Kawasaki

Ninja 650R
ER-6f
ER-6f ABS

Motorcycle Service Manual

Quick Reference Guide

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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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

AT	Austria	GB	United Kingdom
AU	Australia	MY	Malaysia
CA	Canada	SEA	South East Asia
CAL	California	US	United States
CH	Switzerland	WVTA (FULL H)	WVTA Model with Honeycomb Catalytic Converter (Full Power)
DE	Germany	GB WVTA (FULL H)	WVTA Model with Honeycomb Catalytic Converter (Left Side Traffic, Full Power)
EUR	Europe		

EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems in compliance with applicable regulations of the United States Environmental Protection Agency and California Air Resources Board. Additionally, Kawasaki has incorporated an evaporative emission control system (3) in compliance with applicable regulations of the California Air Resources Board on vehicles sold in California only.

1. Crankcase Emission Control System

This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the inlet side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the fuel injection system.

2. Exhaust Emission Control System

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel, ignition, and exhaust systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

The exhaust system of this model motorcycle manufactured primarily for sale in California includes a catalytic converter system.

3. Evaporative Emission Control System

Vapors caused by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped. Liquid fuel is caught by a vapor separator and returned to the fuel tank.

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

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

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

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

NOTE

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

1. *Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.*
2. *Tampering could include.*
   a. *Maladjustment of vehicle components such that the emission standards are exceeded.*
   b. *Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.*
   c. *Addition of components or accessories that result in the vehicle exceeding the standards.*
   d. *Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.*

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

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof. (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below.

- Replacement of the original exhaust system or muffler with a component not in compliance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- Removal of the air box or air box cover.
- Modifications to the muffler(s) or air inlet system by cutting, drilling, or other means if such modifications result in increased noise levels.

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 Service Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use This Manual

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

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

Whenever you see 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

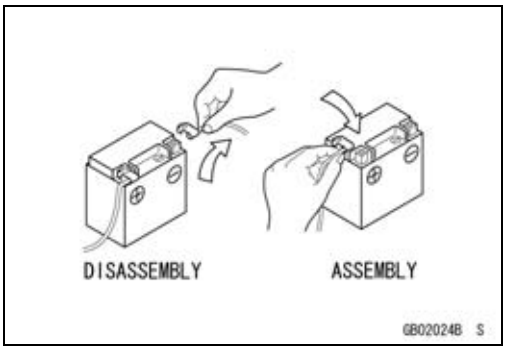
Before Servicing

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:

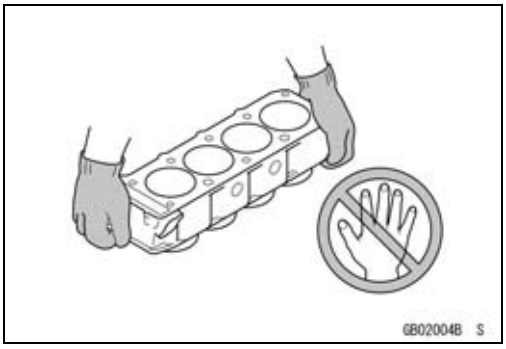
Battery Ground

Before completing any service on the motorcycle, disconnect the battery 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.



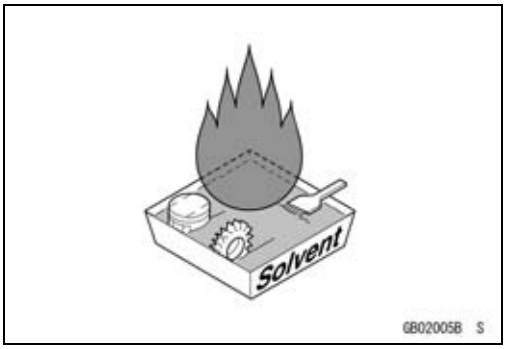
Edges of Parts

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



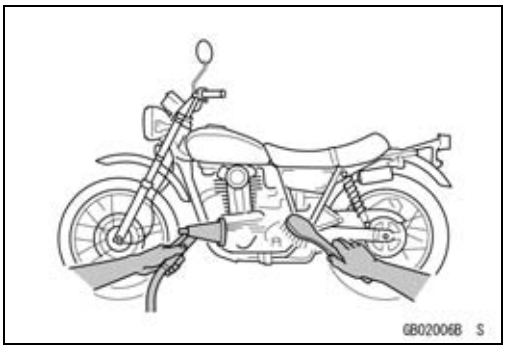
Solvent

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

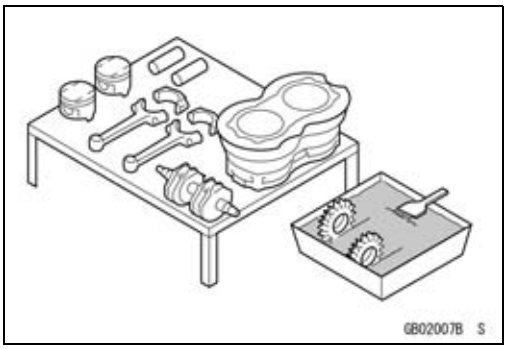
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

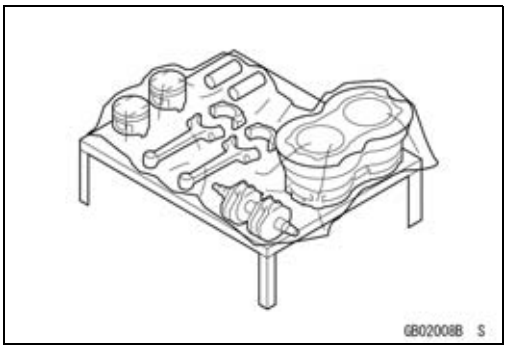
Arrangement and Cleaning of Removed Parts

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.



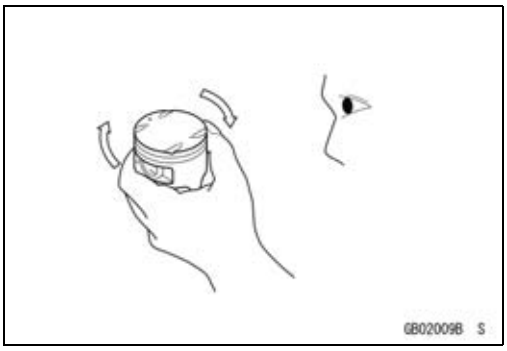
Storage of Removed Parts

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.



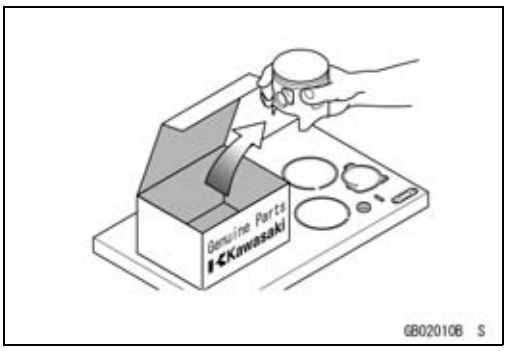
Inspection

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.



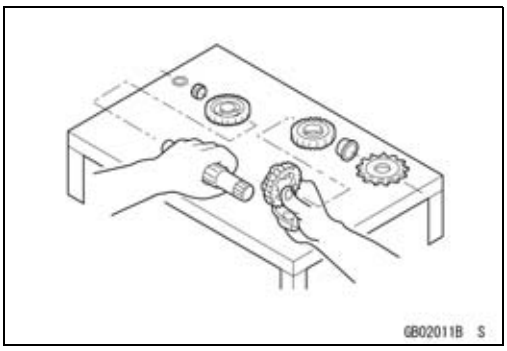
Replacement Parts

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



Assembly Order

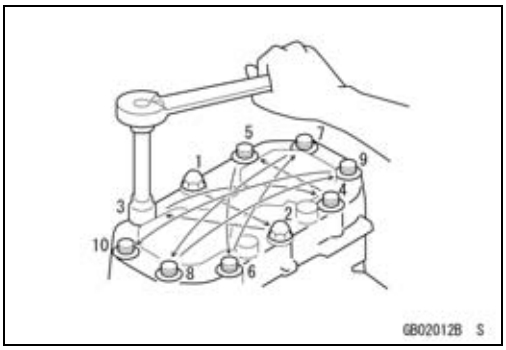
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

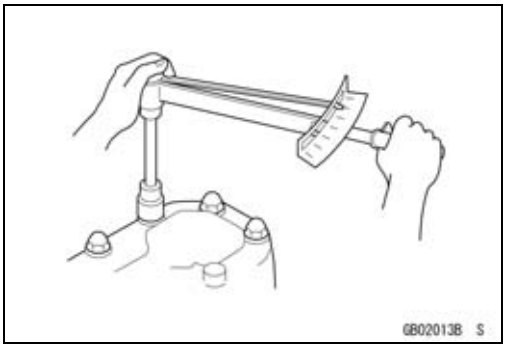
Tightening Sequence

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



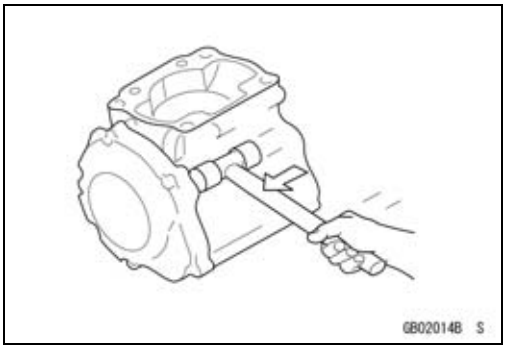
Tightening Torque

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.



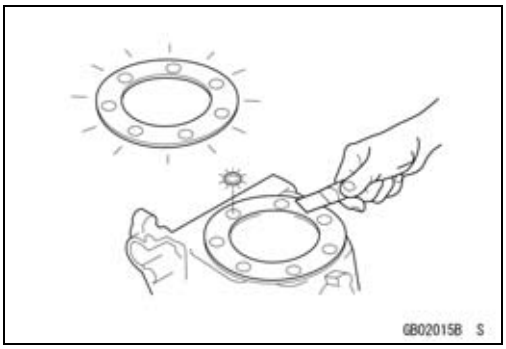
Force

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.



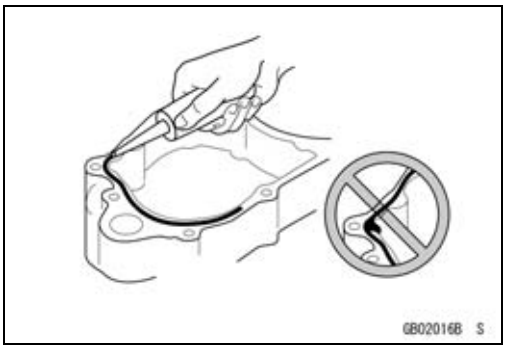
Gasket, O-ring

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 used O-rings when re-assembling



Liquid Gasket, Non-permanent Locking Agent

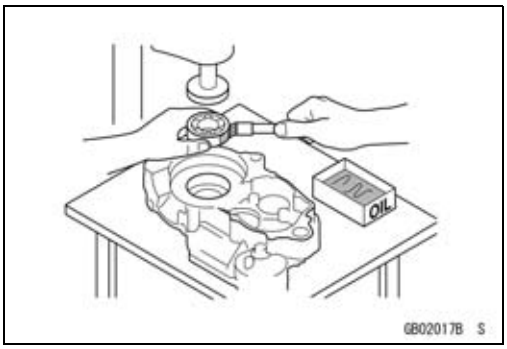
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

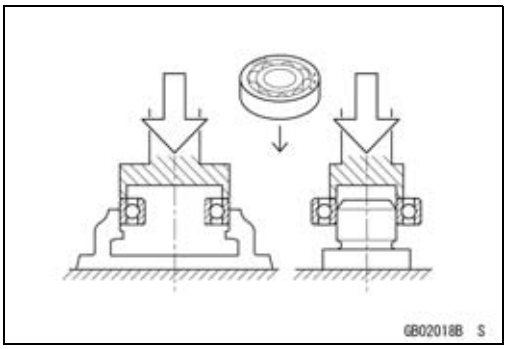
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

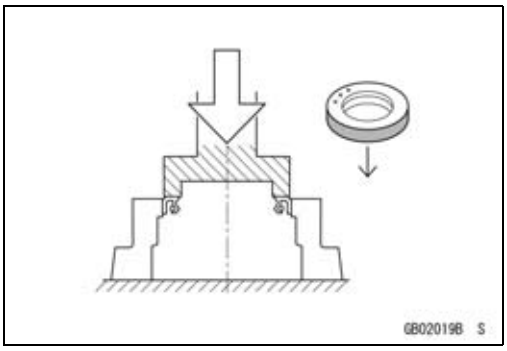
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

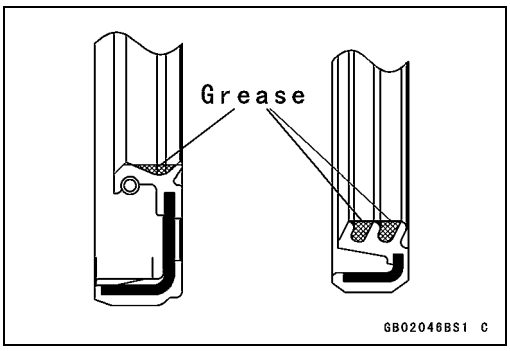


Oil Seal, Grease Seal

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.

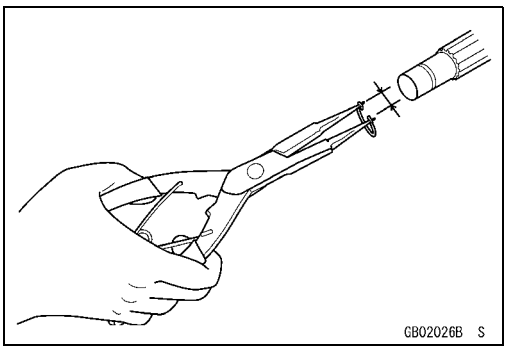


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

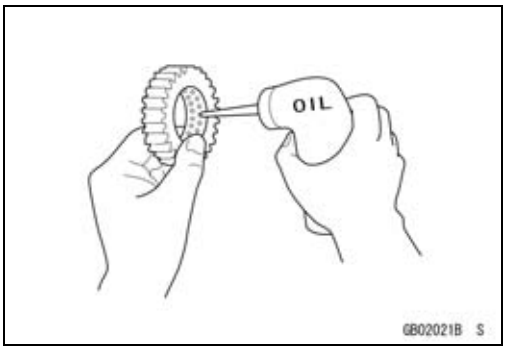
Replace circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

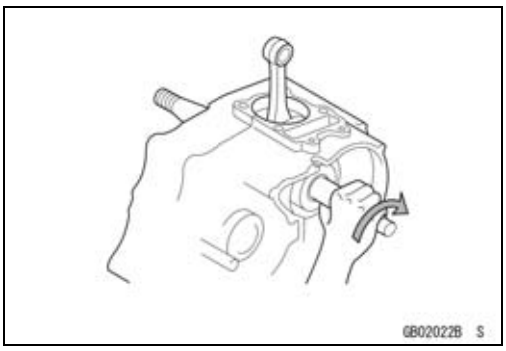
Lubrication

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.



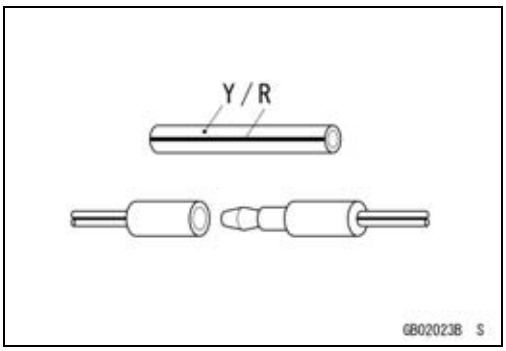
Direction of Engine Rotation

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).



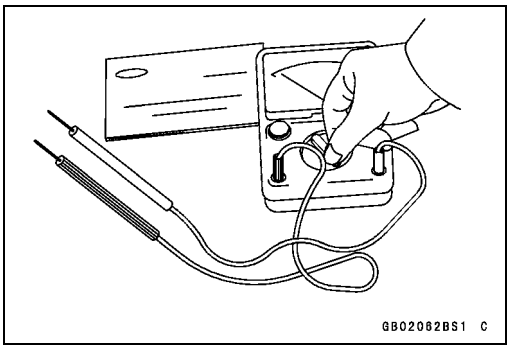
Electrical Leads

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

EX650C9F (EUR Models) Left Side View

EX650C9F (EUR Models) Right Side View

Model Identification

EX650C9F (US, CA Models) Left Side View

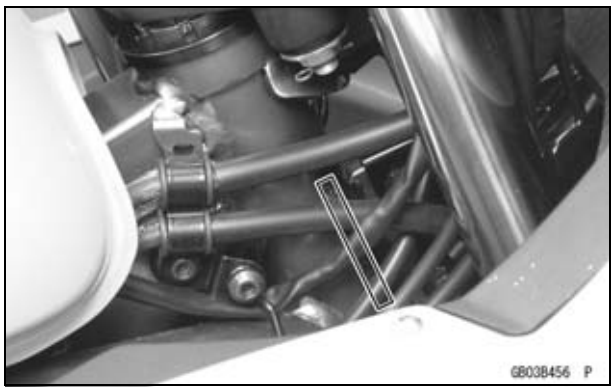
EX650C9F (US, CA Models) Right Side View

Model Identification

EX650D9F Left Side View

EX650D9F Right Side View

Frame Number



Engine Number

General Specifications

Items	EX650C9F, EX650D9F
Dimensions	
Overall Length	2 100 mm (82.68 in.)
Overall Width	760 mm (29.9 in.)
Overall Height	1 200 mm (47.24 in.)
Wheelbase	1 410 mm (55.51 in.)
Road Clearance	145 mm (5.71 in.)
Seat Height	790 mm (31.1 in.)
Curb Mass:	
EX650C Models:	204 kg (450 lb)
Front	104 kg (229 lb)
Rear	100 kg (221 lb)
EX650D Models:	208 kg (459 lb)
Front	105 kg (232 lb)
Rear	103 kg (227 lb)
Fuel Tank Capacity	15.5 L (4.10 US gal.)
Performance	
Minimum Turning Radius	2.7 m (8.9 ft)
Engine	
Type	4-stroke, DOHC, 2-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	83.0 × 60.0 mm (3.27 × 2.36 in.)
Displacement	649 cm^3 (39.6 cu in.)
Compression Ratio	11.3 : 1
Maximum Horsepower	53 kW (72 PS) @8 500 r/min (rpm) (MY) 52 kW (71 PS) @8 000 r/min (rpm) (US, CA, CAL) – – –
Maximum Torque	66 N·m (6.7 kgf·m, 49 ft·lb) @7 000 r/min (rpm) (US, CA, CAL) – – –
Carburetion System	FI (Fuel Injection), KEIHIN TTK38 × 2
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (IC igniter in ECU)
Ignition Timing	From 10° BTDC @1 300 r/min (rpm) To 34° BTDC @5 000 r/min (rpm)
Spark Plug	NGK CR9EIA-9
Cylinder Numbering Method	Left to right, 1-2
Firing Order	1-2
Valve Timing:	
Inlet:	
Open	31° BTDC
Close	61° ABDC
Duration	272°

General Specifications

Items	EX650C9F, EX650D9F
Exhaust:	
Open	50° BBDC
Close	30° ATDC
Duration	260°
Lubrication System	Forced lubrication (semi-dry sump)
Engine Oil:	
Grade	API SE, SF or SG API SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	2.4 L (2.5 US qt)
Drive Train	
Primary Reduction System:	
Type	Gear
Reduction Ratio	2.095 (88/42)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear Ratios:	
1st	2.438 (39/16)
2nd	1.714 (36/21)
3rd	1.333 (32/24)
4th	1.111 (30/27)
5th	0.966 (28/29)
6th	0.852 (23/27)
Final Drive System:	
Type	Chain drive
Reduction Ratio	3.067 (46/15)
Overall Drive Ratio	5.473 @Top gear
Frame	
Type	Tubular, diamond
Caster (Rake Angle)	25°
Trail	106 mm (4.17 in.)
Front Tire:	
Type	Tubeless
Size	120/70 ZR17 M/C (58W)
Rim Size	17 × 3.50
Rear Tire:	
Type	Tubeless
Size	160/60 ZR17 M/C (69W)
Rim Size	17 × 4.50
Front Suspension:	
Type	Telescopic fork
Wheel Travel	120 mm (4.72 in.)

General Specifications

Items	EX650C9F, EX650D9F
Rear Suspension:	
Type	Swingarm
Wheel Travel	125 mm (4.92 in.)
Brake Type:	
Front	Dual discs
Rear	Single disc
Electrical Equipment	
Battery	12 V 10 Ah
Headlight:	
Type	Semi-sealed beam
Bulb:	
High	12 V 55 W + 55 W (quartz-halogen)
Low	12 V 55 W (quartz-halogen)
Tail/Brake Light	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.

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

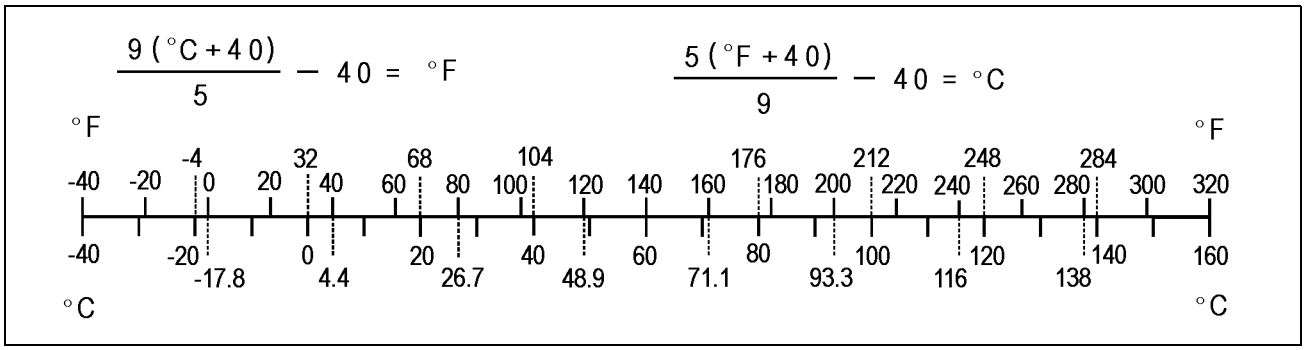
Units of Speed:

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:



Periodic Maintenance

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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 / ITEM		Whichever comes first ➡ / ⬇ Every	* ODOMETER READING × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.75)	12 (7.5)	18 (11.25)	24 (15)	30 (18.75)	36 (22.5)	See Page
Fuel System										
Air cleaner element - clean					●		●		●	2-14
Throttle control system (play, smooth return, no drag) - inspect		year	●		●		●		●	2-15
Engine vacuum synchronization - inspect					●		●		●	2-15
Idle speed - inspect			●		●		●		●	2-17
Fuel leak (fuel hose and pipe) - inspect		year	●		●		●		●	2-18
Fuel hose and pipe damage - inspect		year	●		●		●		●	2-18
Fuel hose and pipe installation condition - inspect		year	●		●		●		●	2-18
Evaporative emission control system function (CAL, SEA Models) - inspection			●	●	●	●	●	●	●	2-18
Cooling System										
Coolant level - inspect			●		●		●		●	2-19
Coolant leak (water hose and pipe) - inspect		year	●		●		●		●	2-20
Water hose damage - inspect		year	●		●		●		●	2-20
Water hose installation condition - inspect		year	●		●		●		●	2-20
Engine Top End										
Valve clearance - inspect	US, CA, CAL Models						●			2-20
	Other than US, CA, CAL Models		Every 42 000 km (26 250 mile)							
Air suction system damage - inspect					●		●		●	2-24
Clutch										
Clutch operation (play, disengagement, engagement) - inspect			●		●		●		●	2-24
Wheels and Tires										
Tire air pressure - inspect		year			●		●		●	2-25
Wheel/tire damage - inspect					●		●		●	2-25
Tire tread wear, abnormal wear - inspect					●		●		●	2-26
Wheel bearing damage - inspect		year			●		●		●	2-26

Periodic Maintenance Chart

FREQUENCY / ITEM	Whichever comes first ➡ / ⬇ Every	* ODOMETER READING × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.75)	12 (7.5)	18 (11.25)	24 (15)	30 (18.75)	36 (22.5)	See Page
Final Drive									
Drive chain lubrication condition - inspect #	Every 600 km (400 mile)								2-27
Drive chain slack - inspect #	Every 1 000 km (600 mile)								2-28
Drive chain wear - inspect #				●		●		●	2-30
Chain guide wear - inspect				●		●		●	2-30
Brakes									
Brake fluid leak (brake hose and pipe) - inspect	year	●	●	●	●	●	●	●	2-31
Brake hose and pipe damage - inspect	year	●	●	●	●	●	●	●	2-31
Brake hose and pipe installation condition - inspect	year	●	●	●	●	●	●	●	2-31
Brake fluid level - inspect	6 months	●	●	●	●	●	●	●	2-32
Brake pad wear - inspect #			●	●	●	●	●	●	2-33
Brake operation (effectiveness, play, no drag) - inspect	year	●	●	●	●	●	●	●	2-33
Brake light switch operation - inspect		●	●	●	●	●	●	●	2-33
Suspension									
Front forks/rear shock absorber operation (damping and smooth stroke) - inspect				●		●		●	2-34
Front forks/rear shock absorber oil leak - inspect	year			●		●		●	2-34
Steering									
Steering play - inspect	year	●		●		●		●	2-35
Steering stem bearings - lubricate	2 years					●			2-36
Electrical System									
Lights and switches operation - inspect	year			●		●		●	2-37
Headlight aiming - inspect	year			●		●		●	2-39
Sidestand switch operation - inspect	year			●		●		●	2-40
Engine stop switch operation - inspect	year			●		●		●	2-41
Others									
Chassis parts - lubricate	year			●		●		●	2-42
Bolts and nuts tightness - inspect		●		●		●		●	2-43

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

*: For higher odometer readings, repeat at the frequency interval established here.

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

Periodic Replacement Parts

FREQUENCY / ITEM	Whichever comes first ➡ / ⬇ Every	* ODOMETER READING × 1 000 km (× 1 000 mile) 1 (0.6)	12 (7.5)	24 (15)	36 (22.5)	48 (30)	See Page
Air cleaner element # - replace	2 years						2-44
Fuel hose - replace	4 years					●	2-44
Coolant - change	3 years				●		2-45
Radiator hose and O-ring - replace	3 years				●		2-47
Engine oil # - change	year	●	●	●	●	●	2-47
Oil filter - replace	year	●	●	●	●	●	2-48
Brake hose and pipe - replace	4 years					●	2-49
Brake fluid - change	2 years			●		●	2-50
Rubber parts of master cylinder and caliper - replace	4 years					●	2-51
Spark plug - replace			●	●	●	●	2-55

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

*: For higher odometer readings, repeat at the frequency interval established here.

Torque and Locking Agent

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

Letters used in the “Remarks” column mean:
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
EO: Apply engine oil.
L: Apply a non-permanent locking agent to the threads.
Lh: Left-hand Threads
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease (ex. PBC grease).
SS: Apply silicone sealant.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Crankshaft Sensor Bolts	6.0	0.61	53 in·lb	
Fuel Level Sensor Bolts	6.9	0.70	61 in·lb	L
Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
Oxygen Sensor (Equipped Models)	44	4.5	32	
Speed Sensor Bolt	7.8	0.80	69 in·lb	L
Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
Switch Housing Screws	3.5	0.36	31 in·lb	
Timing Rotor Bolt	40	4.1	30	
Water Temperature Sensor	12	1.2	106 in·lb	
Cooling System				
Baffle Plate Bolts	5.9	0.60	52 in·lb	
Radiator Bolt	15	1.5	11	
Water Hose Clamp Screws	2.0	0.20	18 in·lb	
Thermostat Housing Bolts	9.8	1.0	87 in·lb	
Water Pump Cover Bolts	9.8	1.0	87 in·lb	
Water Pump Drain Bolt	9.8	1.0	87 in·lb	
Water Pump Impeller Bolt	9.8	1.0	87 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	
Baffle Plate Bolts	5.9	0.60	52 in·lb	
Camshaft Cap Bolts	12	1.2	106 in·lb	S
Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
Camshaft Sprocket Bolts	15	1.5	11	L
Cylinder Head Bolts (M10)	56	5.7	41	MO, S
Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
Rear Camshaft Chain Guide Bolts	20	2.0	15	L
Spark Plugs	15	1.5	11	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	
Cylinder Bolt (M8)	27.5	2.8	20	MO, S
Cylinder Nut	49	5.0	36	MO, S
Cylinder Bolts (M6)	12	1.2	106 in·lb	S
Exhaust Pipe Manifold Holder Nuts	17	1.7	13	
Muffler Body Mounting Bolt (Front)	20	2.0	15	
Muffler Body Mounting Bolt (Rear)	20	2.0	15	
Clutch				
Clutch Cable Clamp Bracket Bolt	9.8	1.0	87 in·lb	
Clutch Cable Holder Bolts	9.8	1.0	87 in·lb	L
Clutch Cover Bolts	9.8	1.0	87 in·lb	
Clutch Hub Nut	130	13.3	96	R
Clutch Lever Clamp Bolts	7.8	0.80	69 in·lb	S
Clutch Spring Bolts	9.8	1.0	87 in·lb	
Timing Rotor Bolt Cap	4.9	0.50	43 in·lb	
Oil Filler Plug	–	–	–	Hand-tighten
Oil Pump Chain Guide Bolts	12	1.2	106 in·lb	L (1)
Oil Pump Sprocket Bolt	12	1.2	106 in·lb	L, Lh
Timing Inspection Cap	3.9	0.40	35 in·lb	
Engine Lubrication System				
Engine Oil Drain Plug	30	3.1	22	
Filter Plate Bolts	9.8	1.0	87 in·lb	L
Holder Mounting Bolt	25	2.5	18	L
Lower Fairing Bracket Bolts	12	1.2	106 in·lb	L
Oil Filter	17.5	1.8	13	EO, R
Oil Pan Bolts	12	1.2	106 in·lb	S
Oil Passage Plug	20	2.0	15	L
Oil Passage Plug (M6)	3.9	0.40	35 in·lb	
Oil Pipe Plate Bolt	9.8	1.0	87 in·lb	L
Oil Plate Bolts	9.8	1.0	87 in·lb	L
Oil Pressure Relief Valve	15	1.5	11	L
Oil Pressure Switch	15	1.5	11	SS
Oil Pump Chain Guide Bolts	12	1.2	106 in·lb	L (1)
Oil Pump Cover Bolts	9.8	1.0	87 in·lb	L
Oil Pump Sprocket Bolt	12	1.2	106 in·lb	L, Lh
Engine Removal/Installation				
Engine Bracket Bolts (Left)	25	2.5	18	S
Engine Bracket Bolts (Right)	25	2.5	18	S
Engine Mounting Nut (Lower)	44	4.5	32	S
Engine Mounting Nut (Rear)	44	4.5	32	S
Engine Mounting Bolt (Left)	44	4.5	32	S
Engine Mounting Bolt (Right)	44	4.5	32	S