MODEL APPLICATION

Year	Model	Beginning Frame No.
2004	ZR750–J1	JKAZRDJ1□4A000001 ZR750J–000001 JKAZR750JJA000001

□:This digit in the frame number changes from one machine to another.

KAWASAKI HEAVY INDUSTRIES, LTD.
Consumer Products & Machinery Company

Part No.99924-1323-01

Printed in Japan

Kawasaki

Z750

Motorcycle Service Manual

Quick Reference Guide

LIST OF ABBREVIATIONS

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

Read OWNER'S MANUAL before operating.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of the warranty period, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your vehicle:

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

How to Use This Manual

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

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

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

If you want spark plug information, for example, go to the Periodic Maintenance Chart first. The chart tells you how frequently to clean and gap the plug. Next, use the Quick Reference Guide to locate the Periodic Maintenance chapter. Then, use the Table of Contents on the first page of the chapter to find the Spark Plug section.

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

⚠ WARNING

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

CAUTION

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

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

NOTE

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

● Indicates a procedural step or work to be done.

○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.

★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

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

General Information

Table of Contents

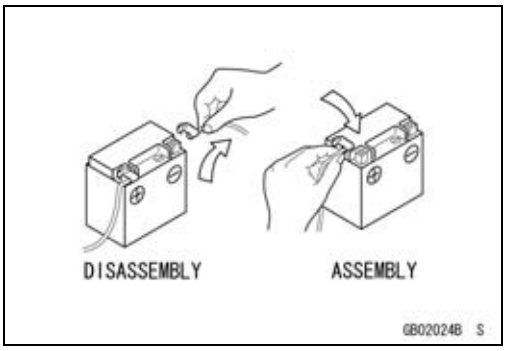
Before Servicing

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

Especially note the following:

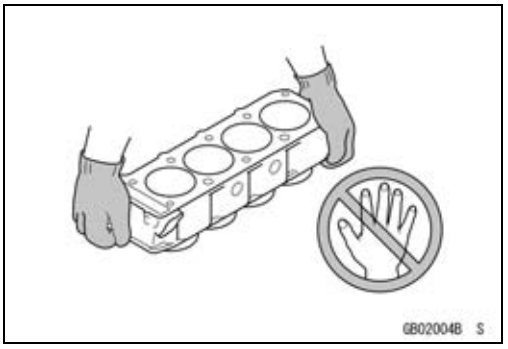
Battery Ground

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



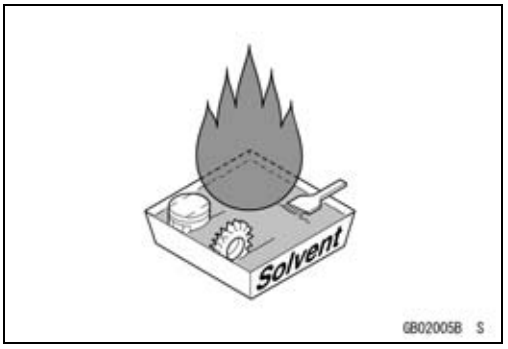
Edges of Parts

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



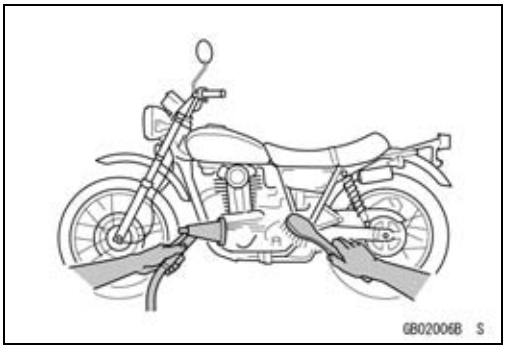
Solvent

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



Cleaning vehicle before disassembly

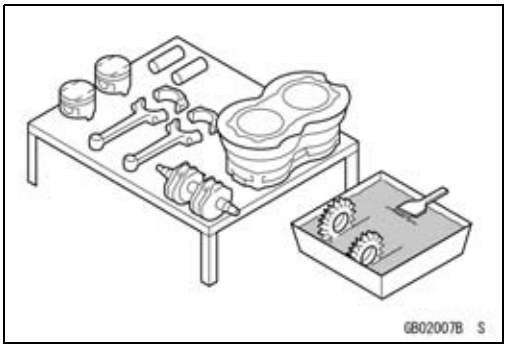
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

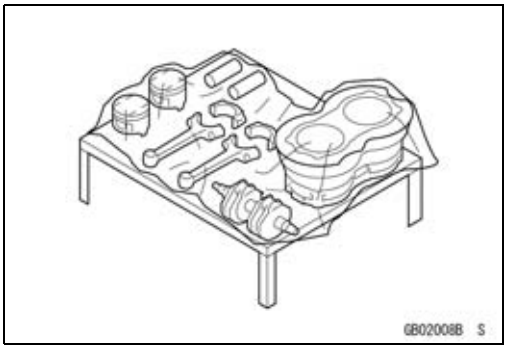
Arrangement and Cleaning of Removed Parts

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



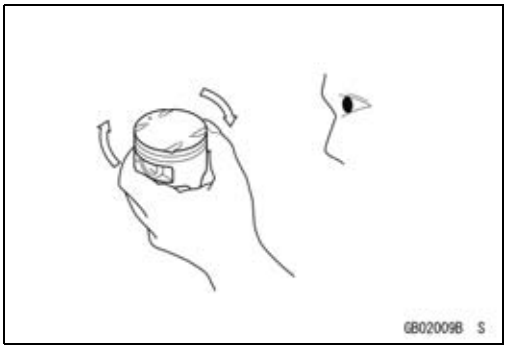
Storage of Removed Parts

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



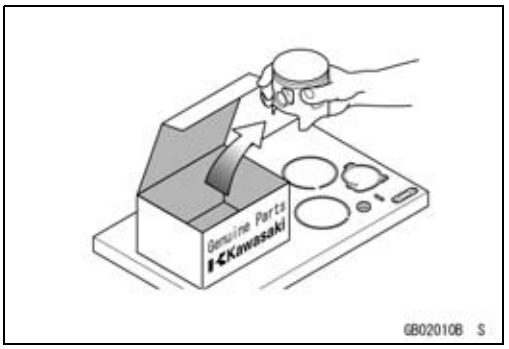
Inspection

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



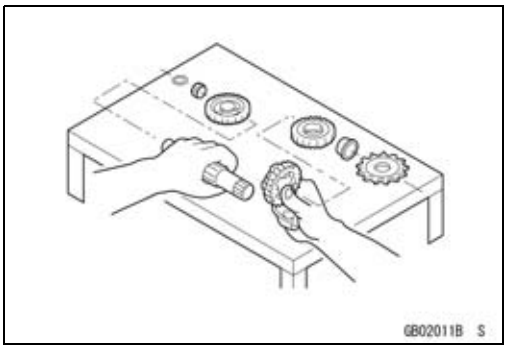
Replacement Parts

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



Assembly Order

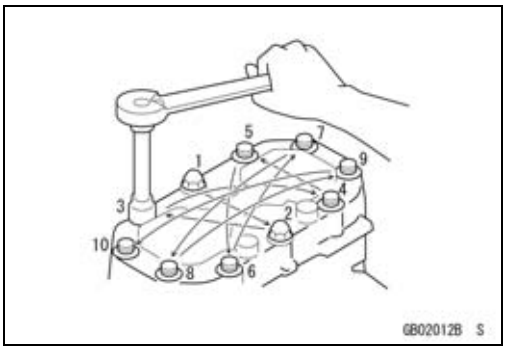
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

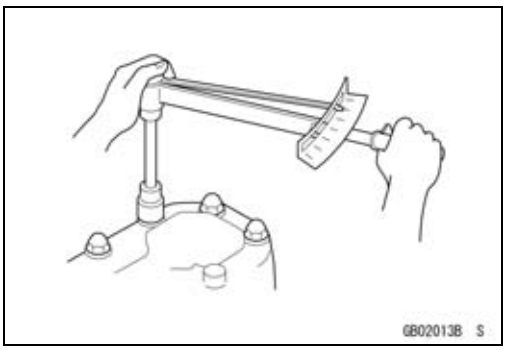
Tightening Sequence

Bolts, nuts, or screws must be tightened according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.



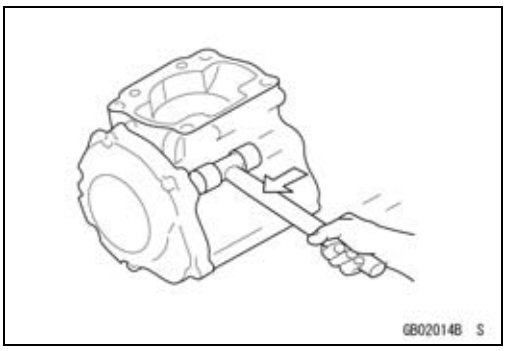
Tightening Torque

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.



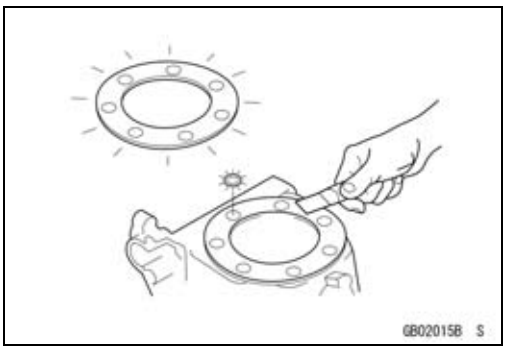
Force

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.



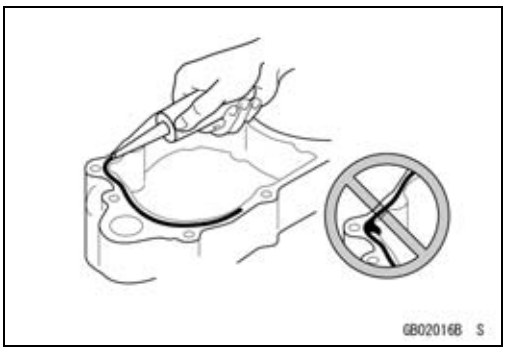
Gasket, O-ring

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 used O-rings when re-assembling



Liquid Gasket, Locking Agent

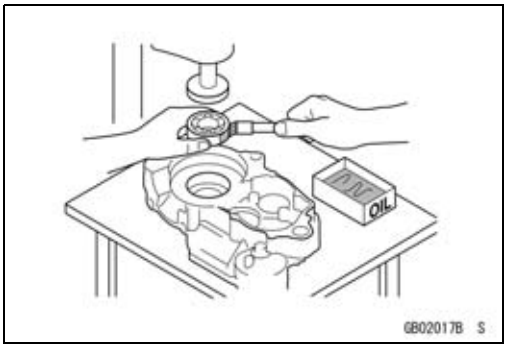
For applications that require Liquid Gasket or a Locking agent, clean the surfaces so that no oil residue remains before applying liquid gasket or locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

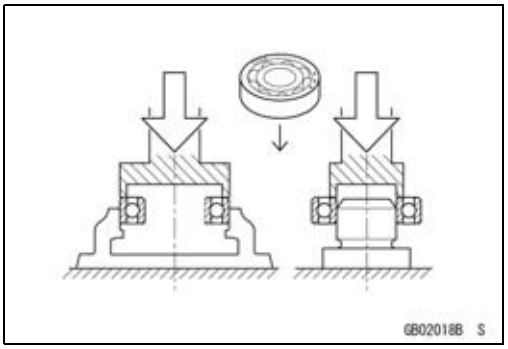
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

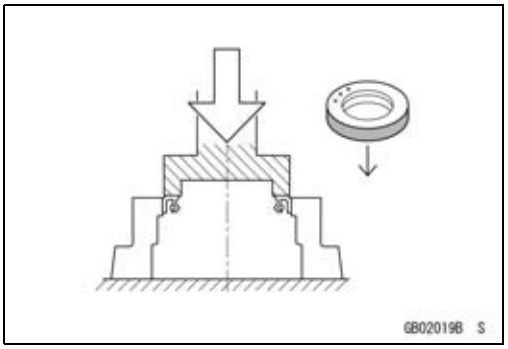
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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



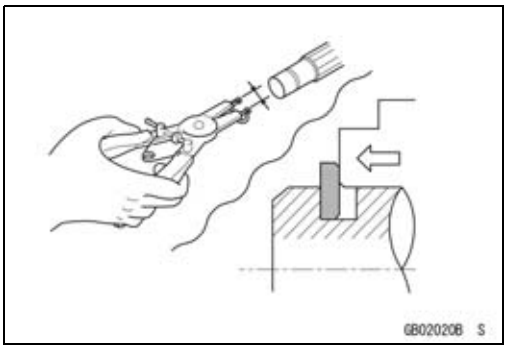
Oil Seal, Grease Seal

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



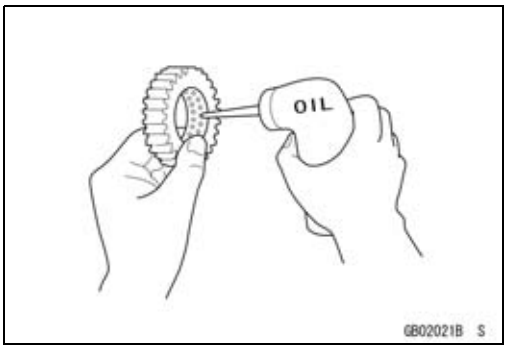
Circlips, Cotter Pins

Replace circlips or cotter pins that were removed with new ones. Install the circlip with its sharp edge facing outward and its chamfered side facing inward to prevent the clip from being pushed out of its groove when loaded. Take care not to open the clip excessively when installing to prevent deformation.



Lubrication

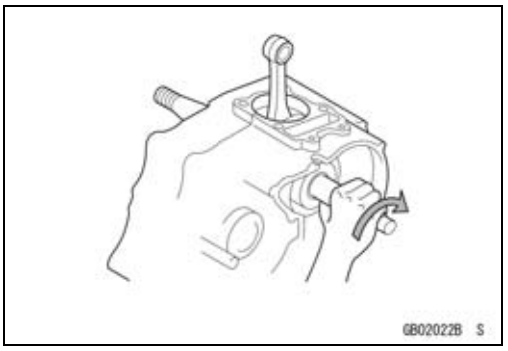
It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual, apply the specific oil or grease as specified.



Before Servicing

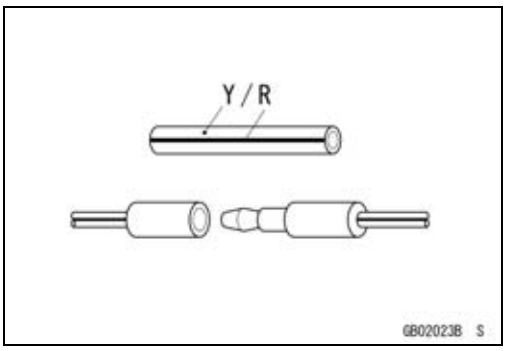
Direction of Engine Rotation

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



Electrical Wires

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



Model Identification

ZR750–J1 Left Side View:

ZR750–J1 Right Side View:

General Specifications

Items		ZR750–J1
Dimensions:		
Overall length		2 080 mm (81.9 in.)
Overall width		780 mm (30.7 in.)
Overall height		1 055 mm (41.5 in.)
Wheelbase		1 425 mm (56.1 in.)
Road clearance		165 mm (6.5 in.)
Seat height		815 mm (32.1 in.)
Dry mass		195 kg (430.0 lb)
Curb mass:	Front	111 kg (244.8 lb)
	Rear	107 kg (235.9 lb)
Fuel tank capacity		18 L (5.0 US gal.)
Performance:		
Minimum turning radius		2.9 m (9.5 ft)
Engine:		
Type		4-stroke, DOHC, 4-cylinder
Cooling system		Liquid-cooled
Bore and stroke		68.4 × 50.9 mm (2.7 × 2.0 in.)
Displacement		748 mL (45.64 cu in.)
Compression ratio		11.3
Maximum horsepower		79 kW (107 PS) @10 500 r/min (rpm), (MY, AU) 80 kW (109 PS) @11 000 r/min (rpm) (HR) 78.2 kW (106 PS) @11 000 r/min (rpm)
Maximum torque		75 N·m (7.6 kgf·m, 55 ft·lb) @8 200 r/min (rpm), (HR) 73 N·m (7.4 kgf·m, 54 ft·lb) @8 200 r/min (rpm)
Carburetion system		FI (Fuel Injection) KEIHIN TTK34 × 4
Starting system		Electric starter
Ignition system		Battery and coil (transistorized)
Timing advance		Electronically advanced (digital igniter)
Ignition timing		From 10° BTDC @1 100 r/min (rpm) to 37° BTDC @5 800 r/min (rpm)
Spark plug		NGK CR9EK or ND U27ETR
Cylinder numbering method		Left to right, 1-2-3-4
Firing order		1-2-4-3
Valve timing:		
Inlet	Open	38° BTDC
	Close	66° ABDC
	Duration	284°
Exhaust	Open	57° BBDC
	Close	31° ATDC
	Duration	268°
Lubrication system		Forced lubrication (wet sump)
Engine oil:		
Type		API SE, SF or SG API SH or SJ with JASO MA

General Specifications

Items		ZR750–J1
Viscosity		SAE 10W-40
Capacity		3.8 L (4.0 US qt)
Drive Train:		
Primary reduction system:		
Type		Gear
Reduction ratio		1.714 (84/49)
Clutch type		Wet multi disc
Transmission:		
Type		6-speed, constant mesh, return shift
Gear ratios:	1st	2.571 (36/14)
	2nd	1.941 (33/17)
	3rd	1.555 (28/18)
	4th	1.333 (28/21)
	5th	1.200 (24/20)
	6th	1.095 (23/21)
Final drive system:		
Type		Chain drive
Reduction ratio		2.867 (43/15)
Overall drive ratio		5.382 @Top gear
Frame:		
Type		Tubular, diamond
Caster (rake angle)		24.5°
Trail		104 mm (4.1 in.)
Front tire:	Type	Tubeless
	Size	120/70 ZR17 M/C (58W)
Rear tire:	Type	Tubeless
	Size	180/55 ZR17 M/C (73W)
Front suspension:	Type	Telescopic fork (upside-down)
	Wheel travel	120 mm (4.7 in.)
Rear suspension:	Type	Swingarm (uni-trak)
	Wheel travel	126 mm (5.0 in.)
Brake Type:	Front	Dual discs
	Rear	Single disc
Electrical Equipment:		
Battery		12 V 8 Ah
Headlight:	Type	Semi-sealed beam
	Bulb	12 V 55 W × 2/55 W (Hi/Lo)
Tail/brake light		12 V 0.5/3.8 W (LED), (CA) 12 V 0.5/5W (LED)
Alternator:	Type	Three-phase AC
	Rated output	24 A/14 V @5 000 r/min (rpm)

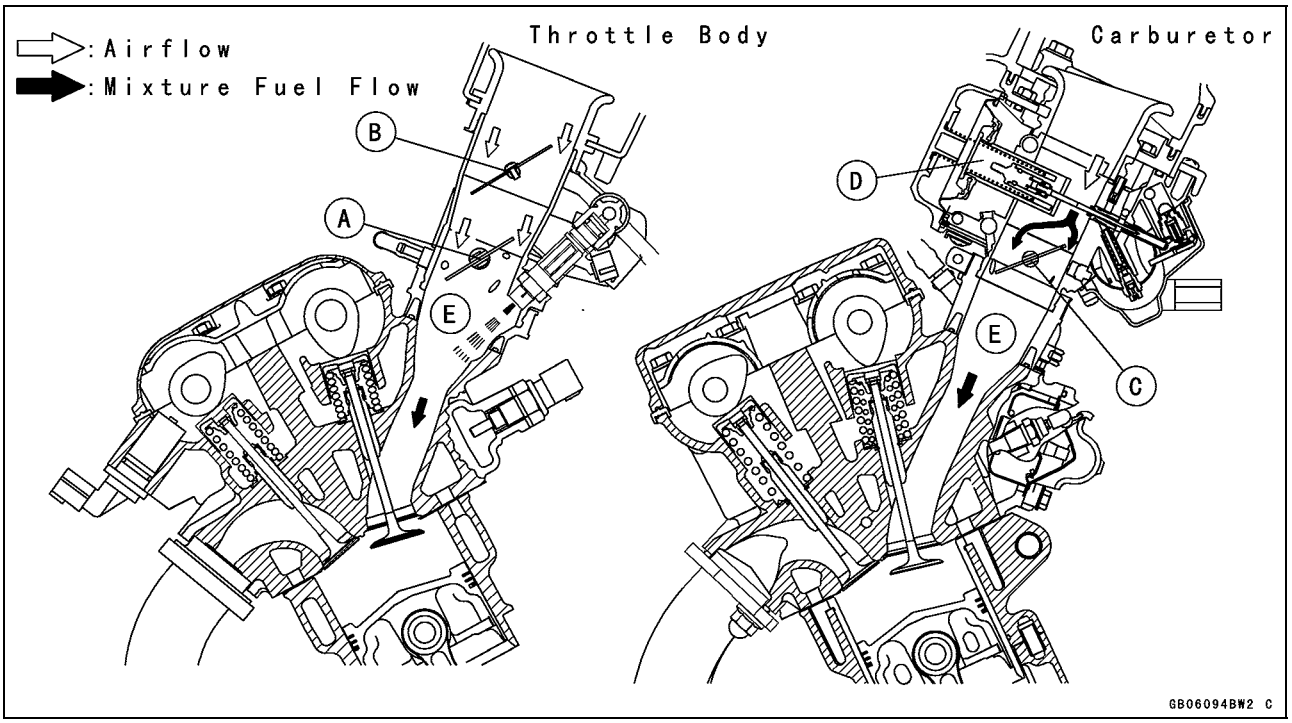
Specifications are subject to change without notice, and may not apply to every country.
(AU): Australia Model
(CA): Canada Model
(MY): Malaysia Model
(HR): with Honeycomb Catalytic Converter Model (Restricted model)

Technical Information – Air Inlet System

Subthrottle Control System

The ZR750–J1 employs large bore throttle bodies to increase power output. However, sudden changes in throttle opening can cause hesitation and jerky throttle response with a single butterfly valve in a large bore. Therefore two throttle valves are placed in each inlet tract, the main throttle valve located closest to the cylinder and a subthrottle valve placed further up the inlet tract. The main throttle valve is operated by the rider when the throttle grip is turned clockwise or counterclockwise, while the subthrottle valve is operated by a stepping motor controlled by the ECU. The subthrottle valve automatically adjusts air inlet to more precisely match engine demand, so that when the main throttle is opened quickly there is no hesitation or jerky response.

The subthrottle valves allow the fuel injection system to provide smooth throttle response, similar to that of a constant velocity carburetor, no matter how quickly the throttle is opened.



A. Main Throttle Valve
B. Subthrottle Valve
C. Throttle Valve
D. Vacuum Piston
E. Inlet Air

Technical Information – Air Inlet System

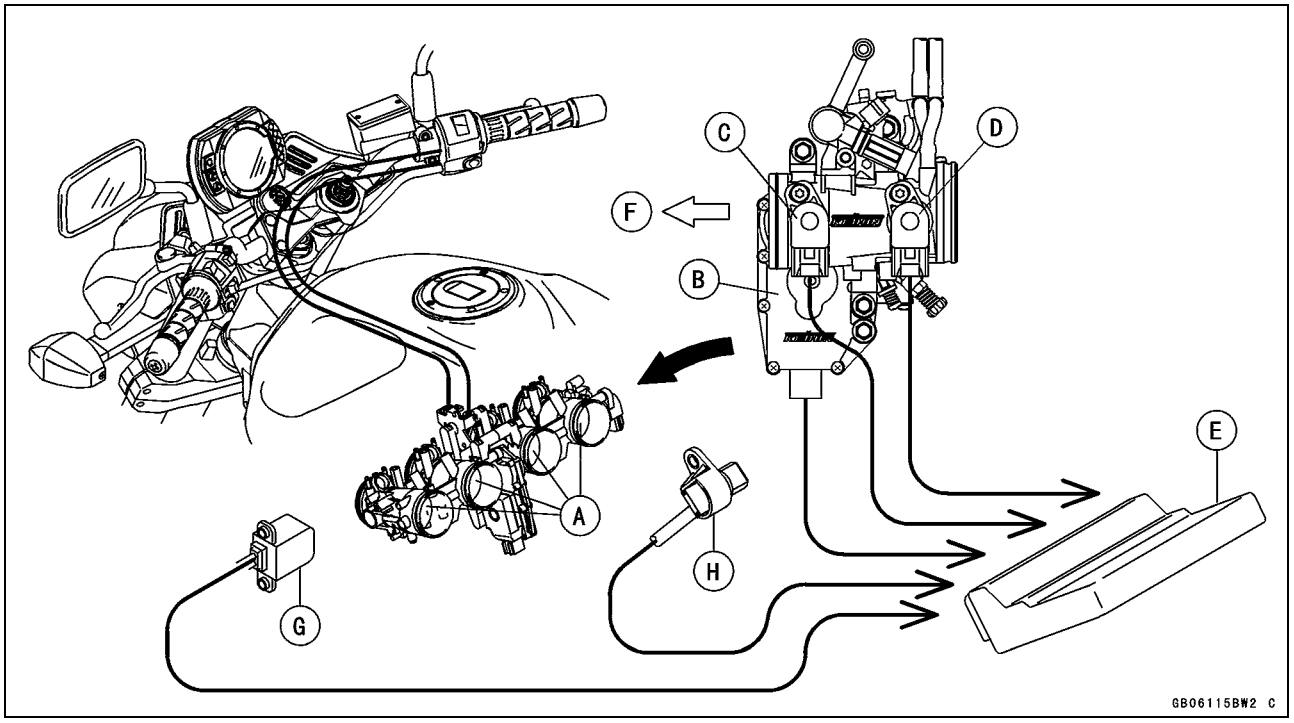
Operation

The subthrottle control system consists of the subthrottle valve, subthrottle valve actuator with a stepping motor built in it, ECU, and subthrottle sensor. The subthrottle valve is built in the each throttle body.

The subthrottle control system operates on the signal supplied from the ECU. The open/close operation of the subthrottle valve is performed by the subthrottle actuator which is controlled by the ECU to change the current direction into the motor of the subthrottle valve actuator.

The subthrottle sensor detects the subthrottle valve actuator movement by measuring voltage and the ECU determines the subthrottle valve angle based on the operation map.

When turning the ignition switch ON, every time the ECU automatically drives the subthrottle valve from fully closed position to fully opened position. The ECU memorizes these positions and turns back the subthrottle valve to the original point to confirm the subthrottle valve idling voltage.



A. Subthrottle Valves
B. Subthrottle Valve Actuator
C. Subthrottle Sensor
D. Main Throttle Sensor
E. ECU (Electric Control Unit)
F. Air Cleaner Side
G. Crankshaft Sensor
H. Speed Sensor

Technical Information – New Ignition Interlock Sidestand

Outline

The New Ignition Interlock Sidestand System applied to ZR750–J1 models that cannot function if gears are engaged and/or the sidestand is not lifted upward even though clutch lever pulled in, which differs from the traditional one. Refer to the tables below as to the engine starts and/or the driving at each condition.

New Ignition Interlock Sidestand System

	Side Stand	Gear Position	Clutch Lever	Engine Start	Engine Run
A	Up	Neutral	Released	Starts	Continue running
B	Up	Neutral	Pulled in	Starts	Continue running
C	Up	In Gear	Released	Doesn't start	Continue running
D	Up	In Gear	Pulled in	Starts	Continue running
E	Down	Neutral	Released	Starts	Continue running
F	Down	Neutral	Pulled in	Starts	Continue running
G	Down	In Gear	Released	Doesn't start	Stops
H	Down	In Gear	Pulled in	*Doesn't start*	*Stops*

Current Ignition Interlock Sidestand System

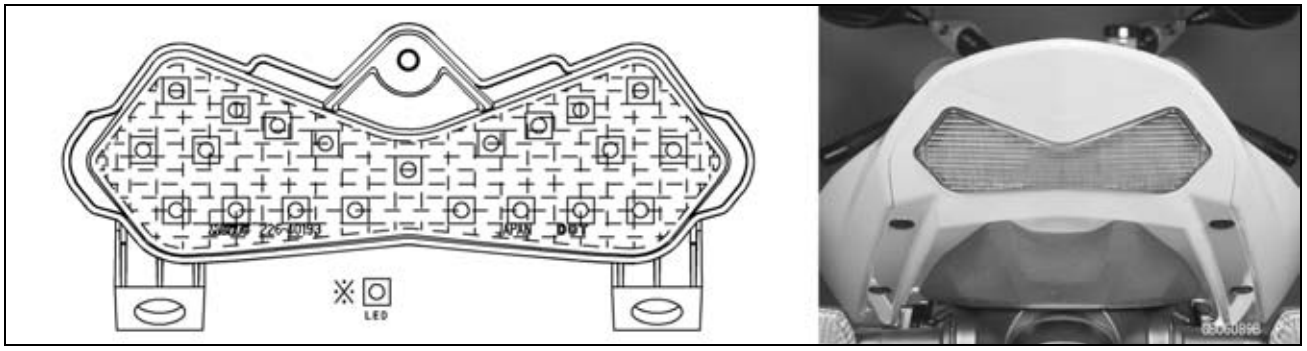
	Side Stand	Gear Position	Clutch Lever	Engine Start	Engine Run
A	Up	Neutral	Released	Starts	Continue running
B	Up	Neutral	Pulled in	Starts	Continue running
C	Up	In Gear	Released	Doesn't start	Continue running
D	Up	In Gear	Pulled in	Starts	Continue running
E	Down	Neutral	Released	Starts	Continue running
F	Down	Neutral	Pulled in	Starts	Continue running
G	Down	In Gear	Released	Doesn't start	Stops
H	Down	In Gear	Pulled in	*Start*	*Continue running*

Technical Information – Tail/Brake Lights Employing LED

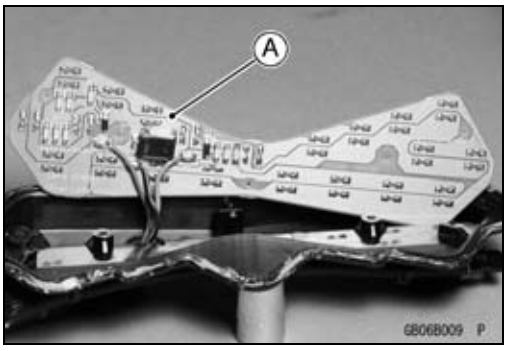
Outline

This model employs a tail/brake light containing 21 Light Emitting Diodes (LED). The LED emits luminous beams over a longer life span than those emitted from a traditional electric heated bulb (more than 5 times longer), uses lower voltage, expends lower wattage (approx. 1/5), and is quicker responsing.

Due Position of LED Installation

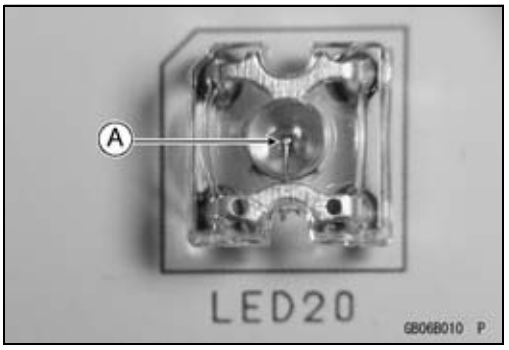


The resistors, the diodes, and the Zener diodes are mounted in the electronic circuits [A] of the LED, which supplies the steady current and voltage to the light.

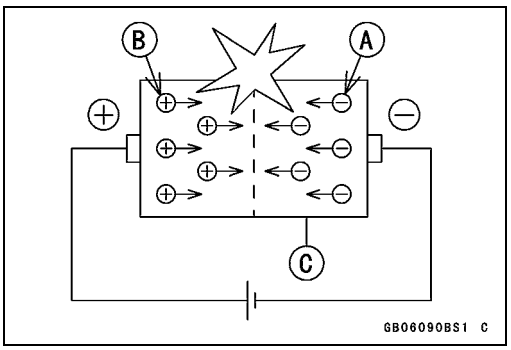


Light Emitting Diode (LED)

The Light Emitting Diode (LED) [A] is an element of semi-conductor diode that converts applied voltage to light.



The LED emits luminous beams by the collision of negative charge electrons [A] and positive charge holes [B] when applied the forward voltage and current to the PN junction diode [C].



Technical Information – Tail/Brake Lights Employing LED

The emitting color differs according to the materials of semi-conductors.

Materials of Semi-Conductor and Emitting Color

Materials of Semi-Conductor	Emitting Color
GaAsP, GaAlAs	Red
GaP	Green
GaN	Blue

Ga: Gallium
As: Arsenic
P: Phosphorus
N: Nitrogen
Al: Aluminum

Technical Information – KAWASAKI LOW EXHAUST EMISSION SYSTEM

Since the emission regulations become more severe, Kawasaki has adopted a type of simplified KAWASAKI LOW EXHAUST EMISSION SYSTEM (KLEEN), which have no catalyst protection system, according to each regulation of different countries.

The muffler with built-in catalyst has the same durability as the conventional muffler, however, do not use leaded gasoline and do not coast with the ignition system OFF. Running the engine without ignition damages catalyst.

Refer to the ZX900E Service Manual (Part No. 99924–1255) for more information about the KLEEN (theory, maintenance, and handling precautions), including the secondary air injection system.

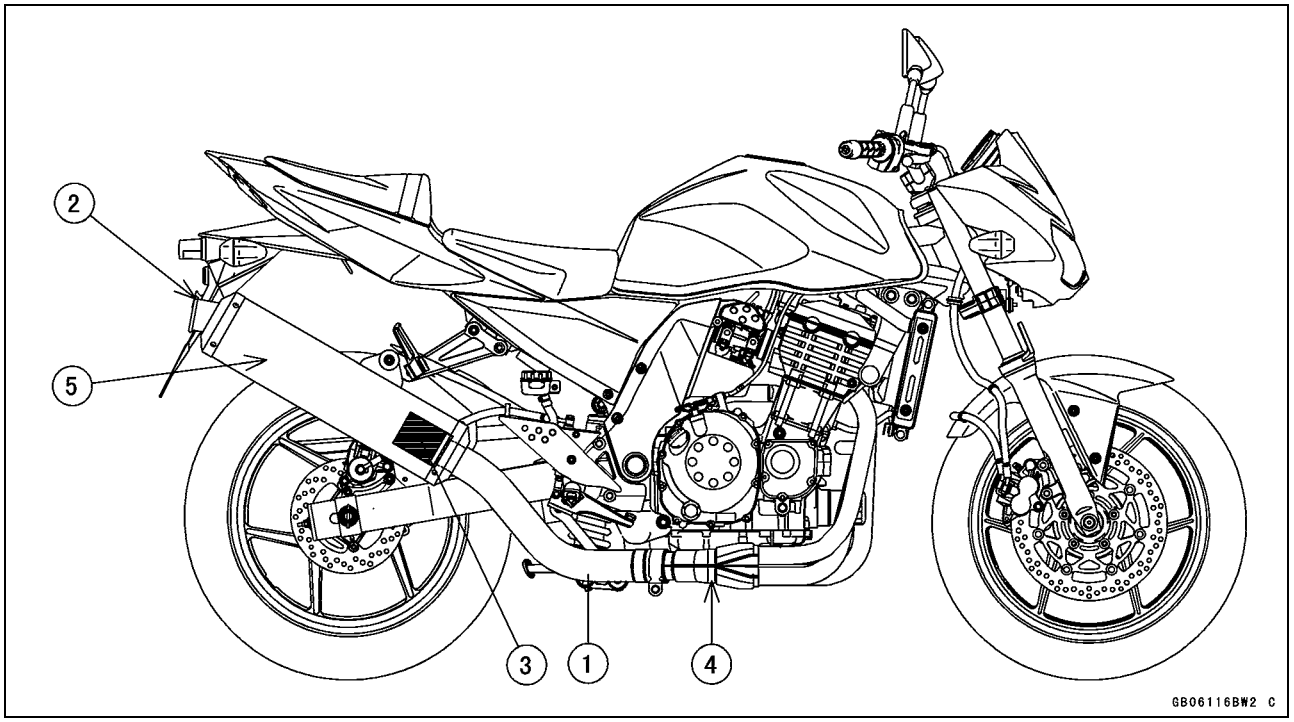
Honeycomb Type Catalytic Converter

○The converter is a three-way catalytic converter, and its surface is covered with alumina upon which platinum and rhodium are applied, and has a cylindrical metallic honeycomb structure made by bending a corrugated sheet and a flat sheet of stainless steel into a spiral of increasing diameter. The honeycomb structure is convenient for the catalytic converter because it has a large surface area but small size to react effectively and has low exhaust resistance. In addition, its inherent strength helps resist vibration, and has simple structure welded directly on the silencer.

○Generally, the temperature of the exhaust gas must be higher than activation temperature, so the converters are installed in the exhaust manifold rear end where the temperature of exhaust gas is still high. And, the converters will be activated even under low load conditions.

○After the exhaust gas is diluted with the secondary air injection, the catalytic converter works well because of rich oxygen to reduce CO, HC, and NO_x. Accordingly, we can keep the exhaust gas emission within regulation.

○This type of converter works more efficiently as a three-way catalytic converter to reduce CO, HC, and NO_x than the pipe type catalytic converter because of its more and denser catalysts.



1. Manifold
2. Silencer
3. Honeycomb Type Catalyst
4. Mark for Manifold
5. Mark for Silencer

Unit Conversion Table

Prefixes for Units:

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

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

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

Units of Force:

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

Units of Length:

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

Units of Torque:

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

Units of Pressure:

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

Units of Speed:

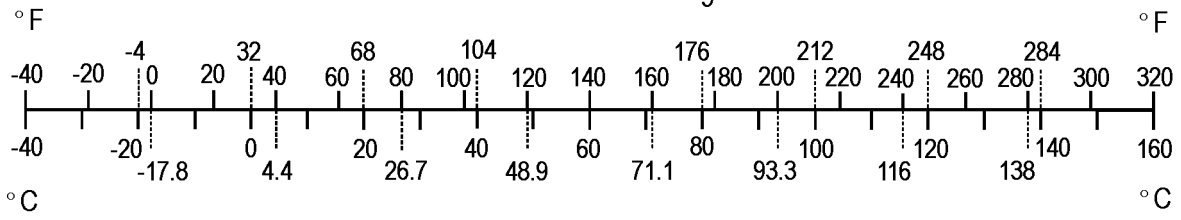
km/h	×	0.6214	=	mph

Units of Power:

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

Units of Temperature:

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



Periodic Maintenance

Table of Contents

2-2 PERIODIC MAINTENANCE

Periodic Maintenance Chart

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

Periodic Inspection:

FREQUENCY	Whichever comes first	* ODOMETER READING km × 1000 (mile × 1000)							
	⬇	1	6	12	18	24	30	36	See
INSPECTION	Every	(0.6)	(4)	(7.5)	(12)	(15)	(20)	(24)	Page
Steering system:									
Steering play - inspect	year	●		●		●		●	2–37
Steering stem bearings - lubricate	2 years					●			2–38
Brake system:									
Brake hoses leak - inspect		●	●	●	●	●	●	●	2–36
Brake hoses damage - inspect		●	●	●	●	●	●	●	2–36
Brake hose installation condition - inspect		●	●	●	●	●	●	●	2–36
Brake operation (effectiveness, play-drag) - inspect	year	●	●	●	●	●	●	●	—
Brake pad wear - inspect #			●	●	●	●	●	●	2–29
Brake fluid level - inspect	6 month	●	●	●	●	●	●	●	2–32
Brake light switch operation - inspect		●	●	●	●	●	●	●	2–29
Wheels and tires:									
Tire air pressure - inspect	year			●		●		●	2–26
Wheels/tires damage - inspect				●		●		●	2–25
Tire tread wear, abnormal wear - inspect				●		●		●	2–25
Wheel bearings damage - inspect	year			●		●		●	—
Suspensions:									
Front forks/rear shock absorber operation (damping and smooth stroke)				●		●		●	—
Front forks/rear shock absorber oil leak - inspect	year			●		●		●	2–37
Rocker arm wear - inspect				●		●		●	—
Rocker arm operation				●		●		●	—
Tie rods operation				●		●		●	—
Drive train:									
Drive chain lubrication condition - inspect #	1 000 km								2–29
Drive chain slack - inspect #	1 000 km								2–27
Drive chain wear - inspect #				●		●		●	2–28
Drive chain guide wear - inspect				●		●		●	—
Electrical system:									
Spark plug condition - inspect				●		●		●	2–39
Lights and switches operation	year			●		●		●	—
Headlight aiming - inspect	year			●		●		●	—
Side stand switch operation	year			●		●		●	—

Periodic Maintenance Chart

FREQUENCY / INSPECTION	Whichever comes first ➡ / ⬇ Every	* ODOMETER READING km × 1000 (mile × 1000) 1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	See Page
Engine stop switch operation	year			●		●		●	—
Fuel system (DFI):									
Air cleaner element - clean #					●				2–18
Throttle control system (play, smooth return, no drag) - inspect	year	●		●		●		●	2–14
Choke operation - inspect	year	●		●		●		●	—
Engine vacuum synchronization - inspect				●		●		●	2–15
Engine vacuum synchronization - adjust		When necessary							2–15
Idle speed - inspect		●		●		●		●	2–15
Fuel hoses leak - inspect		●		●		●		●	2–13
Fuel hoses damage - inspect	year	●		●		●		●	2–13
Fuel hoses installation condition - inspect	year			●		●		●	2–13
Cooling system:									
Coolant level - inspect		●		●		●		●	—
Radiator hoses leak - inspect	year	●		●		●		●	2–20
Radiator hoses damage - inspect	year	●		●		●		●	2–20
Radiator hoses installation condition - inspect	year	●		●		●		●	2–20
Engine top end:									
Air suction system damage - inspect				●		●		●	2–22
Intake/exhaust valve clearance - inspect						●			2–22
Chassis:									
Chassis parts lubricate	year			●		●		●	2–41
Bolts and nuts tightness - inspect		●		●		●		●	2–42

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

Periodic Replacement Parts:

FREQUENCY / CHANGE/REPLACE ITEM	Whichever comes first ⬇ Every	* ODOMETER READING km × 1000 (mile × 1000) ➡ 1 (0.6)	12 (7.5)	24 (15)	36 (24)	48 (30)	See Page
Brake hoses	4 years					●	2–36
Brake fluid (front and rear)	2 years			●		●	2–32
Rubber parts of master cylinder and caliper	4 years					●	2–30
Spark plug			●	●	●	●	2–39
Air cleaner element #					●		2–18
Engine oil #	year	●	●	●	●	●	2–24
Oil filter	year	●	●	●	●	●	2–25
Fuel hoses	4 years					●	2–13
Coolant	3 years				●		2–20
Radiator hoses and O-rings	3 years				●		2–20

: Service more frequently when operating in severe conditions; dusty, wet, muddy, high speed or frequent starting/stopping.

Throttle control system inspection: Inspection of throttle grip play.

Torque and Locking Agent

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

Letters used in the “Remarks” column mean:
- **AL:** Tighten the two clamp bolts alternately two times to ensure even tightening torque.
- **G:** Apply grease to the threads.
- **L:** Apply a non-permanent locking agent to the threads.
- **MO:** Apply molybdenum disulfide grease oil solution.
- **O:** Apply oil to the threads and seating surface.
- **R:** Replacement Parts
- **S:** Tighten the fasteners following the specified sequence.
- **Si:** Apply silicone grease (ex. PBC grease).
- **SS:** Apply silicone sealant.

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

Basic Torque for General Fasteners

Threads 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

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System:				
Inlet air pressure sensor bolt	12	1.2	104 in·lb	
Water temperature sensor	25	2.5	18	
Vehicle-down sensor bolts	2.0	0.20	17 in·lb	
Camshaft position sensor bolt	12	1.2	104 in·lb	
Camshaft position sensor rotor bolt	12	1.2	104 in·lb	L
Throttle cable plate bolt	6.0	0.60	52 in·lb	
Throttle body assy holder clamp bolts	2.0	0.20	17 in·lb	
Choke link holder screws	2.1	0.21	18 in·lb	
Delivery pipe screws	3.4	0.35	30 in·lb	
Bypass screws	0.2	0.02	1.7 in·lb	
Air cleaner duct holder screws	3.8	0.39	34 in·lb	
Air cleaner housing mounting bolts	9.8	1.0	87 in·lb	
Air cleaner duct clamp bolts	2.0	0.20	17 in·lb	
Air cleaner housing screws	1.2	0.12	10 in·lb	
Air cleaner housing tapping screws	1.2	0.12	10 in·lb	
Speed sensor bolt	6.9	0.70	62 in·lb	L
Fuel pump bolts	9.8	1.0	87 in·lb	L, S
Fuel level sensor bolts	6.9	0.70	62 in·lb	
Cooling System:				
Radiator hose clamp screws	2.0	0.20	17 in·lb	
Radiator fan bolts	8.3	0.85	74 in·lb	
Water pump impeller bolt	9.8	1.0	87 in·lb	
Water pump cover bolts	11	1.1	95 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Water pump drain bolt	11	1.1	95 in·lb	
Water pipe bolts	11	1.1	95 in·lb	
Thermostat housing ground bolt	7.0	0.70	61 in·lb	
Thermostat bracket bolt	7.0	0.70	61 in·lb	
Radiator upper bolts	7.0	0.70	61 in·lb	
Radiator lower bolts	7.0	0.70	61 in·lb	
Radiator screen bolt	7.0	0.70	61 in·lb	
Coolant reserve tank screws	7.0	0.70	61 in·lb	
Radiator fan switch	18	1.8	13	
Water temperature sensor	25	2.5	18	
Engine Top End:				
Air suction valve cover bolts	9.8	1.0	87 in·lb	
Cylinder head cover bolts	9.8	1.0	87 in·lb	S
Camshaft cap bolts	12	1.2	104 in·lb	S
Camshaft chain guide bolts	12	1.2	104 in·lb	S
Cylinder head bolts (M10 new bolts)	54	5.5	40	MO, S (Washer)
Cylinder head bolts (M10 used bolts)	49	5.0	36	MO, S (Washer)
Cylinder head bolts (M6)	12	1.2	104 in·lb	S
Cylinder head jacket plugs	22	2.2	16	L
Throttle body holder bolts	13	1.3	113 in·lb	
Throttle body assy holder clamp bolts	2.0	0.20	17 in·lb	
Camshaft sensor bolt	12	1.2	104 in·lb	
Camshaft sensor rotor bolt	12	1.2	104 in·lb	L
Front camshaft chain guide bolt (upper)	25	2.5	18	
Front camshaft chain guide bolt (lower)	12	1.2	104 in·lb	
Rear camshaft chain guide bolt	25	2.5	18	
Camshaft chain tensioner mounting bolts	11	1.1	95 in·lb	
Camshaft chain tensioner cap bolt	28	2.9	21	
Spark plugs	13	1.3	113 in·lb	
Coolant drain plug (Cylinder)	9.8	1.0	87 in·lb	
Exhaust pipe manifold holder nuts	17	1.7	12	
Muffler body clamp bolt	17	1.7	12	
Muffler body mounting bolt	30	3.0	22	
Crankshaft sensor cover bolts	11	1.1	95 in·lb	
Clutch:				
Clutch lever clamp bolts	7.8	0.80	69 in·lb	
Clutch cover mounting bolts	11	1.1	95 in·lb	
Oil filler plug	1.5	0.15	13 in·lb	
Clutch spring bolts	8.8	0.90	78 in·lb	
Clutch hub nut	135	14	100	R

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Lubrication:				
Oil filler plug	1.5	0.15	13 in·lb	
Engine oil drain bolt	20	2.0	14	
Oil filter	31	3.2	23	EO, R
Holder mounting bolt	76	7.8	56	EO
Oil pan bolts	11	1.1	95 in·lb	
Oil pipe holder bolts	13	1.3	113 in·lb	L
Oil pressure relief valve	15	1.5	11	L
Oil pressure switch	15	1.5	11	SS
Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	
Water pump cover bolts	11	1.1	95 in·lb	
Water pump impeller bolt	9.8	1.0	87 in·lb	
Coolant drain plug (water pump)	11	1.1	95 in·lb	
Oil passage plugs	20	2.0	14	L
Engine Removal/Installation:				
Adjusting collar locknut	49	5.0	36	S
Engine mounting bolts and nuts	44	4.5	33	S
Front engine bracket bolts	44	4.5	33	S
Rear engine bracket bolts	25	2.5	18	S
Engine ground cable terminal bolt	9.8	1.0	87 in·lb	
Crankshaft/Transmission:				
Breather plate bolts	9.8	1.0	87 in·lb	L
Crankcase bolts (M9, L = 81 mm)	42	4.3	31	MO, S
Crankcase bolts (M9, L = 95 mm)	42	4.3	31	MO, S
Crankcase bolts (M8)	27	2.8	20	S
Crankcase bolts (M7)	20	2.0	14	S
Crankcase bolts (M6)	12	1.2	104 in·lb	S
Starter motor clutch bolts	12	1.2	104 in·lb	L
Oil pipe holder bolts	13	1.3	113 in·lb	L
Shift drum bearing holder bolt	13	1.3	113 in·lb	L
Shift drum bearing holder screw	5.4	0.55	48 in·lb	L
Connecting rod big end nuts	see the text	←	←	←
Crankshaft position rotor bolt	40	4.1	30	
Oil pressure switch	15	1.5	11	SS
Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	
Oil passage plugs	20	2.0	14	L
Crankshaft sensor cover bolts	11	1.1	95 in·lb	
Shift pedal mounting bolt	34	3.5	25	L
Gear positioning lever bolt	12	1.2	104 in·lb	
Shift shaft return spring pin	29	3.0	22	L
Shift drum cam holder bolt	12	1.2	104 in·lb	L
Footpeg bracket bolts	34	3.5	25	L
Shift lever bolt	6.9	0.70	61 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Tie-rod locknuts	6.9	0.70	61 in·lb	
Neutral switch	15	1.5	11	
Wheels/Tires:				
Front axle clamp bolt	34	3.5	25	
Front axle	108	11	80	
Rear axle nut	108	11	80	
Final Drive:				
Engine sprocket nut	125	13	92	MO
Engine sprocket cover bolts	9.8	1.0	87 in·lb	
Speed sensor cover bolts	6.9	0.70	61 in·lb	L
Rear sprocket nuts	59	6.0	43	
Speed sensor bolt	6.9	0.70	61 in·lb	L
Brakes:				
Bleed valves	7.8	0.80	69 in·lb	
Brake hose banjo bolts	25	2.5	18	
Brake lever pivot bolt	1.0	0.10	9 in·lb	
Brake lever pivot bolt locknut	5.9	0.60	52 in·lb	
Front brake reservoir cap screws	1.0	0.10	9 in·lb	
Front brake light switch screws	1.0	0.10	9 in·lb	
Front master cylinder clamp bolts	8.8	0.90	78 in·lb	S
Front caliper mounting bolts	34	3.5	25	
Front brake disc mounting bolts	27	2.8	20	L
Rear brake disc mounting bolts	27	2.8	20	L
Rear Caliper mounting bolts	25	2.5	18	
Rear master cylinder mounting bolts	25	2.5	18	
Rear master cylinder push rod locknut	18	1.8	13	
Suspension:				
Front fork clamp bolts (Upper)	20	2.0	14	
Front fork clamp bolts (Lower)	20	2.0	14	AL
Front fork top plugs	25	2.5	18	
Front fork bottom Allen bolts	30	3.1	22	L
Front axle clamp bolt	34	3.5	25	
Rear shock absorber nuts (upper and lower)	34	3.5	25	
Swingarm pivot shaft nut	108	11	80	
Swingarm pivot shaft locknut	98	10	72	
Uni-trak				
Rocker arm nut	34	3.5	25	
Tie-rod nuts	59	6.0	43	
Steering:				
Steering stem head bolt	108	11	80	
Steering stem nut	27	2.8	20	
Handlebar clamp bolts	25	2.5	18	S

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Handlebar lower clamp nuts	34	3.5	25	
Switch housing screws	3.5	0.36	31 in·lb	
Front fork clamp bolts (Upper)	20	2.0	14	
Front fork clamp bolts (Lower)	20	2.0	14	AL
Frame:				
Footpeg bracket bolts	34	3.5	25	L
Side stand bolt	44	4.5	33	
Side stand switch bolt	8.8	0.90	78 in·lb	
Front fender bracket bolts	8.8	0.90	78 in·lb	L
Front fender bolts	3.9	0.40	35 in·lb	L
Side stand bracket bolts	49	5.0	36	
Electrical System:				
Spark plugs	13	1.3	113 in·lb	
Alternator rotor bolt	110	11	81	
Stator coil bolts	11	1.1	95 in·lb	
Alternator lead holding plate bolt	11	1.1	95 in·lb	L
Engine ground cable terminal bolt	9.8	1.0	87 in·lb	
Alternator cover bolts	11	1.1	95 in·lb	
Crankshaft sensor cover bolts	11	1.1	95 in·lb	
Crankshaft sensor bolts	5.9	0.60	52 in·lb	
Camshaft position sensor bolt	12	1.2	104 in·lb	L
Timing rotor bolt	39	4.0	29	
Starter motor mounting bolts	11	1.1	95 in·lb	
Switch housing screws	3.5	0.36	31 in·lb	
Radiator fan switch	18	1.8	13	
Water temperature sensor	25	2.5	18	SS
Oil pressure switch	15	1.5	11	SS
Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	G
Neutral switch	15	1.5	11	
Speed sensor bolt	6.9	0.70	61 in·lb	
Fuel level sensor bolts	6.9	0.70	61 in·lb	
Front brake light switch screw	1.0	0.10	9 in·lb	
Meter mounting screws	1.2	0.12	10 in·lb	
Tail/brake light mounting screws	1.2	0.12	10 in·lb	
License plate light mounting screws	1.2	0.12	10 in·lb	
Headlight mounting bolts	5.9	0.60	52 in·lb	
Starter lockout switch screws	–	–	–	L
Starter motor clutch bolts	12	1.2	104 in·lb	L
Starter relay cable terminal bolts	3.9	0.40	35 in·lb	L
Regulator/rectifier bolts	6.9	0.70	61 in·lb	
Regulator/rectifier bracket bolts	6.9	0.70	61 in·lb	
Speed sensor cover bolts	6.9	0.70	61 in·lb	L
Side stand switch bolt	8.8	0.90	78 in·lb	

Specifications

Item	Standard	Service Limit
Fuel System:		
Throttle grip free play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle speed	1 100 ±50 r/min (rpm)	– – –
Bypass screws (turn out)	2 ±1/4 (for reference)	– – –
Engine vacuum	29.7 ±1.333 kPa (225 ±10 mmHg)	– – –
Air cleaner element	Paper filter	– – –
Cooling System:		
Coolant:		
Type (recommended)	Permanent type of antifreeze	– – –
Color	Green	– – –
Mixed ratio	Soft water 50%, Coolant 50%	– – –
Freezing point	–35°C (–31°F)	– – –
Total amount	2.9 L (3.1 US qt)	– – –
Engine Top End:		
Valve clearance:		
Inlet	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)	– – –
Exhaust	0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)	– – –
Clutch:		
Clutch lever free play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Engine Lubrication System:		
Engine oil:		
Type	API SE, SF or SG API SH or SJ with JASO MA	– – –
Viscosity	SAE 10W-40	– – –
Capacity	3.1 L (3.3 US qt) (when filter is not removed)	– – –
	3.3 L (3.5 US qt) (when filter is removed)	– – –
	3.8 L (4.0 US qt) (when engine is completely dry)	– – –
Level	Between upper and lower level lines (after idling or running)	– – –
Wheels/Tires:		
Tread depth:		
Front		
BRIDGESTONE	3.4 mm (0.13 in.)	1 mm (0.04 in.) 1.6 mm (0.06 in.) (AT, CH, DE)
Rear		
BRIDGESTONE	5.8 mm (0.23 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)

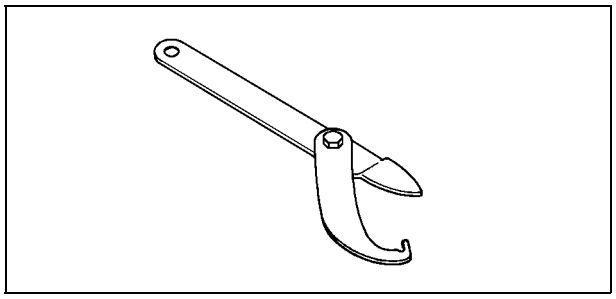
Specifications

Item	Standard	Service Limit
Air pressure: (when cold)		
Front	Up to 180 kg (397 lb) load: 250 kPa (2.5 kgf/cm², 36 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 290 kPa (2.9 kgf/cm², 42 psi)	– – –
Final Drive:		
Drive chain slack	25 ~ 35 mm (1.0 ~ 1.4 in.)	– – –
Drive chain 20-link length	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Brakes:		
Brake fluid:		
Grade	DOT4	– – –
Brake pad lining thickness:		
Front	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Rear	5 mm (0.20 in.)	1 mm (0.04 in.)
Brake light timing:		
Front	Pulled ON	– – –
Rear	ON after about 10 mm (0.39 in.) of pedal travel	– – –
Electrical System:		
Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 mm)	– – –

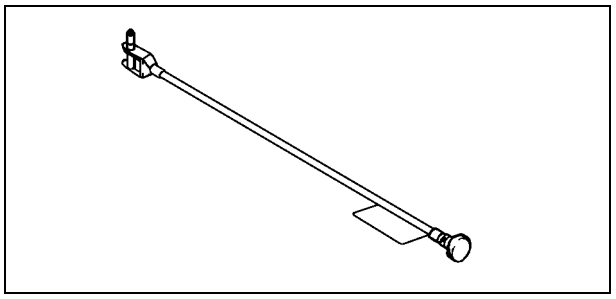
AT: Republic of Austria
CH: Swiss Confederation
DE: Federal Republic of Germany

Special Tools

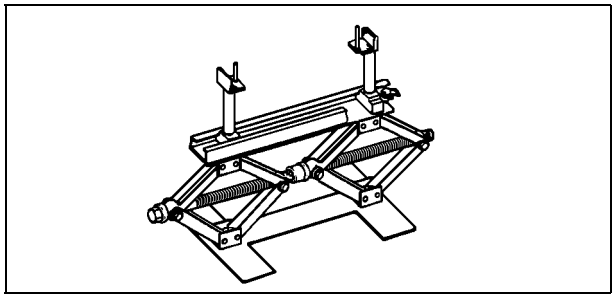
Steering Stem Nut Wrench:
57001–1100



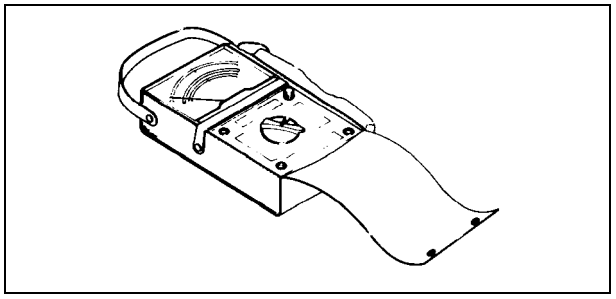
Pilot Screw Adjuster, C:
57001–1292



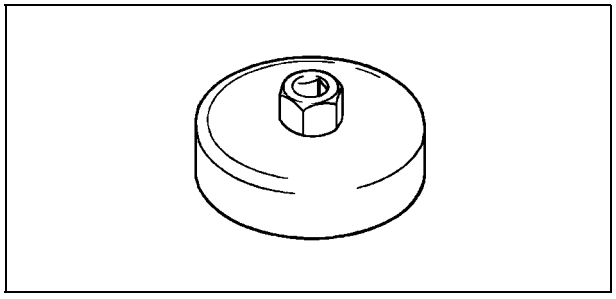
Jack:
57001–1238



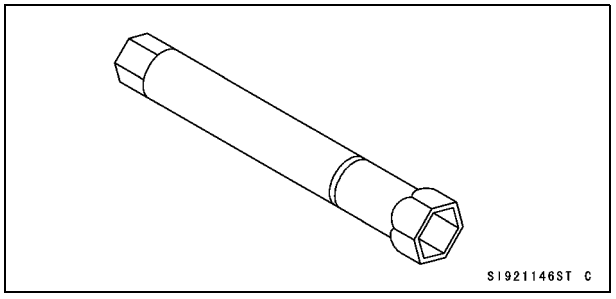
Hand Tester:
57001–1394



Oil Filter Wrench:
57001–1249



Spark Plug Wrench (Owner's Tool):
92110–1146



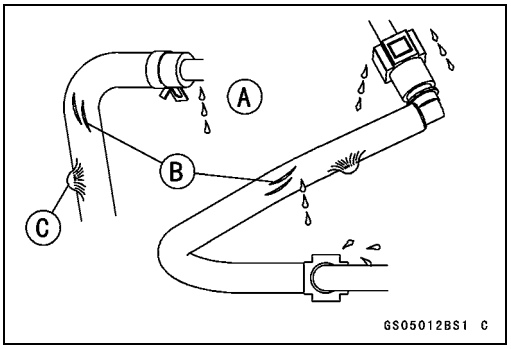
Periodic Maintenance Procedures

Fuel System (DFI)

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 high pressure inside the fuel line can cause fuel to leak [A] or the hose to burst. Remove the fuel tank (see Fuel System (DFI) chapter) and check the fuel hoses.

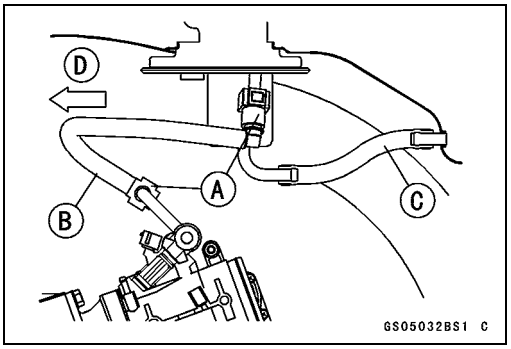
★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.



- Check that the hoses are routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.

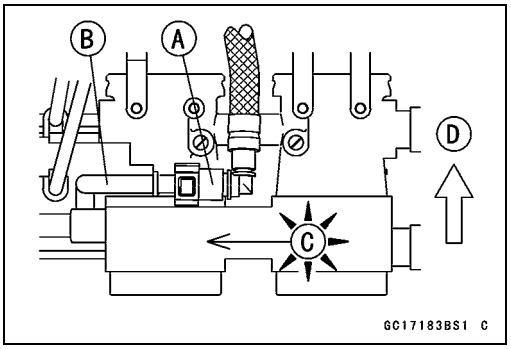
★Replace the hose if it has been sharply bent or kinked.

Hose Joints [A]
Pump Outlet Hose [B]
Pump Inlet Hose [C]
Front [D]



- Insert the pump outlet hose joint [A] straight onto the delivery pipe [B] until the hose joint clicks [C].

Front [D]

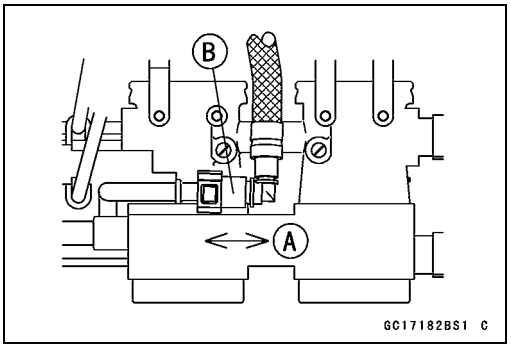


- Push and pull [A] the hose joint [B] back and forth more than two times, and make sure it is locked and doesn't come off. When the hose joint is correctly installed, it should slide on the delivery pipe about 5 mm (0.20 in.).

★If it does not slide, reinstall the hose joint.

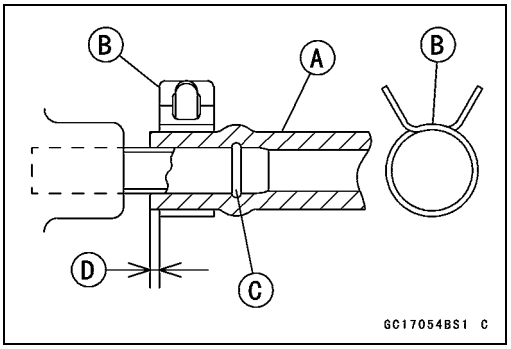
⚠ WARNING

Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint, or the fuel could leak.



- Check that the inlet hose [A] is onto the pipe fully and the plate clamps [B] are installed beyond the raised rib [C].

1 ~ 2 mm (0.039 ~ 0.079 in.) [D]



Periodic Maintenance Procedures

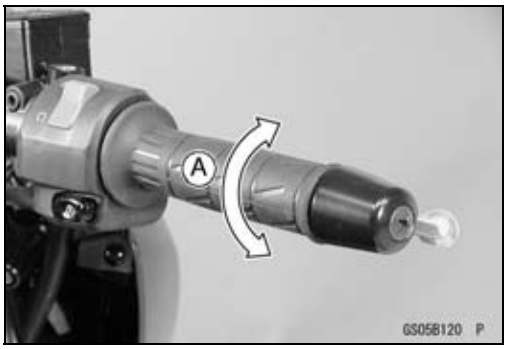
Throttle Control System Inspection

Throttle Grip Play Inspection

- Check the throttle grip free play [A].

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

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



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

★If the throttle grip doesn't 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 doesn't change.

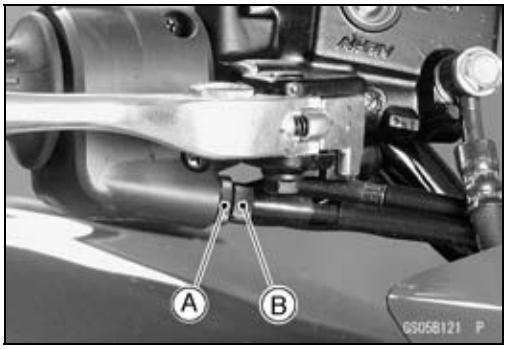
★If the idle speed increases, check the throttle grip free play and the cable routing.

★If necessary, adjust the throttle cable as follows.

- Loosen the locknut [A].
- Turn the adjuster [B] until the proper amount of free play can be obtained.
- Tighten the locknut against the adjuster securely.

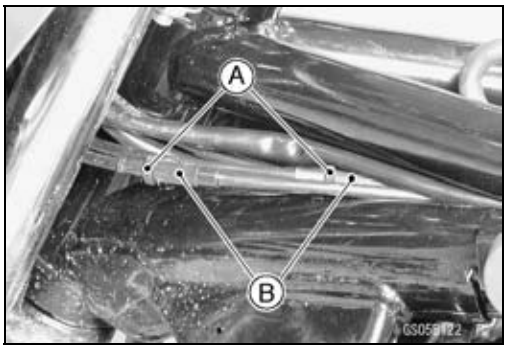
★If the throttle grip free play can not be adjusted with the adjuster, use the adjusters in the middle of the throttle cables.

- Loosen the locknut, and screw the adjuster at the upper end of the accelerator cable all the way in.
- Tighten the locknut against the adjuster securely.
- Remove the fuel tank (see Fuel System (DFI) chapter).



- Loosen the locknuts [A], and turn the lower adjusters [B] until the proper amount of throttle grip free play is obtained.
- Tighten the locknuts against the adjusters securely.

★If the throttle grip free play can not be adjusted with the lower adjusters, use the adjuster at the upper end of the cable again.



Periodic Maintenance Procedures

Idle Speed Inspection

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

★If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed or damaged. Be sure to correct any of these conditions before riding (see Cable, Wire, and Hose Routing section in the Appendix chapter).

⚠ WARNING

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

- Check idle speed.

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

Idle Speed
Standard: 1 100 ±50 r/min (rpm)

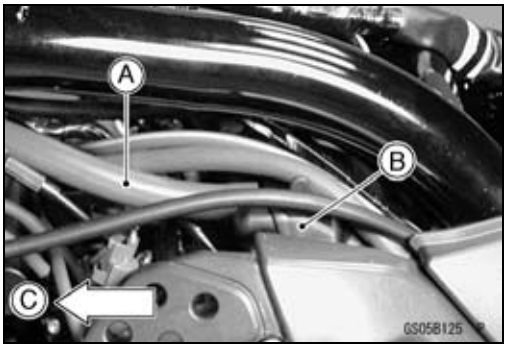
Engine Vacuum Synchronization Inspection

NOTE

○*These procedures are explained on the assumption that the inlet and exhaust systems of the engine are in good condition.*

- Situate the motorcycle so that it is vertical.
- Remove the fuel tank (see Fuel System (DFI) chapter).
- Pull off the vacuum hoses and the rubber cap(s) from the right fitting of each throttle body.
- Pull off the vacuum switch valve hose (thick) [A] from the air cleaner housing [B].

Front [C]

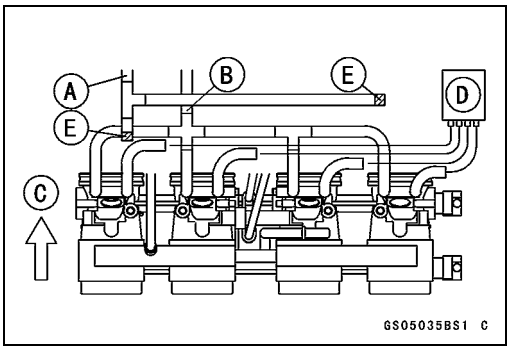


CAUTION

Do not remove the inlet air pressure sensor hoses on the left fitting of each throttle body.

- Connect a commercially available vacuum gauge to these right fittings of the throttle body as shown.
- Connect a highly accurate tachometer to one of the stick coil primary leads.
- Plug:

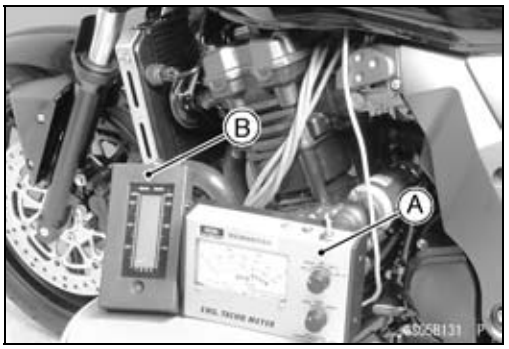
Vacuum Switch Valve Hose (thick) and its Air Cleaner Housing Hole
Vacuum Hoses of Throttle Assy (see the next figure)
Vacuum Switch Valve Hose (small) [A]
Inlet Air Pressure Sensor Hose [B]
Front [C]
Vacuum Gauge [D]
Plugs [E]



Periodic Maintenance Procedures

- Install the fuel tank (see Fuel System (DFI) chapter).
- Start the engine and warm it up thoroughly.
- Check the idle speed.
  Tachometer [A]

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



CAUTION

Do not measure the idle speed by the tachometer of the meter unit.

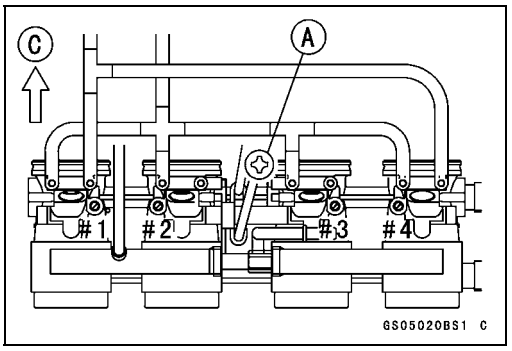
★While idling the engine, inspect the engine vacuum, using the vacuum gauge [B].

Engine Vacuum
Standard: 29.7 ±1.333 kPa (225 ±10 mmHg) at Idle Speed 1 100 ±50 r/min (rpm)

★If any vacuum is not within the specifications, first synchronize the #3 and #4 throttle valves to the #1 and #2 throttle valves by using the center adjusting screw [A].

Special Tool - Pilot Screw Adjuster, C: 57001–1292 [B]

Front [C]



Example:
#1: 165 mmHg
#2: 190 mmHg
#3: 170 mmHg
#4: 200 mmHg

- With the engine at the correct idle speed, equalize the highest vacuum of #3 and #4 (example 200 mmHg) to the highest vacuum of #1 and #2 (example 190 mmHg) by turning the center adjusting screw.

NOTE

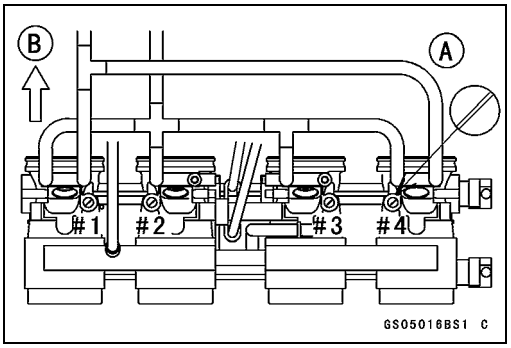
○*After adjustment, the final vacuum measurement between the highest throttle valves may not be 200 mmHg (in this example). The goal is to have the highest two vacuums between the left (1 and 2) and right (3 and 4) banks be the same.*

- Open and close the throttle after each measurement and adjust the idle speed as necessary.
- Once the throttle valves have been synchronized, inspect the main throttle sensor's output voltage to ensure proper operation (procedure is at the end of this section).

Periodic Maintenance Procedures

★If any one vacuum measurement is out of the standard measurement after synchronization, adjust the bypass screws [A].
Front [B]

Special Tool - Pilot Screw Adjuster, C: 57001–1292



- Adjust the lowest vacuum between #1 and #2 to the highest of #1 and #2.
- Adjust the lowest vacuum between #3 and #4 to the highest of #3 and #4.
- Open and close the throttle valves after each measurement and adjust the idle speed as necessary.
- Inspect the vacuums as before.

★If all vacuums are within the specification, finish the engine vacuum synchronization.
★If any vacuum can not be adjusted within the specification, remove the bypass screws #1 ~ #4 and clean them.

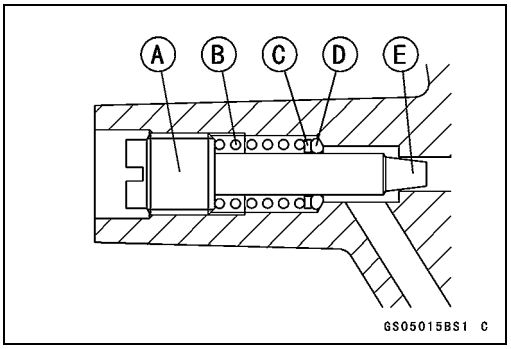
○Turn in the bypass screw and count the number of turns until it seats fully but not tightly. Record the number of turns.

Torque - Bypass Screw: 0.2 N·m (0.02 kgf·m, 1.7 in·lb)

CAUTION
Do not over tighten them. They could be damaged, requiring replacement.

- Remove the bypass screw [A], spring [B], washer [C] and O-ring [D].

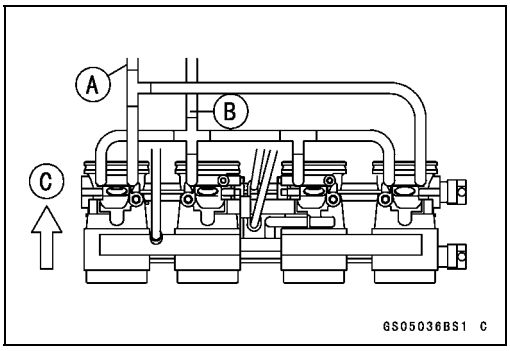
○Check the bypass screw and its hole for carbon deposits.
★If any carbon accumulates, wipe the carbon off the bypass screw and the hole, using a cotton pad penetrated with a high-flash point solvent.
○Replace the O-ring with a new one.
○Check the tapered portion [E] of the bypass screw for wear or damage.
★If the bypass screw is worn or damaged, replace it.



- Turn in the bypass screw until it seats fully but not tightly.

Torque - Bypass Screw: 0.2 N·m (0.02 kgf·m, 1.7 in·lb)

Periodic Maintenance Procedures



- Back out the same number of turns counted when first turned in. This is to set the screw to its original position.

NOTE

○*A throttle body has different "turns out" of the bypass screw for each individual unit. When setting the bypass screw, use the "turns out" determined during disassembly. Use the specifications in this manual only if the original number is unknown.*

- Repeat the same procedure for other bypass screws.
- Repeat the synchronization.

★If the vacuums are correct, check the output voltage of the main throttle sensor (see Output Voltage Inspection of Main Throttle Sensor in the Fuel System (DFI) chapter).

Main Throttle Sensor Output Voltage
Connections to ECU
Meter (+) → Y/W lead (terminal 2)
Meter (–) → BR/BK lead (terminal 14)
Standard:
0.99 ~ 1.03 V DC (at idle throttle opening)

★If the output voltage is out of the range, check the throttle input voltage (see Input Voltage Inspection of Main Throttle Sensor in the Fuel System (DFI) chapter).

- Remove the vacuum gauge hoses and install the vacuum hoses and rubber caps on the original position as shown.
  Vacuum Switch Valve Hose (small) [A]
  Inlet Air Pressure Sensor Hose [B]
  Front [C]

Air Cleaner Element Cleaning

NOTE

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

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

⚠ WARNING

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

CAUTION

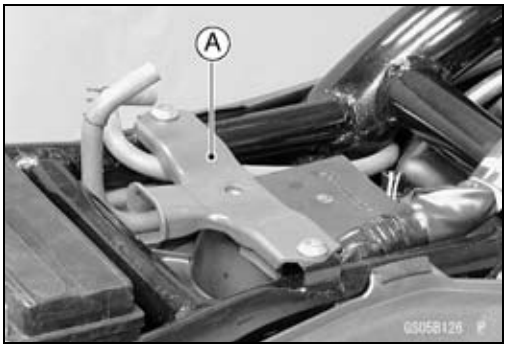
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

⚠ WARNING

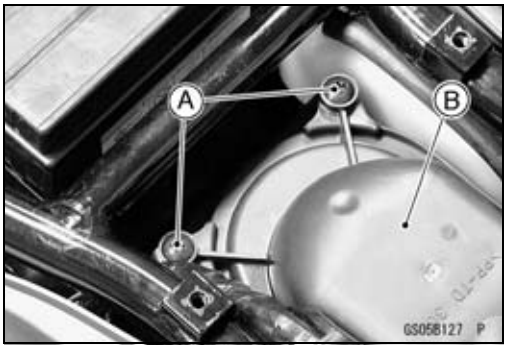
Clean the element in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light.
Because of the danger of highly flammable liquids, do not use gasoline or a low flash-point solvent to clean the element.

Periodic Maintenance Procedures

- Remove the fuel tank (see Fuel System (DFI) chapter).
- Remove the fuel tank bracket bolts and bracket [A].

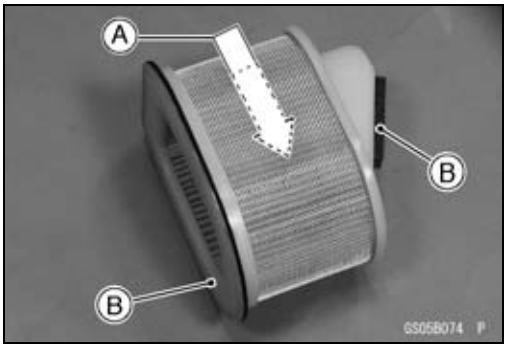


- Remove:
  Air Cleaner Duct Holder Screws [A]
- Remove the air cleaner duct holder [B] backward.



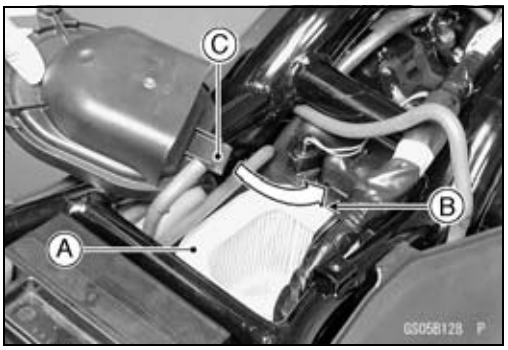
- Clean the element by tapping it lightly to loosen dust.
- Blow away the remaining dust by applying compressed air [A] from the outside to the inside (from the clean side to the dirty side).
- Visually inspect the element for no tears or no breaks and inspect the sponge gaskets [B] also.

★If the element or gasket has any tears or breaks, replace the element.



- Install the element [A] with the flat side [B], facing forwards.
- Fit the tongue [C] of the air cleaner duct holder into the slot of the housing the air cleaner duct holder.

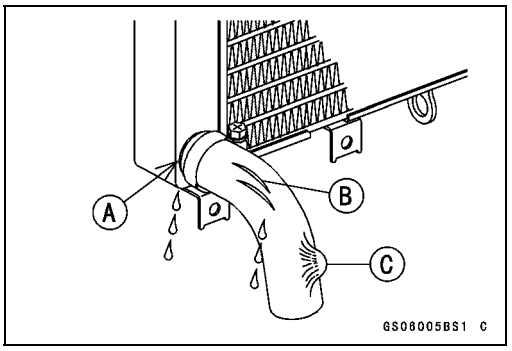
Torque - Air Cleaner Duct Holder Screws: 3.8 N·m (0.39 kgf·m, 34 in·lb)



Periodic Maintenance Procedures

Cooling System

Radiator Hose and Connection Inspection



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

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

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

Torque - Radiator Hose Clamp Screws: 2.0 N·m (0.20 kgf·m, 17 in·lb)

Coolant Change

⚠ WARNING

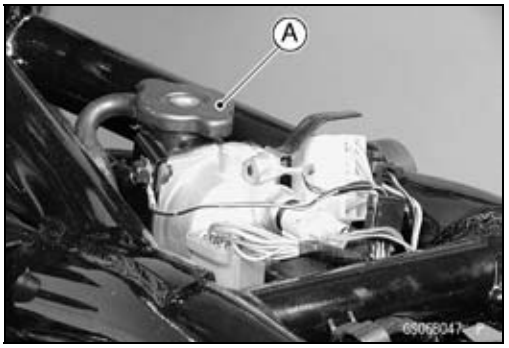
To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.
Coolant on tires will make them slippery and can cause an accident and injury.
Since coolant is harmful to the human body, do not use for drinking.

● Place a container under the water pump drain bolt [A], then remove the drain bolt.

● Remove the fuel tank (see Fuel System (DFI) chapter).

● Remove the radiator cap [A] in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.

○The coolant will drain from the radiator and engine.

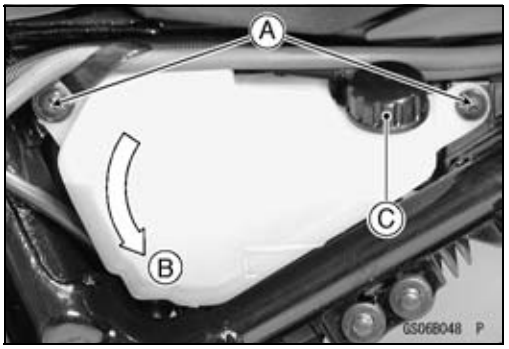


● Remove :
Left Side Cover (see Frame chapter)
Reserve Tank Screws [A]

● Turn over [B] the reserve tank, remove the cap [C], and pour the coolant into a suitable container.

● Install the reserve tank.

Torque - Coolant Reserve Tank Screws: 7.0 N·m (0.70 kgf·m, 61 in·lb)



● Tighten the drain bolt with the gasket.

○Replace the drain bolt gasket with a new one.

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

Periodic Maintenance Procedures

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

CAUTION

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

Water and Coolant Mixture Ratio (when shipping)

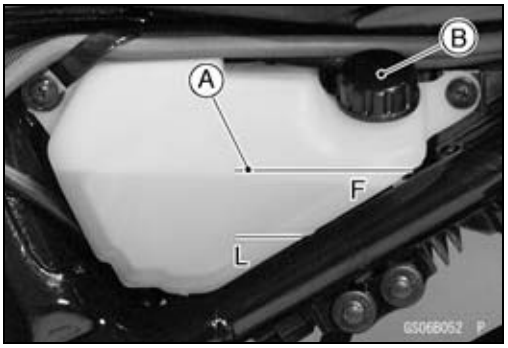
Soft Water	**:**	**50%**
Coolant	**:**	**50%**
Freezing Point	**:**	**−35°C (−31°F)**
Total Amount	**:**	**2.9 L (3.1 US qt)**

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

NOTE

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

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



- Fill the reserve tank up to the "F" (full) level line [A] with coolant and install the cap [B].
- Install the fuel tank (see Fuel System (DFI) chapter).
- Start the engine and warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank several times while the engine is cooling down, and replenish as necessary.

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

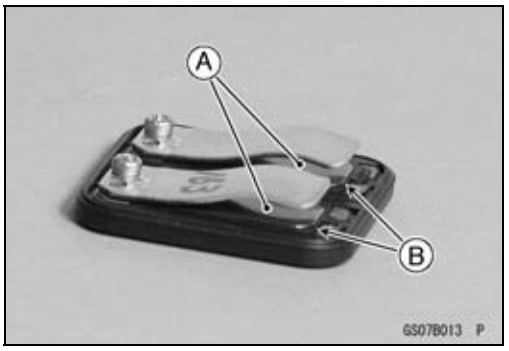
CAUTION

Do not add more coolant above the "F" level line.

Periodic Maintenance Procedures

Engine Top End

Air Suction Valve Inspection



- Remove the air suction valve (see Engine Top End chapter).
- Visually inspect the reeds for cracks, folds, warps, heat damage or other damage.

★If there is any doubt as to the condition of the reeds [A], replace the air suction valve as an assembly.

- Check the reed contact areas [B] of the valve holder for grooves, scratches, any signs of separation from the holder or heat damage.
- If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.
- If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high-flash point solvent.

CAUTION

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

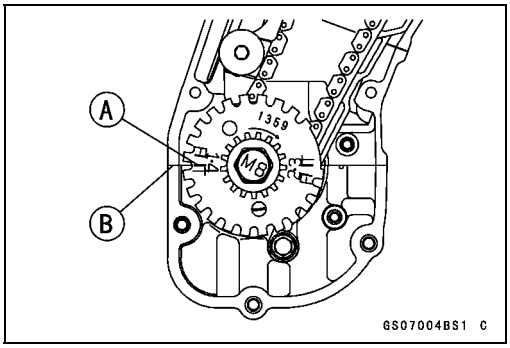
Valve Clearance Inspection

NOTE

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

- Remove:
  Pickup Coil Cover
  Cylinder Head Cover (see Engine Top End chapter)

- Position the crankshaft at 1,4 piston TDC.
  TDC Mark [A] for #1, 4 Pistons
  Timing Mark (crankcase halves mating surface) [B]

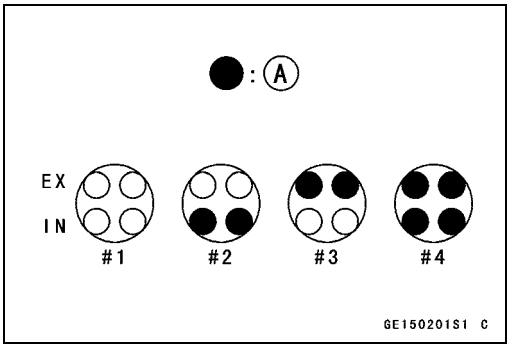


- Using the thickness gauge [A], measure the valve clearance between the cam and the valve lifter.

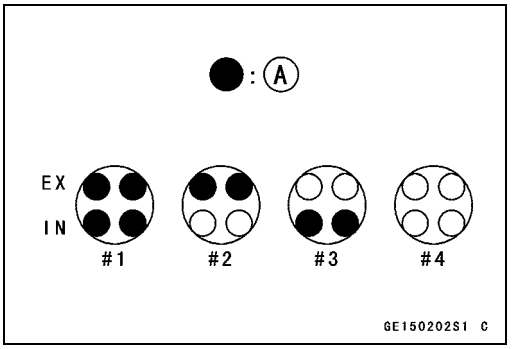
Valve Clearance
Standard:
Inlet: 0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)
Exhaust: 0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)

Periodic Maintenance Procedures

○**When positioning #4 piston TDC at the end of the compression stroke:**
Inlet valve clearance of #2 and #4 cylinders
Exhaust valve clearance of #3 and #4 cylinders
Measuring Valve [A]



○**When positioning #1 piston TDC at the end of the compression stroke:**
Inlet valve clearance of #1 and #3 cylinders
Exhaust valve clearance of #1 and #2 cylinders
Measuring Valve [A]



★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

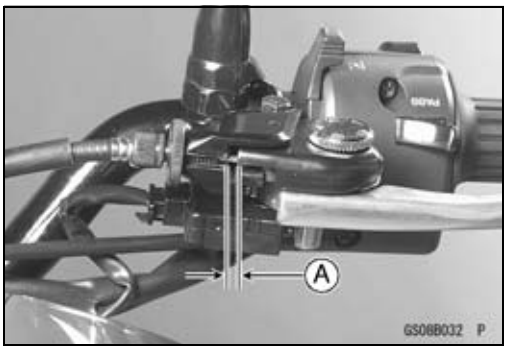
Clutch

Clutch Adjust Inspection

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

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

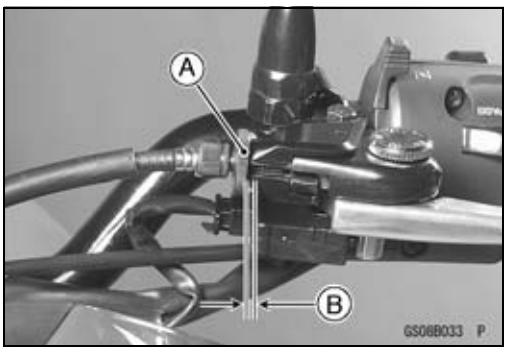
Clutch Lever Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)



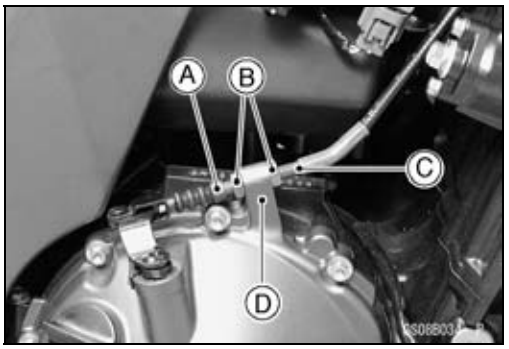
⚠ WARNING

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

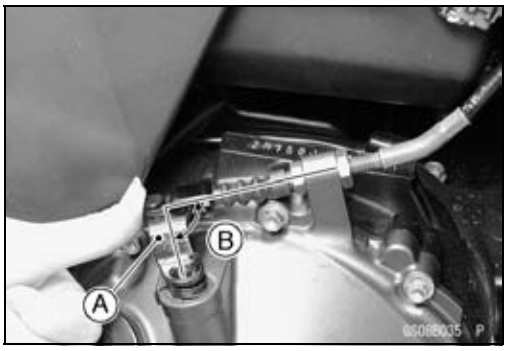
- Turn the adjuster [A] so that 5 ~ 6 mm (0.20 ~ 0.24 in.) [B] of threads are visible.



Periodic Maintenance Procedures



- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen both adjusting nuts [B] at the clutch cover as far as they will go.
- Pull the clutch outer cable [C] tight and tighten the adjusting nuts against the cover [D].
- Slip the rubber dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.



- Push the release lever [A] toward the front of the motorcycle until it becomes hard to turn.

○At this time, the release lever should have the proper angle shown.
60° [B]

★If the angle is wrong, check the clutch and release parts for wear.

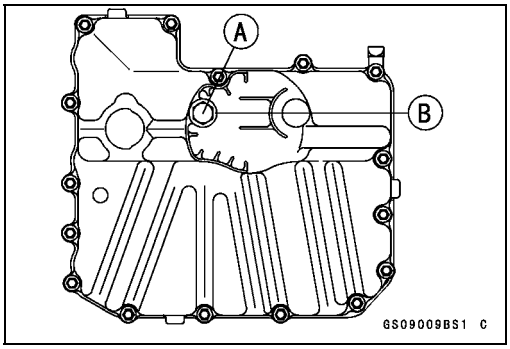
⚠ WARNING

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

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

Engine Lubrication System

Engine Oil Change



- Situate the motorcycle so that it is vertical after warming up the engine.
- Remove the engine oil drain bolt [A] to drain the oil.

○The oil in the oil filter can be drained by removing the filter (see Oil Filter Change).

★Replace the drain bolt gasket [B] with a new one.

- Tighten the drain bolt.

Torque - Engine Oil Drain Bolt: 20 N·m (2.0 kgf·m, 14 ft·lb)

- Pour in the specified type and amount of oil.

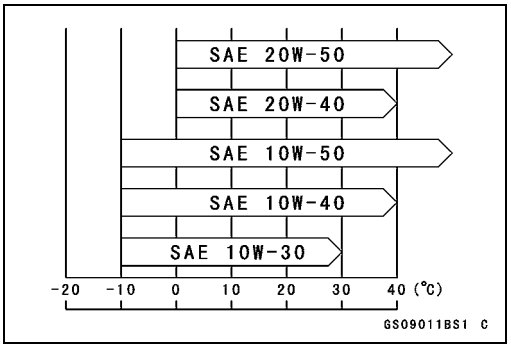
Engine Oil

Grade:	**API SE, SF or SG**
	API SH or SJ with JASO MA
Viscosity:	**SAE 10W-40**
Capacity:	**3.1 L (3.3 US qt) (when filter is not removed)**
	3.3 L (3.5 US qt) (when filter is removed)
	3.8 L (4.0 US qt) (when engine is completely dry)

Periodic Maintenance Procedures

NOTE

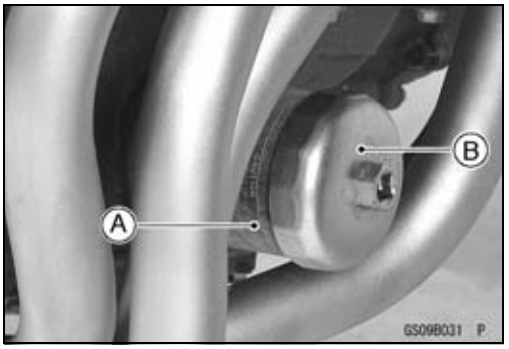
○*Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.*



Oil Filter Change

- Drain the engine oil (see Engine Oil Change).
- Remove the oil filter [A] with the oil filter wrench [B].

Special Tool - Oil Filter Wrench: 57001–1249



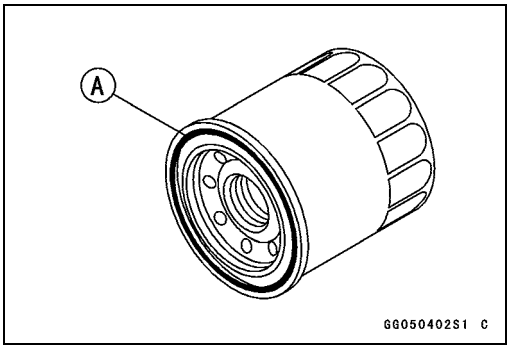
- Replace the filter with a new one.
- Apply engine oil to the gasket [A] before installation.
- Tighten the filter with the oil filter wrench.

Torque - Oil Filter: 31 N·m (3.2 kgf·m, 23 ft·lb)

NOTE

○*Hand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.*

- Pour in the specified type and amount of oil (see Engine Oil Change).



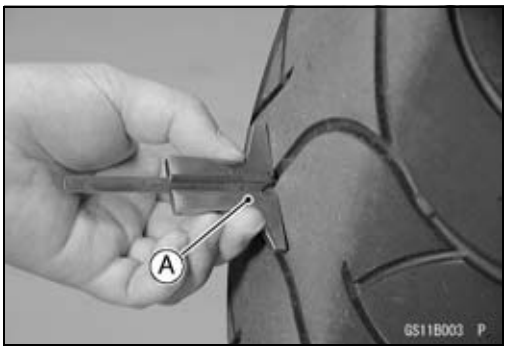
Wheels/Tires

Tire Wear Inspection

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

- 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 damage. Swelling or high spots indicate internal damage, requiring tire replacement.
- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.

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



Periodic Maintenance Procedures

Tread Depth
Front:
Standard: 3.4 mm (0.13 in.)
Service Limit: 1 mm (0.04 in.)
1.6 mm (0.06 in.) (AT, CH, DE)
Rear:
Standard: 5.8 mm (0.23 in.)
Service Limit: 2 mm (0.08 in.)
(Up to 130 km/h (80 mph))
3 mm (0.12 in.)
(Over 130 km/h (80 mph))

⚠ WARNING

To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

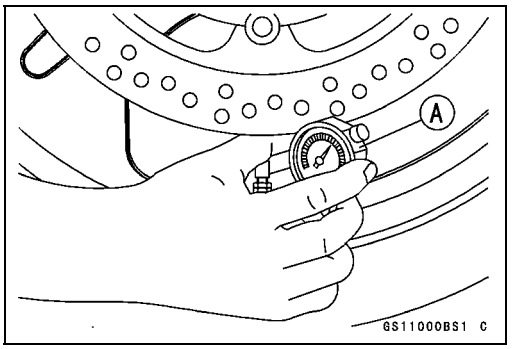
NOTE

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

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).

★Adjust the tire air pressure according to the specifications if necessary.



Air Pressure (when cold)

Front	Up to 180 kg (397 lb)	250 kPa (2.5 kgf/cm², 36 psi)
Rear		290 kPa (2.9 kgf/cm², 42 psi)

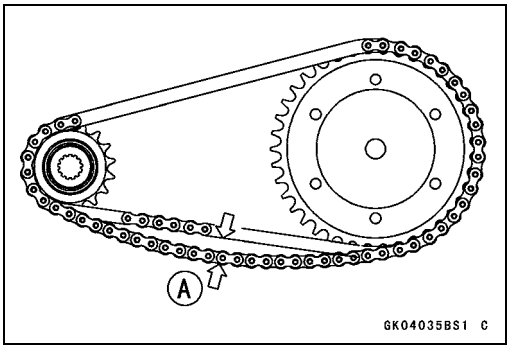
- Install the air valve cap certainly after air pressure inspection.

Torque - Air Valve Cap: 0.15 N·m (0.015 kgf·m, 1.3 in·lb)

Periodic Maintenance Procedures

Final Drive

Drive Chain Slack Inspection



NOTE

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

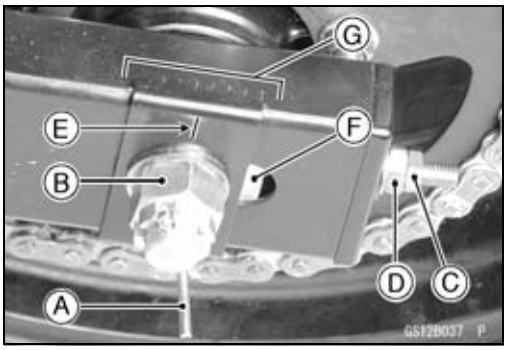
○*Clean the chain if it is dirty, and lubricate it if it appears dry.*

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

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

Chain Slack
Standard: 25 ~ 35 mm (1.0 ~ 1.4 in.)

Drive Chain Slack Adjustment



- Remove the cotter pin [A], and loosen the axle nut [B].
- Loosen the both chain adjuster locknuts [C].

★If the chain is too loose, turn out the left and right chain adjuster [D] evenly.

★If the chain is too tight, turn in the left and right chain adjusters evenly, and kick the wheel forward.

- Turn both chain adjusters evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the notch [E] on the left wheel alignment indicator [F] should align with the same swingarm mark or position [G] that the right indicator notch aligns with.

⚠ WARNING

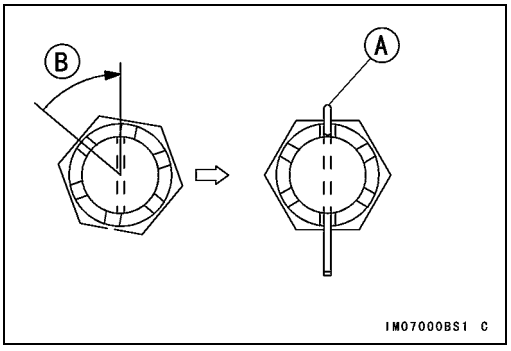
Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition.

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

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

- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

- Insert a new cotter pin [A].



NOTE

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

○*It should be within 30 degree.*

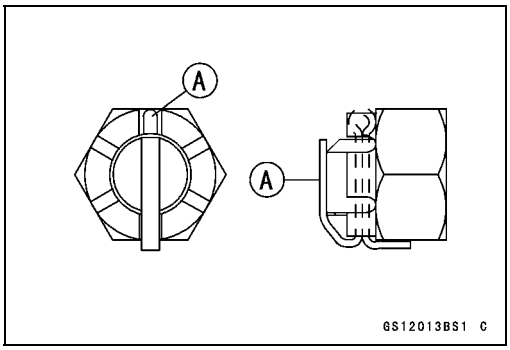
○*Loosen once and tighten again when the slot goes past the nearest hole.*

Periodic Maintenance Procedures

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

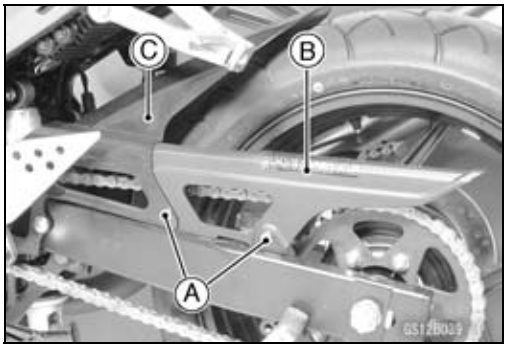
⚠ WARNING

If the rear axle nut is not securely tightened or the cotter pin is not installed, an unsafe riding condition may result.

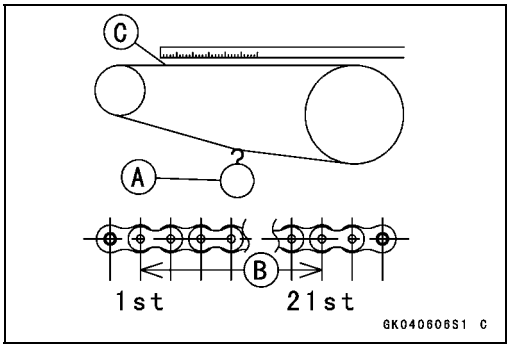


Drive Chain Wear Inspection

● Remove:
Chain Cover Screws [A]
Chain Cover [B]
Mud Guard [C] (see Frame chapter)



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



Drive Chain 20-link Length
Standard: 317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)
Service Limit: 323 mm (12.7 in.)

⚠ WARNING

If the drive chain wear exceeds the service limit, replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control.
For safely, use only the standard chain. It is an endless type and should not be cut for installation.

Standard Chain
Make: ENUMA
Type: EK520MVXL
Link: 112 Links