



**KLX110**  
**KLX110L**



# **Motorcycle** **Service Manual**



# Quick Reference Guide

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

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





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# Motorcycle Service Manual

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

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

## LIST OF ABBREVIATIONS

A	ampere(s)	lb	pound(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	min	minute(s)
ATDC	after top dead center	N	newton(s)
BBDC	before bottom dead center	Pa	pascal(s)
BDC	bottom dead center	PS	horsepower
BTDC	before top dead center	psi	pound(s) per square inch
°C	degree(s) Celsius	r	revolution
DC	direct current	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)		

## COUNTRY AND AREA CODES

AU	Australia	TH	Thailand
CA	Canada	US	United States
EUR	Europe		

**This motorcycle is designed for a rider weighting less than 154 pounds (70 kg). Exceeding this limit could damage the motorcycle.**

# 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.

To get the longest life out of your vehicle:

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

## How to Use This Manual

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

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

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

### **DANGER**

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

### **WARNING**

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

### **NOTICE**

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

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

### **NOTE**

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

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

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





# General Information

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## 1-2 GENERAL INFORMATION

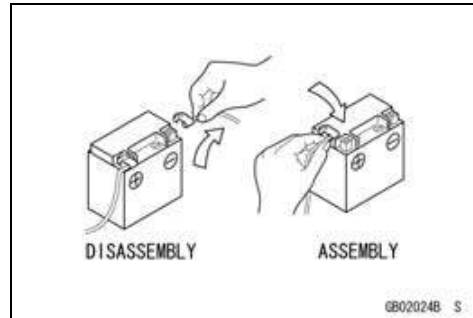
### Before Servicing

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

Especially note the following:

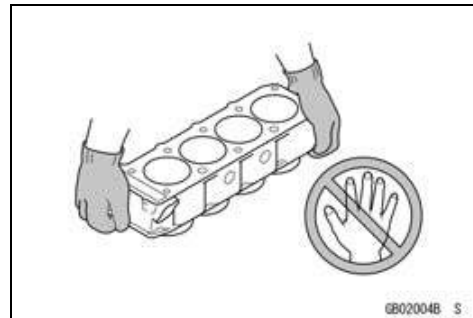
#### **Battery Ground**

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



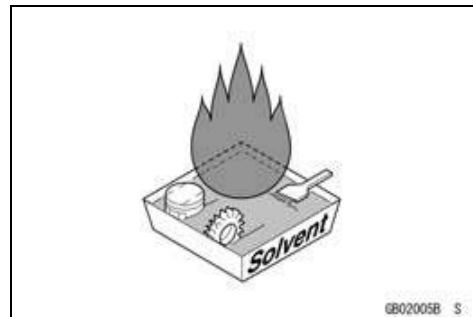
#### **Edges of Parts**

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



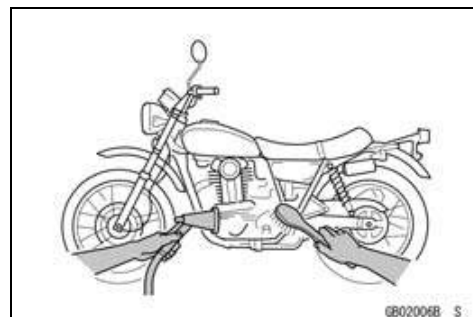
#### **Solvent**

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



#### **Cleaning vehicle before disassembly**

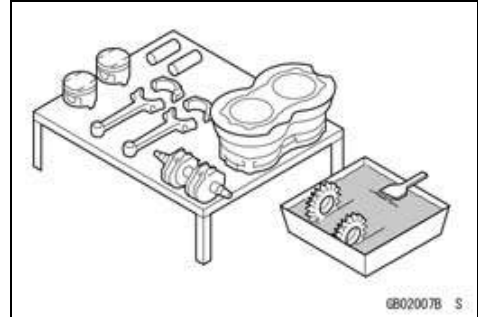
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



## Before Servicing

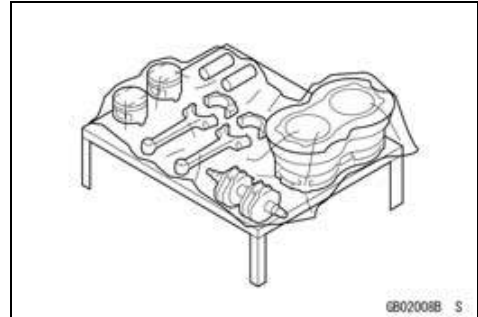
### Arrangement and Cleaning of Removed Parts

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



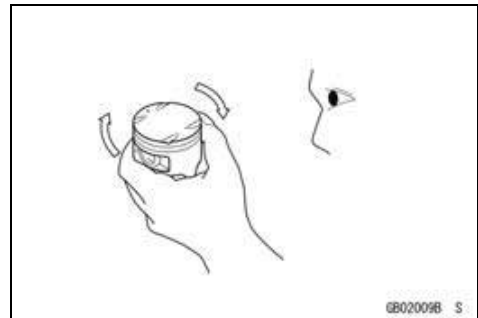
### Storage of Removed Parts

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



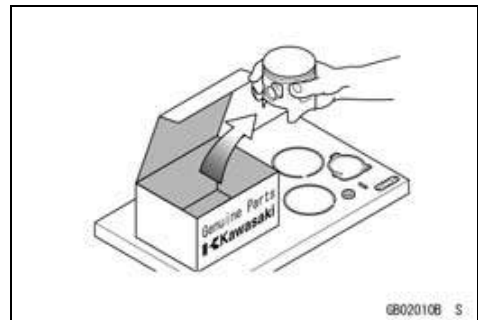
### Inspection

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



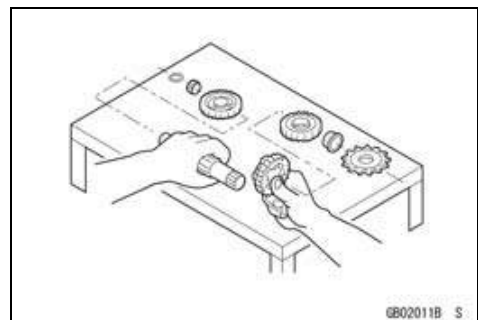
### Replacement Parts

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



### Assembly Order

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

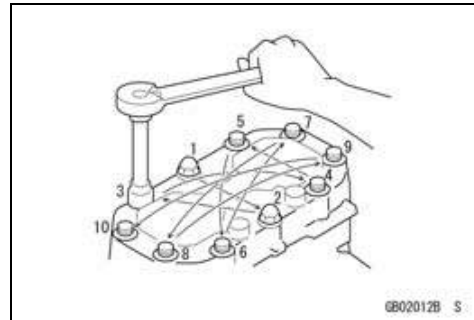


## 1-4 GENERAL INFORMATION

### Before Servicing

#### **Tightening Sequence**

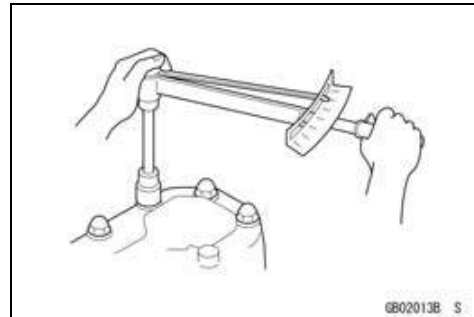
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or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



#### **Tightening Torque**

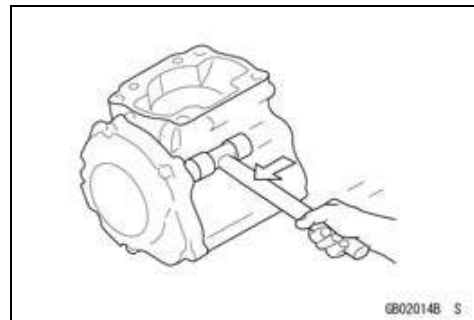
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.

Often, the tightening sequence is followed twice-initial tightening and final tightening with torque wrench.



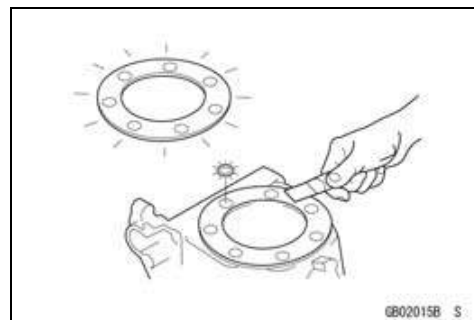
#### **Force**

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



#### **Gasket, O-ring**

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



#### **Liquid Gasket, Non-permanent Locking Agent**

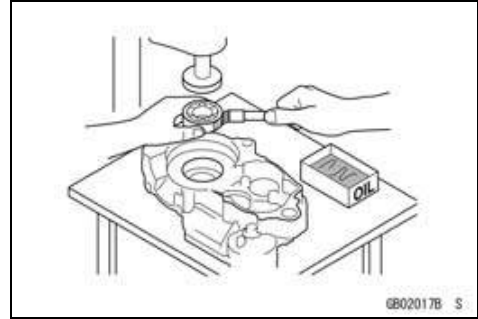
For applications that require Liquid Gasket or a Non-permanent Locking agent, clean the surfaces so that no oil residue remains before applying liquid gasket or Non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



## Before Servicing

### Press

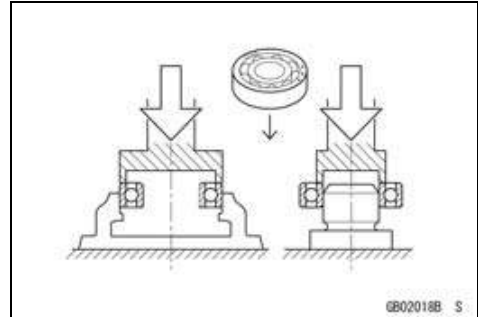
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



### Ball Bearing and Needle Bearing

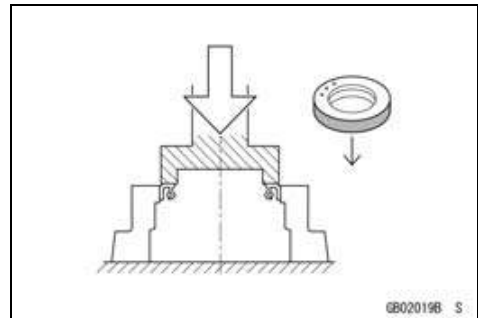
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

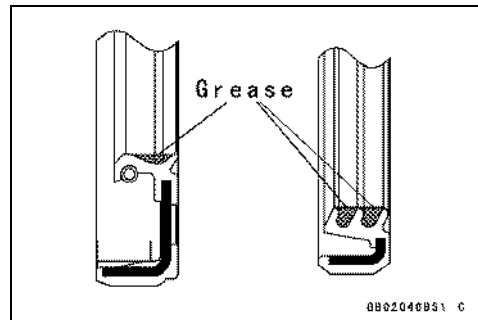


### Oil Seal, Grease Seal

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

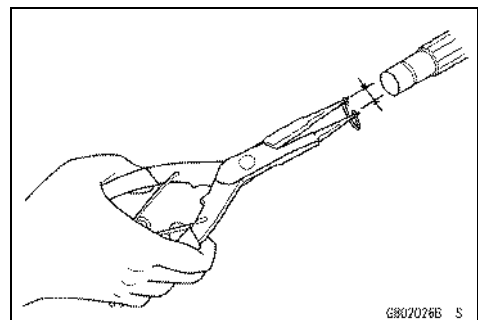


Apply specified grease to the lip of seal before installing the seal.



### Circlips, Cotter Pins

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



## 1-6 GENERAL INFORMATION

### Before Servicing

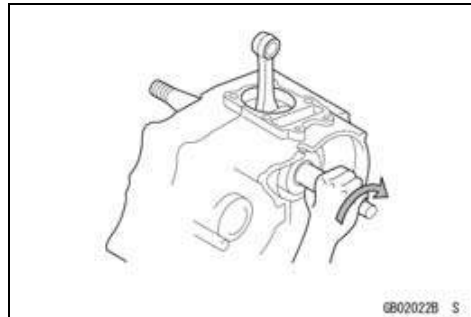
#### **Lubrication**

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



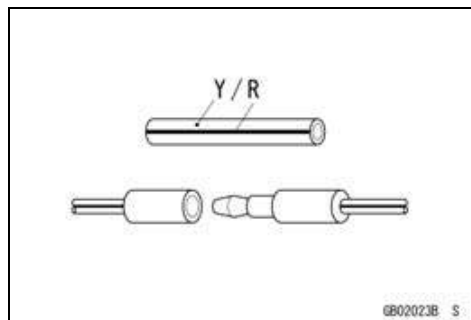
#### **Direction of Engine Rotation**

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



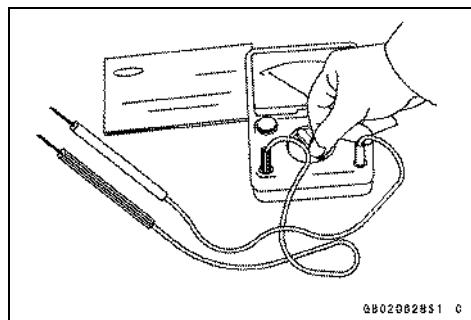
#### **Electrical Leads**

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



#### **Instrument**

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



Model Identification

KLX110CA Left Side View



KLX110CA Right Side View



Frame Number



Engine Number



# 1-8 GENERAL INFORMATION

## Model Identification

KLX110DA Left Side View



KLX110DA Right Side View





**General Specifications**

Items	KLX110CA ~ CE, KLX110DA ~ DE
<b>Dimensions</b>	
Overall Length	1 560 mm (61.42 in.)
Overall Width	650 mm (25.59 in.)
Overall Height:	
KLX110C	955 mm (37.60 in.)
KLX110D	990 mm (38.98 in.)
Wheelbase	1 075 mm (42.32 in.)
Road Clearance:	
KLX110C	215 mm (8.46 in.)
KLX110D	265 mm (10.4 in.)
Seat Height:	
KLX110C	680 mm (26.8 in.)
KLX110D	730 mm (28.7 in.)
Curb Mass:	76 kg (168 lb)
Front:	
KLX110C	35 kg (77 lb)
KLX110D	34 kg (75 lb)
Rear:	
KLX110C	41 kg (90 lb)
KLX110D	42 kg (93 lb)
Fuel Tank Capacity:	
KLX110CA ~ CC, KLX110DA ~ DC	3.8 L (1.0 US gal)
KLX110CD ~/DD ~	3.6 L (0.95 US gal)
<b>Performance</b>	
Minimum Turning Radius	-
<b>Engine</b>	
Type	4-stroke, single cylinder, SOHC
Cooling System	Air-cooled
Bore and Stroke	53.0 × 50.6 mm (2.09 × 1.99 in.)
Displacement	112 cm <sup>3</sup> (6.83 cu in.)
Compression Ratio	9.5 : 1
Carburetion System	Carburetor, KEIHIN PB18
Fuel Type:	
Minimum Octane Rating:	
Research Octane Number (RON)	(AU, EUR, TH) 91
Antiknock Index (RON + MON)/2	(US, CA) 87
Starting System	Kick starter and electric starter
Ignition System	Digital DC-CDI
Timing Advance	Electronically advanced
Ignition Timing	10° BTDC @1 300 r/min (rpm) ~ 31° BTDC @4 000 r/min (rpm)
Spark Plug	NGK CR6HSA

# 1-10 GENERAL INFORMATION

## General Specifications

Items	KLX110CA ~ CE, KLX110DA ~ DE
Valve Timing: Inlet: Open Close Duration Exhaust: Open Close Duration Lubrication System Engine Oil: Type Viscosity Capacity	25° BTDC 55° ABDC 260° 60° BBDC 20° ATDC 260° Forced lubrication (wet sump) API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 SAE 10W-40 1.1 L (1.2 US qt)
<b>Drive Train</b> Primary Reduction System: Type: KLX110C KLX110D Reduction Ratio Clutch Type: KLX110C KLX110D Transmission: Type Gear Ratios: 1st 2nd 3rd 4th Final Drive System: Type Reduction Ratio Overall Drive Ratio	Gear, centrifugal Gear 3.409 (75/22) Centrifugal & wet, multi disc Wet, multi disc 4-speed, constant mesh, return shift 3.000 (36/12) 1.938 (31/16) 1.350 (27/20) 1.087 (25/23) Chain drive 2.923 (38/13) 10.832 @Top gear
<b>Frame</b> Type Steering Angle Caster (rake angle): KLX110C KLX110D Trail: KLX110C KLX110D	Backbone 45° to either side 24.8° 24.2° 50 mm (2.0 in.) 47 mm (1.9 in.)

**General Specifications**

Items	KLX110CA ~ CE, KLX110DA ~ DE
Front Tire:	
Size	2.50-14 4P.R.
Make/Type	IRC, GS-45F, Tube
Rear Tire:	
Size	3.00-12 4P.R.
Make/Type	IRC, GS-45F, Tube
Rim Size:	
Front	14 × 1.40
Rear	12 × 1.60
Front Suspension:	
Type	Telescopic fork
Wheel Travel:	
KLX110C	110 mm (4.3 in.)
KLX110D	140 mm (5.5 in.)
Rear Suspension:	
Type	Swingarm
Wheel travel:	
KLX110C	110 mm (4.3 in.)
KLX110D	132 mm (5.2 in.)
Brake Type:	
Front and Rear	Drum
<b>Electrical Equipment</b>	
Battery	12 V 3 Ah
Alternator:	
Rated Output	6.4 A/14.0 V @10 000 r/min (rpm)

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

# 1-12 GENERAL INFORMATION

## Unit Conversion Table

### Prefixes for Units:

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

### Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

### Units of Volume:

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

### Units of Force:

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

### Units of Length:

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

### Units of Torque:

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

### Units of Pressure:

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

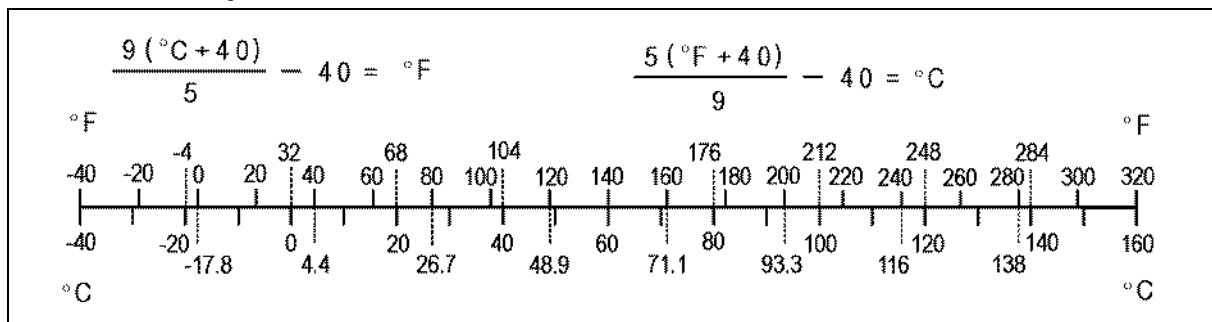
### Units of Speed:

km/h	×	0.6214	=	mph
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### Units of Power:

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

### Units of Temperature:



# Periodic Maintenance

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## 2-2 PERIODIC MAINTENANCE

### Periodic Maintenance Chart

The maintenance must be done in accordance with this chart to keep the motorcycle in good running condition.

#### Periodic Inspection

OPERATION	FREQUENCY hours(month (s))	Initial	Every		See Page
		5 (1)	50 (6)	100 (12)	
E N G I N E	Spark plug - clean and inspect †		●	●	2-36
	Clutch plates - inspect †	●	●	●	2-19
	Clutch - inspect	●	●	●	2-17
	Valve clearance - inspect †	●		●	2-16
	Air cleaner element - clean †	●	●	●	2-13
	Idle speed - inspect †		Every ride		2-12
	Throttle cable - inspect and adjust	●	●	●	2-11
	Fuel tap - clean		●	●	2-15
	Spark arrester - clean			●	2-17
	Engine sprocket - inspect †		●	●	2-27
	Fuel hose, connections - inspect †		●	●	2-11
	C H A S S I S	Brake - adjust †		Every ride	
Brake lining wear - inspect †			Every ride		2-29
Brake camshaft - lubricate			●	●	2-32
Spoke tightness and rim runout - inspect †		●	●	●	2-22
Drive chain - inspect and adjust			Every ride		2-24
Drive chain - lubricate			Every ride		2-26
Drive chain wear - inspect †		●	●	●	2-25
Drive chain guide and slipper - inspect †			●	●	2-27
Front fork - clean and inspect			●	●	2-32
Front fork oil - inspect †			Every year		2-32
Nuts, bolts, fasteners - inspect †		●	●	●	2-39
Steering play - inspect †		●	●	●	2-34
Steering stem bearing - lubricate				●	2-35
Rear sprocket - inspect †			●	●	2-27
Battery - inspect †			●	●	2-37
Battery terminal - inspect †			●	●	2-37
General lubrication - perform		●	●	●	2-38
Sidestand - inspect †		●		●	2-36
Wheel bearing - inspect †		●	●	2-23	
Swingarm pivots - inspect †	●	●	●	2-34	
Rear shock absorber - inspect †		●	●	2-33	
Frame - inspect	●	●	●	2-36	
Wheels/tires - inspect	●	●	●	2-21	
Cable - inspect		Every year		2-38	

†: Replace, add, adjust, clean or torque if necessary.

## PERIODIC MAINTENANCE 2-3

### Periodic Maintenance Chart

#### Periodic Replacement Parts

OPERATION	FREQUENCY hours (month (s))	Initial	Every		See Page
		5 (1)	50 (6)	100 (12)	
Engine oil - change		●	●	●	2-19
Oil filter - replace		●		●	2-20
Fuel hose - replace		Every 5 years			2-14
Front fork oil - change			●	●	2-32

## 2-4 PERIODIC MAINTENANCE

### Torque and Locking Agent

Tighten all bolts and nuts to the proper torque using an accurate torque wrench. If insufficiently tightened, a bolt or nut may become damaged, strip an internal thread, or break and then fall out. The following table lists the tightening torque for the major bolts and nuts, and the parts requiring use of a non-permanent locking agent or liquid gasket.

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

Letters used in the "Remarks" column mean:

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.

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

Lh: Left-hand Threads

MO: Apply molybdenum disulfide oil.

S: Tighten the fasteners following the specified sequence.

Si: Apply Silicone grease.

R: Replacement Parts

T: First, tighten the stem nut with 39 N·m (4.0 kgf·m, 29 ft·lb) of torque, then loosen it and retighten it with 4.9 N·m (0.50 kgf·m, 43 in·lb) of torque.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
<b>Fuel System</b>				
Fuel Tap Mounting Bolts	4.4	0.45	39 in·lb	
Intake Pipe Bolts	5.2	0.53	46 in·lb	
Carburetor Holder Bolts	5.2	0.53	46 in·lb	
Air Cleaner Housing Bolts	3.5	0.36	31 in·lb	
Air Cleaner Cover Screws	1.5	0.15	13 in·lb	
Air Duct Clamp Screw	2.0	0.20	18 in·lb	
Throttle Cable Housing Cap Screws	0.6	0.06	5.3 in·lb	
Screw (for Seat Hook)	5.0	0.51	44 in·lb	
Screw (for Rubber Band Hook)	5.0	0.51	44 in·lb	
<b>Engine Top End</b>				
Valve Adjusting Cap Bolts	5.2	0.53	46 in·lb	
Valve Adjusting Screw Locknuts	8.8	0.90	78 in·lb	
Camshaft Chain Guide Bolt	5.2	0.53	46 in·lb	
Camshaft Chain Plate Screw	5.2	0.53	46 in·lb	
Camshaft Sprocket Bolts	12	1.2	106 in·lb	L
Camshaft Sprocket Cover Bolts	5.2	0.53	46 in·lb	
Camshaft Chain Tensioner Cap Bolt	5.2	0.53	46 in·lb	
Camshaft Chain Tensioner Mounting Bolts	5.2	0.53	46 in·lb	L
Cylinder Head Nuts	22	2.2	16	S
Cylinder Head Bolts	12	1.2	106 in·lb	S, L
Rocker Shaft Holder Plate Bolts (KLX110CA/DA Early Models)	5.2	0.53	46 in·lb	
Rocker Shaft Holder Plate Bolts (KLX110CA/DA Late Models ~)	5.2	0.53	46 in·lb	L
Exhaust Pipe Holder Nuts	16	1.6	12	
Muffler Mounting Nut	30	3.1	22	R
Muffler Mounting Bolt	9.8	1.0	87 in·lb	
Muffler Cover Screws	3.0	0.31	27 in·lb	
Spark Arrester Mounting Bolts	8.8	0.90	78 in·lb	



**Torque and Locking Agent**

Fastener	Torque			Remarks
	N-m	kgf-m	ft-lb	
<b>Clutch</b>				
Primary Clutch Hub Nut (KLX110C)	72	7.3	53	
Secondary Clutch Hub Nut (KLX110C)	72	7.3	53	
Clutch Hub Nut (KLX110D)	72	7.3	53	
Primary Gear Nut (KLX110D)	72	7.3	53	
Clutch Spring Bolts	5.0	0.51	44 in-lb	
Oil Seal Retaining Plate Screws	2.9	0.30	26 in-lb	L
Clutch Adjusting Screw Locknut (KLX110C)	19	1.9	14	
<b>Engine Lubrication System</b>				
Engine Oil Drain Plug	29	3.0	21	
Clutch Cover Bolts	8.8	0.90	78 in-lb	
Oil Filter Cap Bolts	5.2	0.53	46 in-lb	
Oil Pump Mounting Screws (L = 25)	5.2	0.53	46 in-lb	
Oil Pump Mounting Screw (L = 30)	5.2	0.53	46 in-lb	
Oil Pipe Banjo Bolts	15	1.5	11	
Oil Pipe Clamp Screw	5.2	0.53	46 in-lb	
<b>Engine Removal/Installation</b>				
Engine Mounting Nuts	54	5.5	40	R, S
<b>Crankshaft/Transmission</b>				
Primary Gear Nut	72	7.3	53	
Crankcase Bolts (L=75)	9.8	1.0	87 in-lb	S, L (1)
Crankcase Bolts (L=50)	9.8	1.0	87 in-lb	S
Shift Drum Bearing Retaining Screws	2.5	0.25	22 in-lb	L
Drive Shaft Bearing Retaining Screw	5.2	0.53	46 in-lb	L
Shift Drum Cam Bolt	5.2	0.53	46 in-lb	L
Shift Return Spring Pin (Bolt)	22	2.2	16	L
Shift Drum Position Plate Screw	5.2	0.53	46 in-lb	
Shift Drum Position Lever Pivot Bolt	5.2	0.53	46 in-lb	
Kick Pedal Bolt	8.8	0.90	78 in-lb	
Shift Pedal Bolt	5.2	0.53	46 in-lb	
<b>Wheels/Tires</b>				
Front Axle Nut	44	4.5	32	R
Rear Axle Nut	64	6.5	47	
Spoke Nipples	4.0	0.41	35 in-lb	
Torque Link Nuts	25	2.5	18	
<b>Final Drive</b>				
Rear Sprocket Nuts	44	4.5	32	R
Engine Sprocket Cover Bolts	5.2	0.53	46 in-lb	
Rear Axle Nut	64	6.5	47	
Chain Guide Roller Mounting Bolt (KLX110D)	23	2.3	17	
<b>Brakes</b>				
Brake Cam Lever Bolt	7.0	0.71	62 in-lb	
Torque Link Nuts	25	2.5	18	

## 2-6 PERIODIC MAINTENANCE

### Torque and Locking Agent

Fastener	Torque			Remarks
	N-m	kgf-m	ft-lb	
Brake Pedal Bolt	8.8	0.90	78 in-lb	
<b>Suspension</b>				
Front Fork Clamp Bolts (Upper)	20	2.0	15	
Front Fork Clamp Bolts (Lower)	30	3.1	22	
Steering Stem Nut	4.9	0.50	43 in-lb	
Steering Stem Head Nut	44	4.5	32	
Swingarm Pivot Nut	78	8.0	58	R
Torque Link Nuts	25	2.5	18	
Fork Bottom Bolt	20	2.0	15	
Rear Shock Absorber Mounting Bolt (Upper)	39	4.0	29	
Rear Shock Absorber Mounting Nut (Upper)	39	4.0	29	R
Rear Shock Absorber Mounting Nut (Lower)	39	4.0	29	R
<b>Steering</b>				
Handlebar Holder Bolts	25	2.5	18	
Steering Stem Head Nut	44	4.5	32	
Steering Stem Nut	4.9	0.50	43 in-lb	T
Front Fork Clamp Bolts (Upper)	20	2.0	15	
Front Fork Clamp Bolts (Lower)	30	3.1	22	
<b>Frame</b>				
Footpeg Bracket Bolts	25	2.5	18	
Sidestand Nut	29	3.0	21	R
Sidestand Bolt	9.8	1.0	87 in-lb	
Rear Reflector Bracket Screws (CA Model)	7.4	0.75	65 in-lb	
Screw (for Seat Hook)	5.0	0.51	44 in-lb	
Screw (for Rubber Band Hook)	5.0	0.51	44 in-lb	
<b>Electrical System</b>				
Ignition Coil Mounting Bolt	2.9	0.30	26 in-lb	
Regulator Mounting Screw	5.2	0.53	46 in-lb	
Spark Plug	13	1.3	115 in-lb	
End Cover Screws	4.4	0.45	39 in-lb	
Starter Motor Terminal Screw	2.0	0.20	18 in-lb	
Starter Motor Mounting Screws	5.2	0.53	46 in-lb	
Brush Holder Plate Screws	0.9	0.09	8.0 in-lb	
Terminal Cover Plate Screws	2.0	0.20	18 in-lb	
Starter Motor Clutch Bolts	11.8	1.20	104 in-lb	L
Alternator Rotor Nut	53.9	5.50	39.8	
Stator Mounting Screws	5.2	0.53	46 in-lb	
Alternator Cover Bolts (L=45)	8.8	0.90	78 in-lb	
Alternator Cover Bolts (L=25)	8.8	0.90	78 in-lb	
Alternator Lead Clamp Screws	5.2	0.53	46 in-lb	
Crankshaft Sensor Mounting Screws	2.9	0.30	26 in-lb	
Gear Position Switch Screws	2.9	0.30	26 in-lb	

**Torque and Locking Agent**

**Basic Torque for General Fasteners**

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

## 2-8 PERIODIC MAINTENANCE

### Specifications

Item	Standard	Service Limit
<b>Fuel System</b>		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	---
Idle Speed	1 600 ~ 1 700 r/min (rpm)	---
Air Cleaner Element Oil	High quality foam air filter oil	---
<b>Engine Top End</b>		
Valve Clearance:		
Exhaust	0.08 ~ 0.12 mm (0.003 ~ 0.005 in.)	---
Inlet	0.04 ~ 0.08 mm (0.002 ~ 0.003 in.)	---
<b>Clutch (KLX110C)</b>		
Friction Plate Thickness	3.1 ~ 3.3 mm (0.12 ~ 0.13 in.)	3.0 mm (0.12 in.)
Friction Plate Warp	0.2 mm (0.008 in.) or less	0.3 mm (0.01 in.)
Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.01 in.)
<b>Clutch (KLX110D)</b>		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	---
Friction Plate Thickness	3.12 ~ 3.28 mm (0.123 ~ 0.129 in.)	3.0 mm (0.12 in.)
Friction Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.01 in.)
Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.01 in.)
<b>Engine Lubrication System</b>		
Engine oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	---
Viscosity	SAE 10W-40	---
Capacity	0.9 L (1.0 US qt) (when filter is not removed)	---
	1.0 L (1.1 US qt) (when filter is removed)	---
	1.1 L (1.2 US qt) (when engine is completely dry)	---
<b>Wheels/Tires</b>		
Rim Runout:		
Axial	TIR 0.8 mm (0.031 in.) or less	TIR 2.0 mm (0.08 in.)
Radial	TIR 1.2 mm (0.047 in.) or less	TIR 2.0 mm (0.08 in.)
Front and Rear Tires Air Pressure	100 kPa (1.0 kgf/cm <sup>2</sup> , 14 psi)	---
Standard Tire:		
Front:		
Size	2.50-14 4P.R.	---
Make	IRC	---
Type	GS-45F, Tube	---
Rear:		
Size	3.00-12 4P.R.	---
Make	IRC	---
Type	GS-45F, Tube	---

**Specifications**

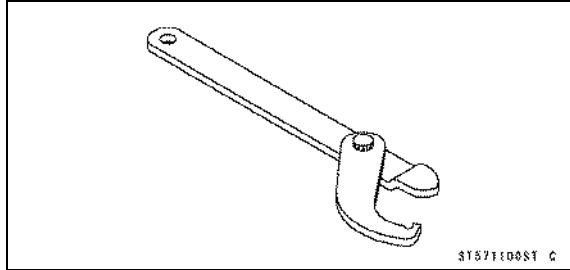
Item	Standard	Service Limit
<b>Final Drive</b>		
Drive Chain Slack		
KLX110C Models	11 ~ 16 mm (0.4 ~ 0.6 in.)	---
KLX110D Models	8 ~ 13 mm (0.3 ~ 0.5 in.)	---
Drive Chain 20-Link Length	254.0 ~ 254.6 mm (10.00 ~ 10.02 in.)	259 mm (10.2 in.)
Standard Chain:		
Make	DAIDO	---
Type	DID 420DX	---
Link	90 Links	---
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)
<b>Brakes</b>		
Brake Lever Free Play	4 ~ 5 mm (0.16 ~ 0.20 in.)	---
Brake Pedal Free Play	20 ~ 30 mm (0.79 ~ 1.18 in.)	---
Brake Shoe Lining Thickness:		
Front	2.10 ~ 3.00 mm (0.08 ~ 0.12 in.)	1.2 mm (0.05 in.)
Rear	3.85 ~ 4.15 mm (0.152 ~ 0.163 in.)	2.0 mm (0.08 in.)
Brake Cam Lever Angle:		
Front	80° ~ 90°	---
Rear	80° ~ 90°	---
<b>Suspension</b>		
Front Fork		
Suspension Oil	Kawasaki SS-8 or equivalent	---
Amount:		
KLX110C	165 ±2.5 mL (5.58 ±0.085 US oz)	
KLX110D	182 ±2.5 mL (5.71 ±0.085 US oz)	---
<b>Electrical System</b>		
Spark Plug Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in.)	---

TIR: Total Indicator Readings

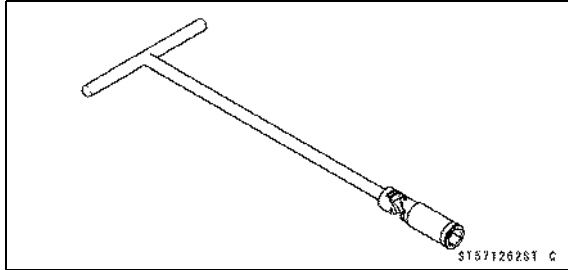
## 2-10 PERIODIC MAINTENANCE

### Special Tools

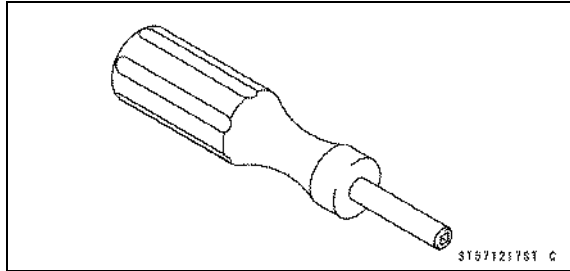
**Steering Stem Nut Wrench:**  
57001-1100



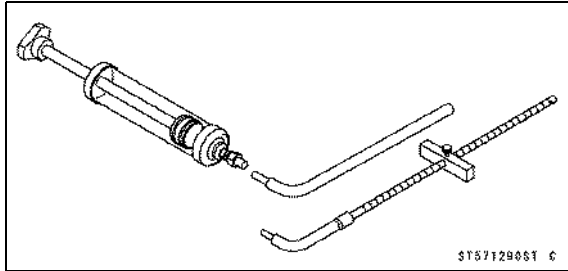
**Spark Plug Wrench, Hex 16:**  
57001-1262



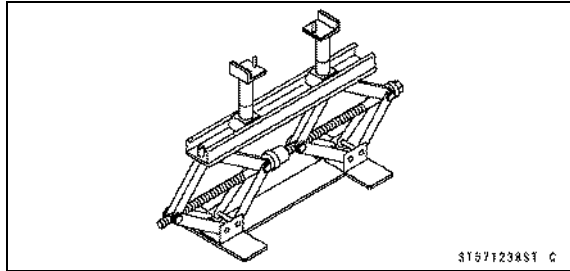
**Valve Adjusting Screw Holder:**  
57001-1217



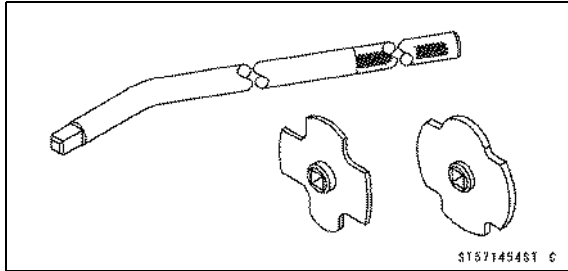
**Fork Oil Level Gauge:**  
57001-1290



**Jack:**  
57001-1238



**Filler Cap Driver:**  
57001-1454



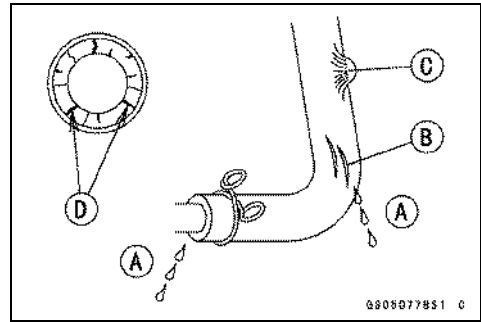
**Periodic Maintenance Procedures**

**Fuel System**

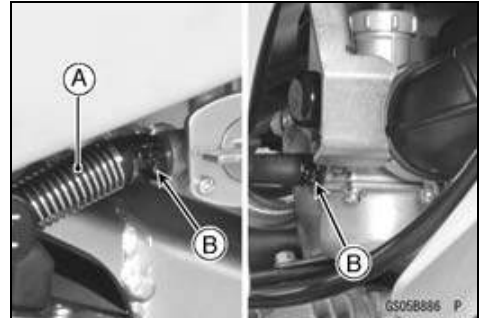
**Fuel Hose and Connection Inspection**

○ The fuel hoses are designed to be used throughout the motorcycle's life without any maintenance, however, if the motorcycle is not properly handled, the inside the fuel line can cause fuel to leak [A] or the hose to burst.

- Check the fuel hose.
- ★ Replace the fuel hose if any fraying, cracks [B], bulges [C] or ozonic cracks [D] are noticed.



- Check that the hose [A] is securely connected and clamps [B] are tightened correctly.
- 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.
- ★ Replace the hose if it has been sharply bent or kinked.



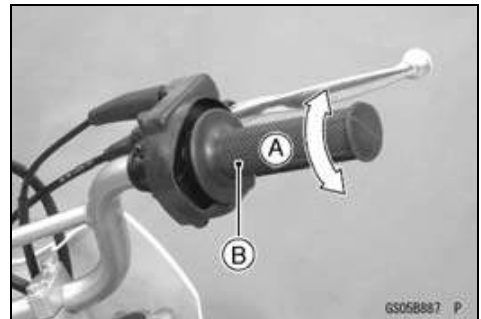
**Throttle Cable Inspection**

- Check throttle grip free play [A] by lightly turning the throttle grip [B] back and forth.
- ★ If the free play is improper, adjust the throttle cable.

**Throttle Grip Free Play**

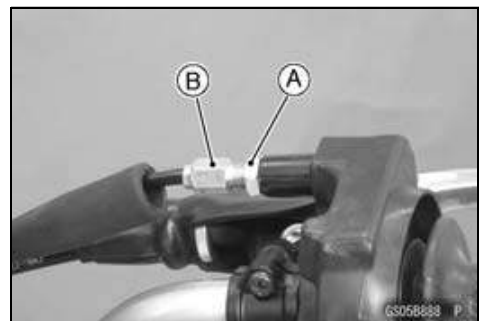
**Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)**

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



**Throttle Cable Adjustment**

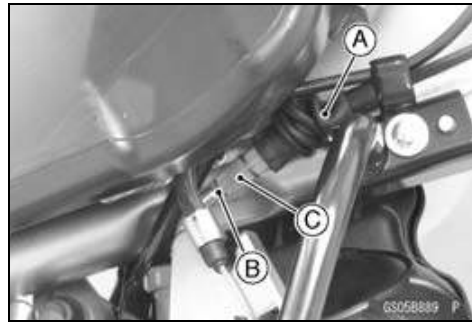
- Loosen the locknut [A] at the upper end of the throttle cable.
- Screw throttle cable adjuster [B] until 2 ~ 3 mm (0.08 ~ 0.12 in.) of throttle grip free play is obtained.
- Tighten the locknut.



## 2-12 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

- ★ If the throttle grip free play cannot be adjusted with the adjuster at the upper end of the throttle cable, use the lower cable adjuster at the carburetor.
- Remove the shroud (see Shroud Removal in the Frame chapter).
- Pull off the boot [A] of the carburetor top.
- Loosen the locknut [B], and make the necessary free play adjustment at the lower cable adjuster [C].
- Tighten the locknut, and install the boot.
- Check if the throttle grip moves smoothly from full open to close, and the throttle closes quickly and completely in all steering positions by the return spring. If not, check the throttle cable routing, grip free play, and cable damage. Then lubricate the throttle cable.
- With the engine idling, turn the handlebar both ways and check if handlebar movement changes the idling speed. If so, the throttle cable may be improperly adjusted or 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. Follow the service manual to be make sure to correct any of these conditions.**

#### **Idle Speed Inspection**

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides [A].
- ★ If handlebar movement changes the idle speed, the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged. Be sure to correct any of these conditions before riding (see Cable, Wire, and Hose Routing section in the Appendix chapter).



#### **⚠ WARNING**

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

- Check the idle speed, using the engine revolution tester for high accuracy.
- ★ If the idle speed is out of specified range, adjust it.

#### **Idle Speed:**

**Standard: 1 600 ~ 1 700 r/min (rpm)**



**Periodic Maintenance Procedures**

**Idle Speed Adjustment**

**NOTICE**

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

**NOTE**

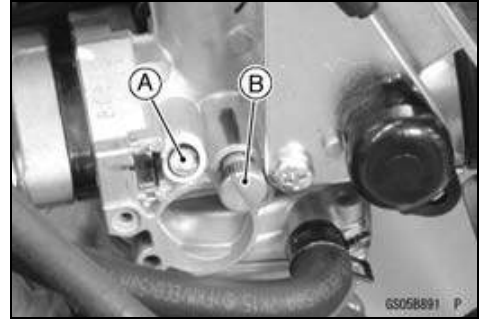
○For US and CA models, the pilot screw cannot be adjusted.

- Remove the shroud (see Shroud Removal in the Frame chapter).
- Turn in the pilot screw and count the number of turns until it seats fully but not tightly.
- Back out the same number of turns counted when turned in. This is to set the screw to its original position.

**NOTE**

○A carburetor has different “turns out” of the pilot screw for each individual unit. When setting the pilot screw, use the “turns out” determined during disassembly. Use the specifications in this manual only if the original number is unknown.

- Start the engine and warm it up thoroughly.
- Turn the idle adjusting screw [B] until idle speed is correct.
- Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.
- Install the shroud (see Shroud Installation in the Frame chapter).



**Air Cleaner Element Cleaning**

**NOTE**

- In dusty areas, the element should be cleaned more frequently than recommended interval.
- After riding through rain or on muddy roads, the element should be cleaned immediately.
- Since repeated cleaning opens the pores of the element, replace it with a new one in accordance with the Periodic Maintenance Chart. Also, if there is a break in the element material or any other damage to the element, replace the element with a new one.

## 2-14 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### **⚠ WARNING**

**Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the element in a well-ventilated area, and take care that there is no spark or flame anywhere near the working areas. Do not use gasoline or low flash-point solvents to clean the element.**

- Remove:
  - Air Cleaner Element [A] (see Air Cleaner Element Removal in the Fuel System chapter)
- Stuff a clean, lint-free towel into the carburetor so no dirt is allowed to enter the carburetor.
- Wipe out the inside of the air cleaner housing with a clean damp towel.

#### **NOTICE**

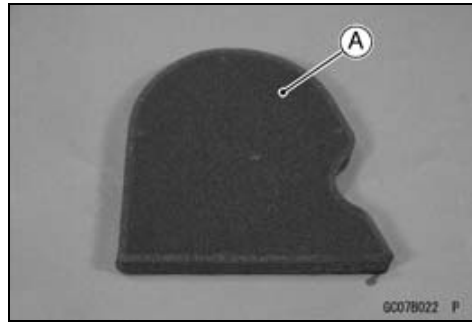
**Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the element in a well-ventilated area, and take care that there is no spark or flame anywhere near the working areas. Do not use gasoline or low flash-point solvents to clean the element.**

- Clean the element in a bath of high flash-point solvent using a soft bristle brush.
- Squeeze it dry in a clean towel. Do not wring the element or blow it dry; the element can be damaged.
- Check all the parts of the element for visible damage.
- ★ If any of the parts of the element are damaged, replace them.
- After cleaning, saturate the element with high-quality foam-air-filter oil, squeeze out the excess, then wrap it in a clean towel and squeeze it as dry as possible.
- Be careful not to tear the sponge filter.
- Remove the towel from the carburetor.
  
- Install the air cleaner element (see Air Cleaner Element Installation in the Fuel System chapter).

### ***Fuel Hose Replacement***

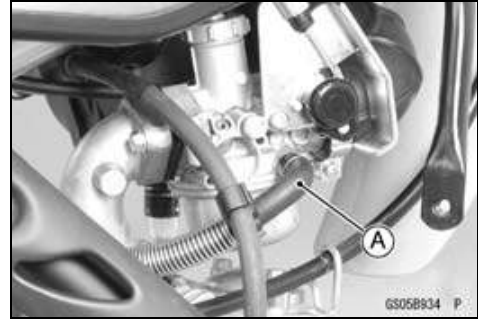
#### **⚠ WARNING**

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

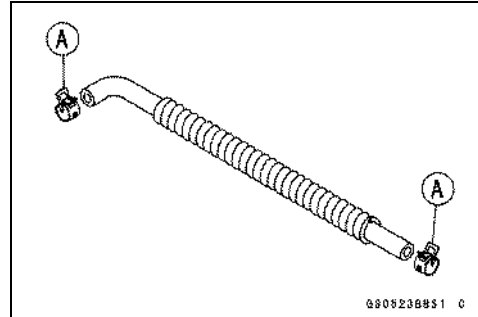


**Periodic Maintenance Procedures**

- Remove:
  - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
  - Fuel Hose [A]



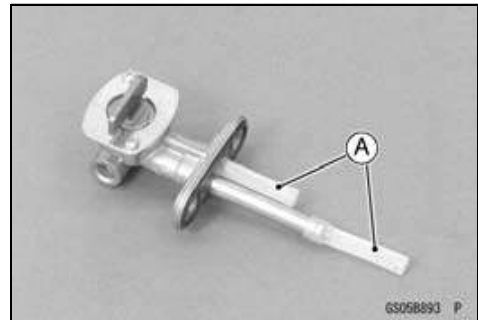
- Replace the fuel hose with a new one.
- Fix the both ends of the fuel hose with the clamps [A] securely.
- Start the engine and check the fuel hose for leaks.



**Fuel Tap Cleaning**

<b>WARNING</b>
<p><b>Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Do not use gasoline or low flash-point solvents to clean the tank.</b></p>

- Remove the fuel tank and drain the fuel (see Fuel Tank Removal in the Fuel System chapter).
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Pour the solvent out of the tank.
- Remove the fuel tap (see Fuel Tap Removal in the Fuel System chapter).
- Clean the fuel tap and the fuel filter screens [A] in high flash-point solvent. After cleaning, install the fuel tap.
- Dry the tank, filter and tap with compressed air.
- Install the fuel tank (see Fuel Tank Installation in the Fuel System chapter).



## 2-16 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

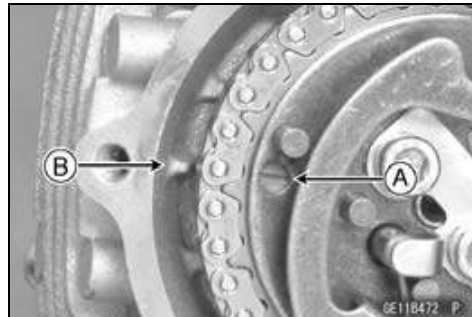
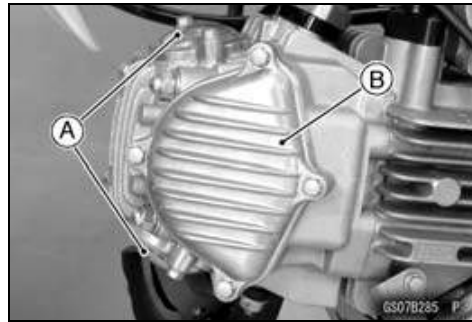
#### Engine Top End

##### Valve Clearance Inspection

###### NOTE

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

- Remove:
  - Valve Adjusting Covers [A] (see Camshaft Sprocket Removal in the Engine Top End chapter)
  - Camshaft Sprocket Cover [B] (see Rocker Arm Removal in the Engine Top End chapter)
- Remove the alternator rotor nut cap.
  - Special Tool - Filler Cap Driver: 57001-1454**
- Turn the crankshaft counterclockwise until the line mark [A] on the KACR unit aligns with the sprocket cover mating surface projection [B].

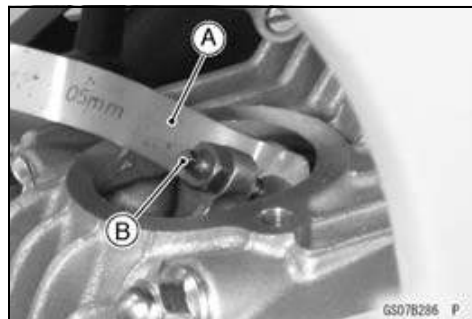


- Using a thickness gauge [A], measure the valve clearance between the adjusting screw [B] and valve stem. Measure the clearance for both valves at a time.

##### Valve Clearance (when cold)

###### Standard:

Inlet	0.04 ~ 0.08 mm (0.002 ~ 0.003 in.)
Exhaust	0.08 ~ 0.12 mm (0.003 ~ 0.005 in.)

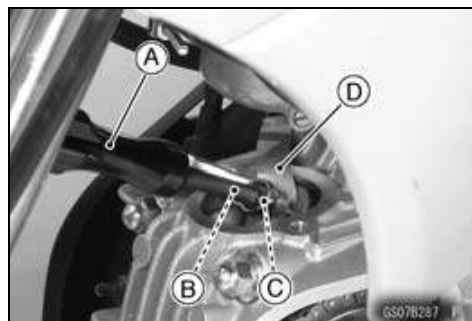


##### Valve Clearance Adjustment

- ★ If a valve clearance is incorrect, adjust it.
- Use the valve adjusting screw holder [A] to holding the valve adjusting screw [B], loosen the adjusting screw locknut [C] and insert the thickness gauge [D] between the valve and adjusting screw, and turn the screw until the adjusting screw stops.

###### Special Tool - Valve Adjusting Screw Holder: 57001-1217

- Tighten:
  - Torque - Valve Adjusting Screw Locknut: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Install the removed parts (see appropriate chapters).



**Periodic Maintenance Procedures**

**Spark Arrester Cleaning**

This vehicle is equipped with a spark arrester. It must be properly maintained to ensure its efficiency.

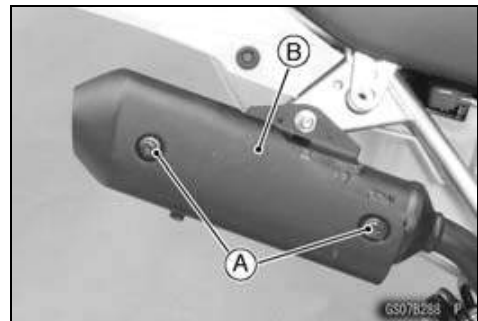
**NOTICE**

The spark arrester must be installed correctly and functioning properly to provide adequate fire protection.

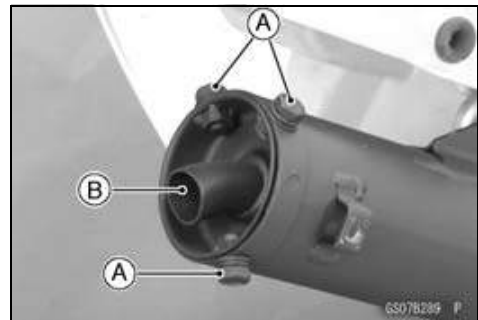
**⚠ WARNING**

Hot exhaust system parts can cause serious burns. The exhaust system becomes very hot soon after the engine is started. To avoid burns, be sure the exhaust system is cold before cleaning the spark arrester.

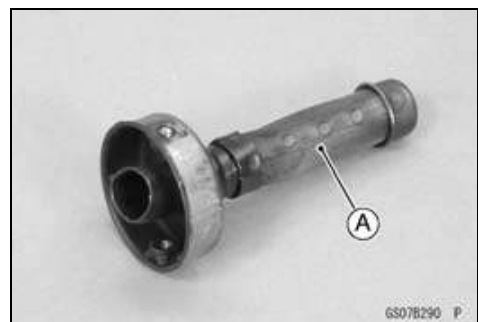
- Remove;
  - Right Side Cover (see Side Cover Removal in the Frame chapter)
  - Muffler Cover Screws [A]
  - Muffler Cover [B]



- Remove:
  - Spark Arrester Mounting Bolts [A]
  - Spark Arrester [B]



- With a wire brush, remove the carbon off the inside of the spark arrester [A] and muffler.
- Inspect the spark arrester.
- ★ If the spark arrester is damaged, replace it with a new one.
- Install the spark arrester into the rear end of the muffler.
  - Torque - Spark Arrester Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Install the muffler cover.
  - Torque - Muffler Cover Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)**



**Clutch**

**⚠ WARNING**

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

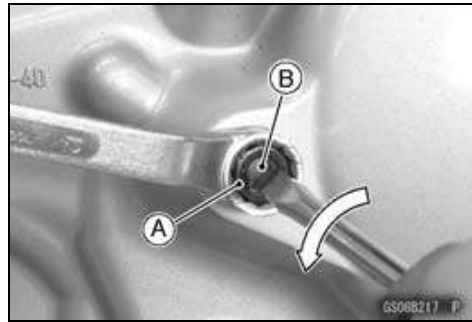
## 2-18 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### **Clutch Release Adjustment (KLX110C)**

- Loosen the adjusting screw locknut [A].
- Turn the adjusting screw [B] counterclockwise until it becomes hard to turn.
- Loosen the adjusting screw until the specified value.

**Clutch Release:** 1/4 turn out



- Tighten the locknut without changing the adjusting screw position.

**Torque - Clutch Adjusting Screw Locknut:** 19 N·m (1.9 kgf·m, 14 ft·lb)

- Start the engine and inspect the conditions of engine shifting the pedal a few times.

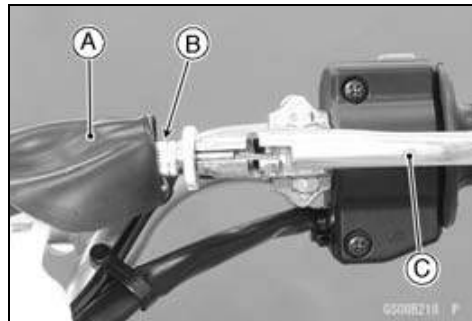
#### **Clutch Lever Free Play Inspection (KLX110D)**

- Slide the dust cover [A] out of place.
- Check that the clutch cable upper end is fully seated in the adjuster [B].
- Pull the clutch lever [C] lightly, and check the clutch lever free play.

**Clutch Lever Free Play**

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

- ★ If it does not, adjust the lever play.

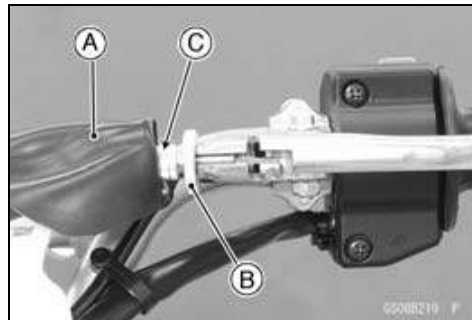


#### **Clutch Lever Free Play Adjustment (KLX110D)**

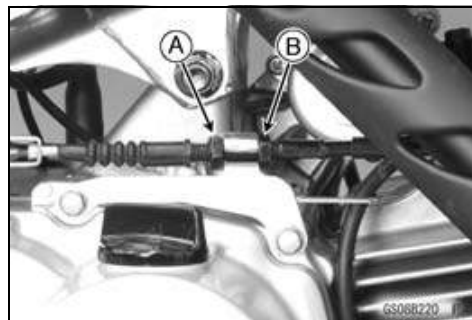
- Slide the dust cover [A] out of place.
- Loosen the locknut [B] and turn the adjuster [C] so that the clutch lever will have 2 ~ 3 mm (0.08 ~ 0.12 in.) of play.

#### **NOTE**

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



- If it cannot be done, loosen the rear locknut [A] at the lower of the clutch cable, and turn the front locknut [B] so that clutch lever has 2 ~ 3 mm (0.08 ~ 0.12 in.) of play.
- After the adjustment is made, tighten the locknut, and start the engine and check that the clutch does not slip and that it release properly.



**Periodic Maintenance Procedures**

**Friction and Steel Plates Inspection**

- Remove the clutch plates (see Secondary Clutch Disassembly (KLX110C) or Clutch Hub Disassembly (KLX110D) in the Clutch chapter).
- Visually inspect the friction and steel plates to see if they show any signs of seizure, or uneven wear.
- ★ If any plates show signs of damage, replace the friction plates and steel plates as a set.
- Measure the thickness of the friction plates [A] with vernier calipers.

[B] KLX110C

[C] KLX110D

- ★ If they have worn past the service limit, replace them with new ones.

**Friction Plate Thickness**

**Standard:**

KLX110C	3.1 ~ 3.3 mm (0.12 ~ 0.13 in.)
KLX110D	3.12 ~ 3.28 mm (0.123 ~ 0.129 in.)

**Service Limit: 3.0 mm (0.12 in.)**

- Place each friction plate or steel plate on a surface plate, and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.
- ★ If any plate is warped over the service limit, replace it with a new one.

**Friction Plate Warp**

**Standard:**

KLX110C	0.2 mm (0.008 in.) or less
KLX110D	0.15 mm (0.0059 in.) or less

**Service Limit: 0.3 mm (0.01 in.)**

**Steel Plate Warp**

**Standard:**

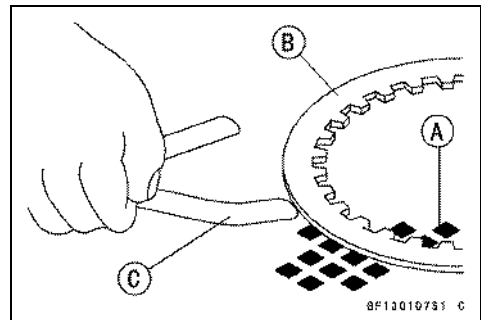
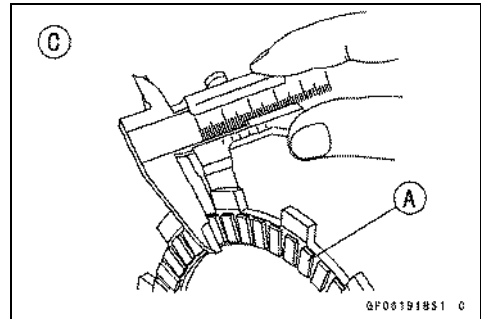
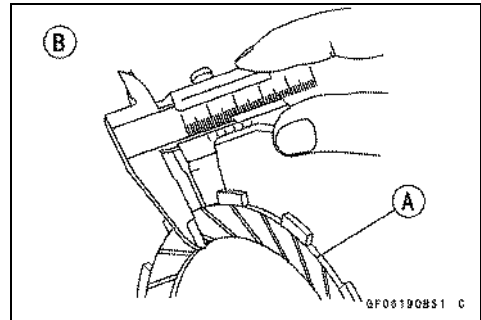
0.15 mm (0.0059 in.) or less

**Service Limit: 0.3 mm (0.01 in.)**

**Engine Lubrication System**

**Engine Oil Change**

- Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily. Then stop the engine.



## 2-20 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### WARNING

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

- Place an oil pan beneath the engine.
- Remove the engine oil drain plug [A], and let the oil drain completely.
- Replace the oil drain gasket with a new one if it is damaged.
- After draining, install the drain plug.

**Torque - Engine Oil Drain Plug: 29 N·m (3.0 kgf·m, 21 ft·lb)**

- Fill the engine with a good quality motor oil specified below.

#### Recommended Engine

**Type:** API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2

**Viscosity:** SAE 10W-40

**Capacity:** 0.9 L (1.0 US qt) (when filter is not removed)  
1.0 L (1.1 US qt) (when filter is removed)  
1.1 L (1.2 US qt) (when engine is completely dry)

#### NOTE

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

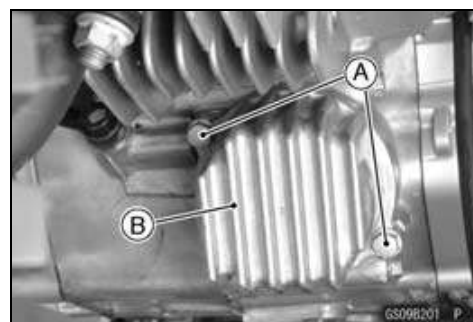
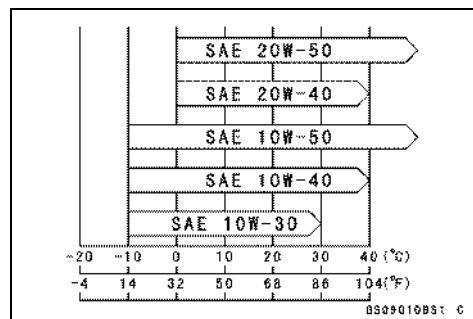
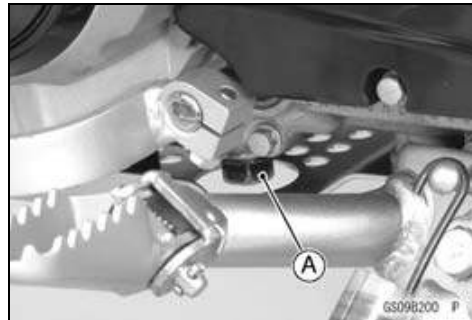
- Tighten:

**Torque - Oil Filler Cap: Hand-tighten**

- Check the oil level (see Oil Level Inspection in the Engine Lubrication System chapter).

#### Oil Filter Replacement

- Drain the engine oil (see Engine Oil Change).
- Remove the engine guard (see Engine Guard Removal/Installation in the Frame chapter).
- Remove:
  - Oil Filter Cap Bolts [A]
  - Oil Filter Cap [B]



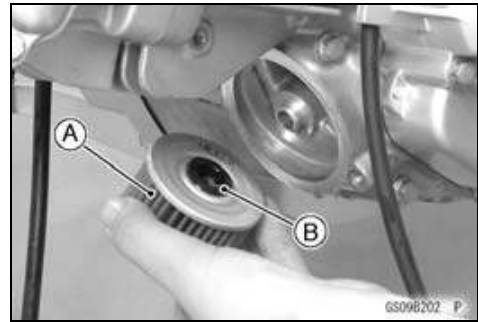


**Periodic Maintenance Procedures**

- Replace the oil filter [A] with a new one.
- Apply engine oil to the grommet [B].
- Be sure to install the filter with the grommet facing inside.

**NOTICE**

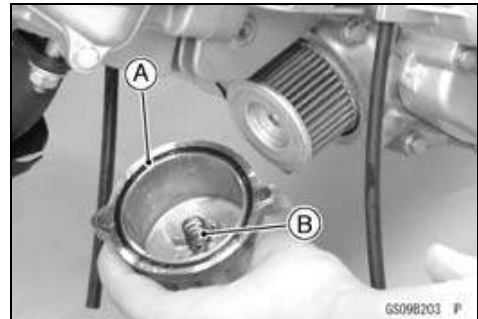
**Inside out installation stops oil flow, causing engine seizure.**



- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install the spring [B] securely.
- Install the oil filter cap.

**Torque - Oil Filter Cap Bolt: 5.2 N·m (0.53 kgf·m, 46 in·lb)**

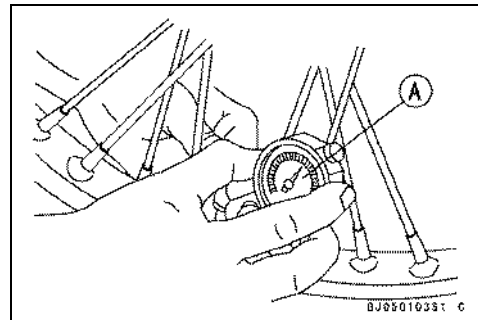
- Install the engine guard (see Engine Guard Removal/Installation in the Frame chapter).
- Pour in the specified type and amount of oil (see Engine Oil Change).



**Wheel/Tires**

**Tire Air Pressure Inspection**

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



**Air Pressure (when Cold)**

Front	100 kPa (1.0 kgf/cm <sup>2</sup> , 14 psi)
Rear	100 kPa (1.0 kgf/cm <sup>2</sup> , 14 psi)

## 2-22 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

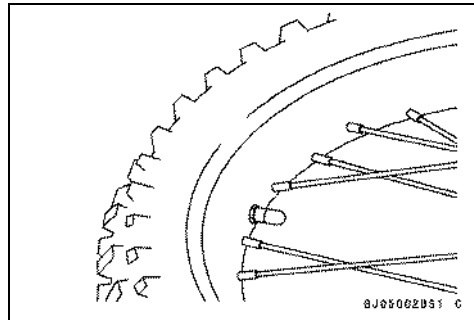
#### **Tires Inspection**

As the tire tread wears down, the tire becomes more susceptible to puncture and failure.

- Remove any imbedded stones or other foreign particles from the tread.
- Visually inspect the tire for cracks and cuts, replacing the tire in case of bad damage. Swelling or high spots indicate internal damage, requiring tire replacement.

#### **⚠ WARNING**

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



#### **NOTE**

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

#### **Standard Tire**

##### **Front:**

**Size:** 2.50-14 4P.R.  
**Make:** IRC  
**Type:** GS-45F

##### **Rear:**

**Size:** 3.00-12 4P.R.  
**Make:** IRC  
**Type:** GS-45F

#### **Spoke Tightness Inspection**

- Check that all the spokes are tightened evenly.
- ★ If spoke tightness is uneven or loose, tighten the spoke nipples evenly.

**Torque - Spoke Nipples: 4.0 N·m (0.41 kgf·m, 35 in·lb)**

- Check the rim runout (see Rim Runout Inspection).

#### **⚠ WARNING**

**A missing spoke places an additional load on the other spokes, which will eventually cause other spokes to break, creating the potential for an accident resulting in serious injury or death. Immediately replace any broken spoke(s).**

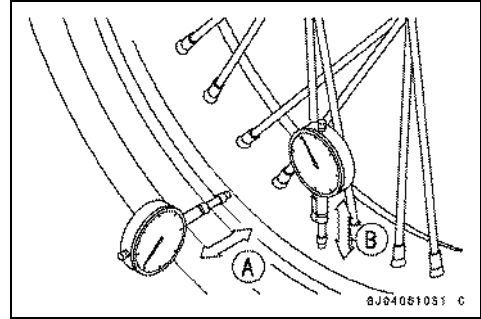
## Periodic Maintenance Procedures

### Rim Runout Inspection

- Place the jack under the frame so that the front/rear wheel off the ground.

**Special Tool - Jack: 57001-1238**

- Inspect the rim for small cracks, dents, bending, or warping.
- ★ If there is any damage to the rim, it must be replaced.
- Set a dial gauge against the side of the rim, and rotate the rim to measure the axial runout [A]. The difference between the highest and lowest dial readings is the amount of runout.
- Set a dial gauge against the outer circumference of the rim, and rotate the rim to measure radial runout [B]. The difference between the highest and lowest dial readings is the amount of runout.
- ★ If rim runout exceeds the service limit, check the wheel bearings first. Replace them if they are damaged. If the problem is not due to the bearings, correct the rim warp (runout). A certain amount of rim warp can be corrected by recentering the rim. Loosen some spokes and tighten others within the standard torque to change the position of different parts of the rim. If the rim is badly bent, however, it must be replaced.



### Rim Runout (with tire installed)

#### Standard:

<b>Axial</b>	<b>TIR 0.8 mm (0.031 in.) or less</b>
<b>Radial</b>	<b>TIR 1.2 mm (0.047 in.) or less</b>

#### Service Limit:

<b>Axial</b>	<b>TIR 2.0 mm (0.08 in.)</b>
<b>Radial</b>	<b>TIR 2.0 mm (0.08 in.)</b>

### Wheel Bearing Inspection

- Raise the front/rear wheel off the ground.
  - Special Tool - Jack: 57001-1238**
  - Spin the wheel lightly, and check for roughness, binding or noise.
  - ★ If roughness, binding, abnormal noise is found, replace the hub bearing.
- 
- Turn the handlebar until the handlebar doesn't move to either side.
  - The wheel edge is moved to one direction gripping the edge of the wheel by both hands and the play of the wheel bearing is checked.
  - ★ If the play is found, replace the bearing.



## 2-24 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### Final Drive

##### Drive Chain Slack Inspection

- Raise the rear wheel off the ground, rotate the rear wheel to find the place where the chain is tightest (because it wears unevenly).
- Check the wheel alignment (see Wheel Alignment Inspection in the Final Drive chapter), and adjust it if necessary (see Drive Chain Slack Adjustment).

##### NOTE

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

- Push up the chain midway between the engine sprocket and rear sprocket.
- Measure the space (chain slack) [A] between the chain and the swingarm as shown.
- ★ If the drive chain slack exceeds the standard, adjust it.

##### Drive Chain Slack

###### Standard:

KLX110C Models 11 ~ 16 mm (0.4 ~ 0.6 in.)

KLX110D Models 8 ~ 13 mm (0.3 ~ 0.5 in.)

##### Drive Chain Slack Adjustment

- Remove:
  - Cotter Pin [A]
- Loosen:
  - Rear Torque Link Nut [B]
  - Axle Nut [C]
  - Brake Adjusting Nut [D]
  - Right and Left Chain Adjuster Locknuts [E]

##### NOTICE

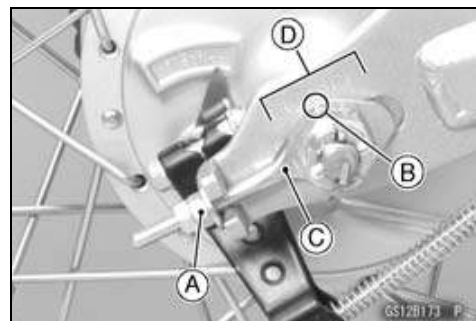
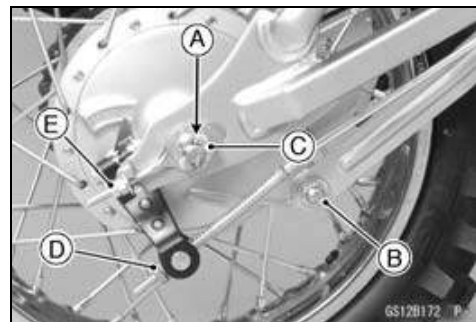
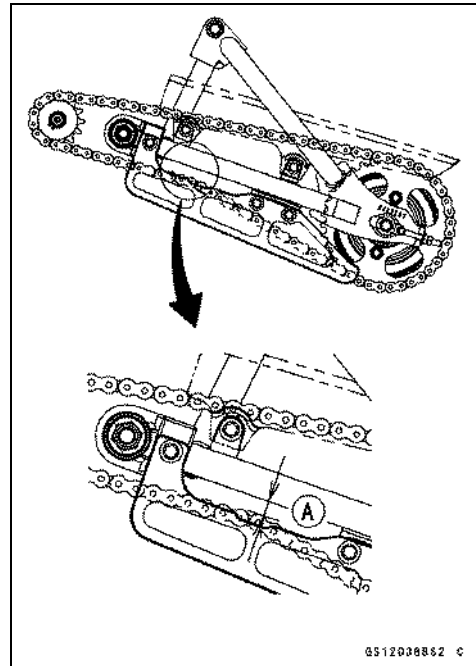
**If you don't loosen the torque link nut, it may lead to the brake parts damage when the adjusters are set.**

- If the chain is too tight, back out the left and right chain adjusting nuts [A] evenly, and push the wheel forward until the chain is too loose.
- Turn both chain adjusting nuts evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the notch [B] on the right chain adjuster [C] should align with the same swingarm mark [D] that the left chain adjuster notch aligns with.

- ★ Check the wheel alignment.

##### ⚠ WARNING

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



**Periodic Maintenance Procedures**

- Tighten both chain adjuster locknuts securely.
- Tighten the axle nut.

**Torque - Rear Axle Nut: 64 N·m (6.5 kgf·m, 47 ft·lb)**

- Rotate the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Tighten the rear torque link nut.

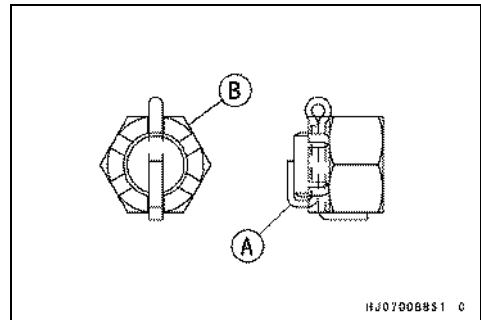
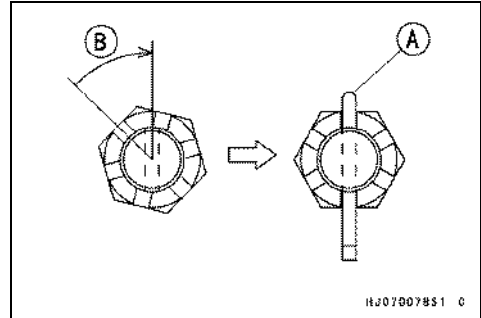
**Torque - Rear Torque Link Nut: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Insert a new cotter pin [A] into the axle.

**NOTE**

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

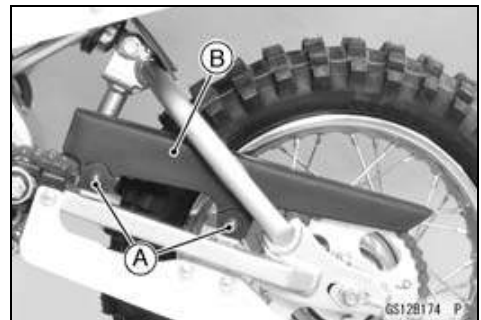
- Bend the cotter pin [A] over the nut [B].
- Check the rear brake effectiveness.



<b>⚠ WARNING</b>
<b>A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.</b>

**Drive Chain Wear Inspection**

- Remove the bolts [A] and take off the chain cover [B].
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.
- ★ If there is any irregularity, replace the drive chain (see Drive Chain Removal and Installation in the Final Drive chapter).
- ★ Lubricate the drive chain if it appears dry (see Drive Chain Lubrication).



## 2-26 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

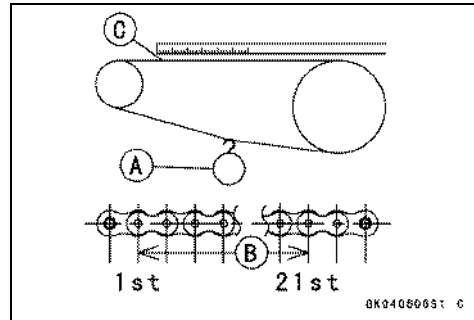
- Stretch the chain taut by hanging a 10 kg (20 lb) weight [A] on the chain.
- Measure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.

#### Drive Chain 20-link Length

**Standard:** 254.0 ~ 254.6 mm (10.00 ~ 10.02 in.)

**Service Limit:** 259 mm (10.2 in.)

- ★ If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.



### **⚠ WARNING**

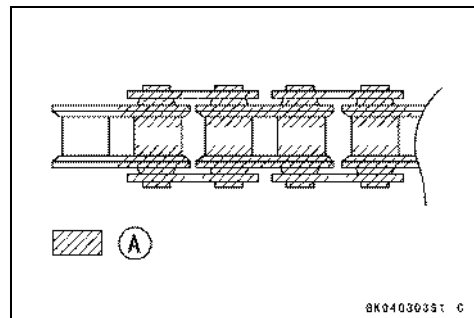
**A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with the standard chain.**

#### Standard Chain

**Make:** DAIDO  
**Type:** DID 420DX  
**Link:** 90 Links

#### **Drive Chain Lubrication**

- The chain should be lubricated with a lubricant which will both prevent the exterior from rusting and also absorb shock and reduce friction in the interior of the chain.
- ★ If the chain is especially dirty, it should be washed in diesel oil or kerosene, and afterward soaked in heavy oil. Shake the chain while it is in the oil so that oil will penetrate to the inside of each roller.
- An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication.
- If a special lubricant is not available, a heavy oil such as SAE90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.
- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings.
- Wipe off any excess oil.  
Oil applied area [A]



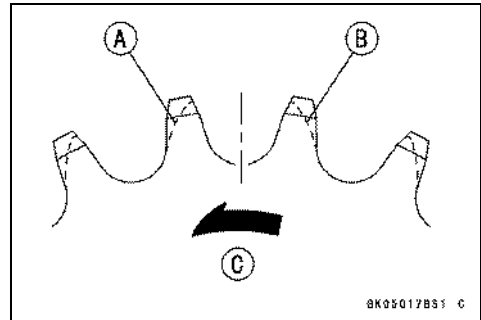
**Periodic Maintenance Procedures**

**Sprocket Wear Inspection**

- Visually inspect the front and rear sprocket teeth for wear and damage.
- ★ If they are worn as illustrated or damaged, replace the sprocket.
  - [A] Worn Tooth (Engine Sprocket)
  - [B] Worn Tooth (Rear Sprocket)
  - [C] Direction of Rotation

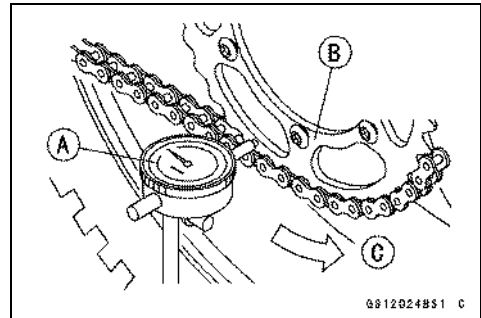
**NOTE**

○ If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.



**Rear Sprocket Warp Inspection**

- Using the jack, raise the rear wheel off the ground.
- Special Tool - Jack: 57001-1238**
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown.
- Rotate [C] the rear wheel to measure the sprocket runout (warp).
- The difference between the highest and lowest dial gauge readings is the amount of runout (warp).
- ★ If the runout exceeds the service limit, replace the rear sprocket.

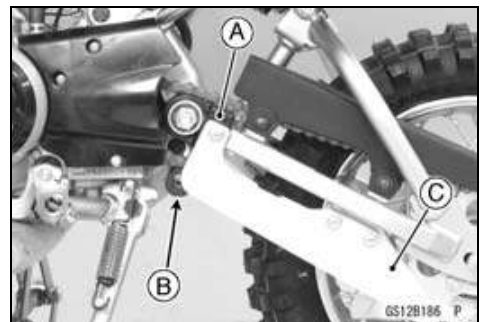


**Rear Sprocket Warp**

- Standard:** TIR 0.4 mm (0.016 in.) or less
- Service Limit:** TIR 0.5 mm (0.020 in.)

**Drive Chain Guide and Slipper Wear Inspection**

- Visually inspect the following parts.
  - Chain Slipper [A]
  - Chain Guide Roller [B] (KLX110D Models)
  - Chain Guide [C]
- ★ If the chain guides, chain slipper and chain guide roller show any signs of abnormal wear or damage, replace them.



**Brakes**

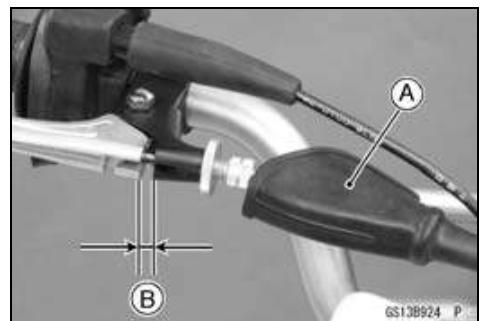
**Brake Lever Free Play Inspection**

- Slide the brake lever dust cover [A] out of place.
- Check the front brake lever free play [B] when the brake is lightly applied.

**Brake Lever Free Play**

- Standard:** 4 ~ 5 mm (0.16 ~ 0.20 in.)

- ★ If the lever has improper play, adjust it.
- Operate the lever a few times to see that it returns to its rest position immediately upon release.
- Check for brake drag.
- Check braking effectiveness.
- Slide the brake lever dust cover back into place.

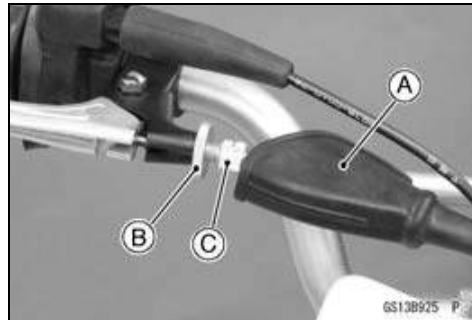


## 2-28 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### **Brake Lever Free Play Adjustment**

- Slide the brake lever dust cover [A] out of place.
- Loosen the locknut [B] and turn the adjuster [C] so that the brake lever will have 4 ~ 5 mm (0.16 ~ 0.20 in.) of play.



- If it cannot be done, use the adjuster at the end of the brake cable.
- Loosen the locknuts [A] at the lower end of the brake cable.
- Turn the adjuster [B] so that the brake lever has the correct amount of play, and tighten the locknuts.
- If sufficient adjustment can not be made with the adjuster at the lower end of the brake cable, complete the adjustment with the adjuster at the brake lever, and then tighten the locknut.
- Check for brake drag.
- Check braking effectiveness.
- Slide the brake lever dust cover back into place.



#### **NOTE**

- For minor corrections, use the adjuster at the front brake lever.
- If the brake lever adjustment cannot be made with the adjuster, move the front brake cam lever to a new position on the brake camshaft.

#### **Brake Pedal Free Play Inspection**

- Check the brake pedal free play [A] when the pedal is pushed down lightly by hand.

##### **Brake Pedal Free Play**

**Standard: 20 ~ 30 mm (0.76 ~ 1.18 in.)**

- ★ If the pedal has improper play, adjust it.
- Operate the pedal a few times to see that it returns to its rest position immediately upon release.
- Rotate the rear wheel 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.





**Periodic Maintenance Procedures**

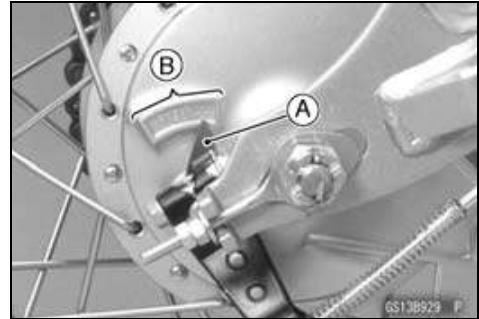
***Brake Pedal Free Play Adjustment***

- Turn the adjusting nut [A] at the brake cam lever so that the pedal has proper play.
- Operate the pedal a few times to see that it returns to its rest position immediately upon release.
- Rotate the rear wheel 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.



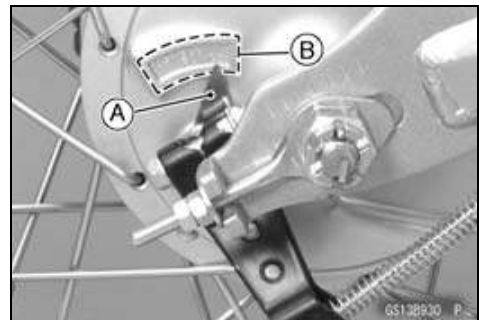
***Brake Lining Wear Inspection***

- Check the brake lining wear indicator [A] (only rear brake) points within the USABLE RANGE [B] when the brake is fully applied.
- ★ If it does not, the brake shoes must be immediately replaced and the other brake parts examined.



***Brake Shoe Lining Wear Inspection***

- Check whether the brake lining wear indicator [A] points within the USABLE RANGE [B] when the brakes are firmly applied, or remove the brake shoes and inspect the lining thickness at few locations.
- ★ If the lining thickness is out of the range, or beyond the service limit, replace the brake shoes as a set and inspect other brake parts.
- ★ If the lining thickness is greater than the service limit, do the following before installing the shoes.
  - File or sand down any high spots on the surface of the lining.
  - Use a wire brush to remove any foreign particles from the lining.



## 2-30 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### Brake Shoe Lining Thickness [A]

##### Standard:

Front	2.10 ~ 3.00 mm (0.08 ~ 0.12 in.)
Rear	3.85 ~ 4.15 mm (0.152 ~ 0.163 in.)

(When the wear indicator is within the USABLE RANGE.)

##### Service limit:

Front	1.2 mm (0.05 in.)
Rear	2.0 mm (0.08 in.)

(When the wear indicator is out of the USABLE RANGE.)

- Wash off any oil or grease with 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.

- Install the brake panel (see Brake Panel Installation in the Brakes chapter).

#### **Cam Lever Angle Inspection**

- Check that the brake cam lever comes to an 80° ~ 90° angle [A] with the brake rod when the brake is fully applied.
- ★ If it does not, adjust the brake cam lever angle.

##### Brake Cam Lever Angle

Standard: 80 ~ 90°

- After adjusting the cam lever angle, make sure to adjust the brake pedal free play (see Brake Pedal Free Play Adjustment).

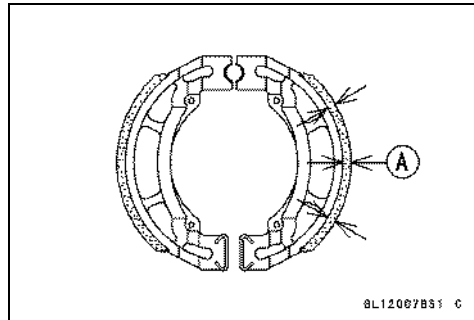
#### WARNING

Since a cam lever angle greater than 90° reduces braking effectiveness, periodically check and adjust the cam lever angle.

#### **Cam Lever Angle Adjustment**

##### Front Brake Cam Lever Angle:

- Remove:
  - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  - Brake Panel (see Brake Panel Removal in the Brakes chapter)



**Periodic Maintenance Procedures**

- Before removing the cam lever [A], mark the position [B] of the cam lever.
- Remove the brake cam lever bolt [C] and nut [D], and then pull out the brake cam lever from the brake camshaft.
- Mount the cam lever at a new position so that the cam lever has a proper angle when the brake is fully applied.

**Brake Cam Lever Angle**  
**Standard: 80 ~ 90°**

- Tighten the brake cam lever bolt and nut.
- Install the removed parts (see appropriate chapters).
- Adjust the brake lever free play (see Brake Lever Free Play Adjustment).

**Rear Brake Cam Lever Angle:**

**NOTICE**

**Do not depress the brake pedal deeply in order to separate the brake rod from the brake cam lever joint, this may extend the brake spring beyond its allowable spring extension. Rotate the rear brake panel clockwise as far as it will go with the brake rod inserted into the brake cam lever joint, then depress the brake pedal lightly, the brake rod will be separated from the brake cam lever joint.**

- Remove the brake rod end [A] from the brake cam lever [B] (see Rear Wheel Removal in the Wheels/Tires chapter).
- Before removing the cam lever, mark the position [C] of the cam lever.
- Remove the brake cam lever bolt [D] and nut [E], and then pull out the brake cam lever from the brake camshaft.
- Mount the cam lever at a new position so that the cam lever has a proper angle when the brake is fully applied.

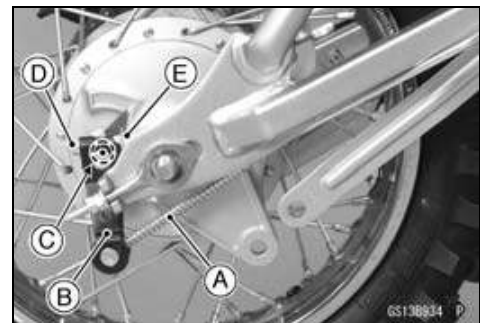
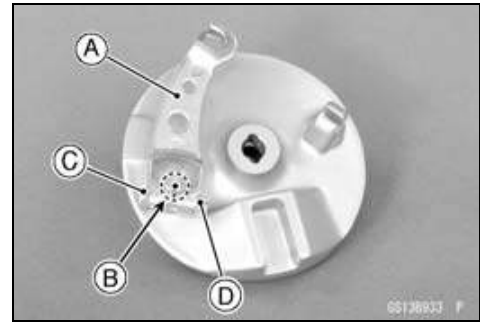
**Brake Cam Lever Angle**  
**Standard: 80 ~ 90°**

- Tighten the brake cam lever bolt and nut.  
**Torque - Brake Cam Lever Bolt: 7.0 N·m (0.71 kgf·m, 62 in·lb)**

**⚠ WARNING**

**When remounting the cam lever, be sure that the position of the wear indicator on the serrated shaft is not altered. A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper operation, taking particular note of the brake lining wear indicator position. In case of doubt as to braking effectiveness, disassemble and inspect all internal brake parts. Worn parts can result in the brake locking or failing.**

- Install the removed parts (see appropriate chapters).
- Adjust the brake pedal free play (see Brake Pedal Free Play Adjustment).

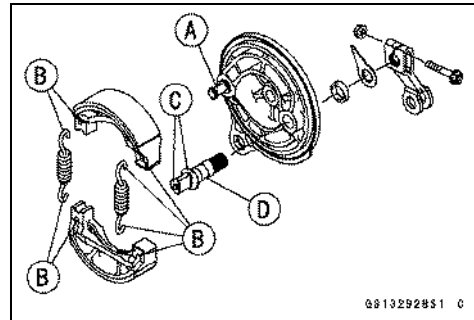


## 2-32 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### **Brake Panel Lubrication**

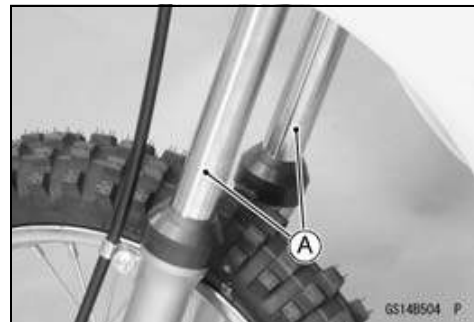
- Disassemble the brake panel (see Brake Panel Disassembly in the Brakes chapter).
- Clean all old grease out of the brake parts with a cloth.
- Apply high-temperature grease to the following.
  - Brake Shoe Anchor Pin [A]
  - Spring Ends [B]
  - Cam Surfaces [C]
  - Cam Shaft Groove [D]



#### **Suspension**

##### **Front Fork Inspection**

- Visually inspect the front fork for oil leakage, scoring or scratches on the outer surface of the inner tubes [A].
- Holding the brake lever, pump the front fork down and up manually to check for smooth operation.
- ★ If the fork shown damages or oil leak, replace the damaged parts.
- ★ If the fork rattles, inspect the oil level or tightening torque.

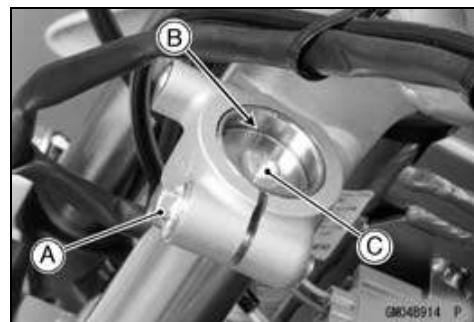


#### **NOTICE**

**If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.**

##### **Front Fork Oil Change**

- Remove the cap.
- Loosen the front fork upper clamp bolt [A].
- Remove the snap ring [B] while pressing the top plug [C], and then remove the top plug with O-ring.



- Remove the front fork (see Front Fork Removal in the Suspension chapter).
- Thoroughly clean the fork before disassembly.

#### **NOTICE**

**Be careful not scratch the inner tube and not to damage the dust seal.**  
**Avoid scratching or damaging the inner tube or the dust seal. Use a mild detergent and sponge out dirt with plenty of water.**

- Remove:
  - Fork Spring
  - Dust Seal

**Periodic Maintenance Procedures**

- Drain the fork oil [A] with the fork upside down.

**NOTE**

○ Pump the fork tube several times to discharge the oil.

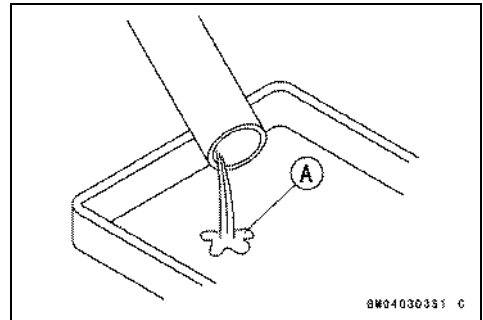
- Pour in the specified type and amount of oil.

**Suspension Oil - SS-8 (1 L): 44091-0007**

**Fork Oil Amount:**

**KLX110C Models 165 ±2.5 mL (5.58 ±0.085 US oz)**

**KLX110D Models 182 ±2.5 mL (5.71 ±0.085 US oz)**



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

**Special Tool - Fork Oil Level Gauge: 57001-1290**

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

**Oil Level (fully compressed, without spring)**

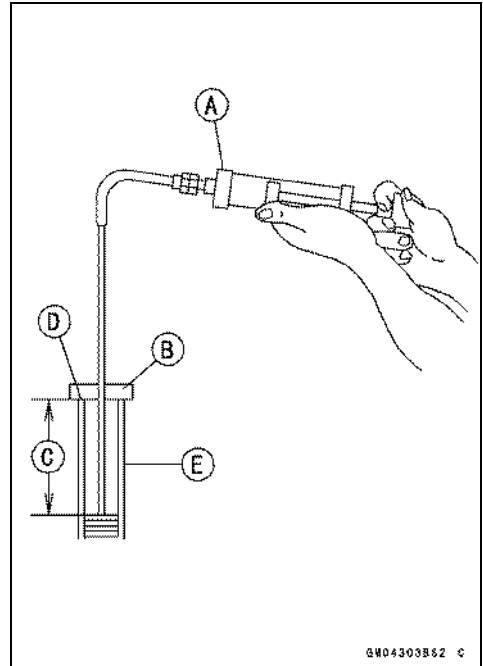
**Standard:**

**KLX110C Models 85 ±2 mm (3.35 ±0.08 in.)**

**KLX110D Models 118 ±2 mm (4.65 ±0.08 in.)**

- Place the stopper of the level gauge at the top [D] of the inner tube [E] and pull the handle slowly to draw out the excess oil from fork into the gauge, thus attaining the standard level.

- ★ If no oil is drawn out, there is not enough oil in the fork. Pour in some more oil and measure again.
- Change the oil in the another fork leg in the same manner.
- Install the removed parts (see appropriate chapters).



**Rear Shock Absorber Operation Inspection**

- Bounce [A] the rear of the motorcycle up and down and check for smooth suspension stroke.
- Remove the side cover (see Side Cover Removal in the Frame chapter).
- Check for a broken or collapsed spring.
- Check the shock for a bent shaft or oil leaks.
- ★ If the shock does not smoothly or damaged, replace or repair defective parts.



## 2-34 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### **Swingarm Pivot Inspection**

- Raise the rear wheel off the ground with the jack.

**Special Tool - Jack: 57001-1238**

- Move the swingarm [A] side to side to check for worn, damaged or loose suspension pivot components.
- ★ If any play is detected, check for looseness of swingarm pivot shaft nut or for damage to the swingarm rubber bushings.



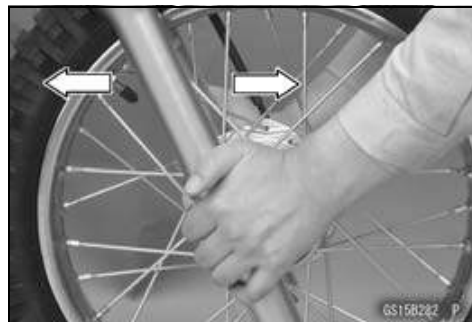
#### **Steering**

##### **Steering Inspection**

- Raise the front wheel off the ground with the jack.

**Special Tool - Jack: 57001-1238**

- With the front wheel pointing straight ahead, alternately nudge each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.
- ★ If the steering binds or catches before the stop, check the routing of the cables, hoses and harnesses.
- ★ If the steering feels tight, adjust or lubricate the steering.
- Feel for steering looseness by pushing and pulling the forks.
- ★ If you feel looseness, adjust the steering.

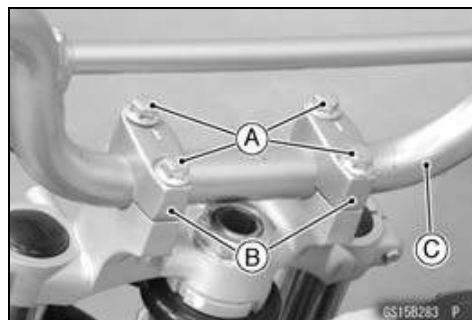


##### **Steering Adjustment**

- Raise the front wheel off the ground with the jack.

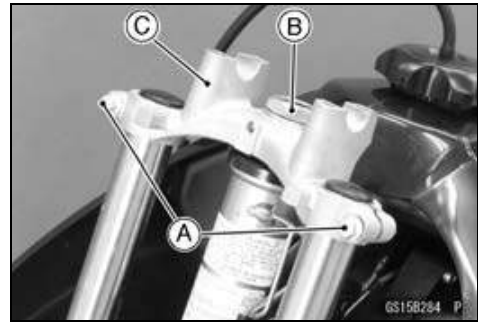
**Special Tool - Jack: 57001-1238**

- Remove:
  - Number Plate (see Number Plate Removal in the Frame chapter)
  - Handlebar Holder Bolts [A]
  - Handlebar Holders [B]
  - Handlebar [C] (from holder)

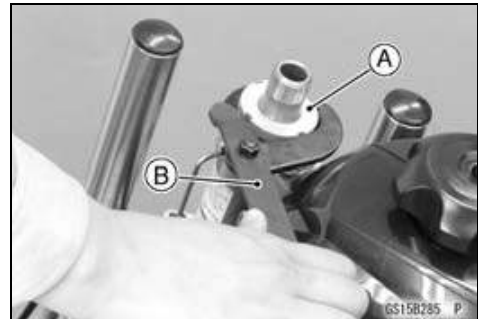


**Periodic Maintenance Procedures**

- Loosen the front fork upper clamp bolts [A], and remove the steering stem head nut [B] and steering stem head [C].



- Turn the steering stem nut [A] with the steering stem nut wrench [B] to obtain the proper adjustment.
- ★ If the steering is too tight, loosen the stem nut a fraction of a turn; if the steering is too loose, tighten the nut a fraction of a turn.



**Special Tool - Steering Stem Nut Wrench: 57001-1100**

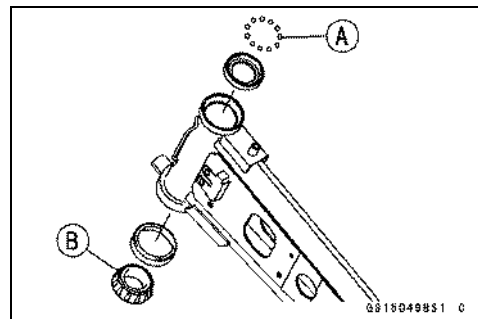
**NOTE**

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

- Install the steering stem head.
- Tighten the following:  
**Torque - Steering Stem Head Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)**  
**Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)**
- Check the steering again.
- ★ If the steering is too tight or too loose, repeat the adjustment as mentioned above.
- Install the removed parts (see appropriate chapters).

**Stem Bearing Lubrication**

- Remove the steering stem (see Steering Stem, Stem Bearing Removal in the Steering chapter).
- Using a high flash-point solvent, wash the upper ball bearing and lower tapered rollers in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and the rollers.
- ★ Replace the bearing part if they show wear or damage.
- Apply grease liberally to the upper races, and stick the ball bearing in place with grease. There are 23 steel balls [A] installed in the upper outer race.
- Pack the lower tapered roller bearings [B] in the cages with grease, and apply a light coat of grease to the lower outer race.
- Install the steering stem, and adjust the steering (see Steering Adjustment).



## 2-36 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

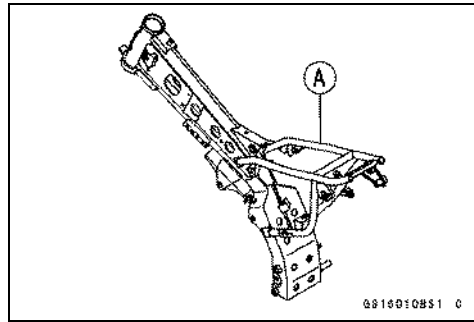
#### Frame

##### **Frame Inspection**

- Clean the frame with steam cleaner.
- Visually inspect the frame [A] for cracks, dents, bending, or warp.
- ★ If there is any damage to the frame, replace it.

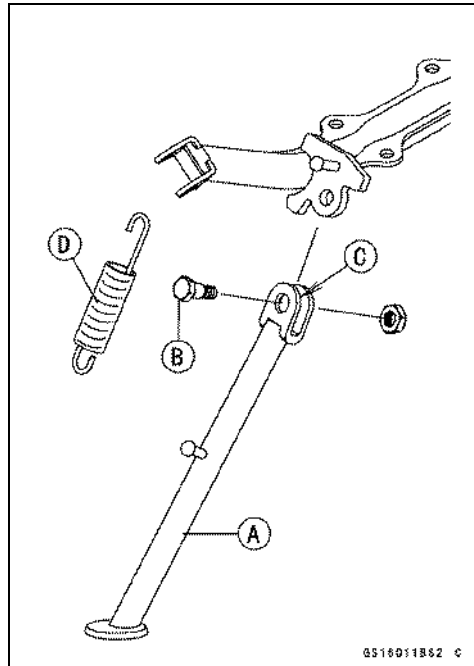
#### **⚠ WARNING**

**A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.**



##### **Sidestand Inspection**

- See if the sidestand [A] moves smoothly and retracts fully.
- ★ If not, clean and grease the pivot [B] and sliding portion [C].
- Check the sidestand spring [D] for damage.
- ★ If necessary, replace the spring.



#### Electrical System

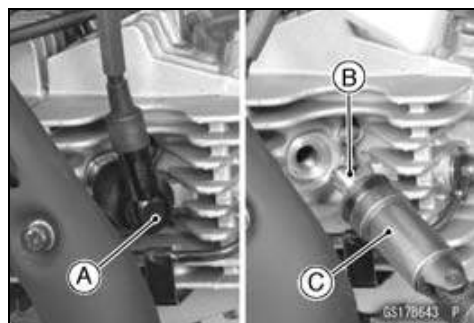
##### **Spark Plug Cleaning and Inspection**

- Remove the spark plug cap [A].
- Remove the spark plug [B], using the spark plug wrench [C].

**Special Tool - Spark Plug Wrench: 57001-1262**

**Owner's Tool - Spark Plug Wrench, 16 mm: 92110-1206**

- The plug may also be cleaned using high flash-point solvent and a nonmetal brush (nylon etc.).
- ★ If the spark plug electrodes are corroded or damaged or if the insulator is cracked, replace the plug. Use the standard spark plug.





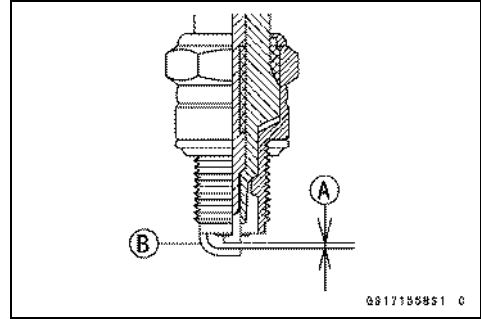
**Periodic Maintenance Procedures**

- 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**

Standard: 0.6 ~ 0.7 mm (0.024 ~ 0.028 in.)

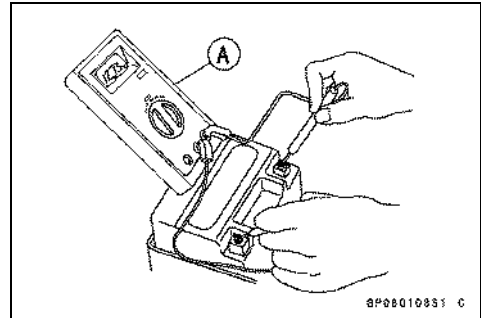
- Install the spark plug.
- Torque - Spark Plug: 13 N·m (1.3 kgf·m, 115 in·lb)



- Insert the plug cap, and confirm for the spark plug not to come off.

**Battery Charging Condition Inspection**

- Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].
- Remove:
  - Left Side Cover (see Side Cover Removal in the Frame chapter)
  - Seat (see Seat Removal in the Frame chapter)
- Open the battery cover (see Battery Removal in the Electrical System chapter).
- Disconnect the battery terminals.



**NOTICE**

**Be sure to disconnect the negative (-) cable first.**

- Measure the battery terminal voltage.

**NOTE**

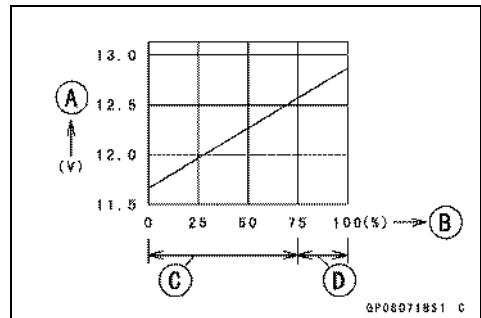
○ Measure with a digital voltmeter which can be read one decimal place voltage.

- ★ If the reading is 12.6 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

**Battery Terminal Voltage**

Standard: 12.6 V or more

- Terminal Voltage (V) [A]
- Battery Charge Rate (%) [B]
- Refresh charge is required [C]
- Good [D]

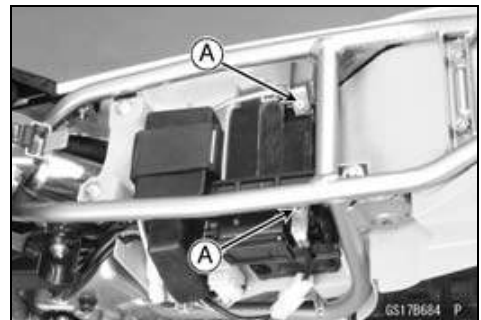


**Battery Terminals Inspection**

- Check the battery terminal screws [A] for tightness and make sure the terminal cover is in place.

**⚠ WARNING**

**Loose battery cables can create sparks which can cause a fire or explosion resulting in injury or death. Make sure the battery terminal screws are tightened securely and the covers are installed over the terminals.**



## 2-38 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

- Check that the battery terminals are not corroded.
- ★ If necessary, remove the battery (see Battery Removal in the Electrical System chapter) and clean the terminals and cable ends using a solution of baking soda and water.
- After attaching both cables, coat the terminals and cable ends with grease to prevent corrosion.
- Install the battery (see Battery Installation in the Electrical System chapter).

### Cable Inspection

#### General Lubrication

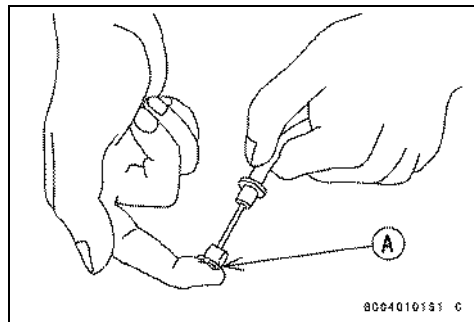
- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

#### NOTE

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

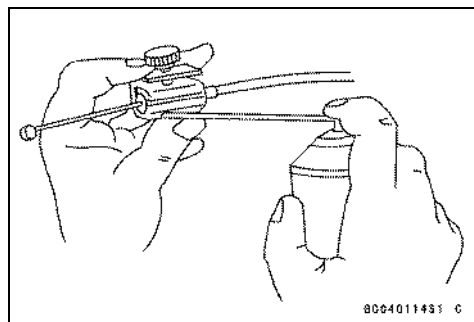
#### Points: Lubricate with Grease.

Clutch Inner Cable Upper and Lower Ends [A] (KLX110D)  
Choke Inner Cable Upper End  
Throttle Inner Cable Upper End



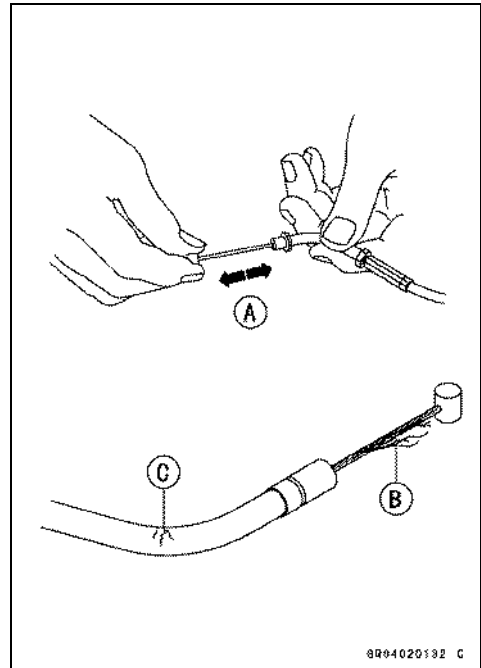
#### Cables: Lubricate with Rust Inhibitor.

Throttle Cables  
Clutch Cable (KLX110D)  
Choke Cable



**Periodic Maintenance Procedures**

- 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.



**Nut, Bolt, and Fastener Tightness Inspection**

***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.

**NOTE**

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

- ★ If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the Torque and Locking Agent section in this chapter for torque specifications. For each fastener, first loosen it by 1/2 turn, then tighten it.

- ★ If cotter pins are damaged, replace them with new ones.

**Nut, Bolt and Fastener to be checked**

Wheels:

- Spoke Nipples
- Front Axle Nut
- Front Axle Nut Cotter Pin
- Rear Axle Nut
- Rear Axle Nut Cotter Pin

Final Drive:

- Chain Adjuster Locknuts
- Rear Sprocket Nuts

## 2-40 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

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#### Brakes:

- Rear Brake Adjust Nut
- Brake Lever Pivot Bolt
- Brake Pedal Bolt
- Torque Link Nuts
- Torque Link Nut Cotter Pins

#### Suspension:

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

#### Steering:

- Steering Stem Head Nut
- Handlebar Holder Bolts

#### Engine:

- Throttle Cable Adjuster Locknuts
- Engine Mounting Nuts
- Shift Pedal Bolt
- Muffler Mounting Nut
- Exhaust Pipe Holder Nuts
- Clutch Cable Adjuster Locknut (KLX110D)
- Clutch Lever Pivot Nut (KLX110D)

#### Others:

- Footpeg Cotter Pins
- Footpeg Bracket Bolts
- Sidestand Nut

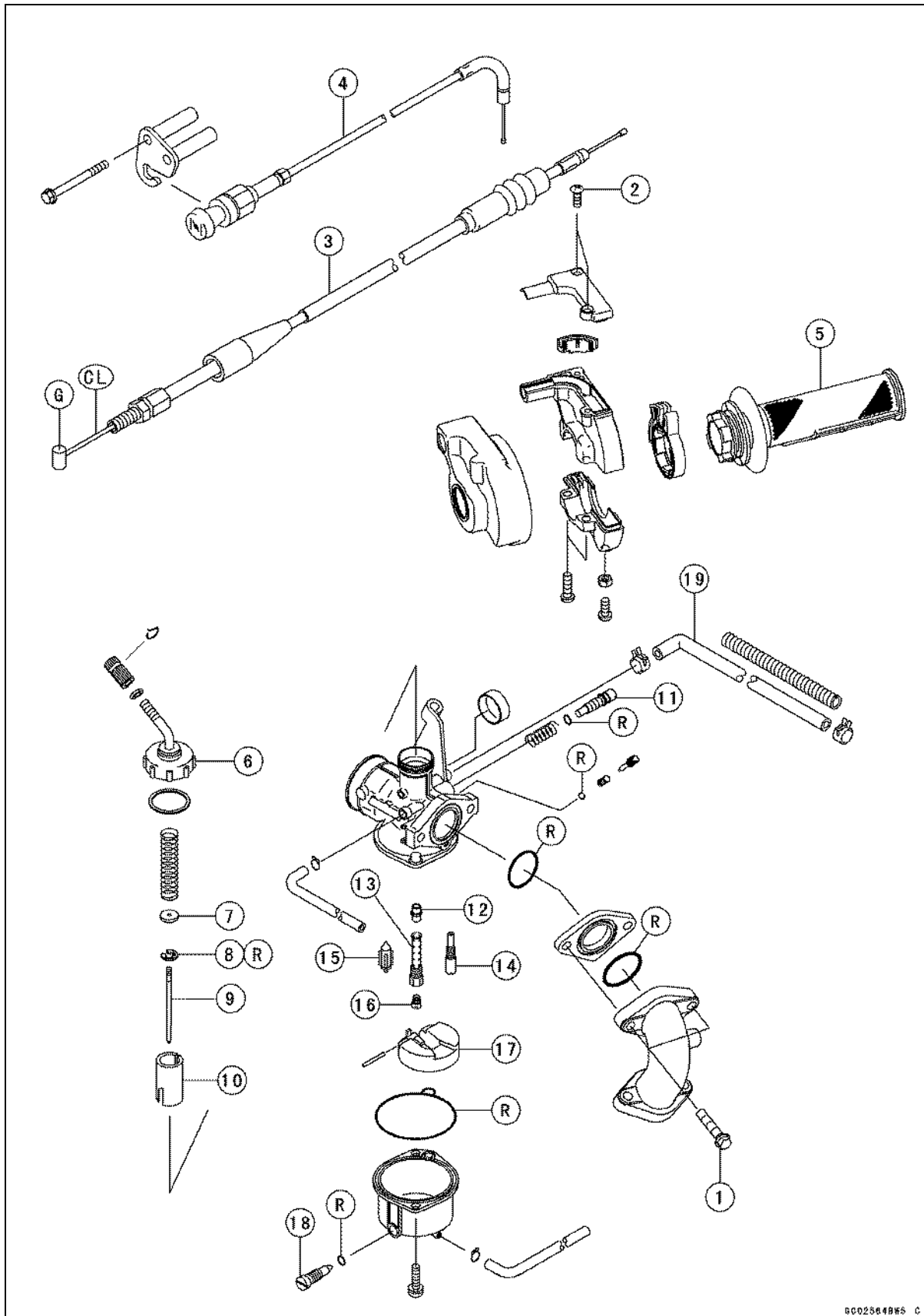
# Fuel System

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# 3-2 FUEL SYSTEM

## Exploded View



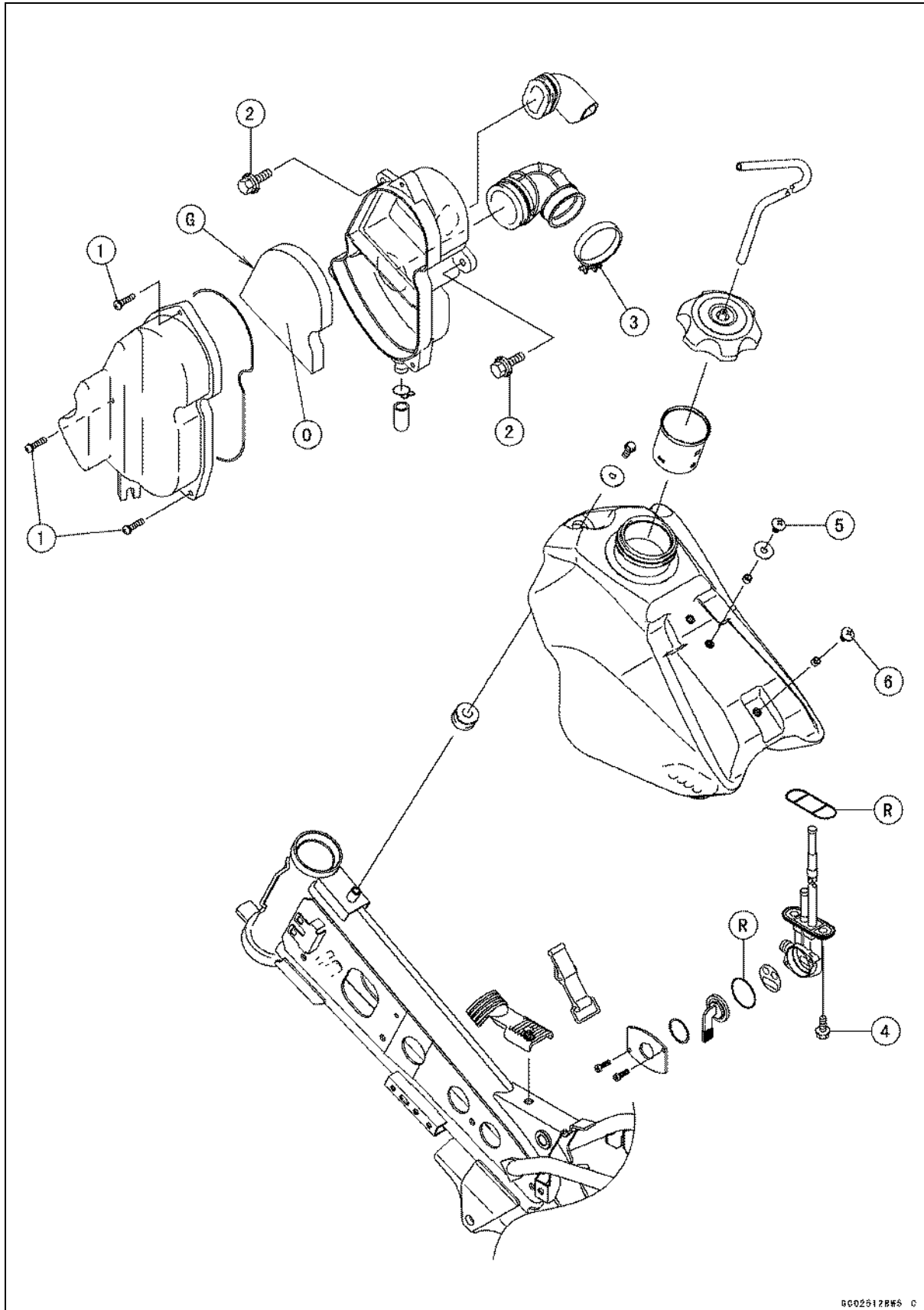
**Exploded View**

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Carburetor Holder Bolts	5.2	0.53	46 in·lb	
2	Throttle Cable Housing Cap Screws	0.6	0.06	5.3 in·lb	

- 3. Throttle Cable
  - 4. Choke Cable
  - 5. Throttle Grip
  - 6. Carburetor Cap
  - 7. Retainer
  - 8. Circlip
  - 9. Jet Needle
  - 10. Throttle Valve
  - 11. Idle Adjusting Screw
  - 12. Needle Jet
  - 13. Needle Jet Holder
  - 14. Pilot Jet
  - 15. Float Valve Needle
  - 16. Main Jet
  - 17. Float
  - 18. Carburetor Drain Plug
  - 19. Fuel Hose
- CL: Apply cable lubricant.  
 G: Apply grease.  
 R: Replacement Parts

# 3-4 FUEL SYSTEM

## Exploded View



0C02912BWS C



**Exploded View**

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Cleaner Cover Screws	1.5	0.15	13 in·lb	
2	Air Cleaner Housing Bolts	3.5	0.36	31 in·lb	
3	Air Duct Clamp Screw	2.0	0.20	18 in·lb	
4	Fuel Tap Mounting Bolts	4.4	0.45	39 in·lb	
5	Screw (for Seat Hook)	5.0	0.51	44 in·lb	
6	Screw (for Rubber Band Hook)	5.0	0.51	44 in·lb	

G: Apply grease.

O: High-quality foam air filter oil.

R: Replacement Parts

## 3-6 FUEL SYSTEM

### Specifications

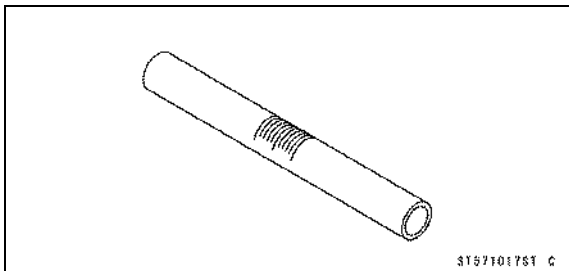
Item	Standard
<b>Throttle Grip and Cable</b> Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
<b>Carburetor</b> Make/Type Idle Speed Main Jet Main Air Jet Jet Needle Throttle Valve Cutaway Slow Jet Pilot Screw (turns out) Service Fuel Level (below the bottom edge of the carburetor body) Float Height	KEIHIN PB18 1 600 ~ 1 700 r/min (rpm) #78 #180 NCFA 3.0 #40/40 1 3/8 3.0 ±1 mm (0.12 ±0.04 in.) 10.7 ±2 mm (0.421 ±0.08 in.)
<b>Air Cleaner</b> Air Cleaner Element Oil	High quality form air filter oil

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**Special Tool**

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**Fuel Level Gauge:  
57001-1017**



## 3-8 FUEL SYSTEM

### Throttle Grip and Cable

If the throttle grip has excessive free play due to cable stretch or misadjustment, there will be a delay in throttle response. Also, the throttle valve may not open fully at full throttle. On the other hand, if the throttle grip has no play, the throttle will be hard to control, and the idle speed will be erratic. Check the throttle grip play periodically in accordance with the Periodic Maintenance Chart, and adjust the play if necessary.

The throttle cable routing is shown in Cable, Wire and Hose Routing Section in the Appendix chapter.

#### **Free Play Inspection**

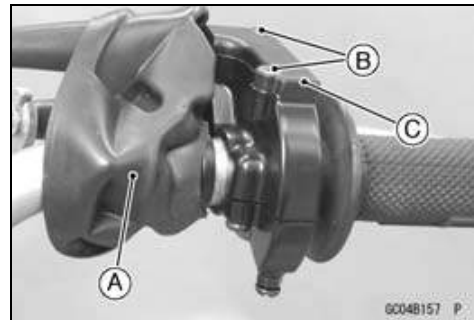
- Refer to the Throttle Grip Free Play Inspection in the Periodic Maintenance chapter.

#### **Free Play Adjustment**

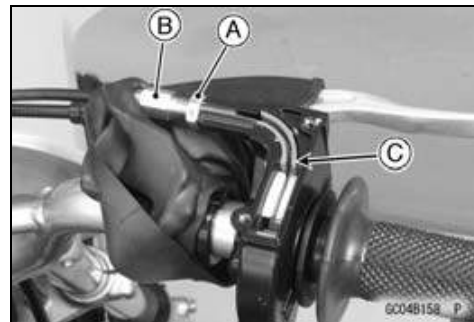
- Refer to the Throttle Grip Free Play Adjustment in the Periodic Maintenance chapter.

#### **Throttle Cable Replacement**

- Tuck up the dust cover [A].
- Remove the throttle cable housing cap screws [B], and take off the cap [C].



- Loosen the locknut [A], and screw in the adjuster [B].
- Remove the throttle cable [C] from the cable housing.



- Remove the fuel tank (see Fuel Tank Removal).
- Loosen the cap [A], and remove the throttle valve (see Carburetor Disassembly).



## Throttle Grip and Cable

- Lubricate the cable.
- Apply grease to the tips of the cables.
- Insert the throttle valve assembly.
- Run the throttle cable in accordance with the Cable, Wire and Hose Routing section in the Appendix chapter.
- Install the throttle cable to the cable housing.
- Tighten:
  - Torque - Throttle Cable Housing Cap Screws: 0.6 N·m (0.06 kgf·m, 5.3 in·lb)**

- After the installation, adjust the cable properly.

### ⚠ WARNING

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

### **Throttle Cable Lubrication**

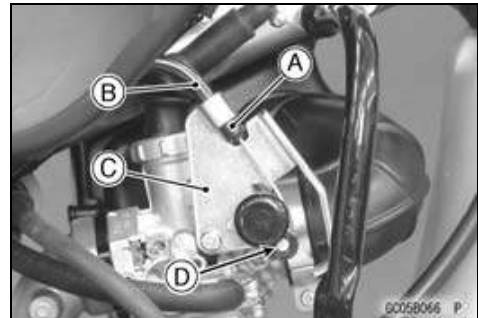
- Whenever the throttle cable is removed or in accordance with the Periodic Maintenance Chart, lubricate the these cables (see Lubrication in the Periodic Maintenance chapter).
- Apply a little grease to the cable upper or lower ends.
- Use a commercially available pressure cable lubricator to lubricate these cables.

### **Throttle Cable Inspection**

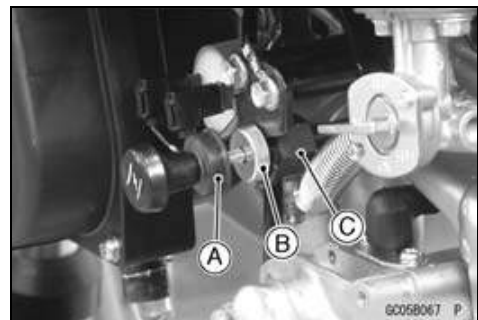
- Refer to the Cable Inspection in the Periodic Maintenance chapter.

### **Choke Cable Removal**

- Remove the shroud (see Shroud Removal in the Frame chapter).
- Free the boot [A], and remove the choke cable [B] from the choke holder [C].
- Remove the choke cable lower end [D].



- Tuck up the boot [A].
- Loosen the adjuster [B] and locknut [C].
- Remove the cable from the bracket.



## 3-10 FUEL SYSTEM

### Throttle Grip and Cable

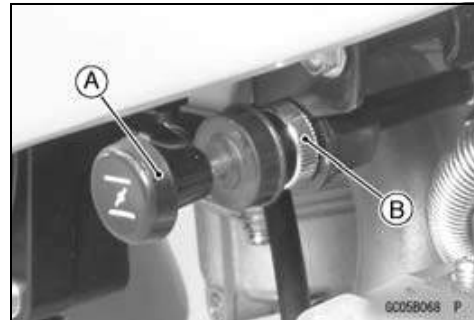
#### **Choke Cable Installation**

- Installation is the reverse of removal.
- Install the choke cable in accordance with the Cable, Wire and Hose Routing section in the Appendix chapter.
- After the installation, adjust the cable properly.

#### **⚠ WARNING**

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

- Adjust the choke knob operation as the following procedures.
  - Pull the choke knob [A] fully.
  - Turn the adjuster [B] to adjust the hardness of the knob operation.
  - ★ If the adjuster too tight, the knob operation becomes heavy.
  - ★ If the adjuster too loose, the position of the knob cannot be fixed.



#### **Choke Cable Lubrication**

- Whenever the choke cable is removed or in accordance with the Periodic Maintenance Chart, lubricate the these cable (see Lubrication in the Periodic Maintenance chapter).

#### **Choke Cable Inspection**

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

## Carburetor

Since the carburetor regulates and mixes the fuel and air going to the engine, there are two general types of carburetor trouble: too rich a mixture (too much fuel), and too lean a mixture (too little fuel). Such trouble can be caused by dirt, wear, maladjustment or improper fuel level in the float chamber. A dirty or damaged air cleaner can also alter the fuel to air ratio.

### Idle Speed Inspection

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

### Idle Speed Adjustment

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

### Service Fuel Level Inspection

#### **⚠ WARNING**

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

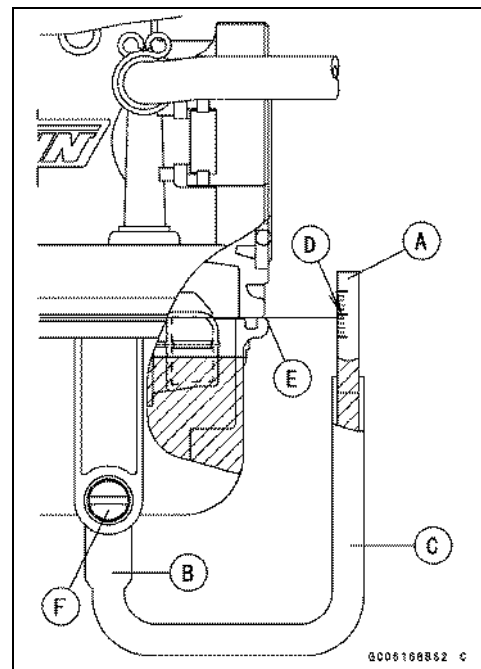
- Remove:
  - Fuel Tank (see Fuel Tank Removal)
  - Carburetor (see Carburetor Removal)
- Hold the carburetor in true vertical position on a stand.
- Put the fuel tank on a bench, and connect the fuel tap to the carburetor with a fuel hose.
- Connect the fuel gauge [A] to the carburetor drain [B] using a suitable hose [C].

**Special Tool - Fuel Level Gauge: 57001-1017**

- Hold the gauge vertically against the side of the carburetor body so that the "middle" line [D] is several millimeters higher than the bottom edge [E] of the carburetor body.
- Turn the fuel tap to the ON position to feed fuel to the carburetor, then turn out the drain plug [F] a few turns.
- Wait until the fuel level in the gauge settles.
- Keeping the gauge vertical, slowly lower the gauge until the "middle" line is even with the bottom edge of the carburetor body.

#### **NOTE**

○ Do not lower the "middle" line below the bottom edge of the carburetor body. If the gauge is lowered and then raised again, the fuel level measure shows somewhat higher than the actual fuel level. If the gauge is lowered too far, dump the fuel out of it into a suitable container and start the procedure over again.



## 3-12 FUEL SYSTEM

### Carburetor

- Check the fuel level in the gauge.

**Service Fuel Level (below the bottom edge of the carburetor body)**

**Standard: 3.0 ± 1 mm (0.12 ± 0.04 in.)**

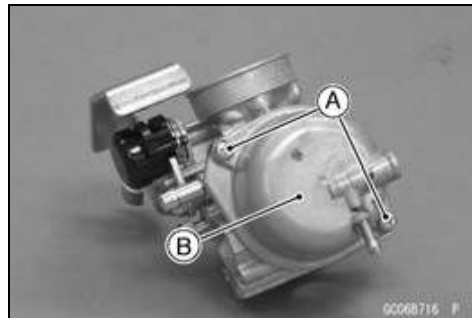
- Screw the carburetor drain plug.
- Turn the fuel tap to the OFF position and remove the fuel level gauge.
- ★ If the fuel level is incorrect, inspect the float, the float valve needle and the contacting surface between the carburetor body and its float valve needle. If they are damaged, replace them with new ones.
- This carburetor cannot adjust the fuel level.
- Install the carburetor (see Carburetor Installation).

#### Float Height Inspection

#### **⚠ WARNING**

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

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

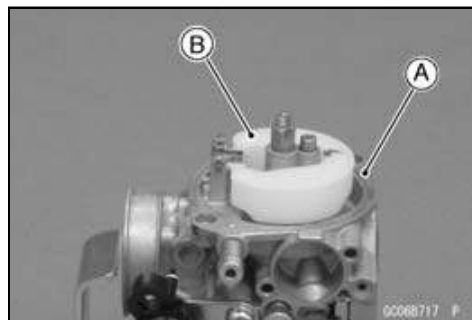


- Measure the height between the float bowl mating surface [A] (with the gasket removed) and the float upper surface [B].

#### Float Height

**Standard: 10.7 ± 2 mm (0.421 ± 0.08 in.)**

- ★ If the float level is incorrect, inspect the float, the float valve needle and the contacting surface between the carburetor body and its float valve needle. If they are damaged, replace them with new ones.
- This carburetor cannot adjust the float level.



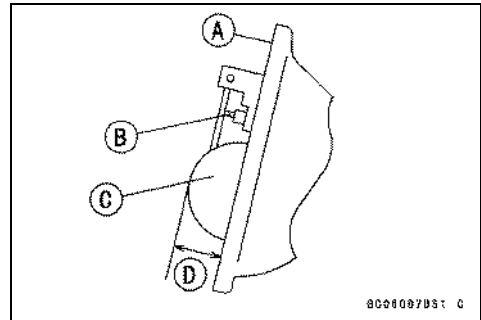


## Carburetor

- Float Bowl Mating Surface [A]
- Float Valve Needle Rod (contacted but unloaded) [B]
- Float [C]
- Float Height [D]

### NOTE

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



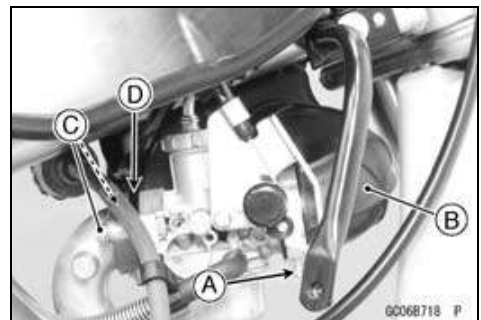
- Install:
  - Float Bowl
  - Carburetor (see Carburetor Installation)

## Carburetor Removal

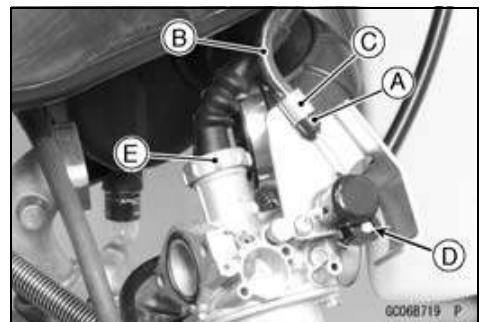
### ⚠ WARNING

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

- Turn the fuel tap to the OFF position.
- Remove the shroud (see Shroud Removal in the Frame chapter).
- Loosen the clamp screw [A] and pull out the air duct [B] from the carburetor.
- Remove:
  - Carburetor Holder Bolts [C]
  - Insulator [D]



- Free the boot [A] and remove the choke cable [B] from the holder [C].
- Remove the choke cable lower end [D].
- Unscrew the cap [E] and pull out the throttle cable lower end with the throttle valve, spring and jet needle as a set.



### ⚠ WARNING

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

### NOTICE

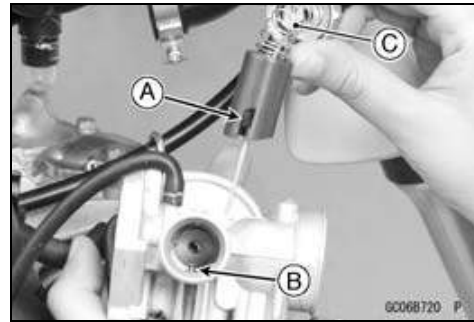
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur. If the throttle valve is not removed from the cable, wrap clean cloths around the throttle valve to avoid damaging to it.

## 3-14 FUEL SYSTEM

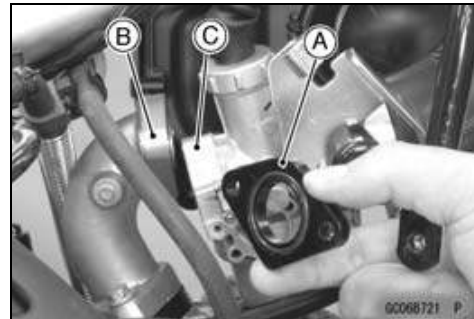
### Carburetor

#### **Carburetor Installation**

- Installation is the reverse of removal.
- Fit the slit [A] and the projection [B], and insert the throttle valve assembly [C] into the carburetor body.



- Replace the O-ring with a new one.
- Install the insulator [A] between intake pipe [B] and carburetor [C] so that the O-ring faces to the intake pipe.
- Tighten:  
**Torque - Carburetor Holder Bolts: 5.2 N·m (0.53 kgf·m, 46 in·lb)**



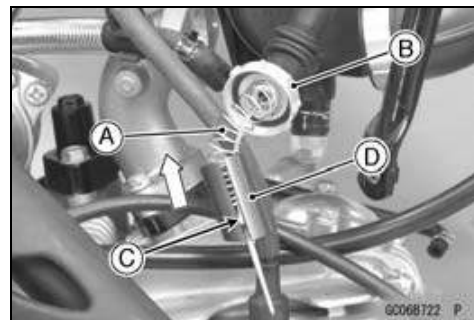
- After installing the carburetor, perform the following.
- Check fuel leakage from the carburetor.

<b>⚠ WARNING</b>
<b>Fuel spilled from the carburetor is hazardous.</b>

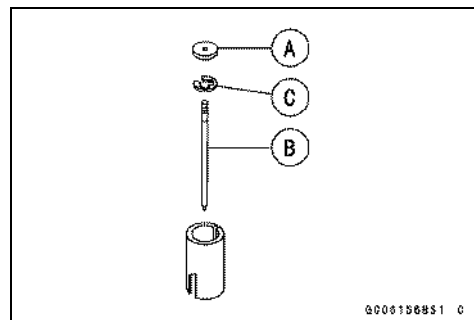
- Adjust the following:
  - Idle Speed (see Idle Speed Adjustment in the Periodic Maintenance chapter)
  - Throttle Grip Free Play (see Throttle Cable Adjustment in the Periodic Maintenance chapter)

#### **Carburetor Disassembly**

- Remove the carburetor (see Carburetor Removal).
- Pull the whole of spring [A] to the cap [B] side, and hold it.
- Free the cable lower end [C] from the throttle valve [D].



- Remove the retainer place [A] and the jet needle [B] with the clip [C].

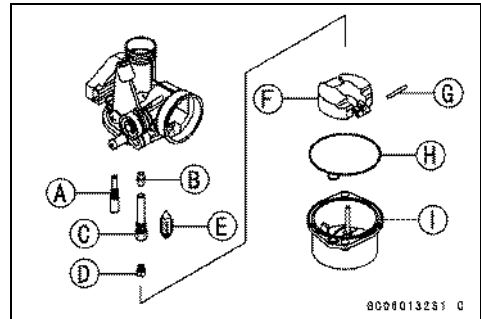
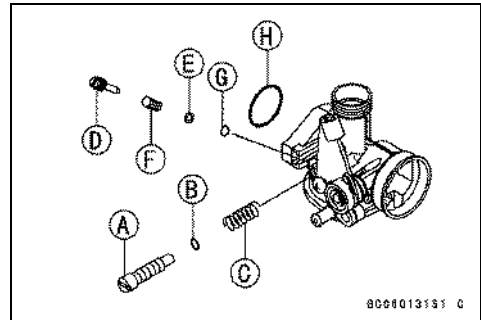


## Carburetor

- Remove the following parts from the carburetor body.

Idle Adjusting Screw [A]  
 O-ring [B]  
 Spring [C]  
 Pilot Screw [D]  
 Washer [E]  
 Spring [F]  
 O-ring [G]  
 O-ring [H]

Pilot Jet [A]  
 Needle Jet [B]  
 Needle Jet Holder [C]  
 Main Jet [D]  
 Float Valve Needle [E]  
 Float [F]  
 Pin [G]  
 O-ring [H]  
 Float Bowl [I]



## Carburetor Cleaning

### **⚠ WARNING**

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. 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. Do not use gasoline or a low flash-point solvent to clean the carburetor.

- Make sure the fuel tap is in the OFF position.
- Remove the carburetor (see Carburetor Removal).
- Drain the fuel in the carburetor.
- Disassemble the carburetor (see Carburetor Disassembly).

### **NOTICE**

Do not use compressed air on an assembled carburetor, the float may be deformed by the pressure. Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with cleaning solution. This will prevent damage or deterioration of the parts. Do not use strong carburetor cleaning solution which could attack the plastic parts; instead, use 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.

## 3-16 FUEL SYSTEM

### Carburetor

- Immerse all the metal parts in carburetor cleaning solution.
- Rinse the parts in water.
- After the parts are cleaned, dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Assemble the carburetor, and install it on the motorcycle.

#### Carburetor Inspection

#### **⚠ WARNING**

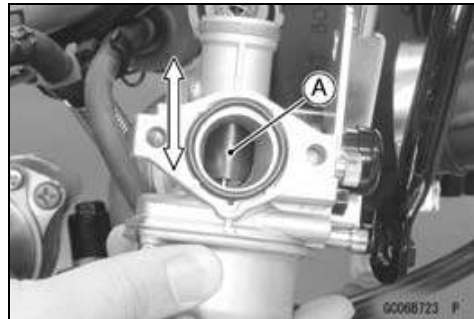
**Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

- Remove the carburetor (see Carburetor Removal).
- Before disassembling the carburetor, check the fuel level.
- ★ If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.
- Check that the throttle valve [A] moves smoothly and return back with the spring tension. The surface of the valve must not be excessively worn.
- ★ If the throttle valve does not move smoothly, or if it is very loose in the carburetor body. Replace the carburetor.
- ★ If the spring tension is weak, replace it.
- Turn the choke cable bracket to check that the choke butterfly valve [A] move smoothly and return with spring tension.
- ★ If the choke butterfly valve do not move smoothly, replace the carburetor.

#### **NOTE**

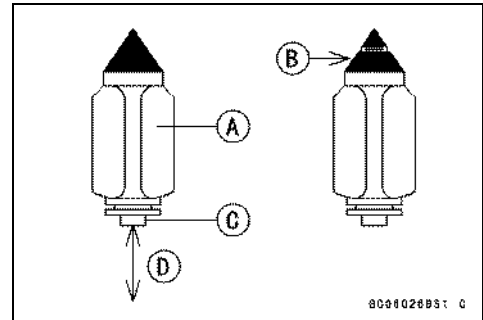
○ Do not remove the pilot screw from the carburetor or change the pilot screw setting, or you will lose the best setting.

- Disassemble the carburetor (see Carburetor Disassembly).
- Clean the carburetor (see Carburetor Cleaning).
- Check that the O-rings on the float bowl, drain plug and the intake pipe are in good condition.
- ★ If any of the O-rings are not in good condition, replace them.

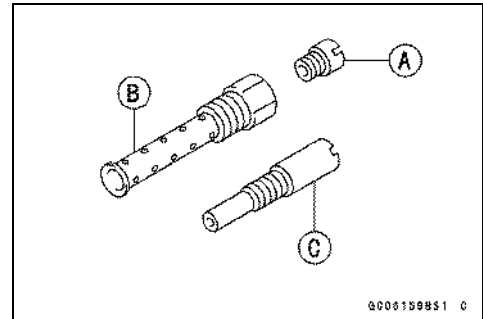


## Carburetor

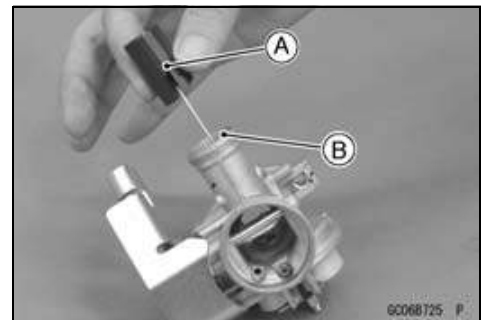
- Remove the float valve needle.
- Check the float valve needle [A].
- ★ If the needle is worn [B] as shown in the figure, replace the valve needle.
- Push the rod [C] in the valve needle, and then release it [D].
- ★ If the rod does not spring out, replace the valve needle.



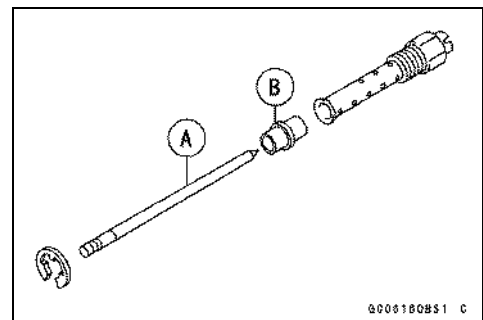
- Check the main jet [A], needle jet holder [B] and pilot jet [C] for any damage.
- ★ If they are damaged, replace them with new ones.



- Inspect the outside of the throttle valve [A] for scratches and abnormal wear.
- ★ If the valve is badly scratched or worn, replace it.
- Inspect the inside of the carburetor body for these same faults.
- ★ If it is badly scratched or worn, replace the entire carburetor.
- [B] Sliding Surface



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



- Disassemble the carburetor, and clean the fuel, air passages with high flash-point solvent and compressed air.
- Stuff the lint-free, clean cloths into the air cleaner housing to keep dirt or other foreign material from entering.

### **⚠ WARNING**

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

## 3-18 FUEL SYSTEM

### Carburetor

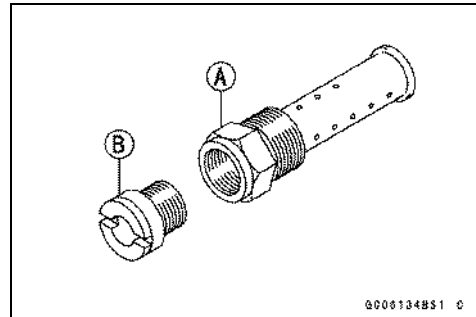
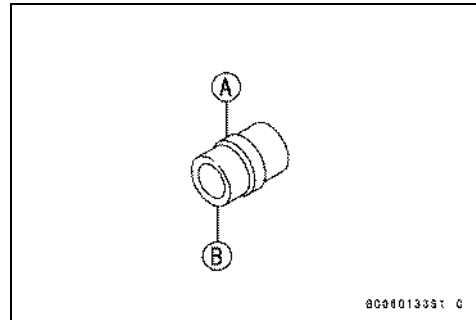
#### **Carburetor Assembly**

- Clean the disassembly parts before assembling.
- Clean the fuel and air passages with high flash-point solvent and compressed air.
- Install the needle jet [A] into the carburetor so that the smaller diameter end [B] of the jet goes in first.

- Carefully screw in the needle jet holder. It will seat against the needle jet, pushing the end of the jet into the carburetor bore.

#### **NOTICE**

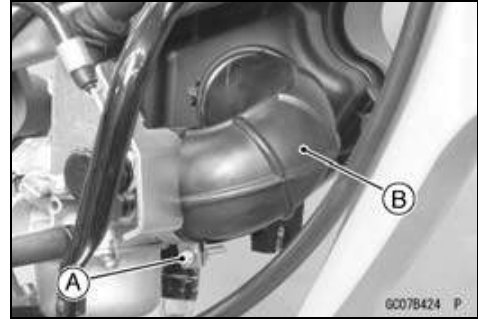
**Do not force the needle jet holder [A] and main jet [B] or overtighten them. The needle jet or the carburetor body could be damaged requiring replacement.**



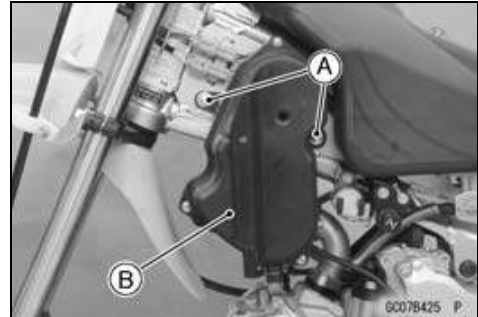
## Air Cleaner

### **Air Cleaner Housing Removal**

- Remove the shroud (see Shroud Removal in the Frame chapter).
- Loosen the clamp screw [A] and pull out the air cleaner duct [B] from the carburetor.

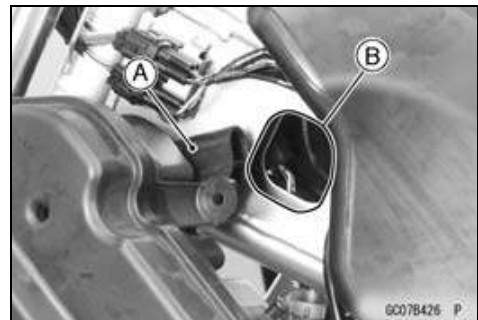


- Remove the air cleaner housing mounting bolts [A].
- Remove the air cleaner housing [B].



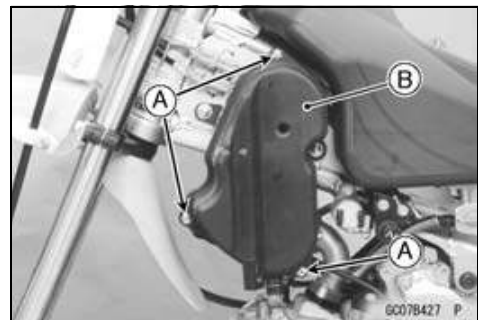
### **Air Cleaner Housing Installation**

- Installation is the reverse of removal.
- Install the intake portion [A] of the air cleaner housing into the frame hole [B].

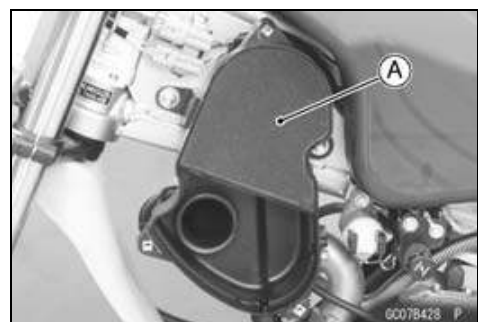


### **Air Cleaner Element Removal**

- Remove:
  - Shroud (see Shroud Removal in the Frame chapter)
  - Screws [A]
  - Air Cleaner Cover [B]



- Pull out the element [A].
- Stuff a clean, lint-free cloth into the air cleaner housing so no dirt is allowed to enter the carburetor.
- Wipe out the inside of the air cleaner housing with a clean damp towel.



### **NOTICE**

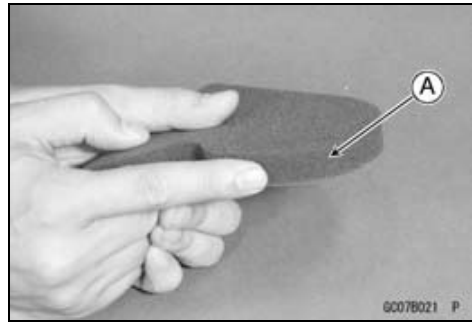
**Check inside of the inlet tract and carburetor for dirt. If dirt is present, clean the inlet tract and carburetor thoroughly. You may also need to replace the element and seal the housing and inlet tract.**

## 3-20 FUEL SYSTEM

### Air Cleaner

#### ***Air Cleaner Element Installation***

- Installation is the reverse of removal.
- When installing the element, coat the lip of the element with a thick layer of all purpose grease [A] to assure a complete seal against the air cleaner element base. Also, coat the base where the lip of the element fits.
- Take out the cloth from the carburetor securely.

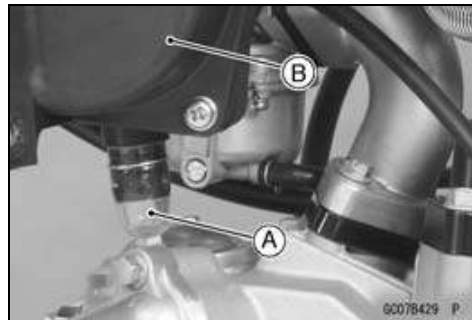


#### ***Air Cleaner Element Cleaning and Inspection***

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

#### ***Air Cleaner Oil Draining***

- Inspect the transparent plug [A] under the air cleaner housing [B] to see if the water or oil accumulates.
- ★ If any water or oil accumulates in the cap, remove the plug and drain it.





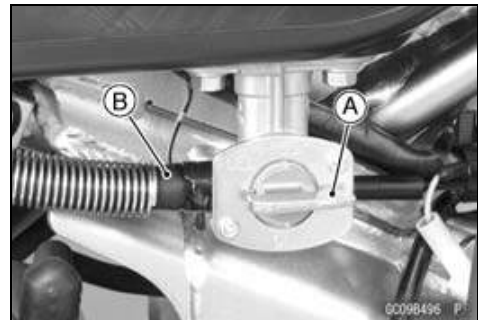
## Fuel Tank

### Fuel Tank Removal

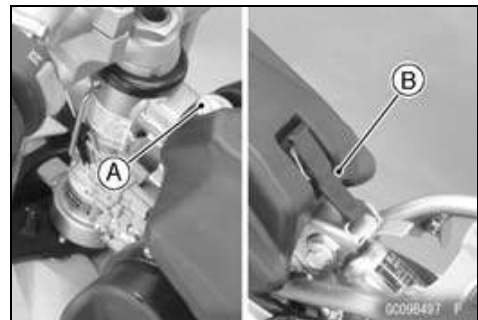
**⚠ WARNING**

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

- Remove the shroud (see Shroud Removal in the Frame chapter).
- Install the fuel tank cap.
- Turn the fuel tap lever [A] to the OFF position.
- Disconnect the fuel hose [B] from the fuel tap.



- Remove the fuel tank mounting bolt [A] and washer.
- Take off the fuel tank, and remove the rubber band [B].



### Fuel Tank Installation

- Inspect the rubber damper [A] on the frame.
- ★ If the damper is damaged or deteriorated, replace it with a new one.
- Set the fuel tank on the frame.
- Connect the fuel hose to the fuel tap securely.



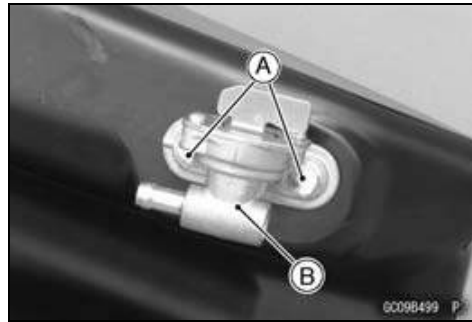
- Install the rubber band, fuel tank bolt and other removed parts.
- Insert the fuel tank breather hose outlet end into the number plate hole.

## 3-22 FUEL SYSTEM

### Fuel Tank

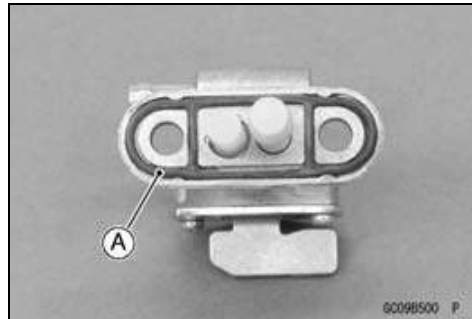
#### **Fuel Tap Removal**

- Remove the fuel tank (see Fuel Tank Removal).
- Drain the fuel.
- Remove the mounting bolts [A] and take off the fuel tap [B].



#### **Fuel Tap Installation**

- Replace the O-ring [A] with a new one.
  - Insert the filter part into the tank, and tighten the bolts.
- Torque - Fuel Tap Mounting Bolts: 4.4 N·m (0.45 kgf·m, 39 in·lb)**

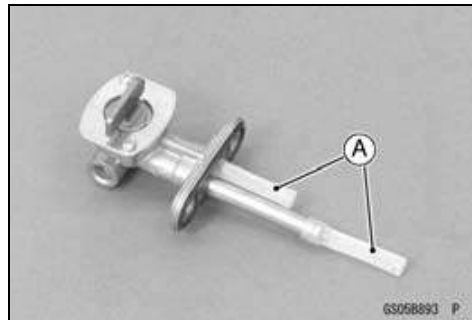


#### **Fuel Tap Cleaning**

- Refer to the Fuel Tap Cleaning in the Periodic Maintenance chapter.

#### **Fuel Tap and Filter Inspection**

- Remove the fuel tap from the fuel tank.
- Check the fuel filters [A] for any breaks or deterioration.
- ★ If the fuel filters have any breaks or are deteriorated, it may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap.
- Check the fuel tap for fuel leaks.
- If the fuel tap leaks, or allows fuel to flow when it is at OFF position, replace the O-ring in the fuel tap lever with a new one.



#### **Fuel Inspection**

#### **⚠ WARNING**

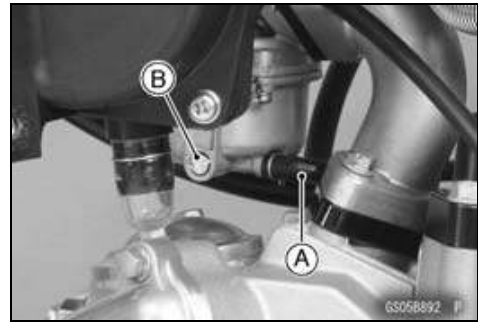
Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

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## Fuel Tank

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- Turn the fuel tap to the OFF position.
- Place a suitable container beneath the carburetor drain hose [A].
- Loosen the drain plug [B] from the bottom of the float bowl and check for water or dirt in the fuel.
- ★ If any water or dirt comes out, clean the carburetor, fuel filter, fuel tap and fuel tank.
- Tighten the drain plug securely.





# Engine Top End

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**Exploded View**

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Valve Adjusting Cap Bolts	5.2	0.53	46 in·lb	
2	Cylinder Head Bolts	12	1.2	106 in·lb	S, L
3	Cylinder Head Nuts	22	2.2	16	S
4	Rocker Shaft Holder Plate Bolts (KLX110CA/DA Early Models)	5.2	0.53	46 in·lb	
	Rocker Shaft Holder Plate Bolts (KLX110CA/DA Late Models ~)	5.2	0.53	46 in·lb	L
5	Camshaft Sprocket Cover Bolts	5.2	0.53	46 in·lb	
6	Intake Pipe Bolts	5.2	0.53	46 in·lb	
7	Carburetor Holder Bolts	5.2	0.53	46 in·lb	
8	Valve Adjusting Screw Locknuts	8.8	0.90	78 in·lb	
9	Camshaft Sprocket Bolts	12	1.2	106 in·lb	L
10	Camshaft Chain Guide Bolt	5.2	0.53	46 in·lb	
11	Camshaft Chain Plate Screw	5.2	0.53	46 in·lb	

12. KLX110CA/DA Early Models

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

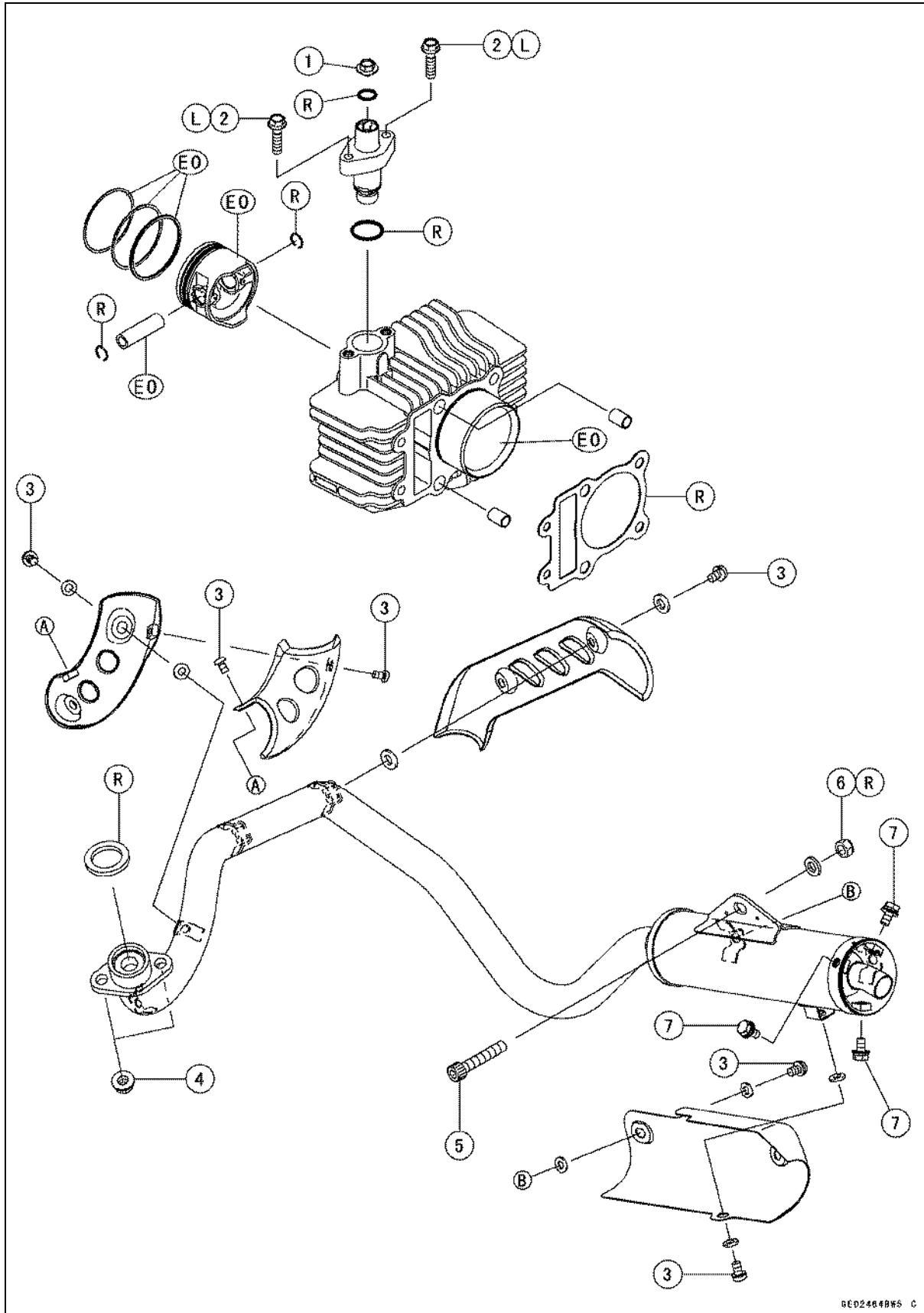
M: Apply molybdenum disulfide grease.

R: Replacement Parts

S: Follow the specific tightening sequence.

# 4-4 ENGINE TOP END

## Exploded View



DE02464BWS C



**Exploded View**

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Camshaft Chain Tensioner Cap Bolt	5.2	0.53	46 in·lb	
2	Camshaft Chain Tensioner Mounting Bolts	5.2	0.53	46 in·lb	L
3	Muffler Cover Screws	3.0	0.31	27 in·lb	
4	Exhaust Pipe Holder Nuts	16	1.6	12	
5	Muffler Mounting Bolt	9.8	1.0	87 in·lb	
6	Muffler Mounting Nut	30	3.1	22	R
7	Spark Arrester Mounting Bolts	8.8	0.90	78 in·lb	

EO: Apply engine oil.

L: Apply a non-permanent locking agent.

R: Replacement Parts

## 4-6 ENGINE TOP END

### Specifications

Item	Standard	Service Limit
<b>Rocker Arm, Rocker Arm Shaft</b>		
Rocker Arm Inside Diameter	10.000 ~ 10.015 mm (0.3937 ~ 0.3943 in.)	10.05 mm (0.396 in.)
Rocker Arm Shaft Diameter	9.980 ~ 9.995 mm (0.3929 ~ 0.3935 in.)	9.95 mm (0.392 in.)
<b>Camshaft</b>		
Cam Height:		
Exhaust	29.054 ~ 29.168 mm (1.1439 ~ 1.1483 in.)	28.95 mm (1.140 in.)
Inlet	29.017 ~ 29.131 mm (1.1424 ~ 1.1469 in.)	28.92 mm (1.139 in.)
<b>Cylinder Head</b>		
Cylinder Compression (Usable Range):		
Kick	700 ~ 1098 kPa (7.14 ~ 11.2 kgf/cm <sup>2</sup> , 102 ~ 159 psi) @5 times	---
Electric Starter	280 ~ 498 kPa (2.86 ~ 5.08 kgf/cm <sup>2</sup> , 41 ~ 72 psi) @350 r/min (rpm)	---
Cylinder Head Warp	---	0.03 mm (0.001 in.)
<b>Valve</b>		
Valve Clearance:		
Exhaust	0.08 ~ 0.12 mm (0.003 ~ 0.005 in.)	---
Inlet	0.04 ~ 0.08 mm (0.002 ~ 0.003 in.)	---
Valve Head Thickness:		
Exhaust	0.8 mm (0.031 in.)	0.5 mm (0.020 in.)
Inlet	0.5 mm (0.020 in.)	0.25 mm (0.010 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	4.462 ~ 4.472 mm (0.1757 ~ 0.1761 in.)	4.44 mm (0.1748 in.)
Inlet	4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in.)	4.46 mm (0.1756 in.)
Valve Guide Inside Diameter:		
Exhaust	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.58 mm (0.1803 in.)
Inlet	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.58 mm (0.1803 in.)
Valve Guide Clearance (Wobble Method):		
Exhaust	0.05 ~ 0.08 mm (0.002 ~ 0.003 in.)	0.19 mm (0.0075 in.)
Inlet	0.02 ~ 0.06 mm (0.0008 ~ 0.002 in.)	0.17 mm (0.0067 in.)
Valve Seat Cutting Angle	32°, 45°, 60°, 67.5°	---
Valve Seat Surface:		
Outside Diameter:		
Exhaust	19.9 ~ 20.1 mm (0.783 ~ 0.791 in.)	---
Inlet	22.9 ~ 23.1 mm (0.902 ~ 0.909 in.)	---
Width:		
Exhaust	0.80 ~ 1.15 mm (0.031 ~ 0.045 in.)	---
Inlet	0.80 ~ 1.15 mm (0.031 ~ 0.045 in.)	---
Valve Spring Free Length	36.6 mm (1.441 in.)	35.8 mm (1.409 in.)

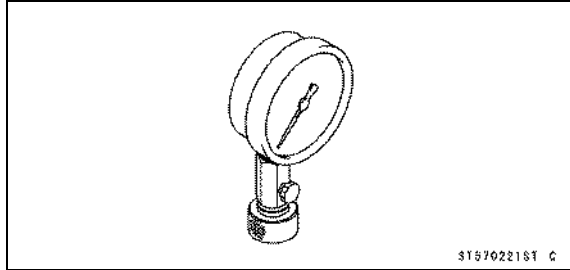
**Specifications**

<b>Item</b>	<b>Standard</b>	<b>Service Limit</b>
<b>Cylinder, Piston</b>		
Cylinder Inside Diameter	52.997 ~ 53.009 mm (2.0865 ~ 2.0870 in.)	53.10 mm (2.0905 in.)
Piston Diameter	52.969 ~ 52.981 mm (2.0854 ~ 2.0859 in.)	52.82 mm (2.080 in.)
Piston/Cylinder Clearance	0.010 ~ 0.022 mm (0.00039 ~ 0.00086 in.)	— — —
Over Size Piston and Rings	+0.50 (0.0197 in.) +1.0 (0.0394 in.)	
Piston Ring/Groove Clearance:		
Top	0.020 ~ 0.060 mm (0.0008 ~ 0.0024 in.)	0.16 mm (0.0063 in.)
Second	0.010 ~ 0.050 mm (0.0004 ~ 0.0020 in.)	0.15 mm (0.0059 in.)
Piston Ring Groove Width:		
Top	0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)	0.91 mm (0.0358 in.)
Second	0.80 ~ 0.82 mm (0.0315 ~ 0.0323 in.)	0.90 mm (0.0354 in.)
Piston Ring Thickness:		
Top	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.0276 in.)
Second	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.0276 in.)
Piston Ring End Gap:		
Top	0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in.)	0.6 mm (0.024 in.)
Second	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)	0.8 mm (0.031 in.)
Oil	0.10 ~ 0.60 mm (0.0039 ~ 0.0236 in.)	0.9 mm (0.035 in.)
Piston Pin Diameter	12.995 ~ 13.000 mm (0.5116 ~ 0.5118 in.)	12.96 mm (0.510 in.)
Piston Pin Hole Diameter	13.001 ~ 13.007 mm (0.5118 ~ 0.5121 in.)	13.08 mm (0.515 in.)
Connecting Rod Small End Inside Diameter	13.003 ~ 13.014 mm (0.5119 ~ 0.5124 in.)	13.05 mm (0.514 in.)

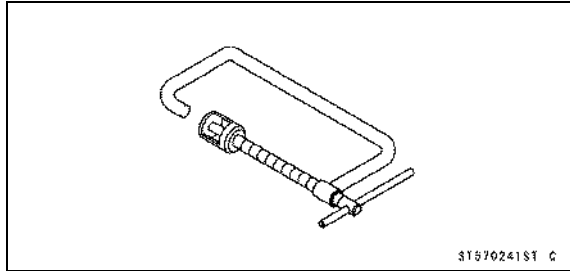
# 4-8 ENGINE TOP END

## Special Tools

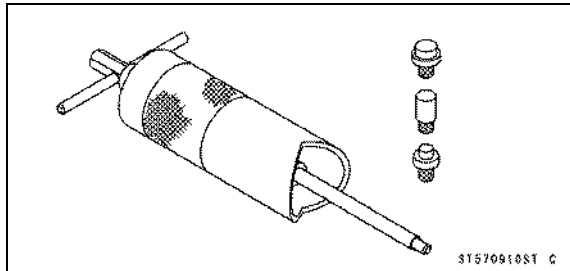
Compression Gauge, 20 kgf/cm<sup>2</sup>:  
57001-221



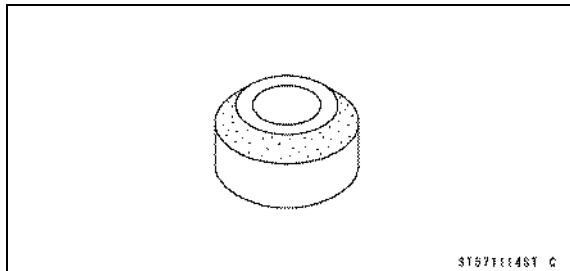
Valve Spring Compressor Assembly:  
57001-241



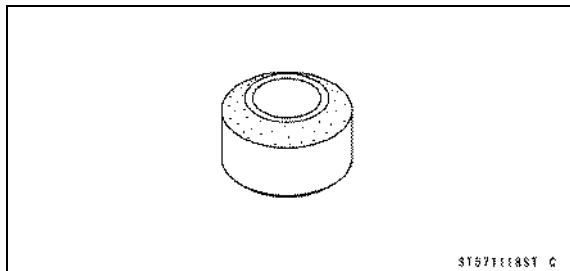
Piston Pin Puller Assembly:  
57001-910



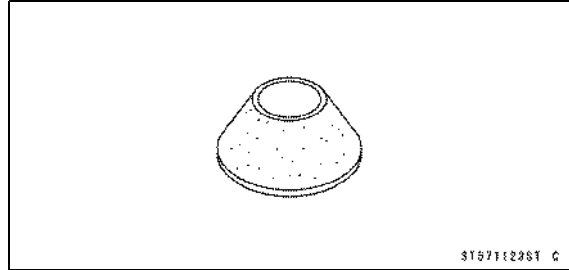
Valve Seat Cutter, 45° -  $\phi 27.5$ :  
57001-1114



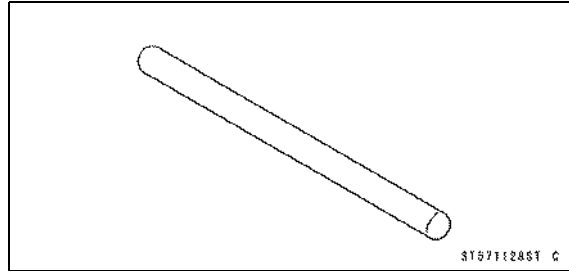
Valve Seat Cutter, 32° -  $\phi 25$ :  
57001-1118



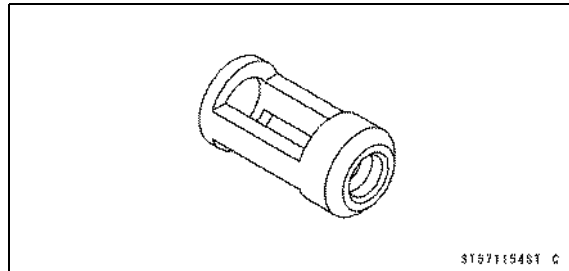
Valve Seat Cutter, 60° -  $\phi 30$ :  
57001-1123



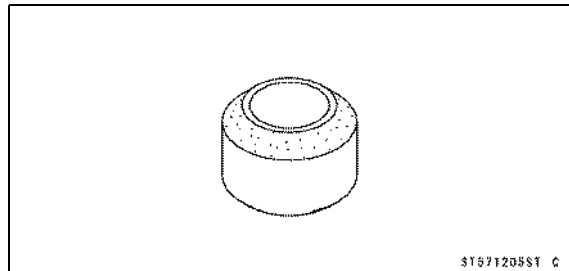
Valve Seat Cutter Holder Bar:  
57001-1128



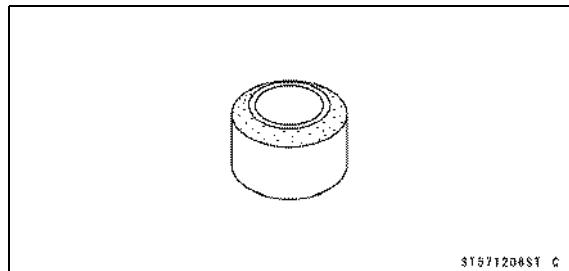
Valve Spring Compressor Adapter,  $\phi 20$ :  
57001-1154



Valve Seat Cutter, 45° -  $\phi 22$ :  
57001-1205

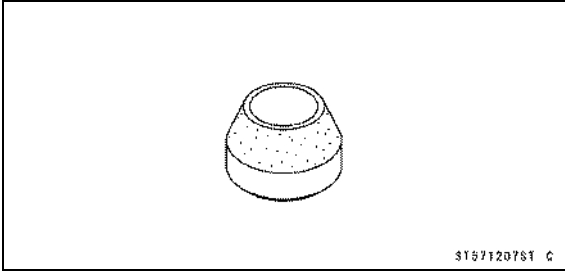


Valve Seat Cutter, 32° -  $\phi 22$ :  
57001-1206

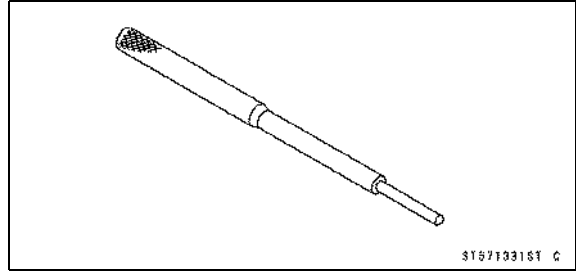


Special Tools

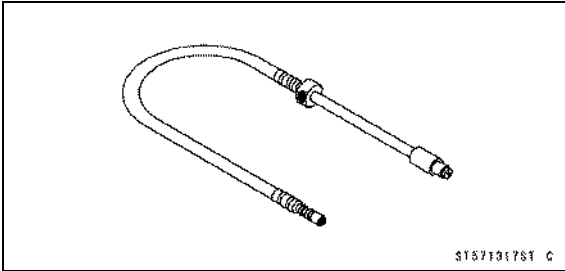
Valve Seat Cutter, 67.5° -  $\phi$ 22:  
57001-1207



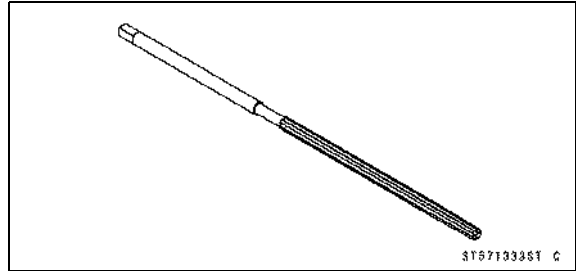
Valve Guide Arbor,  $\phi$ 4.5:  
57001-1331



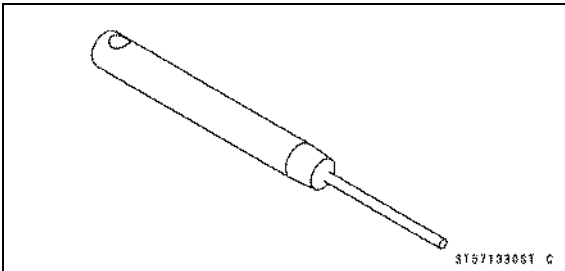
Compression Gauge Adapter, M10 x 1.0:  
57001-1317



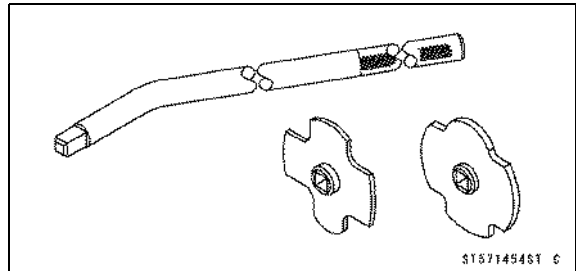
Valve Guide Reamer,  $\phi$ 4.5:  
57001-1333



Valve Seat Cutter Holder,  $\phi$ 4.5:  
57001-1330



Filler Cap Driver:  
57001-1454



## 4-10 ENGINE TOP END

### Camshaft Chain Tensioner

#### Camshaft Chain Tensioner Removal

##### NOTICE

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

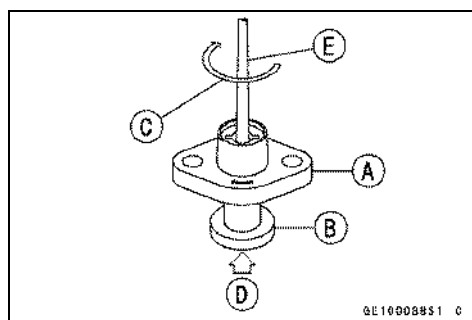
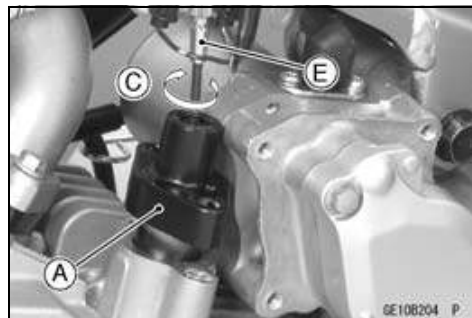
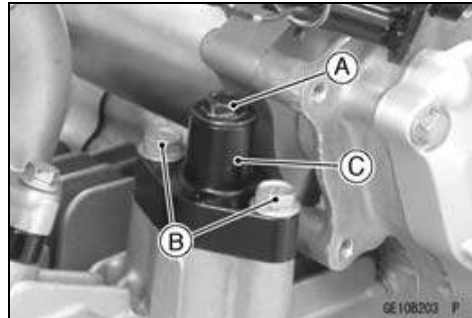
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Chain Tensioner Installation". Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System chapter).
- Remove the choke knob holder for extra clearance.
- Loosen the cap bolt [A] before tensioner removal for later disassembly convenience.
- Unscrew the mounting bolts [B] and remove the camshaft chain tensioner [C].

##### NOTICE

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

- Remove the camshaft chain tensioner [A] while turning the push rod [B] clockwise [C] and compressing [D] it with a standard tip screwdriver [E].



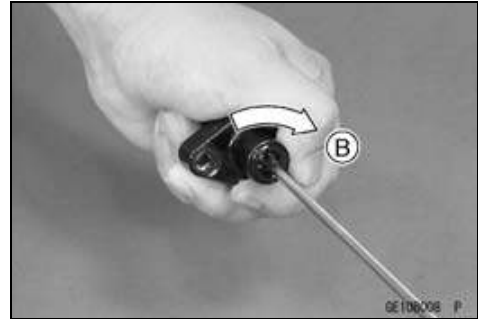
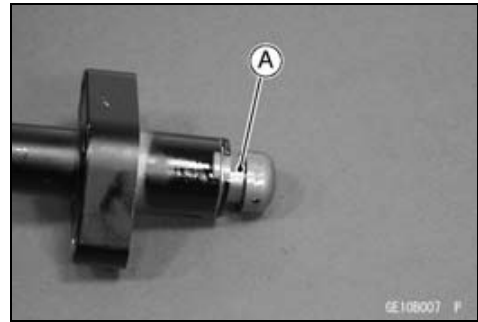
## Camshaft Chain Tensioner

### Camshaft Chain Tensioner Installation

- Remove the tensioner cap bolt and O-ring.
- While compressing the push rod [A], turn it clockwise [B] with a standard tip screwdriver until the rod protrusion comes to about 10 mm (0.4 in.) from the tensioner body.

#### NOTICE

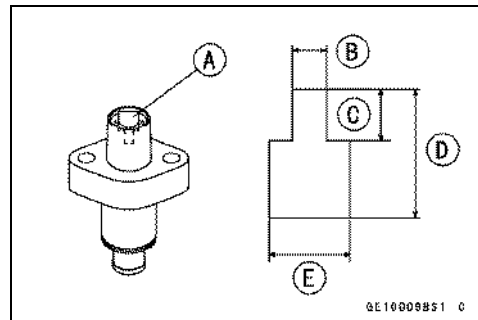
**Do not turn the rod counterclockwise at installation. This could detach the rod and the tensioner cannot be reinstalled.**



- While holding the rod in position with a suitable push rod holder plate [A], install the tensioner on the cylinder.
  - 4 mm (0.16 in.) [B]
  - 6 mm (0.24 in.) [C]
  - 15 mm (0.60 in.) [D]
  - 9.5 mm (0.37 in.) [E]

#### NOTE

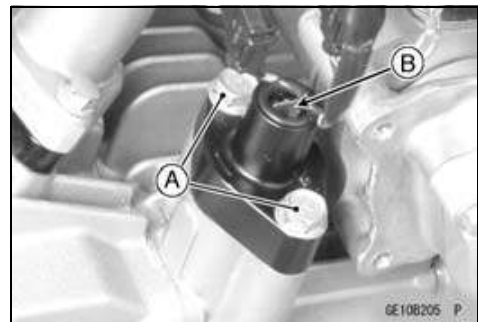
○ To make the procedure easy, use a holder plate to keep the rod from pushing out. A replacement chain tensioner (spare parts) has a holder plate. The holder plate can be made less than 1 mm (0.0394 in.) thick steel plate as shown.



- Apply a non-permanent locking agent to the threads of tensioner mounting bolts [A] and tighten them to the specified torque.

**Torque - Camshaft Chain Tensioner Mounting Bolts: 5.2 N·m (0.53 kgf·m, 46 in·lb)**

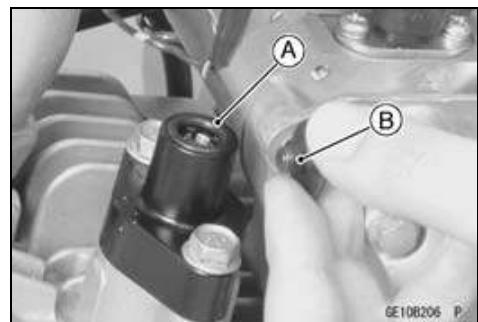
- Take out the holder plate [B].



- Be sure that the new O-ring [A] is properly in place and tighten the cap bolt [B].

**Torque - Camshaft Chain Tensioner Cap Bolt: 5.2 N·m (0.53 kgf·m, 46 in·lb)**

- Install the fuel tank (see Fuel Tank Installation in the Fuel System chapter).

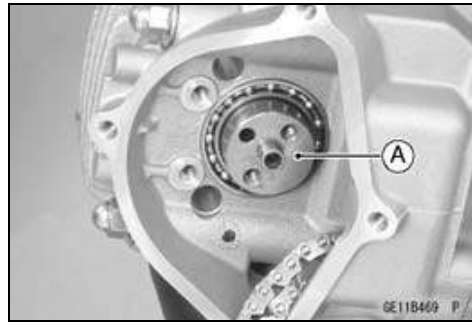


## 4-12 ENGINE TOP END

### Camshaft

#### Camshaft Removal

- Remove the rocker arms (see Rocker Arm Removal).
- Pull out the camshaft [A].



#### Camshaft Installation

- Clean the camshaft with high flash-point solvent.
- Apply clean engine oil to all cam parts.
- Install the camshaft in the cylinder head.
- Install the rocker arm.
- Install the other removed parts.
- Check and adjust the valve clearance.

#### Camshaft Inspection

- Visually inspect the cam for wear or damage.
- ★ If there is any damage or wear, replace the camshaft.
- Measure the height [A] of each cam.

##### Cam Height

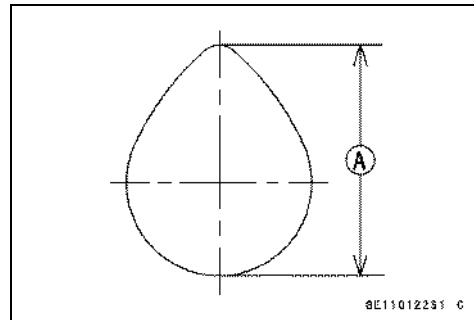
###### Standard:

Exhaust	29.054 ~ 29.168 mm (1.1439 ~ 1.1483 in.)
Inlet	29.017 ~ 29.131 mm (1.1424 ~ 1.1469 in.)

###### Service Limit:

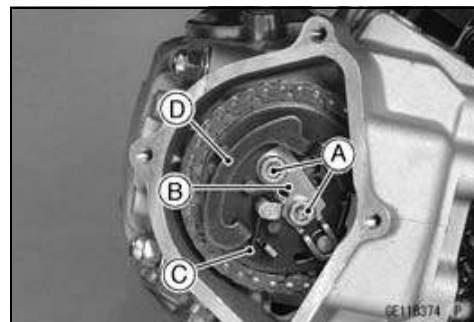
Exhaust	28.95 mm (1.140 in.)
Inlet	28.92 mm (1.139 in.)

- ★ If any cam is worn down past service limit, replace the camshaft.



#### KACR Removal

- Remove:
  - Camshaft Sprocket Cover
  - Camshaft Sprocket Bolts [A]
  - Retaining Plate [B]
  - Shaft [C]
  - Weight [D]
- Remove the camshaft sprocket bolts while holding the alternator rotor nut with a wrench.

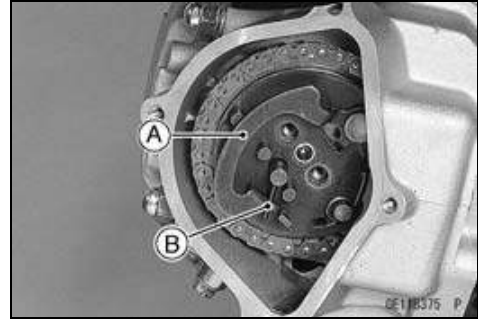




## Camshaft

### **KACR Installation**

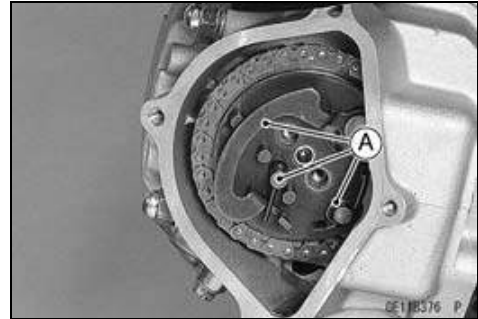
- Install:
  - Weight [A]
- Insert the shaft [B] as shown.
  - Retaining Plate
  - Camshaft Sprocket Bolts
  - Camshaft Sprocket Cover



### **KACR Inspection**

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

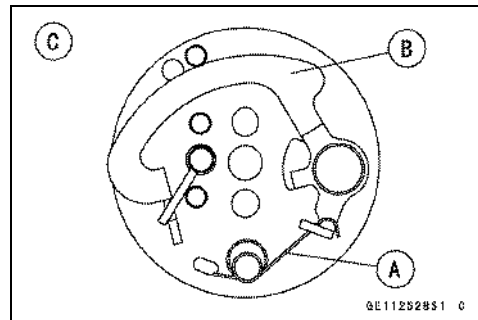
Due to the simplicity of the mechanism, no periodic maintenance is needed. There are only two symptoms of problems with the KACR mechanism [A]: compression is not released during starting, and compression is released during running.



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

- Remove the KACR unit.
- Visually inspect the spring [A].
- ★ If damaged, deformed, or missing, replace the weight.
- Check that the weight arm [B] move back and forth.
- ★ If the weight do not move smoothly, replace the KACR unit. Also inspect the inlet rocker arm for any damage, and replace the rocker arm if necessary.

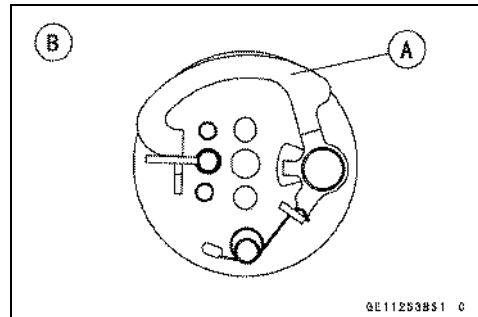
[C] Rest Position (compression is released)



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

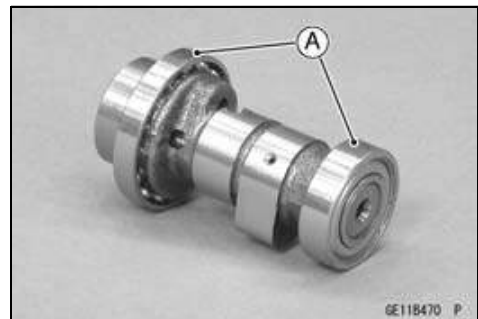
- Check that the weight arm [A] move back and forth.
- ★ If the weight do not move easily from the retracted position, replace the KACR unit. Also inspect the inlet rocker arm for any damage, and replace the rocker arm if necessary.

[B] Running Position (compression is not released)



### **Camshaft Bearing Inspection**

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



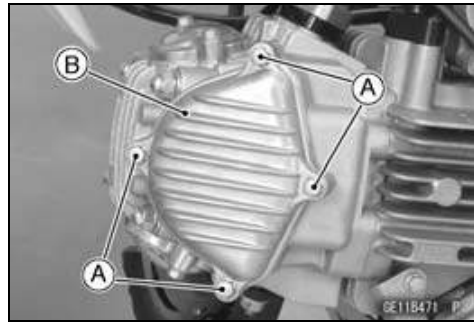
## 4-14 ENGINE TOP END

### Camshaft

#### **Camshaft Sprocket Removal**

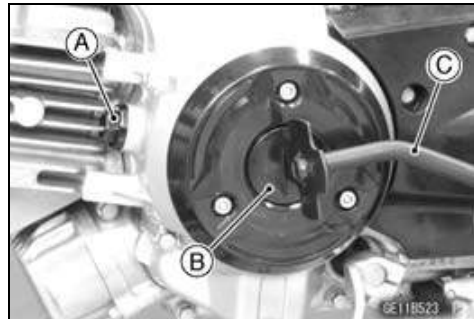
● Remove:

- Camshaft Sprocket Cover Bolts [A]
- Camshaft Sprocket Cover [B]

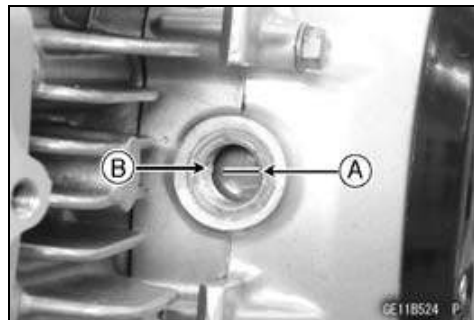


- Remove the timing inspection cap [A] and rotor nut cap [B].

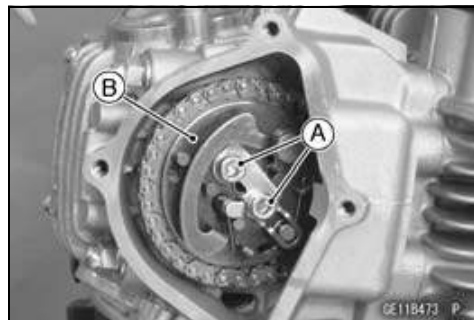
**Special Tool - Filler Cap Driver [C]: 57001-1454**



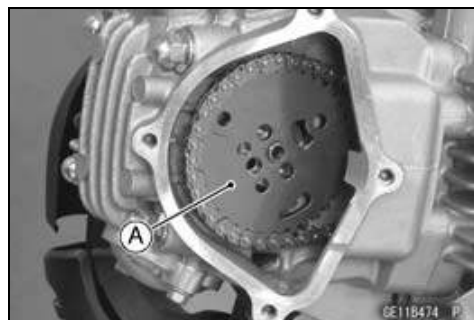
- Turn the alternator rotor nut counterclockwise and align the "T" mark line [A] of the rotor with the notch [B] of the alternator cover.
- Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal).



- With a wrench on the alternator rotor nut to keep the crankshaft from turning, remove the camshaft sprocket bolts [A].
- Remove the KACR unit [B] (see KACR Removal).



- Remove the camshaft sprocket [A].



## Camshaft

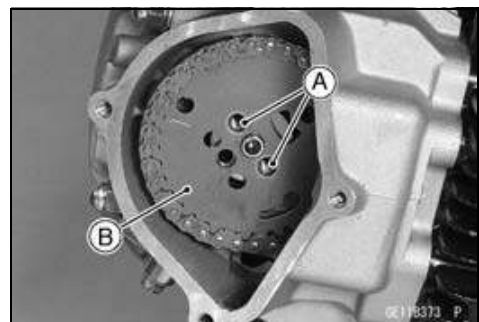
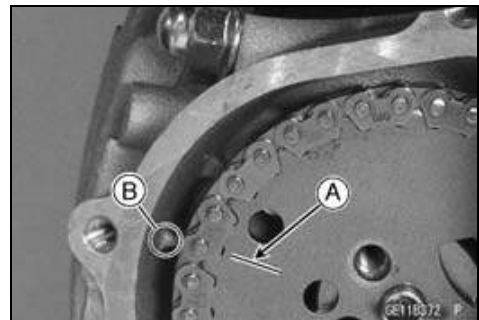
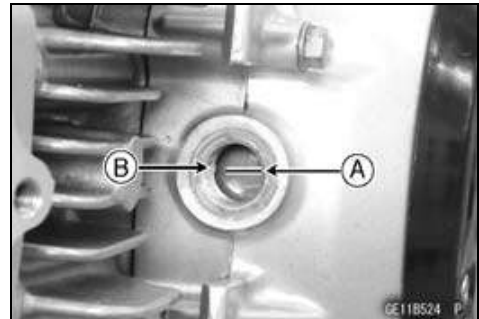
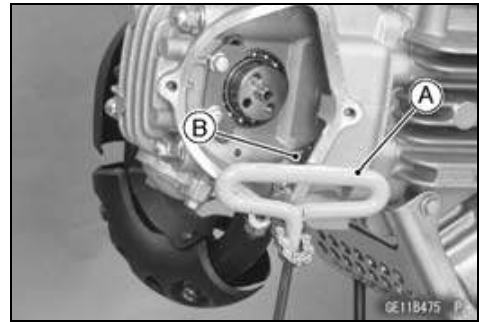
- Use a suitable tool [A] or wire to keep the chain [B] from falling down into the cylinder block.

### NOTICE

**Always pull the camshaft chain taut while turning the crankshaft when the camshaft chain is loose. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.**

### Camshaft Sprocket Installation

- Position the piston at TDC.
  - Turn the crankshaft counterclockwise and align the "T" mark line [A] of the rotor with the notch [B] of the alternator cover.
  - Remember to pull the camshaft chain taut before rotating the crankshaft.
- 
- Pull the lower side of the chain taut and fit it onto the sprocket so that the line [A] on the sprocket aligns with the mark on the sprocket cover mating surface projection [B].
- 
- Fit the sprocket up into place.
  - Turn the camshaft so that the cam lobes point downward, while holding the sprocket steady to align the bolt holes [A].
  - Install the sprocket [B].
  - Install the KACR unit (see KACR Installation).
  - Keep the crankshaft from turning by holding a wrench on the alternator rotor nut.
  - Apply a non-permanent locking agent to the threads of camshaft sprocket bolts.
  - Tighten:
    - Torque - Camshaft Sprocket Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**
  - Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).
  - Check the camshaft chain timing.
  - Turn the crankshaft two turns in the counterclockwise, the crankshaft is at TDC, and re-check the camshaft chain timing.
  - ★ If the timing mark is aligned, the camshaft chain timing is correct.



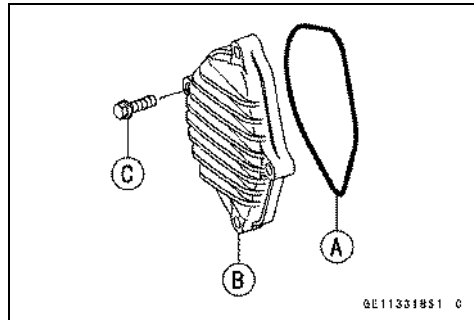
## 4-16 ENGINE TOP END

### Camshaft

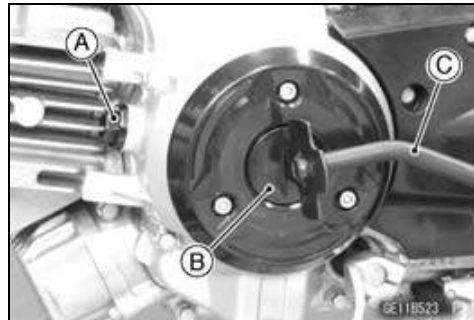
- Apply grease to the new O-ring [A] and install the camshaft sprocket cover [B].
- Tighten:  
Torque - Camshaft Sprocket Cover Bolts [C]: 5.2 N·m (0.53 kgf·m, 46 in·lb)

#### NOTICE

Rotation of the crankshaft with improper camshaft timing could cause the valve to contact each other or the piston, and bend.  
If any resistance is felt when turning the crankshaft, stop immediately, and check the camshaft chain timing.

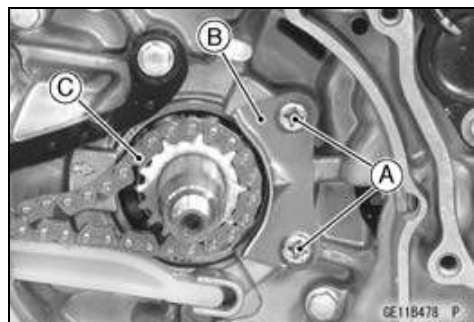
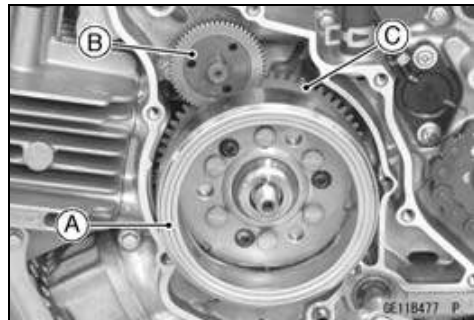


- Install the other removed parts.
- Tighten:  
Torque - Timing Inspection Cap [A]: 2.4 N·m (0.24 kgf·m, 21 in·lb)  
Alternator Rotor Nut Cap [B]: 2.4 N·m (0.24 kgf·m, 21 in·lb)  
Special Tools - Filler Cap Driver [C]: 57001-1454



#### Camshaft Chain Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove  
Camshaft Sprocket (see Camshaft Sprocket Removal)  
Cylinder Head (see Cylinder Head Removal)  
Alternator Rotor [A] (see Alternator Rotor Removal in the Electrical System chapter)  
Woodruff Key  
Torque Limiter [B]  
Starter Motor Clutch Gear [C]
- Remove:  
Screws [A]  
Camshaft Chain Holder [B]  
Camshaft Chain [C]



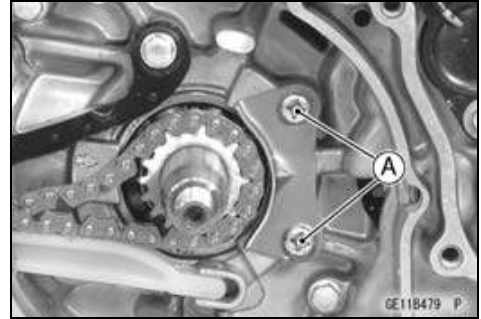
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## Camshaft

---

### ***Camshaft Chain Installation***

- Install the camshaft chain to the crankshaft, and pull up it through camshaft chain hole of the cylinder.
- Keep the chain.
- Install the camshaft chain holder.
- Tighten:
  - Torque - Camshaft Chain Plate Screws [A]: 5.2 N·m (0.53 kgf·m, 46 in·lb)**
- Install the other removed parts (see appropriate chapters).



### ***Camshaft Chain Guide Wear Inspection***

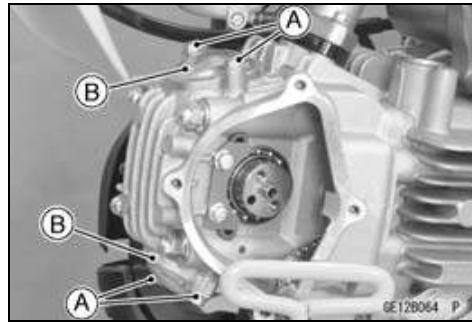
- Visually inspect the guides.
- ★ If the rubber is damaged, replace the guide.

## 4-18 ENGINE TOP END

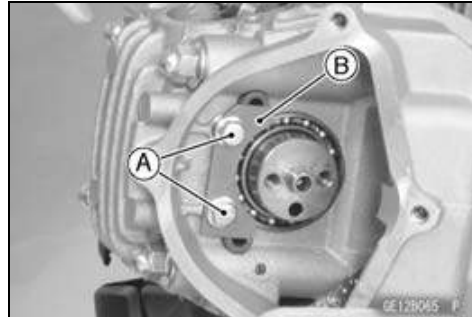
### Rocker Arm, Rocker Arm Shaft

#### Rocker Arm Removal

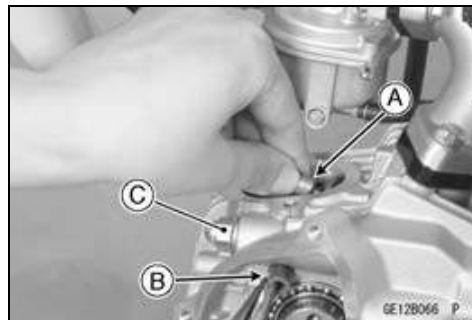
- Remove:
  - Camshaft Sprocket (see Camshaft Sprocket Removal)
  - Valve Adjusting Cover Bolts [A]
  - Valve Adjusting Covers [B]



- Remove:
  - Rocker Shaft Holder Plate Bolts [A]
  - Rocker Shaft Holder Plate Stopper [B]

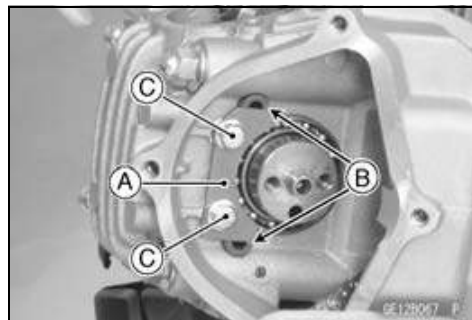


- While holding the rocker arm [A] with hand, pull out the rocker arm shaft [B] and take off the rocker arm.
- Mark and record the rocker arm locations so that the rocker arm can be reinstalled in their original positions.
- When it is difficult to pull out the shaft, loosen the cylinder head nut [C].



#### Rocker Arm Installation

- Clean the rocker arms and rocker arm shafts with high flash-point solvent.
- Apply a clean engine oil to the rocker arm shaft outside and rocker arm cam parts.
- Turn the camshaft so that the cam lobes point downward.
- Install the each rocker arm shaft, running it through each rocker arm.
- Install the rocker shaft holder plate [A] so that the rocker arm shaft protrusion [B] face each other.
- Apply a non-permanent locking agent to the rocker shaft holder plate bolts [C] (KLX110CA/DA Late Models ~).
- Tighten:
  - Torque - Rocker Shaft Holder Plate Bolts: 5.2 N·m (0.53 kgf·m, 46 in·lb)**
- Install the camshaft sprocket.
- Check and adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).



#### NOTICE

**When install the valve adjusting covers, be careful not to drop the O-rings from the cover grooves. If the O-ring is installed improperly, oil will leak.**

## Rocker Arm, Rocker Arm Shaft

### ***Rocker Arm & Arm Shaft Wear Inspection***

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

#### **Rocker Arm Inside Diameter**

**Standard:** 10.000 ~ 10.015 mm (0.3937 ~ 0.3943 in.)

**Service Limit:** 10.05 mm (0.396 in.)

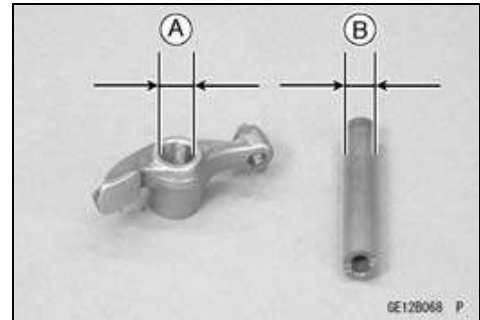
- ★ If it exceeds the service limit, replace the rocker arm.
- Measure the diameter [B] of each rocker arm shaft where the rocker arm fits.

#### **Rocker Arm Shaft Diameter**

**Standard:** 9.980 ~ 9.995 mm (0.3929 ~ 0.3935 in.)

**Service Limit:** 9.95 mm (0.392 in.)

- ★ If the diameter is less than the service limit, replace the rocker arm shaft.



## 4-20 ENGINE TOP END

### Cylinder Head

#### Compression Measurement

- Warm up the engine thoroughly.
- Stop the engine.
- Remove the spark plug (see Spark Plug Cleaning and Inspection in the Periodic Maintenance chapter).
- Attach compression gauge and adapter firmly into the spark plug hole.

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

**[A]**

**Compression Gauge Adapter, M10 × 1.0: 57001-1317 [B]**



- With the throttle fully open, turn the engine over sharply with the kick starter several times until the compression gauge stops rising; the compression is the highest reading obtainable.

#### Cylinder Compression

**Usable Range: 700 ~ 1098 kPa (7.14 ~ 11.2 kgf/cm<sup>2</sup>, 102 ~ 159 psi) @5 times**

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

#### Cylinder Compression

**Usable Range: 280 ~ 498 kPa (2.86 ~ 5.08 kgf/cm<sup>2</sup>, 41 ~ 72 psi) @350 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 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, cylinder base gasket thickness.	Replace to gasket with a standard part.
	Damaged KACR spring.	Replace the spring.
	KACR weight do not move smoothly.	Replace the KACR 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.	Replace the piston and/or cylinder
	Piston seizure.	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.
KACR weight do not move smoothly.	Replace the KACR unit.	

- Remove the compression gauge and adapter, and install the spark plug.

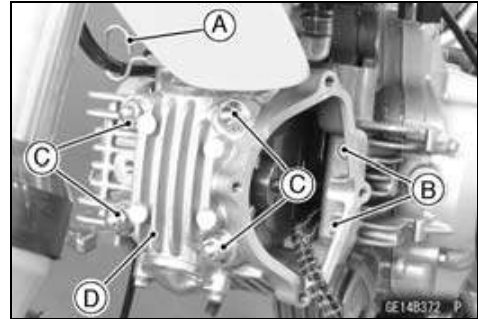
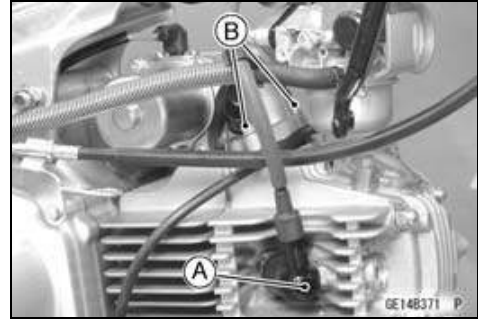
**Torque - Spark Plug: 13 N·m (1.3 kgf·m, 115 in·lb)**



## Cylinder Head

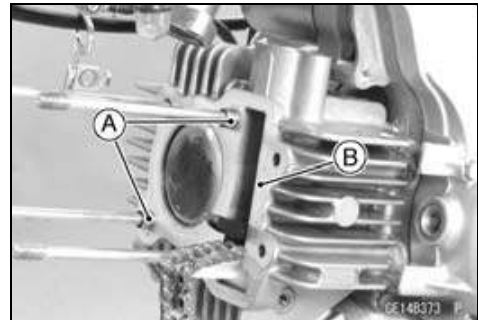
### Cylinder Head Removal

- Remove:
  - Muffler (see Muffler Removal)
  - Oil Pipe (see Oil Pipe Removal in the Engine Lubrication System chapter)
  - Spark Plug Cap [A]
  - Intake Pipe Bolts [B]
  - Insulator
  
- Remove:
  - Camshaft Sprocket (see Camshaft Sprocket Removal)
  - Clamp [A] (KLX110D Models)
- Remove the cylinder head bolts [B] first, then remove the nuts [C], and take off the cylinder head [D].



### Cylinder Head Installation

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



- Fit the cylinder head onto the cylinder block using a screwdriver or wire to keep the chain from falling down into the cylinder block.
- Apply a non-permanent locking agent to the cylinder head bolts.
- Tighten the cylinder head nuts and bolts following the tightening sequence as shown.
- The cylinder head nut [A] has gasket.

#### First Torque -

**Cylinder Head Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)**

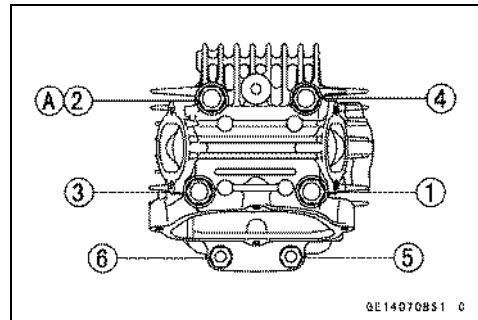
**Cylinder Head Nuts: 13 N·m (1.3 kgf·m, 113 in·lb)**

#### Final Torque -

**Cylinder Head Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)**

**Cylinder Head Nuts: 22 N·m (2.2 kgf·m, 16 ft·lb)**

- Install the camshaft sprocket (see Camshaft Sprocket Installation).
- Install the other removed parts (see appropriate chapters).

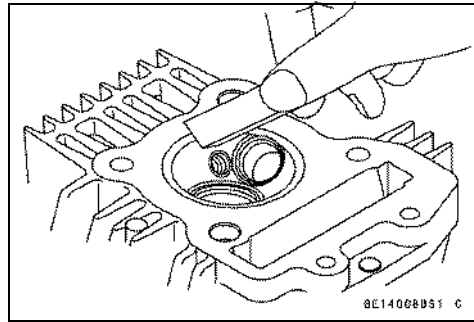


## 4-22 ENGINE TOP END

### Cylinder Head

#### **Cylinder Head Cleaning**

- Scrape out any carbon, and wash the head with high flash-point solvent.



#### **Cylinder Head Warp Inspection**

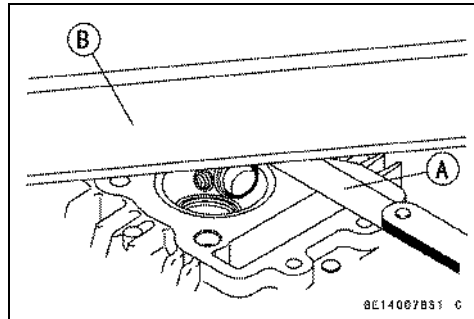
- Lay a straightedge across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the cylinder head.

#### **Cylinder Head Warp**

**Standard:** ---

**Service Limit:** 0.03 mm (0.001 in.)

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



## Valves

### Valve Clearance Inspection

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

### Valve Clearance Adjustment

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

### Valve Removal

- Remove:
  - Cylinder Head (see Cylinder Head Removal)
  - Camshaft (see Camshaft Removal)
- Using the valve spring compressor assembly to press down the valve spring retainer, remove the split keeper.

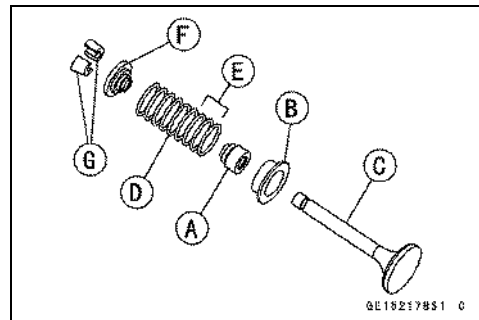
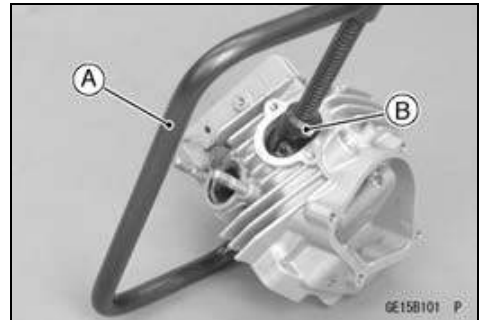
**Special Tools - Valve Spring Compressor Assembly: 57001-241 [A]**

**Valve Spring Compressor Adapter,  $\phi$ 20: 57001-1154 [B]**

- Remove the tool and then remove the spring retainer, spring, and spring seat.
- Push out the valve.
- Pull off the valve stem oil seal.

### Valve Installation

- Replace the valve stem oil seal [A].
- Push a new valve stem oil seal into place.
- ★ If a new valve is to be used, check the valve to guide clearance.
- ★ If there is too much clearance, install a new valve guide.
- Check the spring seat [B].
- Apply a thin coat of molybdenum disulfide grease to the valve stem [C].
- Install spring [D] so that the closed coil end [E] faces downwards, white paint faces upward.
- Install the spring retainer [F] press it down with the valve spring compressor assembly, and put on the split keepers [G].
- After making sure that the split keepers and valve stem are all properly fitted, remove the tool.
- Install:
  - Camshaft (see Camshaft Installation)
  - Rocker Arm & Rocker Arm Shaft (see Rocker Arm Installation)
  - Cylinder Head (see Cylinder Head Installation)
- Check the valve clearance, and adjust if necessary.



## 4-24 ENGINE TOP END

### Valves

#### Valve Guide Removal

- Remove:
  - Valve (see Valve Removal)
  - Valve Stem Oil Seal
- Heat the area around the valve guide to 120 ~ 150°C (248 ~ 302°F).

#### NOTICE

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

- Hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

**Special Tool - Valve Guide Arbor,  $\phi$ 4.5: 57001-1331**

#### Valve Guide Installation

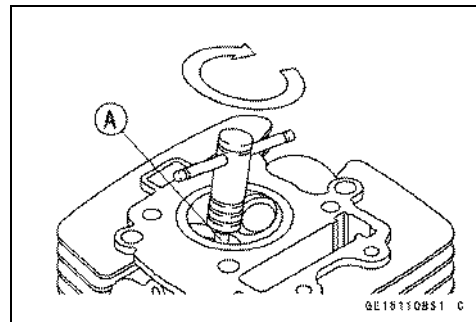
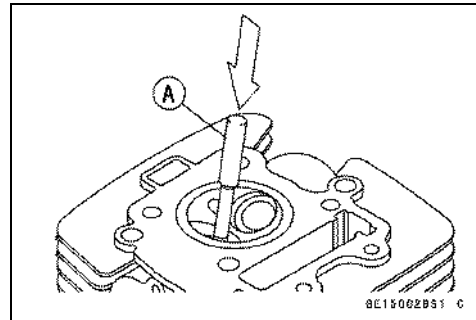
- Valve guides are identical.
- Apply engine oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).

#### NOTICE

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

- Drive the valve guide in from the top of the cylinder head until the circlip stops the guide from going in too far.
- Allow the cylinder head to cool.
- Ream the valve guide with the valve guide reamer [A] even if the old guide is reused.

**Special Tool - Valve Guide Reamer,  $\phi$ 4.5: 57001-1333**



## Valves

### Valve Seat Inspection

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

#### Valve Seat Surface Outside Diameter

##### Standard:

Exhaust 19.9 ~ 20.1 mm (0.783 ~ 0.791 in.)

Inlet 22.9 ~ 23.1 mm (0.902 ~ 0.909 in.)

### NOTE

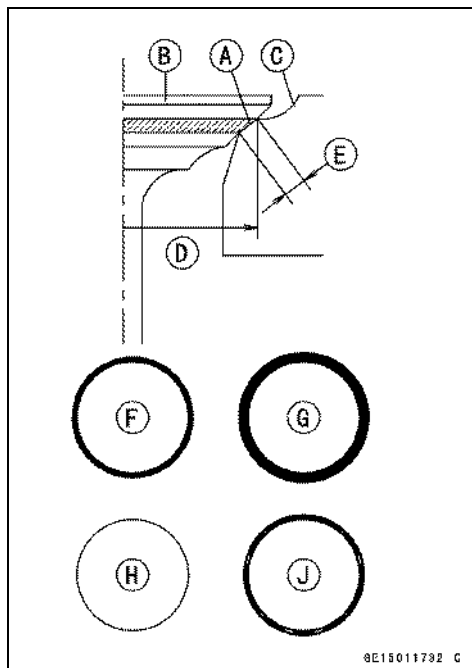
- The valve stem and guide must be in good condition or this check will not be valid.
- ★ If the valve seating pattern is not correct, repair the seat.
- Check the seating surface width of the valve seat.
- Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.
- Good [F]
- ★ If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

#### Valve Seat Width

##### Standard:

Exhaust 0.80 ~ 1.15 mm (0.031 ~ 0.045 in.)

Inlet 0.80 ~ 1.15 mm (0.031 ~ 0.045 in.)



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## 4-26 ENGINE TOP END

### Valves

#### Valve Seat Repair

- Repair the valve seat with the valve seat cutters.

**Special Tools - Valve Seat Cutter Holder,  $\phi$ 4.5: 57001-1330**  
**Valve Seat Cutter Holder Bar: 57001-1128**

#### Inlet

**Special Tools - Valve Seat Cutter, 45° -  $\phi$ 27.5: 57001-1114**  
**Valve Seat Cutter, 32° -  $\phi$ 25: 57001-1118**  
**Valve Seat Cutter, 60° -  $\phi$ 30: 57001-1123**

#### Exhaust

**Special Tools - Valve Seat Cutter, 32° -  $\phi$ 22: 57001-1206**  
**Valve Seat Cutter, 45° -  $\phi$ 22: 57001-1205**  
**Valve Seat Cutter, 67.5° -  $\phi$ 22: 57001-1207**

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

#### Seat Cutter Operating Care

1. This valve seat cutter is developed to grind the valve for repair. Therefore the cutter must not be used for other purpose 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 position.

#### NOTE

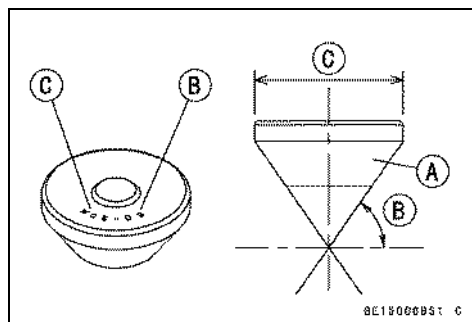
○ Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.

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

#### Marks Stamped on the cutter

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

- 60° ..... Cutter angle [B]  
30 $\phi$  ..... Outer diameter of cutter [C]



## Valves

### Operating Procedures

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

### NOTICE

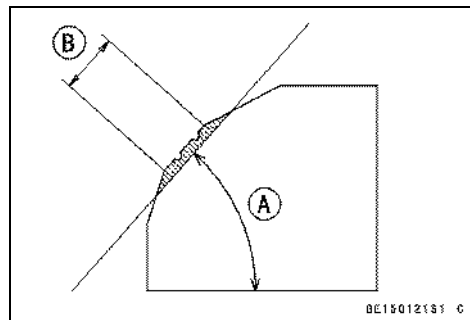
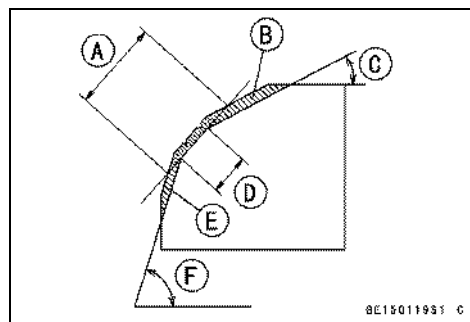
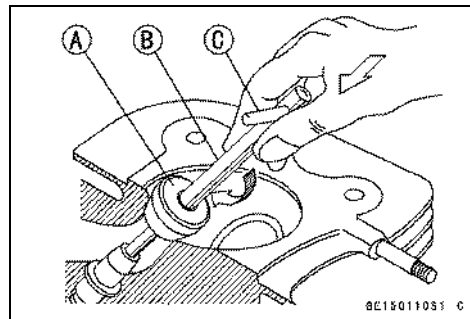
**Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.**

- Valve seat area form is as follows:
  - Widened Width [A] of engagement by machining with 45° cutter
  - Ground Volume [B] by 32° cutter
  - 32° [C]
  - Correct Width [D]
  - Ground Volume [E] by 60° cutter
  - 60° [F]

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

### NOTE

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



## 4-28 ENGINE TOP END

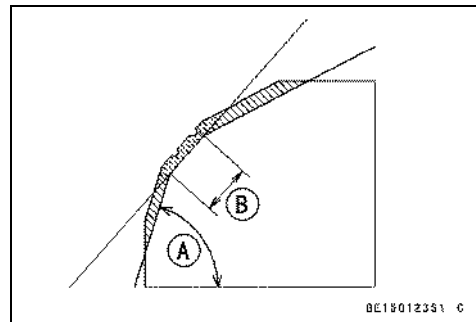
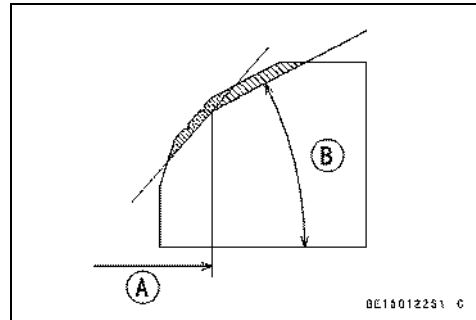
### Valves

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

#### **NOTICE**

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

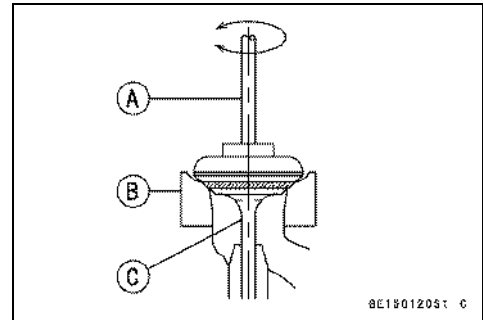
- After making the 32° grind, return to the seat outside diameter measurement step above.
  - To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
  - ★ If the seat width is too narrow, repeat the 45° grind until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





## Valves

- Lap the valve to the seat using a lapper, once the seat width and outside diameter are within the ranges specified above.
- Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
- Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
- Repeat the process with fine grinding compound.
  - [A] Lapper
  - [B] Valve Seat
  - [C] Valve
- The seating area should be marked about in the middle of the valve face.
- ★ If the seat area is incorrect place on the valve, be sure to check the valve is the correct part. If it is, it may have been refaced too much replace the valve.
- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Adjustment in the Periodic Maintenance chapter).



### Valve Head Thickness Inspection

- Measure the thickness of valve head.

#### Valve Head Thickness [A]

##### Standard:

Exhaust valve 0.8 mm (0.031 in.)

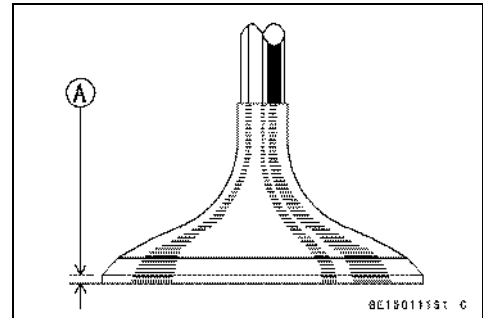
Inlet valve 0.5 mm (0.020 in.)

##### Service Limit:

Exhaust valve 0.5 mm (0.020 in.)

Inlet valve 0.25 mm (0.010 in.)

- ★ If it is under the service limit, replace the valve.



### Valve Stem Bend Inspection

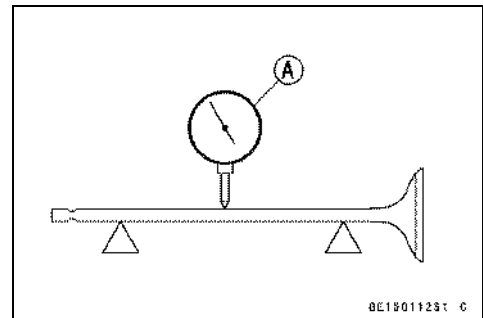
- Support the valve at both ends of the straight stem portion, and set a dial gauge against the center of the stem.
- Turn the valve and read the variation in the dial gauge [A].

#### Valve Stem Bend

Standard: TIR 0.01 mm (0.0004 in.) or less

Service Limit: TIR 0.05 mm (0.002 in.)

- ★ If it is bent over the service limit, replace the valve.



## 4-30 ENGINE TOP END

### Valves

#### Valve Stem Diameter Inspection

- Measure the diameter of the valve stem.

##### Valve Stem Diameter [A]

###### Standard:

Exhaust valve 4.462 ~ 4.472 mm (0.1757 ~ 0.1761 in.)

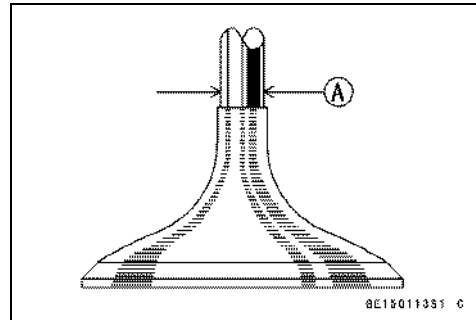
Inlet valve 4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in.)

###### Service Limit:

Exhaust valve 4.44 mm (0.1748 in.)

Inlet valve 4.46 mm (0.1756 in.)

- ★ Replace the valve if the stem is worn to less than the service limit.



#### Valve Guide Inside Diameter Inspection

If a small bore gauge and micrometer are available, measure the valve guide as follows.

- Measure the inside diameter [A] of the valve guide. Since the guide wears unevenly, measure the diameter at four places up and down the guide.

##### Valve Guide Inside Diameter

###### Standard:

Exhaust 4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)

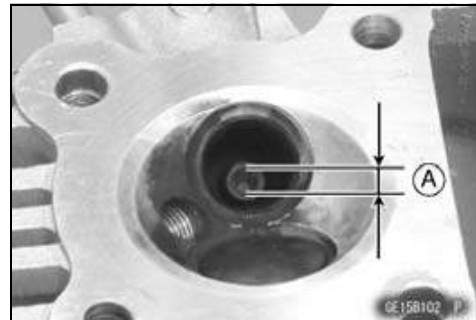
Inlet 4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)

###### Service Limit:

Exhaust 4.58 mm (0.1803 in.)

Inlet 4.58 mm (0.1803 in.)

- ★ If any measurement exceeds the service limit, replace the valve guide.



#### 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 valve guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.

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

###### Standard:

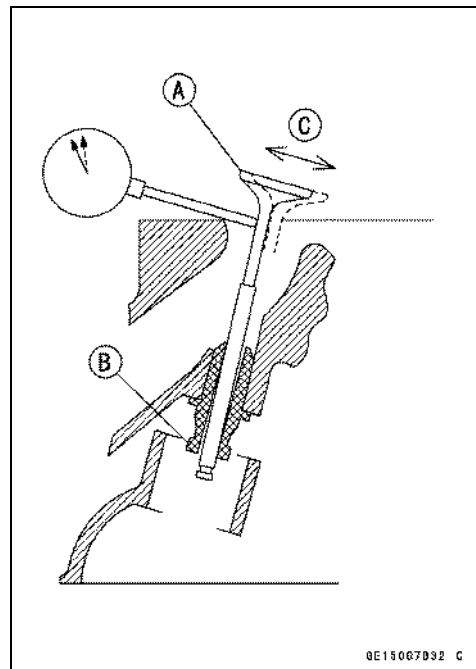
Exhaust 0.05 ~ 0.08 mm (0.002 ~ 0.003 in.)

Inlet 0.02 ~ 0.06 mm (0.0008 ~ 0.002 in.)

###### Service Limit:

Exhaust 0.19 mm (0.0075 in.)

Inlet 0.17 mm (0.0067 in.)



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## Valves

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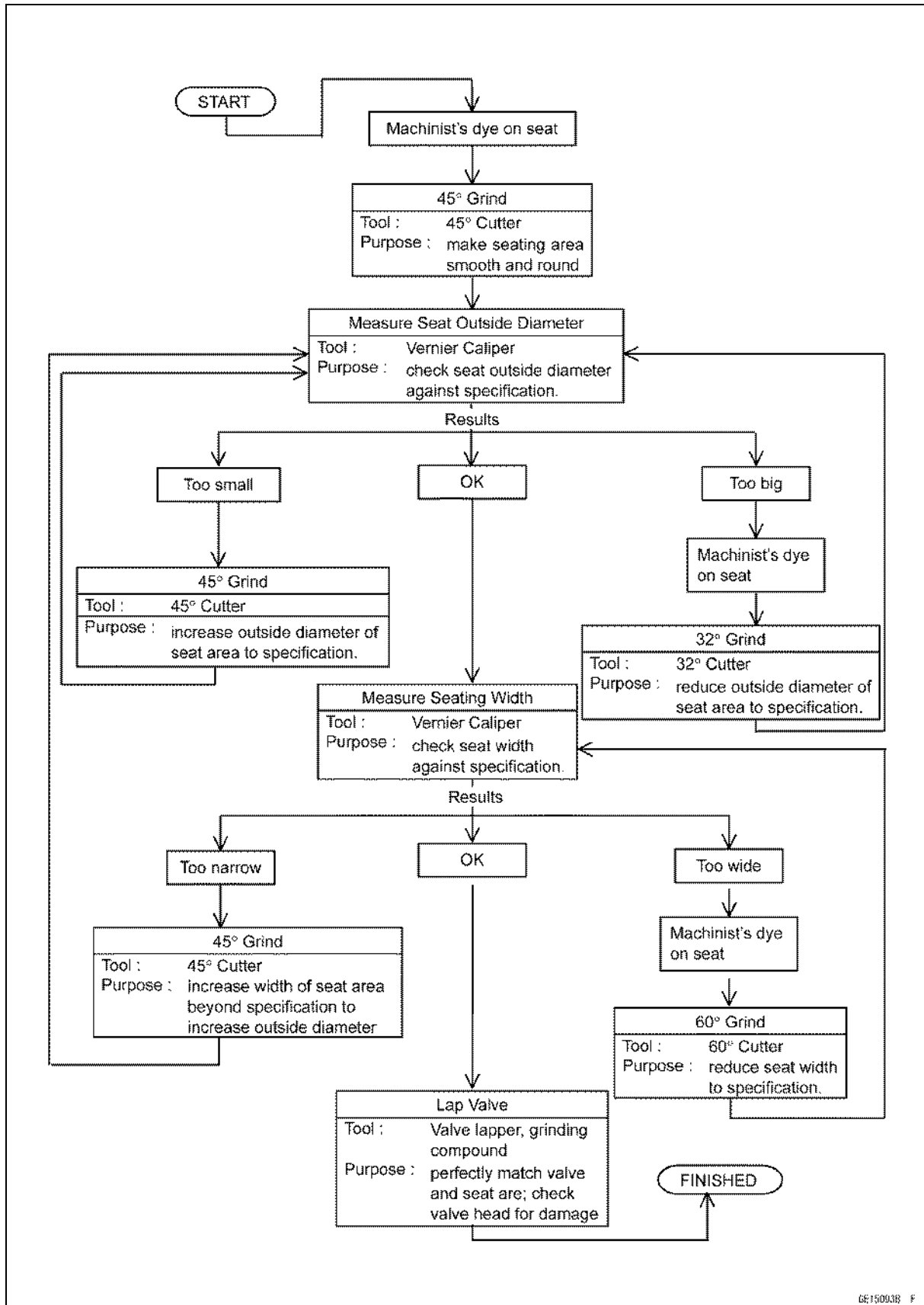
- Repeat the measurement in a direction at a right angle to the first.
- ★ If the reading exceeds the service limit, replace the guide.

**NOTE**

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

# 4-32 ENGINE TOP END

## Valves

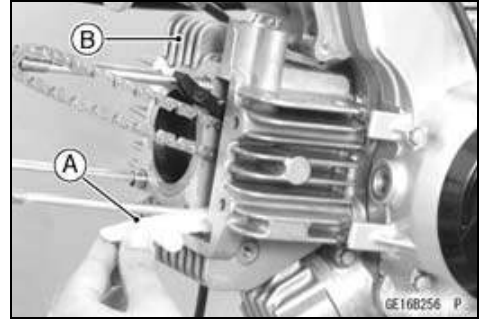


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## Cylinder, Piston

### Cylinder Removal

- Remove:
  - Cylinder Head (see Cylinder Head Removal)
  - Lower Camshaft Chain Guide [A]
- Tap the cylinder [B] lightly with a plastic mallet to separate from the crankcase.
- Remove the cylinder base gasket.

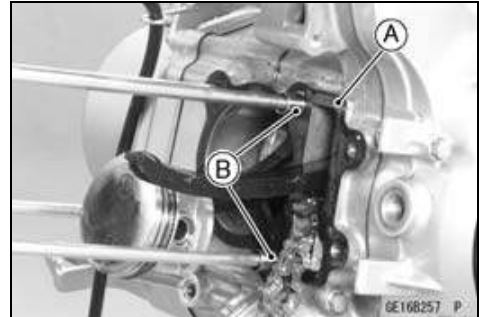


### Cylinder Installation

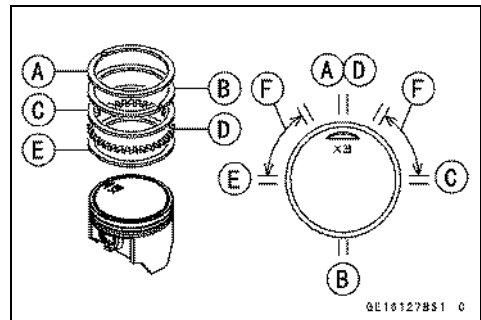
#### NOTE

○ If the cylinder block is replaced with a new one, piston to cylinder clearance must be checked against the specified value.

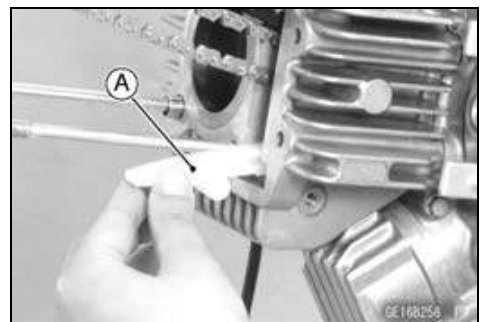
- Install a new cylinder base gasket [A] and be sure that two dowel pins [B] are properly fitted in the crankcase.



- Pull the camshaft chain taut top avoid kinking it and use a wrench on the crankshaft to set the piston at BDC.
- Position the piston ring opening as follows.
  - Top Ring [A]
  - Second Ring [B]
  - Upper Oil Ring Steel Rail [C]
  - Oil Ring Expander [D]
  - Lower Oil Ring Steel Rail [E]
  - 30 ~ 90° [F]



- Apply engine oil to the piston rings and the cylinder inside surface.
- Pull the camshaft chain up through the cylinder and insert a screwdriver to keep the chain from falling back into the engine.
- Place the upper camshaft chain guide inside the cylinder blocks.
- Fit the bottom of the cylinder over the piston rings, pressing in on opposite sides of the rings as necessary. Take care that the rings do not slip out of their proper positions.
- Insert the lower camshaft chain guide [A] all the way down.
- Install the cylinder head (see Cylinder Head Installation).

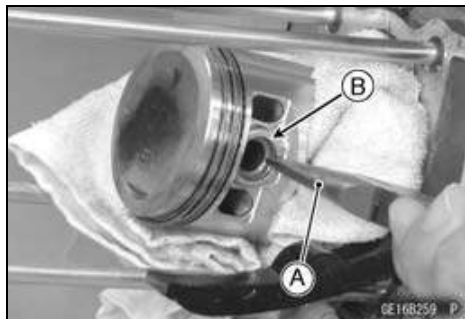


## 4-34 ENGINE TOP END

### Cylinder, Piston

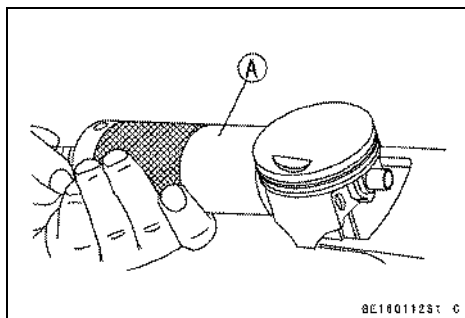
#### **Piston Removal**

- Remove the cylinder (see Cylinder Removal).
- Wrap a clean cloth around the base of the piston.
- Use the plier [A] and remove the snap ring [B].

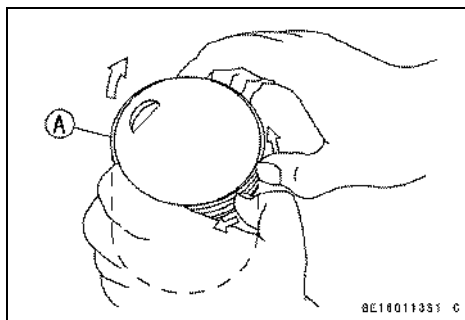


- Remove the piston by pushing the piston pin and pulling it out. Use the piston pin puller assembly [A] if the pin is tight.

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



- Remove the piston rings [A]. Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.

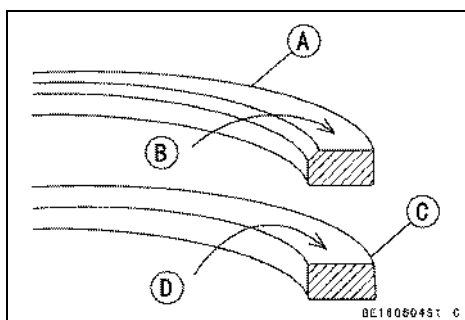
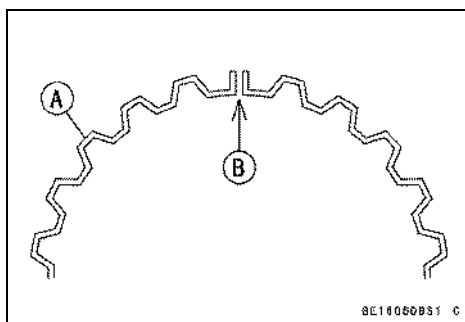


#### **Piston Installation**

##### **NOTE**

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

- Install the oil ring expander [A] in the bottom piston ring groove so that the ends [B] but together, never overlap.
- 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 "O" mark [B] faces up.
- Install the second ring [C] so that the "N" mark [D] faces up.



## Cylinder, Piston

### NOTE

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

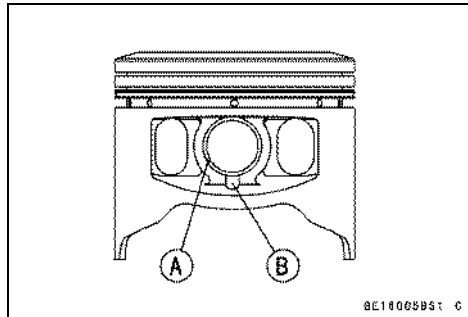
- Install the piston so that the “EX” mark [A] on the piston toward exhaust side.



- Fit a new piston 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 a piston pin snap ring, compress it only enough to install it no more.

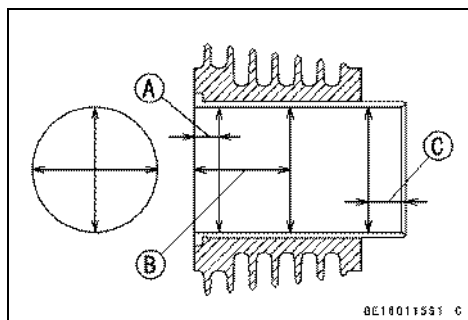
### NOTICE

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



### Cylinder Inside Diameter Measurement

- 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, the cylinder will have to be bored to oversize and then honed.



### Cylinder Inside Diameter

**Standard:** 52.997 ~ 53.009 mm (2.0865 ~ 2.0870 in.) and less than 0.01 mm (0.0004 in.) difference between any two measurements

**Service Limit:** 53.10 mm (2.0905 in.) or 0.05 mm (0.002 in.) difference between any two measurements

10 mm (0.39 in.) [A]

60 mm (2.4 in.) [B]

20 mm (0.79 in.) [C]

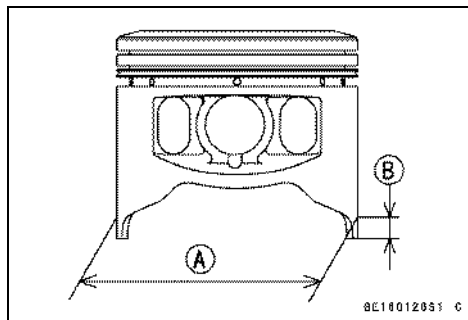
### Piston Wear Inspection

- Measure the outside diameter [A] of the piston 3.8 mm [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

### Piston Diameter

**Standard:** 52.969 ~ 52.981 mm (2.0854 ~ 2.0859 in.)

**Service Limit:** 52.82 mm (2.080 in.)



### NOTE

○ Abnormal wear such as a marked diagonal pattern across the piston skirt may mean a bent connecting rod or crankshaft.

## 4-36 ENGINE TOP END

### Cylinder, Piston

#### ***Piston/Cylinder Clearance Inspection***

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

#### **Piston/Cylinder Clearance**

**Standard:** 0.010 ~ 0.022 mm (0.00039 ~ 0.00086 in.)

#### **NOTE**

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

#### ***Boring, Honing Performance***

When boring and honing a cylinder, note the following:

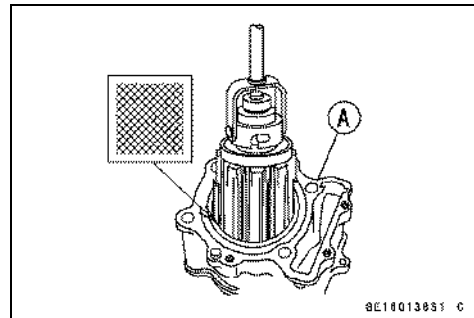
○ There are two sizes of oversize pistons available. Oversize pistons require oversize rings.

#### **Oversize Pistons and Rings**

0.50 mm (0.0197 in.)    Oversize

1.0 mm (0.0394 in.)    Oversize

- Before boring a cylinder [A], first measure the exact diameter of the oversize piston, and then, according to the standard clearance in the specifications section, determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than 1.0 mm (0.0394 in.) oversize, the cylinder block must be replaced.
- Cylinder inside diameter must not vary more than 0.01 mm (0.0004 in.) at any point.
- Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.
- In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus 0.1 mm (0.004 in.) and the service limit for the piston is the oversize piston original diameter minus 0.20 mm (0.0079 in.). If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.





## Cylinder, Piston

### ***Piston Ring End Gap Inspection***

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

#### **Piston Ring End Gap**

##### **Standard:**

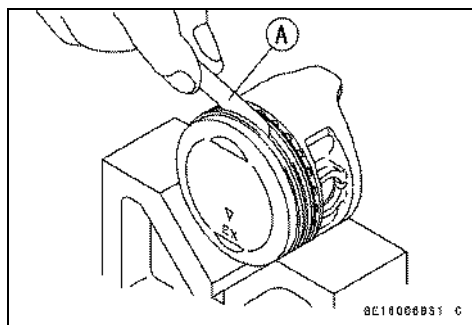
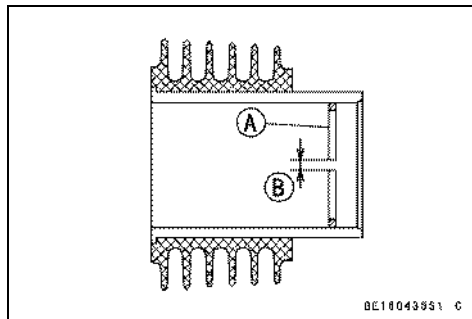
<b>Top</b>	<b>0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in.)</b>
<b>Second</b>	<b>0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)</b>
<b>Oil</b>	<b>0.10 ~ 0.60 mm (0.0039 ~ 0.0236 in.)</b>

##### **Service Limit:**

<b>Top</b>	<b>0.6 mm (0.024 in.)</b>
<b>Second</b>	<b>0.8 mm (0.031 in.)</b>
<b>Oil</b>	<b>0.9 mm (0.035 in.)</b>

### ***Piston Ring, Piston Ring Groove Inspection***

- Visually inspects the piston rings and the piston ring grooves.
- ★ If the rings are worn unevenly or damaged, they must be replaced.
- ★ If the piston ring grooves are worn unevenly or damaged, the piston must be replaced and fitted with new rings.
- Check for uneven groove wear by inspecting the ring seating.
- ★ The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.
- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring groove clearance.



## 4-38 ENGINE TOP END

### Cylinder, Piston

#### Piston Ring/Groove Clearance

##### Standard:

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

Second 0.010 ~ 0.050 mm (0.0004 ~ 0.0020 in.)

##### Service Limit:

Top 0.16 mm (0.0063 in.)

Second 0.15 mm (0.0059 in.)

#### Piston Ring Thickness

##### Standard:

Top 0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)

Second 0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)

##### Service Limit:

Top 0.70 mm (0.0276 in.)

Second 0.70 mm (0.0276 in.)

#### Piston Ring Groove Width

##### Standard:

Top 0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)

Second 0.80 ~ 0.82 mm (0.0315 ~ 0.0323 in.)

##### Service Limit:

Top 0.91 mm (0.0358 in.)

Second 0.90 mm (0.0354 in.)

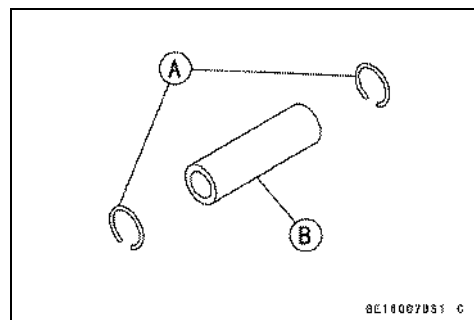
- ★ If the clearance exceeds the service limit, remove the piston rings, and measure the thickness of the piston rings and the width of the ring grooves. If the ring has worn down to less than the service limit, replace the ring, if the groove width exceeds the service limit replace the piston.

#### NOTE

- These tables apply to oversize pistons and rings as well as standard pistons and rings.

#### **Piston, Piston Pin, Connecting Rod Wear Inspection**

- Visually inspect the snap rings [A] are fitted in place.
- ★ If the ring shows weakness or deformation, replace the ring. Also if the pin hole groove shows excessive wear, replace the piston.
- Visually inspect the piston pin hole and connecting rod small end hole.
- ★ If the piston pin hole shows uneven wear, replace the piston.
- ★ If the rod small end hole shows uneven wear, replace the rod, or crankshaft assembly.
- Visually inspect the outer surface of the piston pin [B].
- ★ If the pin shows color change or stepped wear, replace the pin.



## Cylinder, Piston

### ***Piston, Piston Pin, Connecting Rod Inspection***

- Measure the inside diameter of both piston pin holes in the piston.

#### **Piston Pin Hole Inside Diameter [A]**

**Standard:** 13.001 ~ 13.007 mm (0.5118 ~ 0.5121 in.)

**Service Limit:** 13.08 mm (0.515 in.)

- ★ If either piston pin hole diameter exceeds the service limit, replace the piston.
- Measure the diameter of the piston pin.

#### **Piston Pin Diameter [B]**

**Standard:** 12.995 ~ 13.000 mm (0.5116 ~ 0.5118 in.)

**Service Limit:** 12.96 mm (0.0510 in.)

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

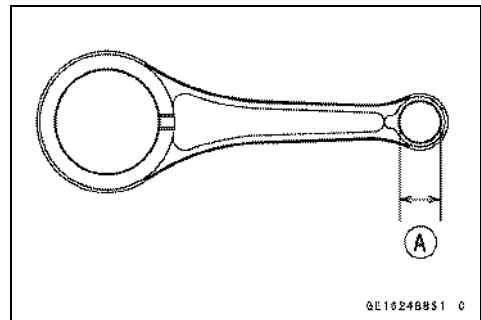
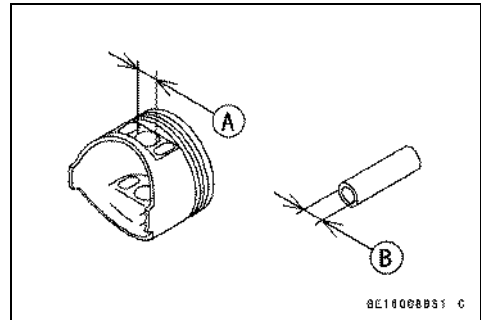
- ★ Measure the inside diameter [A] of the connecting rod small end.

#### **Connecting Rod Small End Inside Diameter**

**Standard:** 13.003 ~ 13.014 mm (0.5119 ~ 0.5124 in.)

**Service limit:** 13.05 mm (0.514 in.)

- ★ If the diameter exceeds the service limit, replace the connecting rod.

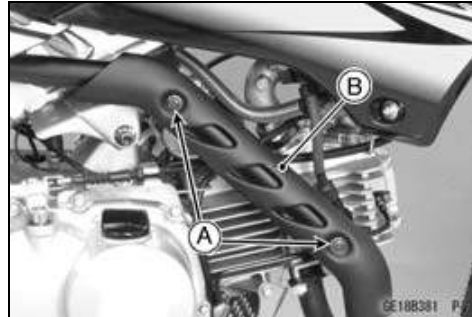
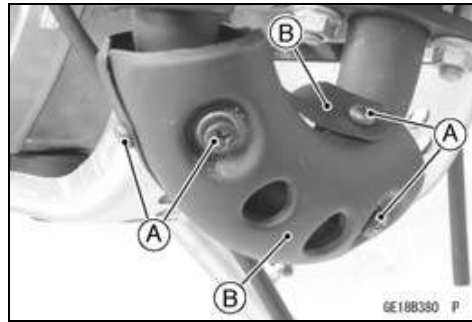


## 4-40 ENGINE TOP END

### Muffler

#### **Muffler Removal**

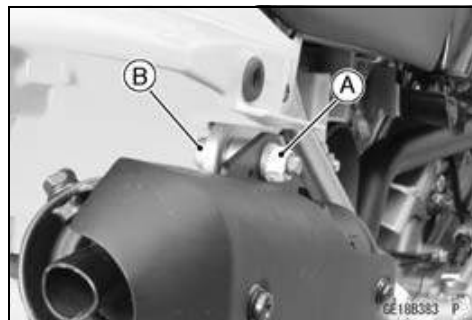
- Remove:
  - Right Side Cover (see Side Cover Removal in the Frame chapter)
  - Screws [A]
  - Exhaust Pipe Covers [B]



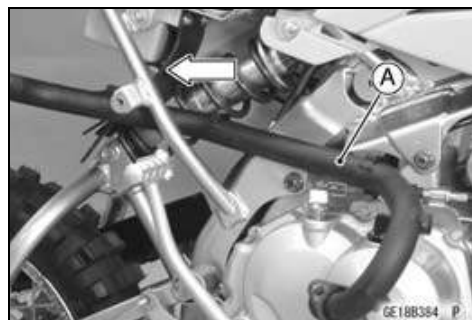
- Remove the exhaust pipe holder nuts [A].



- Remove the muffler mounting nut [A] and bolt [B].



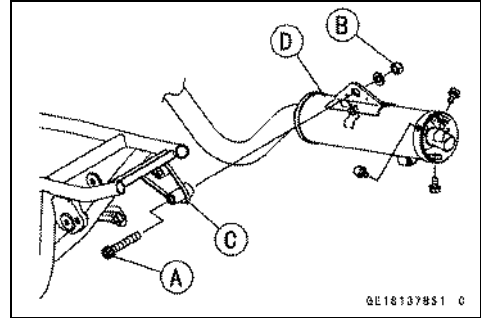
- Remove the muffler assembly [A] rearward.



## Muffler

### Muffler Installation

- Installation is the reverse of removal; note the following.
- Replace the gasket with a new one.
- Tighten:
  - Torque - Exhaust Pipe Holder Nuts: 16 N·m (1.6 kgf·m, 12 ft·lb)**
- Replace the muffler mounting nut [B] with a new one.
- Tighten the muffler mounting bolt [A] and nut in the following procedure.
- Install the muffler mounting bolt to the frame [C] and tighten it to the specified torque.
  - Torque - Muffler Mounting Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install the muffler [D] and tighten the nut to the specified torque.
  - Torque - Muffler Mounting Nut: 30 N·m (3.1 kgf·m, 22 ft·lb)**
- Loosen the nut, and tighten the nut again to the specified torque.
- Thoroughly warm up the engine, wait until the engine cools down, and then retighten the bolt and nuts.



### Spark Arrester Cleaning

- Refer to the Spark Arrester Cleaning in the Periodic Maintenance chapter.



# Clutch

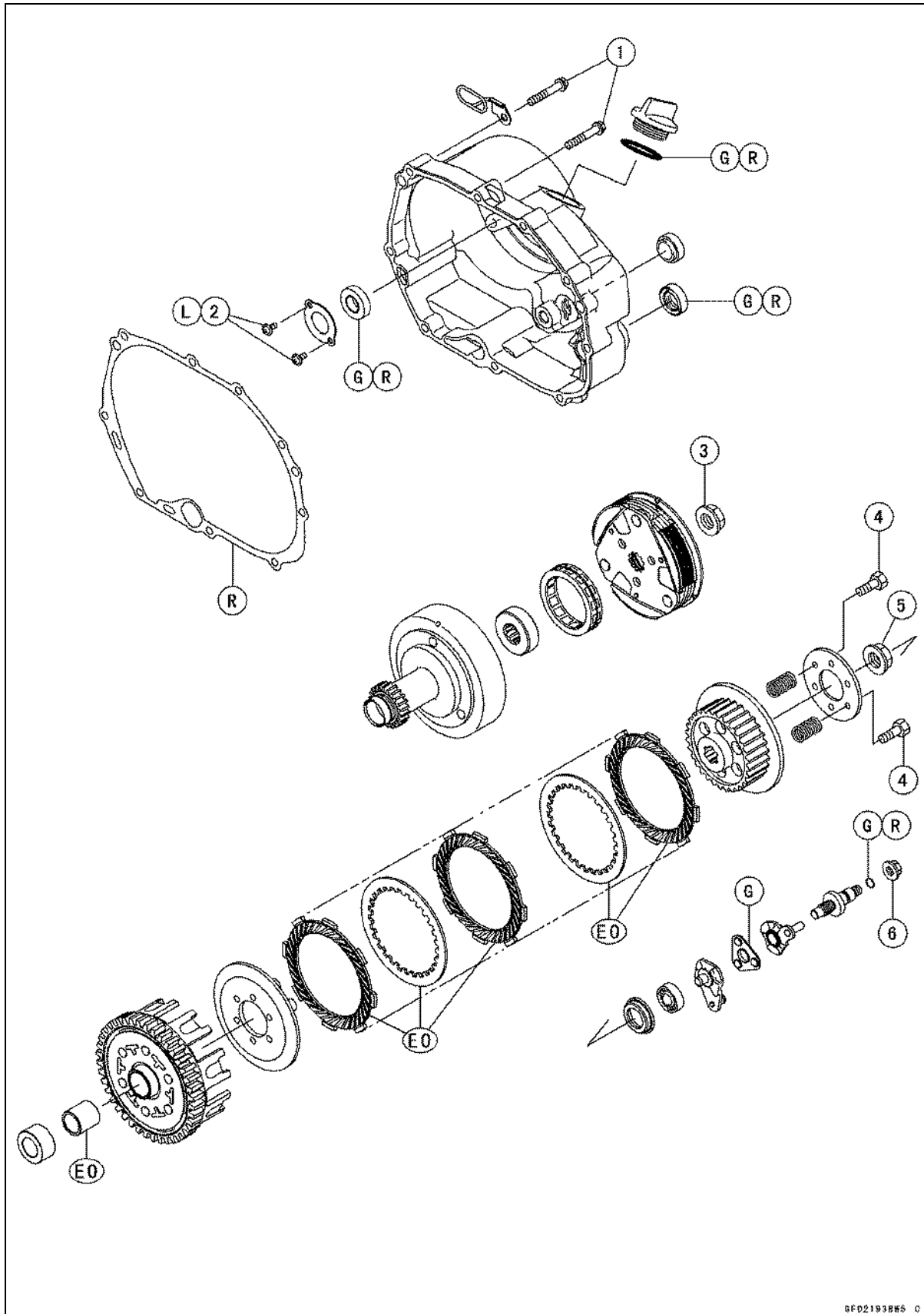
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# 5-2 CLUTCH

## Exploded View

### KLX110C Models



0F02193BWS C



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**Exploded View**


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No.	Fastener	Torque			Remarks
		N-m	kgf-m	ft-lb	
1	Clutch Cover Bolts	8.8	0.9	78 in-lb	
2	Oil Seal Retaining Plate Screws	2.9	0.3	26 in-lb	L
3	Primary Clutch Hub Nut	72	7.3	53	
4	Clutch Spring Bolts	5.0	0.51	44 in-lb	
5	Secondary Clutch Hub Nut	72	7.3	53	
6	Clutch Adjusting Screw Locknut	19	1.9	14	

EO: Apply engine oil.

G: Apply grease.

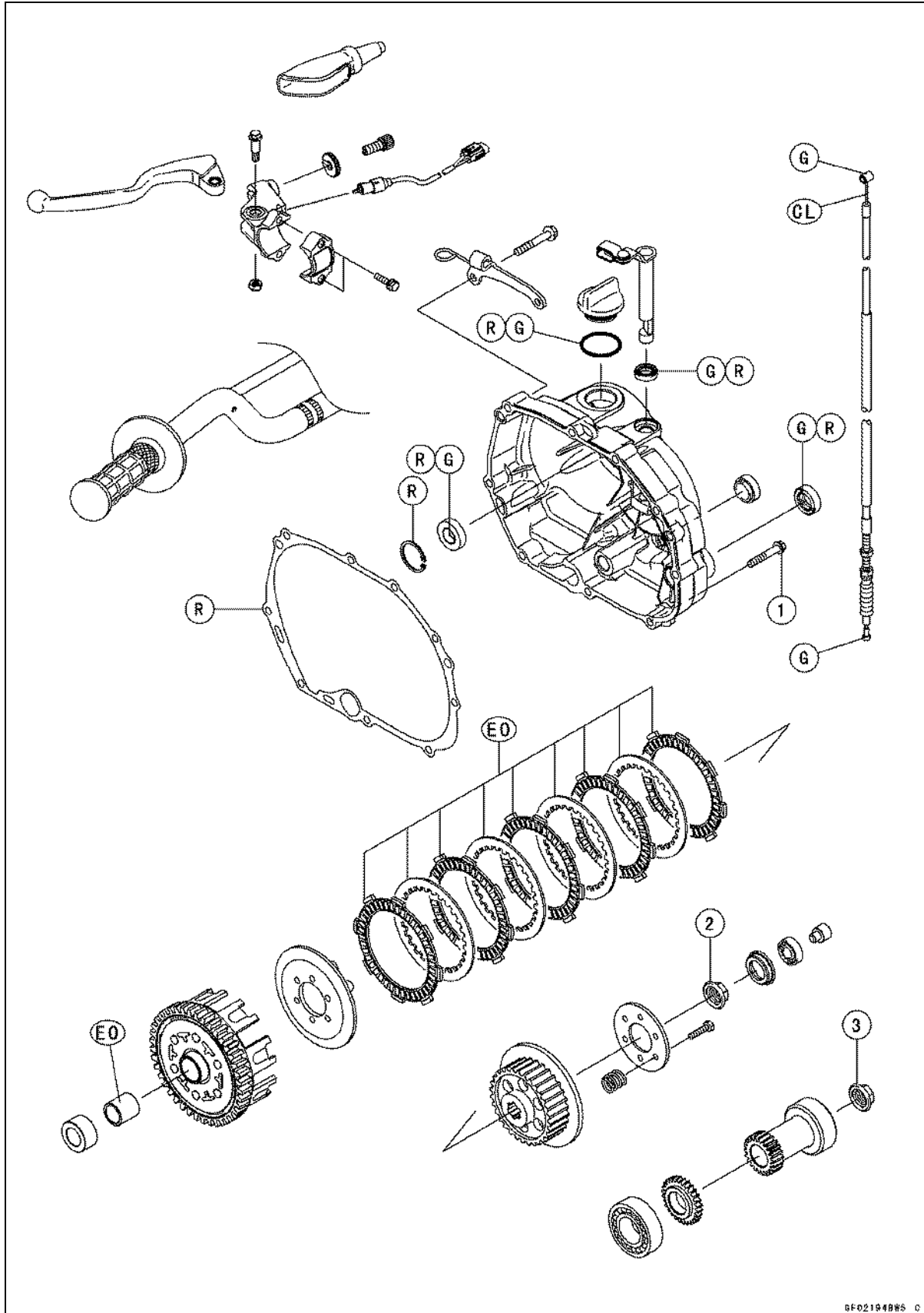
L: Apply a non-permanent locking agent.

R: Replacement Parts

# 5-4 CLUTCH

## Exploded View

### KLX110D Models



GF021948WS C

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**Exploded View**


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No.	Fastener	Torque			Remarks
		N-m	kgf-m	ft-lb	
1	Clutch Cover Bolts	8.8	0.9	78 in-lb	
2	Clutch Hub Nut	72	7.3	53	
3	Primary Gear Nut	72	7.3	53	

CL: Apply cable lubricant.

EO: Apply engine oil.

G: Apply grease.

R: Replacement Parts

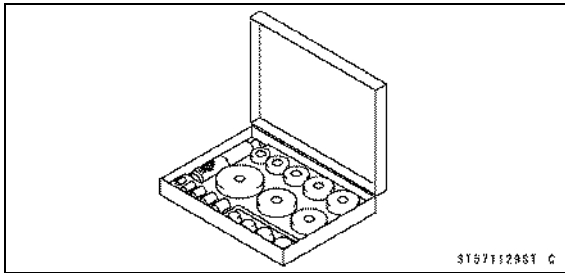
## 5-6 CLUTCH

### Specifications

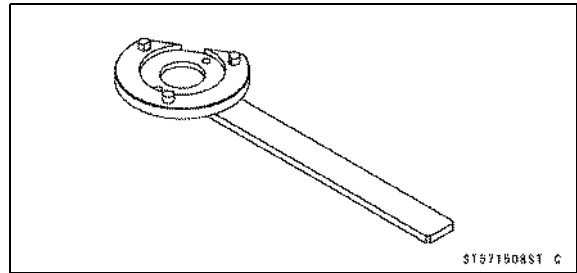
Item	Standard	Service Limit
<b>Clutch (KLX110C)</b>		
Primary Clutch:		
Primary Clutch Housing Inside Diameter	104.0 ~ 104.2 mm (4.094 ~ 4.102 in.)	104.5 mm (4.114 in.)
Primary Clutch Shoe Groove Depth	1.0 mm (0.04 in.)	0.5 mm (0.02 in.)
Secondary Clutch:		
Friction Plate Thickness	3.1 ~ 3.3 mm (0.12 ~ 0.13 in.)	3.0 mm (0.12 in.)
Friction and Steel Plate Warp	0.2 mm (0.008 in.) or less	0.3 mm (0.01 in.)
Clutch Spring Free Length	19.1 mm (0.752 in.)	18.0 mm (0.709 in.)
<b>Clutch (KLX110D)</b>		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	— — —
Friction Plate Thickness	3.12 ~ 3.28 mm (0.123 ~ 0.129 in.)	3.0 mm (0.12 in.)
Friction and Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.01 in.)
Clutch Spring Free Length	22.04 mm (0.868 in.)	20.4 mm (0.803 in.)

Special Tools

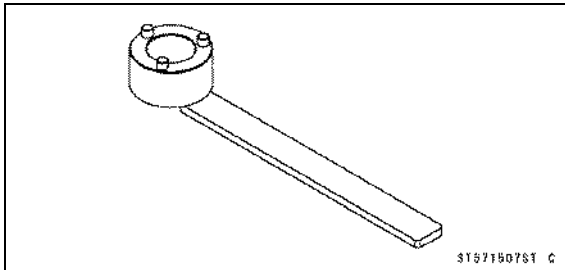
**Bearing Driver Set:**  
57001-1129



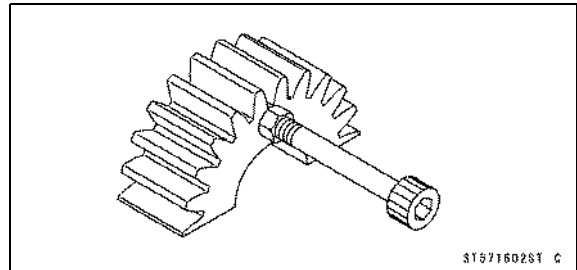
**Clutch Holder 2:**  
57001-1508



**Clutch Holder 1:**  
57001-1507



**Gear Holder:**  
57001-1602



## 5-8 CLUTCH

### Clutch Lever and Cable (KLX110D)

Due to friction plate wear and clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart.

#### **⚠ WARNING**

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

#### **Clutch Lever Free Play Inspection**

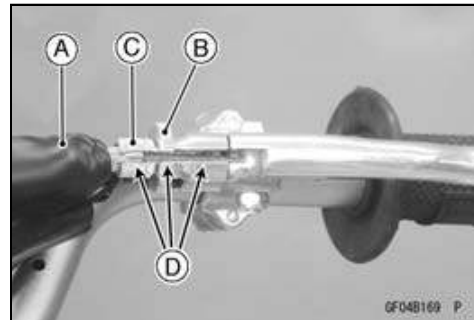
- Refer to the Clutch Lever Free Play Inspection in the Periodic Maintenance chapter.

#### **Clutch Lever Free Play Adjustment**

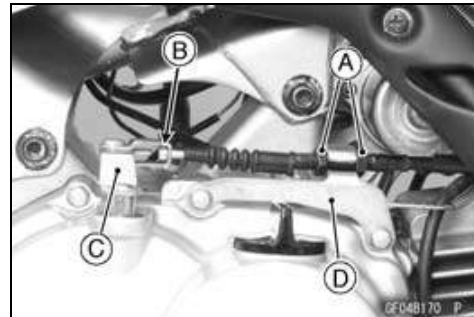
- Refer to the Clutch Lever Free Play Adjustment in the Periodic Maintenance chapter.

#### **Clutch Cable Removal**

- Tuck the rubber boot [A].
- Loosen the locknut [B] and screw in the adjuster [C].
- Align the slots [D] in the clutch lever, locknut and adjuster, and then free the cable from the lever.



- Loosen the adjusting nuts [A] fully.
- Free the clutch inner cable tip [B] from the clutch release lever [C], and free the clutch cable from the clutch cable holder [D].
- Pull the clutch cable out of the frame.

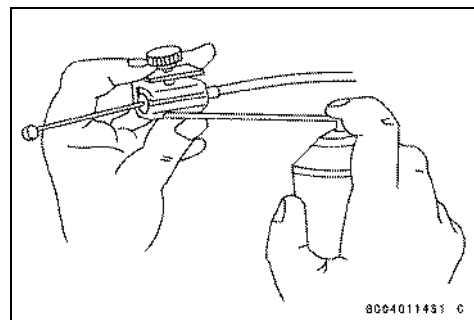


#### **Clutch Cable Installation**

- Installation is the reverse of removal.
- Run the clutch cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Adjust the clutch lever free play (see Clutch Lever Free Play Adjustment in the Periodic Maintenance chapter).

#### **Clutch Cable Lubrication and Inspection**

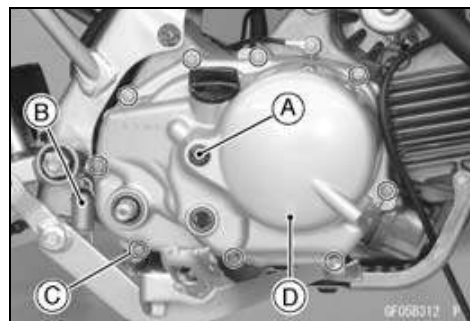
- Whenever the cable is removed, or in accordance with the Periodic Maintenance Chart, lubricate the clutch cable (see General Lubrication in the Periodic Maintenance chapter).
- Apply a thin coat of grease to the cable ends.
- Use the pressure cable lubber to lubricate the cable.
- With the cable disconnected at both ends, the cable should move freely in the cable housing.



## Clutch Cover (KLX110C)

### Clutch Cover Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the kick pedal (see Kick Pedal Removal in the Crankshaft/Transmission chapter).
- When the clutch cove is to be disassembled, loosen the clutch adjuster locknut [A] before clutch cover removal.
- Loosen the footpeg bracket bolts for extra clearance.
- Remove:
  - Brake Pedal Return Spring [B] (Upper End)
  - Clutch Cover Bolts [C]
  - Clutch Cover [D]



### Clutch Cover Installation

- Blow on compressed air to the oil passage [A] in the clutch cover.



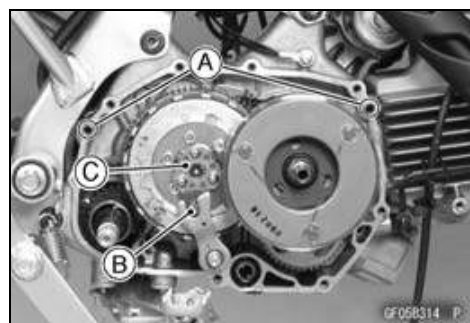
- Install the dowel pins [A].
- Install a new gasket.
- Apply grease to the kick shaft oil seal lip.
- Install the clutch cover, be sure that the release cam [B] and release ball assembly [C] are not falling down.

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

- Install other removed parts.
- Tighten:

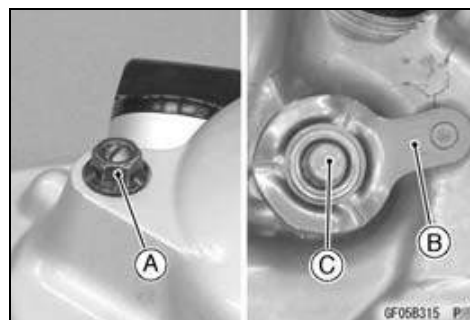
**Torque - Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Pour in the specified engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Adjust the clutch lever free play (see Clutch Lever Free Play Adjustment in the Periodic Maintenance chapter).



### Clutch Cover Disassembly

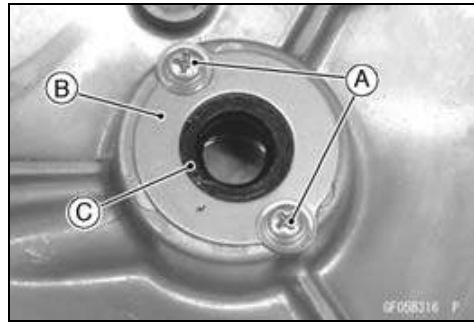
- Remove the clutch cover (see Clutch Cover Removal).
- Unscrew the clutch adjuster locknut [A].
- Remove the release plate [B] and the release shaft [C].



## 5-10 CLUTCH

### Clutch Cover (KLX110C)

- Remove the screws [A] and plate [B].
- Take the oil seal [C] out of the cover with a hook.



#### Clutch Cover Assembly

- Replace the O-ring and the oil seal with new ones.
- Apply high-temperature grease to the oil seal lips [A].
- Press in the new oil seal so that the seal surface is flush with the cover.

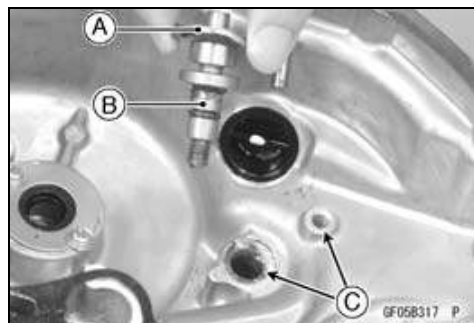
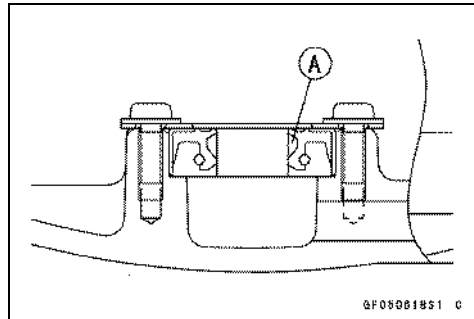
**Special Tool - Bearing Driver Set: 57001-1129**

- Apply a non-permanent locking agent to the oil seal retaining plate screws.
- Install the plate, and tighten the plate screws.

**Torque - Oil Seal Retaining Plate Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)**

- Apply high-temperature grease to the O-ring, and install it.
- Turn in the release plate [A] into the release shaft [B] fully but not tightly and then back it out the three turns, and insert it into the holes [C] of clutch cover securely.
- Tighten the locknut into the release shaft from the opposite side.

**Torque - Clutch Adjusting Screw Locknut: 19 N·m (1.9 kgf·m, 14 ft·lb)**

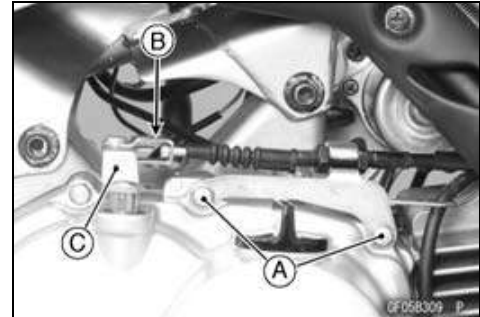




## Clutch Cover (KLX110D)

### Clutch Cover Removal

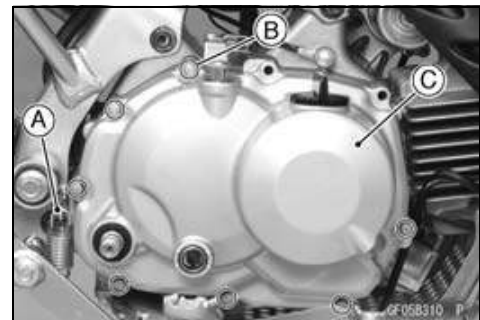
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the kick pedal (see Kick Pedal Removal in the Crankshaft/Transmission chapter).
- Remove the clutch cover bolts [A].
- Free the clutch cable lower end [B] from the clutch release lever [C].



- Remove:
  - Brake Pedal Return Spring [A] (Upper End)
  - Clutch Cover Bolts [B]
  - Clutch Cover [C]

### NOTE

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



### Clutch Cover Installation

- Install the dowel pins [A].
- Install a new gasket.
- Apply high-temperature grease to the oil seal lip of the crankshaft of the clutch cover.
- Apply grease to the kick shaft oil seal lip.
- Install the clutch cover and clutch cable.

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

- Install other removed parts.
- Pour in the specified engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Adjust the clutch lever free play (see Clutch Lever Free Play Adjustment in the Periodic Maintenance chapter).

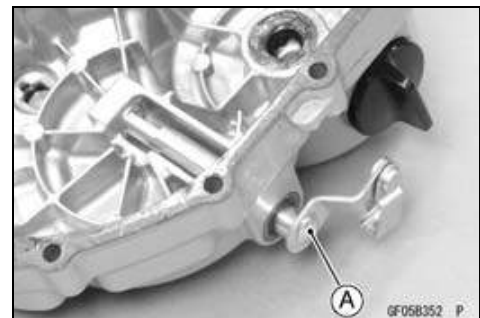


### Release Shaft Removal

#### NOTICE

**Do not remove the clutch release shaft unless it is absolutely necessary. If removed, release shaft oil seal must be replaced with a new one.**

- Remove the clutch cover (see Clutch Cover Removal).
- Pull the lever and shaft assembly [A] straight out of the clutch cover.

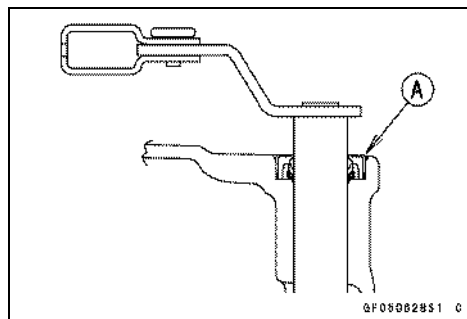


## 5-12 CLUTCH

### Clutch Cover (KLX110D)

#### ***Release Shaft Installation***

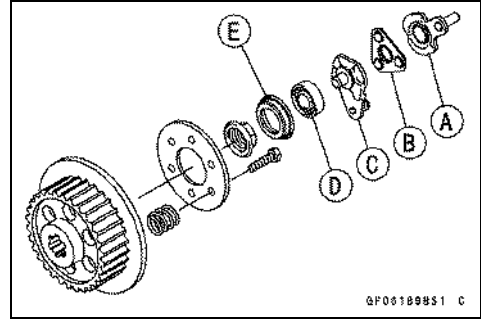
- Installation is the reverse of removal.
- Apply grease to the new oil seal lips.
- Press in the oil seal [A] until it bottoms out.



**Clutch**

**Clutch Removal (KLX110C)**

- Remove the clutch cover (see Clutch Cover Removal).
- Pull out the clutch release lever [A].
- Remove:
  - Release Ball Assembly [B]
  - Release Cam [C]
  - Ball Bearing [D]
  - Ball Bearing Holder [E]



- Loosen the primary clutch hub nut while holding the primary clutch steady with the gear holder.

**Special Tool - Gear Holder: 57001-1602**

**NOTE**

*○ If the primary clutch hub nut is difficult to loosen using a gear holder (57001-1602), use the clutch holder 1 (57001-1507).*

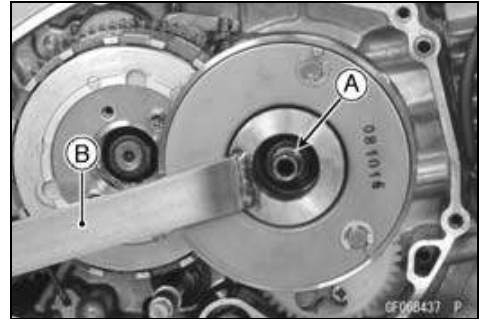
- Loosen the primary clutch hub nut [A], while holding the primary clutch steady with the clutch holder [B].

**Special Tool - Clutch Holder 1: 57001-1507**

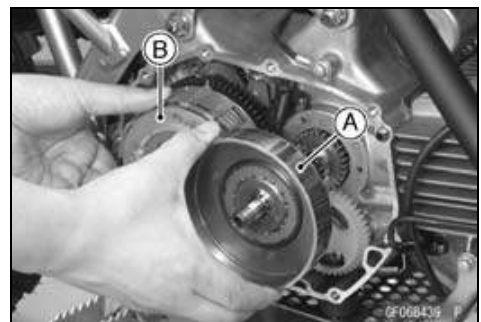
- Remove the secondary clutch hub nut, while holding the secondary clutch steady with the gear holder [A].

**Special Tool - Gear Holder: 57001-1602**

- Remove:
  - Primary Clutch Hub Nut
  - Primary Clutch Hub Nut Assembly



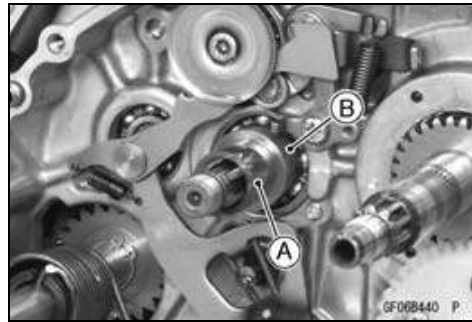
- Remove the primary clutch housing [A] and secondary clutch [B] together.



## 5-14 CLUTCH

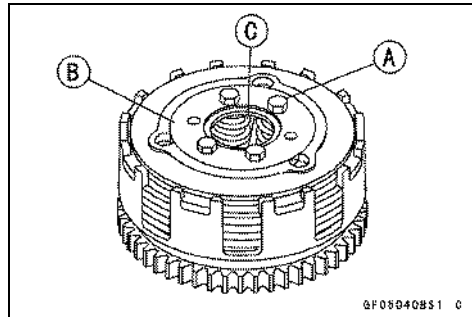
### Clutch

- Remove:
  - Collar [A]
  - Spacer [B]

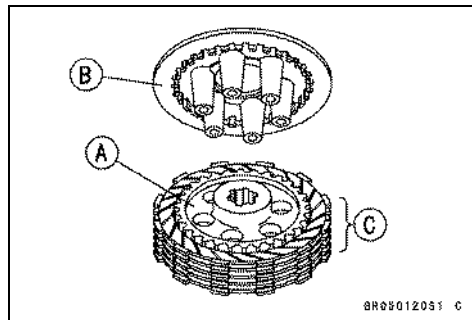


#### **Secondary Clutch Disassembly (KLX110C)**

- Remove the secondary clutch (see Clutch Removal).
- Unscrew the clutch spring bolts [A] and take off the spring plate [B] and springs [C].

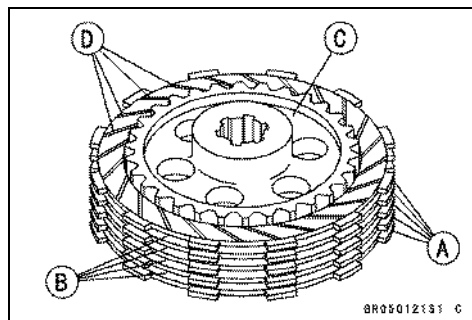


- Remove the clutch hub [A] and clutch wheel [B].
- Remove the secondary clutch plates [C].



#### **Secondary Clutch Assembly (KLX110C)**

- Install the friction plates [A] and steel plates [B] on the secondary clutch hub [C], starting with a friction plate and alternating them.
- The grooves [D] on the friction plate surfaces are cut tangentially and radially. Install the friction plates so that the grooves run toward the center in the direction of the clutch housing rotation (counterclockwise viewed from the engine right side).

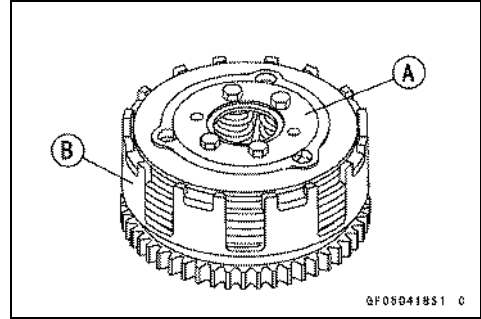


#### **NOTICE**

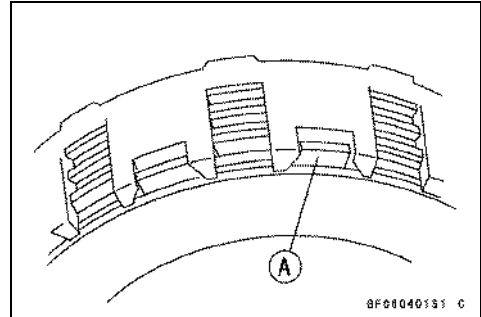
If new dry steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

**Clutch**

- Install the clutch wheel on the clutch hub.
- Install the clutch spring plate [A] with the springs and spring bolts temporarily and fit the clutch hub and plate assembly into the clutch housing [B].

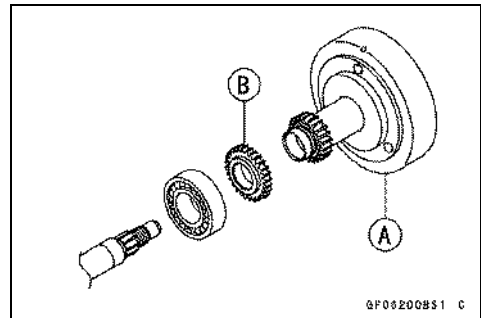


- Install the last friction plate [A] fitting the tangs in the grooves on the housing as shown.
- Tighten:
  - Torque - Secondary Clutch Spring Bolts: 5.0 N-m (0.51 kgf-m, 44 in-lb)**

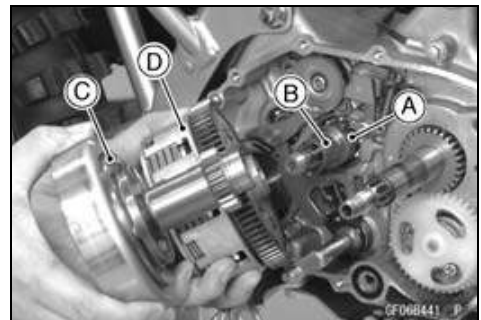


**Clutch Installation (KLX110C)**

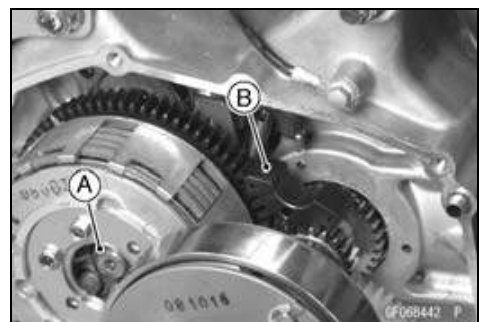
- ★ If the primary clutch housing is disassembled, assemble it as follows.
  - Install the gear [B] to the primary clutch housing [A].
  - Fit the tooth form of the gears, and press the holder to the clutch housing.
- Install the clutch housing.



- Apply engine oil to the collar.
- Install:
  - Spacer [A]
  - Collar [B]
- Insert the primary [C] and secondary clutch [D] together.
- Hard to install the secondary clutch, turn the drive shaft while pushing the clutch.



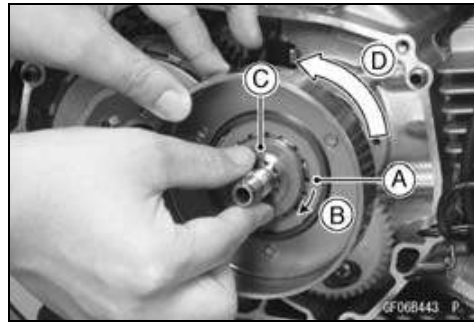
- Tighten the secondary clutch nut [A], while holding the gear holder [B].
  - Torque - Secondary Clutch Hub Nut: 72 N-m (7.3 kgf-m, 53 ft-lb)**
  - Special Tool - Gear Holder: 57001-1602**



## 5-16 CLUTCH

### Clutch

- ★ If the one-way clutch and race dropped from the primary clutch housing, install it as follows.
- Put the one-way clutch [A] in the clutch housing halfway with the rotation mark [B] facing out.
- Fit the race [C] into the one-way clutch with the machining unevenness side facing outside. Push the race in the clutch housing while turning the clutch housing counter-clockwise [D].

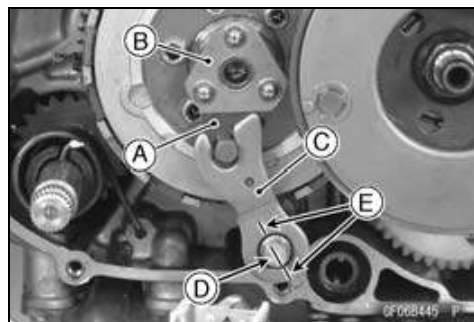
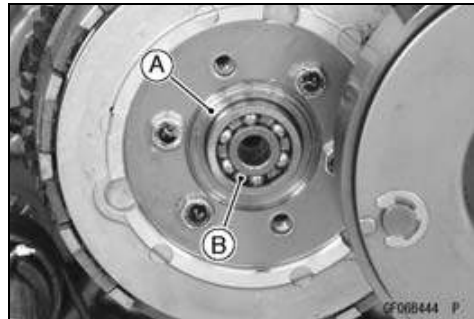


- Install the clutch hub.
- Tighten the primary clutch hub nut, while holding the primary clutch steady with the clutch holder.

**Special Tool - Clutch Holder 1: 57001-1507**

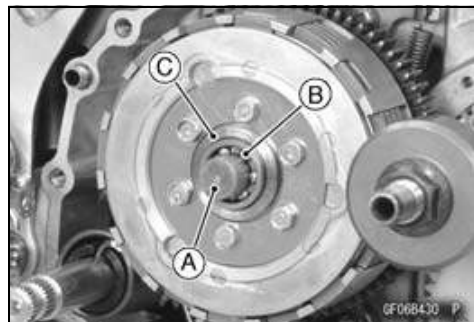
**Torque - Primary Clutch Hub Nut: 72 N·m (7.3 kgf·m, 53 ft·lb)**

- Install the ball bearing holder [A] and ball bearing [B].
- Apply high-temperature grease to the release ball assembly.
- Install the release cam [A] and release ball assembly [B].
- Install the release lever [C] to the shift shaft, with shift shaft line [D] aligning to release lever line [E].
- Install the clutch cover (see Clutch Cover Installation).
- Adjust the clutch (see Clutch Release Adjustment in the Periodic Maintenance chapter).



### **Clutch Removal (KLX110D)**

- Remove the clutch cover (see Clutch Cover Removal).
- Remove:
  - Clutch Pusher [A]
  - Ball Bearing [B]
  - Ball Bearing Holder [C]



## Clutch

- Loosen the clutch hub nut while holding the clutch steady with the gear holder.

**Special Tool - Gear Holder: 57001-1602**

### NOTE

○ If the clutch hub nut is difficult to loosen using a gear holder (57001-1602), use the clutch holder 2 (57001-1508).

- Loosen the clutch hub nut [A], while holding the clutch steady with the clutch holder [B].
- Search the positions of three notches of clutch holder, which can be aligned.
- Remove two clutch spring bolts [C] inserted into the two holes of clutch holder when searching.
- Set a clutch holder.

**Special Tool - Clutch Holder 2: 57001-1508**

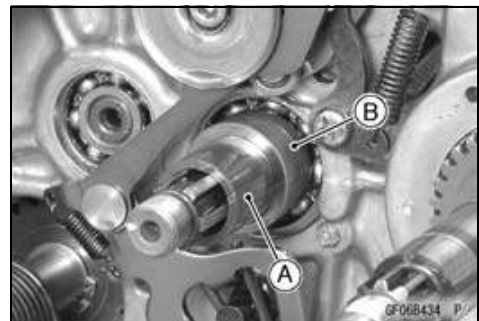
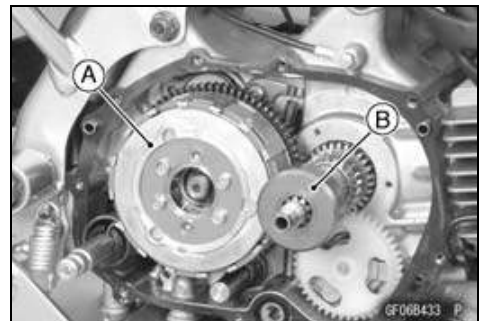
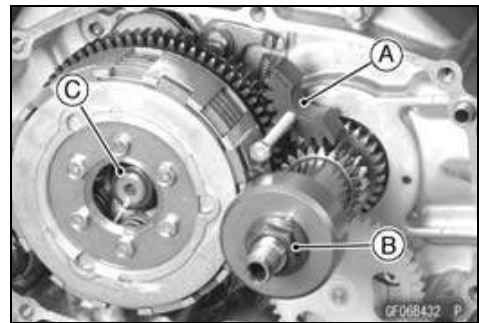
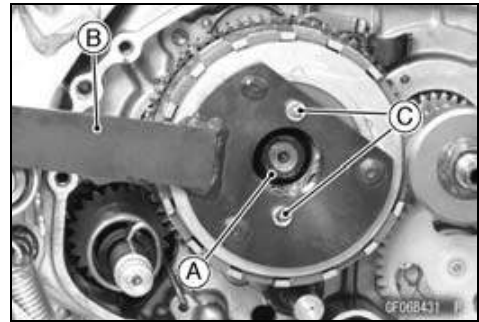
- Using the gear holder [A] to prevent the clutch from rotating.

**Special Tool - Gear Holder: 57001-1602**

- Remove:
  - Primary Gear Nut [B]
  - Clutch Hub Nut [C]

- Remove the clutch hub [A] and primary gear [B] together.

- Remove:
  - Collar [A]
  - Spacer [B]

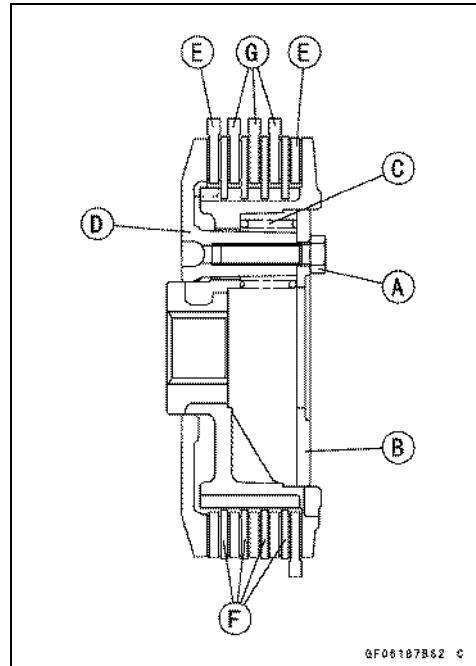


## 5-18 CLUTCH

### Clutch

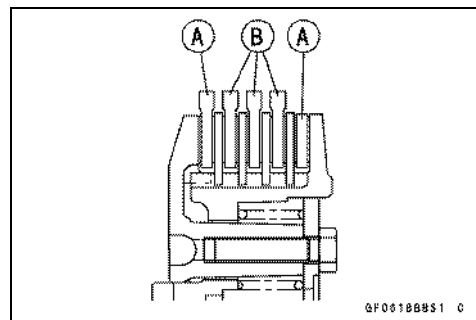
#### Clutch Hub Disassembly (KLX110D)

- Separate the clutch hub assembly from the clutch housing.
- Remove:
  - Clutch Spring Bolts [A]
  - Clutch Spring Plate [B]
  - Clutch Springs [C]
  - Clutch Holder [D]
  - Friction Plates [E]
  - Steel Plates [F]
  - Friction Plates [G]



#### Clutch Hub Assembly (KLX110D)

- Clutch hub assembly is the reverse of disassembly.
- The friction plates [A] are different from the other plates [B]. These plates are installed to both end of the all plates.



- Install the clutch spring plate and then tighten the clutch spring bolts to specified torque.

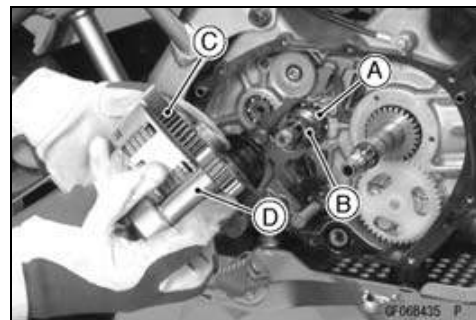
**Torque - Clutch Spring Bolts: 5.0 N·m (0.51 kgf·m, 44 in·lb)**

#### NOTICE

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

#### Clutch Installation (KLX110D)

- Apply molybdenum disulfide oil to the drive shaft and collar.
- Install:
  - Spacer [A]
  - Collar [B]
- Install the clutch hub [C] and primary gear [D] together.
- Hard to install the clutch hub, turn the drive shaft while pushing the clutch.





## Clutch

- Tighten the clutch hub nut while holding the clutch steady with the gear holder.

**Special Tool - Gear Holder: 57001-1602**

### NOTE

○ If the clutch hub nut is difficult to tighten using a gear holder (57001-1602), use the clutch holder 2 (57001-1508).

- Tighten the clutch hub nut, while holding the clutch steady with the clutch holder.

**Special Tool - Clutch Holder 2: 57001-1508**

**Torque - Clutch Hub Nut: 72 N·m (7.3 kgf·m, 53 ft·lb)**

- Tighten two clutch spring bolts holding the clutch housing with hand.

**Torque - Clutch Spring Bolts: 5.0 N·m (0.51 kgf·m, 44 in·lb)**

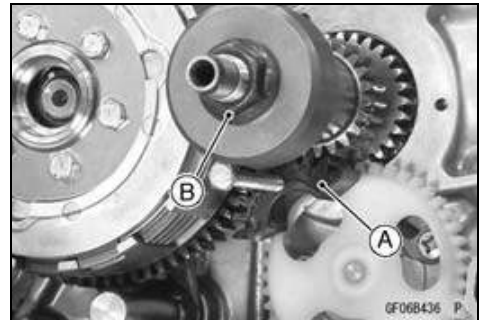
- Use the gear holder [A] to prevent the clutch from rotating.

**Special Tool - Gear Holder: 57001-1602**

- Tighten the primary gear nut [B].

**Torque - Primary Gear Nut: 72 N·m (7.3 kgf·m, 53 ft·lb)**

- Install other removed parts.



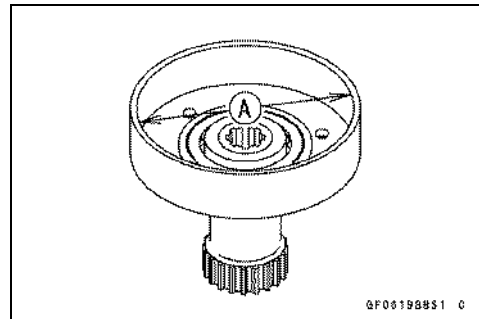
### Primary Clutch Housing Wear Inspection (KLX110C)

- Measure the inside diameter [A] of the clutch housing sliding surface.
- Use a vernier caliper and measure at several points as shown.
- ★ If any measurement is greater than the service limit, replace the primary clutch housing.

#### Primary Clutch Housing Inside Diameter

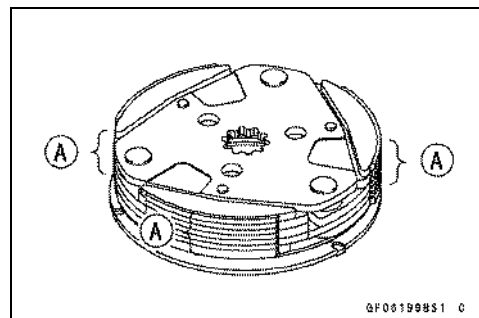
**Standard: 104.0 ~ 104.2 mm (4.094 ~ 4.102 in.)**

**Service Limit: 104.5 mm (4.114 in.)**



### Primary Clutch Shoe Lining Wear Inspection (KLX110C)

- Remove the primary clutch hub (see Clutch Removal).
- Visually inspect the primary clutch shoe linings [A] for uneven wear, discoloration, missing friction material, cracks or other damage.
- ★ If any of the linings are damaged, replace the primary clutch hub.



## 5-20 CLUTCH

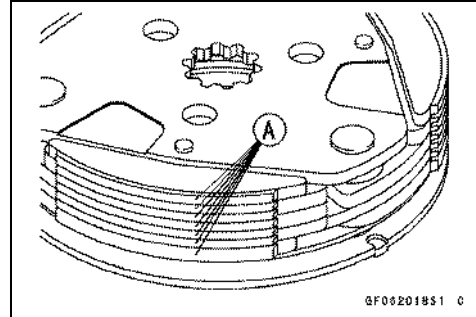
### Clutch

- Measure the groove depth [A].
- Use a depth gauge, and measure at several points as shown.
- ★ If any measurement is less than the service limit, replace the primary clutch hub.

#### Primary Clutch Shoe Groove Depth

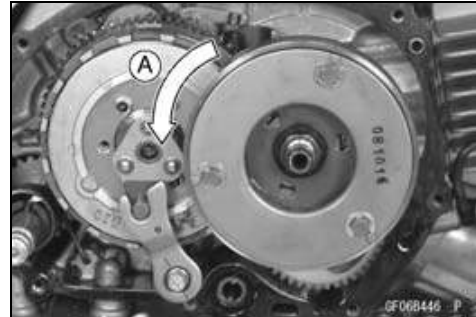
**Standard:** 1.0 mm (0.04 in.)

**Service Limit:** 0.5 mm (0.02 in.)

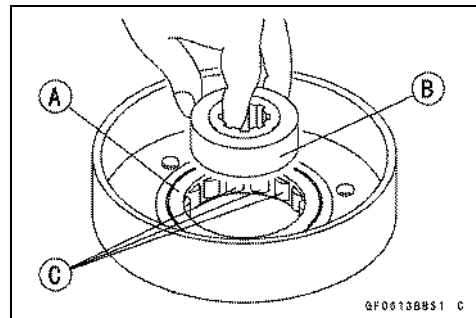


#### One-Way Clutch Inspection (KLX110C)

- Remove the clutch cover.
- Turn the primary clutch housing by hand. When view from the right side of the engine, the primary clutch housing should turn counterclockwise freely [A] but should not turn clockwise.



- ★ If the one-way clutch does not operate as it should or if it makes noise, go to the next steps.
- Remove the primary clutch.
- Check that the one-way clutch is installed so that the rotation mark faces out.
- Visually inspect the one-way clutch [A] and the race [B] in the primary clutch housing.
- ★ If there is any worn or damaged part, replace it.
- Check that the rollers [C] in the one-way clutch is installed when viewed from the right side of the engine.



#### Friction and Steel Plate Damage, Wear Inspection

- Refer to Friction and Steel Plates Inspection in the Periodic Maintenance chapter.

#### Friction and Steel Plate Warp Inspection

- Refer to Friction and Steel Plates Inspection in the Periodic Maintenance chapter.

#### Clutch Spring Free Length Measurement

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

#### Clutch Spring Free Length

##### Standard:

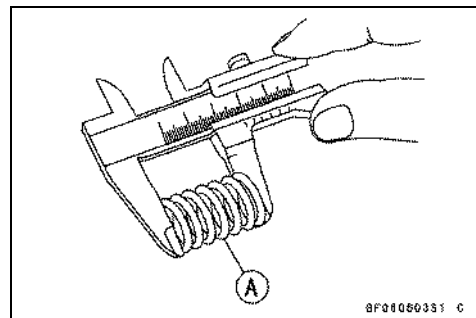
**KLX110C Models** 19.10 mm (0.752 in.)

**KLX110D Models** 22.04 mm (0.868 in.)

##### Service Limit:

**KLX110C Models** 18.0 mm (0.709 in.)

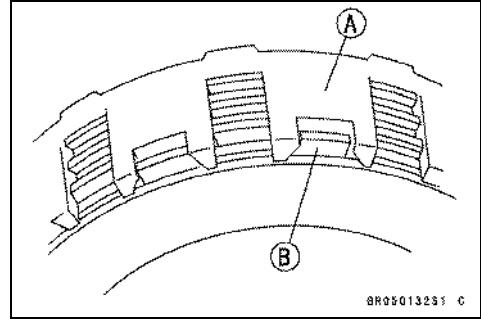
**KLX110D Models** 20.4 mm (0.803 in.)



## Clutch

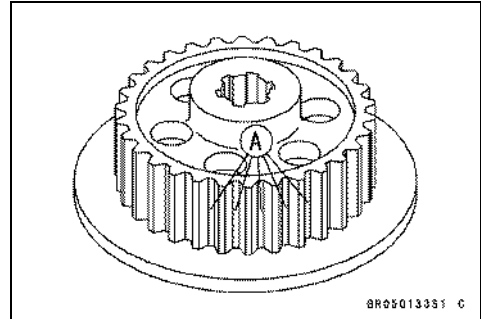
### **Clutch Housing Finger Damage Inspection**

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



### **Clutch Hub Spline Damage Inspection**

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



### **Clutch Adjustment (KLX110C)**

- Refer to the Clutch Release Adjustment in the Periodic Maintenance chapter.



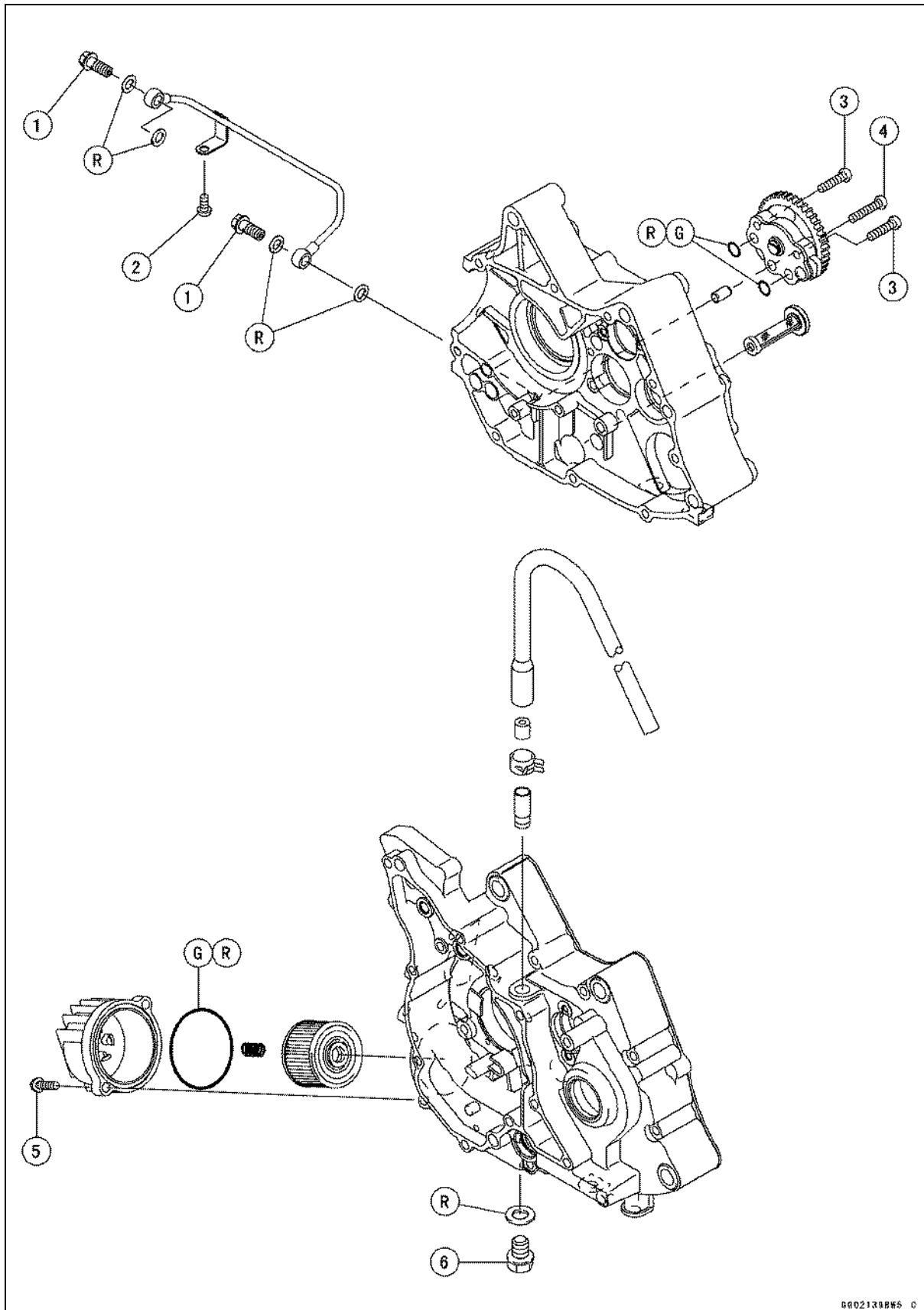
# Engine Lubrication System

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# 6-2 ENGINE LUBRICATION SYSTEM

## Exploded View



00021388W5 C

## ENGINE LUBRICATION SYSTEM 6-3

### Exploded View

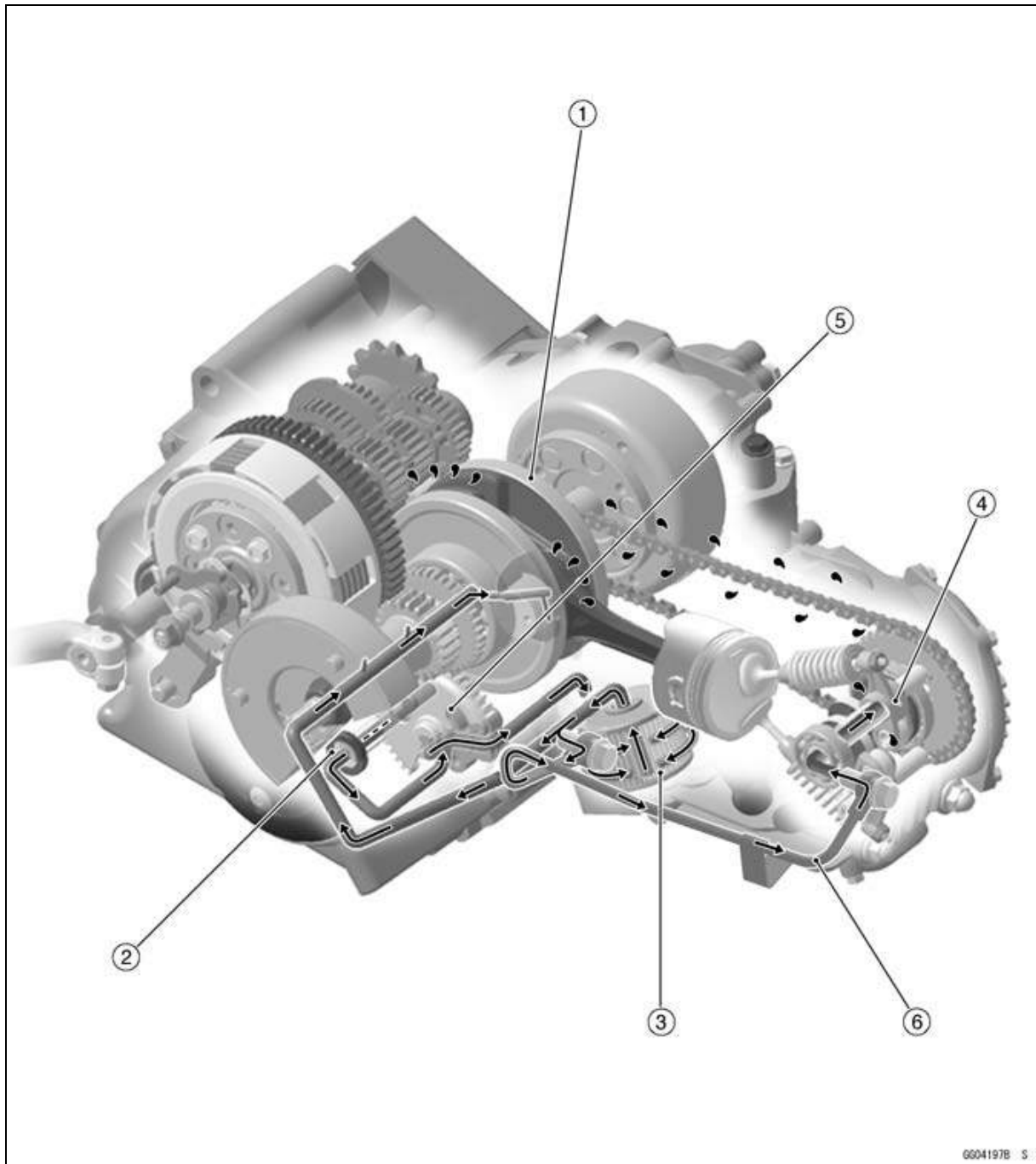
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Pipe Banjo Bolts	15	1.5	11	
2	Oil Pipe Clamp Screw	5.2	0.53	46 in·lb	
3	Oil Pump Mounting Screws (L = 25)	5.2	0.53	46 in·lb	
4	Oil Pump Mounting Screw (L = 30)	5.2	0.53	46 in·lb	
5	Oil Filter Cap Bolts	5.2	0.53	46 in·lb	
6	Engine Oil Drain Plug	29	3.0	21	

G: Apply grease.

R: Replacement Parts

## 6-4 ENGINE LUBRICATION SYSTEM

### Engine Oil Flow Chart



1. Crankshaft
2. Oil Screen
3. Oil Filter
4. Camshaft
5. Oil Pump
6. Oil Pipe



## ENGINE LUBRICATION SYSTEM 6-5

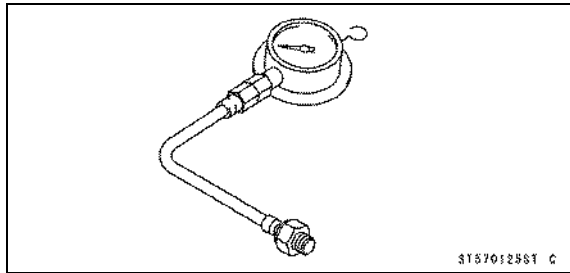
### Specifications

Item	Standard
<b>Engine Oil</b> Type Viscosity Capacity  Level	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 SAE 10W-40 0.9 L (1.0 US qt) (when filter is not removed) 1.0 L (1.1 US qt) (when filter is removed) 1.1 L (1.2 US qt) (when engine is completely dry) Between upper and lower level lines
<b>Oil Pressure Measurement</b> Oil pressure	88 ~ 147 kPa (0.9 ~ 1.5 kgf/cm <sup>2</sup> , 13 ~ 21 psi) at 4 000 r/min (rpm), Oil Temperature 50°C (122°F)

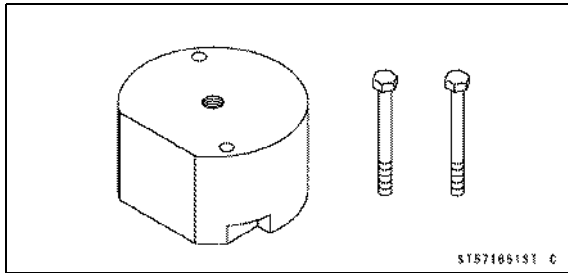
## 6-6 ENGINE LUBRICATION SYSTEM

### Special Tools

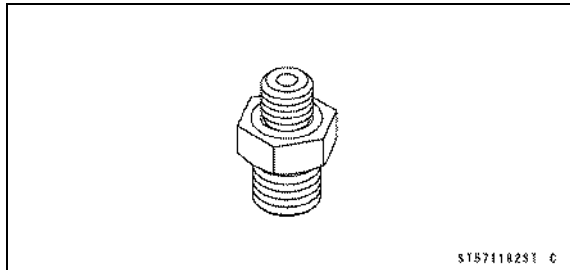
Oil Pressure Gauge, 5 kgf/cm<sup>2</sup>:  
57001-125



Oil Pressure Cap:  
57001-1651



Oil Pressure Gauge Adapter, M10 × 1.25:  
57001-1182



## Engine Oil and Oil Filter

### **⚠ WARNING**

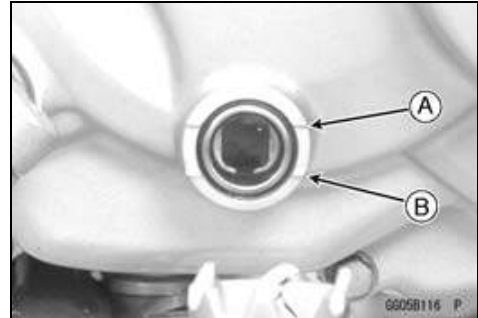
Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

### **Oil Level Inspection**

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

#### **NOTE**

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



### **NOTICE**

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

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

#### **NOTE**

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

### **Engine Oil Change**

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

### **Oil Filter Change**

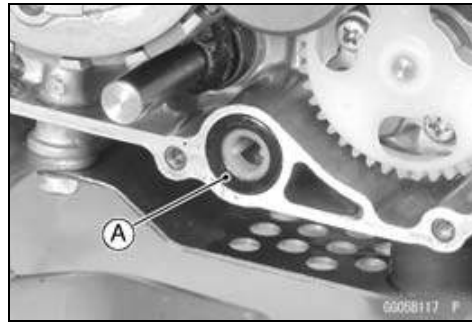
- Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

## 6-8 ENGINE LUBRICATION SYSTEM

### Engine Oil and Oil Filter

#### Oil Screen Cleaning

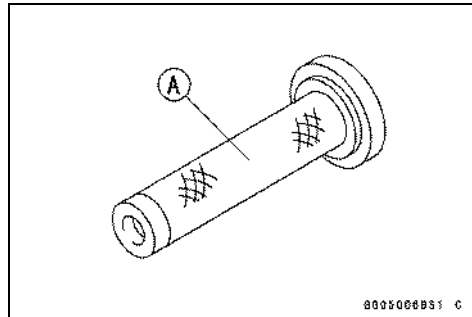
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  - Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
  - Oil Screen [A]



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

#### **⚠ WARNING**

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



#### **NOTE**

- *While cleaning the screen, check for any metal particles that might indicate internal engine damage.*
- Inspect the screen carefully for net tearing or other damages.
- ★ If the screen is damaged, replace it with a new one.
- Install:
  - Oil Screen
  - Clutch Cover (see Clutch Cover Installation in the Clutch chapter)

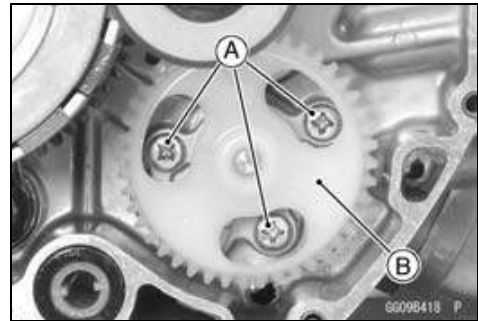
## Oil Pump

### Oil Pump Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the clutch cover (see Clutch Cover Removal in the Clutch chapter).

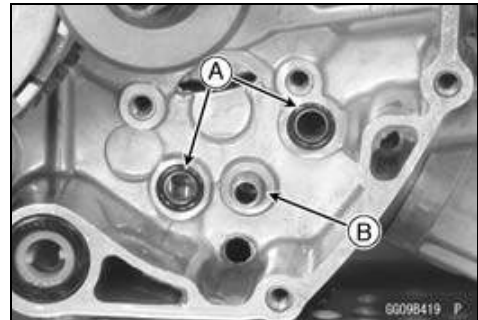
### KLX110C Models

- Remove the clutch (see Clutch Removal (KLX110C) in the Clutch chapter).
- Remove the mounting screws [A] and remove the oil pump assembly [B].
- Turn the pump gear so that the pump mounting screws can be removed through the pump gear holes.



### Oil Pump Installation

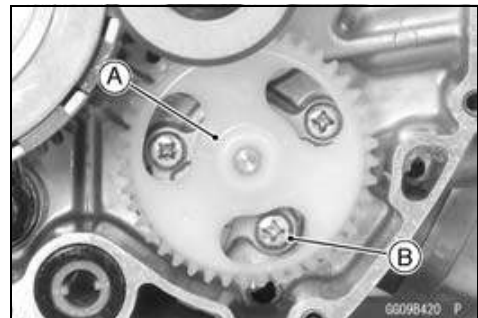
- Replace the O-rings [A] with new ones.
- Apply grease to the O-rings.
- Install the dowel pin [B].



- Install the oil pump assembly [A] and screws.
- The lower screw [B] is longer than the other ones.

**Torque - Oil Pump Mounting Screws: 5.2 N-m (0.53 kgf-m, 46 in-lb)**

- Install the clutch cover (see Clutch Cover Installation in the Clutch chapter).

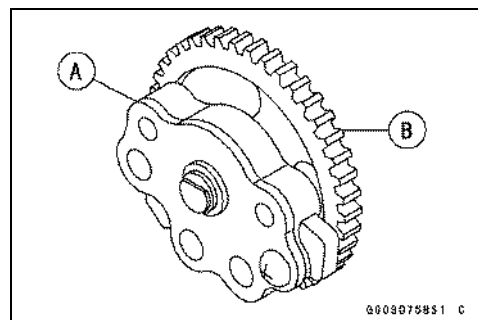


### Oil Pump Inspection

- Visually inspect the oil pump body [A] and the gear [B].
- ★ If there is any damage or uneven wear, replace the oil pump assembly.
- Turn the gear by hand to inspect the condition of the oil pump.
- ★ If the rotation of the pump is noisy, dose not turn smoothly or has any rough spots, replace the oil pump assembly.

### NOTICE

**Do not disassemble the oil pump, because the individual parts of pump are not supplied.**

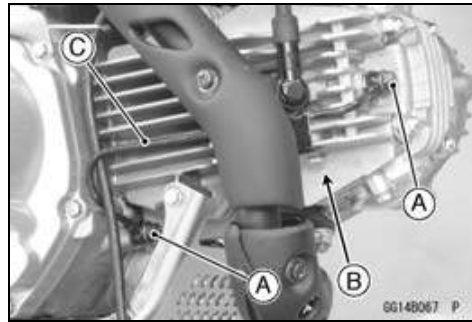


## 6-10 ENGINE LUBRICATION SYSTEM

### Oil Pipe

#### **Oil Pipe Removal**

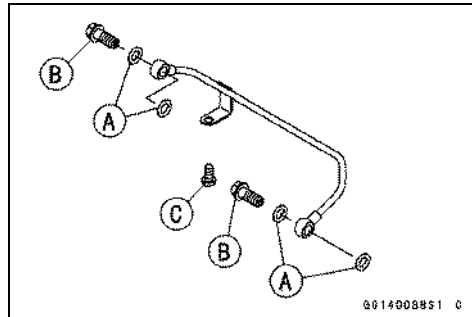
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  - Banjo Bolts [A]
  - Oil Pipe Clamp Screw [B]
  - Oil Pipe [C]



#### **Oil Pipe Installation**

- Before installation, flush out the pipe with a high flash-point solvent.
- Discard the used copper washers and install new washers [A] on each side of the pipe fittings.
- Lightly tighten the banjo bolts and oil pipe clamp screw to a snug fit, and tighten them to the specified torque.

**Torque - Oil Pipe Banjo Bolts [B]: 15 N·m (1.5 kgf·m, 11 ft·lb)**  
**Oil Pipe Clamp Screw [C]: 5.2 N·m (0.53 kgf·m, 46 in·lb)**

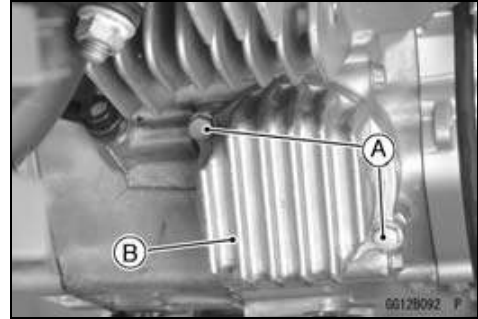


## Oil Pressure

### Oil Pressure Measurement

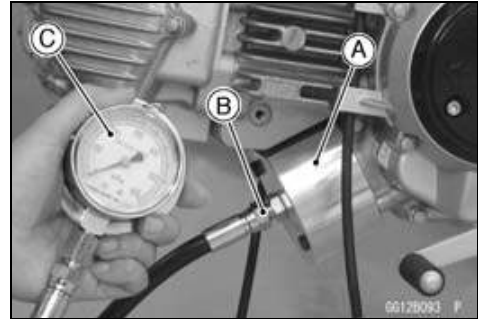
- Remove the engine guard (see Engine Guard Removal/Installation in the Frame chapter).
- Remove the bolts [A] and oil filter cap [B].
- Move the spring and the O-ring of the oil filter cap to the oil pressure cap.

**Special Tool - Oil Pressure Cap: 57001-1651**



- Attach the oil pressure cap [A], the oil pressure gauge adapter [B] and the oil pressure gauge [C].

**Special Tools - Oil Pressure Gauge, 5 kgf/cm<sup>2</sup>: 57001-125**  
**Oil Pressure Gauge Adapter, M10 x 1.25: 57001-1182**  
**Oil Pressure Cap: 57001-1651**



- Start the engine and warm up the engine thoroughly.
- Run the engine at the specified speed, and read the oil pressure value.
- ★ If the oil pressure is much lower than the standard, check the oil pump, and crankshaft oil seal of the clutch cover.
- ★ If the value is much higher than the standard, check the oil pump screen and the oil filter first, and oil passages for dirt or clogging.

### Oil Pressure

**Standard: 88 ~ 147 kPa (0.9 ~ 1.5 kgf/cm<sup>2</sup>, 13 ~ 21 psi) at 4 000 r/min (rpm), Oil Temperature 50°C (122°F)**

- Stop the engine, and remove the oil pressure cap, gauge and adapter.

### **⚠ WARNING**

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

- Install the oil filter cap (see Oil Filter Replacement in the Periodic Maintenance chapter).





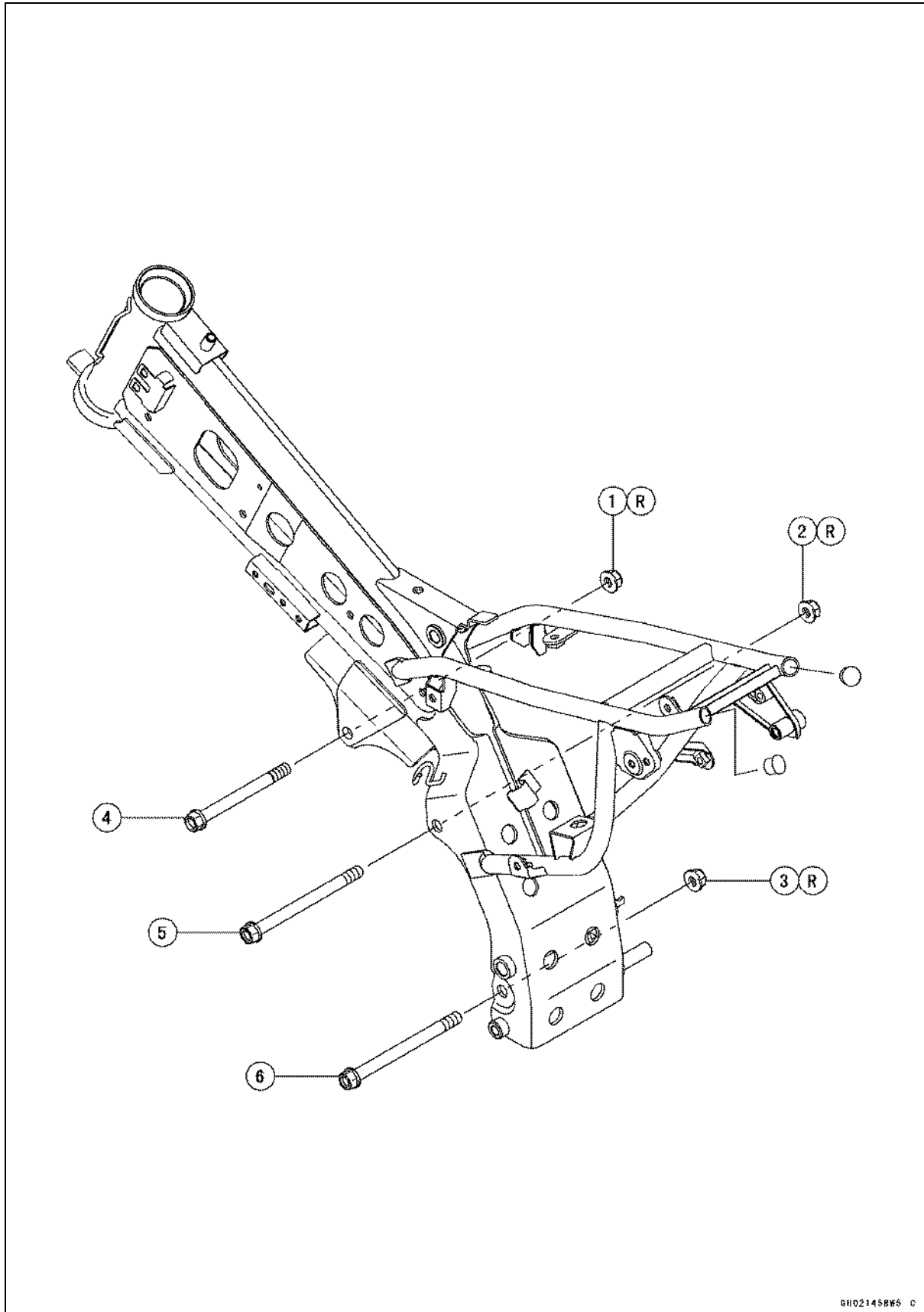
# Engine Removal/Installation

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# 7-2 ENGINE REMOVAL/INSTALLATION

## Exploded View



## ENGINE REMOVAL/INSTALLATION 7-3

### Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Engine Mounting Nut	54	5.5	40	R
2	Middle Engine Mounting Nut	54	5.5	40	R
3	Lower Engine Mounting Nut	54	5.5	40	R

4. Upper Engine Mounting Bolt (L = 105)

5. Middle Engine Mounting Bolt (L = 125)

6. Lower Engine Mounting Bolt (L = 125)

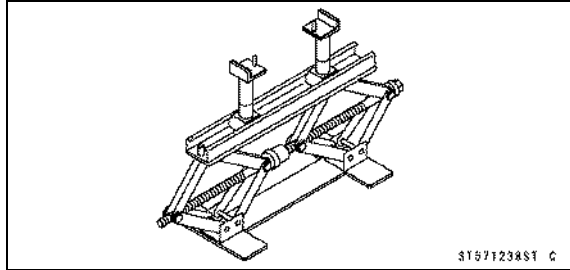
R: Replacement Parts

## 7-4 ENGINE REMOVAL/INSTALLATION

### Special Tool

---

Jack:  
57001-1238



## Engine Removal/Installation

### Engine Removal

- Squeeze the brake lever slowly and hold it with a band [A].

#### **⚠ WARNING**

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

#### **NOTICE**

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

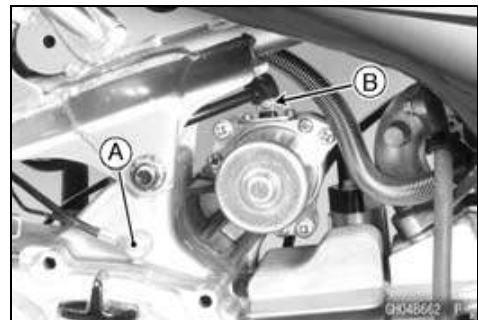
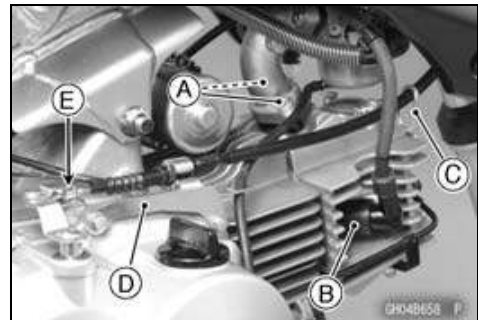
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  - Side Covers (see Side Cover Removal in the Frame chapter)
  - Engine Guard (see Engine Guard Removal/Installation in the Frame chapter)
  - Muffler (see Muffler Removal in the Engine Top End chapter)
  - Shift Pedal (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
  - Kick Pedal (see Kick Pedal Removal in the Crankshaft/Transmission chapter)
  - Battery Negative (-) Cable (see Battery Removal in the Electrical System chapter)

- Remove:
  - Intake Pipe Bolts [A]
  - Insulator
  - Spark Plug Cap [B]

#### **KLX110D Models**

- Remove:
  - Clamp [C]
  - Clutch Cable Holder [D]
  - Clutch Cable Lower End [E]

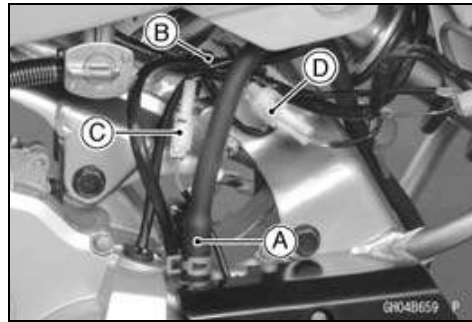
- Remove:
  - Engine Ground Lead Terminal [A]
  - Starter Motor Cable [B]



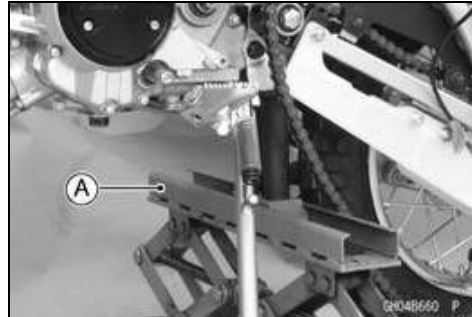
## 7-6 ENGINE REMOVAL/INSTALLATION

### Engine Removal/Installation

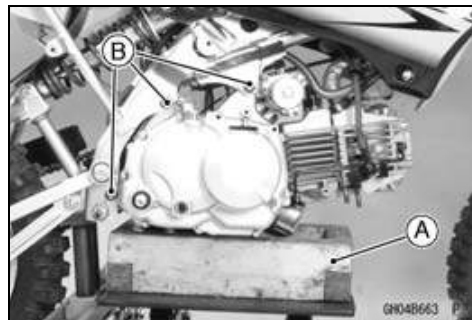
- Remove the breather tube [A].
- Free the leads from the clamp [B].
- Disconnect:
  - Gear Position Switch Lead Connector [C]
  - Alternator Lead Connector [D]
- Remove the engine sprocket (see Engine Sprocket Removal in the Final Drive chapter).



- Support the rear part of the frame on the jack.
  - Special Tool - Jack [A]: 57001-1238**
- Remove the footpeg bracket (see Footpeg Bracket Removal in the Frame chapter).
- Remove the brake pedal (see Brake Pedal and Rod Removal in the Brakes chapter).



- Support the engine with a suitable stand [A].
- Remove the engine mounting nuts [B] and bolts, and dismount the engine.



### Engine Installation

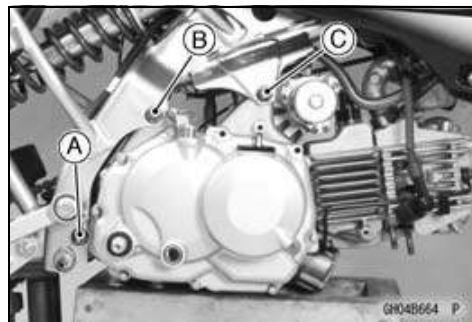
- Support the engine with a suitable stand and set it at the correct position.
- Install the lower [A], middle [B] and upper [C] engine mounting bolts from left side of the engine.
- Replace the engine mounting nuts with new ones.
- Tighten the engine mounting nuts following the tightening sequence.

**Torque - Lower Engine Mounting Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)**

**Middle Engine Mounting Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)**

**Upper Engine Mounting Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)**

- Install the removed parts (see appropriate chapters).
- Run the cables, hoses and leads according to the Cable, Wire and Hose Routing section in the Appendix chapter.
- Fill the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Adjust the drive chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).



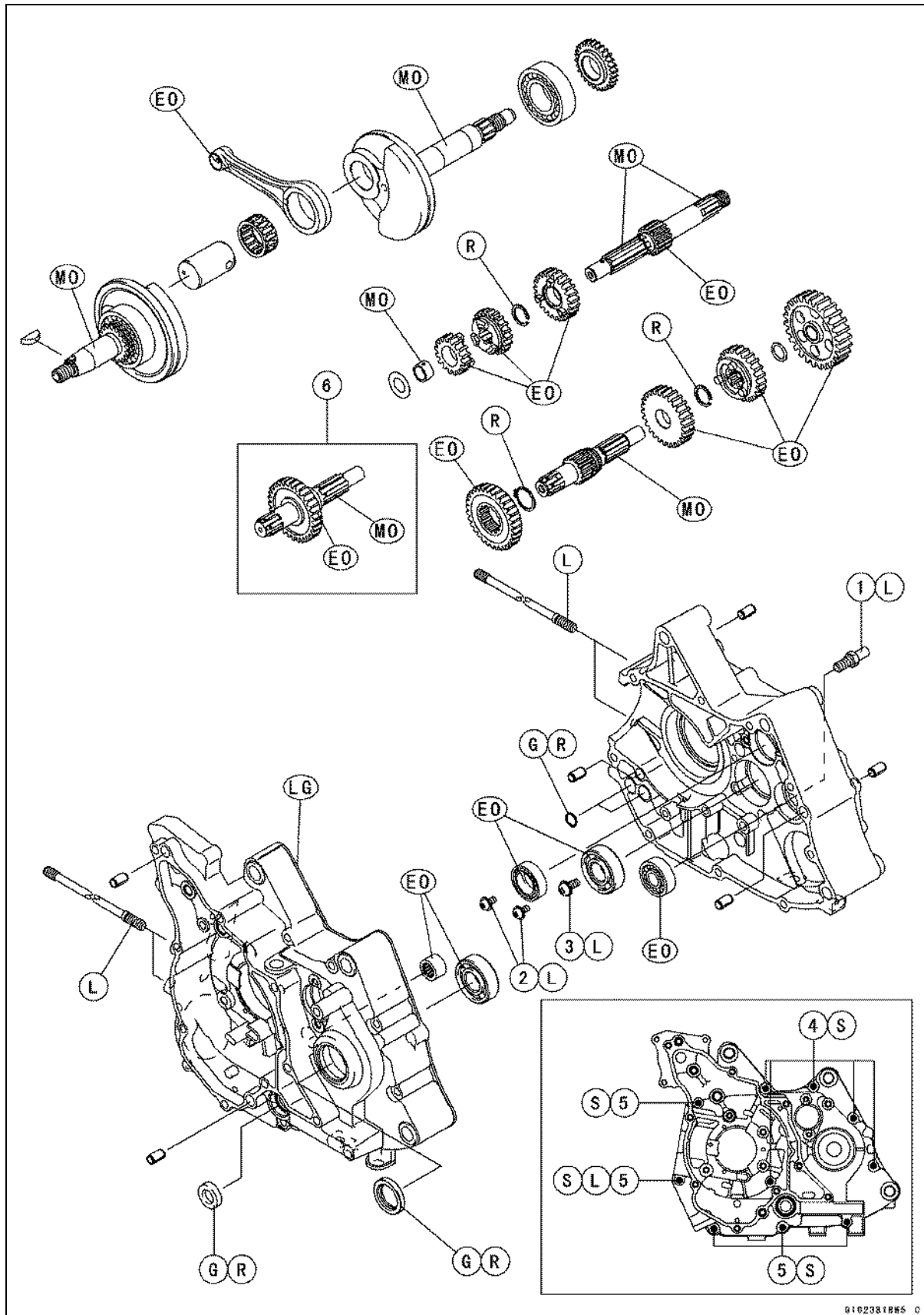
# Crankshaft/Transmission

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# 8-2 CRANKSHAFT/TRANSMISSION

## Exploded View





**Exploded View**

No.	Fastener	Torque			Remarks
		N-m	kgf-m	ft-lb	
1	Shift Return Spring Pin (Bolt)	22	2.2	16	L
2	Shift Drum Bearing Retaining Screws	2.5	0.25	22 in-lb	L
3	Drive Shaft Bearing Retaining Screw	5.2	0.53	46 in-lb	L
4	Crankcase Bolts (L = 50)	9.8	1.0	87 in-lb	S
5	Crankcase Bolts (L = 75)	9.8	1.0	87 in-lb	S, L (1)

6. KLX110CA ~ CC, KLX110DA ~ DC

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket (Liquid Gasket, TB1215: 92104-1065).

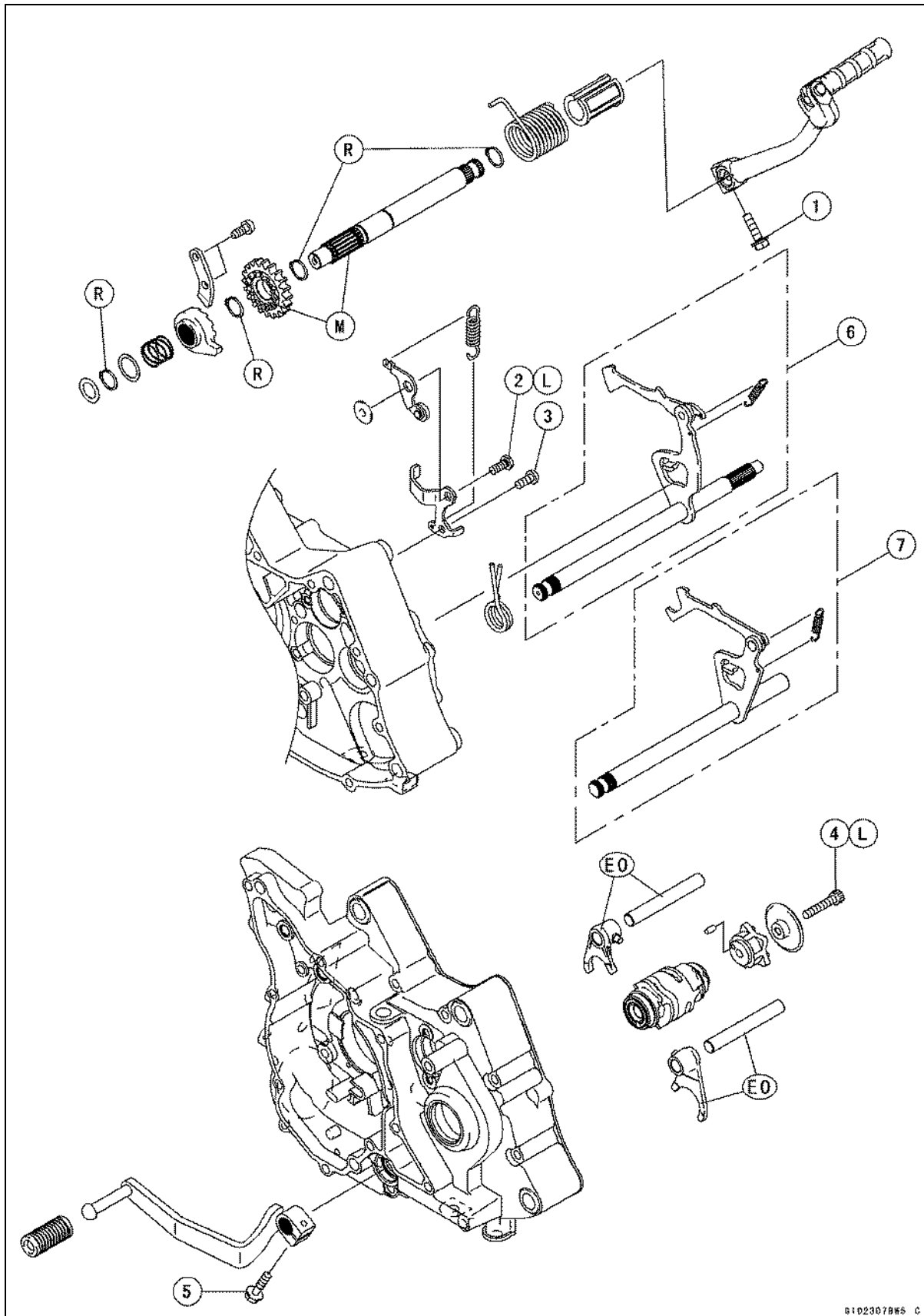
MO: Apply molybdenum disulfide oil (mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1).

R: Replacement Parts

S: Follow the specific tightening sequence.

# 8-4 CRANKSHAFT/TRANSMISSION

## Exploded View



## CRANKSHAFT/TRANSMISSION 8-5

### Exploded View

No.	Fastener	Torque			Remarks
		N-m	kgf-m	ft-lb	
1	Kick Pedal Bolt	8.8	0.90	78 in-lb	
2	Shift Drum Position Lever Pivot Bolt	5.2	0.53	46 in-lb	L
3	Shift Drum Position Plate Screw	5.2	0.53	46 in-lb	
4	Shift Drum Cam Bolt	5.2	0.53	46 in-lb	L
5	Shift Pedal Bolt	5.2	0.53	46 in-lb	

6. KLX110C Models

7. KLX110D Models

EO: Apply engine oil.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

R: Replacement Parts

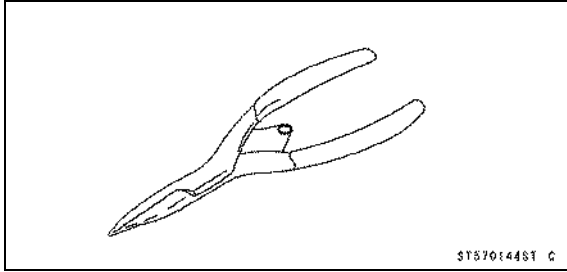
## 8-6 CRANKSHAFT/TRANSMISSION

### Specifications

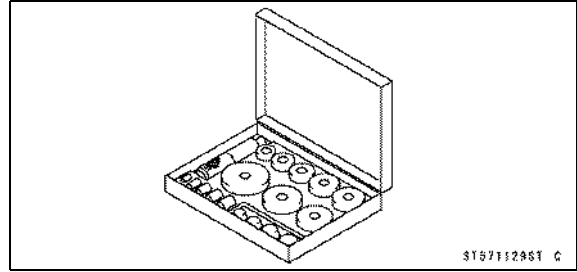
Item	Standard	Service Limit
<b>Crankshaft, Connecting Rods</b> Connecting Rod: Big End Radial Clearance Big End Side Clearance Crankshaft Runout	  0.005 ~ 0.025 mm (0.0002 ~ 0.0010 in.) 0.1 ~ 0.2 mm (0.004 ~ 0.008 in.) TIR 0.03 mm (0.001 in.) or less	  0.07 mm (0.0028 in.) 0.4 mm (0.016 in.) TIR 0.08 mm (0.003 in.)
<b>Transmission</b> Shift Fork Ear Thickness Gear Shift Fork Groove Width Shift Fork Guide Pin Diameter Shift Drum Groove Width	  3.9 ~ 4.0 mm (0.154 ~ 0.157 in.) 4.05 ~ 4.15 mm (0.159 ~ 0.163 in.) 4.9 ~ 5.0 mm (0.193 ~ 0.197 in.) 5.05 ~ 5.20 mm (0.199 ~ 0.205 in.)	  3.8 mm (0.150 in.) 4.3 mm (0.17 in.) 4.8 mm (0.189 in.) 5.3 mm (0.21 in.)
<b>Kick Shaft</b> Kick Shaft Diameter  Kick Gear Inside Diameter	 15.941 ~ 15.968 mm (0.62760 ~ 0.62866 in.)  16.000 ~ 16.018 mm (0.62992 ~ 0.63063 in.)	 15.91 mm (0.6264 in.)  16.04 mm (0.6315 in.)

## Special Tools & Sealant

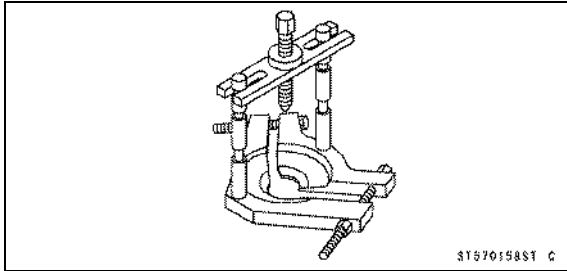
**Outside Circlip Pliers:**  
57001-144



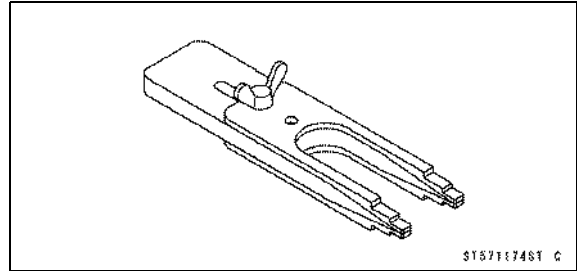
**Bearing Driver Set:**  
57001-1129



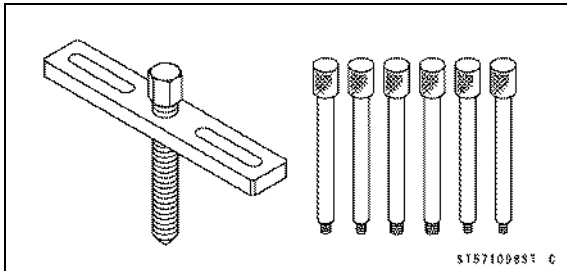
**Bearing Puller:**  
57001-158



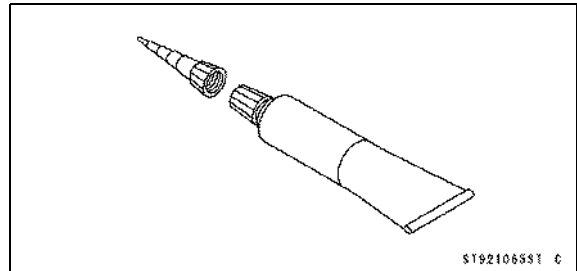
**Crankshaft Jig:**  
57001-1174



**Crankcase Splitting Tool Assembly:**  
57001-1098



**Liquid Gasket, TB1215:**  
92104-1065



## 8-8 CRANKSHAFT/TRANSMISSION

### Crankcase

#### **Crankcase Splitting**

- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
  - Cylinder Head (see Cylinder Head Removal in the Engine Top End chapter)
  - Cylinder (see Cylinder Removal in the Engine Top End chapter)
  - Piston (see Piston Removal in the Engine Top End chapter)
  - Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
  - Clutch (see Clutch Removal (KLX110C/D) in the Clutch chapter)
  - Kick Shaft (see Kick Shaft Removal)
  - Oil Filter and Oil Pump (see Oil Filter Replacement in the Periodic Maintenance chapter and Oil Pump Removal in the Engine Lubrication System chapter)
  - External Shift Mechanism (see External Shift Mechanism Removal)
  - Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  - Starter Motor (see Starter Motor Removal in the Electrical System chapter)
  - Gear Position Switch (see Gear Position Switch Removal in the Electrical System chapter)
  - Crankcase Bolts [A]

- Screw the crankcase splitting tool [A] into the left side of the crankcase [B]. Be certain to screw the adapters in all the way.

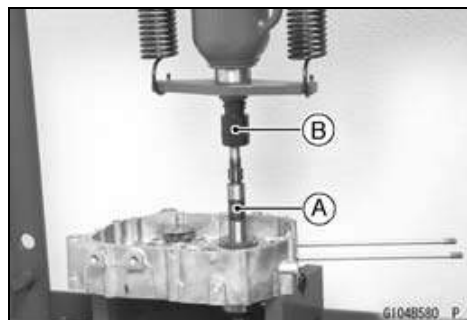
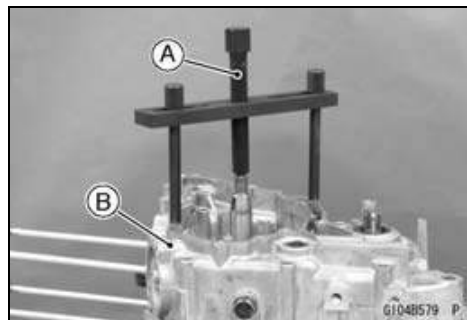
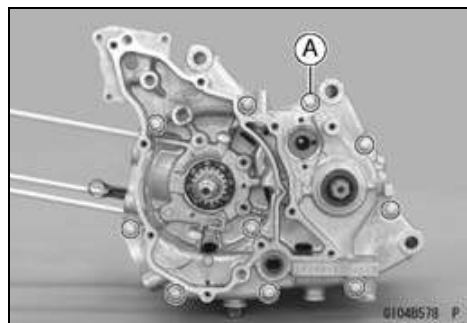
**Special Tool - Crankcase Splitting Tool Assembly: 57001-1098**

- Tighten the center bolt of the crankcase splitting tool to split the crankcase.
- Once the crankcase is split, remove the crankcase splitting tool and separate the crankcase halves.
- Remove the crankshaft [A] from the right crankcase half using a press [B].

#### **NOTICE**

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

- Press the bearing out of the crankcase half if the bearing remains on the crankcase half.



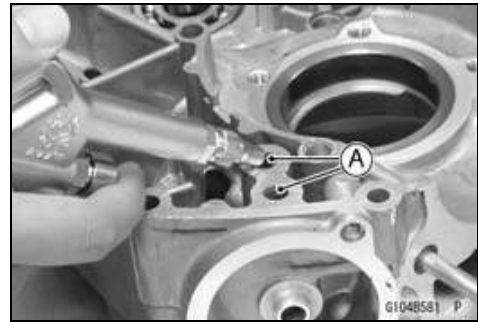
**Crankcase**

**Crankcase Assembly**

**NOTICE**

Right and left crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- Chip off the old gasket from the mating surfaces of the crankcase halves.
- Using compressed air, blow out the oil passages [A] in the crankcase halves and the crankshaft.
- With high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.



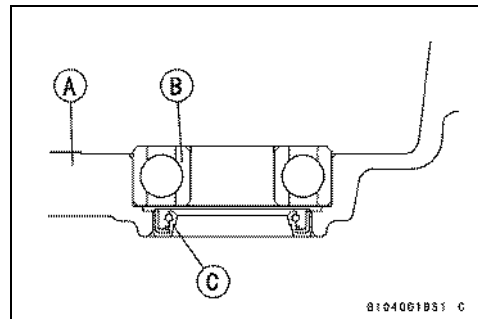
**WARNING**

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the engine parts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working areas. Do not use gasoline or low flash-point solvents to clean parts.

- Using a press and the bearing driver set, install new bearings until they bottoms out.
- Press the output shaft bearing [B] in the left crankcase half [A].

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

- Replace the oil seals [C] with new ones.
- Apply high-temperature grease to the lips of the oil seals.
- Press in the oil seals of the left crankcase half so that the seal surface is flush with the end of the hole.

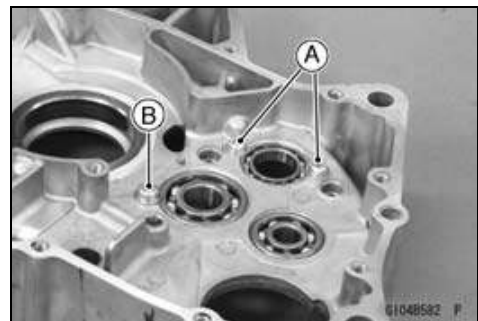


- Apply a non-permanent locking agent to the bearing retainer screws.
- Tighten the shift drum and drive shaft bearing retainer screws to the right crankcase.

**Torque - Shift Drum Bearing Retainer Screws [A]: 2.5 N-m (0.25 kgf-m, 22 in-lb)**

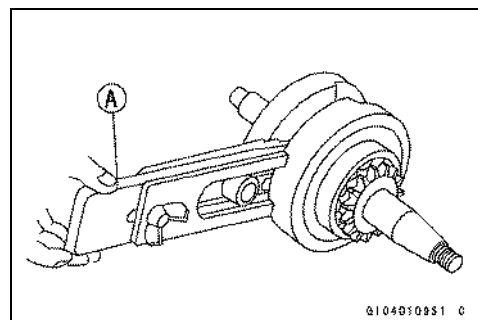
**Drive Shaft Bearing Retainer Screw [B]: 5.2 N-m (0.53 kgf-m, 46 in-lb)**

- Install the shift drum (see Shift Drum Installation).



- Insert the crankshaft jig [A] between the crankshaft flywheels opposite the connecting rod big end to protect flywheel alignment. This tool is easily adjustable to fit in any gap between the flywheel.

**Special Tool - Crankshaft Jig: 57001-1174**



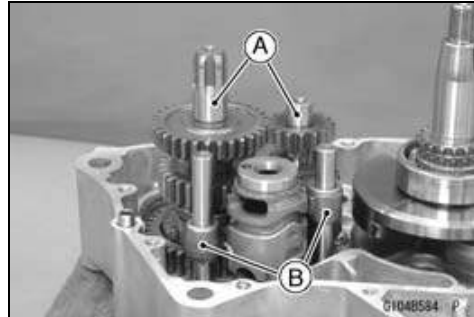
## 8-10 CRANKSHAFT/TRANSMISSION

### Crankcase

- Fit the crankshaft into the right crankcase half using a press [A].



- Install:
  - Transmission Shaft Assemblies [A]
  - Shift Forks [B]
- Check that the shift drum is in neutral position.

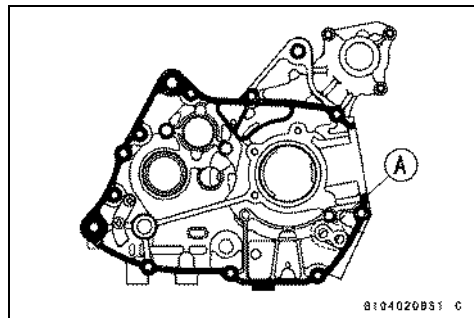


- Make sure that the mating surfaces of the crankcase halves are completely free of oil or contamination.
- Apply liquid gasket to the mating surface of the left crankcase half as shown.

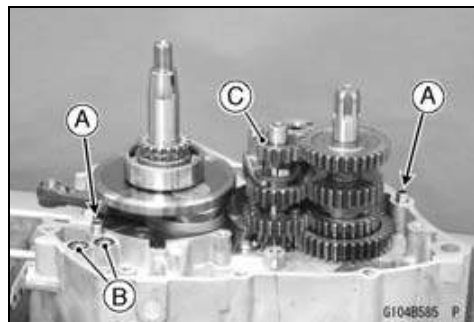
**Sealant - Liquid Gasket, TB1215: 92104-1065**

#### NOTE

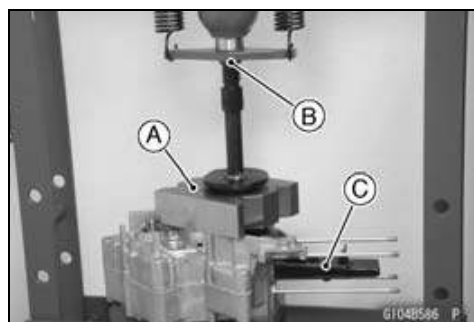
○ Do not apply liquid gasket to this area [A].



- Check that two dowel pins [A], O-rings [B] and drive shaft spacer [C] are in place.



- Using a suitable tool [A] on the left crankcase to press around the hole for the crankshaft, fit the crankcase halves together with a press [B] on the tool.
- Remove the crankshaft jig [C].





## Crankcase

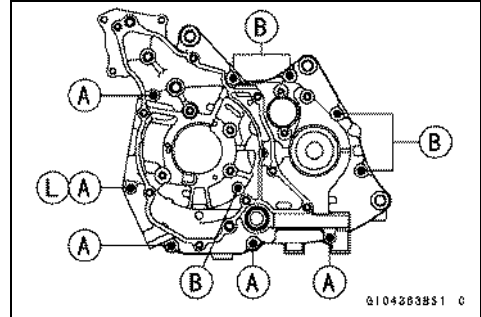
- Install the crankcase bolts in the left and right crankcase half and tighten them, starting with the nearest ones to the crankshaft, then farther ones.

Longer Bolts [A]

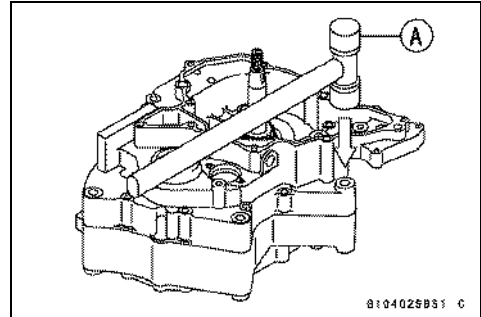
Shorter Bolts [B]

L: Apply a non-permanent locking agent.

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



- Check to see that the crankshaft, and out put shaft all turn freely.
- ★ If the crankshaft will not turn, it is probably not centered. Tap the mount portion of the crankcase with a plastic hammer [A] to reposition it. If it does not free up, split the crankcase again and find the cause.
- ★ Spinning the output shaft, shift the transmission through all the gears to make certain there is not binding and that all the gears shift properly.
- Clean the cylinder and oil filter cap of the mating surface and wipe off the liquid gasket forced out.
- Install the removed parts.



## 8-12 CRANKSHAFT/TRANSMISSION

### Crankshaft, Connecting Rod

#### Crankshaft Disassembly

##### NOTICE

Since assembly of the crankshaft demands exacting tolerance, the disassembly and reassembly of the crankshaft should only be performed by experienced mechanics with the necessary tools and equipment. The crankpin, connecting rod, and right crankshaft are available separately as spare parts, however it is recommended that the crankshaft assembly be replaced rather than attempting to replace the components.

- If it should be necessary to disassemble the crankshaft, follow the following procedures.
- Remove the oil pump drive gear and bearing, using the bearing puller.

**Special Tool - Bearing Puller: 57001-158**

- Use a press to remove the crankpin.
- Removal of the crankpin separates the flywheels, connecting rod, big end needle bearing, and crankpin.

#### Crankshaft Assembly

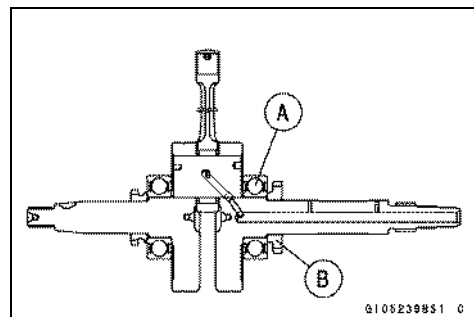
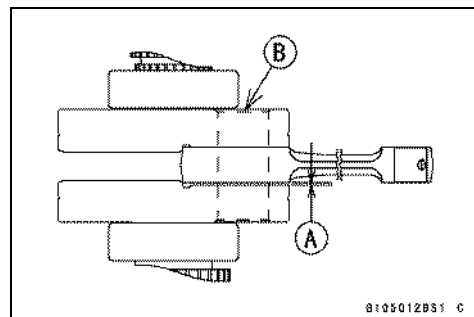
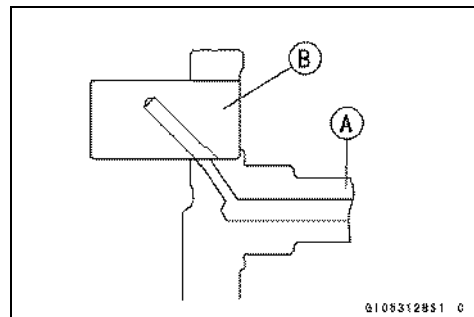
- Carefully align the oil passage hole in the right flywheel [A] with the one in the crankpin [B] at rebuilding of the crankshaft as shown.

- Apply engine oil to the big end bearing.
- Press the crank halves onto the crankpin, noting the crankpin direction until connecting rod side clearance is within specification as shown.

Side Clearance [A]: 0.1 ~ 0.2 mm (0.004 ~ 0.008 in.)

Crankpin Depth [B]: 0.8 ~ 1.2 mm (0.0315 ~ 0.0472 in.)

- Press the bearing [A] and oil pump drive gear [B] until they bottom out.



## Crankshaft, Connecting Rod

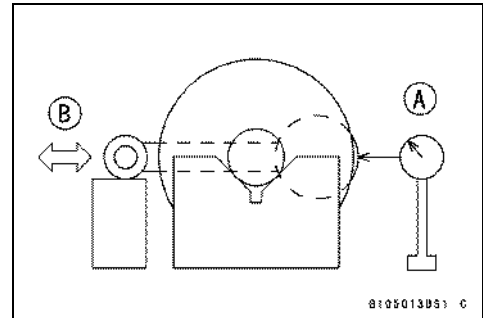
- Check the following items are within specifications after the crankshaft assembly.
  - Connecting Rod Radial Clearance (see Connecting Rod Big End Radial Clearance Inspection)
  - Connecting Rod Side Clearance (see Connecting Rod Big End Side Clearance Inspection)
  - Crankshaft Runout (see Crankshaft Runout Inspection)

### Connecting Rod Big End Seizure Inspection

- ★ In the case of serious seizure with damaged flywheels, the crankshaft must be replaced.
- ★ In the case of less serious damage, disassemble the crankshaft and replace the crankpin, needle bearing, side washers, and connecting rod.

### Connecting Rod Big End Radial Clearance Inspection

- Set the crankshaft in flywheel alignment jig or on a V block, and place a dial gauge [A] against the big end of the connecting rod.
- Push [B] the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.
- ★ If the radial clearance exceeds the service limit, the crankshaft should be either replaced or disassembled and the crankpin, needle bearing, and connecting rod big end examined for wear.



### Connecting Rod Big End Radial Clearance

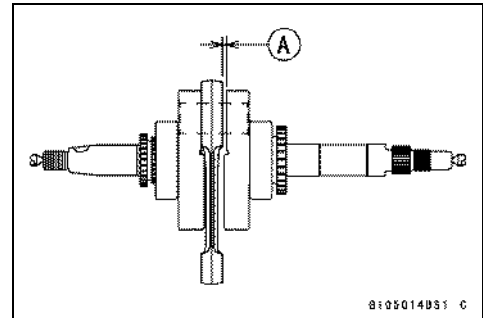
**Standard:** 0.005 ~ 0.025 mm (0.0002 ~ 0.0010 in.)  
**Service Limit:** 0.07 mm (0.0028 in.)

### Connecting Rod Big End Side Clearance Inspection

- Measure the side clearance [A] of the connecting rod with a thickness gauge.
- ★ If the clearance exceeds the service limit, replace the crankshaft.

### Connecting Rod Big End Side Clearance

**Standard:** 0.1 ~ 0.2 mm (0.004 ~ 0.008 in.)  
**Service Limit:** 0.4 mm (0.016 in.)

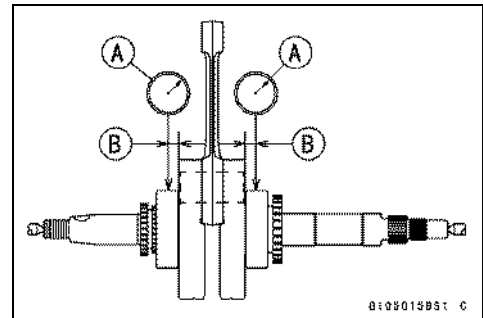


### Crankshaft Runout Inspection

- Set the crankshaft in a flywheel alignment jig or on V blocks, and place a dial gauge [A] against the points indicated.
- Measurement Point [B]: 8 mm (0.315 in.)
- Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.

### Crankshaft Runout

**Standard:** TIR 0.03 mm (0.001 in.) or less  
**Service Limit:** TIR 0.08 mm (0.003 in.)



## 8-14 CRANKSHAFT/TRANSMISSION

### Crankshaft, Connecting Rod

#### **Crankshaft Alignment**

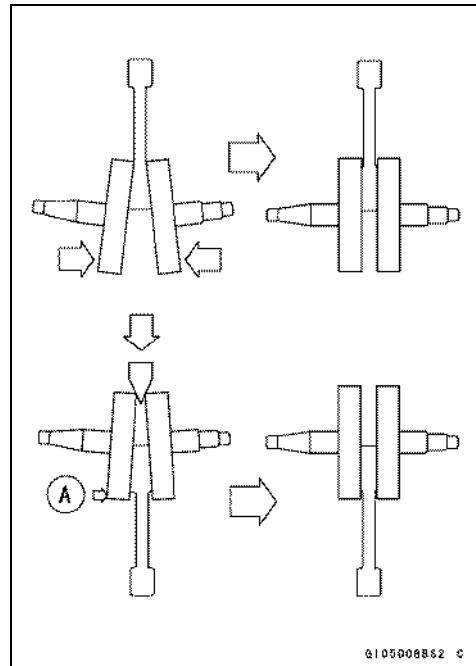
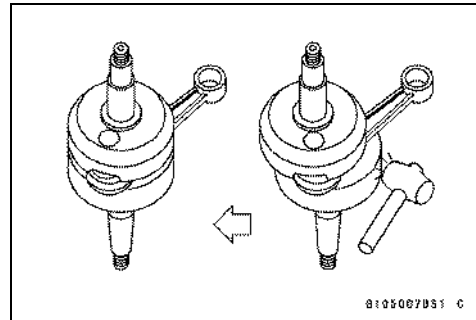
- ★ If the runout at either point exceeds the service limit, align the flywheels so that the runout falls within the service limit.
- In the case of horizontal misalignment, which is the most common, strike the projecting rim of the flywheel with a plastic, soft lead, or brass hammer as indicated in the figure.
- Recheck the runout with a dial gauge, repeating the process until the runout falls within the service limit.
- Vertical misalignment is corrected either by driving a wedge in between the flywheels, or by squeezing the flywheel rims in a vise, depending on the nature of the misalignment.
- In the case of both horizontal and vertical misalignment, correct the horizontal misalignment first.
- Recheck big end side clearance after aligning crankshaft (see Connecting Rod Big End Side Clearance Inspection).

#### **NOTE**

○ If crankshaft alignment cannot be corrected by the above method, replace the crankpin or crank halves as required. Recheck the runout and repeat the process until the runout is within service limit.

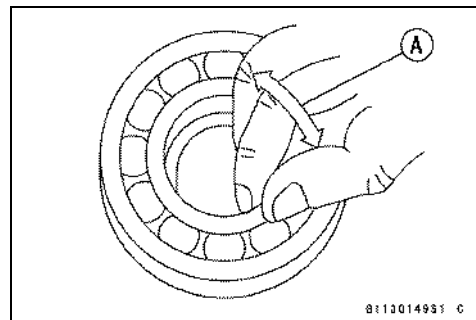
#### **NOTICE**

**Don't hammer the flywheel at the point [A].**



#### **Crankshaft Main Bearing Wear Inspection**

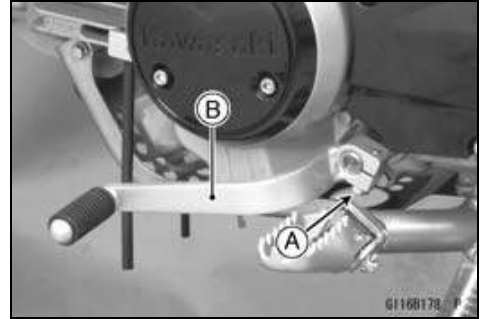
- Wash the bearings in high flash-point solvent, blow them dry (DO NOT SPIN THEM), and lubricate them with engine oil.
- Turn [A] each bearing over by hand and see that it makes no noise, turns smoothly and has no rough spots.
- ★ If any of the bearings are defective, replace them.



**External Shift Mechanism**

**Shift Pedal Removal**

- Remove the shift pedal bolt [A] and take off the shift pedal [B] from the shift shaft.

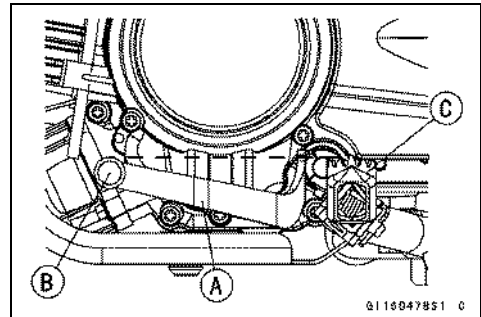


**Shift Pedal Installation**

- Install the shift pedal [A] to the shift shaft so that the upper surface of pedal [B] is level with the upper surface of footpeg [C].

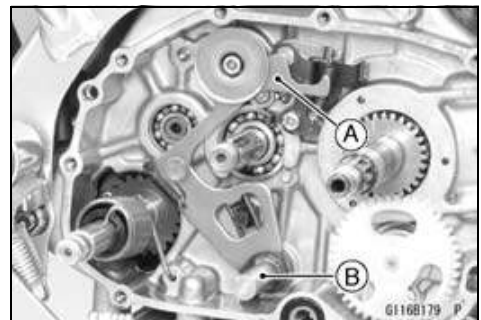
- Tighten:

**Torque - Shift Pedal Bolt: 5.2 N-m (0.53 kgf-m, 46 in-lb)**

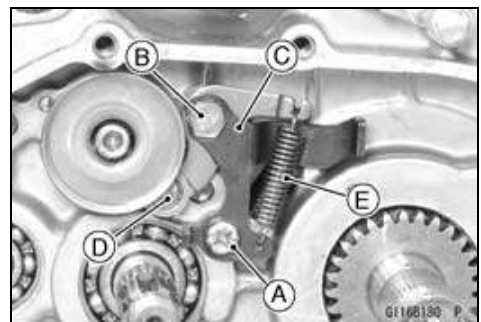


**External Shift Mechanism Removal**

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  - Clutch (see Clutch Removal (KLX110C/D) in the Clutch chapter)
  - Shift Pedal (see Shift Pedal Removal)
- Move the shift mechanism arm [A] out of its position on the end of the shift drum and pull out the shift shaft [B].



- Remove the screw [A] and pivot bolt [B].
- Remove the gear positioning plate [C], gear positioning lever [D] and its spring [E] as a set.

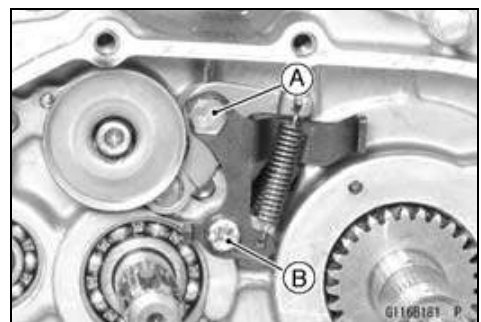


**External Shift Mechanism Installation**

- Apply a non-permanent locking agent to the lever pivot bolt [A].
- Install the gear positioning lever, plate and spring.

**Torque - Shift Drum Position Lever Pivot Bolt: 5.2 N-m (0.53 kgf-m, 46 in-lb)**

**Shift Drum Position Plate Screw [B]: 5.2 N-m (0.53 kgf-m, 46 in-lb)**



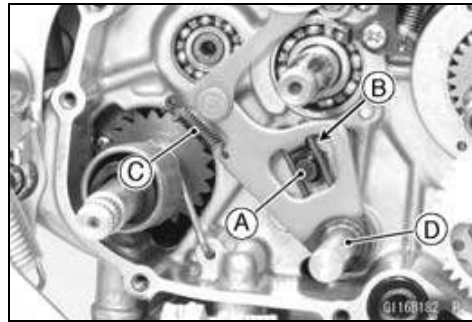
## 8-16 CRANKSHAFT/TRANSMISSION

### External Shift Mechanism

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

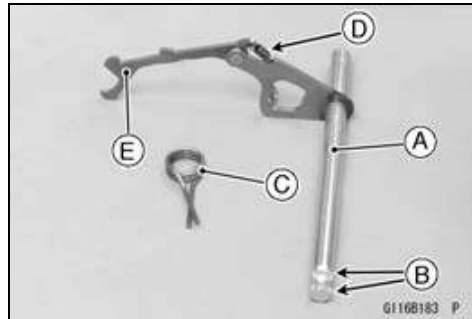
**Torque - Return Spring Pin: 22 N·m (2.2 kgf·m, 16 ft·lb)**

- Check that the return spring [B] and shift arm spring [C] are properly fitted on the mechanism.
- Apply high-temperature grease to the oil seal lips.
- Install the shift shaft [D].
- Install the removed parts (see appropriate chapters).

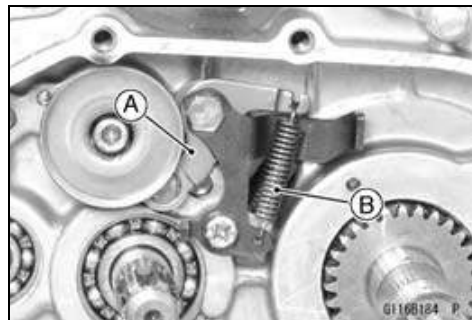


#### **External Shift Mechanism Inspection**

- Examine the shift shaft for any damage.
- ★ If the shaft [A] is bent, straighten or replace it.
- ★ If the splines [B] are damaged, replace the shaft.
- ★ If the return spring [C] and arm spring [D] are damaged in any way, replace them.
- ★ If the shift pawl [E] is damaged in any way, replace the shift shaft assembly.



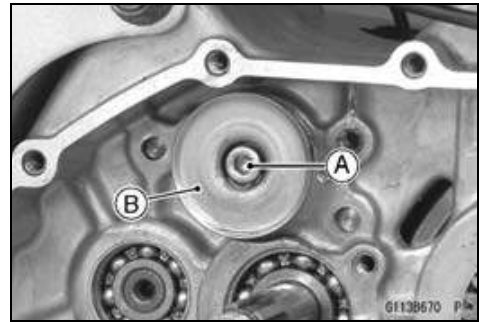
- Check the gear positioning lever [A] and spring [B] for breaks or distortion.
- ★ If the lever or springs are damaged in any way, replace them.



**Transmission**

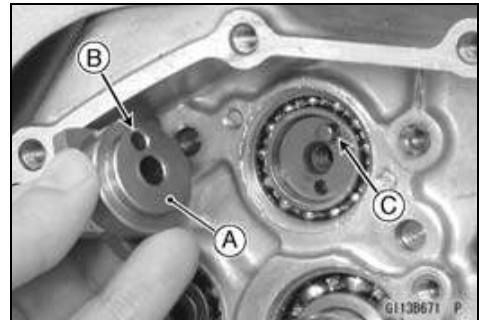
**Shift Drum Removal**

- Remove:
  - Clutch (see Clutch Removal (KLX110C/D) in the Clutch chapter)
  - External Shift Mechanism (see External Shift Mechanism Removal)
  - Shift Drum Allen Bolt [A]
  - Cam Holder [B]
  - Shift Drum Cam
  - Dowel Pin
- Split the crankcase (see Crankcase Splitting).
- Remove the shift drum.



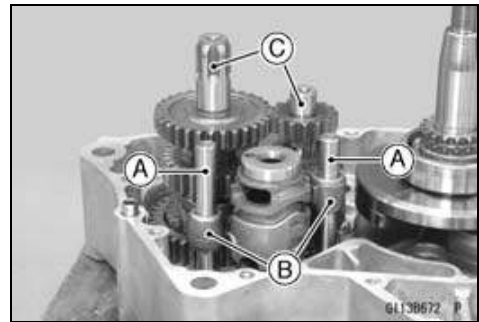
**Shift Drum Installation**

- Fit the shift drum to the right crankcase half.
  - Install the shift drum cam [A] aligning its hole [B] with the dowel pin [C].
  - Install the cam holder.
  - Apply a non-permanent locking agent to the threads of cam bolt, and tighten it.
- Torque - Shift Drum Cam Bolt: 5.2 N·m (0.53 kgf·m, 46 in·lb)**



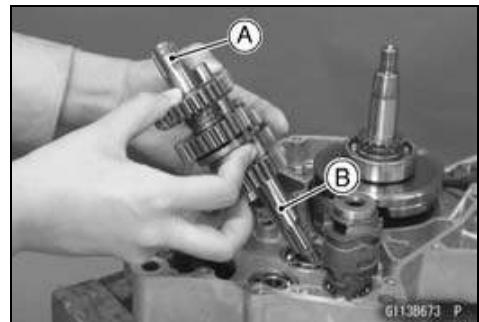
**Transmission Removal**

- Split the crankcase (see Crankcase Splitting).
- Remove:
  - Shift Rods [A]
  - Shift Forks [B]
  - Transmission Shafts [C]



**Transmission Installation**

- Apply a clean engine oil to the transmission gears, bearings, and shaft journal, and fit the output [A] and drive shaft [B] assemblies as a set into the right crankcase half.
- Set the shift drum in neutral position.



## 8-18 CRANKSHAFT/TRANSMISSION

### Transmission

- Apply clean engine oil to the shift fork fingers, and fit each shift fork into its gear-groove so that the shift fork guide pin is in the proper shift drum-groove.

#### NOTE

○Fingers of the 1st/3rd shift fork are longer than the fingers of the 2nd/4th shift fork.

- Apply clean engine oil to the shift rods [A], and insert each rod running it through each shift fork [B].
- Set the shift drum in neutral position, that is, drive and output shaft turn freely.
- Assemble the crankcase (see Crankcase Assembly).

#### NOTE

○Shall be checked that it is impossible to shift change from top position to neutral position when output shaft is driven.

### Transmission Shaft Disassembly

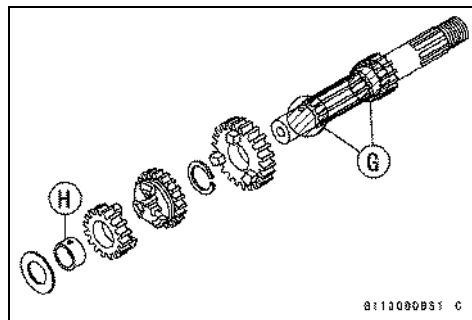
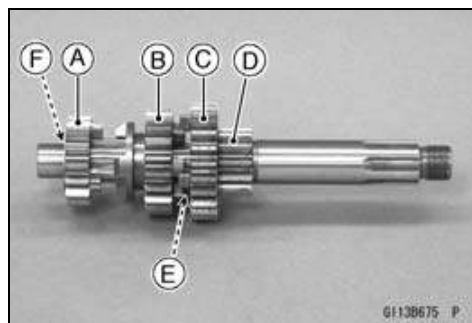
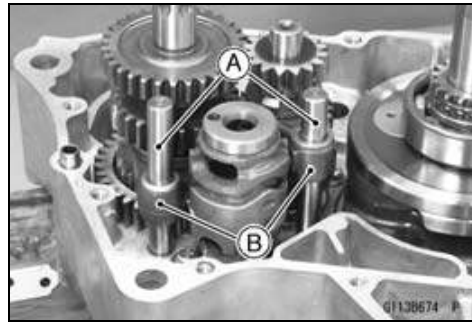
- Remove the transmission shafts.
- Using the circlip pliers to remove the circlip, disassemble the transmission shaft.

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

### Transmission Shaft Assembly

- Assemble the transmission gears as shown.
- Replace the old circlip with a new one if it is removed.
- The drive shaft gears can be identified by size; the smallest diameter gear is 1st gear, and the largest it 4th. Be sure that all parts are put back in the correct sequence, facing the proper direction, and that the circlip and the washer are properly in place.

2nd Gear [A]  
3rd Gear [B]  
4th Gear [C]  
1st Gear [D]  
Circlip [E]  
Spacer [F]  
Apply Engine Oil [G]  
Bushing [H]

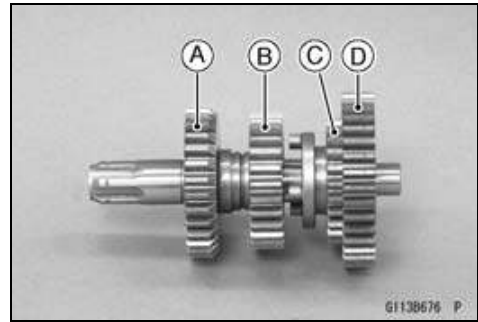




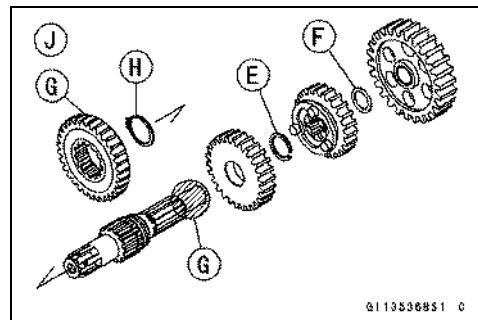
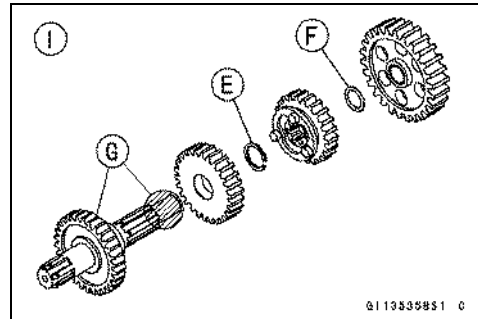
**Transmission**

○The output shaft gears can be identified by size; the largest diameter gear is 1st gear, and the smallest is 4th. Be sure that all parts are put back in the correct sequence and facing the proper direction, and that the circlip is properly in place.

- 2nd Gear [A]
- 3rd Gear [B]
- 4th Gear [C]
- 1st Gear [D]

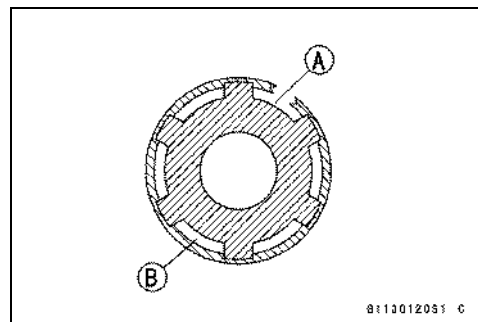


- Circlip [E]
- Spacer [F]
- Apply Engine Oil [G]
- Circlip [H]
- KLX110CA ~ CC, KLX110DA ~ DC Models [I]
- KLX110CD, KLX110DD Models ~ [J]



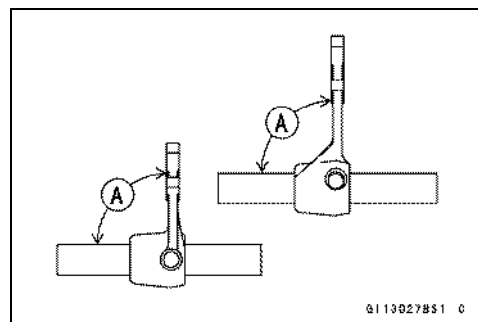
○Always install circlips so that the opening is aligned with a spline groove. To install a circlip without damage, first fit the circlip onto the shaft expanding it just enough to install it, and then use a suitable gear to push the circlip into place.

- [A] Opening of Circlip
- [B] Groove of Shaft Spline



**Shift Fork Bending Inspection**

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power. 90° [A]



## 8-20 CRANKSHAFT/TRANSMISSION

### Transmission

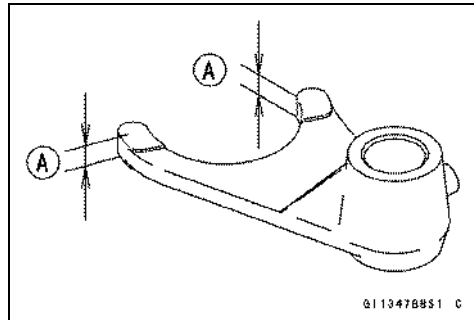
#### **Shift Fork Ear/Gear Shift Fork Groove Wear Inspection**

- Measure the thickness [A] of the shift fork ears.
- ★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

##### **Shift Fork Ear Thickness**

**Standard:** 3.9 ~ 4.0 mm (0.154 ~ 0.157 in.)

**Service Limit:** 3.8 mm (0.150 in.)

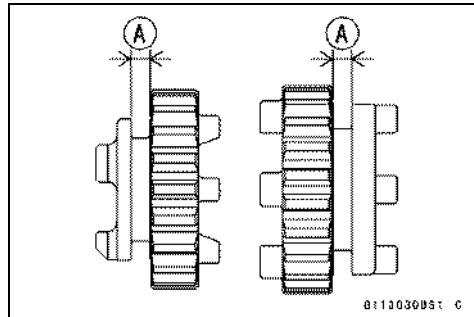


- Measure the width [A] of the gear shift fork grooves in the transmission gears.
- ★ If a gear shift fork groove is worn over the service limit, the gear must be replaced.

##### **Gear Shift Fork Groove Width**

**Standard:** 4.05 ~ 4.15 mm (0.159 ~ 0.163 in.)

**Service Limit:** 4.3 mm (0.17 in.)



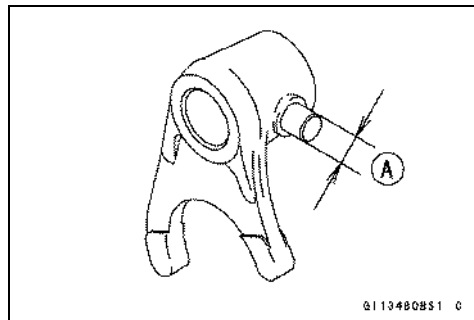
#### **Shift Fork Guide Pin/Shift Drum Groove Wear Inspection**

- Measure the diameter [A] of each shift fork guide pin, and measure the width of each shift drum groove.
- ★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

##### **Shift Fork Guide Pin Diameter**

**Standard:** 4.9 ~ 5.0 mm (0.193 ~ 0.197 in.)

**Service Limit:** 4.8 mm (0.189 in.)

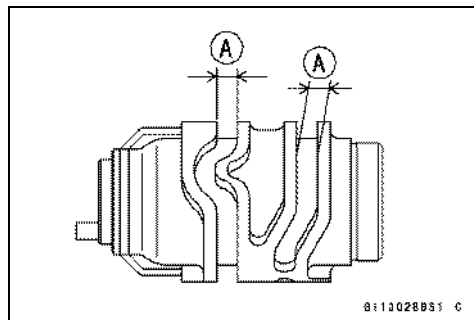


- ★ If any shift drum groove [A] is worn over the service limit, the drum must be replaced.

##### **Shift Drum Groove Width**

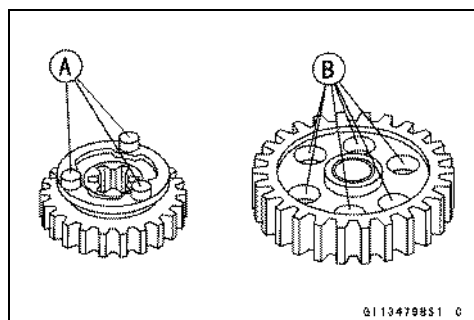
**Standard:** 5.05 ~ 5.20 mm (0.199 ~ 0.205 in.)

**Service Limit:** 5.3 mm (0.21 in.)



#### **Gear Dog/Gear Dog Hole Damage Inspection**

- Visually inspect the gear dogs [A] and gear dog holes [B].
- ★ Replace any damaged gears or gears with excessively worn dogs or dog holes.



## Ball Bearing, Needle Bearing, and Oil Seal

### Ball and Needle Bearing Wear Inspection

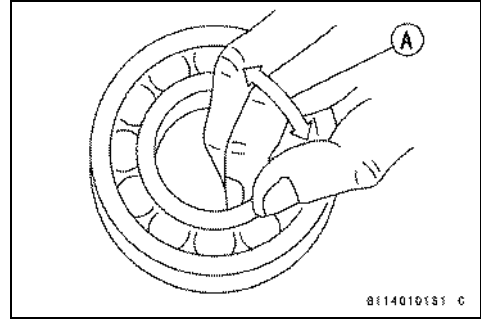
#### NOTICE

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

- Check the ball bearings.
  - Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.
  - Spin [A] the bearing by hand to check its condition.
  - ★ If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.
- Check the needle bearings.
  - The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
  - ★ If there is any doubt as to the condition of a needle bearing, replace it.

### Oil Seal Inspection

- Inspect the oil seal.
- ★ Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

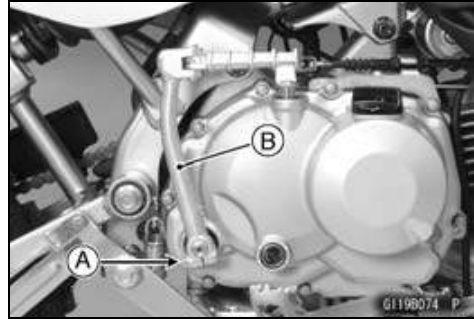


## 8-22 CRANKSHAFT/TRANSMISSION

### Kickstarter

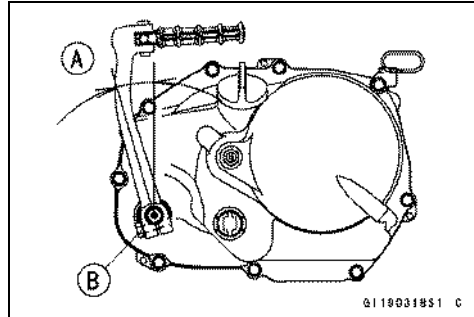
#### **Kick Pedal Removal**

- Remove:
  - Bolt [A]
  - Kick Pedal [B]



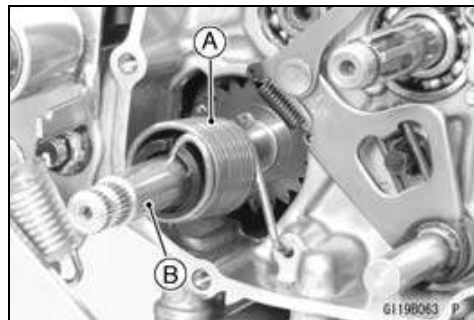
#### **Kick Pedal Installation**

- Installation is the reverse of removal.
- Install the kick pedal as shown in the figure.
  - [A] About 16°
- Tighten:
  - Torque - Kick Pedal Bolt [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)**



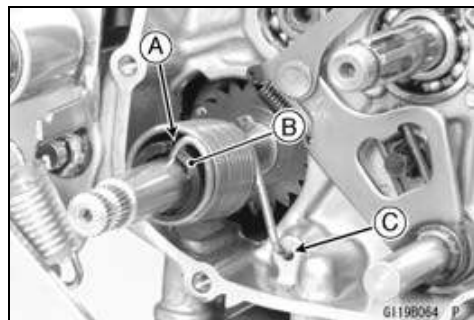
#### **Kick Shaft Removal**

- Remove the clutch (see Clutch Removal (KLX110C/D) in the Clutch chapter).
- Remove the return spring [A] with pliers.
- Remove the kick shaft assembly [B], twisting it counter-clockwise.
- There is a thrust washer between the kick shaft end and the crankcase.



#### **Kick Shaft Installation**

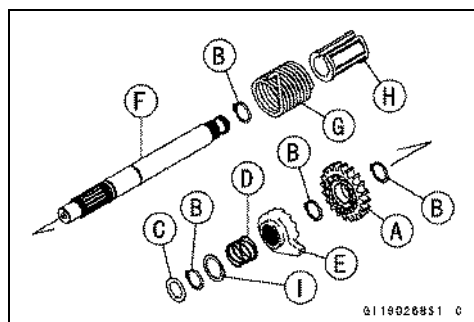
- Apply molybdenum disulfide grease to the thrust washer.
- Fit the return spring end [A] into the kick shaft and install the plastic spring guide [B].
- Put the thrust washer on the kick shaft end, and fit the kick shaft assembly in the crankcase.
- Insert the other spring end [C] into the crankcase.



#### **Kick Shaft Disassembly/Assembly**

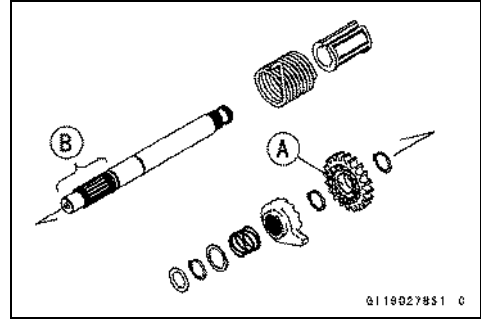
- The kick shaft assembly consists of the following parts.

- [A] Kick Gear
- [B] Circlips
- [C] Washer ( $\phi 20 \times \phi 13.2$ )
- [D] Spring
- [E] Ratchet Gear
- [F] Kick Shaft
- [G] Return Spring
- [H] Spring Guide
- [I] Washer ( $\phi 22 \times \phi 16.8$ )

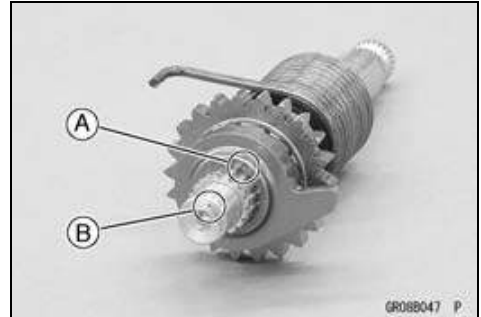


**Kickstarter**

- Apply molybdenum disulfide grease to the inside of the kick gear [A] and kick shaft [B].
- Replace the removed circlips with new ones.

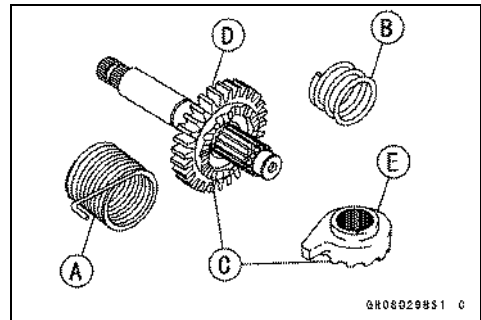


○ When assembling the ratchet gear onto the kick shaft, align the punch mark [A] on the ratchet gear with the punch mark [B] on the kick shaft.

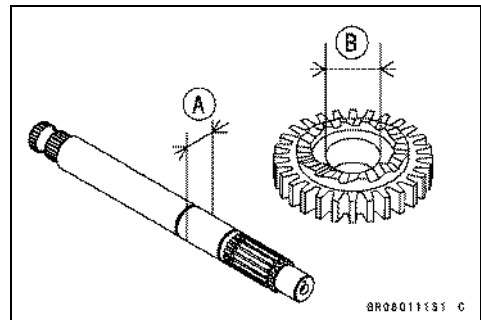


**Kick Shaft Inspection**

- Visually inspect the parts and portion listed below.
  - Kick shaft return spring [A]
  - Ratchet gear spring [B]
  - Ratchet portion [C] of the kick gear [D] and ratchet gear [E]
- ★ If there is any kind of damage, replace the damaged part.



- Measure the kick shaft diameter [A] where the kick gear fits.
- ★ If it is under the service limit, replace the shaft.
- Measure the inside diameter [B] of the kick gear.
- ★ If it exceeds the service limit, replace the gear.



**Kick Shaft, Kick Gear Inside Diameter**

**Standard:**

<b>Kick Shaft</b>	<b>15.941 ~ 15.968 mm</b> <b>(0.62760 ~ 0.62866 in.)</b>
<b>Kick Gear</b>	<b>16.000 ~ 16.018 mm</b> <b>(0.62992 ~ 0.63063 in.)</b>

**Service Limit:**

<b>Kick Shaft</b>	<b>15.91 mm (0.6264 in.)</b>
<b>Kick Gear</b>	<b>16.04 mm (0.6315 in.)</b>



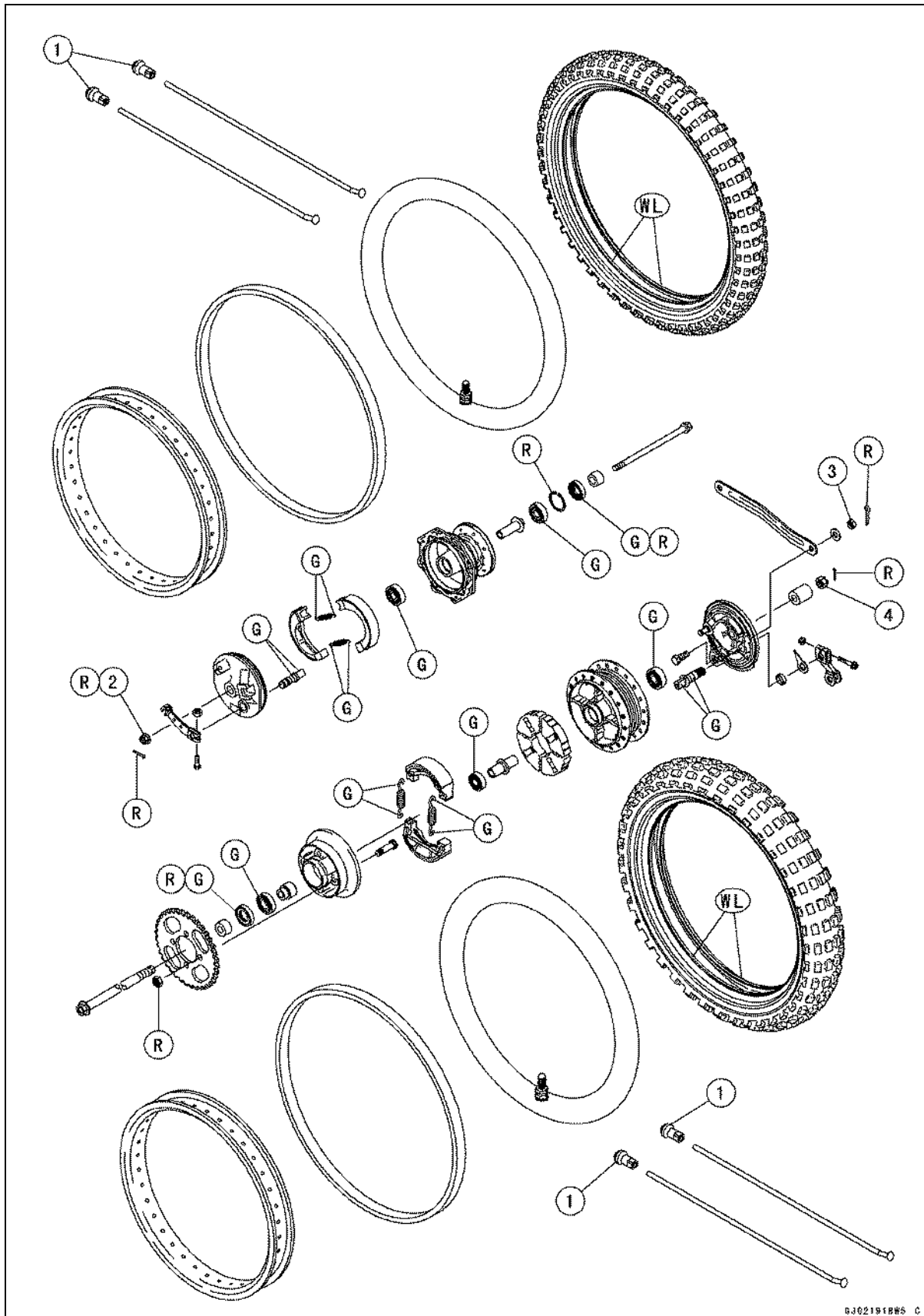
# Wheels/Tires

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# 9-2 WHEELS/TIRES

## Exploded View



0302191BWS C



**Exploded View**

No.	Fastener	Torque			Remarks
		N-m	kgf-m	ft-lb	
1	Spoke Nipples	4.0	0.41	35 in-lb	
2	Front Axle Nut	44	4.5	32	R
3	Torque Link Nuts	25	2.5	18	
4	Rear Axle Nut	64	6.5	47	

G: Apply grease.

R: Replacement Parts

WL: Apply soap and water solution, or rubber lubricant.

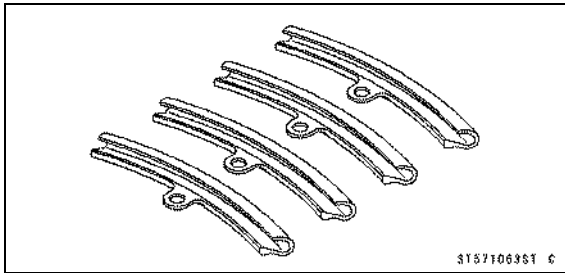
## 9-4 WHEELS/TIRES

### Specifications

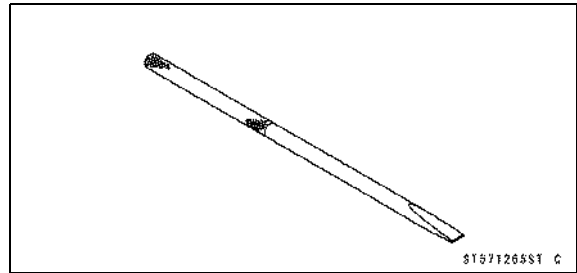
Item	Standard	Service Limit
<b>Wheels (Rims)</b>		
Rim Size:		
Front	14 x 1.40	— — —
Rear	12 x 1.60	— — —
Rim Runout:		
Axial	TIR 0.8 mm (0.031 in.) or less	TIR 2.0 mm (0.08 in.)
Radial	TIR 1.2 mm (0.047 in.) or less	TIR 2.0 mm (0.08 in.)
Front Axle Runout/100 mm (3.94 in.)	TIR 0.1 mm (0.004 in.) or less	TIR 0.2 mm (0.008 in.)
Rear Axle Runout/110 mm (4.33 in.)	TIR 0.1 mm (0.004 in.) or less	TIR 0.2 mm (0.008 in.)
<b>Tires</b>		
Air Pressure (when cold):		
Front and Rear	100 kPa (1.0 kgf/cm <sup>2</sup> , 14 psi)	— — —
Standard Tire:		
Front:		
Size	2.50-14 4P.R.	— — —
Make	IRC	— — —
Type	GS-45F	— — —
Rear:		
Size	3.00-12 4P.R.	— — —
Make	IRC	— — —
Type	GS-45F	— — —

Special Tools

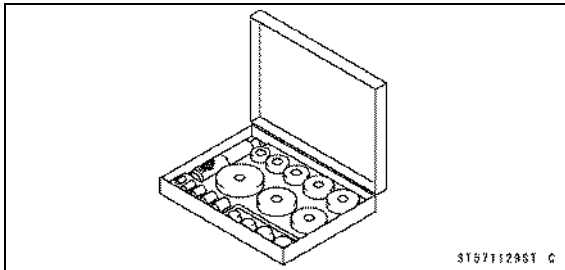
Rim Protector:  
57001-1063



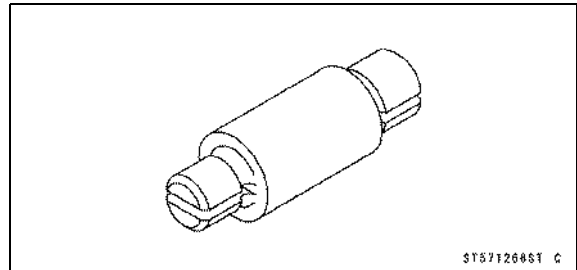
Bearing Remover Shaft,  $\phi 9$ :  
57001-1265



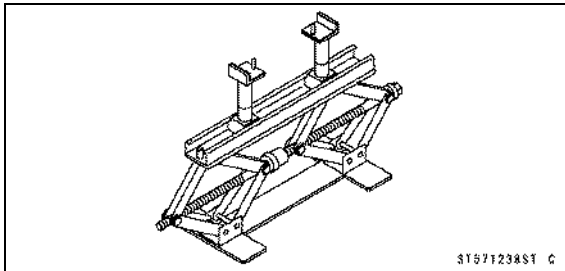
Bearing Driver Set:  
57001-1129



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



Jack:  
57001-1238

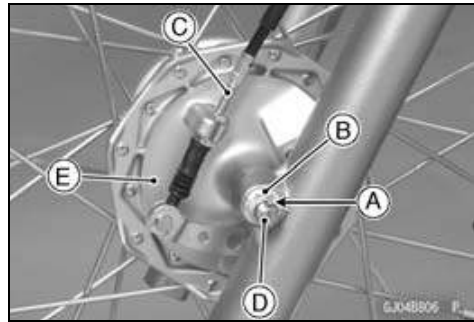


## 9-6 WHEELS/TIRES

### Wheels (Rims)

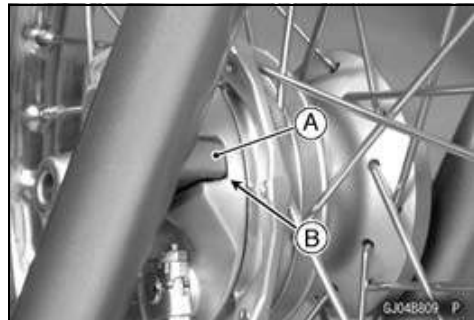
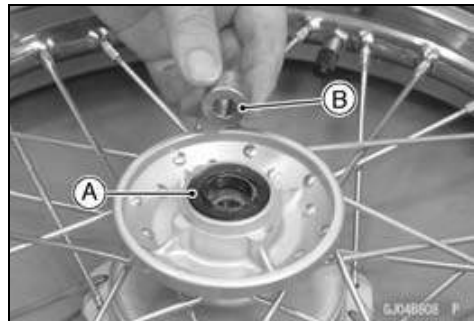
#### **Front Wheel Removal**

- Stabilize the motorcycle with the jack.
- **Special Tool - Jack: 57001-1238**
- Apply the rear brake so that the rear wheel does not turn.
- Remove:
  - Cotter Pin [A]
  - Front Axle Nut [B]
- Raise the front wheel off the ground with the jack.
- Remove:
  - Front Brake Cable [C] (see Brake Cable Removal in the Brakes chapter)
  - Front Axle [D]
  - Front Wheel
  - Front Brake Panel [E]
- Remove the collar [A] on the right side of the hub.



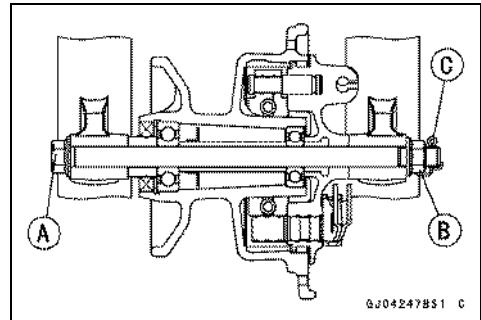
#### **Front Wheel Installation**

- Apply high-temperature grease to the oil seal [A].
- Install the collar [B] on the right side of the hub.
- Install the front brake panel.
- Fit the tongue [A] on the fork leg into the groove [B] on the front brake panel.



## Wheels (Rims)

- Replace the axle nut [B] with a new one.
- Insert the axle [A] from right side, and tighten the axle nut.  
**Torque - Front Axle Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)**
- Insert a new cotter pin [C] to the front axle, and bend it to both sides.

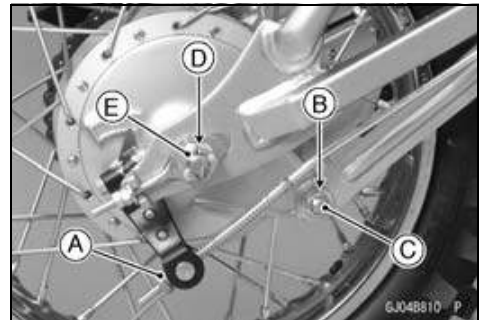


- Install the front brake cable and adjust the brake lever free play (see Brake Lever Free Play Adjustment in the Periodic Maintenance chapter).
- Remove the jack.

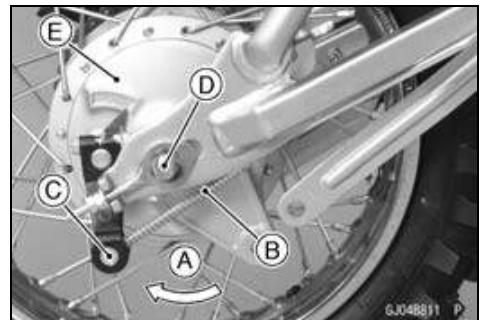
### Rear Wheel Removal

- Raise the rear wheel off the ground with the jack.  
**Special Tool - Jack: 57001-1238**

- Remove:
  - Adjusting Nut [A]
  - Cotter Pin [B]
  - Rear Torque Link Nut [C], Washer and Bolt
  - Cotter Pin [D]
  - Rear Axle Nut [E]



- To remove the brake rod end from the brake cam lever, first turn the brake panel clockwise [A] as far as it will go, then depress the brake pedal lightly, the brake rod [B] will be separated from the brake cam lever joint [C].
- Remove the rear axle [D].
- Disengage the drive chain from the rear sprocket.
- Hang the chain on the swingarm.
- Remove:
  - Rear Wheel
  - Rear Brake Panel [E]



- Remove the collar [A] on the left side of the hub.

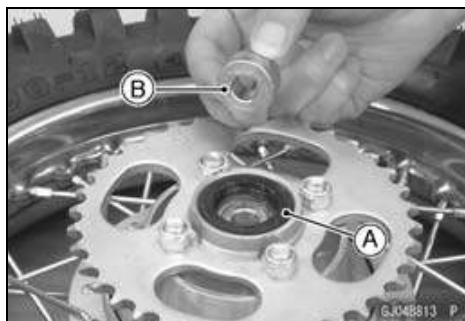


## 9-8 WHEELS/TIRES

### Wheels (Rims)

#### Rear Wheel Installation

- Apply high-temperature grease to the oil seal [A].
- Install the collar [B] on the left side of the hub.
- Install the rear brake panel.
- Engage the drive chain with the rear sprocket, and set the rear wheel to the motorcycle.
- Insert the axle from the left side.
- Turn the brake panel clockwise until the brake cam lever joint goes beyond the brake rod end then insert the brake rod end into the joint hole.



#### NOTICE

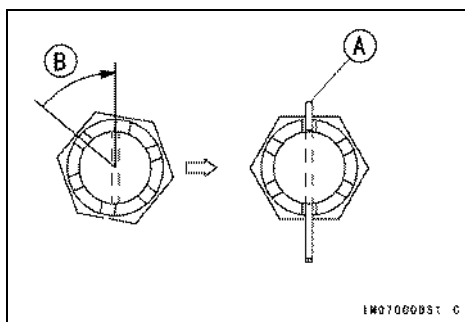
**Do not insert the brake rod into the cam lever joint by depressing the brake pedal deeply, this will extend the brake spring beyond its allowable spring extension.**

- Tighten:
  - Torque - Rear Axle Nut: 64 N·m (6.5 kgf·m, 47 ft·lb)
  - Torque Link Nut: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Insert a new cotter pin [A].

#### NOTE

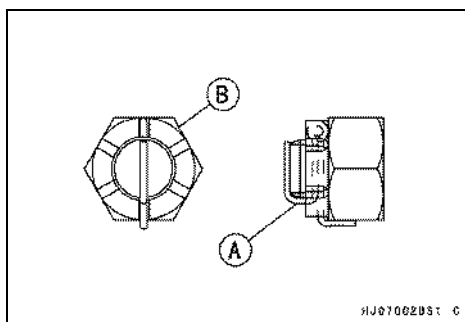
- When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.
- It should be within 30 degrees.
- Loosen once and tighten again when the slot goes past the nearest hole.



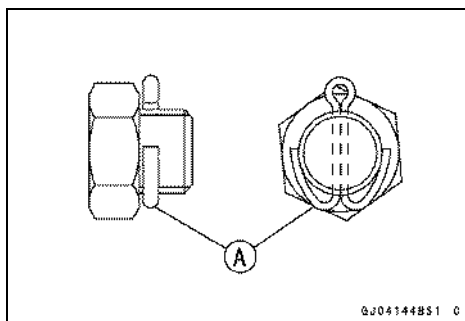
- Bend the cotter pin [A] over the nut [B].

#### ⚠ WARNING

**A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.**



- Insert the cotter pin [A] into the torque link bolt hole and spread its ends.
- Adjust:
  - Drive Chain Slack (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter)
  - Brake Pedal Free Play (see Brake Pedal Free Play Adjustment in the Periodic Maintenance chapter)
- Remove the jack.



## Wheels (Rims)

### Wheels Inspection

- Raise the front/rear wheel off the ground with the jack.
  - Special Tool - Jack: 57001-1238**
- Spin the wheel lightly, and check for roughness or binding.
- ★ If the roughness or binding is found, replace the hub bearings.
- Visually inspect the front and rear axles for damage.
- ★ If the axle is damaged or bent, replace it.

### Spoke Tightness Inspection

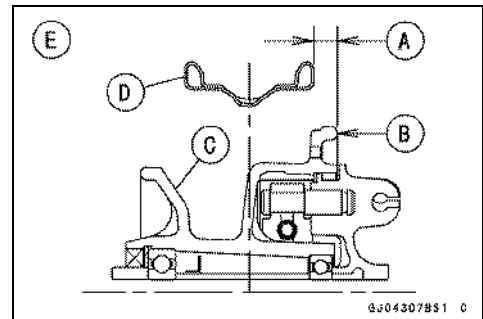
- Refer to the Spoke Tightness Inspection in the Periodic Maintenance chapter.

### Rim Runout Inspection

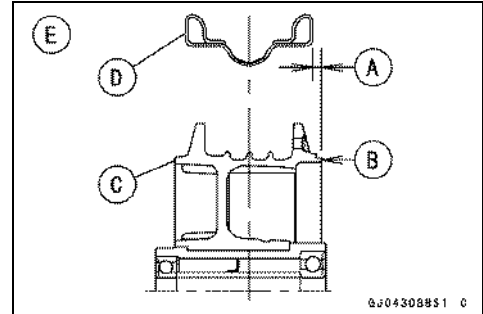
- Refer to the Rim Runout Inspection in the Periodic Maintenance chapter.

### Rim Installation Position

- When installing the rim, set the rim following position.
- The distance [A] from the left end [B] of the front hub [C] to left end of the front rim [D] should be as follows.
  - View from Front [E]
  - Distance:  $9.0 \pm 0.5$  mm ( $0.35 \pm 0.020$  in.)



- The distance [A] from the right end [B] of the rear hub [C] to right end of the rear rim [D] should be as follows.
  - View from Rear [E]
  - Distance:  $4.0 \pm 0.5$  mm ( $0.16 \pm 0.020$  in.)



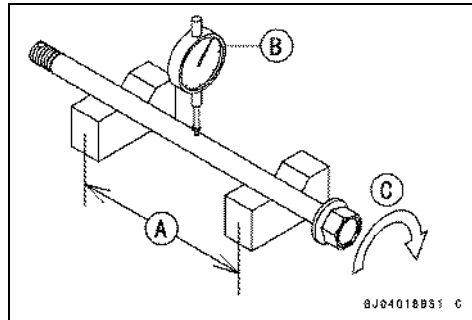
- Check the rim runout (see Rim Runout Inspection in the Periodic Maintenance chapter).

## 9-10 WHEELS/TIRES

### Wheels (Rims)

#### ***Axle Inspection***

- Visually inspect the front and rear axle for damages.
- ★ If the axle is damaged or bent, replace it.
- Place the front axle in V blocks that are 100 mm (3.94 in.) (Rear Axle: 110 mm (4.33 in.)) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.
- ★ If the runout exceeds the service limit, replace the axle.



**Front Axle Runout: 100 mm (3.94 in.)**

**Standard: 0.1 mm (0.004 in.) or less**

**Service Limit: 0.2 mm (0.008 in.)**

**Rear Axle Runout: 110 mm (3.94 in.)**

**Standard: 0.1 mm (0.004 in.) or less**

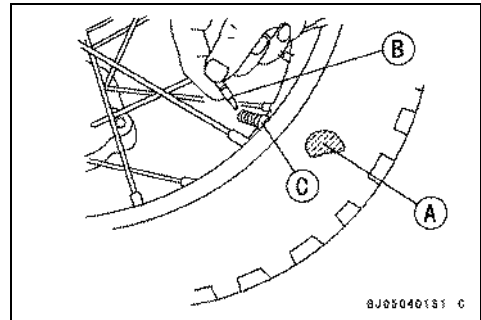
**Service Limit: 0.2 mm (0.008 in.)**



**Tires**

**Tire Removal**

- Remove the wheel (see Front/Rear Wheel Removal).
- To maintain wheel balance, mark [A] the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
- Take out the valve core [B] to let out the air.
- Remove the valve stem nut [C].
- When handling the rim, be careful not to damage the rim flanges.



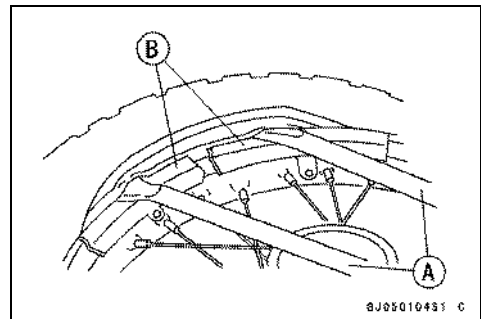
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

<b>NOTICE</b>
<b>Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.</b>

- Break the beads away from both sides of the rim with a suitable bead breaker.
- Step on the side of the tire opposite air valve, and pry the tire off the rim with the tire iron [A] protecting the rim with rim protectors [B].

**Special Tool - Rim Protector: 57001-1063**

<b>NOTICE</b>
<b>Take care not to insert the tire irons so deeply that the tube gets damaged.</b>



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

**Tire Installation**

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

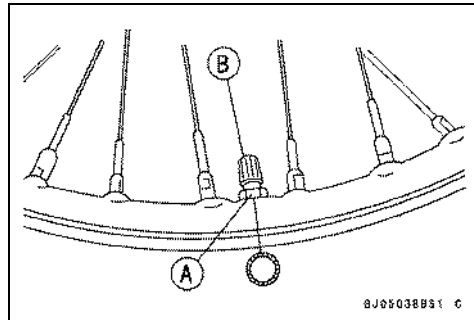
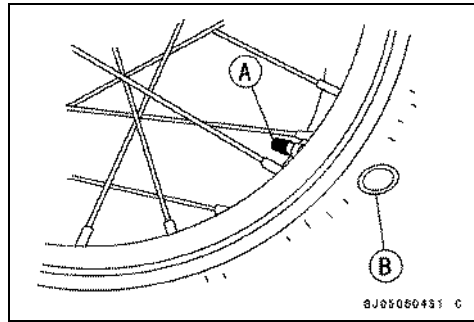
## 9-12 WHEELS/TIRES

### Tires

- Position the tire on the rim so that the air valve [A] is at the tire balance mark [B] (the chalk mark made during removal, or the paint mark on a new tire).
- Insert the valve stem into the rim, and screw the nut on loosely.
- Fit the rim protectors and use suitable tire irons to install the tire bead.

#### NOTE

- *To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.*
- Replace the tire back on the rim from the opposite side of the valve.
- Insert the tire irons so deeply that the tube is not damaged.
- Similarly, slip the tire bead back over the rim on the other side.
- Check that the tube is not pinched between the tire and rim.
- Tighten the valve stem nut [A], and put on the valve cap [B].
- Check and adjust the air pressure after installing.



#### ***Air Pressure Inspection/Adjustment***

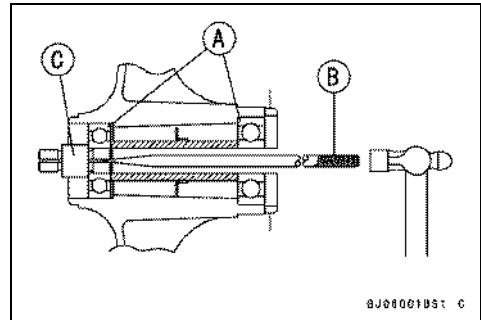
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

## Hub Bearings

### Hub Bearing Removal

- Remove the wheel (see Front/Rear Wheel Removal).
- To remove the grease seals, pry out the grease seal using a screwdriver.
- Using the bearing remover shaft and bearing remover head, remove the hub bearings [A].

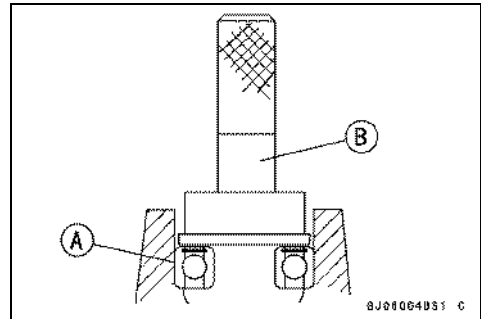
**Special Tools - Bearing Remover Shaft,  $\phi 9$ : 57001-1265 [B]  
Bearing Remover Head,  $\phi 10 \times \phi 12$ : 57001-1266 [C]**



### Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings [A] using the bearing driver set [B] so that the marked or shield sides face out.
- Press in the bearings until they bottom out.

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

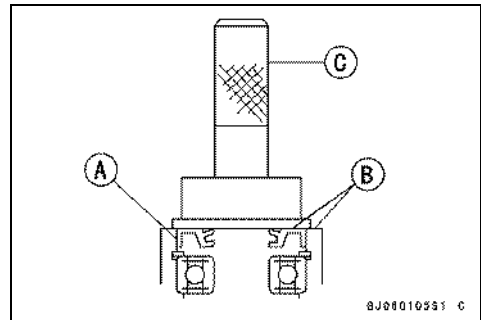


### NOTE

- For correct tire alignment, the right bearing must be installed first rather than left bearing in both front and rear hubs.

- Replace the grease seal [A] with new ones.
- Apply high-temperature grease to the grease seal lips.
- Press in the grease seal so that the seal surface is flush [B] with the end of the hole using the bearing driver set [C].

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



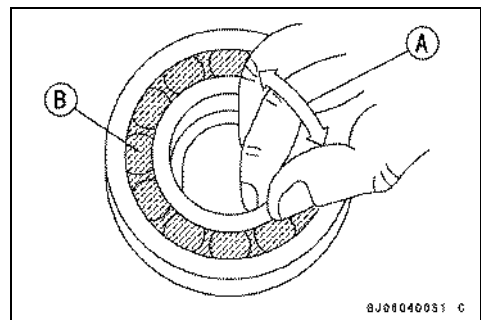
### Bearing Inspection

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

### NOTICE

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

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding. If bearing play, roughness, or binding is found, replace the bearing.
- Examine the bearing seal [B] for damage or leakage.
- ★ If the seal is damaged or is leaking, replace the bearing.

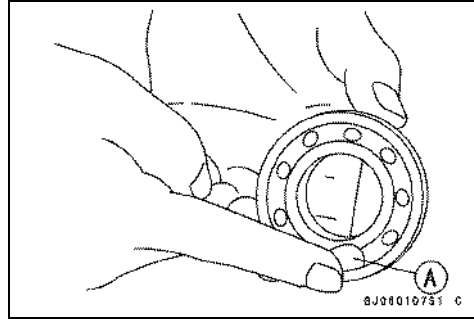


## 9-14 WHEELS/TIRES

### Hub Bearings

#### ***Bearing Lubrication***

- Remove the hub bearings on the front and rear wheel hubs.
- Wash the bearings with a high flash-point solvent, dry them (do not spin them while they are dry), and oil them.
- Spin each bearings by hand to check its condition.
- ★ If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
- If the same bearing is to be used again, re-wash it with a high flash-point solvent, and dry it.
- Pack each bearings with good quality bearing grease [A] before installation. Turn each bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the bearing housings on the wheel hub before bearing installation.
- Install the bearings.



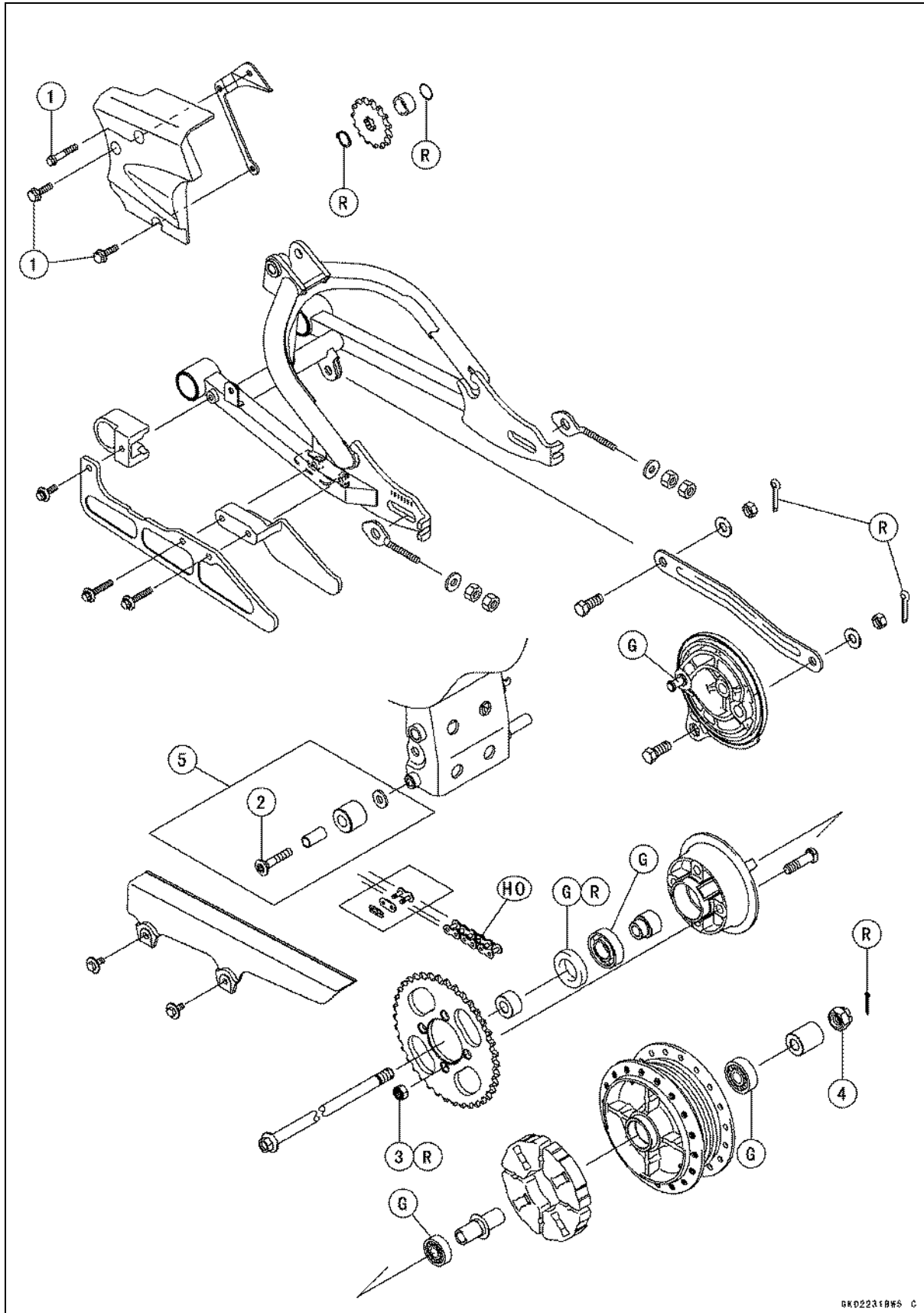
# Final Drive

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# 10-2 FINAL DRIVE

## Exploded View



0K02231BWS C

**Exploded View**

No	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Cover Bolts	5.2	0.53	46 in·lb	
2	Chain Guide Roller Mounting Bolt	23	2.3	17	
3	Rear Sprocket Nuts	44	4.5	32	R
4	Rear Axle Nut	64	6.5	47	

5. KLX110D Models

G: Apply grease.

HO: Apply heavy oil.

R: Replacement Parts

## 10-4 FINAL DRIVE

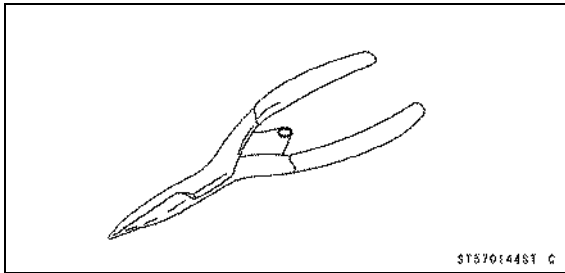
### Specifications

Item	Standard	Service Limit
<b>Drive Chain</b>		
Drive Chain Slack:		
KLX110C Models	11 ~ 16 mm (0.4 ~ 0.6 in.)	---
KLX110D Models	8 ~ 13 mm (0.3 ~ 0.5 in.)	---
Drive Chain 20-link Length	254.0 ~ 254.6 mm (10.00 ~ 10.02 in.)	259 mm (10.2 in.)
Standard Chain:		
Make	DAIDO	---
Type	DID420DX	---
Length	90 Links	---
<b>Sprocket</b>		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

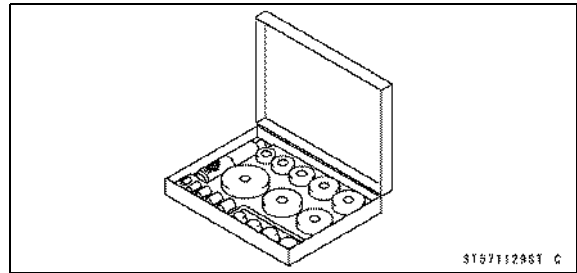


**Special Tools**

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



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



## 10-6 FINAL DRIVE

### Drive Chain

#### **Drive Chain Slack Inspection**

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

#### **Drive Chain Slack Adjustment**

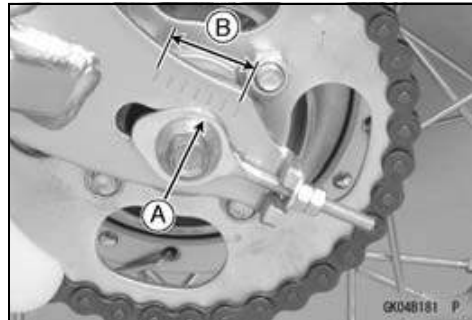
- Refer to the Drive Chain Slack Adjustment in the Periodic Maintenance chapter.

#### **Wheel Alignment Inspection**

- Check that the notch [A] of the chain adjuster aligns with the same swing arm mark [B] as the other side adjuster.
- ★ If they do not, adjust the chain slack and align the wheel alignment (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

#### **NOTE**

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



#### **⚠ WARNING**

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

#### **Wheel Alignment Adjustment**

- This procedure is the same as Drive Chain Slack Adjustment (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

#### **Drive Chain Wear Inspection**

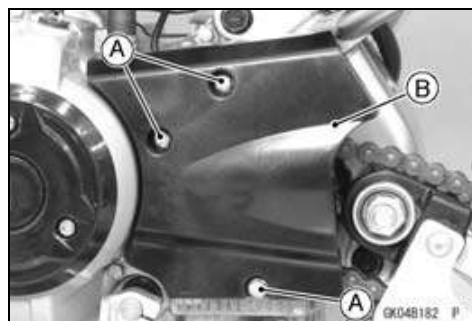
- Refer to the Drive Chain Wear Inspection in the Periodic Maintenance chapter.

#### **Drive Chain Lubrication**

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

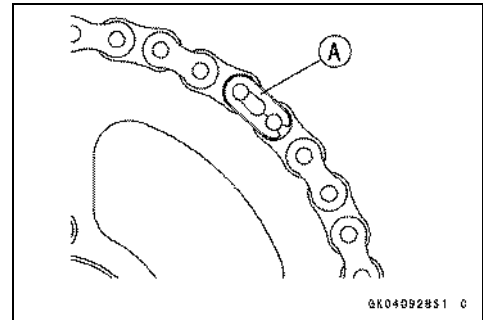
#### **Drive Chain Removal**

- Remove the bolts [A] and the engine sprocket cover [B] with the chain tension guide.



## Drive Chain

- Remove the clip [A] from the master link using pliers, and remove the chain from the rear sprocket.
- Take the chain off the motorcycle, being careful that the chain does not get dirty from contact with the ground.

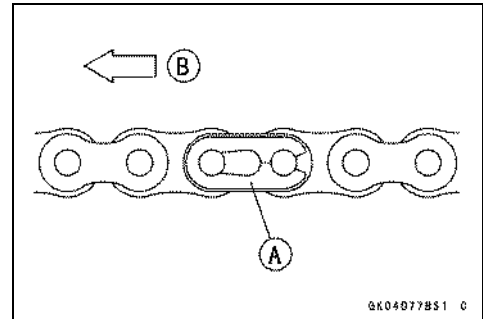


### Drive Chain Installation

#### **⚠ WARNING**

**For safety, use only the standard chain.**

- Fit the drive chain back onto the sprockets with the ends at the rear sprocket.
- Install the master link from the frame side.
- Install the clip [A] so that the closed end of the "U" points in the direction of chain rotation [B]. (The open end of the "U" points in the reverse direction of chain rotation).



#### **⚠ WARNING**

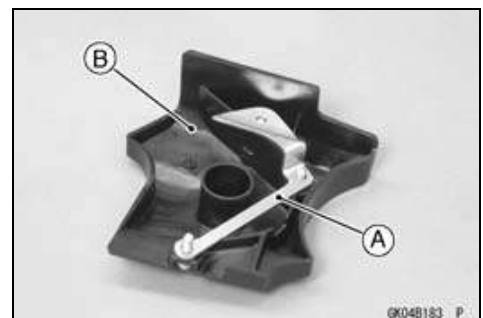
**Incorrect installation of the master link clip can allow it to catch on an adjacent part. If the clip dislodges, the chain could come a part, and this could result in rear wheel lockup and loss of control. Be sure the master link clip is installed correctly.**

- Adjust the drive chain slack (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Check the brake for good braking power, and no brake drag.

#### **⚠ WARNING**

**A rear brake that cannot be fully operated with the pedal can cause a crash resulting in serious injury or death. If a full brake pedal is not obtained, disassemble and inspect the brake parts for wear. Worn brake parts diminish brake performance, can damage brake components and lead to brake failure or cause the brake to lock, resulting in a crash that may cause serious injury or death.**

- Put the chain tension guide [A] on the engine sprocket cover [B], and install the sprocket cover.



## 10-8 FINAL DRIVE

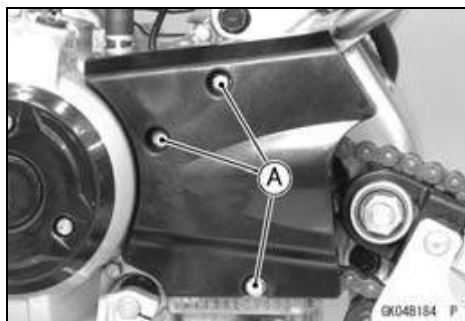
### Drive Chain

---

○The upper bolt is longer than the other ones.

● Tighten:

**Torque - Engine Sprocket Cover Bolts [A]: 5.2 N·m (0.53 kgf·m, 46 in·lb)**



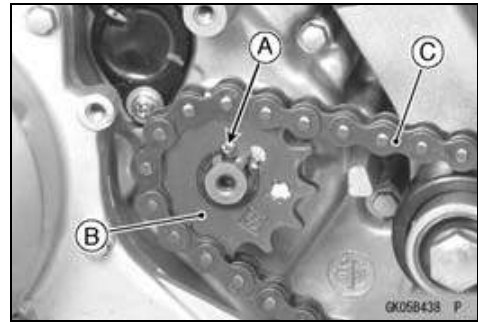
## Sprockets

### Engine Sprocket Removal

- Remove the engine sprocket cover (see Drive Chain Removal).
- Remove the circlip [A] and the engine sprocket [B] with the drive chain [C].

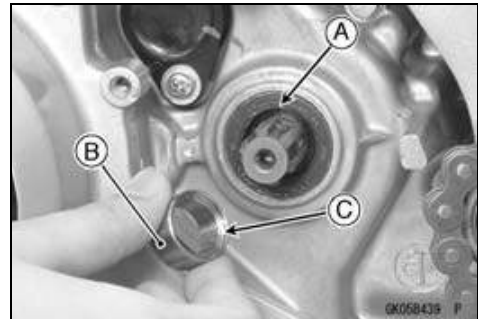
**Special Tool - Outside Circlip Pliers: 57001-144**

- Take off the sprocket from the chain.

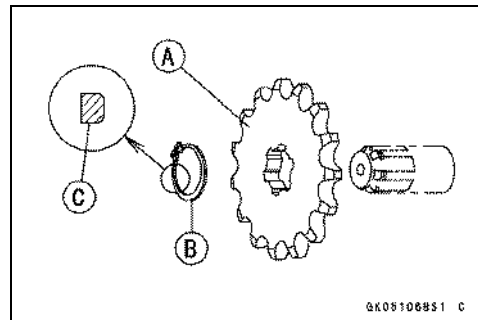


### Engine Sprocket Installation

- Replace the O-ring [A] on the output shaft with a new one.
- Apply grease to the O-ring.
- Install the O-ring on the output shaft while expanding the O-ring by the hand.
- Install the collar [B] to the output shaft.
- The chamfered side [C] of the collar must be faced in.

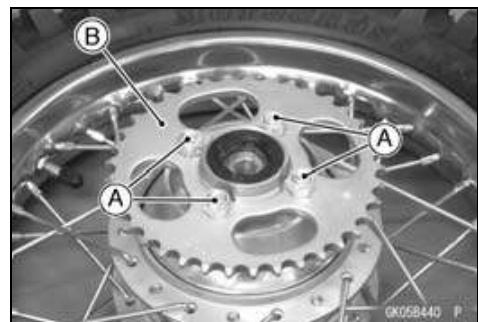


- Install the engine sprocket [A] and drive chain together.
- Install the engine sprocket so that tooth number marking on it faces outward.
- Replace the circlip [B] with a new one.
- Fit the circlip so that the round side [C] faces in as shown.
- Adjust the drive chain slack if necessary (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install the engine sprocket cover (see Drive Chain Installation).



### Rear Sprocket Removal

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).
- Unscrew the rear sprocket nuts [A], and remove the rear sprocket [B].



### Rear Sprocket Installation

- Install the rear sprocket so that the marked [A] side faces outward.
- Replace the rear sprocket nuts with new ones.
- Torque - Rear Sprocket Nuts: 44 N·m (4.5 kgf·m, 32 ft·lb)**
- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).



### Sprocket Wear Inspection

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

## 10-10 FINAL DRIVE

### Sprockets

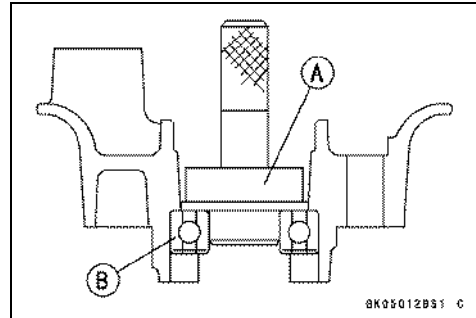
#### **Rear Sprocket Warp Inspection**

- Refer to the Rear Sprocket Warp Inspection in Periodic Maintenance chapter.

#### **Coupling Bearing Removal**

- Pull out the coupling collar from the left.
- Remove the oil seal.
- Using the bearing driver set [A] or some other suitable tool, remove the bearing [B] by tapping from the drum side.

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



#### **Coupling Bearing Installation**

- Press in the bearing so that the marked side faces out until it is bottomed.
- Replace the oil seal with a new one.
- Press in the oil seal so that the seal surface is flush with the end of the hole.

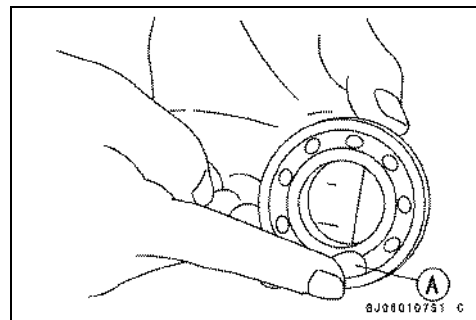
**Special Tool - Bearing Driver Set: 57001-1129**

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

#### **Coupling Bearing Inspection and Lubrication**

Since the coupling bearing is made to extremely close tolerances, the clearance cannot normally be measured.

- Wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.
- ★ If it is noisy, doesn't spin smoothly, or has any rough spots, it must be replaced.
- If the bearing is to be used again, rewash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease. Turn the bearing around by hand a few times to make sure the grease [A] is distributed uniformly inside the bearing, and wipe the old grease out of the coupling before bearing installation.



#### **Coupling Damper Inspection**

- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- ★ Replace the dampers if they appear damaged or deteriorated.



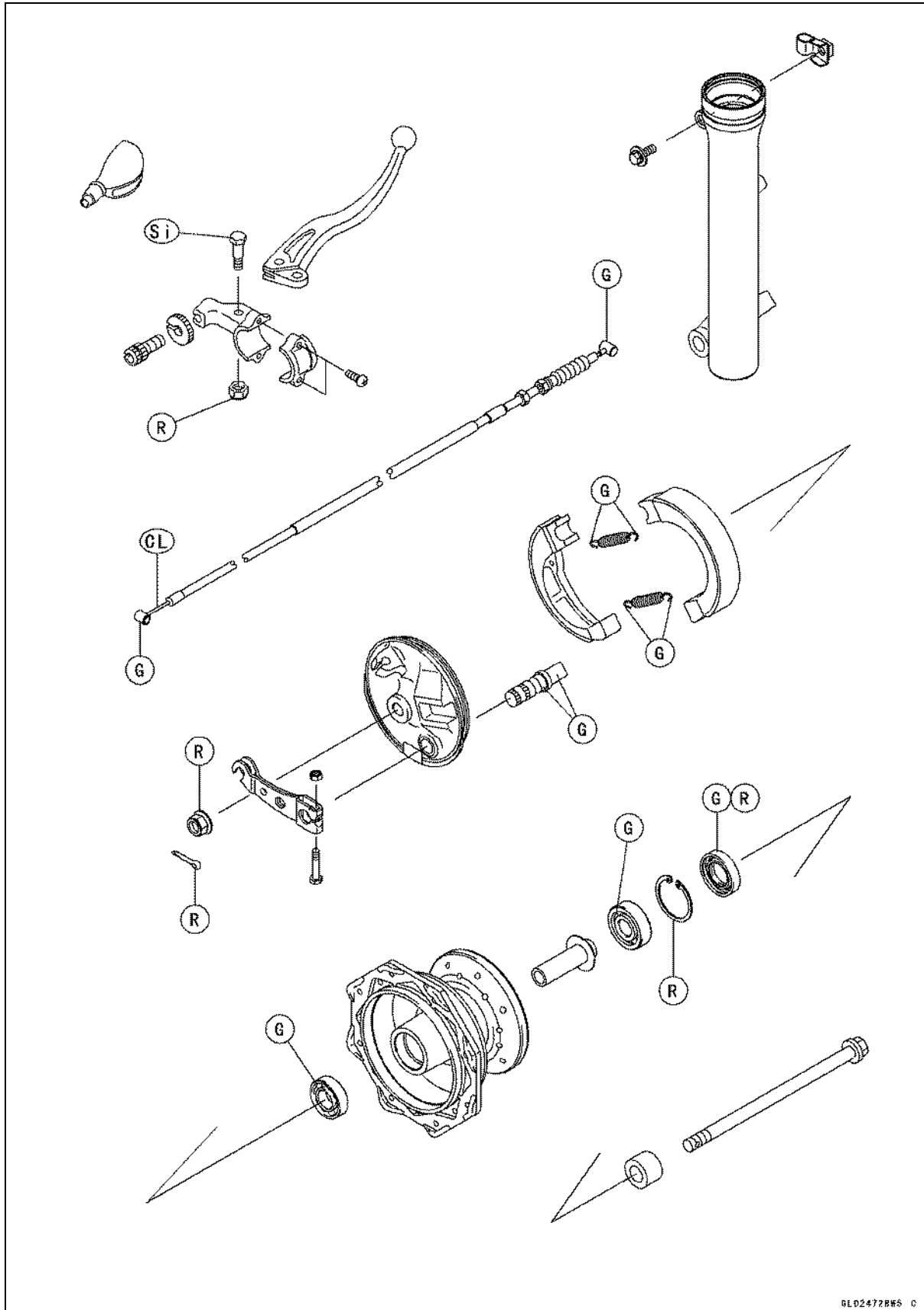
# Brakes

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# 11-2 BRAKES

## Exploded View



DL02472BWS C



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**Exploded View**

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CL: Apply cable lubricant.

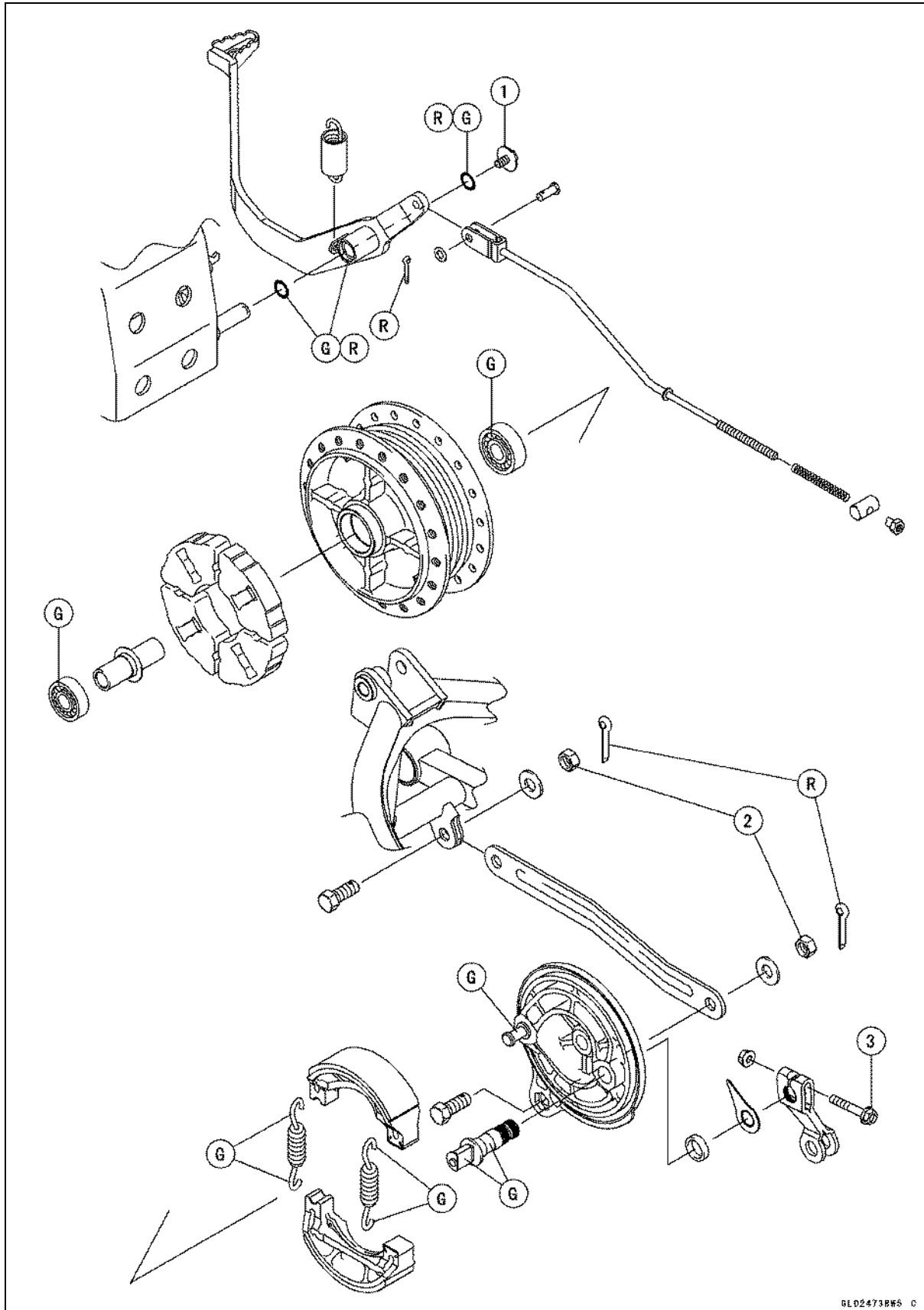
G: Apply grease.

R: Replacement Parts

Si: Apply silicone grease.

# 11-4 BRAKES

## Exploded View



DL02473BWS C

**Exploded View**

No.	Fastener	Torque			Remarks
		N-m	kgf-m	ft-lb	
1	Brake Pedal Bolt	8.8	0.90	78 in·lb	
2	Torque Link Nuts	25	2.5	18	
3	Brake Cam Lever Bolt	7.0	0.71	62 in·lb	

G: Apply grease.

R: Replacement Parts

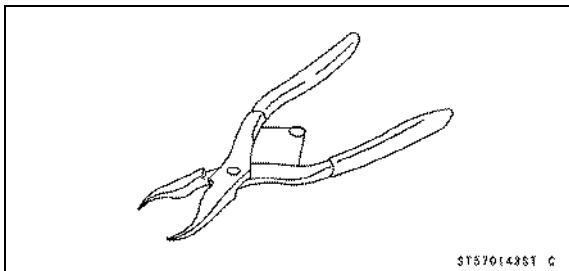
## 11-6 BRAKES

### Specifications

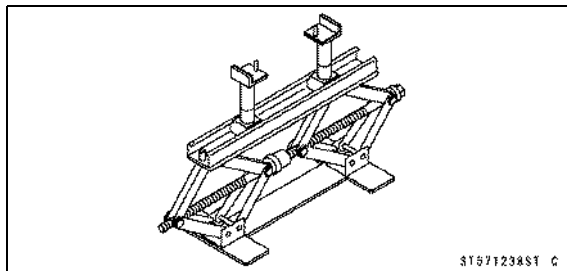
Item	Standard	Service Limit
<b>Brake Lever and Pedal</b>		
Brake Lever Free Play	4 ~ 5 mm (0.16 ~ 0.20 in.)	---
Brake Pedal Free Play	20 ~ 30 mm (0.79 ~ 1.18 in.)	---
<b>Brake Drum, Brake Shoes</b>		
Shoe Lining Thickness:		
Front	2.10 ~ 3.00 mm (0.08 ~ 0.12 in.)	1.2 mm (0.05 in.)
Rear	3.85 ~ 4.15 mm (0.152 ~ 0.163 in.)	2.0 mm (0.08 in.)
Shoe Spring Free Length:		
Front	30.8 ~ 31.2 mm (1.21 ~ 1.23 in.)	32.6 mm (1.28 in.)
Rear	32.5 mm (1.28 in.)	34.1 mm (1.34 in.)
Drum Inside Diameter:		
Front	90.000 ~ 90.087 mm (3.543 ~ 3.547 in.)	90.75 mm (3.57 in.)
Rear	110.000 ~ 110.087 mm (4.331 ~ 4.334 in.)	110.75 mm (4.36 in.)
Camshaft Diameter:		
Front	11.957 ~ 11.984 mm (0.471 ~ 0.472 in.)	11.88 mm (0.47 in.)
Rear	14.957 ~ 14.984 mm (0.589 ~ 0.590 in.)	14.88 mm (0.59 in.)
Camshaft Hole Inside Diameter:		
Front	12.000 ~ 12.027 mm (0.472 ~ 0.474 in.)	12.15 mm (0.478 in.)
Rear	15.000 ~ 15.027 mm (0.591 ~ 0.592 in.)	15.15 mm (0.596 in.)
Cam Lever Angle	80° ~ 90°	---

**Special Tools**

**Inside Circlip Pliers:**  
**57001-143**



**Jack:**  
**57001-1238**



## 11-8 BRAKES

### Brake Lever and Cable

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#### ***Brake Lever Free Play Inspection***

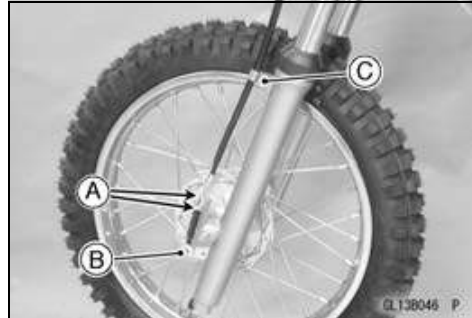
- Refer to the Brake Lever Free Play Inspection in the Periodic Maintenance chapter.

#### ***Brake Lever Free Play Adjustment***

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

#### ***Brake Cable Removal***

- Free the brake cable from the lever.
- Loosen:
  - Front Brake Adjusting Nuts [A]
- Remove:
  - Brake Cable Lower End [B]
  - Bolt [C]
- Pull the brake cable out of the frame.



#### ***Brake Cable Installation***

- Installation is the reverse of the removal.
- Run the brake cable according to the Cable, Wire, and Hose Routing section in the Appendix chapter.
- Adjust the brake lever free play (see Brake Lever Free Play Adjustment in the Periodic Maintenance chapter).

#### ***Brake Cable Lubrication***

- Whenever the brake cable is removed or in accordance with the Periodic Maintenance Chart, lubricate the cable. Refer to the Lubrication in the Periodic Maintenance chapter.

## Brake Pedal and Rod

### **Brake Pedal Free Play Inspection**

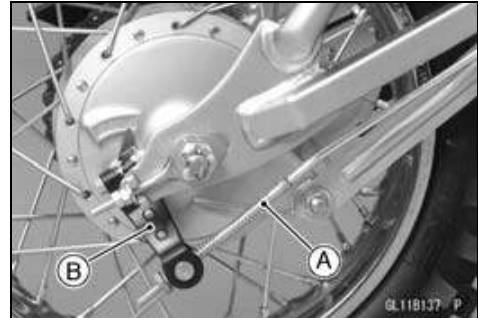
- Refer to Brake Pedal Free Play Inspection in the Periodic Maintenance chapter.

### **Brake Pedal Free Play Adjustment**

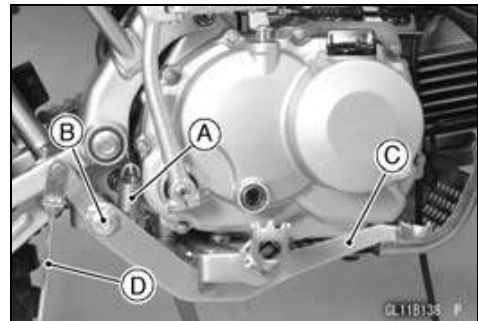
- Refer to Brake Pedal Free Play Adjustment in the Periodic Maintenance chapter.

### **Brake Pedal and Rod Removal**

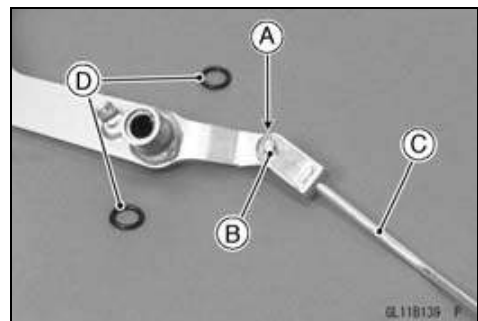
- Remove the brake rod [A] end from the brake cam lever [B] (see Rear Wheel Removal in the Wheels/Tires chapter).



- Remove:
  - Brake Pedal Return Spring [A]
  - Brake Pedal Mounting Bolt [B]
  - Brake Pedal [C] with Rod [D]



- Remove:
  - Cotter Pin [A]
  - Washer
  - Pin [B]
  - Brake Rod [C]
  - O-rings [D]

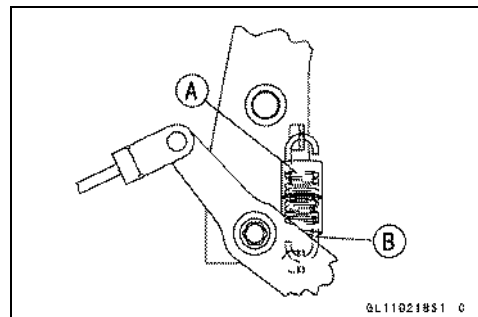


### **Brake Pedal and Rod Installation**

- Installation is the reverse of removal.
- Replace the cotter pin and O-rings with new ones.
- Apply multi purpose grease to the pedal pivot and O-rings.
- Before installing the brake pedal, set in the return spring each end to the brake pedal.
- Install the return spring [A] so that its long hook portion [B] faces downward.
- Tighten:

**Torque - Brake Pedal Mounting Bolt: 8.8 N-m (0.90 kgf-m, 78 in-lb)**

- Adjust the brake pedal free play (see Brake Pedal Free Play Adjustment in the Periodic Maintenance chapter).



## 11-10 BRAKES

### Brake Panel and Drum

#### ***Brake Lining Wear Inspection***

- Refer to Brake Lining Wear Inspection in the Periodic Maintenance chapter.

#### ***Cam Lever Angle Inspection***

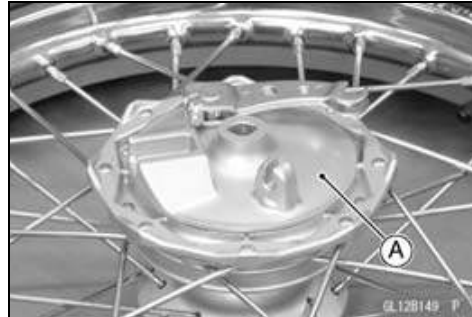
- Refer to Cam Lever Angle Inspection in the Periodic Maintenance chapter.

#### ***Cam Lever Angle Adjustment***

- Refer to Cam Lever Angle Adjustment in the Periodic Maintenance chapter.

#### ***Brake Panel Removal***

- Remove the front or rear wheel (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Separate the brake panel [A] from the wheel.



#### ***Brake Panel Installation***

- Place the brake panel in the drum and install the front or rear wheel (see Front/Rear Wheel Installation in the Wheels/Tires chapter).
- Adjust the brake lever and pedal free play (see Brake Lever/Pedal Free Play Adjustment in the Periodic Maintenance chapter).

#### ***Brake Panel Disassembly***

##### **Front Brake Panel:**

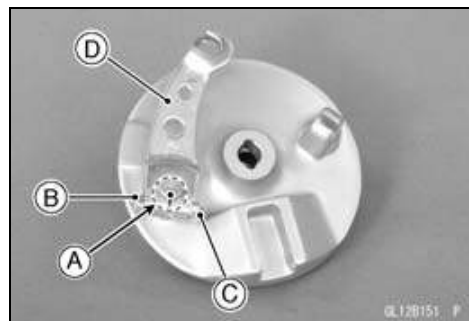
- Remove:
  - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  - Brake Panel (see Brake Panel Removal)
- Using a clean cloth around the linings to prevent grease or oil from getting on them, remove and install the brake shoes [A] by pulling up on the center of the linings.





## Brake Panel and Drum

- Mark the position [A] of the cam lever before removal so that it can be installed later in the same position.
- Remove the brake cam lever bolt [B] and nut [C], and then pull out the brake cam lever [D] from the brake camshaft.
- Pull out the brake camshaft from the brake panel inside.

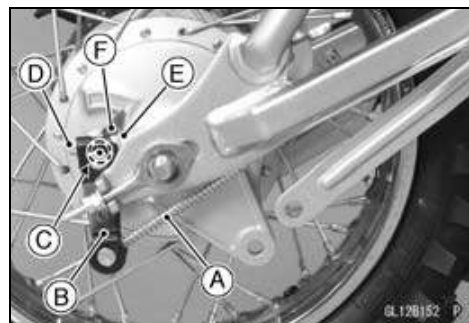


### Rear Brake Panel:

#### NOTICE

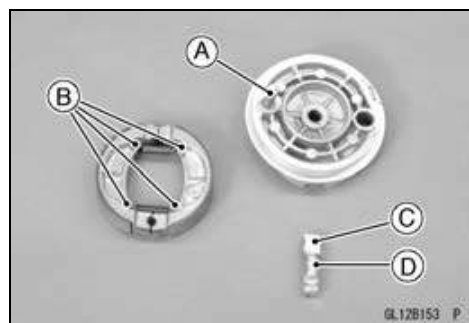
**Do not depress the brake pedal deeply in order to separate the brake rod from the brake cam lever joint, this may extend the brake spring beyond its allowable spring extension. Rotate the rear brake panel clockwise as far as it will go with the brake rod inserted into the brake cam lever joint, then depress the brake pedal lightly, the brake rod will be separated from the brake cam lever joint.**

- Remove the brake rod [A] end from the brake cam lever [B] (see Rear Wheel Removal in the Wheels/Tires chapter).
- Mark the position [C] of the cam lever before removal so that it can be installed later in the same position.
- Remove the brake cam lever bolt [D] and nut [E], and then pull out the brake cam lever from the brake camshaft.
- Remove the indicator [F].
- Remove:
  - Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  - Brake Panel (see Brake Panel Removal)
- Remove and install the brake shoes by referring to the front brake panel disassembly.
- Pull out the brake camshaft from the brake panel inside.



### Brake Panel Assembly

- Wipe off any oil grease from the various areas of the brake panel.
- Apply thin coat of grease:
  - Anchor Pin [A]
  - Shoe Spring (both ends) [B]
  - Camshaft cam face [C]
  - Camshaft shaft portion [D]
- Do not allow grease to come in contact with the lining of the brake shoes.
- Wipe off any excess grease.



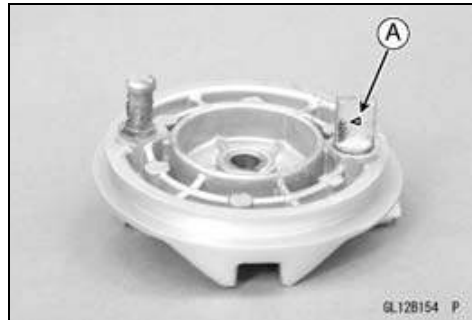
## 11-12 BRAKES

### Brake Panel and Drum

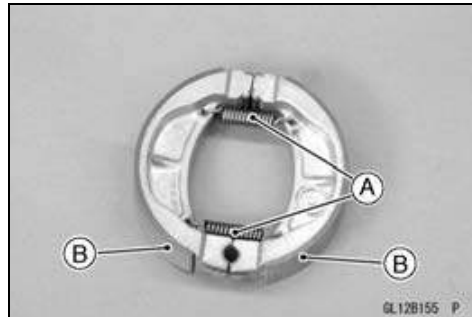
- Face the triangle mark [A] on the cam surface towards the center of the panel and install the camshaft in the panel.

#### **⚠ WARNING**

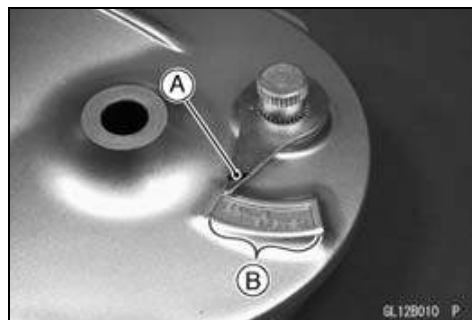
**Ineffective brakes can cause a serious accident resulting in serious injury death. Improper installation will cause ineffective braking. Be sure the brake components are properly installed.**



- Install the shoe springs [A] as shown.
- Install the brake shoes, making sure that grease does not come in contact with the lining [B].

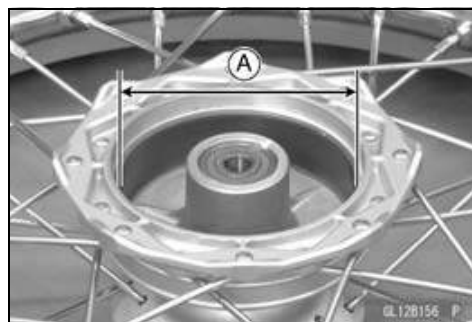


- Install the O-ring and fit the indicator [A] on the serration so that it points to the extreme right of the USABLE RANGE [B] (rear brake panel only).
- Install the cam lever in its original position by aligning it with the mark.
- Tighten:
  - Torque - Brake Cam Lever Bolt: 7.0 N·m (0.71 kgf·m, 62 in·lb) (rear brake panel only)**
- Install the removed parts (see appropriate chapters).



#### **Brake Drum Wear Inspection**

- ★ If the drum is worn unevenly or if it is scored, turn the drum down on a brake drum lathe or replace the hub with a new one (Do not turn it down to the service limit, and do not turn it down if any diameter measurement exceeds the service limit).
- Measure the inside diameter [A] of the brake drum. Since uneven drum wear will decrease braking effectiveness, take measurement at a minimum of two places.
- ★ If any diameter measurement exceeds the service limit, replace the hub with a new one.



#### **Brake Drum Inside Diameter**

##### **Standard:**

Front	90.000 ~ 90.087 mm (3.543 ~ 3.547 in.)
Rear	110.000 ~ 110.087 mm (4.331 ~ 4.334 in.)

##### **Service Limit:**

Front	90.75 mm (3.57 in.)
Rear	110.75 mm (4.36 in.)

#### **Brake Shoe Lining Wear Inspection**

- Refer to the Brake Shoe Lining Wear Inspection in the Periodic Maintenance Chart.

## Brake Panel and Drum

### Camshaft Wear Inspection

- Measure the shaft diameter [A].
- ★ If it is worn down to less than the service limit, replace the shaft.
- Measure the inside diameter [B] of the camshaft hole.
- ★ If it is worn past the service limit, replace the brake panel.

#### Camshaft Diameter

##### Standard:

Front	11.957 ~ 11.984 mm (0.471 ~ 0.472 in.)
Rear	14.957 ~ 14.984 mm (0.589 ~ 0.590 in.)

##### Service Limit:

Front	11.88 mm (0.47 in.)
Rear	14.88 mm (0.59 in.)

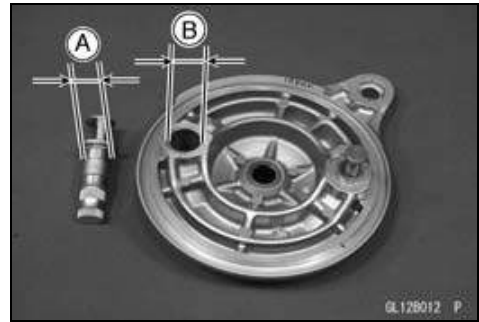
#### Camshaft Hole Inside Diameter

##### Standard:

Front	12.000 ~ 12.027 mm (0.472 ~ 0.474 in.)
Rear	15.000 ~ 15.027 mm (0.591 ~ 0.592 in.)

##### Service Limit:

Front	12.15 mm (0.478 in.)
Rear	15.15 mm (0.596 in.)



### Brake Shoe Springs Inspection

- Visually inspect the brake shoe springs for breaks or distortion.
- ★ If the springs are damaged in any way, replace them.
- Measure the free length [A] of the brake shoe springs.
- ★ If either is stretched beyond the service limit, replace both springs.

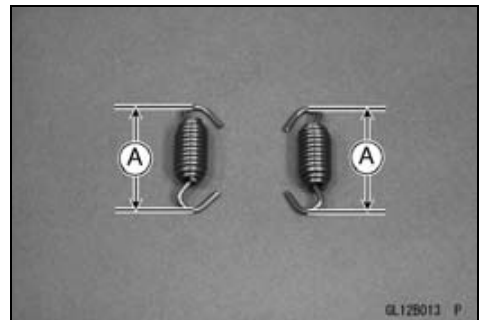
#### Brake Shoe Springs Inspection

##### Standard:

Front	30.8 ~ 31.2 mm (1.21 ~ 1.23 in.)
Rear	32.5 mm (1.28 in.)

##### Service Limit:

Front	32.6 mm (1.28 in.)
Rear	34.1 mm (1.34 in.)



### Brake Panel Lubrication

- Refer to Brake Panel Lubrication in the Periodic Maintenance chapter.



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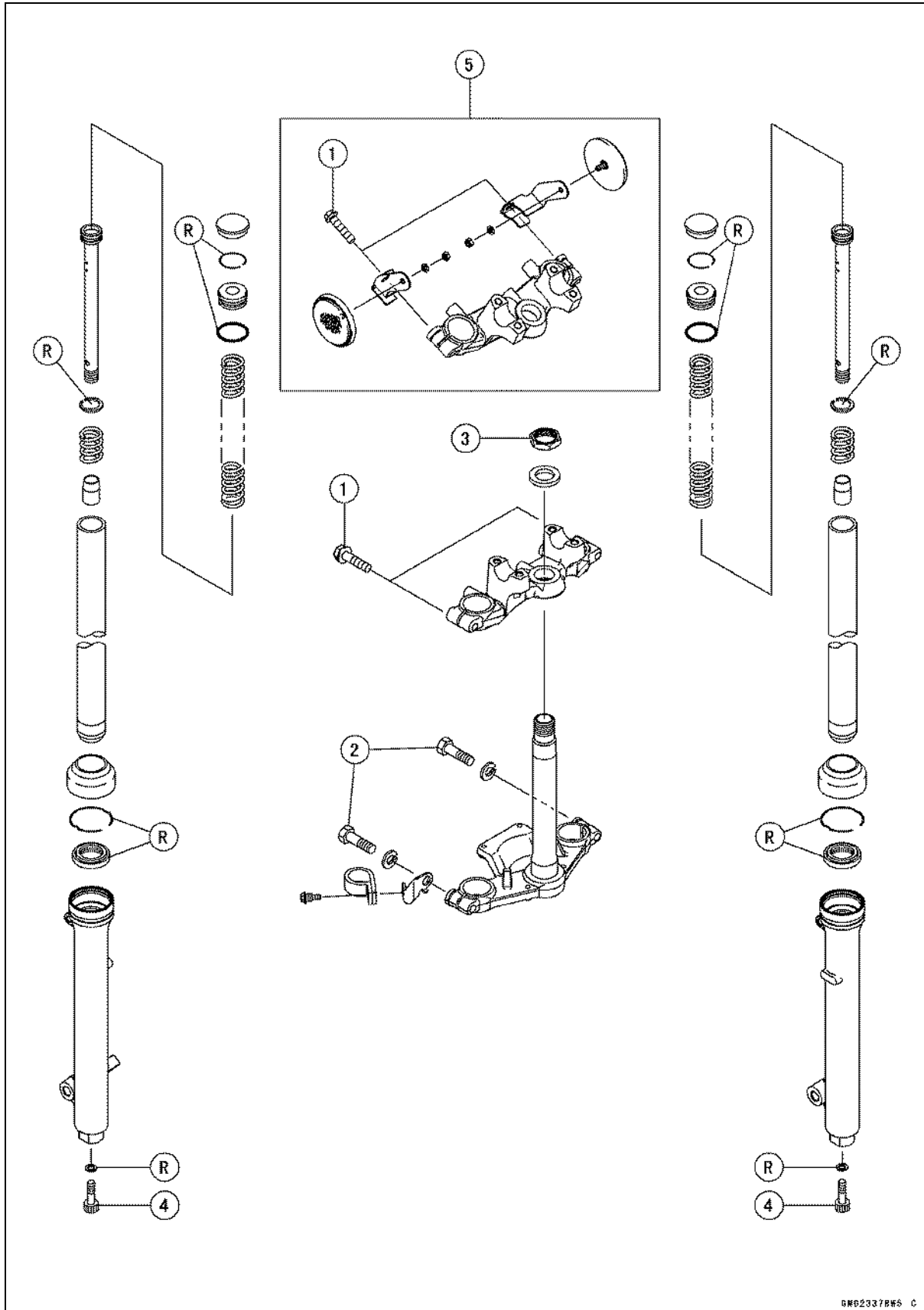
# Suspension

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# 12-2 SUSPENSION

## Exploded View



0M02337BWS C

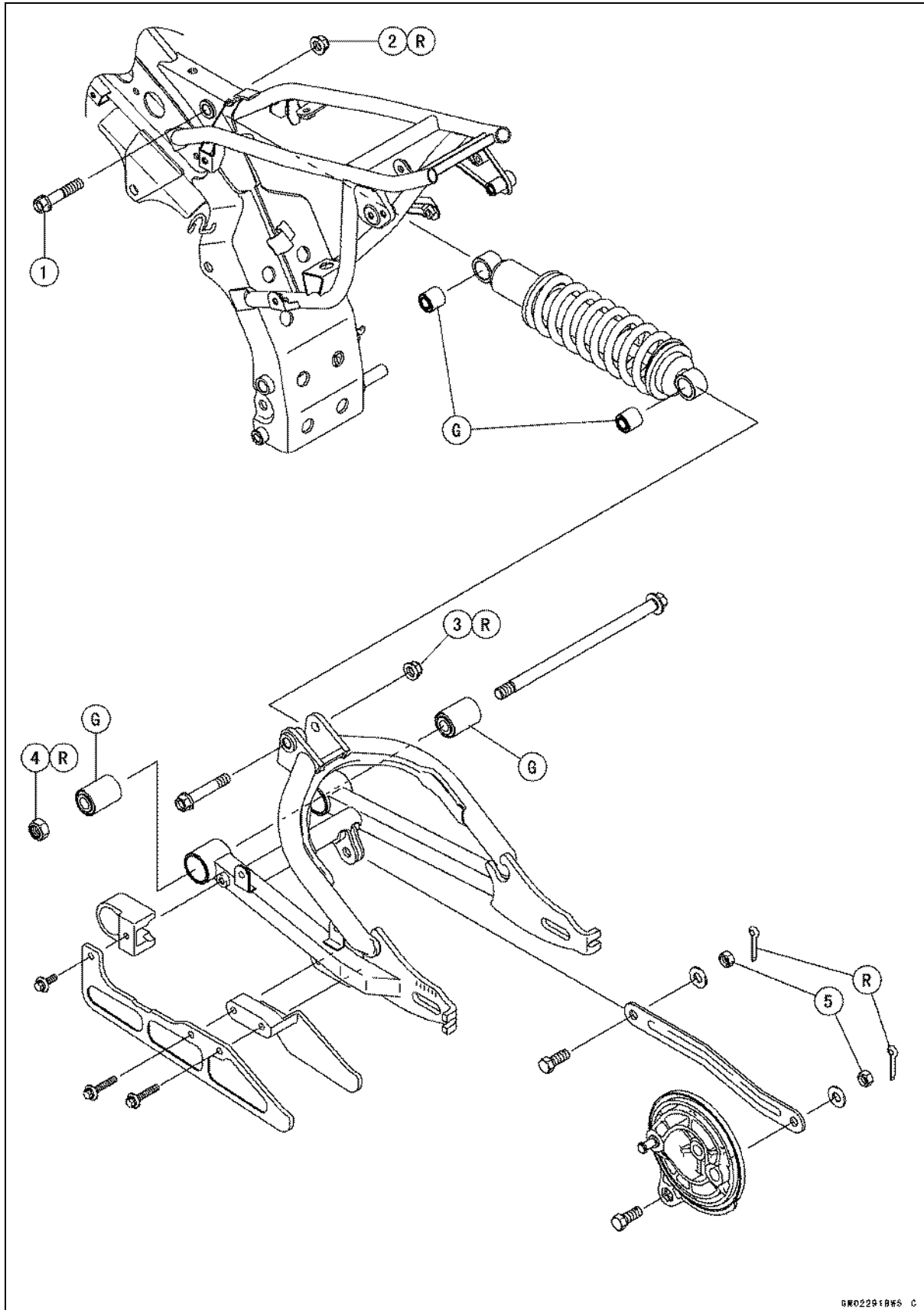
**Exploded View**

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Clamp Bolts (Upper)	20	2.0	15	
2	Front Fork Clamp Bolts (Lower)	30	3.1	22	
3	Steering Stem Head Nut	44	4.5	32	
4	Fork Bottom Bolts	20	2.0	15	

5. CA model only  
 R: Replacement Parts

# 12-4 SUSPENSION

## Exploded View



0R02291BWS C



**Exploded View**

No.	Fastener	Torque			Remarks
		N-m	kgf-m	ft-lb	
1	Rear Shock Absorber Mounting Bolt (Upper)	39	4.0	29	
2	Rear Shock Absorber Mounting Nut (Upper)	39	4.0	29	R
3	Rear Shock Absorber Mounting Nut (Lower)	39	4.0	29	R
4	Swingarm Pivot Nut	78	8.0	58	R
5	Torque Link Nuts	25	2.5	18	

G: Apply grease.

R: Replacement Parts

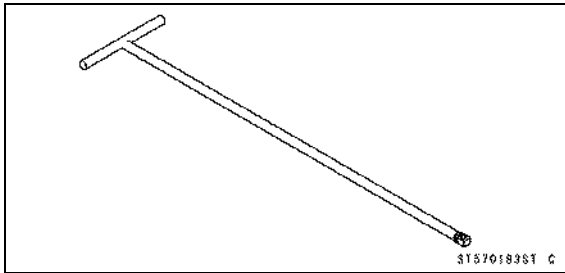
## 12-6 SUSPENSION

### Specifications

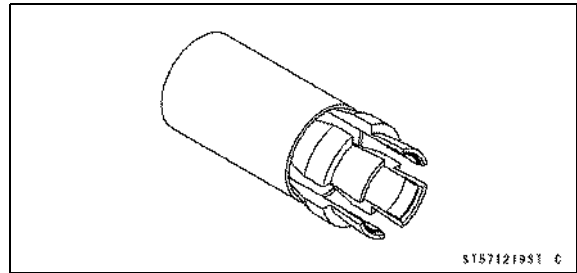
Item	Standard	Service Limit
<b>Front Fork</b>		
Air Pressure	Atmospheric pressure	---
Rebound Damping Adjustment	Non-Adjustable	---
Compression Damping Adjustment	Non-Adjustable	---
Suspension Oil	Kawasaki SS-8 or equivalent	---
Amount	(KLX110C) 165 ±2.5 mL (5.58 ±0.085 US oz)	---
	(KLX110D) 182 ±2.5 mL (6.15 ±0.085 US oz)	---
Level	(KLX110C) 85 ±2 mm (3.35 ±0.08 in.)	---
(fully compressed, without spring)	(KLX110D) 118 ±2 mm (4.65 ±0.08 in.)	---
Fork Spring Free Length	(KLX110C) 442.7 mm (17.43 in.)	433.8 mm (17.08 in.)
	(KLX110D) 498.9 mm (19.64 in.)	488.9 mm (19.25 in.)
<b>Rear Shock Absorber</b>		
Gas Pressure	980 kPa (10 kgf/cm <sup>2</sup> , 142 psi)	---

Special Tools

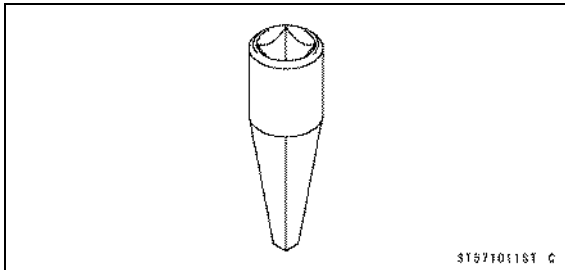
Fork Cylinder Holder Handle:  
57001-183



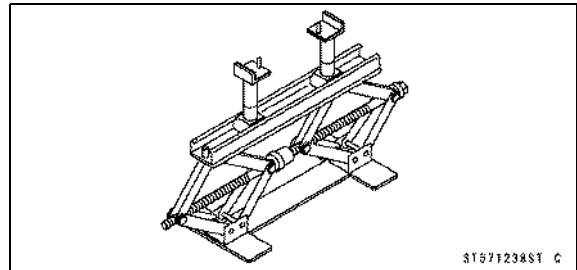
Front Fork Oil Seal Driver:  
57001-1219



Fork Cylinder Holder Adapter:  
57001-1011



Jack:  
57001-1238



## 12-8 SUSPENSION

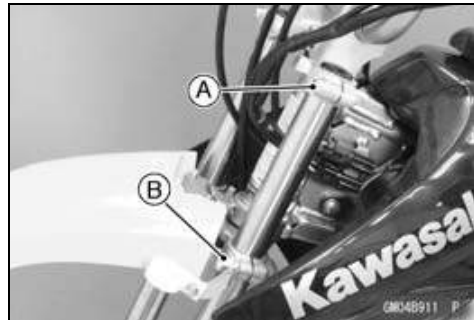
### Front Fork

#### **Front Fork Oil Change**

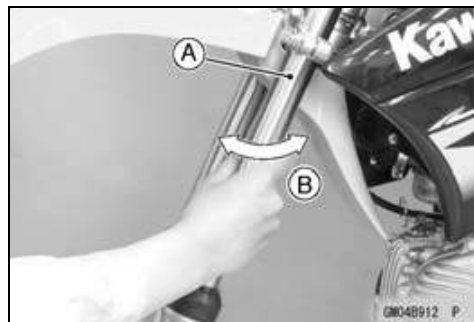
- Refer to the Front Fork Oil Change in the Periodic Maintenance chapter.

#### **Front Fork Removal**

- Remove:
  - Number Plate (see Number Plate Removal in the Frame chapter)
  - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
- Loosen the upper [A] and lower [B] fork clamp bolts.



- Pull out to downward the fork leg [A] with a twisting motion [B].



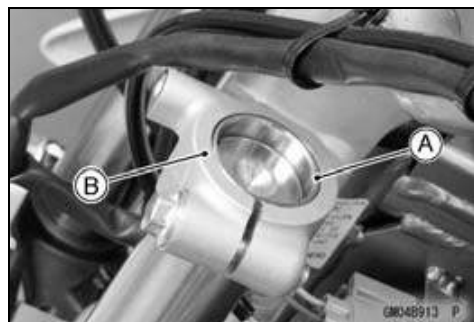
#### **Front Fork Installation**

- Install the fork, aligning the top end [A] of the inner tube with the upper surface [B] of the steering stem head.
- Route the cables and hose according to the Cable, Harness and Hose Routing section in the Appendix chapter.
- Install the front wheel (see Front Wheel Installation in the Wheels/Tires chapter).
- Tighten the fork clamp bolts.

**Torque - Front Fork Clamp Bolt (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)**

**Front Fork Clamp Bolt (Lower): 30 N·m (3.1 kgf·m, 22 ft·lb)**

- Install the other removed parts (see appropriate chapters).
- Check the front brake operation after installation.



## Front Fork

### Front Fork Disassembly (each fork leg)

- Remove the cap.
- Loosen the front fork upper clamp bolt [A].
- Remove the snap ring [B] while pressing the top plug [C], and then remove the top plug with O-ring.
- Remove the front fork (see Front Fork Removal).
- Thoroughly clean the fork before disassembly.

#### NOTICE

Be careful not scratch the inner tube and not to damage the dust seal.

Avoid scratching or damaging the inner tube or the dust seal. Use a mild detergent and sponge out dirt with plenty of water.

- Remove:
  - Fork Spring
  - Dust Seal
- Drain the fork oil [A] with the fork upside down.

#### NOTE

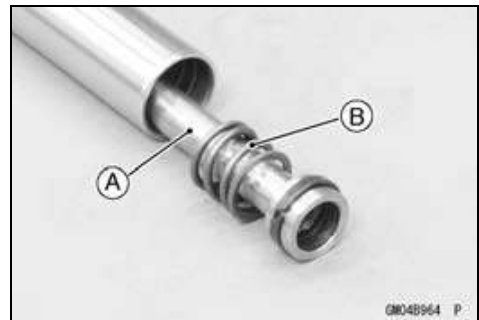
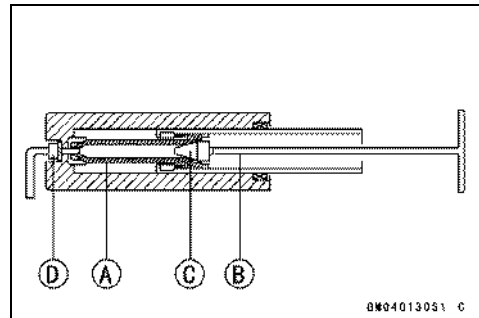
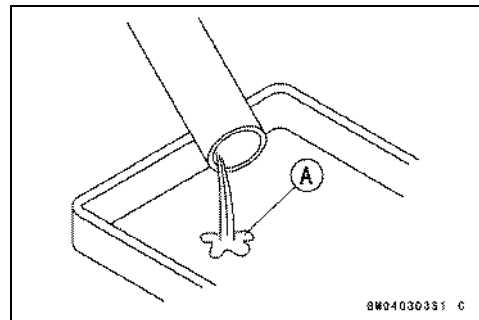
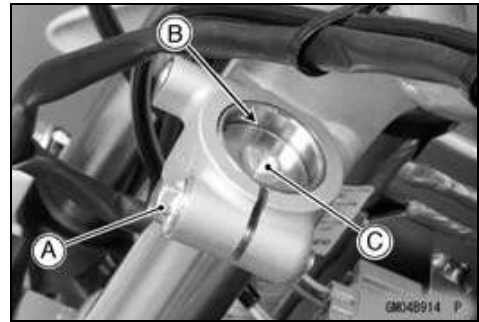
○ Pump the fork tube several times to discharge the oil.

- Hold the outer tube horizontally in a vice.
- Stop the cylinder [A] from turning by using the fork cylinder holder handle [B] and adapter [C].

**Special Tools - Fork Cylinder Holder Handle: 57001-183**

**Fork Cylinder Holder Adapter: 57001-1011**

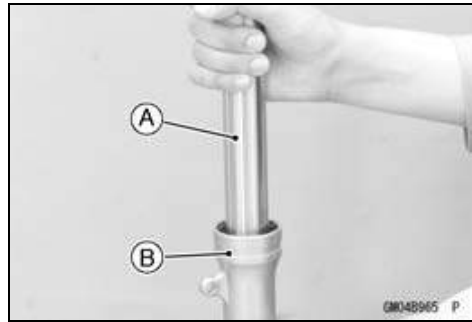
- Unscrew the Allen bolt [D], then take out the bolt and gas-ket from the bottom of the outer tube.
- Remove the cylinder unit [A] and spring [B] from the fork.



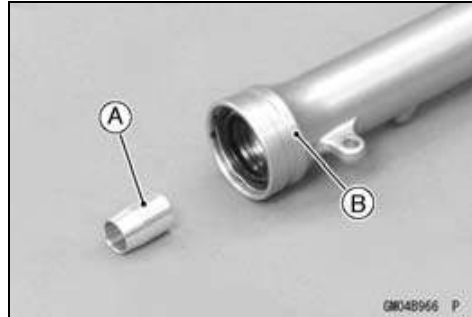
## 12-10 SUSPENSION

### Front Fork

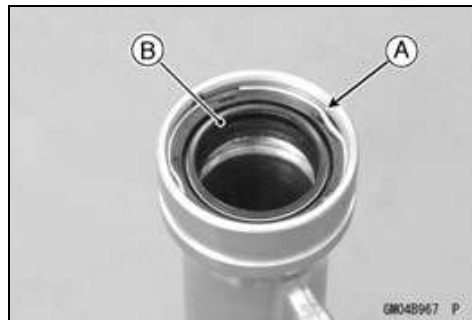
- Separate the inner tube [A] from the outer tube [B] by pulling them out.



- Take the cylinder base [A] out of the outer tube [B].



- Remove the retaining ring [A] from the outer tube.
- Remove the oil seal [B], using a standard tip screwdriver if necessary.

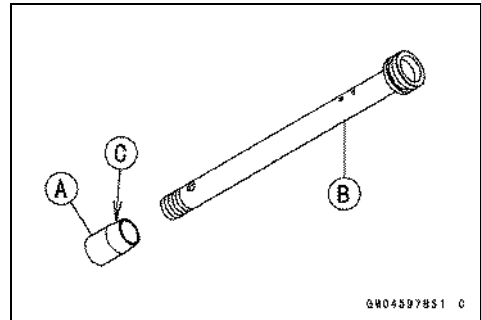


### **Front Fork Assembly**

- When the fork tubes are not disassembled, hold the fork inverted position for more than 20 minutes to allow the fork oil to fully drain.
- Assembly is the reverse of disassembly.
- Replace the following parts removed with a new one.
  - Retaining Ring
  - Oil Seal
  - Bottom Allen Bolt Washer
- Inspect the following and replace them with new ones if damaged.
  - Inner Tube (see Inner Tube Inspection)
  - Top Plug O-ring
- Insert the cylinder unit and spring in the inner tube.

**Front Fork**

- Insert the cylinder base [A] in the cylinder unit [B].
- The cylinder base must be installed with the tapered side [C] facing upward.
- Insert the inner tube and cylinder unit as a set into the outer tube.



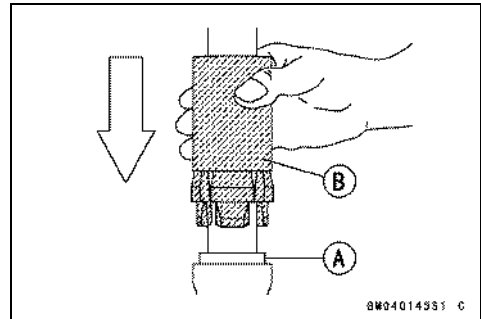
- Apply a non-permanent locking agent to the bottom Allen bolt and tighten it to the specified torque, using the front fork cylinder holder.

**Torque - Fork Bottom Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)**

**Special Tools - Fork Cylinder Holder Handle: 57001-183**  
**Fork Cylinder Holder Adapter: 57001-1011**

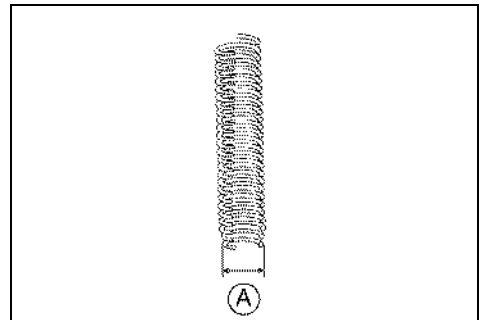
- Install the oil seal [A] by tapping with the fork oil seal driver [B] until it stops.

**Special Tool - Fork Oil Seal Driver: 57001-1219**



- Install the following.
  - Retainer
  - Dust Seal

- Measure the both diameters of the fork spring ends and insert the fork spring with the small diameter end [A] facing down.



- Fill the fork oil (see Front Fork Oil Change in the Periodic Maintenance chapter).
- Install the fork legs (see Front Fork Installation).

## 12-12 SUSPENSION

### Front Fork

#### Inner Tube Inspection

- Visually inspect the inner tube [A].
- ★ If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.

#### NOTICE

If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

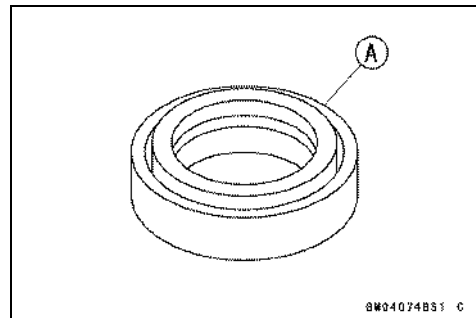
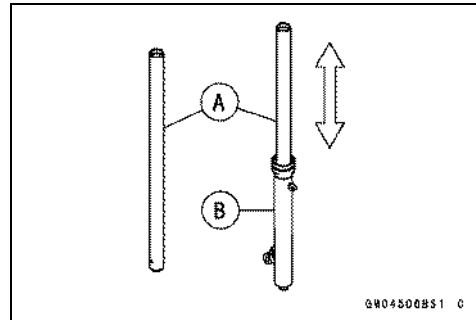
- Temporarily assemble the inner and outer [B] tubes, and pump them back and forth manually to check for smooth operation.
- ★ If you feel binding or catching, the inner and outer tubes must be replaced.

#### ⚠ WARNING

A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

#### Oil Seal Inspection

- Replace the oil seal [A] with a new one whenever it has been removed.



#### Spring Tension Inspection

- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.
- ★ If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced from motorcycle stability.

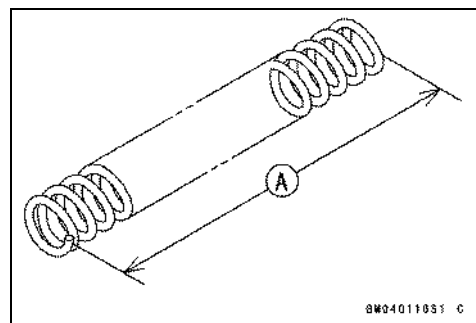
#### Spring Free Length

##### Standard:

KLX110C Models	442.7 mm (17.43 in.)
KLX110D Models	498.9 mm (19.64 in.)

##### Service Limit:

KLX110C Models	433.8 mm (17.08 in.)
KLX110D Models	488.9 mm (19.25 in.)





## Rear Shock Absorber

### ***Rear Shock Absorber Removal***

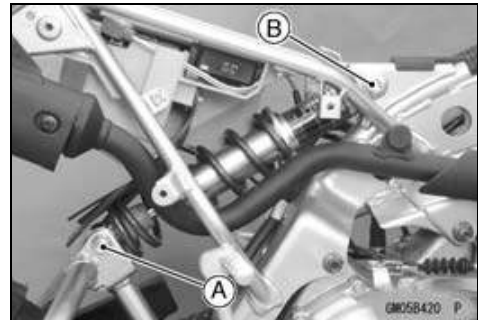
- Remove:
  - Seat (see Seat Removal in the Frame chapter)
  - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
- Raise the rear wheel off the ground with the jack.

**Special Tool - Jack: 57001-1238**

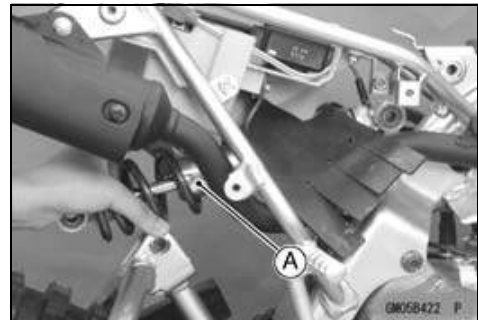
### **NOTICE**

**When pulling out the mounting bolts, lift the rear wheel slightly. Forcing or tapping on a bolt could damage the bolt, sleeve and bearing.**

- Remove:
  - Rear Shock Absorber Mounting Nut [A] and Bolt (Lower)
  - Rear Shock Absorber Mounting Nut [B] and Bolt (Upper)



- Remove the rear shock absorber [A] backward.

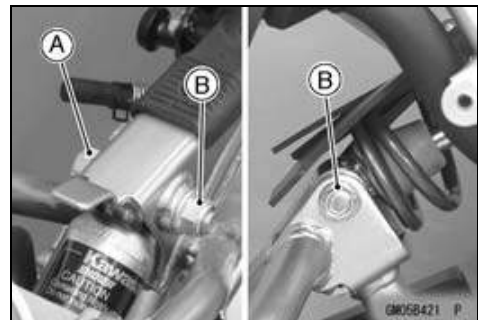


### ***Rear Shock Absorber Installation***

- Installation is the reverse of removal; note the following.
- Replace the rear shock absorber mounting nuts [B] with new ones.
- Tighten:

**Torque - Rear Shock Absorber Mounting Bolt (Upper) [A]:**  
 39 N·m (4.0 kgf·m, 29 ft·lb)

**Rear Shock Absorber Mounting Nuts: 39 N·m (4.0 kgf·m, 29 ft·lb)**

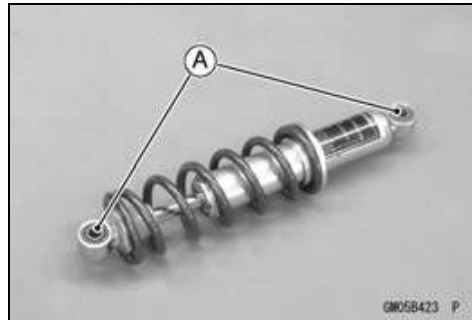


## 12-14 SUSPENSION

### Rear Shock Absorber

#### **Rear Shock Absorber Inspection**

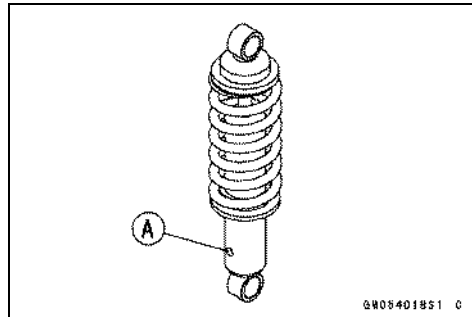
- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
  - Oil Leakage
  - Crack or Dent
- ★ If there is any damage to the rear shock absorber, replace it.
- Visually inspect the rubber bushings [A].
- ★ If it show any signs of damage, replace it.



#### **Rear Shock Absorber Scrapping**

##### **⚠ WARNING**

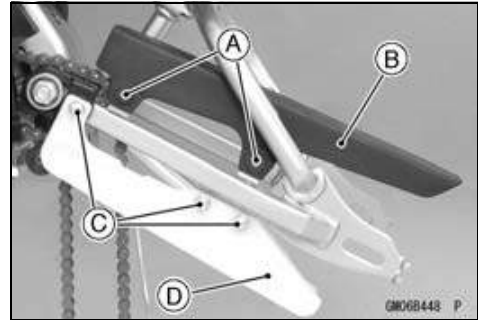
Since the rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode. Before a rear shock absorber is scrapped, drill a hole at the point [A] shown to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may blow out bits of drilled metal when the hole opens.



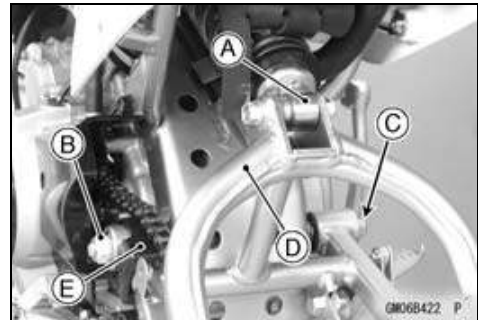
## Swingarm

### Swingarm Removal

- Raise the rear wheel off the ground with the jack.  
**Special Tool - Jack: 57001-1238**
- Remove:  
 Drive Chain (see Drive Chain Removal in the Final Drive chapter)  
 Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
- Remove:  
 Drive Chain Cover Bolts [A]  
 Drive Chain Cover [B]  
 Drive Chain Guide Bolts [C]  
 Drive Chain Guide [D]



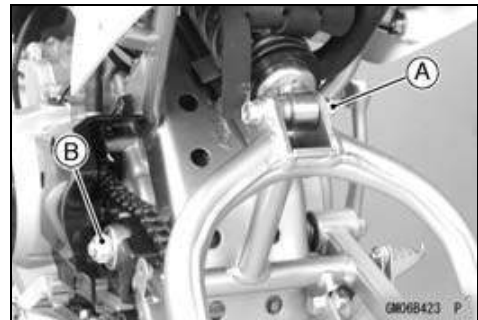
- Remove:  
 Rear Shock Absorber Lower End [A] (see Rear Shock Absorber Removal)  
 Swingarm Pivot Shaft Nut [B]
- Pull out the Swingarm pivot shaft [C] and remove the swingarm [D] backward.
- Remove the chain slipper [E] from the swingarm.



### Swingarm Installation

- Installation is the reverse of removal.
- Replace the rear shock absorber mounting nut [A] and swingarm pivot shaft nut [B] with new ones.
- Tighten the pivot shaft nut after installing the rear shock absorber.

**Torque - Rear Shock Absorber Mounting Nut: 39 N·m (4.0 kgf·m, 29 ft·lb)**  
**Swingarm Pivot Shaft Nut: 78 N·m (8.0 kgf·m, 58 ft·lb)**





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# Steering

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## Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Holder Bolts	25	2.5	18	
2	Steering Stem Head Nut	44	4.5	32	
3	Steering Stem Nut	4.9	0.50	43 in·lb	T
4	Front Fork Clamp Bolts (Upper)	20	2.0	15	
5	Front Fork Clamp Bolts (Lower)	30	3.1	22	

AD: Apply adhesive cement.

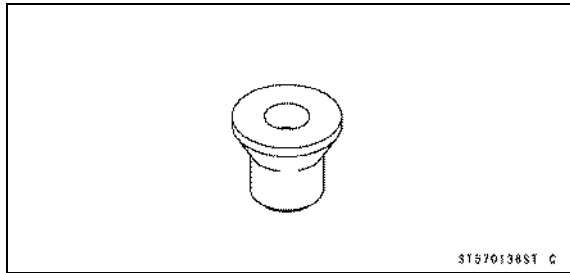
G: Apply grease.

T: First, tighten the stem nut with 39 N·m (4.0 kgf·m, 29 ft·lb) of torque, then loosen it and retighten it with 4.9 N·m (0.50 kgf·m, 43 in·lb) of torque.

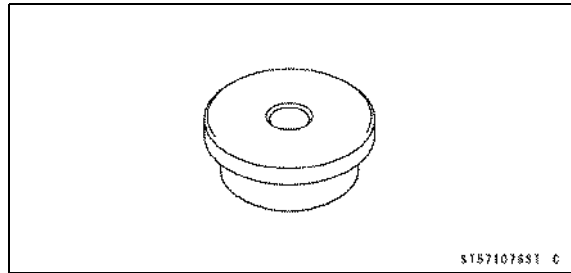
## 13-4 STEERING

### Special Tools

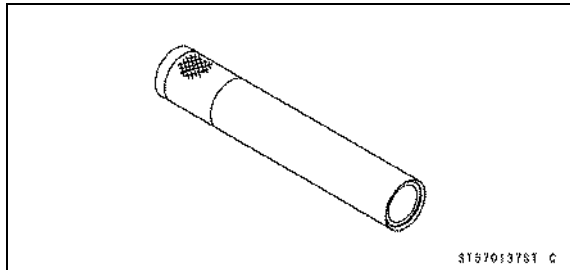
**Bearing Puller Adapter:**  
57001-136



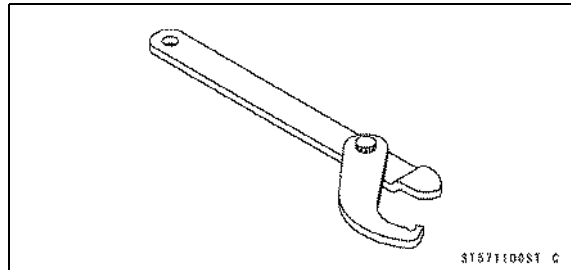
**Head Pipe Outer Race Driver,  $\phi 51.5$ :**  
57001-1076



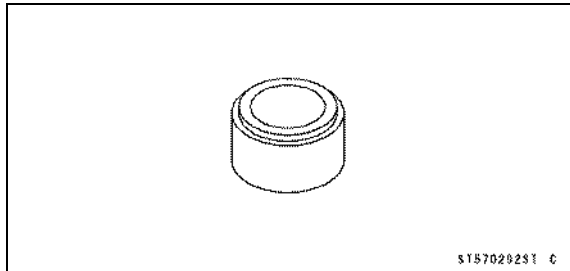
**Steering Stem Bearing Driver:**  
57001-137



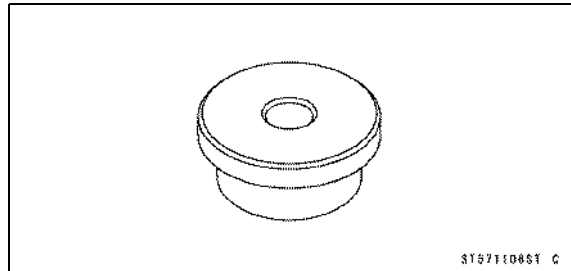
**Steering Stem Nut Wrench:**  
57001-1100



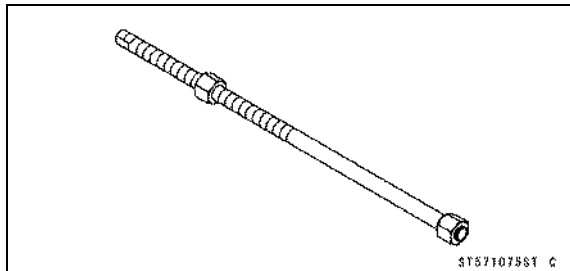
**Steering Stem Bearing Driver Adapter,  $\phi 32$ :**  
57001-292



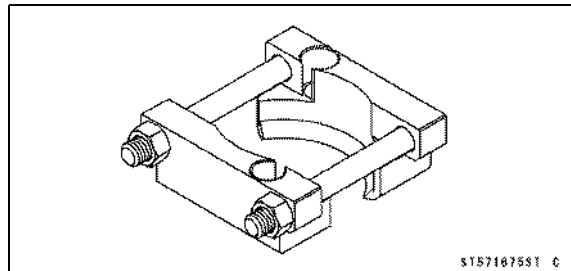
**Head Pipe Outer Race Driver,  $\phi 46.5$ :**  
57001-1106



**Head Pipe Outer Race Press Shaft:**  
57001-1075



**Bearing Puller:**  
57001-1675





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**Steering**

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***Steering Inspection***

- Refer to the Steering Inspection in the Periodic Maintenance chapter.

***Steering Adjustment***

- Refer to the Steering Adjustment in the Periodic Maintenance chapter.

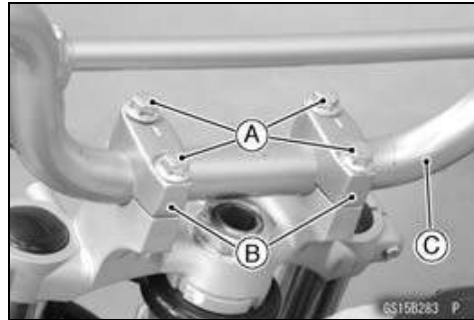
## 13-6 STEERING

### Steering Stem

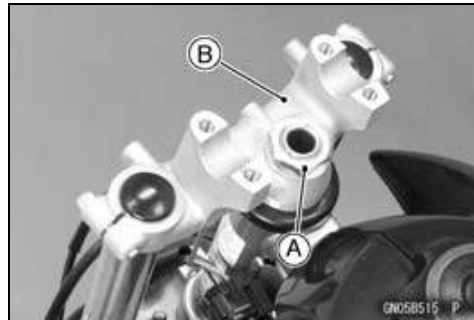
#### **Steering Stem, Stem Bearing Removal**

- Remove:
  - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  - Front Fender (see Front Fender Removal in the Frame chapter)

- Remove:
  - Number Plate (see Number Plate Removal in the Frame chapter)
  - Handlebar Holder Bolts [A]
  - Handlebar Holders [B]
  - Handlebar [C]

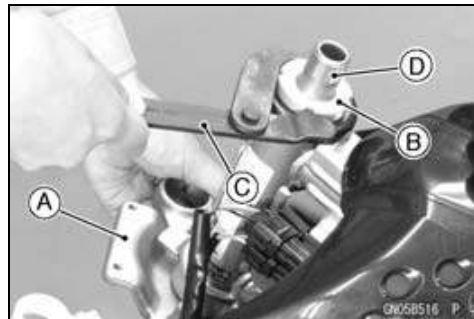


- Loosen the steering stem head nut [A].
- Remove the front fork (see Front Fork Removal in the Suspension chapter).
- Remove the head nut and the steering stem head [B].

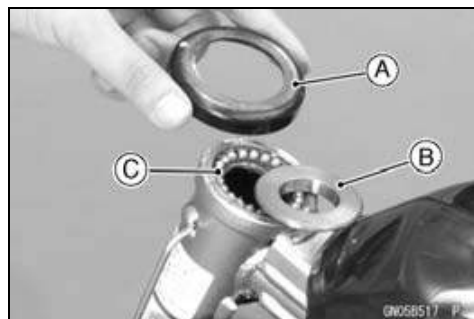


- Pushing up on the stem base [A], and remove the steering stem nut [B] with the steering stem nut wrench [C], then remove the steering stem [D] and stem base.

**Special Tool - Steering Stem Nut Wrench: 57001-1100**



- Remove:
  - Steering Stem Cap [A]
  - Upper Inner Race [B]
  - Steel Balls [C]
- There are 23 steel balls installed in the upper outer race.

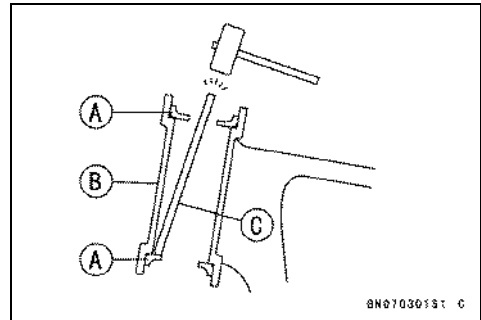


## Steering Stem

- To remove the outer races [A] pressed into the head pipe [B], insert a bar [C] into the head pipe, and hammer evenly around the circumference of the opposite race to drive it out.

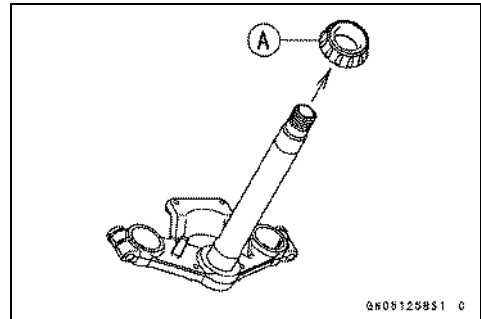
### NOTE

- If either steering stem bearing is damaged, it is recommended that both the upper and lower bearing (including outer races) should be replaced with new ones.



- Remove the lower stem bearing inner race (tapered roller bearing) [A] with its grease seal from the stem using bearing puller.

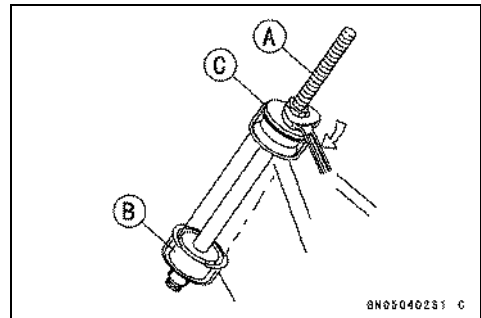
**Special Tools - Bearing Puller: 57001-1675**  
**Bearing Puller Adapter: 57001-136**



### Steering Stem, Stem Bearing Installation

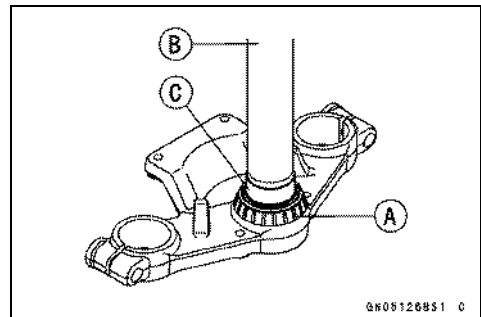
- Replace the bearing outer race with new ones.
- Apply grease to the outer races, and drive them into the head pipe at the same time using the head pipe outer race press shaft [A] and the head pipe outer race drivers.

**Special Tools - Head Pipe Outer Race Press Shaft: 57001-1075**  
**Head Pipe Outer Race Driver,  $\phi 51.5$ : 57001-1076 [B]**  
**Head Pipe Outer Race Driver,  $\phi 46.5$ : 57001-1106 [C]**



- Replace the lower inner races with new ones.
- Apply grease to the lower tapered roller bearing [A], and drive it onto the stem using the steering stem bearing driver [B] and adapter [C].

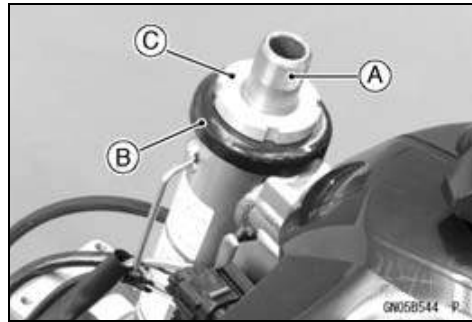
**Special Tools - Steering Stem Bearing Driver: 57001-137**  
**Steering Stem Bearing Driver Adapter,  $\phi 32$ : 57001-292**



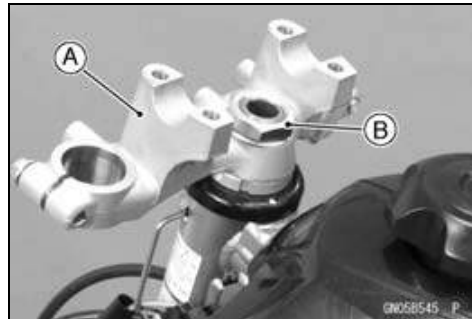
## 13-8 STEERING

### Steering Stem

- Apply grease liberally to the upper outer race in the head pipe so that the steel balls will stick in place during stem insertion, and install upper steel balls.
- Insert the steering stem [A] carefully through the head pipe so that the steel balls on the steering stem does not fall.
- Install the stem cap [B] and steering stem nut [C], and tighten it by hand.



- Install the stem head [A].
- Tighten the stem head nut [B] lightly.



- Settle the bearing in place as follows;
  - Tighten the stem nut to 39 N·m (4.0 kgf·m, 29 ft·lb) of torque. (To tighten the steering stem nut to the specified torque, hook the wrench [A] on the stem nut, and pull the wrench at the hole by 22.2 kg force [B] in the direction shown.)

#### Special Tool - Steering Stem Nut Wrench: 57001-1100

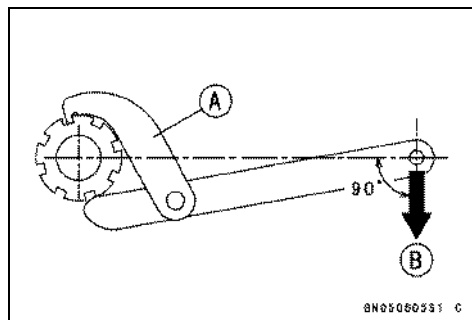
- Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.
- Again back out the stem nut a fraction of a turn until it turns lightly.
- Turn the stem nut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.

#### Torque - Steering Stem Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb)

- Install the front fork (see Front Fork Installation in the Suspension chapter).

#### NOTE

- Tighten the fork upper clamp bolts first, next the stem head nut, last the fork lower clamp bolt.



## Steering Stem

- Tighten:
  - Torque - Steering Stem Head Nut [A]: 44 N·m (4.5 kgf·m, 32 ft·lb)
  - Front Fork Clamp Bolts (Upper) [B]: 20 N·m (2.0 kgf·m, 15 ft·lb)
  - Front Fork Clamp Bolts (Lower) [C]: 30 N·m (3.1 kgf·m, 22 ft·lb)
- Install the other removed parts (see appropriate chapters).

### WARNING

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

- Check and Adjust:
  - Steering
  - Front Brake
  - Clutch Cable (KLX110D Models)
  - Throttle Cable

### **Stem Bearing Lubrication**

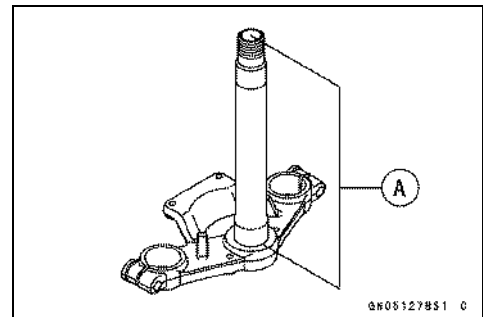
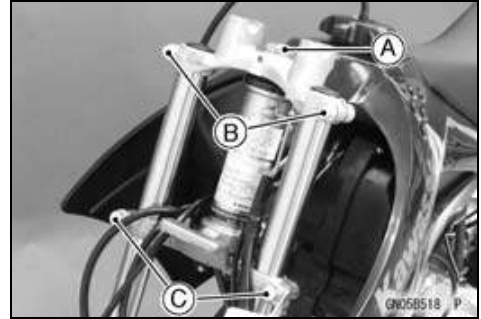
- Refer to the Stem Bearing Lubrication in the Periodic Maintenance chapter.

### **Stem Bearing Inspection**

- Using high flash-point solvent, wipe the bearings clean of grease and dirt.
- Wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Check the upper races and steel balls.
- ★ If the balls or races are worn, or if either race is dented, replace both races and all the balls for that bearing as a set.
- Visually check the lower outer race and tapered roller.
- ★ Replace the bearing assembly if it show damage.

### **Stem Warp Inspection**

- Whenever the steering stem is removed, or if the steering cannot be adjusted for smooth action, check the steering stem for straightness.
- ★ If the steering stem shaft [A] is bent, replace the steering stem.

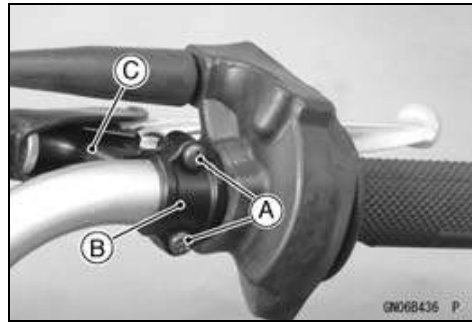


## 13-10 STEERING

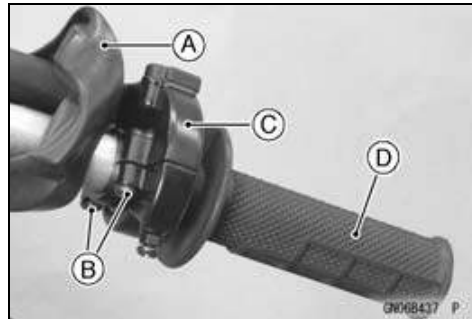
### Handlebar

#### Handlebar Removal

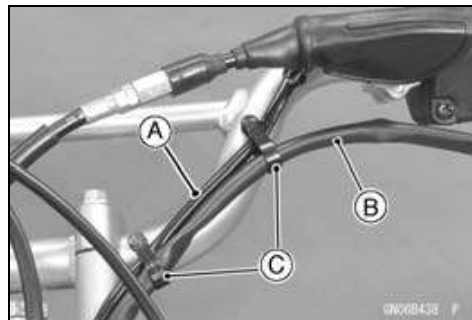
- Remove:
  - Number Plate (see Number Plate Removal in the Frame chapter)
  - Screws [A]
  - Brake Lever Holder [B]
  - Brake Lever Assembly [C]



- Slide out the dust cover [A].
- Loosen the screws [B] and remove the throttle cable housing [C] together with the throttle grip [D] from the handlebar.

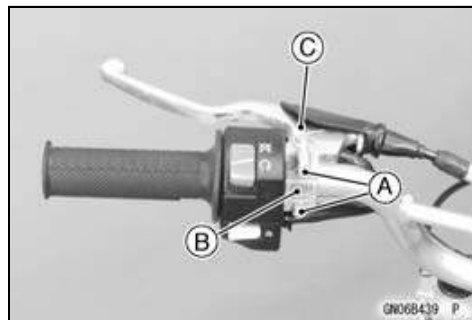


- Free the starter lockout switch lead [A] (KLX110D models only) and left switch housing lead [B] from the clamps [C].

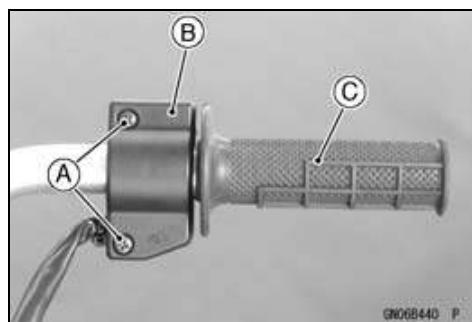


#### KLX110D Models

- Remove:
  - Bolts [A]
  - Clutch Lever Holder [B]
  - Clutch Lever Assembly [C]

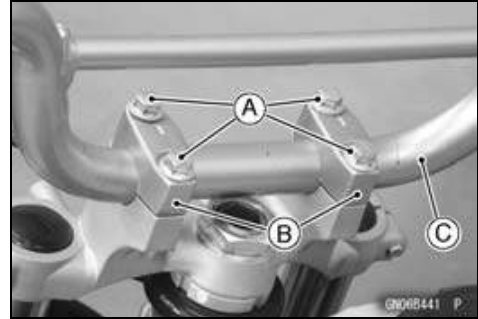


- Remove:
  - Screws [A]
  - Left Switch Housing [B]
  - Left Handlebar Grip [C]



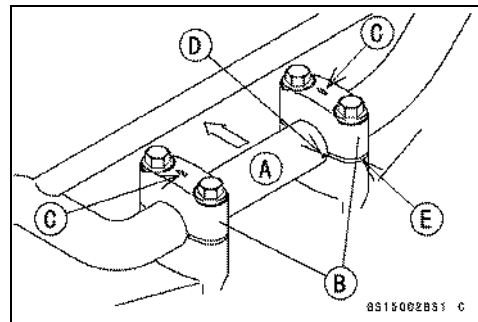
## Handlebar

- Remove:
  - Handlebar Holder Bolts [A]
  - Handlebar Holders [B]
  - Handlebar [C]



### Handlebar Installation

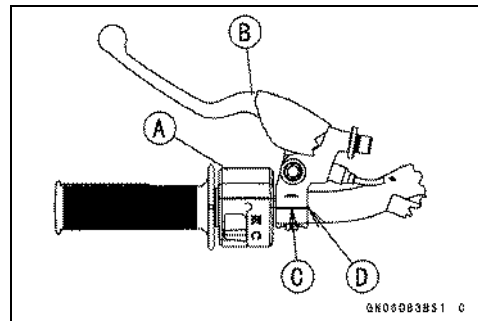
- Apply adhesive to the inside of the left handlebar grip.
- Install the left handlebar grip so that the projection of grip aligns with the punch mark of the handlebar.
- Mount the handlebar holders [B] so that the arrows [C] on the holder point at the front [A].
- Align the punch mark [D] on the handlebar to the mating surface of each holder of handlebar.
- Tighten the holder bolts, front first and then the rear. If the handlebar holder is correctly installed, there will be no gap at the front and a gap [E] at the rear after tightening.
- Tighten the handlebar holder bolts to the specified torque.
  - Torque - Handlebar Holder Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**



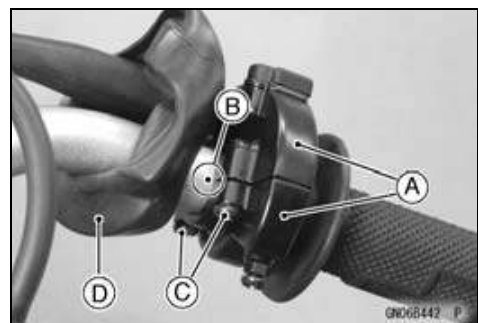
- Install the left switch housing [A].

### KLX110D Models

- Install the clutch lever [B].
- Position the clutch lever so that the mating surface [C] aligns with the punch mark [D] of the handlebar.



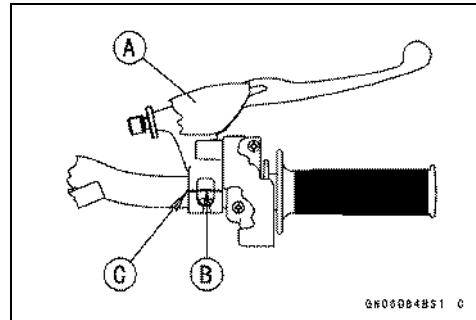
- Install the throttle grip assembly so that the grip is in as far as it will go.
- Position the throttle grip assembly so that the mating surface of the throttle cases [A] aligns with the punch mark [B] of the handlebar, and tighten the screws [C].
- Slip the dust cover [D] back onto place.



## 13-12 STEERING

### Handlebar

- Install the brake lever [A].
- Position the brake lever so that the mating surface [B] aligns with the punch mark [C] of the handlebar.



- Install the number plate (see Number Plate Installation in the Frame chapter).
- Route the cables and leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



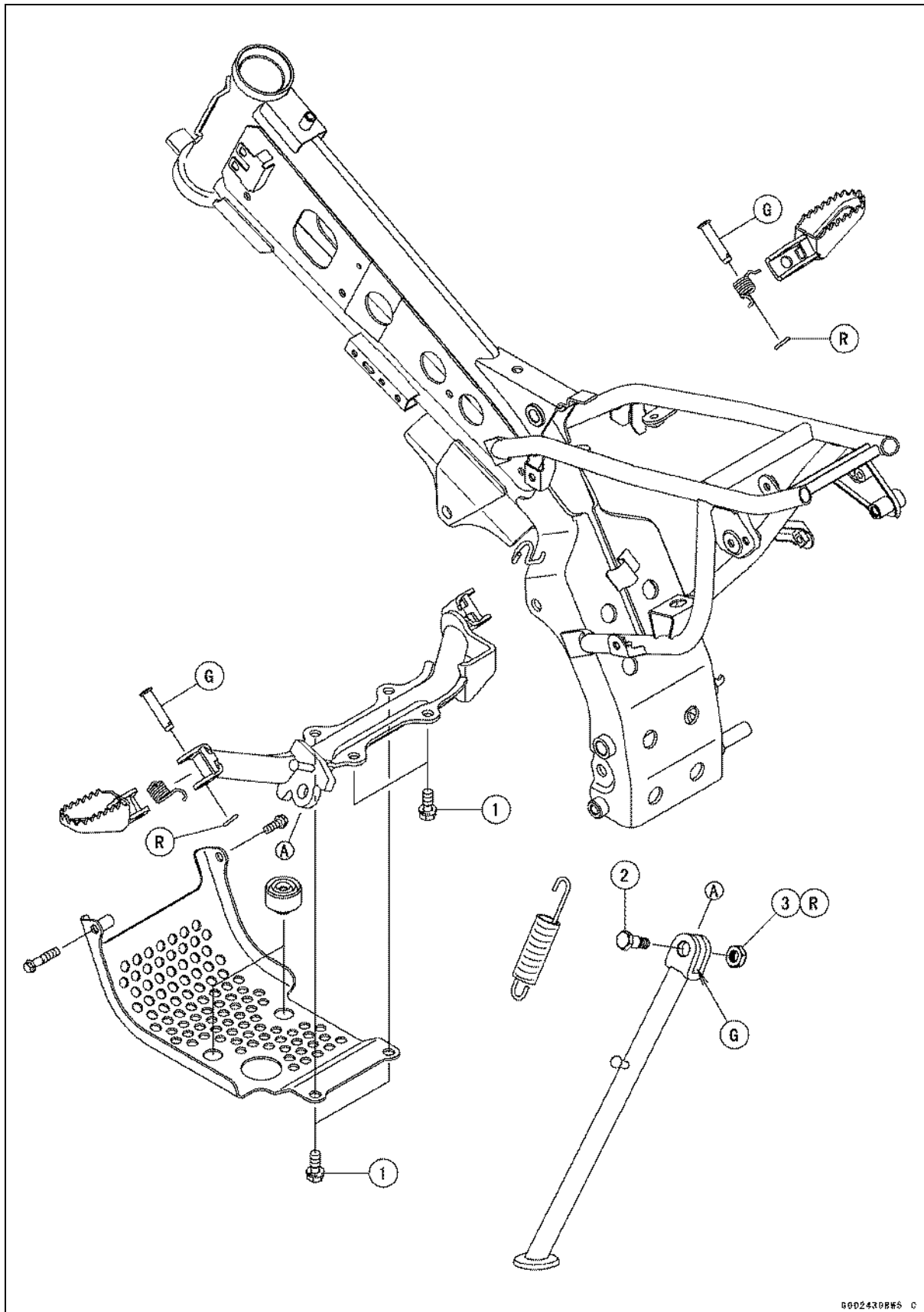
# Frame

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# 14-2 FRAME

## Exploded View



0002430BWS C

**Exploded View**

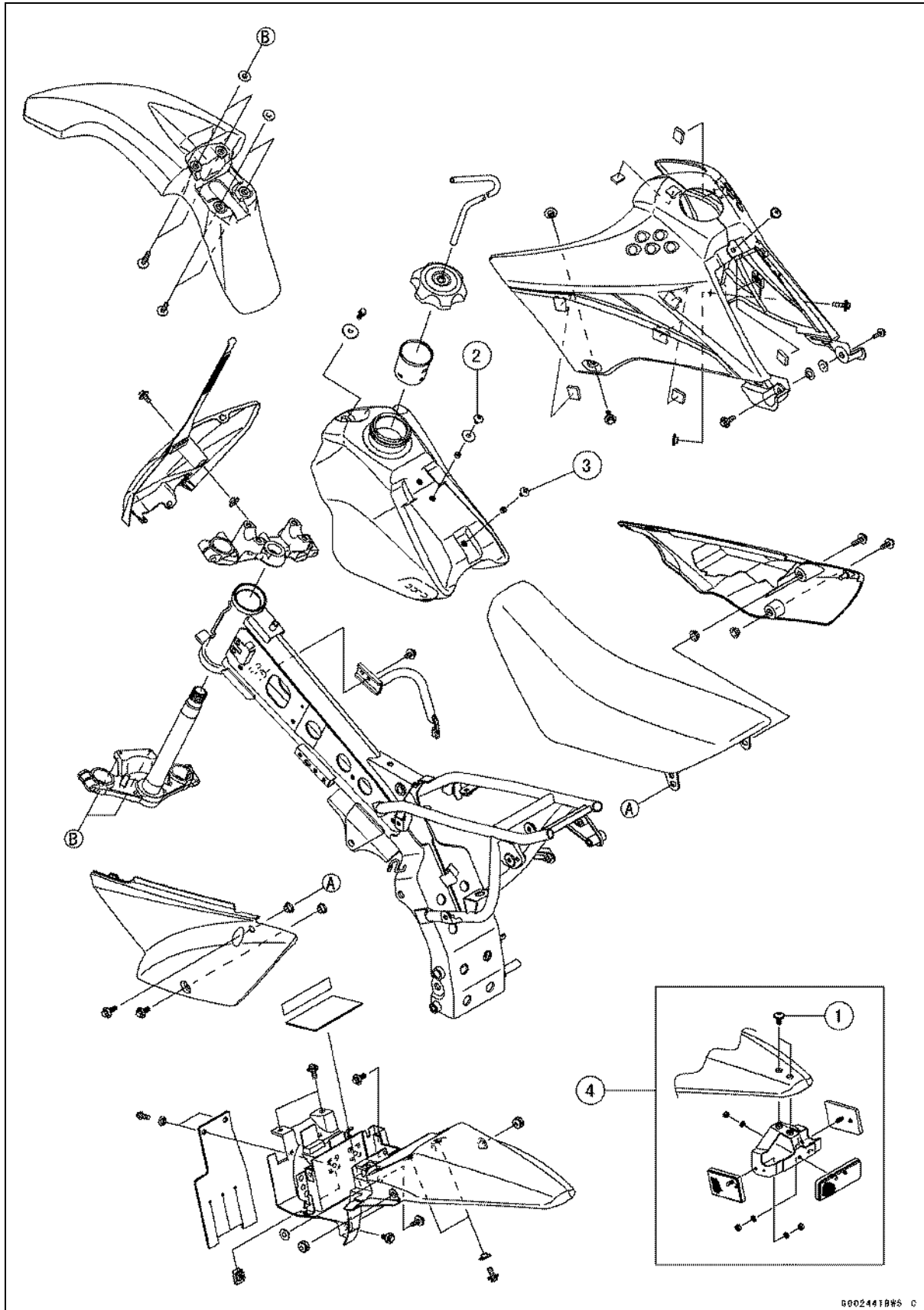
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Footpeg Bracket Bolts	25	2.5	18	
2	Sidestand Bolt	9.8	1.0	87 in·lb	
3	Sidestand Nut	29	3.0	21	R

G: Apply grease.

R: Replacement Parts

# 14-4 FRAME

## Exploded View



0002441BWS C

**Exploded View**

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Reflector Bracket Screws	7.4	0.75	65 in·lb	
2	Screw (for Seat Hook)	5.0	0.51	44 in·lb	
3	Screw (for Rubber Band Hook)	5.0	0.51	44 in·lb	

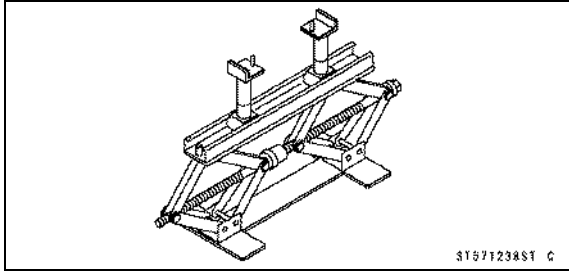
4. CA model only

## 14-6 FRAME

### Special Tool

---

Jack:  
57001-1238



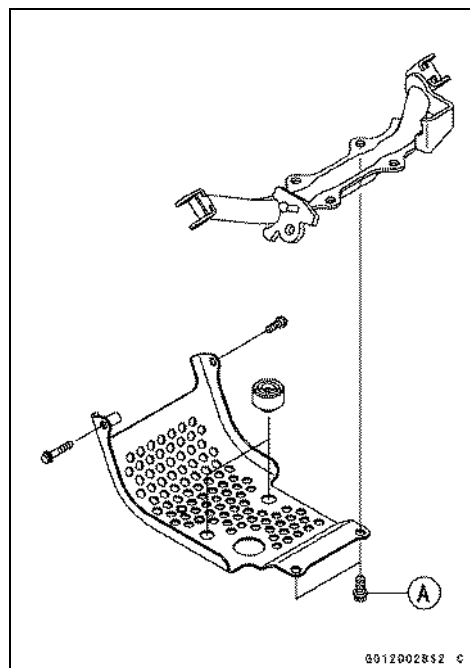
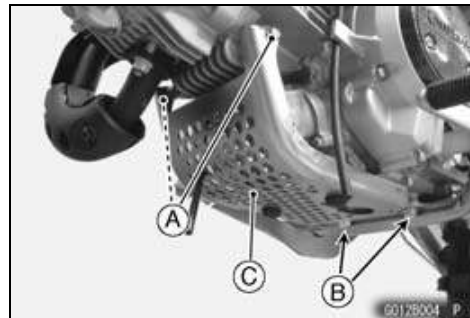
## Frame

### **Frame Inspection**

- Refer to the Frame Inspection in the Periodic Maintenance chapter.

### **Engine Guard Removal/Installation**

- Remove:
  - Bolts [A]
  - Footpeg Bracket Bolts [B]
  - Engine Guard [C]
- Installation is the reverse of removal; note the following.
- Tighten:
  - Torque - Footpeg Bracket Bolts [A]: 25 N·m (2.5 kgf·m, 18 ft·lb)**



## 14-8 FRAME

### Shroud

#### **Shroud Removal**

- Remove:
  - Side Covers (see Side Cover Removal)
  - Seat (see Seat Removal)
  - Bolts [A] (Both Sides)
  - Screw [B]
  - Fuel Tank Cap [C]
  - Shroud [D]



#### **Shroud Installation**

- Installation is the reverse of removal.



## Seat

### **Seat Removal**

- Remove the seat mounting bolts [A] on both sides.
- Take off the seat [B] backward.



### **Seat Installation**

- Installation is the reverse of removal.
- Insert the hooks [A] under the washer [B] and the bracket [C].

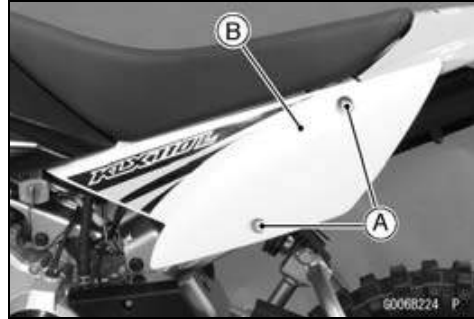


## 14-10 FRAME

### Side Covers

#### **Side Cover Removal**

- Remove the bolts [A].
- Pull the side cover [B] outward to clear the stopper.

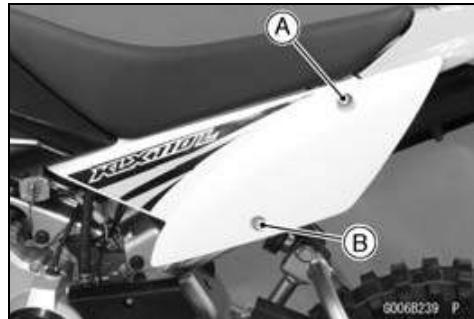


#### **Side Cover Installation**

- Installation is the reverse of removal.
- Install the collars to the side cover.
- Insert the tab [A] into the slot [B].
- Insert the projection [C] into the grommet [D].



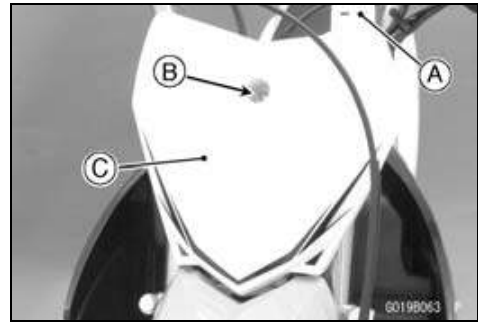
- Rear bolt [A] is longer than the front bolt [B].



## Number Plate

### **Number Plate Removal**

- Remove the band [A] from the handlebar.
- Remove the bolt [B] and take off the number plate [C] upward.

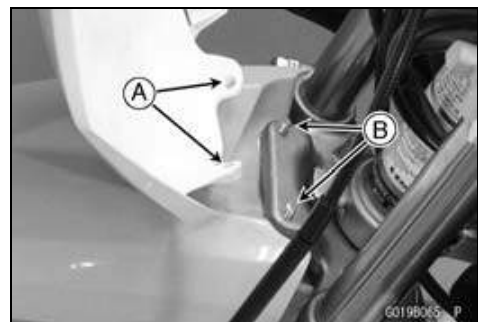


### **Number Plate Installation**

- Install the collar [A] to the number plate.



- Fit the holes [A] at the bottom of number plate onto the bolt threads [B] in the front fork lower bracket.



- Tighten the bolt [A].
- Install the band [B] to the handlebar.
- Run the cables and leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

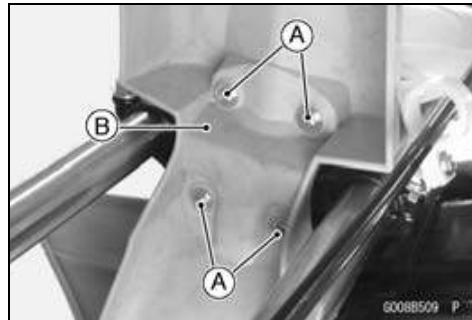


## 14-12 FRAME

### Fenders

#### **Front Fender Removal**

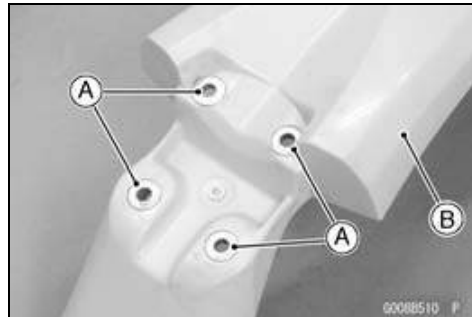
- Remove the bolts [A] and take off the front fender [B].



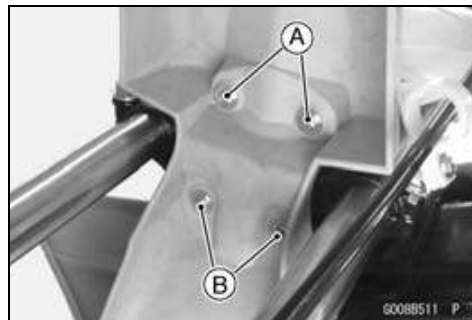
#### **Front Fender Installation**

- Installation is the reverse of removal; note the following.

- Install the collars [A] to the front fender [B].



- Install the longer bolts to the front [A] and the shorter bolts to the rear [B].

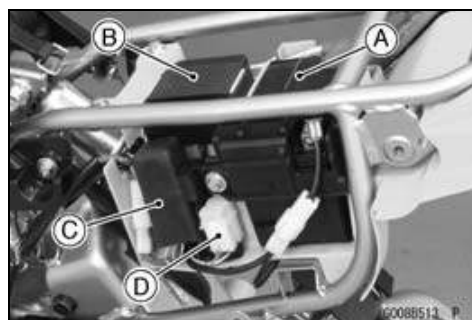


- Install the front fender so that the front bolt threads [A] are inserted into the holes at the bottom of the number plate.



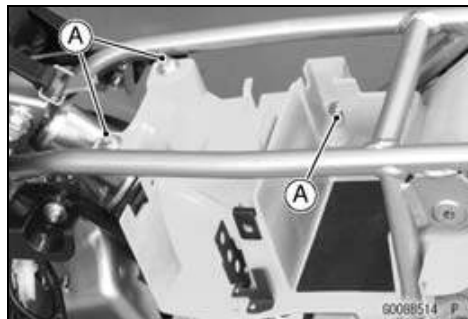
#### **Rear Fender Removal/Installation**

- Remove:
  - Seat (see Seat Removal)
  - Side Covers (see Side Cover Removal)
  - Battery [A] (see Battery Removal in the Electrical System chapter)
  - Igniter [B]
  - Starter Relay [C]
  - Fuse [D]

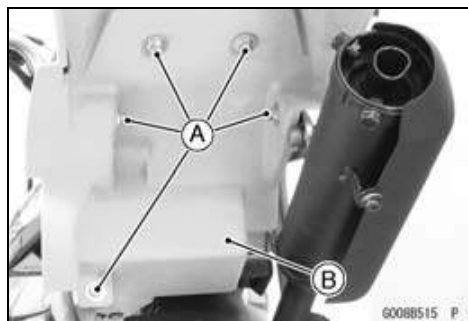


## Fenders

- Remove the bolts [A].



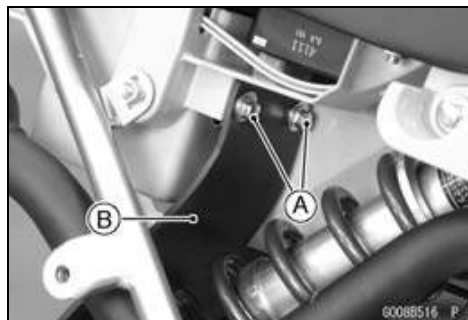
- Remove the bolts [A] and take off the rear fender [B].



- Installation is the reverse of removal.
- Run the cables and leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

### **Rear Flap Removal/Installation**

- Remove:
  - Right Side Cover (see Side Cover Removal)
  - Bolts [A] and Collars
  - Rear Flap [B]



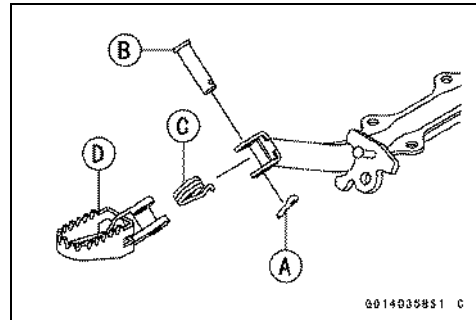
- Installation is the reverse of removal.

## 14-14 FRAME

### Footpegs and Bracket

#### **Footpeg Removal/Installation**

- Remove:
  - Cotter pin [A]
  - Pivot Pin [B]
  - Spring [C]
  - Footpeg [D]



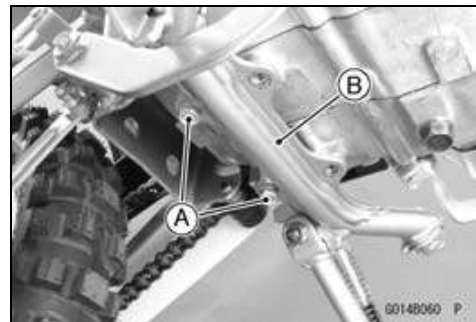
- Installation is reverse of removal; note the following.
- Replace the cotter pin with a new one.
- Apply grease to the sliding area of the footpeg.
- Bend the longer side of the cotter pin.

#### **Footpeg Bracket Removal**

- Remove the engine guard (see Engine Guard Removal/Installation).
- Place the jack under the frame to support the motorcycle.

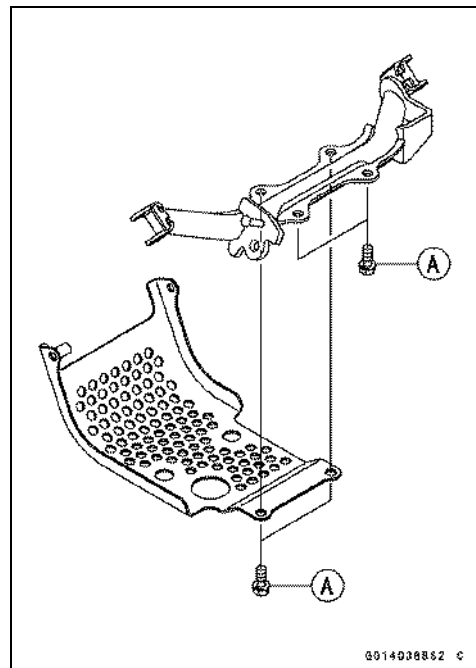
**Special Tool - Jack: 57001-1238**

- Remove the bolts [A] with spring washers.
- Remove the footpeg bracket [B] together with the footpegs and the sidestand.



#### **Footpeg Bracket Installation**

- Installation is the reverse of removal.
- Tighten:
  - Torque - Footpeg Bracket Bolts [A]: 25 N-m (2.5 kgf-m, 18 ft-lb)**



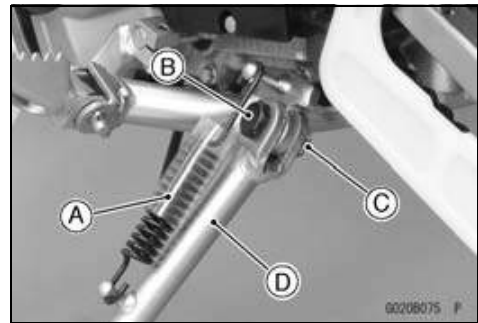
## Sidestand

### **Sidestand Removal**

- Raise the rear wheel off the ground with the jack.

**Special Tool - Jack: 57001-1238**

- Remove:
  - Spring [A]
  - Sidestand Bolt [B]
  - Sidestand Nut [C]
  - Sidestand [D]



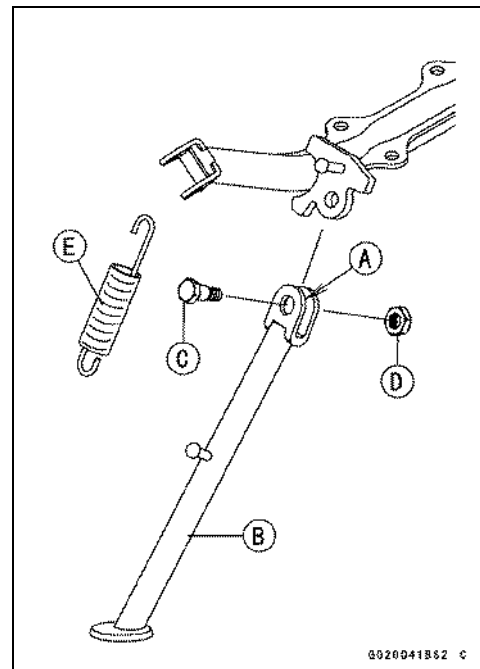
### **Sidestand Installation**

- Apply grease to the sliding area [A] of the sidestand [B].
- Replace the sidestand nut [D] with a new one.
- Tighten the sidestand bolt [C] and nut.

**Torque - Sidestand Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)**

**Sidestand Nut: 29 N·m (3.0 kgf·m, 21 ft·lb)**

- Hook the spring [E] so that the longer spring end faces upward.







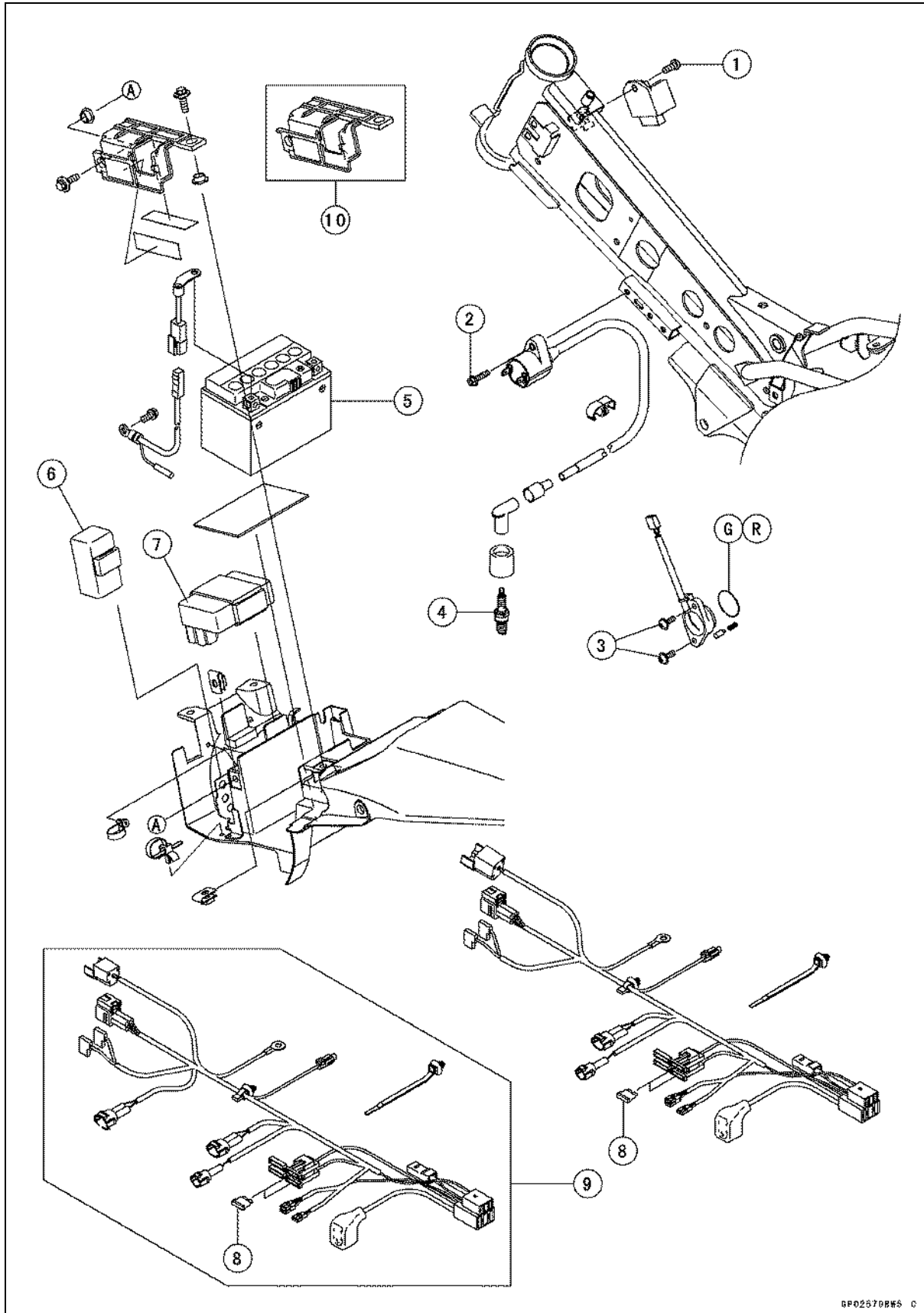
# Electrical System

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# 15-2 ELECTRICAL SYSTEM

## Exploded View



8P02670BWS C

**Exploded View**

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Regulator Mounting Screw	5.2	0.53	46 in·lb	
2	Ignition Coil Mounting Bolt	2.9	0.30	26 in·lb	
3	Gear Position Switch Screws	2.9	0.30	26 in·lb	
4	Spark Plug	13	1.3	115 in·lb	

5. Battery

6. Starter Relay

7. IC Igniter

8. Main Fuse 10 A

9. KLX110D Models

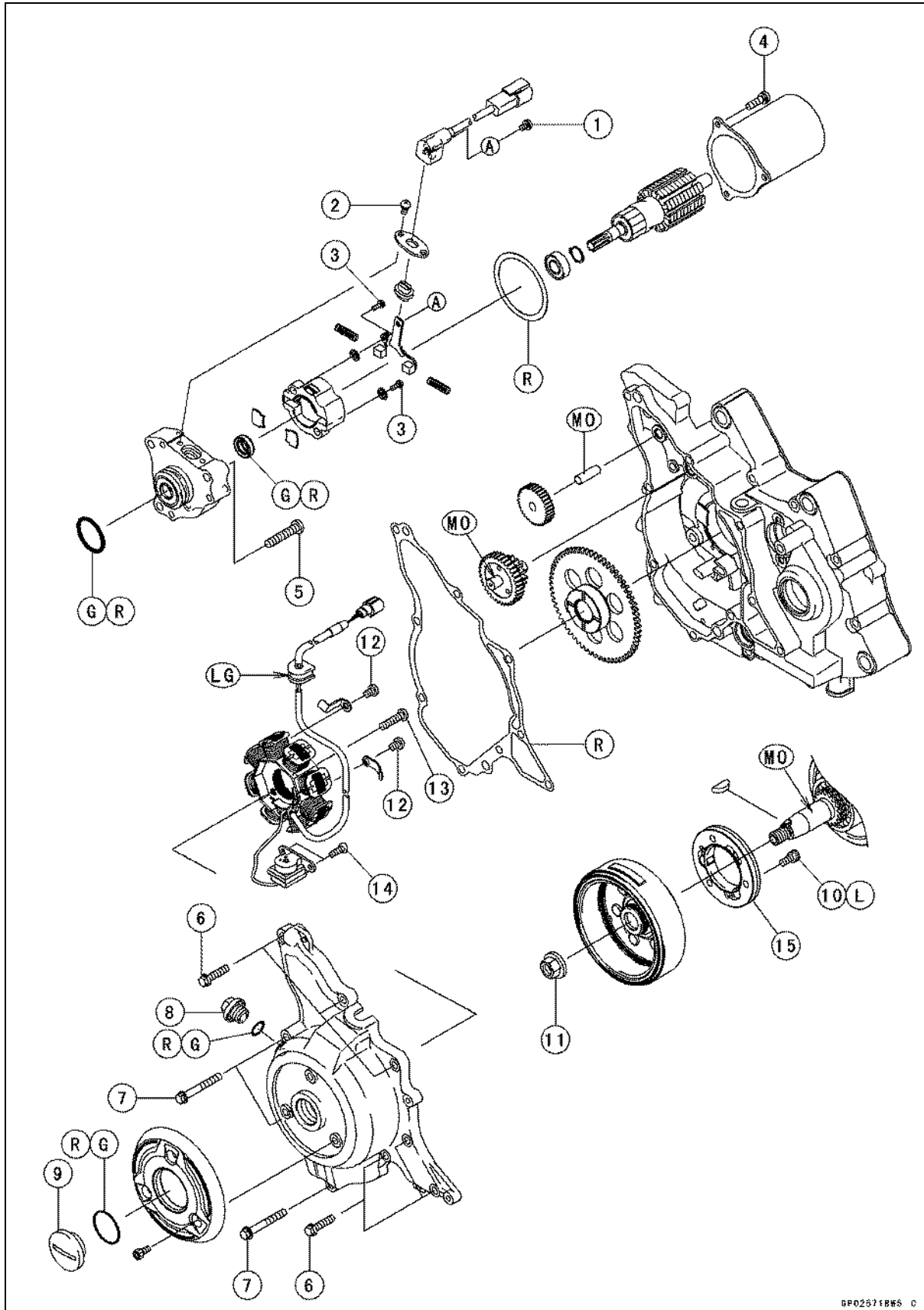
10. KLX110CA/DA Models

G: Apply Grease.

R: Replacement Parts

# 15-4 ELECTRICAL SYSTEM

## Exploded View



8P02671EWS C

## Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Starter Motor Terminal Screw	2.0	0.20	18 in·lb	
2	Terminal Cover Plate Screws	2.0	0.20	18 in·lb	
3	Brush Holder Plate Screws	0.9	0.09	8.0 in·lb	
4	End Cover Screws	4.4	0.45	39 in·lb	
5	Starter Motor Mounting Screws	5.2	0.53	46 in·lb	
6	Alternator Cover Bolts (L=25)	8.8	0.90	78 in·lb	
7	Alternator Cover Bolts (L=45)	8.8	0.90	78 in·lb	
8	Timing Inspection Cap	2.4	0.24	21 in·lb	
9	Alternator Rotor Nut Cap	2.4	0.24	21 in·lb	
10	Starter Motor Clutch Bolts	11.8	1.20	104 in·lb	L
11	Alternator Rotor Nut	53.9	5.50	39.8	
12	Alternator Lead Clamp Screws	5.2	0.53	46 in·lb	
13	Stator Mounting Screws	5.2	0.53	46 in·lb	
14	Crankshaft Sensor Mounting Screws	2.9	0.30	26 in·lb	

15. Starter Motor Clutch

G: Apply grease.

L: Apply a non-permanent locking agent.

MO: Apply molybdenum disulfide oil.

R: Replacement Parts

LG: Apply liquid gasket.

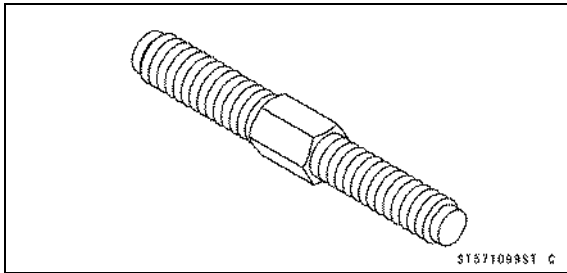
## 15-6 ELECTRICAL SYSTEM

### Specifications

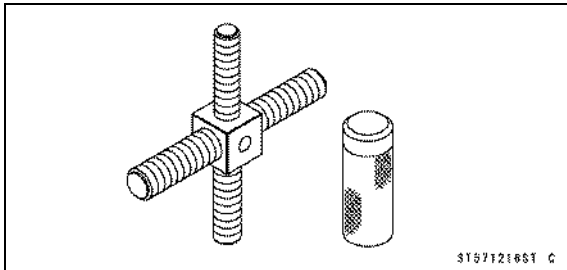
Item	Standard	Service Limit
<b>Battery</b>		
Type	Sealed Battery (wet)	---
Model Name	FTH4L-BS	---
Capacity	12 V 3 Ah	---
Voltage	12.6 V or more	---
Gross Weight	1.4 kg (3.1 lb)	---
Electrolyte Volume	0.18 L (10.98 cu in.)	---
<b>Charging System</b>		
Crankshaft Sensor Resistance	50 ~ 200 $\Omega$ at 20°C (68°F)	---
Alternator Output Voltage	in the text	---
Stator Coil Resistance	in the text	---
Charging Voltage	13.9 ~ 14.9 V	---
<b>Ignition System</b>		
Ignition Timing	BTDC 10° @1 650 r/min (rpm)	---
Ignition Coil:		
3 Needle Arcing Distance	7 mm (0.26 in.) or more	---
Primary Winding Resistance	0.19 ~ 0.23 $\Omega$ at 20°C (68°F)	---
Secondary Winding Resistance	2.5 ~ 3.7 k $\Omega$ at 20°C (68°F)	---
Primary Peak Voltage	100 V or more	---
Crankshaft Sensor Peak Voltage	2 V or more	---
Spark Plug:		
Type	NGK CR6HSA	---
Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in.)	---
<b>Electric Starter System</b>		
Starter Motor:		
Brush Length	7.0 mm (0.28 in.)	3.5 mm (0.14 in.)
Commutator Diameter	22.0 mm (0.87 in.)	21.5 mm (0.85 in.)

Special Tools and Sealant

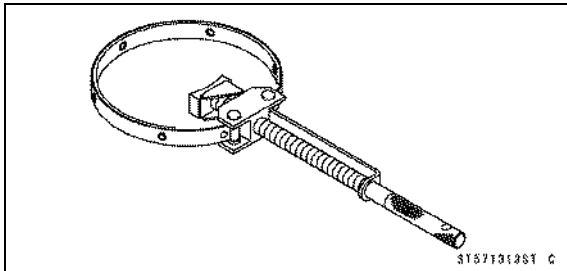
Rotor Puller M18 x 1.5, M16 x 1.5:  
57001-1099



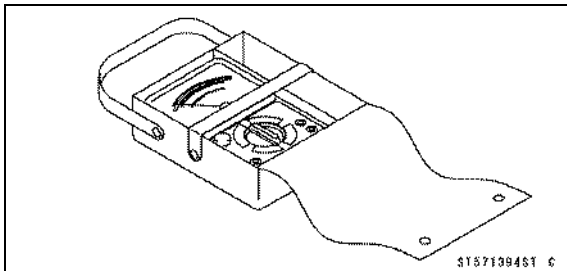
Rotor Puller, M16/M18/M20/M22 x 1.5:  
57001-1216



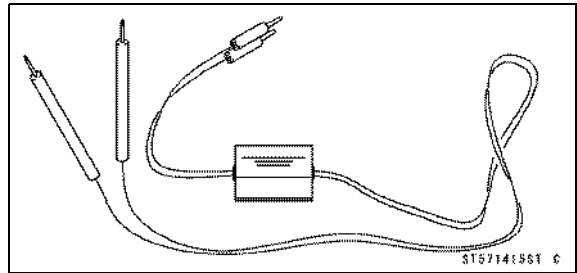
Flywheel Holder:  
57001-1313



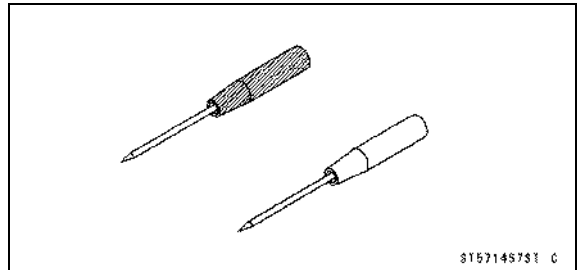
Hand Tester:  
57001-1394



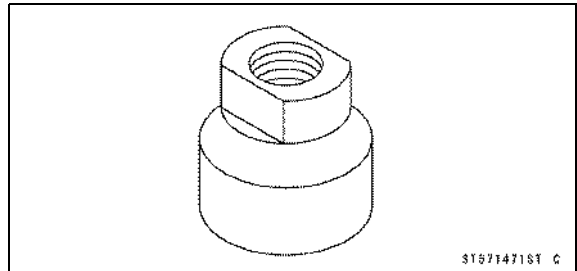
Peak Voltage Adapter:  
57001-1415



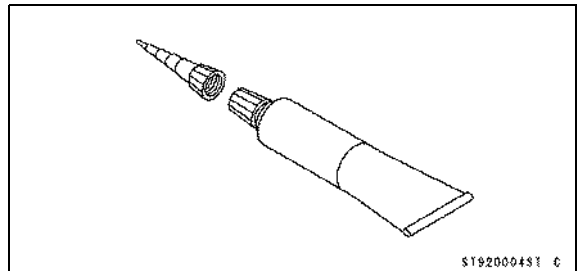
Needle Adapter Set:  
57001-1457



Flywheel Puller, M28 x 1.0:  
57001-1471



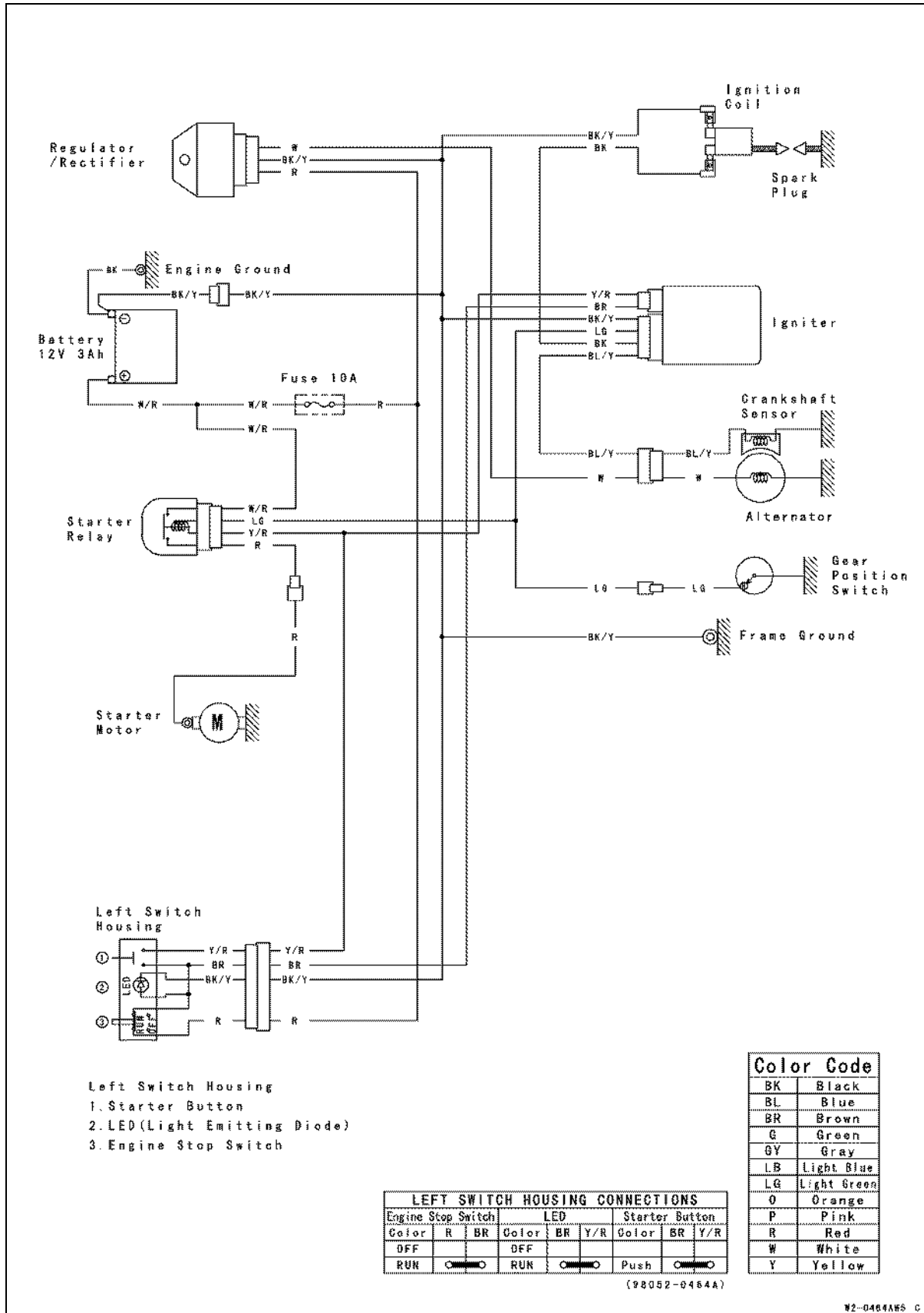
Liquid Gasket, TB1211F:  
92104-0004



# 15-8 ELECTRICAL SYSTEM

## Wiring Diagram

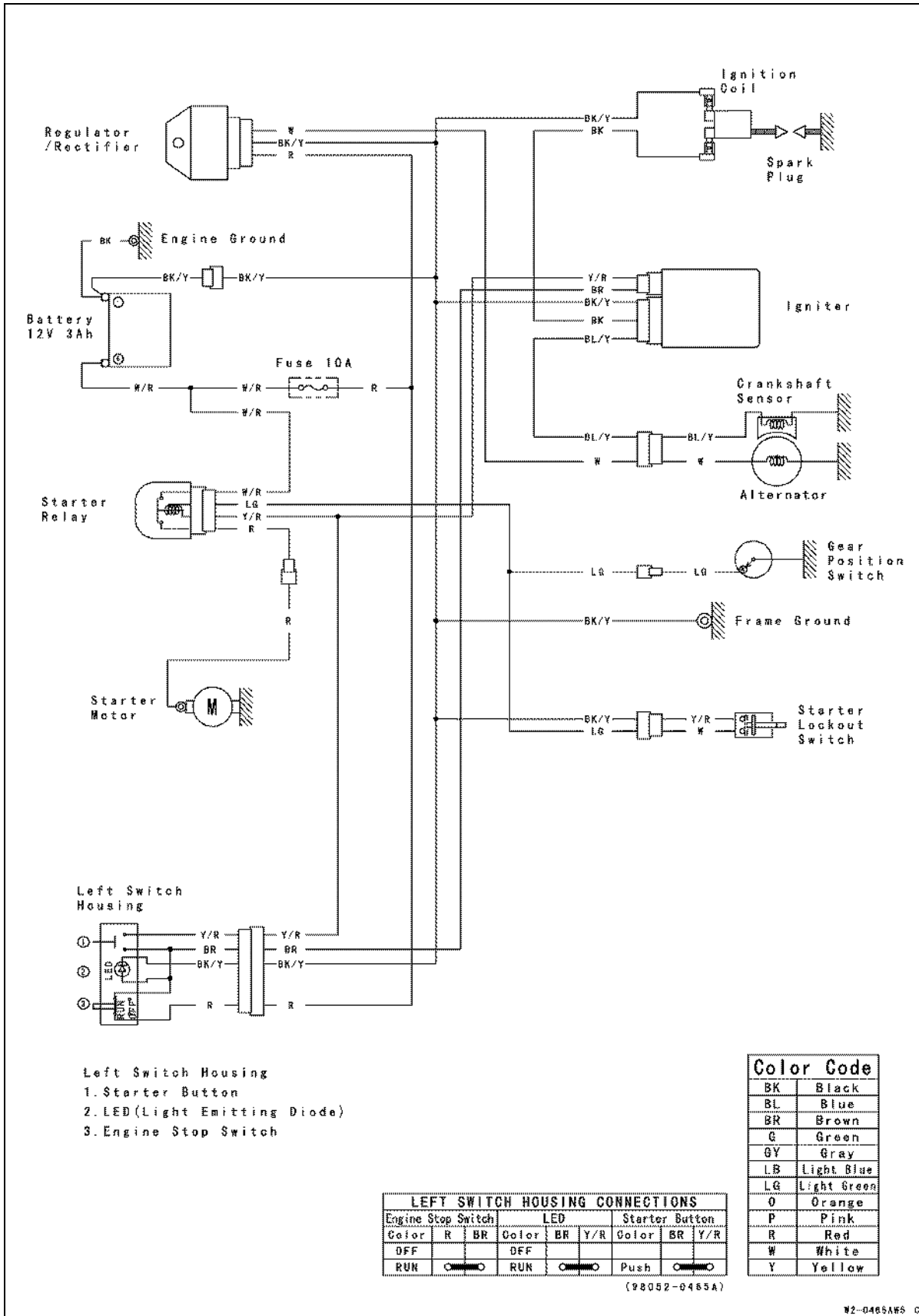
### KLX110CA Model





Wiring Diagram

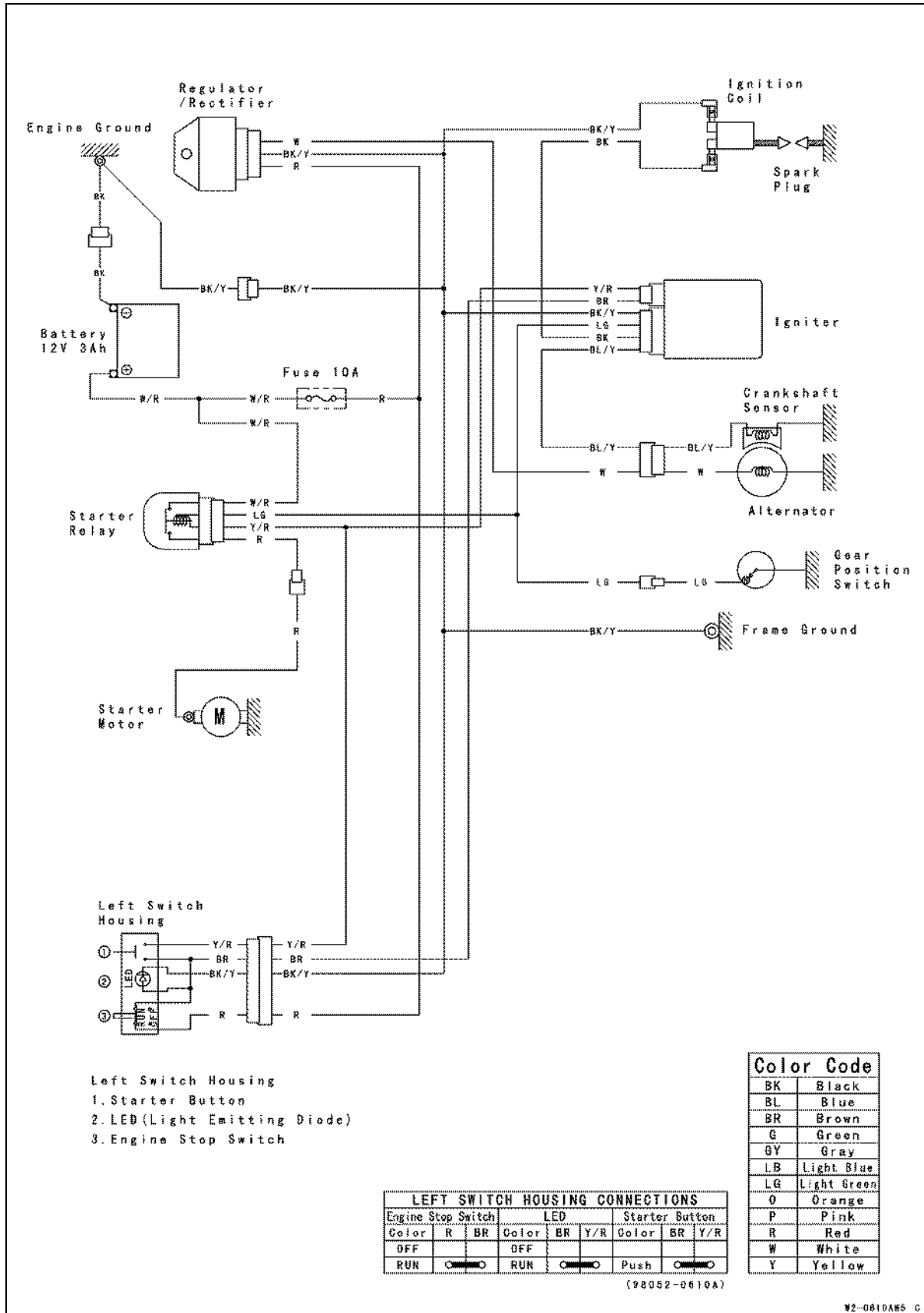
KLX110DA Model



# 15-10 ELECTRICAL SYSTEM

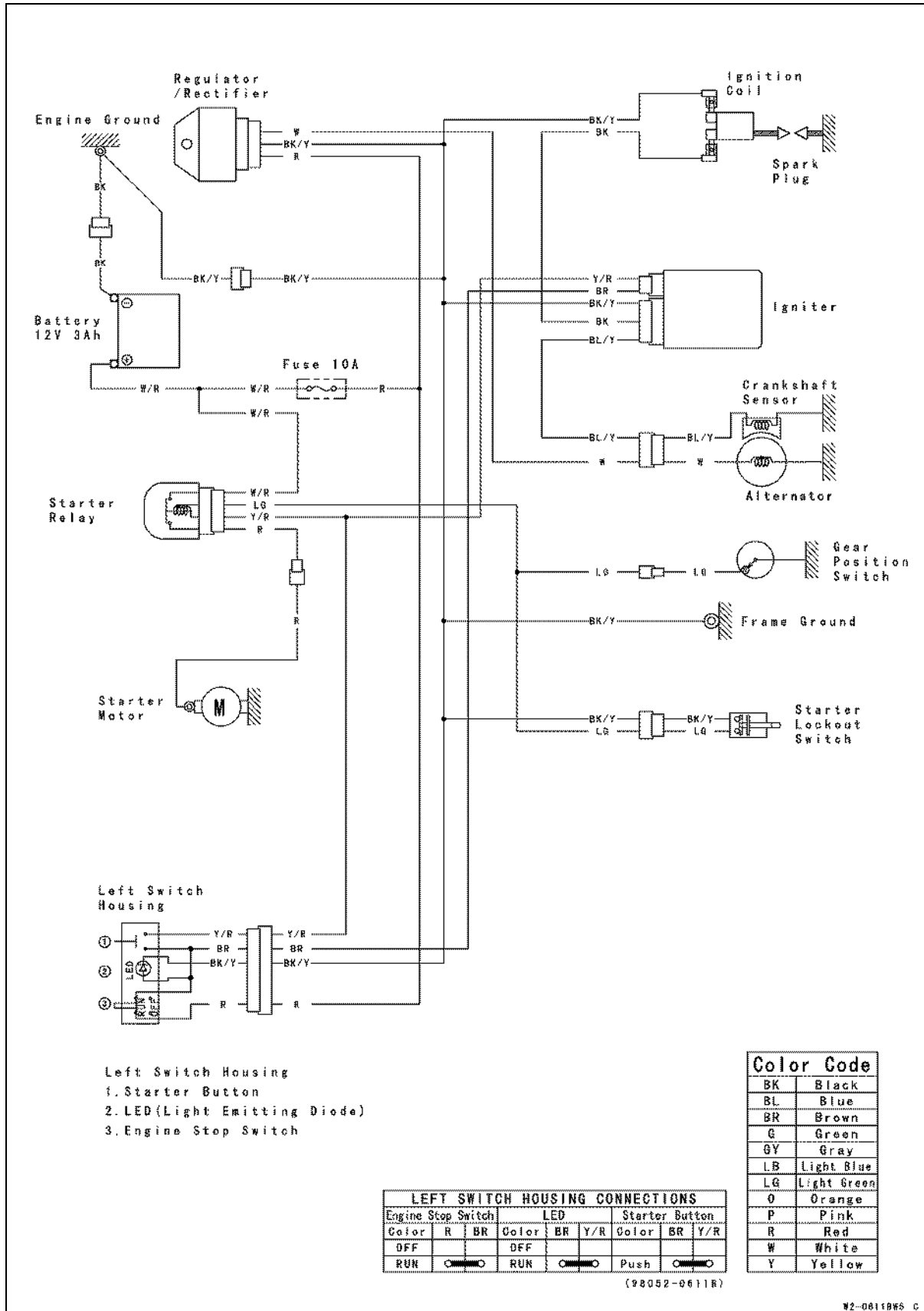
## Wiring Diagram

KLX110CB Models ~



Wiring Diagram

KLX110DB Models ~



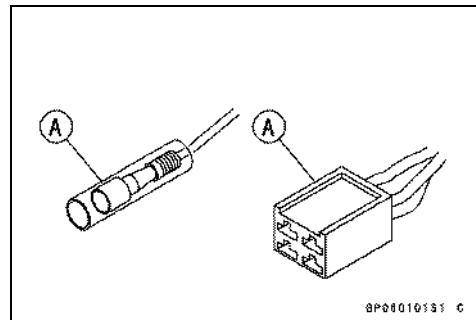
## 15-12 ELECTRICAL SYSTEM

### Precautions

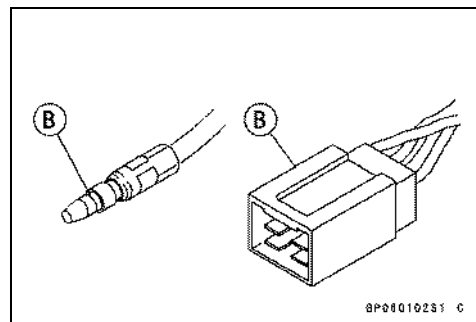
There are numbers of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- 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.
- 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(s), they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).
- Electrical Connectors

Connectors [A]



Connectors [B]



Safety Instructions:

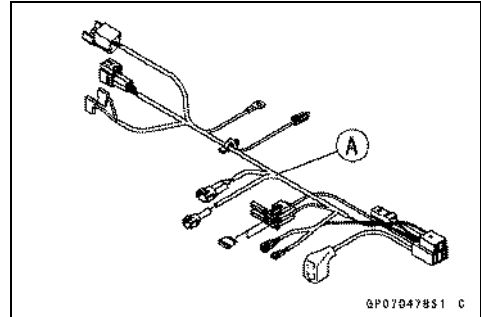
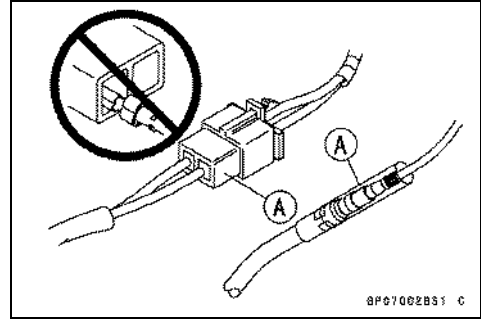
#### **WARNING**

**The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or ignition coil lead while the engine is running, or you could receive a severe electrical shock.**

## Electrical Wiring

### Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect a digital meter between the ends of the leads.
- ★ If the digital meter does not read about 0  $\Omega$ , the lead is defective. Replace the lead or the wiring harness [A] if necessary.



## 15-14 ELECTRICAL SYSTEM

### Battery

#### Battery Removal

- Remove:
  - Seat (see Seat Removal in the Frame chapter)
  - Left Side Cover (see Side Cover Removal in the Frame chapter)
  - Battery Holder Bolts [A]
- Slide the battery, and disconnect the negative (-) cable [B] and then positive (+) cable [C].

#### NOTICE

Be sure to disconnect the negative (-) cable first.

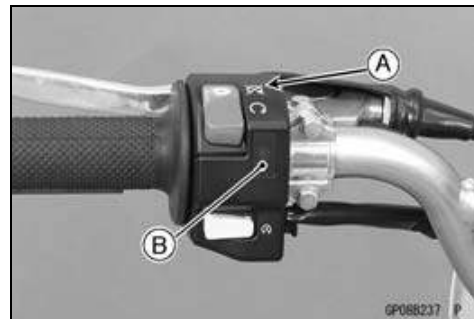
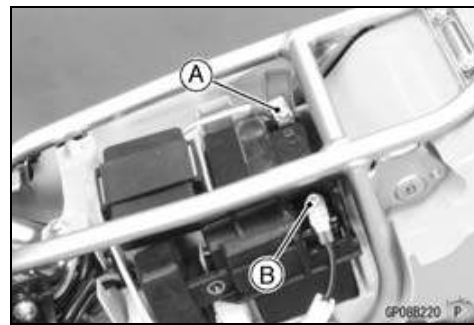
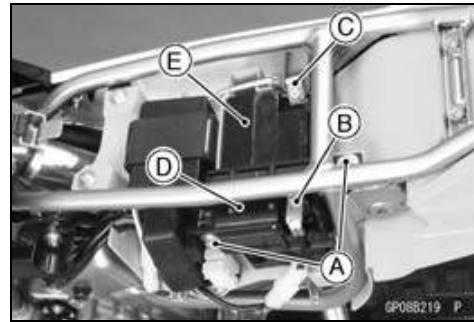
- Remove:
  - Battery Holder [D]
  - Battery [E]

#### Battery Installation

- Visually inspect the surface of the battery container.
- ★ If any signs of cracking or electrolyte leakage from the sides of the battery, replace it.
- Put the battery and battery holder into the battery case.
- Connect the positive cable [A] to the (+) terminal first, and then the negative cable [B] to the (-) terminal.
- Tighten the battery holder bolts.
- Apply a little grease on the terminals to prevent corrosion.
- Cover the (+) terminal with the cap.
- Install the removed parts (see appropriate chapter).

#### NOTE

○ To avoid the battery discharging, check that the engine stop switch is in the stop position [A] and the indicator light (LED) [B] goes off when the motorcycle is not used.



#### Battery Activation

##### Electrolyte Filling

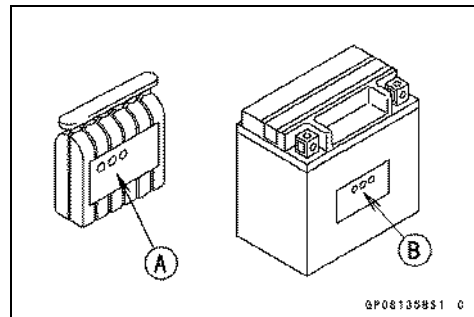
- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

##### Battery Model Name

KLX110C/D: FTH4L-BS

#### NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.



## Battery

**NOTICE**

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.

**⚠ DANGER**

Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

**NOTE**

○The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.

- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

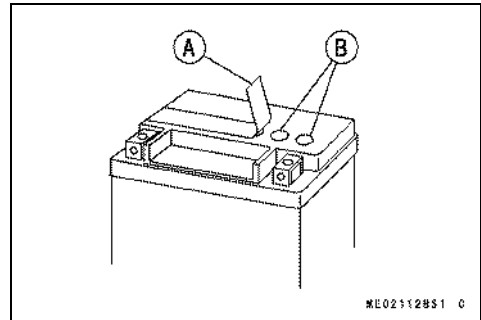
**NOTE**

○Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.

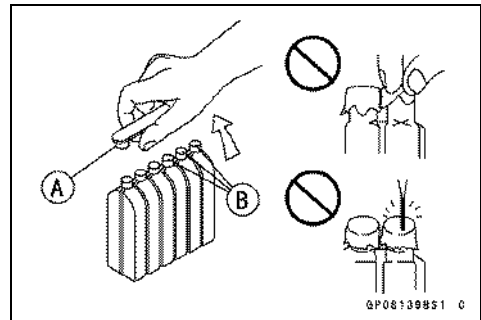
- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

**NOTE**

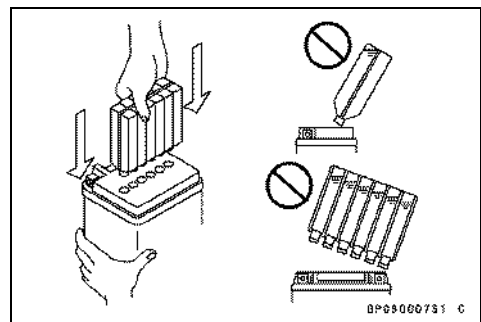
○Do not tilt the electrolyte container.



ME0212851 C



GP0639851 C



BP09060731 C

## 15-16 ELECTRICAL SYSTEM

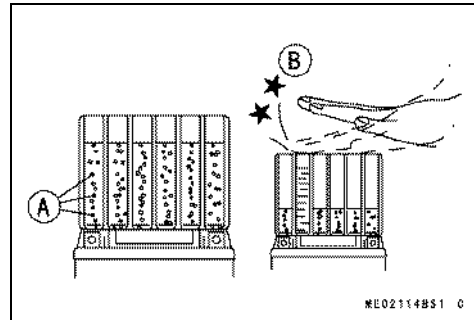
### Battery

- Check the electrolyte flow.
- ★ If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.

#### NOTE

○ Be careful not to have the battery fall down.

- Keep the container in place. Don't remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.



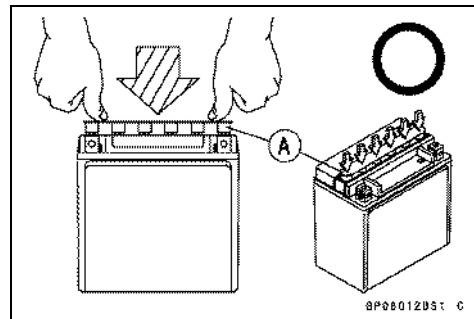
#### NOTICE

**Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.**

- After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.
- Make sure that the container cells have emptied completely, and remove the container from the battery.
- Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.

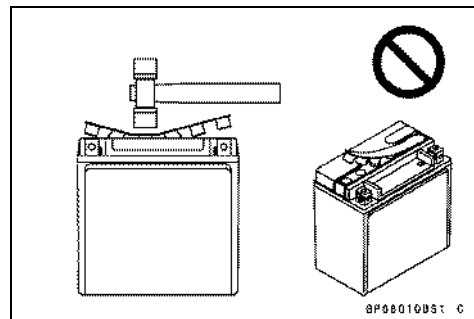
#### NOTICE

**Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.**



#### NOTE

○ Charging the battery immediately after filling can shorten service life.





## Battery

### Initial Charge

- Newly activated sealed batteries require an initial charge.

**Standard Charge: 0.9 A × 5 ~ 10 hours**

- ★ If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

#### Kawasaki-recommended chargers:

**Battery Mate 150-9**

**OptiMate PRO 4-S/PRO S/PRO2**

**Yuasa MB-2040/2060**

**Christie C10122S**

- ★ If the above chargers are not available, use equivalent one.
- Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

### NOTE

- *Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.6 V, repeat charging cycle.*
- *To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds. Re-check voltage and if less than 12.6 V repeat the charging cycle and load test. If still below 12.6 V the battery is defective.*

### Precautions

- 1) No need of topping-up.

No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

- 2) Refreshing charge.

Give a refresh charge for 5 to 10 hours with charging current shown in the specification (see Refreshing Charge).

When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

### NOTICE

**This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.**

**If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.**

- 3) When you do not use the motorcycle for months.

Give a refresh charge before you store the motorcycle. And then store it with the negative cable removed. However, check the battery's state of charge at **every month** to be sure it meets the minimum 12.4 V specification and charge it to 100 % state of charge.

- 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).

# 15-18 ELECTRICAL SYSTEM

## Battery

### **⚠ DANGER**

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medical attention for more severe burns.

### **Interchange**

A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

### **Charging Condition Inspection**

- Refer to Battery Charging Condition Inspection in the Periodic Maintenance chapter.

### **Refreshing Charge**

- Remove the battery (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

### **⚠ WARNING**

This battery is sealed type. Charge with current and time as stated below.

Terminal Voltage: 11.5 ~ less than 12.6 V  
Standard Charge 0.4 A × 5 ~ 10 h (see following chart)  
Quick Charge 4 A × 0.5 h

### **NOTICE**

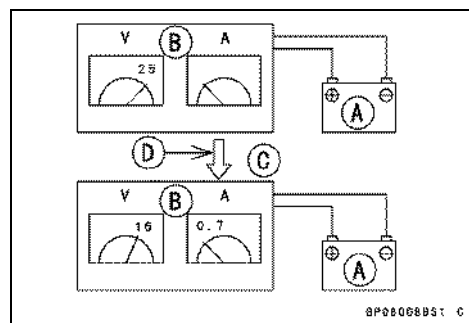
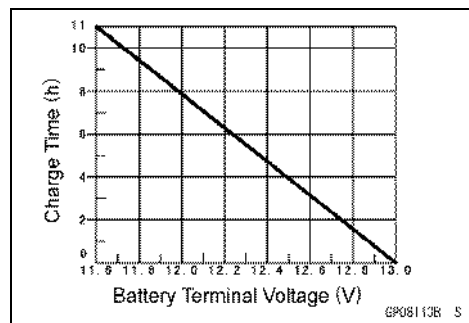
If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

Terminal Voltage: less than 11.5 V  
Charging Method: 0.4 A × 20 h

### **NOTE**

○ Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.

- Battery [A]
- Battery Charger [B]
- Standard Value [C]
- Current starts to flow [D].



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**Battery**

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- Determine the battery condition after refresh charge.
- Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

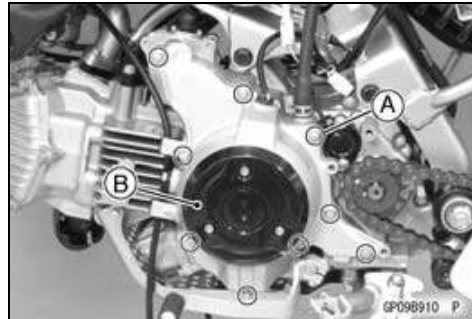
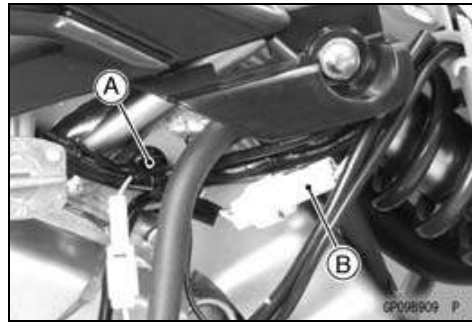
<b>Criteria</b>	<b>Judgement</b>
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

## 15-20 ELECTRICAL SYSTEM

### Charging System

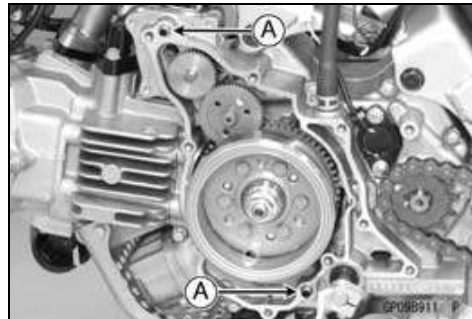
#### **Alternator Cover Removal**

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  - Left Side Cover (see Side Cover Removal in the Frame chapter)
  - Seat (see Seat Removal in the Frame chapter)
  - Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
- Clear the lead from the clamp [A].
- Disconnect the alternator lead connector [B].
- Remove:
  - Alternator Cover Bolts [A]
  - Alternator Cover [B]



#### **Alternator Cover Installation**

- Be sure to install the dowel pins [A].
- Install a new gasket.

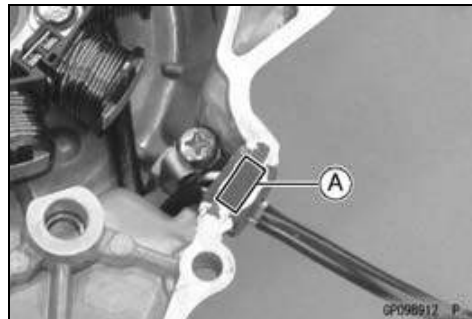


- Using a high flash-point solvent, clean off any oil or dirt that may be on the silicone sealant coating area. Dry them with a clean cloth.
- Apply liquid gasket to the area [A] to the alternator lead grommet.

**Sealant - Liquid Gasket, TB1211F: 92104-0004**

#### **NOTE**

- Wipe off excess silicone sealant after installing the alternator cover.



- Install the alternator cover.
  - Torque - Alternator Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)**
- Install the removed parts (see appropriate chapters).

## Charging System

### Alternator Rotor Removal

- Remove:
  - Alternator Cover (see Alternator Cover Removal)
  - Starter Idle Gear and Washers
- Wipe oil off the outer circumference of the rotor.
- Hold the alternator rotor steady with the flywheel holder [A], and remove the alternator rotor nut [B].

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

- Remove the flywheel holder.
  
- Using the flywheel puller [A] and rotor puller [B], remove the alternator rotor from the crankshaft.

**Special Tools - Flywheel Puller, M28 × 1.0: 57001-1471**  
**Rotor Puller, M16/M18/M20/M22 × 1.5: 57001-1216 or**  
**Rotor Puller M18 × 1.5, M16 × 1.5: 57001-1099**

- Hold the flywheel puller using a wrench, screw in the rotor puller and remove the alternator rotor.

#### NOTE

- If the rotor is difficult to remove using a rotor puller (57001-1216), tap the cap head on the rotor puller with a hammer, while holding the rotor puller in the direction of the turning.

#### NOTICE

**Do not attempt to strike the grab bar or the alternator rotor itself. Striking the bar or the rotor can cause the bar to bend or the magnets to lose their magnetism.**

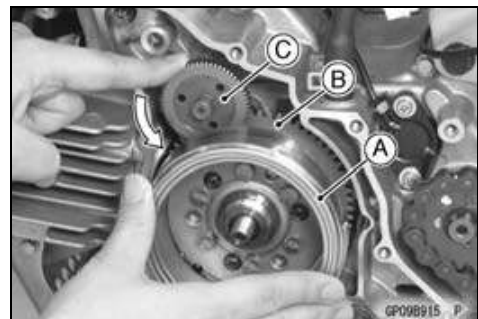
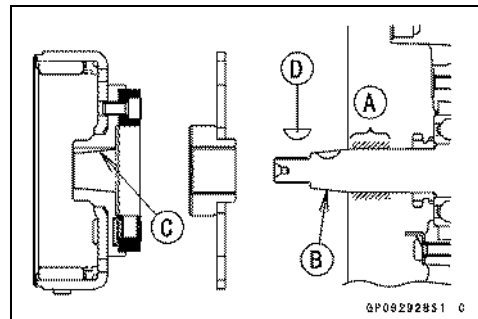
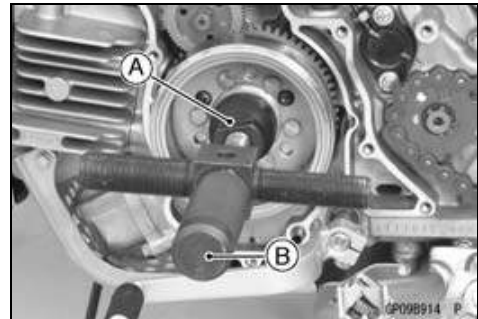
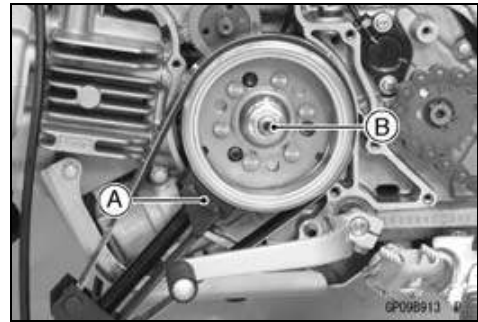
### Alternator Rotor Installation

- Apply molybdenum disulfide oil to the crankshaft [A].
- Using high flash-point solvent, clean off any oil or dirt on the crankshaft tapered portion [B] and rotor tapered portion [C]. Dry them with a clean cloth.
- Fit the woodruff key [D] securely in the slot on the crankshaft.

- Install the rotor [A] while turning the starter motor clutch gear [B] clockwise.

#### NOTE

- Remove the starter idle gear and turn the torque limiter gear [C] counterclockwise.



## 15-22 ELECTRICAL SYSTEM

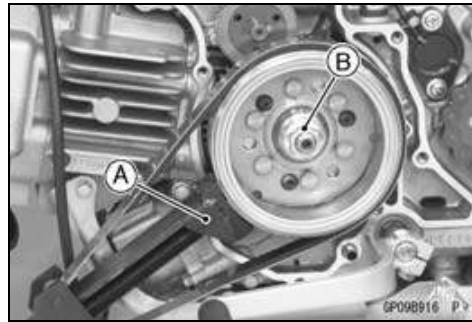
### Charging System

- Hold the rotor steady with the flywheel holder [A], tighten the rotor nut [B].

**Torque - Alternator Rotor Nut: 53.9 N·m (5.50 kgf·m, 39.8 ft·lb)**

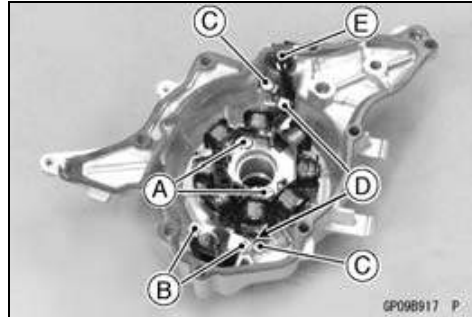
**Special Tool - Flywheel Holder: 57001-1313**

- Install the alternator cover (see Alternator Cover Installation).



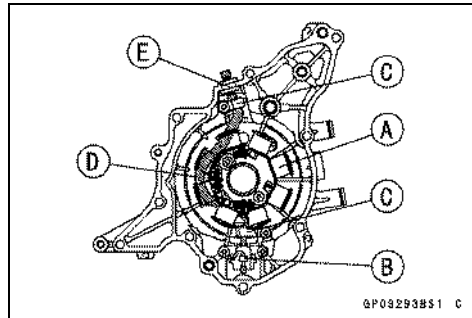
### Stator Removal

- Remove:
  - Alternator Cover (see Alternator Cover Removal)
  - Stator Screws [A]
  - Crankshaft Sensor Screws [B]
  - Alternator Lead Clamp Screws [C]
  - Lead Clamps [D]
  - Wiring Grommet [E]
- Take off the stator and the crankshaft sensor as a set.



### Stator Installation

- Install:
  - Stator [A]
  - Crankshaft Sensor [B]
  - Clamps [C]
- Run the alternator lead [D] as shown.
- Tighten:
  - Torque - Stator Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)**
  - Crankshaft Sensor Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)**
  - Alternator Lead Clamp Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)**



- Using a high flash-point solvent, clean off any oil or dirt that may be on the silicone sealant coating area. Dry them with a clean cloth.
- Apply liquid gasket around the circumference of the wiring grommet [E].

**Sealant - Liquid Gasket, TB1211F: 92104-0004**

- Set the stator wiring grommet securely in the notch of the alternator cover.
- Install the alternator cover (see Alternator Cover Installation).

### Alternator Inspection

- There are three types of alternator problems: short, open (wire burned out), or loss in rotor magnetism.
- A short or open in one of the coil wires will result in either a low output, or no output at all.
- A loss in rotor magnetism, which may be caused by dropping or hitting the rotor by leaving it near an electromagnetic field, or just by aging, will result in low output.

## Charging System

- Check the alternator output voltage, do the following procedures.
  - Remove:
    - Left Side Cover (see Side Cover Removal in the Frame chapter)
    - Seat (see Seat Removal in the Frame chapter)
  - Clear the leads from the clamp [A].
  - Connect a tester to the connector [B] as shown in the table 1, using the needle adapter set.
  - Start the engine.
  - Run it at the rpm given in the table 1.
  - Note the voltage readings.

**Special Tool - Needle Adapter Set: 57001-1457**

**Table 1, Alternator Output Voltage**

Connections		Reading @ 4 000 rpm
Tester (+) to	Tester (-) to	
White lead	Ground	AC 48 V or more

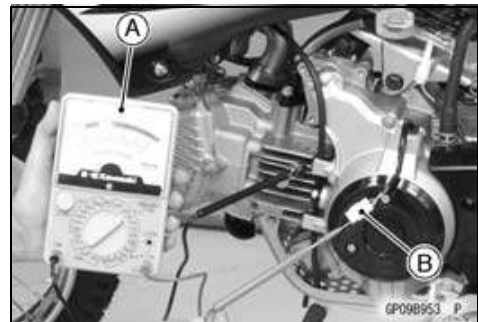
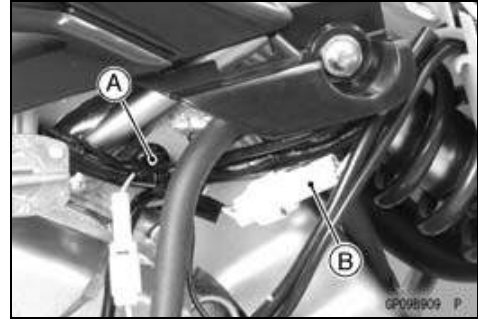
- ★ If the output voltage shows the value in the table, the alternator operates properly.
- ★ If the output voltage shows a much lower reading than that given in the table indicates that the alternator is defective.

- Check the stator coil resistance as follows.
  - Stop the engine.
  - Disconnect the alternator lead connector.
  - Connect the tester [A] to the connector [B] as shown in the table 2.
  - Note the readings.

**Table 2, Stator Coil Resistance**

Connections		Reading
Tester (+) to	Tester (-) to	
White lead	Ground	0.2 ~ 1.0 Ω

- ★ If there is more resistance than shown in the table, or no tester reading ( $\infty$ ) the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
- Using the tester, measure the resistance between each leads and chassis ground.
  - ★ Any tester reading less than infinity ( $\infty$ ) indicates a short, necessitating stator replacement.
  - ★ If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor have probably weakened, and the rotor must be replaced.

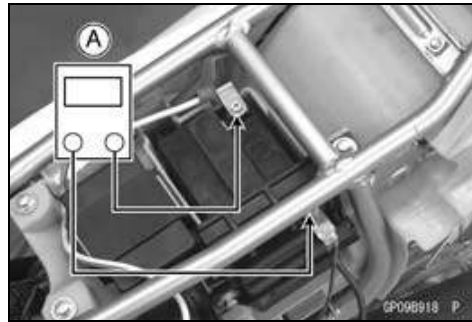


## 15-24 ELECTRICAL SYSTEM

### Charging System

#### Charging Voltage Inspection

- Remove:
  - Seat (see Seat Removal in the Frame chapter)
  - Left Side Cover (see Side Cover Removal in the Frame chapter)
- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Connect a digital meter [A] as shown in the table.



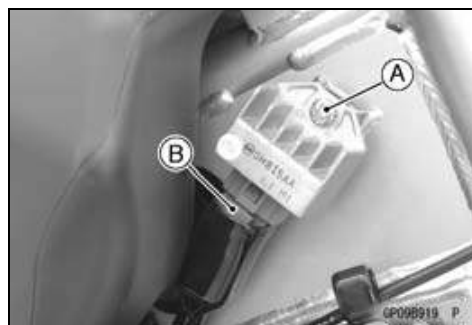
#### Charging Voltage

Connections		Reading
Meter (+) to	Meter (-) to	
Battery (+) Terminal	Battery (-) Terminal	DC 13.9 ~ 14.9 V

- Start the engine, and note the voltage readings at various engine speeds. The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.
- Stop the engine and disconnect the digital meter.
- ★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★ If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the charging voltage does not rise as the engine speed increases, the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

#### Regulator/Rectifier Inspection

- Remove the shroud (see Shroud Removal in the Frame chapter).
- Remove the screw [A], and disconnect the connector [B].





## Charging System

- With the Kawasaki hand tester, measure the internal resistance in both directions between the terminals.

**Special Tool - Hand Tester: 57001-1394**

- ★ If the reading is not the specified value, replace the regulator/rectifier.

**Internal Resistance @20°C (68°F)**

**Unit: kΩ**

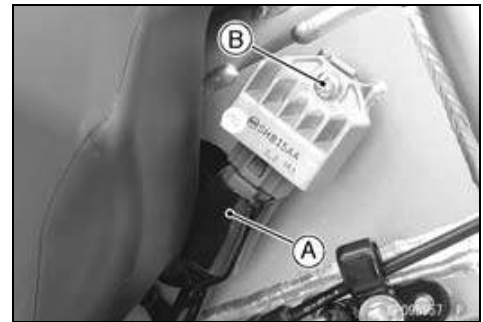
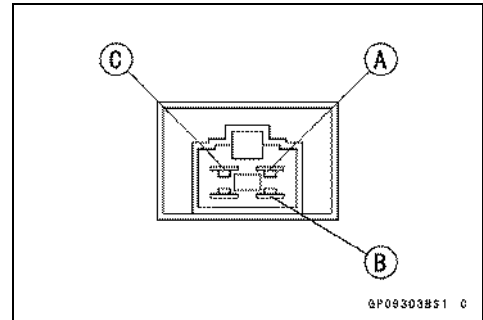
	Terminal	Tester (+) Lead		
		A	B	C
(-)*	A	—	6.9 ~ 70	∞
	B	∞	—	∞
	C	∞	∞	—

(-)\*: Tester (-) Lead

### NOTICE

**Use only Hand Tester 57001-1394 for this test. An ohmmeter other than the Hand Tester may show different readings. If a megger or a meter with a large-capacity battery is used, the regulator will be damaged.**

- Connect the regulator/rectifier lead connector and install the rubber cover [A] over the connector.
- Tighten:  
**Torque - Regulator Mounting Screw [B]: 5.2 N·m (0.53 kgf·m, 46 in·lb)**

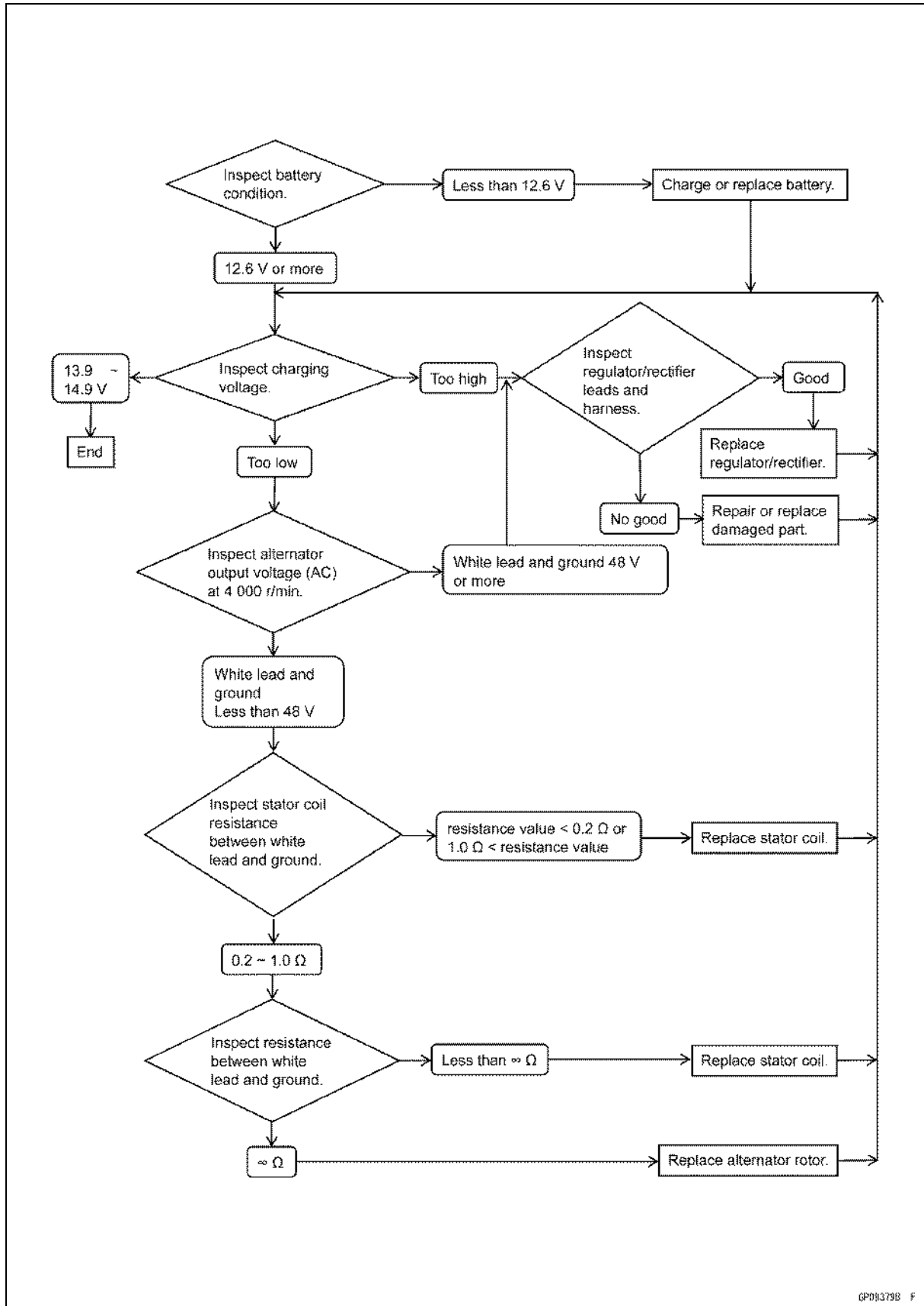


# 15-26 ELECTRICAL SYSTEM

## Charging System

### Charging System Troubleshooting

- Recharge the battery if it is discharged.





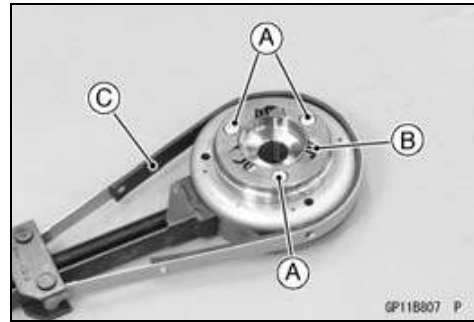
## 15-28 ELECTRICAL SYSTEM

### Starter Motor Clutch

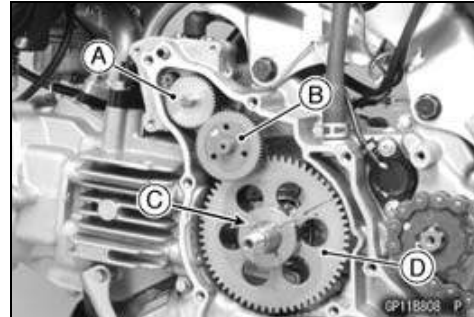
#### **Starter Motor Clutch/Starter Motor Clutch Gear Removal**

- Remove:
  - Alternator Rotor (see Alternator Rotor Removal)
- Remove the bolts [A] and take off the starter motor clutch [B] from the rotor.

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



- Pull the starter motor idle gear [A] and shaft out of the crankcase.
- Remove the torque limiter [B].
- Remove the woodruff key [C] and starter motor clutch gear [D].

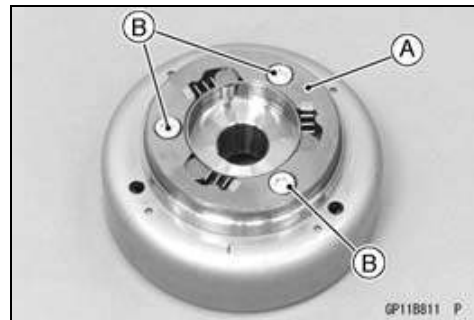


#### **Starter Motor Clutch/Starter Motor Clutch Gear Installation**

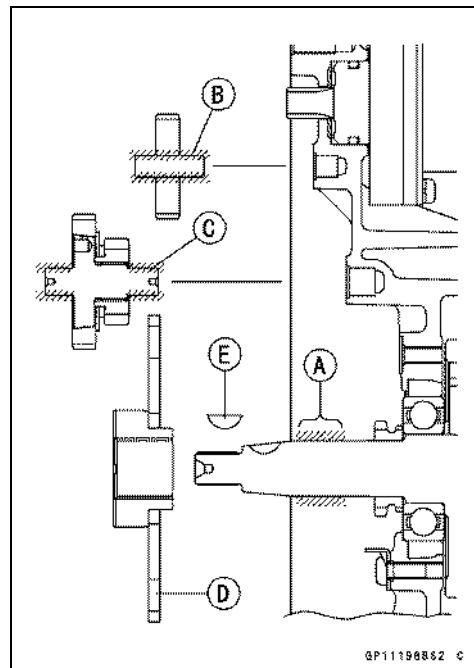
- Apply a non-permanent locking agent to the starter motor clutch bolts.
- Install the starter motor clutch [A] to the alternator rotor.
- Tighten:

**Torque - Starter Motor Clutch Bolts [B]: 11.8 N·m (1.20 kgf·m, 104 in·lb)**

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



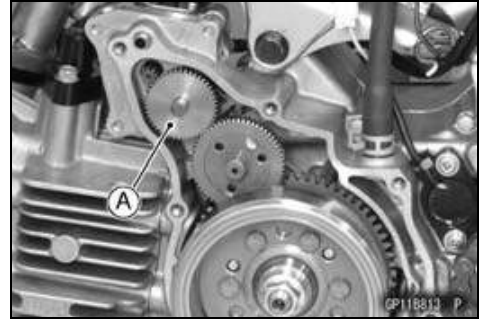
- Apply molybdenum disulfide oil solution to the following:
  - Crankshaft [A]
  - Starter Motor Idle Gear Shaft [B]
  - Torque Limiter Shaft [C]
- Install:
  - Starter Motor Clutch Gear [D]
  - Starter Motor Idle Gear
  - Torque Limiter
  - Woodruff Key [E]
  - Alternator Rotor (see Alternator Rotor Installation)



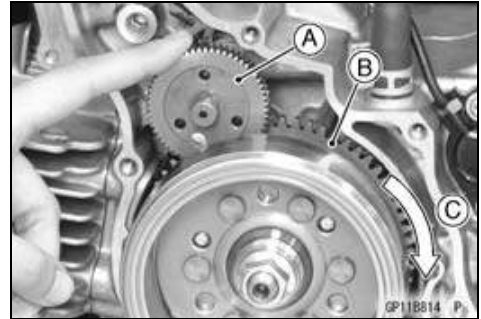
## Starter Motor Clutch

### Starter Motor Clutch Inspection

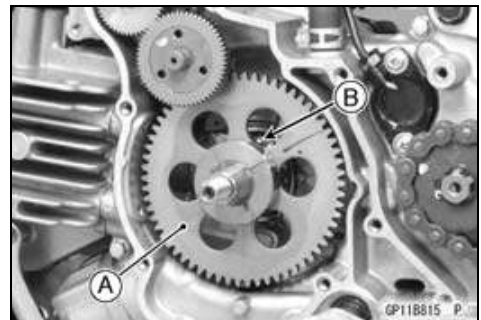
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  - Alternator Cover (see Alternator Cover Removal)
  - Starter Motor Idle Gear [A]



- Turn the torque limiter [A] by hand. The starter motor clutch gear [B] should turn clockwise freely [C] but should not turn counterclockwise.
- ★ If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.
- Disassemble the starter motor clutch, and visually inspect the clutch parts.
- ★ If there is any worn or damaged part, replace it.



- Remove the alternator rotor (see Alternator Rotor Removal).
- Inspect the starter motor clutch gear [A].
- ★ If the sliding surfaces [B] are worn or damaged, replace the starter motor clutch gear.



### Starter Torque Limiter Inspection

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  - Alternator Rotor (see Alternator Rotor Removal)
  - Torque Limiter [A]
- Visually inspect the torque limiter.
- ★ If the limiter has wear, discoloration or other damage, replace it as a unit.



## 15-30 ELECTRICAL SYSTEM

### Ignition System

#### **⚠ WARNING**

The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or ignition coil lead while the engine is running, or you could receive a severe electrical shock.

#### **Crankshaft Sensor Removal**

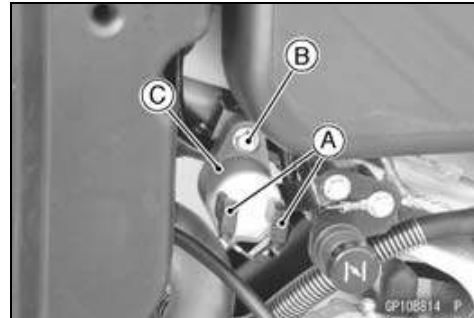
- Refer to the Stator Removal.

#### **Crankshaft Sensor Installation**

- Refer to the Stator Installation.

#### **Ignition Coil Removal/Installation**

- Remove:
  - Shroud (see Shroud Removal in the Frame chapter)
  - Spark Plug Cap
- Disconnect the ignition coil leads [A].
- Remove the mounting bolt [B] and remove the ignition coil [C].



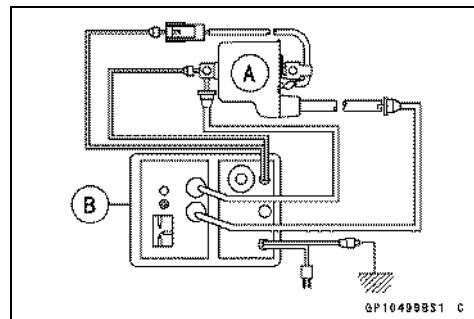
- Installation is the reverse of removal; note the following.
- Tighten:
  - Torque - Ignition Coil Mounting Bolt: 2.9 N-m (0.30 kgf-m, 26 in-lb)**

#### **Ignition Coil Inspection**

##### **Measuring Arcing Distance**

The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance using the coil tester for the 3-needle method.

- Remove the ignition coil (see Ignition Coil Removal/Installation).
- Connect the ignition coil (with the spark plug cap installed on the spark plug lead) [A] to the tester [B], and measure the arcing distance.



#### **⚠ WARNING**

To avoid extremely high voltage shocks, do not touch the coil body or leads.

- ★ If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.

##### **3 Needle Arcing Distance**

**Standard: 7 mm (0.26 in.) or more**

- To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil lead. Remove the cap by turning it counter-clockwise.
- ★ If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug cap.

## Ignition System

### Measuring Coil Resistance

If the arcing tester is not available, the coil can be checked for a broken or badly shorted winding with an ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

- Remove the ignition coil (see Ignition Coil Removal/Installation).
- Measure the primary winding resistance [A].
  - Connect an ohmmeter between the coil terminals.
  - Set the meter to the  $\times 1 \Omega$  range, and read the meter.
- Measure the secondary winding resistance [B].
  - Remove the spark plug cap by turning it counterclockwise.
  - Connect an ohmmeter between the spark plug lead and the green terminal (earth).
  - Set the meter to the  $\times 1 \text{ k}\Omega$  range, and read the meter.

### Ignition Coil Winding Resistance

**Primary windings: 0.19 ~ 0.23  $\Omega$  at 20°C (68°F)**

**Secondary windings: 2.5 ~ 3.7  $\text{k}\Omega$  at 20°C (68°F)**

- ★ If the meter does not read as specified, replace the coil.
- ★ If the meter reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.
- Check the spark plug lead for visible damage.
- ★ If the spark plug lead is damaged, replace the coil.

### Spark Plug Cleaning and Inspection

- Refer to the Spark Plug Cleaning and Inspection in the Periodic Maintenance chapter.

### Spark Plug Gap Inspection

- Refer to the Spark Plug Cleaning and Inspection in the Periodic Maintenance chapter.

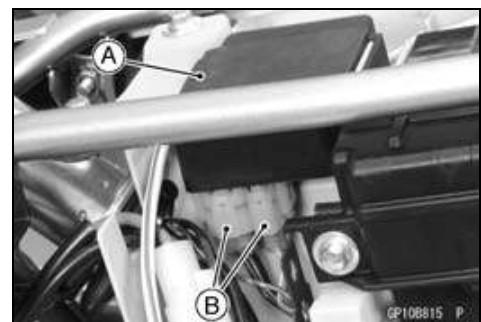
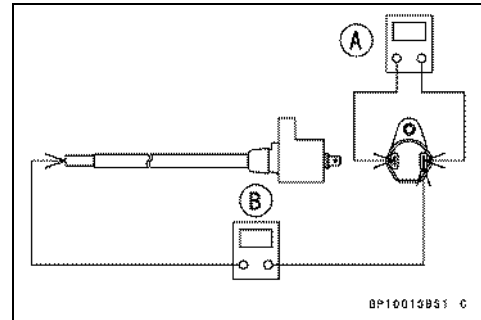
### Igniter Removal

- Remove:
  - Seat (see Seat Removal in the Frame chapter)
  - Left Side Cover (see Side Cover Removal in the Frame chapter)
  - Starter Relay
- Remove the igniter [A], and disconnect the igniter connectors [B].

### Igniter Inspection

#### NOTICE

**When inspecting the IC Igniter observe the following to avoid damage to the IC Igniter.**  
**Do not disconnect the IC Igniter while the engine is running.**  
**This may damage the IC Igniter.**



# 15-32 ELECTRICAL SYSTEM

## Ignition System

### Ignition Coil Primary Peak Voltage Check

- Disconnect the spark plug cap from the spark plug, but do not remove the spark plug.
- Connect the good spark plug [A] to the spark plug cap, then touch the engine with it.

#### NOTE

- Measure the voltage with each lead connected correctly. The correct value may not be obtained if disconnected.
  - Maintain the correct value of compression pressure for the cylinder (Be sure to measure the voltage with the spark plug install to the cylinder head).
- Connect the peak voltage adapter [B] between the terminal of primary lead (black) and ground connection of the unit with the lead of the ignition coil [C] connected.

**Special Tools - Peak Voltage Adapter: 57001-1415**

**Type: KEK-54-9-B**

**Needle Adapter Set: 57001-1457**

Connection:	Adapter	Digital Meter
Ground [D]	← Red Lead →	(+)
Black Lead [E]	← Black Lead →	(-)

IC Igniter [F]

Needle Adapter [G]

- Shift the gear to the neutral position.
- Crank the engine by pushing the starter button several times to measure the peak voltage of the primary ignition coil.

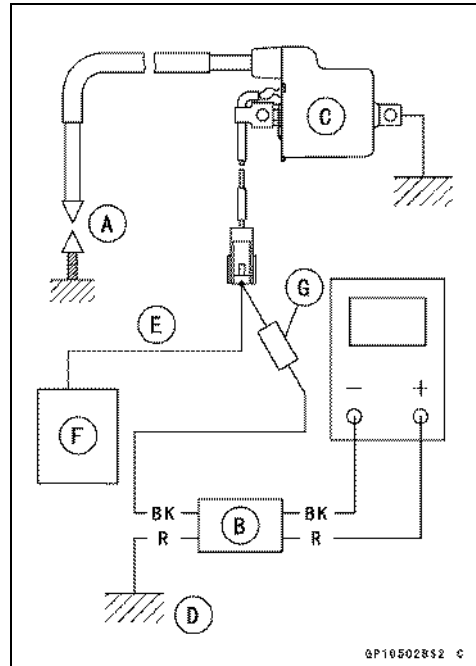
### Ignition Coil Primary Peak Voltage

**Standard: 100 V or more**

#### **⚠ WARNING**

**Electrical equipment can cause serious electrical shock. To avoid being shocked, do not touch the metal portion of the probe when measuring voltage.**

- ★ If the voltage is less than the specified value, check the ignition coil (see Ignition Coil Inspection).
- ★ If the ignition coil is good, check the other parts (see the flow chart in this section).
- ★ If the all parts are good, replace the igniter.





## Ignition System

### Crankshaft Sensor Peak Voltage Check

- To check the peak voltage, do the following procedures.
- Disconnect the alternator lead connector from the main harness (see Alternator Cover Removal).

#### NOTE

- Measure the voltage with each lead connected correctly. The correct value may not be obtained if disconnected.
- Maintain the correct value of compression pressure for the cylinder (Be sure to measure the voltage with the spark plug installed to the cylinder head).
- Connect the peak voltage adapter [A] to the digital meter and the terminals of the alternator lead connector [B].

**Special Tool - Peak Voltage Adapter: 57001-1415**  
**Type: KEK-54-9-B**

Connection:		Adapter		Digital Meter
Blue/Yellow Lead [C]	←	Red Lead	→	(+)
Ground	←	Black Lead	→	(-)

- Crank the engine by pushing the starter button several times with the transmission gear in neutral to measure the peak voltage of the crankshaft sensor.

### Crankshaft Sensor Peak Voltage

**Standard: DC 2 V or more**

#### **⚠ WARNING**

**Electrical equipment can cause serious electrical shock. To avoid being shocked, do not touch the metal portion of the probe when measuring voltage.**

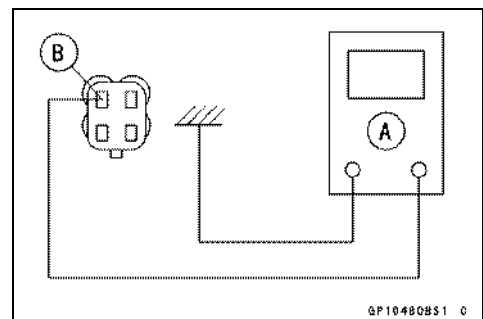
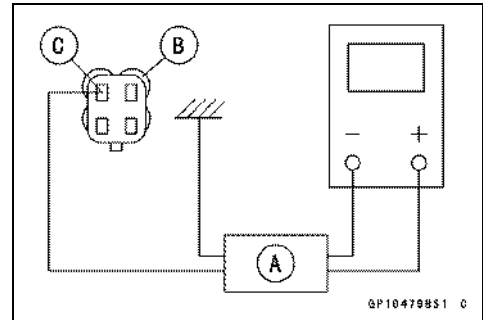
- ★ If the voltage is less than the specified, check the crankshaft sensor (see Crankshaft Sensor Inspection).
- ★ If the crankshaft sensor is good, check the other parts (see the flow chart in this section).
- ★ If the all parts are good, replace the igniter.

### Crankshaft Sensor Inspection

- Remove:
  - Alternator Lead Connector (see Alternator Cover Removal).
- Using a digital meter [A] and connect it to the Blue/Yellow lead [B] in the connector and the ground.
- ★ If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the crankshaft sensor is shorted, and must be replaced.

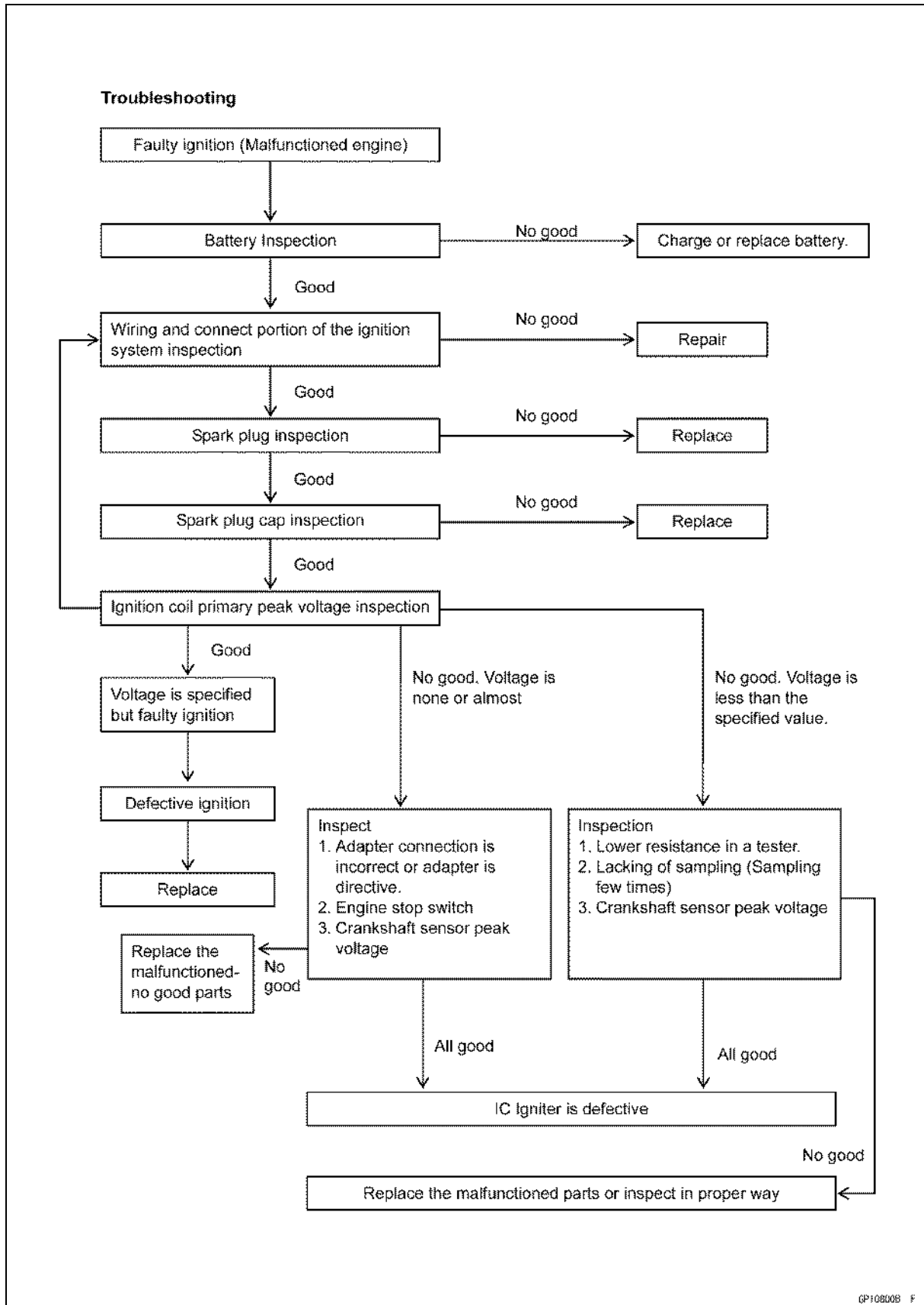
### Crankshaft Sensor Resistance

**Standard: 50 ~ 200 Ω at 20°C (68°F)**



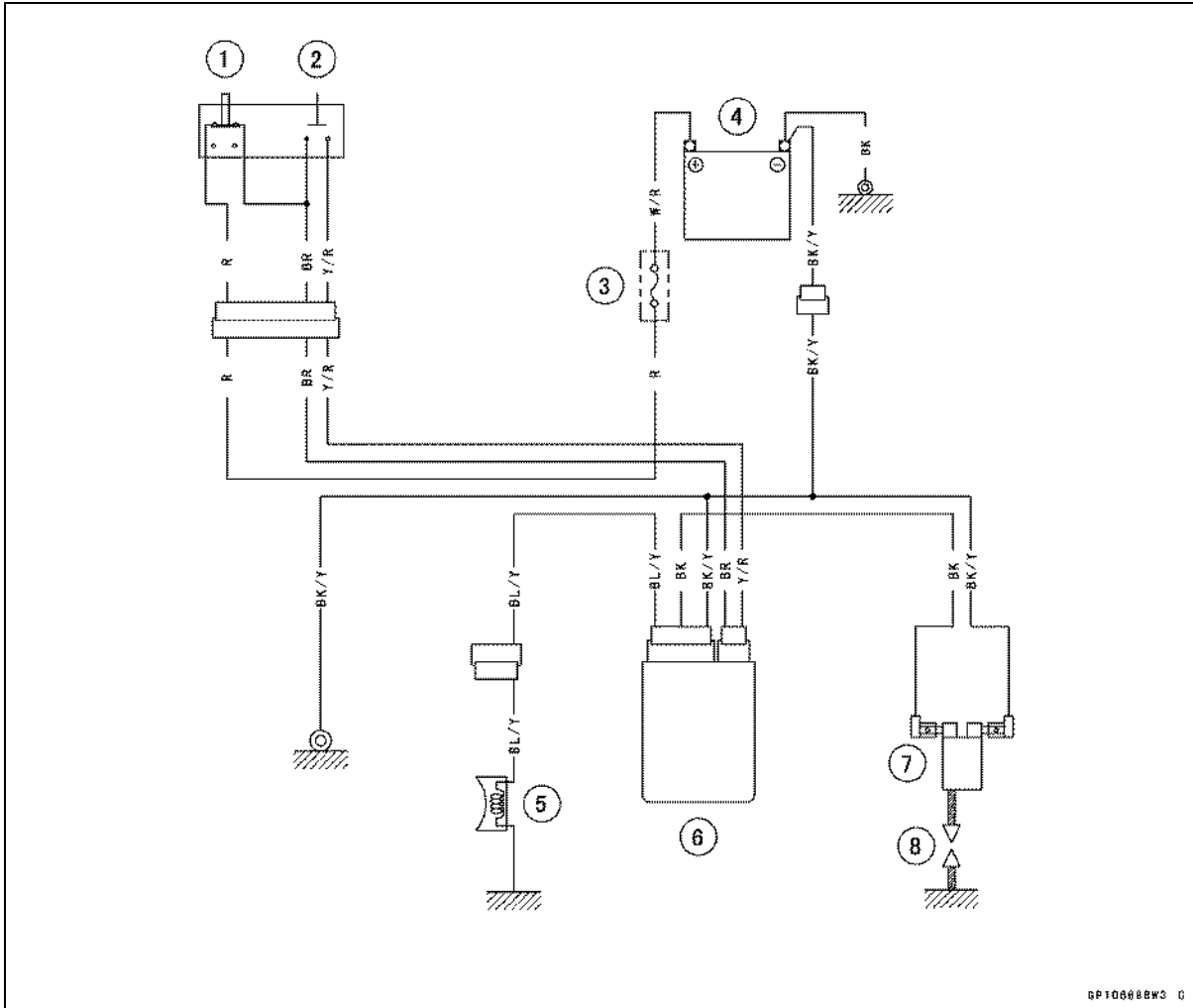
# 15-34 ELECTRICAL SYSTEM

## Ignition System



## Ignition System

## Ignition System Circuit (KLX110CA/DA Models)

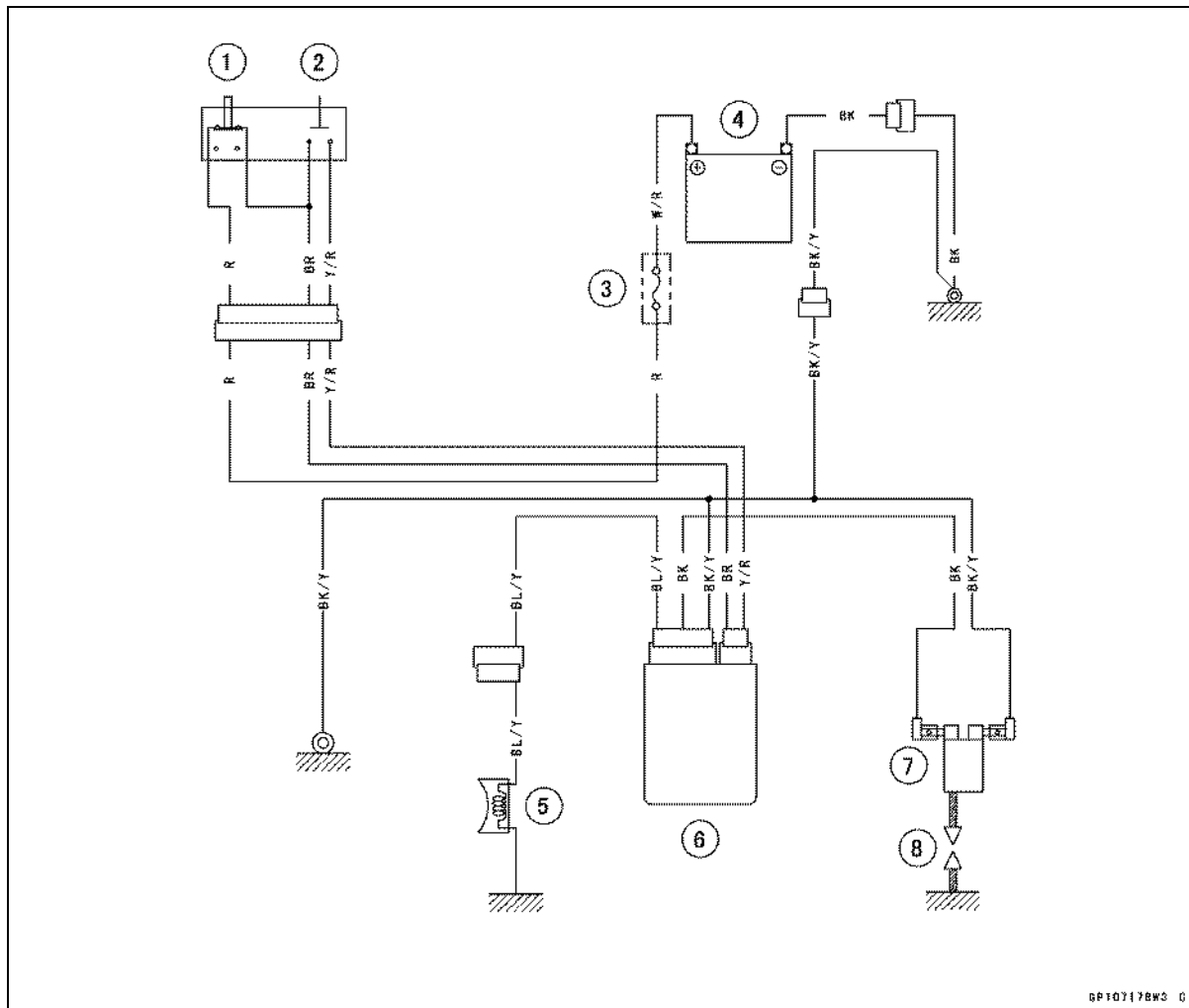


1. Engine Stop Switch
2. Engine Starter Button
3. Main Fuse 10 A
4. Battery 12 V 3 Ah
5. Cranksensor
6. IC Igniter
7. Ignition Coil
8. Spark Plug

# 15-36 ELECTRICAL SYSTEM

## Ignition System

### Ignition System Circuit (KLX110CB/DB Models ~)



1. Engine Stop Switch
2. Engine Starter Button
3. Main Fuse 10 A
4. Battery 12 V 3 Ah
5. Cranksensor
6. IC Igniter
7. Ignition Coil
8. Spark Plug

6P107178W3 G

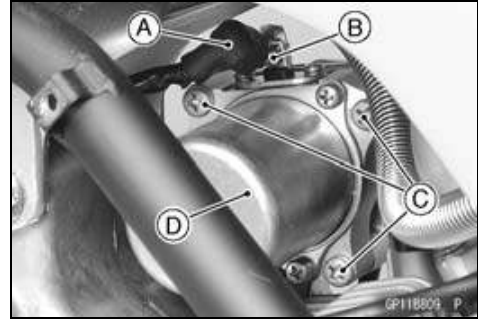
## Electrical Starter System

### Starter Motor Removal

#### NOTICE

**Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.**

- Remove:
  - Exhaust Pipe Cover (see Muffler Removal in the Engine Top End chapter)
- Slide out the rubber cap [A].
- Remove:
  - Starter Motor Terminal Screw [B]
  - Starter Motor Mounting Screws [C]
- Pull out the starter motor [D].

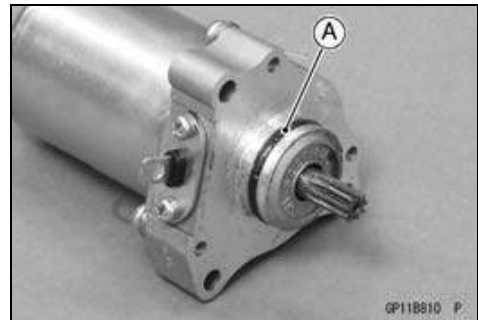


### Starter Motor Installation

#### NOTICE

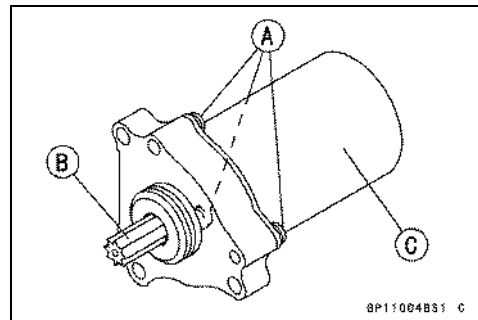
**Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.**

- Replace the O-ring [A] with a new one.
  - Apply grease to the O-ring.
  - Install the starter motor and other removed parts.
- Torque - Starter Motor Mounting Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)**
- Starter Motor Terminal Screw: 2.0 N·m (0.20 kgf·m, 18 in·lb)**



### Starter Motor Disassembly

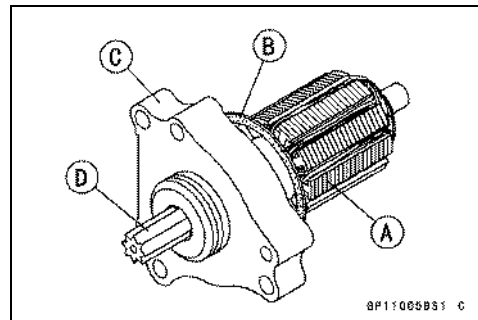
- Remove the starter motor (see Starter Motor Removal).
- Remove the end cover screws [A] with lockwashers.
- Hold the pinion gear portion [B] and pull out the yoke [C].



- Remove the armature [A] and gasket [B] from the end cover [C].

#### NOTE

- Wrap the pinion gear portion [D] by the vinyl tape before removal of the armature.



## 15-38 ELECTRICAL SYSTEM

### Electrical Starter System

#### NOTE

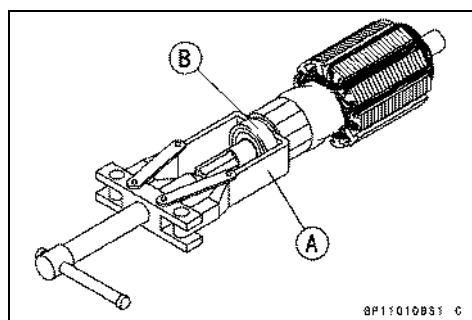
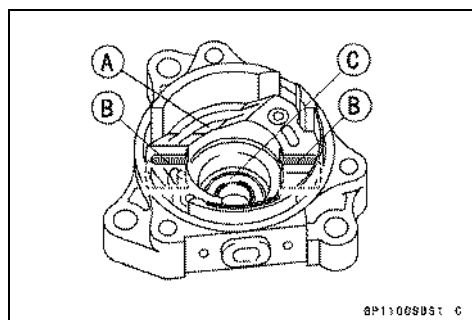
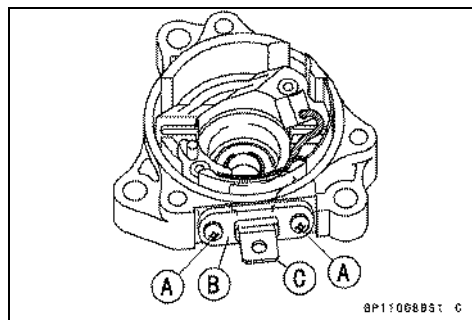
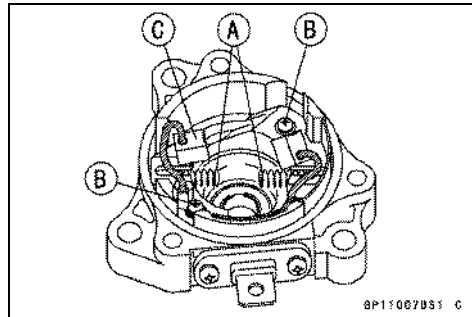
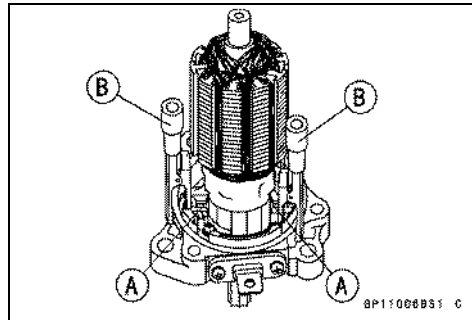
○ Hold the carbon brush leads [A], using the suitable tool [B] as shown.

- Pull out the carbon brush spring [A].
- Remove the brush holder screws [B] with lockwashers and flat washers.
- Remove the (-) carbon brush [C].

- Remove the terminal cover plate screws [A] and terminal cover plate [B].
- Push the terminal [C] into the end cover.
- Remove the terminal with (+) carbon brush.

- Remove the brush holder plate [A] and insulator plates [B].
- Using a suitable tool (or oil seal remover), remove the oil seal [C] from the end cover.

- Using a suitable tool [A] (or bearing puller), remove the bearing [B] from the armature shaft.



## Electrical Starter System

### Starter Motor Assembly

- Smooth the commutator surface if necessary with fine emery paper (more than #600).
- Blow or wipe the parts of the starter motor to clean the dust or any carbon particles.
- Replace the oil seal with a new one.
- Apply engine oil to the oil seal outer circumference.
- Press in the oil seal [A].
- Install the oil seal so that the marked side faces yoke side.
- Install the insulator plates [B] and the brush holder plate [C].
- Install the terminal [D] through the grommet [E] from inside to outside.
- Tighten the brush holder plate screws [F] (one screw should be tightened with the carbon brush lead).

**Torque - Brush Holder Plate Screws: 0.9 N·m (0.09 kgf·m, 8 in·lb)**

- Apply adhesive cement [A] to the terminal [B] as shown.
- Install the terminal cover plate so that the flat side faces outside.
- Tighten:

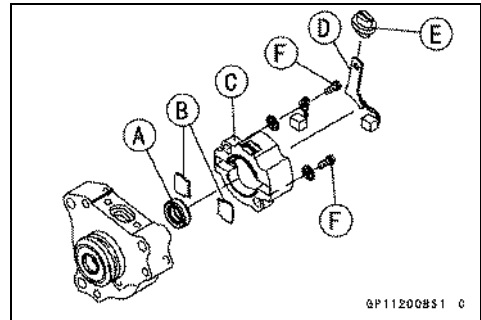
**Torque - Terminal Cover Plate Screws: 2.0 N·m (0.20 kgf·m, 18 in·lb)**

- Replace the bearing with a new one.
- Press in the bearing [A] with a suitable tool.

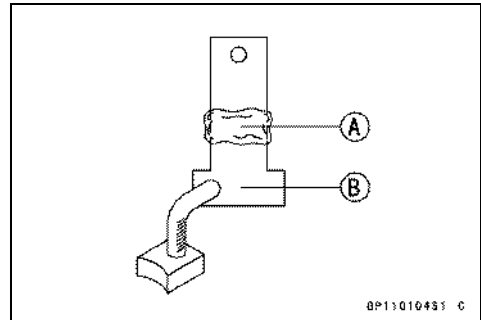
### NOTE

- Install the bearing with the marked side toward the pinion gear.
- Spin the bearing by hand to check its condition. If it is noisy or does not spin smoothly, replace it.

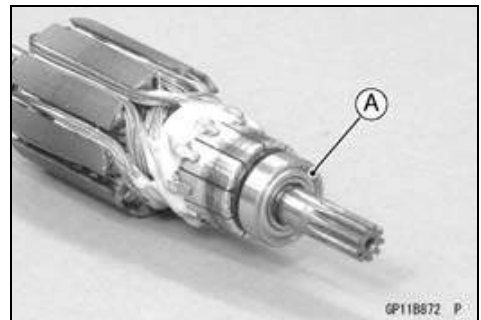
- Insert the (–) carbon brush spring into the brush holder [A].
- Insert the (–) carbon brush [B] into the brush holder until it is bottomed.



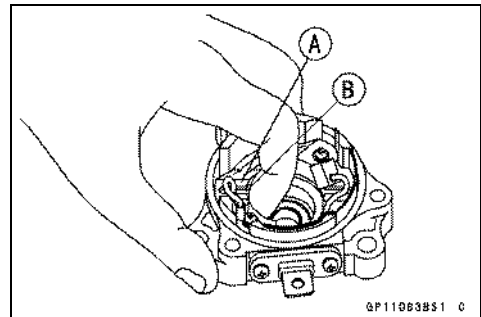
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GP13010433 C



GP118872 P

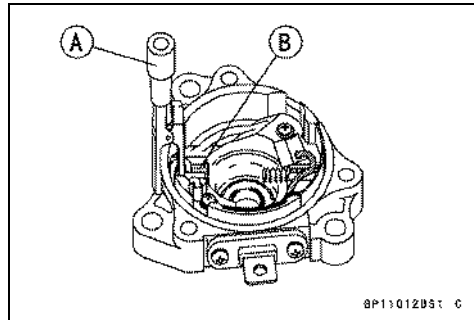


GP11063831 C

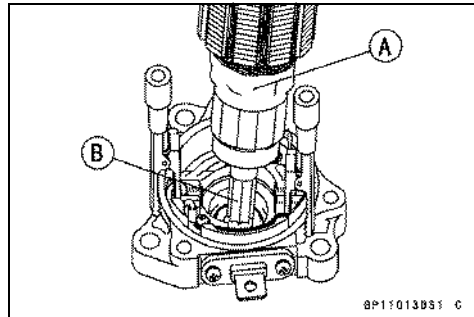
## 15-40 ELECTRICAL SYSTEM

### Electrical Starter System

- Hold the (-) carbon brush in the brush holder so that a suitable tool [A] could hold the (-) carbon brush lead [B] as shown.
- Install the (+) carbon brush spring.



- Hold the (+) carbon brush lead with a suitable tool.
- Apply high-temperature grease to the oil seal lip.
- Before inserting the armature [A], wrap the pinion gear portion [B] by the vinyl tape.
- Remove the suitable tool.



- Check that movement of the carbon brushes is smooth and they touch the commutator properly.
- Raise the lead.
- Apply high-temperature grease to the shaft end of the armature.
- Install the gasket and yoke to the end cover.
- Tighten:
  - Torque - End Cover Screws: 4.4 N-m (0.45 kgf-m, 39 in-lb)**
- Install the starter motor.

#### **Starter Motor Brush Inspection**

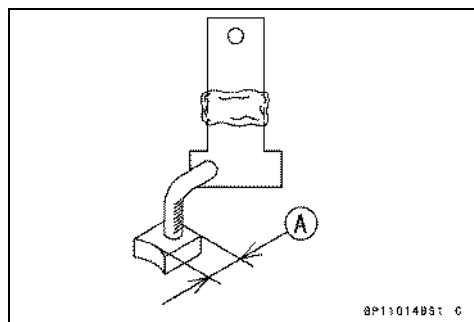
- Measure the overall length [A] of each brush.

##### **Starter Motor Brush Length**

**Standard: 7.0 mm (0.28 in.)**

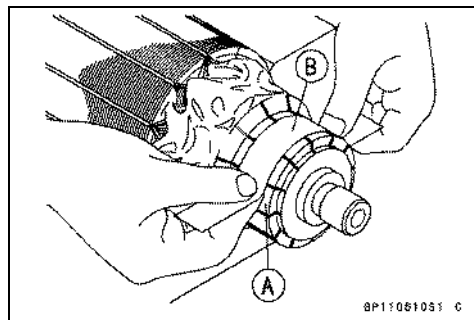
**Service Limit: 3.5 mm (0.14 in.)**

- ★ If any is worn down to the service limit, replace the carbon brush.



#### **Commutator Cleaning/Inspection**

- Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.



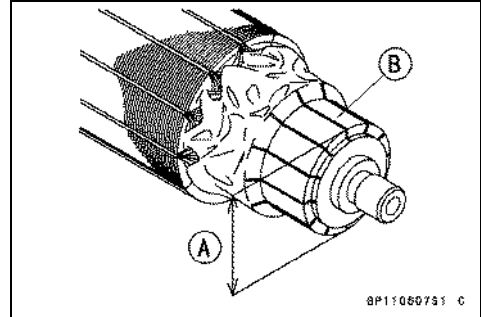


## Electrical Starter System

- Measure the outer diameter [A] of the commutator [B].
- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.

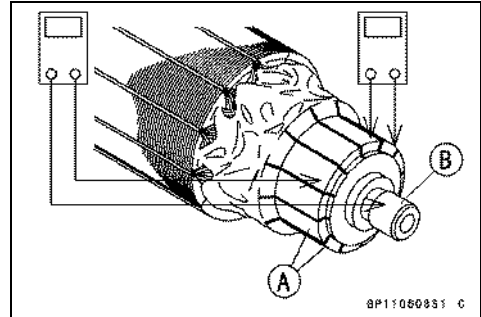
### Commutator Diameter

Standard:	22.0 mm (0.87 in.)
Service Limit:	21.5 mm (0.85 in.)



### Armature Inspection

- Using a digital meter, measure the resistance between any two commutator segments [A].
- ★ If there is a high resistance or no reading ( $\infty$ ) between any two segments, a winding is open and the starter motor must be replaced.
- Using the digital meter, measure the resistance between the segments and the shaft [B].
- ★ If there is any reading at all, the armature has a short and the starter motor must be replaced.

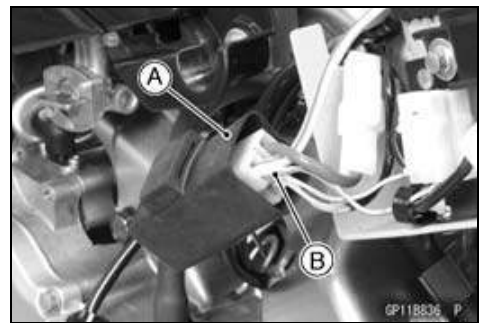


### NOTE

○ Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the digital meter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

### Starter Relay Inspection

- Remove:
  - Seat (see Seat Removal in the Frame chapter)
  - Left Side Cover (see Side Cover Removal in the Frame chapter)
- Tuck up the cover [A] and disconnect the connector [B].



## 15-42 ELECTRICAL SYSTEM

### Electrical Starter System

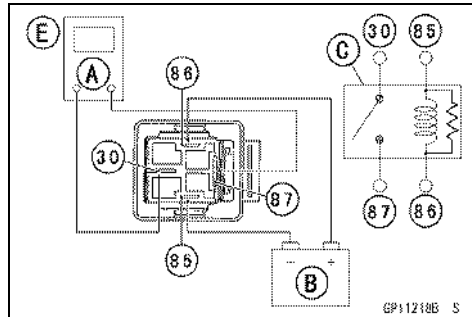
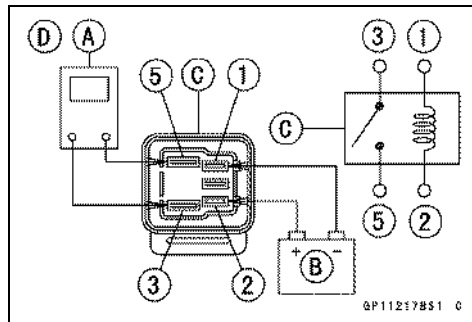
- Connect a digital meter [A] and 12 V battery [B] to the starter relay [C] as shown in the figure.
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.  
KLX110CA/DA Models [D]  
KLX110CB/DB Models ~ [E]

#### Starter Relay Inspection

**Standard:**            When battery is connected →  $0 \Omega$   
                              When battery is disconnected →  $\infty \Omega$

- Install the cables and other removed parts.

**Torque - Starter Relay Terminal Screws:** 2.9 N·m (0.30 kgf·m, 26 in·lb)

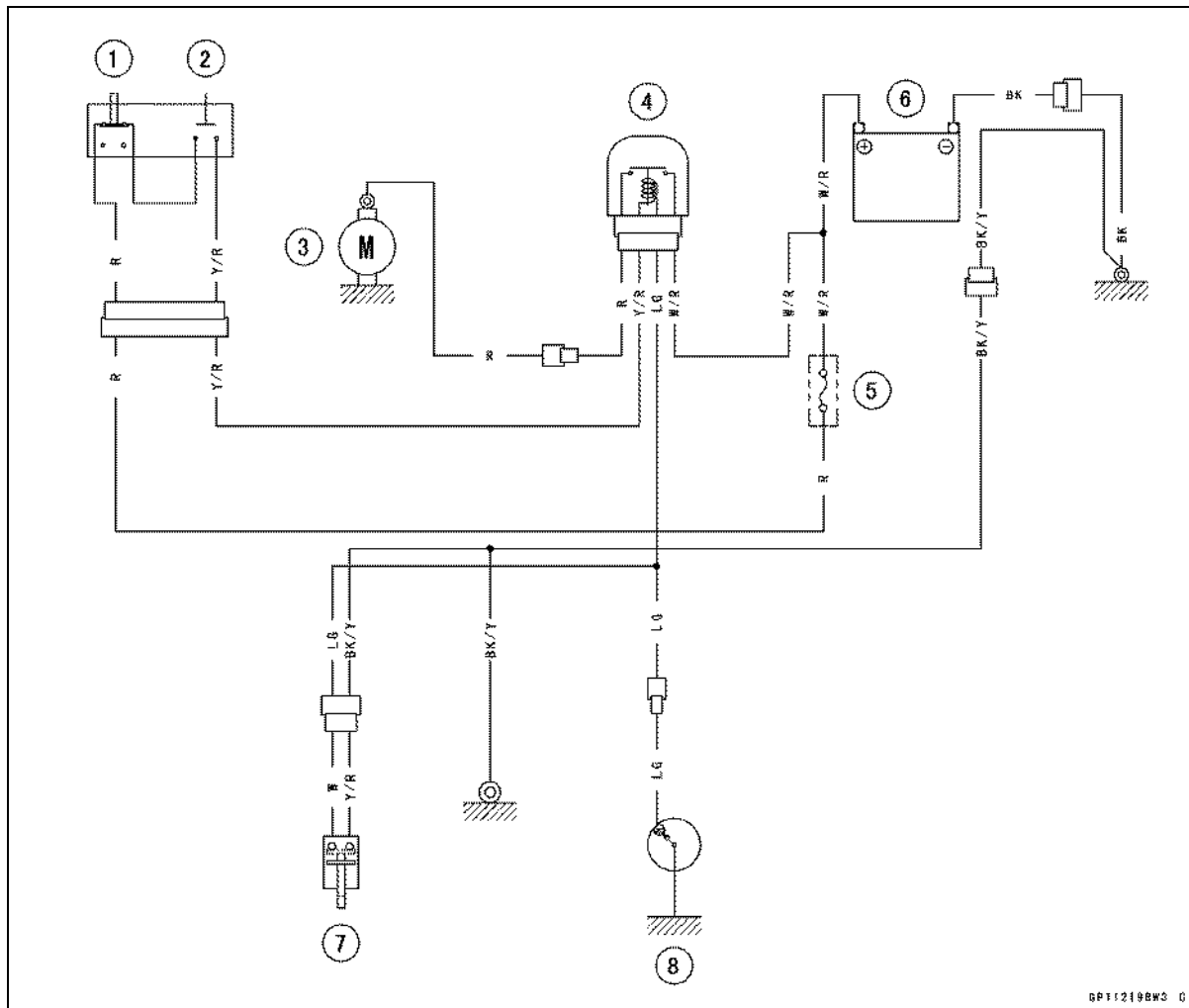




# 15-44 ELECTRICAL SYSTEM

## Electrical Starter System

### Electrical Starter System Circuit (KLX110CB/DB Models ~)



1. Engine Stop Switch
2. Engine Starter Button
3. Starter Motor
4. Starter Relay
5. Main Fuse 10 A
6. Battery 12 V 3 Ah
7. Starter Lockout Switch (KLX110D Models)
8. Gear Position Switch

GF112198W3 G

## Switches and Sensors

### Switch Inspection

- Using a digital meter, check to see that only the connections shown in the table have continuity (about zero ohms).
- ★ If the switch has an open or short, repair it or replace it with a new one.

Engine Stop Switch		
Color	R	BR
Stop		
Run	○ —	○ —

GP183528X3 C

Starter Button		
Color	BR	Y/R
Release		
Push	○ —	○ —

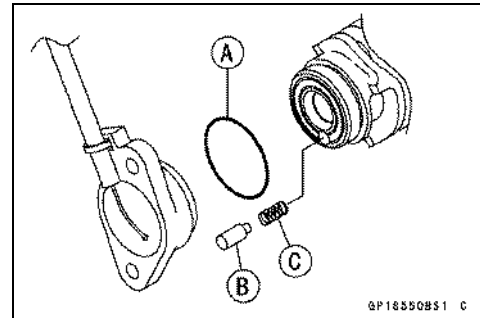
GP183528X3 C

### Gear Position Switch Removal

- Disconnect the gear position switch lead connector [A].
- Remove:
  - Engine Sprocket Cover (see Drive Chain Removal in the Final Drive chapter)
  - Screws [B]
  - Gear Position Switch [C]



- Remove:
  - O-ring [A]
  - Gear Position Switch Finger [B]
  - Spring [C]



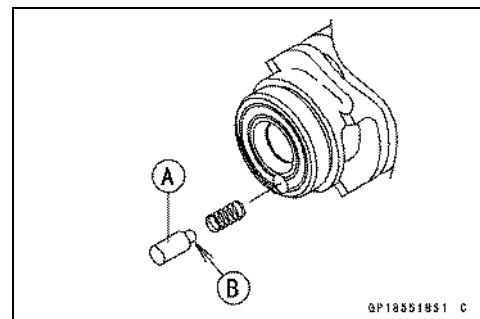
GP185508S1 C

### Gear Position Switch Installation

- Insert the spring into the hole in the shift drum.
- Insert the switch finger [A] so that the small diameter [B] is toward hole side.
- Replace the O-ring with a new one.
- Apply high-temperature grease to the O-ring.
- Clean the contact points on the position switch.
- Tighten the gear position switch screw.

**Torque - Gear Position Switch Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)**

- Install the other removed parts.



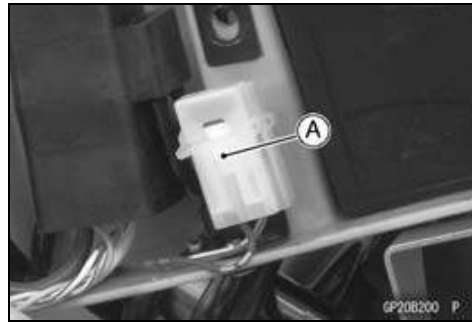
GP185518S1 C

## 15-46 ELECTRICAL SYSTEM

### Fuses

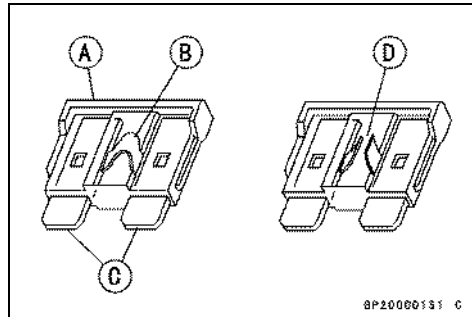
#### **Main Fuse 10 A Removal**

- Remove:
  - Seat (see Seat Removal in the Frame chapter)
  - Left Side Cover (see Side Cover Removal in the Frame chapter)
- Remove the main fuse [A].



#### **Main Fuse 10 A Inspection**

- Remove the fuse (see Main Fuse 10 A Removal) and inspect the fuse element.
- ★ If the fuse element is blown, replace the fuse.
  - Housing [A]
  - Fuse Element [B]
  - Terminal [C]
  - Blown Element [D]



#### **NOTICE**

**When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.**

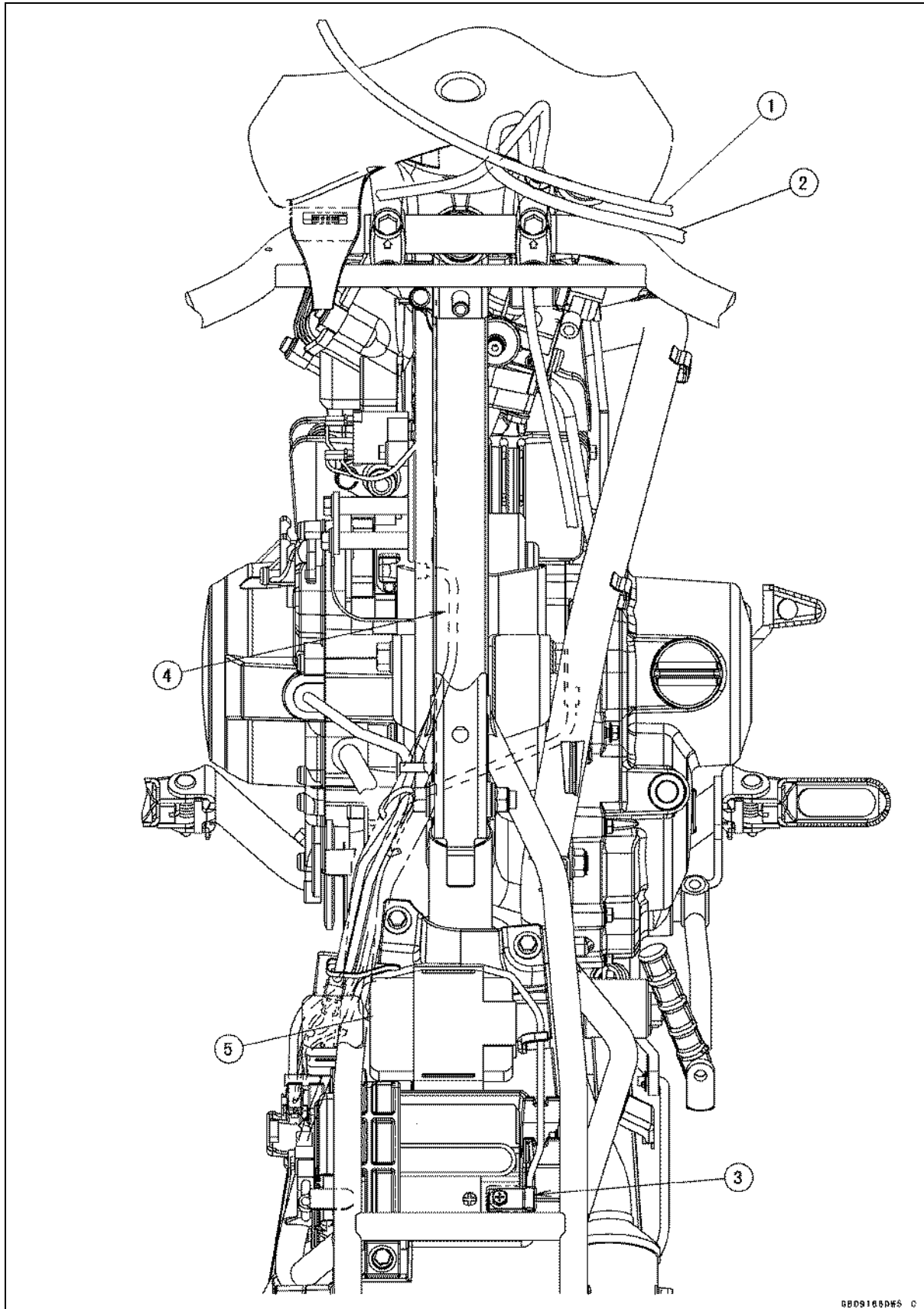
# Appendix

## Table of Contents

Cable, Wire, and Hose Routing .....	16-2
Troubleshooting Guide .....	16-10

## 16-2 APPENDIX

### Cable, Wire, and Hose Routing





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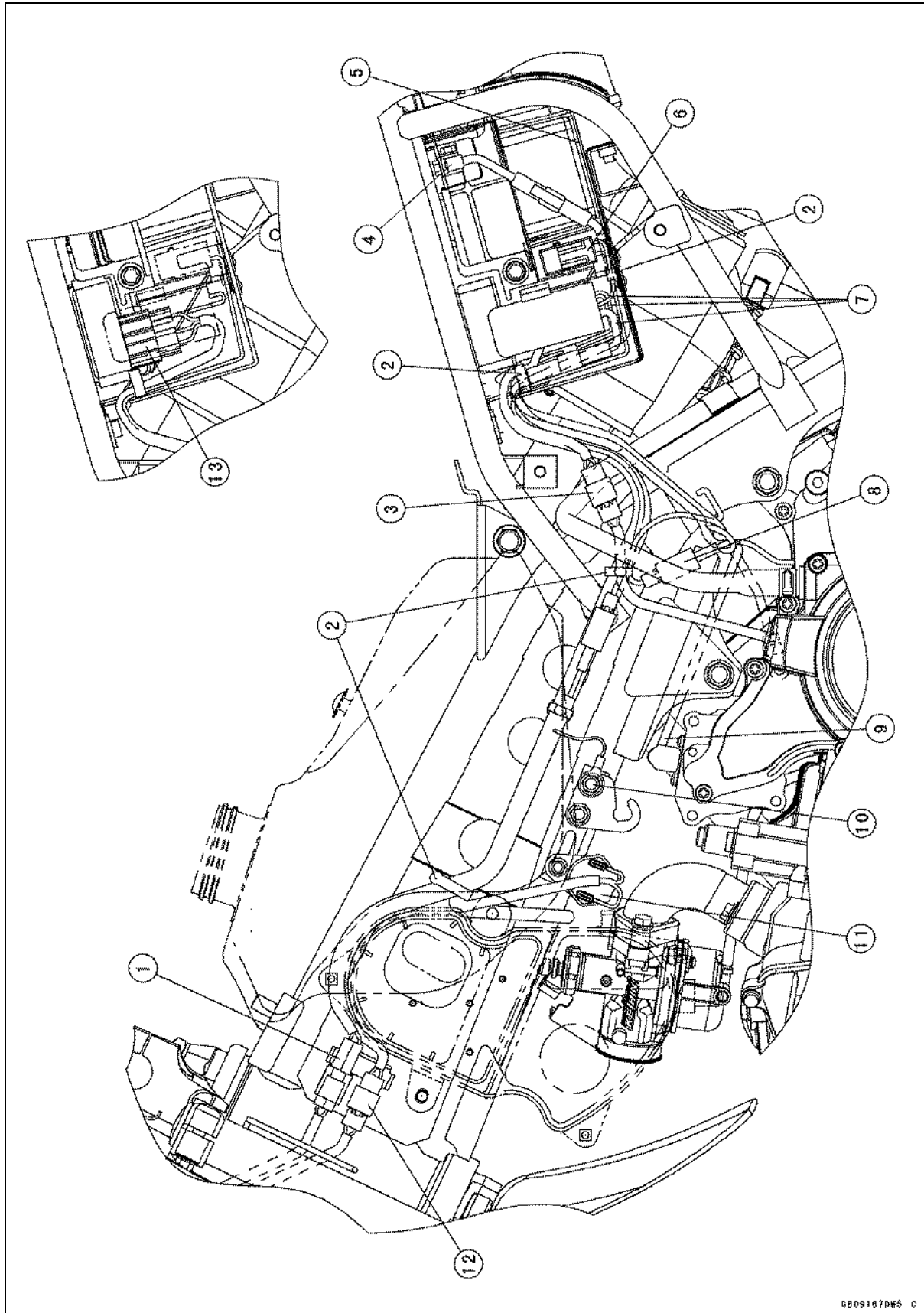
## Cable, Wire, and Hose Routing

---

1. Brake Cable
2. Throttle Cable
3. Battery Positive (+) Cable
4. Route the starter motor cable through the inside of engine mount.
5. Igniter

# 16-4 APPENDIX

## Cable, Wire, and Hose Routing



6B09167D6S C

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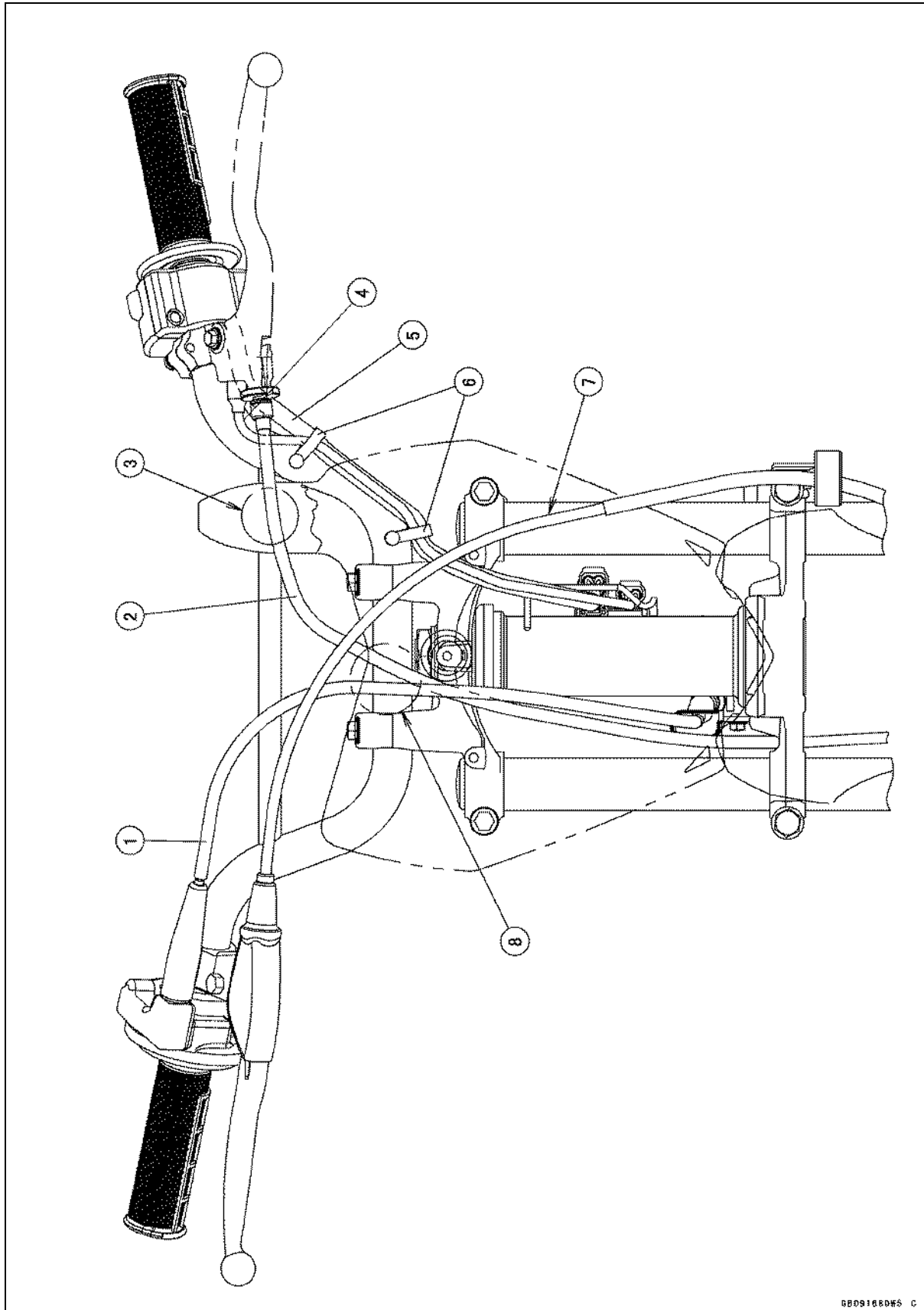
**Cable, Wire, and Hose Routing**

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1. Left Switch Housing Lead Connector
2. Clamps
3. Alternator Lead Connector
4. Battery Negative (-) Cable
5. Damper
6. Fuse
7. Starter Relay Leads
8. Gear Position Switch Lead Connector
9. Starter Motor Cable
10. Frame Ground Lead Terminal
11. Ignition Coil
12. Starter Lockout Switch Lead Connector (KLX110D Models)
13. Igniter

## 16-6 APPENDIX

### Cable, Wire, and Hose Routing



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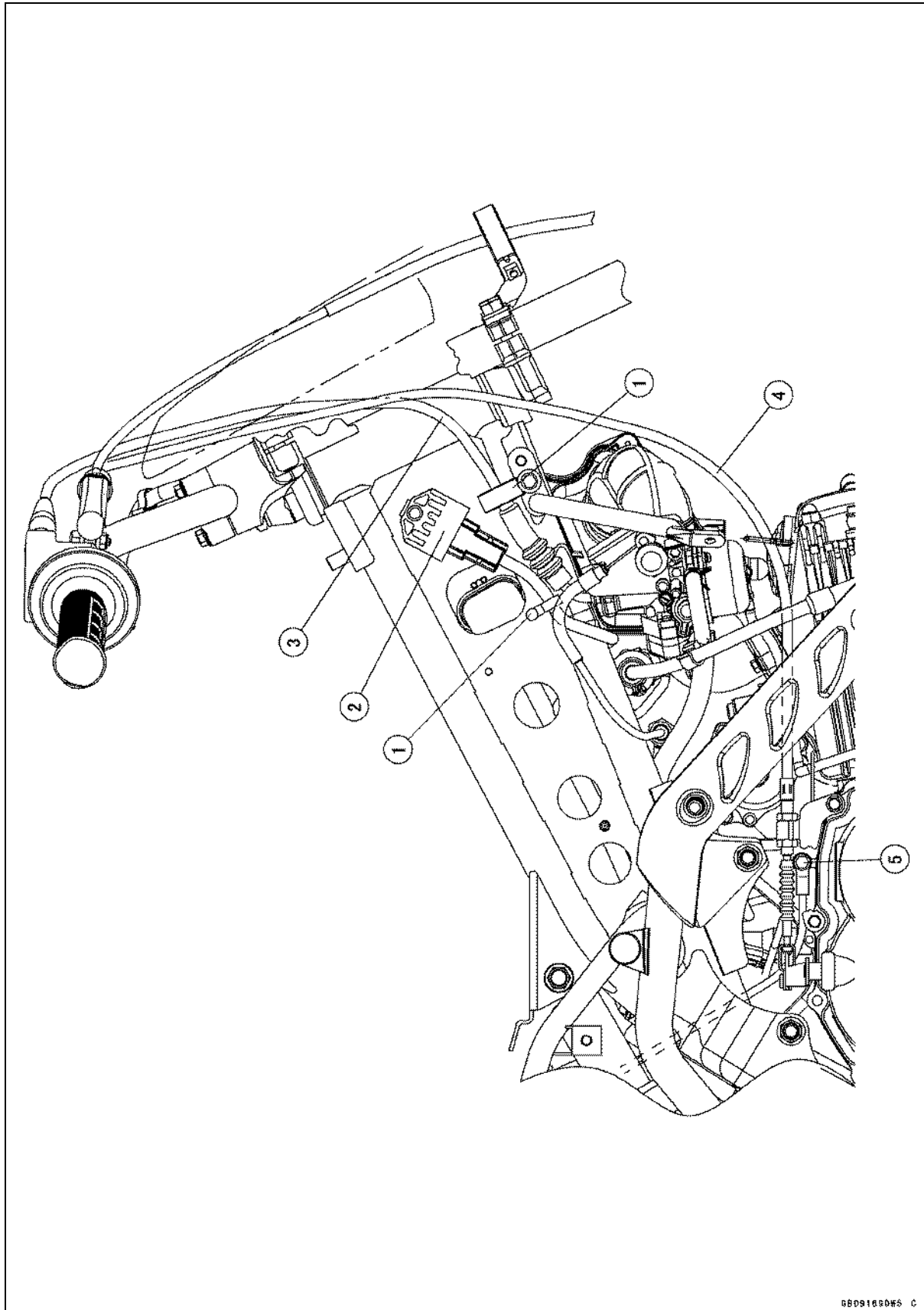
## Cable, Wire, and Hose Routing

---

1. Throttle Cable
2. Clutch Cable (KLX110D Models)
3. Route the clutch cable in front of the band of number plate.
4. Starter Lockout Switch Lead (KLX110D Models)
5. Left Switch Housing Lead
6. Clamps
7. Route the brake cable in front of the number plate.
8. Route the throttle cable and clutch cable inside of the number plate.

# 16-8 APPENDIX

## Cable, Wire, and Hose Routing



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## Cable, Wire, and Hose Routing

---

1. Clamps
2. Regulator/Rectifier
3. Throttle Cable
4. Clutch Cable (KLX110D Models)
5. Engine Ground Lead Terminal

## 16-10 APPENDIX

### Troubleshooting Guide

---

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:**

- Engine stop switch not ON
- Starter lockout switch trouble (KLX110D)
- Gear position switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Engine stop switch trouble
- Fuse blown

##### **Starter motor rotating but engine doesn't turn over:**

- Starter clutch trouble
- Starter idle gear trouble

##### **Engine won't turn over:**

- Valve seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end, big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure
- Kick shaft return spring broken
- Kick ratchet gear not engaging

##### **No fuel flow:**

- No fuel in tank
- Fuel tank cap air vent obstructed
- Fuel tap clogged
- Fuel tap turned off
- Fuel line clogged
- Carburetor float valve clogged

##### **Engine flooded:**

- Fuel level in carburetor float bowl too high
- Float valve worn or jammed with foreign matter
- Starting technique faulty (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)

##### **Fuel/air mixture incorrect:**

- Pilot screw and/or idle adjusting screw maladjusted
- Pilot jet or air passage clogged
- Air cleaner clogged, poorly sealed or missing
- Starter jet clogged

##### **No spark; spark weak:**

- Engine stop switch turned OFF

- Spark plug dirty, broken or gap maladjusted
- Spark plug cap or ignition coil lead trouble
- Spark plug cap shorted or not in good contact

- Spark plug incorrect
- Igniter trouble
- Crankshaft sensor trouble
- Ignition coil trouble
- Engine stop switch shorted
- Gear position switch trouble
- Wiring shorted or open
- Rotor damaged

##### **Compression Low:**

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Cylinder gasket damaged
- Valve spring broken or weak
- Valve not seating properly (valve bent, deformed, worn or carbon accumulation on the seating surface)

#### **Poor Running at Low Speed:**

##### **Spark weak:**

- Battery voltage low
- Spark plug dirty, broken or gap maladjusted
- Spark plug cap or ignition coil lead trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- Igniter trouble
- Crankshaft sensor trouble
- Rotor damaged
- Ignition coil trouble
- Wiring connector not in good contact

##### **Fuel/air mixture incorrect:**

- Pilot screw and/or idle adjusting screw maladjusted
- Pilot jet or air passage clogged
- Needle Jet or air passage clogged
- Air cleaner clogged, poorly sealed or missing
- Choke valve closed
- Fuel level in carburetor float bowl too high or too low
- Fuel tank cap air vent obstructed
- Fuel tap clogged
- Carburetor holder loose
- Air cleaner duct loose



## Troubleshooting Guide

### Compression low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Cylinder gasket damaged
- Valve spring broken or weak
- Valve not seating properly (valve bent, deformed, worn or carbon accumulation on the seating surface)
- Decompression trouble

### Other:

- Igniter trouble
- Engine oil level too high
- Engine oil viscosity too high
- Brake dragging
- Drive train trouble
- Engine overheating
- Clutch slipping

### Poor Running or No Power at High Speed:

#### Firing incorrect:

- Spark plug dirty, broken or gap maladjusted
- Spark plug cap or ignition coil lead trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- Igniter trouble
- Crankshaft sensor trouble
- Rotor damaged
- Ignition coil trouble
- Wiring connector not in good contact

#### Fuel/air mixture incorrect:

- Choke valve closed
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Air jet clogged
- Fuel level in carburetor float bowl too high or too low
- Needle Jet or air passage clogged
- Air cleaner clogged, poorly sealed or missing
- Air cleaner duct loose
- Water or foreign matter in fuel
- Carburetor holder loose
- Fuel tank cap air vent obstructed
- Fuel tap clogged
- Fuel line clogged

### Compression low:

- Spark plug loose

- Cylinder head not sufficiently tightened down

- No valve clearance

- Cylinder, piston worn

- Piston ring bad (worn, weak, broken or sticking)

- Piston ring/groove clearance excessive

- Cylinder head gasket damaged

- Cylinder head warped

- Cylinder gasket damaged

- Valve spring broken or weak

- Valve not seating properly (valve bent, deformed, worn or carbon accumulation on the seating surface.)

- Decompression trouble

### Knocking:

- Carbon built up in combustion chamber

- Fuel poor quality or incorrect

- Spark plug incorrect

- Igniter trouble

### Other:

- Throttle valve won't fully open

- Brake dragging

- Air cleaner clogged

- Water or foreign matter in fuel

- Clutch slipping

- Overheating

- Engine oil level too high

- Engine oil viscosity too high

- Drive chain trouble

- Crankshaft bearing worn or damaged

### Engine Overheating:

#### Firing incorrect:

- Spark plug dirty, broken or maladjusted

- Spark plug incorrect

- Igniter trouble

#### Fuel/air mixture incorrect:

- Main jet clogged or wrong size

- Fuel level in carburetor float bowl too low

- Carburetor holder loose

- Air cleaner clogged, poorly sealed or missing

- Air cleaner duct loose

- Choke valve closed

#### Compression high:

- Carbon built up in combustion chamber

#### Engine load faulty:

- Clutch slipping

- Engine oil level too high

- Engine oil viscosity too high

- Brake dragging

- Drive chain trouble

#### Lubrication inadequate:

- Engine oil level too low

- Engine oil poor quality or incorrect

## 16-12 APPENDIX

### Troubleshooting Guide

---

#### Clutch Operation Faulty:

##### Clutch slipping:

- No clutch release play (KLX110C)
- No clutch lever play (KLX110D)
- Clutch cable maladjusted (KLX110D)
- Clutch inner cable sticking (KLX110D)
- Friction plate worn or warped
- Steel plate worn or warped
- Clutch spring broken or weak
- Clutch release maladjusted (KLX110C)
- Clutch release function trouble
- Clutch hub or housing unevenly worn

##### Clutch not disengaging properly:

- Clutch release play excessive (KLX110C)
- Clutch lever play excessive (KLX110D)
- Clutch spring compression uneven
- Engine oil deteriorated
- Engine oil viscosity too high
- Engine oil level too high
- Clutch housing seized
- Clutch release function trouble
- Clutch hub nut loose
- Clutch plate warped or rough
- Clutch hub spline damaged

#### Gear Shifting Faulty:

##### Doesn't go into gear; shift pedal doesn't return:

- Clutch not disengaging
- Shift fork bent, worn, or seized
- Shift return spring pin loose
- Shift return spring weak or broken
- Shift shaft lever broken
- Pawl guide plate broken
- Shift pawl broken
- Shift pawl spring tension loose
- Gear seized
- Gear set lever operation trouble
- Shift drum broken

##### Jumps out of gear:

- Shift fork ear worn, bent
- Gear groove worn
- Gear dogs and/or dog holes worn
- Shift drum groove worn
- Gear set lever spring weak or broken
- Shift fork guide pin worn
- Drive shaft, output shaft and/or gear splines worn

##### Overshifts:

- Gear set lever spring weak or broken
- Pawl guide plate worn

#### 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 pin hole worn

##### Valve noise:

- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearing or cam face worn
- Valve lifter worn

##### Other noise:

- Connecting rod big end and/or small end clearance excessive
- Piston ring worn, broken or stuck
- Piston seizure, damaged
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive
- Engine mounts loose
- Crankshaft bearing worn
- Camshaft chain tensioner trouble
- Camshaft chain, sprocket, chain guide worn
- Primary gear worn or damaged
- Alternator rotor loose

#### Abnormal Drive Train Noise:

##### Clutch noise:

- Clutch housing finger and friction plate tang worn
- Clutch housing gear worn
- Metal chips jammed in clutch housing gear teeth

##### Transmission noise:

- Bearings worn
- Transmission gears worn or chipped
- Metal chips jammed in gear teeth
- Engine oil insufficient, low viscosity
- Kick ratchet gear not properly disengaging from kick gear
- Kick shaft idle gear worn or chipped

##### Drive chain noise:

- Drive chain maladjusted
- Drive chain worn
- Rear and/or engine sprocket worn
- Drive chain lubrication insufficient
- Rear wheel misaligned

#### Abnormal Frame Noise:

##### Front fork noise:

- Oil insufficient or too thin
- Spring weak or broken

##### Rear shock absorber noise:

- Shock absorber damaged

## Troubleshooting Guide

### Brake noise:

- Brake linings over worn or worn unevenly
- Drum worn unevenly or scored
- Brake spring(s) weak or broken
- Foreign matter in hub
- Brake not properly adjusted

### Other noise:

- Bracket, nut, bolt, etc., not properly mounted or tightened

### Abnormal Exhaust Color:

#### White smoke:

- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

#### Black smoke:

- Air cleaner element clogged
- Main jet too large or fallen off
- Choke valve closed
- Fuel level in carburetor float bowl too high

#### Brown smoke:

- Main jet too small
- Fuel level in carburetor float bowl too low
- Air cleaner duct loose
- Air cleaner poorly sealed or missing

### Handling and/or Stability

#### Unsatisfactory:

##### Handlebar hard to turn:

- Cable, hose, wire routing incorrect
- Steering stem nut too tight
- Steering stem bearing damaged
- Steering stem bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

##### Handlebar shakes or excessively vibrates:

- Tire worn
- Swingarm pivot bearings worn
- Rim warped or not balanced
- Spokes loose
- Wheel bearing worn
- Handlebar holder bolt loose

- Steering stem head nut loose
- Front, rear axle runout excessive

##### Handlebar pulls to one side:

- Frame bent
- Rear wheel misalignment
- Swingarm bent or twisted
- Swingarm pivot shaft runout excessive
- Steering maladjusted
- Steering stem bent
- Front fork bent
- Right and left front fork oil level uneven

##### Suspension operation trouble:

###### (Too hard)

- Tire air pressure too high
- Front fork oil excessive
- Front fork oil viscosity too high
- Front fork bent

###### (Too soft)

- Front fork oil insufficient or leaking
- Front fork oil viscosity too low
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil or gas leaking
- Tire air pressure too low

##### Brake Doesn't Hold:

- Brake not properly adjusted
- Brake linings over worn or worn unevenly
- Drum worn unevenly or scored
- Cam, camshaft, shaft hole worn
- Oil, grease on lining and drum
- Dirt, water between lining and drum
- Overheated

##### Battery Trouble:

###### Battery discharged:

- Charge insufficient
- Battery faulty (too low terminal voltage)
- Battery lead making poor contact
- Alternator trouble
- Wiring faulty
- Regulator/rectifier trouble

###### Battery overcharged:

- Alternator trouble
- Regulator/rectifier trouble
- Battery faulty

## MODEL APPLICATION

Year	Model	Beginning Frame No.
2010	KLX110CA	JKALXSC1□ADA71826 JKALX110CCDA71829
2010	KLX110DA	JKALXSD1□ADA71830
2011	KLX110CB	JKALXSC1□BDA76725 JKALX110CCDA77275
2011	KLX110DB	JKALXSD1□BDA76735
2012	KLX110CC	JKALXSC1□CDA81071 JKALX110CCDA81841
2012	KLX110DC	JKALXSD1□CDA81072
2013	KLX110CD	JKALXSC1□DDA85234 JKALX110CCDA85234
2013	KLX110DD	JKALXSD1□DDA85434
2014	KLX110CE	JKALXSC1□EDA89018 JKALX110CCDA89018
2014	KLX110DE	JKALXSD1□EDA88968

□:This digit in the frame number changes from one machine to another.



**KAWASAKI HEAVY INDUSTRIES, LTD.**  
Motorcycle & Engine Company

**Part No.99924-1429-05**

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