

MODEL APPLICATION

Year	Model	Beginning Frame No.
2006	ER650A6F	JKAEREA1□6A000001 ER650A-000001
2006	ER650A6S	JKAER650AAA000001
2006	ER650B6F	JKAER650ABA000001
2007	ER650A7F	JKAEREA1□7A030001 JKAER650AAA030001 ER650A-030001
2007	ER650B7F	JKAER650ABA030001
2008	ER650A8F	JKAEREA1□8DA00507 JKAER650AADA00007 ER650A-A00707
2008	ER650B8F	JKAER650ABDA

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



KAWASAKI HEAVY INDUSTRIES, LTD.
Consumer Products & Machinery Company

Part No.99924-1360-05

Printed in Japan



ER-6n
ER-6n ABS



Motorcycle Service Manual

Quick Reference Guide

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

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	GB WVTF (FULL H)	WVTA Model with Honeycomb Catalytic Converter (Left Side Traffic Full Power)
EUR	Europe	TW	Taiwan
CH	Switzerland	WVTA (78.2 H)	WVTA Model with Honeycomb Catalytic Converter (78.2 kW Power)
DE	Germany		

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	1-2
Model Identification.....	1-7
General Specifications.....	1-9
Technical Information - Cassette Type Transmission	1-12
Technical Information - Inlet Air Pressure Sensor	1-13
Technical Information – ABS (Anti – Lock Brake System).....	1-14
Unit Conversion Table	1-26

1-2 GENERAL INFORMATION

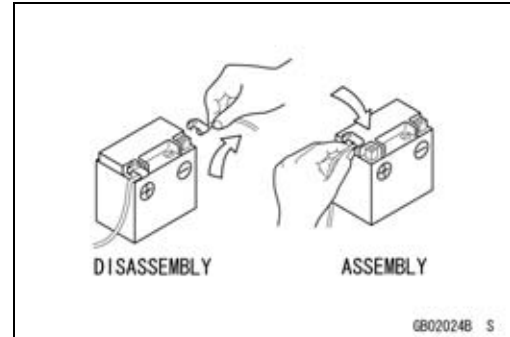
Before Servicing

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

Especially note the following:

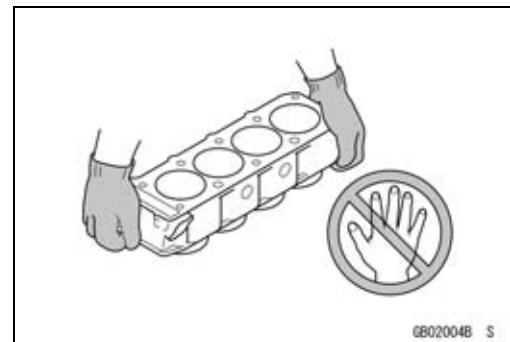
Battery Ground

Before completing any service on the motorcycle, disconnect the battery cables from the battery to prevent the engine from accidentally turning over. Disconnect the ground (-) 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.



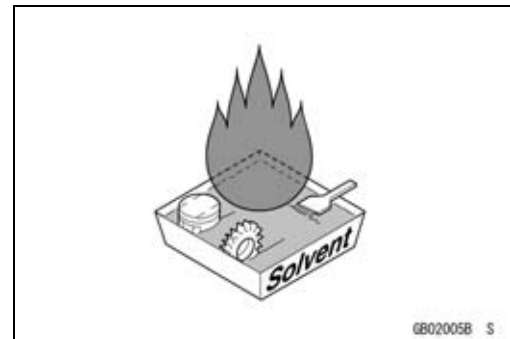
Edges of Parts

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



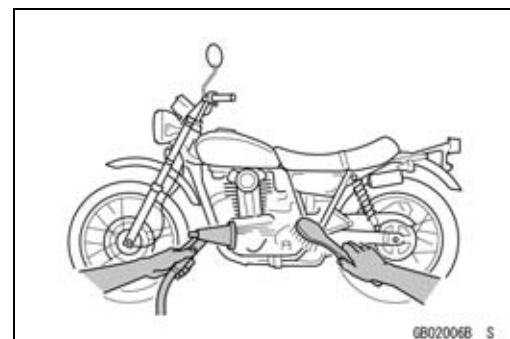
Solvent

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

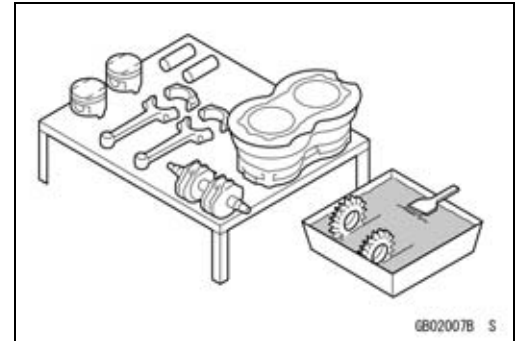
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

Arrangement and Cleaning of Removed Parts

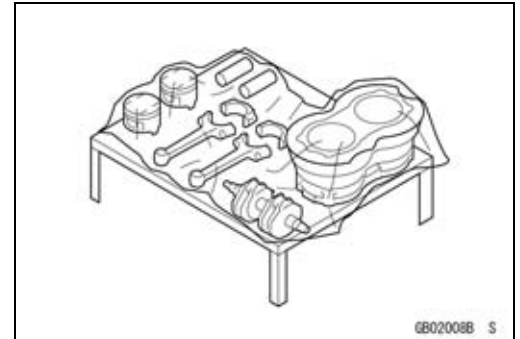
Disassembled parts are easy to confuse. Arrange the parts according to the order the parts were disassembled and clean the parts in order prior to assembly.



GB02007B S

Storage of Removed Parts

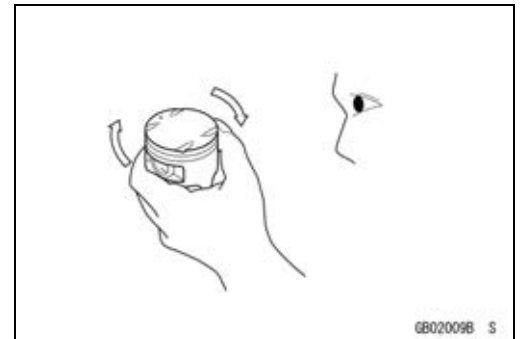
After all the parts including subassembly parts have been cleaned, store the parts in a clean area. Put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before re-assembly.



GB02008B S

Inspection

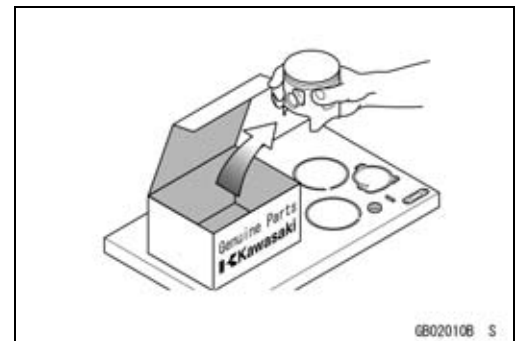
Reuse of worn or damaged parts may lead to serious accident. Visually inspect removed parts for corrosion, discoloration, or other damage. Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part is beyond its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



GB02009B S

Replacement Parts

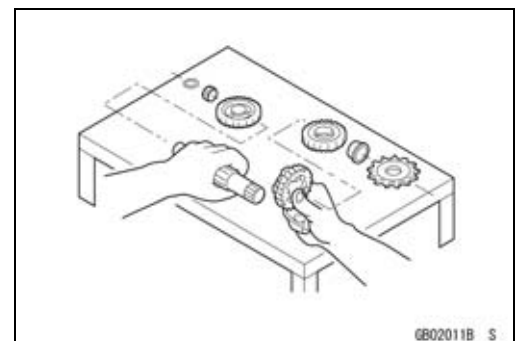
Replacement parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, oil seals, grease seals, circlips or cotter pins must be replaced with new ones whenever disassembled.



GB02010B S

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.



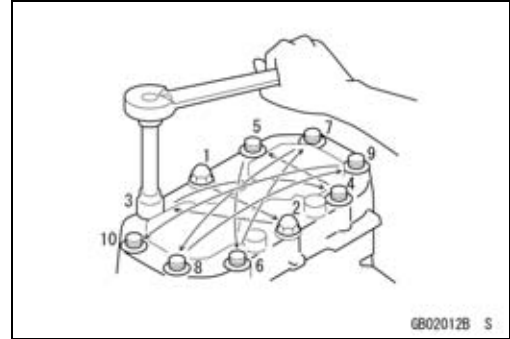
GB02011B S

1-4 GENERAL INFORMATION

Before Servicing

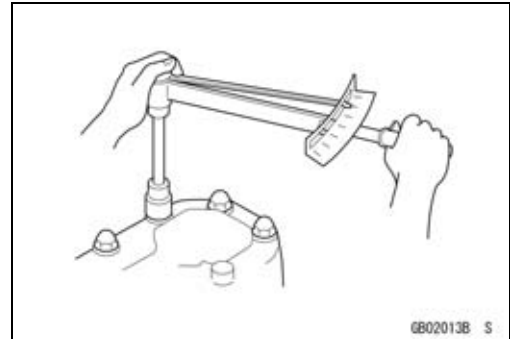
Tightening Sequence

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



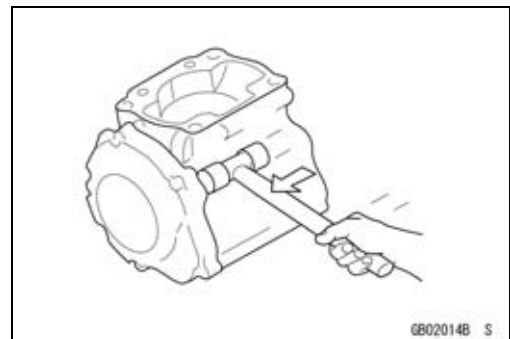
Tightening Torque

Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench. Often, the tightening sequence is followed twice-initial tightening and final tightening with torque wrench.



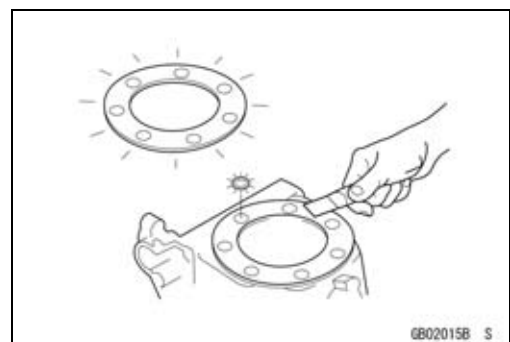
Force

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



Gasket, O-ring

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



Liquid Gasket, Non-permanent Locking Agent

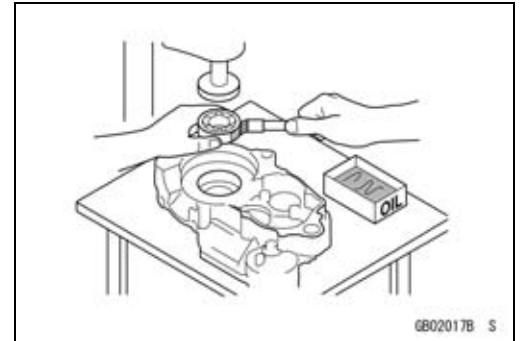
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

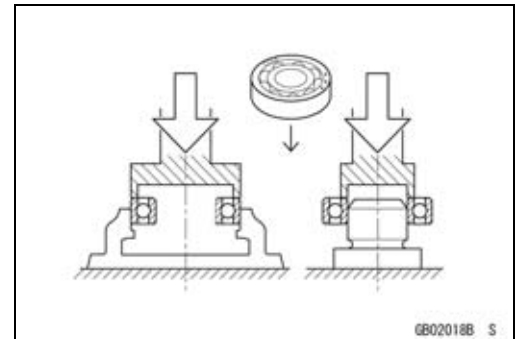
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

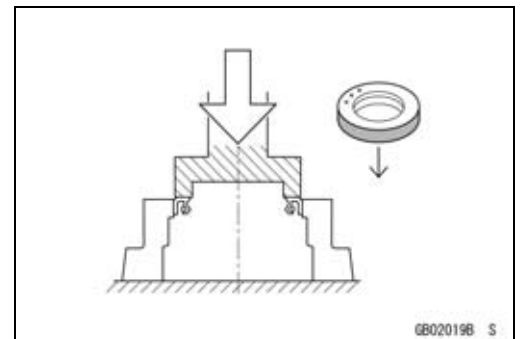
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

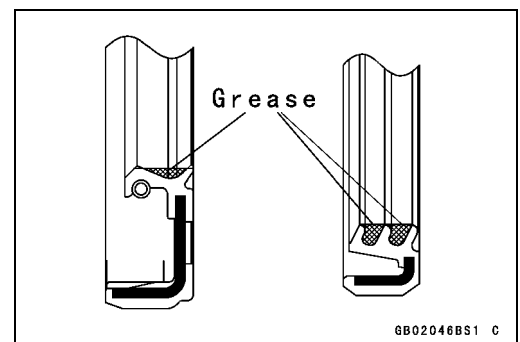


Oil Seal, Grease Seal

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

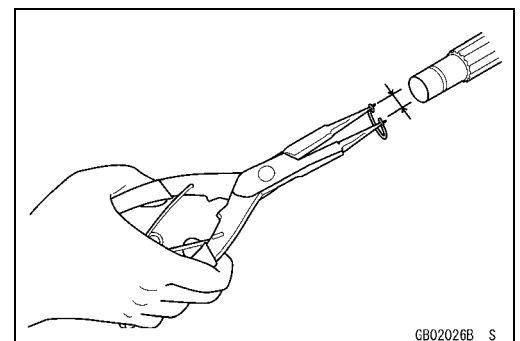


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

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

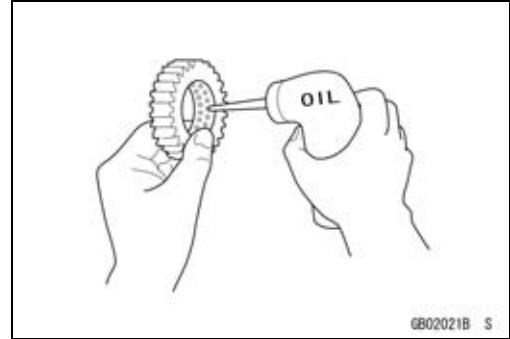


1-6 GENERAL INFORMATION

Before Servicing

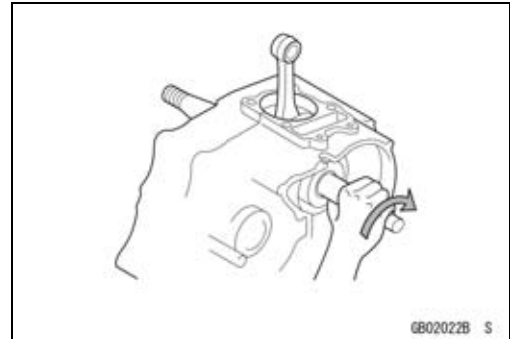
Lubrication

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



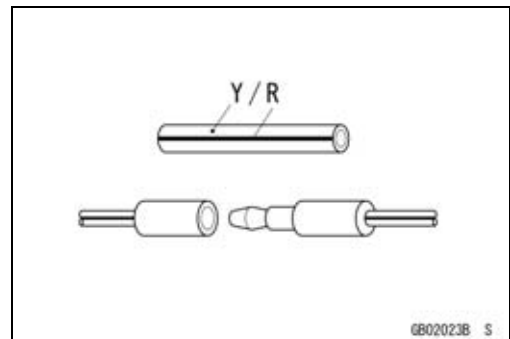
Direction of Engine Rotation

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



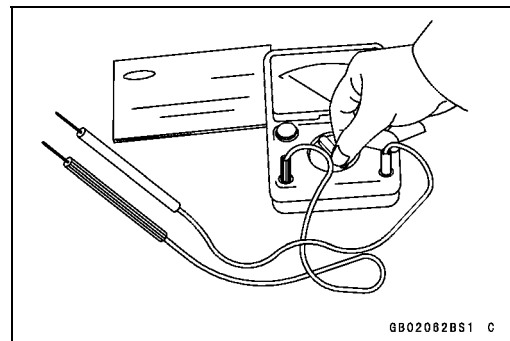
Electrical Leads

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



Instrument

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



Model Identification

ER650A6F/ER650A6S Left Side View



GB03B195 P

ER650A6F/ER650A6S Right Side View



GB03B195 P

ER650A6F: Australia, Malaysia Models

ER650A6S: Europe Models

1-8 GENERAL INFORMATION

Model Identification

ER650B6F Left Side View



ER650B6F Right Side View



General Specifications

Items	ER650A6F ~/ER650A6S, ER650B6F ~
Dimensions	
Overall Length	2 100 mm (82.7 in.)
Overall Width	760 mm (29.9 in.)
Overall Height	1 095 mm (43.1 in.)
Wheelbase	1 405 mm (55.3 in.)
Road Clearance	140 mm (5.5 in.)
Seat Height	785 mm (30.9 in.)
Dry Mass:	
ER650A Models	174 kg (383.7 lb)
ER650B Models	178 kg (392.5 lb)
Curb Mass:	
Front:	
ER650A Models	98 kg (216.1 lb)
ER650B Models	101 kg (222.7 lb)
Rear:	
ER650A Models	98 kg (216.1 lb)
ER650B Models	101 kg (222.7 lb)
Fuel Tank Capacity	15.5 L (4.1 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 × 60 mm (3.3 × 2.4 in.)
Displacement	649 cm ³ (39.60 cu in.)
Compression Ratio	11.3 : 1
Maximum Horsepower	53 kW (72 PS) @8 500 r/min (rpm), (MY) 46 kW (62.5 PS) @7 000 r/min (rpm)
Maximum Torque	66 N·m (6.7 kgf·m, 49 ft·lb) @7 000 r/min (rpm), (MY) 63.2 kW (6.4 kgf·m, 47 ft·lb) @6 500 r/min (rpm)
Carburetion System	FI (Fuel Injection) KEIHIN TTK38 × 2
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (digital igniter)
Ignition Timing	From 10° BTDC @1 300 r/min (rpm) to 35° BTDC @4 800 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°

1-10 GENERAL INFORMATION

General Specifications

Items	ER650A6F ~/ER650A6S, ER650B6F ~
Exhaust: Open Close Duration Lubrication System Engine Oil: Grade Viscosity Capacity	50° BBDC 30° ATDC 260° Forced lubrication (semi-dry sump) API SE, SF or SG API SH, SJ or SL with JASO MA SAE 10W-40 2.4 L (2.5 US qt)
Drive Train Primary Reduction System: Type Reduction Ratio Clutch Type Transmission: Type Gear Ratios: 1st 2nd 3rd 4th 5th 6th Final Drive System: Type Reduction Ratio Overall Drive Ratio	Gear 2.095 (88/42) Wet multi disc 6-speed, constant mesh, return shift 2.438 (39/16) 1.714 (36/21) 1.333 (32/24) 1.111 (30/27) 0.966 (28/29) 0.852 (23/27) Chain drive 3.067 (46/15) 5.473 @Top gear
Frame Type Caster (Rake Angle) Trail Front Tire: Type Size Rim Size Rear Tire: Type Size Rim Size Front Suspension: Type Wheel Travel	Tubular, diamond 24.5° 102 mm (4.0 in.) Tubeless 120/70 ZR17 M/C (58W) 17 × 3.50 Tubeless 160/60 ZR17 M/C (69W) 17 × 4.50 Telescopic fork 120 mm (4.7 in.)

General Specifications

Items	ER650A6F ~/ER650A6S, ER650B6F ~
Rear Suspension: Type Wheel Travel Brake Type: Front Rear	Swingarm 125 mm (4.9 in.) Dual discs Single disc
Electrical Equipment Battery Headlight: Type Bulb Tail/Brake Light Alternator: Type Rated Output	12 V 10 Ah Semi-sealed beam 12 V 55 W/55 W (Hi/Lo) 12 V 5/21 W Three-phase AC 24 A/14 V @5 000 r/min (rpm)

Specifications are subject to change without notice, and may not apply to every country.
 MY: Malaysia Model

1-12 GENERAL INFORMATION

Technical Information - Cassette Type Transmission

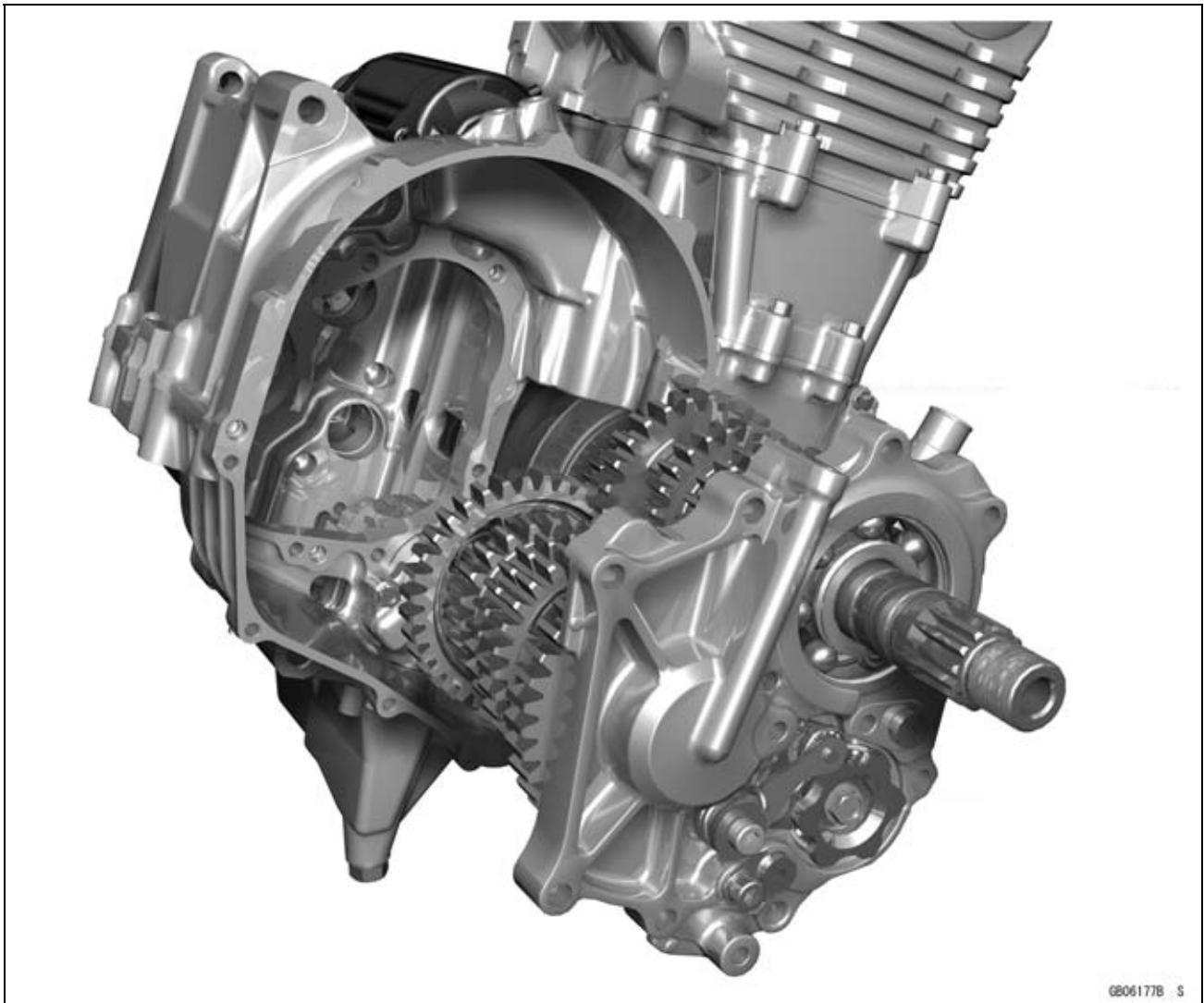
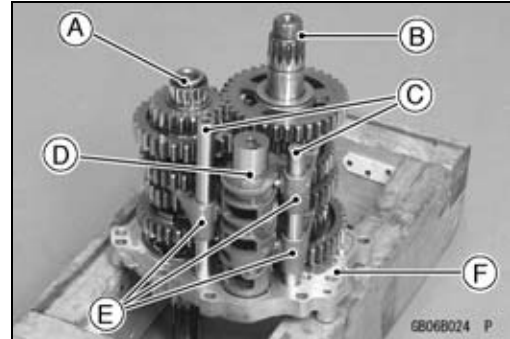
Cassette Type Transmission

The transmission of the current model is unable to be removed without disassembling upper and lower crankcase halves.

The ER650A/B enables transmission to be removed from the right side of engine as an assy, without disassembling crankcase halves (see Transmission Assy Removal in the Crankshaft/Transmission chapter).

Transmission Assy:

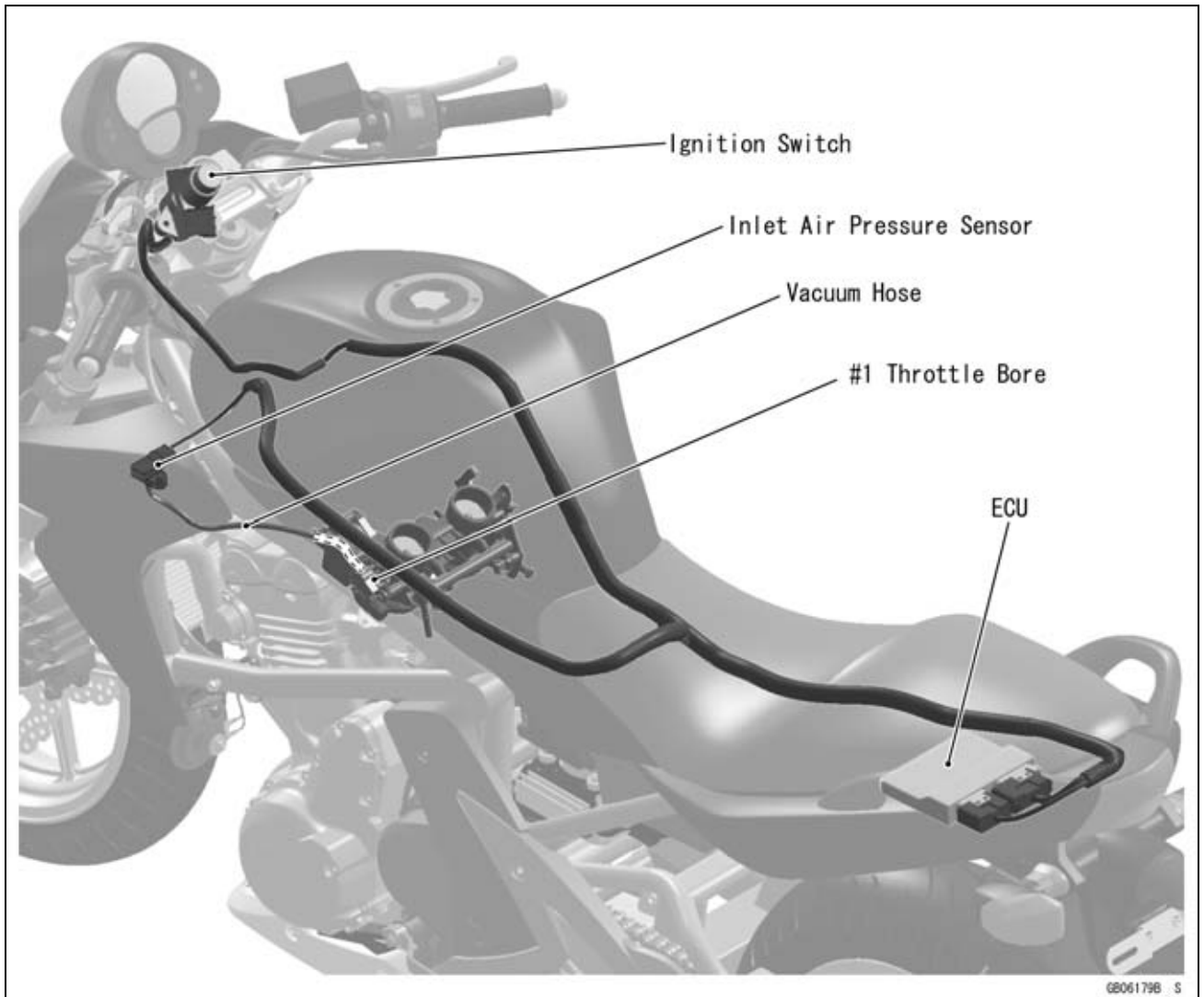
- Drive Shaft [A]
- Output Shaft [B]
- Shift Rods [C]
- Shift Dram [D]
- Shift Forks [E]
- Transmission Case [F]



Technical Information - Inlet Air Pressure Sensor

Atmospheric pressure sensor and camshaft position sensor are not equipped with the ER650A/B. As a substitute of these sensors above, the ER650A/B recognizes atmospheric pressure and intake stroke of #1 by the signal of inlet air pressure sensor.

The ECU detects atmospheric pressure when the ignition is switched ON. While the engine is running, the ECU also presumes atmospheric pressure by analyzing the waveform of boost pressure over fixed period. The intake stroke is recognized by waveform of boost pressure, therefore the system can recognize the difference of each stroke.



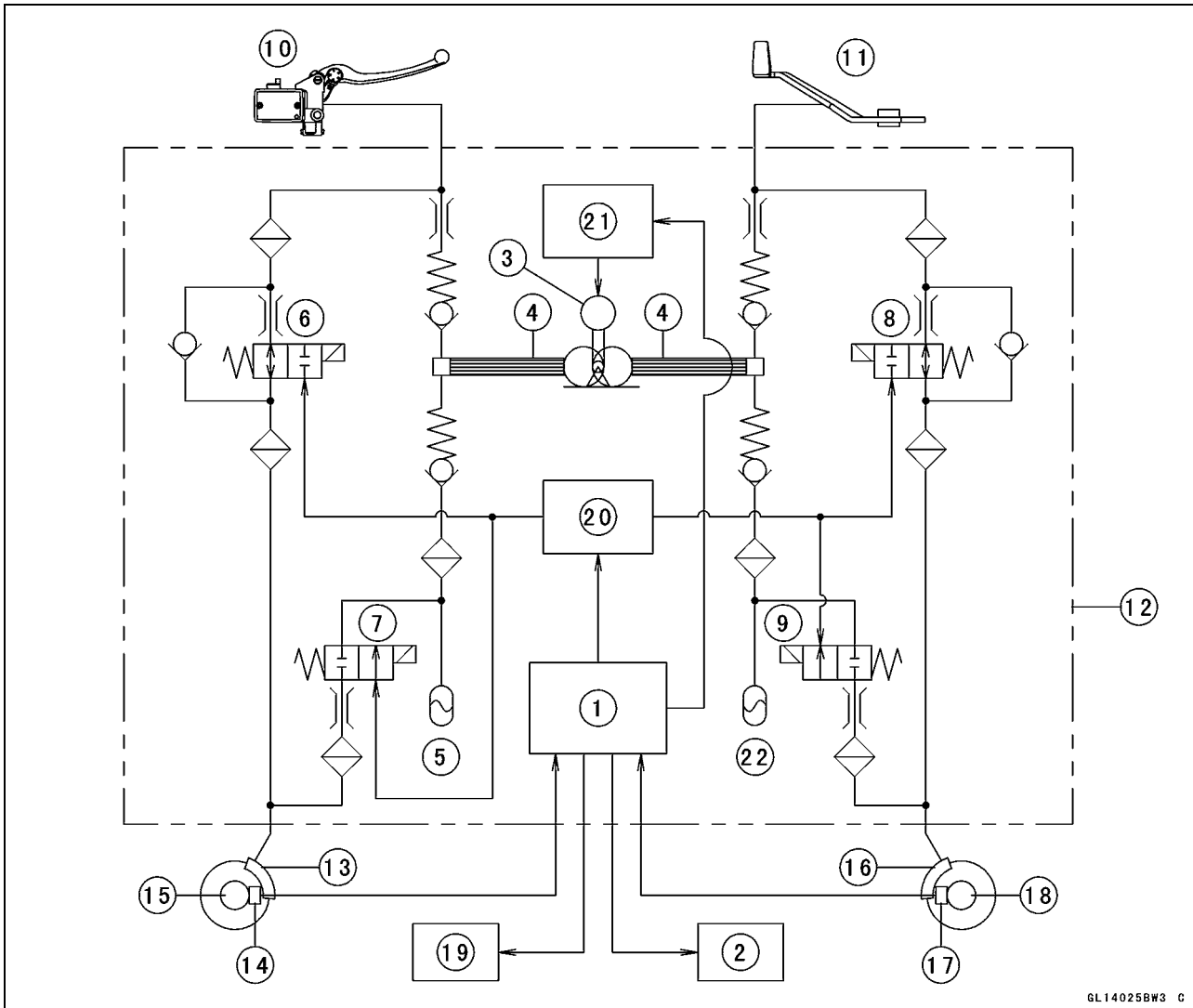
1-14 GENERAL INFORMATION

Technical Information – ABS (Anti – Lock Brake System)

Outline

ABS controls the brake caliper fluid pressure by means of mechatronics – a combination of electronic and hydraulic control technology in order to keep the friction force between the tires and the road surfaces close to the maximum value and prevent wheel lock. But it does not operate during cruising.

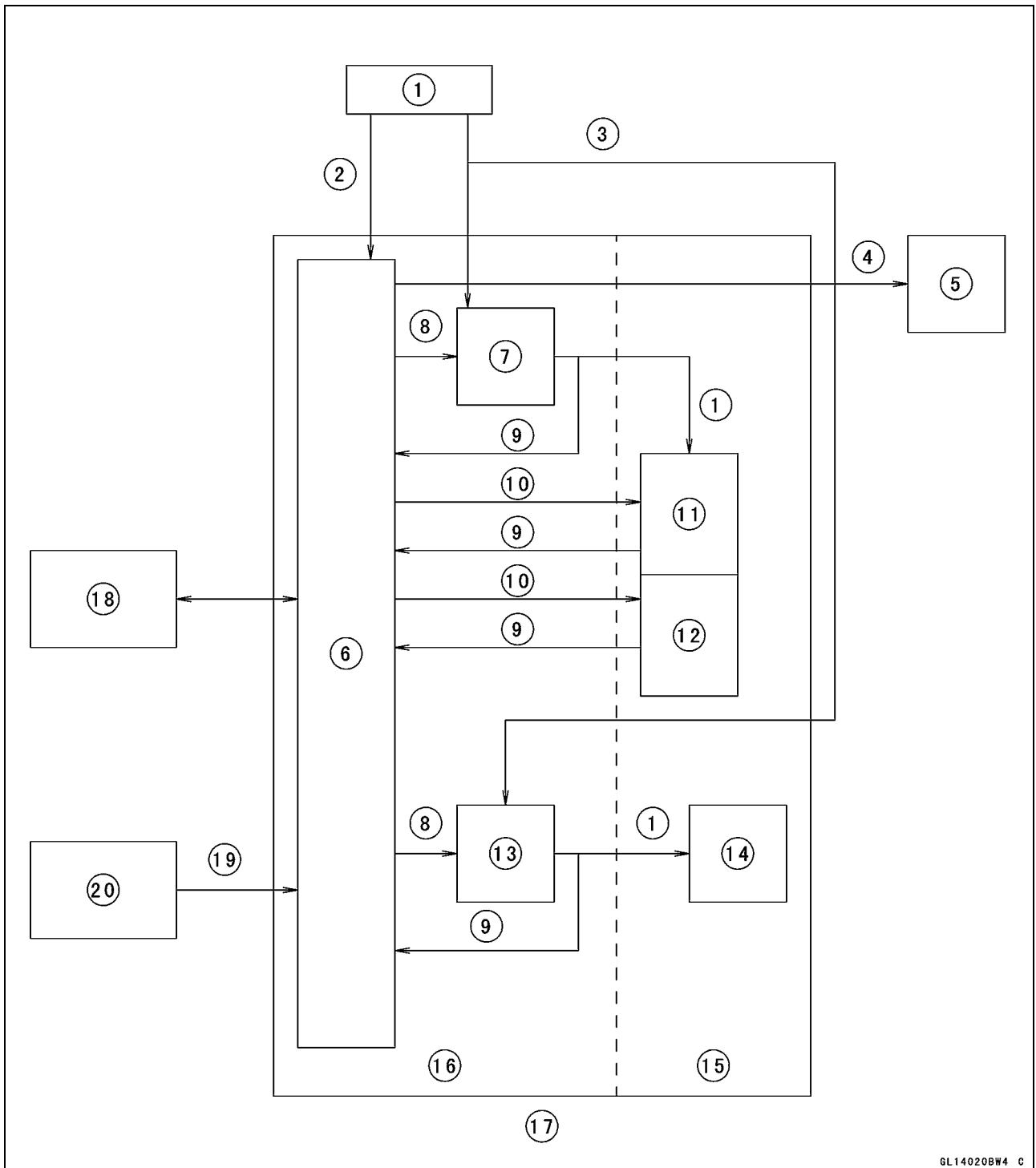
ABS Total System



- | | |
|--------------------------------|--|
| 1. ECU | 13. Front Brake Caliper |
| 2. ABS Indicator Light (LED) | 14. Front Wheel Rotation Sensor |
| 3. Pump Motor | 15. Front Wheel Rotation Sensor Rotor |
| 4. Pump | 16. Rear Brake Caliper |
| 5. Front Reservoir | 17. Rear Wheel Rotation Sensor |
| 6. Front Inlet Solenoid Valve | 18. Rear Wheel Rotation Sensor Rotor |
| 7. Front Outlet Solenoid Valve | 19. ABS Kawasaki Self-diagnosis System Connector |
| 8. Rear Inlet Solenoid Valve | 20. ABS Solenoid Valve Relay |
| 9. Rear Outlet Solenoid Valve | 21. ABS Motor Relay |
| 10. Brake Lever | 22. Rear Reservoir |
| 11. Brake Pedal | |
| 12. ABS Hydraulic Unit | |

Technical Information – ABS (Anti – Lock Brake System)

ABS System Block Diagram



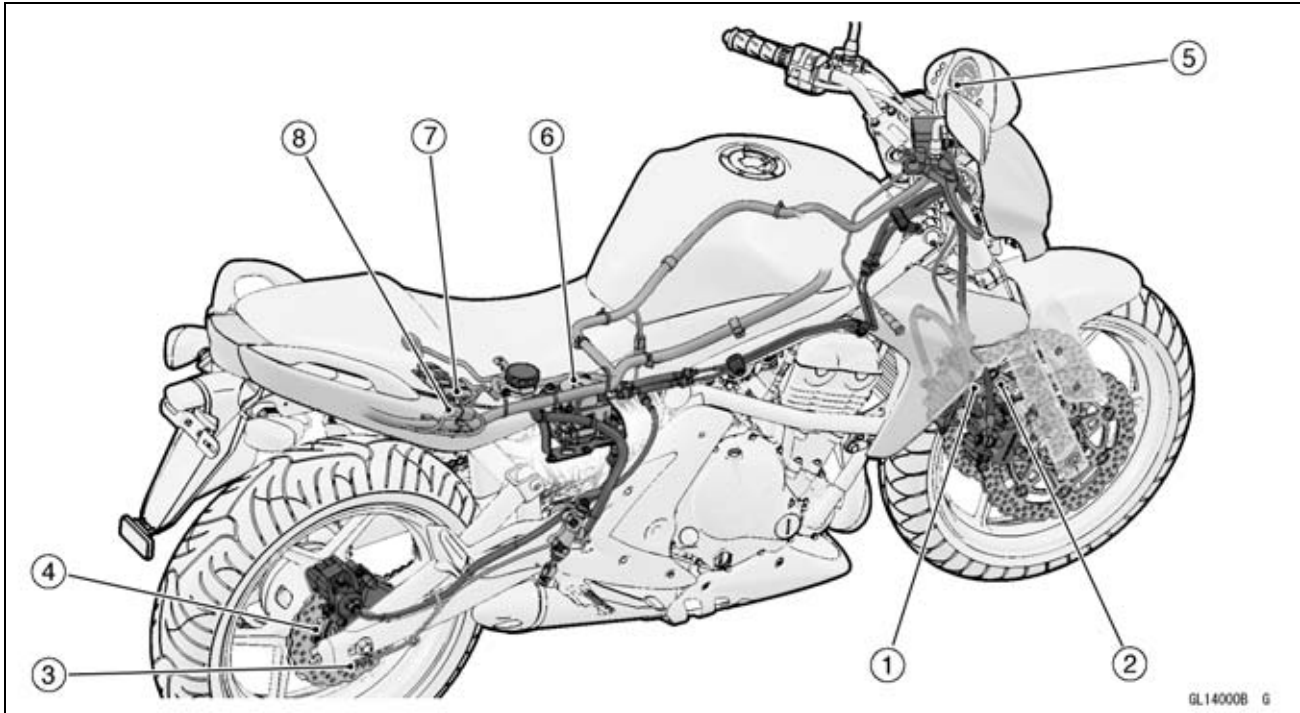
GL140208W4 C

- | | |
|------------------------------|--|
| 1. Power Source | 12. Inlet Solenoid Valve |
| 2. Ignition Power Source | 13. ABS Motor Relay |
| 3. Battery Power Source | 14. Pump Motor |
| 4. Indicator Light Output | 15. Hydraulic Unit |
| 5. ABS Indicator Light (LED) | 16. ABS Controller |
| 6. ECU | 17. ABS Hydraulic Unit |
| 7. ABS Solenoid Valve Relay | 18. ABS Kawasaki Self-diagnosis System Connector |
| 8. Output | 19. Wheel Rotation Input |
| 9. Monitor Input | 20. Wheel Rotation Sensor |
| 10. Valve Output | |
| 11. Outlet Solenoid Valve | |

1-16 GENERAL INFORMATION

Technical Information – ABS (Anti – Lock Brake System)

Related Parts and Function



1. Front Wheel Rotation Sensor
2. Front Wheel Rotation Sensor Rotor
3. Rear Wheel Rotation Sensor
4. Rear Wheel Rotation Sensor Rotor
5. ABS Indicator Light (LED)
6. ABS Hydraulic Unit
7. ABS Fuse Box
8. ABS Kawasaki Self-diagnosis System Connector

Wheel Rotation Sensor

The wheel rotation sensors output the rotation speed of each wheel to the ECU in the ABS hydraulic unit. The wheel rotation sensor is installed to the front fork and rear caliper bracket, and the sensor rotor is pressed into the brake disc. The number of teeth on the front and rear sensor rotor is 50.

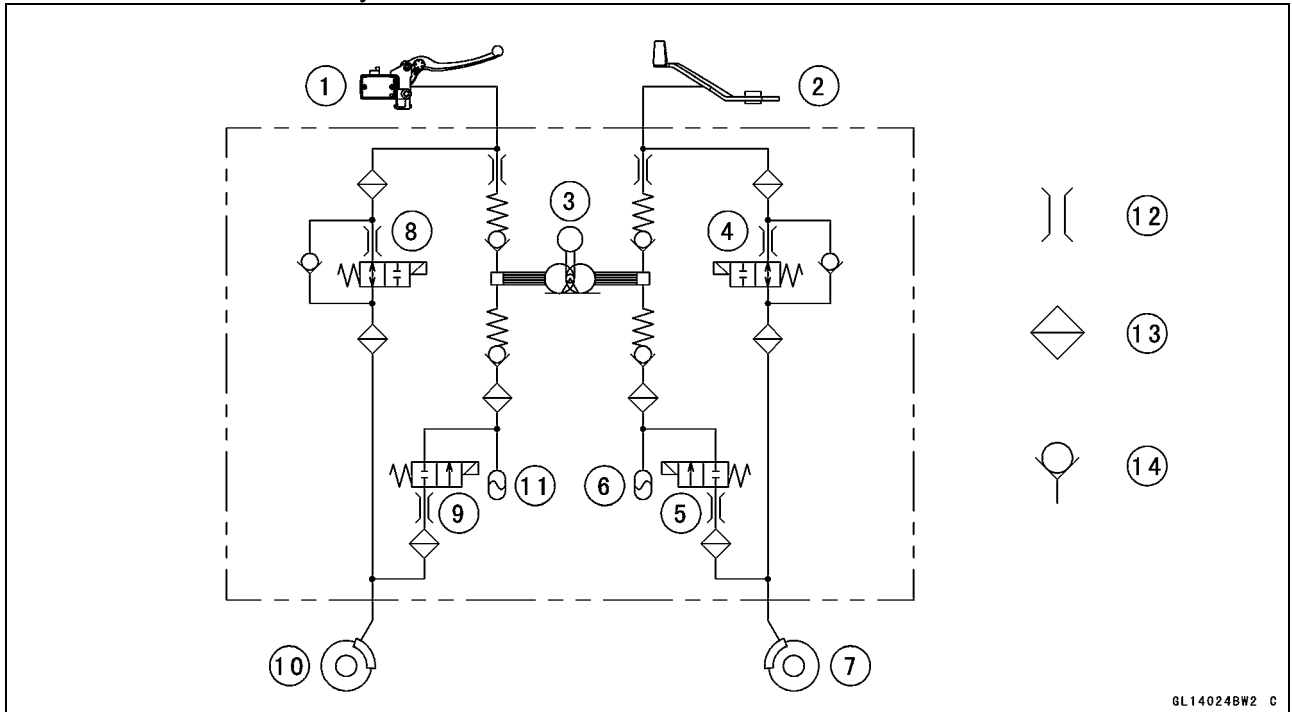
ABS Indicator Light (LED)

The condition or the failure of the ABS system is indicated by various patterns of the ABS indicator light (LED) blinking.

Technical Information – ABS (Anti – Lock Brake System)

ABS Hydraulic Unit

The outlet and inlet solenoid valves, reservoir, pump motor, solenoid valve relay, motor relay, and ECU are built in the ABS hydraulic unit.



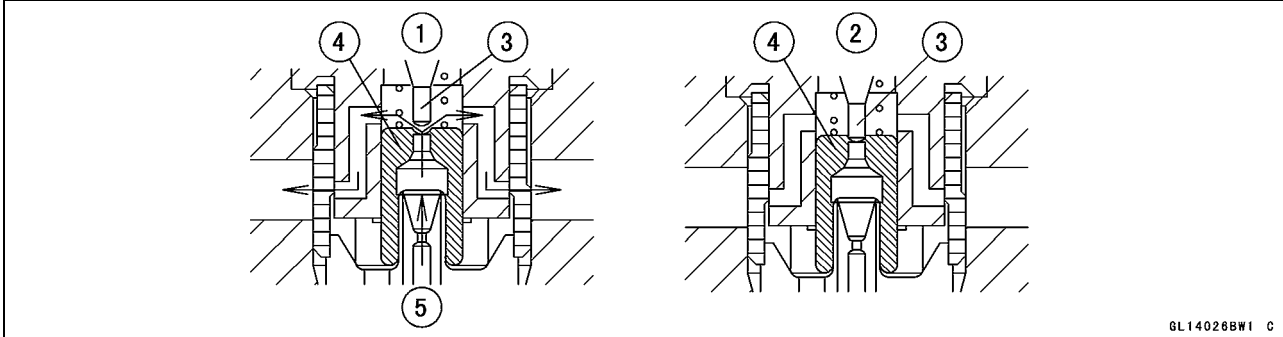
1. Brake Lever
2. Brake Pedal
3. Pump Motor
4. Rear Inlet Solenoid Valve
5. Rear Outlet Solenoid Valve
6. Rear Reservoir
7. Rear Caliper
8. Front Inlet Solenoid Valve
9. Front Outlet Solenoid Valve
10. Front Caliper
11. Front Reservoir
12. Orifice
13. Filter
14. Check Valve

1-18 GENERAL INFORMATION

Technical Information – ABS (Anti – Lock Brake System)

Inlet Solenoid Valve

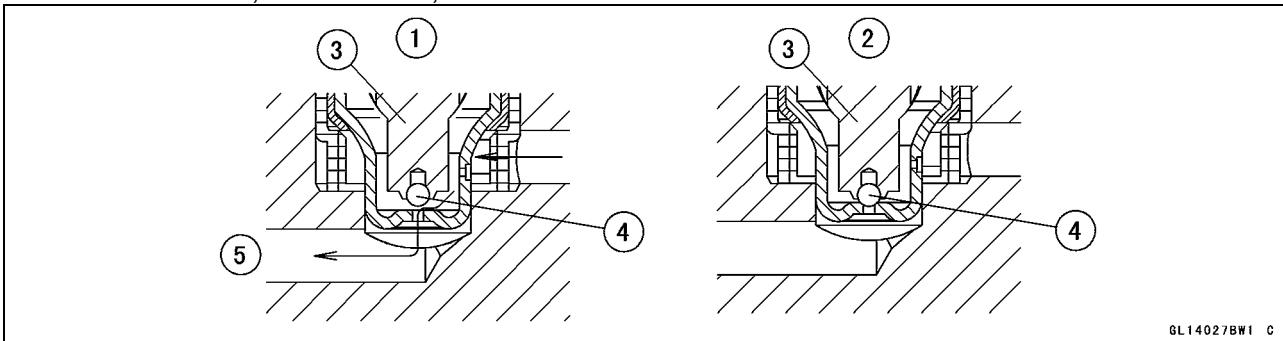
Inlet solenoid valves control the brake pressure of each wheel by combining the operation of the outlet solenoid valve. The ECU changes the electric current in the solenoids of the inlet solenoid valve (2 way, 2 position electromagnetic valve) to move the tappet and change the fluid pressure to “Increase Mode”, “Hold Mode”, or “Decrease Mode”.



1. Increase Mode
2. Hold and Decrease Mode
3. Tappet
4. Valve Body
5. From Master Cylinder

Outlet Solenoid Valve

Outlet solenoid valves control the brake pressure of each wheel by combining the operation of the inlet solenoid valve. The ECU changes the electric current in the solenoids of the outlet solenoid valve to move the armature and change the fluid pressure to “Increase Mode”, “Hold Mode”, or “Decrease Mode”.

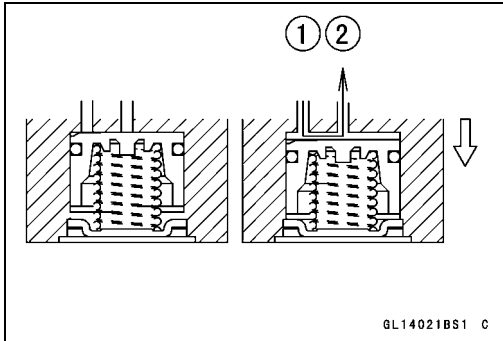


1. Decrease Mode
2. Increase and Hold Mode
3. Armature
4. Valve
5. To Reservoir

Technical Information – ABS (Anti – Lock Brake System)

Reservoir

When the passage opens between the caliper and the reservoir with the outlet solenoid valve in “Decrease Mode”, the brake fluid flows into the reservoir by pushing the piston, stays there temporarily, and then returns to the master cylinder. With the outlet solenoid valve “Increase or Hold Mode”, the pump returns the remaining brake fluid in the reservoir to the master cylinder.



1. From Outlet Solenoid Valve
2. To Pump

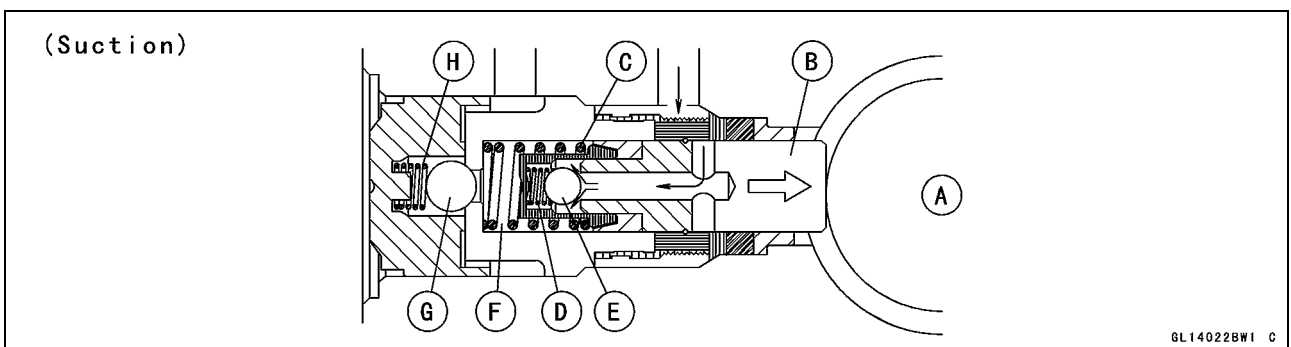
Pump Motor

The pump motor operates the pump, supply or return the brake fluid from the pump.

Pump

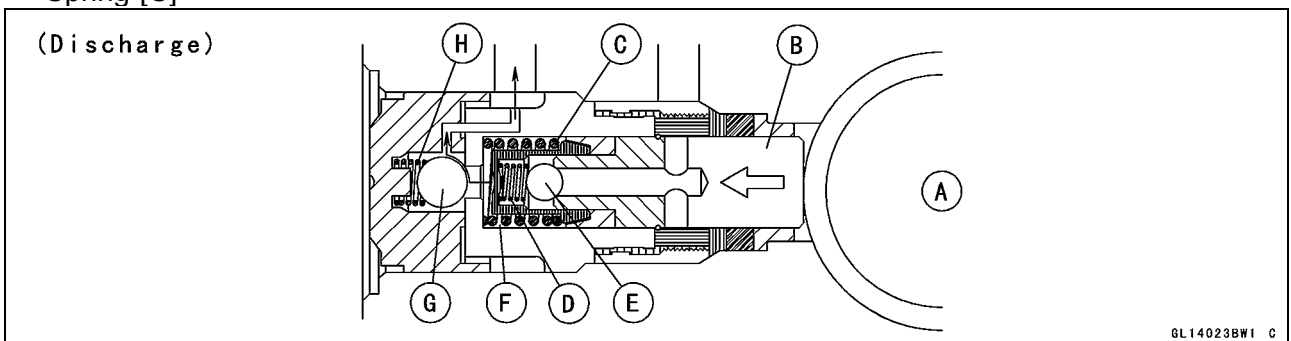
The pump operates continuously when the ABS is activated. The pump is driven by the motor and supply the brake fluid to the caliper or return the brake fluid in the reservoir to the master cylinder. The piston is reciprocated by the eccentric cam [A] on the end of the motor shaft and the pump sucks in or discharge the brake fluid.

When the pump sucks fluid in, the piston [B] is moved right by the force of the spring [C]. At this time, the spring [D] is compressed by the pressure of the brake fluid in the reservoir to open the inlet valve [E] and the brake fluid flows into the cylinder [F]. The outlet valve [G] is held closed by the force of the spring [H].



When the pump discharges the brake fluid, the inlet valve [E] is closed by the spring [D], and the piston [B] is moved left by the eccentric cam [A], producing pressure in the cylinder [F]. The pressure pushes the spring [H], opens the outlet valve [G], and the brake fluid returns to the master cylinder.

Spring [C]



1-20 GENERAL INFORMATION

Technical Information – ABS (Anti – Lock Brake System)

ABS Solenoid Valve Relay

ABS solenoid valve relay supply or intercept the power to the inlet or outlet solenoid valves.

ABS Motor Relay

ABS motor relay supply or intercept the power to the pump motor.

ECU

ECU inputs the sensor signal.

ECU calculates the wheel condition for the slip.

ECU controls the hydraulic unit.

ECU sends the actuating signals to the ABS indicator light (LED).

Technical Information – ABS (Anti – Lock Brake System)

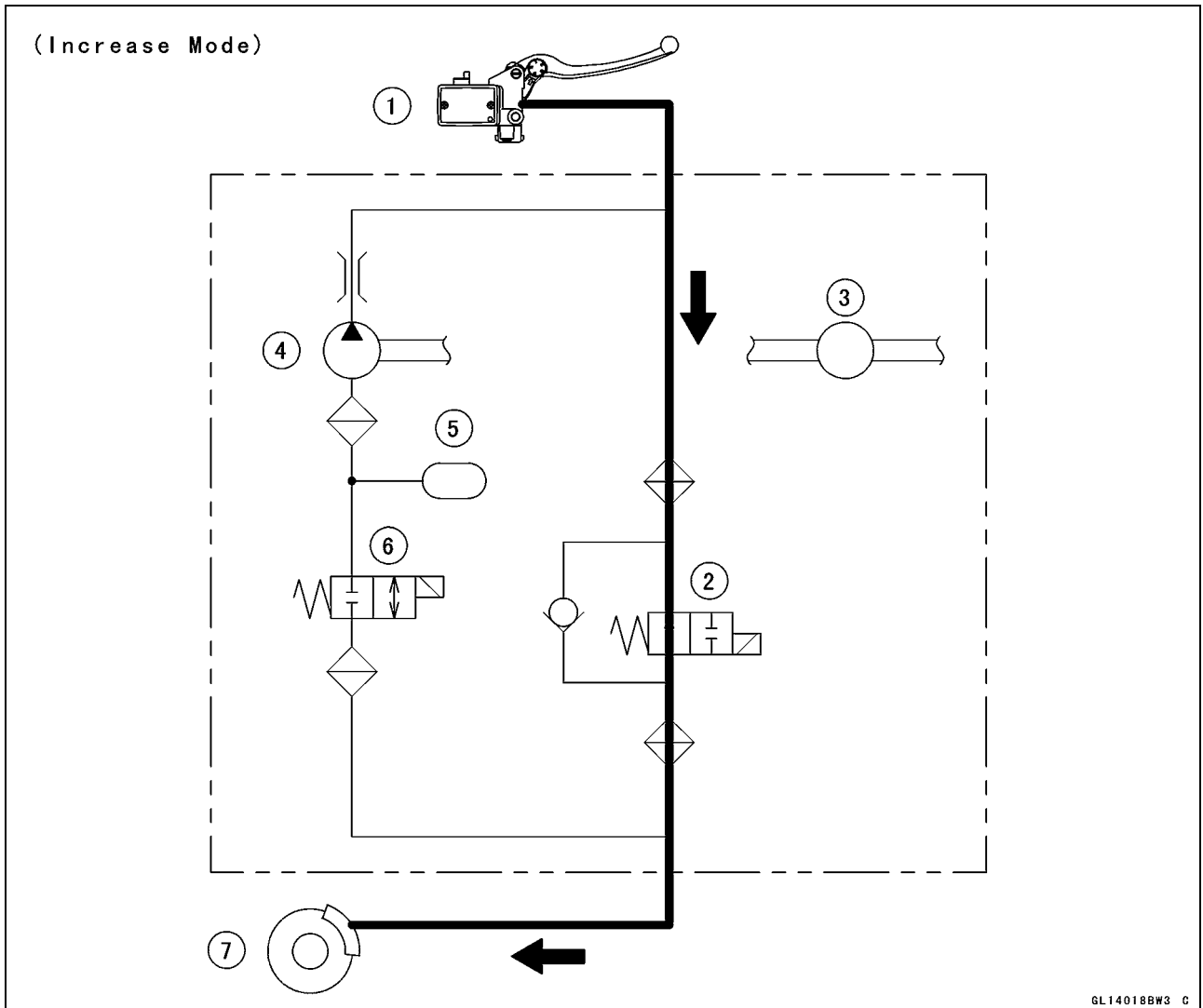
ABS Operation

The ABS has two independent hydraulic lines, one for the front wheel and the other for the rear wheel. The front wheel system is explained here and is identical to the rear wheel system.

ABS in Action

(Increase Mode)

When the caliper fluid pressure is to be increased, first the tappet of inlet solenoid valve opens (normally open). The brake fluid flows through the valve body as shown in the diagram below to increase the brake fluid pressure in the caliper. The master cylinder pressurizes to the brake caliper directly, increasing the braking force.



GL14018BW3 C

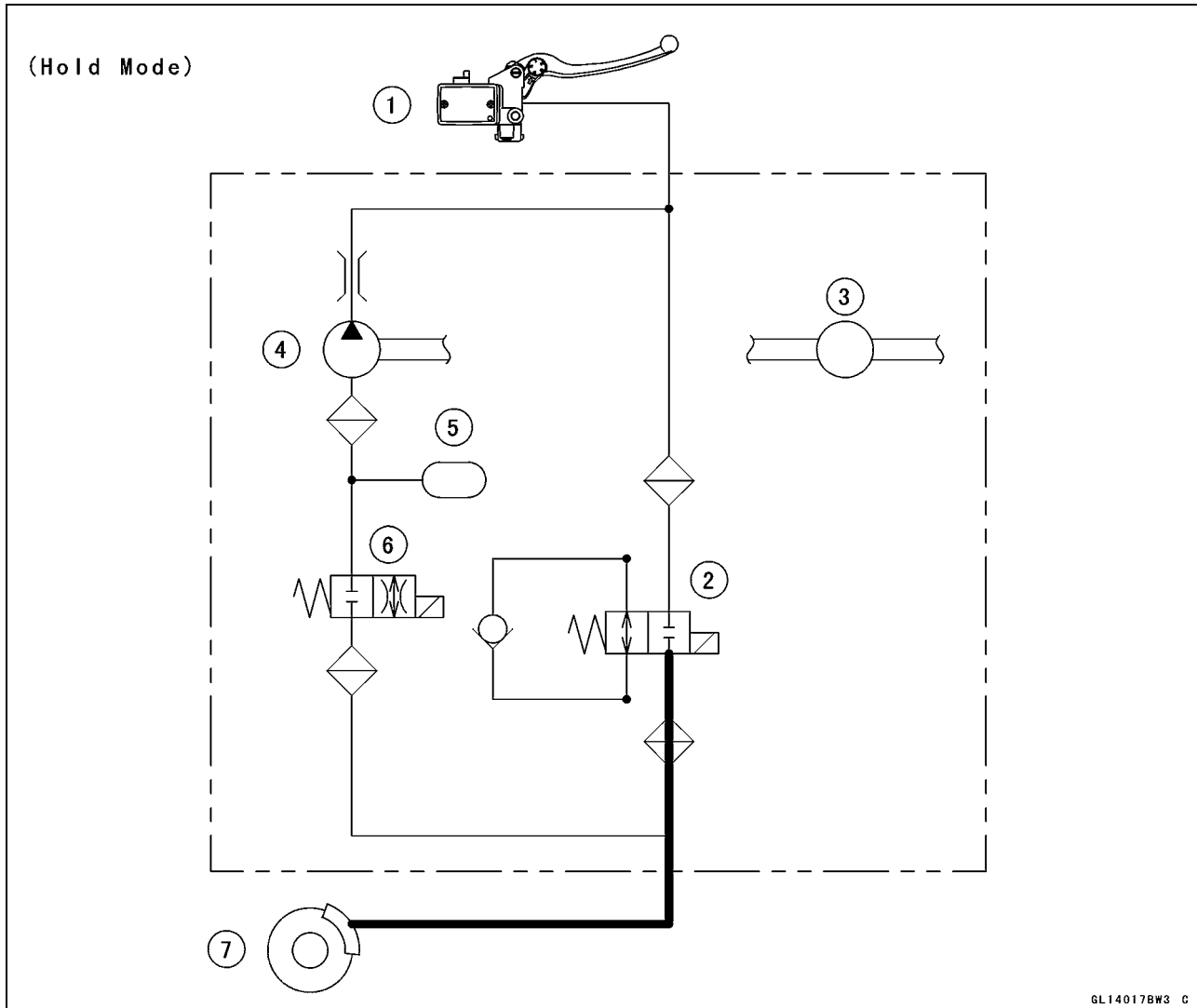
1. Brake Lever
2. Front Inlet Solenoid Valve
3. Pump Motor
4. Pump
5. Front Reservoir
6. Front Outlet Solenoid Valve
7. Front Caliper

1-22 GENERAL INFORMATION

Technical Information – ABS (Anti – Lock Brake System)

(Hold Mode)

When the caliper fluid pressure is to be hold, the tappet of inlet solenoid valve closes, and the passage (master cylinder side) to the valve body is intercepted. No matter how hard the brake lever is pulled, the brake fluid pressure in the caliper is maintained at a given level.

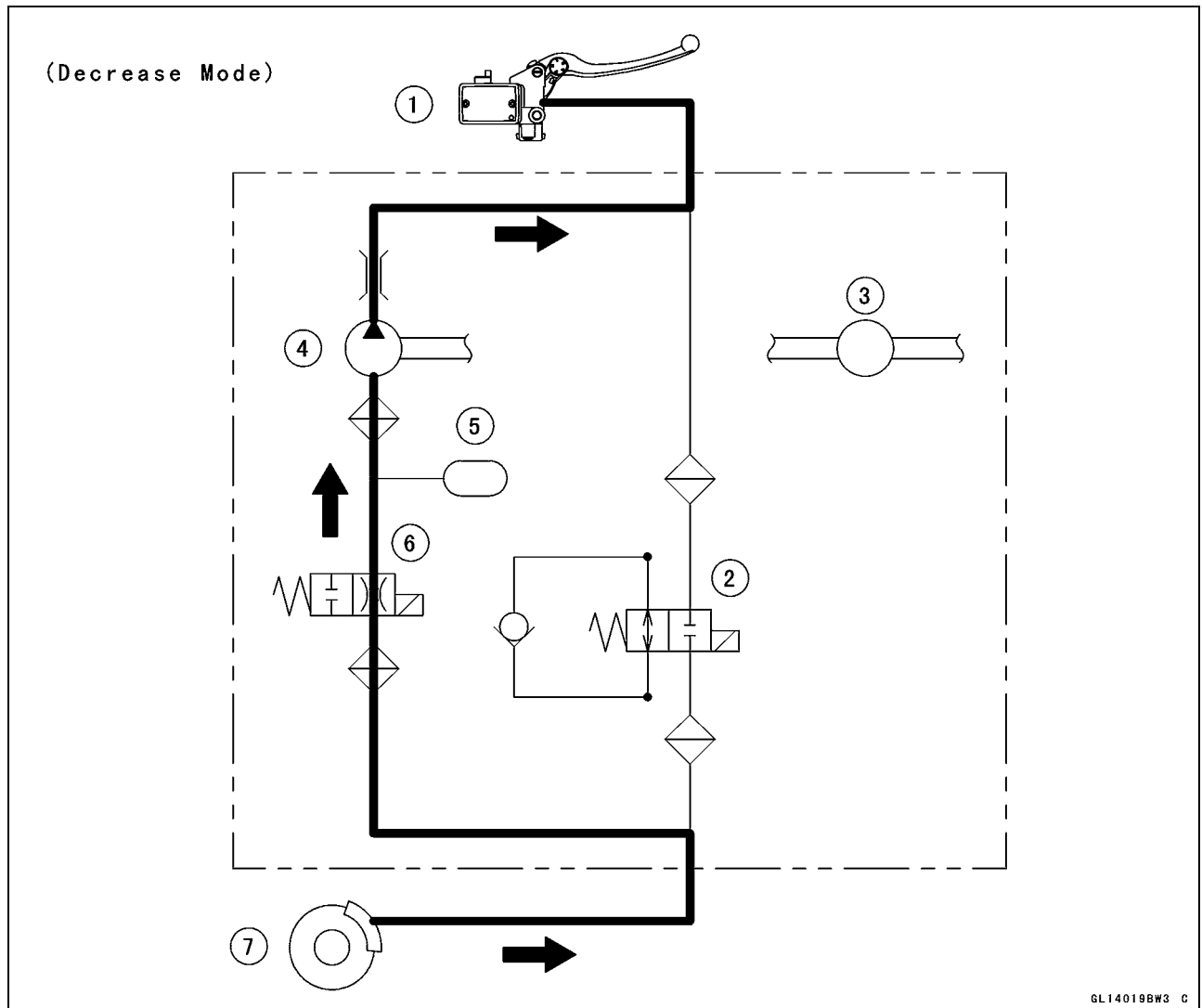


1. Brake Lever
2. Front Inlet Solenoid Valve
3. Pump Motor
4. Pump
5. Front Reservoir
6. Front Outlet Solenoid Valve
7. Front Caliper

Technical Information – ABS (Anti – Lock Brake System)

(Decrease Mode)

When the caliper fluid pressure is to be decreased, the tappet of inlet solenoid valve closes, and the passage to the valve body is intercepted. The outlet solenoid valve is opened by the operation of the armature, and the brake fluid flows to the reservoir. ECU operates pump, and the pump returns the brake fluid in the reservoir to the master cylinder. The brake fluid pressure is decreased, and the wheel is prevented from locking.



1. Brake Lever
2. Front Inlet Solenoid Valve
3. Pump Motor
4. Pump
5. Front Reservoir
6. Front Outlet Solenoid Valve
7. Front Caliper

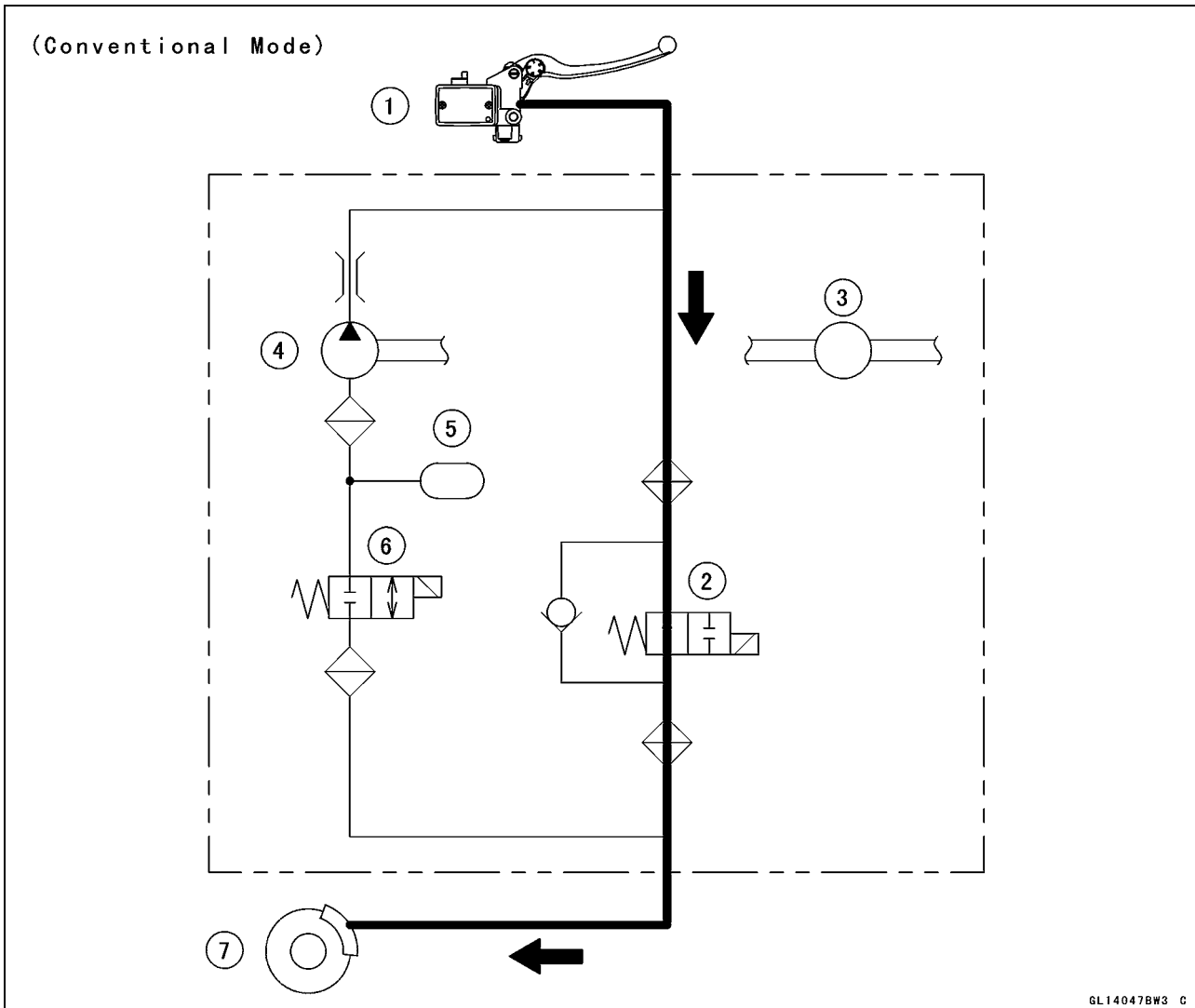
1-24 GENERAL INFORMATION

Technical Information – ABS (Anti – Lock Brake System)

ABS disabled (Conventional Mode)

During cruising (without braking) or in case of a malfunction with the ABS, the ECU stops operating. This is “Conventional Mode”.

When the caliper fluid pressure is to be increased, first the tappet of inlet solenoid valve opens (normally open). The brake fluid flows through the valve body as shown in the diagram below to increase the brake fluid pressure in the caliper. The master cylinder pressurizes to the brake caliper directly, increasing the braking force.



Technical Information – ABS (Anti – Lock Brake System)

Riding Characteristics of ABS

ABS is designed to help prevent the wheels from locking up when hard brakes are applied while running straight. The ABS automatically regulates brake force. Intermittently gaining gripping force and braking force helps prevent wheel lock-up and allows stable steering control while stopping.

Brake control function is identical to that of a conventional motorcycle. The brake lever is used for the front brake and the brake pedal for the rear brake.

Although the ABS provides stability while stopping by preventing wheel lock-up, remember the following characteristics:

- ABS cannot compensate for adverse road conditions, misjudgement or improper application of brakes. You must take the same care as with motorcycles not equipped with ABS.
- ABS is not designed to shorten the braking distance. On loose, uneven or downhill surfaces, the stopping distance of a motorcycle with ABS may be longer than that of an equivalent motorcycle without ABS. Use special caution in such areas.
- ABS will help prevent wheel lock-up during straight-up braking, but it cannot control wheel slip which may be caused by braking during cornering. When turning a corner, it is better to limit braking to the light application of both brakes or not to brake at all. Reduce your speed before you get into the corner.
- The ECU integrated in the ABS compare vehicle speed with wheel speed. Since non-recommended tires can affect wheel speed, they may confuse the ECU, which can extend braking distance.

⚠ WARNING

Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance. The rider could have an accident as a result. Always use recommended standard tires for this motorcycle.

NOTE

- When the ABS is functioning, you may feel a pulsing in the brake lever or pedal. This is normal. You need not suspend applying brakes.*
- Immediately after turning the ignition switch on, you may hear a click of the relay operating. This is the sound of self-checking and is quite normal.*
- ABS does not function at the speed of approx. 6 km/h or below.*
- ABS does not function if the battery is discharged.*

1-26 GENERAL INFORMATION

Unit Conversion Table

Prefixes for Units:

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

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

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

Units of Force:

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

Units of Length:

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

Units of Torque:

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

Units of Pressure:

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

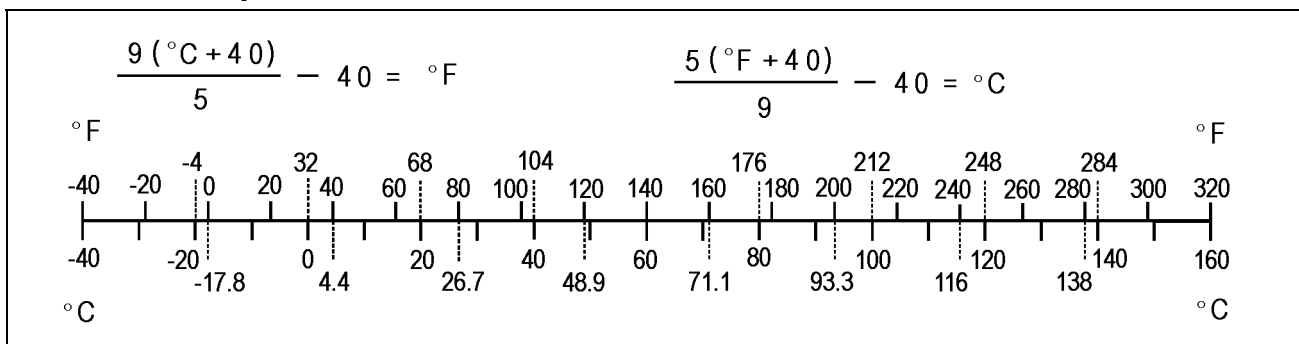
Units of Speed:

km/h	×	0.6214	=	mph
------	---	--------	---	-----

Units of Power:

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

Units of Temperature:



Periodic Maintenance

Table of Contents

Periodic Maintenance Chart	2-3
Torque and Locking Agent.....	2-6
Specifications	2-11
Special Tools	2-13
Periodic Maintenance Procedures.....	2-14
Fuel System (DFI).....	2-14
Air Cleaner Element Cleaning.....	2-14
Throttle Control System Inspection.....	2-15
Engine Vacuum Synchronization Inspection.....	2-16
Idle Speed Inspection	2-18
Idle Speed Adjustment.....	2-18
Fuel Hose Inspection (fuel leak, damage, installation condition).....	2-19
Evaporative Emission Control System Inspection (South East Asia Model).....	2-19
Cooling System.....	2-20
Coolant Level Inspection.....	2-20
Radiator Hose Damage and Installation Condition Inspection.....	2-21
Engine Top End	2-21
Air Suction System Damage Inspection.....	2-21
Valve Clearance Inspection	2-21
Valve Clearance Adjustment.....	2-23
Clutch.....	2-26
Clutch Operation Inspection.....	2-26
Wheels/Tires	2-26
Air Pressure Inspection.....	2-26
Wheel/Tire Damage Inspection.....	2-27
Tire Tread Wear, Abnormal Wear Inspection	2-27
Wheel Bearing Damage Inspection	2-28
Final Drive.....	2-28
Drive Chain Lubrication Condition Inspection	2-28
Drive Chain Slack Inspection	2-29
Drive Chain Slack Adjustment	2-29
Wheel Alignment Inspection	2-30
Drive Chain Wear Inspection	2-31
Chain Guide Inspection.....	2-31
Brakes.....	2-32
Brake Fluid Leak (Brake Hose and Pipe) Inspection	2-32
Brake Hose and Pipe Damage and Installation Condition Inspection.....	2-32
Brake Operation Inspection	2-33
Brake Fluid Level Inspection.....	2-33
Brake Pad Wear Inspection	2-34
Brake Light Switch Operation Inspection	2-34
Suspensions	2-35
Front Forks/Rear Shock Absorber Operation Inspection	2-35
Front Fork Oil Leak Inspection.....	2-35
Rear Shock Absorber Oil Leak Inspection	2-35
Steering	2-36
Steering Play Inspection	2-36
Steering Play Adjustment.....	2-36
Steering Stem Bearing Lubrication	2-37
Electrical System	2-37

2-2 PERIODIC MAINTENANCE

Spark Plug Condition Inspection.....	2-37
Lights and Switches Operation Inspection.....	2-38
Headlight Aiming Inspection	2-40
Sidestand Switch Operation Inspection	2-41
Engine Stop Switch Operation Inspection.....	2-42
Others	2-43
Chassis Parts Lubrication	2-43
Bolts, Nuts and Fasteners Tightness Inspection.....	2-44
Replacement Parts	2-45
Air Cleaner Element Replacement.....	2-45
Fuel Hose Replacement	2-45
Coolant Change	2-46
Radiator Hose and O-ring Replacement.....	2-48
Engine Oil Change.....	2-49
Oil Filter Replacement	2-49
Brake Hose and Pipe Replacement.....	2-50
Brake Fluid Change	2-51
Master Cylinder Rubber Parts Replacement	2-52
Caliper Rubber Parts Replacement	2-54
Spark Plug Replacement	2-56

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

FREQUENCY	Whichever comes first ↓ Every	* ODOMETER READING × 1 000 km (× 1 000 mile)							See Page
		1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	
INSPECTION									
Brake hose and pipe installation condition - inspect	year	•	•	•	•	•	•	•	2-32
Brake operation (effectiveness, play, no drag) - inspect	year	•	•	•	•	•	•	•	2-33
Brake fluid level - inspect	6 months	•	•	•	•	•	•	•	2-33
Brake pad wear - inspect #			•	•	•	•	•	•	2-34
Brake light switch operation - inspect		•	•	•	•	•	•	•	2-34
Suspensions									
Front forks/rear shock absorber operation (damping and smooth stroke) - inspect				•		•		•	2-35
Front forks/rear shock absorber oil leak - inspect	year			•		•		•	2-35
Steering									
Steering play - inspect	year	•		•		•		•	2-36
Steering stem bearings - lubricate	2 years					•			2-37
Electrical System									
Spark plug condition - inspect				•		•		•	2-37
Lights and switches operation - inspect	year			•		•		•	2-38
Headlight aiming - inspect	year			•		•		•	2-40
Sidestand switch operation - inspect	year			•		•		•	2-41
Engine stop switch operation - inspect	year			•		•		•	2-42
Others									
Chassis parts - lubricate	year			•		•		•	2-43
Bolts and nuts tightness - inspect		•		•		•		•	2-44

#: 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.

Periodic Maintenance Chart

Periodic Replacement Parts

CHANGE/REPLACE ITEM	FREQUENCY	* ODOMETER READING					See Page
	Whichever comes first ↓ Every	1 (0.6)	12 (7.5)	24 (15)	36 (24)	48 (30)	
Air cleaner element # - replace	2 years						2-45
Fuel hose - replace	4 years					●	2-45
Coolant - change	3 years				●		2-46
Radiator hose and O-ring - replace	3 years				●		2-48
Engine oil # - change	year	●	●	●	●	●	2-49
Oil filter - replace	year	●	●	●	●	●	2-49
Brake hose and pipe - replace	4 years					●	2-50
Brake fluid - change	2 years			●		●	2-51
Rubber parts of master cylinder and caliper - replace	4 years					●	2-52, 2-54
Spark plug - replace			●	●	●	●	2-56

#: 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.

2-6 PERIODIC MAINTENANCE

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)				
Water Temperature Sensor	12	1.2	106 in·lb	
Speed Sensor Bolt	7.8	0.80	69 in·lb	L
Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
Oxygen Sensor (Europe Models)	44	4.5	32	
Cooling System				
Radiator Hose Clamp Screws	2.0	0.20	17 in·lb	
Water Pump Impeller Bolt	9.8	1.0	87 in·lb	
Water Pump Cover Bolts	9.8	1.0	87 in·lb	
Water Pump Drain Bolt:				
(Aluminium Washer)	7.0	0.70	62 in·lb	
(Copper (Tin Plating) Washer)	9.8	1.0	87 in·lb	
Thermostat Housing Bolts	9.8	1.0	87 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Baffle Plate Bolts	5.9	0.60	52 in·lb	see Text
Radiator Mounting Bolts	14	1.4	10	
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	
Camshaft Cap Bolts	12	1.2	106 in·lb	S
Cylinder Head Bolts (M10)	60	6.1	44	MO, S
Cylinder Bolt (M8)	27	2.8	20	MO, S
Cylinder Nut (M10)	49	5.0	36	MO, S
Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
Cylinder Bolts (M6)	12	1.2	106 in·lb	S
Throttle Body Holder Bolts	12	1.2	106 in·lb	
Rear Camshaft Chain Guide Bolt	20	2.0	15	L
Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
Camshaft Sprocket Bolts	15	1.5	11	L
Spark Plugs	15	1.5	11	



Download the full PDF manual instantly.

Our customer service e-mail:

aservicemanualpdf@yahoo.com