the spline on the driven pulley with the spline [B] on the shaft, do not damage the pulley's spline. If any damage occurs, remove it with a file.

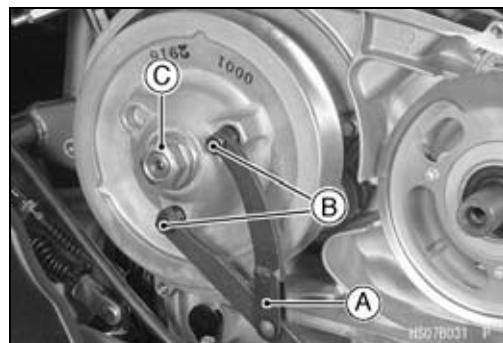
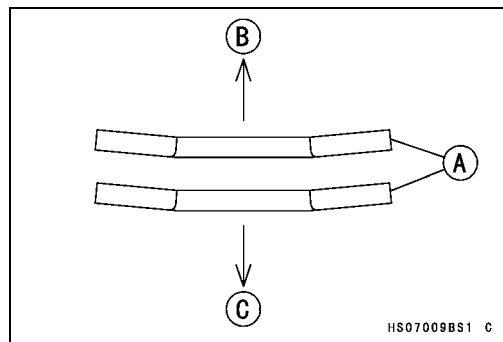
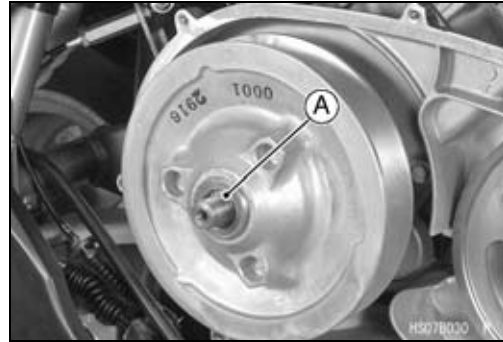
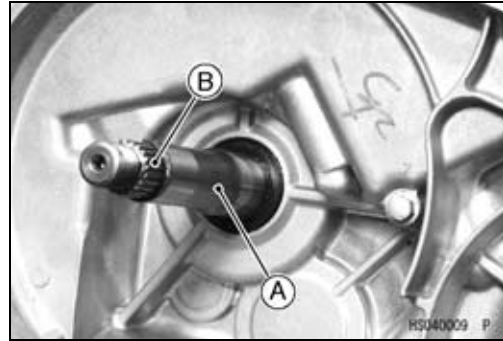
- Clean the driven shaft and driven pulley ends to open the air vent passage. Wipe off any extra grease.
- Wipe off any protruding grease [A].

- Install the washers [A] on the shaft as shown.
 - Crankcase Side [B]
 - Bolt Head [C]

- Using a flywheel & pulley holder [A] and pulley holder attachments [B], tighten the driven pulley nut [C].

Special Tools - Flywheel & Pulley Holder: 57001-1343
Pulley Holder Attachment: 57001-1472

Torque - Driven Pulley Nut: 93 N·m (9.5 kgf·m, 69 ft·lb)



High Altitude Setting Information

Specifications

Altitude	Carburetor
	Main Jet
0 ~ 500 m (0 ~ 1 600 ft)	Front: #135 P/No. (92063-1014) (STD) Rear: #140 P/No. (92063-1013) (STD)
500 ~ 1 500 m (1 600 ~ 4 900 ft)	Front: #132 P/No. (92063-1076) Rear: #138 P/No. (92063-1015)
1 500 ~ 2 500 m (4 900 ~ 8 200 ft)	Front: #130 P/No. (92063-1075) Rear: #135 P/No. (92063-1014)
2 500 ~ 3 500 m (8 200 ~ 11 500 ft)	Front: #128 P/No. (92063-1074) Rear: #130 P/No. (92063-1075)
3 500 ~ 4 500 m (11 500 ~ 14 800 ft)	Front: #120 P/No. (92063-1073) Rear: #125 P/No. (92063-1069)

★There is not high altitude setting for belt converter.

Engine Lubrication System

TABLE OF CONTENTS

Exploded View	7- 2
Specifications	7- 4
Special Tools and Sealant	7- 5
Engine Oil Flow Chart.....	7- 6
Engine Oil and Oil Filter.....	7- 7
Oil Level Inspection.....	7- 7
Engine Oil Change.....	7- 7
Oil Filter Change	7- 7
Oil Screen Removal	7- 7
Oil Screen Cleaning	7- 8
Oil Pressure Measurement	7- 8
Oil Pressure Relief Valve.....	7- 9
Oil Pressure Relief Valve Removal	7- 9
Oil Pressure Relief Valve Installation	7- 9
Oil Pressure Relief Valve Inspection	7- 9
Oil Pump.....	7-10
Oil Pump Removal.....	7-10
Oil Pump Installation	7-10
Oil Pipe	7-12
Oil Pipe Removal	7-12
Oil Pipe Installation	7-13

ENGINE LUBRICATION SYSTEM 7-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Filter	18	1.8	13	R
2	Oil Pressure Switch	15	1.5	11	SS
3	Oil Pipe Bolts	8.8	0.90	78 in·lb	
4	Engine Drain Plug	20	2.0	14	
5	Oil Pressure Relief Valve	15	1.5	11	L
6	Oil Pump Bolts	8.8	0.90	78 in·lb	
7	Chain Guide Bolts	8.8	0.90	78 in·lb	
8	Oil Pump Drive Chain Tensioner Bolt	25	2.5	18	
9	Oil Filter Mounting Bolt	25	2.5	18	L (15 mm)
10	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	

G: Apply grease for oil seal and O-ring.

L: Apply a non-permanent locking agent.

O: Apply engine oil.

SS: Apply silicone sealant (Kawasaki Bond: 56019–120).

R: Replacement Parts

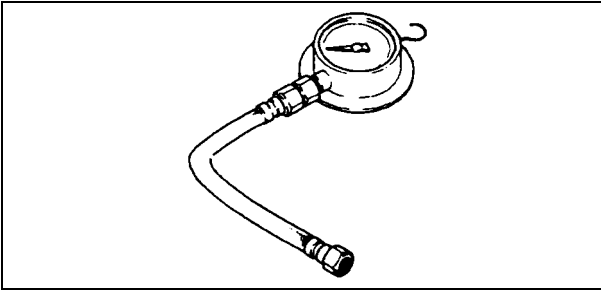
7-4 ENGINE LUBRICATION SYSTEM

Specifications

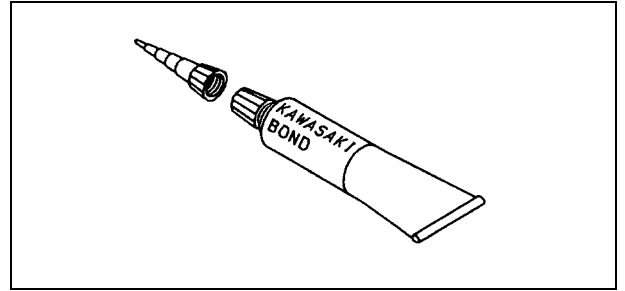
Item	Standard
Engine Oil: Grade Viscosity Capacity	API SF or SG API SH or SJ with JASO MA SAE 10W-40 1.7 L (1.80 US qt) (when filter is not removed) 1.9 L (2.01 US qt) (when filter is removed) 2.2 L (2.33 US qt) (when engine is completely dry)
Oil Pressure Measurement: Oil Pressure @ 4 500 r/min (rpm), oil temp. 110°C (230°F)	480 kPa (4.9 kgf/cm ² , 69.7 psi)

Special Tools and Sealant

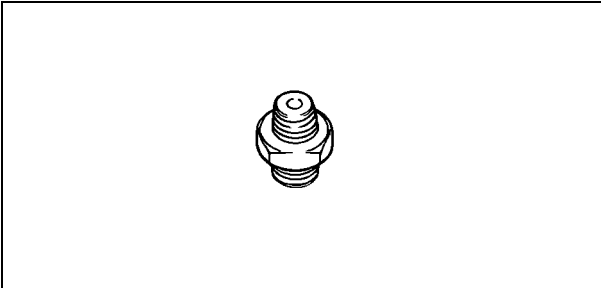
Oil Pressure Gauge, 10 kgf/cm² :
57001-164



Kawasaki Bond (Silicone Sealant) :
56019-120

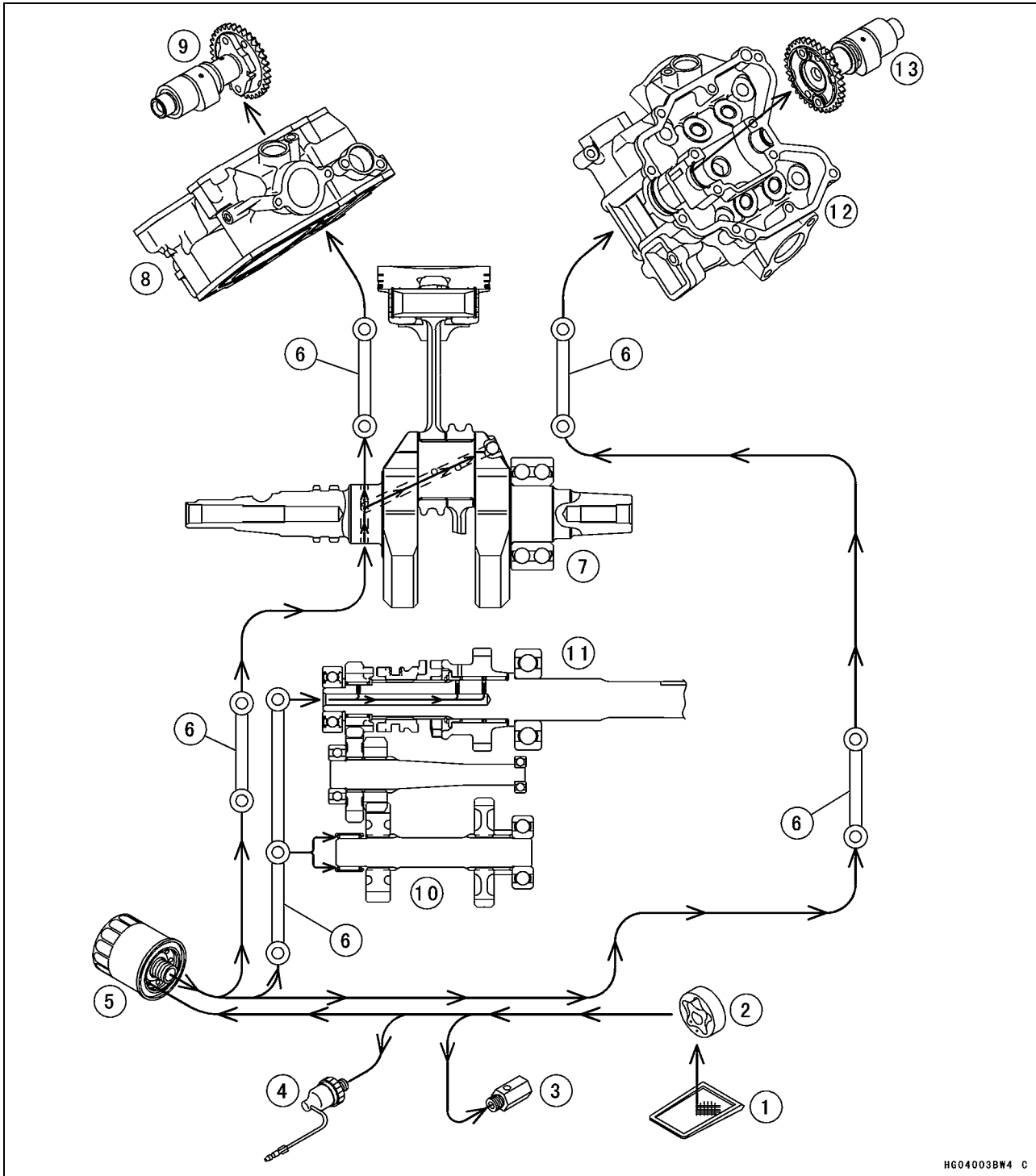


Oil Pressure Gauge Adapter, PT 1/8 :
57001-1033



7-6 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



- 1. Oil Screen
- 2. Oil Pump
- 3. Relief Valve
- 4. Oil Pressure Switch
- 5. Oil Filter

- 6. Oil Pipe
- 7. Crankshaft
- 8. Rear Cylinder Head
- 9. Rear Camshaft
- 10. Transmission Idle Shaft

- 11. Transmission Drive Shaft
- 12. Front Cylinder Head
- 13. Front Camshaft

Engine Oil and Oil Filter

⚠ WARNING

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

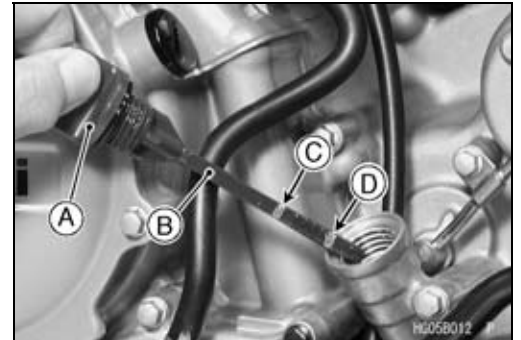
Oil Level Inspection

- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- If the oil has just been changed, start the engine, and run it for several minutes to fill the oil filter.

CAUTION

Allow the engine to idle for several minutes so that oil may reach all parts of the engine. Racing a "dry" engine may cause severe damage.

- Stop the engine and wait several minutes for all the oil to drain back to the sump.
- Unscrew the oil filler cap [A], wipe its dipstick [B] dry, and tighten it into the filler opening.
- Unscrew the oil filler cap and check the oil level. The oil level should be between the upper (H) level line [C] and lower (L) level line [D].
- ★ If the level is too high, suck the excess oil out the filler hole with a syringe or other suitable device.
- ★ If the level is too low, add oil through the filler hole. Use the same type and make of oil that is already in the engine.



Engine Oil Change

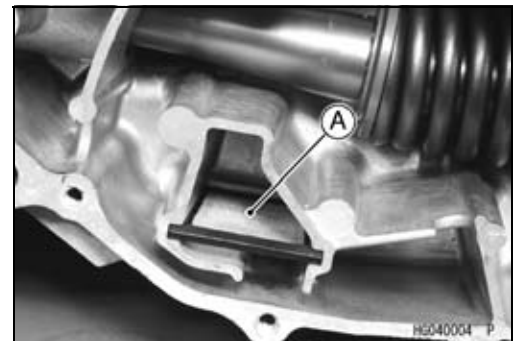
- Refer to the Engine Lubrication System in the Periodic Maintenance chapter.

Oil Filter Change

- Refer to the Engine Lubrication System in the Periodic Maintenance chapter.

Oil Screen Removal

- Split the crankcase (see Crankshaft/Transmission chapter).
- Pull the oil screen [A] out of the crankcase.



7-8 ENGINE LUBRICATION SYSTEM

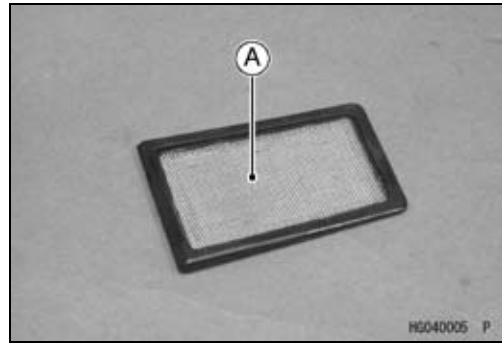
Engine Oil and Oil Filter

Oil Screen Cleaning

- Clean the oil screen [A] thoroughly whenever it is removed for any reason.
- Clean the oil screen with a high flash-point solvent and remove any particles stuck to it.

⚠ WARNING

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



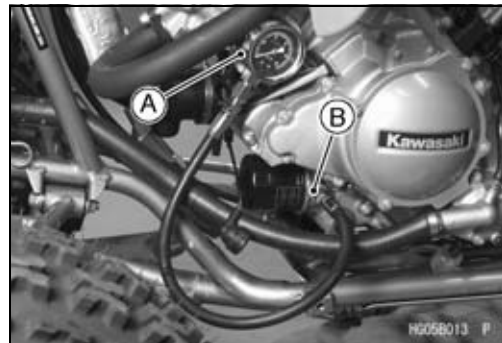
NOTE

- While cleaning the screen, check for any metal particles that might indicate internal engine damage.
- Check the screen carefully for any damage, holes, broken wires, or gasket pulling off.
- ★ If the screen is damaged, replace it.

Oil Pressure Measurement

NOTE

- Measure the oil pressure after the engine is warmed up.
 - Remove the oil pressure switch, and attach the oil pressure gauge [A] and adapter [B].
- Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164**
Oil Pressure Gauge Adapter: 57001-1033



Oil Pressure

Standard: 480 kPa (4.9 kgf/cm², 69.7 psi) @ 4 500 r/min (rpm), 110°C (230°F) of oil temp.

- ★ If the oil pressure is much lower than the standard, inspect the relief valve, oil pump, and/or crankshaft bearing insert wear.
- ★ If the oil pressure is much higher than the standard, inspect the oil filter, oil screen, and other areas of the lubrication system for clogging.
- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

Take care against burns from hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply silicone sealant to the oil pressure switch, and tighten it.

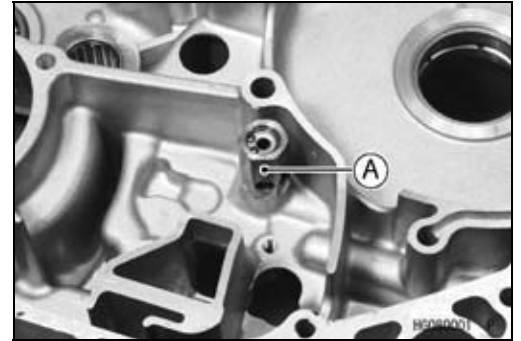
Sealant - Kawasaki Bond (Silicone Sealant): 56019-120

Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)
Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal

- Split the crankcase (see Crankshaft / Transmission chapter).
- Remove the oil pressure relief valve [A].



Oil Pressure Relief Valve Installation

- See crankcase assembly (See Crankshaft / Transmission chapter).
- Apply a non-permanent locking agent to the threads of oil pressure relief valve, and tighten it.

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

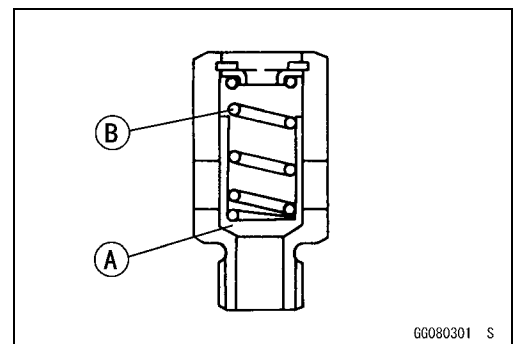
Oil Pressure Relief Valve Inspection

- Remove the relief valve.
- Using a wooden stick, push the inner valve to make sure that the valve [A] moves smoothly and that it returns to its original position by the force of the spring [B].

NOTE

○ *The relief valve cannot be disassembled and it must be inspected in the assembled state.*

- ★ If the valve movement is not smooth, wash the relief valve with high flash-point solvent, and use compressed air to remove any foreign particles from it.



⚠ WARNING

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

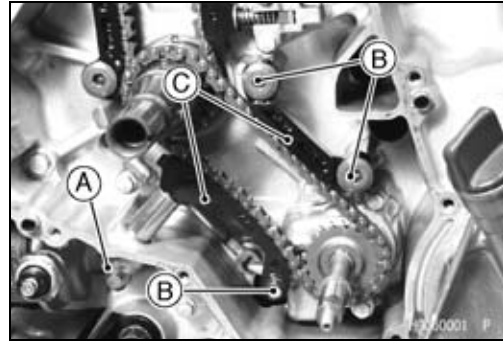
- ★ If the valve does not move smoothly even after washing it, replace the relief valve. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

7-10 ENGINE LUBRICATION SYSTEM

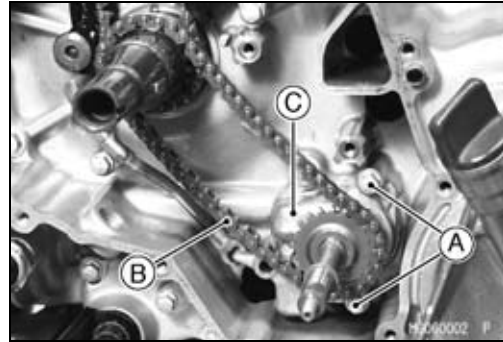
Oil Pump

Oil Pump Removal

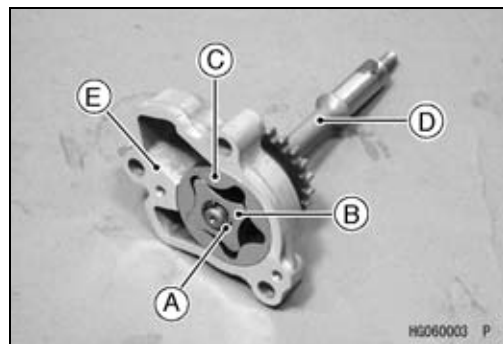
- Remove:
 - Alternator Rotor and Starter Clutch Gear (see Electrical System chapter)
 - Oil Pump Drive Chain Tensioner Bolt [A]
 - Chain Guide Bolts [B] and Collar
 - Chain Guides [C]



- Remove:
 - Oil Pump Bolts [A]
 - Oil Pump Drive Chain [B] and Oil Pump Assembly [C]



- Remove:
 - Circlip [A]
 - Inner Rotor [B]
 - Outer Rotor [C]
 - Oil Pump Drive Shaft [D]
 - Oil Pump Cover [E]

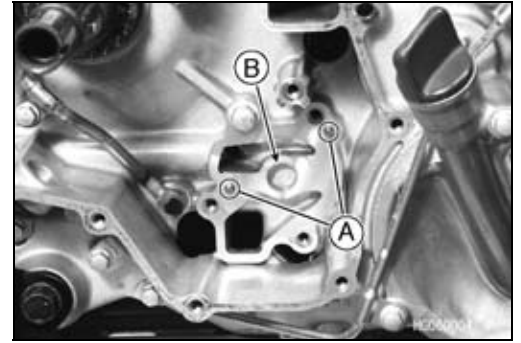


Oil Pump Installation

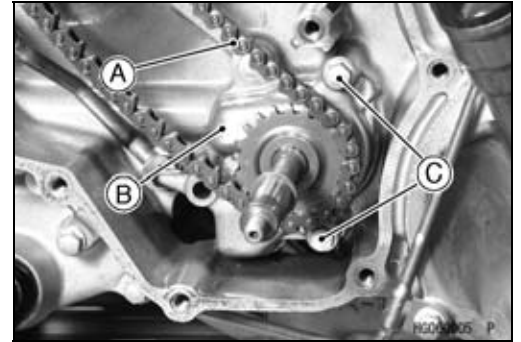
- Apply engine oil:
 - Oil Pump Shaft
 - Inner and Outer Rotors
- Install:
 - Oil Pump Drive Shaft
 - Oil Pump Cover
 - Inner Rotor
 - Outer Rotor
 - New Circlip

Oil Pump

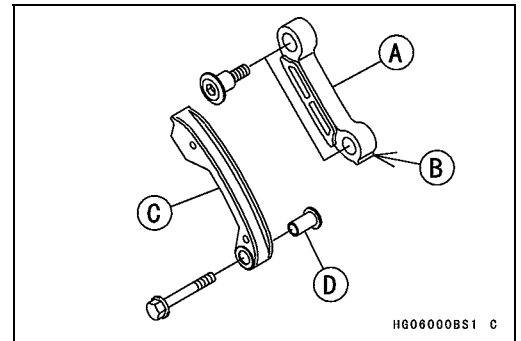
- Check to see that the dowel pins [A] are in place.
- Apply engine oil to the oil pump hole [B].



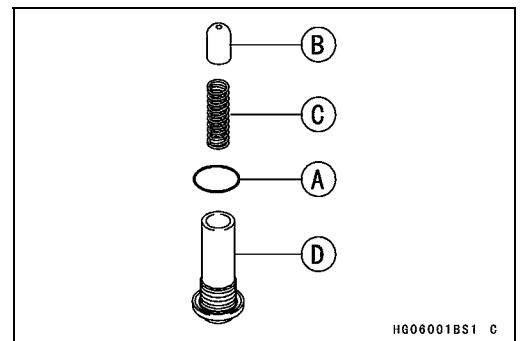
- Install the oil pump drive chain [A] with the oil pump assembly [B].
- Tighten:
 - Torque - Oil Pump Bolts [C]: 8.8 N·m (0.90 kgf·m, 78 in·lb)**



- Install:
 - Upper Chain Guide [A] (Face the tab [B] downward.)
 - Lower Chain Guide [C] and Collar [D]
- Tighten:
 - Torque - Chain Guide Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**



- Apply grease to the O-ring [A].
- Install:
 - Pin [B]
 - Spring [C]
 - O-ring
 - Oil Pump Drive Chain Tensioner Bolt [D]
- Tighten:
 - Torque - Oil Pump Drive Chain Tensioner Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**



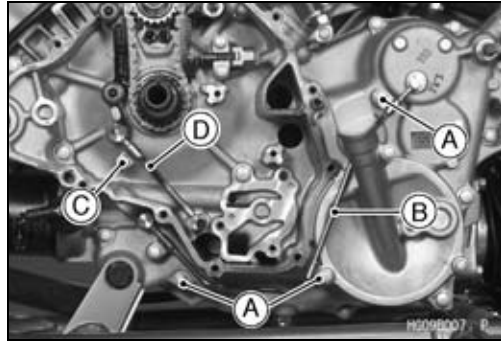
7-12 ENGINE LUBRICATION SYSTEM

Oil Pipe

Oil Pipe Removal

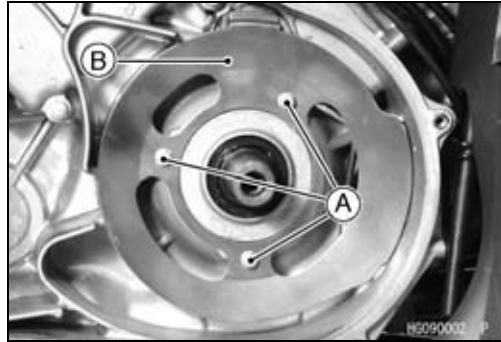
Engine Left Side Oil Pipe:

- Remove:
 - Alternator Cover (see Electrical System chapter)
 - Oil Pipe Bolts [A]
 - Oil Pipe [B]
 - Oil Pump (see Oil Pump Removal)
 - Oil Pipe Bolts [C]
 - Oil Pipe [D]

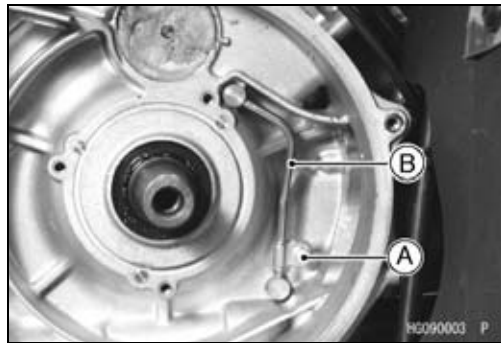


Engine Right Side Oil Pipe:

- Remove:
 - Drive Pulley (see Torque Converter chapter)
 - Plate Bolts [A]
 - Plate [B]



- Remove:
 - Oil Pipe Bolt [A]
 - Oil Pipe [B]



Engine Inside Oil Pipe:

- Remove:
 - Cylinder Head (see Engine Top End chapter)
 - Oil Pipe [A]

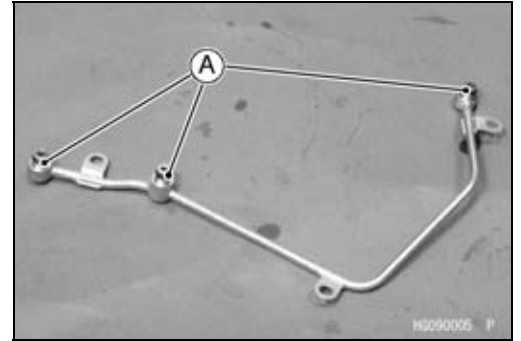


Oil Pipe

Oil Pipe Installation

- Replace the O-ring [A] with new ones.
- Apply engine oil to the O-rings before installation.
- Tighten:

Torque - Oil Pipe Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



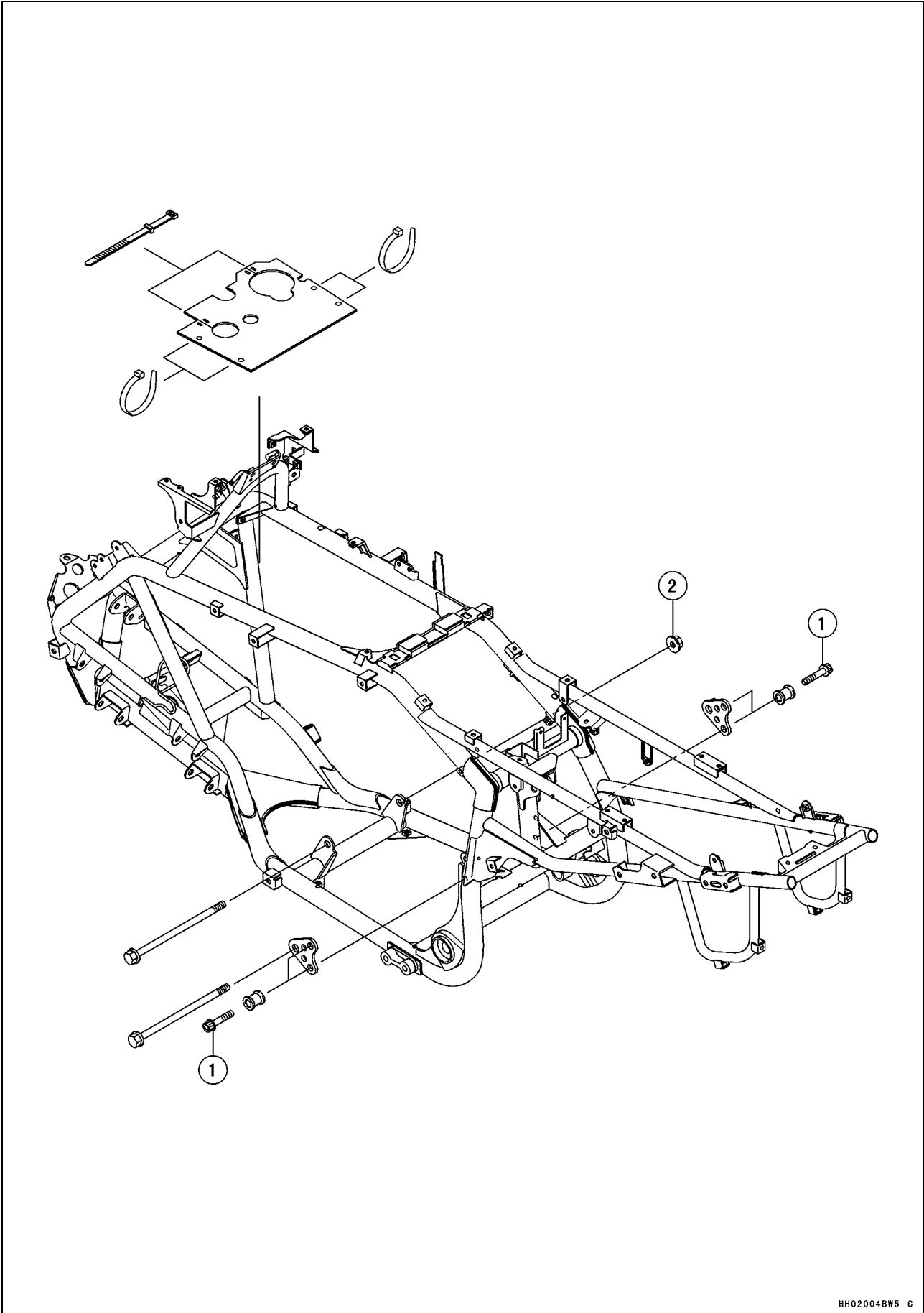
Engine Removal/Installation

TABLE OF CONTENTS

Exploded View	8- 2
Engine Removal/Installation	8- 4
Engine Removal.....	8- 4
Engine Installation.....	8- 5

8-2 ENGINE REMOVAL/INSTALLATION

Exploded View



ENGINE REMOVAL/INSTALLATION 8-3

Exploded View

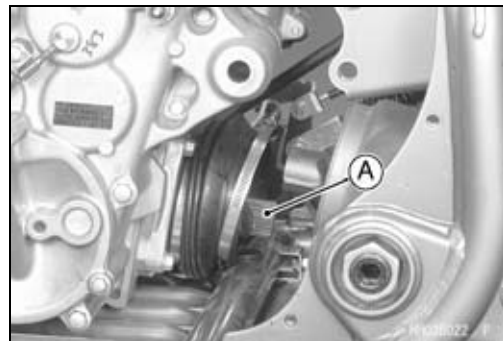
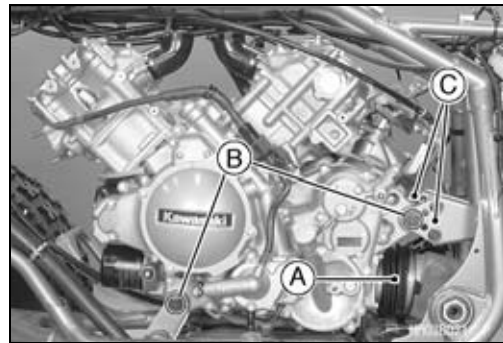
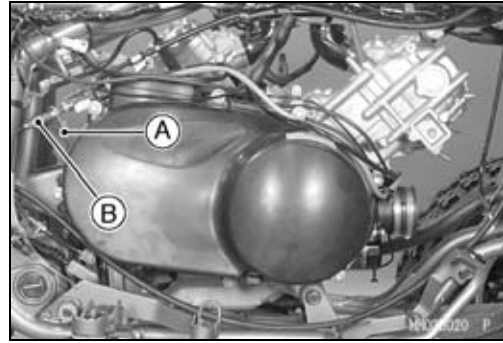
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Mounting Bracket Bolts	52	5.3	38	
2	Engine Mounting Nut	62	6.3	46	

8-4 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

Engine Removal

- Remove:
 - Engine Oil (drain)
 - Coolant (drain) and Coolant Hose
 - Front Fender and Rear Fender (see Frame chapter)
 - Side Inner Covers (see Frame chapter)
 - Muffler and Exhaust Pipe (see Engine Top End chapter)
 - Carburetor (see Fuel System chapter)
 - Intake and Exhaust Converter Duct
 - Alternator Lead Connector
 - Crankshaft Sensor Lead Connector
 - Foot Guards and Guard (see Frame chapter)
 - Cable Holder [A] and Reverse Lock Cable [B] (see Crankshaft/Transmission chapter)
 - Oil Pressure Switch Lead Connector
 - Spark Plug Caps
- Remove:
 - Starter Motor Cable
 - Battery Negative Cable
 - Neutral Switch Lead Connector
 - Reverse Switch Lead Connector
 - Boot (roll up forward) [A]
 - Engine Mounting Bolts [B]
 - Engine Mounting Bracket [C]
- Put a tape to protect the frame.
- Move the engine forward to remove the drive shaft [A].
- Remove the engine as shown.



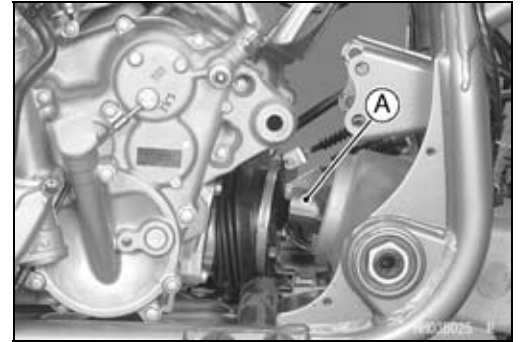
Engine Removal/Installation

Engine Installation

- Roll up the boot [A] toward the engine.



- Insert the drive shaft in the rear propeller shaft joint [A].
- Tighten:
 - Torque - Engine Mounting Bracket Bolts: 52 N·m (5.3 kgf·m, 38 ft·lb)**
 - Engine Mounting Nut: 62 N·m (6.3 kgf·m, 46 ft·lb)**



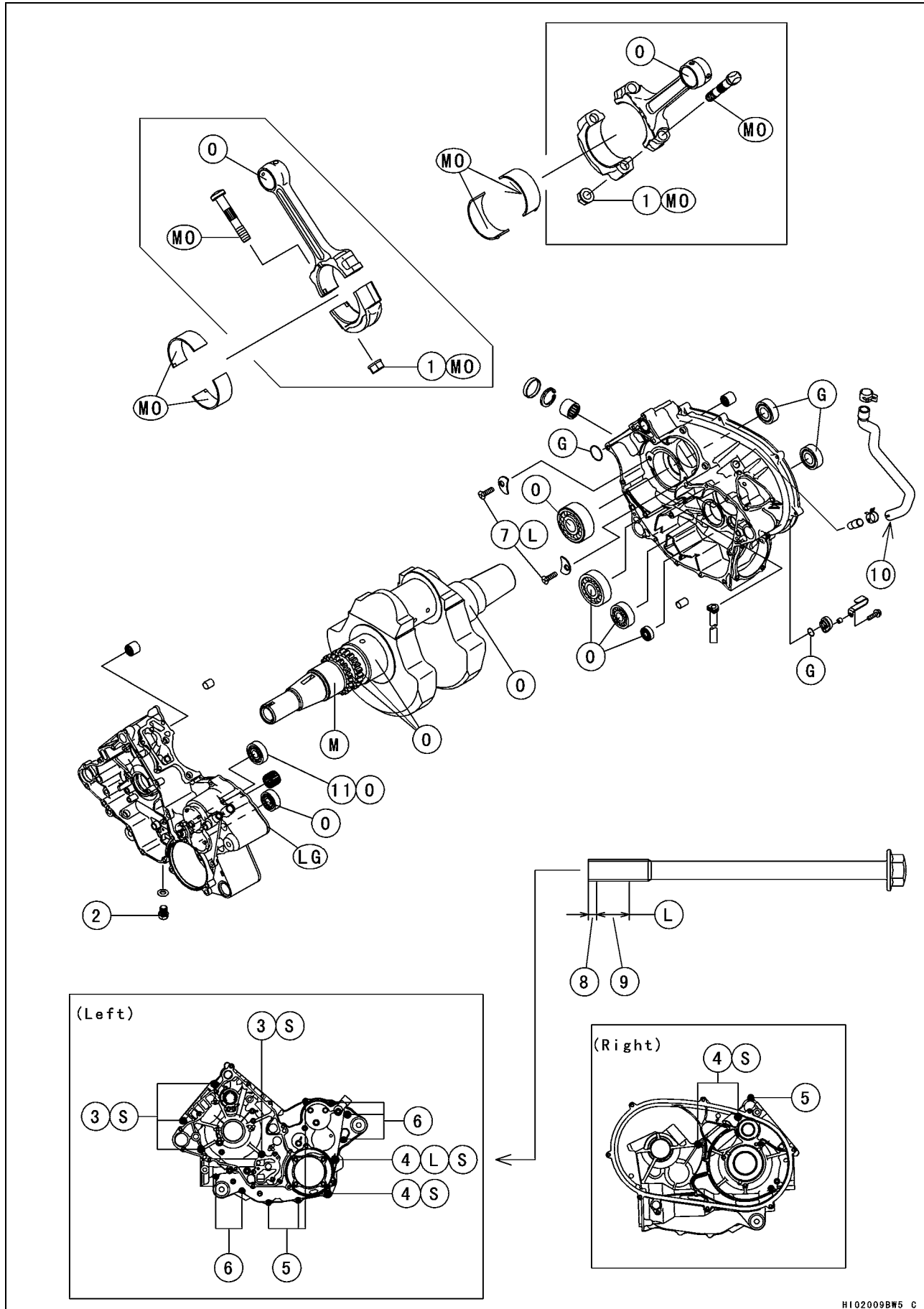
Crankshaft / Transmission

TABLE OF CONTENTS

Exploded View	9- 2
Specifications	9- 6
Special Tools and Sealant	9- 8
Crankcase	9- 9
Crankcase Disassembly	9- 9
Crankcase Assembly	9-10
Crankshaft/Connecting Rod	9-13
Crankshaft Removal	9-13
Crankshaft Installation	9-13
Connecting Rod Removal	9-13
Connecting Rod Installation	9-13
Crankshaft/Connecting Rod Cleaning	9-14
Connecting Rod Bend	9-14
Connecting Rod Twist	9-14
Connecting Rod Big End Side Clearance	9-15
Connecting Rod Big End Bearing/Crankpin Wear	9-15
Crankshaft Runout	9-17
Crankshaft Main Bearing/Journal Wear	9-17
Transmission	9-18
Shift Lever Removal	9-18
Shift Lever Installation	9-18
Shift Control Cables Removal	9-19
Shift Control Cables Installation	9-19
Reverse Lock Cable Removal	9-20
Reverse Lock Cable Installation	9-20
Transmission Removal	9-21
Transmission Installation	9-22
Shift Fork Bending	9-24
Shift Fork/Gear and Shifter Groove Wear	9-24
Transmission and Shift Mechanism Inspection	9-25
Ball Bearing, Needle Bearing, and Oil Seal	9-27
Ball and Needle Bearing Replacement	9-27
Ball and Needle Bearing Wear	9-27
Oil Seal Inspection	9-27

9-2 CRANKSHAFT / TRANSMISSION

Exploded View



CRANKSHAFT / TRANSMISSION 9-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Connecting Rod Big End Cap Nuts	34	3.5	25	MO
2	Engine Drain Plug	20	2.0	14	
3	Crankcase Bolts (M8) 75 mm (2.95 in.)	20	2.0	14	S
4	Crankcase Bolts (M8) 110 mm (4.33 in.)	20	2.0	14	L(1), S
5	Crankcase Bolts (M6) 40 mm (1.57 in.)	9.8	1.0	87 in·lb	
6	Crankcase Bolts (M6) 65 mm (2.56 in.)	9.8	1.0	87 in·lb	
7	Position Plate Mounting Screws	4.9	0.50	43 in·lb	L

8. Do not apply a non-permanent locking agent to this area (2 ~ 3 mm, 0.08 ~ 0.12 in.).

9. About 12 mm (0.47 in.)

10. White Mark: Face the mark backwards and align it with the crankcase mark.

11. Face the seal of the bearing to the left side (outward).

G: Apply grease for oil seal and O-ring.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket (Three Bond 1215, Gray).

M: Apply molybdenum disulfide grease.

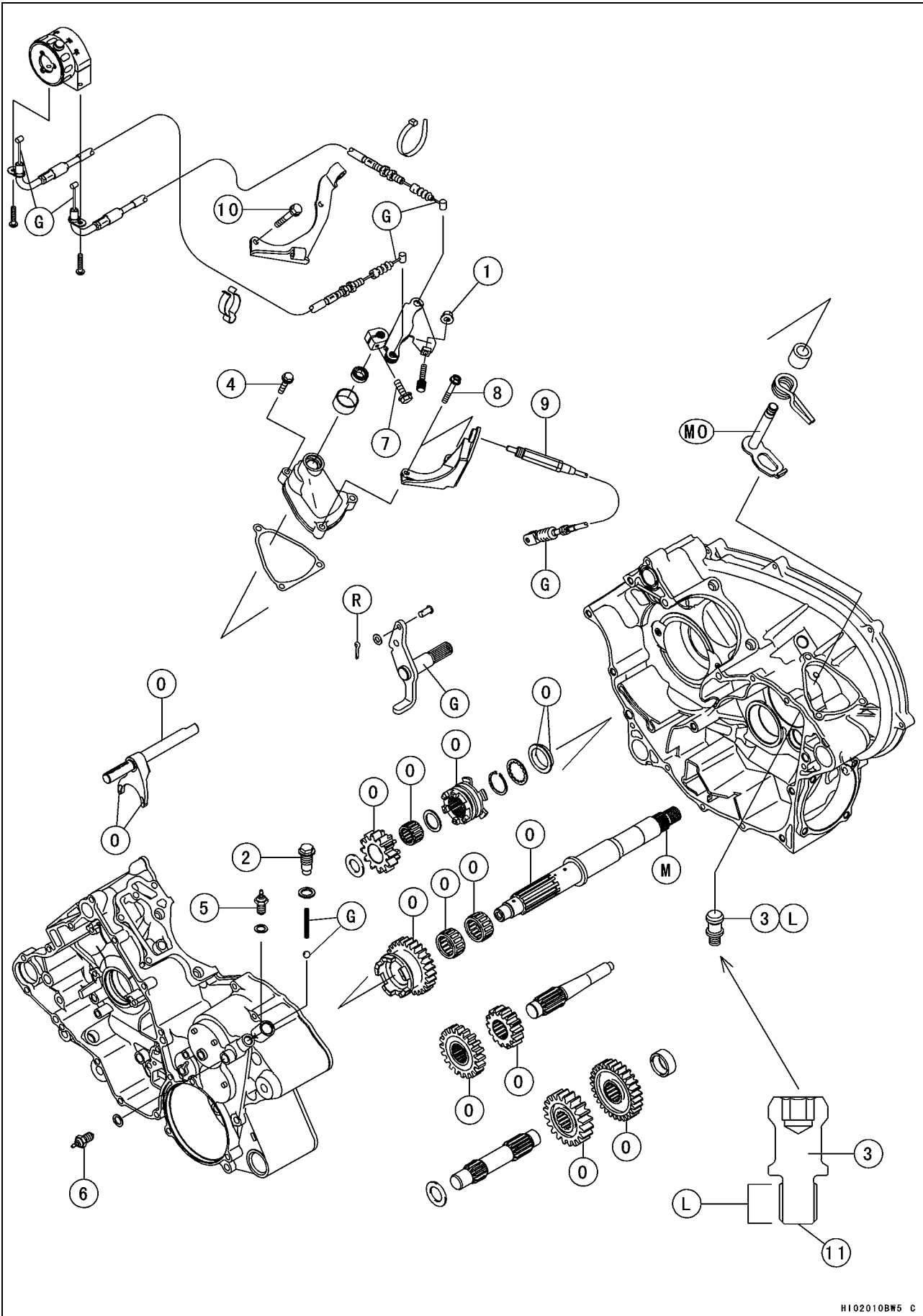
MO: Apply molybdenum disulfide oil.

O: Apply engine oil.

S: Follow the specific tightening sequence.

9-4 CRANKSHAFT / TRANSMISSION

Exploded View



CRANKSHAFT / TRANSMISSION 9-5

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Shift Shaft Lever Nut	8.8	0.90	78 in·lb	
2	Shift Shaft Positioning Bolt	25	2.5	18	
3	Shift Shaft Spring Bolt	25	2.5	18	L
4	Shift Shaft Cover Bolt	8.8	0.90	78 in·lb	
5	Neutral Position Switch	15	1.5	11	
6	Reverse Position Switch	15	1.5	11	
7	Shift Shaft Lever Bolt	14	1.4	10	
8	Reverse Cable Bracket Mounting Bolts	8.8	0.90	78 in·lb	
9	Reverse Cable Locknut	12	1.2	104 in·lb	
10	Cable Holder Mounting Bolts	9.8	1.0	87 in·lb	

11. Do not apply a non-permanent locking agent to this end.

G: Apply grease.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

MO: Apply molybdenum disulfide oil.

O: Apply engine oil.

R: Replacement Parts

9-6 CRANKSHAFT / TRANSMISSION

Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rods:		
Connecting rod bend	— — —	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting rod twist	— — —	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting rod big end side clearance	0.16 ~ 0.46 mm (0.0063 ~ 0.0181 in.)	0.7 mm (0.028 in.)
Connecting rod big end bearing, insert / crankpin clearance	0.028 ~ 0.052 mm (0.0011 ~ 0.0020 in.)	0.09 mm (0.0035 in.)
Crankpin diameter:	39.984 ~ 40.000 mm (1.5742 ~ 1.5748 in.)	39.97 mm (1.5736 in.)
Marking: None	39.984 ~ 39.992 mm (1.5742 ~ 1.57449 in.)	— — —
○	39.993 ~ 40.000 mm (1.57452 ~ 1.5748 in.)	— — —
Connecting rod big end inside diameter:	43.000 ~ 43.016 mm (1.6929 ~ 1.6939 in.)	— — —
Marking: None	43.000 ~ 43.008 mm (1.6929 ~ 1.69323 in.)	— — —
○	43.009 ~ 43.016 mm (1.69326 ~ 1.6935 in.)	— — —
Connecting rod big end bearing insert thickness:		
Brown	1.482 ~ 1.486 mm (0.05835 ~ 0.05850 in.)	— — —
Yellow	1.486 ~ 1.490 mm (0.05850 ~ 0.05866 in.)	— — —
Green	1.490 ~ 1.494 mm (0.05866 ~ 0.05882 in.)	— — —

Connecting rod big end bearing insert selection:

Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92028-1963
None	None	Yellow	92028-1962
○	○		
○	None	Green	92028-1961

Crankshaft runout	TIR 0.04 mm (0.0016 in.) or less	TIR 0.10 mm (0.0039 in.)
Crankshaft main journal diameter:		
φ42 Side	41.984 ~ 42.000 mm (1.6529 ~ 1.6535 in.)	41.96 mm (1.652 in.)
Crankshaft main bearing bore diameter:		
φ42 Side	42.025 ~ 42.041 mm (1.6545 ~ 1.6552 in.)	42.08 mm (1.6567 in.)

CRANKSHAFT / TRANSMISSION 9-7

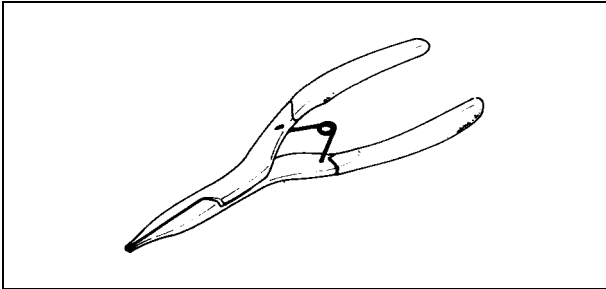
Specifications

Item	Standard	Service Limit
Transmission		
Shift fork ear thickness	5.9 ~ 6.0 mm (0.2322 ~ 0.2362 in.)	5.8 mm (0.228 in.)
Shifter groove width	6.05 ~ 6.15 mm (0.2382 ~ 0.2421 in.)	6.25 mm (0.246 in.)

9-8 CRANKSHAFT / TRANSMISSION

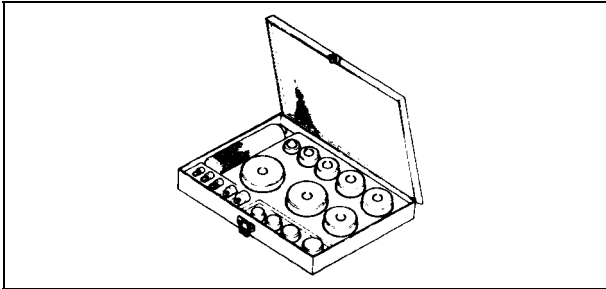
Special Tools and Sealant

Outside Circlip Pliers :
57001-144



Three Bond : 1215 (Gray)

Bearing Driver Set :
57001-1129



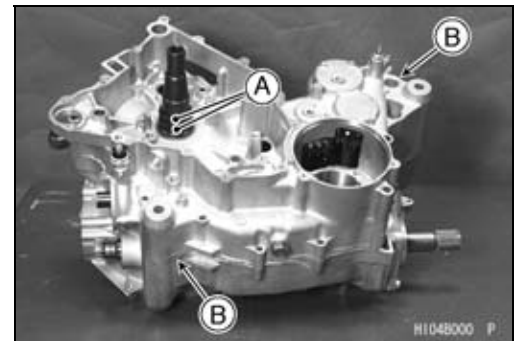
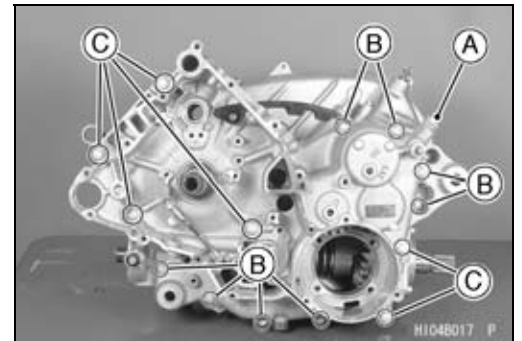
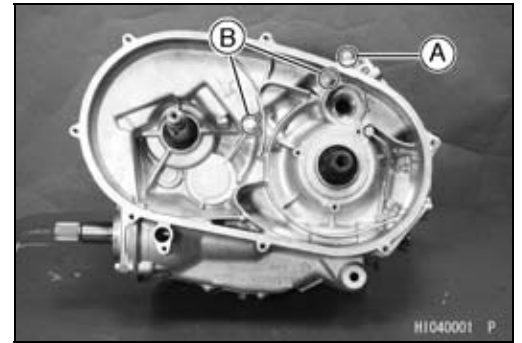
Crankcase

Crankcase Disassembly

- Remove:
 - Engine (see Engine Removal/Installation chapter)
 - Starter Motor (see Electrical System chapter)
 - Oil Filter (see Engine Lubrication System chapter)
 - Cylinder Blocks and Pistons (see Engine Top End chapter)
 - Intermediate Shaft and Chain (see Engine Top End chapter)
 - Right Crankcase Bolts (M6) [A]
 - Right Crankcase Bolts (M8) [B]

- Remove:
 - Shift Shaft Positioning Bolt [A], Washer, Spring, and Steel Ball
 - Left Crankcase Bolts (M6) [B]
 - Left Crankcase Bolts (M8) [C]

- Wrap the teeth on the sprockets [A] by taping for protecting the bushing in the crankcase.
- Using the pry points [B], split the crankcase halves.
- Lift off the left crankcase half.



9-10 CRANKSHAFT / TRANSMISSION

Crankcase

Crankcase Assembly

CAUTION

The right and left crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

NOTE

- Be certain that all parts are cleaned thoroughly before assembly.
- Blow through all oil passages with compressed air to clear any blockage in the crankcase halves and crankshaft.

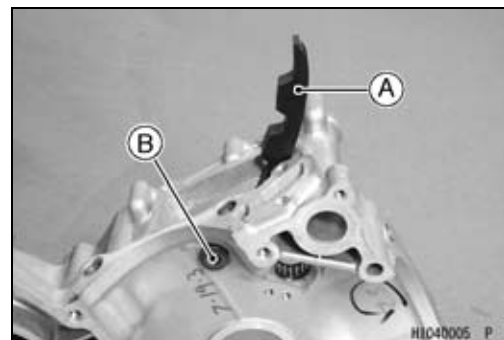
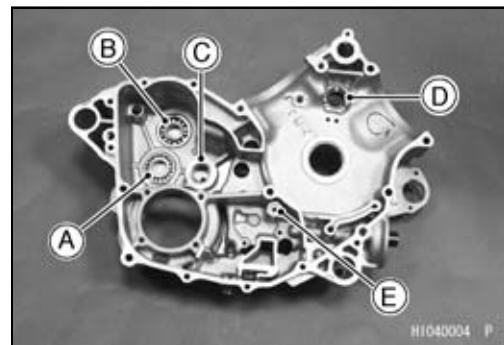
⚠ WARNING

Clean the engine parts 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 low flash-point solvents to clean parts. A fire or explosion could result.

- Apply a small amount of engine oil to the transmission gears, bearings and shift fork.
- Be sure the mating surfaces of the crankcase halves are clean and dry.
- Press and insert the new ball bearings until they are bottomed.

Special Tool - Bearing Driver Set: 57001-1129

- [A] Ball Bearing
- [B] Ball Bearing (sealed side towards crankcase)
- Press and insert the new needle bearings so that the bearing surfaces are flush with the end of the hole.
 - [C] Needle Bearing
 - [D] Needle Bearing (Insert it from outside.)
- Apply engine oil to the bearings.
- Install:
 - Oil Pressure Relief Valve [E] (see Engine Lubrication System chapter)
- Install:
 - Rear Cylinder Camshaft Chain Guide [A]
- Tighten:
 - Torque - Rear Cylinder Camshaft Chain Guide Bolt [B]: 20 N·m (2.0 kgf·m, 14 ft·lb)



Crankcase

- Press and insert the new ball bearings [A] until they are bottomed.

Special Tool - Bearing Driver Set: 57001-1129

- Press and insert the new needle bearings so that the bearing surfaces are flush with the end of the hole.

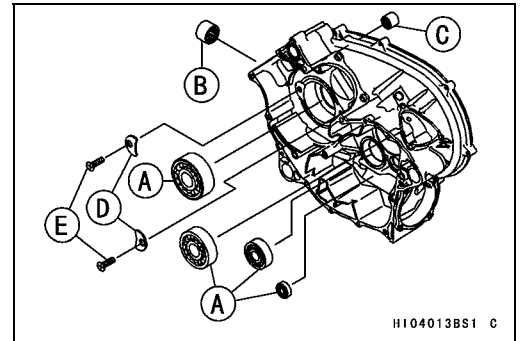
[B] Needle Bearing

[C] Needle Bearing (Insert it from outside.)

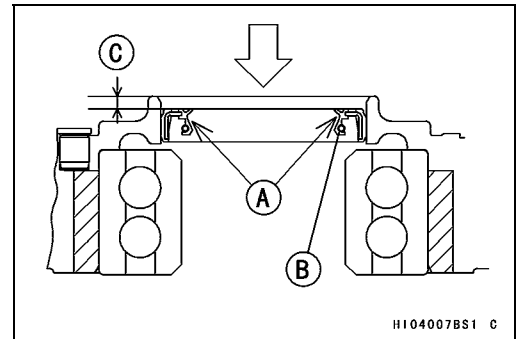
- Apply engine oil to the bearings.
- Install the position plates [D].
- Apply a non-permanent locking agent to the position plate mounting screws [E].
- Tighten:

Torque - Position Plate Mounting Screws: 4.9 N·m (0.50 kgf·m, 43 in·lb)

- Grease the lip [A] of the oil seal [B] and press the seal 3 mm (0.12 in.) [C] inwards from the end of the boss.



H104013BS1 C



H104007BS1 C

- Be sure the following parts are in place in the right crankcase half.

Crankshaft

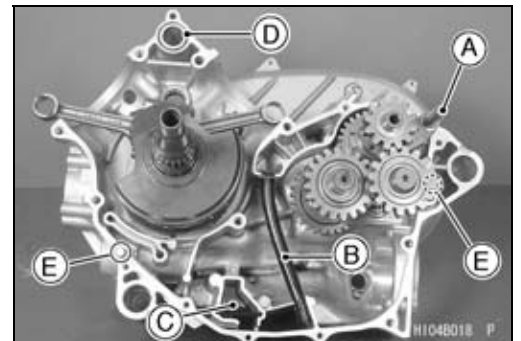
Transmission Shafts and Shift Rod [A]

Oil Tube [B]

Oil Screen [C]

O-ring (Apply Grease) [D]

Dowel Pins [E]

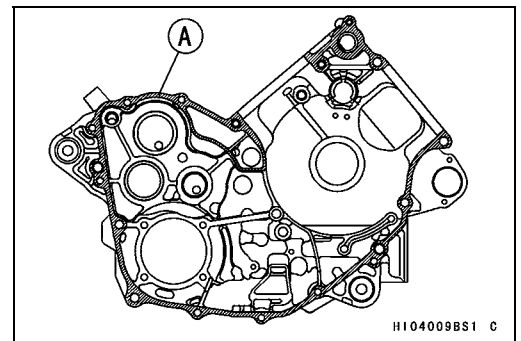


H104B018 P

- Apply liquid gasket [A] to mating surface of the left crankcase half.

Sealant - Three Bond: 1215 (Gray)

- Apply after, must be assembled with in 20 min.



H104009BS1 C

9-12 CRANKSHAFT / TRANSMISSION

Crankcase

- Apply a non-permanent locking agent to the area [C] (12 mm, 0.47 in.) except for the tip [D] (2 ~ 3 mm, 0.08 ~ 0.12 in.).

Left Crankcase Bolt (M8) [3]

- Tighten the right and left crankcase bolts (M8) following the tightening sequence [1 ~ 8].

Torque - Crankcase Bolts (M8): 20 N·m (2.0 kgf·m, 14 ft·lb)

[1, 2, 5, 6] L = 75 mm (2.95 in.)

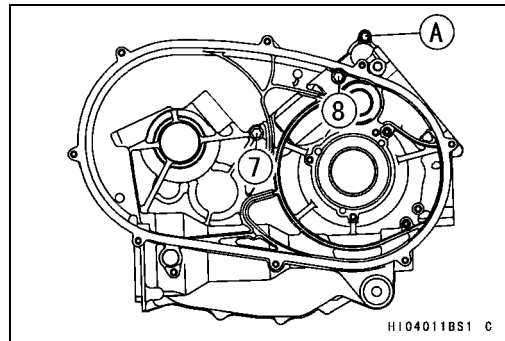
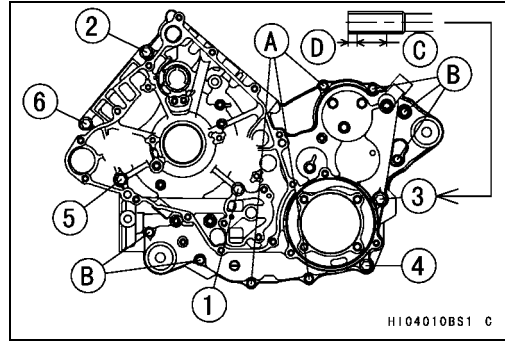
[3, 4, 7, 8] L = 110 mm (4.33 in.)

- Tighten:

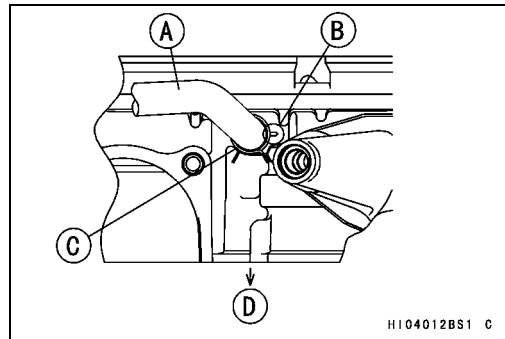
Torque - Crankcase Bolts (M6): 9.8 N·m (1.0 kgf·m, 87 in·lb)

[A] L = 40 mm (1.57 in.)

[B] L = 65 mm (2.56 in.)



- Install the breather tube [A] on the crankcase fitting.
- Align the white line on the tube with the mark [B] on the crankcase.
- Face the open end of the clamp [C] towards the left side [D] as shown.



- Apply grease to the steel ball [A] and spring [B].

- Install:

Steel Ball

Spring

Gasket [C]

Shift Shaft Positioning Bolt [D]

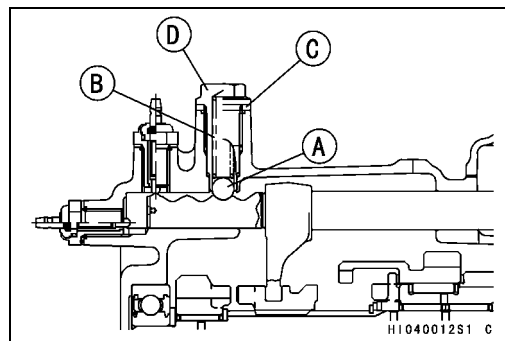
- Tighten:

Torque - Shift Shaft Positioning Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check:

Crankshaft and driven shaft turn freely.

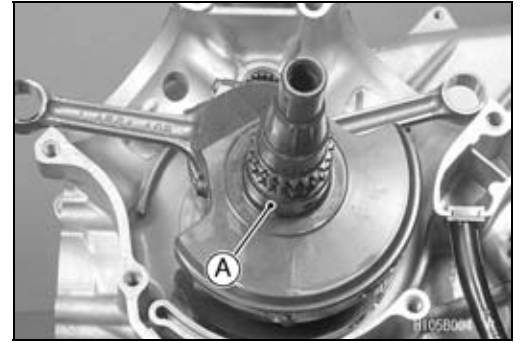
- ★ If any of the shafts do not turn freely, split the crankcase to locate the problem.



Crankshaft/Connecting Rod

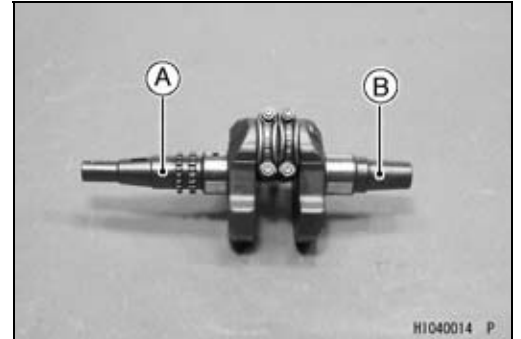
Crankshaft Removal

- Split the crankcase (see Crankcase Disassembly).
- Remove the crankshaft [A] from the crankcase using a press.



Crankshaft Installation

- The left shaft [A] of the crankshaft is longer than the right shaft [B].
- Apply engine oil to the both main journals.
- Insert the right crankshaft tapered end (the shorter end) into the right crankcase using a press.

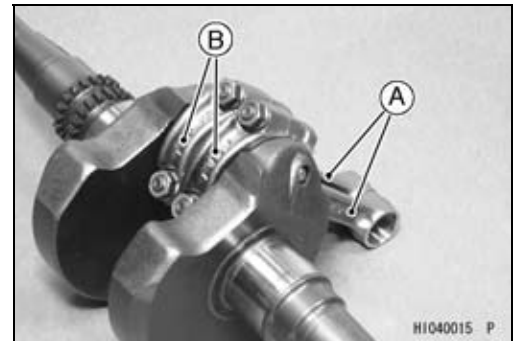


Connecting Rod Removal

- Remove the crankshaft (see Crankshaft Removal).
- Remove the connecting rods [A] from the crankshaft.

NOTE

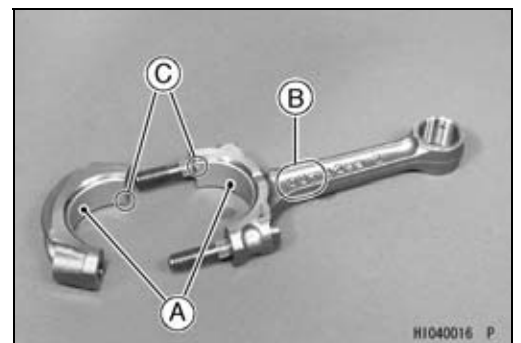
- Mark and record the locations of the connecting rods and their big end caps [B] so that they can be installed in their original positions.
- Remove the connecting rod big end nuts, and take off the rod and cap with the bearing inserts.



Connecting Rod Installation

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

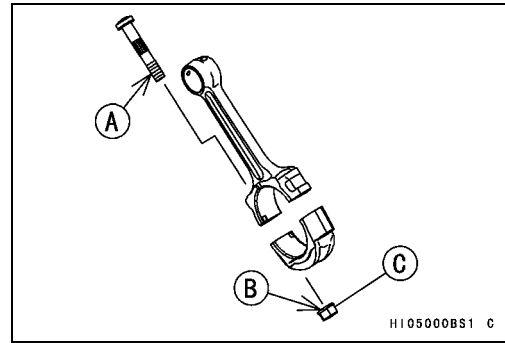
- Apply molybdenum disulfide oil:
Inner Surface [A] of Bearing Inserts
- Face the “OUT” marks [B] of both connecting rods towards the outsides of the crankshaft.
- Fit the connecting rod cap so that the grooves [C] of the cap and connecting rod are on the same side.



9-14 CRANKSHAFT / TRANSMISSION

Crankshaft/Connecting Rod

- Apply molybdenum disulfide oil:
 - Threads [A] of Connecting Rod Big End Cap Bolts
 - Seating Surface [B] of Connecting Rod Big End Cap Nuts [C]
- Tighten:
 - Torque - Connecting Rod Big End Cap Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)**

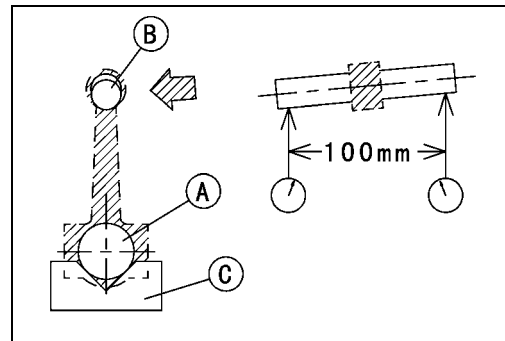


Crankshaft/Connecting Rod Cleaning

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

Connecting Rod Bend

- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
 - Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
 - Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
 - On a surface plate, set the big-end arbor on a V block [C].
 - With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.
- ★ If connecting rod bend exceeds the service limit, the connecting rod must be replaced.

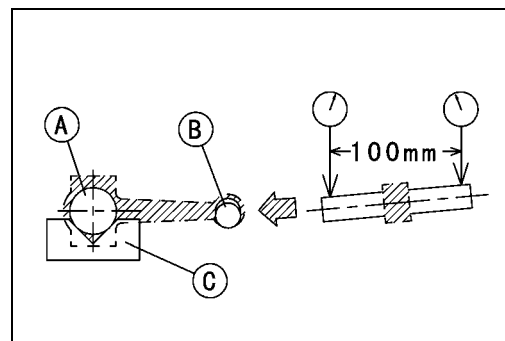


Connecting Rod Bend

Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Twist

- With the big-end arbor [A] still on the V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being parallel with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.
- ★ If connecting rod twist exceeds the service limit, the connecting rod must be replaced.



Connecting Rod Twist

Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Crankshaft/Connecting Rod

Connecting Rod Big End Side Clearance

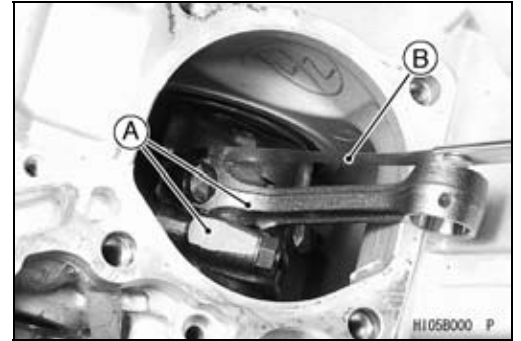
- Measure the side clearance of the connecting rod big end [A].
- Insert a thickness gauge [B] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance

Standard: 0.16 ~ 0.46 mm (0.0063 ~ 0.0181 in.)

Service Limit: 0.7 mm (0.028 in.)

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



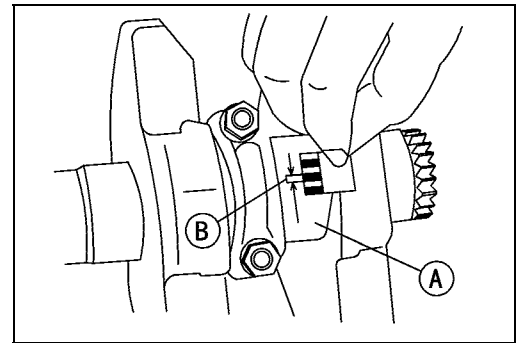
Connecting Rod Big End Bearing/Crankpin Wear

- Measure the bearing insert/crankpin [A] clearance with plastigage [B].
- Tighten the big end nuts to the specified torque.

Torque - Connecting Rod Big End Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)

NOTE

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

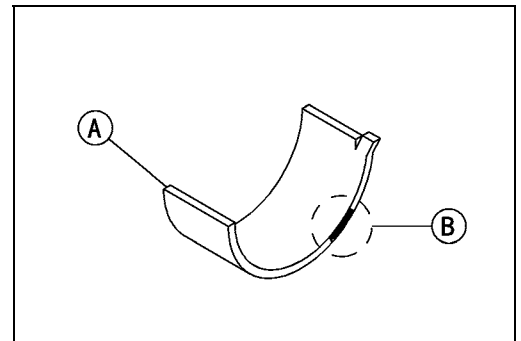


Connecting Rod Big End Bearing, Insert/Crankpin Clearance

Standard: 0.028 ~ 0.052 mm (0.0011 ~ 0.0020 in.)

Service Limit: 0.09 mm (0.0035 in.)

- ★ If the clearance is within the standard, no bearing insert replacement is required.
- ★ If the clearance is between 0.052 mm (0.0020 in.) and the service limit 0.09 mm (0.0035 in.), replace the bearing inserts [A] with inserts painted green [B]. Check insert/crankpin clearance with plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★ If the clearance exceeds the service limit, measure the diameter of the crankpin.



Crankpin Diameter

Standard: 39.984 ~ 40.000 mm (1.5742 ~ 1.5748 in.)

Service Limit: 39.97 mm (1.5736 in.)

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

9-16 CRANKSHAFT / TRANSMISSION

Crankshaft/Connecting Rod

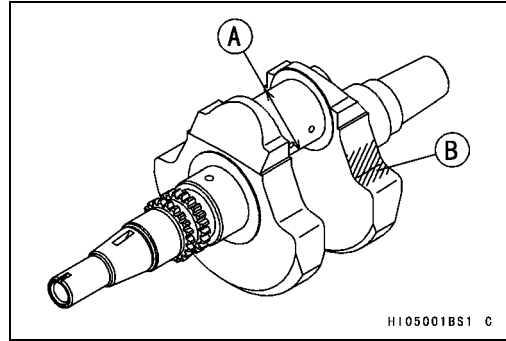
★ If the measured crankpin diameter [A] is not less than the service limit, but does not coincide with the original diameter marking on the crankshaft, make a new mark on it.

Crankpin Diameter Marks

None: 39.984 ~ 39.992 mm (1.5742 ~ 1.57449 in.)

○: 39.993 ~ 40.000 mm (1.57452 ~ 1.5748 in.)

Crankpin Diameter Mark [B]: “○” mark or no mark



- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the big end nuts to the specified torque.

Torque - Connecting Rod Big End Cap Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)

NOTE

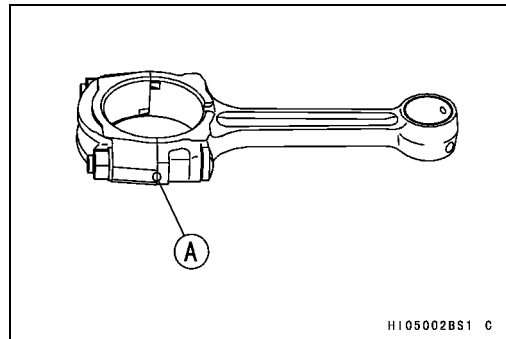
○ The mark already on the big end should almost coincide with the measurement because of little wear.

Connecting Rod Big End Inside Diameter Marks

None: 43.000 ~ 43.008 mm (1.6929 ~ 1.69323 in.)

○: 43.009 ~ 43.016 mm (1.69326 ~ 1.6935 in.)

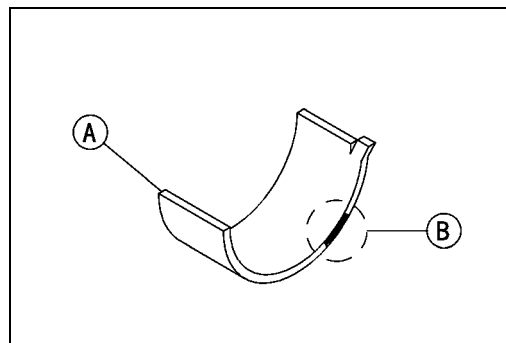
Diameter Mark [A]: “○” mark or no mark



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

Big End Bearing Insert Selection

Con-rod Big End Bore Diameter Marking	Crankpin Diameter Mark	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92028-1963
None	None	Yellow	92028-1962
○	○		
○	None	Green	92028-1961



- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

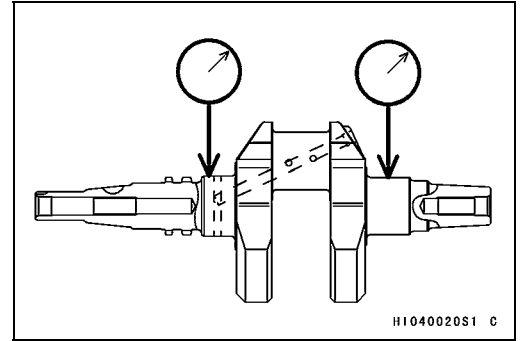
Crankshaft/Connecting Rod

Crankshaft Runout

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

Crankshaft Runout

Standard: TIR 0.04 mm (0.0016 in.) or less
Service Limit: TIR 0.10 mm (0.0039 in.)



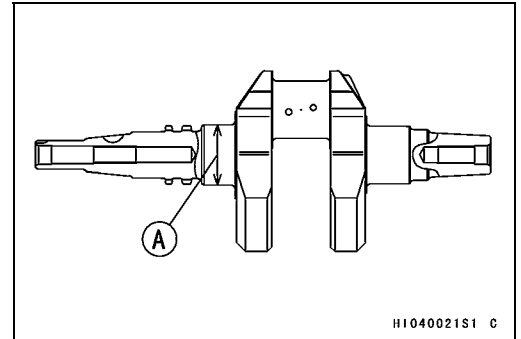
Crankshaft Main Bearing/Journal Wear

- Measure the diameter [A] of the crankshaft main journal.

Crankshaft Main Journal Diameter

Standard: 41.984 ~ 42.000 mm (1.6529 ~ 1.6535 in.)
Service Limit: 41.96 mm (1.652 in.)

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

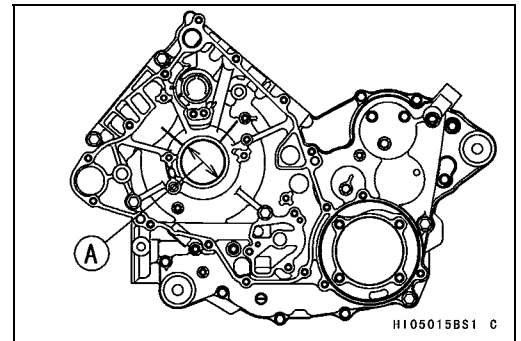


- Measure the main bearing bore diameter [A] in the crankcase halves.

Crankcase Main Bearing Bore Diameter

Standard: 42.025 ~ 42.041 mm (1.6545 ~ 1.6552 in.)
Service Limit: 42.08 mm (1.6567 in.)

- ★ If there is any signs of seizure, damage, or excessive wear, replace the crankcase halves as a set.

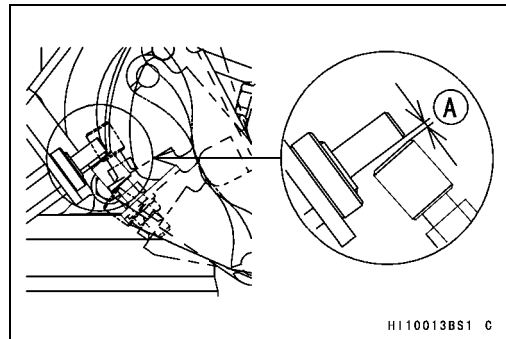
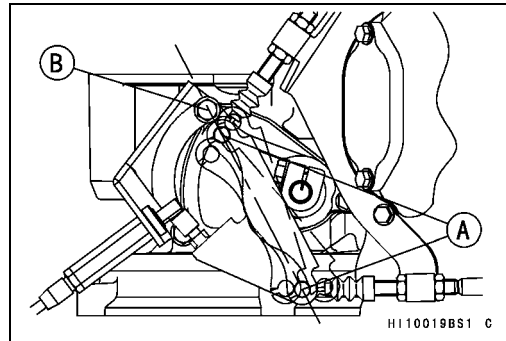


9-18 CRANKSHAFT / TRANSMISSION

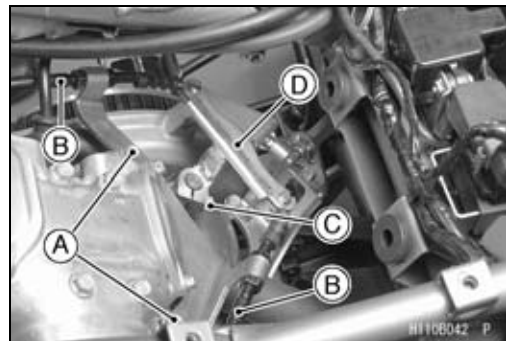
Transmission

Shift Lever Removal

- Remove:
 - Seat and Rear Fender (see Frame chapter)
 - Air Cleaner Cover and Right Side Inner Cover (see Frame chapter)
 - Battery and Rear Ignition Coil (see Electrical System chapter)
- Make sure that the shift control grip is in neutral position.
- Make sure that the shift lever is in neutral position.
- Neutral position is the shift control cable lower ends [A] and reverse cable bracket mounting bolt [B] aligned state.
- At neutral position.
 - 1 mm [A]

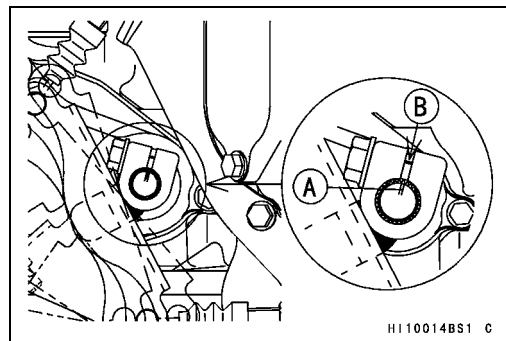


- Remove the cable holder mounting bolts [A].
- Remove the shift control cables [B] from the shift shaft lever.
- Remove the shift shaft lever bolt [C].
- Remove the shift shaft lever [D] from the shift shaft.



Shift Lever Installation

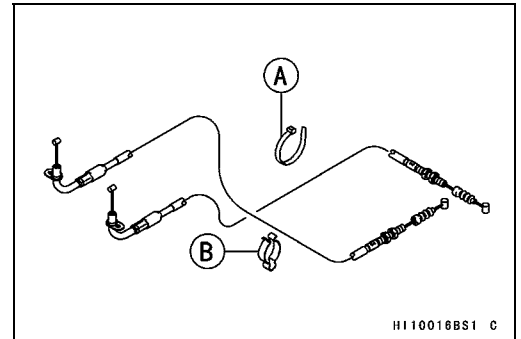
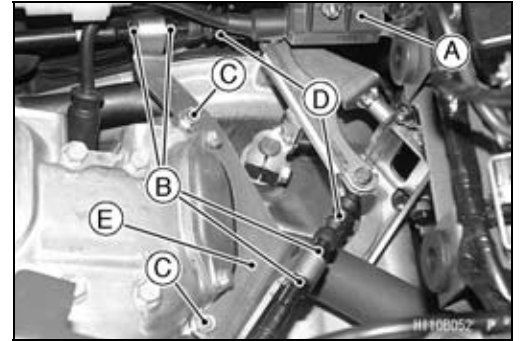
- Install the shift shaft lever to the shift shaft.
- When installing shift shaft lever, align the mark [A] on the shaft end with the slit [B] of the shift shaft lever.
- Tighten the shift shaft lever bolt.
- Torque - Shift Shaft Lever Bolt: 14 N·m (1.4 kgf·m, 10 ft·lb)**
- Install the shift control cables to the shift shaft lever.
- Install the cable holder and tighten the cable holder mounting bolts.
- Torque - Cable Holder Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Adjust the shift control cables free play (see Periodic Maintenance chapter).



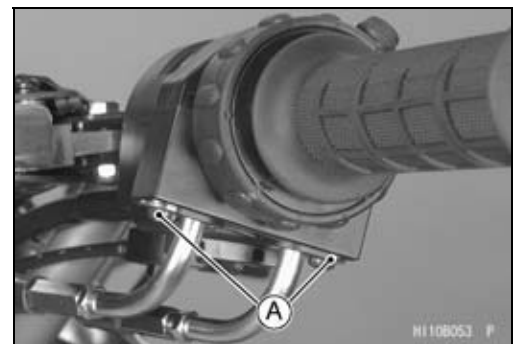
Transmission

Shift Control Cables Removal

- Remove:
 - Seat (see Frame chapter)
 - Battery and Rear Ignition Coil [A] (see Electrical System chapter)
 - Loosen the adjusting nuts [B].
 - Remove the cable holder mounting bolts [C].
 - Remove the shift control cables [D] from the shift shaft lever.
 - Remove the shift control cables from the cable holder [E].
-
- Remove the band [A] and clamp [B].



- Remove the shift control grip screws [A].
- Remove the shift control cables from the shift control grip.

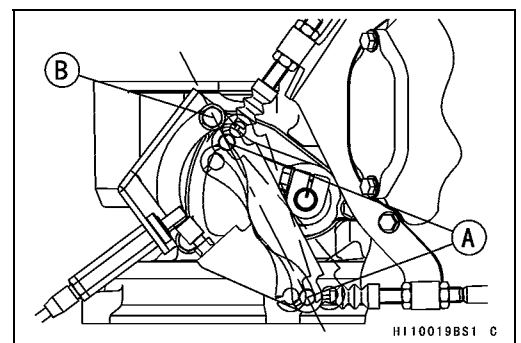


Shift Control Cables Installation

- Make sure that the shift lever is in neutral position.
- Neutral position is the shift control cable lower ends [A] and reverse cable bracket mounting bolt [B] aligned state.
- Lubricate the shift control cables before installation.
- Route the shift control cables correctly according to the Appendix chapter.

⚠ WARNING

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



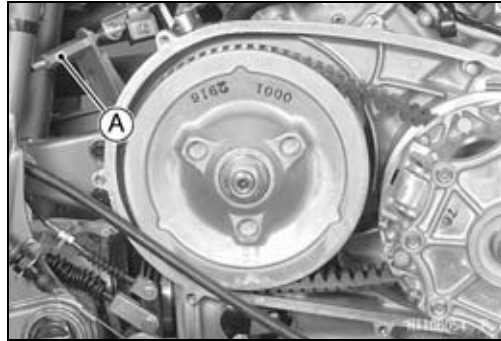
- Adjust the shift control cables free play (see Periodic Maintenance chapter).

9-20 CRANKSHAFT / TRANSMISSION

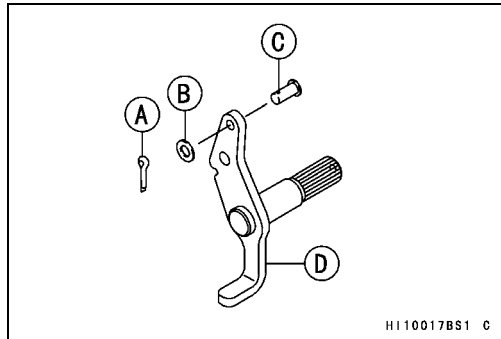
Transmission

Reverse Lock Cable Removal

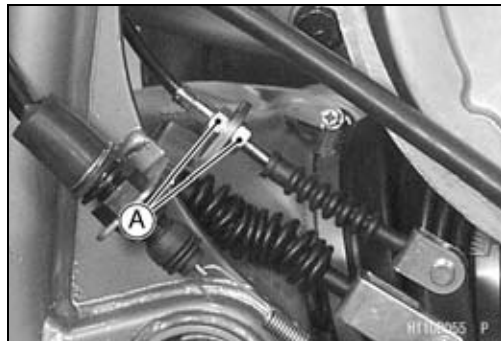
- Remove:
 - Right Foot Guard (see Frame chapter)
 - Converter Cover (see Converter System chapter)
- Remove the reverse lock cable locknut [A].



- Remove the cotter pin [A], washer [B] and pin [C].
- Remove the reverse lock cable from the lever [D].

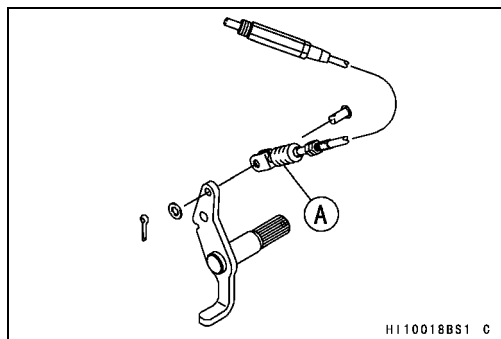


- Loosen the locknuts [A] and remove the reverse lock cable from the frame.



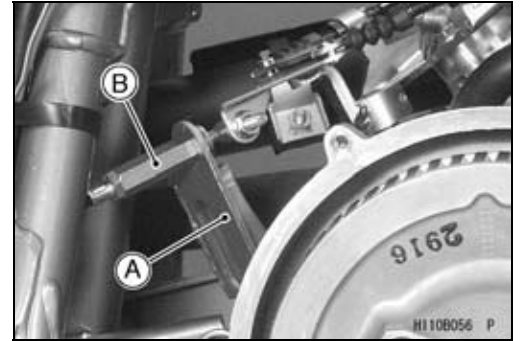
Reverse Lock Cable Installation

- Lubricate the reverse lock cable before installation.
- Install the reverse lock cable to the frame.
- Tighten the locknuts temporarily.
- Install the reverse lock cable [A] to the lever.
- Replace the cotter pin with a new one.
- Install the pin, washer and cotter pin.



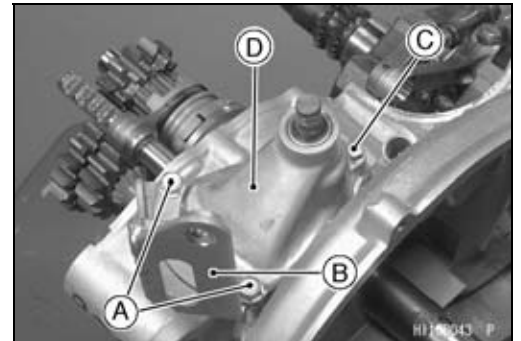
Transmission

- Install the reverse lock cable in the reverse lock cable bracket [A].
- Tighten the reverse lock cable locknut [B].
Torque - Reverse Lock Cable Locknut: 12 N·m (1.2 kgf·m, 104 in·lb)
- Tighten the locknuts securely.

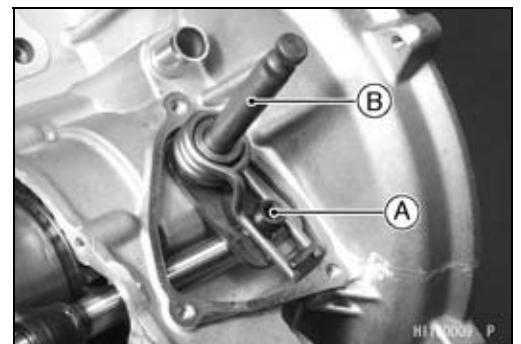


Transmission Removal

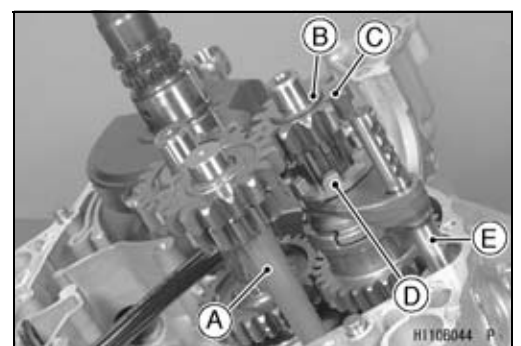
- Remove the shift lever (see Shift Lever Removal).
- Split the crankcase (see Crankcase Disassembly).
- Remove:
 Reverse Lock Cable Bracket Mounting Bolts [A]
 Reverse Lock Cable Bracket [B]
 Shift Shaft Cover Bolt [C]
 Shift Shaft Cover [D]



- Remove:
 Shift Shaft Spring Bolt [A]
 Shift Shaft [B]



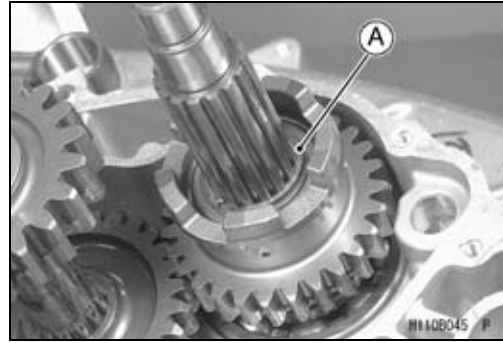
- Remove:
 Reverse Idle Shaft [A]
 Spacer [B]
 Reverse Drive Gear [C], Needle Bearing and Spacer
 Shifter [D]
 Shift Rod [E]



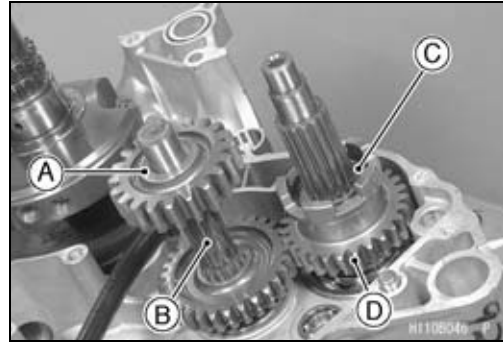
9-22 CRANKSHAFT / TRANSMISSION

Transmission

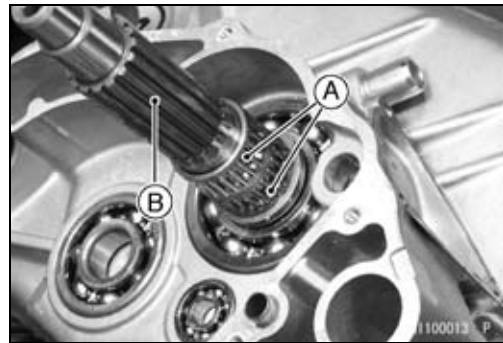
- Remove:
Circlip [A]
Special Tool - Outside Circlip Pliers: 57001-144



- Remove:
Spacer [A]
Idle Gear Assembly [B] and Spacer
Washer and Spacer [C]
High Gear [D]

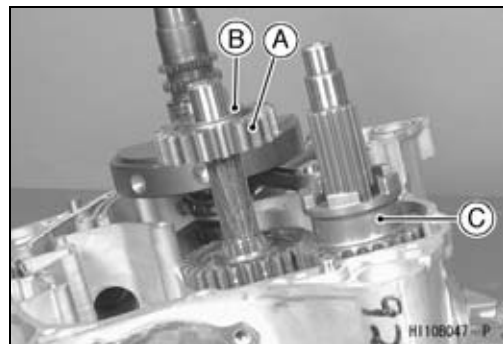


- Remove:
Needle Bearings [A]
- Remove the driven shaft [B] from the crankcase using a press.



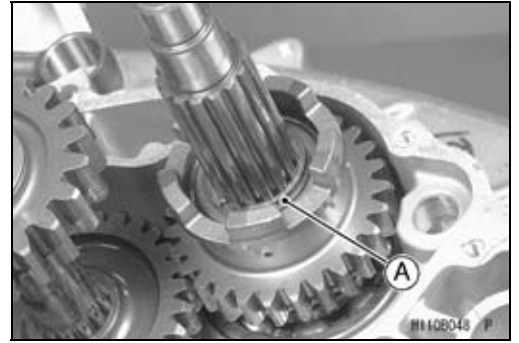
Transmission Installation

- Insert the driven shaft in the crankcase until it is bottomed using a press.
- Apply engine oil to the needle bearings and install them.
- Install:
Spacer and Idle Gear Assembly [A]
Spacer [B]
High Gear [C]

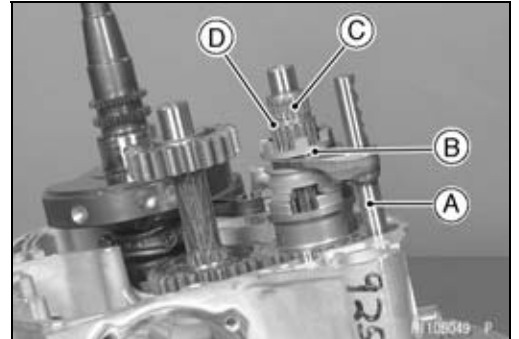


Transmission

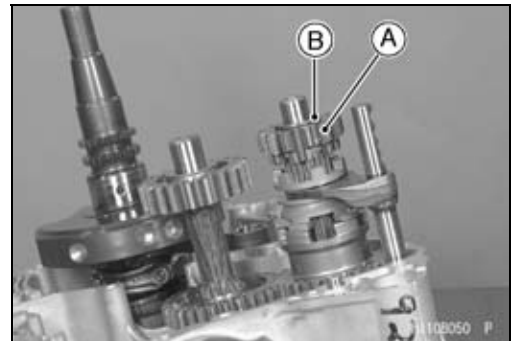
- Install:
Spacer
Toothed Washer [A]
Circlip
Special Tool - Outside Circlip Pliers: 57001-144



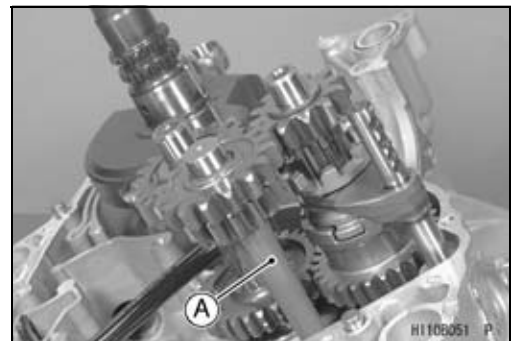
- Apply engine oil:
Shift Rod [A] and Shift Fork Ear [B]
Needle Bearing [C]
- Install:
Shift Rod with Shifter
Spacer [D]
Needle Bearing



- Install:
Reverse Drive Gear [A]
Spacer [B]



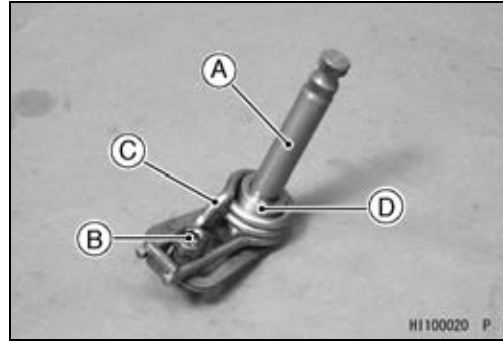
- Install:
Reverse Idle Shaft [A]



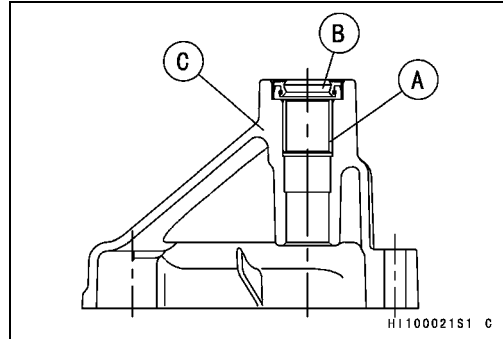
9-24 CRANKSHAFT / TRANSMISSION

Transmission

- Apply molybdenum disulfide oil to the shift shaft [A].
- Install:
 - Shift Shaft Spring Bolt [B]
 - Spring [C]
 - Guide [D]
- Apply a non-permanent locking agent:
 - Shift Shaft Spring Bolt
- Tighten:
 - Torque - Shift Shaft Spring Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**



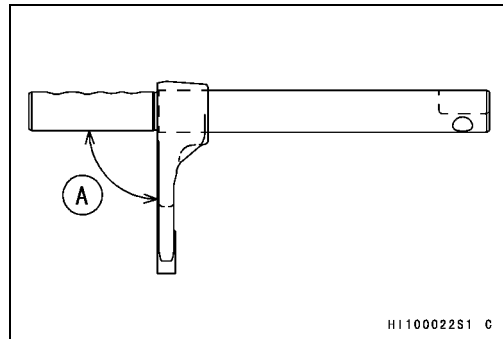
- When a new bushing [A] and oil seal [B] are installed in the shift shaft cover [C], press and insert the new bushing and oil seal so that their surfaces are flush with the end of the each hole.



- Install:
 - Shift Shaft Cover
- Tighten:
 - Torque - Shift Shaft Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**

Shift Fork Bending

- Visually inspect the shift fork.
- ★ If the fork is bent, replace the shift rod with a new one. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
 - [A] 90°



Shift Fork/Gear and Shifter Groove Wear

- Measure the thickness of the shift fork ears [A], and measure the width [B] of the gear groove and shifter.
- ★ If the thickness of a shift fork ear is less than the service limit, the shift rod must be replaced.

Shift Fork Ear Thickness

Standard: 5.9 ~ 6.0 mm (0.2322 ~ 0.2362 in.)

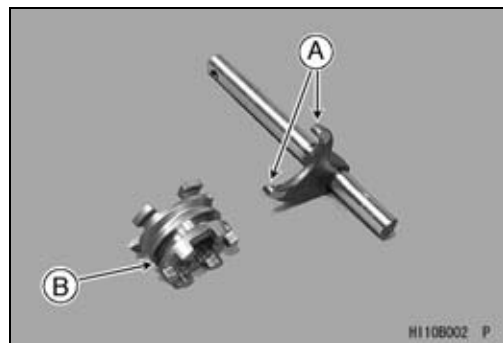
Service Limit: 5.8 mm (0.228 in.)

- ★ If the groove is worn over the service limit, the shifter must be replaced.

Shifter Groove Width

Standard: 6.05 ~ 6.15 mm (0.2382 ~ 0.2421 in.)

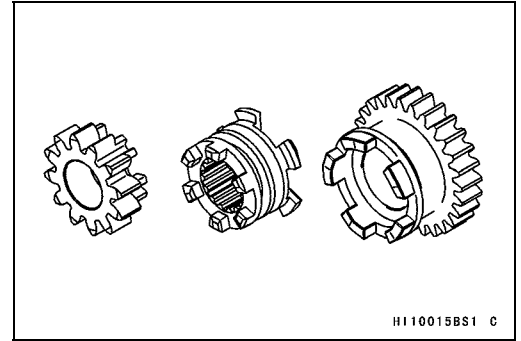
Service Limit: 6.25 mm (0.2460 in.)



Transmission

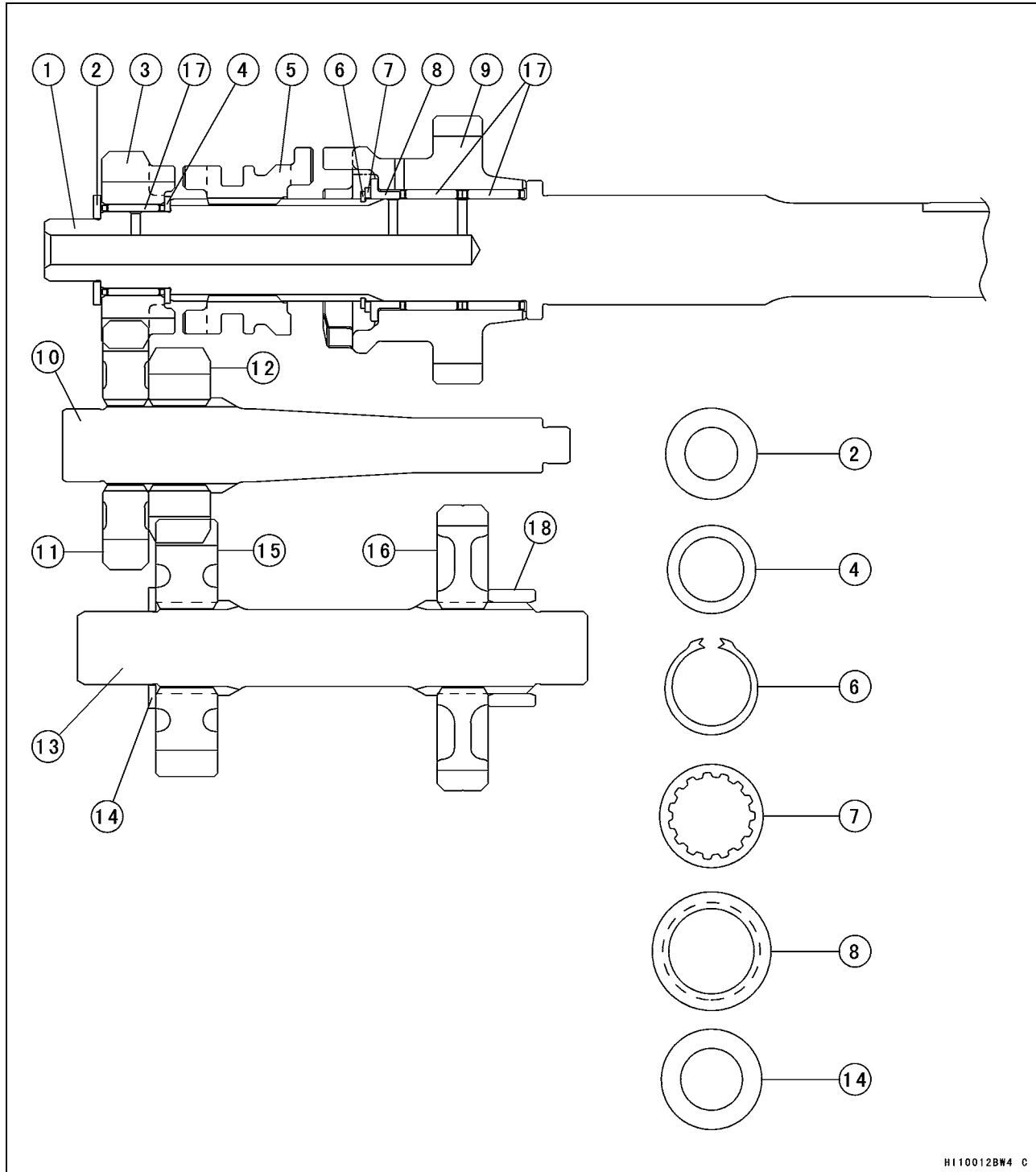
Transmission and Shift Mechanism Inspection

- Visually inspect:
 - Gears
 - Dogs of Gear and Shifter
- ★ If they are damaged or worn excessively, replace them.



9-26 CRANKSHAFT / TRANSMISSION

Transmission



HI10012BW4 C

1. Driven Shaft

2. Spacer (17.3 x 30 x 2.0)

3. Reverse Gear (12T)

4. Spacer (21.2 x 29 x 1.6)

5. Shifter

6. Snap Ring

7. Washer T=1.5

8. Spacer (28 x 39 x 8)

9. Drive Hi Gear (27T)

10. Reverse Idle Shaft

11. Reverse Driven Gear (16T)

12. Reverse Driven Output Gear (14T)

13. Idle Shaft

14. Spacer (20.3 x 33 x 2.0)

15. Driven Output Gear (20T)

16. Driven Hi Gear (29T)

17. Needle Bearing

18. Spacer (25 x 32 x 13)

Ball Bearing, Needle Bearing, and Oil Seal

Ball and Needle Bearing Replacement

CAUTION
Do not remove the ball or needle bearings unless it is necessary. Removal may damage them.

- Using a press or puller, remove the ball bearing and/or three needle bearings.

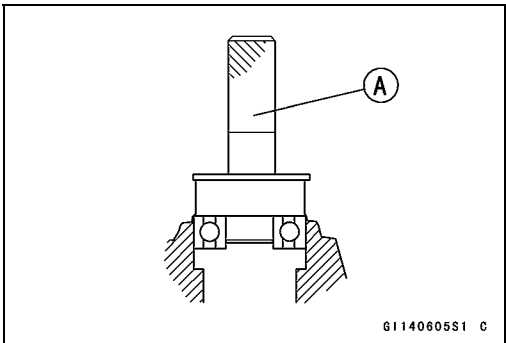
NOTE

○ *In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max., and tapping the bearing in or out.*

CAUTION
Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.

- Using a press and the bearing driver set [A], install the new ball bearing until it stops at the bottom of its housing.
- Three new needle bearings must be pressed into the crankcase so that the end is flush with the end of the hole.

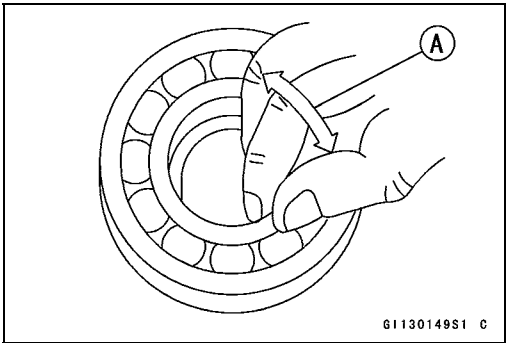
Special Tool - Bearing Driver Set: 57001-1129



Ball and Needle Bearing Wear

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

- Check the ball bearings.
 - Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.
 - Spin [A] the bearing by hand to check its condition.
 - ★ If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.
- Check the needle bearings.
 - The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
 - ★ If there is any doubt as to the condition of a needle bearing, replace it.



Oil Seal Inspection

- Inspect the oil seals.
 - ★ Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

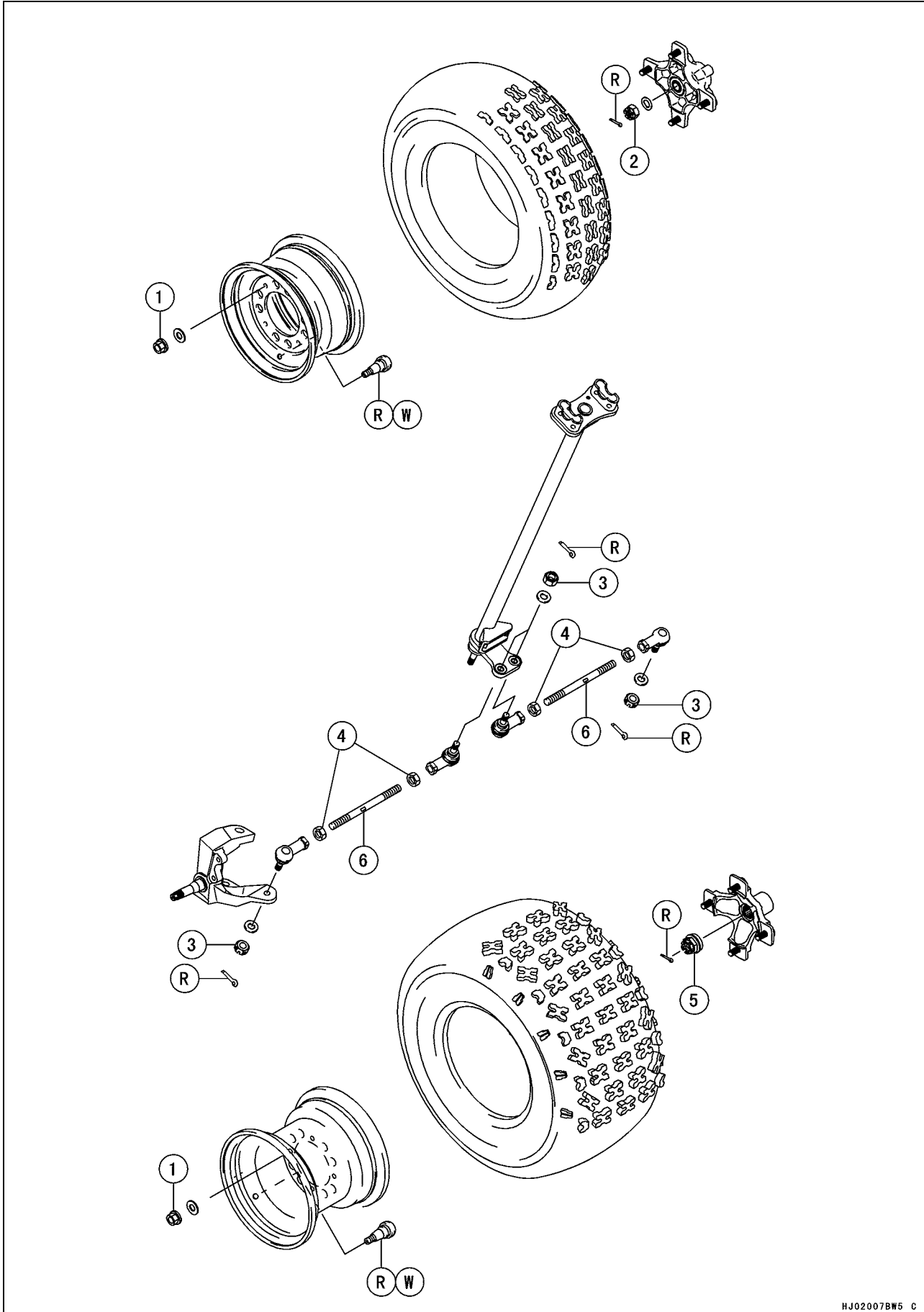
Wheels / Tires

TABLE OF CONTENTS

Exploded View	10- 2
Specifications	10- 4
Special Tool	10- 5
Wheel Alignment	10- 6
Toe-in Inspection	10- 6
Toe-in Adjustment	10- 7
Wheels (Rims)	10- 8
Wheel Removal	10- 8
Wheel Installation	10- 8
Wheel (Rim) Inspection	10- 8
Wheel (Rim) Replacement	10- 9
Tires	10-10
Tire Removal	10-10
Tire Installation	10-10
Tire Inspection	10-11
Front Hub	10-12
Front Hub Removal	10-12
Front Hub Installation	10-12
Front Hub Disassembly/Assembly	10-12
Rear Hub	10-13
Rear Hub Removal	10-13
Rear Hub Installation	10-13
Rear Hub Disassembly/Assembly	10-13

10-2 WHEELS / TIRES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Wheel Nuts	78	8.0	58	
2	Front Axle Nuts	52	5.3	38	
3	Tie-rod End Nuts	42	4.3	31	
4	Tie-rod Adjusting Locknuts	22	2.2	16	
5	Rear Axle Nuts	265	27	195	

6. Tie-rod: Install the width across flats side to the knuckle arm.

W: Apply water or soap and water solution.

R: Replacement parts

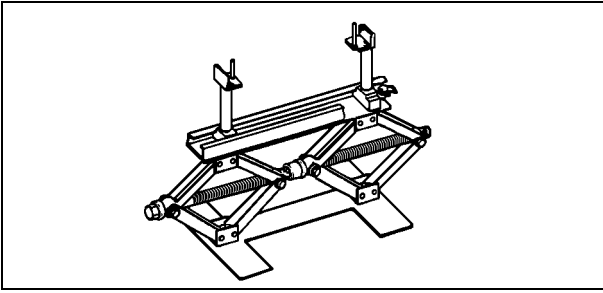
10-4 WHEELS / TIRES

Specifications

Item	Standard	Service Limit
Wheel Alignment: Toe-in of front wheels:	10 ± 10 mm (0.39 \pm 0.39 in.)	- - -
Tires: Standard tire:	Front AT 22 \times 7-10 HOLESHOT XC, Tubeless Rear AT 22 \times 11-10 HOLESHOT XCT, Tubeless	- - - - - -
Tire air pressure (when cold):	Front 28 kPa (0.28 kgf/cm ² , 4.0 psi) Rear 35 kPa (0.35 kgf/cm ² , 5.0 psi)	- - - - - -
Maximun tire air pressure (to seat beads, when cold)	250 kPa (2.5 kgf/cm ² , 36 psi)	- - -
Tire tread depth:	Front - - - Rear - - -	3 mm (0.12 in.) 3 mm (0.12 in.)

Special Tool

Jack :
57001-1238



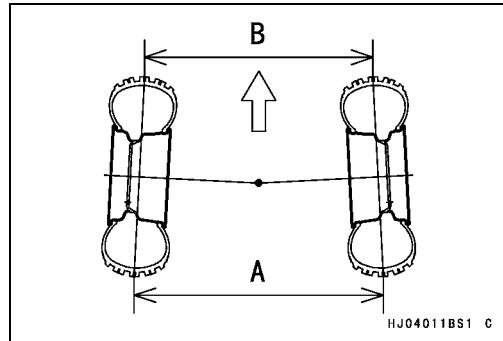
10-6 WHEELS / TIRES

Wheel Alignment

Toe-in is the amount that the front wheels are closer together in front than at the rear at the axle height. When there is toe-in, the distance A (Rear) is the greater than B (Front) as shown.

The purpose of toe-in is to prevent the front wheels from getting out of parallel at any time, and to prevent any slipping or scuffing action between the tires and the ground. If toe-in is incorrect, the front wheels will be dragged along the ground, scuffing and wearing the tread knobs.

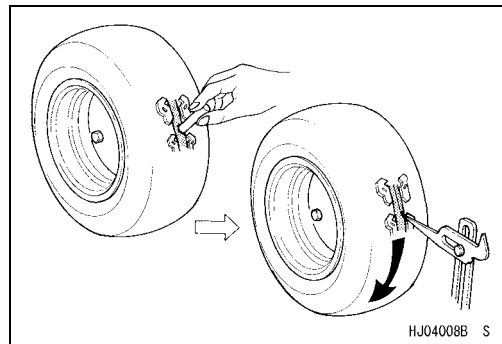
Caster and camber are build-in and require no adjustment.



$A \text{ (Rear)} - B \text{ (Front)} = \text{Amount of Toe-in}$
(Distance A and B are measured at axle height with the vehicle sitting on the ground, or at 1G.)

Toe-in Inspection

- Apply a heavy coat of chalk or a paint line near the center of the front tires.
- Using a needle nose scribe, make a thin mark near the center of the chalk coating while turning the wheel.



- With the front wheels on the ground, set the handlebar straight ahead.
- At the level of the axle height, measure the distance between the scribed or painted lines for both front and rear of the front tires.
- Subtract the measurement of the front from the measurement of the rear to get the toe-in.
- ★ If the toe-in is not in the specified range, go on to the Toe-in Adjustment procedure.



Toe-in of Front Wheels

Standard: $10 \pm 10 \text{ mm}$ ($0.39 \pm 0.39 \text{ in.}$) at 1G

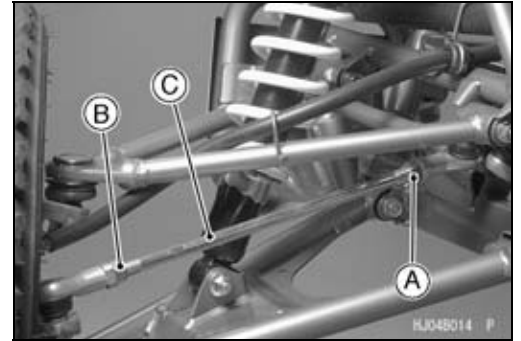
Wheel Alignment

Toe-in Adjustment

- Loosen the locknuts [A] [B] and turn the adjusting tie-rods [C] the same number of turns on both sides to achieve the specified toe-in.

NOTE

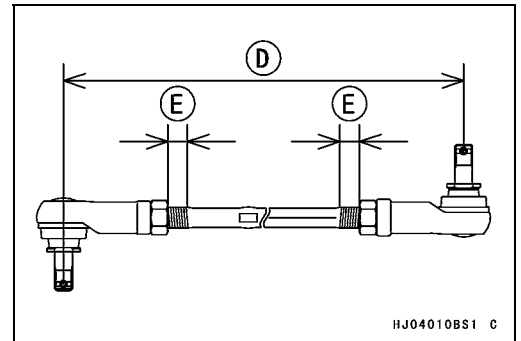
- The locknut [A] on the tie-rod has left-hand threads. Turn the locknut clockwise for loosening.
- The toe-in will be near the specified value, if the tie-rod length [D] is 386 ~ 389 mm (15.2 ~ 15.3 in.) on each tie-rod.



CAUTION

Adjust the tie-rod length so that the visible thread length [E] is even on both ends of the tie-rod. Uneven thread length could cause tie-rod end damage.

- Check the toe-in.
- Tighten:
 - Torque - Tie-Rod Adjusting Locknuts: 22 N·m (2.2 kgf·m, 16 ft·lb)
- Test ride the vehicle.



10-8 WHEELS / TIRES

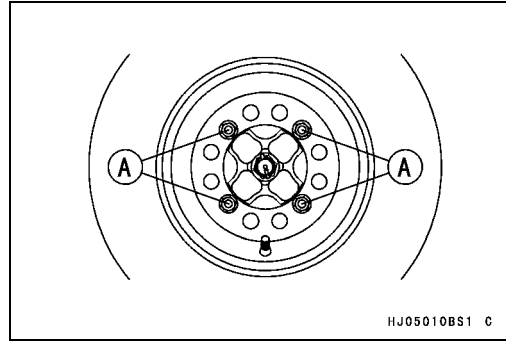
Wheels (Rims)

Wheel Removal

- Loosen the wheel nuts [A].
- Support the vehicle on a stand or a jack so that the wheels are off the ground.

Special Tool - Jack: 57001-1238

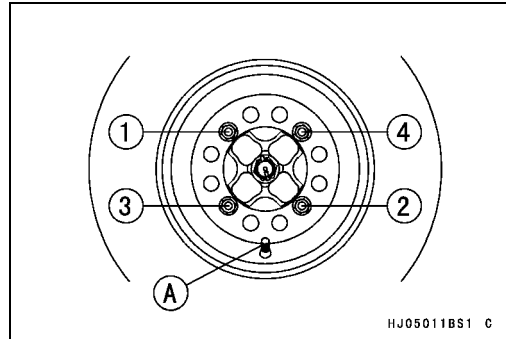
- Remove:
 - Wheel Nuts
 - Wheel



Wheel Installation

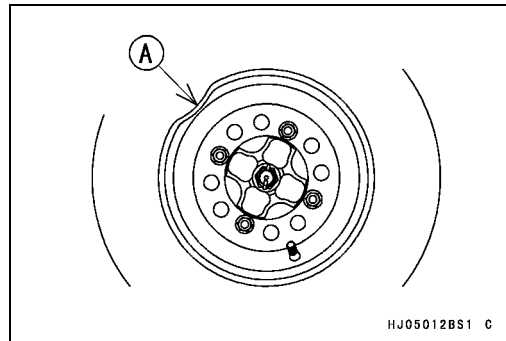
- Position the wheel so that the air valve [A] is toward the outside of the vehicle.
- Tighten the wheel nuts in a criss-cross pattern.

Torque - Wheel Nuts: 78 N·m (8.0 kgf·m, 58 ft·lb)

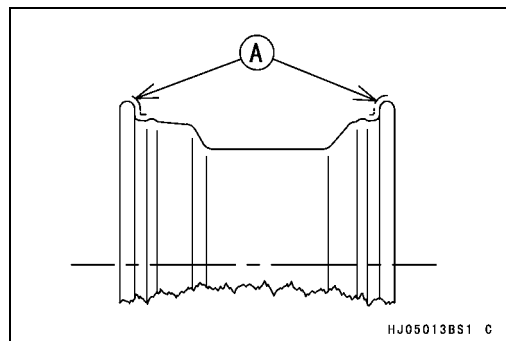


Wheel (Rim) Inspection

- Examine both sides of the rim for dents [A]. If the rim is dented, replace it.



- ★ If the tire is removed, inspect the air sealing surfaces [A] of the rim for scratches or nicks. Smooth the sealing surfaces with fine emery cloth if necessary.



Wheels (Rims)

Wheel (Rim) Replacement

- Remove the wheel (see Wheel Removal).
- Disassemble the tire from the rim (see Tire Removal).
- Remove the air valve and discard it.

CAUTION

**Replace the air valve whenever the tire is replaced.
Do not reuse the air valve.**

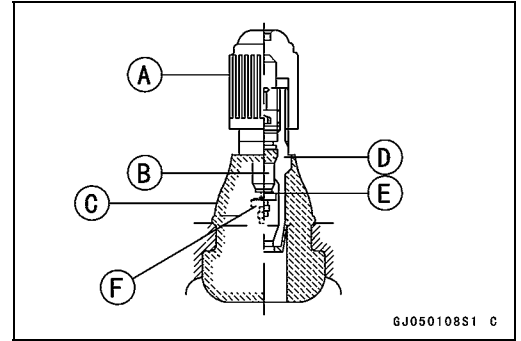
- Plastic Cap [A]
- Valve Core [B]
- Stem Seal [C]
- Valve Stem [D]
- Valve Seat [E]
- Valve Opened [F]

- Install a new air valve in the new rim.
- Remove the valve cap, lubricate the stem with a soap and water solution, and pull the stem [A] through the rim from the inside out until it snaps into place.

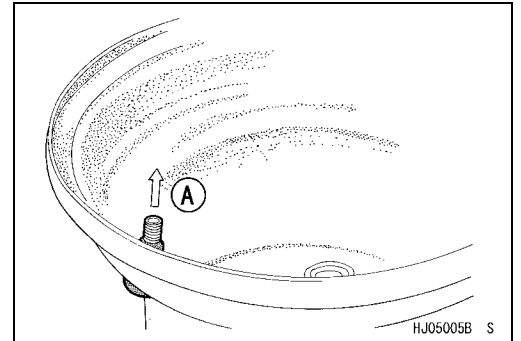
CAUTION

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

- Mount the tire on the new rim (see Tire Installation).
- Install the wheel (see Wheel Installation).



6J050108S1 C



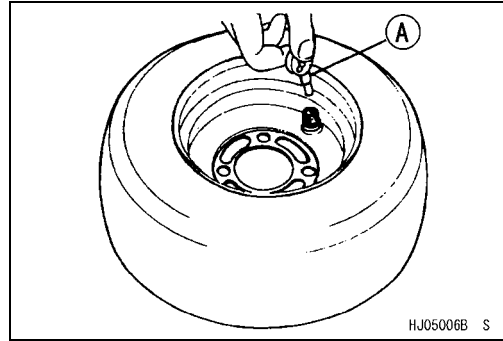
HJ05005B S

10-10 WHEELS / TIRES

Tires

Tire Removal

- Remove the wheel.
- Unscrew the valve core to deflate the tire.
- Use a proper valve core tool [A].



- Lubricate the tire beads and rim flanges on both sides of the wheel with a soap and water solution, or water [A]. This helps the tire beads slip off the rim flanges.

CAUTION

Do not lubricate the tire beads and rim flanges 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 tightly.*

Tire Installation

- Inspect the rim (see Wheel (Rim) Inspection).
- Replace the air valve with a new one.

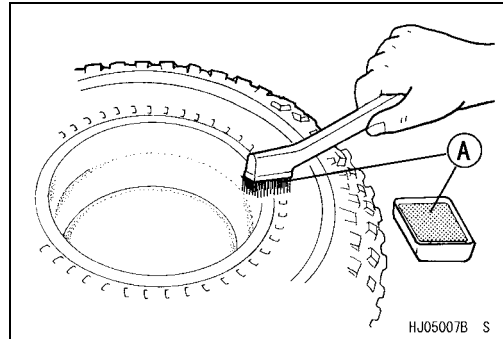
CAUTION

Replace the air valve with whenever the tire is replaced. Do not reuse the air valve.

- Check the tire for wear and damage (see Tire Inspection).
- Lubricate the tire beads and rim flanges with a soap and water solution, or water.

⚠ WARNING

Do not use the lubricant other than a water and soap solution, or water to lubricate the tire beads and rim because it may cause tire separation.



Tires

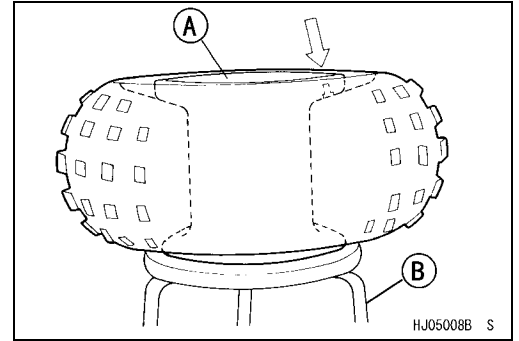
- Support the wheel rim [A] on a suitable stand [B] to prevent the tire from slipping off.
- Inflate the tire until the tire beads seat on the rim.

Maximum Tire Air Pressure (to seat beads when cold)

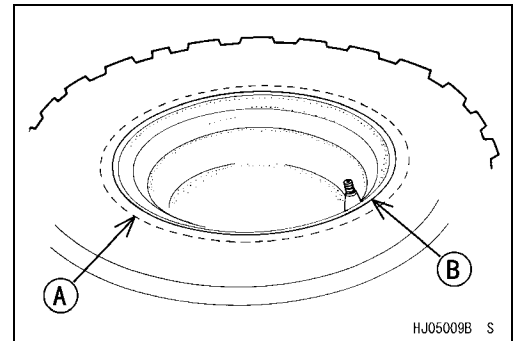
Front and Rear: 250 kPa (2.5 kgf/cm², 36 psi)

⚠ WARNING

Do not inflate the tire to more than the maximum tire air pressure. Overinflation can explode the tire with possibility of injury and loss of life.



- Check to see that rim lines [A] on both sides of the tire are parallel with the rim flanges [B].
- ★ If the rim lines and the rim flanges are not parallel, deflate the tire, lubricate the sealing surfaces again, and reinflate the tire.
- After the beads are properly seated, check for air leaks.
- Apply a soap and water solution around the tire bead and check for bubbles.
- Deflate the tire to the specified pressure.
- Check the tire pressure using an air pressure gauge.



NOTE

○ Kawasaki provides the air pressure gauge (P/N 52005-1082) with the owner's tool kit.

Tire Air Pressure (when cold)

Front: 28 kPa (0.28 kgf/cm², 4.0 psi)

Rear: 35 kPa (0.35 kgf/cm², 5.0 psi)

- Install the wheel (see Wheel Installation).
- Wipe off the soap and water solution on the tire and dry the tire before operation.

⚠ WARNING

Do not operate the vehicle with the water and soap still around the tire beads. They will cause tire separation, and a hazardous condition may result.

Tire Inspection

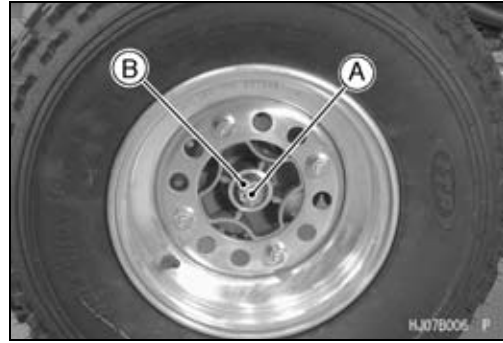
- Refer to the Wheels/Tires in Periodic Maintenance chapter.

10-12 WHEELS / TIRES

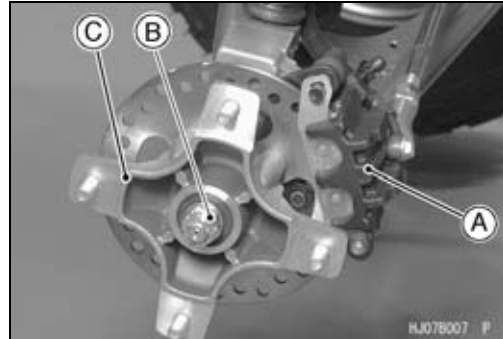
Front Hub

Front Hub Removal

- Remove:
 - Cotter Pin [A]
- Loosen the axle nut [B].



- Remove the wheel (see Wheel Removal).
- Remove the caliper [A] by taking off the mounting bolts, and let the caliper hang free.
- Remove the axle nut [B] and pull off the front hub [C] and brake disc.
- Separate the brake disc from the front hub.

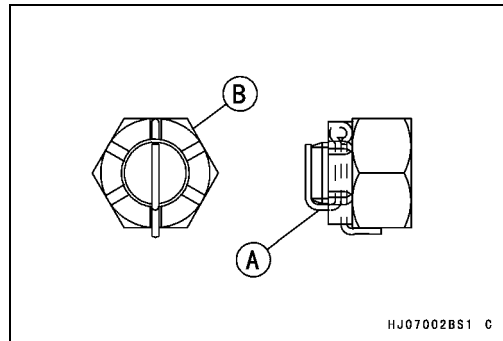


Front Hub Installation

- Install the brake disc (see Brakes chapter).
- Tighten:
 - Torque - Front Axle Nut: 52 N·m (5.3 kgf·m, 38 ft·lb)
- Insert a new cotter pin [A] and bend it over the nut [B].

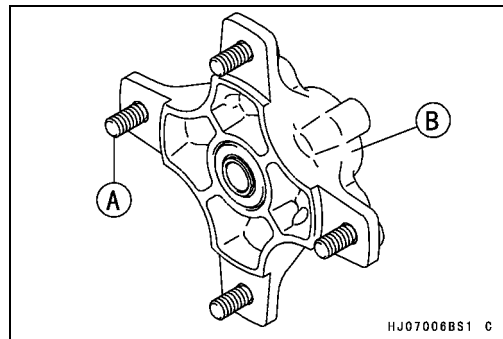
NOTE

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



Front Hub Disassembly/Assembly

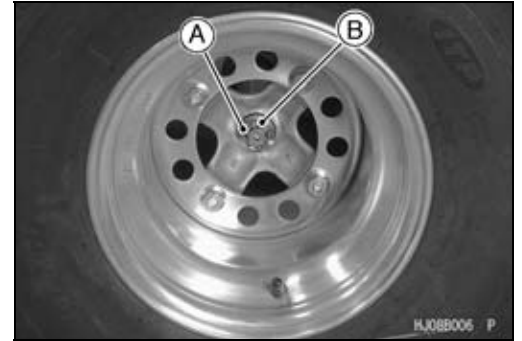
- Do not press the hub bolts [A] out.
- ★ If any hub bolt is damaged, replace the hub [B] and bolts as a unit.



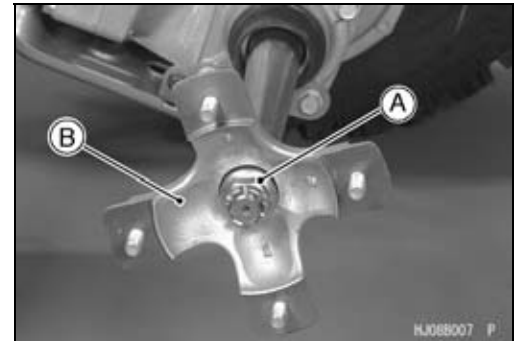
Rear Hub

Rear Hub Removal

- Remove:
 - Cotter Pin [A]
- Loosen the axle nut [B].



- Remove:
 - Wheel (see Wheel Removal)
 - Axle Nut [A]
 - Rear Hub [B]

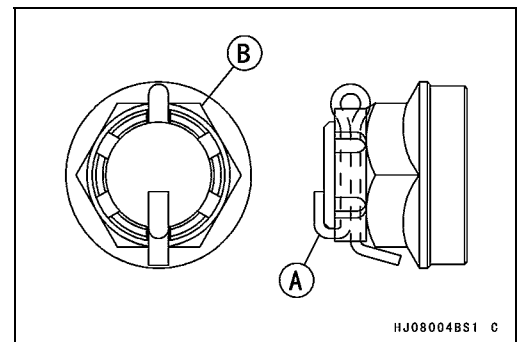


Rear Hub Installation

- Tighten:
 - Torque - Rear Axle Nuts: 265 N·m (27 kgf·m, 195 ft·lb)**
- Insert a new cotter pin [A] and bend it over the nut [B].

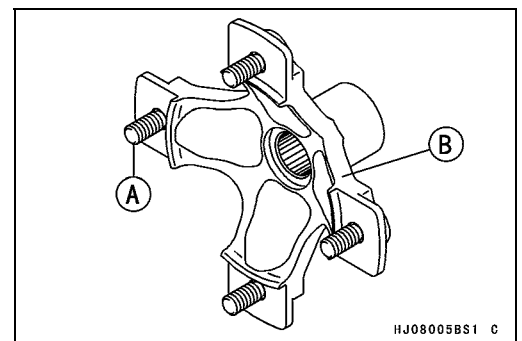
NOTE

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



Rear Hub Disassembly/Assembly

- Do not press the hub bolts [A] out.
- ★ If any hub bolt is damaged, replace the hub [B] and bolts as a unit.



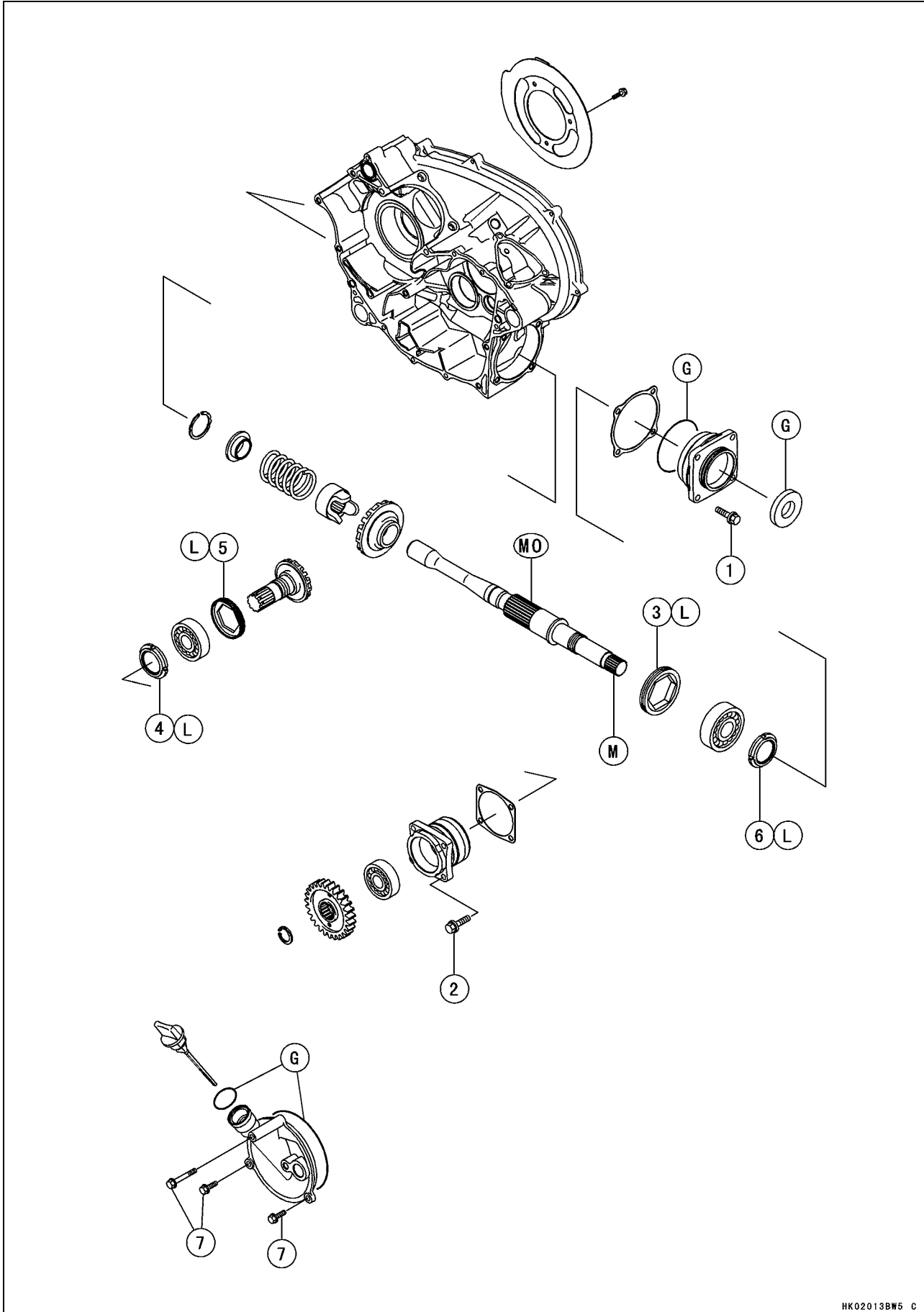
Final Drive

TABLE OF CONTENTS

Exploded View	11- 2
Specifications	11- 6
Special Tools	11- 7
Output Bevel Gears	11- 9
Output Drive Bevel Gear Removal.....	11- 9
Output Drive Bevel Gear Installation.....	11- 9
Output Drive Bevel Gear Disassembly	11-10
Output Drive Bevel Gear Assembly	11-12
Output Driven Bevel Gear Removal.....	11-13
Output Driven Bevel Gear Installation.....	11-14
Output Driven Bevel Gear Disassembly	11-14
Output Driven Bevel Gear Assembly	11-16
Output Bevel Gears Adjustment	11-17
Bevel Gears Inspection.....	11-22
Cam Damper Inspection	11-22
Propeller Shaft.....	11-23
Propeller Shaft Removal	11-23
Propeller Shaft Installation	11-23
Propeller Shaft Joint Boot Inspection.....	11-23
Propeller Shaft Inspection.....	11-23
Rear Axle.....	11-24
Rear Axle Removal	11-24
Rear Axle Installation	11-24
Ball Bearing Wear	11-25
Rear Axle Runout Inspection	11-25
Final Gear Case	11-26
Final Gear Case Oil Level Inspection	11-26
Final Gear Case Oil Change.....	11-26
Final Gear Case Removal	11-26
Final Gear Case Installation.....	11-27
Final Gear Case Disassembly	11-28
Final Gear Case Assembly	11-29
Oil Seal Installation	11-30
Final Bevel Gear Adjustment	11-30
Pinion Gear Unit Disassembly	11-33
Pinion Gear Unit Assembly	11-34
Bevel Gear Inspection.....	11-34
Bearing and Oil Seal.....	11-36
Ball or Needle Bearing Inspection.....	11-36
Oil Seal Inspection	11-36

11-2 FINAL DRIVE

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Output Driven Bevel Gear Housing Bolts	26	2.7	20	
2	Output Drive Bevel Gear Housing Bolts	26	2.7	20	
3	Bearing Holder	137	14	101	L
4	Bevel Gear Holder Nut	157	16	116	L
5	Bearing Holder	120	12	89	L
6	Output Shaft Holder Nut	157	16	116	L
7	Output Drive Bevel Gear Cover Bolts	8.8	0.90	78 in·lb	

G: Apply grease for oil seal and O-ring.

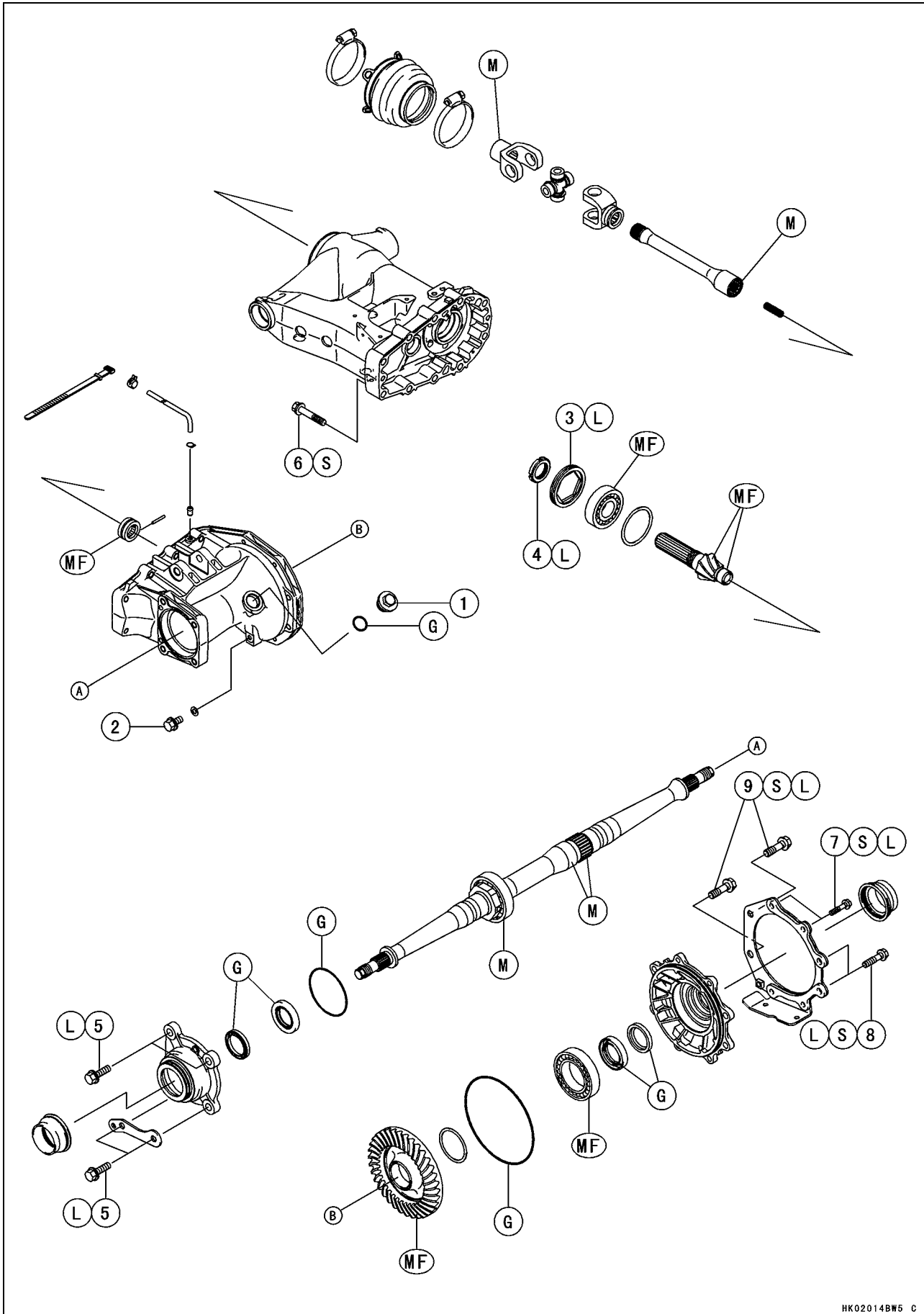
L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

MO: Apply molybdenum disulfide oil.

11-4 FINAL DRIVE

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Filler Cap	29	3.0	22	
2	Oil Drain Plug	20	2.0	14	
3	Pinion Gear Bearing Holder	137	14	101	L
4	Pinion Gear Bearing Holder Nut	157	16	116	L
5	Final Gear Case Left Cover Bolts	49	5.0	36	L
6	Final Gear Case Bolts	42	4.3	31	S
7	Final Gear Case Right Cover Bolts (M8)	24	2.4	17	L, S
8	Final Gear Case Right Cover Bolts (M10)	49	5.0	36	L, S
9	Final Gear Case Right Cover Bolts (M12)	94	9.6	69	L, S

G: Apply grease for oil seal and O-ring.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

MF: Apply MOBIL FLUID 424 or equivalent oil.

S: Follow the specific tightening sequence.

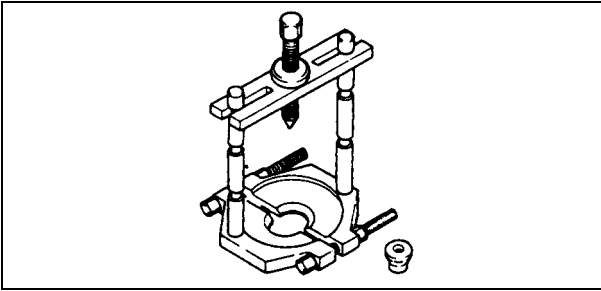
11-6 FINAL DRIVE

Specifications

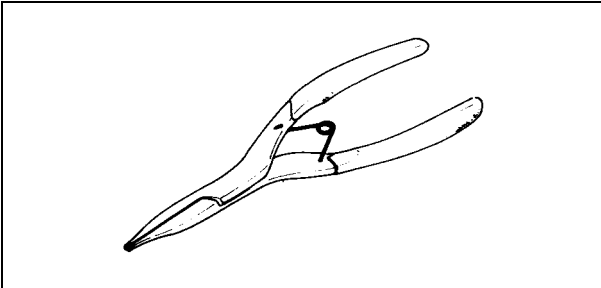
Item	Standard	Service Limit
Output Bevel Gear Case Output bevel gear backlash	0.05 ~ 0.11 mm (0.0020 ~ 0.0043 in.) (at output drive shaft spline)	— — —
Rear Axle Shaft Rear axle shaft runout	TIR 1 mm (0.04 in.) or less	TIR 2 mm (0.08 in.)
Final Gear Case: Gear case oil: Type Oil level Capacity Final bevel gear backlash	MOBIL Fluid 424 or CITGO TRANSGARD TRACTOR HYDRAULIC FLUID Filler opening bottom 900 mL (0.95 US qt) 0.07 ~ 0.14 mm (0.003 ~ 0.006 in.) (at pinion gear spline)	— — — — — — — — — — — —

Special Tools

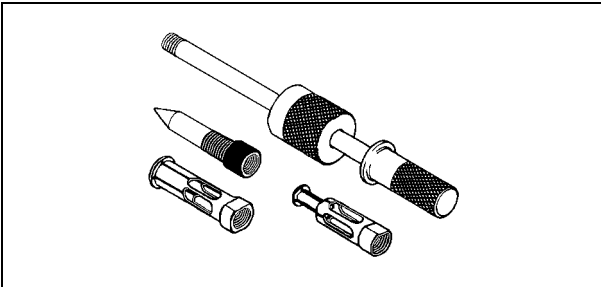
Bearing Puller :
57001-135



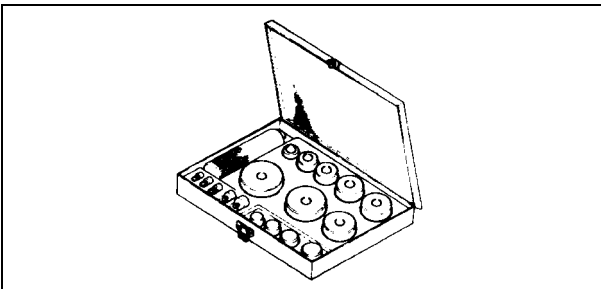
Outside Circlip Pliers :
57001-144



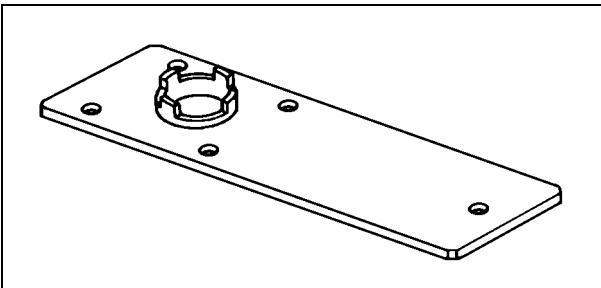
Oil Seal & Bearing Remover :
57001-1058



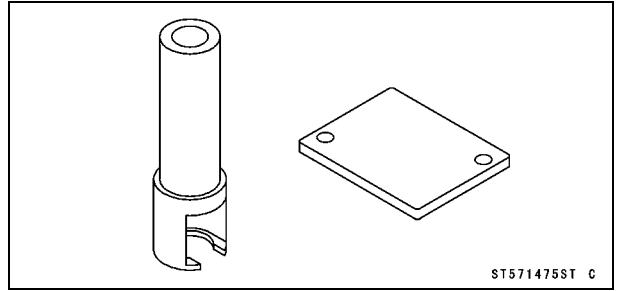
Bearing Driver Set :
57001-1129



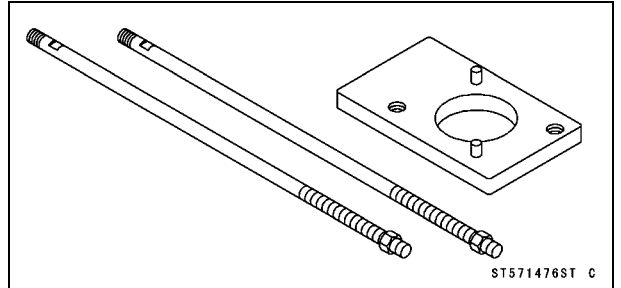
Socket Wrench :
57001-1363



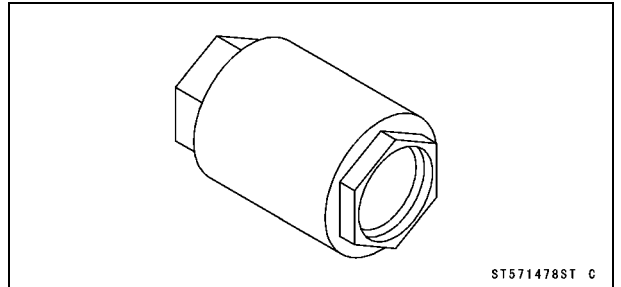
Damper Spring Compressor Set :
57001-1475



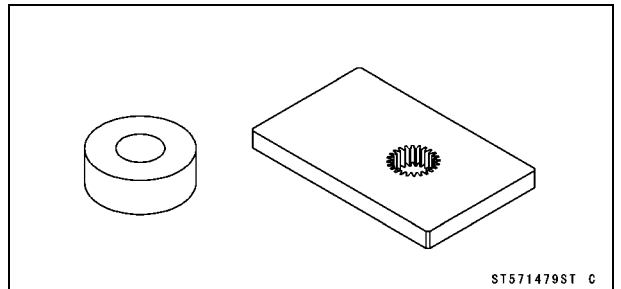
Holder & Guide Arbor :
57001-1476



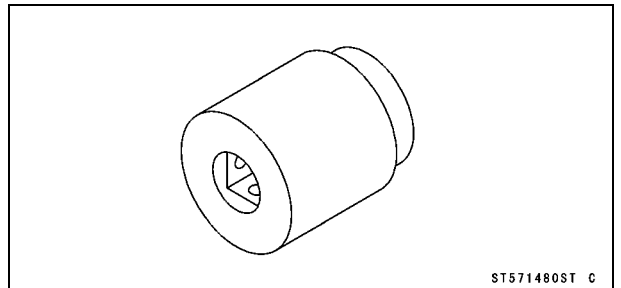
Socket Wrench, Hex 50 :
57001-1478



Output Shaft Holder & Spacer :
57001-1479



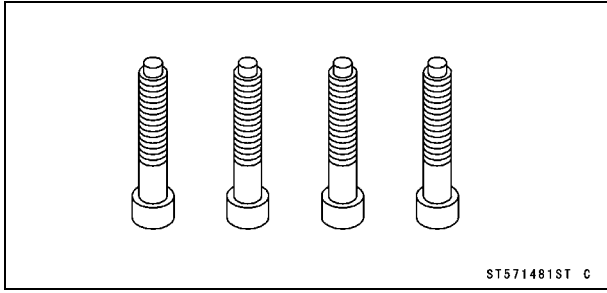
Pinion Gear Holder :
57001-1480



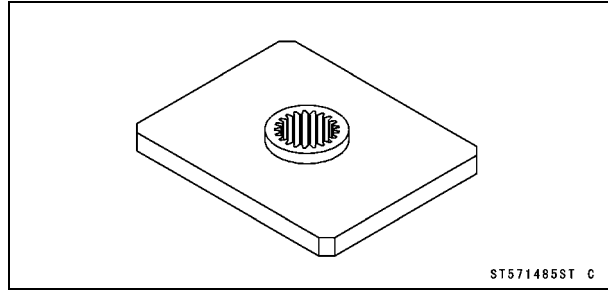
11-8 FINAL DRIVE

Special Tools

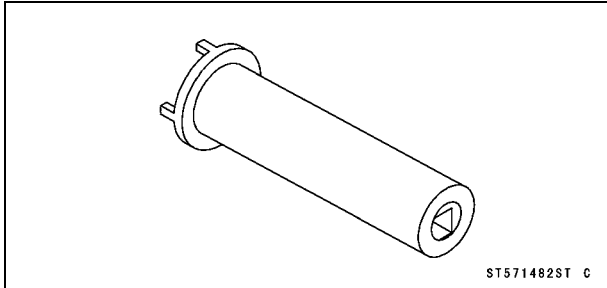
Nut Holding Bolts :
57001-1481



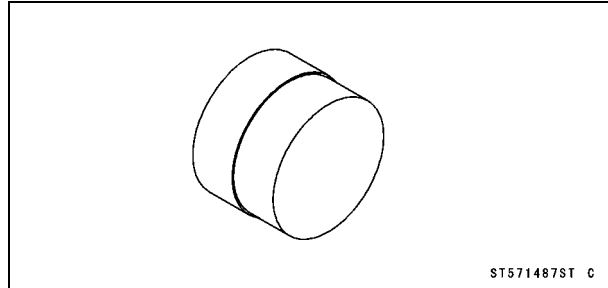
Pinion Gear Holder :
57001-1485



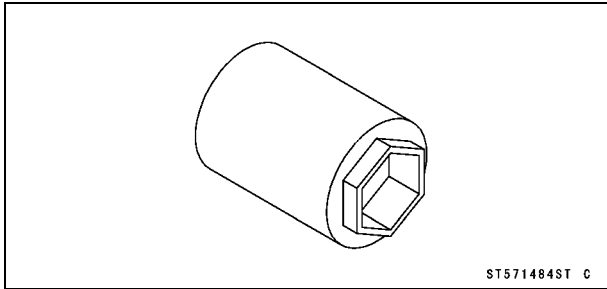
Socket Wrench :
57001-1482



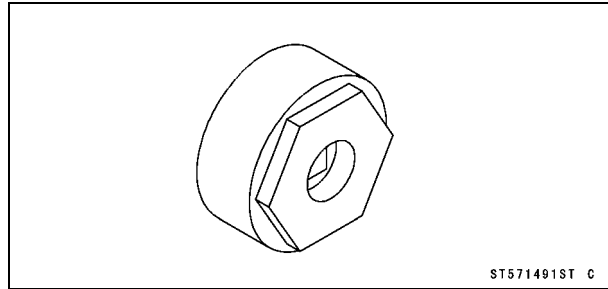
Oil Seal Driver:
57001-1487



Socket Wrench, Hex 41 :
57001-1484



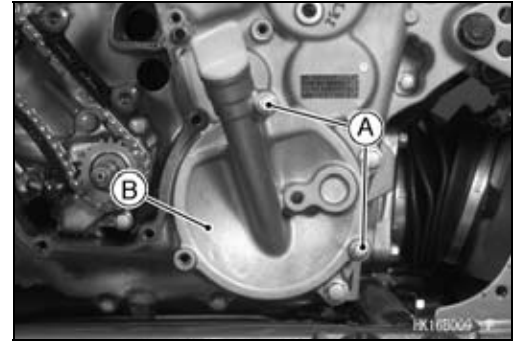
Hexagon Wrench, Hex 41 :
57001-1491



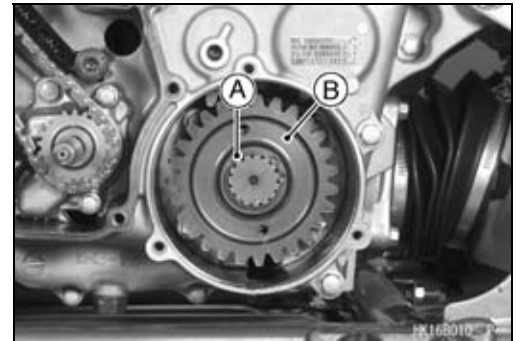
Output Bevel Gears

Output Drive Bevel Gear Removal

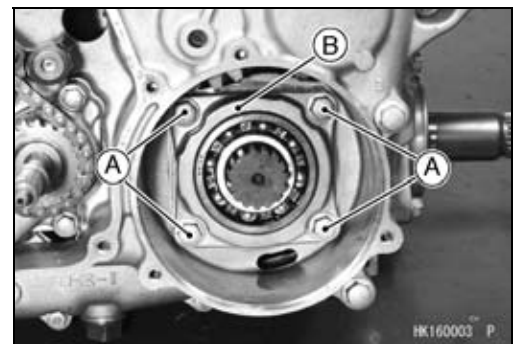
- Remove:
 - Oil Pipe (see Engine Lubrication System chapter)
 - Output Drive Bevel Gear Cover Bolts [A]
 - Output Drive Bevel Gear Cover [B]



- Remove:
 - Circlip [A]
- **Special Tool - Outside Circlip Pliers: 57001-144**
- Remove:
 - Output Drive Idle Gear [B]



- Remove:
 - Output Drive Bevel Gear Housing Bolts [A]
 - Output Drive Bevel Gear Housing [B]



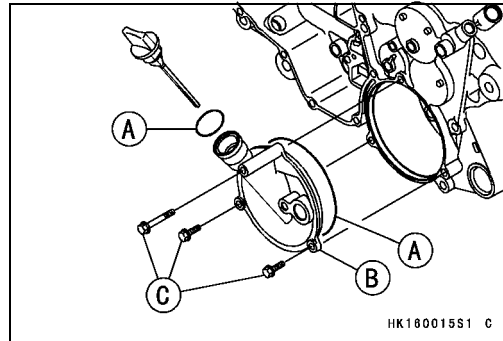
Output Drive Bevel Gear Installation

- Install the output drive bevel gear housing.
- Tighten:
 - Torque - Output Drive Bevel Gear Housing Bolts: 26 N·m
(2.7 kgf·m, 20 ft·lb)**
- Install:
 - Output Drive Idle Gear
 - New Circlip
- **Special Tool - Outside Circlip Pliers: 57001-144**

11-10 FINAL DRIVE

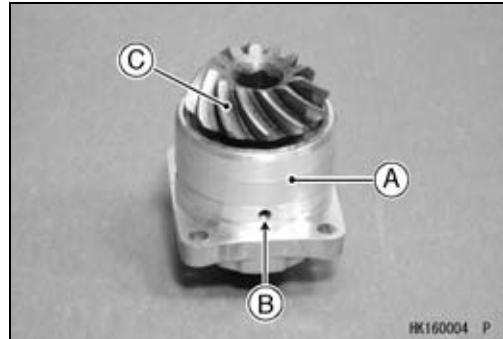
Output Bevel Gears

- Apply grease:
 - O-rings [A]
- Install:
 - Output Drive Bevel Gear Cover [B]
- Tighten:
 - Torque - Output Drive Bevel Gear Cover Bolts [C]: 8.8 N·m (0.90 kgf·m, 78 in·lb)



Output Drive Bevel Gear Disassembly

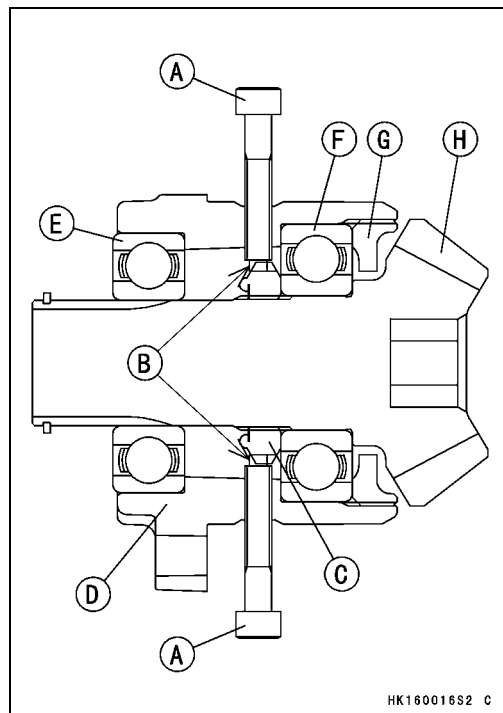
- Remove:
 - Output Drive Bevel Gear Housing [A] (see Output Drive Bevel Gear Removal)
- Look through the hole [B] in the housing.
- Turn the bevel gear [C] until the groove of the output drive bevel gear holder nut is seen.



- Tighten the nut holding bolts [A] (4) securely into the grooves [B] of the bevel gear holder nut [C] in the output drive bevel gear housing.

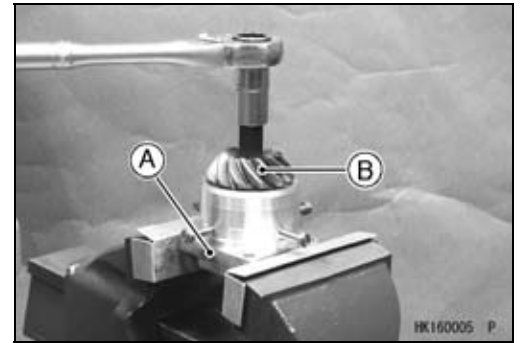
Special Tool - Nut Holding Bolts: 57001-1481

- [D] Output Drive Bevel Gear Housing
- [E] Outer Ball Bearing
- [F] Inner Ball Bearing
- [G] Bearing Holder
- [H] Output Drive Bevel Gear



Output Bevel Gears

- Hold the output drive bevel gear housing [A] in a vise.
- Loosen the bevel gear [B] using an Allen wrench about four rotations.
- Remove one nut holding bolt, and look at through the hole.
- ★ If the groove of the bevel gear holder nut is not seen, loosen the other three bolts.



- Drive the gear shaft end using a copper mallet until the grooves of the bearing holder nut can be seen again.
- Retighten the nut holding bolts (4) securely into the groove of the bevel gear holder nut in the output drive bevel gear housing.

Special Tool - Nut Holding Bolts: 57001-1481

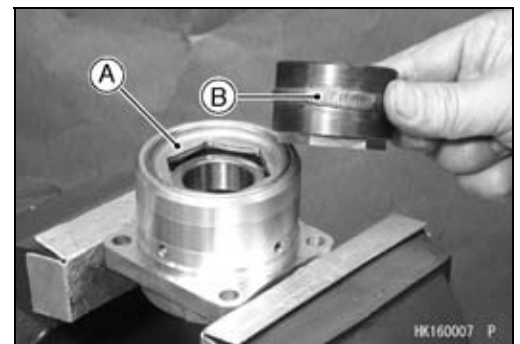
- Repeat the above procedure, and remove the bevel gear from the housing.



- Remove the bearing holder [A] using the hexagon wrench [B].

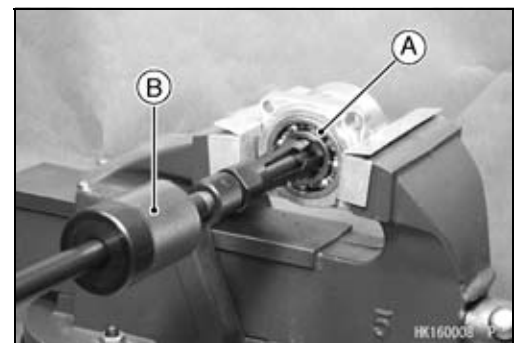
Special Tool - Hexagon Wrench, Hex 41: 57001-1491

- If the holder seems too difficult to break free, apply heat to softer the locking agent.



- Remove:
Outer Ball Bearing [A]

**Special Tool - Oil Seal & Bearing Remover [B]:
57001-1058**

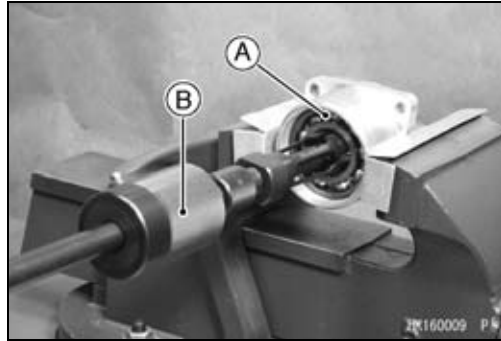


11-12 FINAL DRIVE

Output Bevel Gears

- Remove:
 - Output Drive Bevel Gear Holder Nut
 - Inner Ball Bearing [A]

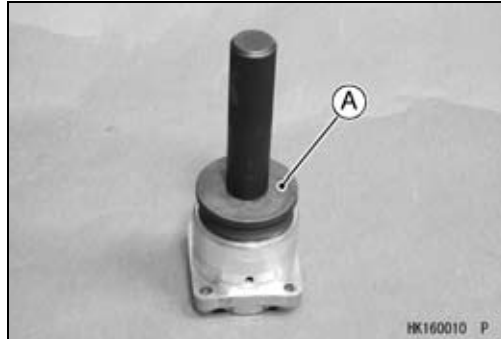
Special Tool - Oil Seal & Bearing Remover [B]:
57001-1058



Output Drive Bevel Gear Assembly

- Press the new inner ball bearing until it is bottomed.

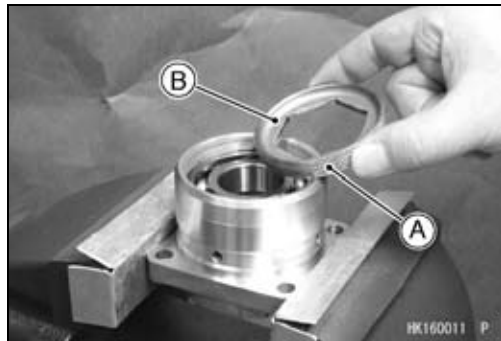
Special Tool - Bearing Driver Set [A]: 57001-1129



- Apply a non-permanent locking agent to the threads of the bearing holder [A] and tighten it so that the deep side [B] faces outward.

Torque - Bearing Holder: 120 N·m (12 kgf·m, 89 ft·lb)

- Press the output drive bevel gear until it is bottomed.



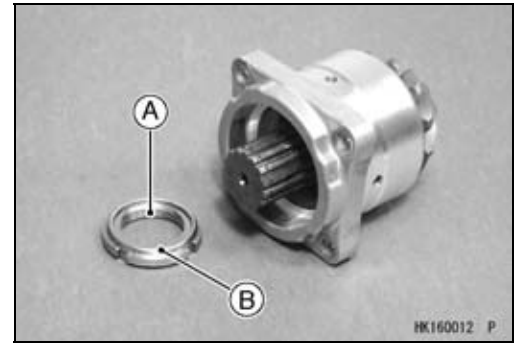
Output Bevel Gears

- Apply a non-permanent locking agent to the threads of the bevel gear holder nut [A] and tighten it so that the projection side [B] faces outward.

Special Tool - Socket Wrench: 57001-1482 [C]

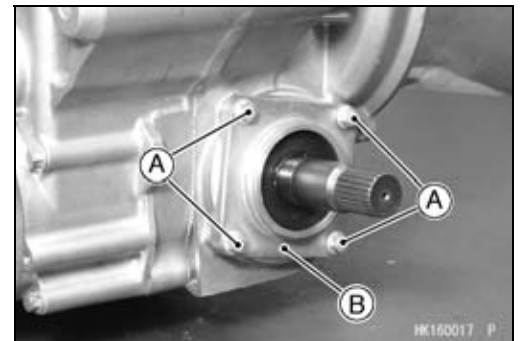
Torque - Bevel Gear Holder Nut: 157 N·m (16 kgf·m, 116 ft·lb)

- Press the new outer ball bearing until it is bottomed.

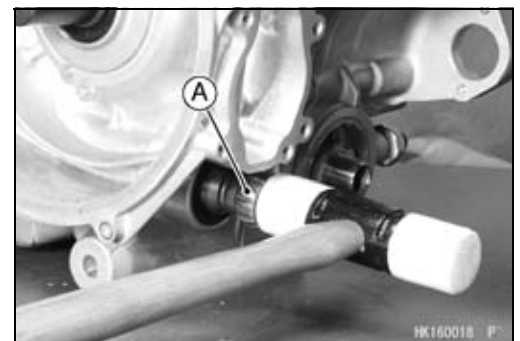


Output Driven Bevel Gear Removal

- Remove:
 - Swingarm (see Suspension chapter) and Propeller Shaft (see this chapter) or Engine (see Engine Removal/Installation chapter)
 - Output Driven Bevel Gear Housing Bolts [A]
 - Output Driven Bevel Gear Housing [B]



- Tap lightly the front end [A] of the output driven bevel gear shaft using a plastic mallet.
- The output driven bevel gear shaft assembly comes off with the housing.

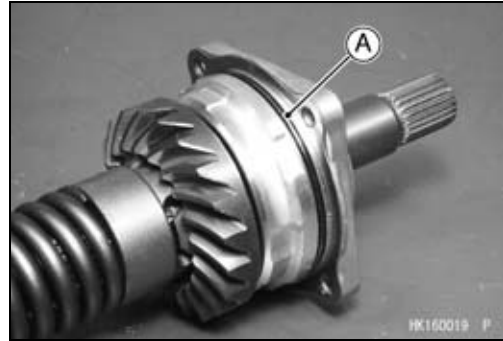


11-14 FINAL DRIVE

Output Bevel Gears

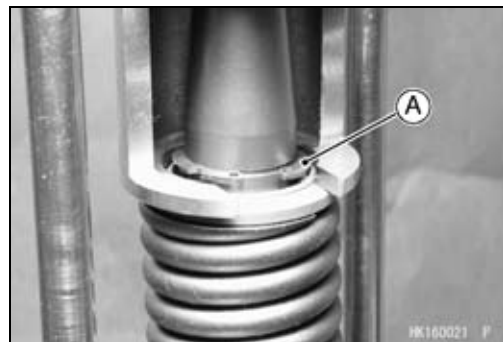
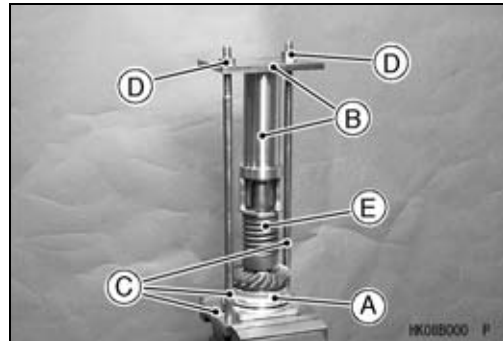
Output Driven Bevel Gear Installation

- Apply grease:
 - O-ring [A]
- Install the output driven bevel gear shaft assembly.
- Tighten:
 - Torque - Output Driven Bevel Gear Housing Bolts: 26 N·m (2.7 kgf·m, 20 ft·lb)

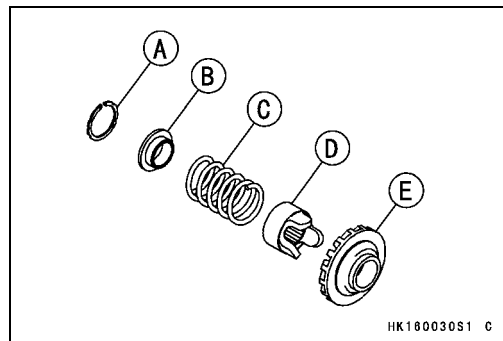


Output Driven Bevel Gear Disassembly

- Remove:
 - Output Driven Bevel Gear Housing Assembly (see Output Driven Bevel Gear Removal)
- Hold the holder in a vise, and set the housing assembly [A] on the holder.
- Special Tools - Damper Spring Compressor Set [B]: 57001-1475
- Holder & Guide Arbor [C]: 57001-1476
- Tighten the nuts [D] and compress the damper spring [E].
- Remove:
 - Circlip [A]
- Special Tool - Outside Circlip Pliers: 57001-144



- Remove:
 - Circlip [A]
 - Spring Holder [B]
 - Spring [C]
 - Cam Damper [D]
 - Output Driven Bevel Gear [E]

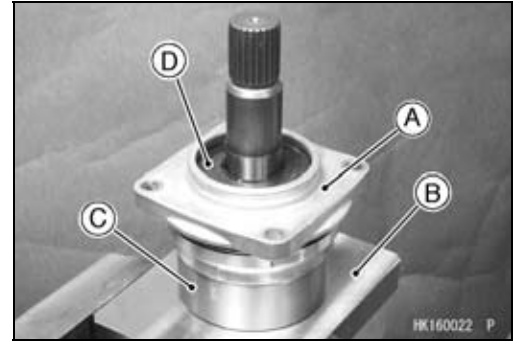


Output Bevel Gears

- Hold the housing assembly [A] with the output shaft holder [B] & spacer [C] in a vise.

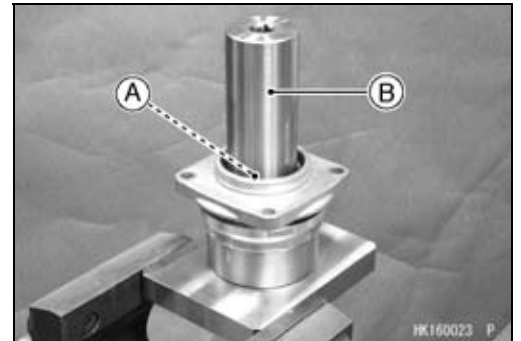
Special Tool - Output Shaft Holder & Spacer: 57001-1479

- Remove:
Oil Seal [D]



- Remove:
Output Shaft Holder Nut [A]

Special Tool - Socket Wrench [B]: 57001-1482



- Hold the housing assembly [A] with the holder [B] in a vise.

Special Tool - Holder & Guide Arbor : 57001-1476

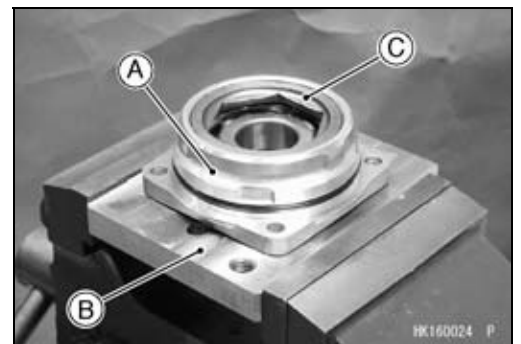
- Remove:
Bearing Holder [C]

Special Tool - Socket Wrench [D], Hex 50: 57001-1478

- If the holder seems too difficult to break free, apply heat to softer the locking agent.

- Remove:
Ball Bearing

Special Tool - Oil Seal & Bearing Remover: 57001-1058



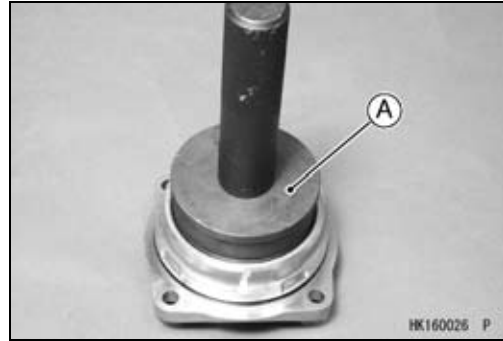
11-16 FINAL DRIVE

Output Bevel Gears

Output Driven Bevel Gear Assembly

- Press the new ball bearing until it is bottomed.

Special Tool - Bearing Driver Set [A]: 57001-1129



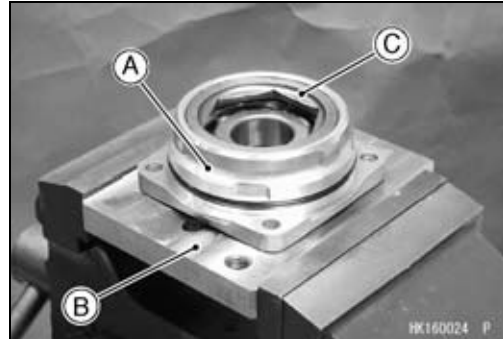
- Hold the housing assembly [A] with the holder [B] in a vise.

Special Tool - Holder & Guide Arbor: 57001-1476

- Apply a non-permanent locking agent to the threads of the bearing holder [C] and tighten it.

Special Tool - Socket Wrench, Hex 50: 57001-1478

Torque - Bearing Holder: 137 N·m (14 kgf·m, 101 ft·lb)



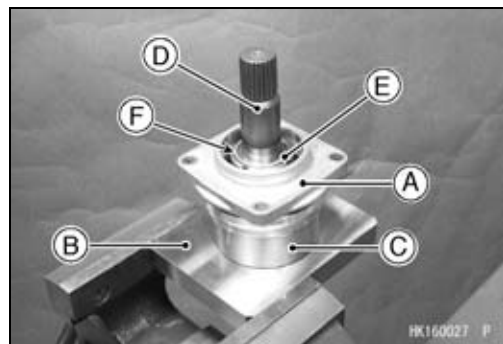
- Hold the housing assembly [A] with the output shaft holder [B] & spacer [C] in a vise.

Special Tool - Output Shaft Holder & Spacer: 57001-1479

- Insert the output shaft [D] in the housing.
- Apply a non-permanent locking agent to the threads of the output shaft holder nut [E] and tighten it so that the projection side [F] faces outward.

Special Tool - Socket Wrench: 57001-1482

Torque - Output Shaft Holder Nut: 157 N·m (16 kgf·m, 116 ft·lb)



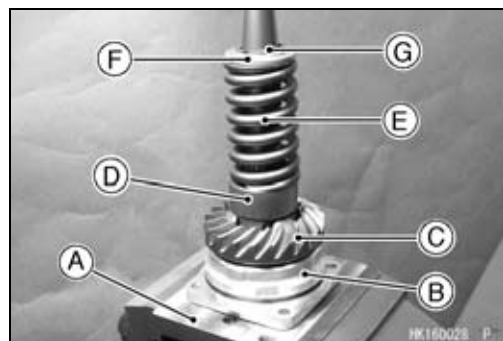
- Apply grease to the oil seal and press it.

- Hold the holder [A] in a vise, and set the housing assembly [B] on the holder.

Special Tool - Holder & Guide Arbor: 57001-1476

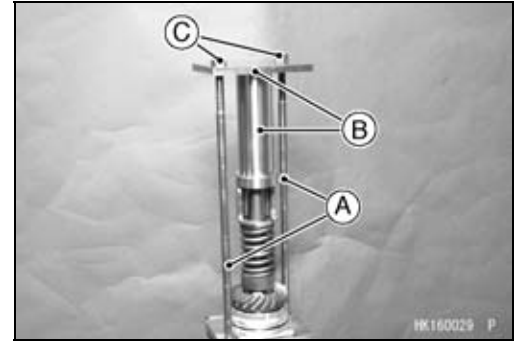
- Install:

Output Driven Bevel Gear [C]
Cam Damper [D]
Spring [E]
Spring Holder [F]
Circlip [G]



Output Bevel Gears

- Install:
 - Guide Bars [A]
 - Damper Spring Compressor Set [B]
- **Special Tools - Holder & Guide Arbor: 57001-1476**
- **Damper Spring Compressor Set: 57001-1475**
- Tighten the nuts [C] and compress the damper spring.
- Install:
 - Circlip
- **Special Tool - Outside Circlip Pliers: 57001-144**

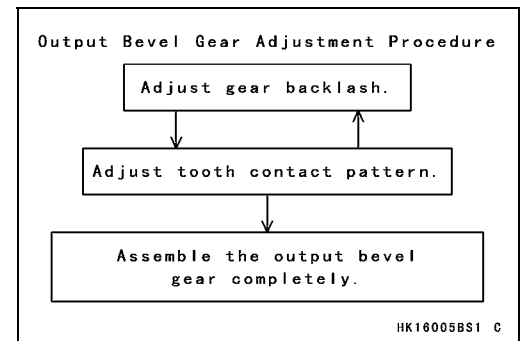


Output Bevel Gears Adjustment

The **backlash** and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

When replacing any one of the backlash-related parts, be sure to check and adjust the backlash and tooth contact. First adjust the backlash, and then tooth contact by replacing shims.

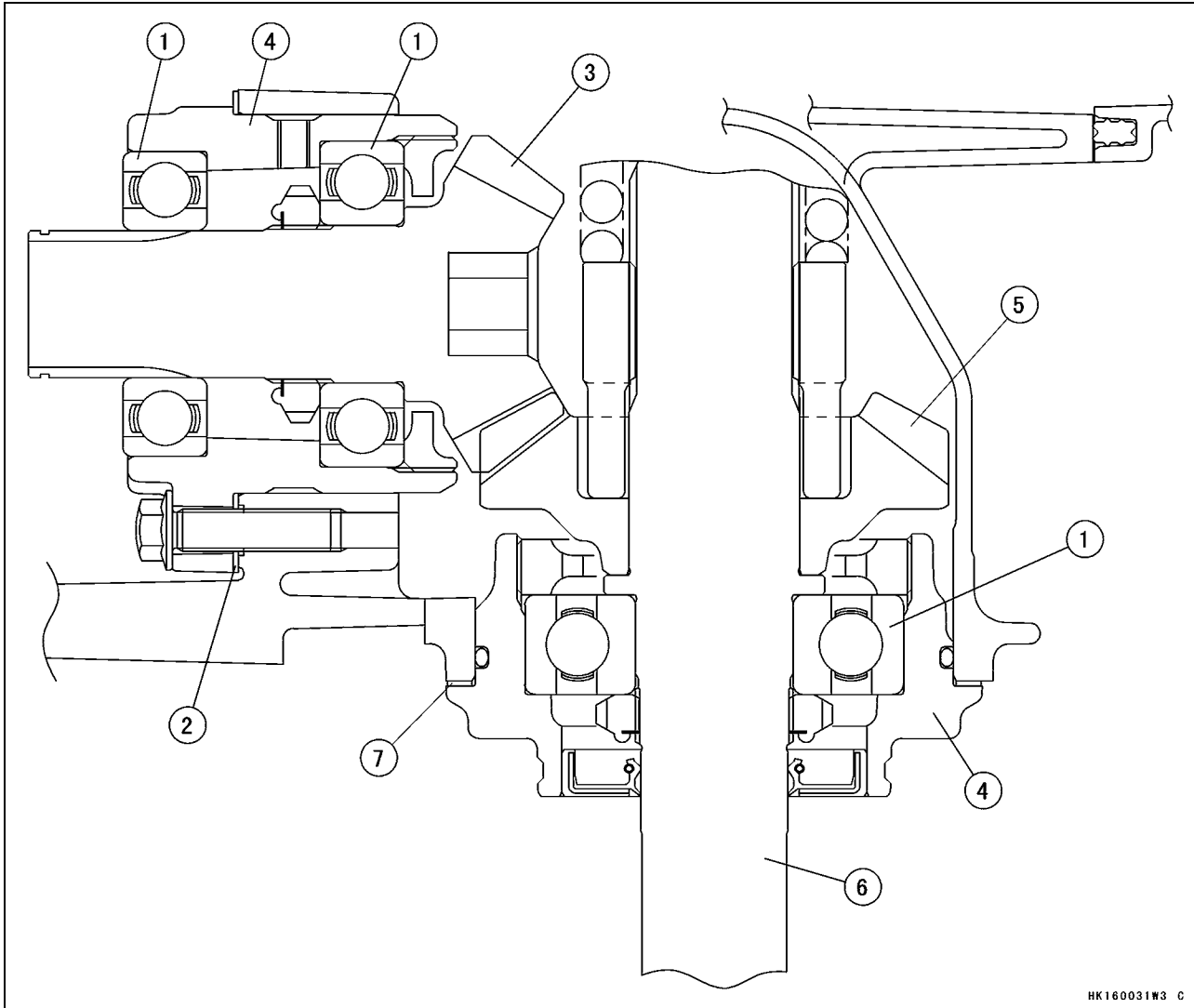
These two adjustments are of critical importance and must be carried out in the correct sequence, using the procedures shown.



11-18 FINAL DRIVE

Output Bevel Gears

Output Bevel Gear (Backlash-related Parts)



HK160031W3 C

- 1. Ball Bearings
- 2. Drive Bevel Gear Shims
- 3. Output Drive Bevel Gear
- 4. Bearing Housings

- 5. Output Driven Bevel Gear
- 6. Output Driven Shaft
- 7. Driven Bevel Gear Shims

Output Bevel Gears

Drive Bevel Gear Shims for Tooth Contact Adjustment

Thickness	Part Number
0.15 mm (0.006 in.)	92180-1311
0.2 mm (0.008 in.)	92180-1312
0.5 mm (0.020 in.)	92180-1313
0.8 mm (0.031 in.)	92180-1314
1.0 mm (0.039 in.)	92180-1351
1.2 mm (0.047 in.)	92180-1352

Driven Bevel Gear Shims for Backlash Adjustment

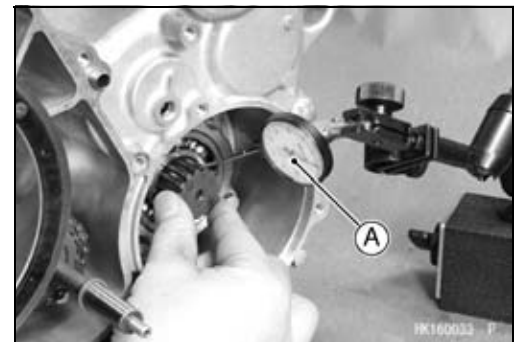
Thickness	Part Number
0.15 mm (0.006 in.)	92180-1307
0.2 mm (0.008 in.)	92180-1308
0.5 mm (0.020 in.)	92180-1309
0.8 mm (0.031 in.)	92180-1310
1.0 mm (0.039 in.)	92180-1349
1.2 mm (0.047 in.)	92180-1350

Bevel Gear Backlash Adjustment

- The amount of backlash is influenced by driven bevel gear position more than by drive bevel gear position.
- Remove the output drive idle gear (see Output Drive Bevel Gear Removal).
- Set up a dial gauge [A] against the output drive shaft spline groove to check gear backlash.
- To measure the backlash, turn the shaft clockwise and counterclockwise slightly so as not to move the mate gear. A rod can be inserted through the lower hole of the housing and into contact with driven gear. This may help to hold it still. The difference between the highest and lowest gauge reading is the amount of backlash.
- ★ If the backlash is not within the limit, replace the shim(s) at the driven bevel gear.
- ★ Change the thickness a little at a time.
- Recheck the backlash, and readjust as necessary.

Output Bevel Gear Backlash

Standard: 0.05 ~ 0.11 mm (0.0020 ~ 0.0043 in.) (at output drive shaft spline)



11-20 FINAL DRIVE

Output Bevel Gears

Tooth Contact Adjustment

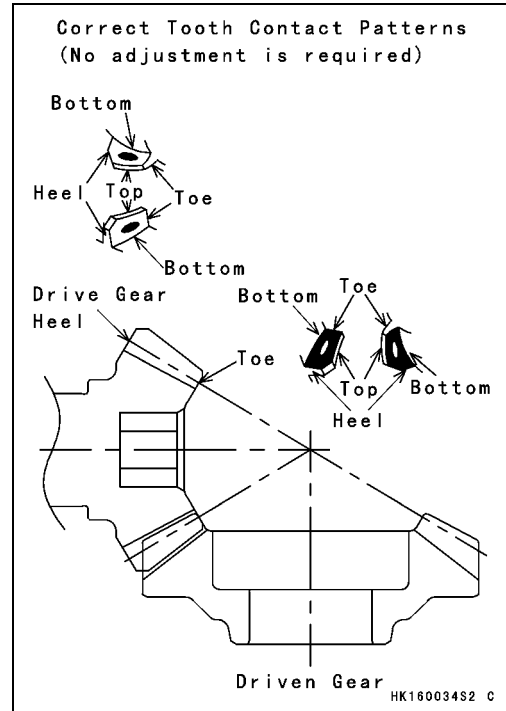
- Tooth contact location is influenced by drive gear position more than by driven gear position.
- Clean any dirt and oil off the bevel gear teeth.
- Apply checking compound to 4 or 5 teeth on the output driven bevel gear.

NOTE

- Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.
- The checking compound must be smooth and firm with the consistency of tooth paste.
- Special compounds are available from automotive supply stores for the purpose of checking differential gear tooth patterns and contact. Use this for checking the bevel gears.
- Turn the output driven shaft for 3 or 4 turns in the drive and reverse (coast) directions, while creating a drag on the drive bevel gear shaft.
- Check the drive pattern and coast pattern of the bevel gear teeth. The tooth contact patterns of both drive and coast sides should be centrally located between the top and bottom of the tooth, and a little closer to the toe of the tooth.
- ★ If the tooth contact pattern is incorrect, replace the shim(s) at the drive bevel gear and shim(s) at the driven bevel gear, following the examples shown. Then erase the tooth contact patterns, and check them again. Also check the backlash every time the shims are replaced. Repeat the shim change procedure as necessary.

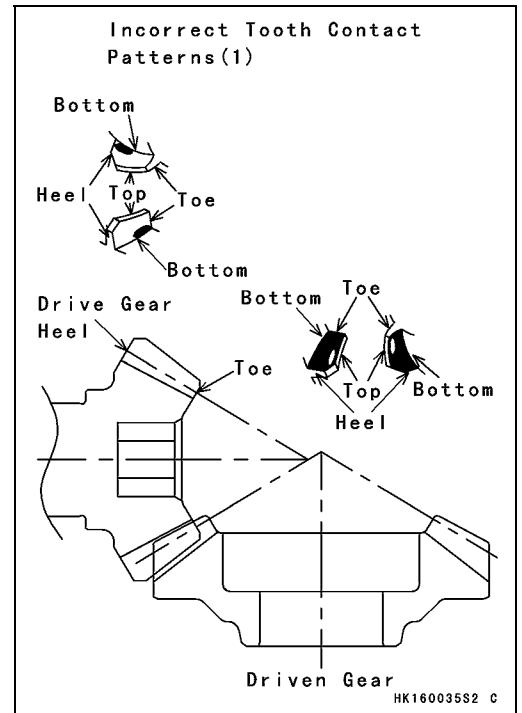
NOTE

- If the backlash is out of the standard range after changing shims, correct the backlash before checking the tooth contact pattern.

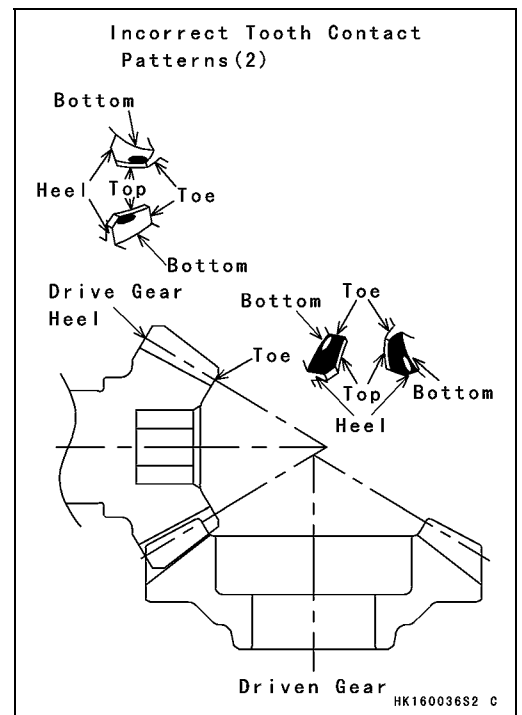


Output Bevel Gears

Example 1: Decrease the thickness of the drive bevel gear shim(s) by 0.1 mm (0.004 in.), and/or increase the thickness of the driven bevel gear shim(s) by 0.1 mm (0.004 in.) to correct the pattern shown below. Repeat in 0.1 mm (0.004 in.) steps if necessary.



Example 2: Increase the thickness of the drive bevel gear shim(s) by 0.1 mm (0.004 in.), and/or decrease the thickness of the driven bevel gear shim(s) by 0.1 mm (0.004 in.) to correct the pattern shown below. Repeat in 0.1 mm (0.004 in.) steps if necessary.

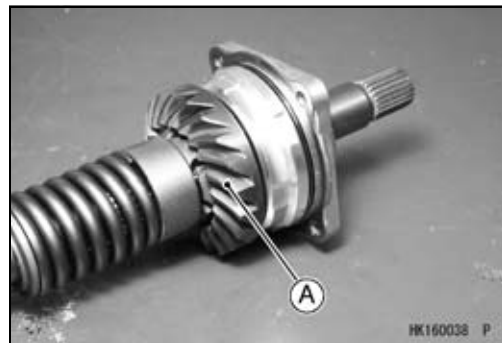
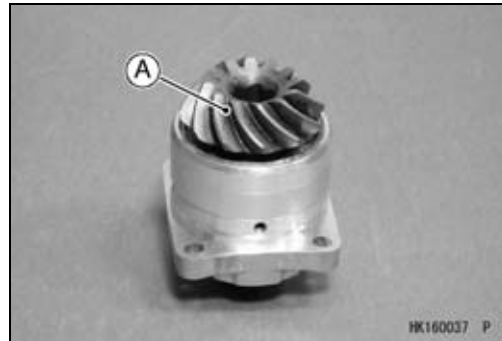


11-22 FINAL DRIVE

Output Bevel Gears

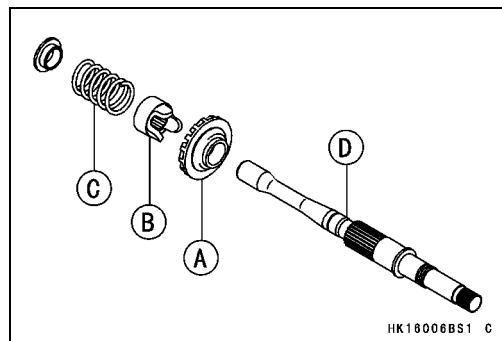
Bevel Gears Inspection

- Visually check the bevel gears [A] for scoring, chipping, or other damage.
- ★ Replace the bevel gears as a set if either gear is damaged.



Cam Damper Inspection

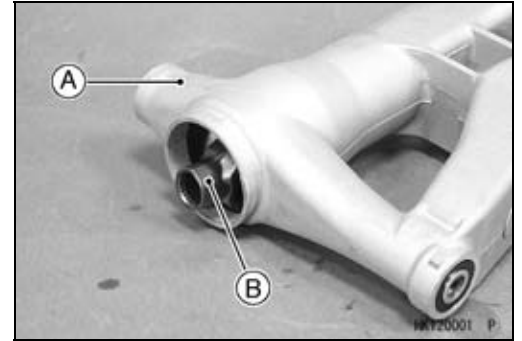
- Visually inspect:
 - Bevel Gear Cam [A]
 - Cam Follower [B]
 - Spring [C]
 - Shaft [D]
- ★ Replace any part if it appears damaged.



Propeller Shaft

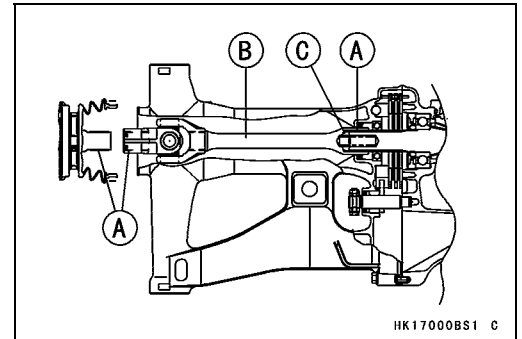
Propeller Shaft Removal

- Drain the final gear case oil (see Final Drive in the Periodic Maintenance chapter).
- Remove:
 - Swingarm [A] (see Suspension chapter)
 - Propeller Shaft [B]



Propeller Shaft Installation

- Wipe the old grease off the front and rear end splines [A] of the propeller shaft [B] and apply new molybdenum disulfide grease in those.
- Be sure to install the spring [C] on the pinion gear nut of the final gear case.
- Install the propeller shaft while aligning the splines.

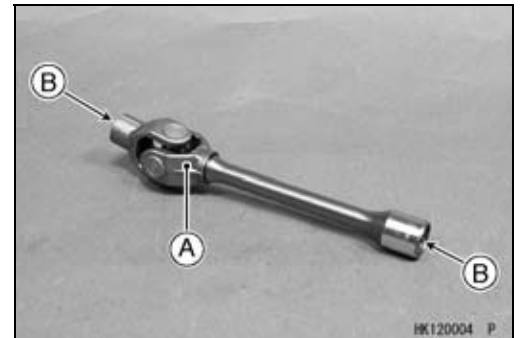


Propeller Shaft Joint Boot Inspection

- Refer to the Final Drive in the Periodic Maintenance chapter.

Propeller Shaft Inspection

- Remove the propeller shaft (see Propeller Shaft Removal).
- Check that the universal joint [A] works smoothly without rattling or sticking.
- ★ If it does rattle or stick, the universal joint is damaged. Replace the propeller shaft with a new one.
- Visually inspect the splines [B] on the propeller shaft.
- ★ If they are badly worn, chipped, or loose, replace the propeller shaft.
- Also, inspect the splines on the rear end of the output shaft and the pinion gear joint in the final gear case.
- ★ If splines are badly worn, chipped, or loose, replace the output shaft and the pinion gear joint.

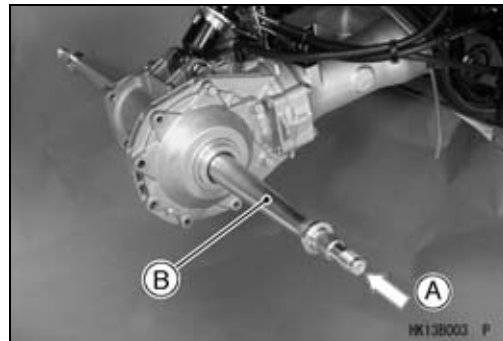
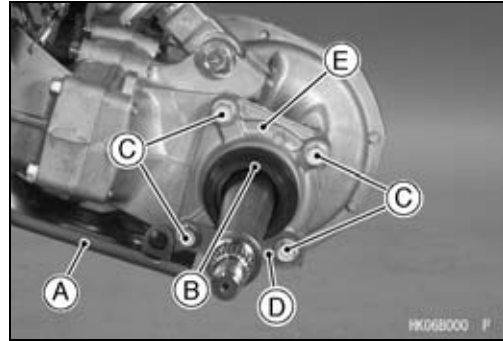


11-24 FINAL DRIVE

Rear Axle

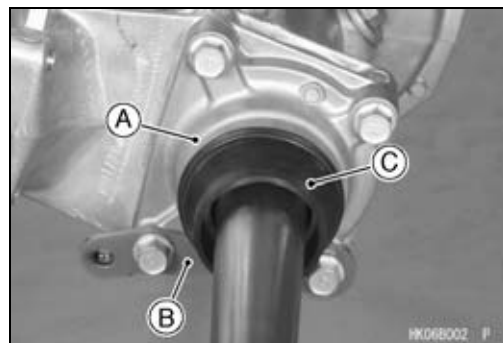
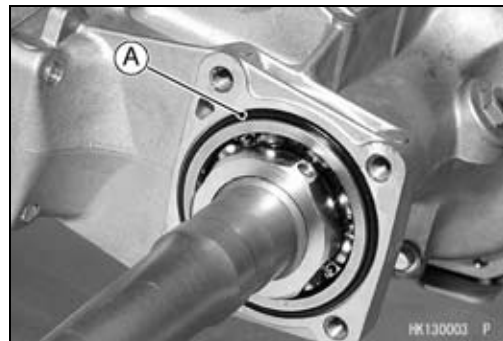
Rear Axle Removal

- Drain the final gear case oil (see Final Drive in the Periodic Maintenance chapter).
- Remove:
 - Rear Wheels (see Wheels/Tires chapter)
 - Rear Hub (see Wheels/Tires chapter)
 - Rear Bottom Guard [A] (see Frame chapter)
 - Cap [B]
 - Final Gear Case Left Cover Bolts [C]
 - Final Gear Case Left Cover Bracket [D]
 - Final Gear Case Left Cover [E]
- Tap [A] the right end of the rear axle [B] and pull it out from the left.
- The left axle bearing comes off with the axle.



Rear Axle Installation

- Install the rear axle from the left side with the left bearing installed, while aligning the splines.
- Apply grease:
 - O-ring [A]
 - Oil Seal Lips in Final Gear Case Left Cover
- Install:
 - Final Gear Case Left Cover [A]
 - Final Gear Case Left Cover Bracket [B]
- Apply a non-permanent locking agent to the cover bolts, and tighten them.
Torque - Final Gear Case Left Cover Bolts : 49 N·m (5.0 kgf·m, 36 ft·lb)
- Install the cap [C].



Rear Axle

Ball Bearing Wear

CAUTION

Do not remove the bearing [A] for inspection. Removal may damage it.

- Check the ball bearing.
- Since the ball bearing is made to extremely close tolerances, the wear must be judged by feel rather than measurement.
- Spin the bearing by hand to check its condition.
- ★ If the bearing is noisy, does not spin smoothly, or has any rough spots, replace the rear axle shaft.

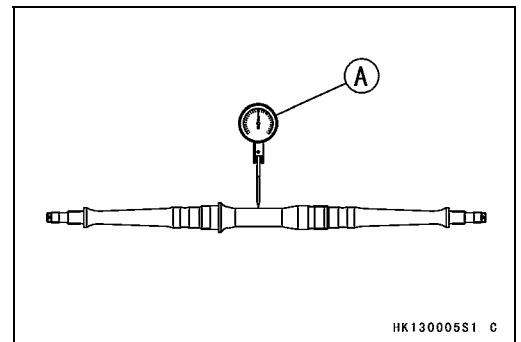
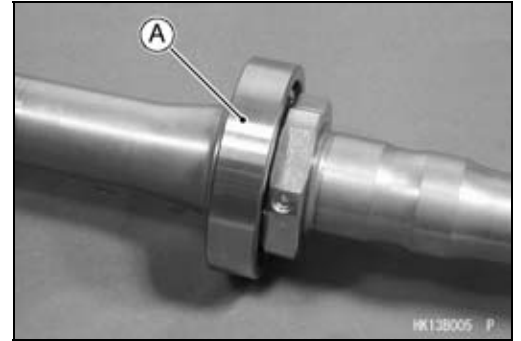
Rear Axle Runout Inspection

- Visually inspect the axle for damage.
- ★ If the axle is damaged or bent, replace it.
- Set the rear axle in an alignment jig or on V blocks, and place a dial gauge [A] against the middle point.
- Turn the axle slowly. The difference between the highest and lowest dial gauge readings is the axle runout (TIR).
- ★ If the runout exceeds the service limit, replace the axle.

Rear Axle Shaft Runout

Standard: TIR 1 mm (0.04 in.) or less

Service Limit: TIR 2 mm (0.08 in.)



11-26 FINAL DRIVE

Final Gear Case

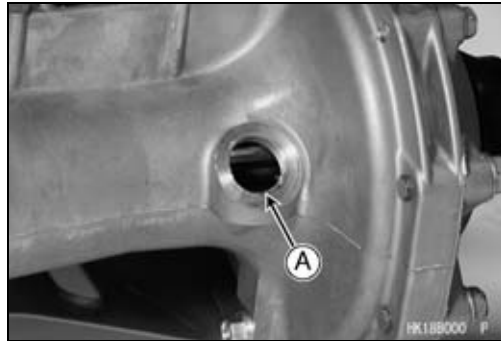
Final Gear Case Oil Level Inspection

- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- Remove the filler cap.

CAUTION

Be careful not to allow any dirt or foreign materials to enter the gear case.

- Check the oil level. The oil level should come to the bottom of the filler opening [A].



★If it is insufficient, first check the final gear case for oil leakage, remedy it if necessary, and add oil through the filler opening. Use the same type and brand of oil that is already in the final gear case.

- Apply grease to the O-ring.
- Be sure the O-ring is in place.

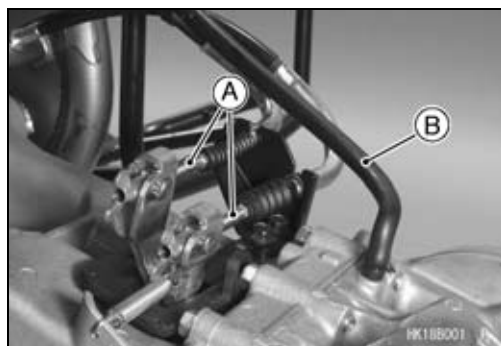
Torque - Oil Filler Cap: 29 N·m (3.0 kgf·m, 22 ft·lb)

Final Gear Case Oil Change

- Refer to the Final Drive in the Periodic Maintenance chapter.

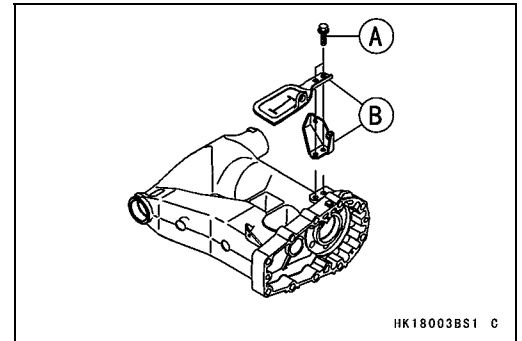
Final Gear Case Removal

- Remove:
 - Lower Rear Shock Absorber Mounting Bolts, Nuts and Washers (see Suspension chapter)
 - Rear Brake Cable Ends [A] (see Brake chapter)
 - Final Gear Case Breather Hose [B]
 - Rear Bottom Guard (see Frame chapter)

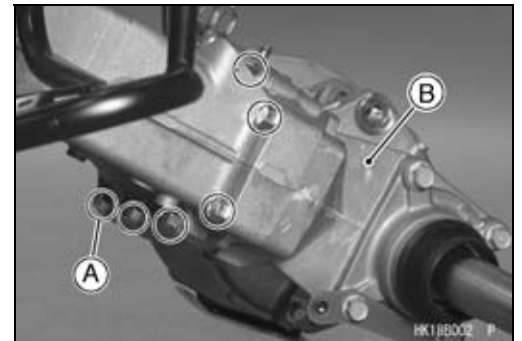


Final Gear Case

- Remove:
 - Brake Cable Mount Bolts [A]
 - Brake Cam Lever Cover and Cable Mount [B]

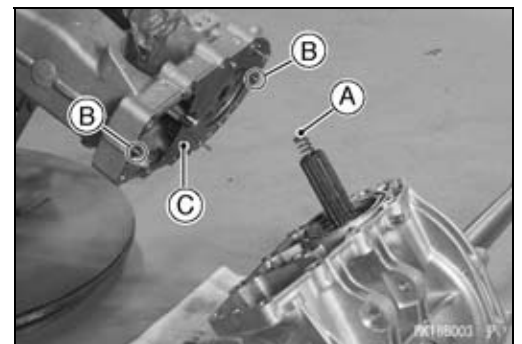


- Remove:
 - Final Gear Case Bolts [A] (10)
 - Final Gear Case [B]

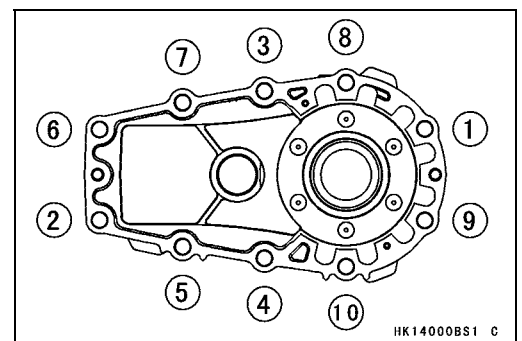


Final Gear Case Installation

- Install:
 - Spring [A]
 - Dowel Pins [B]
 - New Gasket [C] (see Brake System chapter)
- Insert the pinion gear shaft of the final gear case in the plate assembly.
- Align the splines by rotating the axle shaft.



- Tighten the final gear case bolts following the tightening sequence [110].
- Torque - Final Gear Case Bolts: 42 N·m (4.3 kgf·m, 31 ft·lb)**

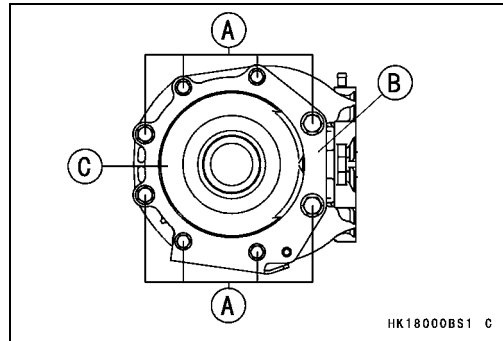


11-28 FINAL DRIVE

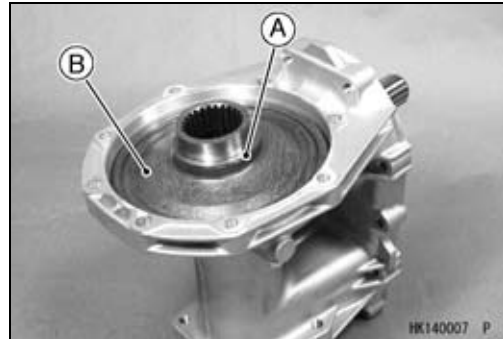
Final Gear Case

Final Gear Case Disassembly

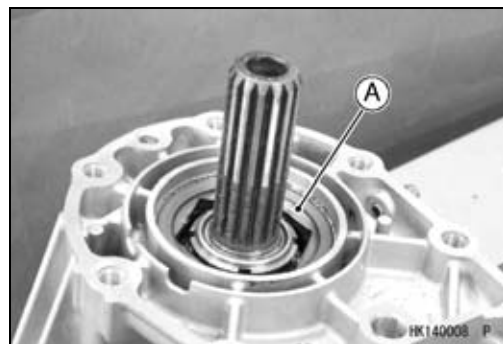
- Remove:
 - Final Gear Case (see Final Gear Case Removal)
 - Final Gear Case Right Cover Bolts [A]
 - Final Gear Case Right Cover Bracket [B]
 - Final Gear Case Right Cover [C]



- Remove:
 - Shim(s) [A]
 - Ring Gear [B]



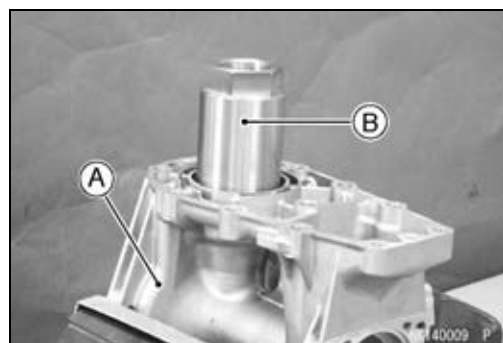
- Remove:
 - Pinion Gear Bearing Holder [A]



○ Hold the final gear case [A] in a vise, and remove the bearing holder using the socket wrench [B].

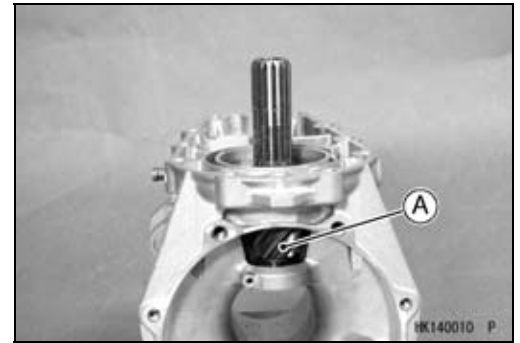
Special Tool - Socket Wrench, Hex 50: 57001-1478

○ If the holder seems too difficult to break free, apply heat to softer the locking agent.



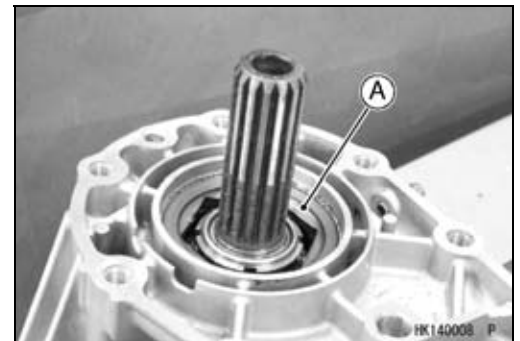
Final Gear Case

- Remove:
 - Pinion Gear Unit [A]
 - Shim(s)

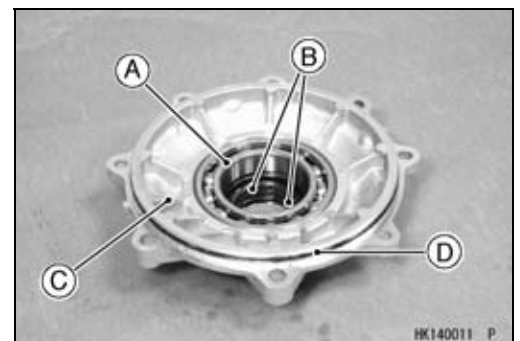


Final Gear Case Assembly

- Visually check the pinion gear and ring gear for scoring, chipping, or other damage.
 - ★ Replace the bevel gear as a set if either gear is damaged since they are lapped as a set in the factory to get the best tooth contact.
 - Install:
 - Shim(s)
 - Pinion Gear Unit
 - Be sure to check and adjust the bevel gear backlash and tooth contact when any of the backlash-related parts are replaced (see Final Bevel Gear Adjustment).
 - Apply a non-permanent locking agent to the pinion gear bearing holder [A], and tighten it.
- Special Tool - Socket Wrench, Hex 50: 57001-1478**
- Torque - Pinion Gear Bearing Holder: 137 N·m (14 kgf·m, 101 ft·lb)**



- Inspect:
 - Ball Bearing [A] (see Bearing and Oil Seal section)
 - Oil Seals [B] (see Bearing and Oil Seal section)
- ★ If they are damaged, replace the final gear case right cover [C].
- Apply grease to the oil seal lips and O-ring [D].



11-30 FINAL DRIVE

Final Gear Case

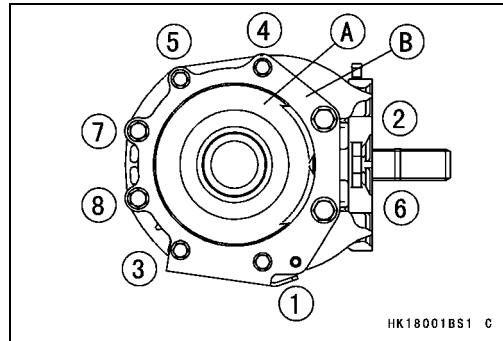
- Install:
 - Final Gear Case Right Cover [A]
 - Final Gear Case Right Cover Bracket [B]
- Apply a non-permanent locking agent to the cover bolts, and tighten them following the tightening sequence [1 ~ 8].

Torque - Final Gear Case Right Cover Bolts (M8): 24 N·m (2.4 kgf·m, 17 ft·lb)

Final Gear Case Right Cover Bolts (M10): 49 N·m (5.0 kgf·m, 36 ft·lb)

Final Gear Case Right Cover Bolts (M12): 94 N·m (9.6 kgf·m, 69 ft·lb)

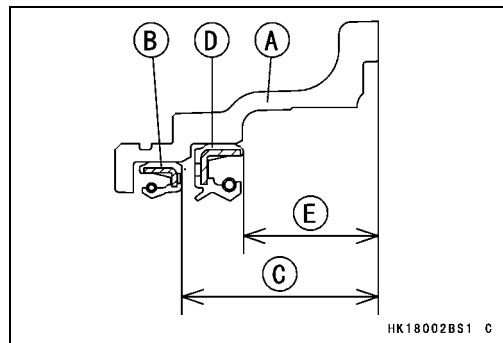
- Install:
 - Final Gear Case Left Cover
 - Rear Axle (see Rear Axle Installation)



Oil Seal Installation

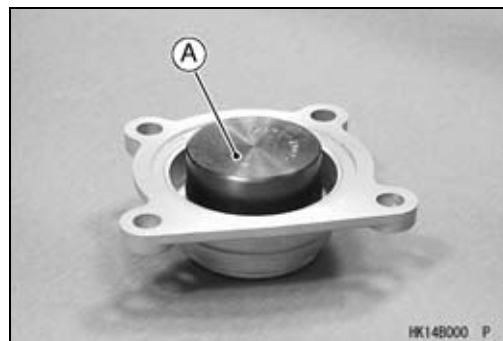
- Press the oil seals in the right and left covers to the specified positions as shown.

- [A] Left Cover
- [B] Outside Oil Seal
- [C] 31.5 ~ 32.5 mm (1.24 ~ 1.28 in.)
- [D] Inside Oil Seal
- [E] 21.3 ~ 22.3 mm (0.84 ~ 0.88 in.)



- Use the oil seal driver [A] for the outside oil seals of the right and left covers.

Special Tool - Oil Seal Driver: 57001-1487



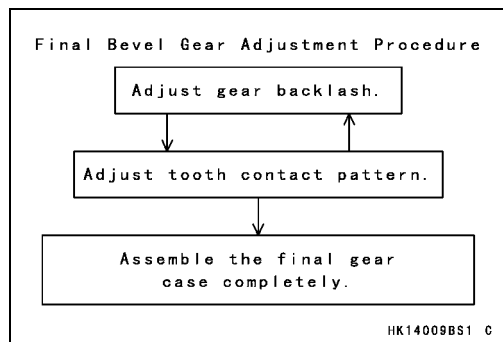
Final Bevel Gear Adjustment

- The **backlash** and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

- After replacing any of the backlash-related parts, be sure to check and adjust the backlash and tooth contact of the bevel gears. First, adjust backlash, and then tooth contact by replacing shims.

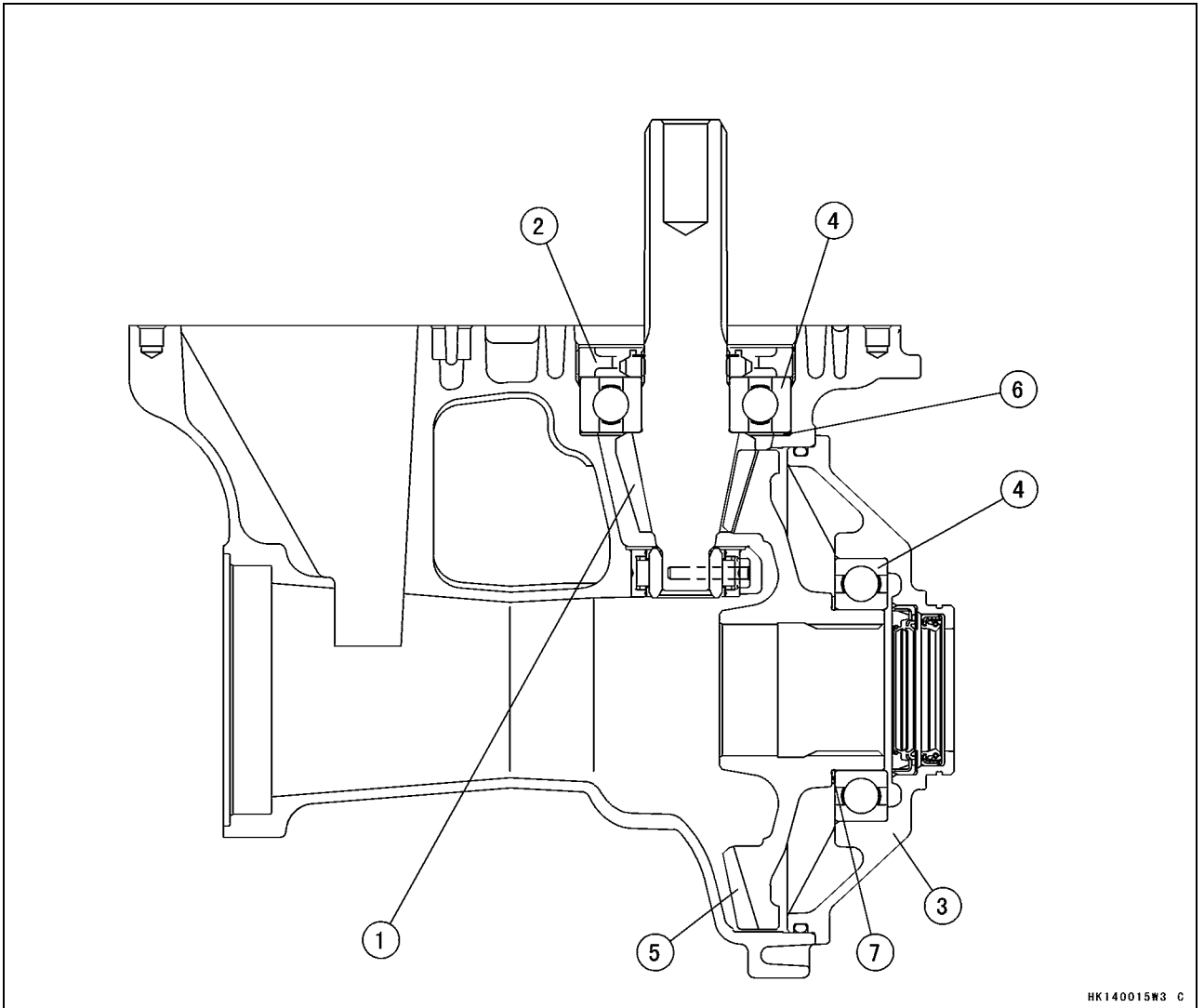
- The amount of backlash is influenced by the ring gear position more than by the pinion gear position.

- Tooth contact locations is influenced by the pinion gear position more than by the ring gear position.



Final Gear Case

Final Gear Case (Backlash-related Parts)



- 1. Pinion Gear
- 2. Pinion Gear Bearing Holder
- 3. Gear Case Right Cover
- 4. Ball Bearings

- 5. Ring Gear
- 6. Pinion Gear Shim(s)
- 7. Ring Gear Shim(s)

11-32 FINAL DRIVE

Final Gear Case

6. Pinion Gear Shims for Tooth Contact Adjustment

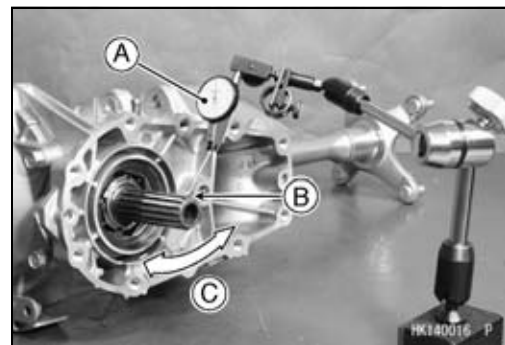
Thickness	Part Number
0.15 mm (0.006 in.)	92180-1320
0.2 mm (0.008 in.)	92180-1319
0.5 mm (0.020 in.)	92180-1321
0.8 mm (0.031 in.)	92180-1322
1.0 mm (0.039 in.)	92180-1345
1.2 mm (0.047 in.)	92180-1346

7. Ring Gear Shims for Backlash Adjustment

Thickness	Part Number
0.15 mm (0.006 in.)	92180-1318
0.2 mm (0.008 in.)	92180-1316
0.5 mm (0.020 in.)	92180-1317
0.8 mm (0.031 in.)	92180-1315
1.0 mm (0.039 in.)	92180-1343
1.2 mm (0.047 in.)	92180-1344

Backlash Adjustment

- Clean any dirt and oil off the bevel gear teeth.
- Install the pinion gear assembly with the primary shim **1.0 mm (0.039 in.) thickness**.
- Assemble the final gear case (see Final Gear Case Assembly).
- Install the ring gear with the primary shim **1.0 mm (0.039 in.) thickness**.
- Check the backlash during tightening the cover bolts, and stop to tighten them immediately if the backlash disappears. Then, change the ring gear shim to a thinner one.
- Temporarily, install the rear axle in the gear case and hold it with a vise so that the ring gear is lower than the pinion gear.
- Mount a dial gauge [A] so that the tip of the gauge is against the splined portion [B] of the pinion gear joint.
- To measure the backlash, move the pinion gear shaft back and forth [C] while holding the rear axle steady. The difference between the highest and the lowest gauge reading is the amount of backlash.
- Measure backlash at three locations equally spaced on the splines.



Final Bevel Gear Backlash :

0.07 ~ 0.14 mm (0.003 ~ 0.006 in.) at pinion gear spline

- ★ If the backlash is not within the limit, replace the ring gear shim(s). To increase backlash, decrease the thickness of the shim(s). To decrease backlash, increase the thickness of the shim(s).
- ★ Change the thickness a little at a time.
- Recheck the backlash, and readjust as necessary.

Final Gear Case

Tooth Contact Adjustment

- Clean any dirt and oil off the bevel gear teeth.
- Apply checking compound to 4 or 5 teeth of the pinion gear.

NOTE

- *Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.*
 - *The checking compound must be smooth and firm, with the consistency of tooth paste.*
 - *Special compounds are available at automotive supply stores for the purpose of checking differential gear tooth patterns and contact.*
- Assemble the final gear case (see Final Gear Case Assembly).
 - Turn the pinion gear for one revolution in the drive and reverse (coast) direction, while creating drag on the ring gear.
 - Remove the ring gear and pinion gear unit to check the drive pattern and coast pattern of the bevel gear teeth.
 - The tooth contact patterns of both (drive and coast) sides should be centrally located between the top and bottom of the tooth. The drive pattern can be a little closer to the toe and the coast pattern can be a somewhat longer and closer to the toe.
- ★ If the tooth contact pattern is incorrect, replace the pinion gear shim(s), following the examples shown.
 - Then erase the tooth contact patterns, and check them again. Also check the backlash every time the shim(s) are replaced. Repeat the shim change procedure as necessary.

NOTE

- *If the backlash is out of the standard range after changing the pinion gear shim(s), change the ring gear shim(s) to correct the backlash before checking the tooth contact pattern.*

Pinion Gear Unit Disassembly

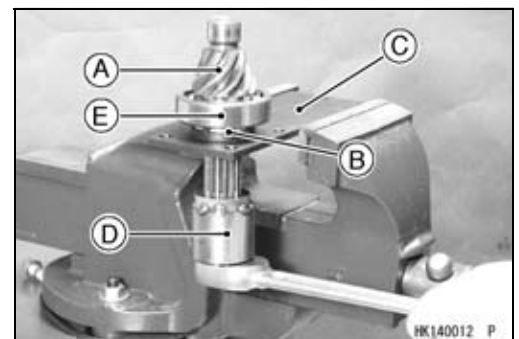
- Remove:
 - Pinion Gear Unit [A] (see Final Gear Case Disassembly)
- Hold the pinion gear bearing holder nut [B] with the socket wrench [C] in a vise, and loosen the pinion gear shaft using the pinion gear holder [D].

Special Tools - Socket Wrench: 57001-1363

Pinion Gear Holder: 57001-1480

- Remove the ball bearing [E] as necessary.

Special Tool - Bearing Puller: 57001-135



11-34 FINAL DRIVE

Final Gear Case

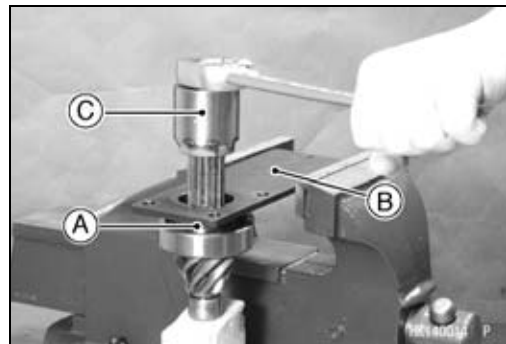
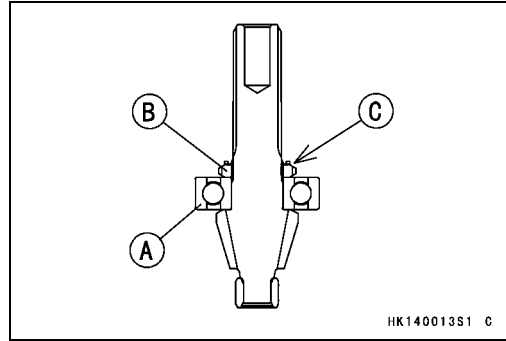
Pinion Gear Unit Assembly

- The pinion gear and ring gear are lapped as a set in the factory to get the best tooth contact. They must be replaced as a set.
- Visually inspect the bearing for abrasion, color change, or other damage.
- ★ If there is any doubt as to the condition of a bearing, replace the bearing.
- Be sure to check and adjust the bevel gear backlash and tooth contact, when any of the backlash-related parts are replaced.
- Press the bearing [A] on the pinion gear until it is bottomed.
- Install the pinion gear bearing holder nut [B] so that the projection [C] faces outward.
- Apply a non-permanent locking agent to the pinion gear bearing holder nut [A], and tighten it.

Special Tools - Socket Wrench [B]: 57001-1363

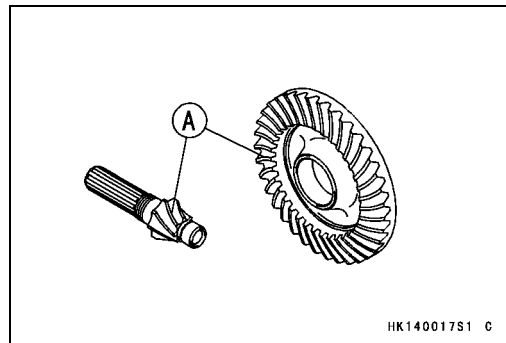
Pinion Gear Holder [C]: 57001-1480

Torque - Pinion Gear Bearing Holder Nut: 157 N·m (16 kgf·m, 116 ft·lb)



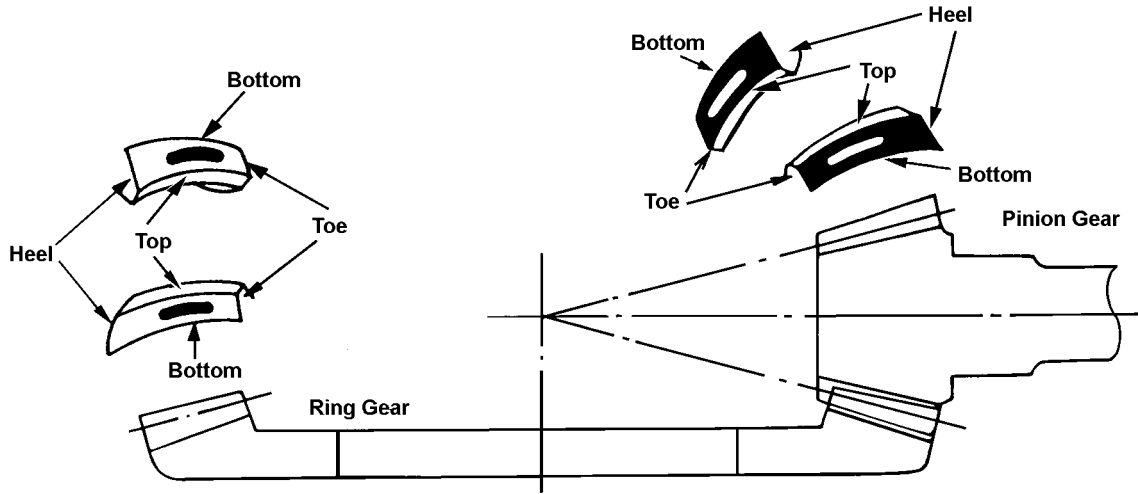
Bevel Gear Inspection

- Visually check the bevel gears [A] for scoring, chipping, or other damage.
- ★ Replace the bevel gears as a set if either gear is damaged.



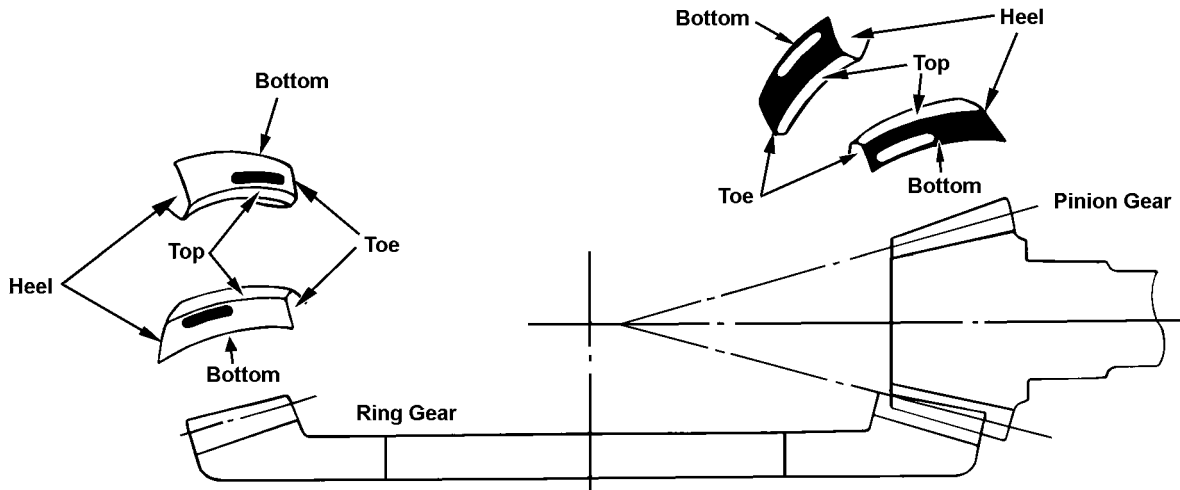
Final Gear Case

Correct Tooth Contact Pattern: No adjustment is required.

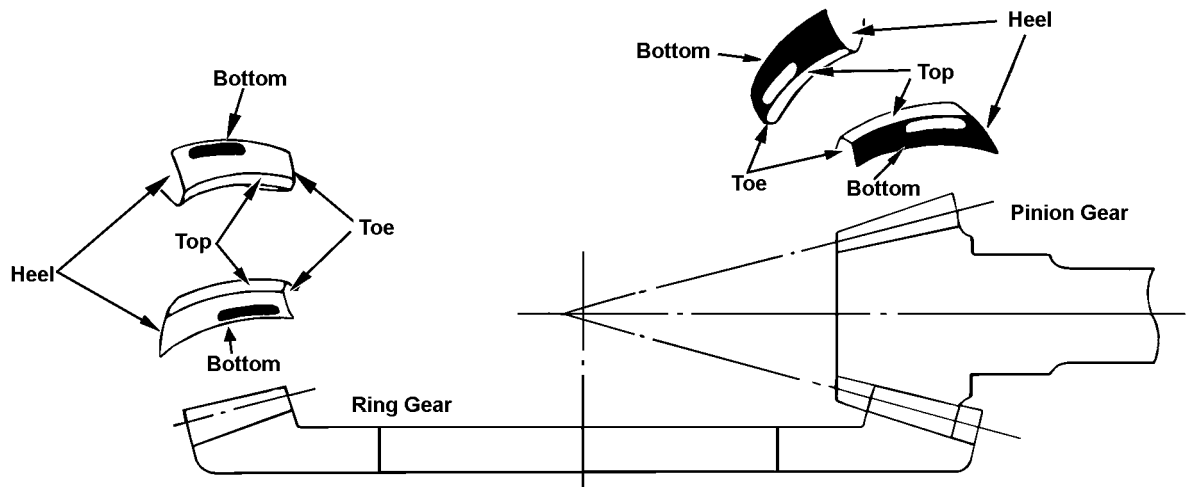


Incorrect Tooth Contact Patterns

Example 1 : Decrease the thickness of the ring gear shim(s) by 0.1 mm (0.004 in.) to correct the pattern shown below. Repeat in 0.1 mm (0.004 in.) steps if necessary.



Example 2 : Increase the thickness of the ring gear shim(s) by 0.1 mm (0.004 in.) to correct the pattern shown below. Repeat in 0.1 mm (0.004 in.) steps if necessary.



11-36 FINAL DRIVE

Bearing and Oil Seal

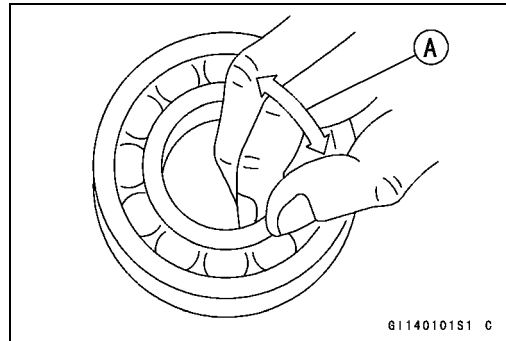
Ball or Needle Bearing Inspection

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

CAUTION

Do not remove any bearings for inspection except the right rear axle bearing.

- Turn each bearing in the case or hub back and forth [A] while checking for plays, roughness, or binding.
- ★ If bearing play, roughness, or binding is found, replace the bearing.

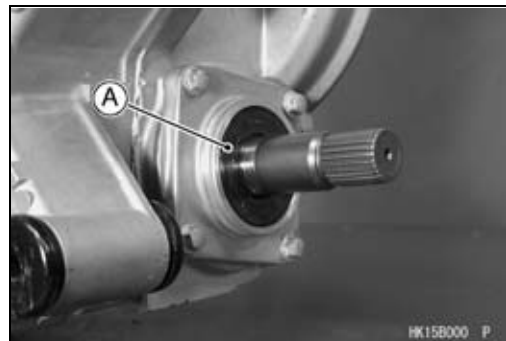


- Check the needle bearings [A] in the final gear case.
- The rollers in the needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
- ★ If the bearing is damaged, replace the rear final gear case.



Oil Seal Inspection

- Inspect the oil seals [A].
- ★ Replace any if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened, or been otherwise damaged.



Brakes

TABLE OF CONTENTS

Exploded View	12- 2	Brake Discs	12-15
Specifications	12- 6	Disc Cleaning.....	12-15
Special Tool	12- 7	Disc Removal.....	12-15
Brake Fluid	12- 8	Disc Installation.....	12-15
Brake Fluid Recommendation.....	12- 8	Disc Wear	12-15
Brake Fluid Level Inspection.....	12- 8	Disc Runout	12-16
Brake Fluid Change	12- 8	Brake Hoses.....	12-17
Brake Line Air Bleeding	12- 8	Brake Hose Inspection.....	12-17
Master Cylinder	12- 9	Brake Hose Replacement.....	12-17
Master Cylinder Removal.....	12- 9	Rear Brake Lever, Pedal and Cables .	12-18
Master Cylinder Installation.....	12- 9	Brake Pedal Position Inspection ...	12-18
Master Cylinder Disassembly	12- 9	Brake Pedal Position Adjustment..	12-18
Master Cylinder Assembly	12-10	Rear Brake Lever Free Play	
Master Cylinder Inspection (Visual		Inspection.....	12-18
Inspection).....	12-10	Brake Pedal Free Play Inspection.	12-18
Calipers	12-11	Rear Brake Lever and Pedal Free	
Caliper Removal	12-11	Play Adjustment	12-18
Caliper Installation	12-11	Brake Pedal Removal	12-18
Caliper Disassembly	12-12	Brake Pedal Installation	12-19
Caliper Assembly	12-12	Brake Cable Removal	12-19
Piston and Cylinder Damage	12-13	Brake Cable Installation	12-20
Caliper Holder Shaft Wear		Brake Cable Lubrication.....	12-20
Inspection.....	12-13	Brake Pedal Shaft Removal.....	12-20
Brake Pads.....	12-14	Brake Pedal Shaft Installation.....	12-20
Brake Pad Removal.....	12-14	Internal Wet Brake.....	12-21
Brake Pad Installation.....	12-14	Internal Wet Brake Disassembly...	12-21
Brake Pad Wear Inspection	12-14	Internal Wet Brake Assembly.....	12-22

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Reservoir Cap Screws	1.5	0.15	13 in·lb	
2	Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	
3	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
4	Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	
5	Brake Switch Mounting Bolt	1.2	0.12	10 in·lb	
6	Brake Hose Banjo Bolts	25	2.5	18	
7	Caliper Mounting Bolts	25	2.5	18	
8	Bleed Valves	7.9	0.80	69 in·lb	
9	Disc Mounting Bolts	37	3.8	27	L

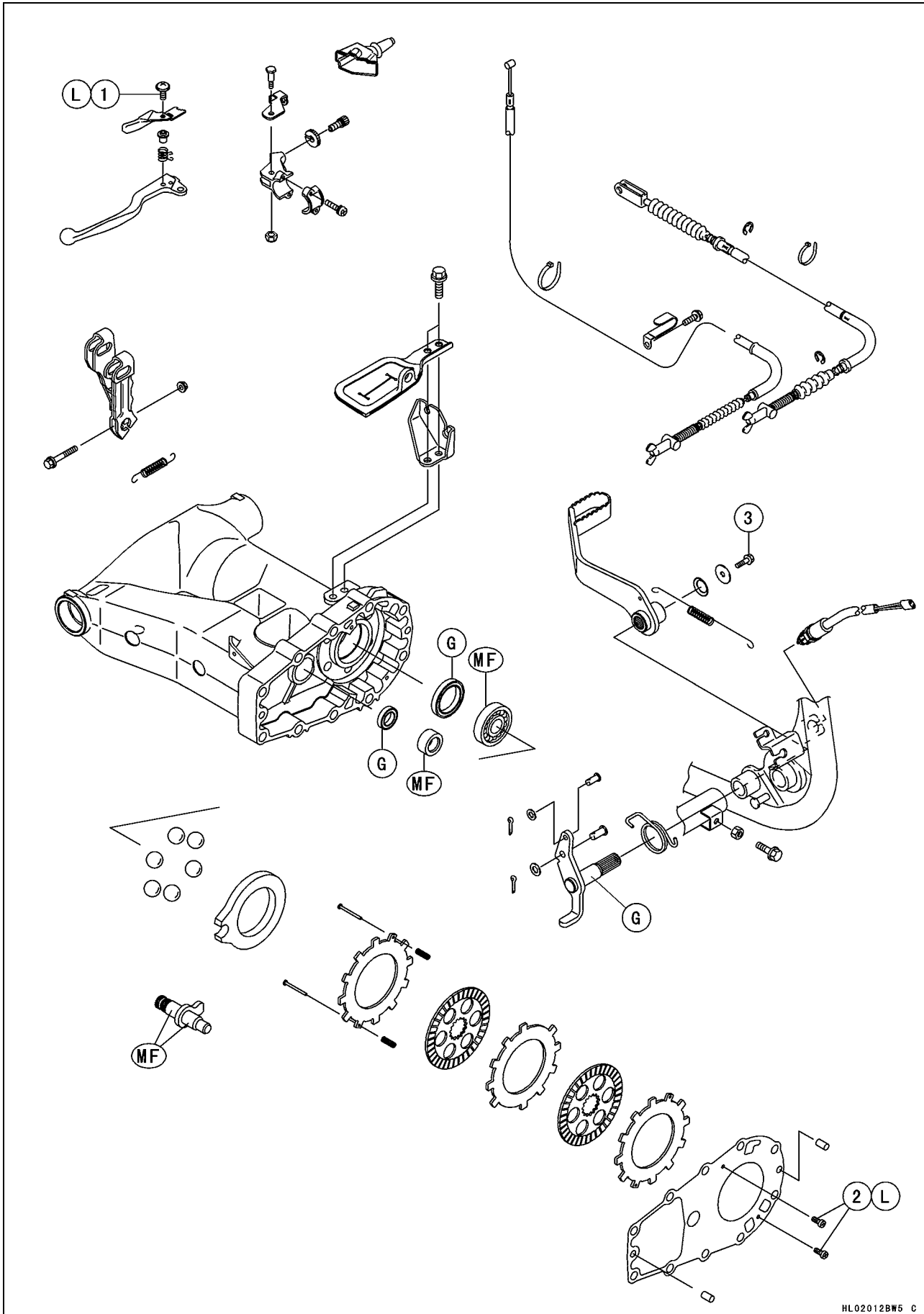
B: Apply brake fluid.

L: Apply a non-permanent locking agent.

Si: Apply silicone grease.

12-4 BRAKES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Parking Brake Lever Screw	–	–	–	L
2	Gasket Screws	–	–	–	L
3	Brake Pedal Bolt	8.8	0.90	78 in·lb	

G: Apply grease.

L: Apply a non-permanent locking agent.

MF: Apply MOBIL FLUID 424 or equivalent oil.

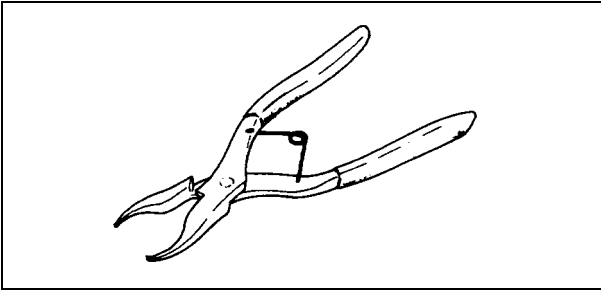
12-6 BRAKES

Specifications

Item	Standard	Service Limit
Brake Fluid: Type	DOT 3 or DOT 4	— — —
Front Disc Brake: Pad lining thickness	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Disc thickness	3.3 ~ 3.7 mm (0.130 ~ 0.146 in.)	3 mm (0.12 in.)
Disc runout	TIR 0.2 mm (0.008 in.) or less	TIR 0.3 mm (0.012 in.)
Rear Brake Lever, Pedal and Cables: Rear brake pedal position	35 ~ 40 mm (1.38 ~ 1.57 in.) above footboard	— — —
Rear brake lever free play	1 ~ 2 mm (0.04 ~ 0.08 in.)	— — —
Rear brake pedal free play	15 ~ 25 mm (0.6 ~ 1.0 in.)	— — —

Special Tool

Inside Circlip Pliers :
57001-143



12-8 BRAKES

Brake Fluid

WARNING

When working with the disc brake, observe the precautions listed below.

1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning of these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
7. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
8. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely washed away immediately.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE LINE.**

Brake Fluid Recommendation

Use extra heavy-duty brake fluid only from a container marked DOT3 or DOT4.

Recommended Disc Brake Fluid

Type : DOT 3 or DOT 4

Brake Fluid Level Inspection

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Fluid Change

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Line Air Bleeding

- Refer to the Brakes in the Periodic Maintenance chapter.

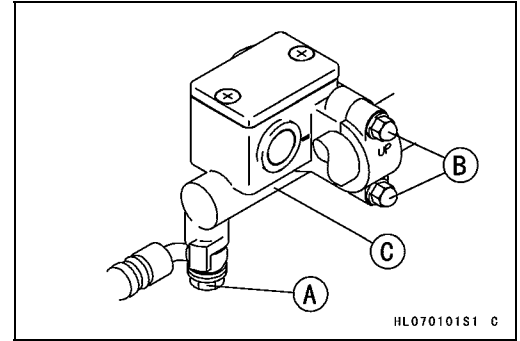
Master Cylinder

Master Cylinder Removal

- Remove:
 - Brake Hose Banjo Bolt [A]
 - Master Cylinder Clamp Bolts [B]
 - Master Cylinder [C]

CAUTION

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



Master Cylinder Installation

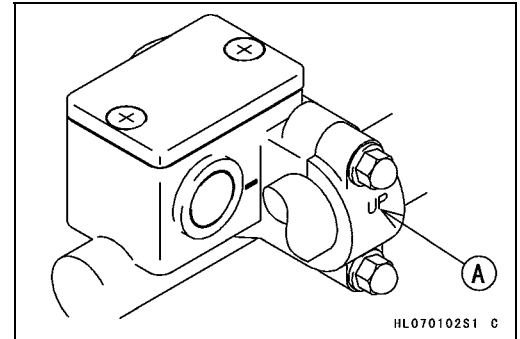
- The master cylinder clamp must be installed with the "UP" mark [A] upwards.
- Tighten the upper clamp bolt first, and then the lower clamp bolt. There will be a gap at the lower part of the clamp after tightening.

Torque - Master Cylinder Clamp Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt.

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

- Bleed the brake line after master cylinder installation (see Brakes in the Periodic Maintenance chapter).
- Check the brake for good braking power, no braking brag, and no fluid leakage.



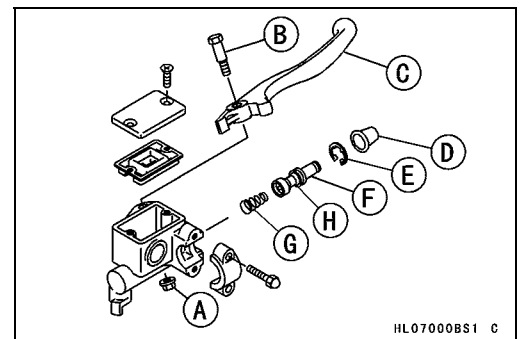
⚠ WARNING

Do not attempt to drive the vehicle until a firm brake lever can be obtained by pumping the brake lever until the pads are against each disc. The brakes will not function on the first application of the lever if this is not done.

Master Cylinder Disassembly

- Remove:
 - Master Cylinder (see Master Cylinder Removal)
 - Brake Lever Pivot Nut [A]
 - Brake Lever Pivot Bolt [B]
 - Brake Lever [C]
 - Dust Cover [D]
 - Circlip [E]
 - Piston [F]
 - Spring [G]

Special Tool - Inside Circlip Pliers: 57001-143



CAUTION

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

12-10 BRAKES

Master Cylinder

Master Cylinder Assembly

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

CAUTION
<p>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.</p>

- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply brake fluid to the removed parts and to the inner wall of the cylinder.
- Tighten:
 - Torque - Brake Lever Pivot Bolt: 5.9 N·m (0.60 kgf·m, 52 in·lb)
 - Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

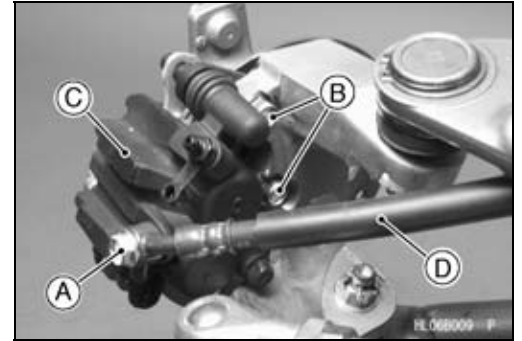
Master Cylinder Inspection (Visual Inspection)

- Refer to the Brakes in the Periodic Maintenance chapter.

Calipers

Caliper Removal

- Remove the front wheel (see Wheels/Tires chapter).
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B].
- Detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper.



CAUTION

Immediately wash away any brake fluid that spills.

NOTE

- If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see *Caliper Disassembly*).

Caliper Installation

- Install the caliper and brake hose lower end.
- Replace the washers that are on each side of hose fitting with new ones.
- Tighten:
 - Torque - Caliper Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
 - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Check the fluid level in the brake reservoir.
- Bleed the brake line (see Brakes in the Periodic Maintenance chapter).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

Do not attempt to drive the vehicle until a firm brake lever can be obtained by pumping the brake lever until the pads are against each disc. The brakes will not function on the first application of the lever if this is not done.

12-12 BRAKES

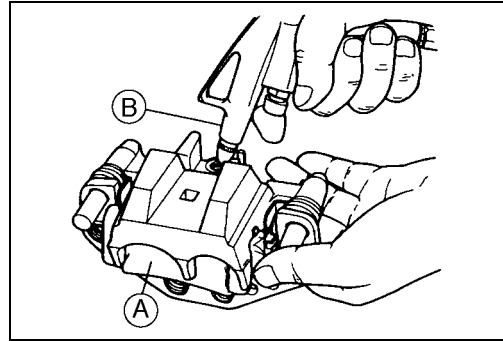
Calipers

Caliper Disassembly

- Remove:
 - Caliper (see Caliper Removal)
 - Pads (see Brake Pad Removal)
 - Anti-rattle Spring
- Using compressed air, remove the piston.
 - Cover the caliper opening with a clean, heavy cloth [A].
 - Remove the piston by lightly applying compressed air [B] to where the brake line fits into the caliper.

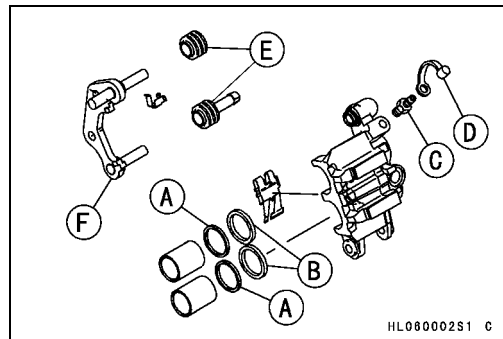
⚠ WARNING

To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.



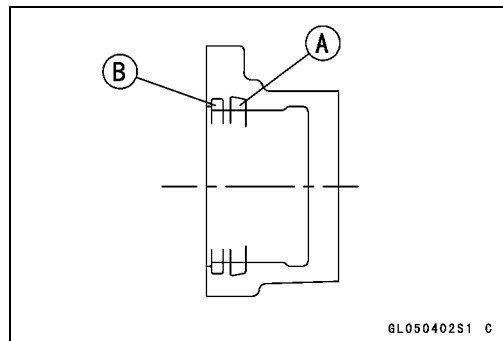
NOTE

- If compressed air is not available, do as follows with the brake hose connected to the caliper.
 - Prepare a container for brake fluid.
 - Remove the pads and spring (see Brake Pad Removal).
 - Pump the brake lever to remove the caliper piston.
- Remove:
 - Dust Seal [A]
 - Fluid Seal [B]
 - Bleed Valve [C] and Rubber Cap [D]
 - Boots [E] and Caliper Holder [F]



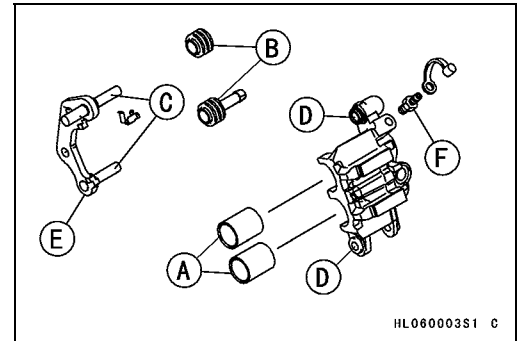
Caliper Assembly

- Replace the fluid seal [A] with a new one.
- Apply brake fluid to the fluid seal, and install it into the cylinder by hand.
- Replace the dust seal [B] with a new one if it is damaged.
- Apply brake fluid to the dust seal, and install it into the cylinder by hand.



Calipers

- Apply brake fluid to the outside of the pistons [A], and push them into the cylinder by hand. Take care that neither the cylinder nor the piston skirt gets scratched.
 - Replace the rubber boots [B] if they are damaged.
 - Apply a thin coat of silicone grease to the caliper holder shafts [C] and holder holes [D] (Silicone grease is a special high temperature, water-resistant grease).
 - Install:
 - Caliper Holder [E]
 - Bleed Valve [F] and Rubber Cap
- Torque - Bleed Valve: 7.9 N·m (0.80 kgf·m, 69 in·lb)**

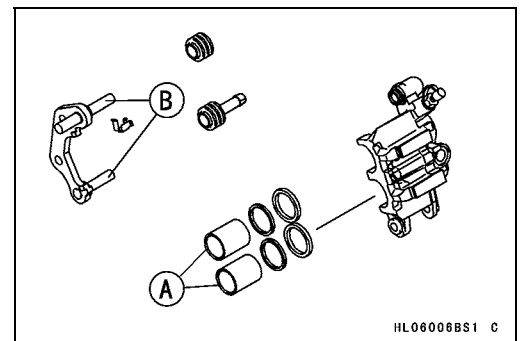


- Install the anti-rattle spring [A] in the caliper as shown.
- Install the pads (see Brake Pad Installation).



Piston and Cylinder Damage

- Visually inspect the pistons [A] and cylinder surfaces.
- ★ Replace the caliper if the cylinder and piston are badly scored or rusty.



Caliper Holder Shaft Wear Inspection

The caliper body must slide smoothly on the caliper holder shafts [B]. 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.

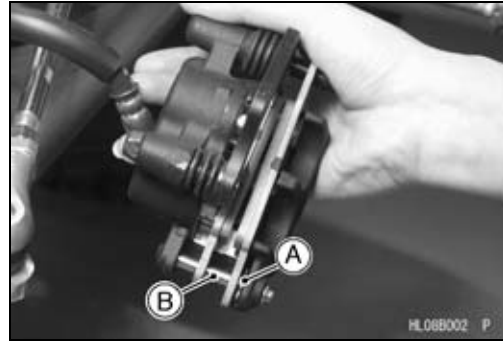
- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber friction boots are not damaged.
- ★ If the rubber friction boot is damaged, replace the rubber friction boot.
- ★ If caliper holder shaft is damaged, replace the caliper holder shaft and rubber friction boot as a unit.

12-14 BRAKES

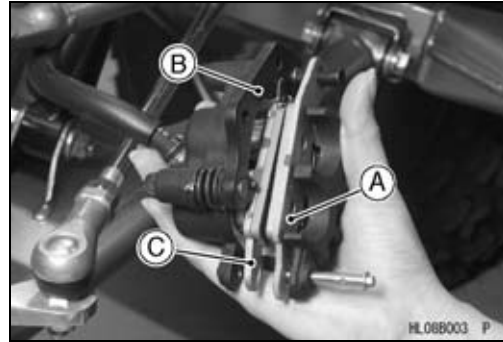
Brake Pads

Brake Pad Removal

- Remove the front wheel (see Wheels/Tires chapter).
- Detach the caliper from the disc (see Caliper Removal).
- Draw out the clip [A], and remove the pad holder pin [B].



- Remove the pad [A] on the outside.
- Push the holder [B] towards the piston, and remove the pad [C] on the piston side.



Brake Pad Installation

- Push the caliper piston in by hand as far as it will go.
- Be sure that the anti-rattle spring is in place.
- Install:
 - Brake Pads
 - Pad Holder Pin and Clip
- The clip must be “outside” of the pads.

⚠ WARNING

Do not attempt to drive the vehicle until a firm brake lever can be obtained by pumping the brake lever until the pads are against each disc. The brake will not function on the first application if this is not done.

Brake Pad Wear Inspection

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Discs

Disc Cleaning

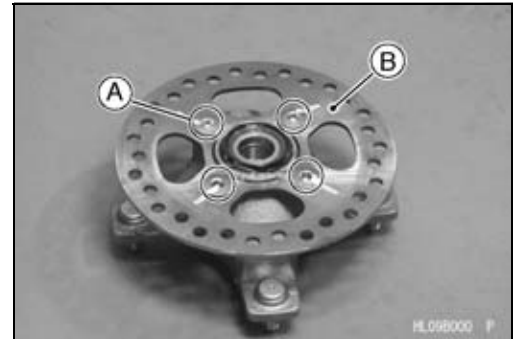
Poor braking can be caused by oil on a disc. Oil on a disc must be cleaned off with an oilless cleaning fluid such as trichloroethylene or acetone.

⚠ WARNING

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

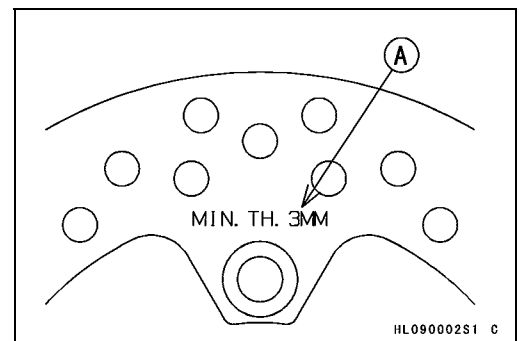
Disc Removal

- Remove:
 - Front Hub (see Wheels/Tires chapter)
 - Brake Disc Mounting Bolts [A]
 - Brake Disc [B]



Disc Installation

- The disc must be installed with the marked side [A] facing toward the steering knuckle.
- Apply a non-permanent locking agent:
 - Disc Mounting Bolts
- Tighten:
 - Torque - Disc Mounting Bolts: 37 N·m (3.8 kgf·m, 27 ft·lb)**
- After installing the discs, check the disc runout. Completely clean off any grease that has gotten on either side of the disc with a high flash-point solvent. Do not use one which will leave an oily residue.

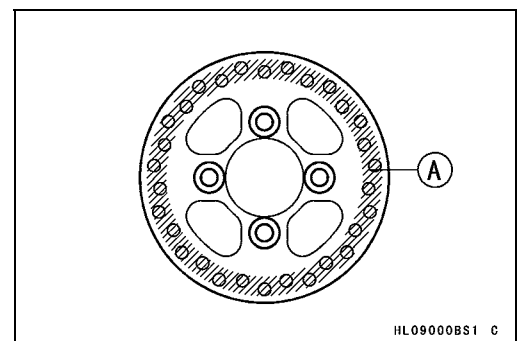


Disc Wear

- Measure the thickness of each disc at the point [A] where it has worn the most.
- ★ Replace the disc if it has worn past the service limit.

Disc Thickness

- Standard:** 3.3 ~ 3.7 mm (0.130 ~ 0.146 in.)
- Service Limit:** 3 mm (0.12 in.)



12-16 BRAKES

Brake Discs

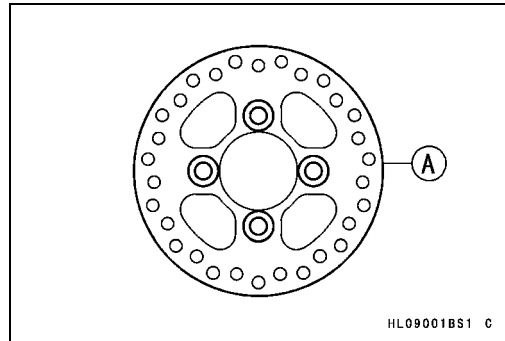
Disc Runout

- Jack up the vehicle so that the wheels are off the ground.
 - Remove the front wheels and turn the handlebar fully to one side.
 - Set up a dial gauge against the disc [A], and measure the disc runout.
- ★ If the runout exceeds the service limit, replace the disc.

Disc Runout

Standard: TIR 0.2 mm (0.008 in.) or less

Service Limit: TIR 0.3 mm (0.012 in.)



Brake Hoses

Brake Hose Inspection

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Hose Replacement

- Refer to the Brakes in the Periodic Maintenance chapter.

12-18 BRAKES

Rear Brake Lever, Pedal and Cables

Brake Pedal Position Inspection

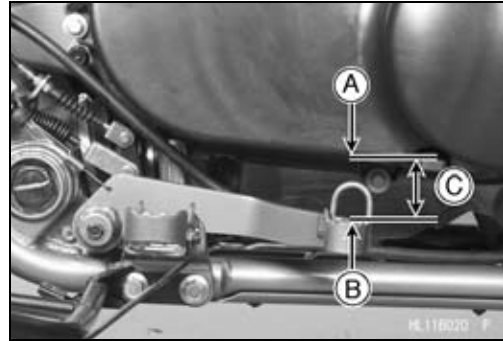
- Check that the brake pedal [B] is in the correct position as shown.

[A] Converter Cover

Pedal Position [C]

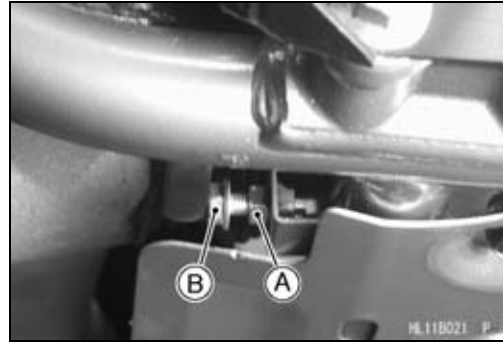
Standard: 35 ~ 40 mm (1.38 ~ 1.57 in.)

- ★ If it is incorrect, adjust the brake pedal position.



Brake Pedal Position Adjustment

- Loosen the locknut [A], and turn the adjusting bolt [B] until the brake pedal is correctly positioned.
- Tighten the locknut.
- Check the brake pedal free play (see Brakes in the Periodic Maintenance chapter).



Rear Brake Lever Free Play Inspection

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Pedal Free Play Inspection

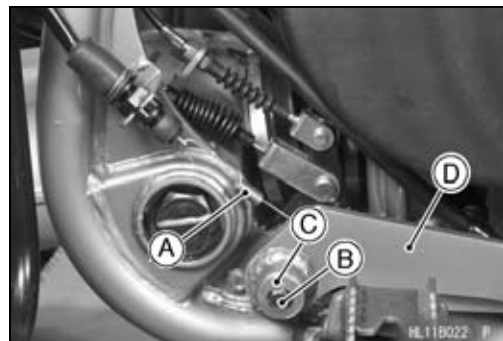
- Refer to the Brakes in the Periodic Maintenance chapter.

Rear Brake Lever and Pedal Free Play Adjustment

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Pedal Removal

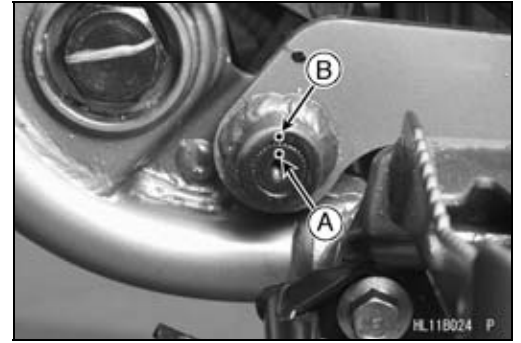
- Remove:
 - Right Foot (see Frame chapter)
- Loosen the locknut and the adjusting bolt.
- Remove the brake switch spring [A].
- Loosen the brake pedal bolt [B].
- Remove:
 - Washers [C]
 - Brake Pedal [D]



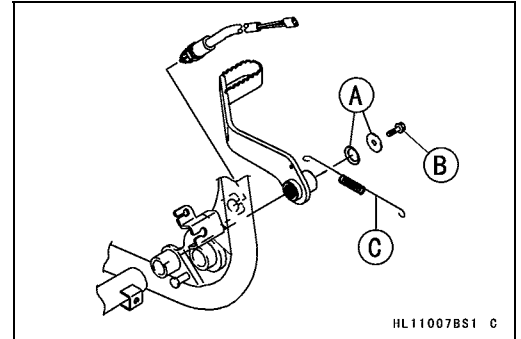
Rear Brake Lever, Pedal and Cables

Brake Pedal Installation

- Apply grease to the tip of the brake pedal shaft.
- Install the brake pedal.
- Align the punch mark [A] on the brake pedal shaft with the punch mark [B] on the brake pedal.

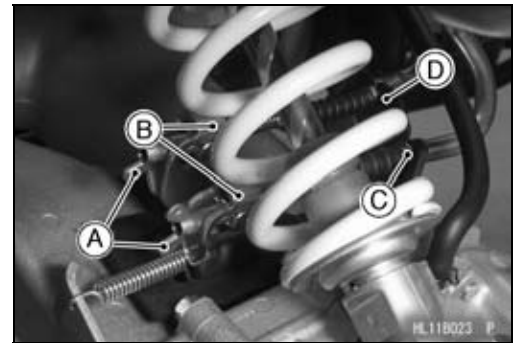


- Install the washers [A].
- Tighten:
 - Torque - Brake Pedal Bolt [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Install the brake switch spring [C].
- Adjust the brake pedal position (see Brake Pedal Position).

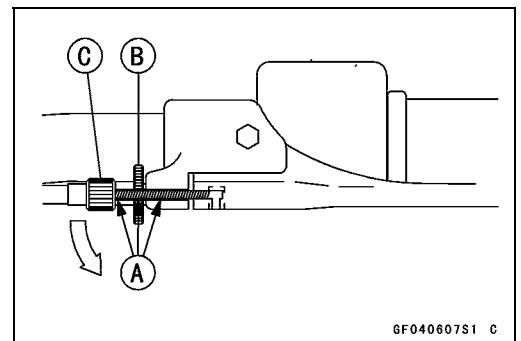


Brake Cable Removal

- Remove:
 - Right Foot Guard (see Frame chapter)
- Unscrew the adjusters [A] at the rear ends of the cables, and pull the cables out of the joints [B].
- Remove the circlip [C] and pull the cables out of the cable mount [D].



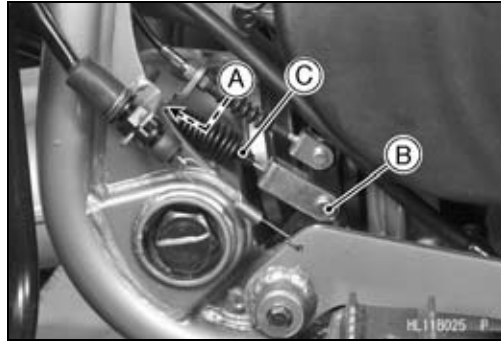
- Loosen the knurled locknut [B] at the rear brake lever and screw in the adjuster [C].
- Line up the slots [A] in the brake lever, knurled locknut, and adjuster, and then free the cable from the lever.
- Remove the brake lever cable from the frame.



12-20 BRAKES

Rear Brake Lever, Pedal and Cables

- Remove:
 - Swingarm (see Suspension chapter)
- Remove:
 - Circlip [A]
 - Cotter Pin, Washer and Pin [B]
 - Brake Pedal Cable [C]



Brake Cable Installation

- Grease the brake cable front ends.
- Replace the cotter pin with a new one.
- Route the brake cables according to the Cable, Wire, and Hose Routing section in Appendix chapter.
- Install the parts removed (see the appropriate chapter).
- Adjust the brake pedal and rear brake lever.

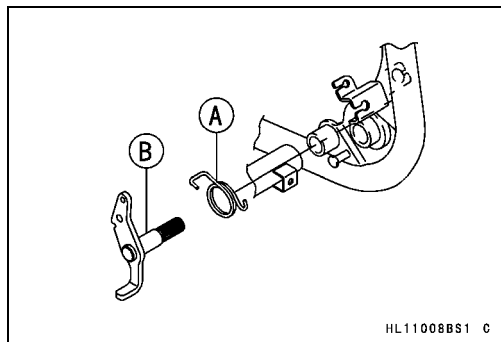
Brake Cable Lubrication

Whenever the brake cable is removed, lubricate the cable as follows:

- Lubricate the cable with a penetrating rust inhibitor.

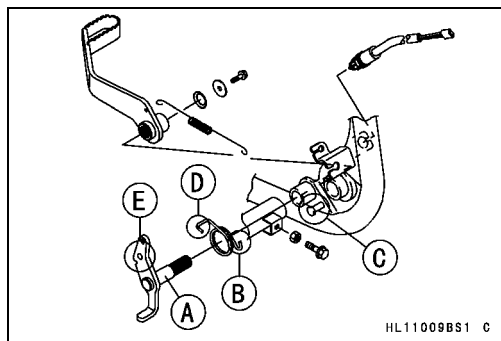
Brake Pedal Shaft Removal

- Remove:
 - Swingarm (see Suspension chapter)
 - Brake Pedal (see Brake Pedal Removal)
 - Brake Cable (see Brake Cable Removal)
 - Reverse Lock Cable (see Crankcase/Transmission chapter)
- Remove the brake return spring [A] with pliers.
- Remove the brake pedal shaft [B].



Brake Pedal Shaft Installation

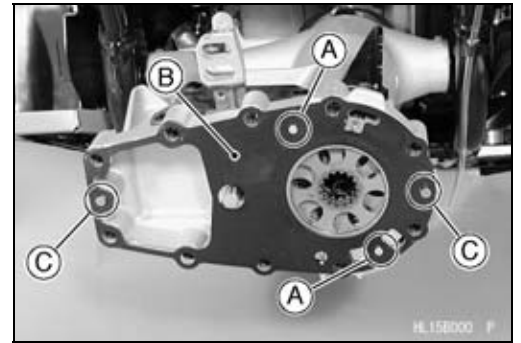
- Apply grease to the tip of the brake pedal shaft [A].
- Install:
 - Brake Return Spring
 - Brake Pedal Shaft
- Hook the brake return spring end [B] to the projection [C], turn the spring clockwise and hook the other end of the spring [D] to the brake pedal shaft [E] with pliers.
- Install:
 - Brake Cable (see Brake Cable Installation)
 - Reverse Lock Cable (see Crankcase/Transmission chapter)
 - Brake Pedal (see Brake Pedal Installation)
 - Swingarm (see Suspension chapter)



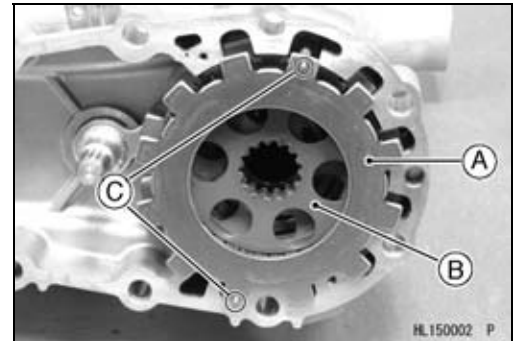
Internal Wet Brake

Internal Wet Brake Disassembly

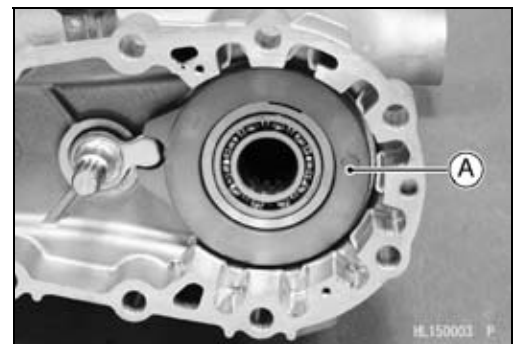
- Remove:
 - Rear Final Gear Case (see Final Drive chapter)
 - Gasket Screws [A]
 - Gasket [B]
 - Dowel Pins [C]



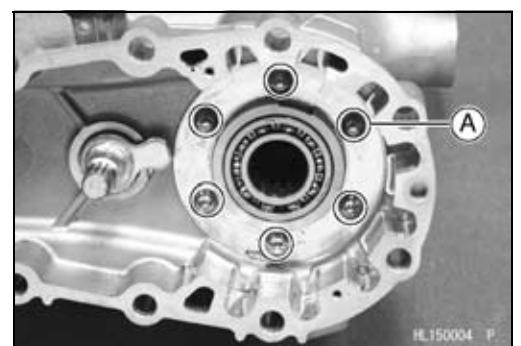
- Remove:
 - Steel Pressure Plates [A] and Steel Plates Friction Plates [B]
 - Pins [C] and Springs



- Remove:
 - Brake Cam Plate [A]



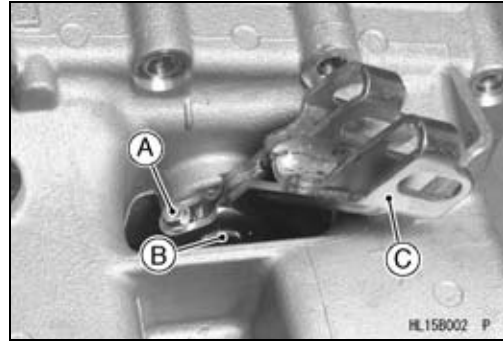
- Remove:
 - Steel Balls [A]



12-22 BRAKES

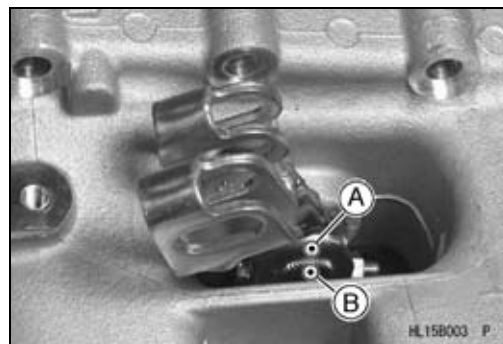
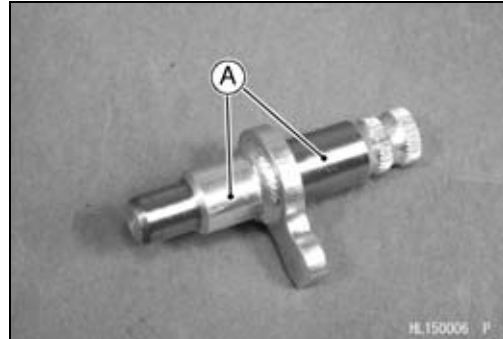
Internal Wet Brake

- Remove:
 - Brake Cam Lever Bolt and Nut [A]
 - Brake Camshaft [B]
 - Brake Cam Lever [C]

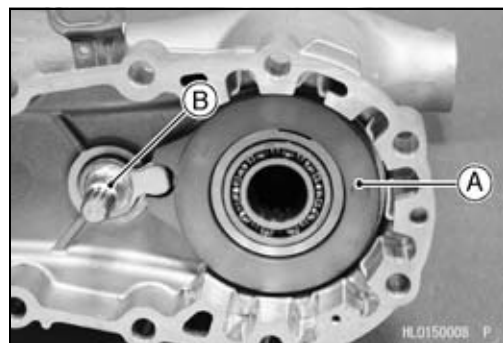


Internal Wet Brake Assembly

- Apply [A] MOBIL FLUID 424 or equivalent oil to the brake camshaft and the inside of the collar.
- Install the brake cam lever inserting the camshaft in the swingarm.
- Align the punch mark [A] on the brake cam lever with the punch mark [B] on the brake camshaft.
- Install the brake cam lever bolt and nut, and tighten them.

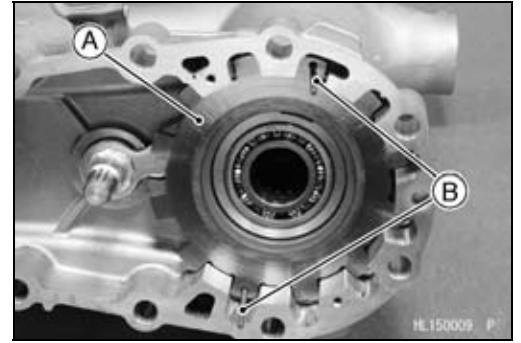


- Install:
 - Steel Balls
 - Brake Cam Plate [A]
- Fit the cam plate and brake camshaft [B] as shown.

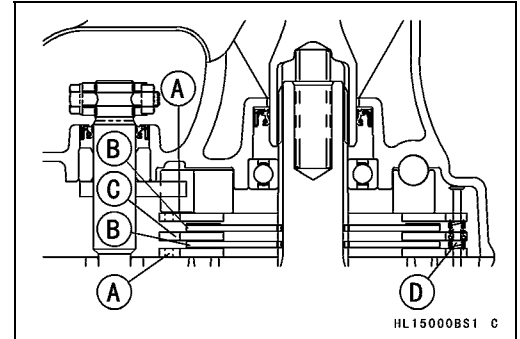


Internal Wet Brake

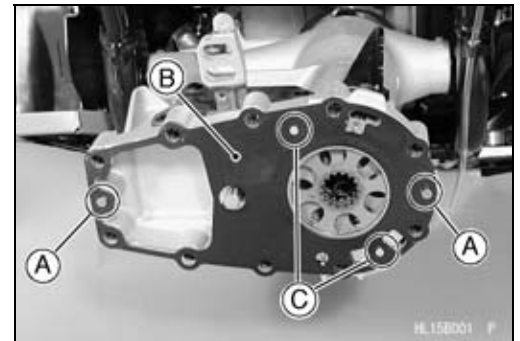
- Install:
Steel Pressure Plate [A] and Pins [B] (as shown)



- Install:
Steel Pressure Plates [A]
Friction Plates [B]
Steel Plate [C]
Springs [D]



- Install:
Dowel Pins [A]
New Gasket [B]
- Apply a non-permanent locking agent to the gasket screws [C], and tighten them.
- Install:
Rear Final Gear Case (see Final Drive chapter)



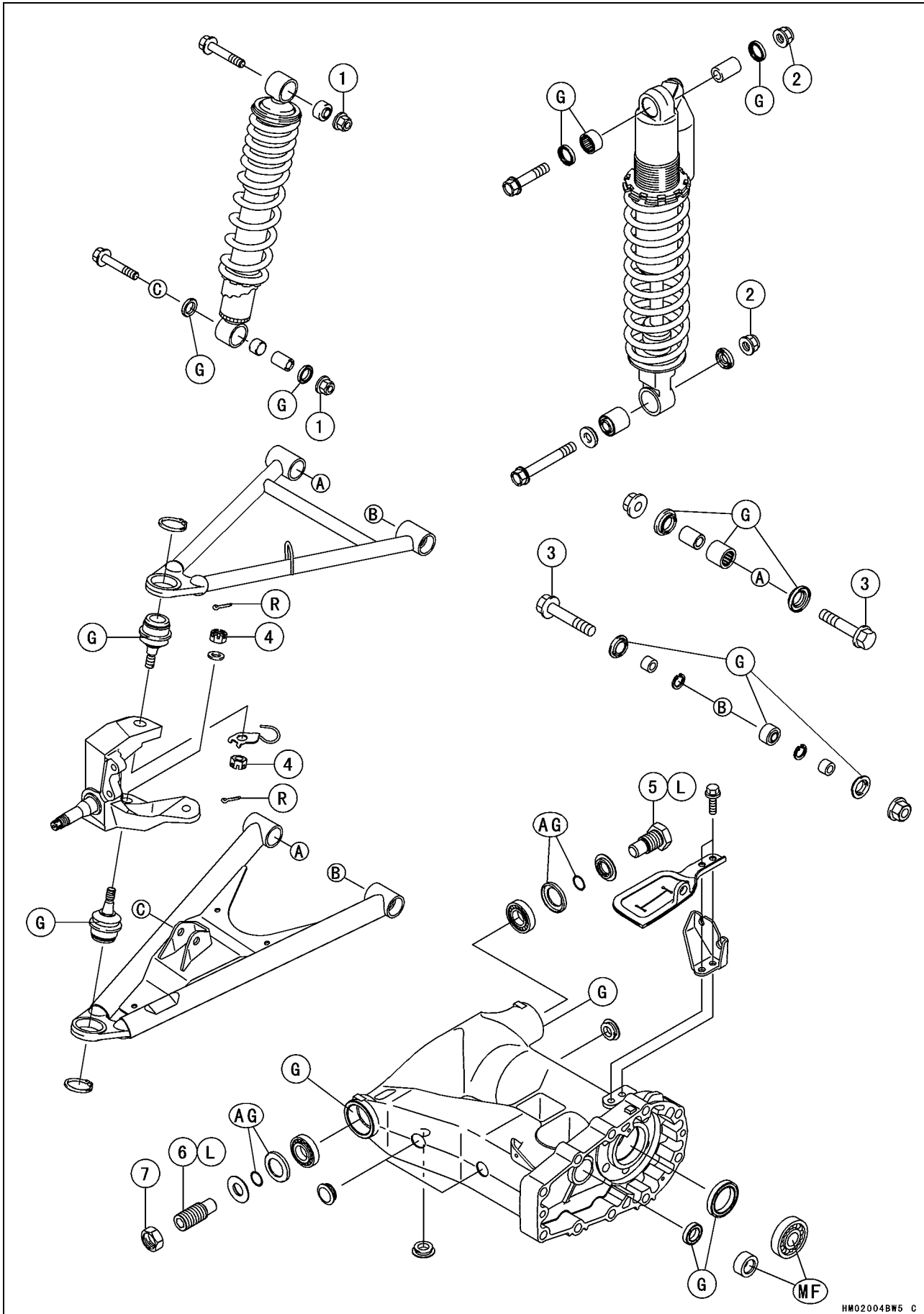
Suspension

TABLE OF CONTENTS

Exploded View	13- 2
Specifications	13- 4
Special Tools	13- 5
Shock Absorbers	13- 6
Front Shock Absorber Inspection.....	13- 6
Front Shock Absorber Preload Adjustment.....	13- 6
Front Shock Absorber Removal.....	13- 6
Front Shock Absorber Installation.....	13- 7
Rear Shock Absorber:	13- 7
Compression Damping Adjustment	13- 7
Rear Shock Absorber Removal	13- 8
Rear Shock Absorber Installation	13- 8
Rear Shock Absorber Preload Adjustment	13- 8
Rear Shock Absorber Inspection	13- 9
Rear Shock Absorber Scrapping	13- 9
Suspension Arms	13-10
Suspension Arm Removal	13-10
Suspension Arm Installation	13-10
Suspension Arm Disassembly	13-10
Suspension Arm Assembly	13-11
Swingarm.....	13-12
Swingarm Removal.....	13-12
Swingarm Installation.....	13-12
Swingarm Disassembly.....	13-13
Swingarm Assembly	13-14
Swingarm Bearing Inspection	13-15
Swingarm Bearing Lubrication	13-15

13-2 SUSPENSION

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Shock Absorber Mounting Nuts	42	4.3	31	
2	Rear Shock Absorber Mounting Nuts	62	6.3	46	
3	Suspension Arm Pivot Bolts	42	4.3	31	
4	Steering Knuckle Joint Nuts	29	3.0	21	
5	Swingarm Pivot Right Shaft	152	15.5	112	L
6	Swingarm Pivot Left Shaft	20	2.0	14	L
7	Swingarm Pivot Left Nut	152	15.5	112	

G: Apply grease.

L: Apply a non-permanent locking agent.

AG: Apply grease (Amoco rykon premium grease No. 2 EP Green).

MF: Apply MOBIL FLUID 424 or equivalent oil.

R: Replacement parts

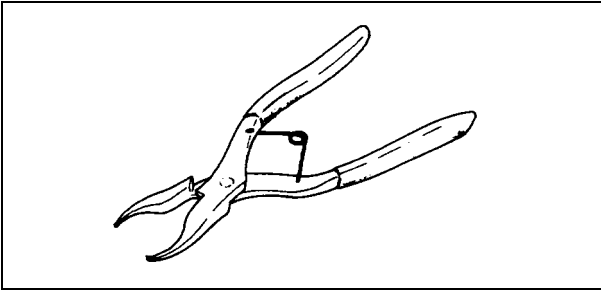
13-4 SUSPENSION

Specifications

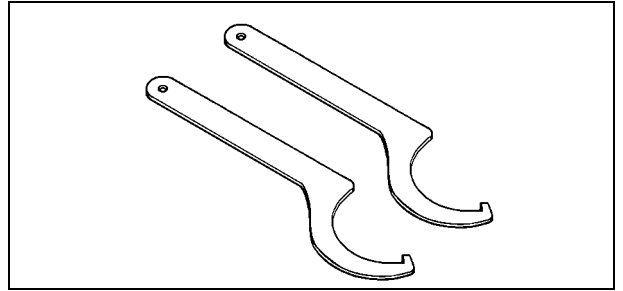
Item	Standard	Service Limit
Front Shock Absorbers: Spring preload setting position	No. 2	(Usable Range) 1 ~ 5
Rear Shock Absorber: Spring preload adjustment (Adjusting nut position from the center of the mounting hole upper)	94.2 mm (3.71 in.)	(Adjustable Range) 93.2 ~ 104.3 mm (3.67 ~ 4.11 in.)
Gas Reservoir: Compression damping Adjustment (from the seated position adjuster tuned fully clockwise)	14 clicks counter-clockwise	(Adjust Range) 19 clicks
Gas pressure	980 kPa (10 kgf/cm ² , 142 psi)	— — —

Special Tools

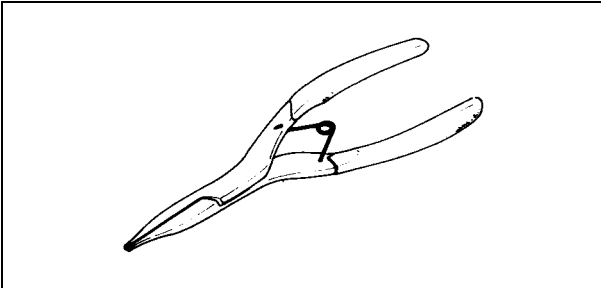
Inside Circlip Pliers :
57001-143



Hook Wrench :
57001-1101



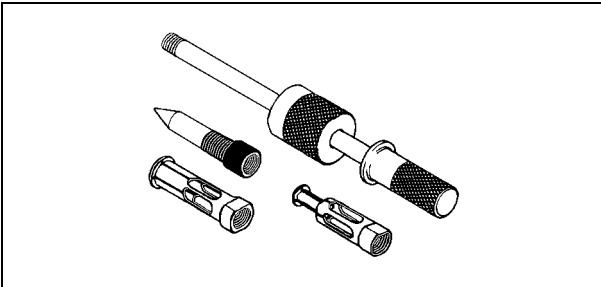
Outside Circlip Pliers :
57001-144



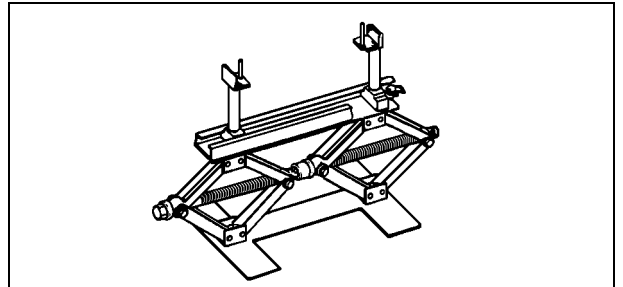
Bearing Driver Set :
57001-1129



Oil Seal & Bearing Remover :
57001-1058



Jack :
57001-1238



13-6 SUSPENSION

Shock Absorbers

Front Shock Absorber Inspection

Since the front shock absorbers are sealed units which cannot be disassembled, only external checks are necessary.

- ★ If one unit is damaged, replace both shock absorbers as a set. If only one unit is replaced and the two are not balanced, vehicle instability at high speed may result.

Front Shock Absorber Preload Adjustment

The spring adjusting sleeve [A] on the rear shock absorber has 5 positions so that the spring can be adjusted for different terrain and loading conditions. If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

Spring Action

Position	Spring	Setting	Load	Terrain	Speed
1	Force	Soft	Light	Smooth	Low
2 (STD)		↑	↑	↑	↑
3					
4	↓	↓	↓	↓	↓
5	Stronger	Hard	Heavy	Rough	High

- Turn the adjusting sleeve on shock absorber to the desired position with the hook wrench [A].

Owner's Tool - 92110-1129

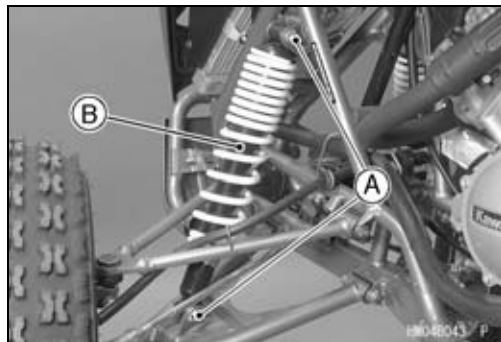


Front Shock Absorber Removal

- Support the vehicle on a stand or a jack so that the rear wheels are off the ground.

Special Tool - Jack: 57001-1238

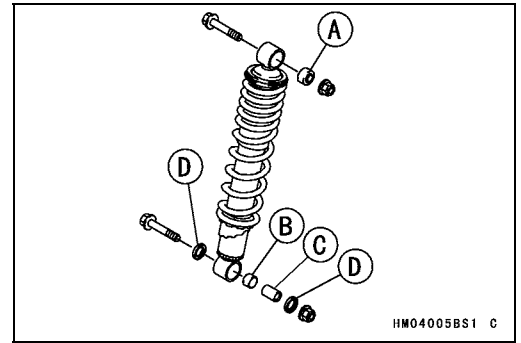
- While holding the rear wheels, remove the lower and upper shock absorber mounting bolts [A], nuts, and washers.
- Remove the front shock absorber [B].



Shock Absorbers

Front Shock Absorber Installation

- Apply plenty of grease to the inside of the bushing, sleeve and oil seals.
- Install:
 - Rubber Bushing [A]
 - Bushing [B]
 - Sleeve [C]
 - Oil Seals [D]
- Tighten:
 - Torque - Front Shock Absorber Mounting Nuts: 42 N·m (4.3 kgf·m, 31 ft·lb)**

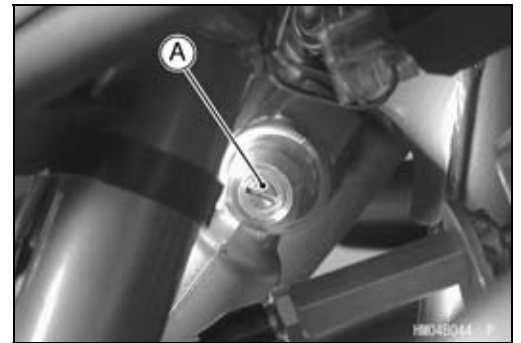


Rear Shock Absorber:

To suit to various riding conditions, the spring preload of the shock absorber can be adjusted or the spring can be replaced. Also the damping force can be adjusted easily so changing oil viscosity unnecessary.

Compression Damping Adjustment

- Turn the compression damping adjuster [A] on the rear shock absorber gas reservoir with a flat-bead screwdriver.
- ★ If the damping feels too soft or too stiff, adjust it in accordance with the following table.

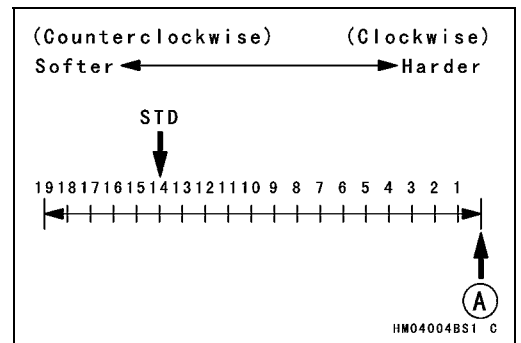


Seated position : adjuster turned fully clockwise [A].

Compression Damping
Standard: 14 clicks

NOTE

○ Always make any damping adjustments in small steps and test their effects before using them in competition.

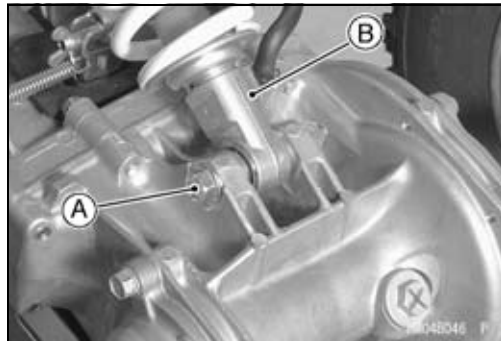
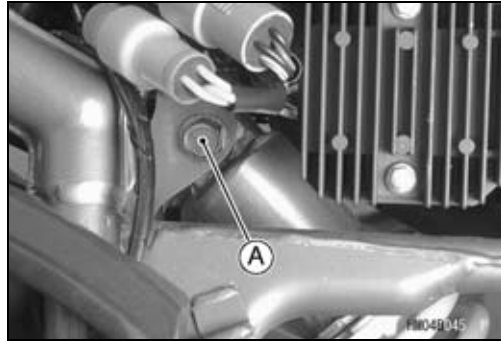


13-8 SUSPENSION

Shock Absorbers

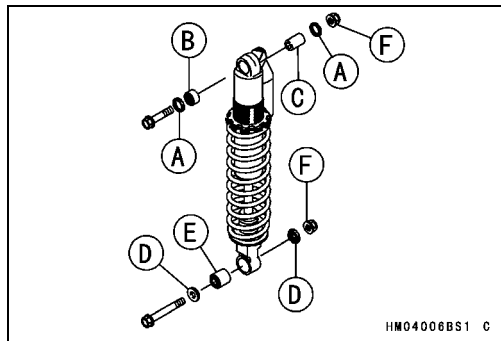
Rear Shock Absorber Removal

- Remove:
 - Seat (see Frame chapter)
 - Rear Fender (see Frame chapter)
- Support the vehicle on a stand or a jack so that the rear wheels are off the ground.
Special Tool - Jack: 57001-1238
- While holding the rear wheels, remove the lower and upper shock absorber mounting bolts [A], nuts, and washers.
- Remove the rear shock absorber [B].



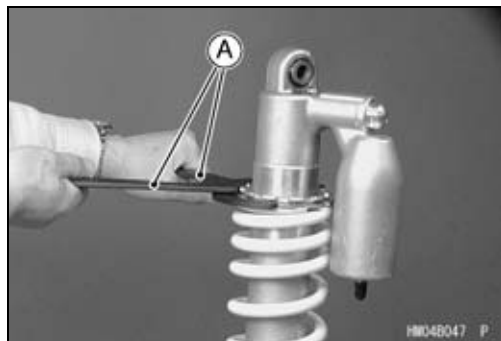
Rear Shock Absorber Installation

- Apply plenty of grease to the inside of the needle bearing, sleeve and oil seals.
- Install:
 - Oil seals [A]
 - Needle Bearing [B]
 - Sleeve [C]
 - Collars [D]
 - Rubber Bushing [E]
- Tighten:
Torque - Rear Shock Absorber Mounting Nuts [F]: 62 N·m (6.3 kgf·m, 46 ft·lb)



Rear Shock Absorber Preload Adjustment

- Remove:
 - Rear Shock Absorber (see Rear Shock Absorber Removal)
- Loosen the locknut and turn out the adjusting nut to free the spring.
Special Tools - Hook Wrench [A]: 57001-1101



Shock Absorbers

- Measure the spring free length.
- To adjust the spring preload, turn in the adjusting nut [A] to the desired position and tighten the locknut [B].
Adjusting nut position [C]

Spring Preload Setting Position

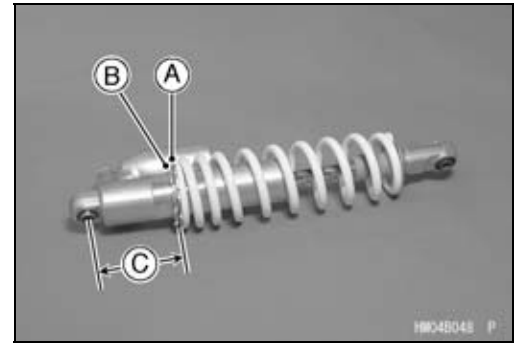
Standard: 94.2 mm (3.71 in.)
Usable Range: 93.2 mm (3.67 in.) to 104.3 mm (4.11 in.)

Torque - Rear Shock Absorber Spring Locknut: 30 N·m (3.1 kgf·m, 22 ft·lb)

- ★ If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

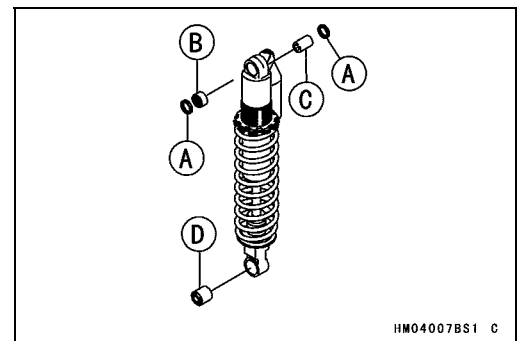
Spring Action

Position	Spring Force	Setting	Load	Terrain	Speed
94.2 mm (3.71 in.)	Weak ↑	Soft ↑	Light ↑	Smooth ↑	Low ↑
↑ ↓					
104.3 mm (4.11 in.)	Stronger ↓	Hard ↓	Heavy ↓	Rough ↓	High ↓



Rear Shock Absorber Inspection

- Check the upper pivot.
- ★ If the sleeve, needle bearing and oil seals is damaged, replace them.
Oil Seal [A]
Needle Bearing [B]
Sleeve [C]
Rubber Bushing [D]
- Check the lower pivot.
- ★ If bushing are worn, cracked, hardened, or otherwise damaged, replace them.



Rear Shock Absorber Scrapping

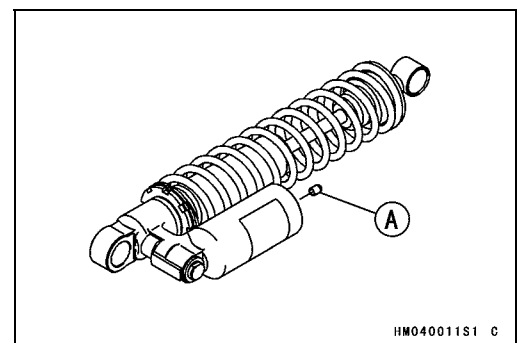
⚠ WARNING

Since the reservoir tank of the rear shock absorber contains nitrogen gas, do not incinerate the reservoir tank without first releasing the gas or it may explode.

- Remove the shock absorber (see Rear Shock Absorber Removal).
- Remove the valve cap [A] and release the nitrogen gas completely from the gas reservoir.
- Remove the valve.

⚠ WARNING

Since the high pressure gas is dangerous, do not point the valve toward your face or body.

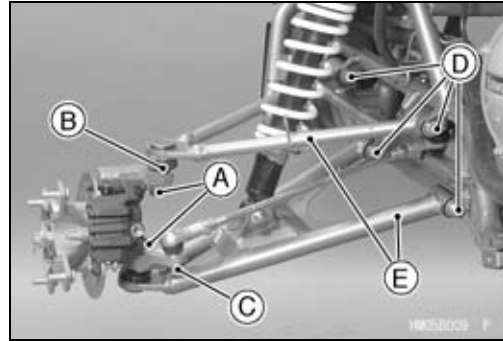


13-10 SUSPENSION

Suspension Arms

Suspension Arm Removal

- Remove:
 - Brake Hose Banjo Bolt (Caliper side)
 - Front Wheel (see Wheels/Tires chapter)
 - Knuckle Joint Nuts and Cotter Pin [A]
 - Knuckle Joints [B] (from Knuckle)
 - Tie-Rod End Nut [C]
 - Suspension Arm Pivot Bolts [D]
 - Suspension Arms [E]

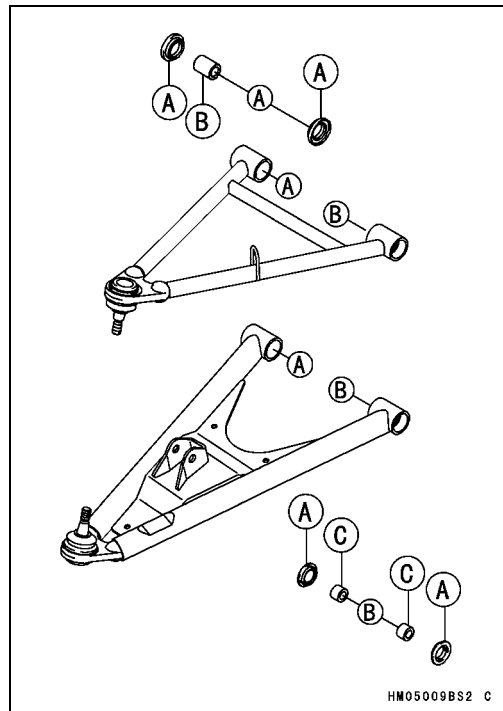


Suspension Arm Installation

- Tighten:
 - Torque - Suspension Arm Pivot Bolts: 42 N·m (4.3 kgf·m, 31 ft·lb)**
 - Knuckle Joint Nuts: 29 N·m (3.0 kgf·m, 21 ft·lb)**
 - Tie-Rod End Nut: 42 N·m (4.3 kgf·m, 31 ft·lb)**

Suspension Arm Disassembly

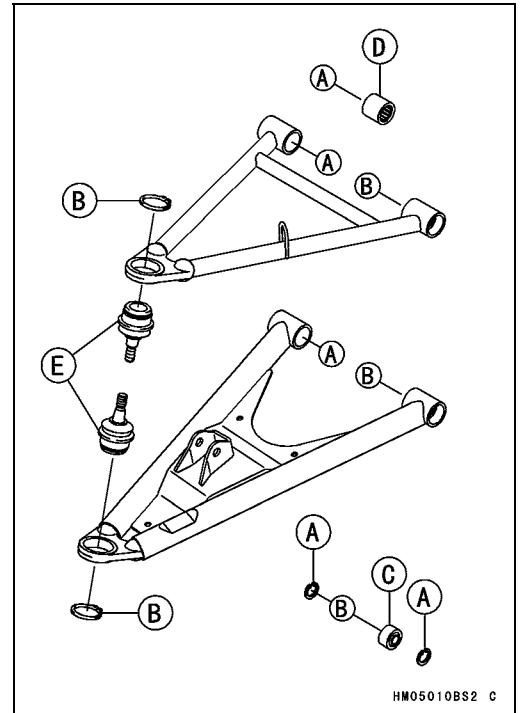
- Remove:
 - Oil Seals [A]
 - Sleeve [B]
 - Collars [C]



Suspension Arms

- Remove:
 - Circlip [A]
 - Snap Ring [B]
- Press out the ball joint bearing [C] and needle bearing [D].
- Knuckle joint [E]

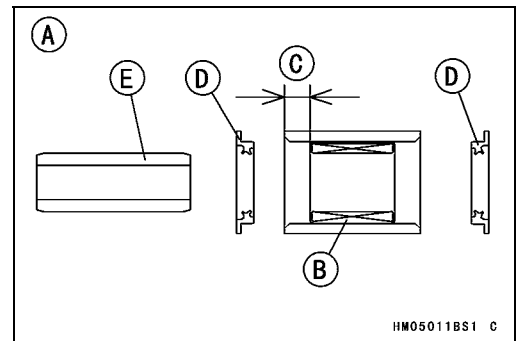
Special Tools - Inside Circlip Pliers: 57001-143
Outside Circlip Pliers: 57001-144



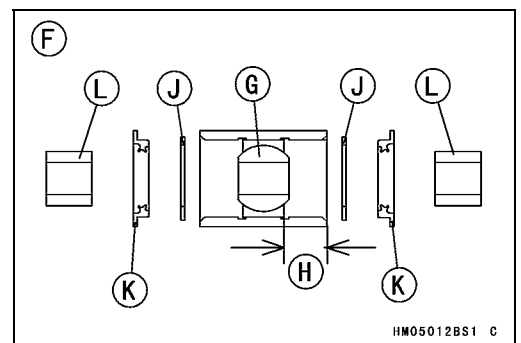
Suspension Arm Assembly

- Install the following parts as shown.

Front Side [A]
 Needle Bearing [B]
 [C] = 7.5 ± 0.1 mm (0.295 ± 0.004 in.)
 Oil seals [D]
 Sleeve [E]



Rear Side [F]
 Ball Joint Bearing [G]
 [H] = 13.5 ± 0.1 mm (0.531 ± 0.004 in.)
 Circlips [J]
 Oil seals [K]
 ● Apply grease to oil seals.
 Collars [L]



13-12 SUSPENSION

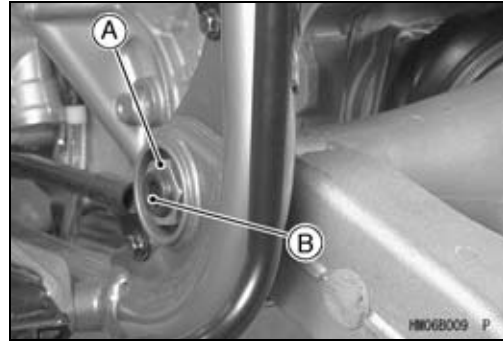
Swingarm

Swingarm Removal

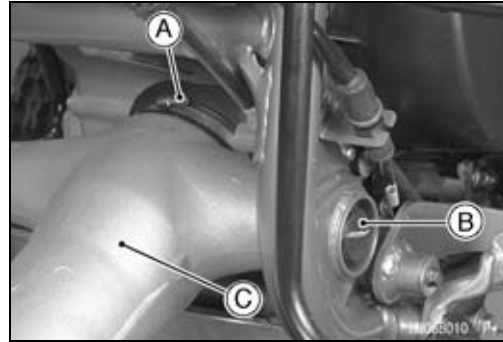
- Support the vehicle on a stand or a jack so that the rear wheels are off the ground.

Special Tool - Jack: 57001-1238

- Remove:
 - Rear Final Gear Case (see Final Drive chapter)
 - Swingarm Pivot Left Nut [A]
 - Swingarm Pivot Left Shaft [B]

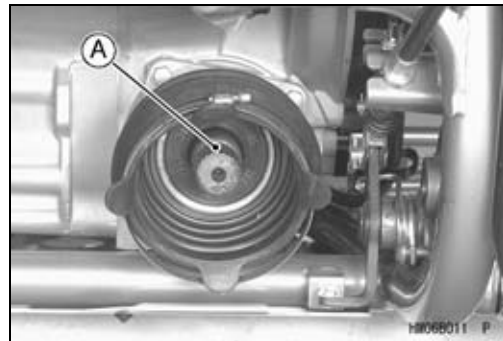


- Loosen:
 - Boot Clamp Screw [A]
- Remove:
 - Boot
 - Swingarm Pivot Right Shaft [B]
 - Swingarm [C]

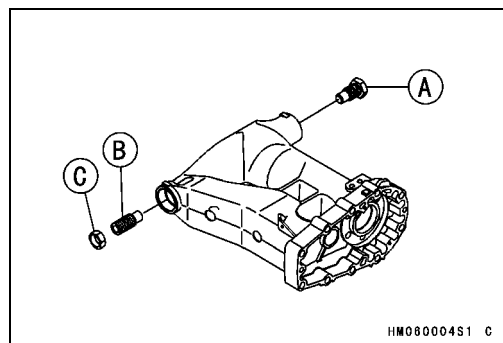


Swingarm Installation

- Apply molybdenum disulfide grease to the spline of the output shaft [A].
- Fit the propeller shaft on the output shaft.



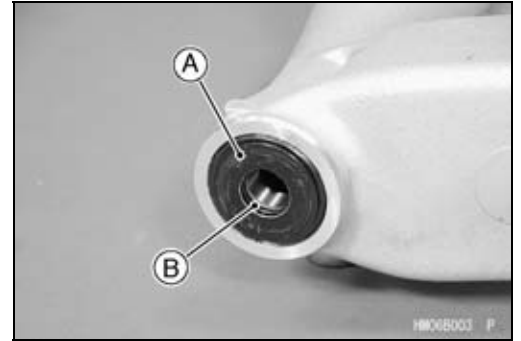
- Apply a non-permanent locking agent:
 - Swingarm Pivot Shaft [A], [B]
- Tighten:
 - Torque - Swingarm Pivot Right Shaft: 152 N·m (15.5 kgf·m, 112 ft·lb)
- Tighten:
 - Torque - Swingarm Pivot Left Shaft [B]: 20 N·m (2.0 kgf·m, 14 ft·lb)
 - Swingarm Pivot Left Nut [C]: 152 N·m (15.5 kgf·m, 112 ft·lb)
- Fit the boot on the swingarm, and tighten the clamp screw.



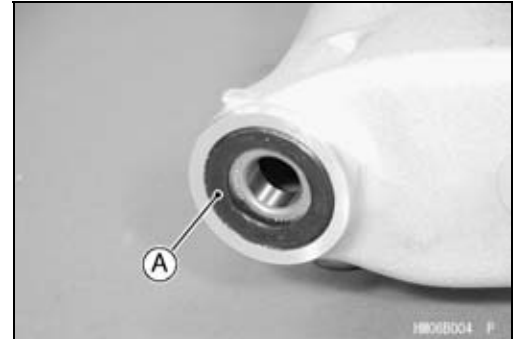
Swingarm

Swingarm Disassembly

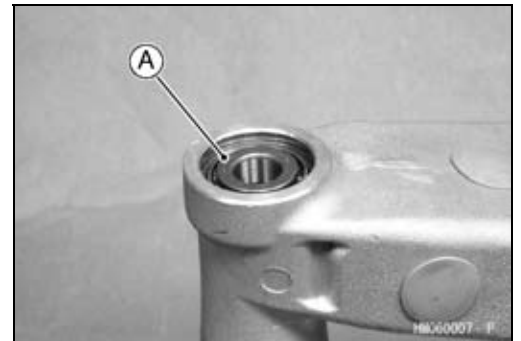
- Remove:
Collars [A]
O-ring [B]



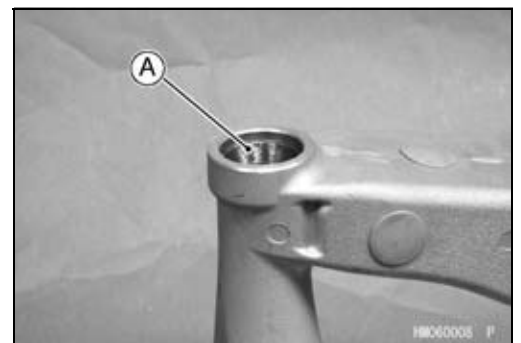
- Remove:
Oil Seal [A]



- Remove:
Tapered Roller Bearing [A]



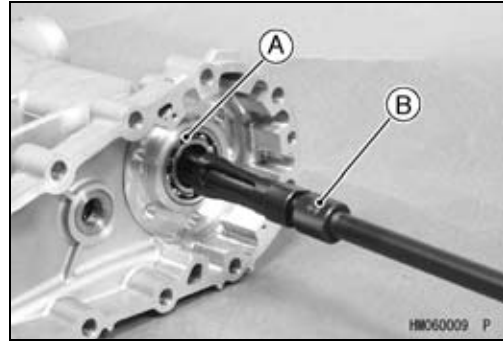
- Remove:
Outer Race [A]



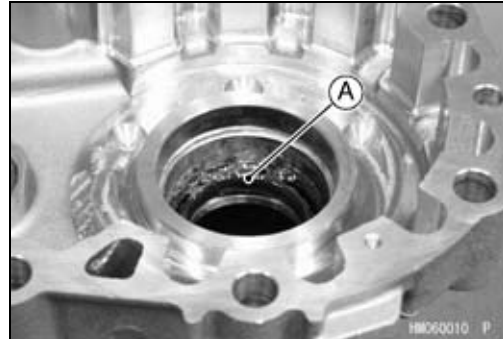
13-14 SUSPENSION

Swingarm

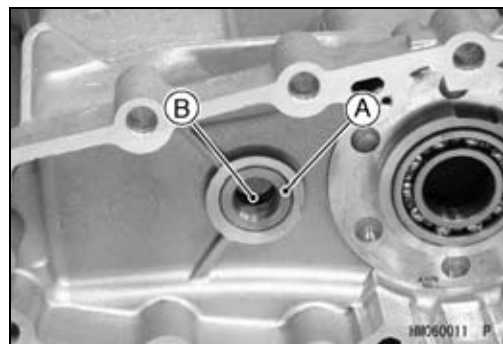
- Remove:
Ball Bearing [A]
Special Tool - Oil Seal & Bearing Remover [B]:
57001-1058



- Remove:
Oil Seal [A]

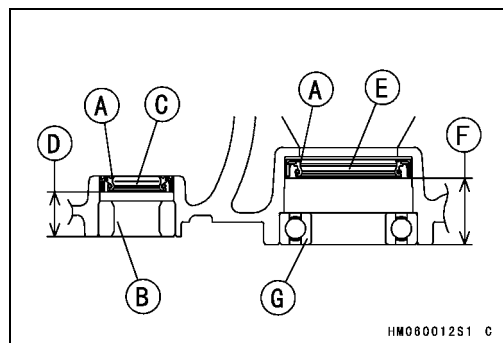


- Remove:
Collar [A]
Oil Seal [B]



Swingarm Assembly

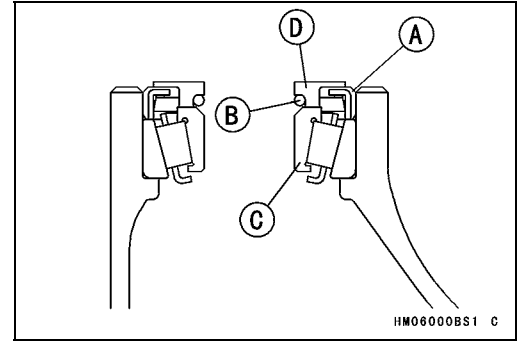
- Apply grease:
Inside [A] of Oil Seals
- Apply MOBIL FLUID 424 or Equivalent:
Surface of Collar [B]
- Install the following parts as shown.
Brake Lever Oil Seal [C]
[D] = 14.5 ± 0.1 mm (0.571 ± 0.004 mm)
Collar (level with surface)
Propeller Shaft Oil Seal [E]
[F] = 25 ± 0.1 mm (0.984 ± 0.004 mm)
Ball Bearing [G] (level with surface)



Swingarm

- Apply Amoco Rykon Premium Grease No.2 EP Green:
Inside of Oil Seals [A]
O-rings [B]
- Install the following parts as shown.
Tapered Roller Bearing [C]
Oil Seal (level with surface)
O-ring
Collar [D]

Special Tool - Bearing Driver Set: 57001-1129

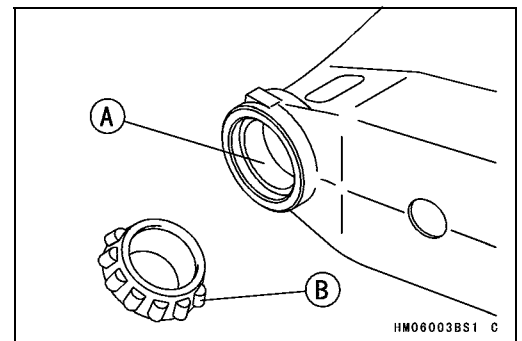


Swingarm Bearing Inspection

- Remove the final gear case (see Final Drive chapter).
- Move the swingarm up and down to check for abnormal friction, and push and pull it back and forth to check for bearing play.
- ★ If abnormal friction is felt, the bearings are damaged. Replace the oil seals and both left and right bearings.
- The play developed during use may indicate bearing damage. In this case, remove the swingarm and inspect the bearings. Replace both left and right bearings, if either of the bearings is damaged.

Swingarm Bearing Lubrication

- Remove the swingarm.
- Using a high flash-point solvent, wash the bearings clean of grease, and dry them.
- Inspect the bearings and oil seals for abrasion, color change, or other damage.
- Apply grease to the outer races [A], and pack the tapered roller bearings [B] with the same grease.
- Apply Amoco Rykon Premium Grease No. 2 EP (green) to the inside of the oil seals.
- Install the swingarm (see Swingarm Installation).



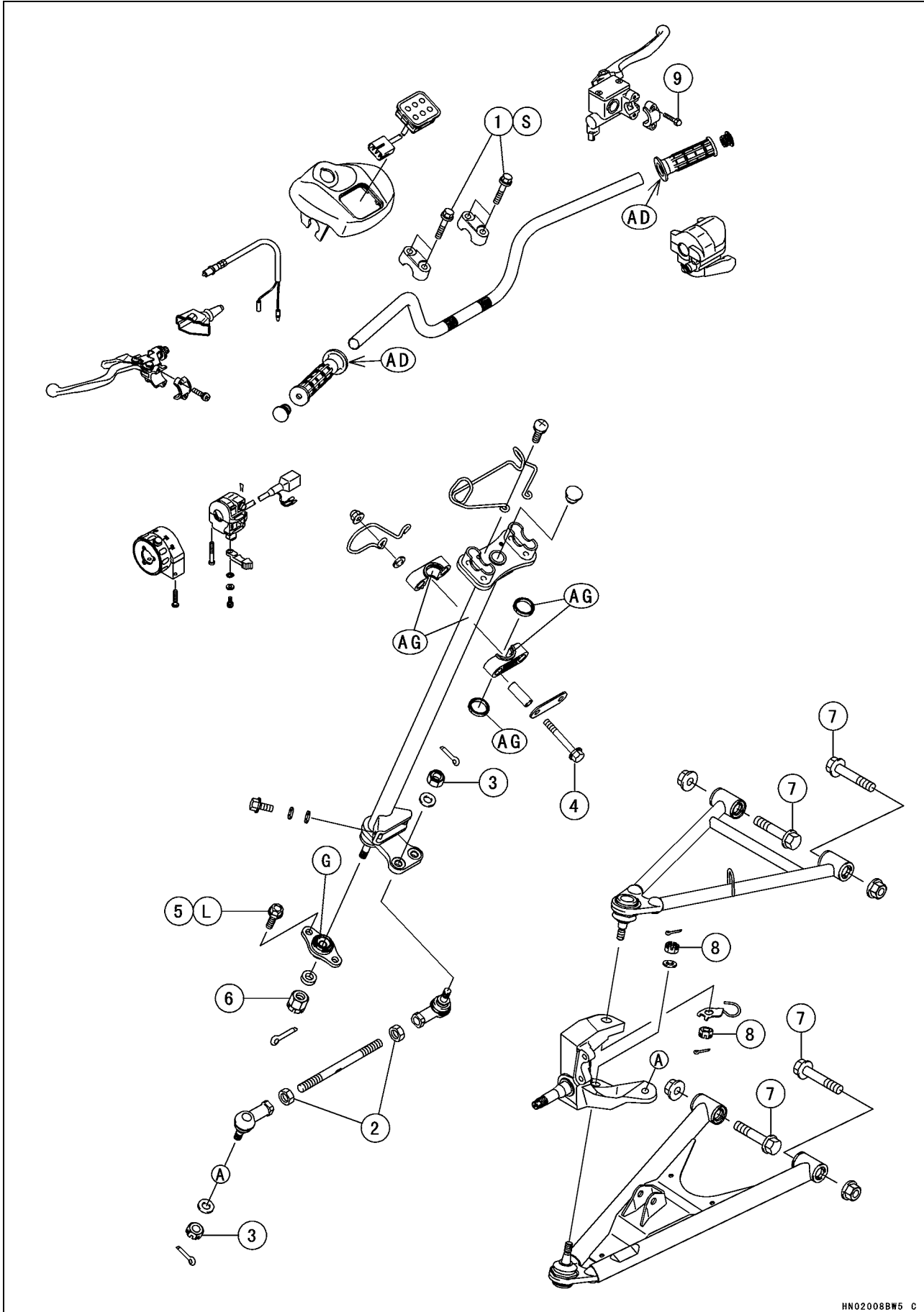
Steering

TABLE OF CONTENTS

Exploded View	14- 2
Specifications	14- 4
Steering	14- 5
Steering Stem Removal	14- 5
Steering Stem Installation	14- 6
Knuckle Removal	14- 7
Knuckle Installation	14- 7
Tie-Rod Removal	14- 7
Tie-Rod Installation	14- 7
Tie-Rod End Removal	14- 8
Tie-Rod End Installation	14- 8
Steering Maintenance	14- 9
Steering Inspection	14- 9
Steering Stem Straightness	14- 9
Steering Lubrication	14- 9
Steering Stem Clamp Inspection	14- 9
Steering Stem Bearing Inspection	14-10
Steering Knuckle Bearing Inspection	14-10
Tie-Rod End and Steering Knuckle Joint Inspection	14-10
Handlebar	14-11
Handlebar Removal	14-11
Handlebar Installation	14-11

14-2 STEERING

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Holder Bolts	29	3.0	22	S
2	Tie-Rod Adjusting Locknuts	22	2.2	16	
3	Tie-Rod End Nuts	42	4.3	31	
4	Steering Stem Clamp Bolts	25	2.5	18	
5	Steering Stem Bearing Joint Bolts	21	2.1	15	L
6	Steering Stem Bottom End Nut	40	4.1	30	
7	Suspension Arm Pivot Bolts	42	4.3	31	
8	Knuckle Joint Nuts	29	3.0	22	
9	Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	

L: Apply a non-permanent locking agent.

G: Apply grease for oil seal and O-ring.

AD: Apply adhesive agent.

AG: Apply grease (Amoco rykon premium grease No. 2 EP Green).

S: Follow the specific tightening sequence.

14-4 STEERING

Specifications

Item	Standard	Service Limit
Tie-Rods: Tie-rod length	387.4 ± 1.5 mm (15.3 ± 0.06 in.)	- - -

Steering

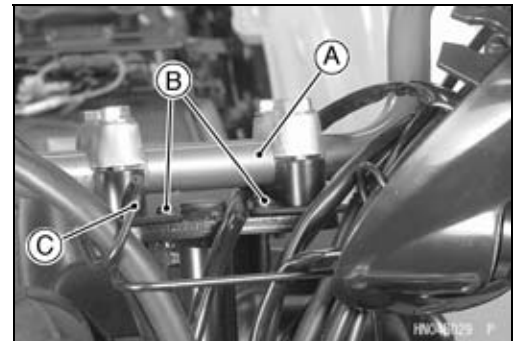
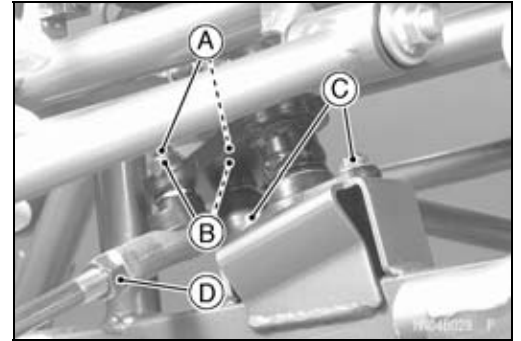
Steering Stem Removal

- Remove:
 - Front Fender (see Frame chapter)
 - Front Wheels (see Wheels/Tires chapter)
 - Cotter Pins [A]
 - Tie-Rod End Nuts [B] and Tie-Rod End Steering Stem Bearing Housing Bolts [C] (right and left)

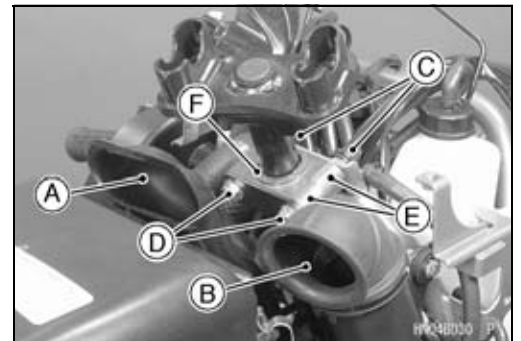
CAUTION

Do not loosen the tie-rod adjusting locknuts [D], or the toe-in of the front wheels will be changed.

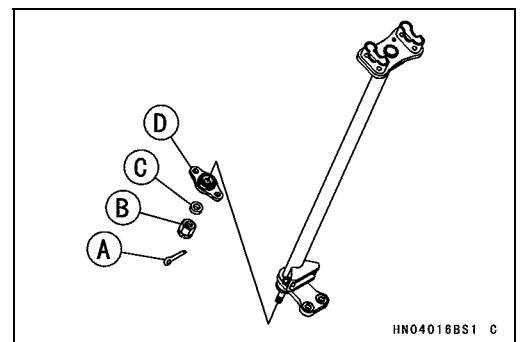
- Handlebar Assembly [A] (see Handlebar Removal)
- Screws [B]
- Clamp [C]



- Remove:
 - Air Cleaner Duct [A]
 - Converter Intake Duct [B]
 - Nuts [C] and Clamp
 - Steering Clamp Bolts [D], and Plate
 - Steering Clamps [E] and Collars
 - Grease Seals [F] (upper and lower)



- Pull the steering stem out of the frame.
- Remove:
 - Cotter Pin [A]
 - Steering Stem Bottom End Nut [B]
 - Collar [C]
 - Steering Stem Bearing [D]

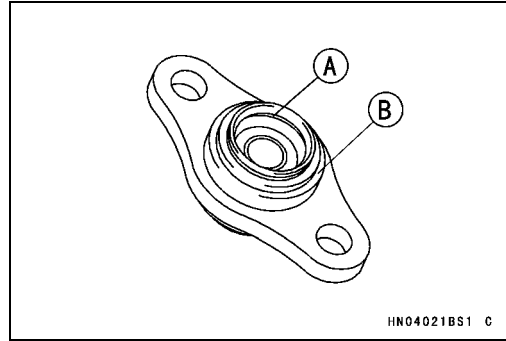


14-6 STEERING

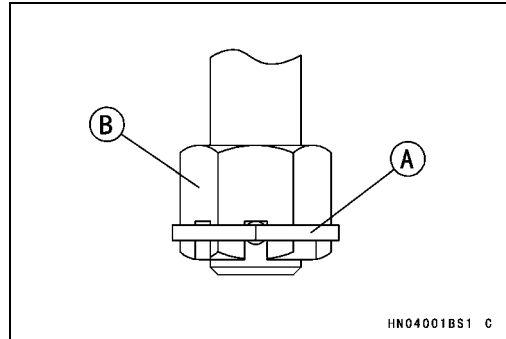
Steering

Steering Stem Installation

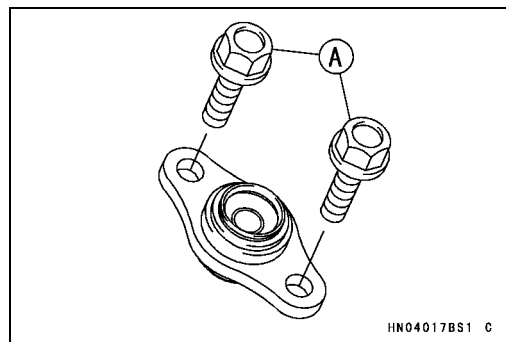
- Full grease up the seal grooves [A] in the steering stem bearing [B].
- Install:
 - Collar
- Tighten:
 - Torque - Steering Stem Bottom End Nut: 40 N·m (4.1 kgf·m, 30 ft·lb)**



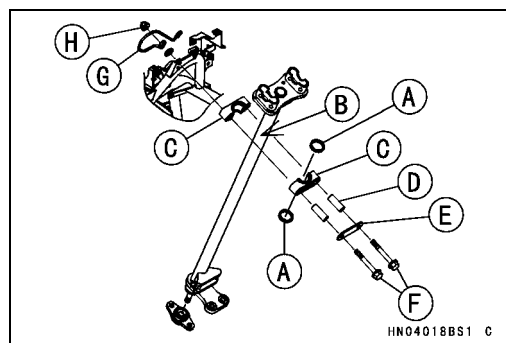
- Bend both ends of the cotter pin [A] as shown.
 - Steering Stem Bottom End Nut [B]



- Apply a non-permanent locking agent:
 - Steering Stem Bearing Joint Bolts [A]



- Apply Amoco Rykon Premium Grease No.2 EP (Green):
 - Inside of Grease Seals [A]
 - Steering Stem [B]
- Install:
 - Grease Seals
 - Steering Clamps [C] and Collars [D]
 - Plate [E], and Steering Stem Clamp Bolts [F]
 - Clamp [G]
 - Nuts [H] and Washers
- Tighten:
 - Torque - Steering Stem Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
 - Tie-Rod End Nuts: 42 N·m (4.3 kgf·m, 31 ft·lb)**
- Inspect the toe-in (see Wheels/Tires chapter).



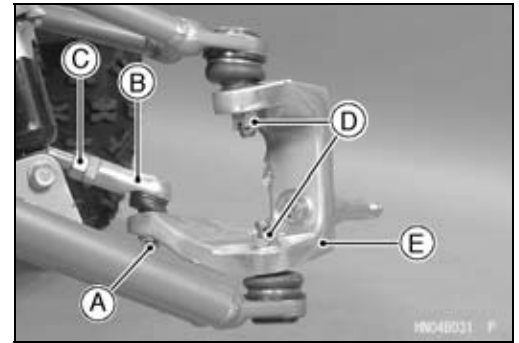
Steering

Knuckle Removal

- Remove:
 - Front Wheel and Hub (see Wheels/Tires chapter)
 - Brake Caliper (see Brakes chapter)
 - Cotter Pin and [A]
 - Tie-Rod End [B]

CAUTION

Do not loosen the tie-rod adjusting locknuts [C], or the toe-in of the front wheels will be changed.



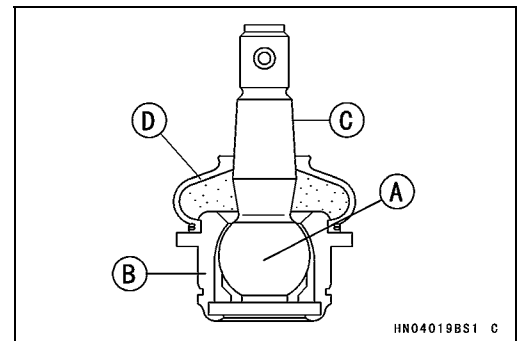
- Remove:
 - Cotter Pins and Knuckle Joint Nuts [D]
 - Brake Hose Clamp (upper knuckle joint)
- Remove the knuckle [E] from the suspension arms.

Knuckle Installation

- Inspect the spherical bearing [A].
- ★ If roughness, excessive play, or seizure is found, replace the knuckle joint [B].
- Clean the shanks [C] of the knuckle joint.
- Check that the joint boot [D] is not torn, worn, deteriorated, or is leaking grease.
- Install the knuckle.
- Tighten:

Torque - Knuckle Joint Nut: 29 N·m (3.0 kgf·m, 22 ft·lb)

Tie-Rod End Nut: 42 N·m (4.3 kgf·m, 31 ft·lb)

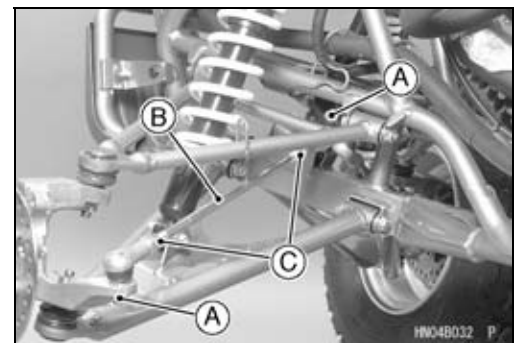


Tie-Rod Removal

- Remove:
 - Front Wheel (see Wheels/Tires chapter)
 - Cotter Pins and Tie-Rod End Nuts [A]
 - Tie-Rod [B]

CAUTION

When removing the tie-rod, be careful not to bend it. Do not loosen the tie-rod adjusting locknuts [C], or the toe-in of the front wheels will be changed.



Tie-Rod Installation

- The right and left tie-rods are identical.
- Tighten:
 - Torque - Tie-Rod End Nuts: 42 N·m (4.3 kgf·m, 31 ft·lb)**
 - Wheel Nuts: 52 N·m (5.3 kgf·m, 38 ft·lb)**
- Inspect the toe-in (see Wheels/Tires chapter).

14-8 STEERING

Steering

Tie-Rod End Removal

- Remove the tie-rod (see Tie-Rod Removal).
- Holding the width across flats [A] on the tie-rod, loosen the locknut [B] and unscrew the tie-rod end [C].

NOTE

- The locknut near the flattened area on the tie-rod has left-hand threads. Turn the wrench clockwise (as viewed from the joint end) for loosening.

CAUTION

Do not remove the grease seal. It is packed with grease.

Tie-Rod End Installation

- Check that the seal lip [A] is on the shank [B].

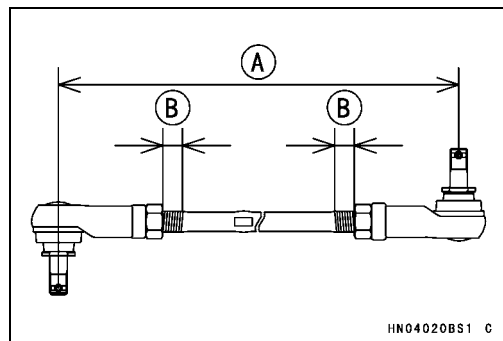
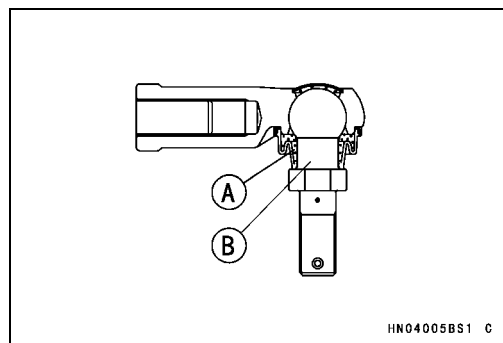
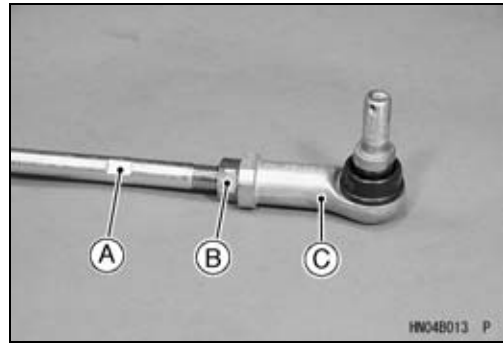
- Install the tie-rod ends so that width across flats on the tie-rod face to the knuckle arm, the tie-rod has the correct length [A], and both visible thread lengths [B] are approximately equal.

Tie-Rod Length

Standard: 387.4 ± 1.5 mm (15.3 ± 0.06 in.)

- Tighten:

Torque - Tie-Rod Adjusting Locknuts: 22 N·m (2.2 kgf·m, 16 ft·lb)



Steering Maintenance

Steering Inspection

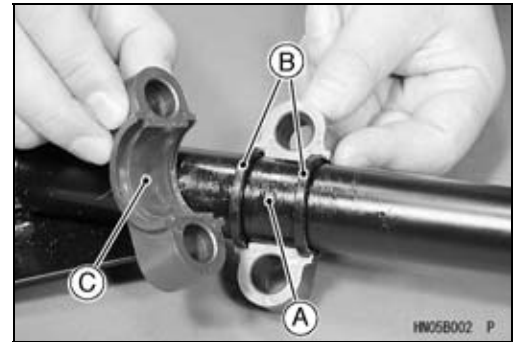
- Refer to the Steering in the Periodic Maintenance chapter.

Steering Stem Straightness

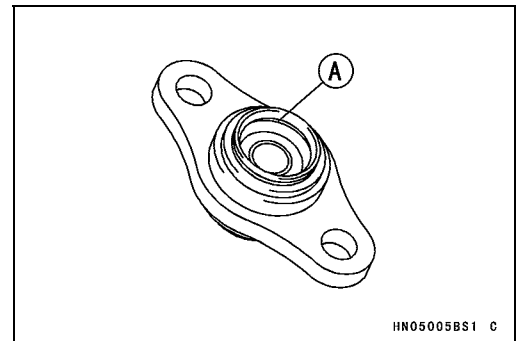
- Remove the steering stem (see Steering Stem Removal).
- Check the steering stem for straightness.
- Use a straightedge along the stem.
- ★ If the steering stem is bent, replace the steering stem.

Steering Lubrication

- Lubricate the steering stem clamps.
- Remove the steering stem (see Steering Stem Removal).
- Wipe all the old grease off the steering stem, bearing sleeves, and out of the grease seals.
- Apply Amoco Rykon Premium Grease No. 2 EP (Green) to the steering stem [A], grease seals [B], and mating surface [C] of the clamp.



- Lubricate the steering stem bearing [A].
- Remove the steering stem bearing.
- Pack the grease seal lips with grease.



Steering Stem Clamp Inspection

- Inspect the steering stem clamps [A].
- ★ If roughness, excessive play, or seizure is found, replace both clamps.

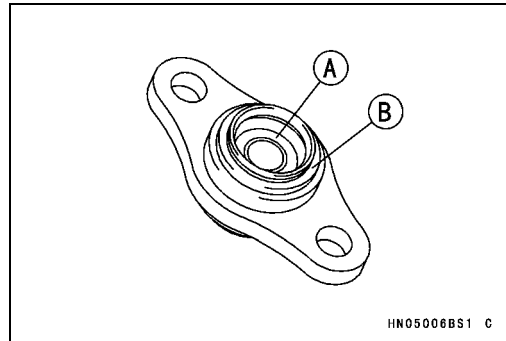


14-10 STEERING

Steering Maintenance

Steering Stem Bearing Inspection

- Inspect the spherical bearing [A].
- ★ If roughness, excessive play, or seizure is found, replace the steering stem bearing.
- Inspect the upper and lower grease seals [B].
- ★ If damage, wear or deterioration is found, replace the steering stem bearing.

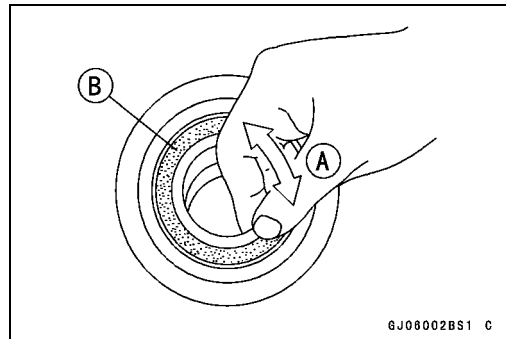


Steering Knuckle Bearing Inspection

CAUTION

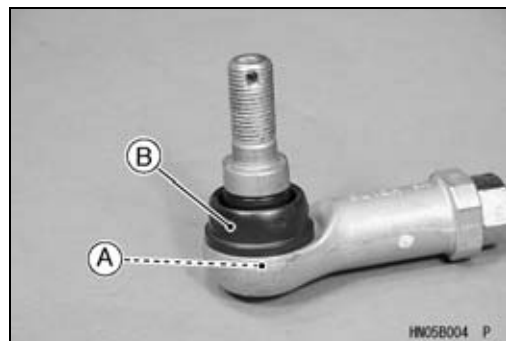
Do not remove any bearings for inspection.

- Remove the steering knuckle (see Steering Knuckle Removal).
- Examine the bearing seal [B] for tears or leakage.
- ★ If the seal is torn or is leaking, replace the bearing.
- Turn [A] the bearing back and forth while checking for roughness or binding.
- ★ If roughness or binding is found, replace the bearing.



Tie-Rod End and Steering Knuckle Joint Inspection

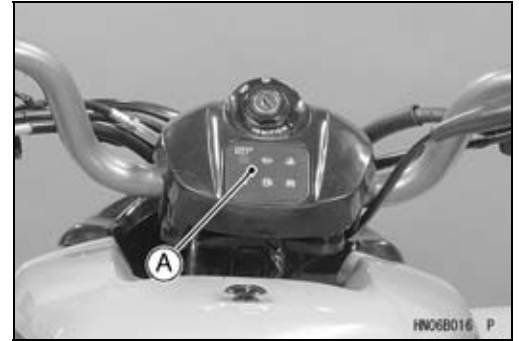
- Inspect each spherical bearing [A].
- ★ If roughness, excessive play, or seizure is found, replace the tie-rod end, or steering knuckle joint.
- Inspect each grease seal [B].
- ★ If damage, wear or deterioration is found, replace the tie-rod end, or steering knuckle joint.



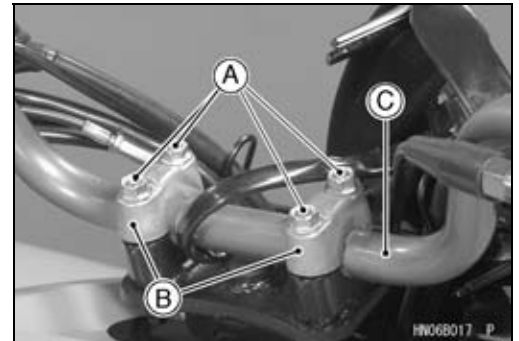
Handlebar

Handlebar Removal

- Remove:
 - Throttle Case
 - Front Brake Master Cylinder
 - Left-hand Switch Housing
 - Rear Brake Lever Assembly
 - Handlebar Cover and Indicator Unit [A] as a set



- Handlebar Holder Bolts [A]
- Handlebar Holders [B]
- Handlebar [C]



Handlebar Installation

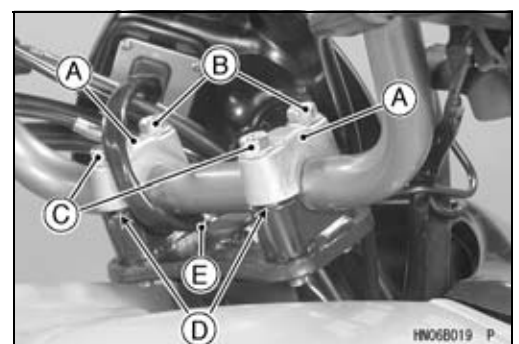
- Install the handlebar so that the angle of the handlebar matches the angle of the steering stem as shown.
 - [A] : Parallel



- Install the handlebar holder [A].
- Tighten the holder front bolts [B] first and then the rear bolts [C].

Torque - Handlebar Holder Bolts: 29 N·m (3.0 kgf·m, 22 ft·lb)

- If the holder is correctly installed, there will be no gap at the front and an even gaps [D] at the rear after tightening.
- Be sure the indicator unit lead place under the handlebar [E].



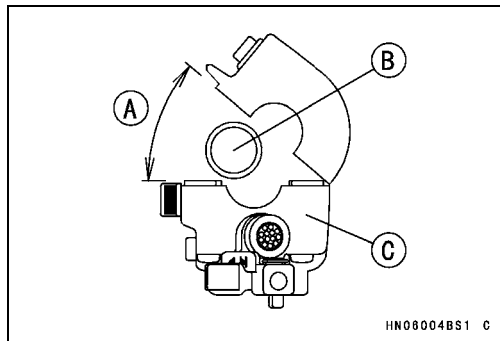
14-12 STEERING

Handlebar

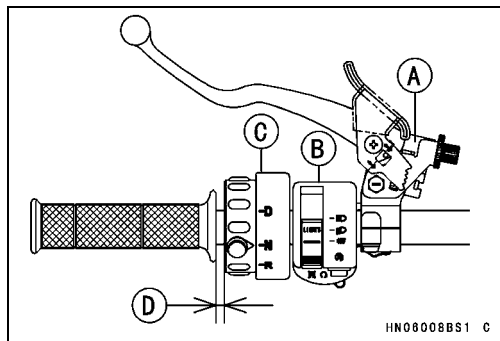
- Install the left switch housing [C] on the handlebar [B] so that the opening angle is 40° [A] or less.

NOTE

- Do not open the housing more than 40° , the built-in parts in the housing may be damaged.



- Install:
 - Rear Brake Lever Assembly [A]
 - Left Switch Housing [B]
 - Shift Grip [C]
 - [D] = 2 ~ 3 mm (0.08 ~ 0.12 in.)



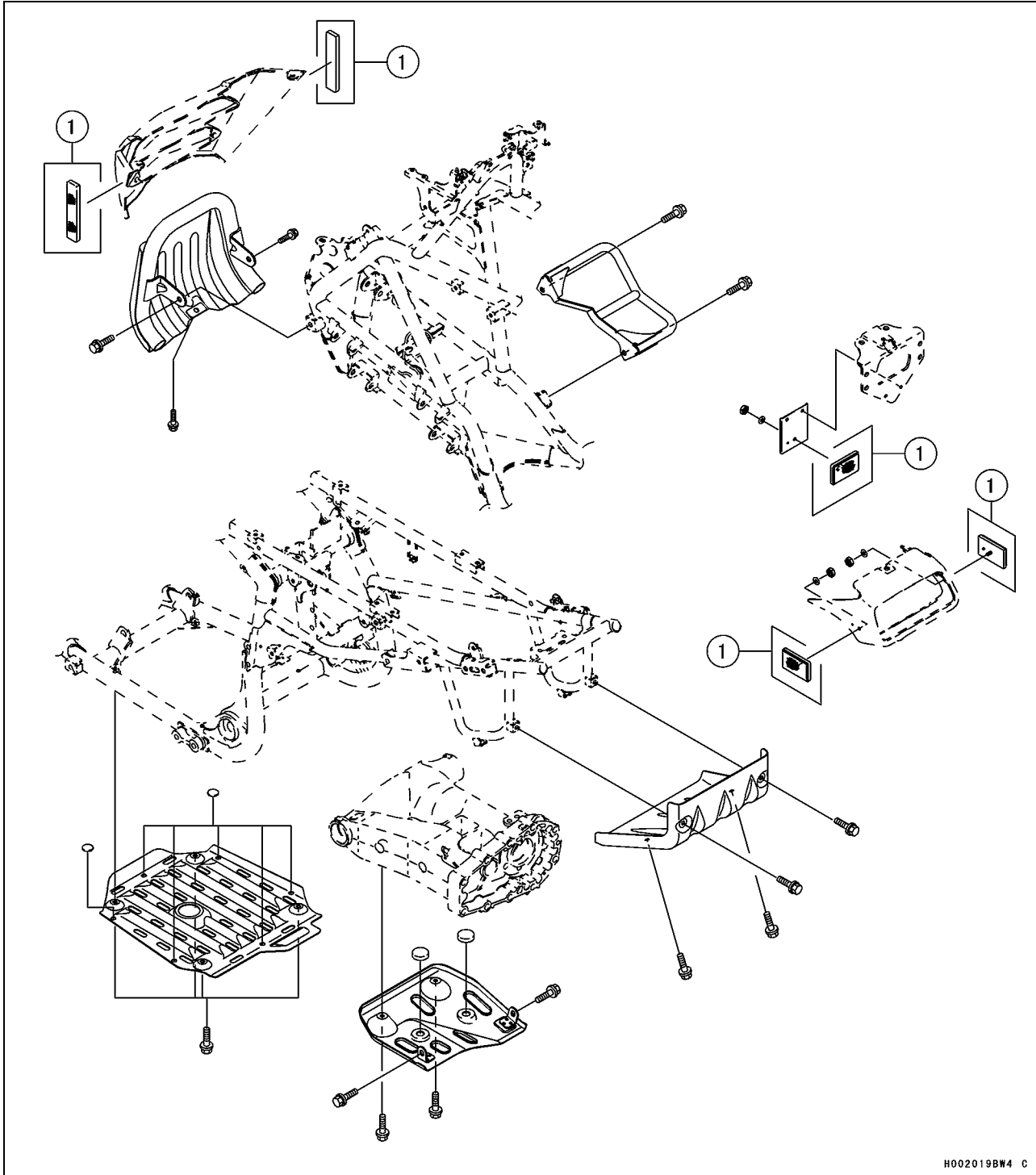
Frame

TABLE OF CONTENTS

Exploded View	15- 2
Seat	15- 6
Seat Removal	15- 6
Seat Installation	15- 6
Fenders	15- 7
Front Fender Removal	15- 7
Front Fender Installation	15- 7
Rear Fender Removal.....	15- 8
Rear Fender Installation.....	15- 8
Covers	15- 9
Side Inner Cover Removal.....	15- 9
Side Inner Cover Installation.....	15- 9
Air Cleaner Cover Removal	15- 9
Air Cleaner Cover Installation	15- 9
Radiator Cover Removal.....	15-10
Guards.....	15-11
Front Guard Removal	15-11
Front Guards Installation.....	15-11
Engine Bottom Guard Removal	15-11
Engine Bottom Guard Installation	15-11
Rear Bottom Guard Removal.....	15-11
Rear Bottom Guard Installation.....	15-11
Foot Guard and Stay	15-12
Foot Guard and Stay Removal	15-12
Foot Guard and Stay Installation	15-12

15-2 FRAME

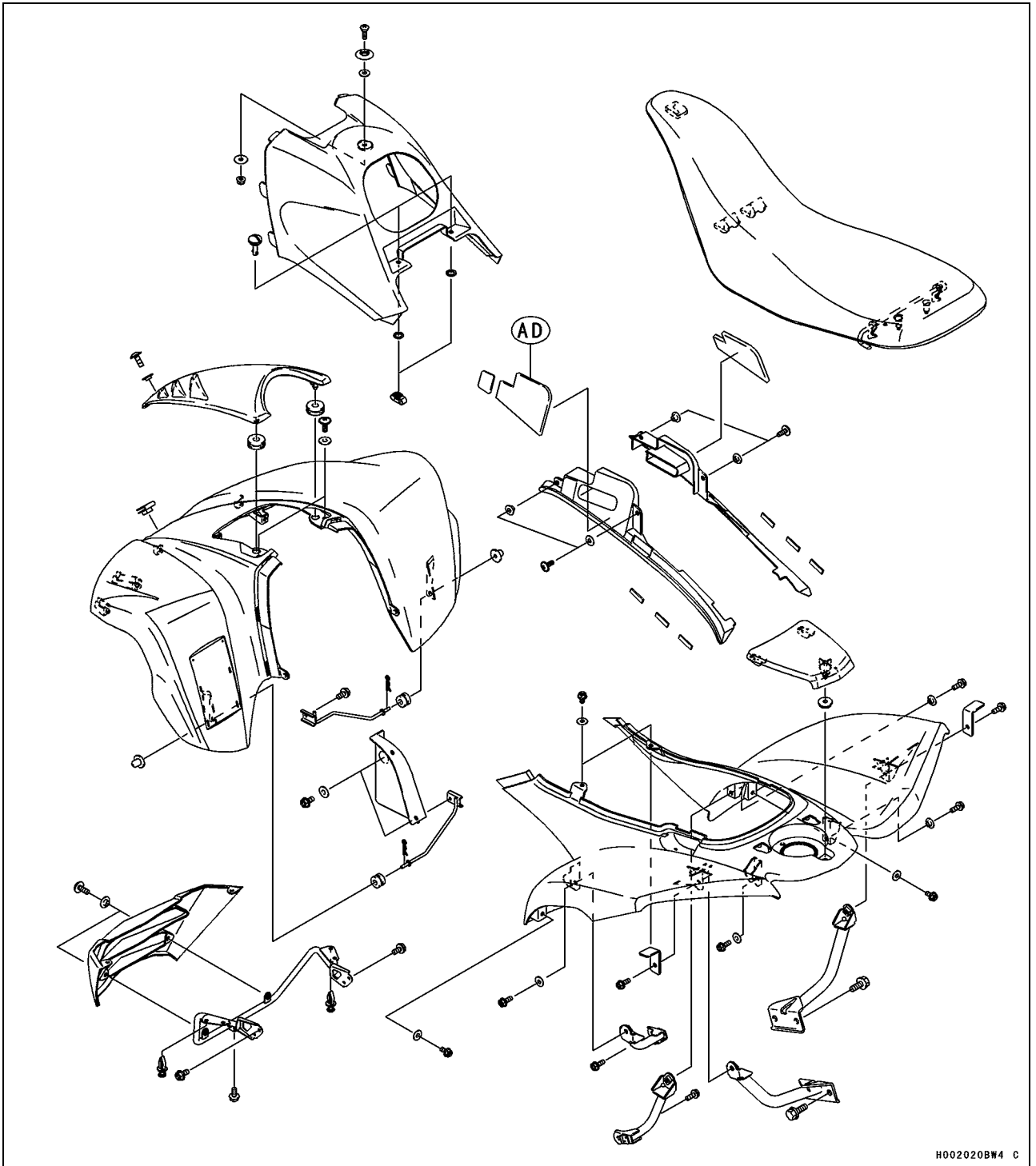
Exploded View



H002019BW4 C

1. Canada Model

Exploded View

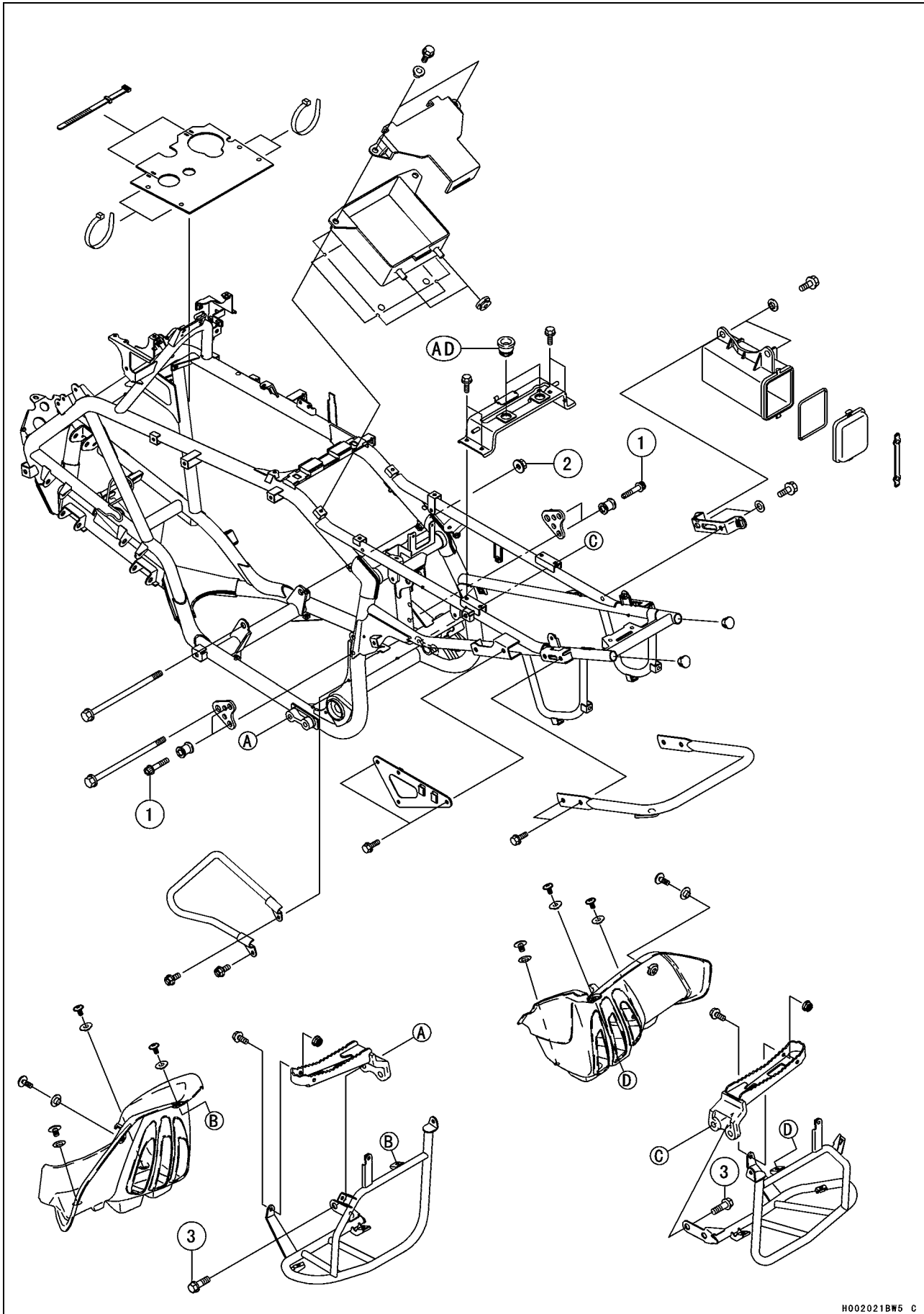


H002020B4 C

AD: Apply adhesive agent to outside.

15-4 FRAME

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Mounting Bracket Bolts	52	5.3	38	
2	Engine Mounting Nut	62	6.3	46	
3	Footrest Mounting Bolts	44	4.5	33	

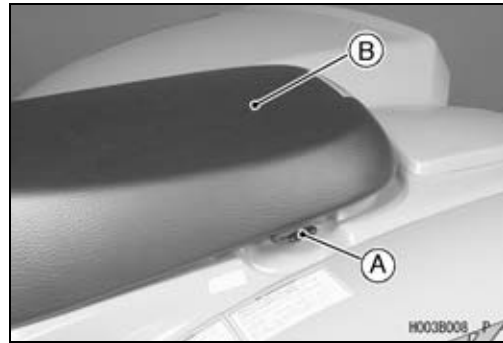
AD: Apply adhesive agent.

15-6 FRAME

Seat

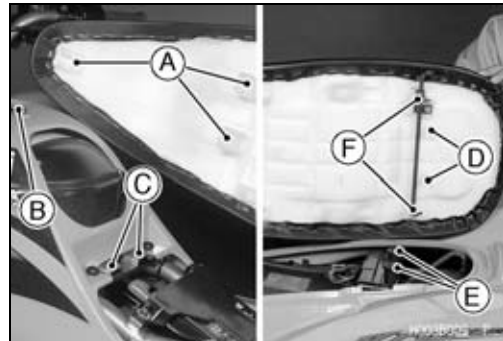
Seat Removal

- Push down the seat latch [A], and then remove the seat [B] by pulling it up to the rear.



Seat Installation

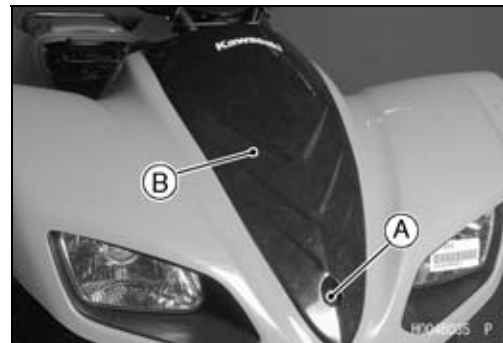
- Slip the front seat hooks [A] into the button [B] on the air cleaner cover and the brace [C] on the frame.
- Put the stoppers [D] into the holes [E] in the frame.
- Push down the rear part of the seat until the lock [F] clicks.



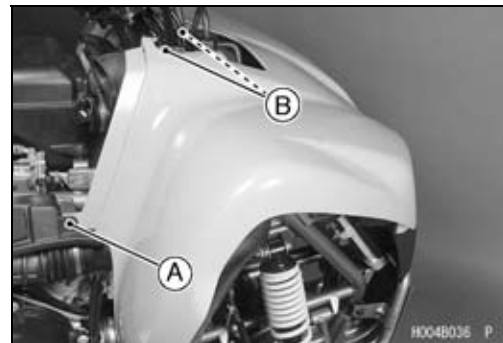
Fenders

Front Fender Removal

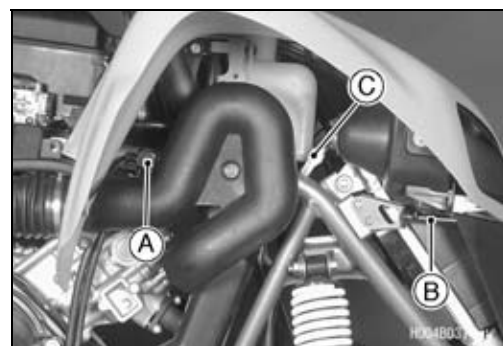
- Remove:
 - Seat (see Seat Removal)
 - Air Cleaner Cover (see Air Cleaner Cover Removal)
 - Screw and Collar [A]
 - Upper Front Cover [B]



- Remove:
 - Screws and Collars [A] (both side)
 - Screws and Collars [B]

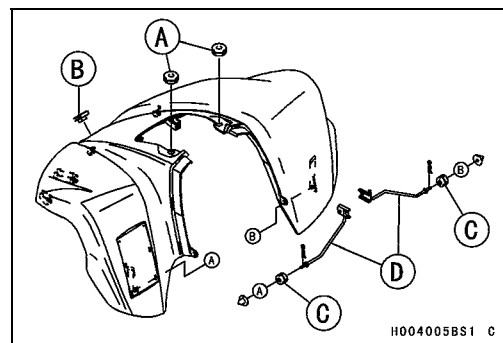


- Remove
 - Bolts [A] (both side)
 - Screws and Collar [B] (both side)
 - Headlight Connector [C] (both side)
 - Front Fender



Front Fender Installation

- Install:
 - Grommets [A]
 - Clamp Nut [B]
 - Damper [C]
 - Stay [D]
 - Front Fender
 - Upper Front Cover
 - Air Cleaner Cover (see Air Cleaner Cover Installation)
 - Seat (see Seat Installation)

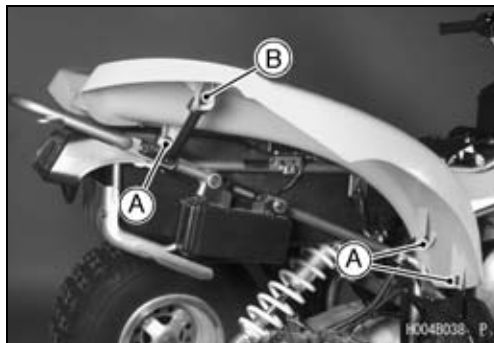


15-8 FRAME

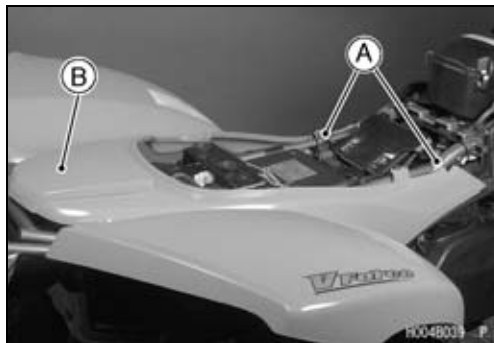
Fenders

Rear Fender Removal

- Remove:
 - Seat (see Seat Removal)
 - Bolts and Collars [A] (both side)
 - Bolts and Plats [B] (both side)



- Remove:
 - Bolts and Collars [A]
 - Tank Cap Cover [B]



- Remove:
 - Fuel Tank Cap [A]
 - Rear Fender
- Install the fuel tank cap at once.



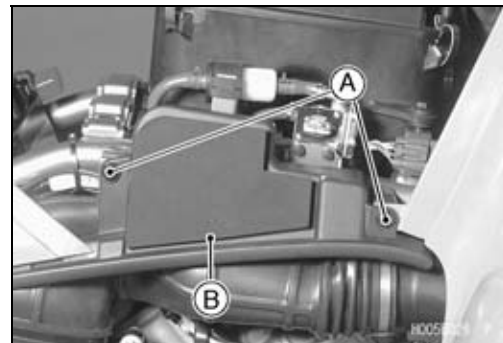
Rear Fender Installation

- Remove the fuel tank cap.
- Install:
 - Rear Fender
 - Fuel Tank Cap
- Install the removed parts.

Covers

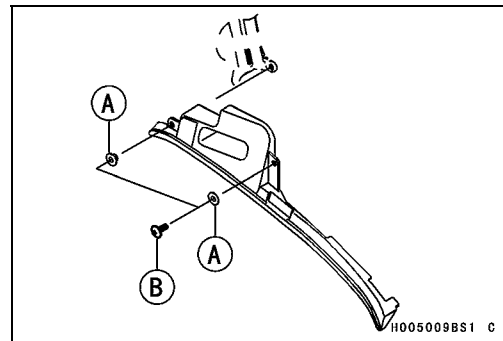
Side Inner Cover Removal

- Remove:
 - Air Cleaner Cover (see Air Cleaner Cover Removal)
 - Screws and Collars [A]
 - Side Inner Cover [B]



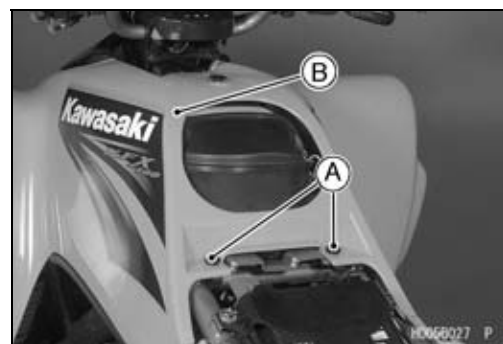
Side Inner Cover Installation

- Install:
 - Collars [A]
 - Screws [B]
 - Air Cleaner Cover (see Air Cleaner Cover Installation)



Air Cleaner Cover Removal

- Remove:
 - Seat (see Seat Removal)
 - Knobs [A]
 - Air Cleaner Cover [B]



Air Cleaner Cover Installation

- Insert the tabs [A] of the cover into the recesses (both sides).
- Install the removed parts.

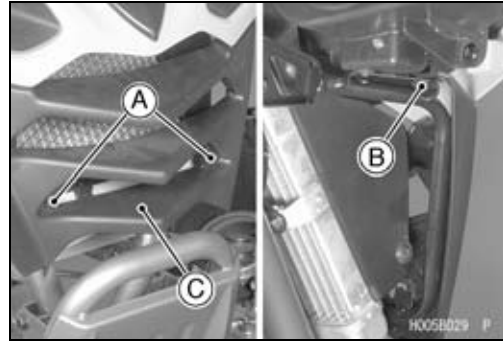


15-10 FRAME

Covers

Radiator Cover Removal

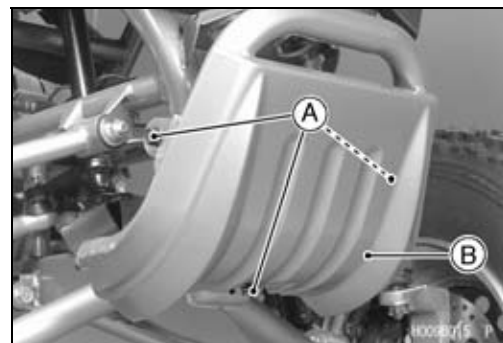
- Remove:
 - Screws and Collars [A]
 - Quick Rivet [B]
 - Radiator Cover [C]



Guards

Front Guard Removal

- Remove:
 - Front Guard Bolts [A]
 - Front Guard [B]

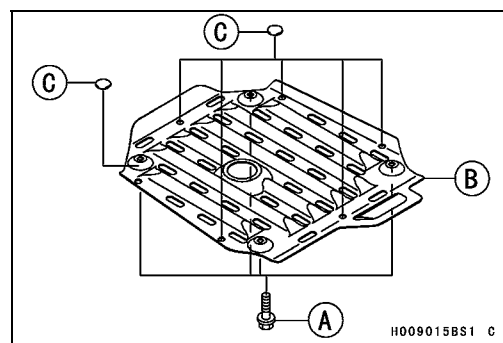


Front Guards Installation

- Install the front guard.
- Tighten the front guard bolts.

Engine Bottom Guard Removal

- Remove:
 - Bolts [A]
 - Engine Bottom Guard [B]

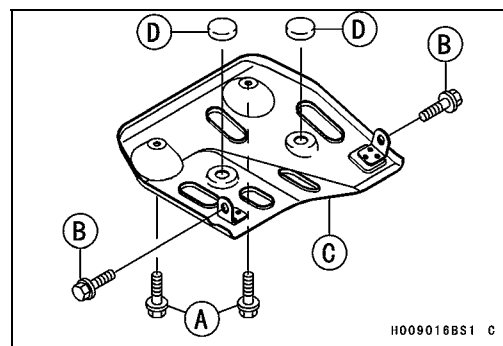


Engine Bottom Guard Installation

- Confirm:
 - Damper [C]
- Install:
 - Engine Bottom Guard
 - Bolts

Rear Bottom Guard Removal

- Remove:
 - Bolts (M6) [A]
 - Bolts (M8) [B]
 - Rear Bottom Guard [C]



Rear Bottom Guard Installation

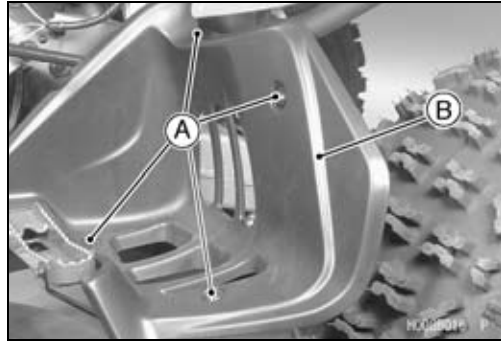
- Confirm:
 - Dampers [D]
- Install:
 - Rear Bottom Guard
 - Bolts (M8)
 - Bolts (M6)

15-12 FRAME

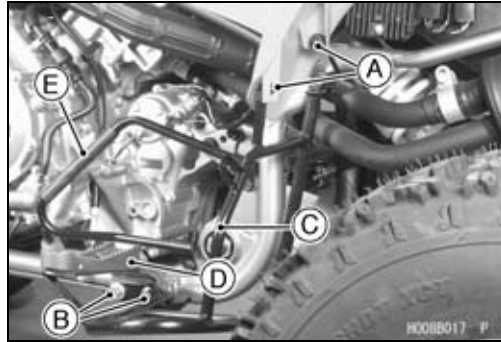
Foot Guard and Stay

Foot Guard and Stay Removal

- Remove:
 - Screws and Collars [A]
 - Foot Guards [B]

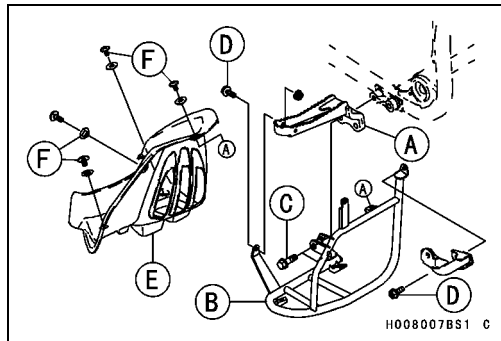


- Remove:
 - Bolt and Nut [A]
 - Bolts [B]
 - Guard Stays [C]
 - Footrest [D]
- For left side, remove guard [E].



Foot Guard and Stay Installation

- For left side, install the guard and tighten it.
- Install the footrest [A] and foot stay [B].
- Tighten the footrest mounting bolt [C] and the bolts [D].
 - Torque - Footrest Mounting Bolt : 44 N·m (4.5 kgf·m, 33 ft·lb)**
- Install the foot guard [E] and tighten the screws [F].



Electrical System

TABLE OF CONTENTS

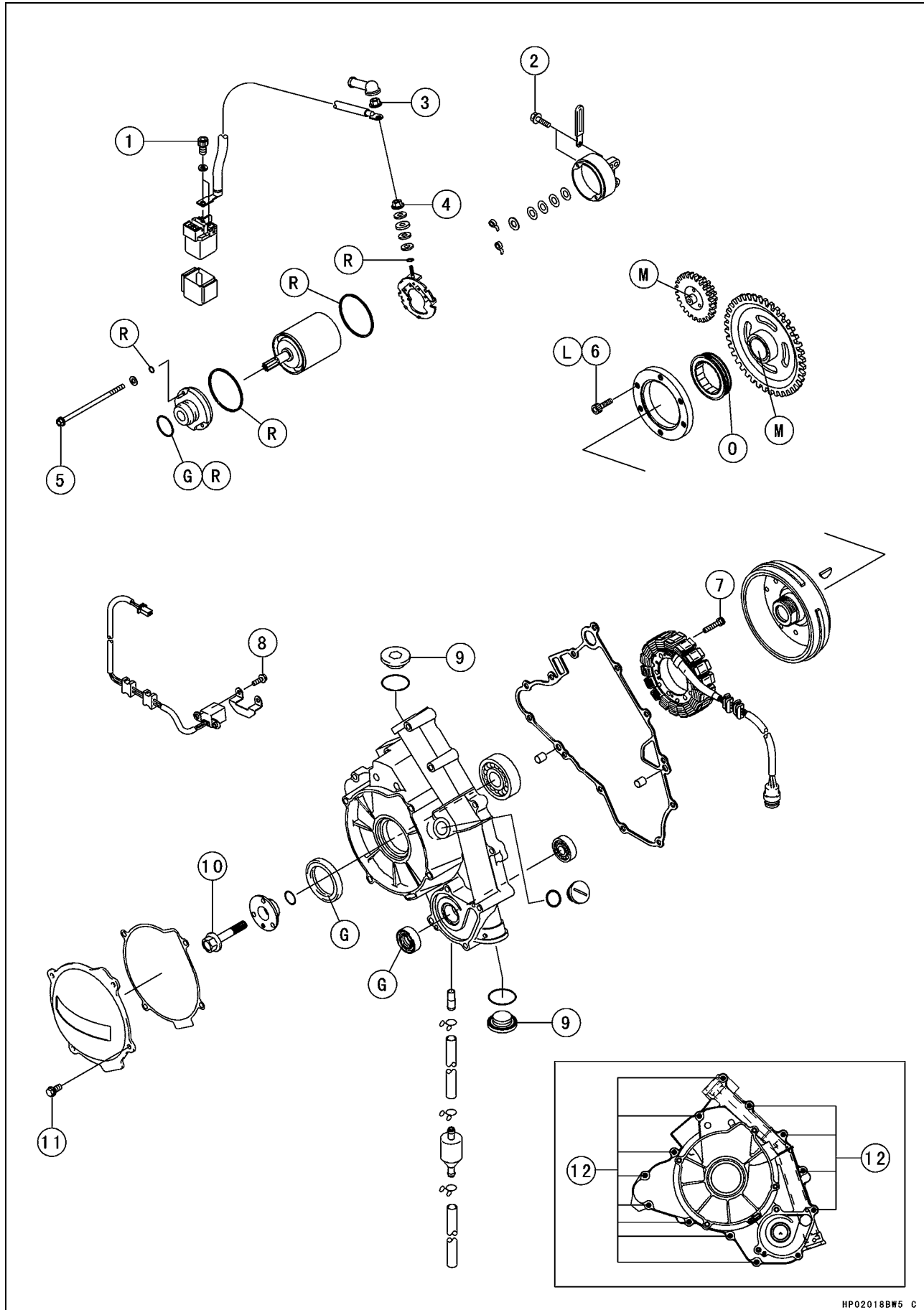
Exploded View	16- 4	Alternator Rotor Inspection	16-38
Specifications	16-10	Ignition Timing Test	16-39
Special Tools	16-12	Vehicle-down Sensor Outline	16-39
Parts Location.....	16-13	Vehicle-down Sensor Removal	16-40
Precautions.....	16-14	Vehicle-down Sensor Installation ..	16-40
Electrical Wiring.....	16-16	Vehicle-down Sensor Inspection...	16-41
Wiring Inspection	16-16	Electric Starter System.....	16-45
Battery	16-17	Starter Motor Removal.....	16-45
Battery Removal	16-17	Starter Motor Installation.....	16-45
Battery Installation	16-17	Starter Motor Disassembly.....	16-46
Electrolyte Filling	16-17	Starter Motor Assembly	16-47
Initial Charge	16-19	Commutator Cleaning/Inspection..	16-48
Precautions	16-19	Armature Inspection.....	16-49
Interchange	16-20	Starter Motor Brush Length.....	16-50
Charging Condition Inspection.....	16-21	Brush Assembly Inspection.....	16-50
Refreshing Charge	16-21	Brush Plate and Terminal Bolt	
Charging System.....	16-23	Inspection.....	16-50
Alternator Cover Removal.....	16-23	Starter Relay Inspection.....	16-50
Alternator Cover Installation.....	16-24	Starter Circuit Relay Inspection ...	16-51
Alternator Rotor Removal	16-25	Starter Motor Clutch Removal.....	16-52
Alternator Rotor Installation	16-26	Starter Motor Clutch Installation....	16-53
Alternator Stator Removal.....	16-26	Starter Motor Clutch Inspection ...	16-53
Alternator Stator Installation.....	16-26	Torque Limiter Inspection.....	16-54
Regulator/Rectifier Output Voltage		Lighting System.....	16-55
Inspection.....	16-27	Headlight Beam Vertical	
Alternator Inspection.....	16-28	Adjustment.....	16-55
Regulator/Rectifier Inspection.....	16-29	Headlight Bulb Replacement	16-55
Ignition System	16-32	Taillight Bulb Replacement.....	16-57
Spark Plug Removal	16-32	Radiator Fan System.....	16-60
Spark Plug Installation	16-33	Radiator Fan Circuit Inspection.....	16-60
Spark Plug Cleaning/Inspection....	16-33	Radiator Fan Motor Inspection.....	16-60
Spark Plug Gap Inspection	16-33	Fuel Pump/Fuel Reserve Switch	16-61
Ignition Coil Removal.....	16-33	Fuel Pump Inspection	16-61
Ignition Coil Installation.....	16-34	Fuel Reserve Switch Inspection	
Ignition Coil Inspection.....	16-34	(1).....	16-62
Ignition Coil Primary Peak Voltage		Fuel Reserve Switch Inspection	
Inspection.....	16-36	(2).....	16-62
Crankshaft Sensor Removal.....	16-36	Indicator Unit	16-64
Crankshaft Sensor Installation	16-37	Indicator Unit Removal.....	16-64
Crankshaft Sensor Inspection.....	16-37	Indicator Unit Installation.....	16-64
Crankshaft Sensor Peak Voltage		Indicator Unit Inspection	16-64
Inspection.....	16-38	Switches	16-67

16-2 ELECTRICAL SYSTEM

Brake Light Switch Adjustment	16-67	30 A Main Fuse Removal.....	16-70
Radiator Fan Switch Inspection	16-67	Radiator Fan Fuse Removal	16-70
Coolant Temperature Warning		Main Fuse Inspection.....	16-70
Light Switch Inspection	16-68	Radiator Fan Fuse Inspection.....	16-71
Switch Inspection	16-68	Wiring Diagram.....	16-72
Fuses.....	16-70		

16-4 ELECTRICAL SYSTEM

Exploded View



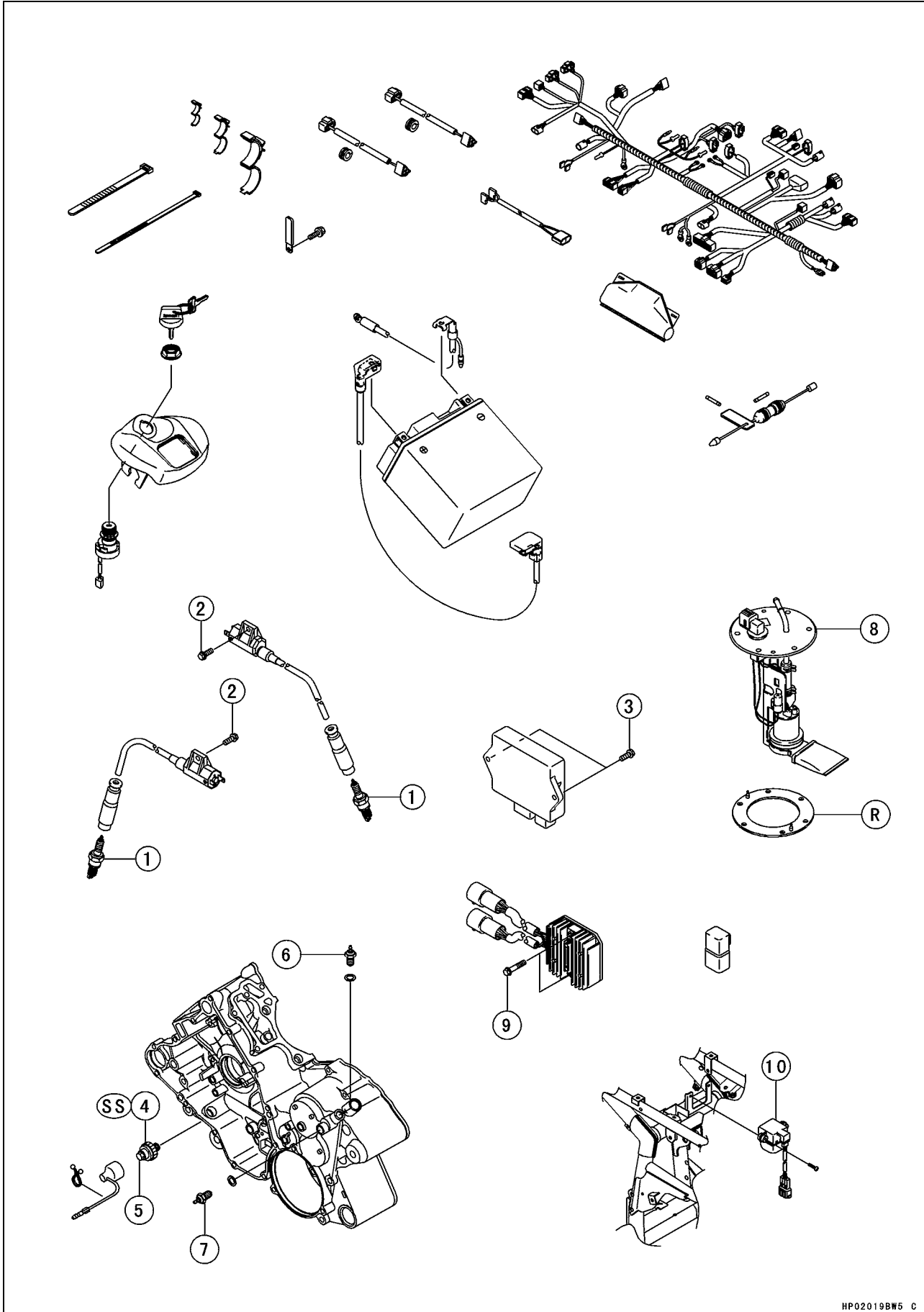
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Battery Cable Bolts	5.9	0.60	52 in·lb	
2	Starter Motor Mounting Bolts	8.8	0.90	78 in·lb	
3	Starter Motor Terminal Nut	4.9	0.50	43 in·lb	
4	Starter Motor Terminal Locknut	6.9	0.70	61 in·lb	
5	Starter Motor Bolts	4.9	0.50	43 in·lb	
6	Starter Motor Clutch Bolts	34	3.5	25	L
7	Alternator Stator Bolts	13	1.3	113 in·lb	
8	Crankshaft Sensor Mounting Bolts	5.9	0.60	52 in·lb	
9	Alternator Cover Plugs	18	1.8	13	
10	Alternator Rotor Bolt	127	13	94	
11	Alternator Bolt Cover Bolts	8.8	0.90	78 in·lb	
12	Alternator Cover Bolts	8.8	0.90	78 in·lb	

- G: Apply grease for oil seal and O-ring.
- L: Apply a non-permanent locking agent.
- M: Apply molybdenum disulfide grease.
- O: Apply engine oil.
- R: Replacement Parts

16-6 ELECTRICAL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Spark Plugs	13	1.3	113 in·lb	
2	Ignition Coil Mounting Bolts	5.5	0.55	48 in·lb	
3	Igniter Mounting Bolts	2.3	0.23	20 in·lb	
4	Oil Pressure Switch	15	1.5	11	SS
5	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	
6	Neutral Position Switch	15	1.5	11	
7	Reverse Position Switch	15	1.5	11	
8	Fuel Pump Mounting Bolts	2.0	0.20	17 in·lb	
9	Regulator/Rectifier Bolts	8.8	0.90	78 in·lb	

10. Vehicle Down Sensor

G: Apply grease for oil seal and O-ring.

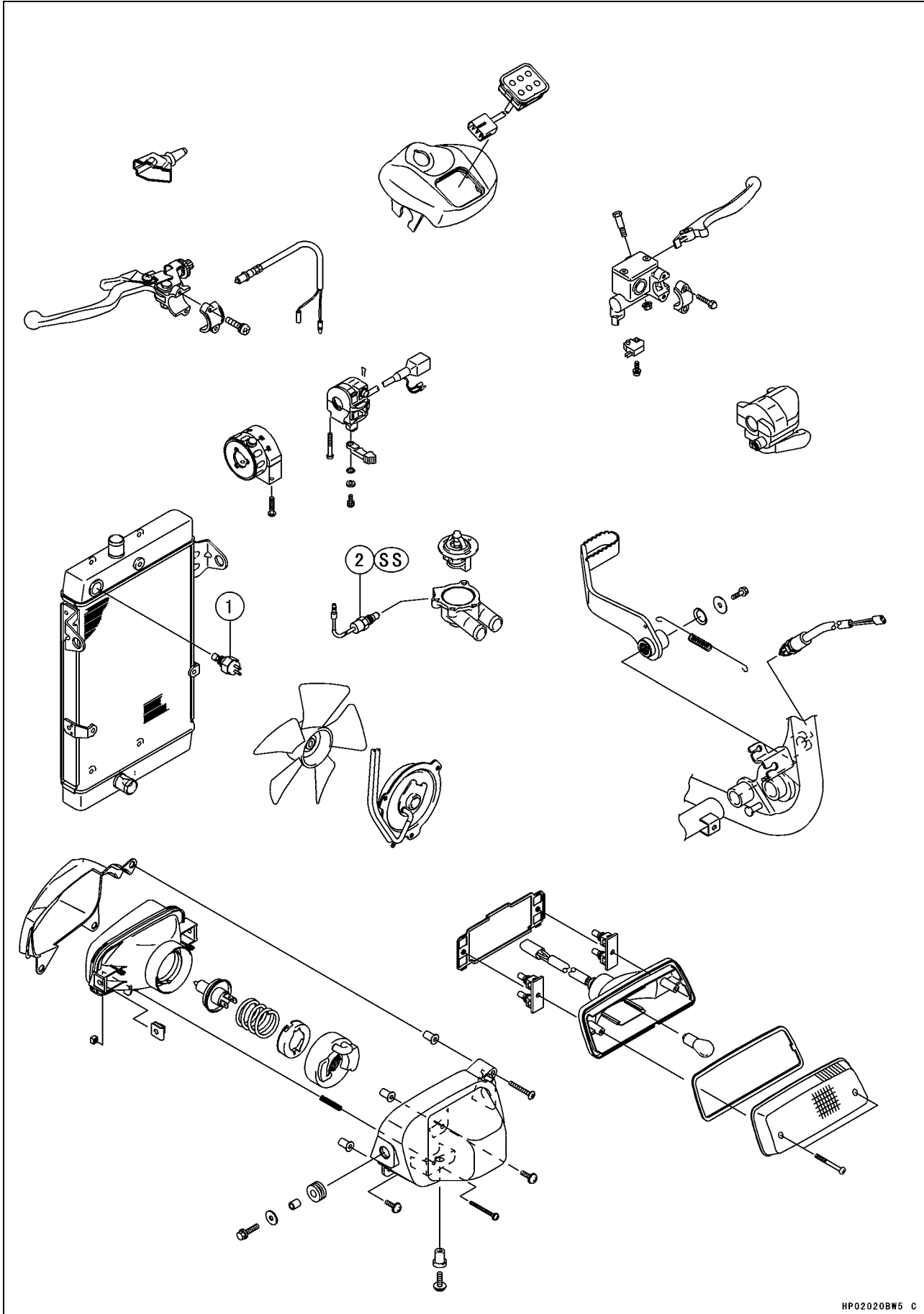
L: Apply a non-permanent locking agent.

S: Follow the specific tightening sequence.

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

16-8 ELECTRICAL SYSTEM

Exploded View



ELECTRICAL SYSTEM 16-9

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Radiator Fan Switch	18	1.8	13	
2	Coolant Temperature Warning Light Switch	6.9	0.70	61 in·lb	SS

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

16-10 ELECTRICAL SYSTEM

Specifications

Item	Standard	Service Limit
Battery:		
Type	Sealed Battery	---
Capacity	12 V 12 Ah	---
Charging System:		
Alternator type	Three-phase AC	---
Charging voltage (Regulator/rectifier output voltage)	14 ~ 15 V	---
Alternator output voltage	36 ~ 54 V 3 000 r/min (rpm)	---
Stator coil resistance	0.33 ~ 0.49 Ω	---
Ignition System:		
Spark plug:		
Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	---
Spark plug cap resistance	3.75 ~ 6.25 k Ω	---
Ignition coil:		
3 needle arcing distance	7 mm (0.28 in.) or more	---
Primary winding resistance	0.09 ~ 0.13 Ω	---
Secondary winding resistance	3.8 ~ 5.8 k Ω	---
Primary peak voltage	50 V or more	---
Crankshaft sensor resistance	110 ~ 140 Ω	---
Crankshaft sensor peak voltage	1.8 V or more	---
Vehicle-down Sensor		
Detection method	Magnetic flux detection method	---
Detection angle	More than 65° \pm 5° for each bank	---
Detection time	Within 0.5 ~ 1.0 sec.	---
Output voltage	in the text	---
Electric Starter System:		
Starter motor:		
Commutator diameter	28 mm (1.10 in.)	27 mm (1.06 in.)
Brush length	12 mm (0.47 in.)	4 mm (0.16 in.)
Fuel Pump:		
Fuel pump pressure	17.7 ~ 22.6 kPa (0.18 ~ 0.23 kgf/cm ² , 2.6 ~ 3.3 psi)	---
Switches:		
Brake light switch timing	ON after 10 mm (0.4 in.) of pedal travel	---
Radiator fan switch resistance: Rising temperature	From OFF to ON at 96 ~ 100°C (205 ~ 212°F)	---

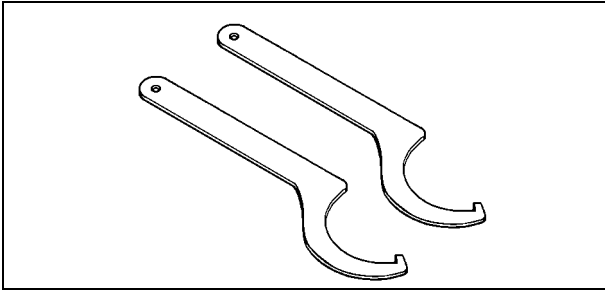
Specifications

Item	Standard	Service Limit
Falling temperature	From ON to OFF at 91 ~ 95°C (196 ~ 203°F) ON: Less than 0.5 Ω OFF: More than 1 MΩ	- - -
Coolant temperature warning light switch resistance:		
Rising temperature	From OFF to ON at 112 ~ 118°C (234 ~ 244°F)	- - -
Falling temperature	From ON to OFF at 108 ~ 111°C (226 ~ 232°F) ON: less than 0.5 Ω OFF: More than 1 MΩ	- - -

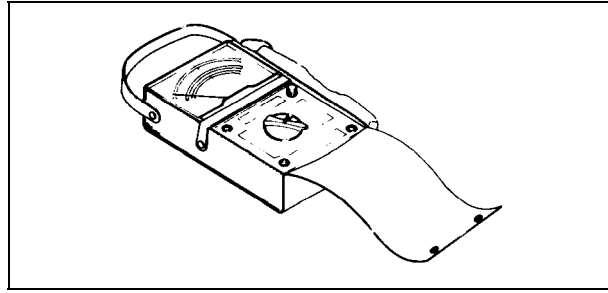
16-12 ELECTRICAL SYSTEM

Special Tools

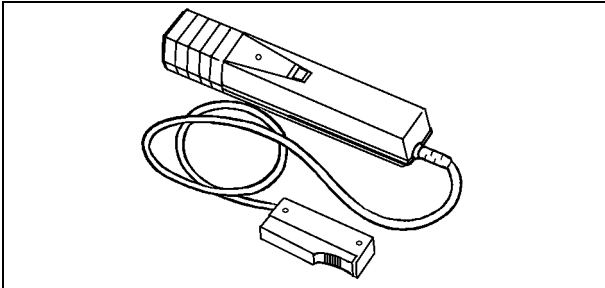
Hook Wrench :
57001-1101



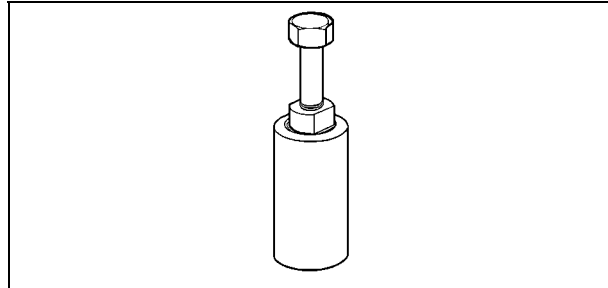
Hand Tester :
57001-1394



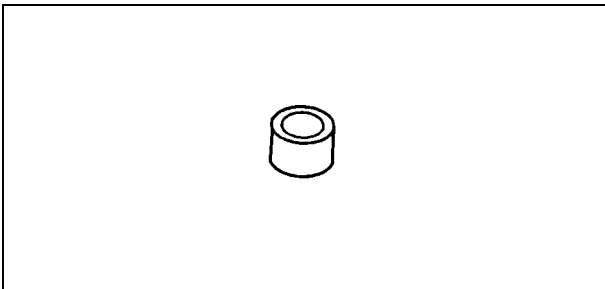
Timing Light :
57001-1241



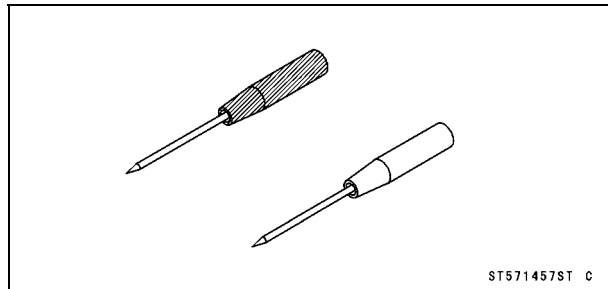
Flywheel Puller Assembly :
57001-1405



Compression Gauge Gasket :
57001-1314



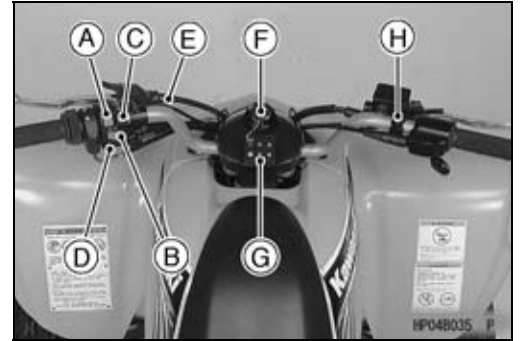
Needle Adapter Set :
57001-1457



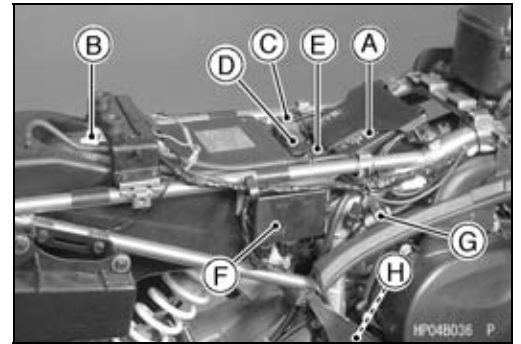
ST571457ST C

Parts Location

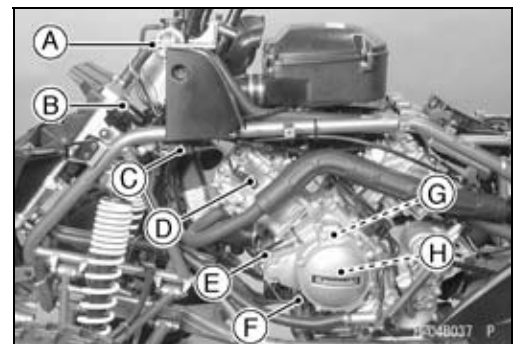
- Light/Dimmer Switch [A]
- Engine Stop Switch [B]
- Starter Button [C]
- Reverse Power Assist Switch (Override) [D]
- Rear Brake Light Switch [E]
- Ignition Switch [F]
- Indicator Unit [G]
- Front Brake Light Switch [H]



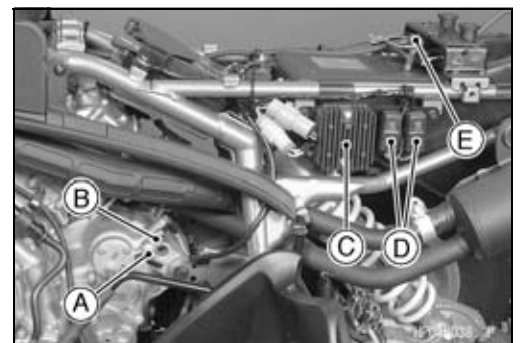
- Battery [A]
- Fuel Pump, Fuel Reserve Switch [B] (in fuel tank)
- Main Fuse 30 A [C]
- Starter Relay [D]
- Vehicle Down Sensor [E]
- Igniter [F]
- Ignition Coil (Rear) [G]
- Rear Brake Light Switch [H]



- Water Temperature Switch [A]
- Radiator Fan Switch [B]
- Ignition Coil (Front) [C]
- Spark Plug [D]
- Starter Motor [E]
- Oil Pressure Warning Light Switch [F]
- Crankshaft Sensor [G]
- Alternator [H]



- Reverse Position Switch [A]
- Neutral Position Switch [B]
- Regulator/Rectifier [C]
- Starter Circuit Relays [D]
- Radiator Fan Fuse [E]



16-14 ELECTRICAL SYSTEM

Precautions

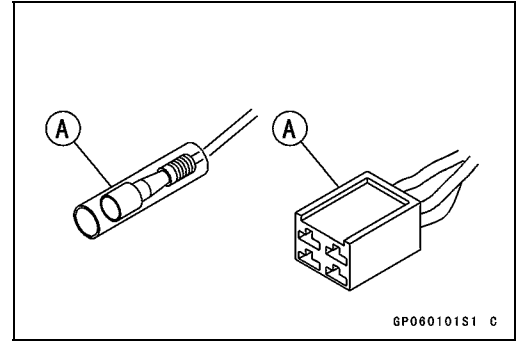
There are a number of important precautions that should be taken when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is required 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 damaging electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the high current, never keep the starter button depressed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Only use an illumination bulb rated for the voltage or wattage specified in the wiring diagram, or the handle cover could be warped by excessive heat radiated from the bulb.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Defective wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).
- Color Codes:

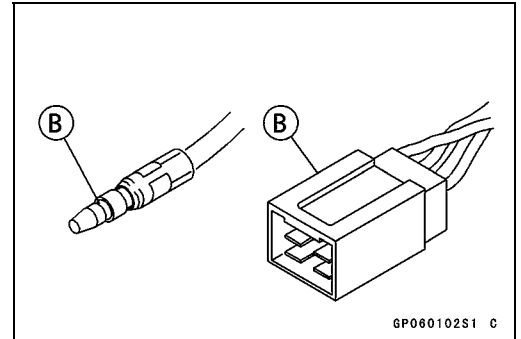
BK	Black	G	Green	P	Pink
BL	Blue	GY	Gray	PU	Purple
BR	Brown	LB	Light blue	R	Red
CH	Chocolate	LG	Light green	W	White
DG	Dark green	O	Orange	Y	Yellow

Precautions

○ Electrical Connectors:
Female Connectors [A]



Male Connectors [B]



16-16 ELECTRICAL SYSTEM

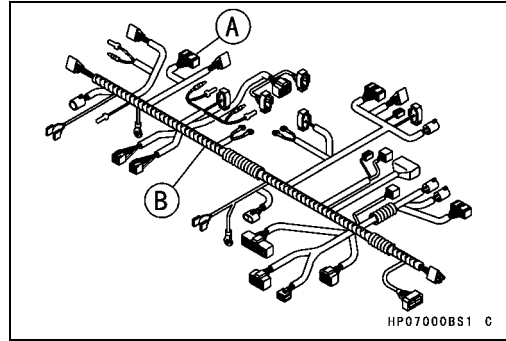
Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is defective, replace the damaged wiring.
- Pull each connector [A] apart and inspect 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 the hand tester between the ends of the leads.

Special Tool - Hand Tester: 57001-1394

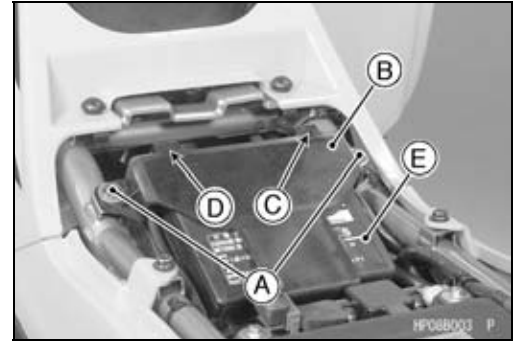
- Set the tester to the $x 1 \Omega$ range.
- ★ If the tester does not read 0Ω , the lead is defective. Replace the lead or the wiring harness [B] if necessary.



Battery

Battery Removal

- Turn off the ignition switch.
- Remove the seat (see Frame chapter)
- Loosen the bolts [A] of the battery holder [B].
- Remove the battery with the holder and the case.
- Disconnect the battery negative (–) cable [C] first, and then the positive (+) cable [D].
- Take out the battery [E].



Battery Installation

- Turn off the ignition switch.
- Put the battery with the case and the holder in place.
- Connect the positive cable first and then the negative cable.
- Put a light coat of grease on the terminals to prevent corrosion.
- Tighten the battery holder bolts.

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 : KMX 14-BS

CAUTION

Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type. This is to prevent overfilling of the electrolyte, shorting the battery life, and deterioration of the battery performance.

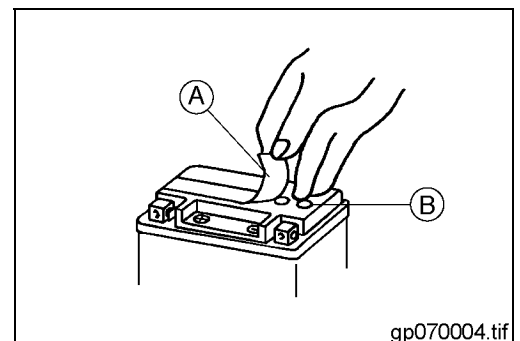
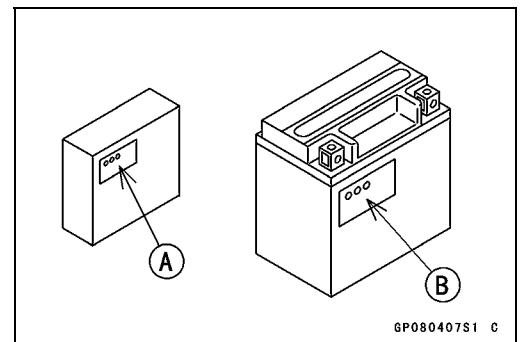
- Check to see that there is no peeling, tears or holes in the seal sheet on the top of the battery.
- Place the battery on a level surface.
- Remove the seal sheet.

CAUTION

Do not remove the aluminum seal sheet [A] sealing the filler ports [B] until just before use.

NOTE

- A battery whose seal sheet has any peeling, tears, holes, or from which the air-sucking sound was not heard requires a refreshing charge (initial charge).



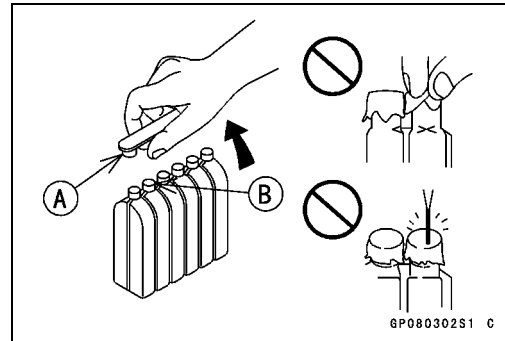
16-18 ELECTRICAL SYSTEM

Battery

- Take the electrolyte container out of the vinyl bag.
- Detach the seal caps [A] from the container.

NOTE

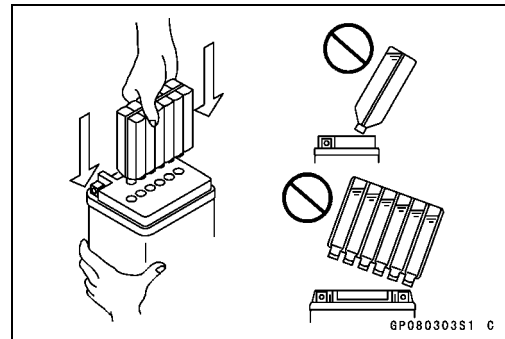
- Do not discard the seal caps because it is used as the battery plugs later.
- Do not peel back or pierce the seals [B] on the container.



- Place the electrolyte container upside down aligning the six seals with the six battery filler ports.
- Push the container down strongly enough to break the seals. Now the electrolyte should start to flow into the battery.

NOTE

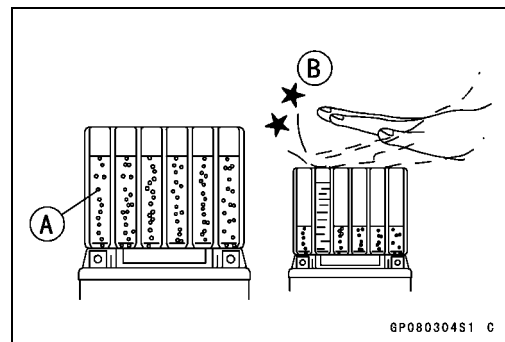
- Do not tilt the container as the electrolyte flow may be interrupted.



- Make sure air bubbles [A] are coming up from all six filler ports.
- Leave the container this way for 5 minutes or longer.

NOTE

- If no air bubbles are coming up from a filler port, tap [B] the bottom of the bottle two or three times. Never remove the container from the battery.



CAUTION

Fill the electrolyte into the battery until the container is completely emptied.

- Be certain that all the electrolyte has flowed out.
- Tap the bottom the same way as above if there is any electrolyte left in the container.
- Now pull the container gently out of the battery.
- Let the battery sit for **20** minutes. During this time, the electrolyte permeates the special separators and the gas generated by chemical reaction is released.

Battery

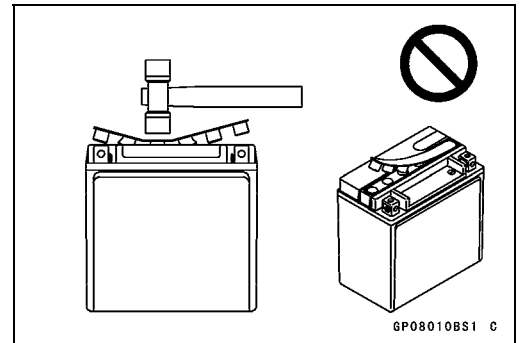
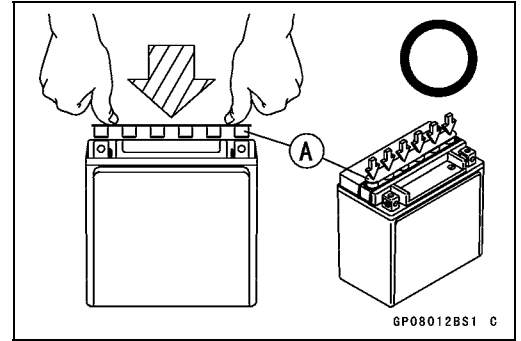
- Fit the seal caps [A] tightly into the filler ports until the seal caps are at the same level as the top of the battery.

NOTE

○ Do not hammer. Press down evenly with both hands.

CAUTION

Once you installed the seal caps after filling the battery, never remove it, nor add any water or electrolyte.



Initial Charge

While an sealed battery can be used after only filling with electrolyte, a battery may not be able to sufficiently move a starter motor to start an engine in the cases shown in the table below, where an initial charge is required before use. However, if a battery shows a terminal voltage of higher than 12.6 V after 10 minutes of filling (Note 1), no initial charge is necessary.

Condition requiring initial charge	Charging method
At low temperatures (lower than 0°C)	1.4 A x 2 ~ 3 hours
Battery has been stored in high temperature and humidity.	1.4 A x 15 ~ 20 hours
Seal has been removed, or broken - peeling, tear or hole. (If you did not hear the air-sucking sound "Shoosh" as you removed the seal.)	
Battery as old as 2 years or more after manufacture. Battery manufacturing date is printed on battery top.	
Example) <u>12</u> <u>10</u> <u>99</u> <u>T1</u> Day Month Year Mfg. location	

Note 1 : Terminal voltage — To measure battery terminal voltage, use a digital voltmeter.

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 sealing plug 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.

16-20 ELECTRICAL SYSTEM

Battery

CAUTION

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above.

Never remove the seal caps during refresh charge.

If by chance an excessive amount of gas is generated due to overcharging, the safety valve operates to keep the battery safe.

- 3) When you do not use the motorcycle for months

Give a refresh charge before you store the motorcycle and store it with the negative lead removed. Give a refresh charge once a month during storage.

- 4) Battery life

If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it. (Provided, however, the vehicle's starting system has no problem.)

WARNING

Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.

No fire should be drawn near the battery, or no terminals should have the tightening loosened.

The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water. Get medical attention if severe.

Interchange

A sealed battery can fully display its performance only when combined with a proper vehicle electrical system. Therefore, replace a sealed battery only on a vehicle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a vehicle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

Battery

Charging Condition Inspection

Battery charging condition can be checked by measuring battery terminal voltage.

- Remove the battery (see Battery Removal).

CAUTION

Be sure to disconnect the negative (-) lead first.

- Measure the battery terminal voltage.

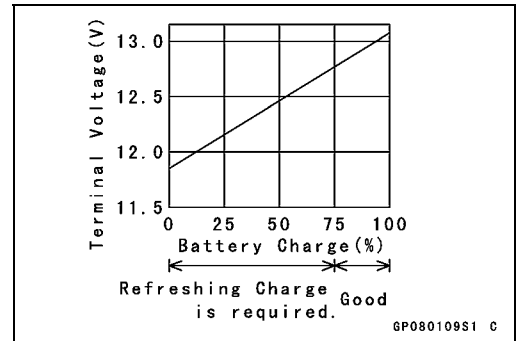
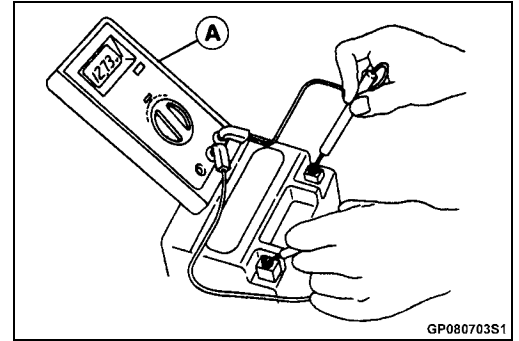
NOTE

○ Measure with a digital voltmeter [A] which can be read to one decimal place voltage.

- ★ If the reading is below the specified, refreshing charge is required.

Battery Terminal Voltage

Standard: 12.6 V or more

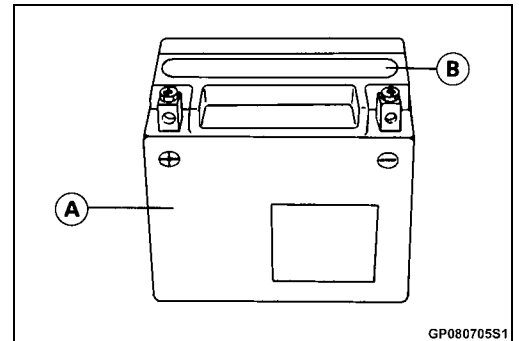


Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Refresh-charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove seal sheet [B] even at charging. Never add water. Charge with current and time as stated below.



Terminal Voltage: 11.5 ~ less than 12.5 V

Standard Charge

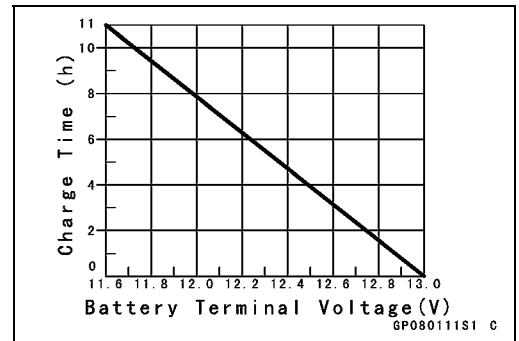
1.4 A x 5 ~ 10 h (see following chart)

Quick Charge

6.0 A x 1.0 h

CAUTION

If possible, do not quick charge. If the quick charge is done due to unavoidable circumstances, do the standard charge later on.



Terminal Voltage : less than 11.5 V

Charging Method: 1.4 A x 20 h

16-22 ELECTRICAL SYSTEM

Battery

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 [D], 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.

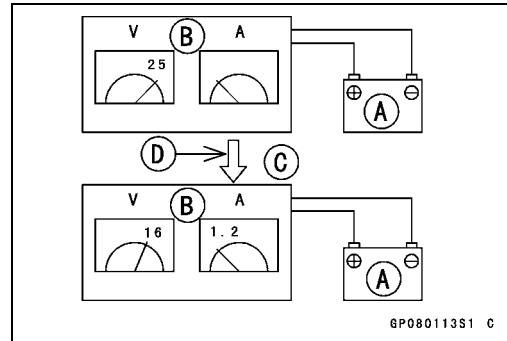
Battery [A]

Battery Charger [B]

Standard Value [C]

- Determine battery condition after refreshing charge.
- Determine the condition of the battery 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

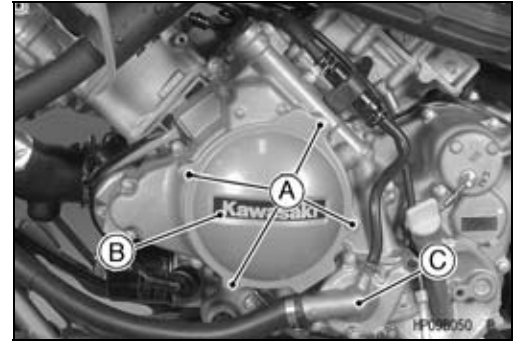
Criteria	Judgement
12.6 V or higher	Good
12.0 ~ 12.5 V or lower	Charge insufficient → Recharge
12.0 V or lower	Unserviceable → Replace



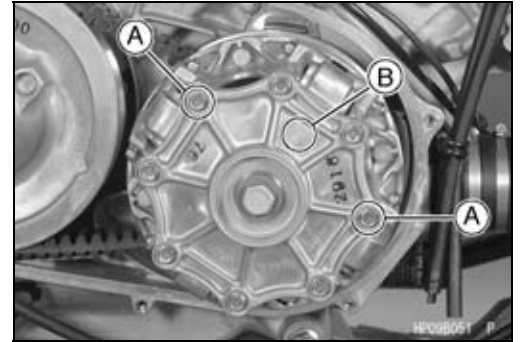
Charging System

Alternator Cover Removal

- Drain the coolant (see Cooling System chapter).
- Remove:
 - Bolts [A] and Alternator Bolt Cover [B]
 - Water Pump Cover [C] and Impeller (see Cooling System chapter)



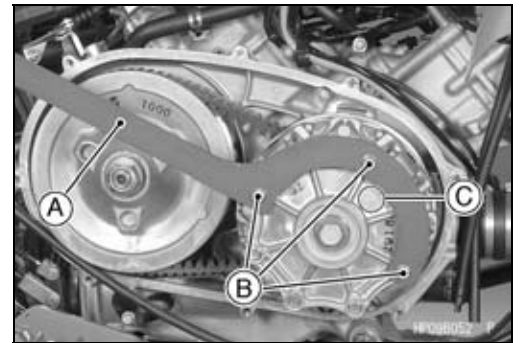
- Remove:
 - Torque Converter Cover (see Converter System chapter)
- Remove the three bolts of the drive pulley cover, except for at the dowel pin parts [A] as shown.
 - [B] Arrow



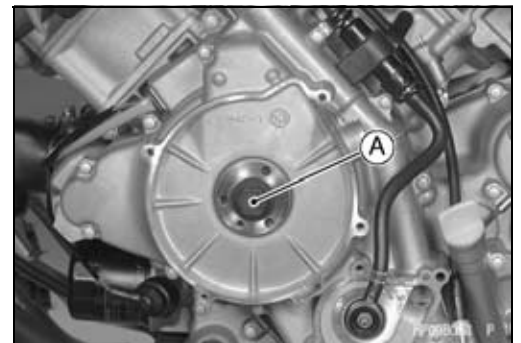
- Install and tighten the drive pulley holder [A] and the three bolts [B].

Special Tool - Drive Pulley Holder: 57001-1520

[C] Arrow



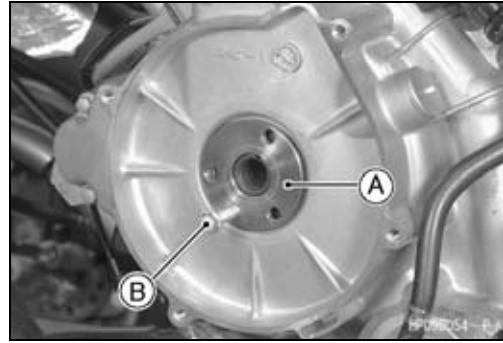
- Holding the drive pulley with the drive pulley holder, loosen the alternator rotor bolt [A].
- Remove:
 - Alternator Rotor Bolt



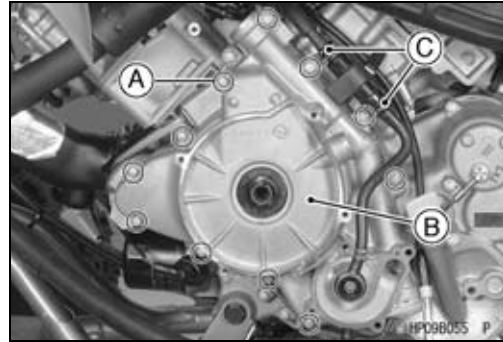
16-24 ELECTRICAL SYSTEM

Charging System

- Remove:
 - Collar [A]
- Install the M6 bolt [B] to the collar, and remove it.

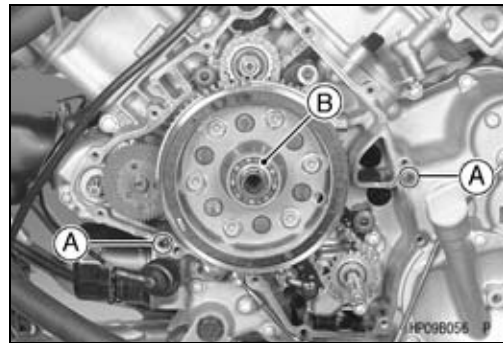


- Place an oil pan under the engine left side.
- Remove:
 - Alternator and Crankshaft Sensor Lead Connectors (disconnect)
 - Alternator Cover Bolts [A]
 - Alternator Cover [B]
 - Clamp [C]

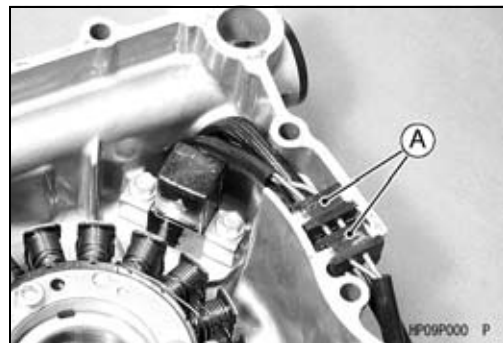


Alternator Cover Installation

- Be sure all of the old gasket has been removed from the alternator cover and the left crankcase sealing surfaces.
- Check that the dowel pins [A] are in place, and fit a new gasket on the crankcase.
- Check that the bearing [B] is in place.

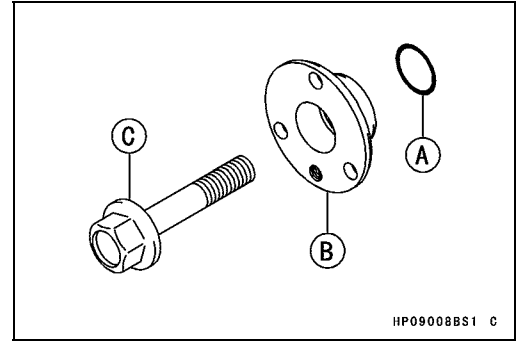


- Fit the grommets [A] into the notch in the cover.
- Grease the alternator cover oil seal.
- Tighten
 - Torque - Alternator Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

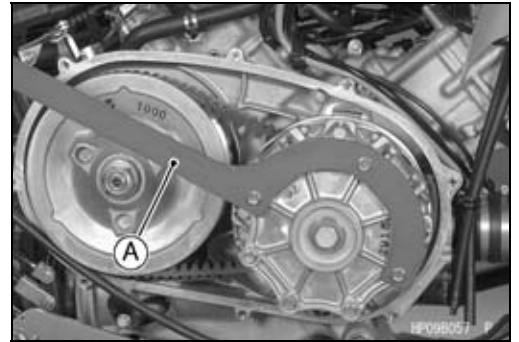


Charging System

- Check that the O-ring [A] in the collar [B] is in good condition.
- Apply grease to the O-ring.
- Install the collar on the alternator cover.
- Install the alternator rotor bolt [C].

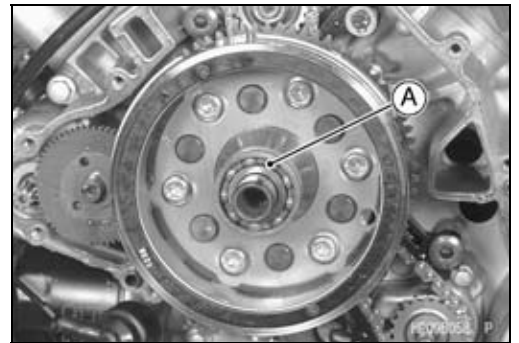


- Hold the drive pulley with the drive pulley holder [A].
Special Tool - Drive Pulley Holder: 57001-1520
- Tighten:
Torque - Alternator Rotor Bolt: 127 N·m (13 kgf·m, 94 ft·lb)
Alternator Bolt Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
- Add engine oil.

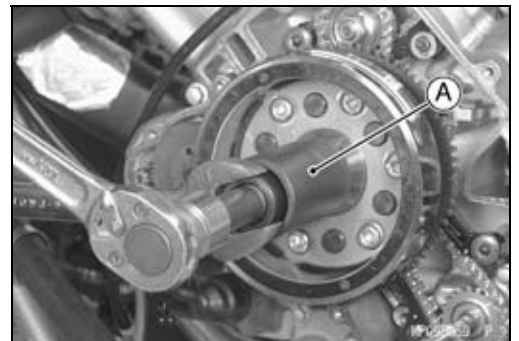


Alternator Rotor Removal

- Remove:
Alternator Cover (see Alternator Cover Removal)
Ball Bearing [A]



- Thread the flywheel puller [A] onto the alternator rotor.
Special Tool - Flywheel Puller: 57001-1405
- Holding the flywheel puller, turn the rotor puller until the alternator rotor is forced off the end of the crankshaft.



CAUTION

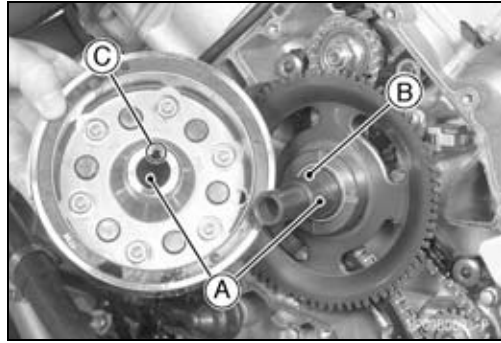
If the rotor is difficult to remove, turn the puller while tapping the end of the puller. Do not strike the alternator rotor. Striking the rotor can cause the magnets to lose magnetism.

16-26 ELECTRICAL SYSTEM

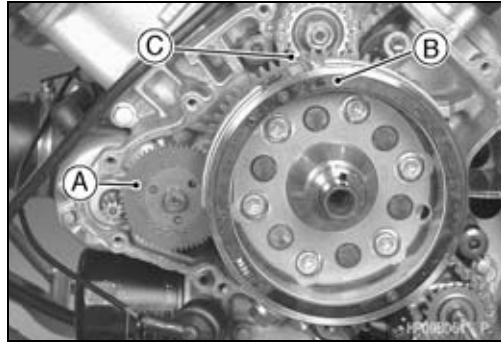
Charging System

Alternator Rotor Installation

- Clean [A] the inside of the rotor and the end of the crankshaft.
- Fit the rotor onto the crankshaft so that woodruff key [B] fits in the groove [C] in the hub of the rotor.

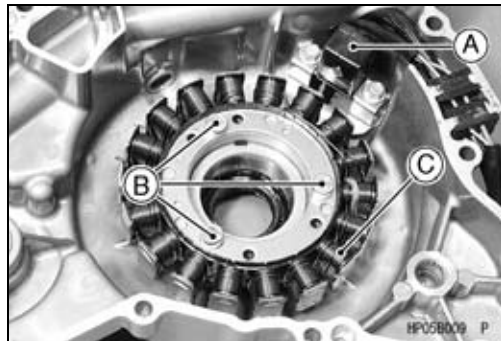


- Install the torque limiter [A].
- Install the alternator rotor [B] while turning the starter clutch gear [C].



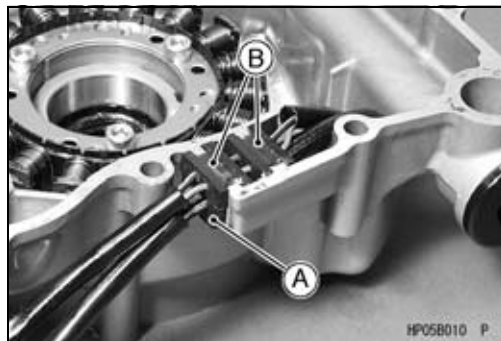
Alternator Stator Removal

- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Crankshaft Sensor [A] (see Crankshaft Sensor Removal)
 - Bolts [B] and Alternator Stator [C]



Alternator Stator Installation

- Tighten:
 - Torque - Alternator Stator Bolts: 13 N·m (1.3 kgf·m, 113 in·lb)**
- Install:
 - Crankshaft Sensor (see Crankshaft Sensor Installation)
- Fit the lead grommets into the notch on the alternator cover.
 - Grommets [A] for Alternator Leads
 - Grommets [B] for Crankshaft Sensor Leads



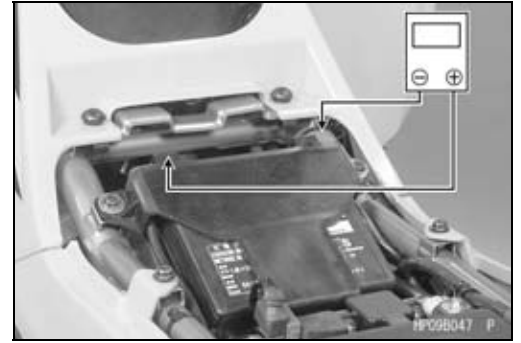
Charging System

Regulator/Rectifier Output Voltage Inspection

- Remove the seat (see Frame chapter).
- Check the battery condition (see Battery section).
- Warm up the engine to obtain actual alternator operating conditions.
- Check that the ignition switch is turned off, and connect a hand tester to the battery terminals.

Special Tool - Hand Tester : 57001-1394

- Start the engine and note the voltage readings at various engine speeds with the headlight turned on and then off. The readings should show nearly battery voltage when the engine speed is low, and as the engine speed increases, the readings should also increase.



Regulator/Rectifier Output Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
25 V DC	Battery (+)	Battery (-)	14 ~ 15 V

- Turn off the ignition switch, and disconnect the hand tester.
- ★ If the regulator/rectifier output voltage is between the values given in the table, the charging system is working normally.
- ★ If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the battery voltage does not increase 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.

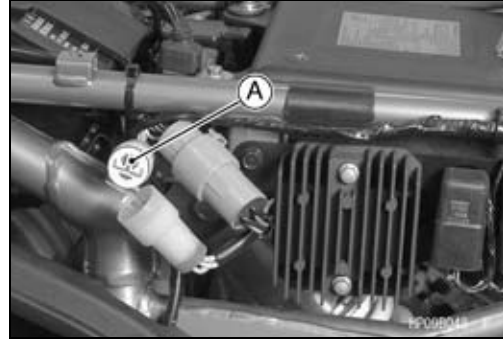
16-28 ELECTRICAL SYSTEM

Charging System

Alternator Inspection

There are three types of alternator failures: short, open, or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

- To check the alternator output voltage, perform the following procedures.
 - Remove the rear fender (see Frame chapter).
 - Disconnect the alternator connector [A].
 - Connect a hand tester as shown in the table.
 - Start the engine.
 - Run it at the rpm given in the table.
 - Note the voltage readings (total 3 measurements).



Alternator Output Voltage

Tester Range	Connections		Reading @3 000rpm
	Tester (+) to	Tester (-) to	
250 V AC	One yellow lead	Another yellow lead	36 ~ 54 V

★ If the output voltage is within the values in the table, the alternator is operating correctly, and the regulator/rectifier is damaged. A much lower reading indicates that the alternator is defective.

- Check the stator coil resistance as follows:
 - Stop the engine.
 - Disconnect the alternator connector.
 - Connect a hand tester as shown in the table.
 - Note the readings (total 3 measurement).

Stator Coil Resistance

Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
x 1 Ω	One yellow lead	Another yellow lead	0.33 ~ 0.49 Ω

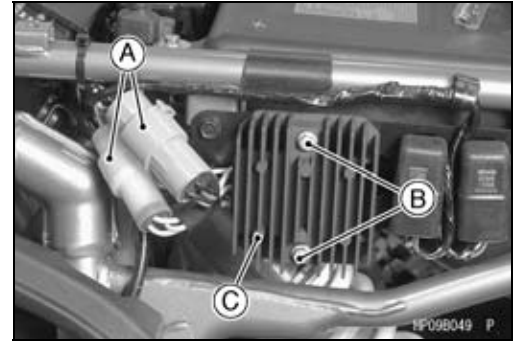
- ★ If there is more resistance than shown in the table, or no reading (infinity) for any two leads, the stator has an open and must be replaced. Much less resistance means the stator is shorted and must be replaced.
- Using the highest resistance range of the hand tester, measure the resistance between each of the black leads and chassis ground.
- ★ Any reading less than infinity (∞) indicates a short, necessitating stator replacement.
- ★ If the stator coils have normal resistance, but the voltage check shows the alternator to be defective; then the rotor magnetism has probably weakened, and the rotor must be replaced.

Special Tool - Hand Tester : 57001-1394

Charging System

Regulator/Rectifier Inspection

- Remove:
 - Connectors [A] (disconnect)
 - Bolts [B] and Regulator/Rectifier [C]



Rectifier Circuit Check:

- Check conductivity of the following pair of terminals.

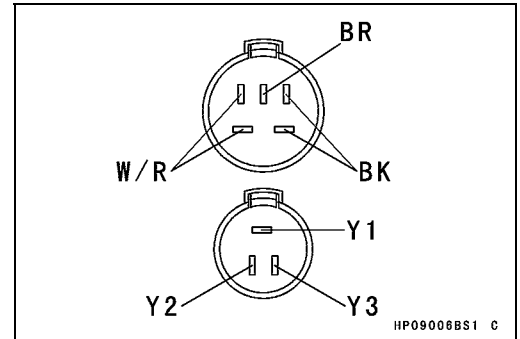
Rectifier Circuit Inspection

Tester connection	W/R-Y1,	W/R-Y2,	W/R-Y3
	BK-Y1,	BK-Y2,	BK-Y3

- ★ The resistance should be low in one direction and more than ten times as much in the other direction. If any two leads are low or high in both directions, the rectifier is defective and must be replaced.

NOTE

- The actual meter reading varies with the meter and the individual rectifier. Generally speaking the lower reading should be from zero to one half of the scale.



Regulator Circuit Check:

To test the regulator out of circuit, use three 12 V batteries and a test light (12 V 3 ~ 6 W bulb in a socket with leads).

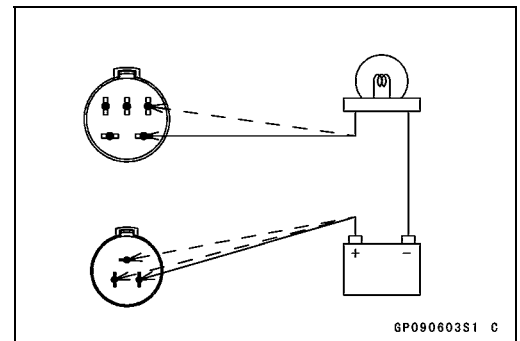
CAUTION

The test light works as an indicator and also a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

- Check to be sure the rectifier circuit is correct before continuing.

Regulator Circuit Test-1st Step:

- Connect the test light and the 12 V battery to the regulator/rectifier as shown.
- Check Y1, Y2, and Y3 terminal respectively.
- ★ If the test light turns on, the regulator/rectifier is defective.
- ★ If the test light does not turn on, continue the test.

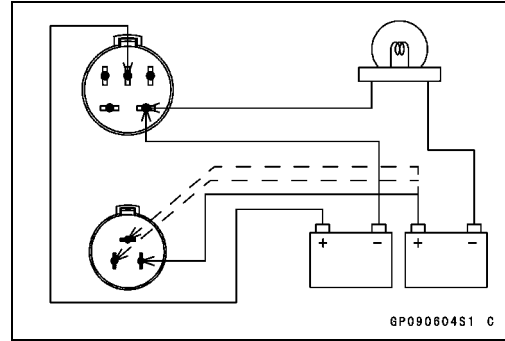


16-30 ELECTRICAL SYSTEM

Charging System

Regulator Circuit Test-2nd Step:

- Connect the test light and a 12 V battery in the same manner as specified in the "Regulator Circuit Test-1st Step".
- Apply 12 V to the BR terminal.
- Check Y1, Y2, and Y3 terminals.
- ★ If the test light turns on, the regulator/rectifier is defective.
- ★ If the test light does not turn on, continue the test.



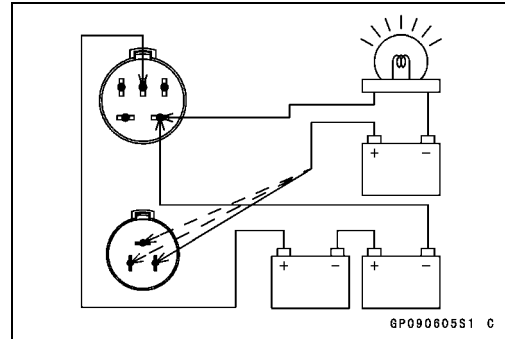
Regulator Circuit Test-3rd Step:

- Connect the test light and a 12 V battery in the same manner as specified in the "Regulator Circuit Test-1st Step".
- Momentarily apply 24 V to the BR terminal by adding a 12 V battery.
- Check Y1, Y2, and Y3 terminals.

CAUTION

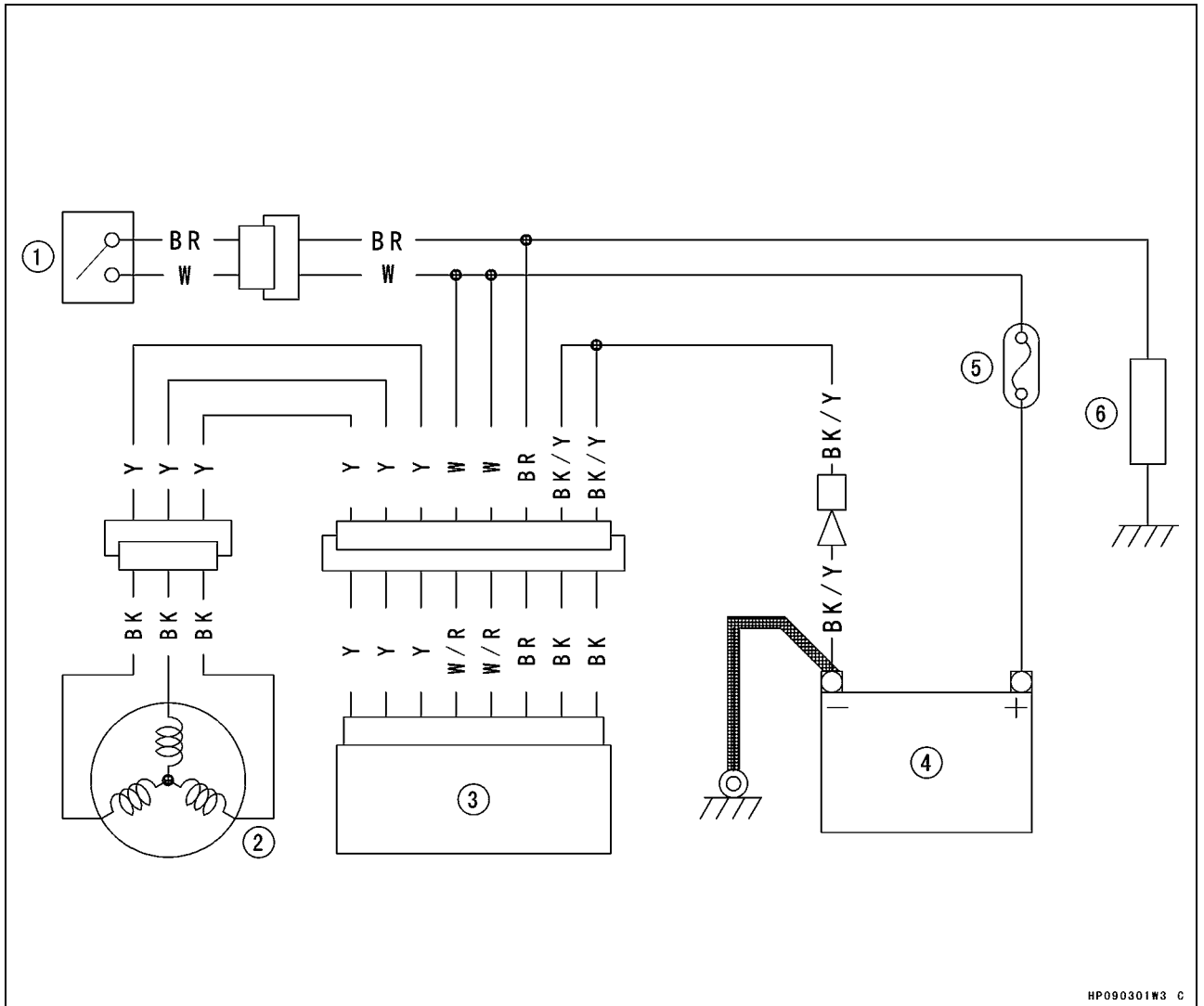
Do not apply more than 24 V to the regulator/rectifier. Do not leave the 24 V applied for more than a few seconds, or the unit will be damaged.

- ★ If the test light did not light when the 24 V was applied momentarily to the BR terminal, the regulator/rectifier is defective.
- ★ If the regulator/rectifier passes all of the tests described, it may still be defective. If the charging system still does not work properly after checking all of the components and the battery, test the regulator/rectifier by replacing it with a known good unit.



Charging System

Charging System Circuit



1. Ignition Switch
2. Alternator

3. Regulator/Rectifier
4. Battery

5. Main Fuse 30 A
6. Load

16-32 ELECTRICAL SYSTEM

Ignition System

⚠ WARNING

The ignition system produces extremely high voltage.

Do not touch the spark plug, ignition coil, or spark plug lead while the engine is running, or you could receive a severe electrical shock.

CAUTION

Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent igniter damage.

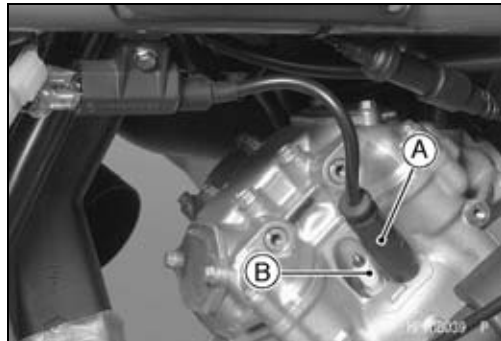
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and igniter.

Use the standard regulator/rectifier, or the igniter will be damaged.

Spark Plug Removal

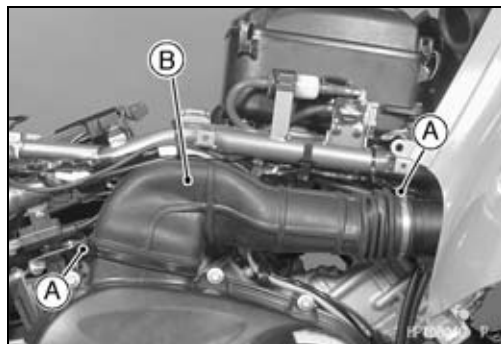
Front Side:

- Remove:
 - Spark Plug Cap [A]
 - Spark Plug [B]



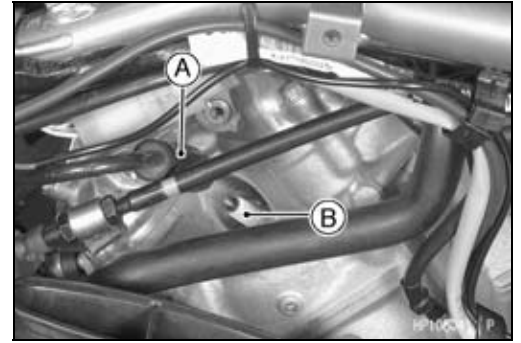
Rear Side:

- Remove:
 - Rear Fender (see Frame chapter)
 - Air Cleaner Cover (see Frame chapter)
 - Inner Side Cover (see Frame chapter)
 - Clamp Screws [A] and Clamps
 - Converter Exhaust Joint Duct [B]



Ignition System

- Remove:
 - Spark Plug Cap [A]
 - Spark Plug [B]



Spark Plug Installation

- Tighten:
 - Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 113 in·lb)**
- Fit the spark plug caps securely.
- Pull up the spark plug caps lightly to make sure of the installation of the spark plug caps.

Spark Plug Cleaning/Inspection

- Refer to the Spark Plug Inspection in the Periodic Maintenance chapter.

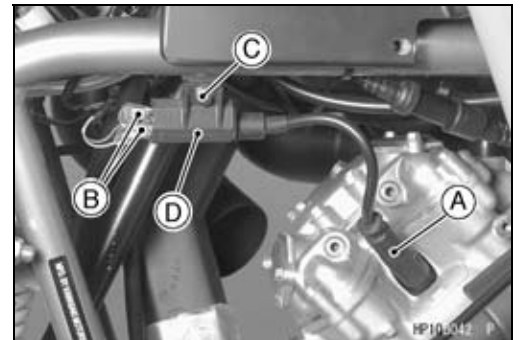
Spark Plug Gap Inspection

- Refer to the Spark Plug Inspection in the Periodic Maintenance chapter.

Ignition Coil Removal

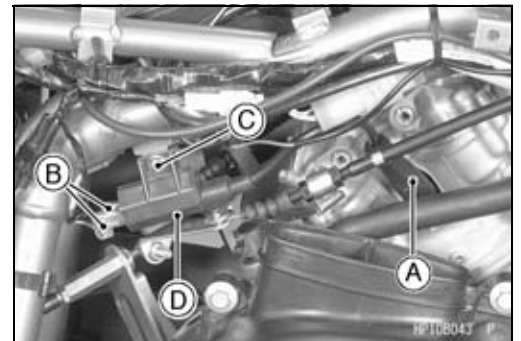
Front Side:

- Remove:
 - Spark Plug Cap [A]
 - Primary Lead Connectors [B]
 - Bolt [C]
 - Ignition Coil [D]



Rear Side:

- Remove:
 - Rear Fender (see Frame chapter)
 - Air Cleaner Cover (see Frame chapter)
 - Inner Side Cover (see Frame chapter)
 - Converter Exhaust Joint Duct (see Spark Plug Removal (Rear Side))
 - Spark Plug Cap [A]
 - Primary Lead Connectors [B]
 - Bolt [C]
 - Ignition Coil [D]



16-34 ELECTRICAL SYSTEM

Ignition System

Ignition Coil Installation

- Connect the primary leads to the ignition coil terminals as shown.

Front Side:

- G/W Lead → (+) Mark [A]
- BK/Y Lead → (-) Mark

Rear Side:

- BL/W Lead → (+) Mark [A]
- BK/Y Lead → (-) Mark

Ignition Coil Inspection

- Remove the ignition coil.
- Measure the arcing distance with a coil tester [A] to check the condition of the ignition coil [B].
- Connect the ignition coil (with the spark plug cap left attached at the end of the spark plug lead) to the tester in the manner prescribed by the manufacturer and measure the arcing distance.

Ignition Coil Arcing Distance

7 mm or more

⚠ WARNING

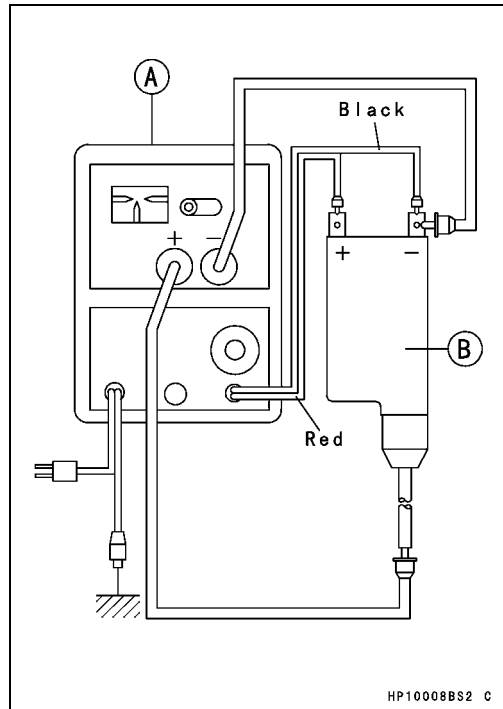
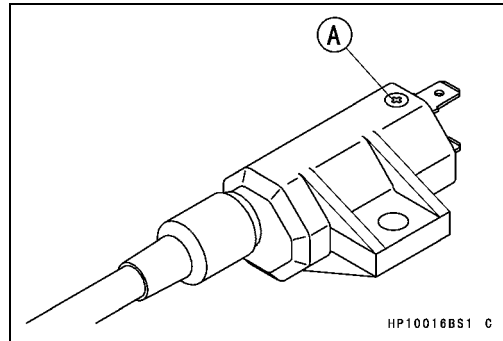
To avoid extremely high voltage shocks, do not touch the ignition coil body or leads.

- ★ If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.
- To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil. Remove the cap by turning it counterclockwise.
- ★ If the arcing distance is as before, the trouble is with the ignition coil. If the arcing distance is normal, the trouble is with the spark plug cap.
- ★ If a coil tester is not available, the coil can be checked for a broken or badly shorted winding with a hand tester.

Special Tool - Hand Tester : 57001-1394

NOTE

- The hand tester cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.



Ignition System

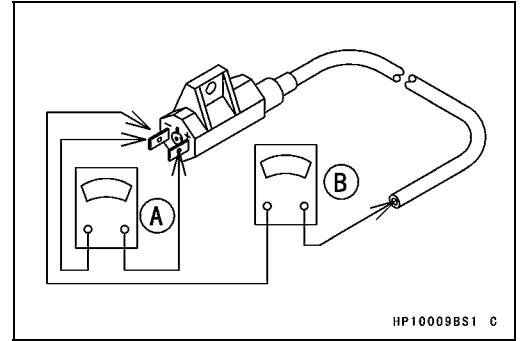
- Measure the primary winding resistance [A] as follows:
 - Connect the tester between the coil terminals.
 - Set the tester to the x 1 Ω range.
- Measure the secondary winding resistance [B] as follows:
 - Remove the plug cap by turning it counterclockwise.
 - Connect the tester between the spark plug lead and terminal.
 - Set the tester to the x 1 k Ω range.

Ignition Coil Winding Resistance

Primary windings : 0.09 ~ 0.13 Ω

Secondary windings : 3.8 ~ 5.8 k Ω

- ★ If the hand tester does not read as specified, replace the coil.
- To install the plug cap, turn it clockwise.



16-36 ELECTRICAL SYSTEM

Ignition System

Ignition Coil Primary Peak Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

- Remove the spark plug cap (see Spark Plug Removal), but do not remove the spark plug.
- Measure the primary peak voltage as follows.
- Connect a commercially peak voltage adapter [A] to the hand tester [B] (250 V DC range). Install the needle adapters [C] on the peak voltage adapter leads.

Special Tools - Hand Tester: 57001-1394

Needle Adapter Set: 57001-1457

Recommended Tool - Peak Voltage Adapter

Type: KEK-54-9-B

Brand: KOWA SEIKI

- Insert the needle adapter inside the seal of the G/W (front) or BL/W (rear) lead in the ignition coil [D] until the needle reaches the terminal in the ignition coil.
- Install a new spark plug [E] into the spark plug cap, and ground it to the engine.

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch ON, rotate the engine for 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
- Repeat the measurements 5 times for one ignition coil.

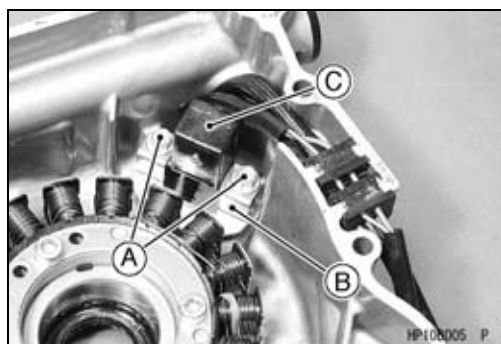
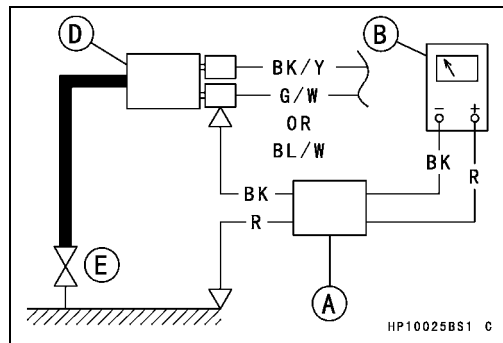
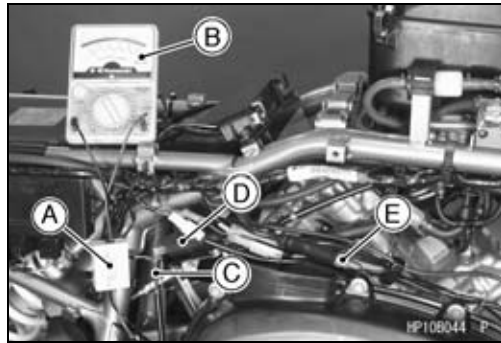
Ignition Coil Primary Peak Voltage

Standard: 50 V or more

- Repeat the test for the other ignition coil.
- ★ If the reading is less than the specified value, check the following.
 - Ignition Coils (see Ignition Coil Inspection)
 - Crankshaft Sensor (see Crankshaft Sensor Inspection)
- ★ If the ignition coils and crankshaft sensor are normal, see the Ignition System Troubleshooting chart.

Crankshaft Sensor Removal

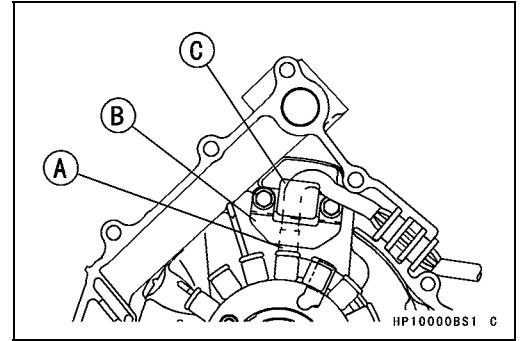
- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Crankshaft Sensor Mounting Bolts [A]
 - Plate [B]
 - Crankshaft Sensor [C]



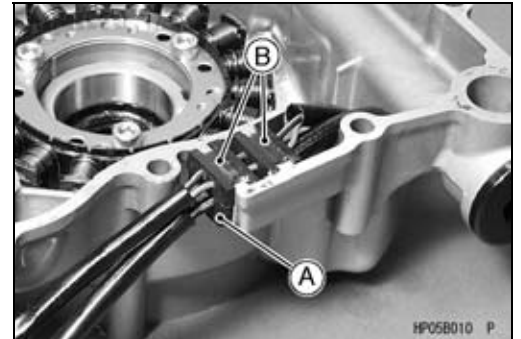
Ignition System

Crankshaft Sensor Installation

- Install:
 - Stator Coil Leads [A]
 - Plate [B]
 - Crankshaft Sensor [C]
- Tighten:
 - Torque - Crankshaft Sensor Mounting Bolts: 5.9 N·m (0.6 kgf·m, 52 in·lb)**



- Fit the lead grommets into the notch on the alternator cover.
 - Grommets [A] for Alternator Leads
 - Grommets [B] for Crankshaft Sensor Leads



Crankshaft Sensor Inspection

- Remove the rear fender (see Frame chapter).
- Disconnect the crankshaft sensor lead connector [A].
- Measure the crankshaft sensor resistance.
 - Connect a hand tester between the BK/W lead and the BL lead.
 - Set the tester to the x 10 Ω range.

Crankshaft Sensor Resistance

110 ~ 140 Ω

- ★ If the tester does not read as specified, replace the crankshaft sensor.



16-38 ELECTRICAL SYSTEM

Ignition System

Crankshaft Sensor Peak Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

- Remove the spark plug caps, but do not remove the spark plugs.
- Disconnect:
 - Crankshaft Sensor Wire Connector [A]
- Set the hand tester [B] to the 10 V DC range.
- Connect the peak voltage adapter [C] to the hand tester and crankshaft sensor leads in the connector.

Special Tool - Hand Tester: 57001-1394

Recommended Tool - Peak Voltage Adapter

Type: KEK-54-9-B

Brand: KOWA SEIKI

Connections:

Crankshaft Sensor Wire		Adapter		Hand Tester
Blue	←	Red	→	(+)
Black/White	←	Black	→	(-)

- Turn the ignition switch on, and rotate the engine for 4 ~ 5 seconds with the transmission gear in neutral to measure the pickup coil peak voltage.
- Repeat the measurement 5 or more times.

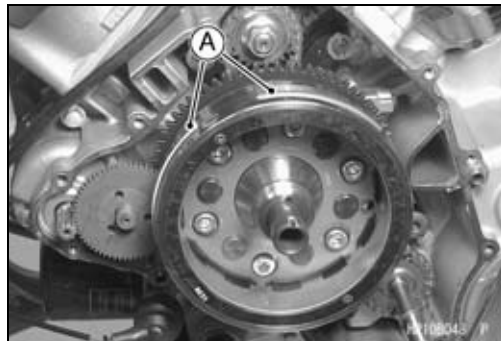
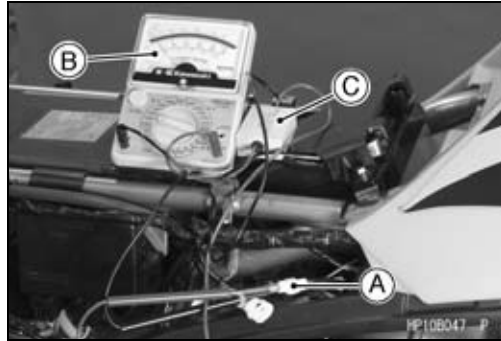
Crankshaft Sensor Peak Voltage

Standard: 1.8 V or more

- ★ If the peak voltage is lower than the standard, inspect the crankshaft sensor.

Alternator Rotor Inspection

- Check the timing projection [A] for damage such as chipping or grooving.
- ★ If the timing projection on the rotor is visibly damaged, replace the alternator rotor.



Ignition System

Ignition Timing Test

- Remove the ignition timing inspection plug.
- Attach a timing light [A] and a tachometer in the manner prescribed by the manufacturer.

Special Tool - Timing Light : 57001-1241

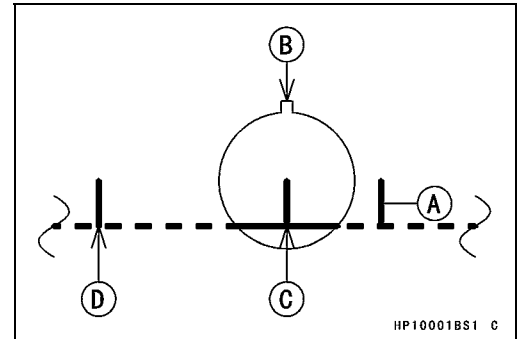
- Start the engine and aim the timing light at the timing mark on the alternator rotor.
- Run the engine at the speeds specified and note the alignment of the timing marks.



[A] F or R mark

Ignition Timing

Engine speed r/min (rpm)	Slot [B] aligned with:
1 100 and below	Advanced mark [C] on alternator rotor
5 000 and above	Advanced mark [D] on alternator rotor



NOTE

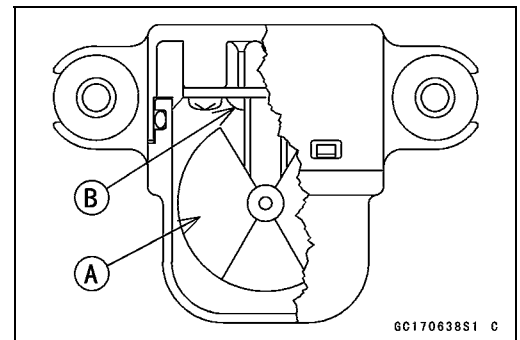
○ Do not mix up the timing marks with mark [A].

- ★ If the ignition timing is incorrect, replace the igniter and the crankshaft sensor.

Vehicle-down Sensor Outline

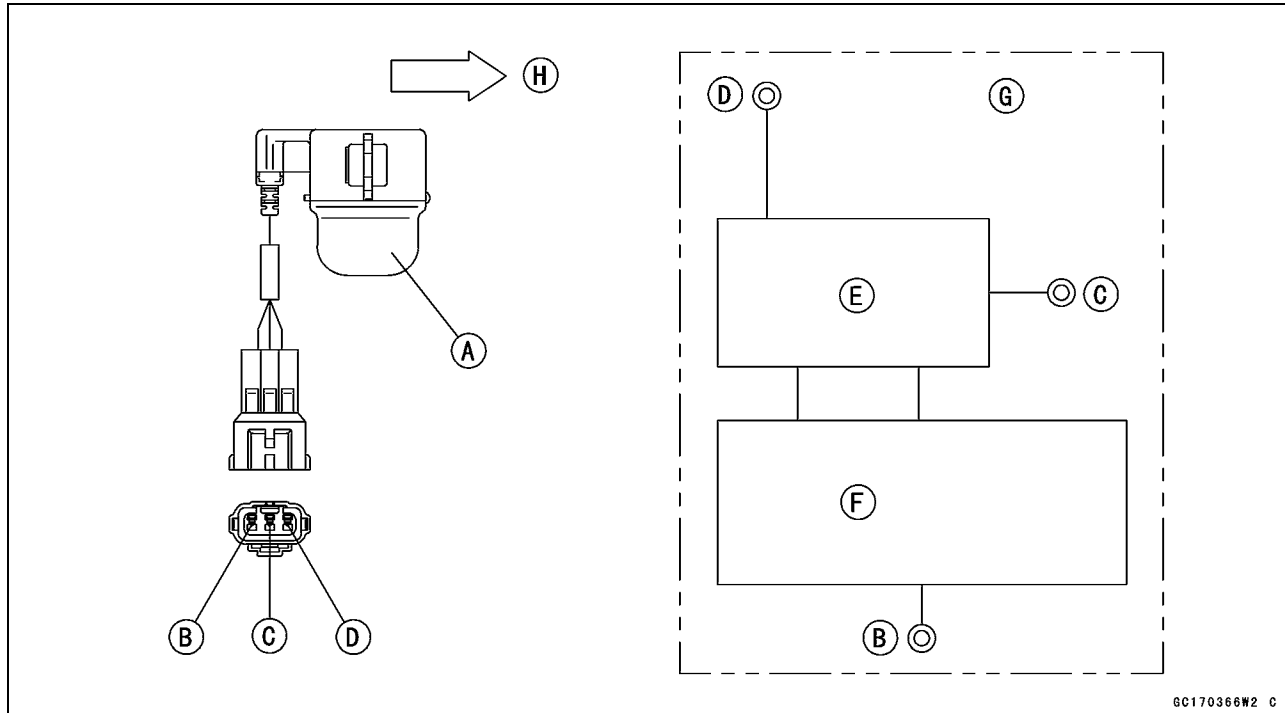
This sensor has a weight [A] with two magnets inside, and sends a signal to the igniter. But when the vehicle banks 60 ~ 70° or more to either side (in fact falls down), the weight turns and shuts off the voltage in the vehicle-down sensor circuit. The igniter senses this change, and stops the fuel pump and the ignition system.

Hall IC [B]



16-40 ELECTRICAL SYSTEM

Ignition System



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

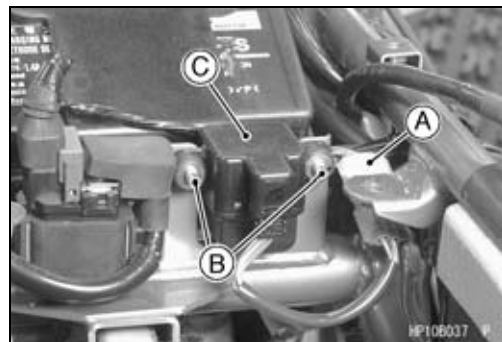
Constant Voltage Circuit [E]
Hall IC (Integrated Circuit) [F]
Vehicle-down Sensor Circuit [G]
Front [H]

Vehicle-down Sensor Removal

CAUTION

Never drop the down-sensor, especially on a hard surface. Shock to the sensor can damage it.

- Remove:
 - Rear Fender (see Frame chapter)
 - Fuel Tank (see Fuel System chapter)
 - Vehicle-down Sensor Lead Connector [A]
 - Screws [B]
 - Vehicle-down Sensor [C]

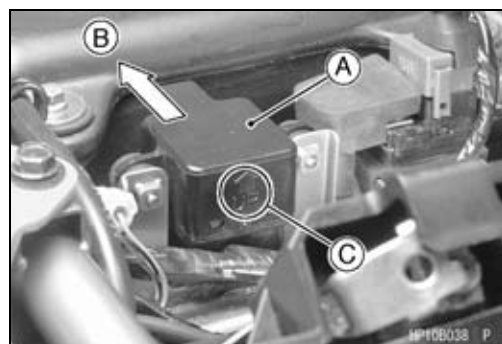


Vehicle-down Sensor Installation

- Install the vehicle-down sensor [A] so that the sensor lead faces backwards [B], and the arrow mark [C] on the sensor points upward.
- Tighten the screws securely.

⚠ WARNING

Incorrect installation of the vehicle-down sensor could cause sudden loss of engine power. The rider could lose balance during certain riding situations, like leaning over in a turn, with the potential for an accident resulting in injury or death. Ensure that the down sensor is held in place by the sensor brackets.



Ignition System

Vehicle-down Sensor Inspection

NOTE

- Be sure the battery is fully charged.

Vehicle-down Sensor Power Source Voltage:

- Remove:
 - Seat (see Frame chapter)
 - Vehicle-down Sensor Lead Connector
- Connect:
 - Vehicle-down Sensor Lead Connector [A] (harness side)
 - Digital Volt Meter [B]

I. Connections to Connector (12 V circuit)

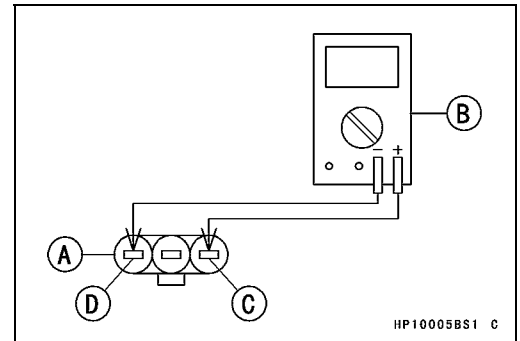
- Meter (+) → Connector BR Lead [C]
- Meter (-) → Connector BK/Y Lead [D]

- Turn the ignition switch ON, and measure the power source voltage.

Vehicle-down Sensor Power Source Voltage

Standard: Battery Voltage (12.5 V or more)

- Turn the ignition switch OFF.
- ★ If there is no battery voltage, check the following:
 - Main Fuse 30A
 - Ignition Switch
 - Wiring for Vehicle-down Sensor Power Source



II. Connections to Connector (5 V circuit)

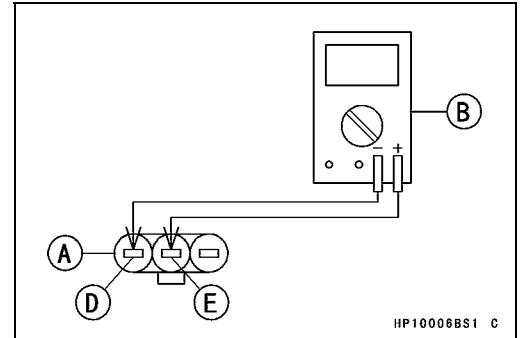
- Meter (+) → Connector Y/G Lead [E]
- Meter (-) → Connector BK/Y Lead [D]

- Turn the ignition switch ON, and measure the power source voltage.

Vehicle-down Sensor Power Source Voltage

Standard: about 5 V

- Turn the ignition switch OFF.
- ★ If there is no standard voltage, check the following:
 - Igniter
 - Wiring for Vehicle-down Sensor Power Source



16-42 ELECTRICAL SYSTEM

Ignition System

Vehicle-down Sensor Output Voltage:

- Remove the vehicle-down sensor (see Vehicle-down Sensor Removal).
- Connect the vehicle-down sensor [A] to the connector of the harness.
- Hold the sensor almost vertical [B] with the arrow mark pointed up.
- Connect:
 - Vehicle-down Sensor Lead Connector [C]
 - Digital Volt Meter [D]
 - Needle Adapters [E]

Special Tool - Needle Adapter Set: 57001-1457

Connection to Connector (5 V circuit)

- Meter (+) → Connector Y/G Lead [F]
- Meter (-) → Connector BK/Y Lead [G]
- Turn the ignition switch ON, and measure the output voltage with the connector joined.

Vehicle-down Sensor Power Output Voltage

Standard: 0.4 ~ 1.4 V

(with sensor arrow mark pointed up)

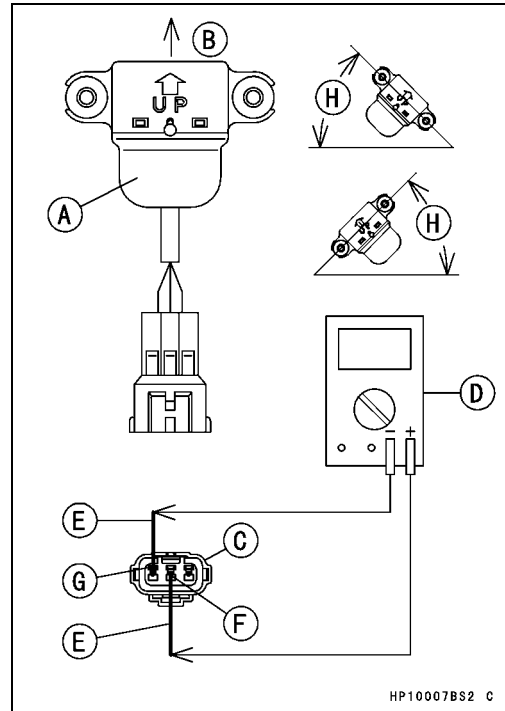
- Tilt the sensor 60 ~ 70° or more [H] right or left, and measure the output voltage.
- The time lag is from 0.5 to 1 second.

Vehicle-down Sensor Power Output Voltage

Standard: 3.7 ~ 4.4 V

(with sensor tilted 60 ~ 70° or more, right or left)

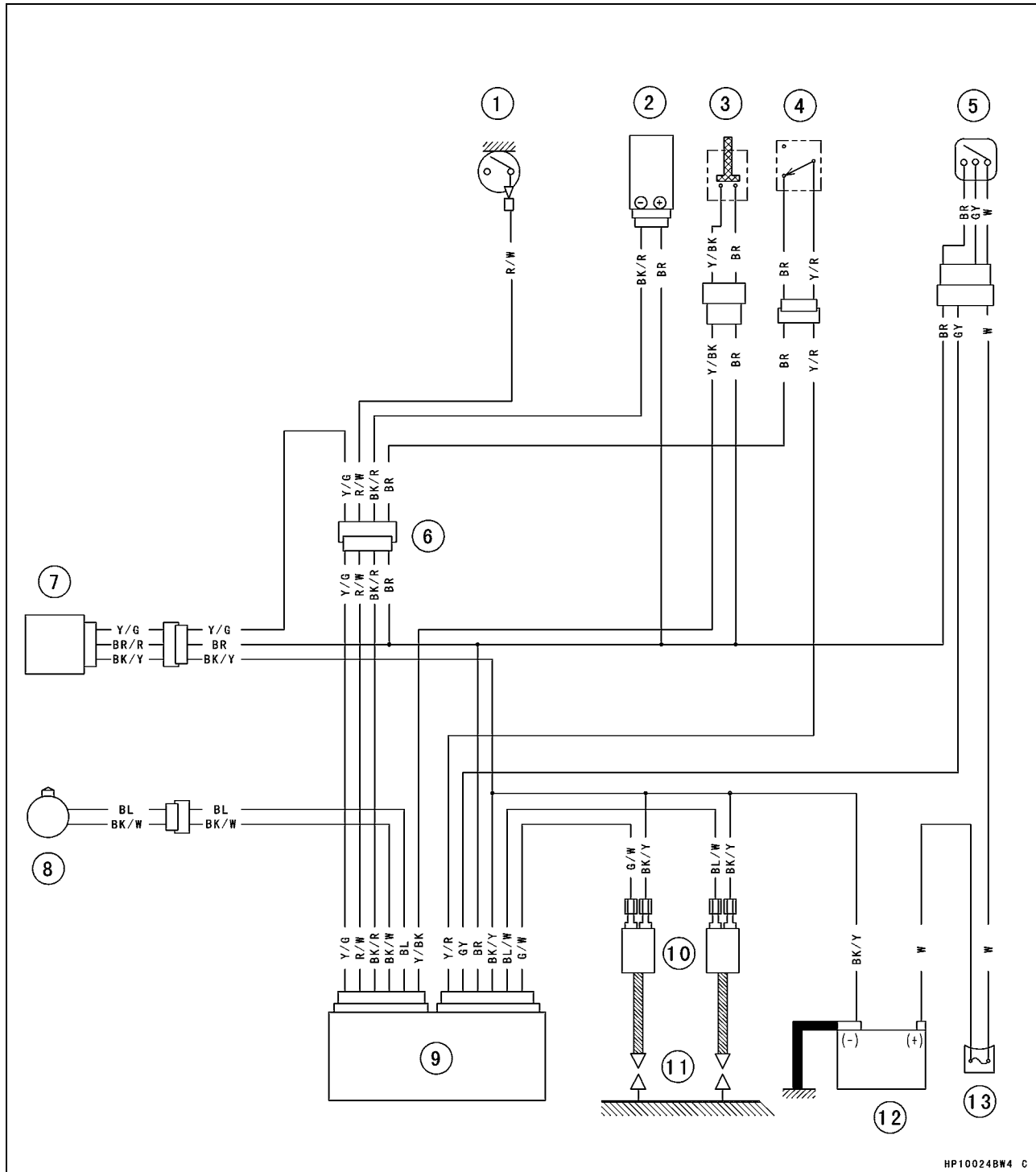
- ★ If the output voltage is out of the specified, replace the vehicle-down sensor.



16-44 ELECTRICAL SYSTEM

Ignition System

Ignition System Circuit



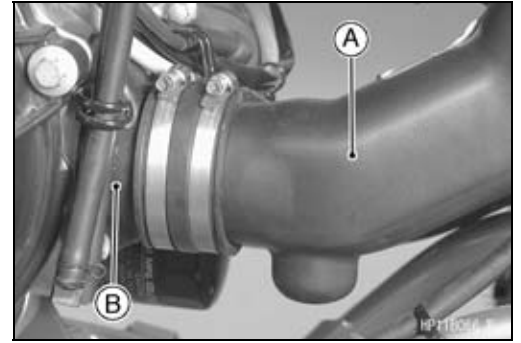
HP10024BW4 C

- | | | |
|---|------------------------|--------------------|
| 1. Reverse Switch | 5. Ignition Switch | 10. Ignition Coils |
| 2. Fuel Pump | 6. Reset Connector | 11. Spark Plugs |
| 3. Reverse Power Assist Switch (Override) | 7. Vehicle-down Sensor | 12. Battery |
| 4. Engine Stop Switch | 8. Crankshaft Sensor | 13. Main Fuse 30A |
| 9. Igniter | | |

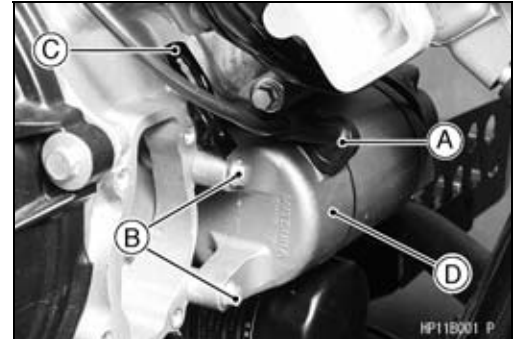
Electric Starter System

Starter Motor Removal

- Remove:
 - Converter Intake Duct [A]
 - Joint Duct [B] and Collars



- Remove:
 - Starter Motor Cable [A]
 - Starter Motor Mounting Bolts [B]
 - Clamp [C]
 - Starter Motor [D]

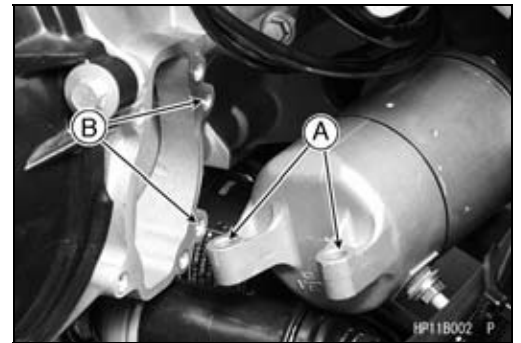


CAUTION

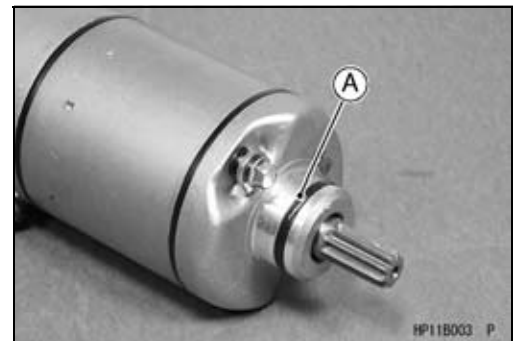
Do not tap the end of the starter motor shaft or the motor may be damaged.

Starter Motor Installation

- When installing the starter motor, clean the starter motor lugs [A] and crankcase [B] where the starter motor is grounded.



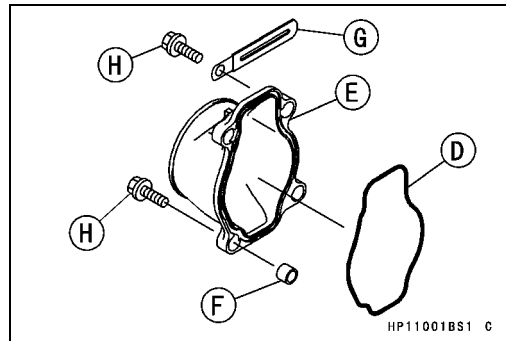
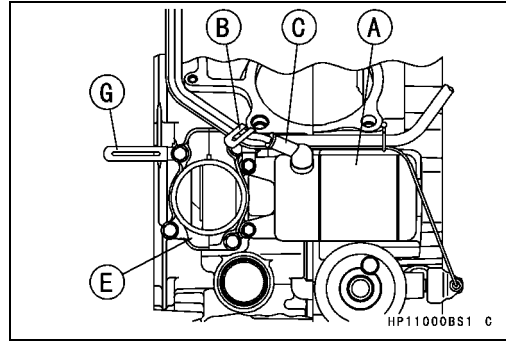
- ★ If the O-ring [A] shows wear or damage, or if it is hardened, replace it with a new one.
- Apply a small amount of engine oil to the O-ring.



16-46 ELECTRICAL SYSTEM

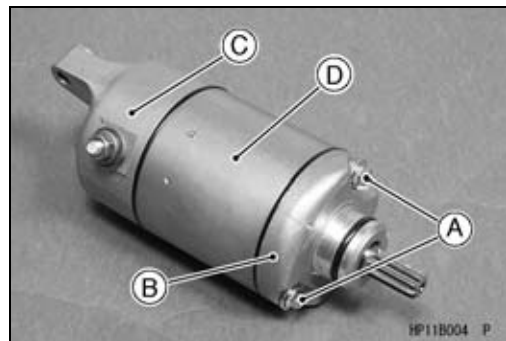
Electric Starter System

- Install:
 - Starter Motor [A]
 - Clamp [B] (as shown)
 - Starter Motor Cable [C]
- Tighten:
 - Torque - Starter Motor Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
 - Starter Motor Terminal Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb)**
- Apply grease to the O-ring [D] in the joint duct [E].
- Install:
 - Joint Duct and Collars [F]
 - Clamp [G] (as shown)
- Tighten:
 - Torque - Joint Duct Bolts [H]: 8.8 N·m (0.90 kgf·m, 78 in·lb)**



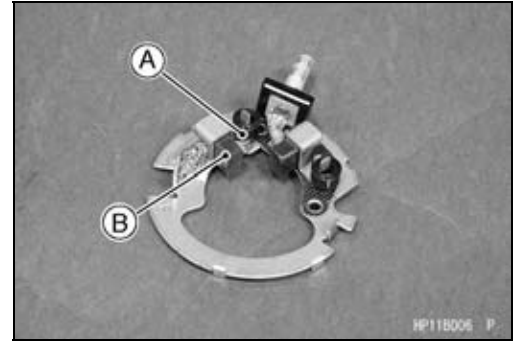
Starter Motor Disassembly

- Remove:
 - Starter Motor Bolts [A]
 - Left End Cover [B]
 - Right End Cover [C]
 - Yoke [D]
- To remove the brush plate assembly [A], remove the terminal nut [B].



Electric Starter System

- Hold the brush spring [A] with needle nose pliers, and pull the brush [B] off the holder.

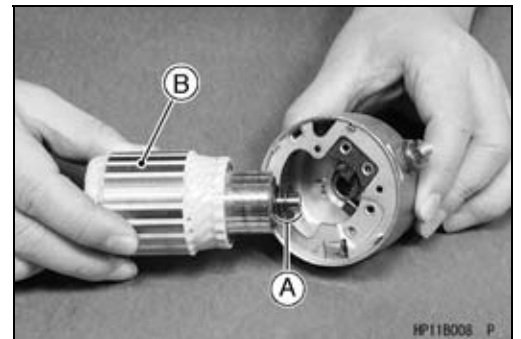
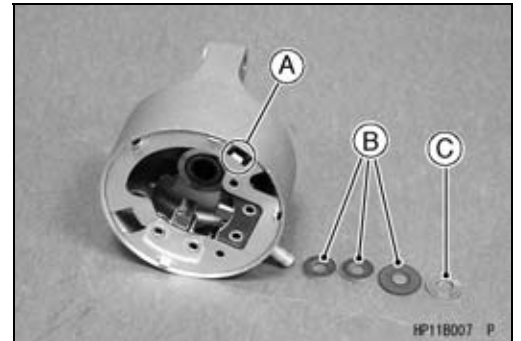


Starter Motor Assembly

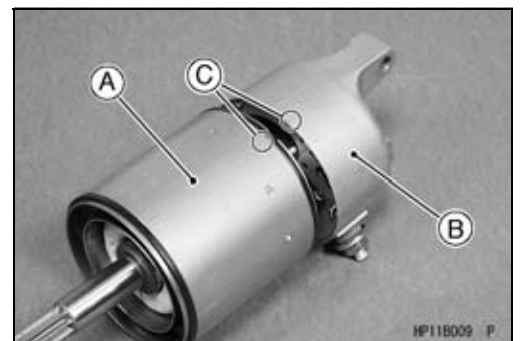
- Replace the O-rings.
- Install the brush plate assembly to the right end cover so that the projection [A] on the brush plate fits into the groove on the right end cover.
- Install the O-ring, insulators [B], and washer [C] in that order on the terminal bolt.
- Tighten:

Torque - Starter Motor Terminal Locknut: 6.9 N·m (0.70 kgf·m, 61 in·lb)

- Install the washers [A].
- Install the armature [B] between the brushes.



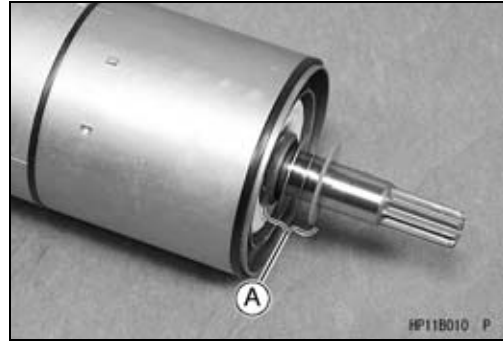
- Install the yoke [A] onto the right end cover [B] aligning the marks [C] on the yoke and right end cover.



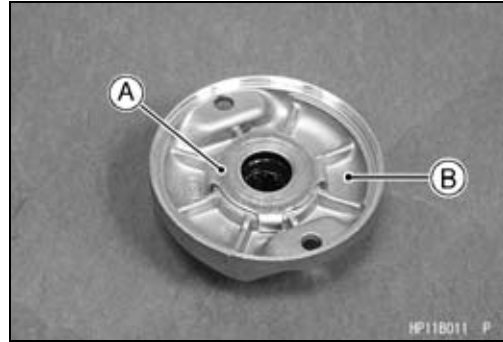
16-48 ELECTRICAL SYSTEM

Electric Starter System

- Install the washers [A].



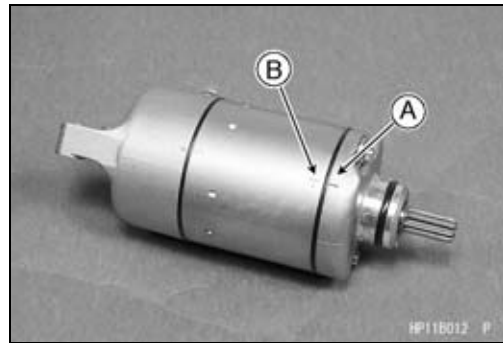
- Install the plate [A] on the left end cover [B].



- Align the mark [A] on the left end cover with the mark [B] on the yoke.

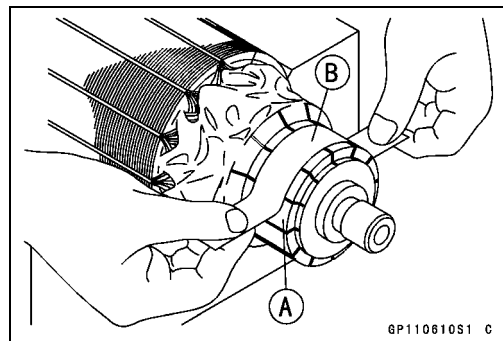
- Tighten:

Torque - Starter Motor Bolts: 4.9 N·m (0.50 kgf·m, 43 in·lb)



Commutator Cleaning/Inspection

- Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.



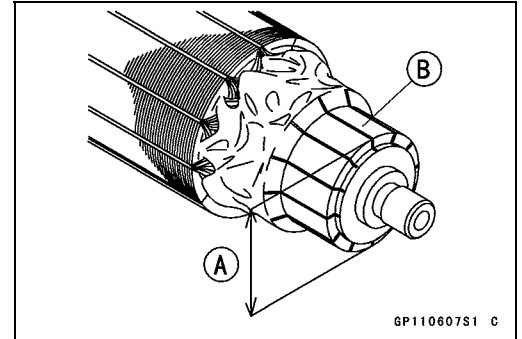
Electric Starter System

- Measure the diameter [A] of the commutator [B].
- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.

Commutator Diameter

Standard: 28 mm (1.10 in.)

Service Limit: 27 mm (1.06 in.)



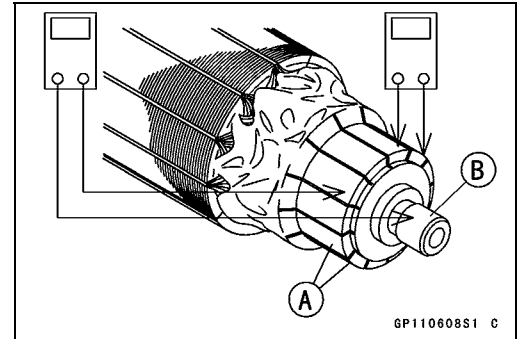
Armature Inspection

- Using the x 1 Ω range, measure the resistance between any two commutator segments [A].
- ★ If there is a high resistance or no reading (∞) between any two segments, a winding is open. Replace the starter motor.
- Using the highest range, measure the resistance between the segments and the shaft [B].
- If there is any reading at all, the armature has a short. Replace the starter motor.

Special Tool - Hand Tester: 57001-1394

NOTE

- Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.



16-50 ELECTRICAL SYSTEM

Electric Starter System

Starter Motor Brush Length

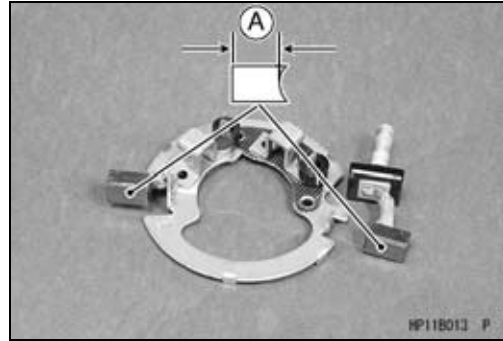
- Measure the overall length [A] of each brush.

Starter Motor Brush Length

Standard: 12 mm (0.47 in.)

Service Limit: 4 mm (0.16 in.)

- ★ If any is worn down to the service limit, replace the brush plate assembly.



Brush Assembly Inspection

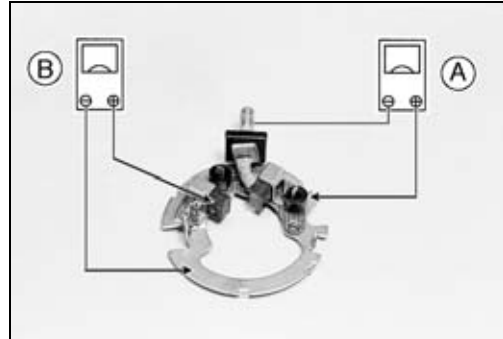
- Using the x 1 Ω range, measure the resistance as shown.

[A] Terminal Bolt and Positive Brush

[B] Brush Plate and Negative Brush

- ★ If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assembly.

Special Tool - Hand Tester: 57001-1394



Brush Plate and Terminal Bolt Inspection

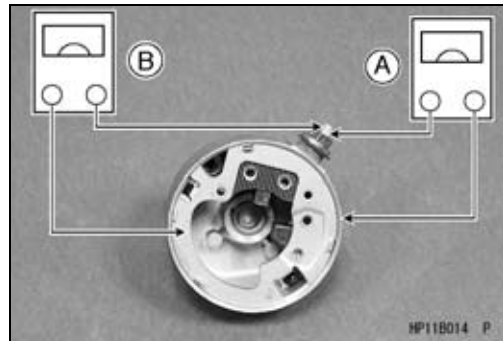
- Using the highest range, measure the resistance as follows:

[A] Terminal Bolt and Right – Hand End Cover

[B] Terminal Bolt and Brush Plate

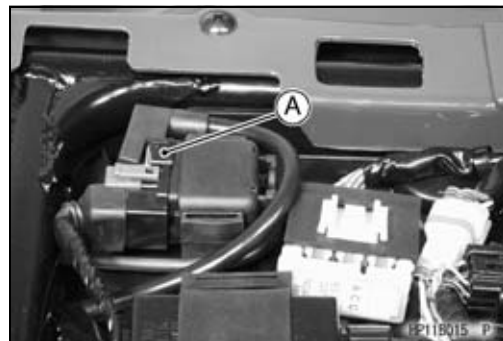
- ★ If there is any reading, the brush holder assembly has a short. Replace the brush plate assembly.

Special Tool - Hand Tester: 57001-1394



Starter Relay Inspection

- Remove:
 - Seat (see Frame chapter)
 - Starter Relay [A]



Electric Starter System

- Connect the hand tester [A] and a 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

Hand Tester Range: x 1 Ω range

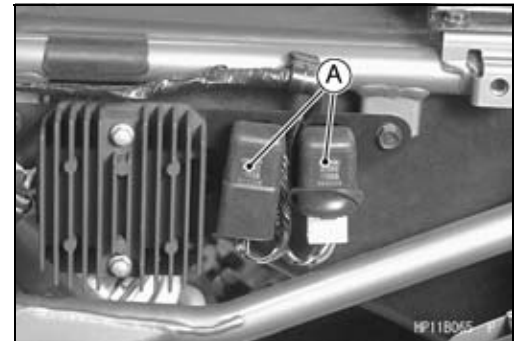
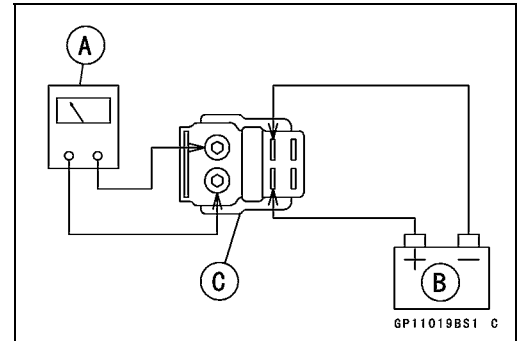
Criteria: When battery is connected $\Rightarrow 0 \Omega$

When battery is disconnected $\Rightarrow \infty \Omega$

Special Tool - Hand Tester: 57001-1394

Starter Circuit Relay Inspection

- Remove:
 - Seat (see Frame chapter)
 - Rear Fender (see Frame chapter)
 - Starter Circuit Relays [A] (Brake and Neutral Switch Circuit)
- The starter circuit relays for the brake and neutral switch circuits are identical.



- Connect the hand tester [A] and a 12 V battery [B] to the starter circuit relay [C] as shown.
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

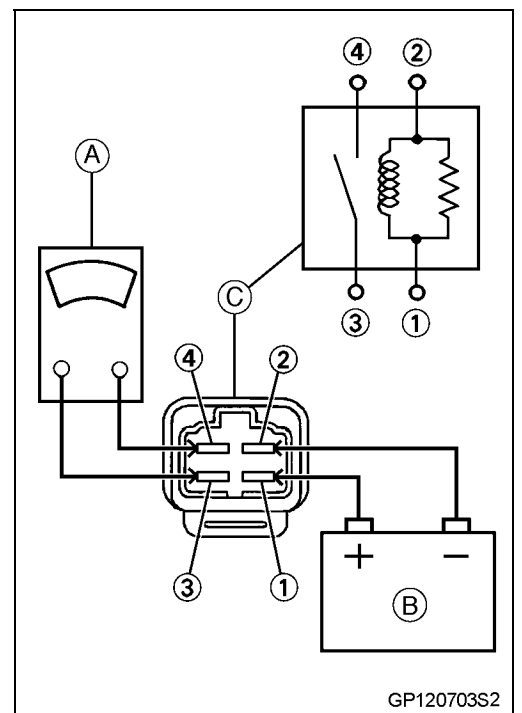
Hand Tester Range: x 1 Ω

Criteria: When battery is connected $\Rightarrow 0 \Omega$

When battery is disconnected $\Rightarrow \infty \Omega$

Relay Coil Terminals [1] and [2]

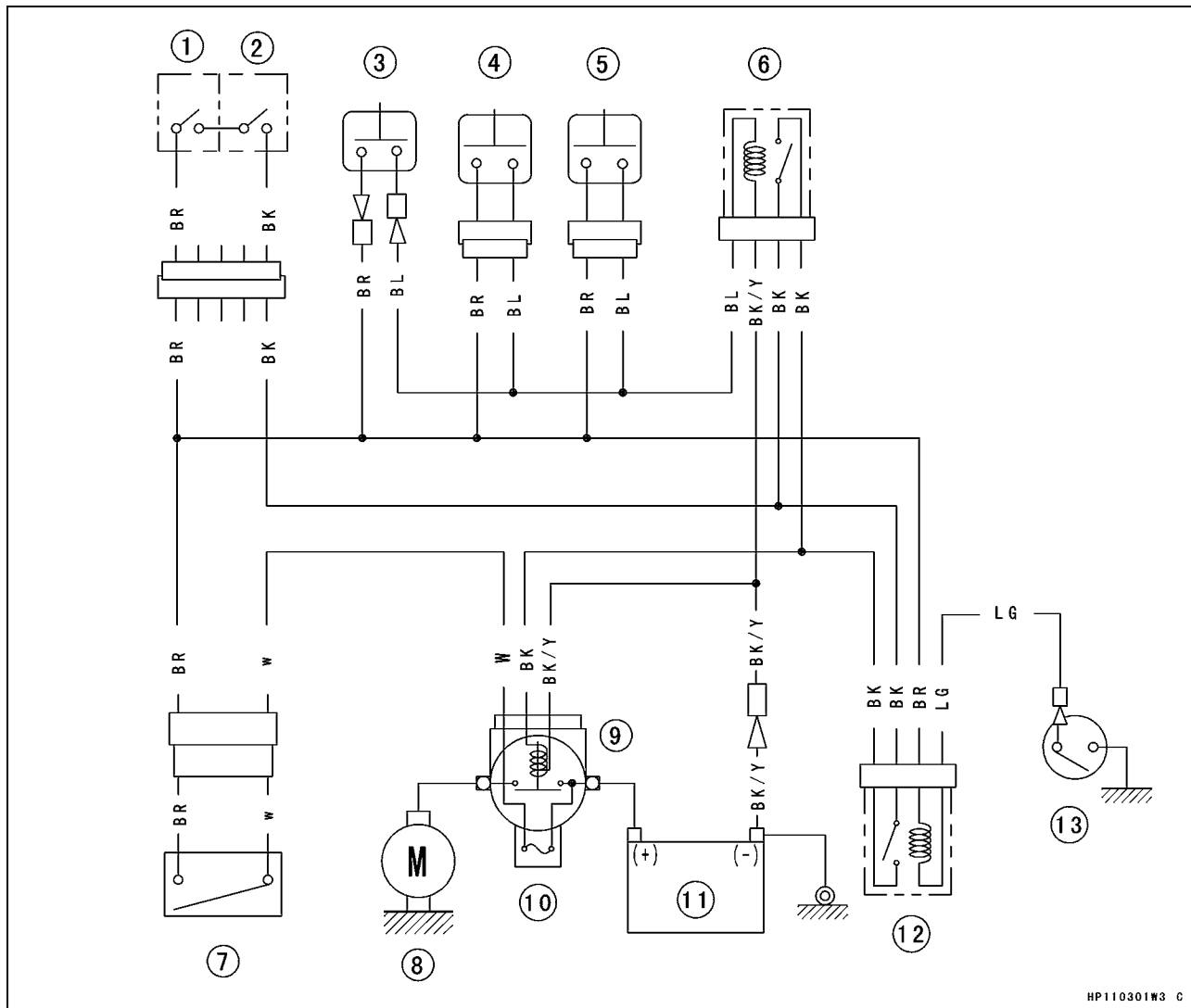
Relay Switch Terminals [3] and [4]



16-52 ELECTRICAL SYSTEM

Electric Starter System

Electric Starter Circuit



HP110301W3 C

- | | | |
|-------------------------------|--------------------------|---------------------------|
| 1. Engine Stop Switch | 6. Starter Circuit Relay | 11. Battery |
| 2. Starter Button | (Brake) | 12. Starter Circuit Relay |
| 3. Front Brake Light Switch | 7. Ignition Switch | (Neutral) |
| 4. Parking Brake Light Switch | 8. Starter Motor | 13. Neutral Switch |
| 5. Rear Brake Light Switch | 9. Starter Relay | |
| | 10. Main Fuse 30A | |

Starter Motor Clutch Removal

- Remove the alternator rotor (see Alternator Rotor Removal).
- Hold the rotor with the flywheel holder and take out the starter motor clutch bolts [A].

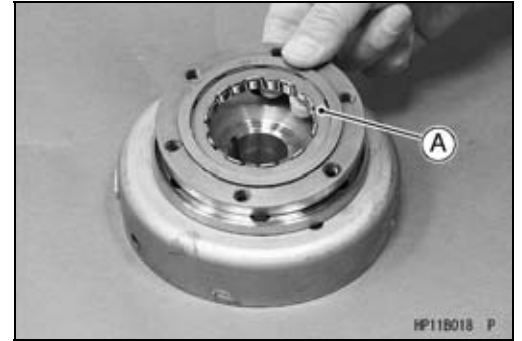
Special Tool - Flywheel Holder: 57001-1313



HP11B017 P

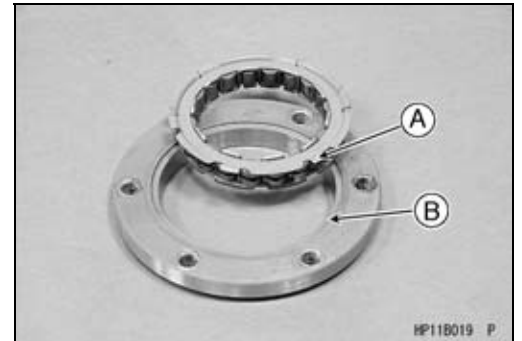
Electric Starter System

- Take out the one-way clutch [A].



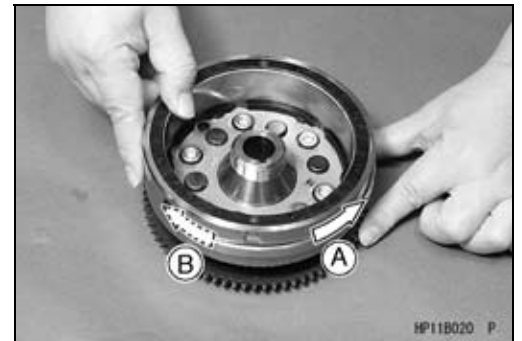
Starter Motor Clutch Installation

- Install the one-way clutch so that the flange [A] fits on the recess [B] of the race.
- Apply a non-permanent locking agent:
Starter Motor Clutch Bolts
- Tighten:
Torque - Starter Motor Clutch Bolts : 34 N·m (3.5 kgf·m, 25 ft·lb)



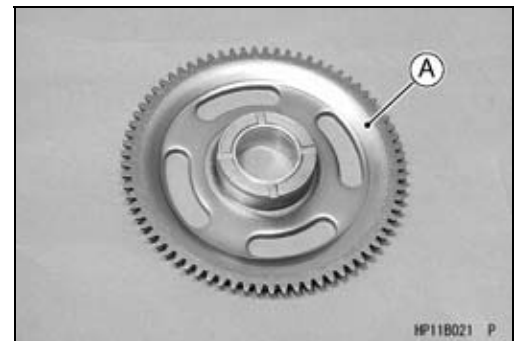
Starter Motor Clutch Inspection

- Remove:
Alternator Rotor (see Alternator Rotor Removal)
- Fit the starter clutch gear into the starter motor clutch.
- ★ If the alternator rotor turns counterclockwise [A] freely from the starter clutch gear, but not clockwise [B], the clutch is operating correctly.
- ★ If the clutch does not operate correctly, or if it makes noise, disassemble it and examine each part visually. Replace any worn or damaged parts.



NOTE

- Examine the starter clutch gear [A]. Replace it if it is worn or damaged.

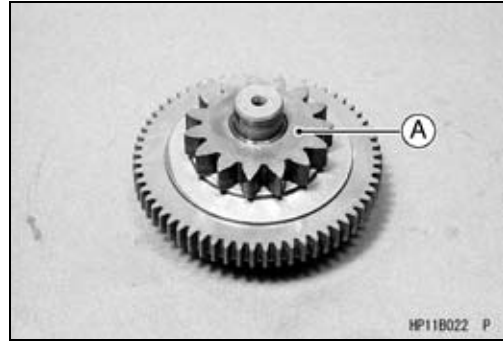


16-54 ELECTRICAL SYSTEM

Electric Starter System

Torque Limiter Inspection

- Remove:
 - Alternator Rotor (see Alternator Rotor Removal)
- Remove the torque limiter [A] and visually inspect it.
- ★ If the limiter has wear, discoloration, or other damage, replace it as a unit.



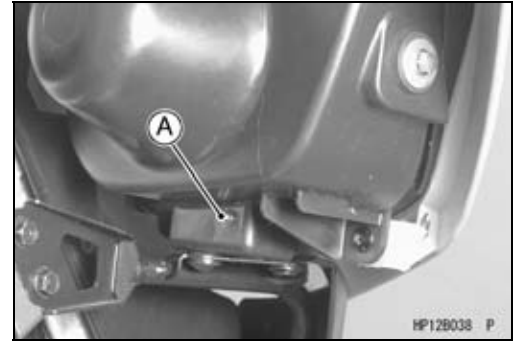
Lighting System

Headlight Beam Vertical Adjustment

- Turn the adjusting screw [A] on each headlight rim in or out to adjust the headlight vertically.

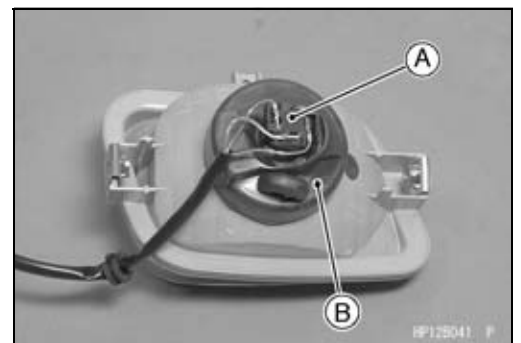
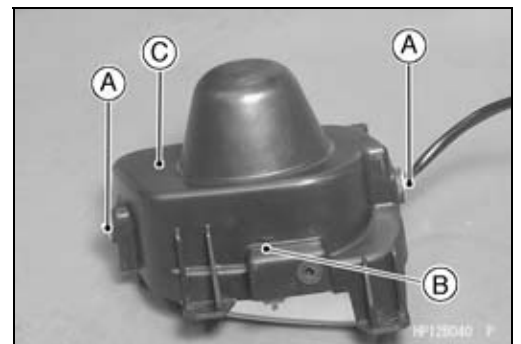
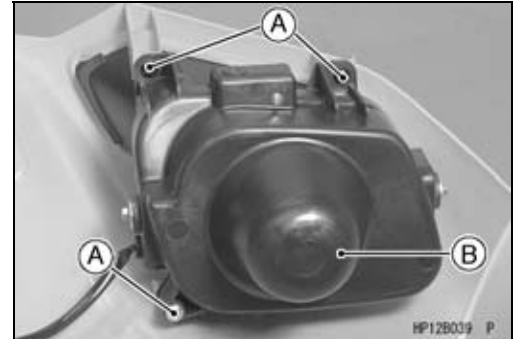
NOTE

- On high beam, the brightest point should be slightly below horizontal with the vehicle on its wheels and the rider seated. Adjust both headlights to the same angle.



Headlight Bulb Replacement

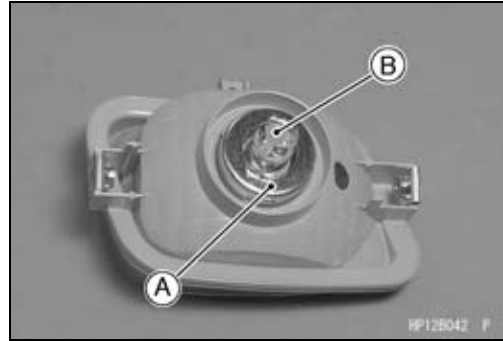
- Remove:
 - Front Fender (see Frame chapter)
 - Mounting Screws [A]
 - Headlight Unit [B]
- Remove:
 - Headlight Bolts [A] and Washer
 - Vertical Adjustment Screw [B], Spring, and Nut
 - Headlight Body [C]
- Remove:
 - Headlight Connector [A]
 - Dust Cover [B]



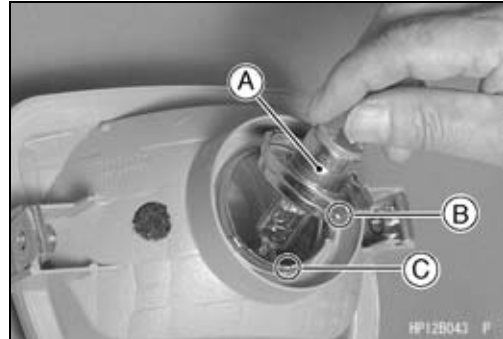
16-56 ELECTRICAL SYSTEM

Lighting System

- Push the holder [A] and turn it counterclockwise.
- Remove:
 - Holder
 - Headlight Bulb [B]



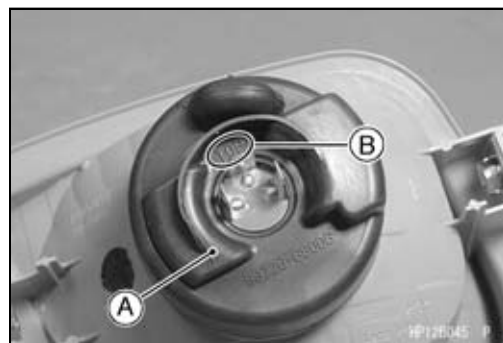
- Insert the new bulb [A] by aligning the projection [B] with the notch [C] in the headlight unit.



- Push the bulb holder [A] in, turn it clockwise, and release it. It should lock in position.

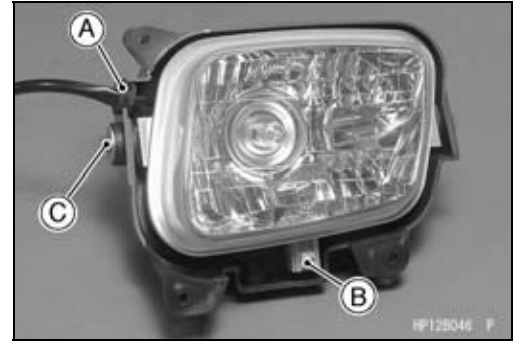


- Fit the dust cover [A].
- Face the TOP mark [B] upward.



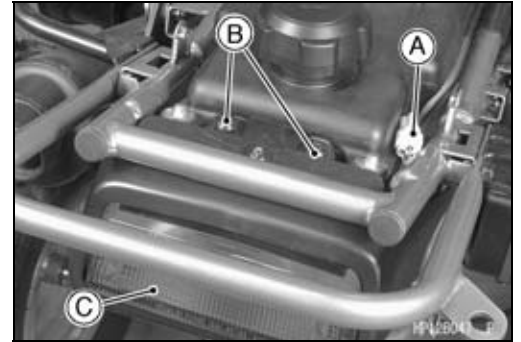
Lighting System

- Install:
 - Grommet [A]
 - Vertical Adjustment Screw, Spring and Nut [B]
 - Damper, Collar and Bolt [C]

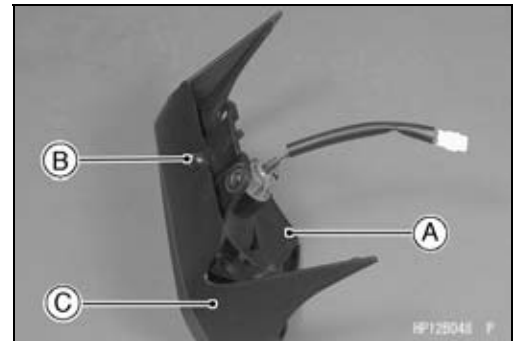


Taillight Bulb Replacement

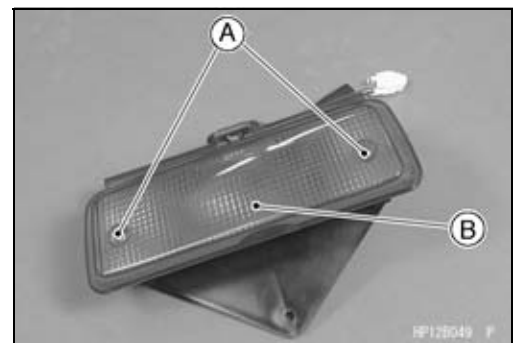
- Remove:
 - Rear Fender (see Frame chapter)
 - Tail Light Connector [A]
 - Screws and Collars [B]
 - Tail Light Assembly [C] with Cover



- Remove
 - Screw [A]
 - Screw and Collar [B]
 - Tail Light Cover [C]



- Remove the screws [A].
- Remove the taillight lens [B] from the taillight assembly.



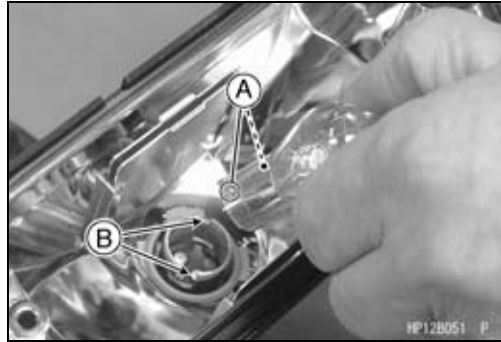
16-58 ELECTRICAL SYSTEM

Lighting System

- Push the bulb [A] in, turn it counterclockwise, and pull it out.
- Be sure the socket is clean.

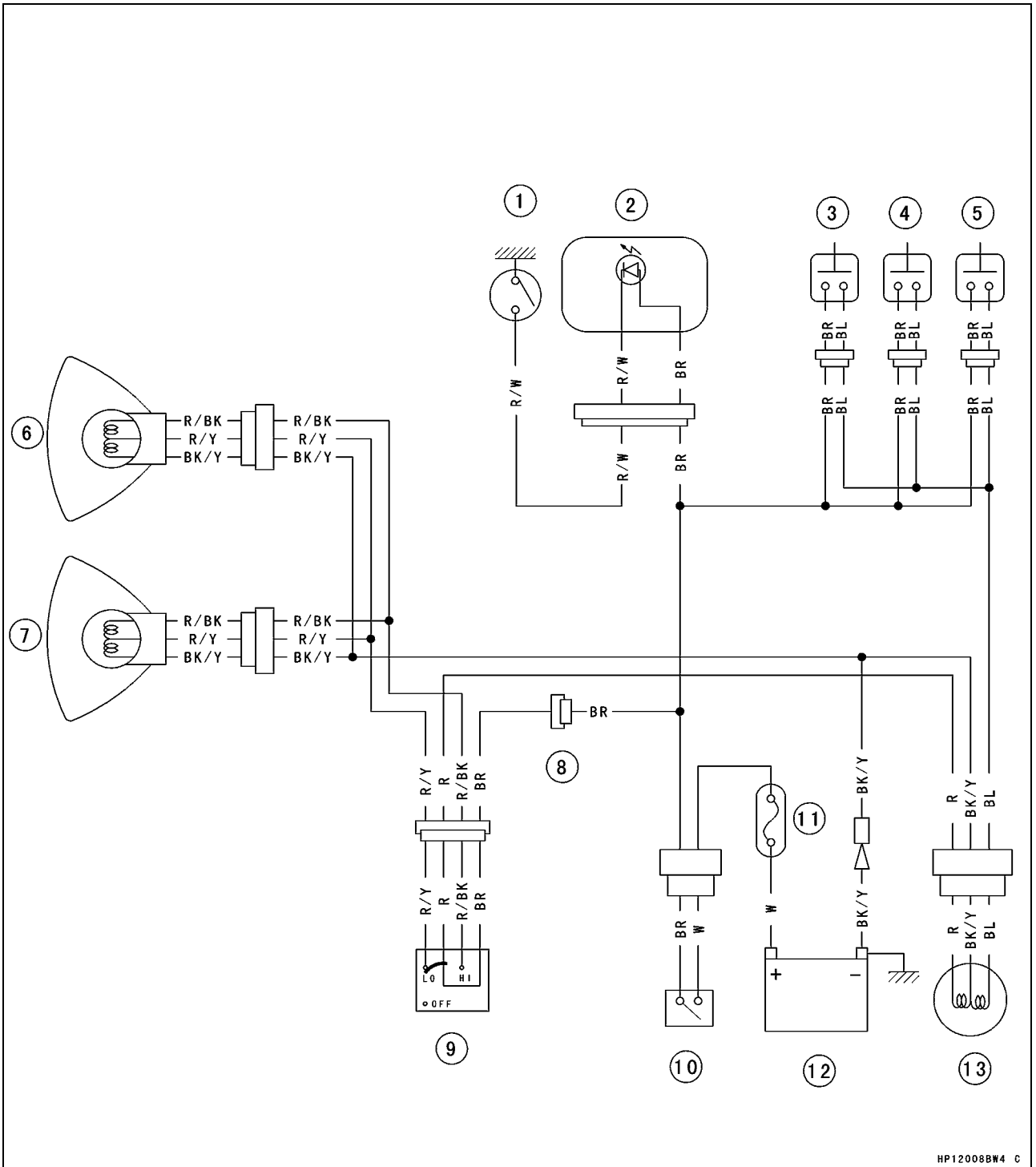


- Insert the new bulb by aligning the pins [A] with the grooves [B] in the walls of the socket.
- Push the bulb in, turn it clockwise, and release it. It should lock in position.



Lighting System

Lighting System Circuit



HP12008BW4 C

- 1. Reverse Switch
- 2. Reverse Indicator Light (LED)
- 3. Front Brake Light Switch
- 4. Parking Brake Light Switch

- 5. Rear Brake Light Switch
- 6. Headlight (Right)
- 7. Headlight (Left)
- 8. Reset Connector
- 9. Light/Dimmer Switch
- 10. Ignition Switch

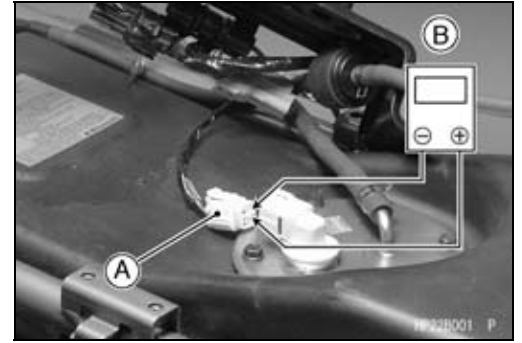
- 11. Main Fuse 30A
- 12. Battery
- 13. Tail/Brake Light

Fuel Pump/Fuel Reserve Switch

Fuel Pump Inspection

Fuel Pump Supply Voltage Inspection:

- Turn the ignition switch OFF.
- Remove:
 - Seat
 - Fuel Pump Lead Connector [A]
- Connect a hand tester [B] with suitable leads as shown.
 - Hand Tester (+) → Fuel Pump Connector (BR) Terminal
 - Hand Tester (-) → Fuel Pump Connector (BK/R) Terminal
- Turn the ignition switch ON, and run the engine with the transmission in neutral.
- Measure the fuel pump supply voltage.



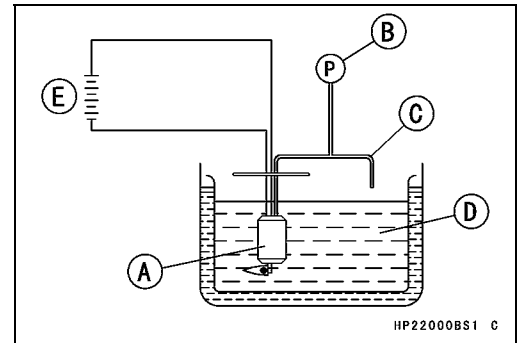
Fuel Pump Supply Voltage

Standard: near the Battery Voltage

- ★ If the reading is not as specified, replace the igniter.
- ★ If the reading is as specified, check the fuel pump.

Fuel Pump Operational Inspection:

- Remove:
 - Fuel Pump (see Fuel System chapter)
- Prepare a container filled with kerosene.
- Prepare the rubber hoses, and connect them to the pump fitting.
- Connect a suitable pressure gauge to the outlet hose as shown.
 - Fuel Pump [A]
 - Pressure Gauge [B]
 - Outlet Hose [C]
 - Kerosene [D]
 - Battery [E] (12V)
- Connect the pump leads to the battery using auxiliary wires as shown.
 - Battery (+) → Fuel Pump Connector (BR) Terminal
 - Battery (-) → Fuel Pump Connector (BK/R) Terminal
- ★ If the pump does not operate, the pump is defective. Replace the fuel pump.
- ★ If the pump operates is normal, close the outlet hose while operating the fuel pump.
- When the pump stops, read the pressure gauge.
- ★ If the pressure gauge reading is out of the specified pressure, the pump is defective. Replace the fuel pump.



Fuel Pump Pressure

Standard: 17.7 ~ 22.6 kPa

(0.18 ~ 0.23 kgf/cm², 2.6 ~ 3.3 psi)

- Install the fuel pump and tighten it.

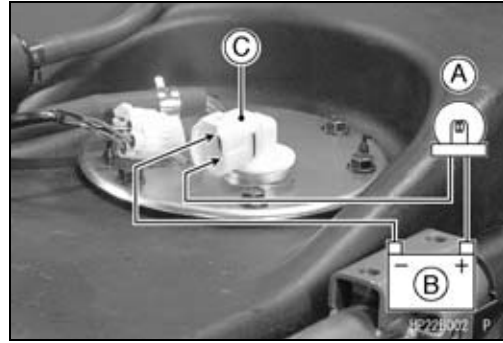
Torque - Fuel Pump Mounting Bolts : 2 N·m (0.2 kgf·m, 17 in·lb)

16-62 ELECTRICAL SYSTEM

Fuel Pump/Fuel Reserve Switch

Fuel Reserve Switch Inspection (1)

- Fill the fuel tank with fuel.
- Close the fuel tank cap surely.
- Remove the fuel tank (see Fuel System chapter).
- Connect the test light [A] (12 V 3.4 W bulb a socket with leads) and the 12 V battery [B] to the fuel pump connector [C].



Connections:

- Battery (+) → 12 V 3.4 W Bulb (one side)
- 12 V 3.4 W Bulb (other side) → BL Lead Terminal
- Battery (-) → BK/Y Lead Terminal

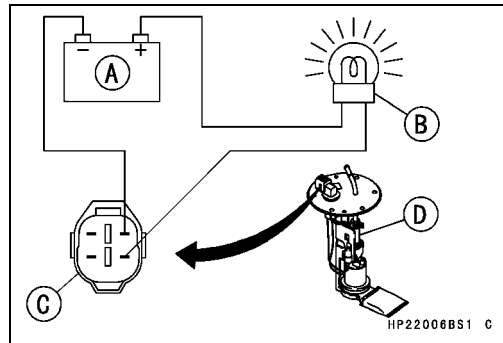
Special Tool - Needle Adapter Set: 57001-1457

- ★ If the test light turn on, the reverse switch is defective. Replace the fuel pump.

Fuel Reserve Switch Inspection (2)

- Remove:
 - Fuel Pump (see Fuel System chapter)
- Connect the test light (12 V 3.4 W bulb in a socket with leads) and the 12 V battery to the fuel pump connector as shown.
 - 12 V Battery [A]
 - Test Light [B]
 - Fuel Pump Connector [C]
 - Fuel Reserve Switch [D]

- ★ If the test light doesn't light, replace the fuel pump.

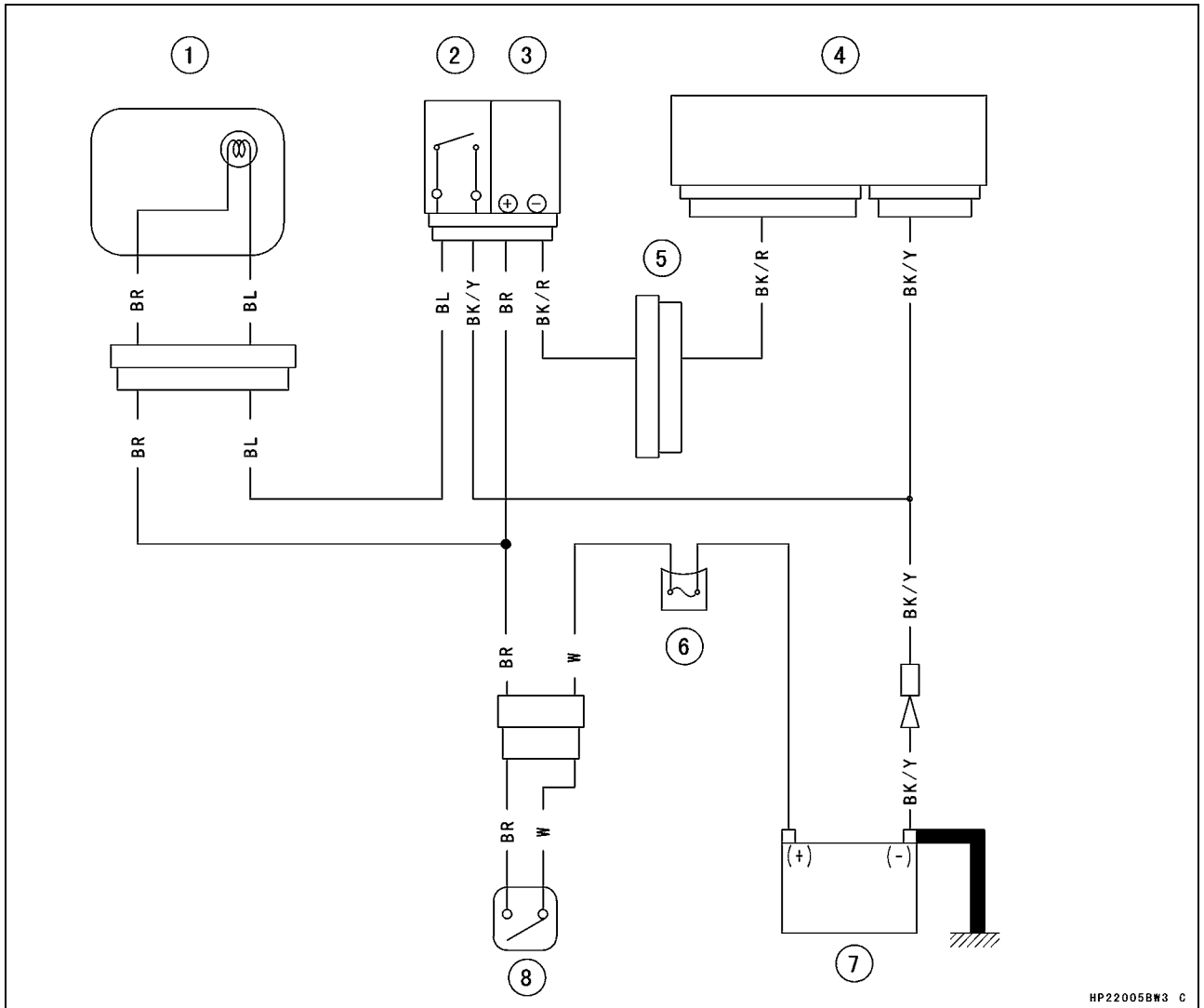


NOTE

- It may take a long time to turn on the test light in case that the fuel reserve switch is inspected just after the fuel pump is removed. Leave the fuel reserve switch with leads for inspection connected for 3 minute.

Fuel Pump/Fuel Reserve Switch

Fuel Pump/Fuel Reserve Switch Circuit



- 1. Indicator Unit
- 2. Fuel Level Sensor
- 3. Fuel Pump
- 4. Igniter

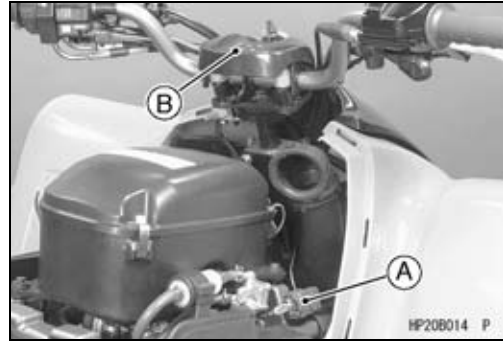
- 5. Reset Connector
- 6. Main Fuse 30 A
- 7. Battery
- 8. Ignition Switch

16-64 ELECTRICAL SYSTEM

Indicator Unit

Indicator Unit Removal

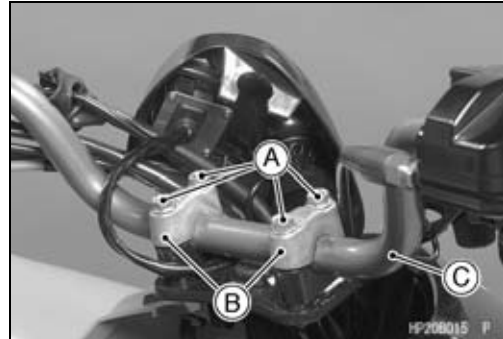
- Remove:
 - Air Cleaner Cover (see Frame chapter)
 - Indicator Unit Lead Connector [A]
 - Handlebar Cover and Indicator Unit [B]



- Remove:
 - Bolts [A]
 - Handle Holders [B]
 - Handlebar Assembly
- Remove the indicator unit from handlebar cover.

CAUTION

Do not drop the indicator unit.

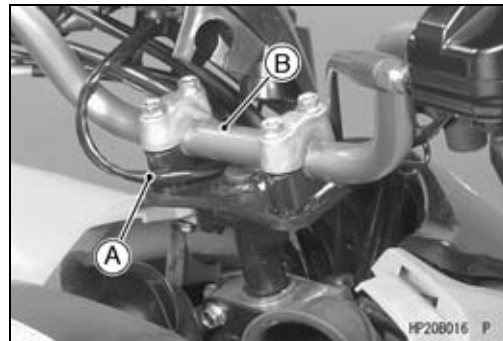


Indicator Unit Installation

- Install:
 - Indicator Unit Lead Connector
 - Handlebar Assembly
- Be sure the indicator unit lead [A] placed under the handlebar [B].
- Install the removed parts.

CAUTION

Do not drop the indicator unit.



Indicator Unit Inspection

- Remove:
 - Indicator Unit (see Indicator Unit Removal)

Indicator Unit

Check1. Indicator Light Inspection

- Using the auxiliary leads connect a 12 V battery to the indicator unit connector as follows:

Fuel Indicator Light [A]:

Battery Positive (+) Terminal to Terminal [1]

Battery Positive (-) Negative to Terminal [2]

- ★ If indicator light does not go on, replace the indicator unit.

Check2. LED (light Emitting Diode) Light Inspection

- Using the auxiliary leads, connect a 12 V battery to the indicator unit connector as follows:

Neutral Indicator Light (LED) [B]:

Battery Positive (+) Terminal to Terminal [1]

Battery Positive (-) Negative to Terminal [3]

Reverse Indicator Light (LED) [C]:

Battery Positive (+) Terminal to Terminal [1]

Battery Positive (-) Negative to Terminal [4]

Water Temperature Warning Light (LED) [D]:

Battery Positive (+) Terminal to Terminal [1]

Battery Positive (-) Negative to Terminal [5]

Oil Pressure Warning Light (LED) [E]:

Battery Positive (+) Terminal to Terminal [1]

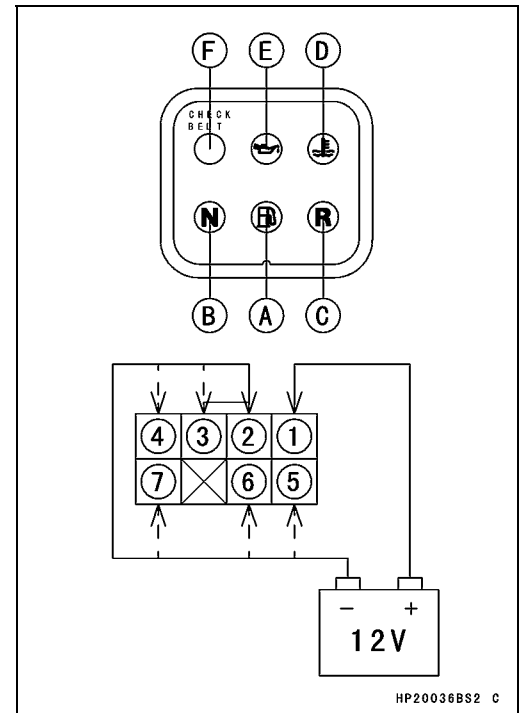
Battery Positive (-) Negative to Terminal [6]

Belt Indicator Light (LED) [F]:

Battery Positive (+) Terminal to Terminal [1]

Battery Positive (-) Negative to Terminal [7]

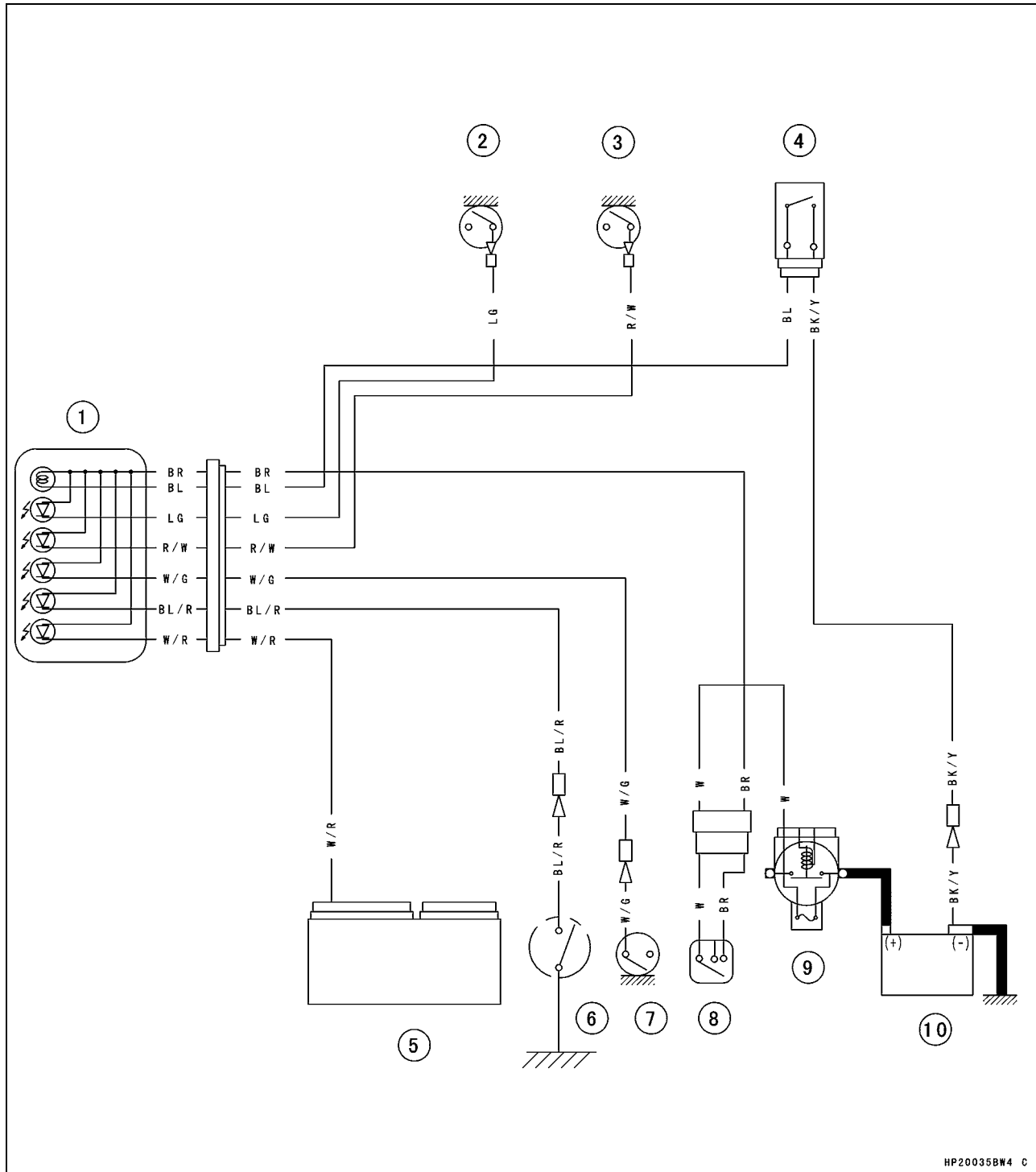
- ★ If each LED light does not go on, replace the indicator unit.



16-66 ELECTRICAL SYSTEM

Indicator Unit

Indicator Unit Circuit



HP20035BW4 C

1. Indicator Unit
2. Neutral Switch
3. Reverse Switch
4. Fuel Reserve Switch

5. Igniter
6. Oil Pressure Switch
7. Water Temperature Switch

8. Ignition Switch
9. Main Fuse 30A
10. Battery

Switches

Brake Light Switch Adjustment

- Refer to the Brake Light Switch Inspection in the Periodic Maintenance chapter.

Radiator Fan Switch Inspection

- Remove:
Radiator Fan Switch (see Cooling System chapter)
- Suspend the fan switch [A] in a container of coolant so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer [B] in the coolant.

NOTE

- *The switch and thermometer must not touch the container sides or bottom.*
- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the switch across the terminals at the temperatures shown in the table.
- ★ If the hand tester does not show the specified values, replace the switch.

Radiator Fan Switch Resistance

○ Rising temperature:

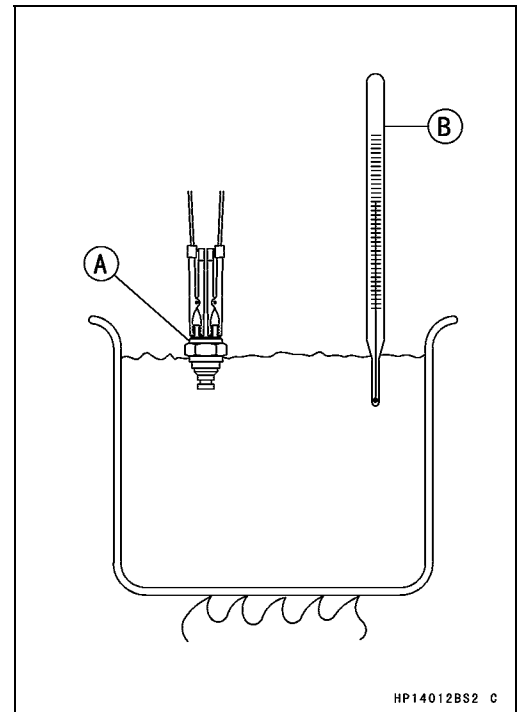
From OFF to ON at 96 ~ 100°C (205 ~ 212°F)

○ Falling temperature:

From ON to OFF at 91 ~ 95°C (196 ~ 203°F)

ON: Less than 0.5 Ω

OFF: More than 1 MΩ



16-68 ELECTRICAL SYSTEM

Switches

Coolant Temperature Warning Light Switch Inspection

- Remove:
Coolant Temperature Warning Light Switch (see Cooling System chapter)
- Suspend the switch [A] in a container of coolant so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer [B] in the coolant.

NOTE

- *The switch and thermometer must not touch the container sides or bottom.*
- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the switch across the connector and the body at the temperatures shown in the table.
- ★ If the hand tester does not show the specified values, replace the switch.

Coolant Temperature Warning Light Switch Resistance

○ Rising temperature:

From OFF to ON at 112 ~ 118°C (234 ~ 244°F)

○ Falling temperature:

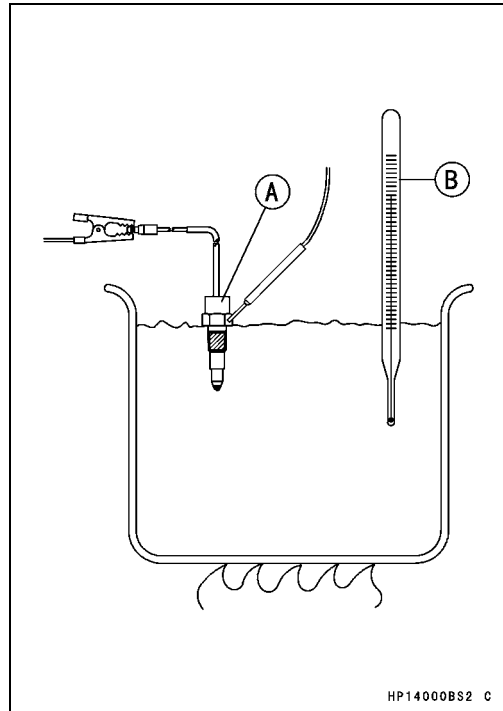
From ON to OFF at 108 ~ 111°C (226 ~ 232°F)

ON: Less than 0.5 Ω

OFF: More than 1 MΩ



Switch Inspection

- Using the hand tester, check to see that only the connections shown in the table have continuity (about zero ohms).
- For the handlebar switches, ignition switch, refer to tables in the Wiring Diagram.
- ★ If the switch has an open or short, repair or replace it with a new one.

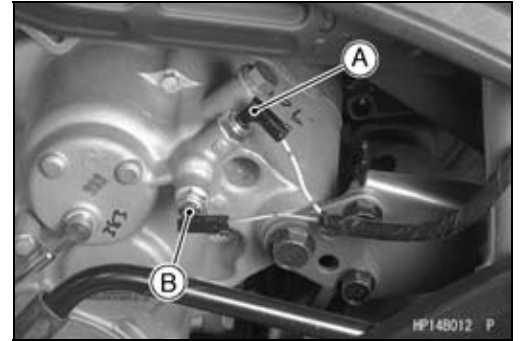


Switches

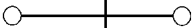

Neutral Switch Connection

	SW.Terminal	$\overline{\text{TTT}}$
When transmission is in neutral		
When transmission is not in neutral		

[A] Neutral Switch





Reverse Switch Connections

	SW.Terminal	$\overline{\text{TTT}}$
When transmission is in reverse		
When transmission is not in reverse		

[B] Reverse Switch

Oil Pressure Switch Connections*

	SW. Terminal	$\overline{\text{TTT}}$
When engine is stopped		
When engine is running		

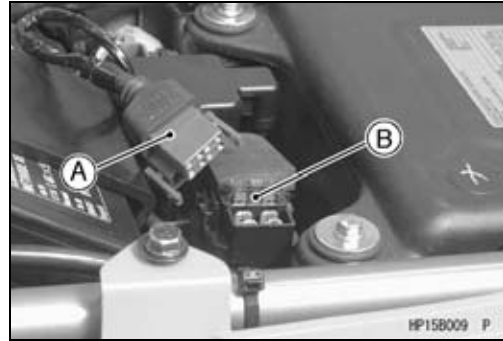
*: Engine lubrication system is in good condition.

16-70 ELECTRICAL SYSTEM

Fuses

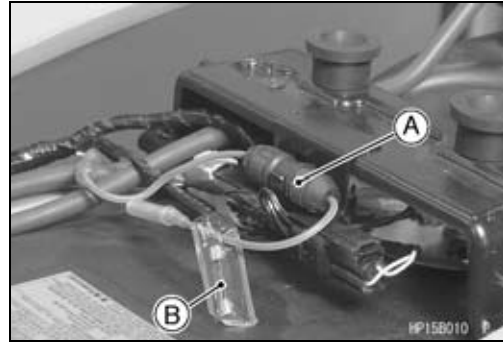
30 A Main Fuse Removal

- Remove:
 - Seat (see Frame chapter)
 - Starter Relay and 30A Main Fuse Connector [A]
- Pull out the main fuse [B] from the starter relay with a needle nose pliers.



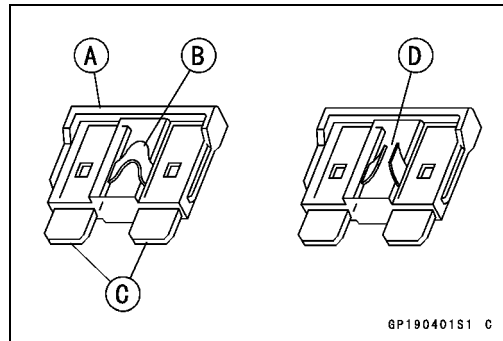
Radiator Fan Fuse Removal

- Remove:
 - Seat (see Frame chapter)
 - Fuse Case Cover [A]
- Pull out the fuse from the fuse case.
 - Spare Fuse [B]



Main Fuse Inspection

- Inspect the fuse element.
- ★ If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.
 - Housing [A]
 - Fuse Element [B]
 - Terminals [C]
 - Blown Element [D]



CAUTION

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

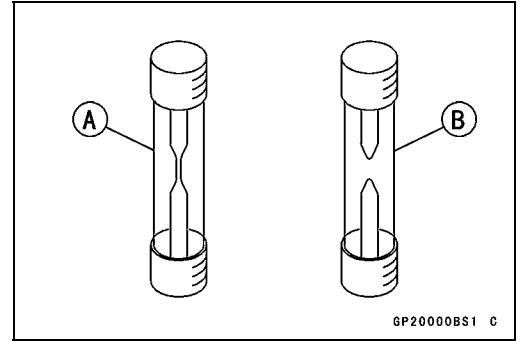
Fuses

Radiator Fan Fuse Inspection

- Remove the fuse (see Radiator Fan 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.

Fuse Element [A]

Blown Element [B]

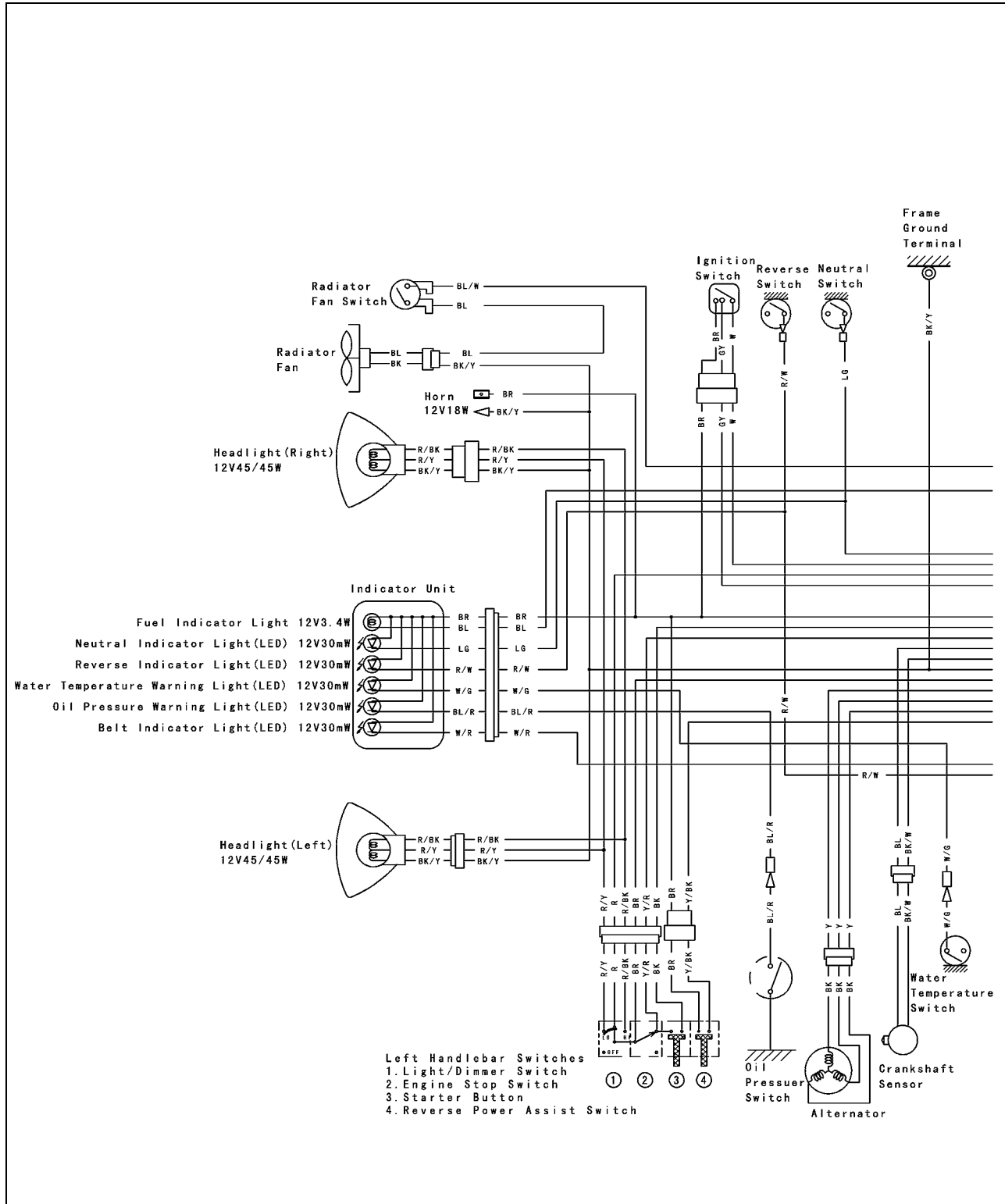


CAUTION

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

16-72 ELECTRICAL SYSTEM

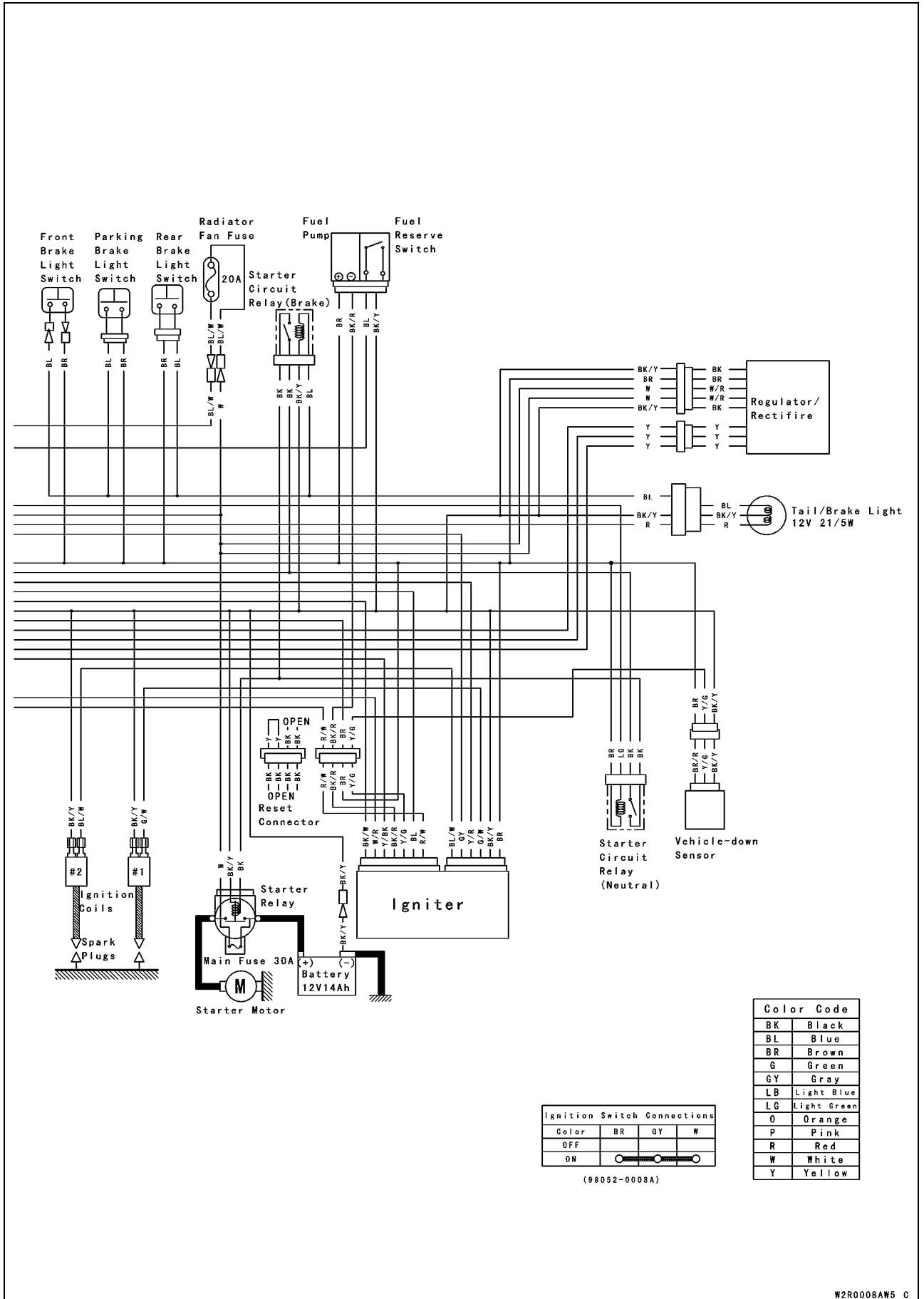
Wiring Diagram



- Left Handlebar Switches**
1. Light/Dimmer Switch
 2. Engine Stop Switch
 3. Starter Button
 4. Reverse Power Assist Switch

Left Handlebar Switch Connections													
Light/Dimmer Switch				Engine Stop Switch			Starter Button			Reverse Power Assist Switch			
Color	R/Y	R	R/BK	BR	Color	BR	Y/R	Color	Y/R	BK	Color	BR	Y/BK
OFF					OFF			Released			OFF		
LO	●	●	●	●				Push	●		ON	●	
HI					RUN	●							

Wiring Diagram



Appendix

TABLE OF CONTENTS

Troubleshooting Guide	17- 2
Cable, Wire, and Hose Routing	17- 6

17-2 APPENDIX

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:

- Neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:

- Starter motor clutch trouble

Engine won't turn over:

- Valve seizure
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure

No fuel flow:

- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

Engine flooded:

- Fuel level 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.)

Fuel/air mixture incorrect:

- Pilot screw and/or idle adjusting screw maladjusted
- Pilot jet or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter jet clogged

No spark; spark weak:

- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble

- Spark plug cap not in good contact
- Spark plug incorrect
- Crankshaft Sensor trouble
- Igniter trouble
- Ignition coil trouble
- Battery voltage low
- Ignition or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

Compression Low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
- Compression release cam (K.A.C.R.) sticks open (Engine stalls when moving off)

Poor Running at Low Speed:

Spark weak:

- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- Igniter trouble
- Pickup coil trouble
- Ignition coil trouble
- Battery voltage low

Fuel/air mixture incorrect:

- Pilot screw and/or idle adjusting screw maladjusted
- Pilot jet or air passage clogged
- Starter plunger stuck open
- Air cleaner clogged, poorly sealed, or missing
- Fuel level too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Air cleaner duct loose

Compression low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance

Troubleshooting Guide

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)
 Compression release cam (K.A.C.R.) sticks open (Engine stalls when moving off)

Other:

Carburetor vacuum piston doesn't slide smoothly
 Engine oil viscosity too high
 Brake dragging
 Igniter trouble
 Final gear case oil viscosity too high

Poor Running or No Power at High Speed:

Firing incorrect:

Spark plug dirty, broken, or maladjusted
 Spark plug cap or spark plug lead trouble
 Spark plug cap shorted or not in good contact
 Spark plug incorrect
 Pickup coil trouble
 Igniter trouble
 Ignition coil trouble

Fuel/air mixture incorrect:

Main jet clogged or wrong size
 Jet needle or needle jet worn
 Main air jet clogged
 Bleed holes of air bleed pipe or needle jet clogged
 Fuel level too high or too low
 Air cleaner clogged, poorly sealed, or missing
 Starter plunger stuck open
 Water or foreign matter in fuel
 Carburetor holder loose
 Air cleaner duct loose
 Fuel tank air vent obstructed
 Fuel tap clogged
 Fuel line clogged

Compression low:

Spark plug loose
 Cylinder head not sufficiently tightened down
 No valve clearance
 Cylinder, piston worn
 Piston rings 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.)
 Compression release cam (K.A.C.R.) sticks open (Engine stalls when moving off)

Knocking:

Carbon built up in combustion chamber
 Fuel poor quality or incorrect
 Spark plug incorrect
 Igniter trouble

Miscellaneous:

Throttle valve won't fully open
 Carburetor vacuum piston doesn't slide smoothly
 Brake dragging
 Overheating
 Engine oil level too high
 Engine oil viscosity too high
 Final gear case oil viscosity too high

Overheating:

Firing incorrect:

Spark plug dirty, broken, or maladjusted
 Spark plug incorrect
 Igniter trouble

Fuel/air mixture incorrect:

Main jet clogged
 Fuel level too low
 Carburetor holder loose
 Air cleaner poorly sealed, or missing
 Air cleaner duct loose
 Air cleaner clogged

Compression high:

Carbon built up in combustion chamber
 Compression release cam (K.A.C.R.) sticks close

Engine load faulty:

Engine oil level too high
 Engine oil viscosity too high
 Drive train trouble
 Brake dragging

Lubrication inadequate:

Engine oil level too low
 Engine oil poor quality or incorrect

Final gear case overheating:

Insufficient oil
 Bevel gears maladjusted

Coolant incorrect:

Coolant level too low
 Coolant deteriorated

17-4 APPENDIX

Troubleshooting Guide

Thick coolant

Cooling system component incorrect:

Radiator clogged
Thermostat trouble
Radiator cap trouble
Radiator fan switch trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Cooling system component incorrect:

Radiator fan switch trouble
Thermostat trouble

Converter Operation Faulty:

Belt slipping:

Belt dirty, worn, or wetted
Drive or driven pulley sheave dirty or worn
Drive pulley spring broken or weak

Converter engagement speed too low:

Drive pulley spring broken or weak

Converter engagement speed too high:

Belt dirty or worn
Drive or driven pulley sheave dirty or worn
Drive pulley weight doesn't move smoothly
Drive pulley movable sheave doesn't move smoothly
Drive or driven pulley movable sheave bush worn
Drive pulley weight or roller worn

Shifting too quickly:

Drive pulley spring weak
Driven pulley spring weak or incorrectly installed (too loose)

Shifting too slowly:

Belt dirty or worn
Drive or driven pulley sheave dirty or worn
Drive pulley weight doesn't move smoothly
Drive pulley movable sheave doesn't move smoothly
Drive pulley spring incorrect installed (too tight)
Driven pulley movable sheave doesn't move smoothly

Gear Shifting Faulty:

Doesn't go into gear:

Shift shaft bent or seized
Gear stuck on the shaft
Shift control grip damaged
Shift control cable maladjusted
Reverse lock maladjusted

Jumps out of gear:

Shifter groove worn

Gear dogs worn
Shift block worn
Shift fork worn
Shift shaft spring weak or broken
Shift control cable maladjusted
Drive shaft, output shaft, and/or gear splines worn

Overshifts:

Shift shaft spring weak or broken
Shift control cable maladjusted

Abnormal Engine Noise:

Knocking:

Igniter trouble
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating

Piston Slap:

Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston holes worn

Valve noise:

Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Rocker arm 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
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guides worn
Loose alternator rotor

Abnormal Drive Train Noise:

Converter noise:

Belt worn
Drive or driven pulley sheave worn
Drive or driven pulley movable sheave bush worn
Drive or driven pulley mount loose
Driven pulley shoe worn
Drive pulley weight or roller side washer worn

Troubleshooting Guide

Drive pulley weight or roller worn
Wear guides worn

Transmission noise:

Bearing worn
Transmission gears worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient or too thin

Final gear case noise:

Insufficient lubricant
Bevel gear bearings worn
Bevel gears worn or chipped
Bevel gears maladjusted

Abnormal Frame Noise:

Shock absorber noise:

Shock absorber damaged

Disc brake noise:

Pad installed incorrectly
Pad surface glazed
Disc warped
Caliper trouble

Rear brake noise:

Foreign matter in hub
Brake not properly adjusted

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
Cylinder head gasket damaged
Engine oil level too high

Black Smoke:

Air cleaner clogged
Main jet too large or fallen off
Starter plunger stuck open
Fuel level too high

Brown smoke:

Main jet too small
Fuel level too low
Air cleaner duct loose
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory

Handlebar hard to turn:

Tire air pressure too low
Steering stem bearing damaged
Steering stem bearing lubrication inadequate
Steering stem bent
Damage tie-rod end

Handlebar shakes or excessively vibrates:

Tire worn
Wheel rim warped
Rear axle runout excessive
Wheel bearing worn
Handlebar clamp loose
Steering stem clamp bolt loose

Handlebar pulls to one side:

Frame bent
Wheel maladjustment
Suspension arm bent or twisted
Steering stem bent
Front or rear tire air pressure unbalanced
Front shock absorber unbalanced

Shock absorption unsatisfactory:

Too hard:

Tire air pressure too high
Shock absorber maladjusted

Too soft:

Shock absorber oil leaking
Shock absorber spring weak
Tire air pressure too low
Shock absorber maladjusted

Brake Doesn't Hold

Front brake:

Air in the brake line
Brake fluid leakage
Brake fluid deteriorated
Primary or secondary cup trouble
Master cylinder scratched inside
Pad overworn or worn unevenly
Oil, grease on pads and disc
Disc worn or warped
Brake overheated

Rear Brake:

Brake not properly adjusted
Plates worn
Brake parts worn or damaged

Battery Discharged:

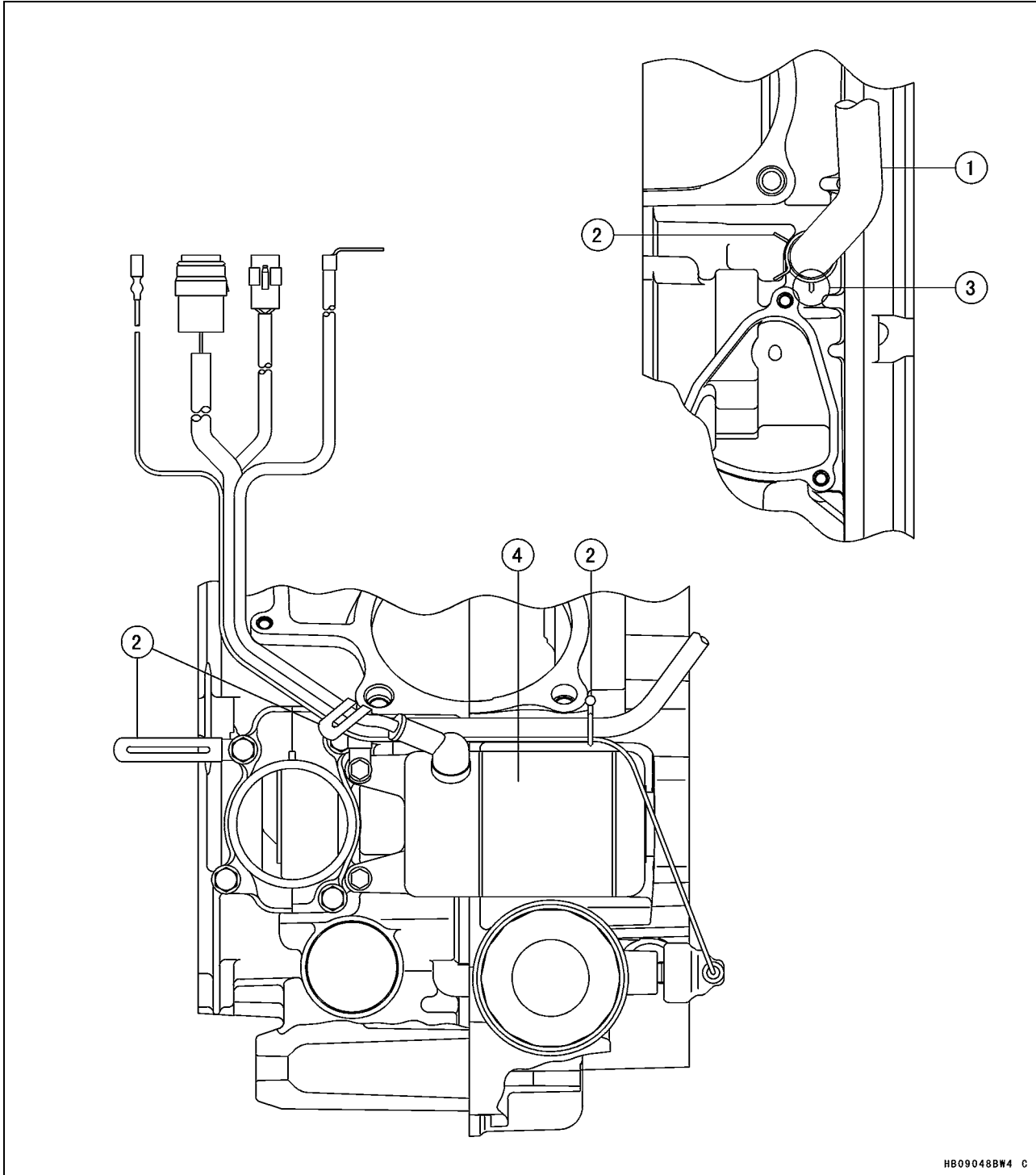
Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
Battery leads making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Regulator/rectifier trouble
Alternator trouble
Wiring faulty

Battery Overcharged:

Regulator/rectifier trouble
Battery trouble

17-6 APPENDIX

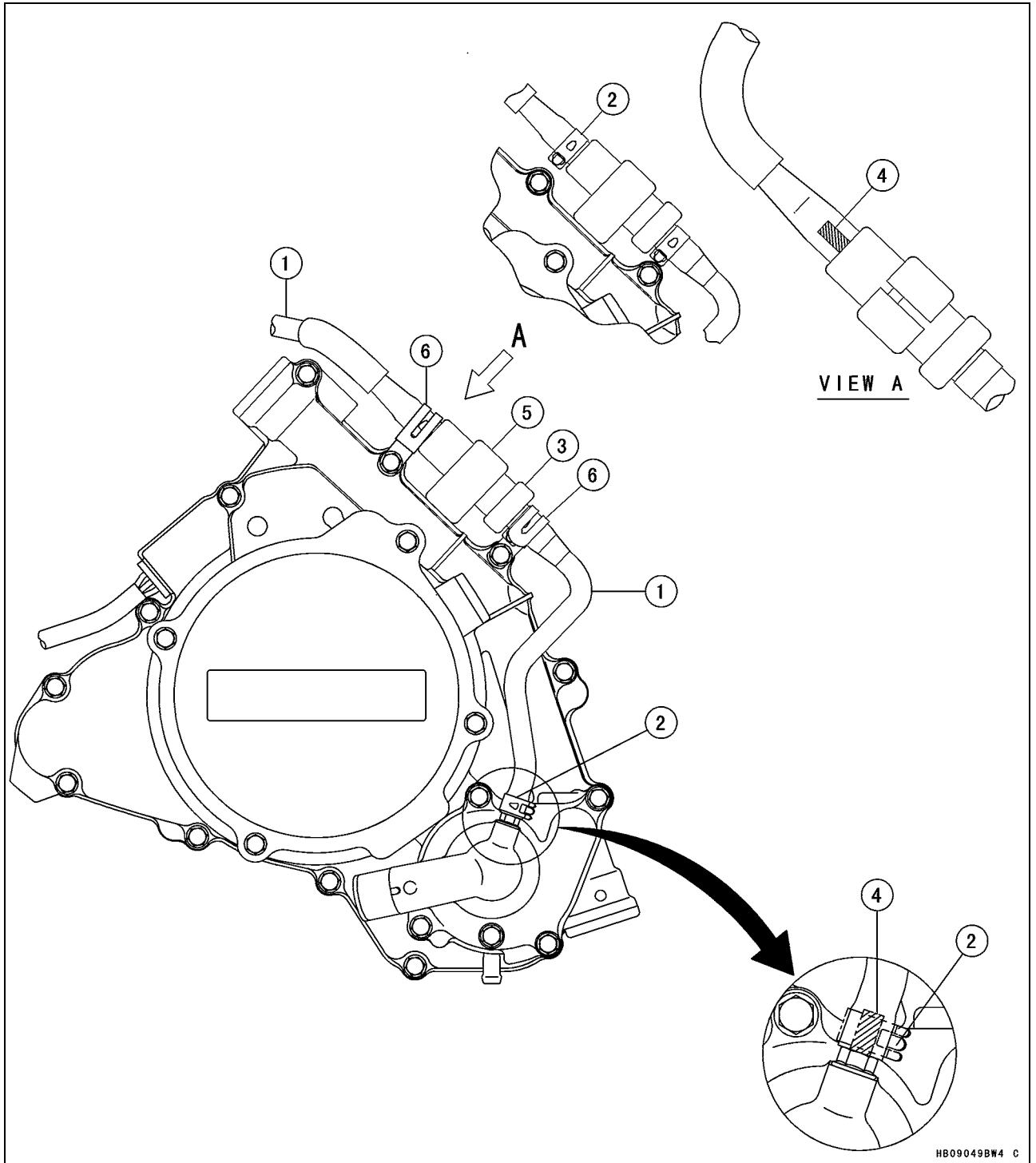
Cable, Wire, and Hose Routing



HB09048BW4 C

1. Tube
2. Clamp
3. Align the white paint mark on the tube with the adjustment mark on the crankcase.
4. Electric Starter

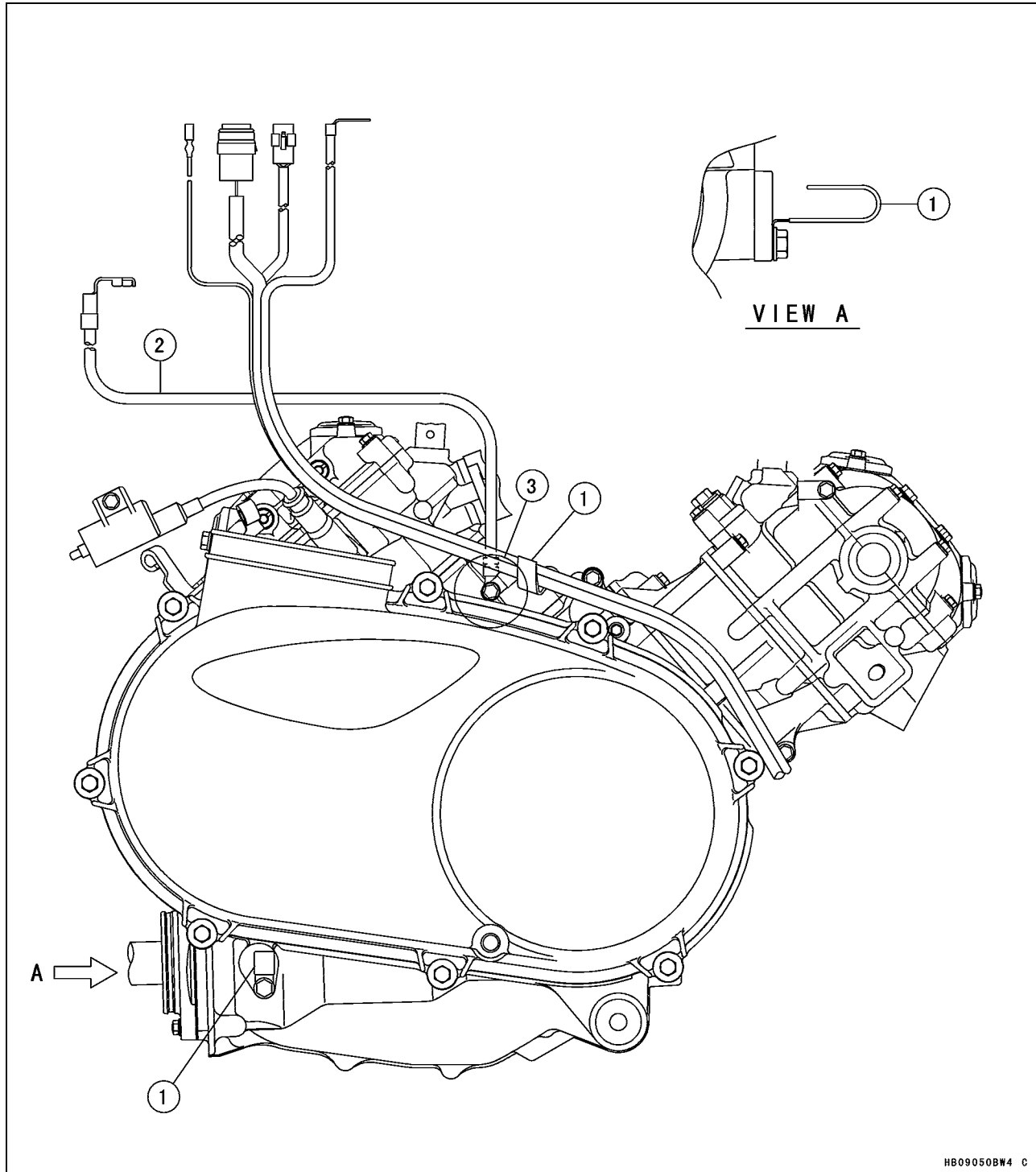
Cable, Wire, and Hose Routing



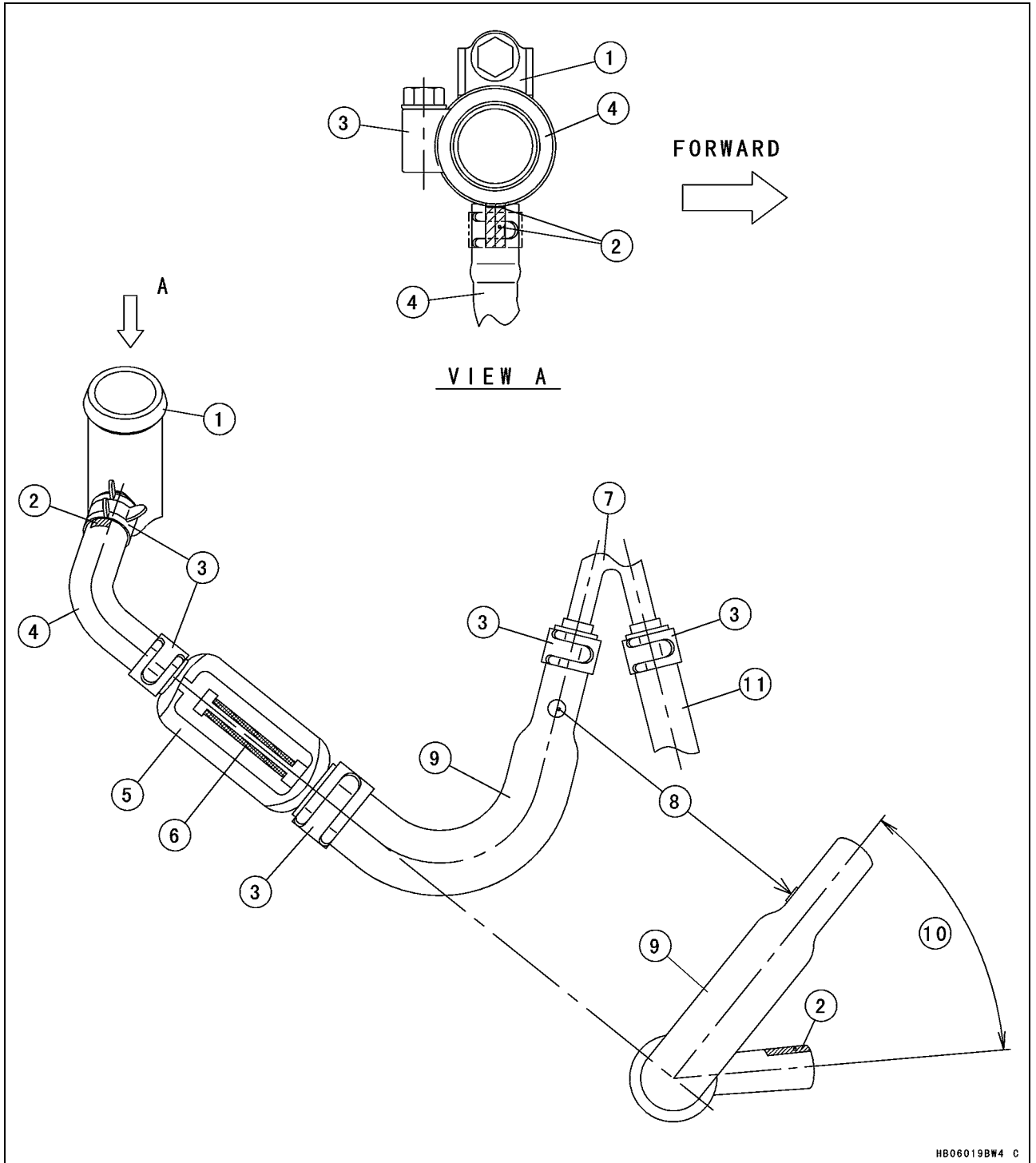
1. Cooling Hoses
2. Clamps (Install the clamps with the tabs direction as shown.)
3. Coolant Valve
4. Position the white marks on the tube as shown.
5. Damper
6. Clamps

17-8 APPENDIX

Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

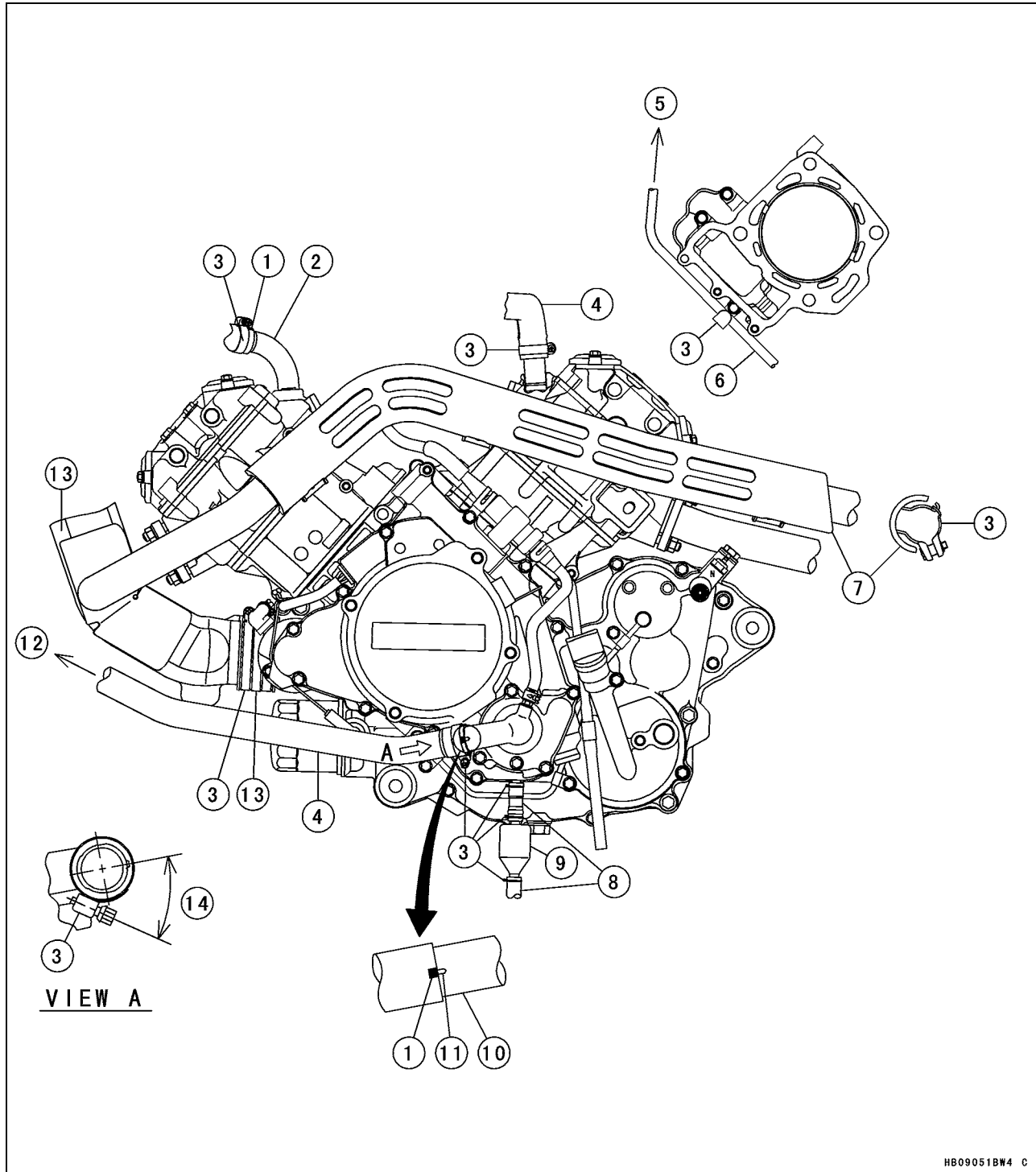


HB06019BW4 C

- | | |
|------------------------|---|
| 1. Water Pipe | 7. Carburetor |
| 2. White Paint | 8. Mark |
| 3. Clamps | 9. Cooling Hose |
| 4. Cooling Hoses | 10. Assemble Angle (about 45°, [4] and [9] hoses) |
| 5. Coolant Filter Body | 11. Cooling Hose |
| 6. Coolant Filter | |

17-10 APPENDIX

Cable, Wire, and Hose Routing

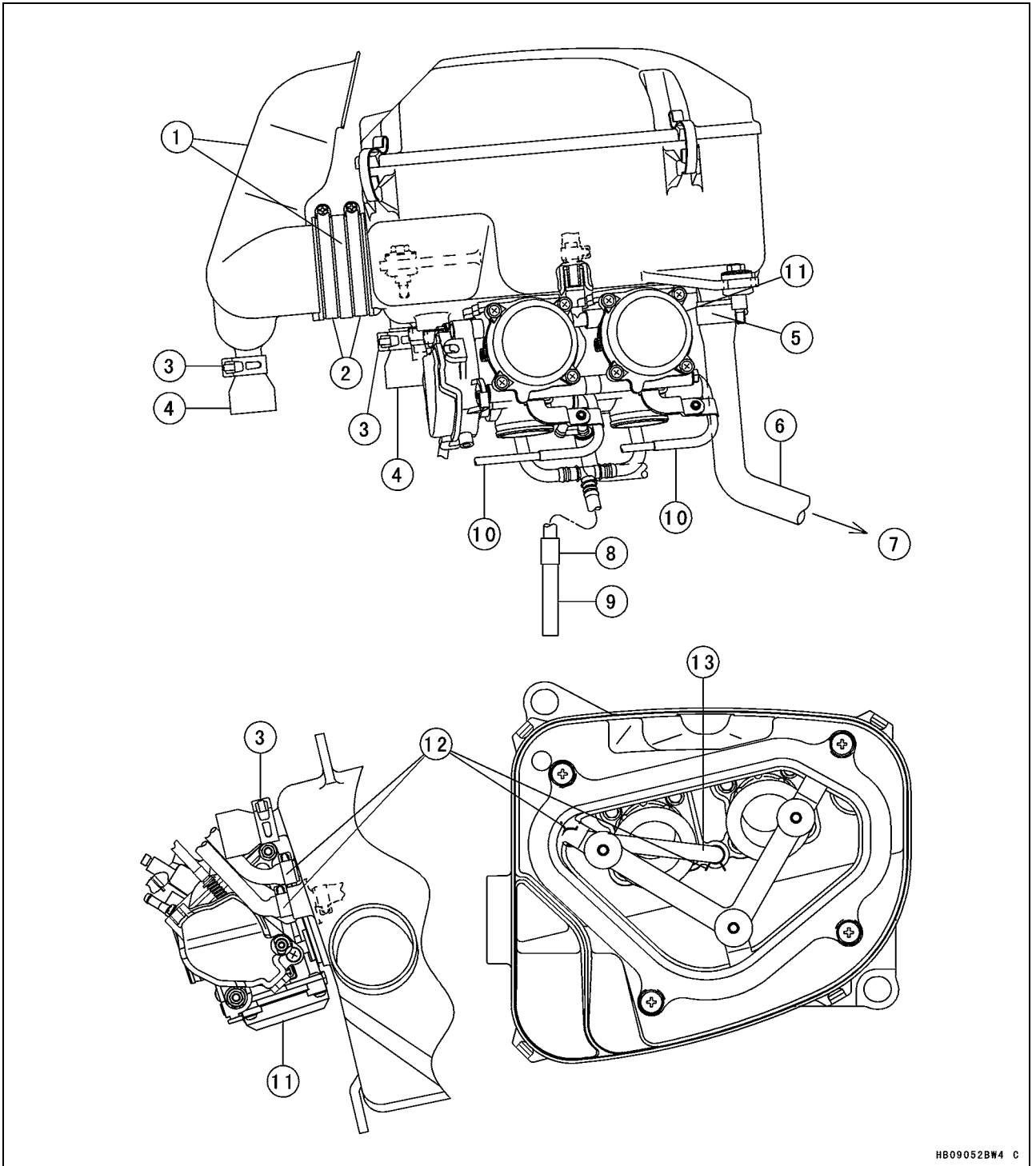


HB09051BW4 C

1. White Paint
2. Water Pipe
3. Clamp
4. Cooling Hose
5. To Carburetor
6. Carburetor Overflow Tube
7. Exhaust Pipe Cover

8. Tube
9. Breather
10. Pump Cover
11. Mark
12. To Radiator
13. Duct
14. Face the clamp screw as shown.

Cable, Wire, and Hose Routing



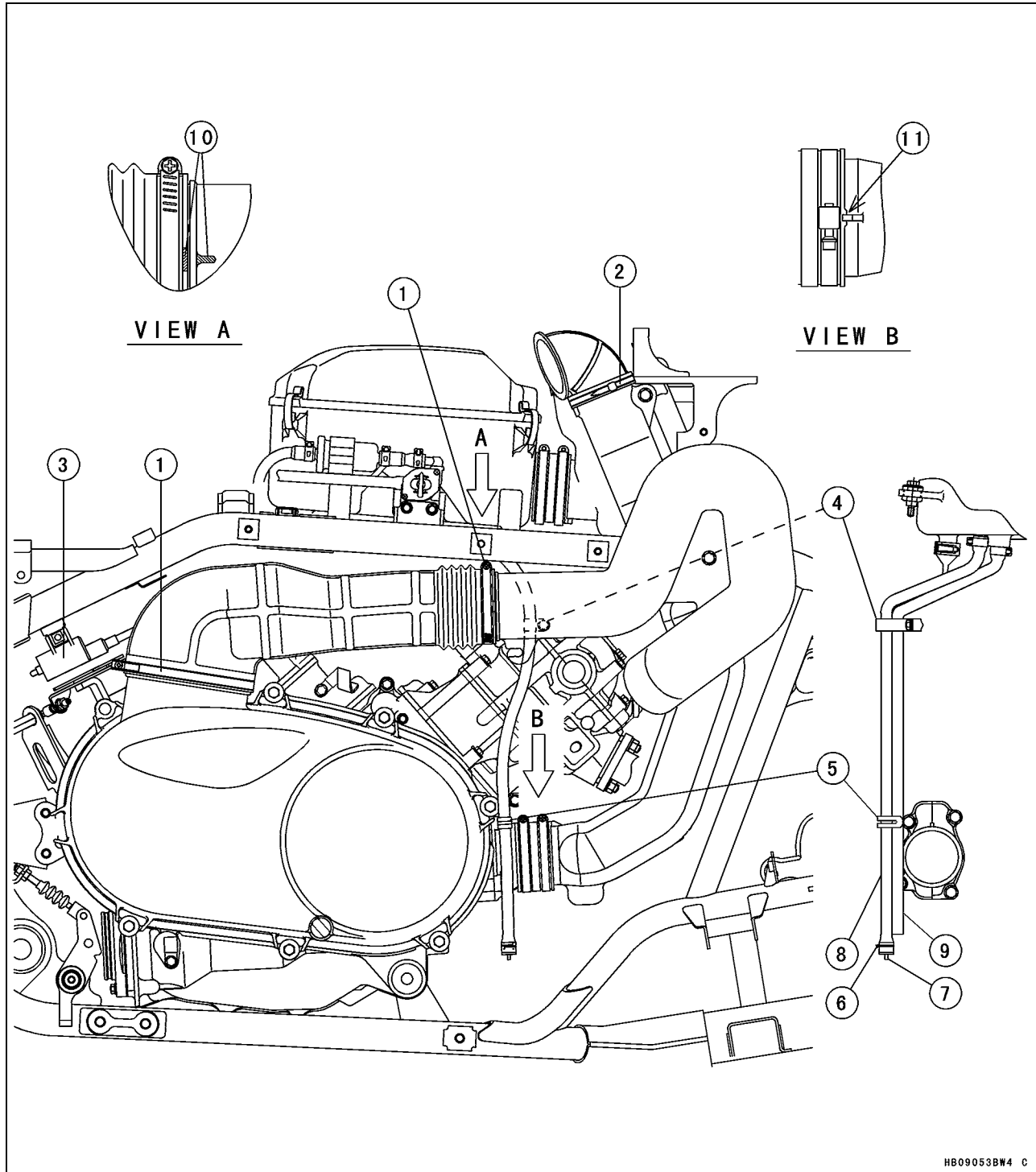
HB09052BW4 C

- 1. Air Cleaner Duct
- 2. Clamps
- 3. Clamps
- 4. Boots
- 5. Clamp
- 6. Vent Hose
- 7. To Crankcase

- 8. Coolant Valve
- 9. Coolant Tube
- 10. Starter Cable
- 11. Carburetor
- 12. Clamps
- 13. Air Vent Tube

17-12 APPENDIX

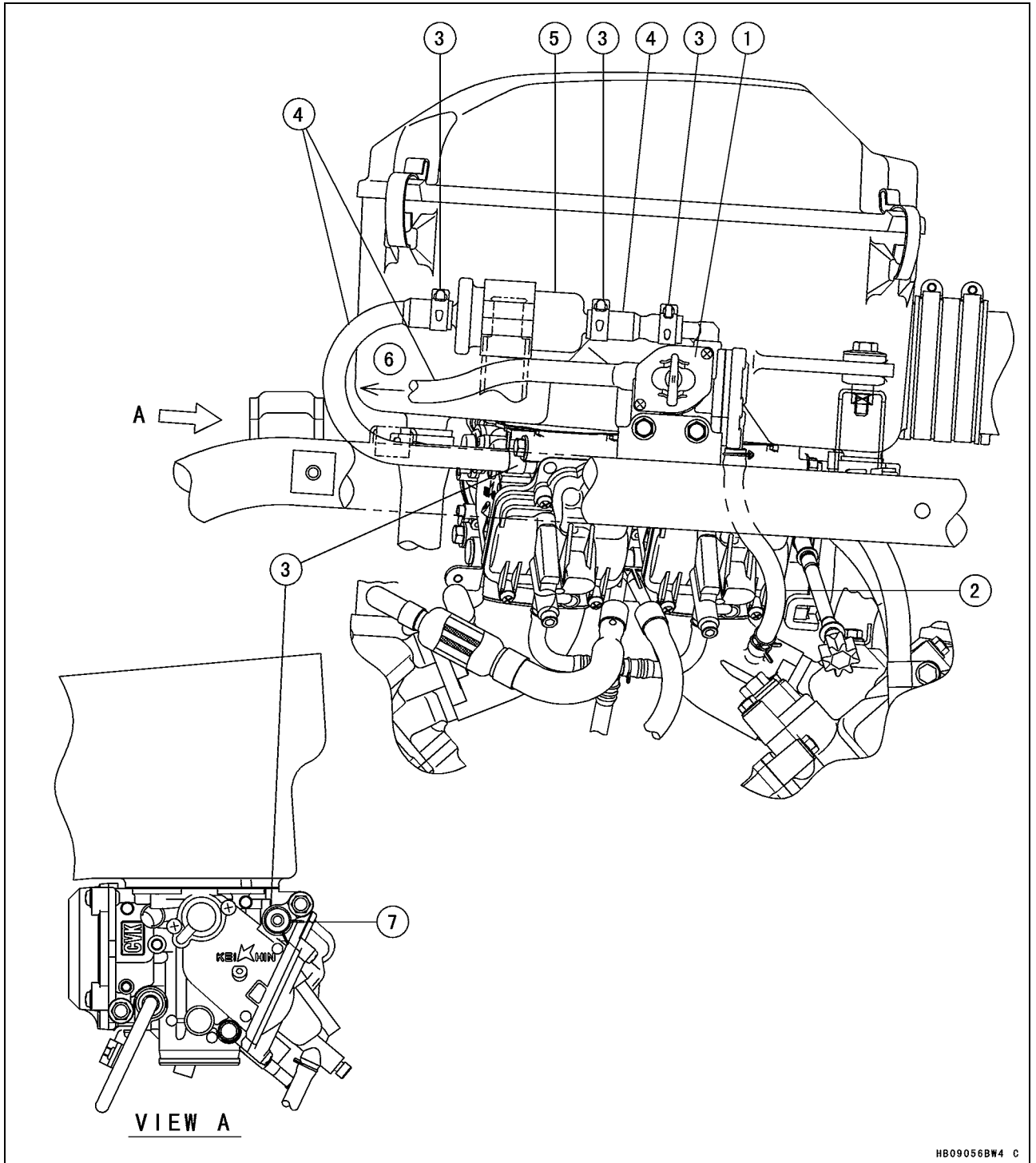
Cable, Wire, and Hose Routing



1. Clamps
2. Bands
3. Ignition Coil (Rear)
4. Clamp
5. Clamp
6. Clamp

7. Drain Plug
8. Drain Hose
9. Vent Hose
10. Align the mark.
11. Fit the projection and groove of the each ducts.

Cable, Wire, and Hose Routing

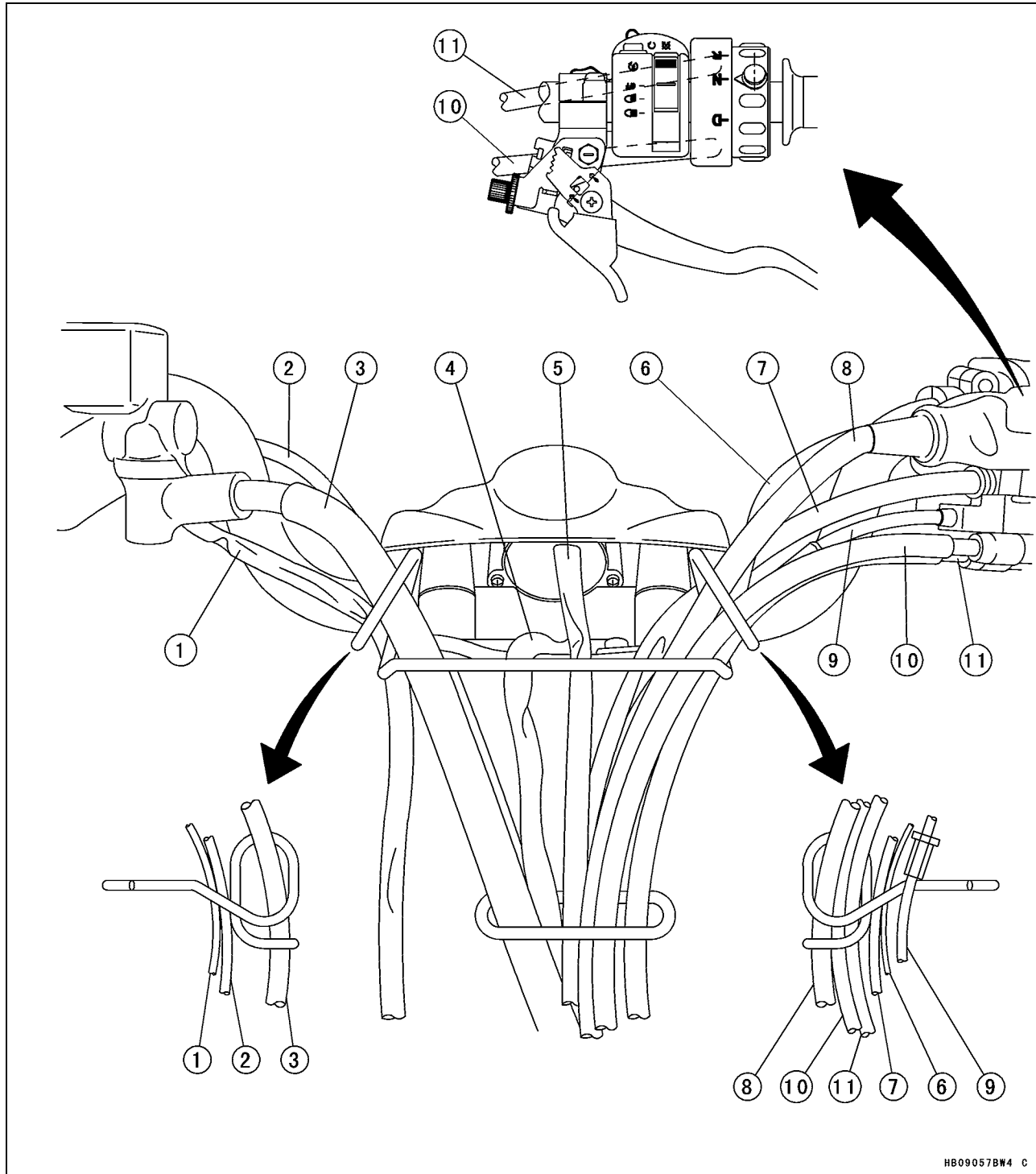


HB09056BW4 C

1. Fuel Tap
2. Fuel Tap Vacuum Hose
3. Clamp
4. Fuel Hose
5. Fuel Filter
6. To Fuel Tank
7. Face the clamp as shown.

17-16 APPENDIX

Cable, Wire, and Hose Routing

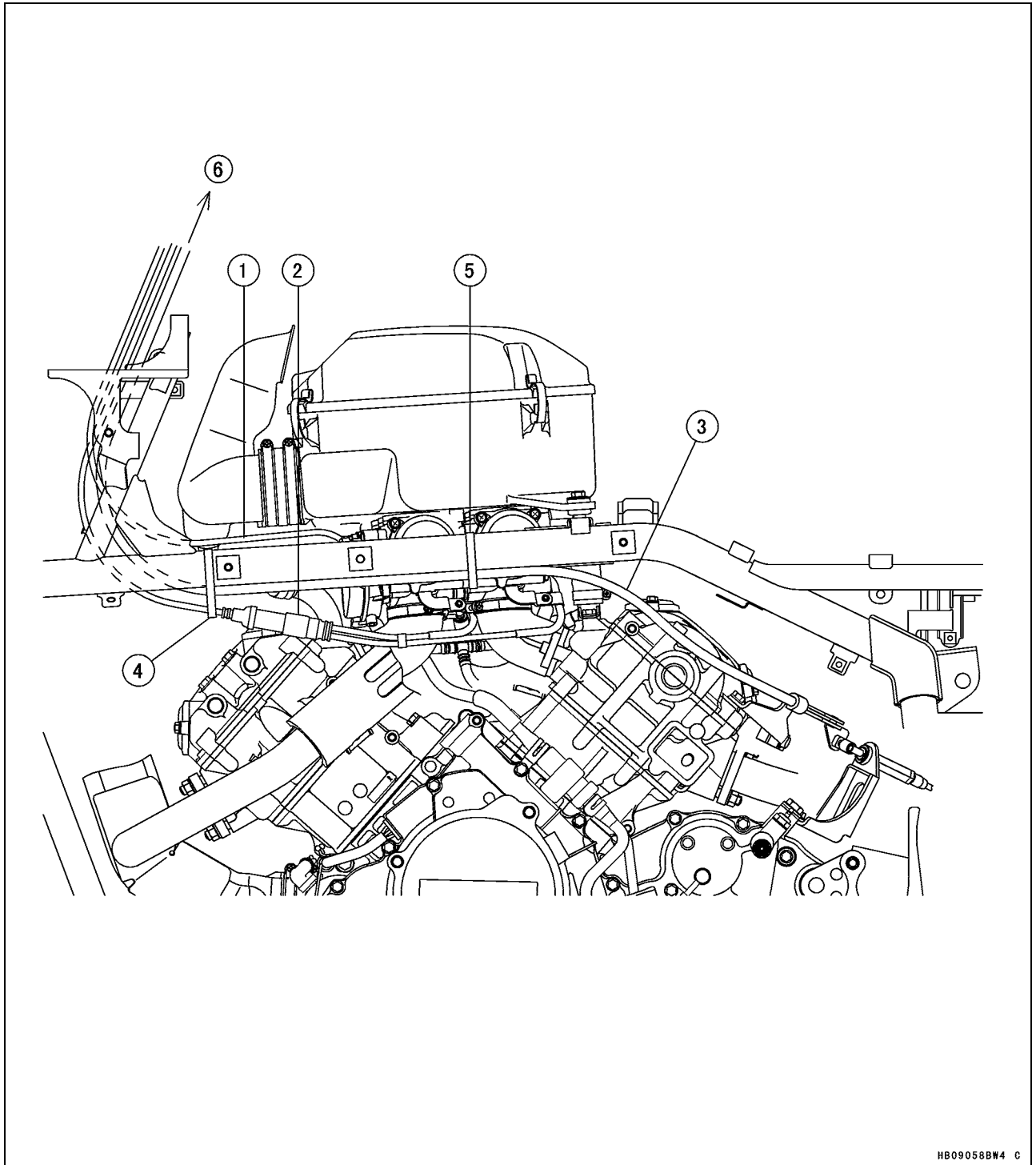


HB09057BW4 C

- 1. Front Brake Switch Lead
- 2. Throttle Cable
- 3. Front Brake Hose
- 4. Indicator Unit Lead
- 5. Ignition Switch Lead
- 6. Brake Switch Lead

- 7. Left Handlebar Switch Lead
- 8. Parking Brake Cable
- 9. Choke Cable
- 10. Shift Control Cable
- 11. Shift Control Cable

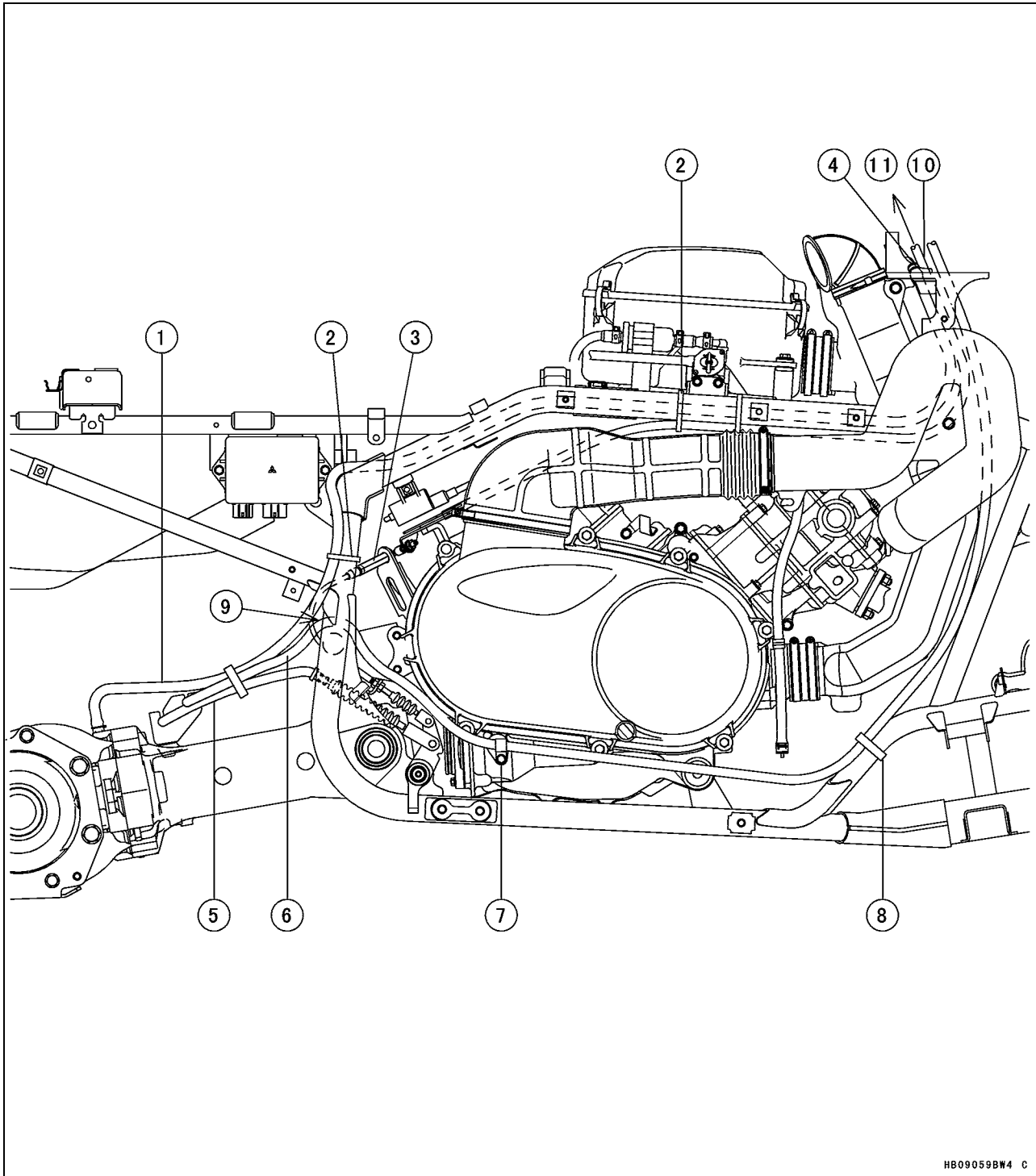
Cable, Wire, and Hose Routing



1. Throttle Cable
2. Choke Cable
3. Shift Control Cable
4. Clamp the choke cable only with the band.
5. Band
6. To Front Side of Shift Control Grip

17-18 APPENDIX

Cable, Wire, and Hose Routing

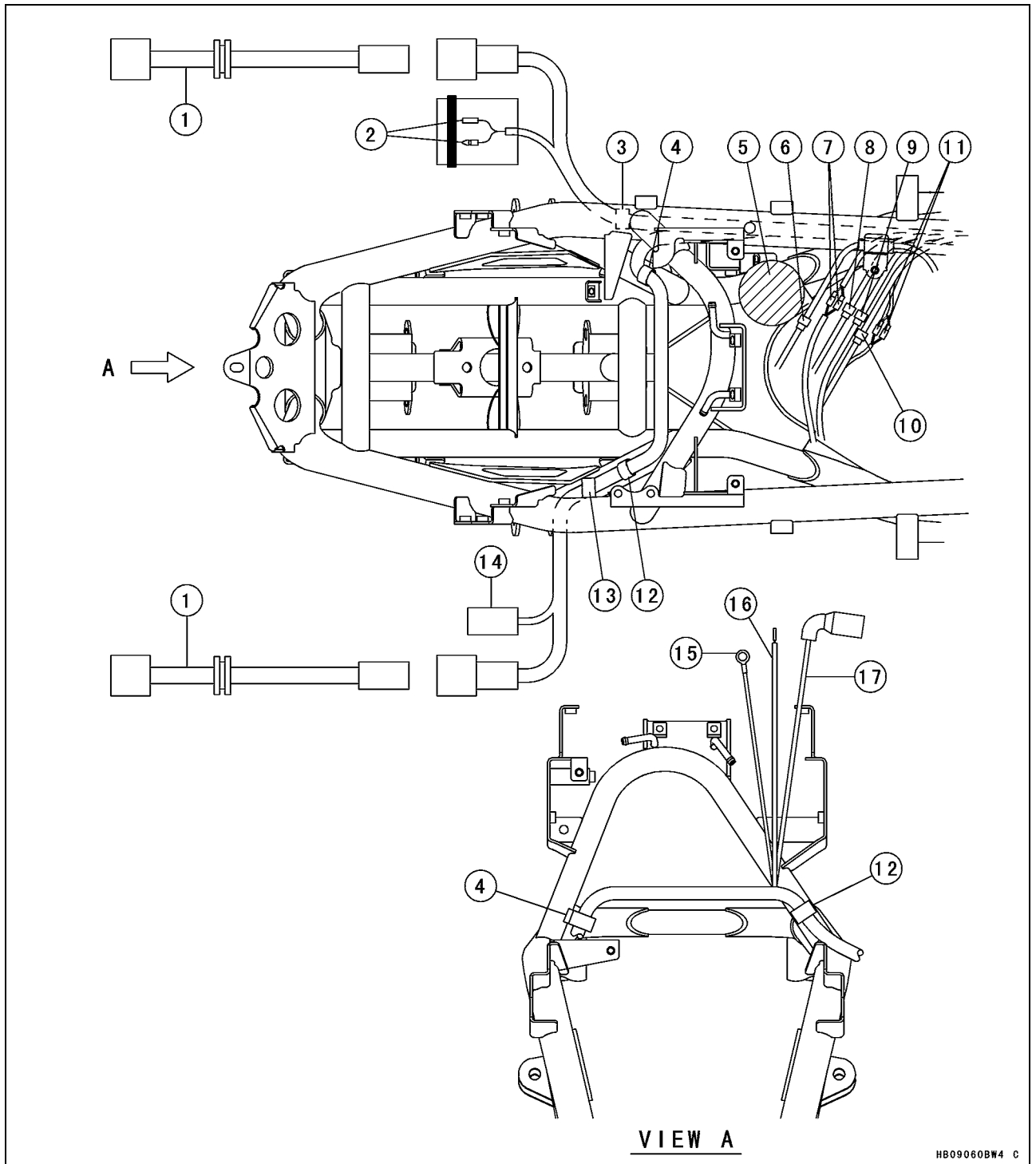


HB09059BW4 C

1. Final Gear Case Breather Hose
2. Band
3. Reverse Lock Cable
4. Clamp
5. Rear Brake Cable
6. Parking Brake Cable

7. Clamp
8. Band (With the Rear Brake Light Switch)
9. Through the parking brake cable upper side on the cross pipe.
10. Shift Control Cable
11. To Rear Side of Shift Control Grip

Cable, Wire, and Hose Routing

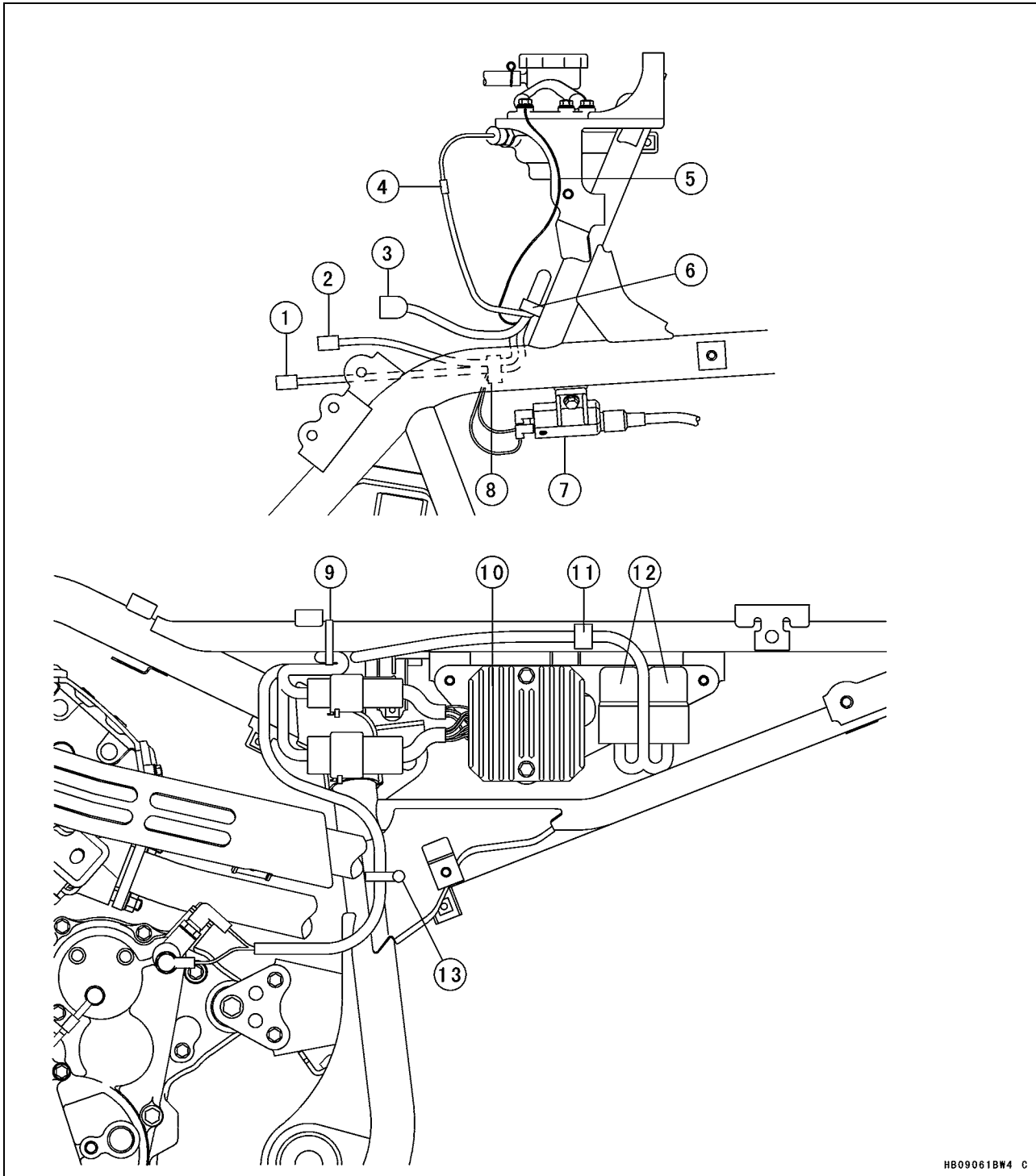


HB09060B4 C

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Head Light Lead 2. Horn Connector 3. Clamp 4. Clamp 5. Convertor Duct 6. Indicator Unit Lead Connector 7. Rear Brake Switch Lead Connector 8. Front Brake Switch Lead Connector 9. Ignition Switch Lead Connector 10. Left Handlebar Switch Lead Connector | <ul style="list-style-type: none"> 11. Reverse Power Assist Switch Lead Connector 12. Clamp 13. Clamp 14. Radiator Fan Connector 15. Ground (Tighten with the thermostat cover bolt.) 16. Water Temperature Warning Switch Lead 17. Radiator Fan Switch Lead |
|--|---|

17-20 APPENDIX

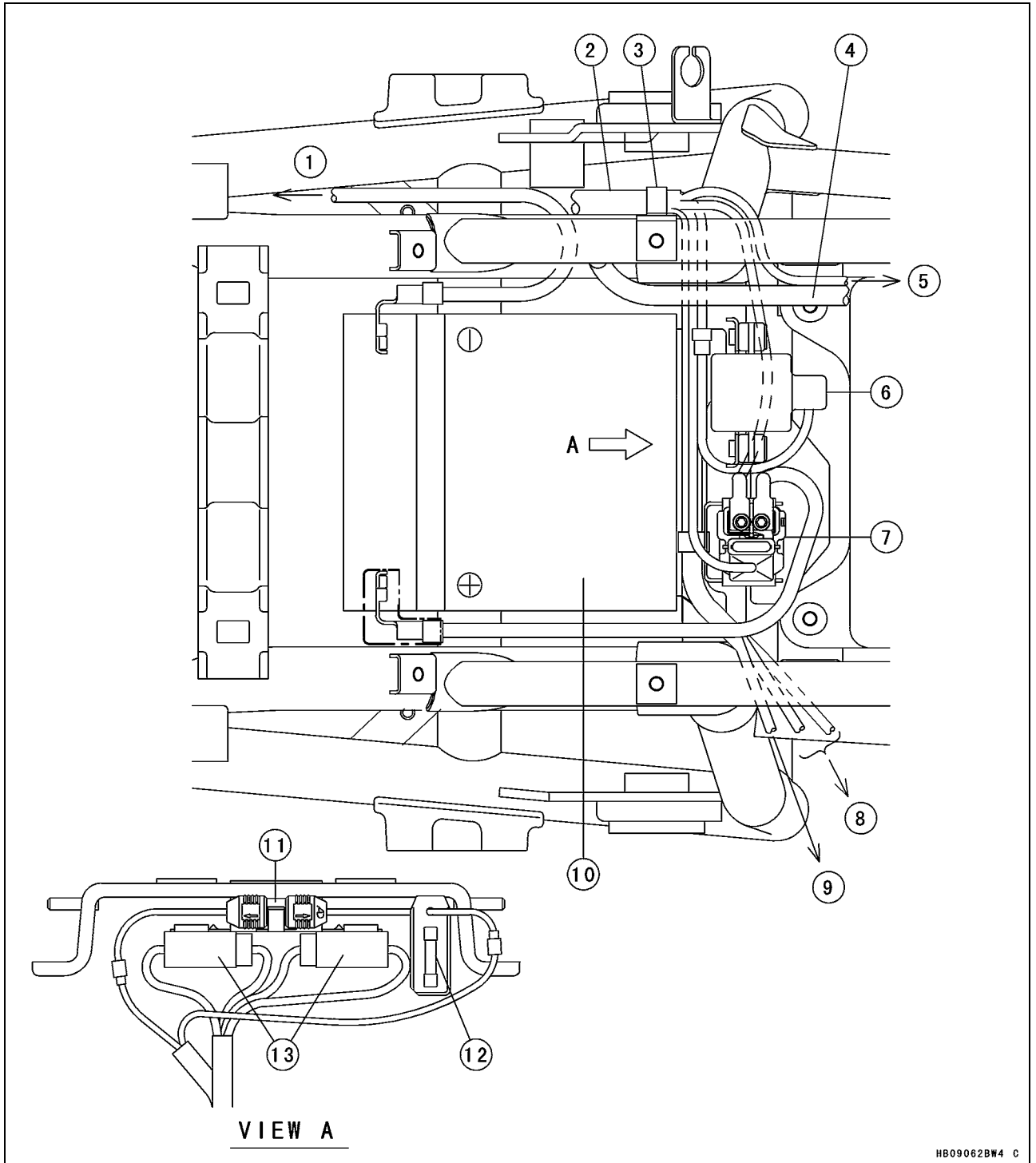
Cable, Wire, and Hose Routing



HB09061BW4 C

- | | |
|---|----------------------------|
| 1. Left Head Light Lead Connector | 7. Ignition Coil (Front) |
| 2. Radiator Fan Connector | 8. Clamp |
| 3. Radiator Fan Switch Connector | 9. Band |
| 4. Water Temperature Warning Switch Lead | 10. Regulator/Rectifier |
| 5. Ground (Tighten with the thermostat cover bolt.) | 11. Clamp |
| 6. Clamp | 12. Starter Circuit Relays |
| | 13. Clamp |

Cable, Wire, and Hose Routing

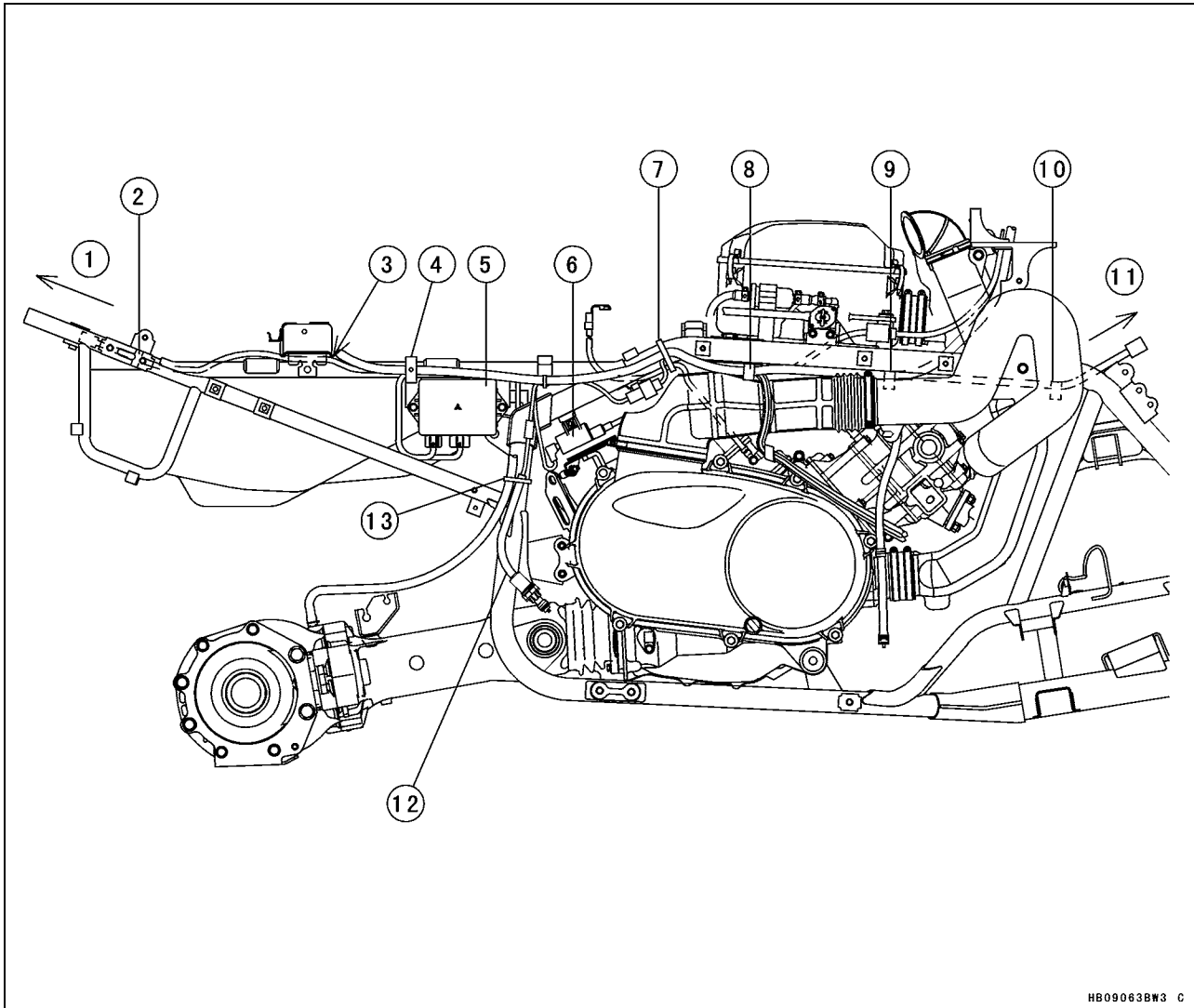


HB09062BW4 C

- | | |
|-----------------------------------|----------------------------------|
| 1. To Engine Ground | 8. To Regulator/Rectifier |
| 2. Main Harness | 9. To Reverse/Neutral Switch |
| 3. Clamp (Main Harness Accessory) | 10. Battery |
| 4. Fuel Tank Breather Hose | 11. Fuse Case (For Radiator Fan) |
| 5. To Tail/Brake Light | 12. Spare Fuse |
| 6. Vehicle-down Sensor | 13. Reset Connectors |
| 7. Starter Relay/Main Fuse | |

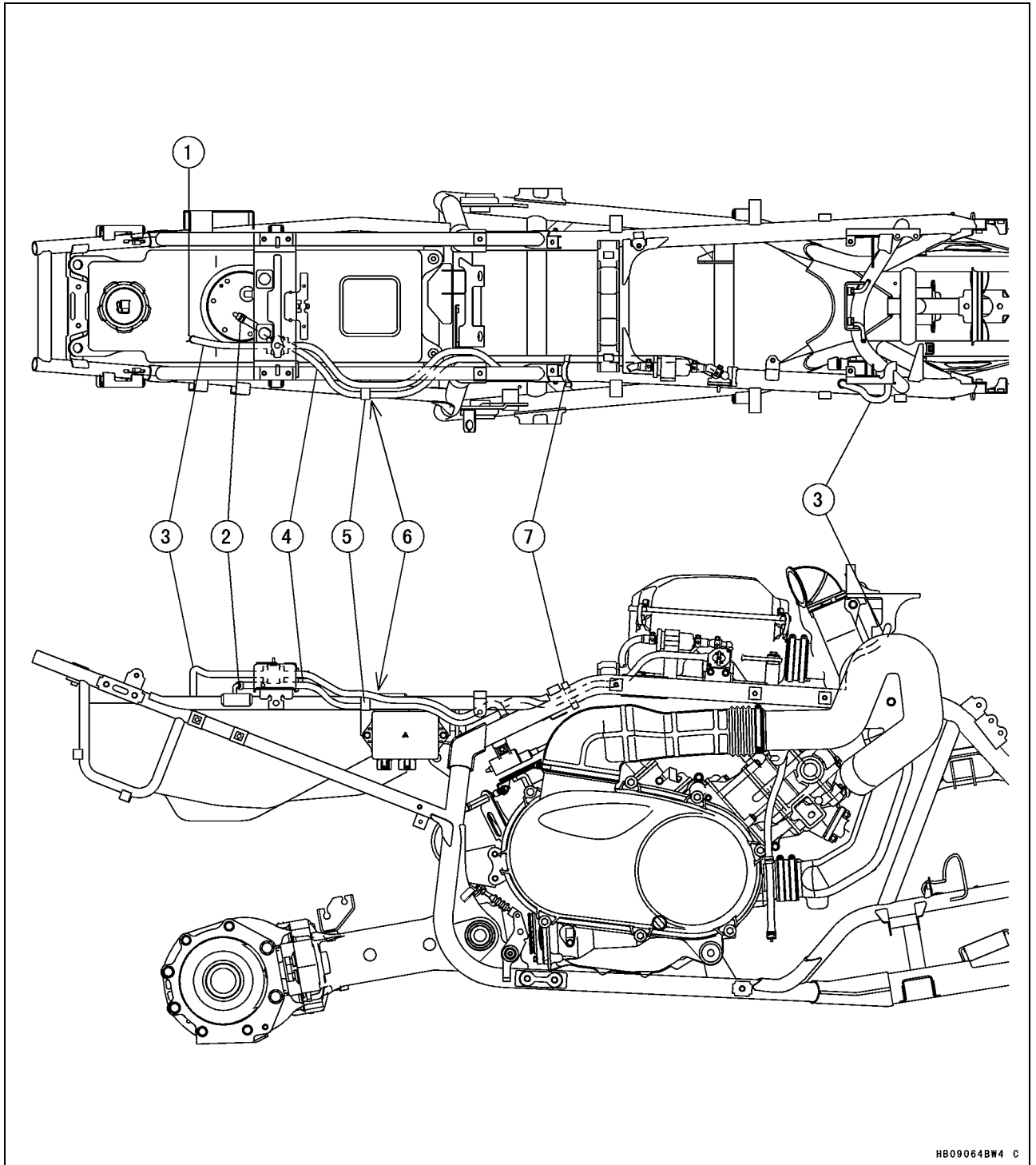
17-22 APPENDIX

Cable, Wire, and Hose Routing



1. To Tail/Brake Light
2. Clamp
3. Run the main harness under the seat bracket.
4. Clamp (With the Fuel Hose)
5. Igniter
6. Ignition Coil (Rear)
7. Band (Face the end of the band upward.)
8. Clamp
9. Clamp
10. Clamp
11. To Right Headlight
12. Rear Brake Light Switch
13. Band (With the Final Gear Case Breather Hose)

Cable, Wire, and Hose Routing



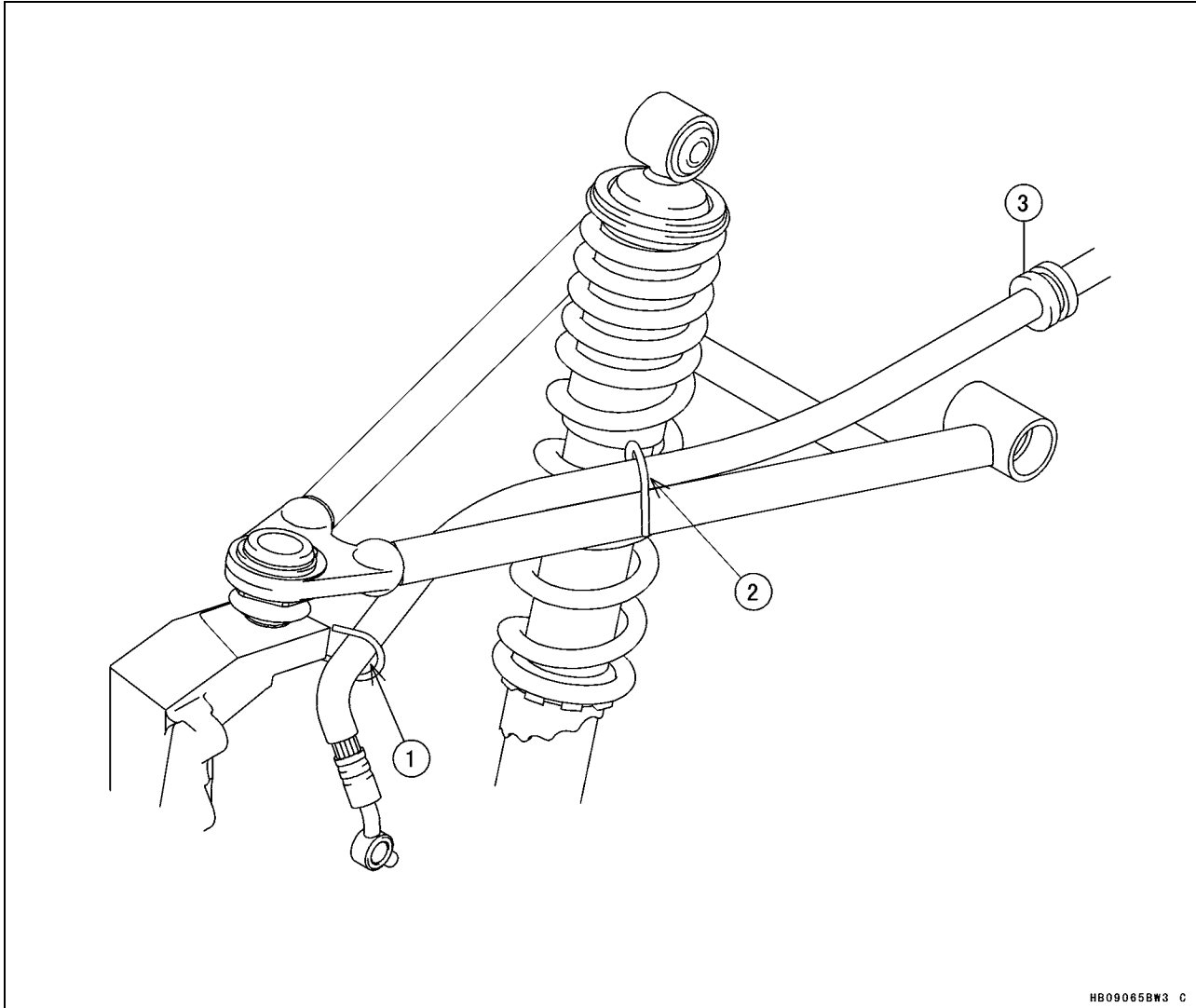
HB09064BW4 C

- 1. Clamp
- 2. Clamp
- 3. Fuel Tank Breather Hose
- 4. Fuel Hose

- 5. Clamp the fuel hose and main harness.
- 6. Through the hoses above the main harness.
- 7. Clamp

17-24 APPENDIX

Cable, Wire, and Hose Routing



1. Through the brake hose to the clamp. (Left Side Only)
2. Through the brake hose to the clamp on the left side suspension arm.
3. Fit the grommet to the frame clamp.

MODEL APPLICATION

Year	Model	Beginning Frame No.
2004	KSV700-A1	JKASV700AAB600001 or JKASV6A1□4B500001

□ : This digit in the frame number changes from one machine to another.



KAWASAKI HEAVY INDUSTRIES, LTD.
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