# SUZUKI GSF650/A/S/SA GSX650F

**SERVICE MANUAL** 



## **FOREWORD**

This manual contains an introductory description on the SUZUKI GSF650/S and procedures for its inspection/service and overhaul of its main components.

Other information considered as generally known is not included.

Read the GENERAL INFORMATION section to familiarize yourself with the motorcycle and its maintenance. Use this section as well as other sections to use as a guide for proper inspection and service.

This manual will help you know the motorcycle better so that you can assure your customers of fast and reliable service.

- \* This manual has been prepared on the basis of the latest specifications at the time of publication. If modifications have been made since then, differences may exist between the content of this manual and the actual motorcycle.
- \* Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual motorcycle exactly in detail.
- \* This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI motorcycles. If you do not have the proper knowledge and tools, ask your authorized SUZUKI motorcycle dealer to help you.

#### **▲** WARNING

Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.

Improper repair may result in injury to the mechanic and may render the motorcycle unsafe for the rider and passenger.

SUZUKI MOTOR CORPORATION

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Precautions	
General Information	
General Information	UA-1
Service Data	
Engine	
Precautions	1-1
Engine General Information and Diagnosis	1A-1
Emission Control Devices	
Engine Electrical Devices	
Engine Mechanical	
Engine Lubrication System	
Engine Cooling System	
Fuel System	
Ignition SystemStarting System	
Charging System	
Exhaust System	
·	
Suspension	
Precautions	2-1
Suspension General Diagnosis	2A-1
Front Suspension	
Rear Suspension	
Wheels and Tires	
Driveline / Axle	3-i
Precautions	3-1
Drive Chain / Drive Train / Drive Shaft	3A-1
Brake	<b>1</b> _i
Precautions	
Brake Control System and Diagnosis	
Front Brakes	<del>-</del> 7∧-1 4R₋1
Rear Brakes	
ABS	
Transmission / Transaxle	
Precautions	5-1
Manual Transmission	
Clutch	
Steering	6-i
Precautions	6-1
Steering General Diagnosis	6A-1
Steering / Handlebar	
Body and Accessories	Q_i
Precautions	<b>5-1</b> Q_1
Wiring Systems	
Lighting Systems	
Combination Meter / Fuel Meter / Horn	9C-1
Exterior Parts	
Body Structure	

**TABLE OF CONTENTS** 

# Section 00

# **Precautions**

## **CONTENTS**

Precautions00-1	General Precautions	00-1
Precautions00-1	Precautions for Electrical Circuit Service	00-2
Warning / Caution / Note00-1	Precautions for ABS	00-7

## **Precautions**

#### **Precautions**

#### Warning / Caution / Note

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Please read this manual and follow its instructions carefully. To emphasize special information, the symbol and the words WARNING, CAUTION and NOTE have special meanings. Pay special attention to the messages highlighted by these signal words.

#### **▲ WARNING**

Indicates a potential hazard that could result in death or injury.

#### **↑** CAUTION

Indicates a potential hazard that could result in motorcycle damage.

#### NOTE

Indicates special information to make maintenance easier or instructions clearer.

Please note, however, that the warnings and cautions contained in this manual cannot possibly cover all potential hazards relating to the servicing, or lack of servicing, of the motorcycle. In addition to the WARNINGS and CAUTIONS stated, you must use good judgement and basic mechanical safety principles. If you are unsure about how to perform a particular service operation, ask a more experienced mechanic for advice.

#### **General Precautions**

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#### **A WARNING**

- Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the motorcycle.
- When 2 or more persons work together, pay attention to the safety of each other.
- When it is necessary to run the engine indoors, make sure that exhaust gas is forced outdoors.
- When working with toxic or flammable materials, make sure that the area you work in is well-ventilated and that you follow all of the material manufacturer's instructions.
- · Never use gasoline as a cleaning solvent.
- To avoid getting burned, do not touch the engine, engine oil, radiator and exhaust system until they have cooled.

 After servicing the fuel, oil, water, exhaust or brake systems, check all lines and fittings related to the system for leaks.

#### **⚠** CAUTION

- If parts replacement is necessary, replace the parts with Suzuki Genuine Parts or their equivalent.
- When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.
- Be sure to use special tools when instructed.
- Make sure that all parts used in reassembly are clean. Lubricate them when specified.
- Use the specified lubricant, bond, or sealant.
- When removing the battery, disconnect the negative (-) cable first and then the positive (+) cable.
- When reconnecting the battery, connect the positive (+) cable first and then the negative (-) cable, and replace the terminal cover on the positive (+) terminal.
- When performing service to electrical parts, if the service procedures do not require use of battery power, disconnect the negative (–) cable the battery.
- When tightening the cylinder head or case bolts and nuts, tighten the larger sizes first. Always tighten the bolts and nuts diagonally from the inside toward outside and to the specified tightening torque.
- Whenever you remove oil seals, gaskets, packing, O-rings, locking washers, selflocking nuts, cotter pins, circlips and certain other parts as specified, be sure to replace them with new ones. Also, before installing these new parts, be sure to remove any left over material from the mating surfaces.
- Never reuse a circlip. When installing a new circlip, take care not to expand the end gap larger than required to slip the circlip over the shaft. After installing a circlip, always ensure that it is completely seated in its groove and securely fitted.

- Use a torque wrench to tighten fasteners to the specified torque. Wipe off grease and oil if a thread is smeared with them.
- After reassembling, check parts for tightness and proper operation.
- To protect the environment, do not unlawfully dispose of used motor oil, engine coolant and other fluids: batteries, and tires.
- To protect Earth's natural resources, properly dispose of used motorcycle and parts.

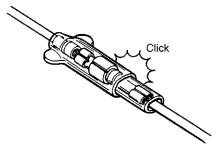
#### **Precautions for Electrical Circuit Service**

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When handling the electrical parts or servicing the FI system, observe the following points for the safety of the system.

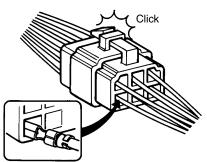
# Electrical Parts Connector / Coupler

 When connecting a connector, be sure to push it in until a click is felt.

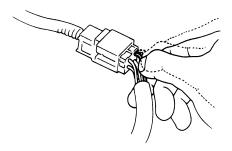


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- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.
- Inspect each terminal for corrosion and contamination. The terminals must be clean and free of any foreign material which could impede proper terminal contact.

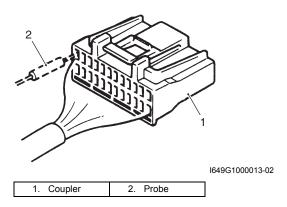


Inspect each lead wire circuit for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.

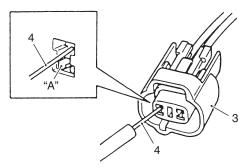


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 When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (backside) of the connector/ coupler.



- When connecting meter probe from the terminal side
  of the coupler (where connection from harness side
  not being possible), use extra care not to force and
  cause the male terminal to bend or the female
  terminal to open. Connect the probe as shown to
  avoid opening of female terminal. Never push in the
  probe where male terminal is supposed to fit.
- Check the male connector for bend and female connector for excessive opening. Also check the coupler for locking (looseness), corrosion, dust, etc.

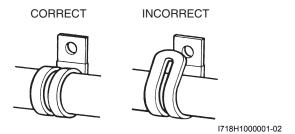


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3. Coupler 4. Probe "A": Where male terminal fits

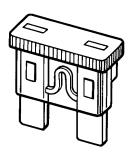
#### Clamp

- Clamp the wire harness at such positions as indicated in "Wiring Harness Routing Diagram (GSF650/S/A/ SAK7) in Section 9A (Page 9A-8)".
- Bend the clamp properly so that the wire harness is clamped securely.
- In clamping the wire harness, use care not to allow it to hang down.
- Do not use wire or any other substitute for the band type clamp.



#### **Fuse**

- When a fuse blows, always investigate the cause to correct it and then replace the fuse.
- · Do not use a fuse of a different capacity.
- · Do not use wire or any other substitute for the fuse.



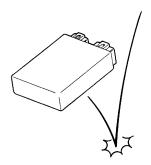
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#### **Switch**

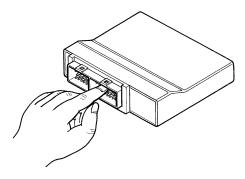
Never apply grease material to switch contact points to prevent damage.

#### ECM / Various sensors

 Since each component is a high-precision part, great care should be taken not to apply any sharp impacts during removal and installation.

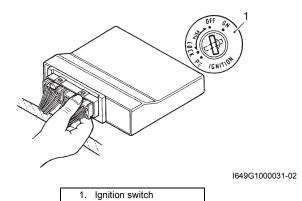


 Be careful not to touch the electrical terminals of the electronic parts (ECM, etc.). The static electricity from your body may damage these.



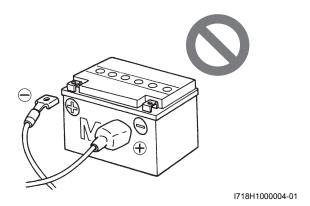
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 When disconnecting and connecting the coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



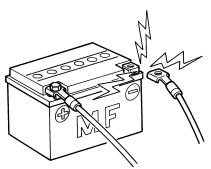
#### **Battery**

 Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.



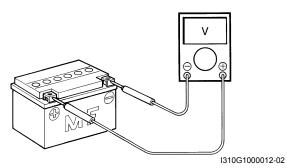
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 Removing any battery terminal of a running engine is strictly prohibited. The moment such removal is made, damaging counter electromotive force will be applied to the ECM which may result in serious damage.



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 Before measuring voltage at each terminal, check to make sure that battery voltage is 11 V or higher.
 Terminal voltage check with a low battery voltage will lead to erroneous diagnosis.



- Never connect any tester (voltmeter, ohmmeter, or whatever) to the ECM when its coupler is disconnected. Otherwise, damage to electronic unit may result.
- Never connect an ohmmeter to the ECM with its coupler connected. If attempted, damage to ECM or sensors may result.
- Be sure to use a specified voltmeter/ohmmeter.
   Otherwise, accurate measurements may not be obtained and personal injury may result.

#### **Electrical Circuit Inspection Procedure**

While there are various methods for electrical circuit inspection, described here is a general method to check for open and short circuit using an ohmmeter and a voltmeter.

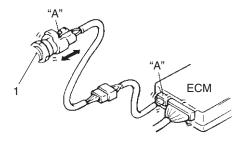
#### Open circuit check

Possible causes for the open circuit are as follows. As the cause can exist in the connector/coupler or terminal, they need to be checked carefully.

- · Loose connection of connector/coupler
- Poor contact of terminal (due to dirt, corrosion or rust, poor contact tension, entry of foreign object etc.)
- · Wire harness being open.
- Poor terminal-to-wire connection.

When checking system circuits including an electronic control unit such as ECM, etc., it is important to perform careful check, starting with items which are easier to check.

- 1) Disconnect the negative (–) cable from the battery.
- 2) Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.



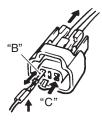
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1 Sensor	"A". Check for loose connection

3) Using a test male terminal, check the female terminals of the circuit being checked for contact tension.

Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted in the coupler and locked.

If contact tension is not enough, rectify the contact to increase tension or replace. The terminals must be clean and free of any foreign material which could impede proper terminal contact.

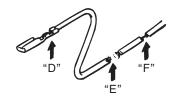


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B": Check contact tension by inserting and removing.

"C": Check each terminal for bend and proper alignment.

4) Using continuity inspect or voltage check procedure as described below, inspect the wire harness terminals for open circuit and poor connection. Locate abnormality, if any.



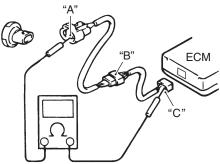
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"D":	": Looseness of crimping	
"E":	Open	
"F":	Thin wire (A few strands left)	

## **Continuity check**

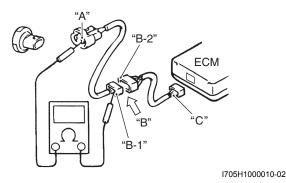
1) Measure resistance across coupler "B" (between "A" and "C" in figure).

If no continuity is indicated (infinity or over limit), the circuit is open between terminals "A" and "C".



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2) Disconnect the coupler "B" and measure resistance between couplers "A" and "B-1". If no continuity is indicated, the circuit is open between couplers "A" and "B-1". If continuity is indicated, there is an open circuit between couplers "B-2" and "C" or an abnormality in coupler "B-2" or coupler "C".



#### Voltage check

If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

- 1) With all connectors/couplers connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.
- 2) If measurements were taken as shown in the figure and results were are as listed in the following, it means that the circuit is open between terminals "A" and "B".

#### Voltage between

"A" and body ground: Approx. 5 V
"B" and body ground: Approx. 5 V
"C" and body ground: 0 V

3) Also, if measured values are as listed following, a resistance (abnormality) exists which causes the voltage drop in the circuit between terminals "A" and "B".

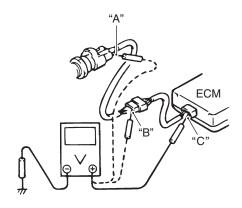
#### Voltage between

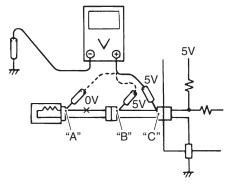
"A" and body ground: Approx. 5 V

"B" and body ground: Approx. 5 V – 2 V voltage

drop

"C" and body ground: 3 V - 2 V voltage drop





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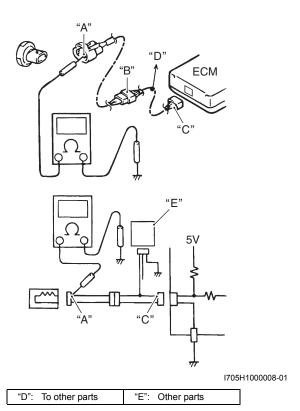
#### Short circuit check (Wire harness to ground)

- 1) Disconnect the negative (–) cable from the battery.
- 2) Disconnect the connectors/couplers at both ends of the circuit to be checked.

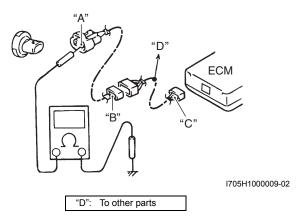
#### **NOTE**

If the circuit to be checked branches to other parts as shown, disconnect all connectors/ couplers of those parts. Otherwise, diagnosis will be misled.

3) Measure resistance between terminal at one end of circuit ("A" terminal in figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals "A" and "C".



4) Disconnect the connector/coupler included in circuit (coupler "B") and measure resistance between terminal "A" and body ground. If continuity is indicated, the circuit is shorted to the ground between terminals "A" and "B".

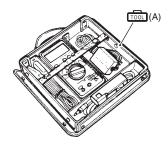


#### **Using The Multi-Circuit Testers**

- · Use the Suzuki multi-circuit tester set.
- · Use well-charged batteries in the tester.
- · Be sure to set the tester to the correct testing range.

#### Special tool

(A): 09900-25008 (Multi-circuit tester set)



I649G1000024-03

#### Using the testers

- Incorrectly connecting the (+) and (–) probes may cause the inside of the tester to burnout.
- If the voltage and current are not known, make measurements using the highest range.
- When measuring the resistance with the multi-circuit tester (1),  $\infty$  will be shown as 10.00 M $\Omega$  and "1" flashes in the display.
- Check that no voltage is applied before making the measurement. If voltage is applied the tester may be damaged.

· After using the tester, turn the power off.

#### Special tool

: 09900-25008 (Multi-circuit tester set)



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#### **NOTE**

- When connecting the multi-circuit tester, use the needle pointed probe to the back side of the lead wire coupler and connect the probes of tester to them.
- Use the needle pointed probe to prevent the rubber of the water proof coupler from damage.
- When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### Special tool

(A): 09900-25009 (Needle pointed probe set)



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#### **Precautions for ABS**

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#### **ABS Wiring**

The ABS parts are connected to various lead wires.
 The coupler and lead wire connections, as well as the lead wire and wire harness routings must be done correctly. Make sure that the proper clamps are used and positioned correctly.

#### **NOTE**

If all of the connections are not properly connected, the ABS may not operate correctly. For connector and coupler precautions. Refer to "Precautions for Electrical Circuit Service (Page 00-2)".

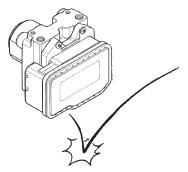
#### **ABS Control Unit/HU**

 Never allow dust or water to contact the ABS control unit/HU.



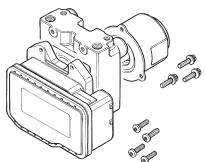
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 Never subject the ABS control unit/HU to strong impacts or allow them to be dropped.



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The ABS control unit/HU cannot be disassembled.
 Replace the whole unit with a new one.



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## Section 0

# **General Information**

## CONTENTS

General Information	0A-1	Periodic Maintenance Schedule Chart	
General Description		(GSX650FK8)	0B-3
Symbols		Lubrication Points (GSX650FK8)	
Abbreviations		Repair Instructions	0B-4
Vehicle Side View (GSF650/SK7)		Air Cleaner Element Replacement	
Vehicle Identification Number		Air Cleaner Element Inspection and Cleaning	
Fuel and Oil Recommendation		Exhaust Pipe Bolt and Muffler Bolt Inspection	
Engine Coolant Recommendation		Spark Plug Replacement	
BREAK-IN Procedures		Spark Plug Inspection and Cleaning	0B-5
Cylinder Identification		Valve Clearance Inspection and Adjustment	
Country and Area Codes (GSF650/S/U/		Fuel Line Inspection	0B-12
SUK7)	0A-5	Engine Oil and Filter Replacement	0B-12
Wire Color Symbols		Throttle Cable Play Inspection and	
Warning, Caution and Information Labels		Adjustment	0B-14
Location (GSF650/S/A/SAK7)	0A-6	Throttle Valve Synchronization	0B-14
Vehicle Side View (GSF650A/ÚA/SA/ASUK7)		PAIR System Inspection	0B-14
Country and Area Codes (GSF650A/UA/SA/		Cooling System Inspection	0B-14
ASUK7)	0A-7	Clutch System Inspection	0B-16
Country and Area Codes (GSF650/A/S/SA/		Clutch Hose Replacement	0B-16
SU/U/UA/ASUK8)	0A-8	Clutch Fluid Replacement	0B-16
Vehicle Side View (GSX650FK8)		Drive Chain Inspection and Adjustment	0B-17
Country and Area Codes (GSX650FK8)		Drive Chain Cleaning and Lubricating	0B-18
Warning, Caution and Information Labels		Brake System Inspection	
Location (GSX650FK8)	0A-9	Tire Inspection	
Component Location	0A-10	Steering System Inspection	
Electrical Components Location		Front Fork Inspection	
Specifications		Rear Suspension Inspection	
Specifications (GSF650/S/U/SUK7)		Chassis Bolt and Nut Inspection	
Specifications (GSF650A/UA/SA/ASUK7)		Compression Pressure Check	
Specifications (GSF650/S/U/SUK8)		Oil Pressure Check	
Specifications (GSF650A/UA/SA/ASUK8)		SDS Check	
Specifications (GSX650FK8)		Specifications	
Special Tools and Equipment		Tightening Torque Specifications	0B-24
Special Tool		Special Tools and Equipment	0B-24
		Recommended Service Material	0B-24
Maintenance and Lubrication	0B-1	Special Tool	0B-24
Precautions	0B-1	On a transport	00.4
Precautions for Maintenance		Service Data	
General Description		Specifications	0C-1
Recommended Fluids and Lubricants		Service Data (GSF650/S/U/SUK7)	0C-1
Scheduled Maintenance		Tightening Torque List	
Periodic Maintenance Schedule Chart	٧٢-1	Service Data (GSF650A/UA/SA/ASUK7)	
(GSF650/S/A/SAK7)	0R-1	Service Data (GSF650/S/U/SUK8)	
Lubrication Points (GSF650/S/A/SAK7)		Service Data (GSF650A/UA/SA/ASUK8)	
242110410111 Ollito (301 000/0// VO/ (1/)	50 2	Service Data (GSX650FK8)	0C-11

## **General Information**

## **General Description**

**Symbols** 

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Listed in the table below are the symbols indicating instructions and other information necessary for servicing. The meaning of each symbol is also included in the table.

Symbol	Definition
U	Torque control required.
	Data beside it indicates specified torque.
	Apply oil.
	Use engine oil unless otherwise specified.
M/O	Apply molybdenum oil solution.
	(Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1).
ÆAH	Apply SUZUKI SUPER GREASE "A" or equivalent.
AAH	99000-25010
₹ <b>M</b> H	Apply SUZUKI MOLY PASTE or equivalent.
A.W.A	99000-25140
ÆSH	Apply SUZUKI SILICONE GREASE or equivalent.
ASA	99000-25100
1207B	Apply SUZUKI BOND "1207B" or equivalent.
12075	99000-31140
1215	Apply SUZUKI BOND "1215" or equivalent.
-(1210-)	99000-31110
<del>+</del> 1303	Apply THREAD LOCK SUPER "1303" or equivalent.
0.555	99000-32030
<del>+</del> 1322	Apply THREAD LOCK SUPER "1322" or equivalent.
0.223	99000-32110
<del>+</del>  1360	Apply THREAD LOCK SUPER "1360" or equivalent.
0.555	99000-32130
LLC	Use engine coolant or equivalent.
	99000-99032-11X
FORK	Use fork oil or equivalent.
	99000-99001-G10
BF	Apply or use brake fluid.
TOOL	Use special tool.
8	Do not reuse.
	Note on reassembly.

#### **Abbreviations**

A:

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**ABDC:** After Bottom Dead Center **ABS:** Anti-lock Brake System **AC:** Alternating Current

ACL: Air Cleaner, Air Cleaner Box API: American Petroleum Institute ATDC: After Top Dead Center

A/F: Air Fuel Mixture

B:

**BBDC:** Before Bottom Dead Center **BTDC:** Before Top Dead Center **B+:** Battery Positive Voltage

C:

**CKP Sensor:** Crankshaft Position Sensor (CKPS)

**CKT:** Circuit

CLP Switch: Clutch Lever Position Switch (Clutch

Switch)

**CO:** Carbon Monoxide

CPU: Central Processing Unit

D:

**DC:** Direct Current

**DMC:** Dealer Mode Coupler

**DOHC:** Double Over Head Camshaft

**DRL:** Daytime Running Light **DTC:** Diagnostic Trouble code

E:

**ECM:** Engine Control Module Engine Control Unit

(ECU) (FI Control Unit)

ECT Sensor: Engine Coolant Temperature Sensor

(ECTS)

Water Temp. Sensor (WTS)

F:

FI: Fuel Injection, Fuel Injector

FP: Fuel pump

**FPR:** Fuel Pressure Regulator **FP Relay:** Fuel Pump Relay

G:

**GEN:** Generator **GND:** Ground

GP Switch: Gear Position Switch

H:

**HC:** Hydrocarbons

**HO2 sensor:** Heated Oxygen Sensor (HO2S)

I:

IAP Sensor: Intake Air Pressure Sensor (IAPS)
IAT Sensor: Intake Air Temperature Sensor (IATS)

**IG:** Ignition

ISC Valve: Idle Speed Control Valve (ISCV)

J:

JASO: Japanese Automobile Standards Organization

L:

LCD: Liquid Crystal Display

**LED:** Light Emitting Diode (Malfunction Indicator Lamp)

LH: Left Hand

M:

MAL-CODE: Malfunction Code (Diagnostic Code)

Max: Maximum

MIL: Malfunction Indicator Lamp (LED)

Min: Minimum

N:

NOx: Nitrogen Oxides

0:

**OHC:** Over Head Camshaft **OPS:** Oil Pressure Switch

P:

PAIR: Pulsed Secondary Air Injection

**PCV:** Positive Crankcase Ventilation (Crankcase Breather)

R:

RH: Right Hand

ROM: Read Only Memory

S:

SAE: Society of Automotive Engineers

SDS: Suzuki Diagnosis System

STC System: Secondary Throttle Control System

(STCS)

STP Sensor: Secondary Throttle Position Sensor

(STPS)

ST Valve: Secondary Throttle Valve (STV)

STV Actuator: Secondary Throttle Valve Actuator

(STVA)

T:

**TO Sensor:** Tip-over Sensor (TOS)

TP Sensor: Throttle Position Sensor (TPS)

## Vehicle Side View (GSF650/SK7)

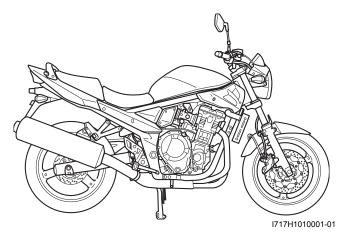
B817H20101004

#### NOTE

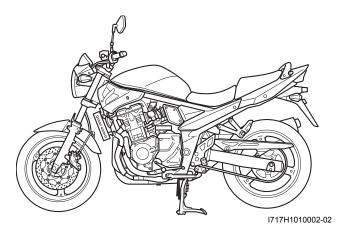
Difference between illustration and actual motorcycles may exist depending on the markets.

#### SUZUKI GSF650 (2007-model)

#### **Right Side**

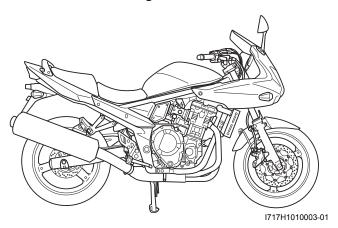


#### Left Side

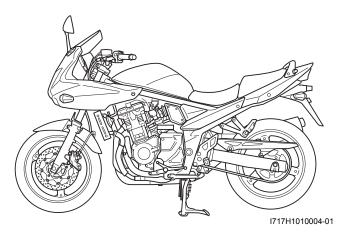


#### SUZUKI GSF650S (2007-model)

#### **Right Side**



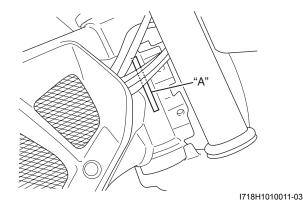
#### Left Side

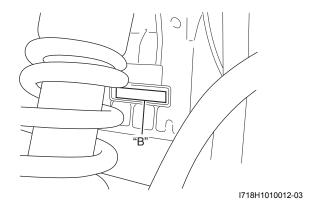


#### Vehicle Identification Number

B817H20101005

The frame serial number or V.I.N. (Vehicle Identification Number) "A" is stamped on the right side of the steering head pipe. The engine serial number "B" is located on the right side of the crankcase. These numbers are required especially for registering the machine and ordering spare parts.





#### **Fuel and Oil Recommendation**

B817H20101006

#### Fuel (For USA and Canada)

Use only unleaded gasoline of at least 87 pump octane (R/2 + M/2) or 91 octane or higher rated by the research method.

Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.

#### **Fuel (For Other Countries)**

Gasoline used should be graded 91 octane (Research Method) or higher. Unleaded gasoline is recommended.

#### **Engine Oil (For USA)**

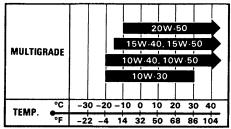
Oil quality is a major contributor to your engine's performance and life. Always select good quality engine oil.

Suzuki recommends the use of SUZUKI PERFORMANCE 4 MOTOR OIL or an equivalent engine oil. Use of SF/SG or SH/SJ in API with MA in JASO.

Suzuki recommends the use of SAE 10W-40 engine oil. If SAE 10W-40 engine oil is not available, select and alternative according to the chart.

#### **Engine Oil (For Other Countries)**

Oil quality is a major contributor to your engine's performance and life. Always select good quality engine oil. Use of SF/SG or SH/SJ in API with MA in JASO. Suzuki recommends the use of SAE 10W-40 engine oil. If SAE 10W-40 engine oil is not available, select an alternative according to the chart.



I310G1010005-01

#### **Brake Fluid**

Specification and classification: DOT 4

#### **▲ WARNING**

Since the brake system of this motorcycle is filled with a glycol-based brake fluid by the manufacturer, do not use or mix different types of fluid such as silicone-based and petroleum-based fluid for refilling the system, otherwise serious damage will result.

Do not use any brake fluid taken from old or used or unsealed containers.

Never reuse brake fluid left over from a previous servicing, which has been stored for a long period.

#### **Front Fork Oil**

Use fork oil G10 or an equivalent fork oil.

#### **Engine Coolant Recommendation**

B817H20101007

#### **Engine Coolant**

Use an anti-freeze/engine coolant compatible with an aluminum radiator, mixed with distilled water only.

#### Water for mixing

Use distilled water only. Water other than distilled water can corrode and clog the aluminum radiator.

#### Anti-freeze/Engine coolant

The engine coolant perform as a corrosion and rust inhibitor as well as anti-freeze. Therefore, the engine coolant should be used at all times even though the atmospheric temperature in your area does not go down to freezing point.

Suzuki recommends the use of SUZUKI COOLANT antifreeze/engine coolant. If this is not available, use an equivalent which is compatible with an aluminum radiator.

#### Liquid amount of water/Engine coolant

Solution capacity (total) 3 000 ml (3.2/2.6 US/Imp qt)

For engine coolant mixture information, refer to "Engine Coolant Description in Section 1F (Page 1F-1)".

#### **↑** CAUTION

Mixing of anti-freeze/engine coolant should be limited to 60%. Mixing beyond it would reduce its efficiency. If the anti-freeze/engine coolant mixing ratio is below 50%, rust inhabiting performance is greatly reduced. Be sure to mix it above 50% even though the atmospheric temperature does not go down to the freezing point.

#### **BREAK-IN Procedures**

B817H20101008

0A-4

During manufacture only the best possible materials are used and all machined parts are finished to a very high standard but it is still necessary to allow the moving parts to "BREAK-IN" before subjecting the engine to maximum stresses. The future performance and reliability of the engine depends on the care and restraint exercised during its early life. The general rules are as follows.

1) Keep to these break-in engine speed limits:

#### Speed limits

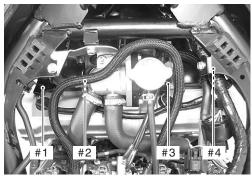
Initial 800 km (500 miles): Below 6 000 r/min Up to 1 600 km (1 000 miles): Below 9 000 r/min Over 1 600 km (1 000 miles): Below 12 500 r/min

 Upon reaching an odometer reading of 1 600 km (1 000 miles) you can subject the motorcycle to full throttle operation. However, do not exceed 12 500 r/ min at any time.

#### **Cylinder Identification**

B817H20101009

The four cylinders of this engine are identified as # 1, 2, 3 and # 4 cylinder, as counted from left to right (as viewed by the rider on the seat).



I717H1010005-03

## Country and Area Codes (GSF650/S/U/SUK7)

The following codes stand for the applicable country(-ies) and area(-s).

B817H20101010

Code	Country or Area	Effective Frame No.
GSF650 K7 (E-02)	U.K.	JS1CJ122200100001 -
GSF650 K7 (E-19)	E.U.	JS1CJ122100100001 -
GSF650S K7 (E-02)	U.K.	JS1CJ111200100001 -
GSF650S K7 (E-19)	Ē.U.	JS1CJ111100100001 -
GSF650S K7 (E-28)	Canada	JS1GP74A 72100001 –
GSF650U K7 (E-19)	Ē.U.	JS1CJ212100100001 -
GSF650SU K7 (E-19)	E.U.	JS1CJ211100100001 -

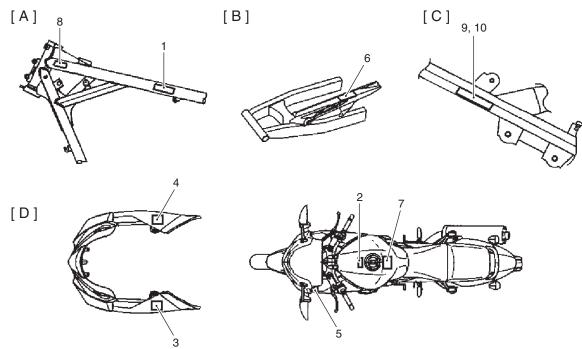
## **Wire Color Symbols**

B817H20101011

Symbol	Wire Color	Symbol	Wire Color
В	Black	BI/Y	Blue with Yellow tracer
Bl	Blue	Br/B	Brown with Black tracer
Br	Brown	G/B	Green with Black tracer
Dbr	Dark brown	G/Y	Green with Yellow tracer
Dg	Dark green	Gr/B	Gray with Black tracer
G	Green	Gr/R	Gray with Red tracer
Gr	Gray	Gr/W	Gray with White tracer
Lbl	Light blue	Gr/Y	Gray with Yellow tracer
Lg	Light green	O/G	Orange with Green tracer
0	Orange	O/R	Orange with Red tracer
Р	Pink	O/W	Orange with White tracer
R	Red	O/Y	Orange with Yellow tracer
W	White	P/B	Pink with Black tracer
Υ	Yellow	P/W	Pink with White tracer
B/BI	Black with Blue tracer	R/B	Red with Black tracer
B/Br	Black with Brown tracer	R/BI	Red with Blue tracer
B/G	Black with Green tracer	W/B	White with Black tracer
B/Lg	Black with Light green tracer	W/BI	White with Blue tracer
B/O	Black with Orange tracer	W/G	White with Green tracer
B/R	Black with Red tracer	W/R	White with Red tracer
B/W	Black with White tracer	W/Y	White with Yellow tracer
B/Y	Black with Yellow tracer	Y/B	Yellow with Black tracer
BI/B	Blue with Black tracer	Y/BI	Yellow with Blue tracer
BI/G	Blue with Green tracer	Y/R	Yellow with Red tracer
BI/W	Blue with White tracer	Y/W	Yellow with White tracer

## Warning, Caution and Information Labels Location (GSF650/S/A/SAK7)

B817H20101012



I717H1010006-02

		GSF650/A	GSF650U/UA	GSF650S/SA	GSF650SU/ASU
1.	Information label	_	_	For E-28	_
2.	Fuel caution label	For E-02	_	For E-02	_
3.	Screen label	_	_	For E-02, 19, 28	For E-19
4.	Screen label	-	_	For E-28	_
5.	Warning steering label	_	_	For E-02, 19, 28	For E-19
6.	Tire information label	For E-02, 19	For E-19	For E-02, 19, 28	For E-19
7.	General warning label	For E-02, 19	For E-19	For E-02, 19, 28	For E-19
8.	ICES Canada label	_	_	For E-28	_
9.	I.D. plate	For E-02, 19	For E-19	For E-02, 19	For E-19
10.	Safety plate	_	_	For E-28	_
[A]:	Frame head (left side)				
[B]:	Swingarm				
[C]:	Frame side tube (Right side)				
[D]:	Cowling body				

## Vehicle Side View (GSF650A/UA/SA/ASUK7)

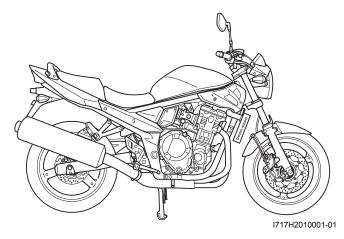
B817H20101014

#### **NOTE**

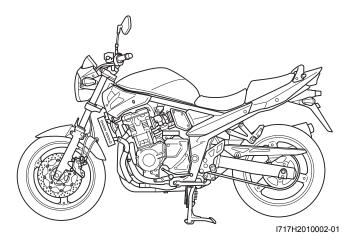
Difference between illustration and actual motorcycles may exist depending on the markets.

#### SUZUKI GSF650A/UA (2007-model)



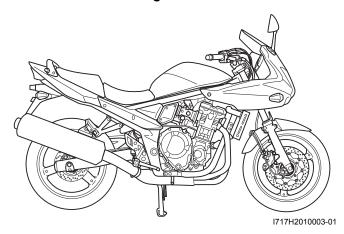


Left Side

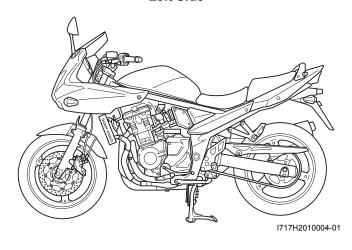


#### SUZUKI GSF650SA/ASU (2007-model)





Left Side



## Country and Area Codes (GSF650A/UA/SA/ASUK7)

The following codes stand for the applicable country(-ies) and area(-s).

Code	Country or Area	Effective Frame No.
GSF650A K7 (E-02)	U.K.	JS1CJ124200100001 -
GSF650A K7 (E-19)	E.U.	JS1CJ124100100001 -
GSF650SA K7 (E-02)	U.K.	JS1CJ113200100001 -
GSF650SA K7 (E-19)	E.U.	JS1CJ113100100001 -
GSF650SA K7 (E-28)	Canada	JS1GP74B 72100001 –
GSF650UA K7 (E-19)	E.U.	JS1CJ214100100001 -
GSF650ASU K7 (E-19)	E.U.	JS1CJ213100100001 -

B817H20101015

## Country and Area Codes (GSF650/A/S/SA/SU/U/UA/ASUK8)

B817H20101019

The following codes stand for the applicable country(-ies) and area(-s).

Code	Country or Area	Effective Frame No.
GSF650 K8 (E-02)	U.K.	JS1CJ122200100465 -
GSF650 K8 (E-19)	E.U.	JS1CJ122100103082 –
GSF650 K8 (P-37)	Brazil	XXXXXXXXXXXXXXXXXXXXXX
GSF650A K8 (E-19)	E.U.	JS1CJ124100100964 -
GSF650S K8 (E-02)	U.K.	JS1CJ111200100068 -
GSF650S K8 (E-19)	E.U.	JS1CJ111100101804 -
GSF650S K8 (E-28)	Canada	JS1GP74A82100001 -
GSF650S K8 (P-37)	Brazil	XXXXXXXXXXXXXXXX –
GSF650SA K8 (E-02)	U.K.	JS1CJ113200100546 -
GSF650SA K8 (E-19)	E.U.	JS1CJ113100102613 -
GSF650SA K8 (E-28)	Canada	JS1GP74B82100001 -
GSF650SU K8 (E-19)	E.U.	JS1CJ211100101865 -
GSF650U K8 (E-19)	E.U.	JS1CJ212100103896 -
GSF650UA K8 (E-19)	E.U.	JS1CJ214100100035 -
GSF650ASU K8 (E-19)	E.U.	JS1CJ213100100525 -

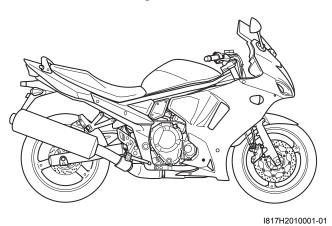
## Vehicle Side View (GSX650FK8)

B817H20101016

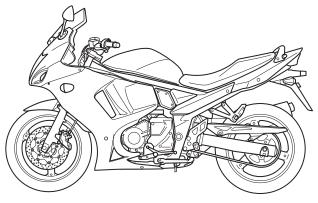
NOTE

Difference between illustration and actual motorcycles may exist depending on the markets.

## **Right Side**



Left Side



I817H2010002-01

## Country and Area Codes (GSX650FK8)

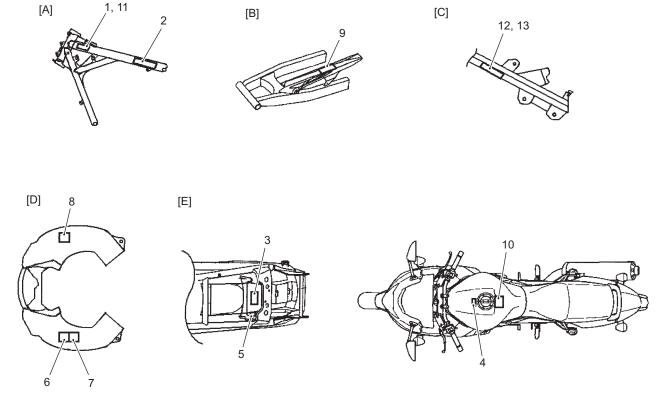
The following codes stand for the applicable country(-ies) and area(-s).

B817H20101017

Code	Country or Area	Effective Frame No.
GSX650F K8 (E-02)	U.K.	JS1CJ135200100001 -
GSX650F K8 (E-03)	U.S.A (Except for California)	JS1GP74A 82100001 –
GSX650F K8 (E-19)	E.U.	JS1CJ135100100001 -
GSX650F K8 (E-24)	Australia	JS1CJ135300100001 -
GSX650F K8 (E-28)	Canada	JS1GP74A 82100001 –
GSX650F K8 (E-33)	California (U.S.A)	JS1GP74A 82100001 –
GSX650F K8 (P-37)	Brazil	XXXXXXXXXXXXXXXXXXXXXX
GSX650FU K8 (E-19)	E.U.	JS1CJ225100100001 -

## Warning, Caution and Information Labels Location (GSX650FK8)

B817H20101018



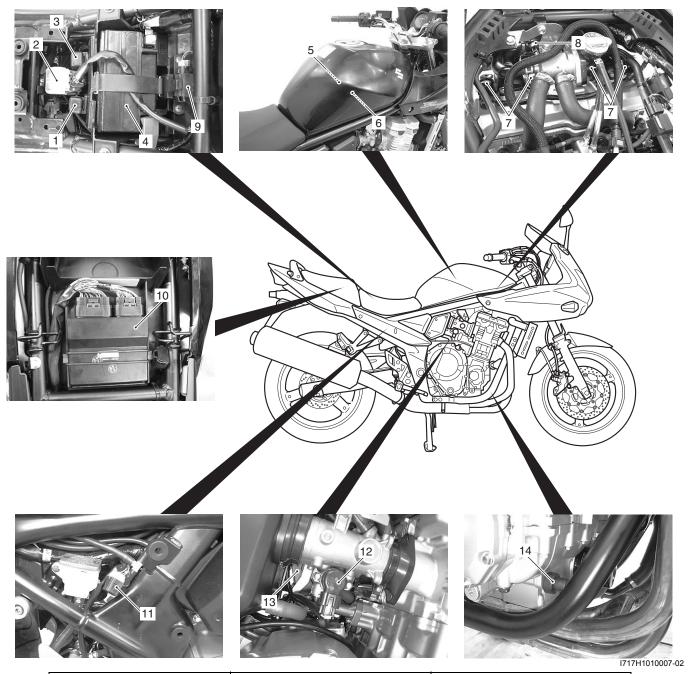
I817H2010003-03

		GSX650F	GSX650FU
1.	Noise label	For E-03, 24, 33	_
2.	Information label	For E-03, 28, 33	_
3.	Vacuum hose routing label	For E-33	_
4.	Fuel caution label	For E-02, 24	_
5.	Manual notice label	For E-03, 33	_
6.	Screen label	For E-02, 03, 19, 24, 28, 33	For E-19
7.	Screen label	For E-28	_
8.	Warning steering label	For E-02, 03, 19, 24, 28, 33	For E-19
9.	Tire information label	For E-02, 03, 19, 24, 28, 33	For E-19
10.	General warning label	For E-02, 03, 19, 24, 28, 33	For E-19
11.	ICES Canada label	For E-28	_
12.	I.D. plate	For E-02, 19, 24	For E-19
13.	Safety plate	For E-03, 28, 33	_
[A]:	Frame head (Left side)		
[B]:	Swingarm		
[C]:	Frame side tube (Right side)		
[D]:	Cowling body		
[E]:	Rear fender		

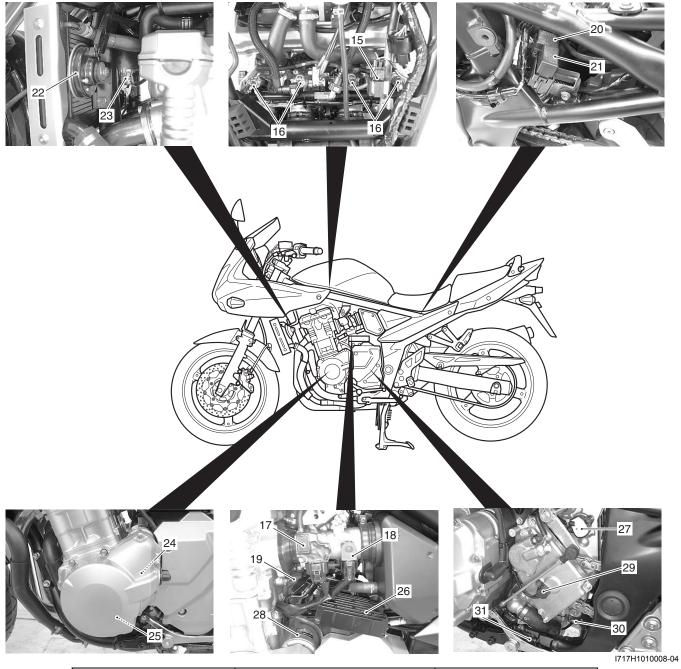
# **Component Location**

## **Electrical Components Location**

B817H20103001



Fuel pump relay	Fuel level gauge	Mode selection switch coupler
Starter relay/Main fuse	7. Ignition coil/plug cap	12. ISC valve
Cooling fan relay	PAIR control solenoid valve	13. STV actuator
4. Battery	9. TO sensor	14. Oil pressure switch
5. Fuel pump	10. ECM	



15. IAP sensor (# 1)	21. Turn signal/side-stand relay	27. GP switch
16. Fuel injector	22. Horn	28. Starter motor
17. IAP/TP (# 2) /IAT sensor	23. Cooling fan	29. Speed sensor
18. STP sensor	24. CKP sensor	30. HO2 sensor
19. ECT sensor	25. Generator	31. Side-stand switch
20. Fuse box	26. Regulator/rectifier	

## **Specifications**

## Specifications (GSF650/S/U/SUK7)

## NOTE

B817H20107001

These specifications are subject to change without notice.

## **Dimensions and dry mass**

Item	Specification	Remark
Overall length	2 130 mm (83.9 in)	
Overall width	780 mm (30.1 in)	
Overall height	1 085/1 095 mm (42.7/43.1 in)	Low/High GSF650/U
_	1 225 mm (48.2 in)	GSF650S/SU
Wheelbase	1 470 mm (57.9 in)	
Ground clearance	135 mm (5.3 in)	
Seat height	770/790 mm (30.3/31.1 in)	Low/High
Dry mass	215 kg (473 lbs)	GSF650/U
	218 kg (480 lbs)	GSF650S/SU

## **Engine**

Item	Specification	Remark
Туре	4-stroke, liquid-cooled, DOHC	
Number of cylinders	4	
Bore	65.5 mm (2.579 in)	
Stroke	48.7 mm (1.917 in)	
Displacement	656 cm <sup>3</sup> (40.0 cu. in)	
Compression ratio	11.5 : 1	
Carburetor	Fuel injection	
Air cleaner	Non-woven fabric element	
Starter system	Electric	
Lubrication system	Wet sump	
Idle speed	1 200 ± 100 r/min	

#### **Drive train**

Ite	Item Specification		Remark
Clutch		Wet multi-plate type	
Transmission		6-speed constant mesh	
Gearshift pattern		1-down, 5-up	
Primary reduction	n ratio	1.700 (85/50)	
2r	Low	3.076 (40/13)	
	2nd	2.058 (35/17)	
	3rd	1.600 (32/20)	
Gear railos	4th	1.363 (30/22)	
	5th	1.208 (29/24)	
	Тор	1.107 (31/28)	
Final reduction ra	itio	3.200 (48/15)	
Drive chain		RK525 SMOZ7Y 118 links	

## 0A-13 General Information:

## **Chassis**

Item	Specification	Remark
Front suspension	Telescopic, coil spring, oil damped	
Rear suspension	Link type, coil spring, oil damped	
Front suspension stroke	130 mm (5.1 in)	
Rear wheel travel	128 mm (5.0 in)	
Steering angle	35° (right & left)	
Caster	26°	
Trail	108 mm (4.25 in)	
Turning radius	2.8 m (9.2 ft)	
Front brake	Disc brake, twin	
Rear brake	Disc brake	
Front tire size	120/70ZR17M/C (58W), tubeless	
Rear tire size	160/60ZR17M/C (69W), tubeless	

## **Electrical**

Item	Specification	Remark
Ignition type	Electronic ignition (Transistorized)	
Ignition timing	2° B.T.D.C. at 1 200 r/min	
Spark plug	NGK CR9E or DENSO U27ESR-N	
Battery	12 V 28.8 kC (8 Ah)/10 HR	
Generator	Three-phase A.C. generator	
Main fuse	30 A	
Fuse	10/10/10/15/15/15 A	
Headlight	12 V 60/55 W (H4)	GSF650/U
Headilght	12 V 55 W (H7) + 12 V 55 W (H7)	GSF650S/SU
Position light	12 V 5 W	GSF650/U
Position light	12 V 5 W x 2	GSF650S/SU
Turn signal light	12 V 21 W	
Brake light/Taillight	12 V 21/5 W	
License plate light	12 V 5 W	
Speedometer light	LED	
Tachometer light	LED	
Neutral indicator light	LED	
High beam indicator light	LED	
Turn signal indicator light	LED	
Oil pressure indicator light	LED	
Coolant temperature indicator light	LED	
Fuel injection indicator light	LED	

## **Capacities**

	Item	Specification	Remark
Fuel tank	Including reserve	19.0 L (5.0/4.2 US/Imp gal)	
	Oil change	3 000 ml (3.2/2.6 US/Imp qt)	
Engine oil	With filter change	3 500 ml (3.7/3.1 US/Imp qt)	
	Overhaul	3 700 ml (3.9/3.3 US/Imp qt)	
Coolant	·	3.0 L (3.2/2.6 US/Imp gal)	

## Specifications (GSF650A/UA/SA/ASUK7)

#### **NOTE**

B817H20107002

- These specifications are subject to change without notice.
- Any differences between the GSF650/SK7 ('07-model) and GSF650A/UA/SA/ASUK7 ('07-model) in specifications are indicated an asterisk mark (\*).

## **Dimensions and dry mass**

Item	Specification	Remark
Overall length	2 130 mm (83.9 in)	
Overall width	780 mm (30.1 in)	
Overall height	1 085/1 095 mm (42.7/43.1 in)	Low/High GSF650A/UA
_	1 225 mm (48.2 in)	GSF650SA/ASU
Wheelbase	1 470 mm (57.9 in)	
Ground clearance	135 mm (5.3 in)	
Seat height	770/790 mm (30.3/31.1 in)	Low/High
Dry mass	* 219 kg (482 lbs)	GSF650A/UA
	* 222 kg (489 lbs)	GSF650SA/ASU

## **Electrical**

Item	Specification	Remark
Ignition type	Electronic ignition (Transistorized)	
Ignition timing	2° B.T.D.C. at 1 200 r/min	
Spark plug	NGK CR9E or DENSO U27ESR-N	
Battery	12 V 28.8 kC (8 Ah)/10 HR	
Generator	Three-phase A.C. generator	
Main fuse	30 A	
Fuse	* 10/10/10/15/15/15/15/20 A	
Llaadliaht	12 V 60/55 W (H4)	GSF650A/UA
Headlight	12 V 55 W (H7) + 12 V 55 W (H7)	GSF650SA/ASU
Desition light	12 V 5 W	GSF650A/UA
Position light	12 V 5 W + 12 V 55 W (H7)	GSF650SA/ASU
Turn signal light	12 V 21 W	
Brake light/Taillight	12 V 21/5 W	
License plate light	12 V 5 W	
Speedometer light	LED	
Tachometer light	LED	
Neutral indicator light	LED	
High beam indicator light	LED	
Turn signal indicator light	LED	
Oil pressure indicator light	LED	
Coolant temperature indicator light	LED	
Fuel injection indicator light	LED	
* ABS indicator light	LED	

## Specifications (GSF650/S/U/SUK8)

#### **NOTE**

B817H20107003

- These specifications are subject to change without notice.
- Any differences between the GSF650/SK7 ('07-model) and GSF650/S/U/SUK8 ('08-model) in specifications are indicated an asterisk mark (\*).

#### **Electrical**

Item	Specification	Remark
Ignition type	Electronic ignition (Transistorized)	
Ignition timing	2° B.T.D.C. at 1 200 r/min	
Spark plug	* NGK CR8E or DENSO U24ESR-N	
Battery	12 V 28.8 kC (8 Ah)/10 HR	
Generator	Three-phase A.C. generator	
Main fuse	30 A	
Fuse	10/15/15/10/10 A	
Hoodlight	12 V 60/55 W (H4)	GSF650/U
Headlight	12 V 55 W (H7) + 12 V 55 W (H7)	GSF650S/SU
Position light	12 V 5 W	GSF650/U
Position light —	12 V 5 W x 2	GSF650S/SU
Turn signal light	12 V 21 W	
Brake light/Taillight	12 V 21/5 W	
License plate light	12 V 5 W	
Speedometer light	LED	
Tachometer light	LED	
Neutral indicator light	LED	
High beam indicator light	LED	
Turn signal indicator light	LED	
Oil pressure indicator light	LED	
Coolant temperature indicator	LED	
light		
Fuel injection indicator light	LED	

General Information: 0A-16

## Specifications (GSF650A/UA/SA/ASUK8)

## **NOTE**

B817H20107004

- These specifications are subject to change without notice.
- Any differences between the GSF650A/UA/SA/ASUK7 ('07-model) and GSF650A/UA/SA/ASUK8 ('08-model) in specifications are indicated an asterisk mark (\*).

## **Electrical**

Item	Specification	Remark			
Ignition type					
Ignition timing	2° B.T.D.C. at 1 200 r/min				
Spark plug	* NGK CR8E or DENSO U24ESR-N				
Battery	12 V 28.8 kC (8 Ah)/10 HR				
Generator	Three-phase A.C. generator				
Main fuse	30 A				
Fuse	10/10/10/15/15/15/20 A				
Uppdlight	12 V 60/55 W (H4)	GSF650A/UA			
Headlight	12 V 55 W (H7) + 12 V 55 W (H7)	GSF650SA/ASU			
Desition light	12 V 5 W	GSF650A/UA			
Position light	12 V 5 W + 12 V 55 W (H7)	GSF650SA/ASU			
Turn signal light	12 V 21 W				
Brake light/Taillight	12 V 21/5 W				
License plate light	12 V 5 W				
Speedometer light	LED				
Tachometer light	LED				
Neutral indicator light	LED				
High beam indicator light	LED				
Turn signal indicator light	LED				
Oil pressure indicator light	LED				
Coolant temperature indicator	LED				
light	LED				
Fuel injection indicator light	LED				
ABS indicator light	LED				

## **Specifications (GSX650FK8)**

#### **NOTE**

- These specifications are subject to change without notice.
- Any differences between the GSF650/SK7 ('07-model) and GSX650FK8 ('08-model) in specifications are indicated an asterisk mark (\*).

#### **Dimensions and dry mass**

Item	Specification	Remark
Overall length	2 130 mm (83.9 in)	
Overall width	* 760 mm (31.1 in)	
Overall height	* 1 225 mm (48.2 in)	
Wheelbase	* 1 470 mm (57.9 in)	
Ground clearance	* 125 mm (4.9 in)	
Seat height	* 770 mm (30.3 in)	
Dry mass	* 216 kg (476 lbs)	

## **Chassis**

Item	Specification	Remark
Front suspension	Telescopic, coil spring, oil damped	
Rear suspension	Link type, coil spring, oil damped	
Front suspension stroke	130 mm (5.1 in)	
Rear wheel travel	128 mm (5.0 in)	
Steering angle	* 32° (right & left)	
Caster	<b>26</b> °	
Trail	108 mm (4.25 in)	
Turning radius	* 3.0 m (9.8 ft)	
Front brake	Disc brake, twin	
Rear brake	Disc brake	
Front tire size	120/70ZR17M/C (58W), tubeless	
Rear tire size	160/60ZR17M/C (69W), tubeless	

#### **Electrical**

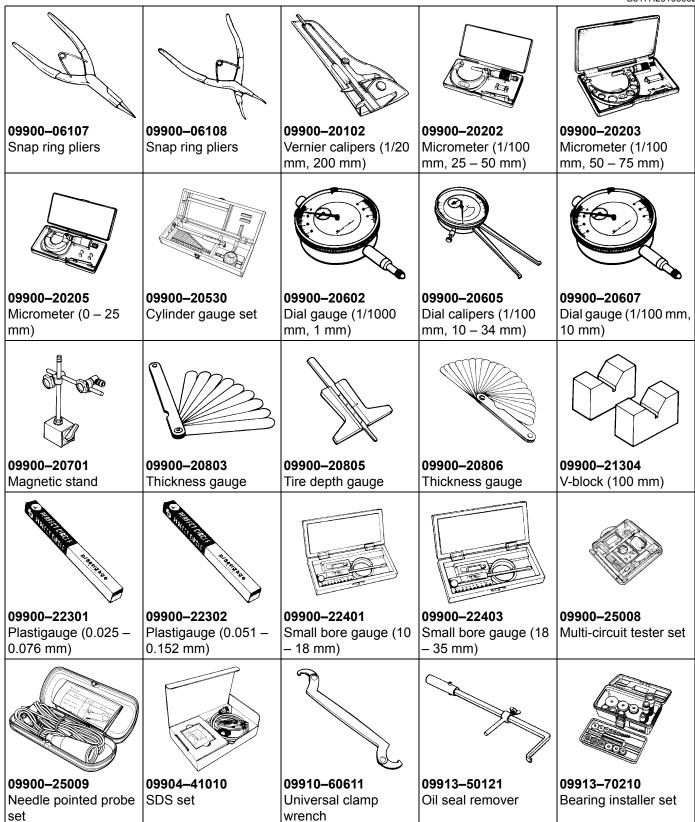
Item	Specification	Remark
Ignition type	Electronic ignition (Transistorized)	
Ignition timing	2° B.T.D.C. at 1 200 r/min	
Spark plug	* NGK CR8E or DENSO U24ESR-N	
Battery	12 V 28.8 kC (8 Ah)/10 HR	
Generator	Three-phase A.C. generator	
Main fuse	30 A	
Fuse	10/10/10/15/15/15 A	
Loadiaht	* 12 V 60 W (HB3)	High
Headlight	* 12 V 55 W (H7)	Low
Position light	* 12 V 5 W x 2	
Turn signal light	12 V 21 W	
Brake light/Taillight	12 V 21/5 W	
License plate light	12 V 5 W	
Speedometer light	LED	
Tachometer light	LED	
Neutral indicator light	LED	
High beam indicator light	LED	
Turn signal indicator light	LED	
* Oil pressure/Coolant temperature	LED	
indicator light	LED	
Fuel injection indicator light	LED	
* Engine R.P.M. indicator light	LED	

B817H20107005

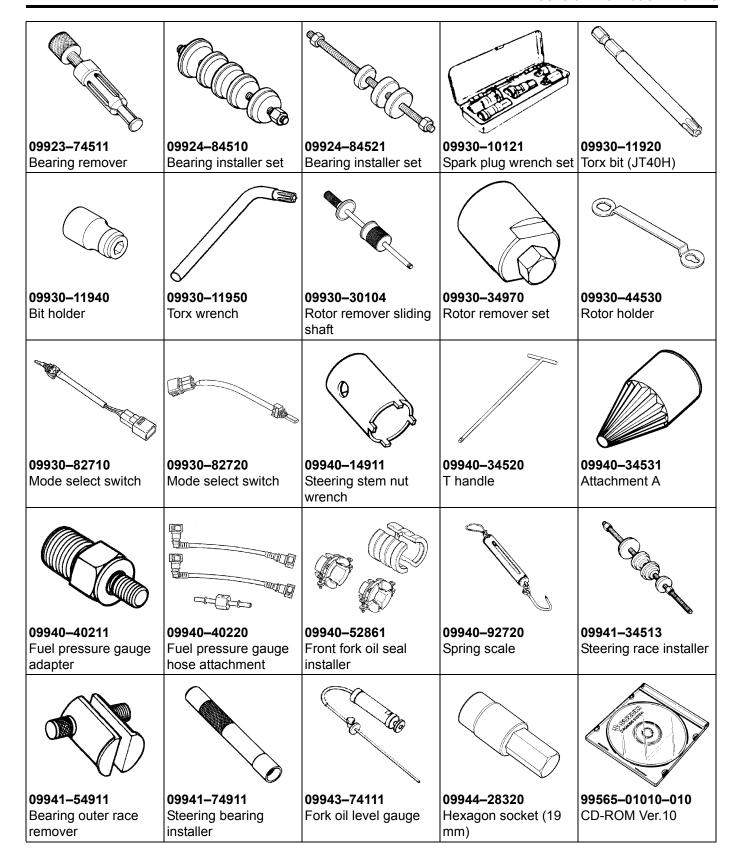
## **Special Tools and Equipment**

## **Special Tool**

B817H20108002







## **Precautions**

#### **Precautions for Maintenance**

B817H20200001

The "Periodic Maintenance Schedule Chart" lists the recommended intervals for all the required periodic service work necessary to keep the motorcycle operating at peak performance and economy. Maintenance intervals are expressed in terms of kilometers, miles and months for your convenience.

#### NOTE

More frequent servicing may be required on motorcycles that are used under severe conditions.

## **General Description**

#### **Recommended Fluids and Lubricants**

B817H20201001

Refer to "Fuel and Oil Recommendation in Section 0A (Page 0A-3)" and "Engine Coolant Recommendation in Section 0A (Page 0A-4)".

## **Scheduled Maintenance**

#### Periodic Maintenance Schedule Chart (GSF650/S/A/SAK7)

B817H20205001

#### **NOTE**

I = Inspect and clean, adjust, replace or lubricate as necessary.

R = Replace.

T = Tighten.

	Interval						
Item	km	1 000	6 000	12 000	18 000	24 000	
	miles	600	4 000	7 500	11 000	14 500	
	months	2	12	24	36	48	
Air cleaner element		_	I	l	R	I	
Exhaust pipe bolts, muffler bolts and nut		T	_	Т	_	Т	
Valve clearance		_	_	_	_	I	
Spark plugs		_	I	R	I	R	
Fuel line		_	I	I	I	I	
Engine oil		R	R	R	R	R	
Engine oil filter		R	_	_	R	_	
Throttle cable play		ı	I	I	I	I	
Throttle valve synchronization		_	_	I	_	I	
PAIR (air supply) system		_	_	I	_	I	
Engine coolant			Repla	ace every 2	years.		
Radiator hose		_	I	I	I		
Clutch hose							
Oldter flose		Replace every 4 years.					
Clutch fluid		_	I	I	I	I	
Oldfor Ildia		Replace every 2 years.					
Drive chain		I	I	I	I	I	
Dive chair		Clean and lubricate every 1 000 km (600 miles).					
Brakes		ı	I	I	I	I	
Brake hose		<del>-</del>	I	l	I	I	
Diano 11000	Replace every 4 years.						
Brake fluid			I	l	I	I	
		Replace every 2 years.					
Tires		_	I	I	I	I	

		Interval						
Item	km	1 000	6 000	12 000	18 000	24 000		
	miles	600	4 000	7 500	11 000	14 500		
	months	2	12	24	36	48		
Steering	·	I	_			I		
Front forks		_	_			I		
Rear suspension		_	_			I		
Chassis bolts and nuts		T	Т	T	Т	Т		

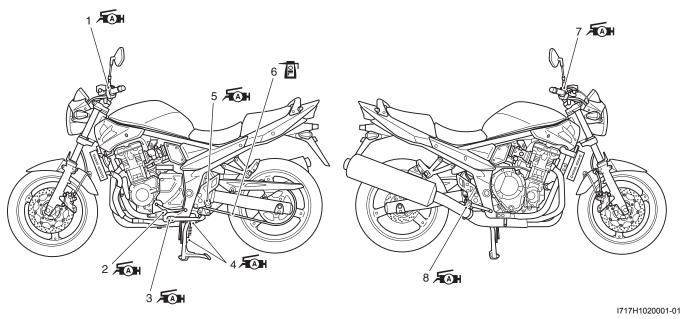
## **Lubrication Points (GSF650/S/A/SAK7)**

B817H20205002

Proper lubrication is important for smooth operation and long life of each working part of the motorcycle. Major lubrication points are indicated as follows.

#### **NOTE**

- Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt or grime.
- Lubricate exposed parts which are subject to rust, with a rust preventative spray whenever the motorcycle has been operated under wet or rainy conditions.



Clutch lever holder	6. Drive chain
Gearshift lever pivot	7. Brake lever holder
Side-stand pivot and spring hook	Brake pedal pivot and footrest pivot
Center stand pivot and spring hook	: Apply oil.
5. Footrest pivot	Æa⊩: Apply grease.

## Periodic Maintenance Schedule Chart (GSX650FK8)

B817H20205003

#### **NOTE**

I = Inspect and clean, adjust, replace or lubricate as necessary.

R = Replace.

T = Tighten.

	Interval						
Item	km	1 000	6 000	12 000	18 000	24 000	
	miles	600	4 000	7 500	11 000	14 500	
	months	2	12	24	36	48	
Air cleaner element		_		I	R	I	
Exhaust pipe bolts, muffler bolts and nut		Т	_	Т	_	T	
Valve clearance		_	_	_	_	I	
Spark plugs			I	R	I	R	
Fuel line			I	I	I	I	
Evaporative emission control system (E-33 or	ıly)		_	l l	_	I	
Engine oil		R	R	R	R	R	
Engine oil filter		R	_	_	R	_	
Throttle cable play		I	I	I	I	I	
Throttle valve synchronization		l (E-33 only)	_	1	_	I	
PAIR (air supply) system		_	_	I	_	I	
Engine coolant		Replace every 2 years.					
Radiator hose		_		I	I	I	
Clutch hose		_		I	I	I	
Ciuterriose		Replace every 4 years.					
Clutch fluid			I	I	I	I	
Ciuter nuid		Replace every 2 years.					
Drive chain		I	I	I	I	I	
Drive chair		Clean and lubricate every 1 000 km (600 miles).				miles).	
Brakes		I	I	I	I	I	
Brake hose			I	I	I	I	
Diake nose			Repla	ace every 4	years.		
Brake fluid			I	I	I	I	
Blake lidid		Replace every 2 years.					
Tires		<u> </u>	l	I	I	I	
Steering		I	<del></del>	l	<del></del>	I	
Front forks		<del></del>	<del></del>	l	<del></del>	I	
Rear suspension		<del></del>	<del></del>	l l	<del></del>	I	
Chassis bolts and nuts		T	T	T	T	Т	

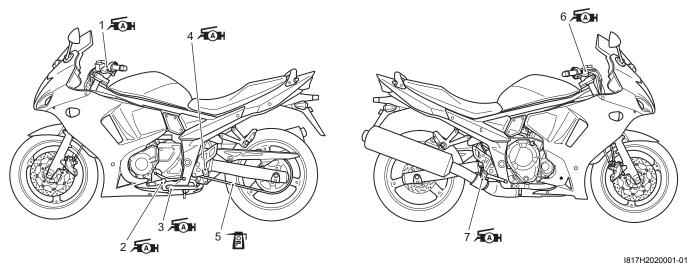
## **Lubrication Points (GSX650FK8)**

B817H20205004

Proper lubrication is important for smooth operation and long life of each working part of the motorcycle. Major lubrication points are indicated as follows.

#### **NOTE**

- Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt or grime.
- Lubricate exposed parts which are subject to rust, with a rust preventative spray whenever the motorcycle has been operated under wet or rainy conditions.



Clutch lever holder	Brake lever holder
Gearshift lever pivot	<ol><li>Brake pedal pivot and footrest pivot</li></ol>
Side-stand pivot and spring hook	Apply oil.
Footrest pivot	ÃÃH: Apply grease.
5. Drive chain	

## **Repair Instructions**

## **Air Cleaner Element Replacement**

B817H20206001

#### Replace air cleaner element Every 18 000 km (11 000 miles, 36 months)

Refer to "Air Cleaner Element Removal and Installation in Section 1D (Page 1D-7)".

# Air Cleaner Element Inspection and Cleaning B817H20206002

## Inspect air cleaner element Every 6 000 km (4 000 miles, 12 months)

#### Inspection

1) Remove the air cleaner element. Refer to "Air Cleaner Element Removal and Installation in Section 1D (Page 1D-7)".

2) Inspect the air cleaner element for clogging. If it is clogged with dirt, replace it with a new one.

#### **⚠ CAUTION**

If driving under dusty conditions, clean the air cleaner element more frequently. The surest way to accelerate engine wear is to operate the engine without the element or to use a torn element. Make sure that the air cleaner is in good condition at all times. Life of the engine depends largely on this component.



I718H1020009-01

3) After finishing the air cleaner element inspection, reinstall the removed parts.

#### Cleaning

- 1) Remove the air cleaner element. Refer to "Air Cleaner Element Removal and Installation in Section 1D (Page 1D-7)".
- 2) Carefully use compressed air to clean the air cleaner element.

#### **↑** CAUTION

Always apply compressed air to the inside of the air cleaner element. If compressed air is applied to the outside, dirt will be forced into the pores of the air cleaner element, restricting air flow through the air cleaner element.



I718H1020010-01

- 3) After cleaning the air cleaner element, reinstall the removed parts.
- 4) Drain water from the air cleaner by removing the drain plug.



I718H1020011-01

5) Reinstall the drain plug.

## Exhaust Pipe Bolt and Muffler Bolt Inspection

<u>Tighten exhaust pipe bolts, muffler bolt and nut</u> Initially at 1 000 km (600 miles, 2 months) and every 12 000 km (7 500 miles, 24 months) thereafter.

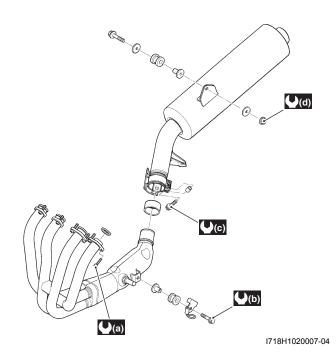
Check the exhaust pipe bolts, muffler bolts and nut to the specified torque.

#### **Tightening torque**

Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft) Exhaust pipe mounting bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

Muffler connecting bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

Muffler mounting nut (d): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)



#### **Spark Plug Replacement**

B817H20206004

# Replace spark plug Every 12 000 km (7 500 miles, 24 months)

Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".

#### Spark Plug Inspection and Cleaning

B817H20206005

## Inspect spark plug

#### Every 6 000 km (4 000 miles, 12 months)

#### **Heat Range**

- 1) Remove the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".
- Check spark plug heat range by observing electrode color.

If it is white or glazed appearing, replace the spark plug with colder type one.

#### Heat range

	Standard	Cold type	Hot type
NGK	CR9E	CR10E	CR8E
DENSO	U27ESR-N	U31ESR-N	U24ESR-N

3) After finishing the spark plug inspection, reinstall the removed parts.

#### 0B-6

#### **Carbon Deposits**

- 1) Remove the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".
- Check carbon deposits on the spark plug.
   If carbon is deposited, remove it using a spark plug cleaner machine or carefully use a tool with a pointed end.



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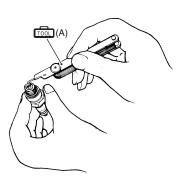
3) After finishing the spark plug inspection, reinstall the removed parts.

#### **Spark Plug Gap**

- 1) Remove the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".
- 2) Measure the spark plug gap using a thickness gauge.

Adjust the spark plug gap if necessary.

## Spark plug gap 0.7 - 0.8 mm (0.028 - 0.030 in)



I649G1020011-04

3) After finishing the spark plug inspection, reinstall the removed parts.

#### **Electrodes Condition**

- 1) Remove the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".
- 2) Check to see the worn or burnt condition of the electrodes.If it is extremely worn or burnt, replace the plug. And

also replace the plug if it has a broken insulator, damaged thread.

3) After finishing the spark plug inspection, reinstall the removed parts.

#### Valve Clearance Inspection and Adjustment

B817H20206006

#### Inspect valve clearance

Initially every 24 000 km (14 500 miles, 48 months).

#### Inspection

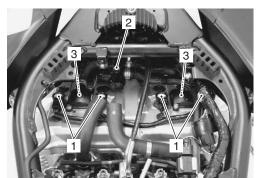
Valve clearance adjustment must be checked and adjusted, a) at the time of periodic inspection, b) when the valve mechanism is serviced, and c) when the camshafts are removed for servicing.

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Remove the frame head covers (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Move the cowling removing the screws (GSF650S).



I717H1020002-01

- 4) Drain a small amount of engine coolant and remove the thermostat connector. Refer to "Thermostat Connector / Thermostat Removal and Installation in Section 1F (Page 1F-9)".
- 5) Remove the ignition coil/caps (1) and spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".
- 6) Remove the PAIR control solenoid valve (2) and reed valves (3). Refer to "PAIR Control Solenoid Valve Removal and Installation in Section 1B (Page 1B-6)" and "PAIR Reed Valve Removal and Installation in Section 1B (Page 1B-6)".



I717H1020003-02

7) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly in Section 1D (Page 1D-24)".

#### NOTE

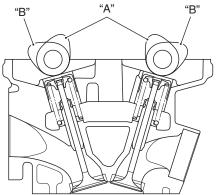
The valve clearance specification is different for both intake and exhaust valves.

## Valve clearance (When cold)

IN.: 0.10 – 0.20 mm (0.004 – 0.008 in) EX.: 0.20 – 0.30 mm (0.008 – 0.012 in)

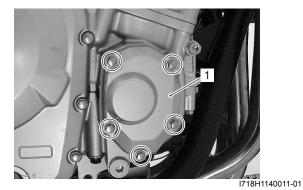
#### **NOTE**

- The cam must be at positions, "A" or "B", when checking or adjusting the valve clearance. Clearance readings should not be taken with the cam in any other position than these two positions.
- The valve clearance should be taken when each cylinder is at Top Dead Center (TDC) of compression stroke.
- The clearance specification is for COLD state
- To turn the crankshaft for clearance checking, be sure to use a wrench, and rotate in the normal running direction.



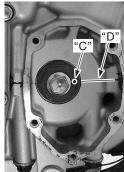
I718H1020001-03

8) Remove the right crankshaft cover (1).

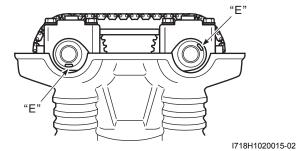


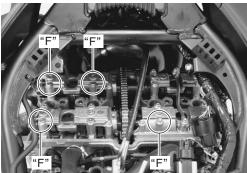
- 9) Turn the crankshaft clockwise and align the match mark "C" on the crankshaft with the mating surfaces "D" of the crankcases. Also, position the notches "E" on the right end of each camshaft as shown. Then, measure the following valve clearances "F".
  - Cylinder #1: Intake and exhaust valve clearances
  - Cylinder #2: Exhaust valve clearance
  - Cylinder #3: Intake valve clearance





I718H1020014-01





I717H1020004-01

Camshaft position	Notch "E" position faces outside
Measuring position	"F"

10) Insert the thickness gauge between the tappet and the cam. If the clearance is out of specification, adjust it into the specified range.

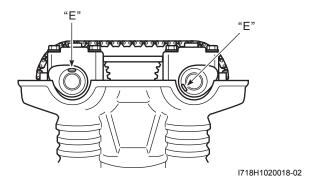
#### Special tool

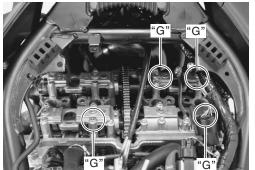
(A): 09900-20803 (Thickness gauge)



I717H1020005-01

- 11) Turn the crankshaft clockwise 360° (one full rotation) and align the match mark on the crankshaft with the mating surfaces of crankcases. Also, position the notches "E" on the right end of each camshaft as shown. Then, measure the following valve clearances "G".
  - Cylinder #2: Intake valve clearance
  - · Cylinder #3: Exhaust valve clearance
  - Cylinder #4: Intake and exhaust valve clearances
- 12) Measure the valve clearances of the remaining valves "E" and adjust them if necessary.





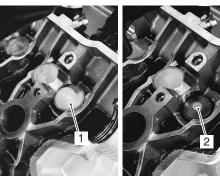
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Camshaft position	Notch "E" position faces inside					
Measuring position	"G"					

#### Adjustment

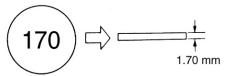
The clearance is adjusted by replacing the existing tappet shim by a thicker or thinner shim.

- 1) Remove the intake or exhaust camshafts. Refer to "Engine Top Side Disassembly in Section 1D (Page 1D-24)".
- 2) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



I718H1020019-01

3) Check the figures printed on the shim. These figures indicate the thickness of the shim, as illustrated.



I310G1020023-01

4) Select a replacement shim that will provide a clearance within the specified range. For the purpose of this adjustment, a total of 21 sizes of tappet shim are available ranging from 1.20 to 2.20 mm in steps of 0.05 mm.

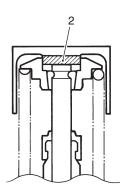
#### **↑** CAUTION

Both the right and left valve clearances should be as closely as possible.

5) Fit the selected shim (2) to the valve stem end, with numbers toward tappet. Be sure to check shim size with micrometer to ensure its size.

#### **NOTE**

- Be sure to apply engine oil to tappet shim top and bottom faces.
- When seating the tappet shim, be sure the figure printed surface faces the tappet.



I718H1020002-02

## (INTAKE SIDE)

TAPPET SHIM SELECTION TABLE [INTAKE] TAPPET SHIM NO. (12892-05C00-XXX)

TAPPET SHIM SET (12800-05830)

	220	2.20	2.10	2.15	ï	L														III. Match clearance in vertical column with present shim size					
	215	2.15	2.05	2.10		2.20														nt shi					
	210	2.10	2.00	2.05		2.20												COL		prese					
	205	2.05	1.95	2.00		2.15	2.20											임의		with					
	200	2.00	1.90	1.95		2.10	2.15	2.20										ENGIR		olumr				בן ג	<u> </u>
	195	1.95	1.85	1.90		2.05	2.10	2.15	2.20								Ή.	nce. "E	size.	tical c			6	0.23 mm 1 70 mm	1.80 mm
Ī	190	1.90	1.80	1.85	ED	2.00	2.05	2.10	2.15	2.20							CHA	leara	shim	in ver	mn.	L		<u>ග</u>	eq
	185	1.85	1.75	1.80 1.85	EQUIR	1.95	2.00	2.05	2.10	2.15	2.20						THIS	ppet	esent	rance	in horizontal column.		EXAMPLE	Tappet clearance is Present shim size	Shim size to be used
	180	1.80	1.70	1.75	MENT P	1.90	1.95	2.00	2.05	2.10	2.15	2.20		_			USE	ure ta	ure pr	ı clea	izonta	ĺ	E E	et cied ent chi	size t
	175	1.75	1.65	1.70	JUSTA	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20				HOW TO USE THIS CHART:	<ol> <li>Measure tappet clearance. "ENGINE IS COLD."</li> </ol>	<ol> <li>Measure present shim size.</li> </ol>	Match	in hor		j j	Prese	Shim
	170	1.70	1.60	1.65	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20			¥	<u>-</u> :	≓	≡					
	165	1.65	1.55	1.60	RANCE	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
	160	1.60	1.50	1.55	CLEA	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
	155	1.55	1.45	1.50	CIFIE	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20								
	150	1.50	1.40	1.45	SPI	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20							
	145	1.45	1.35	1.40		1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20						
	140	1.40	1.30	1.35		1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20					
	135	1.35	1.25	1.30		1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20				
	130	1.30	1.20	1.25		1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20			
	125	1.25		1.20		1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20		_
	120	1.20				1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	
	SUFFIX NO.	PRESENT SHIM SIZE (mm)		•			,			-	,	•	)				)		_				(		
		MEASURED TAPPET CLEAFANCE (mm)	0.00-0.04	0.05-0.09	0.10-0.20	0.21-0.25	0.26-0.30	0.31-0.35	0.36-0.40	0.41-0.45	0.46-0.50	0.51-0.55	0.56-0.60	0.61-0.65	0.66-0.70	0.71-0.75	0.76-0.80	0.81-0.85	0.86-0.90	0.91-0.95	0.96-1.00	1.01-1.05	1.06-1.10	1.11-1.15	

TAPPET SHIM SET (12800-05830)

## (EXHAUST SIDE)

TAPPET SHIM SELECTION TABLE [EXHAUST] TAPPET SHIM NO. (12892-05C00-XXX)

III. Match clearance in vertical column with present shim size 2.05 2.10 2.15 2.20 220 2.05 2.00 2.10 2.20 2.15 215 Measure tappet clearance. "ENGINE IS COLD" 2.20 1.95 2.00 2.05 2.10 2.00 1.90 1.95 2.15 2.05 2.20 205 1.95 2.10 1.90 1.85 2.15 2.20 2.00 200 1.70 mm Shim size to be used 1.80 mm 1.85 1.90 2.02 2.10 1.80 2.15 Measure present shim size. 1.95 195 HOW TO USE THIS CHART: 1.90 1.95 2.00 2.10 1.75 1.80 2.05 2.15 1.90 1.80 1.85 190 in horizontal column. Tappet clearance is EXAMPLE SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED Present shim size 2.00 2.05 1.70 1.75 2.10 2.15 1.85 2.20 185 1.65 1.70 1.75 2.00 2.05 1.95 2.15 2.20 1.80 180 1.70 1.65 1.85 1.90 1.95 2.05 1.60 2.00 2.10 2.15 1.75 175 2.00 2.05 2.10 
 1.60
 1.65
 1.70
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 1.80
 1.85
 1.55 1.50 1.55 1.60 1.60 1.65 2.05 1.95 2.00 2.15 1.80 1.85 1.90 1.90 1.95 1.70 170 2.00 2.10 1.45 1.50 2.15 2.20 1.65 165 1.55 1.90 1.85 1.95 2.05 2.10 2.15 2.20 1.60 160 1.35 1.40 1.40 1.45 1.50 1.75 1.80 1.85 1.90 1.95 2.05 2.10 2.00 1.55 2.10 2.15 155 1.45 1.75 1.80 1.90 1.70 1.85 2.05 1.95 2.00 2.10 2.15 2.20 1.50 150 1.30 1.75 1.35 1.70 1.80 1.85 1.40 2.05 1.55 1.60 1.65 1.90 1.95 2.00 2.15 2.20 145 1.45 1.80 1.25 1.30 1.55 1.60 1.65 1.70 1.75 1.35 1.50 1.85 2.00 2.05 2.10 2.15 1.40 1.90 1.95 2.20 140 1.20 1.25 1.30 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.85 1.90 1.95 2.00 2.05 2.10 2.15 1.80 1.35 135 1.25 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10 2.15 1.20 2.20 1.30 30 1.55 2.10 1.20 1.50 1.60 1.65 2.00 1.35 1.40 1.45 1.70 1.75 1.80 1.85 1.90 2.05 2.15 1.95 1.25 1.40 1.45 1.50 1.95 2.00 2.05 2.10 1.30 1.35 1.55 1.60 1.65 1.70 1.75 1.85 1.90 2.15 1.20 1.80 120 PRESENT SHIM SIZE (mm) 0.41-0.45 0.51-0.55 0.96-1.00 1.11-1.15 0.15-0.19 0.20-0.30 0.36-0.40 0.46-0.50 0.56-0.60 0.61-0.65 0.71-0.75 1.01-1.05 1.06-1.10 0.05-0.09 0.10-0.14 0.31-0.35 0.66-0.70 0.76-0.80 0.81-0.85 0.86-0.90 0.91-0.95 1.16-1.20 1.21-1.25 MEASURED TAPPET CLEARANCE

- 6) Install the cam chain tension adjuster and camshafts. Refer to "Engine Top Side Assembly in Section 1D (Page 1D-26)".
- 7) Rotate the engine so that the tappet is depressed fully. This will squeeze out oil trapped between the shim and the tappet that could cause an incorrect measurement, then check the clearance again to confirm that it is within the specified range.
- 8) After finishing the tappet clearance adjustment, reinstall the removed parts. Refer to "Engine Top Side Assembly in Section 1D (Page 1D-26)".

## **Fuel Line Inspection**

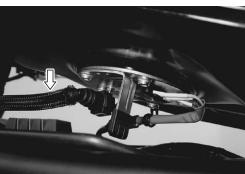
B817H20206007

## Inspect fuel line

Every 6 000 km (4 000 miles, 12 months)

Inspect the fuel line in the following procedures:

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- Remove the fuel tank mounting bolts. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Lift up the fuel tank.
- Inspect the fuel feed hose for damage and fuel leakage. If any defects are found, the fuel feed hose must be replaced.



I717H1020007-01

5) After finishing the Fuel feed hose Inspection, reinstall the removed parts.

#### **Engine Oil and Filter Replacement**

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## Replace engine oil

Initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

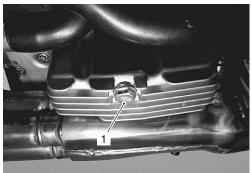
#### Replace oil filter

Initially at 1 000 km (600 miles, 2 months) and every 18 000 km (11 000 miles, 36 months) thereafter.

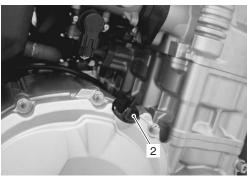
Oil should be changed while the engine is warm. Oil filter replacement at the above intervals, should be done together with the engine oil change.

#### **Engine Oil Replacement**

- 1) Keep the motorcycle upright with the center stand.
- 2) Place an oil pan below the engine, and drain engine oil by removing the oil drain plug (1) and filler cap (2).



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I717H1020008-0

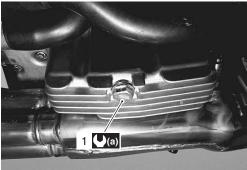
3) Tighten the oil drain plug (1) to the specified torque.

#### **⚠ CAUTION**

Replace the gasket washer with a new one.

#### Tightening torque

Oil drain plug (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I718H1020023-0

- 4) Pour new oil through the oil filler. When performing an oil change (without oil filter replacement), the engine will hold about 3.0 L (3.2/2.6 US/Imp qt) of oil. Use of SF/SG or SH/SJ in API with MA in JASO.
- 5) Start up the engine and allow it to run for several minutes at idling speed.

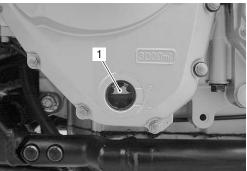
6) Turn off the engine and wait about three minutes, then check the oil level through the inspection window (3). If the level is below the "L" mark, add oil to the "F" mark. If the level is above the "F" mark, drain the oil until the level reaches the "F" mark.



I717H1020040-02

#### Oil Level Inspection

- 1) Keep the motorcycle upright with the center stand.
- 2) Start up the engine and allow it to run for several minutes at idling speed.
- 3) Turn off the engine and wait about three minutes, then check the oil level through the inspection window (1). If the level is below mark "L", add oil to "F" level. If the level is above mark "F", drain oil to "F" level.



I717H1020041-03

#### Oil Filter Replacement

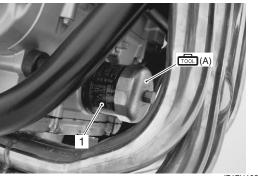
- 1) Drain engine oil as described in the engine oil replacement procedure.
- 2) Remove the oil filter (1) using the special tool.

#### NOTE

Remove the oil filter from the left side of the vehicle. Push the radiator hose aside if it interferes with the removal operation.

#### Special tool

(A): 09915-40610 (Oil filter wrench)



I717H1020009-01

Apply engine oil lightly to the O-ring of new oil filter, before installation.

#### **⚠ CAUTION**

# ONLY USE A GENUINE SUZUKI MOTORCYCLE OIL FILTER.

Other manufacturer's oil filters may differ in thread specifications (thread diameter and pitch), filtering performance and durability which may lead to engine damage or oil leaks. Also, do not use a genuine Suzuki automobile oil filter on this motorcycle.

4) Install a new oil filter. Turn it by hand until you feel that the oil filter O-ring contacts the oil filter mounting surface. Then, tighten the oil filter two full turns (or to specified torque) using the special tool.

#### NOTE

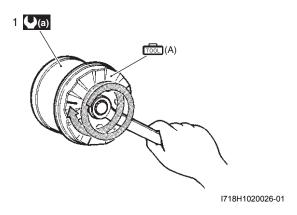
To properly tighten the oil filter, use the special tool. Never tighten the oil filter by hand only.

#### Special tool

(A): 09915-40610 (Oil filter wrench)

#### **Tightening torque**

Oil filter (a): 20 N·m (2.0 kgf-m, 14.5 lbf-ft)



5) Add new engine oil and check the oil level is as described in the engine oil replacement procedure.

Necessary amount of engine oil

Oil change: 3 000 ml (3.2/2.6 US/Imp qt)
Oil and filter change: 3 500 ml (3.7/3.1 US/Imp qt)
Engine overhaul: 3 700 ml (3.9/3.3 US/Imp qt)

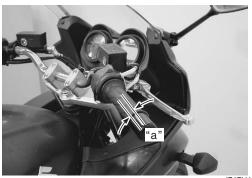
## **Throttle Cable Play Inspection and Adjustment**

B617F120

Inspect throttle cable play Initially at 1 000 km (6 000 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

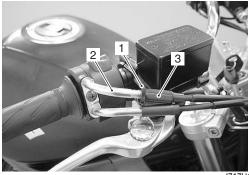
Inspect and adjust the throttle cable play "a" as follows.

Throttle cable play "a"
2.0 - 4.0 mm (0.08 - 0.16 in)



I717H1020010-01

- 1) Loosen the lock-nut (1) of the throttle pulling cable (2).
- 2) Turn the adjuster (3) in or out until the throttle cable play "a" (at the throttle grip) is between 2 4 mm (0.08 0.16 in).
- 3) Tighten the lock-nut (1) while holding the adjuster (3).



I717H1020042-02

#### **A WARNING**

After the adjustment is completed, check that handlebar movement does not raise the engine idle speed and that the throttle grip returns smoothly and automatically.

## **Throttle Valve Synchronization**

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## Inspect throttle valve synchronization Every 12 000 km (7 500 miles, 24 months)

Inspect the throttle valve synchronization periodically. Refer to "Throttle Valve Synchronization in Section 1D (Page 1D-16)".

#### **PAIR System Inspection**

B817H20206011

## **Inspect PAIR system**

Every 12 000 km (7 500 miles, 24 months)

Inspect the PAIR (air supply) system periodically. Refer to "PAIR System Inspection in Section 1B (Page 1B-7)".

## **Cooling System Inspection**

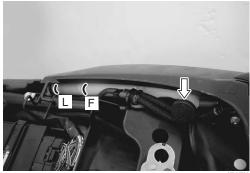
B817H20206012

Inspect cooling system
Every 6 000 km (4 000 miles, 6 months)

Replace engine coolant Every 2 years

#### **Engine Coolant Level Inspection**

- 1) Keep the motorcycle upright with the center stand.
- 2) Remove the seat. Refer to "Exterior Parts Construction (GSF650S/SAK7) in Section 9D (Page 9D-2)".
- 3) Check the engine coolant level by observing the full and lower lines on the engine coolant reservoir tank. If the level is below the lower line, add engine coolant to the full line from the engine coolant reservoir tank filler.



I717H1020011-01

4) Reinstall the seat.

#### **Engine Coolant Change**

Refer to "Engine Coolant Description in Section 1F (Page 1F-1)".

#### **A WARNING**

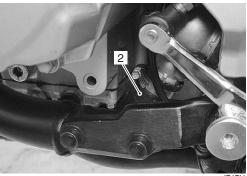
Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor. Engine coolant may be harmful if swallowed or if it comes in contact with skin or eyes. If engine coolant gets into the eyes or in contact with the skin, flush thoroughly with plenty of water. If swallowed, induce vomiting and call physician immediately.

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Remove the radiator cap (1).



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3) Drain engine coolant by disconnecting the water pump outlet hose (2).



I717H1020043-03

- 4) Flush the radiator with fresh water if necessary.
- 5) Reconnect the water pump outlet hose.
- 6) Pour the specified engine coolant up to the thermostat connector inlet.

**Engine coolant capacity** 

Reservoir side: 250 ml (0.3/0.2 US/Imp qt) Engine side: 2 750 ml (2.9/2.4 US/Imp qt))

- 7) Bleed air from the cooling circuit.
- 8) After changing engine coolant, reinstall the removed parts.

## Air Bleeding From the Cooling Circuit

- 1) Support the motorcycle upright with the center stand.
- 2) Lift up the fuel tank by removing the mounting bolts. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Place a rag under the thermostat connector.
- 4) Pour engine coolant up to the thermostat connector inlet.



1717H1020013-01

- 5) Slowly swing the motorcycle, right and left, to bleed the air trapped in the cooling circuit.
- 6) Add engine coolant up to the thermostat connector inlet.
- 7) Start up the engine and bleed air from the thermostat connector inlet completely.
- 8) Add engine coolant up to the thermostat connector inlet.
- 9) Repeat the 6), 7) procedures until no air bleeds from the thermostat connector inlet.
- 10) Close the radiator cap securely.
- 11) After warming up and cooling down the engine several times, add the engine coolant up to the full level of the reservoir.

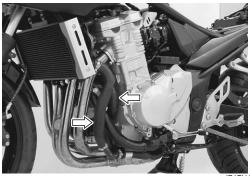
#### **↑** CAUTION

Make sure that the radiator is filled with engine coolant up to the reservoir full level.

12) Reinstall the removed parts.

#### **Radiator Hose Inspection**

Check the radiator hoses for crack, damage or engine coolant leakage. If any defect is found, replace the radiator hose with a new one.



I717H1020014-01



I717H1020015-01

#### **Clutch System Inspection**

B817H20206013

Inspect clutch hose and clutch fluid Every 6 000 km (4 000 miles, 12 months)

#### **▲ WARNING**

The clutch system of this motorcycle is filled with a glycol-based brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based. Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for a long period of mine. Check the clutch hose and hose joints for cracks and fluid leakage.

#### **Clutch Fluid Level Check**

- Keep the motorcycle upright and place the handlebars straight.
- 2) Check the clutch fluid level by observing the lower limit line on the clutch fluid reservoir. When the clutch fluid level is below the lower limit line, replenish with clutch fluid that meets the following specification.

BF: Brake fluid (DOT 4)



I718H1020034-0

#### **Clutch Hose Inspection**

- Remove the seat and left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Inspect the clutch hose for crack, damage or clutch fluid leakage. If it is defected, replace the clutch hose with a new one.



I717H1020016-01

4) After finishing the clutch hose inspection, reinstall the removed parts.

#### **Clutch Hose Replacement**

B817H20206014

#### Replace clutch hose Every 4 years

Refer to "Clutch Hose Removal and Installation in Section 5C (Page 5C-5)".

#### **Clutch Fluid Replacement**

B817H20206015

## Replace clutch fluid Every 2 years

Refer to "Clutch Fluid Replacement in Section 5C (Page 5C-4)".

## Air Bleeding from Clutch Fluid Circuit

Refer to "Air Bleeding from Clutch Fluid Circuit in Section 5C (Page 5C-3)".

#### **Drive Chain Inspection and Adjustment**

B817H20206016

#### Inspect drive chain

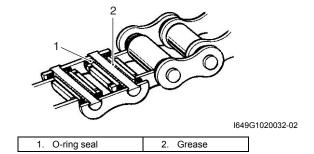
Initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

#### **Drive Chain Visual Check**

- With the transmission in neutral, support the motorcycle using the center-stand and turn the rear wheel slowly by hand.
- 2) Visually check the drive chain for the possible defects listed as follows. If any defects are found, the drive chain must be replaced. Refer to "Drive Chain Replacement in Section 3A (Page 3A-7)".
  - · Loose pins
  - · Damaged rollers
  - · Dry or rusted links
  - · Kinked or binding links
  - · Excessive wear
  - · Improper chain adjustment
  - · Missing O-ring seals

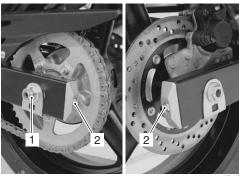
#### **NOTE**

When replacing the drive chain, replace the drive chain and sprockets as a set.



#### **Drive Chain Length Inspection**

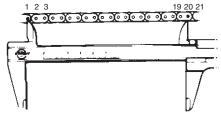
- 1) Loosen the axle nut (1).
- 2) Give tension to the drive chain fully by turning both chain adjuster bolts (2).



I717H1020017-02

 Count out 21 pins (20 pitches) on the chain and measure the distance between the two points. If the distance exceeds the service limit, the chain must be replaced.

<u>Drive chain 20-pitch length</u> Service limit: 323.8 mm (12.75 in)



I649G1020034-02

4) After finishing the drive chain length inspection, adjust the drive chain slack.

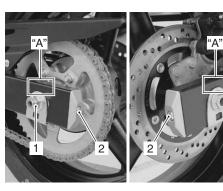
#### **Drive Chain Slack Adjustment**

- 1) Place the motorcycle on its center stand for accurate adjustment.
- 2) Loosen the axle nut (1).
- 3) Loosen or tighten both chain adjuster bolts (2) until there is 20 30 mm (0.8 1.2 in) "a" of slack at the middle of the chain between the engine and rear sprockets as shown.

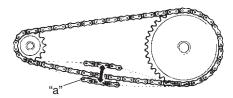
#### **⚠ CAUTION**

The reference marks "A" on both sides of the swingarm and the edge of each chain adjuster must be aligned to ensure that the front and rear wheels are correctly aligned.

Drive chain slack "a"
Standard 20 – 30 mm (0.8 – 1.2 in)



I717H1020018-02



I649G1020036-02

4) After adjusting the drive chain, tighten the axle nut (1) to the specified torque.

## **Tightening torque**

Rear axle nut: 100 N·m (10.0 kgf-m, 72.5 lbf-ft)

Recheck the drive chain slack after tightening the axle nut.

## **Drive Chain Cleaning and Lubricating**

B817H20206017

## Clean and lubricate drive chain Every 1 000 km (600 miles)

Clean and lubricate the drive chain in the following procedures:

 Clean the drive chain with kerosine. If the drive chain tends to rust quickly, the intervals must be shortened.

#### **⚠ CAUTION**

Do not use trichloroethylene, gasoline or any similar solvent.

These fluids have too great a dissolving power for this chain and they can damage the O-rings. Use only kerosine to clean the drive chain.

2) After cleaning and drying the chain, oil it with a heavyweight motor oil.

## **⚠ CAUTION**

- Do not use any oil sold commercially as "drive chain oil". Such oil can damage the O-rings.
- The standard drive chain is a RK 525SMOZ7Y. SUZUKI recommends to use this standard drive chain as a replacement.



I717H1020019-01

## **Brake System Inspection**

B817H20206018

#### Inspect brake system

Initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

Inspect brake hose and brake fluid Every 6 000 km (4 000 miles, 12 months)

#### **▲ WARNING**

- The brake system of this motorcycle is filled with a glycol-based brake fluid. Do not use or mix different types of fluid such as silicone-based and petroleum-based fluids. Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for a long period of time.
- Brake fluid, if it leaks, will interfere with safe running and immediately discolor painted surfaces. Check the brake hoses and hose joints for cracks and oil leakage before riding.

#### **Brake Fluid Level Check**

- 1) Keep the motorcycle upright and place the handlebars straight.
- 2) Check the brake fluid level by observing the lower limit lines on the front and rear brake fluid reservoirs. When the brake fluid level is below the lower limit line, replenish with brake fluid that meets the following specification.

## BF: Brake fluid (DOT 4)



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I718H1020040-01

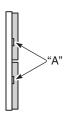
## **Brake Pads Check**

The extent of brake pad wear can be checked by observing the grooved limit line "A" on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to "Front Brake Pad Replacement in Section 4B (Page 4B-2)" and "Rear Brake Pad Replacement in Section 4C (Page 4C-2)".

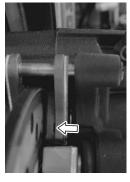
#### **⚠ CAUTION**

Replace the brake pad as a set, otherwise braking performance will be adversely affected.





I717H1020020-01





I717H1020021-01

#### Front and Rear Brake Hose Inspection

 Inspect the brake hoses and hose joints for crack, damage or brake oil leakage. If any defects are found, replace the brake hose with a new one. Refer to "Brake Hose Removal and Installation in Section 4A (Page 4A-8)".



I717H1020022-01



I717H1020023-02

#### **Brake Pedal Height Inspection and Adjustment**

1) Inspect the brake pedal height "a" between the pedal top face and footrest.

Adjust the brake pedal height if necessary.

Brake pedal height "a"

Standard: 55 – 65 mm (2.0 – 2.6 in)

- 2) Loosen the lock-nut (1).
- 3) Turn the push rod (2) until the brake pedal becomes 55 65 mm (2.0 2.6 in) "a" below the top of the footrest.
- 4) Tighten the lock-nut (1) securely.

**Tightening torque** 

Rear brake master cylinder rod lock-nut (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



I717H1020024-02

#### **Brake Hose Replacement**

## Replace brake hose

**Every 4 years** 

Refer to "Brake Hose Removal and Installation in Section 4A (Page 4A-8)".

#### **Brake Fluid Replacement**

## Replace brake fluid

**Every 2 years** 

Refer to "Brake Fluid Replacement in Section 4A (Page 4A-7)".

#### Air Bleeding from Brake Fluid Circuit

Refer to "Air Bleeding from Brake Fluid Circuit in Section 4A (Page 4A-5)".

#### Rear Brake Light Switch Adjustment

Refer to "Rear Brake Light Switch Inspection and Adjustment in Section 4A (Page 4A-5)".

#### **Tire Inspection**

B817H20206019

#### Inspect tire

Every 6 000 km (4 000 miles, 12 months)

#### **Tire Tread Condition**

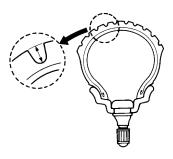
Operating the motorcycle with excessively worn tires will decrease riding stability and consequently invite a dangerous situation. It is highly recommended to replace a tire when the remaining depth of tire tread reaches the following specification.

#### Special tool

ான் : 09900-20805 (Tire depth gauge)

Tire tread depth (Service limit)

Front: 1.6 mm (0.06 in) Rear: 2.0 mm (0.08 in)



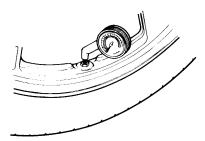
I310G1020068-02

#### Tire Pressure

If the tire pressure is too high or too low, steering will be adversely affected and tire wear increased. Therefore, maintain the correct tire pressure for good roadability or shorter tire life will result. Cold inflation tire pressure is as follows.

#### Cold inflation tire pressure

		Solo ridin	<u></u> g	[	Dual riding	g
	kPa	kgf/cm <sup>2</sup>	psi	kPa	psi	
Front	250	2.50	36	250	2.50	36
Rear	250	2.50	36	290	2.90	42



I310G1020069-02

#### **↑** CAUTION

The standard tire fitted on this motorcycle is 120/70 ZR17 M/C (58W) for front and 160/60 ZR17 M/C (69W) for rear. The use of tires other than those specified may cause instability. It is highly recommended to use a SUZUKI Genuine Tire.

#### Tire type BRIDGESTONE

- Front
  - BT011F G (GSF650)
  - BT011F M (GSF650S)
- Rear: BT020R G

## Steering System Inspection

B817H20206020

#### Inspect steering system

Initially at 1 000 km (600 miles, 2 months) and every 12 000 km (7 500 miles, 24 months) thereafter.

Steering should be adjusted properly for smooth turning of handlebars and safe running. Overtighten steering prevents smooth turning of the handlebars and too loose steering will cause poor stability.

- 1) Check that there is no play in the front fork.
- Support the motorcycle so that the front wheel is off the ground, with the wheel facing straight ahead, grasp the lower fork tubes near the axle and pull forward.

If play is found, readjust the steering. Refer to "Steering Tension Adjustment in Section 6B (Page 6B-10)".



I717H1020025-01

#### **Front Fork Inspection**

B817H20206021

#### Inspect front fork

#### Every 12 000 km (7 500 miles, 24 months)

Inspect the front forks for oil leakage, scoring or scratches on the outer surface of the inner tubes. Replace any defective parts, if necessary. Refer to "Front Fork Parts Inspection in Section 2B (Page 2B-9)".



1717H1020026-01

## **Rear Suspension Inspection**

B817H20206022

#### Inspect rear suspension Every 12 000 km (7 500 miles, 24 months)

Inspect the rear shock absorbers for oil leakage and check that there is no play in the swingarm. Replace any defective parts, if necessary. Refer to "Rear Shock Absorber Removal and Installation in Section 2C (Page 2C-3)", "Cushion Lever Removal and Installation in Section 2C (Page 2C-6)" and "Swingarm / Cushion Rod Removal and Installation in Section 2C (Page 2C-8)".



I717H1020027-01



I717H1020028-01

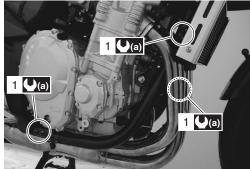
## **Chassis Bolt and Nut Inspection**

B817H20206023

## Tighten chassis bolt and nut

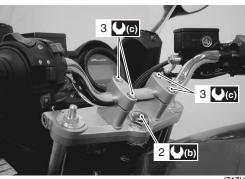
Initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

Check that all chassis bolts and nuts are tightened to their specified torque.



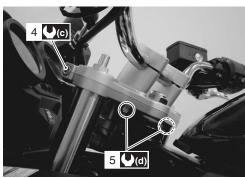
I717H1020029-01

1 (5.0 kgf-m, 36.0 lb-ft)



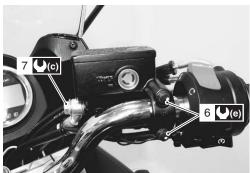
I717H1020030-01

2 <b>(J(b)</b>	Steering stem head nut 65 N·m (6.5 kgf-m, 47.0 lb-ft)
3 <b>(J(c)</b>	Handlebar holder bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)



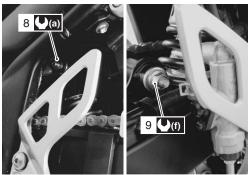
I717H1020031-02

4 <b>()(c)</b>	Front fork upper clamp bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)
5 (J(d)	Handlebar holder set nut 45 N·m (4.5 kgf-m, 32.5 lb-ft)



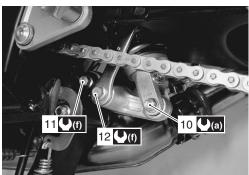
I717H1020032-01

6 <b>( ( e )</b>	Front brake master cylinder mounting bolt 10 N·m (1.0 kgf-m, 7.0 lb-ft)
7 (0/6)	Brake hose union holt 23 N.m (2.3 kgf-m. 16.5 lh-ft)



I717H1020033-02

8 <b>((a)</b>	Rear shock absorber mounting nut (Upper) 50 N·m (5.0 kgf-m, 36.0 lb-ft)
9 <b>(f)</b>	Cushion rod mounting nut 78 N·m (7.8 kgf-m, 56.5 lb-ft)

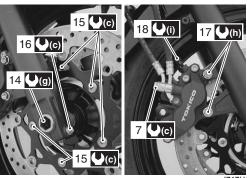


I717H1020034-01

10 <b>(4)</b>	Rear shock absorber mounting nut (Lower) 50 N·m (5.0 kgf-m, 36.0 lb-ft)
11 <b>(J)</b>	Cushion lever mounting nut 78 N·m (7.8 kgf-m, 56.5 lb-ft)
12 <b>(f)</b>	Cushion rod mounting nut 78 N·m (7.8 kgf-m, 56.5 lb-ft)

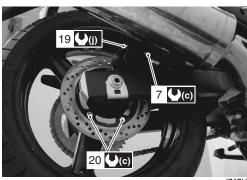
I717H1020035-02

13 (C) Front fork lower clamp bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)



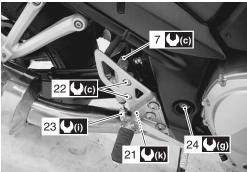
I717H1020036-02

7 <b>()(c)</b>	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)
14 <b>(g)</b>	Front axle 100 N·m (10.0 kgf-m, 72.5 lb-ft)
15 <b>()(c)</b>	Brake disc bolt (Front) 23 N·m (2.3 kgf-m, 16.5 lb-ft)
16 <b>()(c)</b>	Front axle pinch bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)
17 <b>(J(h)</b>	Front brake caliper mounting bolt 25 N·m (2.5 kgf-m, 18.0 lb-ft)
18 <b>()(i)</b>	Air bleeder valve (Front brake) 8.5 N·m (0.85 kgf-m, 6.1 lb-ft)



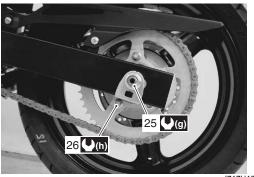
I717H1020037-01

		Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)
19	<b>(</b> j)	Air bleeder valve (Rear brake) 6 N·m (0.6 kgf-m, 4.5 lb-ft)
20	(U(c)	Brake disc holt (Rear) 23 N.m (2.3 kgf-m, 16.5 lb-ft)



I717H1020038-01

7 <b>(J(c)</b>	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)
21 <b>(k)</b>	Front footrest bolt 35 N·m (3.5 kgf-m, 25.5 lb-ft)
22 <b>(C)</b>	Rear brake master cylinder mounting bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)
23 <b>(i)</b>	Rear brake master cylinder rod lock-nut 18 N-m (1.8 kgf-m, 13.0 lb-ft)
24 <b>(g)</b>	Swingarm pivot nut 100 N·m (10.0 kgf-m, 72.5 lb-ft)



I717H1020039-02
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25	<b>(</b> (g)	Rear axle nut 100 N·m (10.0 kgf-m, 72.5 lb-ft)
26	<b>(</b> h)	Rear sprocket nut 60 N·m (6.0 kgf-m, 43.5 lb-ft)

## **Compression Pressure Check**

B817H2020602

Refer to "Compression Pressure Check in Section 1D (Page 1D-4)".

## **Oil Pressure Check**

B817H20206025

Refer to "Oil Pressure Check in Section 1E (Page 1E-3)".

## **SDS Check**

B817H20206026

Refer to "SDS Check in Section 1A (Page 1A-17)".

## **Specifications**

## **Tightening Torque Specifications**

B817H20207001

Fastening part	Ti	ghtening torq	Note	
rastering part	N⋅m	kgf-m	lbf-ft	Note
Exhaust pipe bolt	23	2.3	16.5	☞(Page 0B-5)
Exhaust pipe mounting bolt	23	2.3	16.5	☞(Page 0B-5)
Muffler connecting bolt	23	2.3	16.5	☞(Page 0B-5)
Muffler mounting nut	25	2.5	18.0	☞(Page 0B-5)
Oil drain plug	23	2.3	16.5	☞(Page 0B-12)
Oil filter	20	2.0	14.5	☞(Page 0B-13)
Rear axle nut	100	10.0	72.5	☞(Page 0B-18)
Rear brake master cylinder rod lock-nut	18	1.8	13.0	☞(Page 0B-20)

#### **NOTE**

The specified tightening torque is also described in the following.

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

## **Recommended Service Material**

B817H20208001

Material	SUZUKI recommended produc	ct or Specification	Note
Brake fluid	DOT 4	_	☞(Page 0B-16) /
			☞(Page 0B-19)

#### NOTE

Required service material is also described in the following.

- "Lubrication Points (GSF650/S/A/SAK7) (Page 0B-2)"
- "Lubrication Points (GSX650FK8) (Page 0B-3)"

## Special Tool

09900–20803
Thickness gauge

(Page 0B-8)

09915–40610
Oil filter wrench

(Page 0B-13) /

(Page 0B-13)

<sup>&</sup>quot;Chassis Bolt and Nut Inspection (Page 0B-22)"

## **Service Data**

## **Specifications**

## Service Data (GSF650/S/U/SUK7)

Valve + Guide Unit: mm (in) B817H20307001

Item		Standard	Limit
Valve diam.	IN.	23 (0.91)	_
valve diam.	EX.	20 (0.79)	_
Valve clearance (when cold)	IN.	0.10 - 0.20 (0.004 - 0.008)	_
valve clearance (when cold)	EX.	0.20 - 0.30 (0.008 - 0.012)	_
Valve guide to valve stem clearance	IN.	0.010 - 0.037 (0.0004 - 0.0015)	_
valve guide to valve sterri clearance	EX.	0.030 - 0.057 (0.0012 - 0.0022)	_
Valve stem deflection	IN. & EX.	_	0.35 (0.014)
Valve guide I.D.	IN. & EX.	4.500 – 4.512 (0.1772 – 0.1776)	_
Valve stem O.D.	IN.	4.475 – 4.490 (0.1762 – 0.1768)	_
valve stelli O.D.	EX.	4.455 – 4.470 (0.1754 – 0.1760)	_
Valve stem runout	IN. & EX.	_	0.05 (0.002)
Valve head thickness	IN. & EX.	_	0.5 (0.02)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	_
Valve head radial runout	IN. & EX.	_	0.03 (0.001)
Valve spring free length	IN. & EX.	_	40.4 (1.59)
Valve spring tension	IN. & EX.	182 – 210 N (18.2 – 21.0 kgf, 40.1 – 46.3 lbs) at length 36.0 mm (1.42 in)	_

## Camshaft + Cylinder Head

Unit: mm (in)

Item		Standard		
Cam height	IN.	35.65 – 35.69 (1.4035 – 1.4051)	35.35 (1.3917)	
Can neight	EX.	35.37 – 35.41 (1.3925 – 1.3941)	35.07 (1.3807)	
Camshaft journal oil clearance	IN. & EX.	0.032 - 0.066 (0.0013 - 0.0026)	0.150 (0.0059)	
Camshaft journal holder I.D.	IN. & EX.	24.012 - 24.025 (0.9454 - 0.9459)	_	
Camshaft journal O.D.	IN. & EX.	23.959 – 23.980 (0.9433 – 0.9441)	_	
Camshaft runout	IN. & EX.	_	0.10 (0.004)	
Cam chain pin (at arrow "3")		16th pin		
Cylinder head distortion		<del>-</del>	0.20 (0.008)	

Service Data: 0C-2

# **Cylinder + Piston + Piston Ring** Unit: mm (in)

Item	Standard		Limit
Compression pressure	1 200 1 6	00 kPa (12 – 16 kgf/cm², 171 – 226 psi)	900 kPa
Compression pressure	1 200 - 1 0	00 KF a (12 - 10 kg//cm , 17 1 - 220 psi)	(9 kgf/cm <sup>2</sup> , 128 psi)
Compression pressure difference			200 kPa
Compression pressure difference		<del>-</del>	(2 kgf/cm <sup>2</sup> , 28 psi)
Piston-to-cylinder clearance		030 - 0.040 (0.0012 - 0.0016)	0.120 (0.0047)
Cylinder bore		500 – 65.515 (2.5787 – 2.5793)	Nicks or Scratches
Piston diam.		465 – 65.480 (2.5774 – 2.5779)	65.380 (2.574)
i istori diarri.	Measu	re 15 mm (0.6 in) from the skirt end.	03.300 (2.374)
Cylinder distortion			0.20 (0.008)
Piston ring free end gap	1st IR	Approx. 9.1 (0.36)	7.2 (0.28)
I istorring free end gap	2nd R	Approx. 9.2 (0.36)	7.2 (0.28)
Piston ring end gap	1st IR	0.06 - 0.21 (0.002 - 0.008)	0.5 (0.020)
I istorring end gap	2nd R	0.06 - 0.21 (0.002 - 0.008)	0.5 (0.020)
Piston ring-to-groove clearance	1st		0.180 (0.007)
1 istori mig-to-groove clearance	2nd		0.150 (0.006)
	1st	1.01 – 1.03 (0.040 – 0.041)	_
Piston ring groove width	2nd	0.81 - 0.83 (0.032 - 0.033)	
	Oil	1.51 – 1.53 (0.059 – 0.060)	
Piston ring thickness	1st	0.97 - 0.99 (0.038 - 0.039)	_
· ·	2nd	0.77 - 0.79 (0.030 - 0.031)	_
Piston pin bore I.D.	14.002 – 14.008 (0.5513 – 0.5515)		14.030 (0.5524)
Piston pin O.D.	13.	995 – 14.000 (0.5510 – 0.5512)	13.980 (0.5504)

## **Conrod + Crankshaft**

Unit: mm (in)

Item		Standard	Limit
Conrod small end I.D.		14.040 (0.5528)	
Conrod big end side clearance		0.10 - 0.20 (0.004 - 0.008)	0.30 (0.012)
Conrod big end width		20.95 - 21.00 (0.825 - 0.827)	_
Crank pin width		21.10 - 21.15 (0.831 - 0.833)	_
Conrod big end oil clearance	0.032 - 0.056 (0.0013 - 0.0022)		0.080 (0.0031)
Crank pin O.D.		_	
Crankshaft journal oil clearance	0.016 - 0.040 (0.0006 - 0.0016)		0.080 (0.0031)
Crankshaft journal O.D.	33.976 – 34.000 (1.3376 – 1.3386)		_
Crankshaft thrust clearance		0.055 - 0.110 (0.0022 - 0.0043)	_
Crankshaft thrust bearing thickness	Right side	2.425 – 2.450 (0.0955 – 0.0965)	_
Crankshall thrust bearing thickness	Left side	2.350 - 2.500 (0.0925 - 0.0984)	_
Crankshaft runout		<del>_</del>	0.05 (0.002)

## Oil Pump

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	100 – 400 kPa (1.0 – 4.0 kgf/cm², 14 – 57 psi)	_
	at 3 000 r/min	

## Clutch

Unit: mm (in)

• ()			
Item		Limit	
Clutch drive plate thickness	No.1, 2, 3	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
Clutch drive plate claw width	No.1, 2, 3	13.7 – 13.8 (0.539 – 0.543)	13.0 (0.51)
Clutch driven plate distortion		_	0.10 (0.004)
Clutch spring free length	54.15 (2.13)		51.5 (2.01)
Clutch master cylinder bore	14.000 – 14.043 (0.5511 – 0.5529)		_
Clutch master cylinder piston diam.	13.957 – 13.984 (0.5495 – 0.5506)		_
Clutch release cylinder bore	38.18 – 38.23 (1.503 – 1.505)		_
Clutch release cylinder piston diam.	38.08 – 38.13 (1.500 – 1.501)		_
Clutch fluid type		_	

## 0C-3 Service Data:

## **Transmission + Drive Chain**

Unit: mm (in) Except ratio

Item			Limit	
Primary reduction ratio			_	
Final reduction ratio			3.200 (48/15)	_
	1st		3.076 (40/13)	_
	2nd		2.058 (35/17)	_
Gear ratios	3rd		1.600 (32/20)	_
Geal Tallos	4th		1.363 (30/22)	_
	5th	1.208 (29/24)		_
	Тор		_	
Shift fork to groov	ve clearance	No.1, 2, 3	0.1 - 0.3 (0.004 - 0.012)	0.5 (0.02)
Shift fork groove		No.1, 2, 3 5.0 – 5.1 (0.197 – 0.201)		_
Shift fork thickness	SS	4.8 – 4.9 (0.189 – 0.193)		_
		Туре	RK 525SMOZ7Y	_
Drive chain	Drive chain		118 links	_
		20-pitch length —		323.8 (12.75)
Drive chain slack	,	20 – 30 (0.8 – 1.2)		_
Gearshift lever he	eight		45 – 55 (1.8 – 2.2)	

## Thermostat + Radiator + Fan + Coolant

Item		Standard/Specification	Note	
Thermostat valve opening temperature		Approx. 82 °C (180 °F)		
Thermostat valve lift	8 n	nm (0.31 in) and over at 95 °C (203 °F)	_	
	20 °C (68 °F)	Approx. 2.45 kΩ	_	
ECT sensor resistance	50 °C (122 °F)	Approx. 0.811 kΩ	_	
ECT Selisur resistance	80 °C (176 °F)	Approx. 0.318 kΩ	_	
	110 °C (230 °F)	Approx. 0.142 kΩ	_	
Radiator cap valve opening pressure	93 – 12	_		
Cooling fan operating temperature	OFF→ON	Approx. 105 °C (221 °F)	_	
	ON→OFF	Approx. 100 °C (212 °F)	_	
Engine coolant type	Use an antifreeze/coolant compatible with aluminum radiator, mixed with distilled water only, at the ratio of 50:50.		_	
Engine coolant	Reservoir tank side	Approx. 250 ml (0.3/0.2 US/lmp qt)		
	Engine side	Approx. 2 750 ml (2.9/2.4 US/Imp qt)		

## Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11 – 13 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	166 ml (5.6/5.8 US/Imp oz) and more/10 sec.	
Fuel pressure regulator operating set	Approx. 300 kPa (3.0 kgf/cm², 43 psi)	
pressure	Approx. 300 KFa (3.0 Kgi/CIIF, 43 psi)	

## FI Sensors + Secondary Throttle Valve Actuator

Item		Standard/Specification	Note
CKP sensor resistance		90 – 150 Ω	
CKP sensor peak voltage		2.0 V and more	When cranking
IAP sensor (# 1) input voltage		4.5 – 5.5 V	
IAP sensor (# 1) output voltage		Approx. 2.7 V at idle speed	
IAP sensor (# 2) input voltage		4.5 – 5.5 V	
IAP sensor (# 2) output voltage		2.0 – 3.0 V at idle speed	
TP sensor input voltage		4.5 – 5.5 V	
TP sensor output voltage	Closed Opened	Approx. 1.1 V Approx. 4.3 V	
ECT sensor input voltage		4.5 – 5.5 V	
ECT sensor output voltage		0.15 – 4.85 V	
ECT sensor resistance		Approx. 2.45 kΩ at 20 °C (68 °F)	
IAT sensor input voltage		4.5 – 5.5 V	
IAT sensor output voltage		Approx. 2.4 V at 20 °C (68 °F)	
IAT sensor resistance		Approx. 2.56 kΩ at 20 °C (68 °F)	
TO sensor resistance		16.5 – 22.3 kΩ	
	Normal	0.4 – 1.4 V	
TO sensor voltage	Leaning	3.7 – 4.4 V	When leaning 65°
GP switch voltage		0.6 V and more	From 1st to Top
Injector voltage		Battery voltage	
Ignition coil primary peak voltage		When cranking	
STP sensor input voltage		4.5 – 5.5 V	
STP sensor output voltage	Closed	Approx. 0.6 V	
31F Selisor output voltage	Opened	Approx. 4.5 V	
STV actuator resistance		Approx. 7.0 Ω	
ISC valve resistance		Approx. 20 Ω at 20 °C (68 °F)	
HO2 sensor heater resistance		Approx. 8 Ω at 23 °C (73 °F)	
HO2 sensor heater voltage		Battery voltage 0.3 V and less at idle speed	
HO2 sensor output voltage			
PAIR control solenoid valve resistance	18 – 22 Ω at 20 – 30 °C (68 – 86 °F)		
PAIR control solenoid valve voltage		Battery voltage	

## **Throttle Body**

Item	Specification			
Bore size	36 mm			
I.D. No.	17H0			
Idle r/min.	1 200 ± 100 r/min.			
Fast idle r/min.	1 300 – 1 800 r/min. (When cold engine)			
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)			

## 0C-5 Service Data:

## **Electrical**

Unit: mm (in)

Item			Specification	Note	
Firing order				1 · 2 · 4 · 3	
Spark plug	Spark plug		Туре	NGK: CR9E DENSO: U27ESR-N	
			Gap	0.7 - 0.8 (0.028 - 0.031)	
Spark perfor			O	over 8 (0.3) at 1 atm.	
CKP sensor				90 – 150 Ω	
CKP sensor	peak voltage			2.0 V and more	When cranking
Ignition coil	resistance		Primary	1.1 – 1.9 Ω	Terminal – Terminal
_			Secondary	10.8 – 16.2 kΩ	Plug cap – Terminal
	primary peak	voltage		80 V and more	When cranking
	oil resistance			$0.2 - 0.8 \Omega$	
	Generator maximum output		Approx. 400 W at 5 000 r/min		
	Generator no-load voltage (When engine is cold)		60 V (AC) and more at 5 000 r/min		
Regulated v	oltage		14.0 – 15.5 V at 5 000 r/min		
Starter moto	or brush length	-	Standard Limit	7.0 (0.28) 3.5 (0.14)	
Starter relay	resistance		3 – 6 Ω		
,	Type des	ignation	YTX9-BS		
Battery	Capa		12 V 28.8 kC (8 Ah)/10 HR		
_	Standard ele		1.320 at 20 °C (68 °F)		
	Ы			10 A	
Headlight ——		LO	10 A		
	Fuel		10 A		
Fuse size	Igni		15 A		
	Sig		15 A		
	Fa		15 A		
	Ma	in		30 A	

# Wattage Unit: W

Itam		Speci	fication
Item		GSF650/U	GSF650S/SU
Headlight	HI	60	55
Headilgiit	LO	55	<b>←</b>
Position/Parking light		5	5 x 2
Brake light/Taillight		21/5	<b>←</b>
Turn signal light		21 x 4	<b>←</b>
License plate light		5	<b>←</b>
Speedometer light		LED	<b>←</b>
Tachometer light		LED	<b>←</b>
Turn signal indicator light		LED x 2	<b>←</b>
High beam indicator light		LED	<b>←</b>
Neutral position indicator light		LED	<b>←</b>
Oil pressure indicator light		LED	<b>←</b>
FI indicator light		LED	←
Coolant temperature indicator light		LED	<b>←</b>

## Brake + Wheel

Unit: mm (in)

Item		Standard			
Rear brake pedal height		50	_		
Brake disc thickness	Front		4.8 – 5.2 (0.189 – 0.205)	4.5 (0.18)	
brake disc trickriess	Rear		4.8 – 5.2 (0.189 – 0.205)	4.5 (0.18)	
Brake disc runout			_	0.30 (0.012)	
Master cylinder bore	Front	14.00	00 – 14.043 (0.5512 – 0.5529)	_	
Iwaster cylinder bore	Rear	14.00	00 – 14.043 (0.5512 – 0.5529)	_	
Master cylinder piston diam.	Front	13.95	57 – 13.984 (0.5495 – 0.5506)	_	
lwaster cylinder pistori diam.	Rear	13.95	57 – 13.984 (0.5495 – 0.5506)	_	
	Front	Leading	27.050 – 27.126 (1.0650 – 1.0680)	_	
Brake caliper cylinder bore	FIOR	Trailing	30.280 – 30.356 (1.1921 – 1.1951)	_	
	Rear	38.18	_		
	Front	Leading	26.920 – 26.970 (1.0598 – 1.0618)	_	
Brake caliper piston diam.	FIOR	Trailing	30.150 – 30.200 (1.1870 – 1.1890)	_	
	Rear	38.08	_		
Brake fluid type			DOT 4	_	
Wheel rim runout	Axial		2.0 (0.08)		
Vineerinii runout	Radial		_		
M/b a all and a min and	Front		_	0.25 (0.010)	
Wheel axle runout	Rear		0.25 (0.010)		
Wheel rim size	Front		17 M/C x MT 3.50	_	
VVIICEI IIIII SIZE	Rear		17 M/C x MT 5.00	_	

## Tire

Item		Standard			
Cold inflation tire pressure	Front	250 kPa	(2.50 kgf/cm <sup>2</sup> , 36 psi)	_	
(Solo riding)	Rear		(2.50 kgf/cm <sup>2</sup> , 36 psi)	_	
Cold inflation tire pressure	Front		(2.50 kgf/cm <sup>2</sup> , 36 psi)	_	
(Dual riding)	Rear		290 kPa (2.90 kgf/cm², 42 psi)		
Tire size	Front	120/70 ZR17 M/C (58 W)		_	
THE SIZE	Rear	160/60 ZR17 M/C (69 W)		_	
	Front	GSF650/U	BRIDGESTON BT011F G	_	
Tire type	1 TOTAL	GSF650S/SU	BRIDGESTON BT011F M		
	Rear	BRIDGESTON BT020R G		_	
Tire tread depth	Front		1.6 mm (0.06 in)		
(Recommended depth)	Rear		2.0 mm (0.08 in)		

Suspension Unit: mm (in)

Item		Standard	Limit
Front fork stroke		130 (5.1)	_
Front fork inner tube O.D.		41 (1.61)	_
Front fork spring free length		375.5 (14.78)	368 (14.5)
Front fork oil level (Without spring,	GSF650/U	133 (5.2)	_
outer tube fully compressed)	GSF650S/SU	132 (5.2)	_
Front fork oil type	SUZUKI FORK	OIL G10 or an equivalent fork oil	_
Front fork oil capacity (Each leg)	GSF650/U	458 ml (15.5/16.1 US/lmp oz)	_
Front lork on capacity (Each leg)	GSF650S/SU	459 ml (15.5/16.2 US/lmp oz)	_
Front fork spring adjuster	GSF650/U	5th groove from top	
Front lork spring adjuster	GSF650S/SU	our groove from top	_
Rear shock absorber spring adjuster		3rd position	_
Rear shock absorber damping force	Rebound	1-1/4 turns out from stiffest	
adjuster	Reboulla	position	_
Rear wheel travel	128 (5.0)		_
Swingarm pivot shaft runout	_		0.3 (0.01)

Fuel + Oil

Item		Specification	Note
		gasoline of at least 87 pump octane (R/2	
	+ M/2) or 91 octane	e or higher rated by the research method.	
	Gasoline containing	g MTBE (Methyl Tertiary Butyl Ether), less	E-28
Fuel type	than 10% ethanol,	or less than 5% methanol with	
	appropriate cosolve		
		uld be graded 91 octane or higher. An	The others
	unleaded gasoline	THE UTILETS	
Fuel tank capacity		19 L (5.0/4.2 US/Imp gal)	
Engine oil type	SAE 10 W-40,		
	Change	3 000 ml (3.2/2.6 US/lmp qt)	
Engine oil capacity	Filter change	3 500 ml (3.7/3.1 US/lmp qt)	
	Overhaul	3 700 ml (3.9/3.3 US/Imp qt)	

## **Tightening Torque List**

**Engine** 

B817H20307002

Item		N⋅m	kgf-m	lb-ft	
Exhaust pipe bolt			23	2.3	16.5
Exhaust pipe mounting bolt			23	2.3	16.5
Muffler connecting bolt			23	2.3	16.5
Muffler mounting nut			25	2.5	18.0
Speed sensor rotor bolt			25	2.5	18.0
Speed sensor bolt			6.5	0.65	4.7
Engine sprocket nut			115	11.5	83.0
	Fron	t upper	55	5.5	40.0
Engine mounting nut		upper	88	8.8	63.5
		rlower	88	8.8	63.5
Engine mounting bracket bolt			23	2.3	16.5
Cylinder head cover bolt			14	1.4	10.0
Spark plug			11	1.1	8.0
Camshaft journal holder bolt			10	1.0	7.0
Oil pipe mounting bolt			10	1.0	7.0
		Initial	16	1.6	11.5
Camshaft sprocket bolt		Final	25	2.5	18.0
Cam chain tension adjuster cap bo	t	'	23	2.3	16.6
Cam chain tension adjuster mounti			10	1.0	7.0
•		Initial	25	2.5	18.0
Cylinder head bolt	[M10]	Final	42	4.2	30.5
·	1	M6]	10	1.0	7.0
Water inlet connector bolt		-	10	1.0	7.0
PAIR reed valve cover bolt			11	1.1	8.0
Clutch sleeve hub nut			150	15.0	108.5
Clutch spring set bolt			10	10	7.0
Starter clutch cover bolt			25	2.5	18.0
Generator rotor bolt			120	12.0	87.0
Generator stator set bolt			11	1.1	8.0
Gearshift cam stopper bolt			10	1.0	7.0
Gearshift cam stopper plate bolt			13	1.3	9.5
Gearshift arm stopper			19	1.9	13.5
Gearshift lever bolt			40	4.0	29.0
Gearshift shaft end bolt			10	1.0	7.0
Gear position switch mounting bolt			6.5	0.65	4.7
Oil pressure switch			14	1.4	10.0
Oil pressure switch lead wire bolt			1.5	0.15	1.1
·	FN 403	(Initial)	6	0.6	4.5
Considerate half	[M6]	(Final)	11	1.1	8.0
Crankcase bolt	FN 403	(Initial)	15	1.5	11.0
	[M8]	(Final)	26	2.6	19.0

Item		N⋅m	kgf-m	lb-ft
Crankshaft journal bolt	[M9] (Initia	al) 18	1.8	13.0
Crankshalt journal bolt	(Fina	al) 32	3.2	23.0
	(Cylinder head	d) 10	1.0	7.0
	[M6]	10	1.0	7.0
Oil gallery plug	[M8]	10	1.0	7.0
	[M12]	15	1.5	11.0
	[M16]	35	3.5	25.5
Oil gallery bolt		10	1.0	7.0
Oil gallery jet	22	2.2	16.0	
Oil drain plug		23	2.3	16.5
Piston cooling oil jet bolt		10	1.0	7.0
Oil pump mounting bolt		10	1.0	7.0
Conrod cap bolt	Initial	15	1.5	11.0
Cornod cap boil	Final		90° (1/4 turn)	
Gearshift fork shaft retainer screw		10	1.0	7.0
Countershaft bearing retainer screw		12	1.2	8.5
Push rod oil seal bolt		12	1.2	8.5
Oil filter		20	2.0	14.5
Starter motor lead wire mounting bolt	5	0.5	3.5	

## FI System and Intake Air System

Item	N⋅m	kgf-m	lb-ft
CKP sensor mounting bolt	11	1.1	8.0
Fuel delivery pipe mounting screw	3.5	0.35	2.5
Fuel pump mounting bolt	10	1.0	7.0
STPS mounting screw	3.5	0.35	2.5
ISC valve mounting screw	3.5	0.35	2.5
GP switch mounting bolt	7	0.7	5.0
HO2 sensor	25	2.5	18.0

## **Cooling System**

Item	N⋅m	kgf-m	lb-ft
Impeller securing bolt	8	0.8	6.0
Water pump case screw	6	0.6	4.5
Water pump mounting bolt	10	1.0	7.0
Water pump air vent bolt	13	1.3	9.5
Water hose clamp bolt	2	0.2	1.5
ECT sensor	18	1.8	13.0
Thermostat connector cap bolt	10	1.0	7.0

## 0C-9 Service Data:

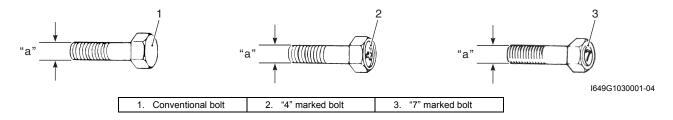
## **Chassis**

Item	N⋅m	kgf-m	lb-ft
Steering stem head nut	65	6.5	47.0
Steering stem nut	Tighten 45 N·m (4.5 kgf-m, 32.5 lb-ft) then turn back 1/2 – 1/4.		
Front fork upper clamp bolt	23	2.3	16.5
Front fork lower clamp bolt	23	2.3	16.5
Front fork cap bolt	23	2.3	16.5
Front fork cylinder bolt	30	3.0	21.5
Front axle	100	10.0	72.5
Front axle pinch bolt	23	2.3	16.5
Handlebar holder bolt	23	2.3	16.5
Handlebar holder set nut	45	4.5	32.5
Master cylinder mounting bolt (Front brake and Clutch)	10	1.0	7.0
Front brake caliper housing bolt	22	2.2	16.0
Front brake caliper mounting bolt	25	2.5	18.0
Front brake pad mounting pin	16	1.6	11.5
Hose union bolt (Front/Rear brake and clutch)	23	2.3	16.5
Air bleeder valve (Front brake caliper)	8.5	0.85	6.5
Air bleeder valve (Rear brake caliper)	6	0.6	4.5
Air bleeder valve (Clutch)	6	0.6	4.5
Side-stand bolt	50	5.0	36.0
Side-stand nut	40	4.0	29.0
Side-stand switch mounting bolt	14	1.4	10.0
Rear combination light mounting bolt	2	0.2	1.5
Brake disc bolt (Front and Rear)	23	2.3	16.5
Front footrest bracket mounting bolt	35	3.5	25.5
Swingarm pivot nut	100	10.0	72.5
Rear shock absorber mounting nut (Upper and Lower)	50	5.0	36.0
Cushion lever mounting nut	78	7.8	56.5
Cushion rod mounting nut	78	7.8	56.5
Rear brake caliper mounting bolt	22	2.2	16.0
Rear brake caliper sliding pin	27	2.7	19.5
Rear brake pad mounting pin	18	1.8	13.0
Pad pin plug	2.5	0.25	1.8
Rear brake master cylinder mounting bolt	23	2.3	16.5
Rear brake master cylinder rod lock-nut	17	1.7	12.5
Rear footrest bolt	23	2.3	16.5
Rear axle nut	100	10.0	72.5
Rear sprocket nut	60	6.0	43.5
Frame down tube bolt	50	5.0	36.0
Brake lever pivot bolt	6	0.6	4.5
Brake lever pivot bolt lock-nut	6	0.6	4.5
Clutch lever pivot bolt	6	0.6	4.5
Clutch lever pivot bolt lock-nut	6	0.6	4.5
Licence light mounting bolt	5	0.5	3.5
Brake pipe flare nut	16	1.6	11.5

## **Tightening Torque Chart**

For other bolts and nuts not listed in the preceding page, refer to this chart:

<b>Bolt Diameter</b>	olt Diameter Convent	onventional or "4" marked bolt "7" marked bolt		Conventional or "4" marked bolt			t
"a" (mm)	N⋅m	kgf-m	lb-ft	N⋅m	kgf-m	lb-ft	
4	1.5	0.15	1.0	2.3	0.23	1.5	
5	3	0.3	2.0	4.5	0.45	3.0	
6	5.5	0.55	4.0	10	1.0	7.0	
8	13	1.3	9.5	23	2.3	16.5	
10	29	2.9	21.0	50	5.0	36.0	
12	45	4.5	32.5	85	8.5	61.5	
14	65	6.5	47.0	135	13.5	97.5	
16	105	10.5	76.0	210	21.0	152.0	
18	160	16.0	115.5	240	24.0	173.5	



## Service Data (GSF650A/UA/SA/ASUK7)

## **Electrical**

Unit: mm

Item		Specification	Note
Fuse size	ABS motor	20 A	
i use size	ABS	15 A	

## Wattage

Unit: W

Item	Specification		
item	GSF650A/UA	GSF650SA/ASU	
ABS indicator light	LED	<b>←</b>	

## Service Data (GSF650/S/U/SUK8)

#### **Electrical**

Unit: mm

Item	Specification		Note
Spark plug	Туре	NGK: CR8E	
Spark plag	Турс	DENSO: U24ESR-N	

B817H20307003

B817H20307005

## Service Data (GSF650A/UA/SA/ASUK8)

#### **Electrical**

Unit: mm

Item		Specification		Note
Spark plug		Туре	NGK: CR8E DENSO: U24ESR-N	
Fuse size	ABS motor	20 A		
ABS		15 A		

## Wattage

Unit: W

Item	Specification		
item	GSF650A/UA	GSF650SA/ASU	
ABS indicator light	LED	←	

## Service Data (GSX650FK8)

B817H20307007

## **NOTE**

- These specifications are subject to change without notice.
- Any differences between the GSF650/SK7 ('07-model) and GSX650FK8 ('08-model) in service data are indicated an asterisk mark (\*).

## **Throttle Body**

Item	Specification
Bore size	36 mm
I.D. No.	* 17H2 (For E-33), 17H3 (For the others)
Idle r/min	1 200 ± 100 r/min
Fast idle r/min	1 300 – 1 800 r/min (When cold engine)
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)

#### **Electrical**

Unit: mm (in)

	Item	Specification		Note		
Firing order		1 · 2 · 4 · 3				
Spark plug	Spark plug		NGK: CR8E DENSO: U24ESR-N			
		Gap	0.7 - 0.8 (0.028 - 0.031)			
Spark perfor	mance	С	over 8 (0.3) at 1 atm.			
CKP sensor	resistance		90 – 150 Ω			
CKP sensor	peak voltage		2.0 V and more	When cranking		
Ignition coil	rosistanco	Primary	1.1 – 1.9 Ω	Terminal – Terminal		
Igrillion con	resistance	Secondary	10.8 – 16.2 kΩ	Plug cap – Terminal		
	primary peak voltage	80 V and more		When cranking		
Generator c	oil resistance		$0.2 - 0.8 \Omega$			
Generator n	naximum output	Appro	ox. 400 W at 5 000 r/min			
Generator n engine is co	o-load voltage (When ld)	60 V (A	C) and more at 5 000 r/min			
Regulated v	oltage	14.0	- 15.5 V at 5 000 r/min			
Startor moto	ur brush longth	Standard	7.0 (0.28)			
Starter motor brush length		Limit	3.5 (0.14)			
Starter relay	Starter relay resistance		3 – 6 Ω			
	Type designation	YTX9-BS		YTX9-BS		
Battery	Capacity		/ 28.8 kC (8 Ah)/10 HR			
Standard electrolyte S.		1.320 at 20 °C (68 °F)				

B817H20307006

Item			Specification	Note
	Hoodlight	HI	10 A	
	Headlight	LO	10 A	
Fuse size	Fuel		10 A	
	Ignition		15 A	
	Signal		15 A	
	Fan		15 A	
	Main		30 A	

# Wattage Unit: W

Item		Specification	
Headlight	HI	* 60	
rieadiigiit	LO	* 55	
Position/Parking light		* 5 x 2	
Brake light/Taillight		21/5	
Turn signal light		21 x 4	
License plate light		5	
Speedometer light		LED	
Tachometer light		LED	
Turn signal indicator light		LED x 2	
High beam indicator light		LED	
Neutral position indicator light		LED	
* Oil pressure/Engine coolant		LED	
temperature indicator light			
FI indicator light		LED	
* Engine R.P.M. indicator light		LED	

## Tire

Item		Standard		
Cold inflation tire pressure	Front	250 kPa (2.50 kgf/cm², 36 psi)	_	
(Solo riding)	Rear	250 kPa (2.50 kgf/cm², 36 psi)	_	
Cold inflation tire pressure	Front	250 kPa (2.50 kgf/cm², 36 psi)	_	
(Dual riding)	Rear	290 kPa (2.90 kgf/cm², 42 psi)	_	
Tire size	Front	120/70 ZR17 M/C (58 W)	_	
THE SIZE	Rear	160/60 ZR17 M/C (69 W)	_	
Tire type	Front	* BRIDGESTON BT011F N	_	
The type	Rear	BRIDGESTON BT020R G	_	
Tire tread depth	Front	<del>_</del>	1.6 mm (0.06 in)	
(Recommended depth)	Rear	<del>_</del>	2.0 mm (0.08 in)	

# Suspension Unit: mm (in)

Item		Standard	Limit
Front fork stroke		130 (5.1)	_
Front fork inner tube O.D.		41 (1.61)	_
Front fork spring free length		375.5 (14.78)	368 (14.5)
Front fork oil level (Without spring, outer tube fully compressed)	* 132 (5.2)		_
Front fork oil type	SUZUKI FORK OIL G10 or an equivalent fork oil		_
Front fork oil capacity (Each leg)	* 459 ml (15.5/16.2 US/lmp oz)		<del>-</del>
Front fork spring adjuster	5th groove from top		_
Rear shock absorber spring adjuster	3rd position		<del>_</del>
Rear shock absorber damping force adjuster	Rebound	1-1/4 turns out from stiffest position	_
Rear wheel travel	128 (5.0)		_
Swingarm pivot shaft runout	_		0.3 (0.01)

## Section 1

# **Engine**

## **CONTENTS**

Precautions1-1	DT
Precautions1-1	Va
Precautions for Engine	DTO
Treduction for Engine	Po
Engine General Information and	DTO
Diagnosis 1A-1	Ma
General Description1A-1	DTO
Injection Timing Description1A-1	(P
Self-Diagnosis Function (GSF650/S/A/SAK7) 1A-2	Ci
Self-Diagnosis Function (GSX650FK8)1A-4	DTO
Schematic and Routing Diagram1A-6	Va
FI System Wiring Diagram1A-6	DT(
Terminal Alignment of ECM Coupler1A-7	Ma DT0
Component Location1A-8	Ma
FI System Parts Location1A-8	DT
Diagnostic Information and Procedures1A-9	Ma
Engine Symptom Diagnosis1A-9	DT
Self-Diagnostic Procedures (GSF650/S/A/	(H
SAK7)1A-13	DŤ
Use of SDS Diagnosis Reset Procedures1A-15	Ci
Show Data When Trouble (DTC)1A-16	DTO
SDS Check1A-17	Ci
DTC Table1A-21	Sel
Fail-Safe Function Table	Spec
FI System Troubleshooting	Ser
Malfunction Code and Defective Condition	Spec
Table	Spe
DTC "C12" (P0335): CKP Sensor Circuit	
Malfunction1A-27 DTC "C13" (P0105-H/L): IAP Sensor (#1)	Emiss
Circuit Malfunction1A-30	Preca
DTC "C14" (P0120-H/L): TP Sensor Circuit	Pre
Malfunction	Gene
DTC "C15" (P0115-H/L): ECT Sensor Circuit	Fue
Malfunction1A-47	Cra
DTC "C17" (P1750-H/L): IAP Sensor (#2)	De
Circuit Malfunction	Exh
DTC "C21" (P0110-H/L): IAT Sensor Circuit	De Noi
Malfunction1A-62	
DTC "C23" (P1651-H/L): TO Sensor Circuit	Sche PAI
Malfunction	
DTC "C24" (P0351), "C25" (P0352), "C26"	Repa
(P0353) or "C27" (P0354): Ignition System	Hea In:
Malfunction1A-75	

DTC "C28" (P1655): Secondary Throttle	
Valve Actuator (STVA) Malfunction	1A-75
DTC "C29" (P1654-H/L): Secondary Throttle	
Position Sensor (STPS) Circuit Malfunction	1A-79
DTC "C31" (P0705): GP Switch Circuit	
Malfunction	1A-87
DTC "C32" (P0201), "C33" (P0202), "C34"	
(P0203) or "C35" (P0204): Fuel Injector	
Circuit Malfunction	1A-89
DTC "C40" (P0505, P0506 or P0507): ISC	
Valve Circuit Malfunction	1A-93
DTC "C41" (P0230-H/L): FP Relay Circuit	
Malfunction	1A-99
DTC "C41" (P2505): ECM Power Input Signal	
Malfunction	.1A-102
DTC "C42" (P1650): IG Switch Circuit	
Malfunction	.1A-104
DTC "C44" (P0130/P0135): HO2 Sensor	4.4.40
(HO2S) Circuit Malfunction	.1A-104
DTC "C49" (P1656): PAIR Solenoid Valve	4 4 4 4 6
Circuit Malfunction	.1A-110
DTC "C60" (P0480): Cooling Fan Relay	4 4 4 4 4
Circuit Malfunction(COVCEDEIX)	
Self-Diagnostic Procedures (GSX650FK8)	
Specifications	
Service Data	
Special Tools and Equipment	
Special Tool	.1A-119
mission Control Devices	1R <sub>-</sub> 1
Precautions Precautions for Emission Control Devices	1 <b>B-</b> 1
General Description	
Fuel Injection System Description	1B-1
Crankcase Emission Control System	4D (
Description Exhaust Emission Control System	IB-2
Description	1D 1
Noise Emission Control System Description	
•	
Schematic and Routing Diagram	
PAIR System Hose Routing Diagram	
Repair Instructions	1B-t
Heated Oxygen Sensor (HO2S) Removal and	1D 5
Installation	
HEALEU OXVUEH SEHSUL (FIOZS) HISDECHOH	I D-0

## 1-ii Table of Contents

PAIR Reed Valve Removal and Installation	1B-6	Throttle Cable Routing Diagram	
PAIR Control Solenoid Valve Removal and		(GSX650FK8)	1D-3
Installation	1B-6	Diagnostic Information and Procedures	1D-4
PAIR System Inspection	1B-7	Engine Mechanical Symptom Diagnosis	1D-4
Crankcase Breather (PCV) Hose Inspection	1B-8	Compression Pressure Check	1D-4
Crankcase Breather (PCV) Hose / Cover		Repair Instructions	1D-5
Removal and Installation		Engine Components Removable with the	
Crankcase Breather (PCV) Cover Inspection		Engine in Place	1D-5
Specifications		Air Cleaner Element Removal and Installation	1D-7
Service Data		Air Cleaner Element Inspection and Cleaning	1D-7
Tightening Torque Specifications	1B-10	Air Cleaner Box Removal and Installation	
Special Tools and Equipment		Throttle Cable Removal and Installation	
Recommended Service Material		Throttle Cable Inspection	1D-8
Special Tool	1B-10	Throttle Cable Play Inspection and	
Fraire Fleetwicel Devices	40.4	Adjustment	
Engine Electrical Devices		Throttle Body Components	
Precautions		Throttle Body Construction	
Precautions for Engine Electrical Device		Throttle Body Removal and Installation	
Component Location		Throttle Body Disassembly and Assembly	
Engine Electrical components Location	1C-1	Throttle Body Inspection and Cleaning	
Diagnostic Information and Procedures	1C-1	Throttle Valve Synchronization	
Engine Symptom Diagnosis	1C-1	Engine Assembly Removal	
Repair Instructions	1C-1	Engine Assembly Installation	
ECM Removal and Installation	1C-1	Engine Top Side Disassembly	
CKP Sensor Inspection	1C-1	Engine Top Side Assembly	
CKP Sensor Removal and Installation	1C-1	Valve Clearance Inspection and Adjustment	
IAP Sensor (#1) Inspection	1C-1	Cylinder Head Cover Inspection	
IAP Sensor (#1) Removal and Installation		Camshaft Inspection  Camshaft Sprocket Inspection	
IAP / TP / IAT Sensor Inspection	1C-2	Camshaft Sprocket Removal and Installation	
IAP / TP / IAT Sensor Removal and		Cam Chain Tension Adjuster Inspection	
Installation		Cam Chain Guide Removal and Installation	
ECT Sensor Removal and Installation		Cam Chain Guide Inspection	
ECT Sensor Inspection		Cam Chain Tensioner Inspection	
TO Sensor Removal and Installation		Cylinder Head Disassembly and Assembly	
TO Sensor Inspection		Cylinder Head Related Parts Inspection	
STP Sensor Inspection		Valve Guide Replacement	
STP Sensor Adjustment	_	Valve Seat Repair	
STP Sensor Removal and Installation		Cylinder Disassembly and Assembly	
STV Actuator Inspection		Cylinder Inspection	
STV Actuator Removal and Installation		Piston Ring Removal and Installation	
ISC Valve InspectionISC Valve Removal and Installation		Piston and Piston Ring Inspection	
ISC Valve Preset and Opening Initialization		Engine Bottom Side Disassembly	1D-51
HO2 Sensor Inspection		Engine Bottom Side Assembly	1D-58
HO2 Sensor Removal and Installation		Conrod Removal and Installation	1D-67
GP Switch Inspection		Conrod and Crankshaft Inspection	1D-69
GP Switch Removal and Installation		Conrod Crank Pin Bearing Inspection and	
Specifications		Selection	1D-70
Service Data		Crankshaft Journal Bearing Inspection and	
Tightening Torque Specifications		Selection	1D-71
Special Tools and Equipment		Crankshaft Thrust Clearance Inspection and	
Recommended Service Material		Selection	
Special Tool		Specifications	
	10-0	Service Data	
Engine Mechanical	1D-1	Tightening Torque Specifications	
Schematic and Routing Diagram		Special Tools and Equipment	
Camshaft and Sprocket Assembly Diagram		Recommended Service Material	
Throttle Cable Routing Diagram (GSF650/S/	'	Special Tool	1D-79
A/SAK7)	1D-2		
,			

Engine Lubrication System 1E-1	Water pump Components	
Precautions1E-1	14/ 4 5 6 4 41	1F-12
Precautions for Engine Oil1E-1	M-4 D D	1F-12
Schematic and Routing Diagram1E-2	Mater Dump Disassembly and Assembly	1F-13
Engine Lubrication System Chart Diagram 1E-2	Water Dump Delated Darte Inchestion	1F-16
Diagnostic Information and Procedures1E-3	Specifications	1F-17
Engine Lubrication Symptom Diagnosis1E-3	Service Data	
Oil Pressure Check	Lightoning Lorgijo Shocitications	1F-18
Repair Instructions1E-4	Chaoial Table and Equipment	1F-18
Engine Oil and Filter Replacement1E-4	Decempeded Contine Meterial	1F-18
Engine Oil Level Inspection	Shoolal Lool	1F-18
Oil Pan / Oil Strainer / Oil Pressure Regulator		
Removal and Installation1E-4	Fuel System	
Oil Pressure Regulator / Oil Strainer	Precautions	
Inspection1E-6	Precautions for Fuel System	1G-1
Oil Pressure Switch Removal and Installation 1E-7	General Description	
Oil Pressure Switch Inspection1E-7	Frank Oranda and Danasala Cara	1G-2
Oil Jet Removal and Installation1E-8		1G-3
Oil Gallery Jet Removal and Installation1E-9	Fuel Tank Drain Hose and Breather Hose	
Oil Jet / Oil Gallery Jet Inspection1E-10		1G-3
Oil Pump Removal and Installation1E-10		1G-4
Oil Pump Inspection1E-12		1G-4
Specifications1E-12		
Service Data1E-12	•	
Tightening Torque Specifications1E-12	•	
Special Tools and Equipment1E-13		
Recommended Service Material1E-13		1G-6
Special Tool1E-13		1G-7
'	Fuel Level Gauge Inspection	1G-7
Engine Cooling System1F-1	Fuel Level Indicator Inspection	1G-7
Precautions1F-1		
Engine Cooling System Warning 1F-1	Inspection	
Precautions for Engine Coolant 1F-1	Fuel Tank Construction	
General Description1F-1	Fuel Tank Removal and Installation	
Engine Coolant Description1F-1	Fuel Pump Components	1G-10
Schematic and Routing Diagram1F-2	Fuel Pump Assembly / Fuel Level Gauge	
Cooling Circuit Diagram 1F-2	Removal and Installation	1G-11
Water Hose Routing Diagram 1F-3	Fuel Level Gauge and Fuel Level Indicator	40.40
Diagnostic Information and Procedures1F-4	Switch Inspection	
Engine Cooling Symptom Diagnosis 1F-4	Fuel Pump Disassembly and Assembly	
Repair Instructions1F-4	ruei Mesti Filler Inspection and Cleaning	
Cooling Circuit Inspection 1F-4	r del riose inspection	1G-14
Radiator Cap Inspection1F-5		10 14
Radiator / Cooling Fan Motor Removal and	Fuel Injector Inspection and Cleaning	
Installation1F-5		
Radiator Inspection and Cleaning1F-6	Specifications	
Radiator Hose Removal and Installation 1F-6	Tightening Torque Specifications	
Radiator Reservoir Tank Inspection1F-7		
Water Hose Inspection1F-7	Recommended Service Material	
Radiator Reservoir Tank Removal and	Special Tool	
Installation1F-7		1G-10
Cooling Fan Inspection1F-8		1H-1
Cooling Fan Relay Inspection 1F-8	Oakamatia and Davilina Diamana	
ECT Sensor Removal and Installation 1F-9	Ignition System Diagram	
ECT Sensor Inspection	Ignition System Components Location	
Thermostat Connector / Thermostat Removal		
and Installation	Lauritiana Constanta Constanta Dia antara in	
Thermostat Inspection1F-10	Ignition System Symptom Diagnosis  No Spark or Poor Spark	
	NO Spaik of Fool Spaik	111-2

Repair Instructions1	H-3	Special Tools and Equipment	11-13
Ignition Coil / Plug Cap and Spark Plug		Recommended Service Material	1I-13
Removal and Installation1		Special Tool	1I-13
Spark Plug Inspection and Cleaning1		Charaina Systom	414
Ignition Coil / Plug Cap Inspection1		Charging System	
CKP Sensor Inspection1		Schematic and Routing Diagram	
CKP Sensor Removal and Installation1		Charging System Diagram	
Engine Stop Switch Inspection1		Component Location	
Ignition Switch Inspection1		Charging System Components Location	1J-1
Ignition Switch Removal and Installation1		Diagnostic Information and Procedures	1J-1
Specifications1		Charging System Symptom Diagnosis	1J-1
Service Data1H		Battery Runs Down Quickly	1J-2
Tightening Torque Specifications1	H-9	Repair Instructions	1J-3
Special Tools and Equipment1	H-9	Battery Current Leakage Inspection	
Special Tool1h	H-9	Regulated Voltage Inspection	
		Generator Inspection	
Starting System1l		Generator Removal and Installation	1J-4
Schematic and Routing Diagram1	11-1	Regulator / Rectifier Construction	1J-8
Starting System Diagram 1	1I-1	Regulator / Rectifier Inspection	1J-8
Component Location1	11-1	Battery Components	1J-9
Starting System Components Location 1		Battery Charging	1J-9
Diagnostic Information and Procedures 1	11-1	Battery Removal and Installation	1J-12
Starting System Symptom Diagnosis 1		Battery Visual Inspection	1J-12
Starter motor will not run		Specifications	1J-13
Starter Motor Runs but Does not Crank the		Service Data	
Engine1	11-2	Tightening Torque Specifications	1J-13
Repair Instructions1		Special Tools and Equipment	
Starter Motor Components 1		Recommended Service Material	
Starter Motor Removal and Installation1		Special Tool	
Starter Motor Disassembly and Assembly 1	11-4	•	
Starter Motor Inspection 1		Exhaust System	1K-1
Starter Relay Removal and Installation 1		Precautions	1K-1
Starter Relay Inspection 1		Precautions for Exhaust System	1K-1
Turn Signal / Side-stand Relay Removal and		Repair Instructions	
Installation1	11-7	Exhaust System Construction	
Side-stand / Ignition Interlock System Parts		Exhaust Pipe / Muffler Removal and	
Inspection1	1I-8	Installation	1K-3
Starter Clutch Removal and Installation1I-	l-10	Exhaust System Inspection	
Starter Clutch Inspection1I-	l-11	Specifications	
Starter Button Inspection1I-	l-12	Tightening Torque Specifications	
Specifications1I-	l-12	Special Tools and Equipment	
Service Data1I-		Recommended Service Material	
Tightening Torque Specifications1I-	-12	1 to sommorido de vido material	

Precautions:

# **Precautions**

# **Precautions**

# **Precautions for Engine**

B817H21000001

Refer to "General Precautions in Section 00 (Page 00-1)" and "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".

# **Engine General Information and Diagnosis**

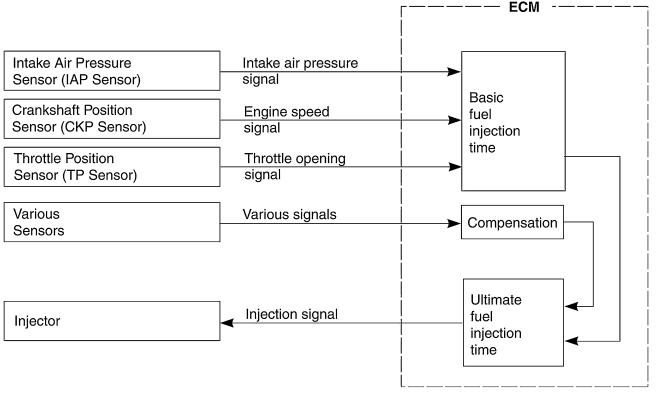
# **General Description**

#### **Injection Timing Description**

### **Injection Time (Injection Volume)**

B817H21101001

The factors to determine the injection time include the basic fuel injection time, which is calculated on the basis of the intake air pressure, engine speed and throttle opening angle, and various compensations. These compensations are determined according to the signals from various sensors that detect the engine and driving conditions.



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#### **Compensation of Injection Time (Volume)**

The following different signals are output from the respective sensors for compensation of the fuel injection time (volume).

Signal	Descriptions
ENGINE COOLANT TEMPERATURE SENSOR	When engine coolant temperature is low, injection time (volume)
SIGNAL	is increased.
INTAKE AIR TEMPERATURE SENSOR SIGNAL	When intake air temperature is low, injection time (volume) is
INTAKE AIR TEINI ERATORE SENSOR SIGNAL	increased.
	Air/fuel ratio is compensated to the theoretical ratio from density
HEATED OXYGEN SENSOR SIGNAL	of oxygen in exhaust gasses. The compensation occurs in such a
TIEATED OXTOLIN SENSON SIGNAL	way that more fuel is supplied if detected air/fuel ratio is lean and
	less fuel is supplied if it is rich.
	ECM operates on the battery voltage and at the same time, it
BATTERY VOLTAGE SIGNAL	monitors the voltage signal for compensation of the fuel injection
BATTERT VOLTAGE STORAL	time (volume). A longer injection time is needed to adjust injection
	volume in the case of low voltage.
ENGINE RPM SIGNAL	At high speed, the injection time (volume) is increased.
STARTING SIGNAL	When starting engine, additional fuel is injected during cranking
OTAINTING GIGINAL	engine.
ACCELERATION SIGNAL/ DECELERATION	During acceleration, the fuel injection time (volume) is increased,
SIGNAL	in accordance with the throttle opening speed and engine rpm.
OTOTAL	During deceleration, the fuel injection time (volume) is decreased.

#### **Injection Stop Control**

Signal	Descriptions
	When the motorcycle tips over, the tip-over sensor sends a signal
TIP-OVER SENSOR SIGNAL (FUEL SHUT-OFF)	to the ECM. Then, this signal cuts OFF current supplied to the fuel
	pump, fuel injectors and ignition coils.
OVER-REV. LIMITER SIGNAL	The fuel injector stops operation when engine rpm reaches rev.
OVER-REV. LIIVIITER SIGNAL	limit rpm.

## Self-Diagnosis Function (GSF650/S/A/SAK7)

B817H2110100

The self-diagnosis function is incorporated in the ECM. The function has two modes, "User mode" and "Dealer mode". The user can only be notified by the LCD (DISPLAY) panel and LED (FI indicator light). To check the function of the individual FI system devices, the dealer mode is provided. In this check, the special tool is necessary to read the code of the malfunction items.

#### **User Mode**

	Malfunction	LCD (display) indication "A"	FI indicator light indication "B"	Indication mode
	"NO"	Odometer	_	_
"YES"	⊢ndine can start	Odometer and "FI" letters *1	FI indicator light turns ON.	Each 2 sec. Odometer or "FI" is indicated.
123	Engine can not start	"FI" letters *2	FI indicator light turns ON and blinks.	"FI" is indicated continuously.

\*1

When one of the signals is not received by ECM, the fail-safe circuit works and injection is not stopped. In this case, "FI" and odometer are indicated in the LCD panel and motorcycle can run.

\*2

The injection signal is stopped, when the crankshaft position sensor signal, tip-over sensor signal, ignition signal, #1, #2, #3 and #4 injector signals, fuel pump relay signal or ignition switch signal is not sent to ECM. In this case, "FI" is indicated in the LCD panel. Motorcycle does not run.

#### "CHEC":

The LCD panel indicates "CHEC" when no communication signal from the ECM is received for 5 seconds and more.

#### For Example:

The ignition switch is turned ON, and the engine stop switch is turned OFF. In this case, the speedometer does not receive any signal from the ECM, and the panel indicates "CHEC".

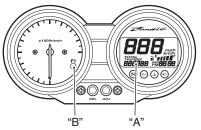
If CHEC is indicated, the LCD does not indicate the trouble code. It is necessary to check the wiring harness between ECM and speedometer couplers.

The possible cause of this indication is as follows:

Engine stop switch is in OFF position. Side-Stand/ignition inter-lock system is not working. Ignition fuse is burnt.

#### **NOTE**

FI light turns ON 2 seconds when the ignition switch turns ON.



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#### **Dealer Mode**

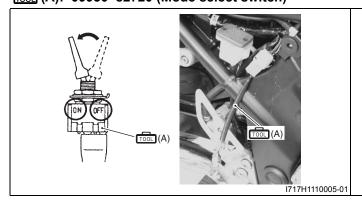
The defective function is memorized in the computer. Use the special tool's coupler to connect to the mode select switch. The memorized malfunction code is displayed on LCD (DISPLAY) panel. Malfunction means that the ECM does not receive signal from the devices. These affected devices are indicated in the code form.

#### **⚠ CAUTION**

Before checking the malfunction code, do not disconnect the ECM coupler. If the coupler from the ECM is disconnected, the malfunction code memory is erased and the malfunction code can not be checked.

### Special tool

(A): 09930-82720 (Mode select switch)





Malfunction	LCD (display) indication	FI light indication	Indication mode
"NO"	C00		_
"YES"	C** code is indicated from small numeral to large one.	FI indicator light turns OFF.	For each 2 sec., code is indicated.

#### Self-Diagnosis Function (GSX650FK8)

B817H21101003

The self-diagnosis function is incorporated in the ECM. The function has two modes, "User mode" and "Dealer mode". The user can only be notified by the LCD (DISPLAY) panel and LED (FI indicator light). To check the function of the individual FI system devices, the dealer mode is provided. In this check, the special tool is necessary to read the code of the malfunction items.

#### **User Mode**

	Malfunction	LCD (display) indication "A"	FI indicator light indication "B"	Indication mode
	"NO"	Odometer	_	_
"YES"	Engine can start	Odometer and "FI" letters *1	FI indicator light turns ON.	Each 2 sec. Odometer or "FI" is indicated.
123	Engine can not start	"FI" letters *2	FI indicator light turns ON and blinks.	"FI" is indicated continuously.

\*1

When one of the signals is not received by ECM, the fail-safe circuit works and injection is not stopped. In this case, "FI" and odometer are indicated in the LCD panel and motorcycle can run.

\*2

The injection signal is stopped, when the crankshaft position sensor signal, tip-over sensor signal, ignition signal, #1, #2, #3 and #4 injector signals, fuel pump relay signal or ignition switch signal is not sent to ECM. In this case, "FI" is indicated in the LCD panel. Motorcycle does not run.

#### "CHEC":

The LCD panel indicates "CHEC" when no communication signal from the ECM is received for 5 seconds and more.

#### For Example:

The ignition switch is turned ON, and the engine stop switch is turned OFF. In this case, the speedometer does not receive any signal from the ECM, and the panel indicates "CHEC".

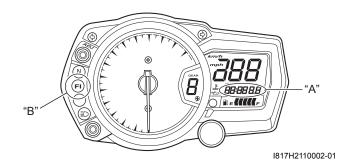
If CHEC is indicated, the LCD does not indicate the trouble code. It is necessary to check the wiring harness between ECM and speedometer couplers.

The possible cause of this indication is as follows:

Engine stop switch is in OFF position. Side-Stand/ignition inter-lock system is not working. Ignition fuse is burnt.

#### NOTE

The FI light "B" turns ON about 3 seconds after turning the ignition switch is turned ON.



#### 1A-5 Engine General Information and Diagnosis:

#### **Dealer Mode**

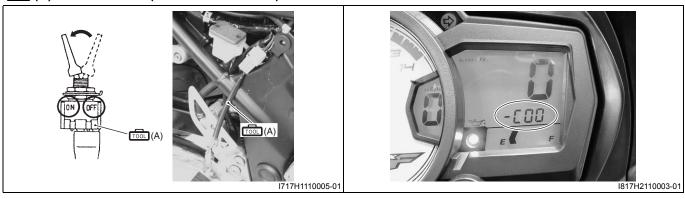
The defective function is memorized in the computer. Use the special tool's coupler to connect to the mode select switch. The memorized malfunction code is displayed on LCD (DISPLAY) panel. Malfunction means that the ECM does not receive signal from the devices. These affected devices are indicated in the code form.

#### **⚠ CAUTION**

Before checking the malfunction code, do not disconnect the ECM coupler. If the coupler from the ECM is disconnected, the malfunction code memory is erased and the malfunction code can not be checked.

#### Special tool

#### (A): 09930-82720 (Mode select switch)

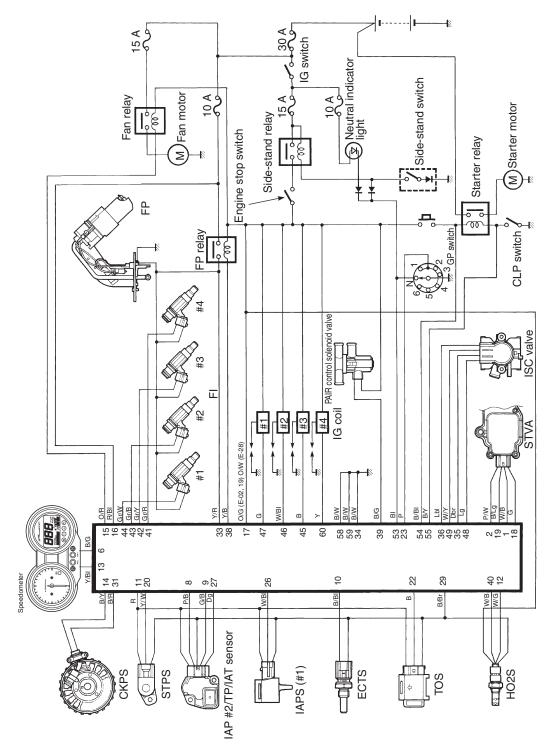


Malfunction	LCD (display) indication	FI light indication	Indication mode
"NO"	C00		_
1 "YES"	C** code is indicated from small numeral to large one.	FI indicator light turns OFF.	For each 2 sec., code is indicated.

# **Schematic and Routing Diagram**

# FI System Wiring Diagram

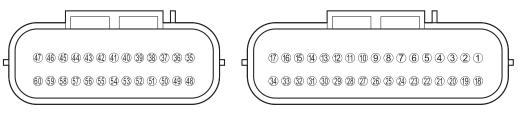
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# **Terminal Alignment of ECM Coupler**

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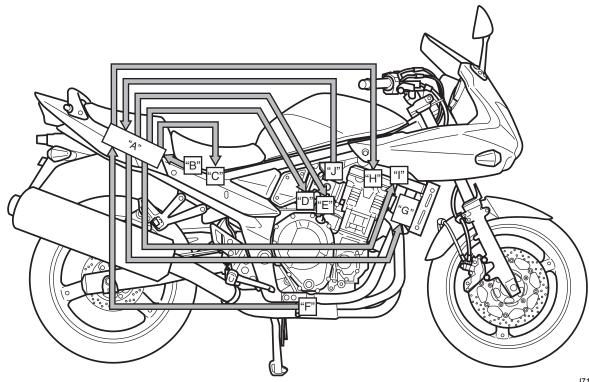


TEDMINIAL NO	CIDCUIT	TEDMINIAL NO	I718H1110004
TERMINAL NO.		TERMINAL NO.	
1	STVA signal (STVA, 2A)	31	CKP sensor signal (CKP-)
2	STVA signal (STVA, 1A)	32	Serial data for self-diagnosis
3	_	33	Power source for fuel injector (VM)
4		34	ECM ground (E1)
5		35	ISC signal (ISC, 2A)
6	Serial data for speedometer	36	ISC signal (ISC, 1A)
7		37	_
8	TP sensor signal (TP)	38	Fuel pump relay (FP Relay)
9	IAP sensor signal #2 (IAP, 2)	39	PAIR control solenoid valve (PAIR)
10	ECT sensor signal (ECT)	40	HO2 sensor heater (HO2, H)
11	Power source for sensors (Vcc)	41	Fuel injector #4 (#4, 1)
12	HO2 sensor signal (HO2S)	42	Fuel injector #3 (#3, 1)
13	_	43	Fuel injector #2 (#2, 1)
14	CKP sensor signal (CKP+)	44	Fuel injector #1 (#1, 1)
15	Cooling fan relay (FAR)	45	Ignition coil #3
16	Power source for back-up	46	Ignition coil #2
17	Power source	47	Ignition coil #1
18	STVA signal (STVA, 2B)	48	ISC signal (ISC, 2B)
19	STVA signal (STVA, 1B)	49	ISC signal (ISC, 1B)
20	STP sensor (STP)	50	_
21	Ignition switch signal	51	_
22	TO sensor signal (TOS)	52	_
23	GP sensor signal (GP)	53	Neutral switch
24		54	Starter relay
25		55	Clutch position switch
26	IAP sensor signal #1 (IAP, 1)	56	_
27	IAT sensor signal (IAT)	57	_
28		58	Ground
29	Sensors ground (E2)	59	Ground for ignition system
30	Mode select switch	60	Ignition coil #4

# **Component Location**

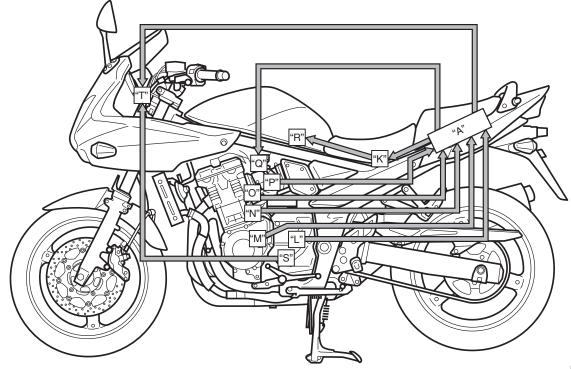
# **FI System Parts Location**

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I717H1110003-02

"A": ECM	"C": Cooling fan relay	"E": ISC valve	"G": Cooling fan	"I": PAIR control solenoid valve
"B": TO sensor	"D": STV actuator	"F": HO2 sensor	"H": Ignition coil	"J": IAP sensor (#1)



I717H1110004-01

"A": ECM	"M": CKP sensor	"P": STP sensor	"S": Speed sensor
"K": Fuel pump relay	"N": ECT sensor	"Q": Fuel injector	"T": Speedometer
"L": GP switch	"O": IAP #2/TP/IAT sensor	"R": Fuel pump	

# **Diagnostic Information and Procedures**

# **Engine Symptom Diagnosis**

B817H21104001

Condition	Possible cause	Correction / Reference Item
Engine will not start or is	Valve clearance out of adjustment.	Adjust.
hard to start	Worn valve guides or poor seating of	Repair or replace.
(Compression too low)	valves.	,
,	Mistimed valves.	Adjust.
	Excessively worn piston rings.	Replace.
	Worn-down cylinder bores.	Replace.
	Starter motor cranks too slowly.	Refer to "Starting System Diagram in Section
	-	1I (Page 1I-1)".
	Poor seating of spark plugs.	Retighten.
Engine will not start or is	Fouled spark plugs.	Clean.
hard to start (Plugs not	Wet spark plugs.	Clean and dry.
sparking)	Defective ignition coil/plug cap.	Replace.
	Defective CKP sensor.	Replace.
	Defective ECM.	Replace.
	Open-circuited wiring connections.	Repair or replace.
Engine will not start or is	Clogged fuel filter or fuel hose.	Clean or replace.
hard to start (No fuel	Defective fuel pump.	Replace.
reaching the intake	Defective fuel pressure regulator.	Replace.
manifold)	Defective fuel injectors.	Replace.
	Defective fuel pump relay.	Replace.
	Defective ECM.	Replace.
	Open-circuited wiring connections.	Check and repair.
Engine will not start or is	Defective fuel pump.	Replace.
hard to start (Incorrect	Defective fuel pressure regulator.	Replace.
fuel/air mixture)	Defective TP sensor.	Replace.
	Defective CKP sensor.	Replace.
	Defective IAP sensor.	Replace.
	Defective ECM.	Replace.
	Defective ECT sensor.	Replace.
	Defective IAT sensors.	Replace.
Engine idles poorly	Valve clearance out of adjustment.	Adjust.
	Poor seating of valves.	Replace or repair.
	Defective valve guides.	Replace.
	Worn down camshafts.	Replace.
	Too wide spark plug gaps.	Adjust or replace.
	Defective ignition coil/plug gap.	Replace.
	Defective CKP.	Replace.
	Defective ECM.	Replace.
	Defective TP sensor.	Replace.
	Defective fuel pump. Defective ISC valve.	Replace.
	Imbalanced throttle valve.	Replace.
		Adjust.
Engine stalls often	Damaged or cranked vacuum hose.  Defective IAP sensor or circuit.	Replace. Repair or replace.
(Incorrect fuel/air mixture)		Clean or replace.
	Defective fuel pump.	Replace.
	Defective fuel pressure regulator.	Replace.
	Damaged or cracked vacuum hose.	Replace.
	Defective ECT sensor.	Replace.
	Defective thermostat.	Replace.
	Defective IAT sensors.	Replace.
	Delective IVI Scusols.	Γλερίαυς.

Condition	Possible cause	Correction / Reference Item
Engine stalls often (Fuel	Defective fuel injectors.	Replace.
injector improperly	No injection signal from ECM.	Repair or replace.
operating)	Open or short circuited wiring	Repair or replace.
operating)	connection.	Nepall of Teplace.
	Defective battery or low battery voltage.	Replace or recharge.
Engine stalls often	Defective ECM.	Replace.
(Control circuit or sensor	Defective fuel pressure regulator.	Replace.
improperly operating)	Defective TP sensor.	Replace.
improperty operating)	Defective IAT sensors.	Replace.
	Defective IAT sensors.  Defective CKP sensor.	Replace.
	Defective CRT sensor.	Replace.
	Defective fuel pump relay.	Replace.
	Defective ISC valve.	•
Engine stelle often		Replace. Clean.
Engine stalls often	Fouled spark plugs.	
(Engine parts improperly operating)	Defective CKP sensor or ECM.	Replace. Clean.
operating)	Clogged fuel hose.	
Fraire reject/Estateira	Out of adjustment tappet clearance.	Adjust.
Engine noisy (Excessive	Too large tappet clearance.	Adjust.
valve chatter)	Weakened or broken valve springs.	Replace.
	Worn tappet or cam surface.	Replace.
Facility of the Control of the Contr	Worn and burnt camshaft journal.	Replace.
Engine noisy (Noise	Worn down pistons or cylinders.	Replace.
seems to come from	Combustion chambers fouled with	Clean.
piston)	carbon.	Davidson
	Worn piston pins or piston pin bores.	Replace.
Facility of the Control of the Contr	Worn piston rings or ring grooves.	Replace.
Engine noisy (Noise	Stretched chain.	Replace.
seems to come from	Worn sprockets.	Replace.
timing chain)	Tension adjuster not working.	Repair or replace.
Engine noisy (Noise	Rattling bearings due to wear.	Replace.
seems to come from	Worn and burnt big-end bearings.	Replace.
crankshaft)	Worn and burnt journal bearings.	Replace.
	Too large thrust clearance.	Replace thrust bearing.
Engine noisy (Noise	Worn splines of countershaft or hub.	Replace.
seems to come from	Worn teeth of clutch plates.	Replace.
clutch)	Distorted clutch plate, driven and drive.	Replace.
	Worn clutch release bearing.	Replace.
Engine noisy (Noise	Worn or rubbing gears.	Replace.
seems to come from	Worn splines.	Replace.
transmission)	Worn or rubbing primary gears.	Replace.
	Worn bearings.	Replace.
Engine noisy (Noise	Worn or damaged impeller shaft.	Replace.
seems to come from	Worn or damaged mechanical seal.	Replace.
water pump)	Contact between pump case and	Replace.
	impeller.	
	Too much play on pump shaft bearing.	Replace.

Condition	Possible cause	Correction / Reference Item
Engine runs poorly in	Weakened valve springs.	Replace.
high speed range	Worn camshafts.	Replace.
	Valve timing out of adjustment.	Adjust.
electrical parts)	Too narrow spark plug gap.	Adjust.
	Ignition not advanced sufficiently due to	Replace ECM.
	poorly working timing advance circuit.	ntopiado Zomi
	Defective ignition coil/plug gap.	Replace.
	Defective CKP sensor.	Replace.
	Defective ECM.	Replace.
	Clogged air cleaner element.	Clean.
	Clogged fuel hose, resulting in	Clean and prime.
	inadequate fuel supply to injector.	orean and prime.
	Defective fuel pump.	Replace.
	Defective TP sensor.	Replace.
	Defective STP sensor or STVA.	Replace.
Engine runs poorly in	Clogged air cleaner element.	Clean or replace.
high speed range	Defective throttle valves.	Adjust or replace.
(Defective air flow	Defective ISC valve.	Replace.
system)	Sucking air from throttle body joint.	Repair or replace.
Systemy	Defective ECM.	Replace.
	Defective secondary throttle body joint.	Adjust or replace.
	Imbalancing throttle valve	Adjust.
	synchronization.	Aujust.
Engine runs poorly in	Low fuel pressure.	Repair or replace.
high speed range	Defective TP sensor.	Replace.
(Defective control circuit	Defective IAT sensors.	Replace.
or sensor)	Defective IAP sensor.	Replace.
•	Defective ECM.	Replace.
	TP sensor out of adjustment.	Adjust.
	Defective STP sensor or STVA.	Replace.
	Defective fuel tank pressure control	Replace.
	valve.	
	Defective GP sensor.	Replace.
	Defective ISC valve.	Replace.
Engine lacks power	Loss of tappet clearance.	Adjust.
(Defective engine internal/	Weakened valve springs.	Replace.
electrical parts)	Valve timing out of adjustment.	Adjust.
	Worn piston rings or cylinders.	Replace.
	Poor seating of valves.	Repair.
	Fouled spark plugs.	Clean or replace.
	Incorrect spark plugs.	Adjust or replace.
	Clogged fuel injectors.	Clean.
	Clogged air cleaner element.	Clean.
	Sucking air from throttle valve or	Retighten or replace.
	vacuum hose.	
	Too much engine oil.	Drain out excess oil.
	Defective fuel pump or ECM.	Replace.
	Defective CKP sensor and ignition coil/	Replace.
	plug caps.	
	Imbalancing throttle valve	Adjust.
	synchronization.	

Condition	Possible cause	Correction / Reference Item
Engine lacks power	Low fuel pressure.	Repair or replace.
(Defective control circuit	Defective TP sensor.	Replace.
or sensor)	Defective IAT sensor.	Replace.
	Defective CKP sensor.	Replace.
	Defective GP sensor.	Replace.
	Defective IAP sensor.	Replace.
	Defective ECM.	Replace.
	TP sensor out of adjustment.	Adjust.
	Defective STP sensor or STVA.	Replace.
	Defective ISC valve.	Replace.
	Imbalancing throttle valve	Adjust.
	synchronization.	
Engine overheats	Heavy carbon deposit on piston crown.	Clean.
(Defective engine internal	Not enough oil in the engine.	Add oil.
parts)	Defective oil pump or clogged oil circuit.	Replace or clean.
	Use of incorrect engine oil.	Change.
	Sucking air from intake pipe.	Retighten or replace.
	Defective cooling system.	Refer to "Engine Cooling System Warning in
		Section 1F (Page 1F-1)".
Engine overheats (Lean	Short-circuited IAP sensor/lead wire.	Repair or replace.
fuel/air mixture)	Short-circuited IAT sensor/lead wire.	Repair or replace.
	Sucking air from intake pipe joint.	Repair or replace.
	Defective fuel injector.	Replace.
	Defective ECT sensor.	Replace.
Engine overheats (The	Ignition timing too advanced due to	Replace.
other factors)	defective timing advance system (ECT	
	sensor, CKP sensor, GP sensor and	
	ECM.)	
	Drive chain is too tight.	Adjust.
Dirty or heavy exhaust	Worn piston rings or cylinders.	Replace.
smoke	Too much engine oil in the engine.	Check and drain excess oil.
	Worn valve guides.	Replace.
	Scored or scuffed cylinder walls.	Replace.
	Worn valves stems.	Replace.
	Defective stem seals.	Replace.
	Worn oil ring side rails.	Replace.

# Self-Diagnostic Procedures (GSF650/S/A/SAK7) B817H21104002 Use of Mode Select Switch

#### NOTE

- Do not disconnect coupler from ECM, the battery cable from the battery, ECM ground wire harness from the engine or main fuse before confirming DTC (Diagnostic Trouble Code) stored in memory. Such disconnection will erase memorized information in ECM memory.
- DTC stored in ECM memory can be checked by the special tool.
- Before checking DTC, read self-diagnosis function "User mode and dealer mode" (Refer to "Self-Diagnosis Function (GSF650/S/A/SAK7) (Page 1A-2)".) carefully to have good understanding as to what functions are available and how to use it.
- Be sure to read "Precautions for Electrical Circuit Service" (Refer to "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".) before inspection and observe what is written there.
- Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Connect the special tool to the mode select switch at the wiring harness.

#### Special tool

(A): 09930-82720 (Mode select switch)



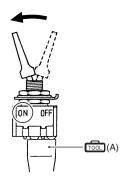
I717H1110006-01

- 3) Start the engine or crank the engine for more than 4 seconds.
- 4) Turn the special tool's switch ON.

5) Check the DTC to determine the malfunction part. Refer to "DTC Table (Page 1A-21)".

#### Special tool

(A): 09930-82720 (Mode select switch)



I718H1110006-04



1718H1110144-01

6) After repairing the trouble, turn OFF the ignition switch and turn ON again. If DTC is indicated (C00), the malfunction is cleared.

#### **NOTE**

- Even though DTC (C00) is indicated, the previous malfunction history DTC still remains stored in the ECM. Therefore, erase the history DTC memorized in the ECM using SDS.
- DTC is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored history DTC using SDS. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".
- 7) Turn the ignition switch OFF and disconnect the special tool from the mode select switch.
- 8) Reinstall the right frame cover.

#### **Use of SDS**

#### NOTE

- Do not disconnect the coupler from ECM, the battery cable from the battery, ECM ground wire harness from the engine or main fuse before confirming DTC (Diagnostic Trouble Code) stored in memory. Such disconnection will erase the memorized information in ECM memory.
- DTC stored in ECM memory can be checked by the SDS.
- Be sure to read "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)" before inspection and observe what is written there.
- 1) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Set up the SDS tools. (Refer to the SDS operation manual for further details.)

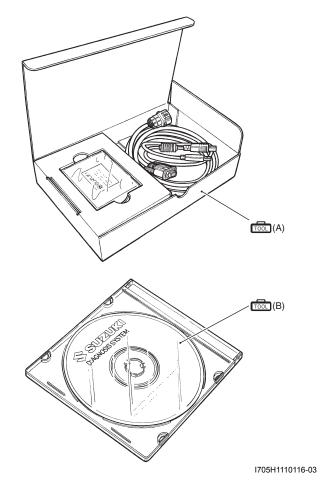
#### Special tool

(A): 09904-41010 (SDS Set)

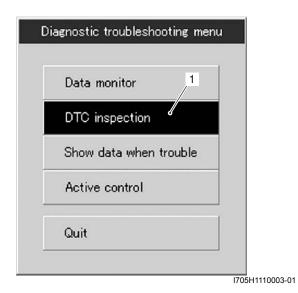
(B): 99565-01010-010 (CD-ROM Ver.10)



I717H1110007-01



3) Click the DTC inspection button (1).



#### 1A-15 Engine General Information and Diagnosis:

- 4) Start the engine or crank the engine for more the 4 seconds.
- 5) Check the DTC to determine the malfunction part. (Refer to "DTC Table (Page 1A-21)".)

#### NOTE

- Read the DTC (Diagnostic Trouble Code) and show data when trouble (displaying data at the time of DTC) according to instructions displayed on SDS.
- Not only is SDS used for detecting Diagnostic Trouble Codes but also for reproducing and checking on screen the failure condition as described by customers using the trigger. (Refer to "Show Data When Trouble (DTC) (Page 1A-16)".)
- How to use trigger. (Refer to the SDS operation manual for further details.)
- 6) After repairing the trouble, clear to delete history code (Past DTC). Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".
- 7) Reinstall the removed parts.

### **Use of SDS Diagnosis Reset Procedures**

B817H21104003

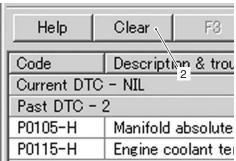
#### NOTE

The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.

- 1) After repairing the trouble, turn OFF the ignition switch and turn ON again.
- 2) Click the DTC inspection button (1).

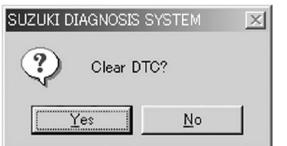


- 3) Check the DTC.
- 4) The previous malfunction history code (Past DTC) still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS tool.
- 5) Click "Clear" (2) to delete history code (Past DTC).



I705H1110005-01

6) Follow the displayed instructions.



I705H1110006-01



I705H1110009-01

Check that both "Current DTC" (3) and "Past DTC"
 are deleted (NIL).



I705H1110008-01

8) Turn OFF the ignition switch and disconnect the special tool from the dealer mode coupler.

# **Show Data When Trouble (DTC)**

Use of SDS B817H21104004

ECM stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called "Show data when trouble".

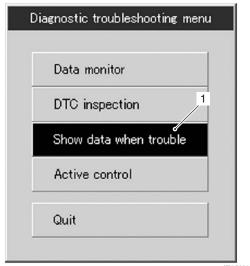
Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the motorcycle was running or stopped) when a malfunction was detected by checking the show data when trouble. This show data when trouble function can record the maximum of two Diagnostic Trouble Codes in the ECM.

Also, ECM has a function to store each show data when trouble for two different malfunctions in the order as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.

Failure #1					
P0105-H Manifold absolute pressure circuit malfunction 1					
Item	Pre-detect	Detect poi	Post-dete		
Engine speed	0	0	0		
Throttle position	28.9	28.9	28.9		
Manifold absolute pressure 1	135.2	144.3	145.6		
Engine coolant / oil temperature	24.0	24.0	24.0		
Gear position	N	N	N		
Secondary throttle actuator position sensor	96.1	96.1	98.4		

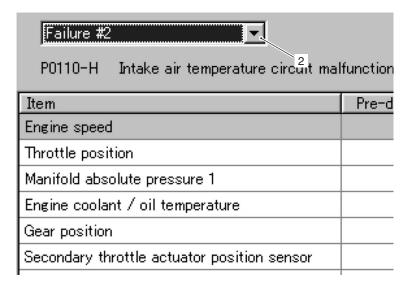
I705H1110010-01

1) Click "Show data when trouble" (1) to display the data.



I718H1110008-01

2) Click the drop down button (2), either "Failure #1" or "Failure #2" can be selected.



I718H1110009-01

#### **SDS Check**

B817H21104005

Using SDS, sample the data at the time of new and periodic vehicle inspections.

After saving the sampled data in the computer, file them by model and by user.

The periodically filed data help improve the accuracy of troubleshooting since they can indicate the condition of vehicle functions that has changed with time.

For example, when a vehicle is brought in for service but the troubleshooting of a failure is not easy, comparing the current data value to past filed data value at time of normal condition can allow the specific engine failure to be determined.

Also, in the case of a customer vehicle which is not periodically brought in for service with no past data value having been saved, if the data value of a good vehicle condition have been already saved as a master (STD), comparison between the same models helps facilitate the troubleshooting.

#### **NOTE**

- Before taking the sample of data, check and clear the Past DTC.
- A number of different data under a fixed condition as shown below should be saved or filed as sample.

- 1) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

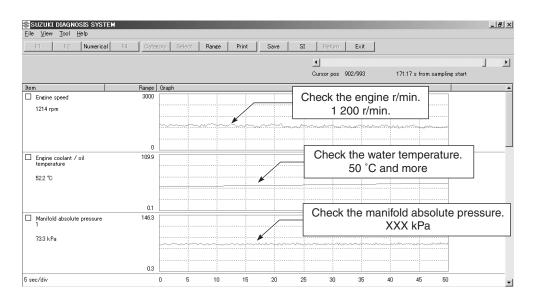
### Special tool

: 09904-41010 (SDS set)

**600**: 99565-01010-010 (CD-ROM Ver.10)

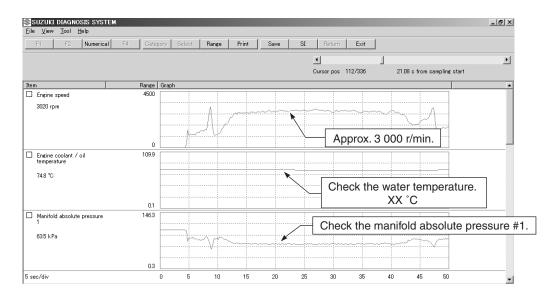
#### Sample

Data sampled from cold starting through warm-up



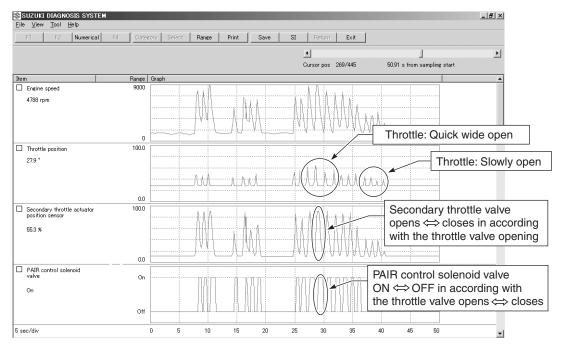
I718H1110149-01

#### Data at 3 000 r/min under no load



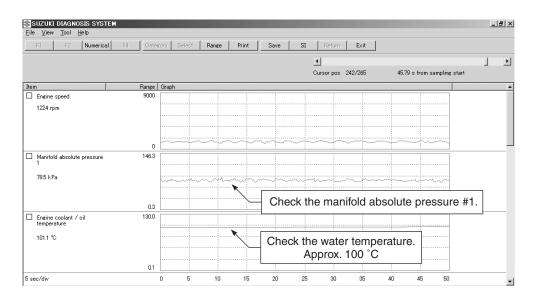
I718H1110150-01

#### Data at the time of racing



I718H1110151-01

#### Data of intake negative pressure during idling (100 °C)



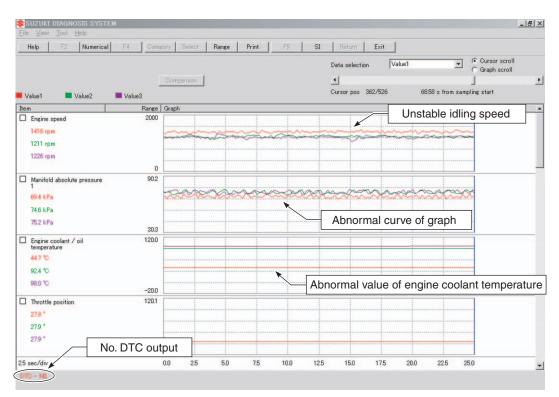
I718H1110152-01

#### **Example of Trouble**

Three data; value 1 (current data 1), value 2 (past data 2) and value 3 (past data 3); can be made in comparison by showing them in the graph. Read the change of value by comparing the current data to the past data that have been saved under the same condition, then you may determine how changes have occurred with the passing of time and identify what problem is currently occurring.

#### **NOTE**

With DTC not output, if the value of engine coolant temperature is found to be lower than the data saved previously, the possible cause may probably lie in a sensor circuit opened, ground circuit opened or influence of internal resistance value changes, etc.



I718H1110153-03

DTC Table

B817H21104006

Code	Malfunction Part	Remarks
C00	None	No defective part
C12 (P0335)	Overalle leaff and a West and and (OVDO)	·
☞(Page 1A-27)	Crankshaft position sensor (CKPS)	Pick-up coil signal, signal generator
C13 (P0105-H/L)	14.4 (A.DO)	
☞(Page 1A-30)	Intake air pressure sensor #1 (IAPS)	
C14 (P0120-H/L)	TI W (TD0)	
☞(Page 1A-39)	Throttle position sensor (TPS)	
C15 (P0115-H/L)	F : (FOTO)	
☞(Page 1A-47)	Engine coolant temperature sensor (ECTS)	
C17 (P1750-H/L)	// // // // // // // // // // // // //	
☞ (Page 1A-54)	Intake air pressure sensor #2 (IAPS)	
C21 (P0110-H/L)	(4.70)	
☞(Page 1A-62)	Intake air temperature sensor (IATS)	
C23 (P1651-H/L)		
☞(Page 1A-69)	Tip-over sensor (TOS)	
C24 (P0351)		
☞(Page 1A-75)	Ignition signal #1 (IG coil #1)	For #1 cylinder
C25 (P0352)	1 11 1 110 (10 110)	F //O
☞(Page 1A-75)	Ignition signal #2 (IG coil #2)	For #2 cylinder
C26 (P0353)	1 11 1 1 1 10 110 110	F #2 #1
☞(Page 1A-75)	Ignition signal #3 (IG coil #3)	For #3 cylinder
C27 (P0354)		- "4 " 1
☞(Page 1A-75)	Ignition signal #4 (IG coil #4)	For #4 cylinder
C28 (P1655)	0 1 11 11 1 1 (07)(A)	
☞(Page 1A-75)	Secondary throttle valve actuator (STVA)	
C29 (P1654-H/L)	Construction and the Company (CTDC)	
☞(Page 1A-75)	Secondary throttle position sensor (STPS)	
C31 (P0705)	Coor position signal (CD switch)	
☞(Page 1A-87)	Gear position signal (GP switch)	
C32 (P0201)	Injector signal #1 (FI #1)	For #1 cylinder
☞(Page 1A-89)	Injector signal #1 (11#1)	1 of #1 cyllidel
C33 (P0202)	Injector signal #2 (FI #2)	For #2 cylinder
☞(Page 1A-89)	Injector signar #2 (11 #2)	1 of #2 cylinder
C34 (P0203)	Injector signal #3 (FI #3)	For #3 cylinder
☞(Page 1A-89)	injusted digital no (1 1 no)	. 5. 7.5 5/11/105/
C35 (P0204)	Injector signal #4 (FI #4)	For #4 cylinder
☞(Page 1A-89)	,5555. 513.101.11.17	
C40 (P0505/		
P0506/P0507)	Idle speed control valve (ISC valve)	
☞(Page 1A-93)		
C41 (P0230-H/L,	Fuel pump control system (FP control system),	
P2505)	ECM/PCM power input signal	Fuel pump, Fuel pump relay
☞(Page 1A-99)	- p p	
C42 (P1650)	Ignition switch signal (IG switch signal)	Anti-theft
☞(Page 1A-104)	0 ( 2 2 2 3 7 )	
C44 (P0130/	Heated among concer (HOSO)	
P0135)	Heated oxygen sensor (HO2S)	
☞(Page 1A-104)		
C49 (P1656)	PAIR control solenoid valve	
☞(Page 1A-110)		
C60 (P0480)	Cooling fan control system	Cooling fan relay
☞(Page 1A-114)		

In the LCD (DISPLAY) panel, the malfunction code is indicated from small code to large code.

#### **Fail-Safe Function Table**

B817H21104007

FI system is provided with fail-safe function to allow the engine to start and the motorcycle to run in a minimum performance necessary even under malfunction condition.

Item	Fail-Safe Mode	Starting Ability	Running Ability		
IAP sensor	Intake air pressure is fixed to 101 kPa (760 mmHg).	"YES"	"YES"		
TP sensor	The throttle opening is fixed to full open position. Ignition timing is also fixed.	"YES"	"YES"		
ECT sensor	Engine coolant temperature value is fixed to 80 °C (176 °F).	"YES"	"YES"		
IAT sensor	Intake air temperature value is fixed to 40 °C (104 °F).	"YES"	"YES"		
	#1 Fuel-cut	"YES"	"YES"		
	#11 del-cut		rlinder can run.		
	#2 Fuel-cut	"YES"	"YES"		
Ignition signal	#2 i dei-cut		rlinder can run.		
Igilition signal	#3 Fuel-cut	"YES"	"YES"		
	#3 i dei-cut		#1, #2 & #4 cylinder can run.		
	#4 Fuel-cut	"YES"	"YES"		
		#1, #2 & #3 cylinder can run.			
Secondary throttle valve actuator	When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"		
STP sensor	Secondary throttle valve is fixed to full close position.	"YES"	"YES"		
Gear position signal	Gear position signal is fixed to 6th gear.	"YES"	"YES"		
HO2 sensor	Feedback compensation is inhibited. (Air/fuel ratio is fixed to normal.)	"YES"	"YES"		
PAIR control solenoid valve	ECM stops controlling PAIR control solenoid valve.	"YES"	"YES"		
ISC valve	When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"		

The engine can start and can run even if the signal in the table is not received from each sensor. But, the engine running condition is not complete, providing only emergency help (by fail-safe circuit). In this case, it is necessary to bring the motorcycle to the workshop for complete repair.

When two ignition signals or two injector signals are not received by ECM, the fail-safe circuit can not work and ignition or injection is stopped.

☐ Other:

# **FI System Troubleshooting**

#### **Customer Complaint Analysis**

B817H21104008

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such an inspection form such as following will facilitate collecting information to the point required for proper analysis and diagnosis.

NOTE			
This form is a stand characteristic of each		d be modified according to conditions and	
EXAMPLE: CUSTOMER	PROBLEM INSPECTION FO	DRM	
User name:	Model:	VIN:	
Date of issue:	Date Reg.:	Date of problem: Mileage:	
Malfunction indicator light condition (LED) ☐ Always ON / ☐ Somet		times ON / □ Always OFF / □ Good condition	
Malfunction display/co		y / ☐ Malfunction display ( )	
(LCD)	Dealer mode: ☐ No code	e / □ Malfunction code ( )	
	PROBLEM	SYMPTOMS	
☐ Difficult Starting		☐ Poor Driveability	
☐ No cranking		☐ Hesitation on acceleration	
□ No initial combustion	n	☐ Back fire / ☐ After fire	
□ No combustion		☐ Lack of power	
☐ Poor starting at		☐ Surging	
(□ cold / □ warm / l	□ always)	☐ Abnormal knocking	
□ Other		☐ Engine rpm jumps briefly	
		□ Other	
☐ Poor Idling		☐ Engine Stall when	
□ Poor fast Idle		☐ Immediately after start	
□ Abnormal idling spe	ed	☐ Throttle valve is opened	
(□ High / □ Low) (	r/min)	☐ Throttle valve is closed	
☐ Unstable		☐ Load is applied	
☐ Hunting ( r/min t	to r/min)	□ Other	
□ Other			
☐ OTHERS:			
MOTOR	OVOLE/ENVIDONMENTAL O	CONDITION WHEN PROPIEM COOLING	
MOTOR		ONDITION WHEN PROBLEM OCCURS  ntal condition	
Weather		To Snow / □ Always / □ Other	
	☐ Hot / ☐ Warm / ☐ Cool / ☐		
	Frequency		
	☐ Under certain condition☐ Urban / ☐ Suburb / ☐ Highway / ☐ Mountainous (☐ Uphill / ☐ Downhill)		
	☐ Tarmacadam / ☐ Gravel /		
		ele condition	
Engine condition		ise / □ Warmed up / □ Always / □ Other at starting	
_	• • • • • • • • • • • • • • • • • • • •	Racing without load / □ Engine speed ( r/min)	
		speed / □ Accelerating / □ Decelerating	
	☐ Right hand corner / ☐ Lef		
		need when problem occurs ( km/h mile/h)	

#### **Visual Inspection**

Prior to diagnosis using the mode select switch or SDS, perform the following visual inspections. The reason for visual inspection is that mechanical failures (such as oil leakage) cannot be displayed on the screen with the use of mode select switch or SDS.

- Engine oil level and leakage. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".
- Engine coolant level and leakage. Refer to "Cooling Circuit Inspection in Section 1F (Page 1F-4)".
- Fuel level and leakage. Refer to "Fuel Line Inspection in Section 0B (Page 0B-12)".
- Clogged air cleaner element. Refer to "Air Cleaner Element Inspection and Cleaning in Section 0B (Page 0B-4)".
- · Battery condition. Refer to "Battery Visual Inspection in Section 1J (Page 1J-12)".
- Throttle cable play. Refer to "Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-14)".
- · Vacuum hose looseness, bend and disconnection.
- Broken fuse. Refer to "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".
- FI light operation. Refer to "Self-Diagnosis Function (GSF650/S/A/SAK7) (Page 1A-2)".
- Each warning light operation. Refer to "Combination Meter Inspection (GSF650/S/A/SAK7) in Section 9C (Page 9C-6)".
- Speedometer operation. Refer to "Combination Meter Inspection (GSF650/S/A/SAK7) in Section 9C (Page 9C-6)".
- Exhaust gas leakage and noise. Refer to "Exhaust System Inspection in Section 1K (Page 1K-5)".
- Each coupler disconnection. Refer to "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".
- Clogged radiator fins. Refer to "Radiator Inspection and Cleaning in Section 1F (Page 1F-6)".

#### **Malfunction Code and Defective Condition Table**

B817H21104009

Malfunction Code		Detected Item	Detected Failure Condition	Check For
C00		NO FAULT	_	_
C12 P0335		CKP sensor	The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	CKP sensor wiring and mechanical parts CKP sensor, lead wire/coupler connection
C13/C1	7		The sensor should produce following voltage. 0.5 V ≤ sensor voltage < 4.85 V In other than the above range, C13 (P0105) or C17 (P1750) is indicated.	IAP sensor, lead wire/coupler connection
P0105/ P1750	Н	IAP sensor	Sensor voltage is higher than specified value.	IAP sensor circuit open or shorted to Vcc or ground circuit open
1 1730	L		Sensor voltage is lower than specified value.	IAP sensor circuit shorted to the ground or Vcc circuit open
C17/P1750			If the pressure variation (voltage variation) does not exist even under the engine operating condition, this malfunction code is output.	Make sure to check that IAP sensor #2 is securely installed on the throttle body.
C14			The sensor should produce following voltage. 0.2 V ≤ sensor voltage < 4.8 V In other than the above range, C14 (P0120) is indicated.	TP sensor, lead wire/coupler connection
	Н	TP sensor	Sensor voltage is higher than specified value.	TP sensor circuit shorted to Vcc or ground circuit open
P0120	L		Sensor voltage is lower than specified value.	TP sensor circuit open or shorted to the ground or Vcc circuit open

Malfunct Code	ion	Detected Item	Detected Failure Condition	Check For
C15		ECT sensor	The sensor voltage should be the following. $0.15 \text{ V} \le \text{sensor voltage} < 4.85 \text{ V}$ In other than the above range, C15 (P0115) is indicated.	ECT sensor, lead wire/coupler connection
P0115		ECT sensor	Sensor voltage is higher than specified value.	ECT sensor circuit open or ground circuit open
1 0113	L		Sensor voltage is lower than specified value.	ECT sensor circuit shorted to the ground
C21		IAT sensor	The sensor voltage should be the following. $0.15 \text{ V} \le \text{sensor voltage} < 4.85 \text{ V}$ In other than the above range, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection
P0110	Η	IAI selisoi	Sensor voltage is higher than specified value.	IAT sensor circuit open or ground circuit open
	L		Sensor voltage is lower than specified value.	IAT sensor circuit shorted to the ground
C23		TO sensor	The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V $\leq$ sensor voltage $<$ 4.8 V In other than the above value, C23 (P1651) is indicated.	TO sensor, lead wire/coupler connection
54054	Н		Sensor voltage is higher than specified value.	TO sensor circuit shorted to Vcc or ground circuit open
P1651	L		Sensor voltage is lower than specified value.	TO sensor circuit open or shorted to the ground or Vcc circuit open
C24/C2 C26/C2 P0351/P0 P0353/P0	7 352	Ignition signal	CKP sensor (pick-up coil) signal is produced, but signal from ignition coil is interrupted 8 times or more continuously. In this case, the code C24 (P0351), C25 (P0352), C26 (P0353) or C27 (P0354) is indicated.	Ignition coil, wiring/coupler connection, power supply from the battery
C28 P1655		Secondary throttle valve actuator	When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or operation voltage does not reach STVA motor, C28 (P1655) is indicated. STVA can not operate.	STVA motor, STVA lead wire/ coupler
C29			The sensor should produce following voltage. 0.2 V ≤ sensor voltage < 4.85 V In other than the above range, C29 (P1654) is indicated.	STP sensor, lead wire/coupler connection
	Н	STP sensor	Sensor voltage is higher than specified value.	STP sensor circuit shorted to Vcc or ground circuit open
P1654	L		Sensor voltage is lower than specified value.	STP sensor circuit open or shorted to the ground or Vcc circuit open
C31		Gear position signal	Gear position signal voltage should be higher than the following for 3 seconds and more. Gear position sensor voltage > 0.6 V If lower than the above value, C31 (P0705) is indicated.	GP switch, wiring/coupler connection, gearshift cam, etc.
C32/C33 C34/C35 P0201/P0202 P0203/P0204			CKP sensor (pickup coil) signal is produced, but fuel injector signal is interrupted 4 times or more continuously. In this case, the code C32 (P0201), C33 (P0202), C34 (P0203) or C35 (P0204) is indicated.	Fuel injector, wiring/coupler connection, power supply to the injector.

Malfunct Code		Detected Item	Detected Failure Condition	Check For
C40/P0505			The circuit voltage of motor drive is unusual.	ISC valve circuit open or shorted to the ground
C40/P0506		ISC valve	Idle speed is lower than the desired idle speed.	Air passage clogged ISC valve fixed ISC valve pre-set position is incorrect
C40/P05	07		Idle speed is higher than the desired idle speed.	ISC valve hose connection ISC valve is fixed ISC valve pre-set position is incorrect
C41			No voltage is applied to the fuel pump, although fuel pump relay is turned ON, or voltage is applied to fuel pump although fuel pump relay is turned OFF.	Fuel pump relay, lead wire/ coupler connection, power source to fuel pump relay and fuel injectors
P0230	н	Fuel pump relay	Voltage is applied to fuel pump although fuel pump relay is turned OFF.	Fuel pump relay switch circuit shorted to power source Fuel pump relay (switch side)
F 0230	L		No voltage is applied to the fuel pump, although fuel pump relay is turned ON.	Fuel pump relay circuit open or short Fuel pump relay (coil side)
C41/P25	05	ECM power input signal	No voltage is applied to the ECM, although FP relay is turned ON.	Lead wire/coupler connection of ECM terminal to fuel fuse, Fuel fuse, Power source of speedometer shorted to ground.
C42 P1650	)	Ignition switch	Ignition switch signal is not input to the ECM.	Ignition switch, lead wire/coupler, etc.
C44 P0130		HO2 sensor (HO2S)	HO2 sensor output voltage is not input to ECM during engine operation and running condition. (Sensor voltage > 1.0 V) C44 (P0130) is indicated.	HO2S sensor circuit open or shorted to the power source, HO2 sensor lead wire/coupler connection.
C44 P0135			The Heater can not operate so that heater operation voltage is not supply to the oxygen heater circuit, C44 (P0135) is indicated.	Heated circuit open or shorted to the ground Battery voltage supply to the HO2 sensor
C49 P1656	<u> </u>	PAIR control solenoid valve	PAIR control solenoid valve voltage is not input to ECM.	PAIR control solenoid valve, lead wire/coupler
C60 P0480		Cooling fan relay	Cooling fan relay signal is not input to ECM.	Cooling fan relay, lead wire/ coupler connection

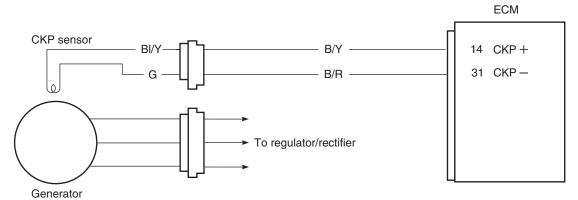
# DTC "C12" (P0335): CKP Sensor Circuit Malfunction

#### **Detected Condition and Possible Cause**

B817H21104010

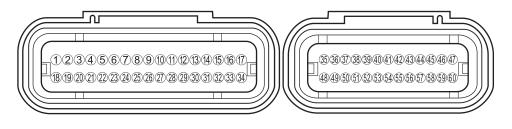
Detected Condition	Possible Cause
The signal does not reach ECM for 3 sec. or more, after	Metal particles or foreign material being stuck on the
receiving the starter signal.	CKP sensor and rotor tip.
	CKP sensor circuit open or short.
	CKP sensor malfunction.
	ECM malfunction.

### **Wiring Diagram**



I717H1110033-01

#### **ECM** coupler (Harness side)



I718H1110240-01

#### **Troubleshooting**

#### **NOTE**

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".

Step		Action	Yes	No
<u> 3ւep</u> 1	1)	Turn the ignition switch OFF.	Go to Step 2.	Replace the CKP
	2)	Check the CKP sensor coupler for loose or poor		sensor with a new one.
	-/	contacts.		
		If OK, then measure the CKP sensor resistance.		
	2)	1717H1110008-01		
	3)	Disconnect the CKP sensor coupler and measure the resistance.		
		Special tool ক্রি (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Resistance ( $\Omega$ )		
		CKP sensor resistance		
		90 – 150 $\Omega$ (B/Y – G)		
	4)	If OK, then check the continuity between each terminal and ground.  CKP sensor continuity		
		$\infty \Omega$ (Infinity) (B/Y – Ground, G – Ground)		
		Ι717H1110010-01		
	1	a the resistance and continuity OK?		
	A/6	the resistance and continuity OK?		

Step	Action	Yes	No
2	1) Crank the engine a few seconds with the starter motor,	<ul> <li>B/Y or B/R wire open</li> </ul>	<ul> <li>Inspect that metal</li> </ul>
	and measure the CKP sensor peak voltage at the	or shorted to the	particles or foreign
	coupler.	ground.	material stuck on the
	Special tool (A): 09900–25008 (Multi-circuit tester set)	Loose or poor contacts on the CKP sensor coupler or	CKP sensor and rotor tip.  • If there are no metal
	Tester knob indication Voltage()	ECM coupler (terminal 14 or 31).	particles and foreign material, then replace
	CKP sensor peak voltage 2.0 V and more ((+) terminal: BI/Y – (–) terminal: G)	If wire and connection are OK, intermittent trouble or faulty ECM.	the CKP sensor with a new one. Refer to "CKP Sensor Removal and Installation in Section
	Peakvolt adaptor	Recheck each terminal and wire harness for open circuit and poor connection.	1C (Page 1C-1)".
	1717H1110011-01	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section	
	2) Repeat the 1) test procedures a few times and measure	1C (Page 1C-1)".	
	the highest peak voltage.		
	Is the voltage OK?		

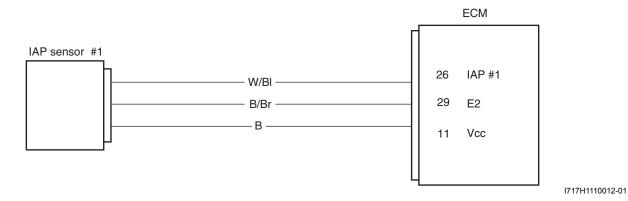
# DTC "C13" (P0105-H/L): IAP Sensor (#1) Circuit Malfunction

B817H21104011

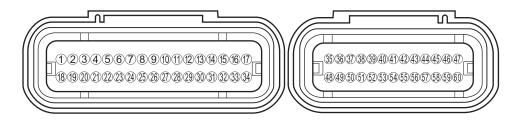
#### **Detected Condition and Possible Cause**

Detected Condition		Detected Condition	Possible Cause	
C13		IAP sensor voltage is not within the following range.  0.5 V ≤ Sensor voltage < 4.85 V  NOTE  Note that atmospheric pressure varies depending on weather conditions as well as altitude.  Take that into consideration when inspecting voltage.	<ul> <li>Clogged vacuum passage between throttle body and IAP sensor.</li> <li>Air being drawn from vacuum passage between throttle body and IAP sensor.</li> <li>IAP sensor circuit open or shorted to the ground.</li> <li>IAP sensor malfunction.</li> <li>ECM malfunction.</li> <li>IAP sensor circuit is open or shorted to Vcc or ground circuit open.</li> <li>IAP sensor circuit is shorted to the ground or Vcc circuit</li> </ul>	
P0105	Н	Sensor voltage is higher than specified value.	open.	
1 0103	L	Sensor voltage is lower than specified value.		

#### **Wiring Diagram**



#### **ECM** coupler (Harness side)



I718H1110240-01

#### **Troubleshooting**

### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".

# C13 (Use of mode select switch)

Step		Action	Yes	No
	1)	Turn the ignition switch OFF.	Go to Step 4.	<ul> <li>Loose or poor</li> </ul>
	2)	Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".		contacts on the ECM coupler.
	3)	Check the IAP sensor coupler for loose or poor contacts. If OK, then measure the IAP sensor input voltage.		<ul> <li>Open or short circuit in the B wire or B/Br wire.</li> </ul>
		1718H1110159-01		
	4)	Disconnect the IAP sensor coupler.		
	5)	Turn the ignition switch ON.		
	6)	Measure the voltage at the B wire and ground. If OK, then measure the voltage at the B wire and B/Br wire.		
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( )		
		IAP sensor #1 input voltage		
		4.5 – 5.5 V		
		((+) terminal: B – (–) terminal: Ground, (+) terminal: B – (–) terminal: B/Br)		
		( ) to minum 2/21)		
		I718H1110160-03		
	ls t	he voltage OK?		

# P0105-H (Use of SDS)

To Click the data monitor button (1).  Diagnostic troubleshooting menu  DTC inspection Show data when trouble Active control  Quit  2) Check the manifold absolute pressure 1 data.	Step	Action	Yes	No
Data monitor  DTC inspection  Show data when trouble  Active control  Quit  2) Check the manifold absolute pressure 1 data.			1	
Throttle position  279 *  DTC -1  Current  P0105-H Manifold absolute pressure circuit malfunction 1  1718H1110161-02  Approx. 146 kPa (1.46 kgf/cm³, 21 psi) and more OK?  2 1) Turn the ignition switch OFF.  2) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".  3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.		Diagnostic troubleshooting menu  Data monitor  DTC inspection  Show data when trouble  Active control  Quit    T18H1110251-01	Go to Step 2.	Go to Step 4.
Approx. 146 kPa (1.46 kgf/cm³, 21 psi) and more OK?  2 1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)". 3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.				
Approx. 146 kPa (1.46 kgf/cm³, 21 psi) and more OK?  2 1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".  3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.		DTC - 1 Current P0105-H Manifold absolute pressure circuit malfunction 1		
2 1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)". 3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.		I718H1110161-02		
<ul> <li>2) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".</li> <li>3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.</li> </ul>		Approx. 146 kPa (1.46 kgf/cm³, 21 psi) and more OK?		
	2	<ol> <li>Turn the ignition switch OFF.</li> <li>Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".</li> <li>Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.</li> </ol>	·	

Step		Action	Yes	No
2	4)	Disconnect the IAP sensor coupler.	Go to Step 4.	W/BI wire shorted to
	5)	Check the continuity between the B wire and W/BI wire. If the sound is not heard from the tester, the circuit condition is OK.		Vcc, or B/Br wire open.
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity ( •))))		
	7)	Disconnect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".  Insert the needle pointed probes to the lead wire coupler. Check the continuity between the W/BI wire "C" and		
		terminal 26. If OK, then check the continuity between the B/Br wire "B" and terminal 29.		
		Special tool (A): 09900-25008 (Multi-circuit tester set) (B): 09900-25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		ECM coupler (Harness side)		
		"C" "B" (A)		
		"26" <b>29</b> "		
	Is t	he continuity OK?		

# P0105-L (Use of SDS)

Step	Action	Yes	No
1	Click the data monitor button (1).	Go to Step 2.	Go to Step 4.
	Diagnostic troubleshooting menu  Data monitor  DTC inspection  Show data when trouble  Active control  Quit    Tahti110251-01	Go to Step 2.	Go to Step 4.
	I718H1110163-02		
	Approx. –20 kPa (–0.2 kgf/cm³, –2.8 psi) and less OK?		
2	1) Turn the ignition switch OFF.  2) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".  3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.	Go to Step 3.	B and W/BI wire open, W/BI wire shorted to the ground.

Step		Action	Yes	No
2	4)	Disconnect the IAP sensor coupler.	Go to Step 3.	B and W/BI wire open,
	5)	Check the continuity between the W/Bl wire "C" and ground. Also, check the continuity between the W/Bl wire and B/Br wire. If the sound is not heard from the tester, the circuit condition is OK.		W/BI wire shorted to the ground.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity ( •))))		
	6)	Disconnect the ECM coupler. Refer to "ECM Removal		
	_,	and Installation in Section 1C (Page 1C-1)".		
	1	Insert the needle pointed probes to the lead wire coupler. Check the continuity between the B wire "A" and terminal 11. Also, check the continuity between the W/BI wire "C" and terminal 26.		
		Special tool  (A): 09900-25008 (Multi-circuit tester set)  (B): 09900-25009 (Needle pointed probe set)		
		Tester knob indication Continuity ( •))))		
		ECM coupler (Harness side)		
		"C" "A" (A) (D) (D) (A) (D) (D) (D) (D) (D) (D) (D) (D) (D) (D		
	ls t	he continuity OK?		
	<u> </u>	and the second s	l	1

Step		Action	Yes	No
3	1)	Connect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	Go to Step 4.	Open or short circuit in the B wire or B/Br wire.
	2)	Turn the ignition switch ON.		
	3)	Measure the input voltage at the B wire and ground with the needle pointed probes.  If OK, the measure the input voltage at the B wire and B/Br wire.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Voltage ( )		
		IAP sensor #1 input voltage 4.5 – 5.5 V ((+) terminal: B – (–) terminal: Ground, (+) terminal: B – (–) terminal: B/Br)		
		I718H1110165-01		
	ls t	he voltage OK?		

# 1A-37 Engine General Information and Diagnosis:

Step		Action	Yes		No
4	1)	Turn the ignition switch OFF.	Go to Step 5.	•	Check the vacuum
	2)	Connect the ECM coupler and IAP sensor coupler.			hose for crack or
	3)	Insert the needle pointed probes to the lead wire coupler.			damage.
	4)	Start the engine at idle speed and measure the IAP		•	Open or short circuit in the W/BI wire.
		sensor output voltage at the wire side coupler between			
		the W/BI wire and B/Br wire.		•	If vacuum hose and wire is OK, replace
		Special tool			the IAP sensor with a
		(A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)			new one. Refer to
					"IAP Sensor (#1)
		Tester knob indication			Removal and Installation in Section
		Voltage ( )			1C (Page 1C-2)".
		IAP sensor #1 output voltage			. o (. ago . o _) .
		Approx. 2.7 V at idle speed ((+) terminal: W/BI – (–) terminal: B/Br)			
		I718H1110166-03			
	Is t	he voltage OK?			

Step			Δ	ction				Yes	No
5	1)	Turn the ign	nition switch	OFF.			•	B, W/BI or B/Br wire	If check result is not
	2)	Remove the Installation is	e IAP sensor in Section 10			moval and		open or shorted to the ground, or poor	satisfactory, replace the IAP sensor with a new
	3)	Connect the the IAP sen	•	mp gauge	to the va	cuum port of		11, 26 or 29 connection.	one. Refer to "IAP Sensor (#1) Removal and Installation in
	4)	•	e is 4.5 – 5.0 terminal "B"	V) and co	nnect (-)	terminal to	•	If wire and connection are OK, intermittent trouble or faulty ECM.	Section 1C (Page 1C-2)".
	5)	applied by ι	o, check if vousing vacuur	oltage redu	ices whe		•	Recheck each terminal and wire harness for open circuit and poor	
			ol 9917–47011 9900–25008	•		• /	•	connection.  Replace the ECM with a known good	
		Tester knol Voltage ( ==	<u>b indication</u> )					one, and inspect it again. Refer to "ECM Removal and Installation in Section	
			"C" "B"		(B)	I718H1110030-02		1C (Page 1C-1)".	
		ALTITUDE (	Reference)	ATOMOSE PRESS	PHERIC	OUTPUT VOLTAGE			
		ft	m	mmHg	kPa	V			
		0 – 2 000	0 – 610	760 – 707	100 – 94	3.4 – 4.0			
		2 001 – 5 000	611 – 1 524	707 – 634	94 – 85	3.0 – 3.7			
		5 001 – 8 000	1 525 – 2 438	634 – 567	85 – 76	2.6 – 3.4			
		8 001 – 10 000	2 439 – 3 048	567 – 526	76 – 70	2.4 – 3.1 I718H1110167-02			
	ls t	the voltage C	K?			1. 13111110107-02			

### DTC "C14" (P0120-H/L): TP Sensor Circuit Malfunction

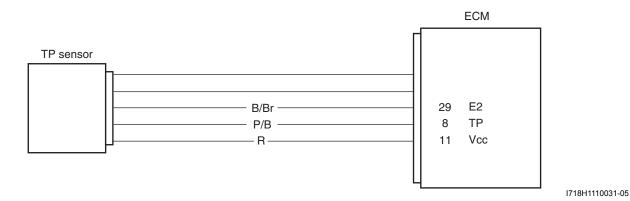
**Detected Condition and Possible Cause** 

B817H21104012

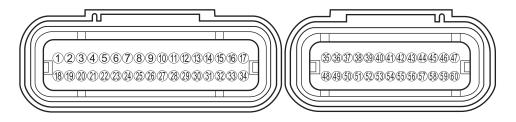
I718H1110240-01

		Detected Condition		Possible Cause
		Output voltage is not within the following	•	TP sensor maladjusted.
		range.	•	TP sensor circuit open or short.
C14	Difference between actual throttle opening and opening calculated by ECM is larger		•	TP sensor malfunction.
		than specified value.	•	ECM malfunction.
		0.2 V ≤ Sensor voltage < 4.8 V	•	TP sensor circuit is shorted to Vcc or ground circuit is
	Н	Sensor voltage is higher than specified		open.
P0120		value.	•	TP sensor circuit is open or shorted to the ground or Vcc
F0120	ı	Sensor voltage is lower than specified		circuit is open.
		value.		·

### **Wiring Diagram**



#### **ECM** coupler (Harness side)



#### **Troubleshooting**

### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

- After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".
- TP sensor is incorporated in the IAP sensor/IAT sensor.

# C14 (Use of mode select switch)

1 1) Turn the ignition switch OFF. 2) Check the TP sensor coupler for loose or poor contacts. If OK, then measure the TP sensor input voltage.  3) Disconnect the TP sensor coupler. 4) Turn the ignition switch ON. 5) Insert the needle pointed probes to the lead wire coupler. 8) Measure the input voltage at the R wire and B/Br wire.  Special tool ((a)) (19900–25008 (Multi-circuit tester set) ((a)) ((b)) ((b)) ((c)) ((c	Step		Action	Yes	No
Tribilitions of the series of input voltage.  3) Disconnect the TP sensor coupler.  4) Turn the lightion switch ON.  5) Insert the needle pointed probes to the lead wire coupler.  6) Measure the input voltage at the R wire and ground.  If OK, then measure the input voltage at the R wire and B/Br wire.  Special tool  ((a): 09900−25008 (Multi-circuit tester set)  ((b) ((b): 09900−25009 (Needle pointed probe set))  Tester knob indication  Voltage (			Turn the ignition switch OFF.	Go to Step 4.	
3) Disconnect the TP sensor coupler.  4) Turn the ignition switch ON.  5) Insert the needle pointed probes to the lead wire coupler.  6) Measure the input voltage at the R wire and ground. If OK, then measure the input voltage at the R wire and B/Br wire.  Special tool  (iii) (A): 09900–25008 (Multi-circuit tester set)  (iiii) (B): 09900–25009 (Needle pointed probe set)  Tester knob indication  Voltage ( == )  TP sensor input voltage  4.5 - 5.5 V ((+) terminal: R - (-) terminal: Ground, (+) terminal: R  - (-) terminal: B/Br)		2)			
in the R or B/Br wire.  3) Disconnect the TP sensor coupler. 4) Turn the ignition switch ON. 5) Insert the needle pointed probes to the lead wire coupler. 6) Measure the input voltage at the R wire and ground. If OK, then measure the input voltage at the R wire and B/Br wire.  Special tool  ( (A): 09900–25008 (Multi-circuit tester set)  ( (B): 09900–25009 (Needle pointed probe set)  Tester knob indication  Voltage ( :)  TP sensor input voltage  4.5 − 5.5 V ((+) terminal: R − (−) terminal: Ground, (+) terminal: R  − (−) terminal: B/Br)			If OK, then measure the TP sensor input voltage.		·
4) Turn the ignition switch ON. 5) Insert the needle pointed probes to the lead wire coupler. 6) Measure the input voltage at the R wire and ground. If OK, then measure the input voltage at the R wire and B/Br wire.  Special tool  ((a): 09900–25008 (Multi-circuit tester set)  ((b): 09900–25009 (Needle pointed probe set)  Tester knob indication  Voltage ()  TP sensor input voltage  4.5 – 5.5 V  ((+) terminal: R – (-) terminal: Ground, (+) terminal: R  - (-) terminal: B/Br)			17.17H1110013-02		
5) Insert the needle pointed probes to the lead wire coupler. 6) Measure the input voltage at the R wire and ground. If OK, then measure the input voltage at the R wire and B/Br wire.  Special tool  (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)  Tester knob indication Voltage ()  TP sensor input voltage 4.5 – 5.5 V ((+) terminal: R – (-) terminal: Ground, (+) terminal: R – (-) terminal: B/Br)		3)	Disconnect the TP sensor coupler.		
6) Measure the input voltage at the R wire and ground. If OK, then measure the input voltage at the R wire and B/Br wire.  Special tool  (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)  Tester knob indication Voltage ()  TP sensor input voltage 4.5 – 5.5 V ((+) terminal: R – (-) terminal: Ground, (+) terminal: R  - (-) terminal: B/Br)		4)	Turn the ignition switch ON.		
If OK, then measure the input voltage at the R wire and B/Br wire.  Special tool (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)  Tester knob indication Voltage ( )  TP sensor input voltage 4.5 – 5.5 V ((+) terminal: R – (-) terminal: Ground, (+) terminal: R – (-) terminal: B/Br)		5)	Insert the needle pointed probes to the lead wire coupler.		
(A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)  Tester knob indication Voltage ( )  TP sensor input voltage 4.5 – 5.5 V ((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)		6)	If OK, then measure the input voltage at the R wire and		
Voltage ( )  TP sensor input voltage 4.5 – 5.5 V  ((+) terminal: R – (–) terminal: Ground, (+) terminal: R  – (–) terminal: B/Br)			் (A): 09900–25008 (Multi-circuit tester set)		
4.5 – 5.5 V ((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)					
I718H1110035-03			4.5 – 5.5 V ((+) terminal: R – (–) terminal: Ground, (+) terminal: R		
Is the voltage OK?					
1 1/0 1/10 TOINING OIL		ls t	the voltage OK?		

# 1A-41 Engine General Information and Diagnosis:

# P0120-H (Use of SDS)

Step		Action	Yes	No
1	1)	Click the data monitor button (1).	Go to Step 2.	Go to Step 4.
		Diagnostic troubleshooting menu  Data monitor  DTC inspection  Show data when trouble  Active control  Quit    Titel   Unit   Un	Go to Step 2.	Go to Step 4.
	Thi	rottle position approx. 125° and more OK?		
	<u>////</u> 1)	Turn the ignition switch OFF.	Go to Step 4.	P/B wire shorted to Vcc,
	,	Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.	, and the second	or B/Br wire open.

Step		Action	Yes	No
2	3)	Disconnect the TP sensor coupler.	Go to Step 4.	P/B wire shorted to Vcc,
	_ ′	Insert the needle pointed probes to the lead wire coupler.		or B/Br wire open.
	1 '	Check the continuity between the P/B wire and R wire. If the sound is not heard from the tester, the circuit condition is OK.		
		Special tool  (A): 09900-25008 (Multi-circuit tester set)  (B): 09900-25009 (Needle pointed probe set)		
		Tester knob indication Continuity ( •))))		
		(A)		
	6)	Disconnect the ECM coupler. Refer to "ECM Removal		
		and Installation in Section 1C (Page 1C-1)".		
	7)	Check the continuity between the P/B wire "B" and terminal 8. Also, check the continuity between the B/Br wire "C" and terminal 29.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity ( •١)))		
		ECM coupler (Harness side)		
		"C" "B" "OOL(A)		
		"29" 1718H1110171-02		
	Is t	he continuity OK?		

# 1A-43 Engine General Information and Diagnosis:

### P0120-L (Use of SDS)

1   1   Click the data monitor button (1).   Go to Step 2.   Go to Step 4.	1) Click the data monitor button (1).  Diagnostic troubleshooting menu  Data monitor  DTC inspection  Show data when trouble  Active control  Quit  2) Check the throttle position data.    Been	Step	Action	Yes	No
Data monitor  DTC inspection  Show data when trouble  Active control  Quit  2) Check the throttle position data.    Secondary first speed   10   10   10   10   10   10   10   1	DTC inspection  Show data when trouble  Active control  Quit  2) Check the throttle position data.				
Throttle position approx. 0° OK?  2 1) Turn the ignition switch OFF. 2) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  Go to Step 3.  R and P/B wire open, or P/B wire shorted to the ground.	Throttle position approx. 0° OK?  2 1) Turn the ignition switch OFF. 2) Check the TP sensor coupler for loose or poor contacts.  R and P/B wire open P/B wire shorted to be shorted to b		Diagnostic troubleshooting menu  Data monitor  DTC inspection  Show data when trouble  Active control  Quit    Trishtilio251-01	Go to Step 2.	Go to Step 4.
Throttle position approx. 0° OK?  2 1) Turn the ignition switch OFF. 2) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  Go to Step 3.  R and P/B wire open, or P/B wire shorted to the ground.	Throttle position approx. 0° OK?  2 1) Turn the ignition switch OFF. 2) Check the TP sensor coupler for loose or poor contacts.  R and P/B wire open P/B wire shorted to		DTC - 1 Current P0120-L Throttle position sensor A circuit malfunction		
2 1) Turn the ignition switch OFF. 2) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  R and P/B wire open, or P/B wire shorted to the ground.	2 1) Turn the ignition switch OFF. Go to Step 3. R and P/B wire operation of the content of the		I718H1110172-01		
2) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  P/B wire shorted to the ground.	2) Check the TP sensor coupler for loose or poor contacts.				
3) Disconnect the TP sensor coupler.			2) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.	Go to Step 3.	P/B wire shorted to the

-	ı		1	
Step		Action	Yes	No
2	4)	Insert the needle pointed probes to the lead wire coupler.	GO to Step 3.	R and P/B wire open, or P/B wire shorted to the
	5)	Check the continuity between the P/B wire and ground. Also, check the continuity between the P/B wire and B/Br wire.  If the sound is not heard from the tester, the circuit condition is OK.		ground.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
	6)	Disconnect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".  Check the continuity between the P/B wire "B" and terminal 8. Also, check the continuity between the R wire "A" and terminal 11.  Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)  ECM coupler (Harness side)		
		"B" "A" (A) (A) (B) (B) (T18H1110041-03		
	ls t	he continuity OK?		

# 1A-45 Engine General Information and Diagnosis:

Step		Action	Yes	No
3	1)	Connect the ECM coupler. Refer to "ECM Removal and		Open or short circuit in
		Installation in Section 1C (Page 1C-1)".	OFF and go to Step 4.	the R or B/Br wire.
	2)	Turn the ignition switch ON.		
	3)	Measure the input voltage at the R wire and ground. If OK, the measure the input voltage at the R and B/Br wire.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( )		
		TP sensor input voltage 4.5 – 5.5 V		
		((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)		
		I718H1110035-03		
	Is t	he voltage OK?		

Step Action	Yes No
Action  4 1) Turn the ignition switch OFF.  2) Connect the ECM coupler and TP sensor coupler.  3) Insert the needle pointed probes to the lead wire coupler.  4) Turn the ignition switch ON.  5) Measure the TP sensor output voltage at the P/B wire and B/Br wire by turning the throttle grip.  Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)  Tester knob indication  Voltage ()  TP sensor output voltage  Throttle valve is closed: Approx. 1.1 V  Throttle valve is opened: Approx. 4.3 V  ((+) terminal: P/B – (–) terminal: B/Br)	<ul> <li>P/B, R or B/Br wire open or shorted to the ground, or poor 8, 11 or 29 connection.</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".</li> </ul>

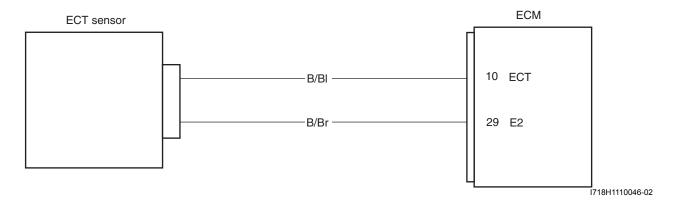
### DTC "C15" (P0115-H/L): ECT Sensor Circuit Malfunction

#### **Detected Condition and Possible Cause**

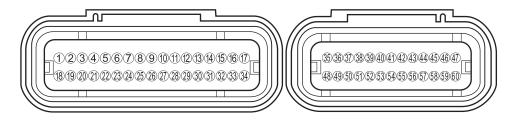
B817H21104013

		Detected Condition	Possible Cause
	Output voltage is not with in the following		ECT sensor circuit open or short.
C15		range.	ECT sensor malfunction.
		0.15 V ≤ Sensor voltage < 4.85 V	ECM malfunction.
	Н	Sensor voltage is higher than specified	
D0115	11	value.	ECT sensor circuit is open or ground circuit open.
P0115		Sensor voltage is lower than specified	ECT sensor circuit shorted to the ground.
	L	value.	

### **Wiring Diagram**



### **ECM** coupler (Harness side)



I718H1110240-01

#### **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

### **NOTE**

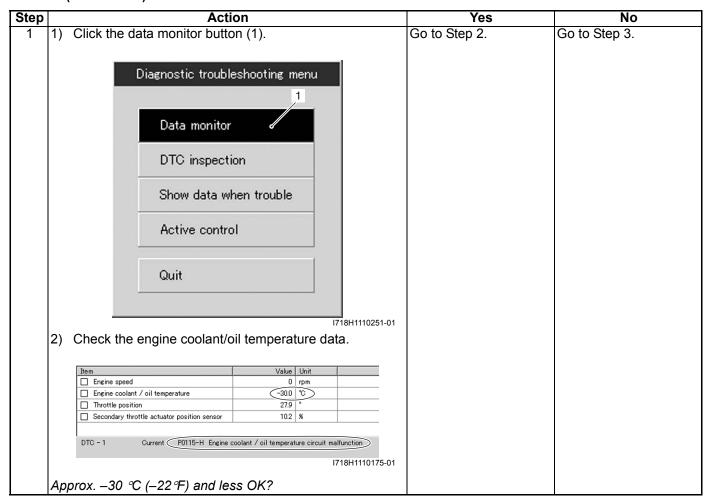
After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".

# C15 (Use of mode select switch)

Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 3.	Loose or poor
	2)	Check the ECT sensor coupler for loose or poor		contacts on the ECM
		contacts.		coupler.
		If OK, then measure the ECT sensor input voltage at the wire side coupler.		Open or short circuit in the B/BI or B/Br wire.
		1717H1110014-01		
	3)	Disconnect the coupler and turn the ignition switch ON.		
	4)	Measure the input voltage between the B/BI wire terminal and ground.  If OK, then measure the input voltage between the B/BI wire terminal and B/Br wire terminal.		
		Special tool ট্রি (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( )		
		ECT sensor input voltage 4.5 – 5.5 V ((+) terminal: B/BI – (–) terminal: Ground, (+) terminal: B/BI – (–) terminal: B/Br)		
		I718H1110048-03		
	10.4			
	ıs t	he voltage OK?		

### 1A-49 Engine General Information and Diagnosis:

### **P0115-H (Use of SDS)**



Step		Action	Yes	No D/D/ or D/Dawing area
2	1)	Turn the ignition switch OFF.	Go to Step 3.	B/BI or B/Br wire open.
	2)	Check the ECT sensor coupler for loose or poor		
		contacts.		
		If OK, then check the ECT sensor lead wire continuity.		
		I717H1110014-01		
	3)	Disconnect the ECT coupler.		
	4)	Disconnect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".		
	5)	Insert the needle pointed probes to the lead wire coupler.		
	6)	Check the continuity between the B/BI wire "A" and terminal 10. Also, check the continuity between the B/Br wire "B" and terminal 29.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		ECM coupler (Harness side)		
		"A" "OOD (B)		
	Is t	"10" ———————————————————————————————————		

# 1A-51 Engine General Information and Diagnosis:

# P0115-L (Use of SDS)

Step		Action	Yes	No
1	1)	Click the data monitor button (1).	Go to Step 2.	Go to Step 3.
	,	Diagnostic troubleshooting menu  Data monitor  DTC inspection  Show data when trouble  Active control	'	
		Quit		
		I718H1110251-01		
	2)	Check the engine coolant/oil temperature data.		
		Item Value Unit		
		☐ Engine speed         0 rpm           ☐ Engine coolant / oil temperature         1200 °C		
		☐ Throttle position 27.9 °		
		Secondary throttle actuator position sensor 10.2 %		
		DTC - 1 Current P0115-L Engine coolant / oil temperature circuit malfunction		
		I718H1110176-01		
		orox. 120 ℃ (248 ℉) and more OK?		
2		Turn the ignition switch OFF.	Go to Step 3.	B/Bl wire shorted to the ground.
	2)	Check the ECT sensor coupler for loose or poor contacts.		If wire is OK, go to
		If OK, then check the ECT sensor lead wire.		Step 3.
	3)	T717H1110014-01  Disconnect the ECT sensor coupler.		
	(د	Disconlined the LOT sensor coupler.		1

Step		Action	Yes	No
2	4)	Check the continuity between the B/BI wire and ground.	Go to Step 3.	B/Bl wire shorted to
		If the sound is not heard from the tester, the circuit		the ground.
		condition is OK.		<ul> <li>If wire is OK, go to</li> </ul>
		Special tool		Step 3.
		(A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication		
		Continuity test ( •))))		
		•)))		
		1718H1110054-03		
	5)	Connect the ECT sensor coupler.		
	6)	Remove the regulator/rectifier. Refer to "Regulator /		
	-,	Rectifier Inspection in Section 1J (Page 1J-8)".		
	7)	Insert the needle pointed probes to the lead wire coupler.		
	8)	Turn the ignition switch ON.		
	9)	Measure the output voltage between the B/BI wire and ground.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Voltage ( )		
		ECT sensor output voltage		
		0.15 – 4.85 V		
		((+) terminal: B/BI – (–) terminal: Ground)		
		TOOL (A) V		
	Are	e the continuity and voltage OK?		

# 1A-53 Engine General Information and Diagnosis:

Step		Action	Τ	Yes	No
3	1)	Turn the ignition switch OFF.	•	B/BI or B/Br wire	Replace the ECT
	2)	Connect the ECM coupler.		open or shorted to	sensor with a new one.
	3)	Remove the regulator/rectifier. Refer to "Regulator / Rectifier Inspection in Section 1J (Page 1J-8)".		the ground, or poor 10 or 29 connection.	Refer to "ECT Sensor Removal and
	4)	Disconnect the ECT sensor coupler.	•	If wire and	Installation in Section 1C (Page 1C-2)".
	5)	Measure the ECT sensor resistance.		connection are OK, intermittent trouble or faulty ECM.	(i ago 10 2) :
		Special tool (A): 09900–25008 (Multi-circuit tester set)			
		Tester knob indication Resistance ( $\Omega$ )		terminal and wire harness for open	
		ECT sensor resistance Approx. 2.45 kΩ at 20 °C (68 °F) (Terminal – Terminal)		circuit and poor connection.  Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	
		Π717H1110016-01 NOTE			
		Refer to "ECT Sensor Inspection in Section 1C	1		
		(Page 1C-3)" for details.			
	Is t	the resistance OK?			

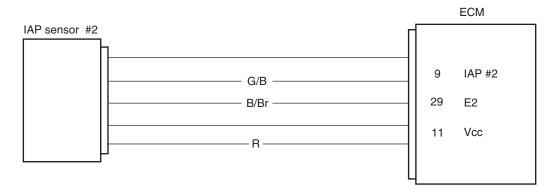
### DTC "C17" (P1750-H/L): IAP Sensor (#2) Circuit Malfunction

B817H21104014

### **Detected Condition and Possible Cause**

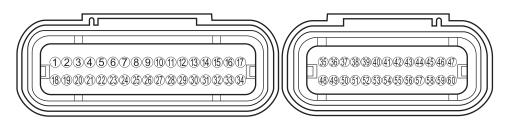
		Detected Condition	Possible Cause
		IAP sensor voltage is not within the following range.	Clogged vacuum passage between throttle body and IAP sensor.
		0.5 V ≤ Sensor voltage < 4.85 V	IAP sensor circuit open or shorted to the ground.
		NOTE	IAP sensor malfunction.
017		Note that atmospheric pressure	ECM malfunction.
C17		varies depending on weather conditions as well as altitude.	IAP sensor circuit is open or shorted to Vcc or ground circuit open.
		Take that into consideration when inspecting voltage.	IAP sensor circuit is shorted to the ground or Vcc circuit open.
P1750	Н	Sensor voltage is higher than specified value.	
F1750	L	Sensor voltage is lower than specified value.	
		When the sensor has unfastened (or	Loosen the IAP sensor.
P175	Λ	being unfastened) from the throttle body	Clogged vacuum passage.
P1/5	U	or the pressure variation (voltage variation) cannot be detected, this	
		malfunction code is output.	

### **Wiring Diagram**



I717H1110017-01

### **ECM** coupler (Harness side)



I718H1110240-01

### **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

### NOTE

- After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".
- IAP sensor #2 is incorporated in the TP sensor/IAT sensor.

### C17 (Use of mode select switch)

		of mode select switch)		
Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 4.	Loose or poor
	2)	Check the IAP sensor coupler for loose or poor contacts.		contacts on the ECM
		If OK, then measure the IAP sensor input voltage.		coupler.
		I717H1110013-02		Open or short circuit in the R or B/Br wire.
	3)	Disconnect the IAP sensor coupler.		
	4)	Turn the ignition switch ON.		
	5)	Insert the needle pointed probes to the lead wire coupler.		
	6)	Measure the voltage at the R wire and ground. If OK, then measure the voltage at the R wire and B/Br wire.		
		Special tool (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)		
		<u>Tester knob indication</u> Voltage ( )		
		IAP sensor #2 input voltage		
		4.5 – 5.5 V		
		((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)		
		- (-) terminal. D/DI)		
		1718H1110180-03		
	10.4			
<u> </u>	ıs t	he voltage OK?		

# P1750-H (Use of SDS)

Step	Action	Yes	No
1	Click the data monitor button (1).	Go to Step 2.	Go to Step 4.
	Diagnostic troubleshooting menu  Data monitor  DTC inspection  Show data when trouble  Active control  Quit		
	2) Check the manifold absolute pressure 2 data.		
	2) Check the manifold absolute pressure 2 data.		
	Item		
2	Turn the ignition switch OFF.	Go to Step 4.	W/BI wire shorted to
	<ol> <li>Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".</li> </ol>		Vcc, or B/Br wire open.
	3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.     Tith   Ti		

Step		Action	Yes	No
	4)	Disconnect the IAP sensor coupler.	Go to Step 4.	W/BI wire shorted to
	5)	Insert the needle pointed probes to the lead wire coupler.		Vcc, or B/Br wire open.
	6)	Check the continuity between the R and G/B wire. If the sound is not heard from the tester, the circuit condition is OK.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity ( •))))		
		(A)		
	7)	Disconnect the ECM coupler. Refer to "ECM Removal		
	' )	and Installation in Section 1C (Page 1C-1)".		
	8)	Check the continuity between the G/B wire "C" and terminal 9.  If OK, then check the continuity between the B/Br wire "B" and terminal 29.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		ECM coupler (Harness side)		
		"C" "B" (A)		
		"29" 1718H1110182-02		
	Is t	he continuity OK?		

# P1750-L (Use of SDS)

Step Action Yes  1 1) Click the data monitor button (1).  Diagnostic troubleshooting menu  1	Go to Step 4.
Data monitor	
DTC inspection	
Show data when trouble	
Active control	
Quit	
2) Check the manifold absolute pressure 2 data.	
Rem	
I718H1110183-02	
Approx. 0 kPa (0 kgf/cm³, 0 psi) and less OK?  2 1) Turn the ignition switch OFF. Go to Step 3.	R and G/B wire open,
2 1) Turn the ignition switch OFF. 2) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.	W/Bl wire shorted to the ground.
1717H1110013-02	
3) Disconnect the IAP sensor coupler.	
4) Insert the needle pointed probes to the lead wire coupler.	

Step		Action	Yes	No
	5)		Go to Step 3.	R and G/B wire open,
	,	Also, check the continuity between the G/B wire and B/	'	W/BI wire shorted to the
		Br wire. If the sound is not heard from the tester, the		ground.
		circuit condition is OK.		
		Special tool		
		(A): 09900–25008 (Multi-circuit tester set)		
		(B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication		
		Continuity ( •))))		
		1001(A) (**)))		
		(B)		
		I718H1110027-04		
	6)	Disconnect the ECM coupler. Refer to "ECM Removal		
		and Installation in Section 1C (Page 1C-1)".		
	7)	Check the continuity between the R wire "A" and		
		terminal 11. Also, check the continuity between the G/B wire "C" and terminal 9.		
		Tester knob indication		
		Continuity ( •))))		
		ECM coupler (Harness side)		
		"C"		
		"A" (A)		
		T00 (B)		
		1000 (D)		
		9		
		1		
		I718H1110028-03		
	ls t	he continuity OK?		

	1			1
Step		Action	Yes	No
3	1)	Connect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	Go to Step 4.	Open or short circuit in the R wire or B/Br wire.
	2)	Turn the ignition switch ON.		
	3)	Insert the needle pointed probes to the lead wire coupler.		
	4)	Measure the input voltage at the R wire and ground with the needle pointed probes. If OK, the measure the input voltage at the R wire and B/Br wire.		
		Special tool (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)		
		<u>Tester knob indication</u> Voltage ( )		
		IAP sensor #2 input voltage 4.5 – 5.5 V		
		((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)		
		1718H1110180-03		
	ls t	he voltage OK?		

# P1750 (Use of SDS)

Step	Action	Yes	No
1	<ol> <li>Check the IAP sensor is installed securely on the throttle body.</li> </ol>	Intermittent trouble.	<ul> <li>Retighten the IAP sensor.</li> </ul>
	I717H1110018-01		Replace the IAP sensor. Refer to "Throttle Body Removal and Installation in Section 1D (Page 1D-10)".
	OK?		

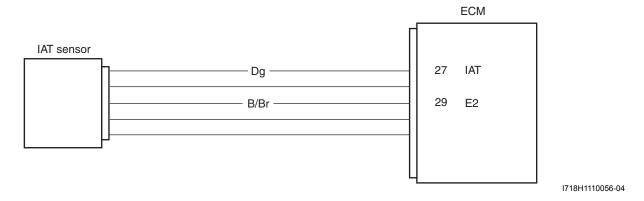
### DTC "C21" (P0110-H/L): IAT Sensor Circuit Malfunction

### **Detected Condition and Possible Cause**

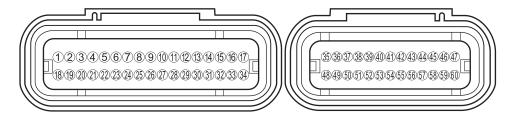
B817H21104015

		Detected Condition	Possible Cause		
C21		Output voltage is not with in the following	IAT sensor circuit open or short.		
		range.	IAT sensor malfunction.		
		0.15 V ≤ Sensor voltage < 4.85 V	ECM malfunction.		
	Н	Sensor voltage is higher than specified			
P0110	11	value.	IAT sensor circuit open or ground circuit open.		
PUTTU	-	Sensor voltage is lower than specified	IAT sensor circuit shorted to the ground.		
	L	value.			

### **Wiring Diagram**



### ECM coupler (Harness side)



I718H1110240-01

#### **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

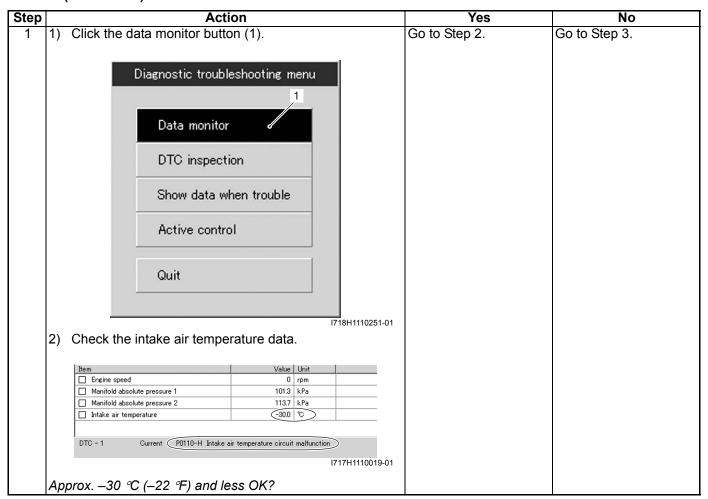
#### NOTE

- After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".
- IAT sensor is incorporated in the IAP sensor/TP sensor.

# C21 (Use of mode select switch)

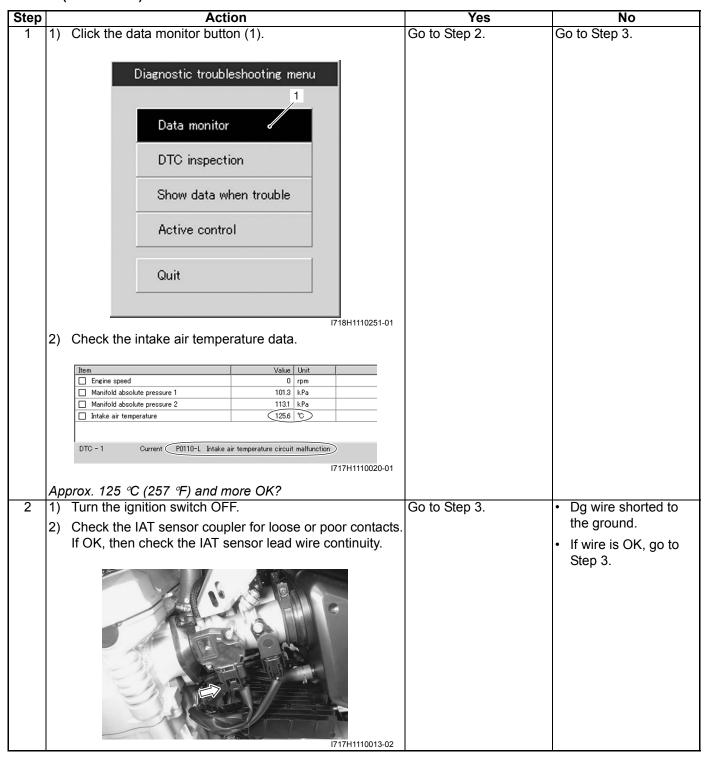
Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 3.	Loose or poor
	2)	Check the IAT sensor coupler for loose or poor contacts.		contacts on the ECM
		If OK, then measure the IAT sensor input voltage.		coupler.
		I717H1110018-01		Open or short circuit in the Dg or B/Br wire.
	3)	Disconnect the IAT sensor coupler and turn the ignition switch ON.		
	4)	Insert the needle pointed probes to the lead wire coupler.		
	5)	Measure the voltage between the Dg wire terminal and		
		ground.  If OK, then measure the input voltage between the Dg wire terminal and B/Br wire terminal.		
		Special tool (A): 09900-25008 (Multi-circuit tester set) (B): 09900-25009 (Needle pointed probe set)		
		<u>Tester knob indication</u> Voltage ( )		
		IAT sensor input voltage		
		4.5 – 5.5 V		
		((+) terminal: Dg – (–) terminal: Ground, (+) terminal: Dg – (–) terminal: B/Br)		
		29 ( ) (0.11111211 2/21)		
		V TOO. (A)		
	Is t	the voltage OK?		

### P0110-H (Use of SDS)



Step		Action	Yes	No
2	1)	Turn the ignition switch OFF.	Connect the ECM	Dg or B/Br wire open.
	2)	Check the IAT sensor coupler for loose or poor contacts.	coupler and go to Step	
	ĺ ´	If OK, then check the IAT sensor lead wire continuity.	3.	
		I717H1110013-02		
	3)	Disconnect the IAT sensor coupler.		
	4)	Disconnect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".		
	5)	Insert the needle pointed probes to the lead wire coupler.		
	6)	Check the continuity between the Dg wire "B" and terminal 27. Also, check the continuity between the B/Br wire "A" and terminal 29.		
		Special tool  (A): 09900-25008 (Multi-circuit tester set)  (B): 09900-25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		ECM coupler (Harness side)		
		"A"  "B"  "OLI (A)  "27"  "1718H1110060-03		
	ıs t	he continuity OK?		

### P0110-L (Use of SDS)



Step		Action	Yes	No
2	3)	Disconnect the IAT sensor coupler.	Go to Step 3.	Dg wire shorted to
	4)	Insert the needle pointed probes to the lead wire coupler.		the ground.
	5)	Check the continuity between the Dg wire and ground. If the sound is not heard from the tester, the circuit condition is OK.		If wire is OK, go to Step 3.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		(A)		
	6)	Connect the IAT sensor coupler.		
	7)	Turn the ignition switch ON.		
	8)	Insert the needle pointed probes to the lead wire coupler.		
	9)	Measure the output voltage between the Dg wire and ground.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Voltage ( )		
		IAT sensor output voltage		
		2.4 V at 20 °C (68 °F)		
		((+) terminal: Dg – (–) terminal: Ground)		
		I718H1110238-03		
	Are the continuity and voltage OK?			

Step		Action	Т	Yes	No
3	1) 2) 3)	Turn the ignition switch OFF.  Disconnect the IAT sensor coupler.  Measure the IAT sensor resistance.  Special tool  (A): 09900–25008 (Multi-circuit tester set)  Tester knob indication Resistance (Ω)  IAT sensor resistance Approx. 2.56 kΩ at 20 °C (68 °F) (Terminal – Terminal)	•	Dg or B/Br wire open or shorted to the	Replace the IAT sensor with a new one. Refer to "IAP / TP / IAT Sensor Removal and Installation in Section 1C (Page 1C-2)".
	ls t	the resistance OK?			

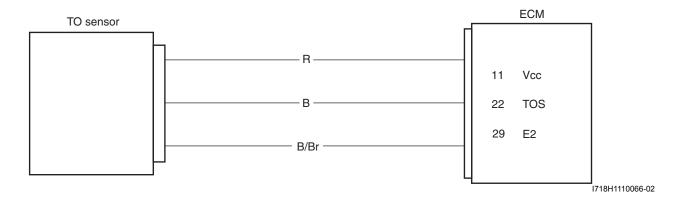
# DTC "C23" (P1651-H/L): TO Sensor Circuit Malfunction

#### **Detected Condition and Possible Cause**

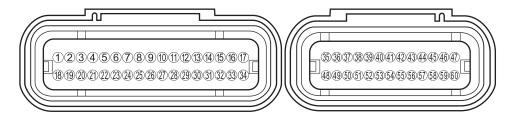
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		Detected Condition	Possible Cause
C23		The sensor voltage should be the	TO sensor circuit open or short.
54054		following for 2 sec. and more, after ignition	TO sensor malfunction.
P165		switch is turned ON. 0.2 V ≤ Sensor voltage < 4.8 V	ECM malfunction.
	Н	Sensor voltage is higher than specified	<ul> <li>TO sensor circuit shorted to Vcc or ground circuit open</li> </ul>
P1651		value.	
F 1051	ı	Sensor voltage is lower than specified	TO sensor circuit open or shorted to ground or Vcc
	L	value.	circuit open.

#### **Wiring Diagram**



### **ECM** coupler (Harness side)



I718H1110240-01

### **Troubleshooting**

#### **A** CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".

# C23 (Use of mode select switch)

	Step		Action	Yes	No
Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)*.  3) Check the TO sensor coupler for loose or poor contacts. If OK, then measure the TO sensor resistance.  4) Disconnect the TO sensor coupler and dismount the TO sensor.  5) Measure the resistance between terminal "A" and terminal "C".  Special tool ((A): 09900–25008 (Multi-circuit tester set))  TO sensor resistance 16.5 – 22.3 kΩ ((Terminal "A" – Terminal "C"))  Tester knob indication Resistance (Ω)			Turn the ignition switch OFF.	Go to Step 2.	Replace the TO sensor
3)".  4) Disconnect the TO sensor coupler and dismount the TO sensor.  5) Measure the resistance between terminal "A" and terminal "C".  Special tool  (Δ): 09900–25008 (Multi-circuit tester set)  TO sensor resistance  16.5 – 22.3 kΩ  (Terminal "A" – Terminal "C")  Tester knob indication  Resistance (Ω)		2)	Installation (GSF650/S/A/SAK7) in Section 9D		"TO Sensor Removal and Installation in
4) Disconnect the TO sensor coupler and dismount the TO sensor.  5) Measure the resistance between terminal "A" and terminal "C".  Special tool  (Δ): 09900–25008 (Multi-circuit tester set)  TO sensor resistance 16.5 – 22.3 kΩ (Terminal "A" – Terminal "C")  Tester knob indication Resistance (Ω)		3)			
terminal "C".  Special tool  (A): 09900–25008 (Multi-circuit tester set)  TO sensor resistance 16.5 – 22.3 kΩ (Terminal "A" – Terminal "C")  Tester knob indication Resistance (Ω)			Disconnect the TO sensor coupler and dismount the TO sensor.		
(A): 09900–25008 (Multi-circuit tester set)  TO sensor resistance 16.5 – 22.3 kΩ (Terminal "A" – Terminal "C")  Tester knob indication Resistance (Ω)		5)			
16.5 – 22.3 k $\Omega$ (Terminal "A" – Terminal "C")  Tester knob indication Resistance ( $\Omega$ )					
Resistance (Ω)  (C" "A"  I718H1110188-02			16.5 – 22.3 kΩ		
"C" "A"					
			"C" "A"		
Is the resistance OK?					
		Is t	he resistance OK?		

# **1A-71** Engine General Information and Diagnosis:

# **P1651-H (Use of SDS)**

Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 2.	B wire shorted to Vcc, or
	2)	Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		B/Br wire open.
	3)	Check the TO sensor coupler for loose or poor contacts. If OK, then check the TO sensor lead wire continuity.		
		1717H1110021-02		
	•	Disconnect the TO sensor coupler.  Check the continuity between the R wire "A" and B wire "B". If the sound is not heard from the tester, the circuit condition is OK.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity test ( •)))		
		"A"  "B"  (A)  (B)  (B)  (B)  (B)  (C)  (D)  (D)  (D)  (D)  (D)  (D)  (D		
	6)	Disconnect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".		
	7)	Insert the needle pointed probes to the lead wire coupler.		

Step		Action	Yes	No
1	8)	Check the continuity between the B wire "B" and terminal 22. Also, check the continuity between B/Br wire "C" and terminal 29.	1	B wire shorted to Vcc, or B/Br wire open.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		ECM coupler (Harness side)		
		"B" (C" (A) (A) (A) (B) (C" (22") (C" (22") (C" (29") (C		
	10			
	15	the continuity OK?		

# P1651-L (Use of SDS)

	1			T
Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 2.	R or B wire open, or B
	2)	Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		wire shorted to the ground.
	3)	Check the TO sensor coupler for loose or poor contacts. If OK, then check the TO sensor lead wire continuity.		
		1717H1110021-02		

Step		Action	Yes	No
1	4)	Disconnect the TO sensor coupler.	Go to Step 2.	R or B wire open, or B wire shorted to the
	5)	Check the continuity between the B wire "B" and ground. Also, check the continuity between the B wire "B" and B/Br wire "C". If the sound is not heard from the tester, the circuit condition is OK.		ground.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity test ( •)))		
		"B" "C" (A)		
	6)	Disconnect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".		
	7)	Insert the needle pointed probes to the lead wire coupler.		
		Check the continuity between the R wire "A" and terminal 11. Also, then check the continuity between B wire "B" and terminal 22.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		ECM coupler (Harness side)		
		"A" "B" (A)		
		"22"-"-"" 1718H1110074-02		
	Is t	he continuity OK?		

Step		Action	L	Yes	No
2	1)	Connect the ECM coupler and TO sensor coupler.	•	R, B or B/Br wire	Loosen or poor
	2)	Dismount the TO sensor from its bracket.		open or shorted to	contacts on the ECM
	3)	Insert the needle pointed probes to the lead wire coupler.		the ground, or poor 11, 22 or 29	coupler.
	4)	Turn the ignition switch ON.		connection.	Open or short circuit.
	5)	Measure the voltage at the wire side coupler between B and B/Br wire.  Special tool	•	If wire and connection are OK, intermittent trouble or	Replace the TO sensor with a new one. Refer to "TO
		চিত্র (A): 09900–25008 (Multi-circuit tester set) ত্রি (B): 09900–25009 (Needle pointed probe set)	•	faulty ECM. Recheck each	Sensor Removal and Installation in Section 1C (Page 1C-3)".
		Tester knob indication Voltage ( )		terminal and wire harness for open circuit and poor	
		TO sensor voltage (Normal) 0.4 – 1.4 V		connection.	
	6)	((+) terminal: B – (–) terminal: B/Br)  Weasure the voltage when it is leaned 65° and more, left and right, from the horizontal level.	•	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	
	ls t	and right, from the horizontal level.  TO sensor voltage (Leaning) 3.7 – 4.4 V ((+) terminal: B – (–) terminal: B/Br)  To sensor voltage (Leaning)  To sensor voltage (Leaning)			

DTC "C24" (P0351), "C25" (P0352), "C26" (P0353) or "C27" (P0354): Ignition System Malfunction

#### **NOTE**

Refer to "No Spark or Poor Spark in Section 1H (Page 1H-2)" for details.

# DTC "C28" (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction

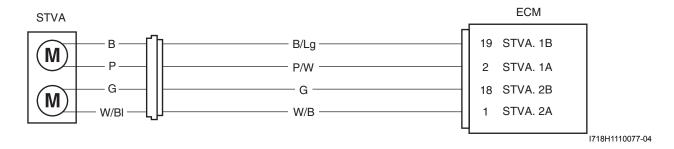
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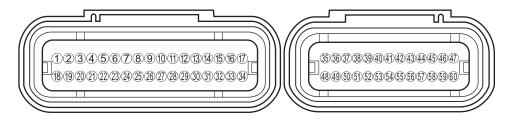
#### **Detected Condition and Possible Cause**

Detected Condition	Possible Cause
The operation voltage does not reach the STVA.	STVA malfunction.
	STVA circuit open or short.
STVA.	STVA motor malfunction.

#### Wiring Diagram



## **ECM** coupler (Harness side)



## **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

Step		Action	Yes	No
1	1)	Remove the regulator/rectifier. Refer to "Regulator /	Go to Step 2.	Loose or poor
	<b>'</b>	Rectifier Inspection in Section 1J (Page 1J-8)".		contacts on the
	2)	Check the STVA lead wire coupler for loose or poor		coupler.
	,	contacts.		Open or short circuit in the B/Lg, P/W, W/B or G wire.
		I718H1110191-01		If wire and connection are OK, go to Step 2.
	3)	Move the air cleaner backward. Refer to "Air Cleaner Element Removal and Installation in Section 1D (Page 1D-7)".		
	4)	Turn the ignition switch ON to check the STV operation. (STVA operating order: Full open $\rightarrow$ 15% open)		
		I705H1110063-01		
	Is t	he operating OK?		

Step		Action	1	Yes	1	No
2	1)	Turn the ignition switch OFF.	•	W/B, P/W, G and B/	•	Loose or poor
	2)	Move the throttle body right side. Refer to "Throttle Body Removal and Installation in Section 1D (Page 1D-10)".		Lg wire open or shorted to the		contacts on the ECM coupler.
	3)	Disconnect the STVA lead wire coupler.		ground, or poor 1, 2, 18 and 19	•	Replace the STVA
	4)	Check the continuity between each terminal and ground.		connection.		with a new one. Refer to "STV Actuator
		Special tool (A): 09900–25008 (Multi-circuit tester set) Tester knob indication	•	If wire and connection are OK, intermittent trouble or		Removal and Installation in Section 1C (Page 1C-5)".
		Resistance ( $\Omega$ )		faulty ECM.		
		STVA continuity	•	Recheck each		
		$\infty \Omega$ (Infinity)		terminal and wire harness for open		
		(Terminal – Ground)		circuit and poor connection.		
		Ω (A) (C) (C) (C) (C) (C) (C) (C) (C) (C) (C	•	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".		
	5)	If OK, then measure the STVA resistance (between the B wire "A" and P wire "B") and (between the G wire "C" and W/BI wire "D").				
		STVA resistance Approx. 7.0 $\Omega$ (Terminal "A" – Ground "B", Terminal "C" – Ground "D")				
		(A) Ω (A) Ω (B) (C) (A) (D) (D) (A) (D) (D) (D) (D) (D) (D) (D) (D) (D) (D				
	Is t	the resistance OK?				

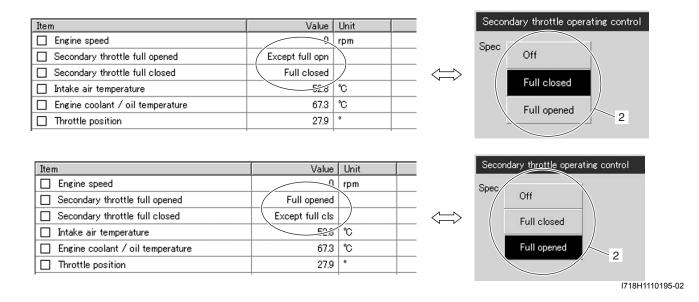
## **Active Control Inspection**

- 1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- 2) Turn the ignition switch ON.
- 3) Click "Secondary throttle operating control" (1).



4) Click each button (2).

At this time, if an operation sound is heard from the STVA, the function is normal.



# DTC "C29" (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction

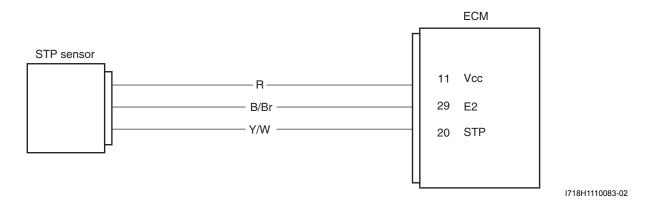
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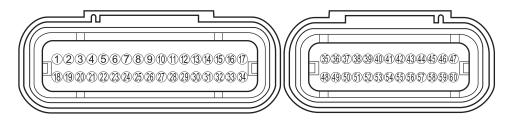
#### **Detected Condition and Possible Cause**

	Detected Condition			Possible Cause
	Signal voltage is not within the following •		•	STP sensor maladjusted.
		range.		STP sensor circuit open or short.
C29		Difference between actual throttle opening and opening calculated by ECM is larger	•	STP sensor malfunction.
		than specified value.	•	ECM malfunction.
		0.15 V ≤ Sensor voltage < 4.85 V	•	STP sensor circuit shorted to Vcc or ground circuit open.
	Н	Sensor voltage is higher than specified	•	STP sensor circuit open or shorted to the ground or Vcc
P1654		value.		circuit open.
11034	ı	Sensor voltage is lower than specified		·
	_	value.		

## **Wiring Diagram**



#### **ECM** coupler (Harness side)



## **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

# C29 (Use of mode select switch)

Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 4.	Loose or poor
	2)	Check the STP sensor coupler for loose or poor		contacts on the ECM
		contacts.		coupler.
		If OK, then measure the STP sensor input voltage.		Open or short circuit in the R wire or B/Br wire.
		I717H1110024-01		
	3)	Disconnect the STP sensor coupler.		
	4)	Turn the ignition switch ON.		
	5)	Measure the voltage at the R wire and ground. Also, measure the voltage at the R wire and B/Br wire.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( )		
		STP sensor input voltage		
		4.5 – 5.5 V		
		((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)		
		( ) tollimal bibl)		
		I718H1110197-02		
	,			
	Is t	he voltage OK?		

# 1A-81 Engine General Information and Diagnosis:

# P1654-H (Use of SDS)

Step		Action	Yes	No
1	1)	Click the data monitor button (1).	Go to Step 2.	Go to Step 4.
		Diagnostic troubleshooting menu  1  Data monitor		
		DTC inspection		
		Show data when trouble		
		Active control		
		Quit		
	2)	Check the secondary throttle actuator position sensor data.		
		Item		
		condary throttle position approx. 100% and more OK?	Co to Oton 4	V(\0.4) in a also arts of to
2		Turn the ignition switch OFF.  Check the STP sensor coupler for loose or poor contacts.  If OK, then check the STP sensor lead wire continuity.	Go to Step 4.	Y/W wire shorted to Vcc, or B/Br wire open.

Step		Action	Yes	No
2	3)	Disconnect the STP sensor coupler.	Go to Step 4.	Y/W wire shorted to
	4)	Check the continuity between the Y/W wire and R wire. If the sound is not heard from the tester, the circuit condition is OK.		Vcc, or B/Br wire open.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity ( •))))		
	,	Disconnect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".  Check the continuity between the Y/W wire "A" and terminal 20. Also, check the continuity between the B/Br wire "B" and terminal 29.		
		Special tool  (A): 09900-25008 (Multi-circuit tester set)  (B): 09900-25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •))))		
		ECM coupler (Harness side)		
		"B" (A) (A) (D) (D) (D) (D) (D) (D) (D) (D) (D) (D		
		I718H1110089-04		
	Is t	he continuity OK?		

# 1A-83 Engine General Information and Diagnosis:

# P1654-L (Use of SDS)

1 1) Click the data monitor button (1).  Diagnostic troubleshooting menu  Data monitor  DTC inspection  Show data when trouble  Active control  Quit	Go to Step 2.	Go to Step 4.
Data monitor  DTC inspection  Show data when trouble  Active control		
2) Check the secondary throttle actuator position sensor data.    Nature   Value   Unit       Engine speed   0   rpm		
Engine coolant / oil temperature   35.3   C     Throttle position   27.9   °     Secondary throttle actuator position sensor   0.0   %     DTC - 1 Current   P1654-L Secondary throttle actuator position sensor circuit malfunction     1718H1110199-01		
2 1) Turn the ignition switch OFF. 2) Check the STP sensor coupler for loose or poor contacts. If OK, then check the STP sensor lead wire continuity.	Go to Step 3.	R or Y/W wire open, or Y/W wire shorted to the ground.

Step		Action	Yes	No
2	3)	Disconnect the STP sensor coupler.	Go to Step 3.	R or Y/W wire open, or
	4)	Check the continuity between the Y/W wire and ground. Also, check the continuity between the Y/W wire and B/Br wire.  If the sound is not heard from the tester, the circuit condition is OK.		Y/W wire shorted to the ground.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity test ( •)))		
	5) 6)	Disconnect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".  Check the continuity between the Y/W wire "A" and terminal 20. Also, check the continuity between the R wire "C" and terminal 11.		
		Special tool ত্রি (A): 09900–25008 (Multi-circuit tester set) ত্রি (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •))))		
		ECM coupler (Harness side)		
		"C" A" (A)		
		I718H1110093-02		
	Is t	he continuity OK?		

# 1A-85 Engine General Information and Diagnosis:

Step		Action	Yes	No
3	1)	Connect the ECM coupler. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	Go to Step 4.	Open or short circuit in the R or B/Br wire.
	2)	Disconnect the STP sensor coupler.		
	3)	Turn the ignition switch ON.		
	4)	Measure the input voltage at the R wire and ground. Also, measure the input voltage at the R wire and B/Br wire.		
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Voltage ( )		
		STP sensor input voltage 4.5 – 5.5 V ((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)		
		I7.18H1110197-02		
	IS 1	the voltage OK?		

Step		Action		Yes	No
4	1)	Turn the ignition switch OFF.	•	R, Y/W or B/Br wire	If check result is not
	2)	Connect the ECM coupler and STP sensor coupler.		open or shorted to	satisfactory, replace the
	3)	Move the air cleaner box backward. Refer to "Air Cleaner Box Removal and Installation in Section 1D (Page 1D-7)".		the ground, or poor 11, 20 or 29 connection.	STP sensor with a new one. Refer to "STP Sensor Removal and Installation in Section
	4)	Disconnect the STVA lead wire coupler. Refer to "DTC "C28" (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction (Page 1A-75)".	•	If wire and connection are OK, intermittent trouble or faulty ECM.	1C (Page 1C-4)".
	5)	Insert the needle point probes to the lead wire coupler.		•	
	6)	Turn the ignition switch ON.	•	Recheck each terminal and wire	
	7)	Measure the STP sensor output voltage at the coupler (between the (+) Y/W wire and (–) B/Br wire) by turning the secondary throttle valve (close and open) with a finger.		harness for open circuit and poor connection.	
		Special tool (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)	•	Replace the ECM with a known good one, and inspect it again. Refer to "Engine Components	
		Tester knob indication Voltage ( )		Removable with the	
		STP sensor output voltage Secondary throttle valve is closed: Approx. 0.6 V Secondary throttle valve is opened: Approx. 4.5 V ((+) terminal: Y/W - (-) terminal: B/Br)		Engine in Place in Section 1D (Page 1D-5)".	
		TTOO (A) V O O O O O O O O O O O O O O O O O O			
		I705H1110071-01			
	le t	the voltage OK?			
	10 1	ino voltage on:			

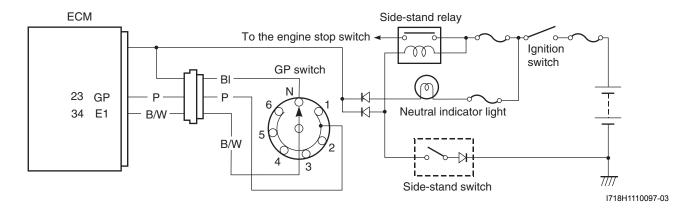
# DTC "C31" (P0705): GP Switch Circuit Malfunction

#### **Detected Condition and Possible Cause**

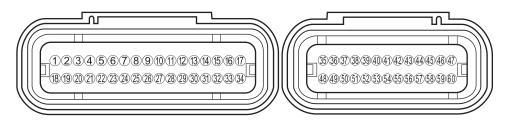
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Detected Condition	Possible Cause
No Gear Position switch voltage	Gear position switch circuit open or short.
Switch voltage is not within the following range.	Gear position switch malfunction.
Switch voltage > 0.6 V	ECM malfunction.

## **Wiring Diagram**



# **ECM** coupler (Harness side)



I718H1110240-01

#### **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### NOTE

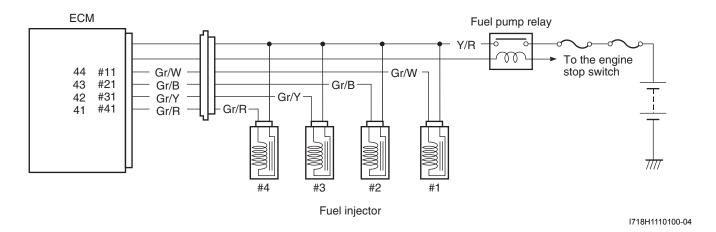
tep		Action		Yes		No
1	1)	Turn the ignition switch OFF.	•	P wire open or	•	P or B/W wire open,
	2)	Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section OD (Dags OD 6)"		shorted to the ground.		or P wire shorted to the ground.
	3)	9D (Page 9D-6)".  Check the GP switch coupler for loose or poor contacts. If OK, then measure the GP switch voltage.	•	If wire and connection are OK, intermittent trouble or faulty ECM.  Recheck each terminal and wire harness for open circuit and poor	•	Loose or poor contacts on the ECM coupler.  If wire and connection are OK, replace the GP switch with a new one. Refer to "Gear
		1718H1110202-01	•	connection.  Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section		Position Switch Removal and Installation in Section 5B (Page 5B-12)".
	4)	Support the motorcycle with a jack.		1C (Page 1C-1)".		
	5) 6)	Fold the side-stand to up position.  Make sure the engine stop switch is in the "RUN"				
		position.				
	7)	Insert the needle pointed probe to the lead wire coupler.				
	8)	Turn the ignition switch ON.				
	9)	Measure the voltage at the wire side coupler between the P and B/W wire, when shifting the gearshift lever from 1st to Top.				
		Special tool (A): 09900-25008 (Multi-circuit tester set) (B): 09900-25009 (Needle pointed probe set)				
		<u>Tester knob indication</u> Voltage ( )				
		GP switch voltage  0.6 V and more				
	lo 4	((+) terminal: P – (–) terminal: B/W)  Total (B)  (A)  (This is a second of the voltage OK?				
	ıs l	no vollago OIX:	<u> </u>			

# DTC "C32" (P0201), "C33" (P0202), "C34" (P0203) or "C35" (P0204): Fuel Injector Circuit Malfunction

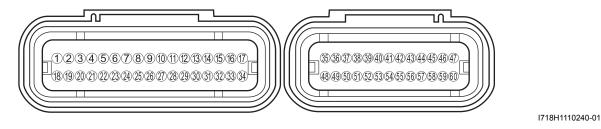
#### **Detected Condition and Possible Cause**

Detected Condition	Possible Cause
CKP signal is produced but fuel injector signal is	Injector circuit open or short.
interrupted by 4 times or more continuity.	Injector malfunction.
	ECM malfunction.

## **Wiring Diagram**



#### ECM coupler (Harness side)



#### **Troubleshooting**

## **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

- After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".
- Injector voltage can be detected only for 3 seconds after ignition switch is turned ON.

Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 2.	Replace the injector
	2)	Lift and support the fuel tank. Refer to "Fuel Tank		with a new one. Refer to
		Removal and Installation in Section 1G (Page 1G-9)".		"Throttle Body Disassembly and
	3)	Check the injector coupler for loose or poor contacts.		Assembly in Section 1D
		If OK, then measure the injector resistance.		(Page 1D-11)".
	4)	I718H1110204-01  Disconnect the injector coupler and measure the		
	4)	resistance between terminals.  Special tool		
		ि (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Resistance ( $\Omega$ )		
		Injector resistance 11 – 13 $\Omega$ at 20 °C (68 °F) (Terminal – Terminal)		
		Ω (A) (Ω) (Ω) (Ω) (Ω) (Ω) (Ω) (Ω) (Ω) (Ω) (Ω		

# 1A-91 Engine General Information and Diagnosis:

Step	Action	Yes	No
1	<ul> <li>If OK, then check the continuity between each terminal and ground.</li> <li>Special tool         <ul> <li>(A): 09900–25008 (Multi-circuit tester set)</li> <li>Injector continuity</li></ul></li></ul>	Go to Step 2.	Replace the injector with a new one. Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-11)".
	Ω (A)		
	Are the resistance and continuity OK?		

Step		Action		Yes	No
2	1)	Turn the ignition switch ON.  Measure the injector voltage between the Y/R wire and ground.  Special tool  (A): 09900–25008 (Multi-circuit tester set)	•	Gr/W wire open or shorted to the ground, or poor 44 connection (#1 cylinder side).	Open circuit in the Y/R wire.
		Tester knob indication Voltage ( === )  Injector voltage Battery voltage ((+) terminal: Y/R - (-) terminal: Ground)	•	Gr/B wire open or shorted to the ground, or poor 43 connection (#2 cylinder side). Gr/Y wire open or	
Is the voltage OK?	((*) terminali (*) terminali Growne)	shorted to the ground, or poor 42 connection (#3 cylinder side).			
		•	Gr/R wire open or shorted to the ground, or poor 41 connection (#4 cylinder side).		
	le i	I718H11110207-03  Is the voltage OK?	If wire and connection are OK, intermittent trouble or faulty ECM.		
	13 (		•	Recheck each terminal and wire harness for open circuit and poor connection.	
			•	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	

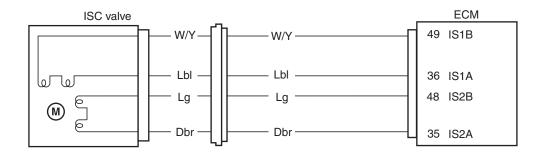
# DTC "C40" (P0505, P0506 or P0507): ISC Valve Circuit Malfunction

**Detected Condition and Possible Cause** 

B817H21104022

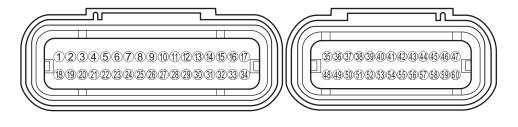
	Detected Condition	Possible Cause
C40	The circuit voltage of motor drive is	ISC valve circuit open or shorted to the ground.
(P0505)	unusual.	Air passage clogged.
C40 (P0506)	Idle speed is lower than the desired idle speed.	ISC valve is fixed.
(1 0000)	Idle speed is high than the desired idle	ISC valve Preset position is incorrect.
C40	speed.	Disconnect ISC valve hose.
(P0507)		ISC valve is fixed.
		ISC valve Preset position is incorrect.

#### **Wiring Diagram**



I718H1110105-03

#### **ECM** coupler (Harness side)



I718H1110240-01

#### **Troubleshooting**

#### **⚠** CAUTION

- Be careful not to disconnect the ISC valve coupler at least 5 seconds after ignition switch is turned to OFF.
  - If the ECM coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an usual valve being written in ECM and causing an error of ISC valve operation.
- When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

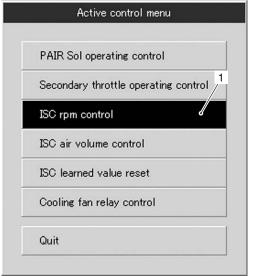
#### **NOTE**

Step 1		Action Turn the ignition quiteh OFF	Yes Go to Step 2.	No
1	1)	Turn the ignition switch OFF.	Go to Step 2.	Lbl, W/Y, Dgr or Lg wire open.
	2)	Check the ISC valve coupler for loose or poor contacts.		орен.
		If OK, then check the ISC valve lead wire continuity.		
	2)	Disconnect the ISC valve counter and ECM counter		
	3)	Disconnect the ISC valve coupler and ECM coupler.  Refer to "ECM Removal and Installation in Section 1C"		
		(Page 1C-1)".		
	4)	Check the continuity between terminals "A" and 49,		
	7)	terminals "B" and 36, terminals "C" and 48, terminals "D"		
		and 35.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication		
		Continuity test ( •)))		
	ls 1	"A" "D" (A) (A) (B) (B) (B) (B) (B) (B) (B) (B) (B) (B		
	IS 1	ne continuity OK?		

Step		Action	Yes	No
2	1)	Move the throttle body right side. Refer to "Throttle Body		Replace the ISC valve
	,	Removal and Installation in Section 1D (Page 1D-10)".	intermittent trouble or	with a new one. Refer to
	2)	Disconnect the ISC valve coupler.	faulty ECM.	"ISC Valve Removal
	3)	Check the continuity between each terminal and ground.		and Installation in Section 1C (Page 1C-
		Special tool (A): 09900–25008 (Multi-circuit tester set)		5)".
		$\begin{array}{l} \underline{\text{ISC valve continuity}} \\ \infty \ \Omega \ (\text{Infinity}) \\ (\text{Terminal - Ground}) \end{array}$		
	4)	If OK, then measure the resistance (between the Lbl wire "A" and W/Y wire "B") and (between the Dbr wire "C" and Lg wire "D").  ISC valve resistance		
		Approx. 20 Ω at 20 °C (68 °F) (Terminal: Lg – Terminal: W/Y, Terminal: Dbr – Terminal: Lg)		
		(A) Ω (B) (T) (T) (T) (T) (T) (T) (T) (T) (T) (T		
	ļ,_ ,			
<u> </u>	ıs t	he resistance OK?		

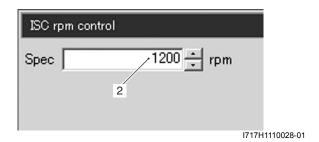
# ACTIVE CONTROL INSPECTION (ISC RPM CONTROL) Check 1

- 1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- 2) Check that the engine is running.
- 3) Click the "Active control".
- 4) Click the "ISC rpm control" (1).



I718H1110246-01

- 5) Check that the "Spec" (2) is idle speed 1 200  $\pm$  100 rpm.
- 6) Check that the "Desired idle speed" (3) is within the specified idle rpm.



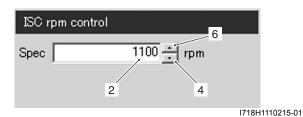
Item	Value	Unit
☐ Engine speed	1197	rpm
Desired idle speed	3 1205	rpm
Cooling fan relay	Off	
☐ ISC valve position	76	step
☐ Manifold absolute pressure 1	76.1	kPa
Manifold absolute pressure 2	51.2	kPa

I717H1110029-01

#### 1A-97 Engine General Information and Diagnosis:

#### Check 2

- 1) Click the button (4) and decrease the "Spec" (2) to 1 100 rpm slowly.
- 2) Check that the "Desired idle speed" (3) is nearly equal to the "Spec" (2). At the same time, check that the number of steps (5) in the ISC valve position decreases.
- 3) Click the button (6) and increase the "Spec" (2) slowly.
- 4) Check that the "Desired idle speed" (3) is nearly equal to the "Spec" (2). Also, check that the number of steps (5) in the ISC valve position increases.

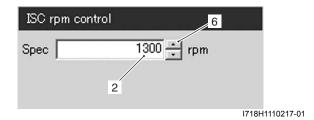


Item	Value	Unit
☐ Engine speed	1131	rpm
Desired idle speed	3 1104	rpm
Cooling fan relay	Off	
☐ ISC valve position	5 68	step
☐ Manifold absolute pressure 1	68.3	kPa
☐ Manifold absolute pressure 2	85.4	kPa
		1747114440000

I717H1110030-01

#### Check 3

- 1) Click the button (6) and increase the "Spec" (2) to 1 300 rpm slowly.
- 2) Check that the "Desired idle speed" (3) is nearly equal to the "Spec" (2). Also, check that the number of steps (5) in the ISC valve position increases.



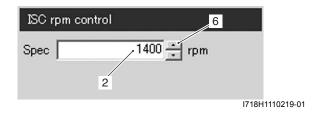
Item	Value	Unit
☐ Engine speed	1289	rpm
Desired idle speed	3 1305	rpm
Cooling fan relay	Off	
☐ ISC valve position	5 78	step
☐ Manifold absolute pressure 1	75.4	kPa
☐ Manifold absolute pressure 2	70.5	kPa
	1	I717H1110031-01

#### Check 4

- 1) Click the button (6) and increase the "Spec" (2) to 1 400 rpm.
- 2) Check that the "Desired idle speed" (3) is approx. 1 400 rpm.
- 3) Check that the "Engine speed" (7) is close to 1 400 rpm.

## **NOTE**

Be careful not to increase the "Spec" to 1 700 rpm, or the "Engine speed" may reach the upper limit.



Item	Value	Unit
☐ Engine speed	7 1413	rpm
Desired idle speed	3 1405	rpm
Cooling fan relay	Off	
☐ ISC valve position	88	step
Manifold absolute pressure 1	78.1	kPa
Manifold absolute pressure 2	75.0	kPa
	•	I717H111003

If the ISC valve does not function properly, replace the ISC valve or inspect the ISC valve. Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-11)".

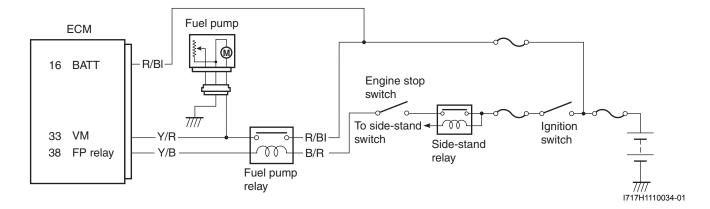
# DTC "C41" (P0230-H/L): FP Relay Circuit Malfunction

**Detected Condition and Possible Cause** 

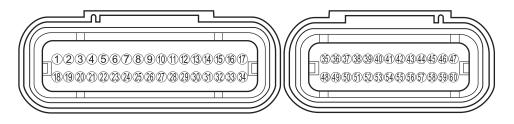
B817H21104023

Detected Condition			Possible Cause
C41		No voltage is applied to fuel pump although fuel pump relay is turned ON, or voltage is applied to fuel pump, although fuel pump relay is turned OFF.	<ul> <li>Fuel pump relay circuit open or short.</li> <li>Fuel pump relay malfunction.</li> <li>ECM malfunction.</li> </ul>
	Н	Voltage is applied to fuel pump although fuel pump relay is turned OFF.	Fuel pump relay switch circuit is shorted to power source.
P0230	L	No voltage is applied to fuel pump although fuel pump relay is turned ON.	<ul><li>Faulty pump relay (switch side).</li><li>Fuel pump relay coil circuit open or short.</li><li>Faulty pump relay (coil side).</li></ul>

#### **Wiring Diagram**



# **ECM** coupler (Harness side)



I718H1110240-01

## **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

# C41 (Use of mode select switch)

Step		Action		Yes	No
1	1) 2)	Turn the ignition switch OFF.  Remove the seat. Refer to "Exterior Parts Removal and	•	•	Replace the FP relay with a new one. Refer to
	۷)	Installation (GSF650/S/A/SAK7) in Section 9D		connection.	"Fuel Pump Relay
	3)	(Page 9D-6)".  Check the FP relay coupler for loose or poor contacts.	•	Y/R or R/BI wire open, shorted or poor	Inspection in Section 1G (Page 1G-6)".
		If OK, then check the FP relay. Refer to "Fuel Pump Relay Inspection in Section 1G (Page 1G-6)".	•	33 connection.  If wire and	
				connection are OK, intermittent trouble or faulty ECM.	
		t I	Recheck each terminal and wire harness for open circuit and poor connection.		
		I718H1110248-01	•	Replace the ECM with a known good one, and inspect it again. Refer to "ECM	
	Is t	the FP relay OK?		Removal and Installation in Section 1C (Page 1C-1)".	

# P0230-H (Use of SDS)

Step		Action		Yes	No
1	1)	Turn the ignition switch OFF.	•	Y/B wire shorted to	Replace the FP relay
	2)	Remove the seat. Refer to "Exterior Parts Removal and		power source.	with a new a new one.
		Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".	•	Y/B wire shorted to the ground.	Refer to "Fuel Pump Relay Inspection in Section 1G (Page 1G-
	3)	Check the FP relay coupler for loose or poor contacts. If OK, then check the FP relay. Refer to "Fuel Pump Relay Inspection in Section 1G (Page 1G-6)".	•	If wire and connection are OK, intermittent trouble or faulty ECM.	6)".
			•	Recheck each terminal and wire harness for open circuit and poor connection.	
		I718H1110248-01	•	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section	
	Is t	the FP relay OK?		1C (Page 1C-1)".	

# 1A-101 Engine General Information and Diagnosis:

# P0230-L (Use of SDS)

Step		Action		Yes	No
1	1) 2)	Turn the ignition switch OFF.  Remove the seat. Refer to "Exterior Parts Removal and Installation (CSESSO(S/A)(SAKZ) in Section OF	•	38 connection.	Replace the FP relay with a new one. Refer to "Fuel Pump Relay
	3)	Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".  Check the FP relay coupler for loose or poor contacts.	•	B/R wire open or shorted to the ground.	Inspection in Section 1G (Page 1G-6)".
		If OK, then check the FP relay. Refer to "Fuel Pump Relay Inspection in Section 1G (Page 1G-6)".	•	R/BI or Y/R wire open or shorted to the ground or poor 33 connection.	
			•	If wire and connection are OK, intermittent trouble of faulty ECM.	
		I718H1110248-01	•	Recheck each terminal and wire harness for open circuit and poor connection.	
	Is t	the FP relay OK?	•	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	

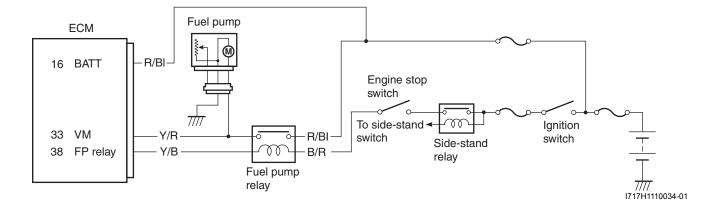
# DTC "C41" (P2505): ECM Power Input Signal Malfunction

#### **Detected Condition and Possible Cause**

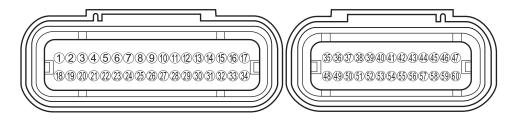
B817H21104024

	Detected Condition	Possible Cause
	No voltage is applied to the ECM/PCM,	<ul> <li>Lead wire/coupler connection of ECM terminal to fuel</li> </ul>
044/00505	although fuel pump relay is turned ON.	fuse
C41/P2505		Fuel fuse
		Power source of speedometer shorted to ground

#### **Wiring Diagram**



# ECM coupler (Harness side)



I718H1110240-01

## **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

Step		Action	$\overline{}$	Yes	No
1	1)	Turn the ignition switch OFF.	•	R/BI wire open or	Open or short circuit in
	2)	Remove the seat. Refer to "Exterior Parts Removal and		short or poor 16	the R/BI wire.
		Installation (GSF650/S/A/SAK7) in Section 9D		connection.	
	3)	(Page 9D-6)".  Check the ECM coupler for loose or poor contacts. If OK,	•	If wire and connection are OK,	
	3)	then measure the ECM input voltage.		intermittent trouble or	
				faulty ECM.	
			•	Recheck each terminal and wire	
				harness for open	
				circuit and poor	
				connection.	
			•	Replace the ECM with a known good	
				one, and inspect it	
				again. Refer to "ECM Removal and	
		I717H1110035-02		Installation in Section	
	4)	Disconnect the ECM coupler.		1C (Page 1C-1)".	
	5)	Insert the needle pointed probe to ECM coupler.			
	6)	Measure the voltage between terminal "16" and ground.			
		Special tool			
		(A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)			
		Tester knob indication			
		Voltage ( )			
		ECM input voltage			
		Battery voltage			
		-0.			
		V (A)			
		"16" = "1718H1110250-01			
	ls t	the voltage OK?			
	_		_		

# DTC "C42" (P1650): IG Switch Circuit Malfunction

#### **Detected Condition and Possible Cause**

B817H21104025

Detected Condition	Possible Cause
Ignition switch signal is not input in the ECM.	Ignition system circuit open or short.
	ECM malfunction.

# **Troubleshooting**

#### **NOTE**

- Refer to "Ignition Switch Inspection in Section 9C (Page 9C-11)" for details.
- After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".

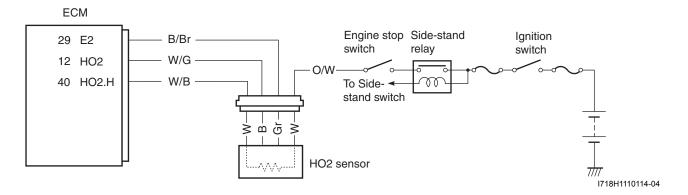
# DTC "C44" (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction

## **Detected Condition and Possible Cause**

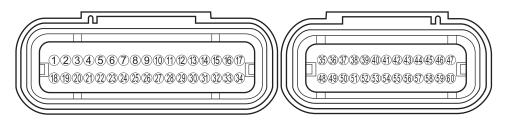
B817H21104026

Detected Condition	Possible Cause
HO2 sensor output voltage is not input to ECM during	HO2 sensor circuit open or short.
engine operation and running condition.	ECM malfunction.
Sensor voltage > 1.0 V	HO2 sensor lead wire/coupler connection.
The heater can not operate so that heater operation voltage is not supplied to the oxygen heater circuit.	Battery voltage supply to the HO2 sensor

# **Wiring Diagram**



## ECM coupler (Harness side)



I718H1110240-01

Troubleshooting (When Indicating C44/P0130:)

## **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

## **NOTE**

Step	.	Action	Yes	No
1		Turn the ignition switch OFF.	Go to Step 2.	W/G wire shorted to the
	,	Remove the left frame cover. Refer to "Exterior Parts		power source, or W/G
		Removal and Installation (GSF650/S/A/SAK7) in Section		or B/Br wire open.
		9D (Page 9D-6)".		
	3)	Check the HO2 sensor coupler for loose or poor		
	'	contacts.		
		If OK, then check the HO2 sensor lead wire continuity.		
	1	Disconnect the HO2 sensor coupler.		
	5)	Check the continuity between the W/G wire and O/W wire. If the sound is not heard from the tester, the circuit condition is OK.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity test ( •))))		
		I717H1110036-02		

Step		Action	Yes	No
1	6)	Disconnect the ECM coupler. Refer to "ECM Removal	Go to Step 2.	W/G wire shorted to the
'	0)	and Installation in Section 1C (Page 1C-1)".	Go to Step 2.	power source, or W/G
	<b>-</b> \	, -		or B/Br wire open.
	/)	Check the continuity between the W/G wire "A" and terminal "12". Also, check the continuity between the B/Br wire "B" and terminal "29".		or b/b) wife open.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity ( •))))		
		"B" (A) (B) (12)		
	ls t	in the continuity OK?		

Step		Action		Yes	No
2	1)	Connect the ECM coupler and HO2 sensor coupler.	•	W/G or B/Br wire	Replace the HO2
	2)	Warm up the engine enough.		open or shorted to	sensor with a new one.
	3)	Insert the needle pointed probes to the lead wire coupler.		the power source, or	Refer to "Heated
	4)	Measure the HO2 sensor output voltage between the W/	,	poor 12 or 29 connection.	Oxygen Sensor (HO2S) Removal and
		G wire and B/Br wire, when idling condition.		If wire and	Installation in Section
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		connection are OK, intermittent trouble or faulty ECM.	1B (Page 1B-5)".
		Tester knob indication Voltage ( )	•	Recheck each terminal and wire	
		HO2 sensor output voltage at idle speed 0.3 V and less		harness for open circuit and poor	
		((+) terminal: W/G – (–) terminal: B/Br)		connection.	
		(( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	•	Replace the ECM	
		I718H1110230-02		with a known good one, and inspection it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	
	5)	If OK, then pinch the PAIR hose (1) with a proper hose clamp.			
		1718H1110225-01			
	6)	Measure the HO2 sensor output voltage while holding the engine speed at 3 000 r/min.			
		HO2 sensor output voltage at 3 000 r/min 0.6 V and more ((+) terminal: W/G – (–) terminal: B/Br)			
	ls t	he voltage OK?			

#### Troubleshooting (When Indicating C44/P0135:)

#### NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".

Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.  Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".	Go to Step 2.	Replace the HO2 sensor with a new one. Refer to "HO2 Sensor Removal and
	3)	Check the HO2 sensor for loose or poor contacts. If OK, then measure the HO2 sensor resistance.		Installation in Section 1C (Page 1C-6)".
	4)	Disconnect the HO2 sensor coupler and measure the resistance between terminals.		
		<b>⚠ CAUTION</b>		
		<ul> <li>Temperature of the sensor affects resistance value largely.</li> <li>Make sure that the sensor heater is in atmospheric temperature.</li> </ul>		
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Resistance ( $\Omega$ )		
		HO2 sensor heater resistance Approx. 8 Ω at 23 °C (73 °F) (W – W)		
		ΩΩ (A) (718H1110243-01		
	ls t	the resistance OK?		

Step		Action		Yes		No	
2	1) 2) 3)	Connect the HO2 sensor coupler.  Insert the needle pointed probes to the lead wire coupler.  Turn the ignition switch ON and measure the heater voltage between the W/B wire and ground.  If the tester voltage indicates the battery voltage, it is good condition.  NOTE	•	Recheck each terminal and wire harness for open circuit and poor connection. If wire and	•	<ul> <li>Open or short circuit in the W/B wire or O/ W wire.</li> <li>Loose or poor contacts on the ECM coupler or HO2 sensor coupler.</li> </ul>	
		Battery voltage can be detected only before starting the engine.	•				
		Special tool (A): 09900-25008 (Multi-circuit tester set) (B): 09900-25009 (Needle pointed probe set)	•	connection are OK, intermittent trouble or faulty ECM.  Replace the ECM			
		Tester knob indication Voltage ( )		with a known good one, and inspect it			
		HO2 sensor heater voltage Battery voltage ((+) terminal: W/B – (–) terminal: Ground)			again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".		
		I718H1110232-02					
	Is t	the voltage OK?			L		

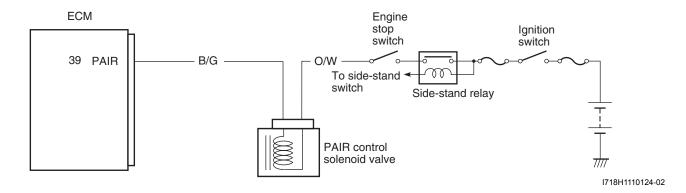
#### DTC "C49" (P1656): PAIR Solenoid Valve Circuit Malfunction

B817H21104027

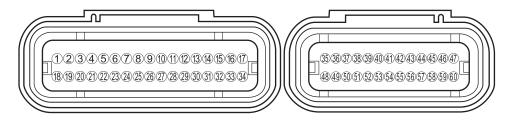
#### **Detected Condition and Possible Cause**

Detected Condition	Possible Cause
PAIR control solenoid valve voltage is not input to ECM.	PAIR control solenoid valve circuit open or short.
	PAIR control solenoid valve malfunction.
	ECM malfunction.

#### **Wiring Diagram**



#### **ECM** coupler (Harness side)



I718H1110240-01

#### **Troubleshooting**

#### **⚠ CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".

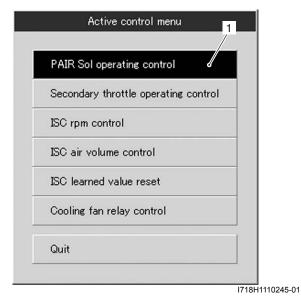
Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 2.	Replace the PAIR
	2)	Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".		control solenoid with a new one. Refer to "PAIR
	3)	Check the PAIR control solenoid valve coupler for loose		Control Solenoid Valve Removal and
		or poor contacts.		Installation in Section
		If OK, then measure the PAIR solenoid valve resistance.		1B (Page 1B-6)".
	4)	Disconnect the PAIR control solenoid valve coupler.		
	5)	Measure the resistance between terminals.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Resistance ( $\Omega$ )		
		PAIR control solenoid valve resistance $18-22~\Omega$ at $20-30~^{\circ}C$ ( $68-86~^{\circ}F$ ) (Terminal – Terminal)		
		1718H1110234-02		
	Is t	he resistance OK?		

Step		Action		Yes	No
2	2) M S G T V	Action Furn the ignition switch ON.  Measure the voltage between the O/W wire and ground.  Special tool  (A): 09900–25008 (Multi-circuit tester set)  Tester knob indication  Moltage ( )  PAIR control solenoid valve voltage  Battery voltage (+) terminal: O/W – (–) terminal: Ground)	•	B/G wire open or shorted to the ground, or poor 39 connection failure.  If wire and connection are OK, intermittent trouble or faulty ECM.  Recheck each terminal and wire harness for open circuit and poor connection.  Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	Open or short circuit in the O/W wire.
	Is the	i718H1110235-02 e voltage OK?			

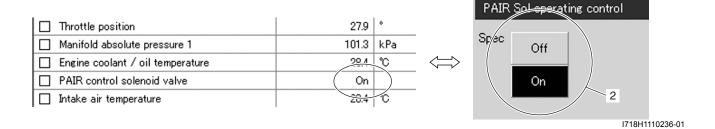
#### 1A-113 Engine General Information and Diagnosis:

#### **Active Control Inspection**

- 1) Set up the SDS tool. Refer to "SDS operation manual" for further details.
- 2) Turn the ignition switch ON.
- 3) Click "PAIR Sol operating control" (1).



4) Click each button (2). At this time, if and operation sound is heard from the PAIR control solenoid valve, the function is normal.



B817H21104028

#### DTC "C60" (P0480): Cooling Fan Relay Circuit Malfunction

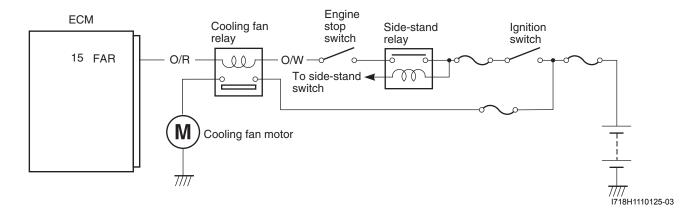
**Detected Condition** 

**Detected Condition and Possible Cause** 

Cooling fan relay signal is not input to ECM.

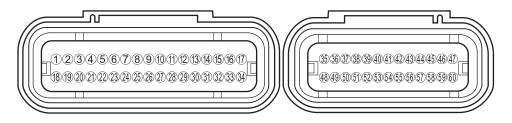
Possible Cause
Cooling fan relay circuit open or short.

#### **Wiring Diagram**



ECM malfunction.

#### ECM coupler (Harness side)



I718H1110240-01

#### **Troubleshooting**

#### **A CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

#### **NOTE**

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".

## 1A-115 Engine General Information and Diagnosis:

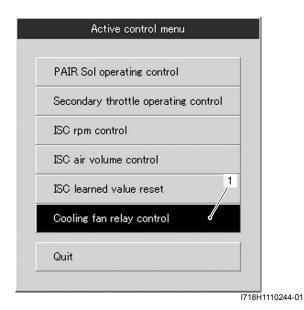
Step		Action		Yes	No
1	1)	Turn the ignition switch OFF.	•	O/W and O/R wire	Replace the cooling fan
	2)	Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		open or shorted to the ground, or poor 15 connection.	relay with a new one. Refer to "Cooling Fan Relay Inspection in
	3)	Check the cooling fan relay coupler for loose or poor contacts.  If OK, then inspection the cooling fan relay. Refer to "Cooling Fan Relay Inspection in Section 1F (Page 1F-	•	If wire and connection are OK, intermittent trouble or faulty ECM.	Section 1F (Page 1F-8)".
		8)".  I718H1110222-02	•	Recheck each terminal and wire harness for open circuit and poor connection.  Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	
	ls t	the cooling fan relay OK?			

#### **Active Control Inspection**

#### NOTE

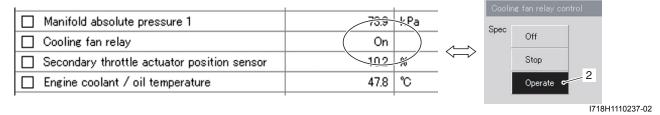
Cooling fan relay and cooling fan motor operation can be checked until the engine coolant temperature is less than 100 °C (212 °F) after starting the engine.

- 1) Set up the SDS tool. Refer to "SDS operation manual" for further details.
- 2) Start the engine and run it idling condition.
- 3) Click "Cooling fan relay control" (1).

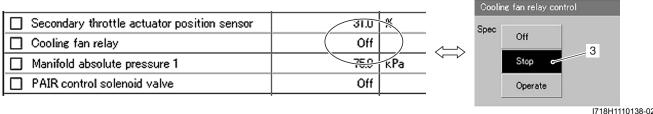


4) Click the operate button (2).

At this time, if an operation sound is heard from the cooling fan relay and cooling fan motor is operated, the function is normal.



5) Click the stop button (3) to check the operation properly.



I718H1110138-02

#### Self-Diagnostic Procedures (GSX650FK8)

B817H21104029

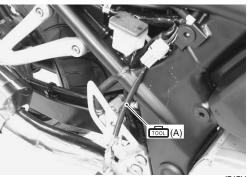
Use of Mode Select Switch

#### NOTE

- Do not disconnect coupler from ECM, the battery cable from the battery, ECM ground wire harness from the engine or main fuse before confirming DTC (Diagnostic Trouble Code) stored in memory. Such disconnection will erase memorized information in ECM memory.
- DTC stored in ECM memory can be checked by the special tool.
- Before checking DTC, read self-diagnosis function "User mode and dealer mode" (Refer to "Self-Diagnosis Function (GSX650FK8) (Page 1A-4)".) carefully to have good understanding as to what functions are available and how to use it.
- Be sure to read "Precautions for Electrical Circuit Service" (Refer to "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".) before inspection and observe what is written there.
- 1) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Connect the special tool to the mode select switch at the wiring harness.

#### Special tool

(A): 09930-82720 (Mode select switch)



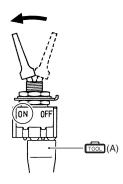
I717H1110006-0

- Start the engine or crank the engine for more than 4 seconds.
- 4) Turn the special tool's switch ON.

5) Check the DTC to determine the malfunction part. Refer to "DTC Table (Page 1A-21)".

#### Special tool

(A): 09930-82720 (Mode select switch)



I718H1110006-04



I817H2110001-01

6) After repairing the trouble, turn OFF the ignition switch and turn ON again. If DTC is indicated (C00), the malfunction is cleared.

#### **NOTE**

- Even though DTC (C00) is indicated, the previous malfunction history DTC still remains stored in the ECM. Therefore, erase the history DTC memorized in the ECM using SDS.
- DTC is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored history DTC using SDS. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-15)".
- 7) Turn the ignition switch OFF and disconnect the special tool from the mode select switch.
- 8) Reinstall the right frame cover.

## **Specifications**

## **Service Data**

Injector

B817H21107001

Item	Specification	Note
Injector resistance	11 – 13 Ω at 20 °C (68 F°)	_

### FI Sensors

Item		Note		
CKP sensor resistance				
CKP sensor peak voltage		When cranking		
IAP sensor (#1) input voltage				
IAP sensor (#1) output voltage	A	oprox. 2.7 V at idle speed		
IAP sensor (#2) input voltage		4.5 – 5.5 V		
IAP sensor (#2) output voltage		2.0 – 3.0 V at idle speed		
TP sensor input voltage		4.5 – 5.5 V		
TP sensor output voltage	Closed	Approx. 1.1 V		
,	Opened	Approx. 4.3 V		
ECT sensor input voltage		4.5 – 5.5 V		
ECT sensor output voltage		0.15 – 4.85 V		
ECT sensor resistance	Appr	ox. 2.45 kΩ at 20 °C (68 °F)		
IAT sensor input voltage		4.5 – 5.5 V prox. 2.4 V at 20 °C (68 °F)		
IAT sensor output voltage				
IAT sensor resistance	Appr	ox. 2.56 kΩ at 20 °C (68 °F)		
TO sensor resistance		16.5 – 22.3 kΩ		
TO sensor output voltage	Normal	Normal 0.4 – 1.4 V		
10 sensor output voltage	Leaning	3.7 – 4.4 V Battery voltage	When leaning 65°	
Injector voltage				
HO2 sensor heater resistance	App			
HO2 sensor heater voltage				
HO2 sensor output voltage	Idle speed	0.3 V and less		
, ,	3 000 r/min	0.6 V and more		
Ignition coil primary peak voltage		80 V and more	When cranking	
STP sensor input voltage		4.5 – 5.5 V		
STP sensor output voltage	Closed	Approx. 0.6 V		
	Opened	Approx. 4.5 V		
STV actuator resistance	Approx. 7.0 Ω			
GP switch voltage	0.6 V and more		From 1st to Top	
ISC valve resistance	Apı	orox. 20 Ω at 20 °C (68 °F)		
PAIR control solenoid valve	Approx. 18 – 22 Ω at 20 – 30 °C (68 – 86 °F)			
resistance	la la company			
PAIR control solenoid valve voltage	Battery voltage			

## **Special Tools and Equipment**

Special Tool

B817H21108001

			B817H21108001
09900–25008		09900–25009	
Multi-circuit tester set		Needle pointed probe set	
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09904–41010		09917–47011	
SDS set		Vacuum pump gauge	
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00000 00700	~	00565 04040 040	
09930–82720		99565-01010-010	
Mode select switch		CD-ROM Ver.10	
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## **Emission Control Devices**

#### **Precautions**

#### **Precautions for Emission Control Devices**

Refer to "General Precautions in Section 00 (Page 00-1)".

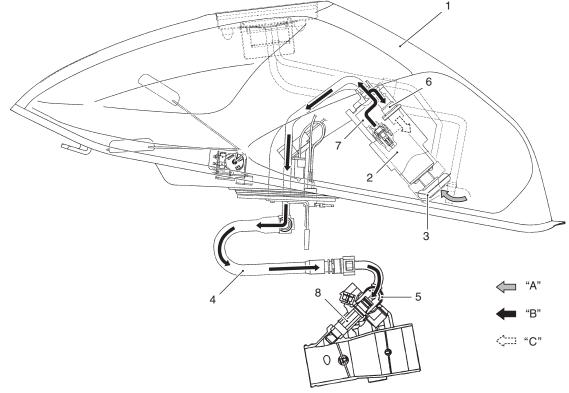
B817H21200001

## **General Description**

#### **Fuel Injection System Description**

B817H21201001

GSF650 motorcycles are equipped with a fuel injection system for emission level control. This fuel injection system is precision designed, manufactured and adjusted to comply with the applicable emission limits. With varying engine conditions, all of the fuel injection volumes are precisely controlled by the programmed injection maps in the ECM to reduce CO, NOX and HC. Adjusting, interfering with, improper replacement, or resetting of any of the fuel injection components may adversely affect injection performance and cause the motorcycle to exceed the exhaust emission level limits.



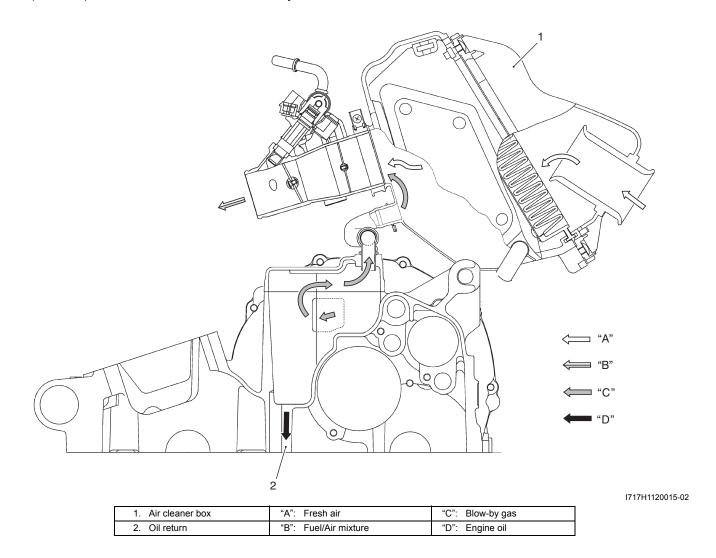
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Fuel tank	<ol><li>Fuel delivery pipe</li></ol>	"A": Before-pressurized fuel
2. Fuel pump	Fuel pressure regulator	"B": Pressurized fuel
Fuel mesh filter	7. Fuel filter (For high pressure)	"C": Relieved fuel
Fuel feed hose	8. Fuel injector	

### **Crankcase Emission Control System Description**

B817H21201002

The engine is equipped with a PCV system to prevent discharging crankcase emissions into the atmosphere. Blow-by gas in the engine is constantly drawn into the crankcase, which is returned to the combustion chamber through the PCV (breather) hose, air cleaner and throttle body.

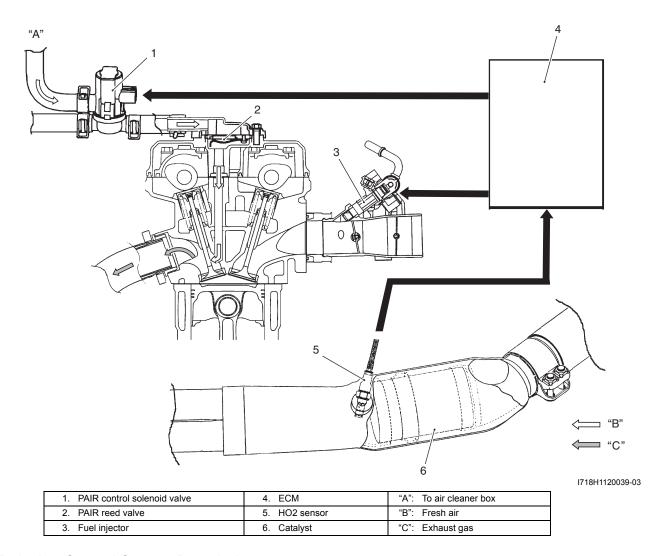


#### **Exhaust Emission Control System Description**

B817H21201003

The exhaust emission control system is composed of the PAIR system, HO2 sensor, catalyst system and ISC system. The fresh air is drawn into the exhaust port through the PAIR control solenoid valve and PAIR reed valve. The PAIR control solenoid valve is operated by the ECM, which is controlled according to the signals from TPS, ECTS, IATS, IAPS and CKPS.

ISC valve adjusts the bypass air volume of the throttle body to control engine idling speed with various sensor signals by varying engine running conditions and the idling control contributes to reduce exhaust emission level.



#### **Noise Emission Control System Description**

B817H21201004

TAMPERING WITH THE NOISE CONTROL SYSTEM PROHIBITED: Local law or federal law prohibits the following acts or the causing thereof:

- 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
- The use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

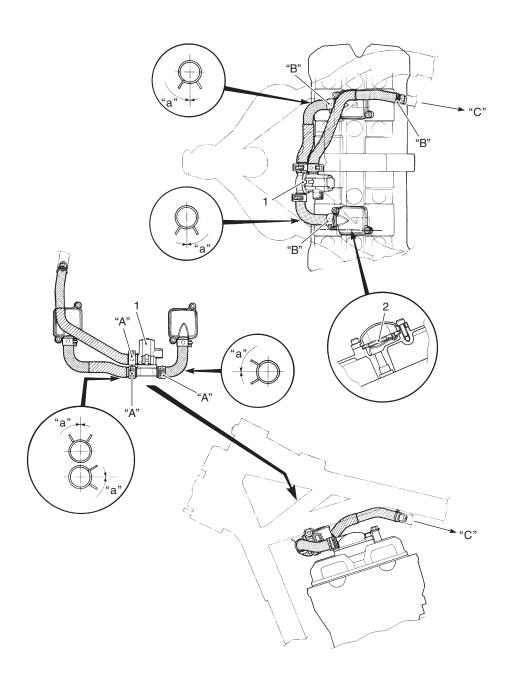
#### Among Those Acts Presumed to Constitute Tampering are the Acts Listed Below:

- Removing or puncturing the muffler, baffles, header pipes, screen type spark arrester (if equipped) or any other component which conducts exhaust gases.
- Removing or puncturing the air cleaner case, air cleaner cover, baffles or any other component which conducts intake air.
- Replacing the exhaust system or muffler with a system or muffler not marked with the same model specific code as the code listed on the Motorcycle Noise Emission Control Information label.

## **Schematic and Routing Diagram**

## **PAIR System Hose Routing Diagram**

B817H21202001



I717H1120001-01

	<ol> <li>PAIR control solenoid valve</li> </ol>	"A": Marking (Yellow)	"C": To air cleaner box
Ī	2. PAIR reed valve	"B": Marking (White)	"a": Approx. 0°

### **Repair Instructions**

## Heated Oxygen Sensor (HO2S) Removal and Installation

Removal

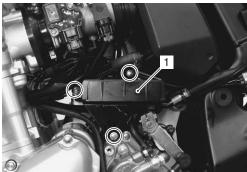
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#### **▲ WARNING**

Do not remove the HO2 sensor while it is hot.

#### **⚠ CAUTION**

- Be careful not to expose the HO2 sensor to excessive shock.
- Do not use an impact wrench when removing or installing the HO2 sensor.
- Be careful not to twist or damage the sensor lead wires.
- 1) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- Remove the engine sprocket outer cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)"
- 3) Move the regulator/rectifier assembly (1) by removing the regulator/rectifier bracket mounting bolts.



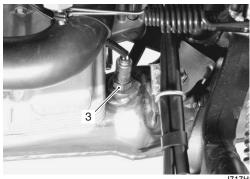
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- 4) Disconnect the HO2 sensor coupler (2).
- 5) Release the HO2 sensor lead wire from the clamps.



I717H1120002-01

6) Remove the HO2 sensor (3).



I717H1120003-01

#### Installation

Install the HO2 sensor in the reverse order of removal. Pay attention to the following points:

#### **⚠** CAUTION

Do not apply oil or other materials to the sensor air hole.

• Tighten the HO2 sensor to the specified torque.

Tightening torque

HO2 sensor (a): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)



I717H1120004-0

 Route the HO2 sensor lead wire properly. Refer to "Wiring Harness Routing Diagram (GSF650/S/A/ SAK7) in Section 9A (Page 9A-8)".

#### Heated Oxygen Sensor (HO2S) Inspection

B817H21206002

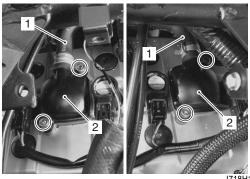
Refer to "DTC "C44" (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction in Section 1A (Page 1A-104)".

#### PAIR Reed Valve Removal and Installation

B817H21206003

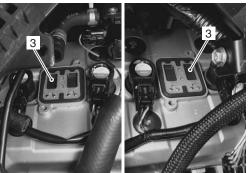
#### Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Drain engine coolant and remove the thermostat connector. Refer to "Thermostat Connector / Thermostat Removal and Installation in Section 1F (Page 1F-9)".
- 3) Disconnect the hoses (1) and remove the PAIR reed valve covers (2).



I718H1120023-01

4) Remove the PAIR reed valves (3).



I718H1120029-01

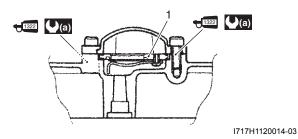
#### Installation

Install the PAIR reed valve in the reverse order of removal. Pay attention to the following points:

- · Install the PAIR reed valves (1) as shown.
- Apply thread lock to the bolts and tighten them to the special torque.

+ 1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

# Tightening torque PAIR reed valve cover bolt (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

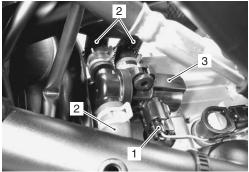


## PAIR Control Solenoid Valve Removal and Installation

B817H21206004

#### Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Remove the upper panel. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the PAIR control solenoid valve coupler (1) and PAIR hoses (2).
- 4) Remove the PAIR control solenoid valve (3).



1717H1120005-01

#### Installation

Install the PAIR control solenoid valve in the reverse order of removal. Pay attention to the following point:

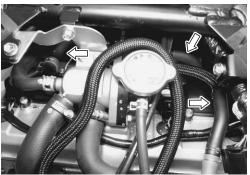
 Connect the PAIR control solenoid valve coupler and PAIR hoses securely. Refer to "PAIR System Hose Routing Diagram (Page 1B-4)".

#### **PAIR System Inspection**

B817H21206005

#### **PAIR Hose**

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- Inspect the hoses for wear or damage. If it is worn or damaged, replace the PAIR hose with a new one.
   Refer to "PAIR System Hose Routing Diagram (Page 1B-4)".



1717H1120006-0

3) Reinstall the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".

#### **PAIR Reed Valve**

- 1) Remove the PAIR reed valves. Refer to "PAIR Reed Valve Removal and Installation (Page 1B-6)".
- 2) Inspect the reed valves for the carbon deposit. If the carbon deposit is found in the reed valve, replace the PAIR reed valve with a new one.



I718H1120032-01

3) Reinstall the PAIR reed valve. Refer to "PAIR Reed Valve Removal and Installation (Page 1B-6)".

#### **PAIR Reed Valve Cover**

- 1) Remove the PAIR reed valve covers. Refer to "PAIR Reed Valve Removal and Installation (Page 1B-6)".
- 2) Inspect the PAIR reed valve for carbon deposit. If the carbon deposit is found in the PAIR reed valve cover.

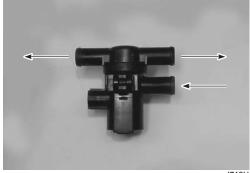


I717H1120007-01

3) Install the PAIR reed valve cover. Refer to "PAIR Reed Valve Removal and Installation (Page 1B-6)".

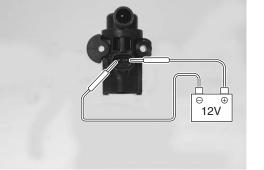
#### **PAIR Control Solenoid Valve**

- 1) Remove the PAIR control solenoid valve. Refer to "PAIR Control Solenoid Valve Removal and Installation (Page 1B-6)".
- 2) Check that air flows through the air inlet port to the air outlet port. If air does not flow out, replace the PAIR control solenoid valve with a new one.



I718H1120033-01

 Connect the 12 V battery to the PAIR control solenoid valve terminals and check the air flow. If air does not flow out, the solenoid valve is normal condition.



I718H1120034-01

4) Check the resistance between the terminals of the PAIR control solenoid valve.

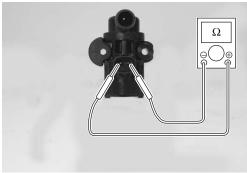
Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication

Resistance ( $\Omega$ )

PAIR control solenoid valve resistance  $18 - 22 \Omega$  at  $20 - 30 ^{\circ}$ C  $(68 - 86 ^{\circ}$ F)



I718H1120035-01

5) Reinstall the PAIR control solenoid valve. Refer to "PAIR Control Solenoid Valve Removal and Installation (Page 1B-6)".

#### Crankcase Breather (PCV) Hose Inspection

B817H21206006

Inspect the PCV hose (1) for wear and damage. If it is worn or damaged, replace the PCV hose with a new one. Refer to "Crankcase Breather (PCV) Hose / Cover Removal and Installation (Page 1B-8)".



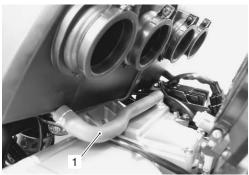
I717H1120008-01

## Crankcase Breather (PCV) Hose / Cover Removal and Installation

#### Removal

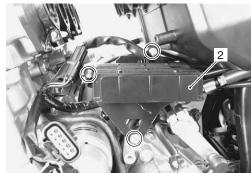
B817H21206007

- 1) Remove the throttle body. Refer to "Throttle Body Removal and Installation in Section 1D (Page 1D-10)"
- 2) Remove the crankcase breather (PCV) hose (1).



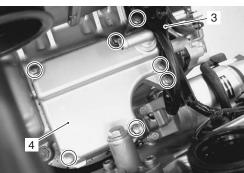
I717H1120009-01

- 3) Remove the engine sprocket outer cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- 4) Move the regulator/rectifier assembly (2) by remove the regulator/rectifier bracket mounting bolts.



I717H1120010-0

5) Remove the regulator/rectifier bracket (3) and crankcase breather (PCV) cover (4).



I717H1120011-01

#### Installation

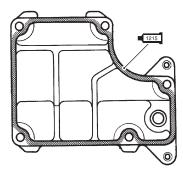
Installation is in the reverse order of removal. Pay attention to the following points:

 Apply bond to the mating surface of the breather cover.

■1215]: Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)

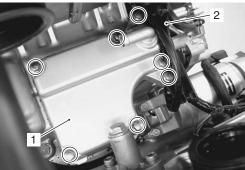
#### **NOTE**

- Make surfaces free from moisture, oil, dust and other foreign materials.
- Spread on surfaced thinly to form an even layer, and assembly the crankcases within few minutes.



I718H1120040-03

- Fit the breather cover (1) and tighten the bolts.
- Install the regulator/rectifier bracket (2) and tighten the bolts.



I717H1120013-01

#### Crankcase Breather (PCV) Cover Inspection

B817H21206008

Inspect the crankcase breather (PCV) cover in the following procedures.

- 1) Remove the crankcase breather cover. Refer to "Crankcase Breather (PCV) Hose / Cover Removal and Installation (Page 1B-8)".
- Inspect the crankcase breather cover in the carbon deposit. If the carbon deposit is found in the crankcase breather cover, remove it.



I718H1120015-02

3) Reinstall the crankcase breather cover. Refer to "Crankcase Breather (PCV) Hose / Cover Removal and Installation (Page 1B-8)".

## **Specifications**

#### **Service Data**

FI sensors

B817H21207001

Item	Specification	Note
HO2 sensor heater resistance	Approx. 8 Ω at 23 °C (73 F°)	
HO2 concer output voltage	0.3 V and less at idle speed	
HO2 sensor output voltage	0.6 V and more at 3 000 r/min	
PAIR control solenoid valve resistance	18 – 22 Ω at 20 – 30 °C (68 – 86 °F)	

## **Tightening Torque Specifications**

B817H21207002

Fastening part	Ti	ghtening torq	Note	
l asterning part	N⋅m	kgf-m	lbf-ft	Note
HO2 sensor	25	2.5	18.0	☞(Page 1B-5)
PAIR reed valve cover bolt	11	1.1	8.0	☞(Page 1B-6)

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

#### **Recommended Service Material**

B817H21208001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI BOND No.1215 or	P/No.: 99000-31110	☞(Page 1B-9)
	equivalent		
Thread lock cement	THREAD LOCK CEMENT SUPER	P/No.: 99000-32110	
	1322 or equivalent		

#### **Special Tool**

B817H21208002

09900–25008 Multi-circuit tester set (Page 1B-8)		

## **Engine Electrical Devices**

#### **Precautions**

#### **Precautions for Engine Electrical Device**

B817H21300001

Refer to "General Precautions in Section 00 (Page 00-1)" and "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".

### **Component Location**

#### **Engine Electrical components Location**

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

B817H21303001

### **Diagnostic Information and Procedures**

#### **Engine Symptom Diagnosis**

Refer to "Engine Symptom Diagnosis in Section 1A (Page 1A-9)".

B817H21304001

### **Repair Instructions**

#### **ECM** Removal and Installation

#### Removal

B817H21306001

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the battery (–) lead wire. Refer to "Battery Removal and Installation in Section 1J (Page 1J-12)".
- 3) Disconnect the ECM couplers (1) and remove the ECM (2).



#### Installation

Install the ECM in the reverse order of removal.

#### **CKP Sensor Inspection**

B817H21306002

Refer to "DTC "C12" (P0335): CKP Sensor Circuit Malfunction in Section 1A (Page 1A-27)".

#### **CKP Sensor Removal and Installation**

B817H21306003

#### Removal

- Remove the generator cover. Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".
- Remove the CKP sensor (1) along with generator starter.



I717H1130002-01

#### Installation

Install the CKP sensor in the reverse order of removal. Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".

#### IAP Sensor (#1) Inspection

B817H21306004

Refer to "DTC "C13" (P0105-H/L): IAP Sensor (#1) Circuit Malfunction in Section 1A (Page 1A-30)".

#### IAP Sensor (#1) Removal and Installation

B817H21306005

#### Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Disconnect the IAP sensor (#1) coupler (1) and vacuum hose (2).
- 3) Remove the IAP sensor (#1) (3).



1717H1130003-01

#### Installation

Install the IAP sensor (#1) in the reverse order of removal.

#### IAP / TP / IAT Sensor Inspection

B817H21306006

Refer to "DTC "C17" (P1750-H/L): IAP Sensor (#2) Circuit Malfunction in Section 1A (Page 1A-54)", "DTC "C14" (P0120-H/L): TP Sensor Circuit Malfunction in Section 1A (Page 1A-39)" and "DTC "C21" (P0110-H/L): IAT Sensor Circuit Malfunction in Section 1A (Page 1A-62)".

#### **NOTE**

IAP sensor (#2)/TP sensor/IAT sensor are combined into one.

#### IAP / TP / IAT Sensor Removal and Installation

B817H21306007

Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-11)".

#### **⚠ CAUTION**

- Never remove the IAP/TP/IAT sensor from the throttle body.
- The IAP/TP/IAT sensor, STVA and throttle body are available only as an assembly.

#### **ECT Sensor Removal and Installation**

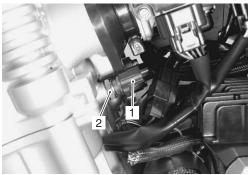
B817H21306008

#### Removal

- 1) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".
- 2) Disconnect the coupler (1) and remove the ECT sensor (2).

#### **⚠ CAUTION**

Take special care when handling the ECT sensor. It may cause damage if it gets a sharp impact.



I717H1130004-01

#### Installation

Install the ECT sensor in the reverse order of removal. Pay attention to the following points:

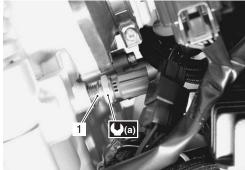
Tighten the ECT sensor to the specified torque.

#### **A CAUTION**

Use the new gasket washer (1) to prevent engine coolant leakage.

#### **Tightening torque**

ECT sensor (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



I717H1130005-01

 Pour engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".

#### **ECT Sensor Inspection**

B817H21306009

Refer to "DTC "C15" (P0115-H/L): ECT Sensor Circuit Malfunction in Section 1A (Page 1A-47)".

Inspect the ECT sensor in the following procedures:

- 1) Remove the ECT sensor. Refer to "ECT Sensor Removal and Installation (Page 1C-2)".
- 2) Connect the ECT sensor (1) to a circuit tester and place it in the oil (2) contained in a pan, which is placed on a stove.
- 3) Heat the oil to raise its temperature slowly and read the column thermometer (3) and the ohmmeter. If the ECT sensor ohmic valve does not change in the proportion indicated, replace it with a new one.

#### **⚠** CAUTION

- Take special care when handling the ECT sensor. It may cause damage if it gets a sharp impact.
- Do not contact the ECT sensor and the column thermometer with a pan.

#### Special tool

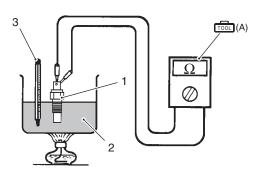
(A): 09900-25008 (Multi-circuit tester set)

#### Tester knob indication

Resistance ( $\Omega$ )

#### Temperature sensor specification

Temperature	Standard resistance
20 °C (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.811 $k\Omega$
80 °C (176 °F)	Approx. 0.318 k $\Omega$
110 °C (230 °F)	<b>Approx. 0.142</b> kΩ



I718H1130014-01

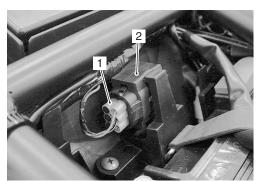
4) Install the ECT sensor. Refer to "ECT Sensor Removal and Installation (Page 1C-2)".

#### **TO Sensor Removal and Installation**

B817H21306010

#### Removal

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the coupler (1) and remove the TO sensor (2).

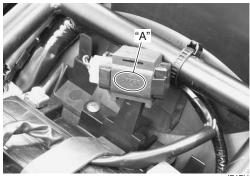


I717H1130006-02

#### Installation

Install the TO sensor in the reverse order of removal. Pay attention to the following point:

 When installing the TO sensor, bring the "UPPER" letters and arrow mark "A" upward.



I717H1130007-01

#### **TO Sensor Inspection**

B817H21306011

Refer to "DTC "C23" (P1651-H/L): TO Sensor Circuit Malfunction in Section 1A (Page 1A-69)".

#### **STP Sensor Inspection**

B817H21306012

Refer to "DTC "C29" (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction in Section 1A (Page 1A-79)".

#### **STP Sensor Adjustment**

B817H21306013

Adjust the STP sensor in the following procedures:

- 1) Move the air cleaner box backward. Refer to "Air Cleaner Box Removal and Installation in Section 1D (Page 1D-7)".
- 2) Remove the regulator/rectifier. Refer to "Regulator / Rectifier Inspection in Section 1J (Page 1J-8)".
- 3) Disconnect the STVA lead wire coupler (1).



I717H1130008-01

- 4) Insert the needle pointed probes to the STP sensor coupler.
- 5) Turn the ignition switch ON position.
- 6) Close the secondary throttle valve by finger and measure the STP sensor output voltage.

#### Special tool

(A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)

#### **Tester knob indication**

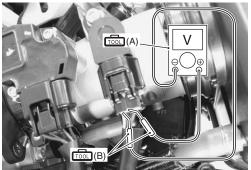
Voltage ( === )

#### STP sensor output voltage

ST valve is fully closed: Approx. 0.6 V ((+): Y/W – (–): B/Br)



I718H1130017-01



I717H1130009-02

7) Loosen the STP sensor mounting screw adjust the STP sensor (2) until the output voltage comes within the specified value and tighten the STP sensor mounting screw.

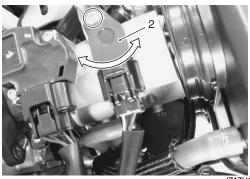
Special tool

ான்: 09930-11950 (Torx wrench)

**Tightening torque** 

STP sensor mounting screw: 3.5 N·m (0.35 kgf-

m, 2.5 lbf-ft)



I717H1130010-01

8) Reinstall the removed parts.

#### STP Sensor Removal and Installation

B817H21306014

#### Removal

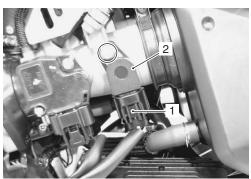
- 1) Turn the ignition switch OFF position.
- 2) Disconnect the coupler (1) and remove the STP sensor (2) with the special tool.

#### NOTE

Prior to disassembly, mark each sensor's original position with a paint or scribe for accurate reinstallation.

Special tool

: 09930-11950 (Torx wrench)



1717H1130011-01

#### Installation

- 1) Move the air cleaner box backward. Refer to "Air Cleaner Box Removal and Installation in Section 1D (Page 1D-7)".
- 2) Close the secondary throttle valve by finger.



I718H1130017-01

3) With the STV fully closed, install the STP sensor (1) and tighten the STP sensor mounting screw to the specified torque.

#### **⚠ CAUTION**

Replace the O-ring (2) with a new one.

#### NOTE

- Apply thin coat of the engine oil to the Oring.
- Align the secondary throttle shaft end "A" with the groove "B" of STP sensor.
- Apply grease to the secondary throttle shaft end "A" if necessary.

反 Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

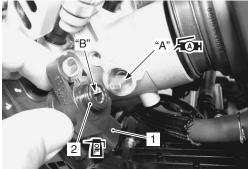
Special tool

**109930–11950 (Torx wrench)** 

Tightening torque

STP sensor mounting screw: 3.5 N·m (0.35 kgf-

m, 2.5 lbf-ft)



I717H1130012-01

- 4) Make sure the STP valve open or close smoothly.
- 5) Adjust the position of STP sensor. Refer to "STP Sensor Adjustment (Page 1C-4)".
- 6) Reinstall the removed parts.

#### **STV Actuator Inspection**

B817H21306015

Refer to "DTC "C28" (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction in Section 1A (Page 1A-75)".

#### **STV Actuator Removal and Installation**

B817H21306016

Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-11)".

#### **⚠ CAUTION**

- Never remove the STVA from the throttle body.
- The STVA, IAP/TP/IAT sensor and throttle body are available only as an assembly.

#### **ISC Valve Inspection**

B817H21306017

Refer to "DTC "C40" (P0505, P0506 or P0507): ISC Valve Circuit Malfunction in Section 1A (Page 1A-93)".

#### ISC Valve Removal and Installation

B817H21306018

Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-11)".

#### **⚠ CAUTION**

Be careful not to disconnect the ISC valve coupler at least 5 seconds after ignition switch is turned to OFF. If the ECM coupler or ISC valve coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an unusual valve position being written in ECM and causing an error of ISC valve operation.

#### NOTE

When the ISC valve is removed or replaced, the ISC valve or new one should be set to Preset position. Refer to "ISC Valve Preset and Opening Initialization (Page 1C-5)".

#### ISC Valve Preset and Opening Initialization

B817H2130601

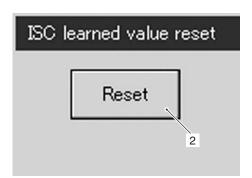
When removing or replacing the ISC valve, set the ISC valve to the following procedures:

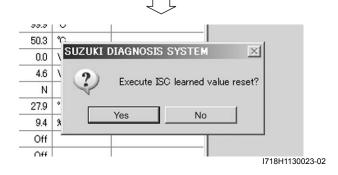
- 1) Turn the ignition switch to ON position.
- 2) Set up the SDS tool.
- 3) Click the "Active control".

4) Click the "ISC learned value reset" (1).



5) Click the "Reset" button to clear the ISC leaned value.







#### **NOTE**

The leaned value of the ISC valve is set at PRESET position.

6) Close the SDS tool and turn the ignition to OFF position.

#### **NOTE**

The ISC valve opening initialization is automatically started after the ignition switch is turned OFF position.

#### **HO2 Sensor Inspection**

B817H21306020

Refer to "DTC "C44" (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction in Section 1A (Page 1A-104)".

#### **HO2 Sensor Removal and Installation**

B817H21306021

Refer to "Heated Oxygen Sensor (HO2S) Removal and Installation in Section 1B (Page 1B-5)".

#### **GP Switch Inspection**

B817H21306022

Refer to "DTC "C31" (P0705): GP Switch Circuit Malfunction in Section 1A (Page 1A-87)".

#### **GP Switch Removal and Installation**

B817H21306023

Refer to "Gear Position Switch Removal and Installation in Section 5B (Page 5B-12)".

## **Specifications**

#### **Service Data**

**FI Sensors** 

B817H21307001

Item	Specification		Note
CKP sensor resistance	90 – 150 Ω		
CKP sensor peak voltage	2.0 V and more		When cranking
IAP sensor (#1) input voltage		4.5 – 5.5 V	
IAP sensor (#1) output voltage	Α	pprox. 2.7 V at idle speed	
IAP sensor (#2) input voltage		4.5 – 5.5 V	
IAP sensor (#2) output voltage	2	2.0 – 3.0 V at idle speed	
TP sensor input voltage		4.5 – 5.5 V	
TD consor output voltage	Closed	Approx. 1.1 V	
TP sensor output voltage	Opened	Approx. 4.3 V	
ECT sensor input voltage		4.5 – 5.5 V	
ECT sensor output voltage		0.15 – 4.85 V	
ECT sensor resistance	Appr	ox. 2.45 kΩ at 20 °C (68 °F)	
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	Approx. 2.4 V at 20 °C (68 °F)		
IAT sensor resistance	Approx. 2.56 kΩ at 20 °C (68 °F)		
TO sensor resistance	16.5 – 22.3 kΩ		
TO sensor voltage	Normal 0.4 – 1.4 V		
TO sensor voltage	Leaning	3.7 – 4.4 V	When leaning 65°
GP switch voltage		0.6 V and more	From 1st to Top
Injector voltage		Battery voltage	
Ignition coil primary peak voltage		80 V and more	When cranking
STP sensor input voltage		4.5 – 5.5 V	
STP sensor output voltage	Closed	Approx. 0.6 V	
31F selisor output voltage	Opened	Approx. 4.5 V	
STV actuator resistance		Approx. 7.0 Ω	
ISC valve resistance		prox. 20 Ω at 20 °C (68 °F)	
HO2 sensor heater resistance		orox. 8 Ω at 23 °C (73.4 °F)	
HO2 sensor output voltage		3 V and less at idle speed	
	0.6 V and more at 3 000 r/min		
PAIR control solenoid valve resistance	18 – 22 Ω at 20 – 30 °C (68 – 86 °F)		

## **Tightening Torque Specifications**

B817H21307002

Fastening part	Tightening torque			Note
Fastering part	N⋅m	kgf-m	lbf-ft	Note
ECT sensor	18	1.8	13.0	☞(Page 1C-2)
STP sensor mounting screw	3.5	0.35	2.5	

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

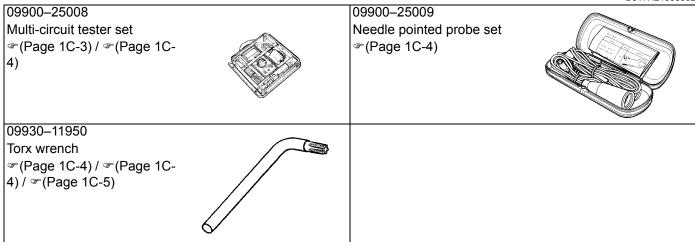
#### **Recommended Service Material**

B817H21308001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	☞(Page 1C-5)
	equivalent		

### **Special Tool**

B817H21308002

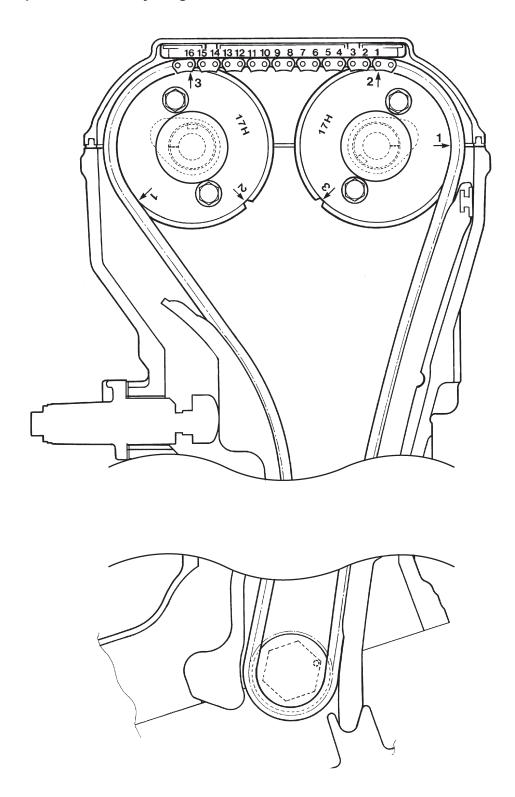


## **Engine Mechanical**

## **Schematic and Routing Diagram**

**Camshaft and Sprocket Assembly Diagram** 

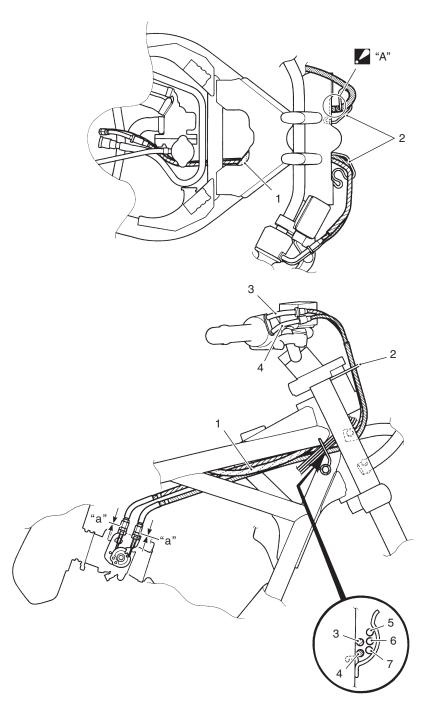
B817H21402001



I717H1140211-01

## Throttle Cable Routing Diagram (GSF650/S/A/SAK7)

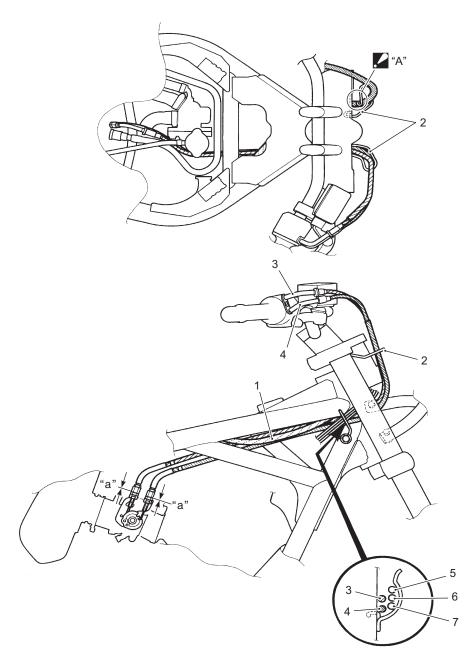
B817H21402002



I718H1140308-03

Wiring harness	4. Throttle cable No.2	7. Ignition switch lead wire
2. Cable guide (GSF650S only)	<ol><li>Handlebar switch lead wire (L)</li></ol>	"a": 0 mm (0 in)
3. Throttle cable No.1	6. Handlebar switch lead wire (R)	"A": Don't contact the tip of cable guide with the upper bracket.

B817H21402003



I817H2140001-01

Wiring harness	4. Throttle cable No. 2	7. Ignition switch lead wire
2. Cable guide	5. Handlebar switch lead wire (L)	"a": 0 mm (0 in)
3. Throttle cable No. 1	Handlebar switch lead wire (R)	"A": Don't contact the tip of cable guide with the upper bracket.

## **Diagnostic Information and Procedures**

#### **Engine Mechanical Symptom Diagnosis**

Refer to "Engine Symptom Diagnosis in Section 1A (Page 1A-9)".

#### Compression Pressure Check

B817H21404002

The compression pressure reading of a cylinder is a good indicator of its internal condition.

The decision to overhaul the cylinder is often based on the results of a compression test. Periodic maintenance records kept at your dealership should include compression readings for each maintenance service.

#### **NOTE**

- · Before checking the engine for compression pressure, make sure that the cylinder head nuts are tightened to the specified torque values and the valves are properly adjusted.
- · Make sure that the battery is in fullycharged condition.
- 1) Warm up the engine.
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Remove the frame head covers, left and right. (GSF650) Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 4) Remove all the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".
- 5) Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.

#### Special tool

(A): 09915-64512 (Compression gauge) (B): 09915-63311 (Compression gauge attachment)



6) Keep the throttle grip in the fully-opened position.



I717H1140005-01

- 7) Press the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.
- 8) Repeat this procedure with the other cylinders.

#### Compression pressure specification

Standard	Limit	Difference
1 200 – 1 600 kPa	900 kPa	200 kPa
(12 – 16 kgf/cm <sup>2</sup> ,	(9 kgf/cm <sup>2</sup> , 128	(2 kgf/cm <sup>2</sup> , 28
171 – 226 psi)	psi)	psi)

#### Low compression pressure can indicate any of the following conditions:

- Excessively worn cylinder walls
- Worn piston or piston rings
- Piston rings stuck in grooves
- Poor valve seating
- Ruptured or otherwise defective cylinder head aasket

#### Overhaul the engine in the following cases:

- Compression pressure in one of the cylinders is 900 kPa (9 kgf/cm<sup>2</sup>, 128 psi) and less.
- The difference in compression pressure between any two cylinders is 200 kPa (2 kgf/cm<sup>2</sup>, 124 psi) and more.
- All compression pressure readings are below 1 200 kPa (12 kgf/cm<sup>2</sup>, 171 psi) even when they measure 900 kPa (9 kgf/cm<sup>2</sup>, 128 psi) and more.
- 9) After checking the compression pressure, reinstall the removed parts.

Engine Mechanical:

## **Repair Instructions**

## **Engine Components Removable with the Engine in Place**

B817H21406001

Engine components which can be removed while the engine is installed on the frame are as follows. For the installing and removing procedures, refer to respective paragraphs describing each component.

## **Center of Engine**

Item	Removal	Inspection	Installation
Air cleaner element	Refer to "Air Cleaner Element Removal and Installation (Page 1D-7)".	Refer to "Air Cleaner Element Inspection and Cleaning in Section 0B (Page 0B-4)".	Refer to "Air Cleaner Element Removal and Installation (Page 1D-7)".
Exhaust pipe/Muffler	Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".	Refer to "Exhaust System Inspection in Section 1K (Page 1K-5)".	Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".
Oil filter	Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".	_	Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".
Oil pan/Oil strainer/Oil pressure regulator	Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation in Section 1E (Page 1E-4)".	Refer to "Oil Pressure Regulator / Oil Strainer Inspection in Section 1E (Page 1E-6)".	Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation in Section 1E (Page 1E-4)".
Throttle body	Refer to "Throttle Body Removal and Installation (Page 1D-10)".	Refer to "Throttle Body Inspection and Cleaning (Page 1D-15)".	Refer to "Throttle Body Removal and Installation (Page 1D-10)".
Cam chain tension adjuster	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Cam Chain Tension Adjuster Inspection (Page 1D-36)".	Refer to "Engine Top Side Assembly (Page 1D-26)".
Cylinder head cover	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Cylinder Head Cover Inspection (Page 1D- 34)".	Refer to "Engine Top Side Assembly (Page 1D-26)".
Camshafts	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Camshaft Inspection (Page 1D-34)".	Refer to "Engine Top Side Assembly (Page 1D-26)".
Cylinder head	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Cylinder Head Related Parts Inspection (Page 1D-41)".	Refer to "Engine Top Side Assembly (Page 1D-26)".
Cylinder	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Cylinder Inspection (Page 1D-47)".	Refer to "Engine Top Side Assembly (Page 1D-26)".
Pistons	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Piston and Piston Ring Inspection (Page 1D- 49)".	Refer to "Engine Top Side Assembly (Page 1D-26)".
Starter motor	Refer to "Starter Motor Removal and Installation in Section 1I (Page 1I-4)".	Refer to "Starter Motor Inspection in Section 1I (Page 1I-5)".	Refer to "Starter Motor Removal and Installation in Section 1I (Page 1I-4)".
PAIR reed valve	Refer to "PAIR Reed Valve Removal and Installation in Section 1B (Page 1B-6)".	Refer to "PAIR System Inspection in Section 1B (Page 1B-7)".	Refer to "PAIR Reed Valve Removal and Installation in Section 1B (Page 1B-6)".

## 1D-6 Engine Mechanical:

## **Engine Right Side**

Item	Removal	Inspection	Installation
Clutch cover	Refer to "Clutch Removal in Section 5C (Page 5C-12)".	_	Refer to "Clutch Installation in Section 5C (Page 5C-14)".
Clutch plates	Refer to "Clutch Removal in Section 5C (Page 5C-12)".	Refer to "Clutch Parts Inspection in Section 5C (Page 5C-17)".	Refer to "Clutch Installation in Section 5C (Page 5C-14)".
Clutch sleeve hub	Refer to "Clutch Removal in Section 5C (Page 5C-12)".	Refer to "Clutch Parts Inspection in Section 5C (Page 5C-17)".	Refer to "Clutch Installation in Section 5C (Page 5C-14)".
Primary driven gear	Refer to "Clutch Removal in Section 5C (Page 5C-12)".	Refer to "Clutch Parts Inspection in Section 5C (Page 5C-17)".	Refer to "Clutch Installation in Section 5C (Page 5C-14)".
Oil pump drive gear	Refer to "Oil Pump Removal and Installation in Section 1E (Page 1E-10)".	_	Refer to "Oil Pump Removal and Installation in Section 1E (Page 1E-10)".
Oil pump	Refer to "Oil Pump Removal and Installation in Section 1E (Page 1E-10)".	Inspection in Section 1E (Page 1E-12)".	Refer to "Oil Pump Removal and Installation in Section 1E (Page 1E-10)".
Oil pressure switch	Refer to "Oil Pressure Switch Removal and Installation in Section 1E (Page 1E-7)".	Refer to "Oil Pressure Indicator Inspection (GSF650/S/A/SAK7) in Section 9C (Page 9C-10)".	Refer to "Oil Pressure Switch Removal and Installation in Section 1E (Page 1E-7)".
Gearshift shaft	Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation in Section 5B (Page 5B-15)".	Refer to "Gearshift Linkage Inspection in Section 5B (Page 5B-18)".	Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation in Section 5B (Page 5B-15)".

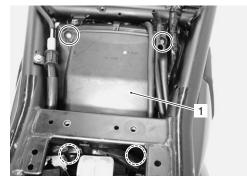
## **Engine Left Side**

Item	Removal	Inspection	Installation
	Refer to "Generator Removal	Refer to "Generator	Refer to "Generator Removal
Generator	and Installation in Section 1J	Inspection in Section 1J	and Installation in Section 1J
	(Page 1J-4)".	(Page 1J-3)".	(Page 1J-4)".
	Refer to "Engine Sprocket	Refer to "Drive Chain	Refer to "Engine Sprocket
Engine sprocket	Removal and Installation in	Related Parts Inspection in	Removal and Installation in
	Section 3A (Page 3A-2)".	Section 3A (Page 3A-5)".	Section 3A (Page 3A-2)".
	Refer to "Drive Chain	Refer to "Drive Chain	Refer to "Drive Chain
Driven chain	Replacement in Section 3A	Inspection and Adjustment in	Replacement in Section 3A
	(Page 3A-7)".	Section 0B (Page 0B-17)".	(Page 3A-7)".
	Refer to "Gear Position	Refer to "Gear Position	Refer to "Gear Position
Gear position switch	Switch Removal and	Switch Inspection in Section	Switch Removal and
Gear position switch	Installation in Section 5B	5B (Page 5B-12)".	Installation in Section 5B
	(Page 5B-12)".	SB (Fage SB-12) .	(Page 5B-12)".
	Refer to "Starter Clutch		Refer to "Starter Clutch
Starter idle gear	Removal and Installation in	<del>_</del>	Removal and Installation in
	Section 1I (Page 1I-10)".		Section 1I (Page 1I-10)".
	Refer to "Starter Clutch	Refer to "Starter Clutch	Refer to "Starter Clutch
Starter clutch	Removal and Installation in	Inspection in Section 1I	Removal and Installation in
	Section 1I (Page 1I-10)".	(Page 1I-11)".	Section 1I (Page 1I-10)".
	Refer to "Generator Removal	Refer to "CKP Sensor	Refer to "Generator Removal
CKP sensor	and Installation in Section 1J	Inspection in Section 1H	and Installation in Section 1J
	(Page 1J-4)".	(Page 1H-6)".	(Page 1J-4)".
	Refer to "Water Pump	Refer to "Water Pump	Refer to "Water Pump
Water pump	Removal and Installation in	Related Parts Inspection in	Removal and Installation in
	Section 1F (Page 1F-12)".	Section 1F (Page 1F-16)".	Section 1F (Page 1F-12)".

## Air Cleaner Element Removal and Installation

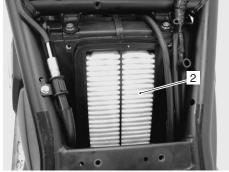
#### Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Remove the air cleaner cover screws.
- 3) Remove the air cleaner cover (1).



I717H1140006-01

4) Remove the air cleaner element (2).



I717H1140007-01

#### Installation

Installation in the reverse order of removal.

# Air Cleaner Element Inspection and Cleaning B817H21406003

Refer to "Air Cleaner Element Inspection and Cleaning in Section 0B (Page 0B-4)".

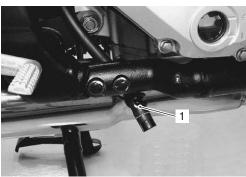
#### Air Cleaner Box Removal and Installation

B817H21406004

#### Removal

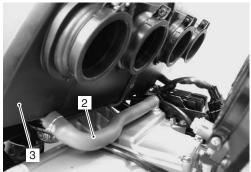
- 1) Remove the throttle body. Refer to "Throttle Body Removal and Installation (Page 1D-10)".
- 2) Remove the air cleaner cover and air cleaner element. Refer to "Air Cleaner Element Removal and Installation (Page 1D-7)".

3) Release the drain hose from the clamp (1).



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4) Disconnect the breather hose (2) and remove the air cleaner box (3).



717H1140008-01

#### Installation

Install the air cleaner box in the reverse order of removal. Pay attention to the following point:

Route the hoses properly. Refer to "Throttle Body Construction (Page 1D-9)".

### **Throttle Cable Removal and Installation**

B817H21406005

#### Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Remove the right handlebar switch box. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".
- 3) Remove the throttle cables as shown in the cable routing diagram. Refer to "Throttle Cable Routing" Diagram (GSF650/S/A/SAK7) (Page 1D-2)".

#### Installation

Install the throttle cables in the reverse order of removal. Pay attention to the following points:

- · Install the throttle cables as shown in the cable routing diagram. Refer to "Throttle Cable Routing Diagram (GSF650/S/A/SAK7) (Page 1D-2)".
- Check the throttle cable play and proper operation.

## **Throttle Cable Inspection**

B817H21406006

Check that the throttle grip moves smoothly from full open to full close. If it does not smoothly, lubricate the throttle cables.

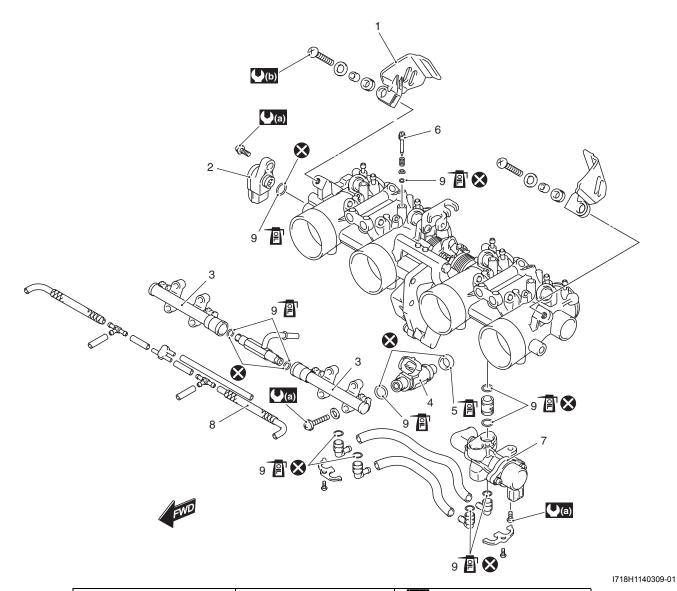
## **Throttle Cable Play Inspection and Adjustment**

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Refer to "Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-14)".

## **Throttle Body Components**

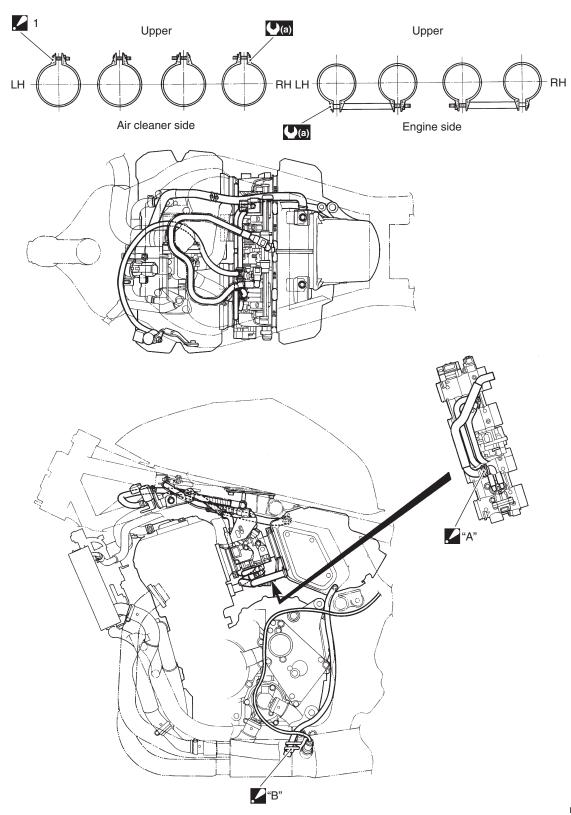
B817H21406008



Fuel injector cover	6. Air screw	(0.35 kgf-m, 2.5 lb-ft)
STP sensor	7. ISC valve	(b): 5 N·m (0.5 kgf-m, 3.5 lb-ft)
Fuel delivery pipe	8. Vacuum hose	🐼 : Do not reuse.
Fuel injector	9. O-ring	
5. Cushion seal	: Apply engine oil	

## **Throttle Body Construction**

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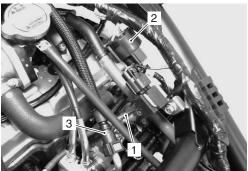
1.	Clamp (Air cleaner side) : After tighten the clamp band #3, 4 and tighten the clamp band #1, 4.	"B": Clamp the drain hose at mark position.
"A":	White mark downward.	(0.15 kgf-m, 1.0 lb-ft)

## **Throttle Body Removal and Installation**

B817H21406010

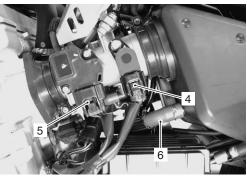
#### Removal

- 1) Disconnect the battery (–) read wire. Refer to "Battery Removal and Installation in Section 1J (Page 1J-12)".
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Disconnect the vacuum hose (1), fuel injector coupler (2) and fuel feed hose (3).



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4) Disconnect the STP sensor coupler (4), IAP/TP/IAT sensor coupler (5) and ISC valve hose (6).



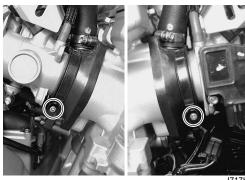
I717H1140016-01

5) Remove the air cleaner box mounting bolts.

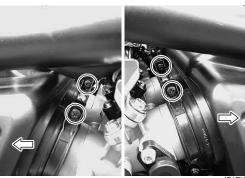


I717H1140017-01

- 6) Loosen the throttle body clamp screws.
- 7) Move the air cleaner box backward.



I717H1140019-01



I717H1140020-01

- 8) Move the throttle body right side.
- 9) Disconnect the throttle cables from their drum and remove the throttle body assembly.

#### **A CAUTION**

After disconnecting the throttle cables, do not snap the throttle valve from the open to full close. It may cause damage to the throttle valve and throttle body.

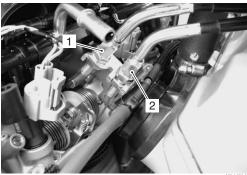


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#### Installation

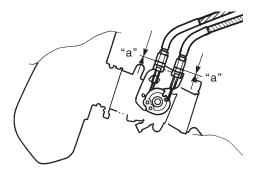
Install the throttle body in the reverse order of removal. Pay attention to the following points:

· Connect the throttle pulling cable (1) and throttle returning cable (2) to the throttle cable drum.



I717H1140022-01

- Tighten the throttle body clamp screws. Refer to "Throttle Body Construction (Page 1D-9)".
- · Loosen each throttle cable lock-nut.
- Turn in each throttle cable adjuster fully and locate each outer cable so that the clearance "a" is 0 mm (0 in).



I718H1140322-01

"a": 0 mm (0 in)

- · Tighten each lock-nut.
- · Adjust the throttle cable play. Refer to "Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-14)".

# Throttle Body Disassembly and Assembly 8817H21406011

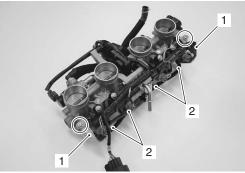
Refer to "Throttle Body Removal and Installation (Page 1D-10)".

## Disassembly

#### **A CAUTION**

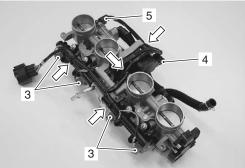
Identify the position of each removed part. Organize the parts in their respective groups so that they can be reinstalled in their original positions.

1) Remove the injector covers (1) and disconnect the respective vacuum hoses (2) from each throttle body.



I717H1140023-01

2) Remove the clamps and disconnect the fuel injector couplers (3), STVA coupler (4) and ISC valve coupler (5).

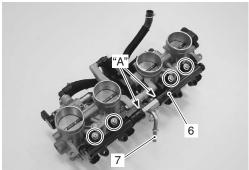


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3) Remove the fuel delivery pipe assembly (6).

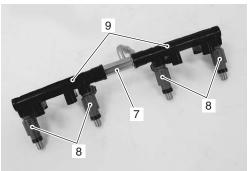
#### **⚠** CAUTION

Be careful not to twist the fuel delivery pipe's T-joint (7), when disconnecting the fuel feed hose or removing the fuel delivery pipes, or joint part "A" of the fuel delivery pipe get damage.



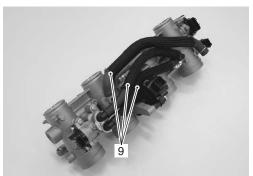
I717H1140025-01

4) Remove the fuel injectors (8) and fuel delivery pipes (9) from the T-joint (7).



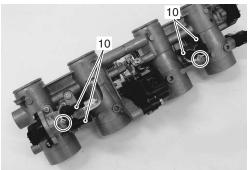
I718H1140323-02

5) Disconnect the ISC valve hoses (9).



I717H1140026-01

6) Remove the plats and joint pipes (10).

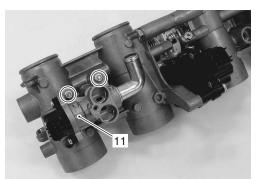


I718H1140329-01

7) Remove the ISC valve assembly (11).

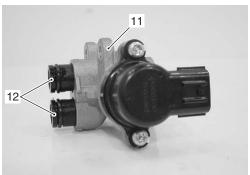
## Special tool

் : 09930–11950 (Torx wrench)



I718H1140330-02

8) Remove the joint pipes (12) from the ISC valve assembly (11).



I717H1140208-01

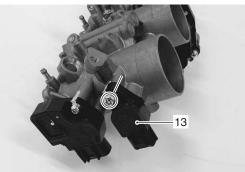
9) Remove the STP sensor (13).

## **NOTE**

Prior to disassembly, mark sensor's original position with a paint or scribe for accurate reinstallation.

#### Special tool

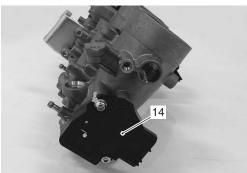
(Torx wrench)



I718H1140327-02

## **⚠ CAUTION**

Never remove the IAP/TP/IAT sensor (14) from the throttle body.



I718H1140331-02

#### **⚠ CAUTION**

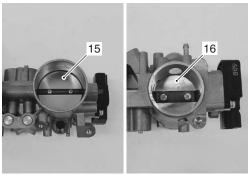
Never separate the throttle bodies, left and light.



I718H1140332-01

#### **⚠ CAUTION**

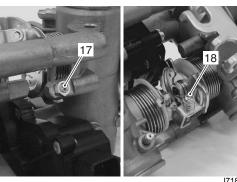
Never remove the throttle valve (15) and secondary throttle valve (16).



I718H1140333-03

#### **⚠** CAUTION

These adjusting screws (17), (18) are factoryadjusted at the time of delivery and therefore avoid removing or turning them unless otherwise necessary.



I718H1140334-02

## Assembly

Assembly is the throttle body in the reverse order of removal. Pay attention to the following points:

- Apply thin coat of the engine oil to the O-ring.
- With the STV fully closed, install the STP sensor (1) and tighten the STP sensor mounting screw to the specified torque.

#### **NOTE**

- Align the secondary throttle shaft end "A" with the groove "B" of STP sensor.
- Apply grease to the secondary throttle shaft end "A" if necessary.

র⊛: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

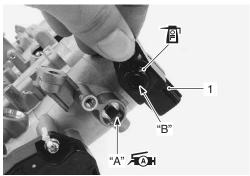
## Special tool

(Torx wrench)

## **Tightening torque**

STP sensor mounting screw: 3.5 N·m (0.35 kgf-

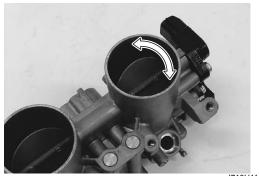
m, 2.5 lbf-ft)



I718H1140335-01

#### NOTE

Make sure the STP valve open or close smoothly. If the STP sensor adjustment is necessary, refer to "STP Sensor Adjustment in Section 1C (Page 1C-4)".



I718H1140336-01

## 1D-14 Engine Mechanical:

 Apply thin coat of the engine oil to the O-rings and install the ISC valve assembly.

## **⚠ CAUTION**

Replace the O-rings with new ones.

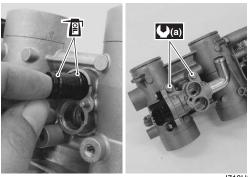
Special tool

**109930-11950 (Torx wrench)** 

**Tightening torque** 

ISC valve mounting screw (a): 3.5 N·m (0.35 kgf-

m, 2.5 lbf-ft)



I718H1140337-02

 Apply thin coat of the engine oil to the O-rings and install the plate.

#### **A** CAUTION

Replace the O-rings with new ones.

## **NOTE**

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I718H1140338-01

· Connect the ISC valve hoses securely.

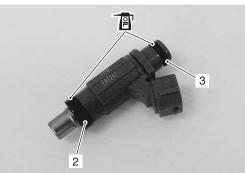


I717H1140027-01

 Apply thin coat of the engine oil to the new cushion seal (2) and the O-ring (3).

## **⚠ CAUTION**

Replace the cushion seal and O-ring with the new ones.

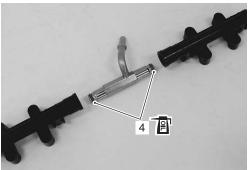


I718H1140340-02

• Apply thin coat of the engine oil to the new O-rings (4).

## **⚠ CAUTION**

Replace the O-rings with the new ones.



I718H1140341-02

· Assemble the fuel delivery pipes as shown.



I718H1140342-01

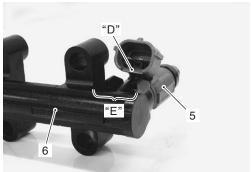
 Install the fuel injector (5) by pushing it straight to the delivery pipe (6).

#### **⚠ CAUTION**

Never turn the injector while pushing it.

#### NOTE

Align the coupler "D" of injector with boss "E" of the delivery pipe.



I717H1140210-02

 Install the fuel delivery pipe assembly (7) to the throttle body assembly.

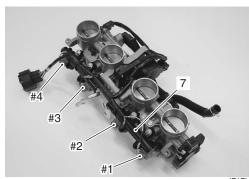
#### **↑** CAUTION

Never turn the fuel injectors while installing them.

Connect the fuel injector couplers to the fuel injectors.

#### **NOTE**

Make sure that each coupler is installed in the correct position.



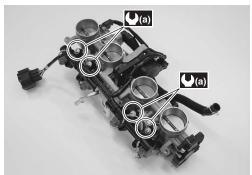
I717H1140028-01

Coupler	Wire color
#1	Y/R and Gr/W
#2	Y/R and Gr/B
#3	Y/R and Gr/Y
#4	Y/R and Gr/R

• Tighten the fuel delivery pipe mounting screws to the specified torque.

**Tightening torque** 

Fuel delivery pipe mounting screw (a): 3.5 N·m ( 0.35 kgf-m, 2.45 lbf-ft)



I717H1140029-01

## **Throttle Body Inspection and Cleaning**

B817H2140601

Refer to "Throttle Body Disassembly and Assembly (Page 1D-11)".

#### Cleaning

#### **▲ WARNING**

Some carburetor cleaning chemicals, especially dip-type soaking solutions, are very corrosive and must be handled carefully. Always follow the chemical manufacturer's instructions on proper use, handling and storage.

 Clean passageways with a spray-type carburetor cleaner and blow dry with compressed air.

## **⚠ CAUTION**

- Never clean the main bore of throttle body to prevent come off molybdenum from the throttle valve.
- Do not use wire to clean passageways.
  Wire can damage passageways. If the
  components cannot be cleaned with a
  spray cleaner it may be necessary to use a
  dip-type cleaning solution and allow them
  to soak. Always follow the chemical
  manufacturer's instructions for proper use
  and cleaning of the throttle body
  components. Do not apply carburetor
  cleaning chemicals to the rubber and
  plastic materials.

## 1D-16 Engine Mechanical:

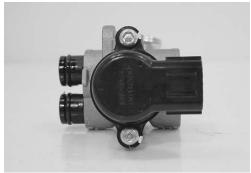
## Inspection

Check following items for any defects or clogging. Replace the throttle body if necessary.

- O-ring
- · Throttle valve
- · Secondary throttle valve
- · Vacuum hose

## **ISC Valve Visual Inspection**

Visually inspect the ISC valve if necessary.



I717H1140030-01

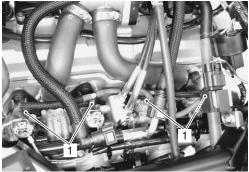
## **Throttle Valve Synchronization**

B817H21406013

## **Use of SDS Tool**

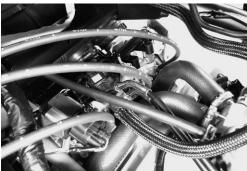
Check and adjust the throttle valve synchronization among four cylinders.

1) Lift and support the fuel tank. Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation in Section 1G (Page 1G-11)". 2) Disconnect the IAP sensor (#1) vacuum hoses (1) from the throttle body.



1717H1140031 04

3) Connect the respective vacuum tester hoses to each vacuum nipple on the throttle body.



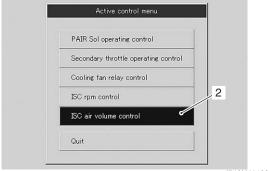
I717H1140033-01

- 4) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- 5) Start the engine.
- 6) Click "Data monitor".
- 7) Warm up the engine (Water temp. more than 80 °C (176 °F)).

	Unit
1212	rpm
Off	
82.3	8
76	step
73.5	kPa
103.8	kPa
	Off 82.3

1717H1140034-01

- 8) Click "Active control".
- 9) Click "ISC air volume control" (2).



I718H1140351-01

"B": ISC valve position: Approx. 72 step

10) Click "ON" button to fix the ISC air volume among 4 cylinders.

"A": Engine speed: Approx. 1 200 rpm

## **NOTE**

When making this synchronization, be sure that the water temperature is within 80 - 100 °C (176 - 212

Item	Value	Unit	ISC air volume control
☐ Engine speed	"A"—→ 1173	rpm	Sans I
Desired idle speed	1205	rpm	Spec Off
Cooling fan relay	Off		On
☐ Engine coolant / oil temperature	⇒ 86.1	°C	
☐ ISC valve position	"B"─── 72	step	
			I717H1140035-0

11) Check for the synchronization of vacuum from #1 to #4 cylinders.



I717H1140036-01

12) Equalize the vacuum of the cylinders by turning each airscrew and keep it turning at idling speed.

#### **NOTE**

Always set the engine rpm at idle rpm.



717H1140037-0

13) If the adjustment is not yet correct, remove each air screw and clean them with a spray-type carburetor cleaner and blow dry with a compressed air. Also, clean the air screw passageways.

## NOTE

- Slowly turn the air screw in clockwise and count the number of turns until the screw is lightly seated.
- Make a note of how many turns were made so the screw can be reset correctly after cleaning.
- 14) Repeat the procedures of 5) to 13).
- 15) Close the SDS tool and turn the ignition switch to OFF position.
- 16) Disconnect the vacuum tester and reinstall the removed parts.
- 17) After completing the throttle valve synchronization, clear the DTC and reset the ISC learned valve using SDS tool. Refer to "ISC Valve Preset and Opening Initialization in Section 1C (Page 1C-5)".

#### **Use of Mode Select Switch**

The following procedure describes only difference between use of SDS tool and use of mode select switch.

- 1) 1), 2) and 3) are the same as the using SDS tool.
- Connect the special tool (Mode select switch) and turn ON.



I718H1140391-01

- 3) Start the engine and warm up it.
  - \* Summer: Approx. 5 min. at idle speed
  - \* Winter: Approx. 8 min. at idle speed

#### **NOTE**

- The ISC valve automatically is set at synchronization mode.
- Water temperature should be more than 80
   °C (176 °F) and then wait 30 seconds.
- 4) This step is the same as the step 11) of the use of SDS.
- 5) This step is the same as the step 12) of the use of SDS.
- This step is the same as the step 13) of the use of SDS.
- 7) Repeat the procedures of 3).
- 8) Turn OFF the mode select switch.
- 9) Disconnect the vacuum tester and reinstall the removed parts.

## **Engine Assembly Removal**

B817H21406014

Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps:

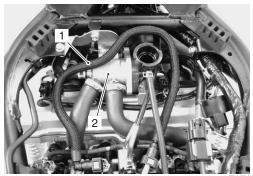
- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".
- Remove the seat and frame covers. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Remove the frame head covers (GSF650) or cowling (GSF650S). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

- 4) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 5) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".
- 6) Disconnect the battery (-) lead wire.



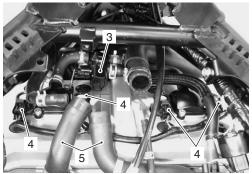
I717H1140038-01

- 7) Disconnect the fuel feed hose (1).
- 8) Remove the thermostat connector (2) and its bracket. Refer to "Thermostat Connector / Thermostat Removal and Installation in Section 1F (Page 1F-9)".



I717H1140040-01

- 9) Remove the PAIR control solenoid valve (3) and hoses.
- 10) Disconnect all ignition coil/plug cap couplers and then remove the ignition coil/plug caps (4).
- 11) Disconnect the water hoses (5).



I717H1140041-01

12) Remove the throttle body assembly (6). Refer to "Throttle Body Removal and Installation (Page 1D-10)".



I717H1140042-01

- 13) Remove the radiator (7). Refer to "Radiator / Cooling Fan Motor Removal and Installation in Section 1F (Page 1F-5)".
- 14) Remove the muffler, and then exhaust pipe (8) along with the HO2 sensor. Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".



I717H1140043-0

15) Remove the air cleaner box (9). Refer to "Air Cleaner Box Removal and Installation (Page 1D-7)".



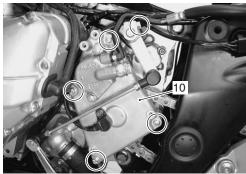
I717H1140044-01

16) Disengage the gearshift lever link arm by removing the bolt.

#### NOTE

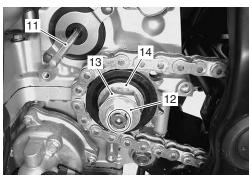
Mark the gearshift shaft head at which the gearshift link arm slit set for correct reinstallation.

17) Move the engine sprocket inner cover (10).



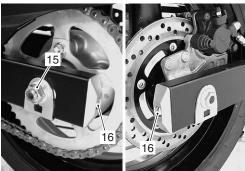
I717H1140045-01

- 18) Remove the clutch push rod (11).
- 19) Remove the speed sensor rotor (12) while depressing the rear brake pedal.
- 20) Remove the engine sprocket nut (13) while depressing the rear brake pedal.
- 21) Remove the washer (14).



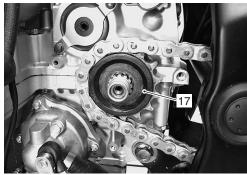
I717H1140046-01

22) Loosen the rear axle nut (15) and chain adjuster bolts (16) to provide additional chain slack.



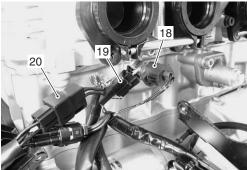
I717H1140047-02

23) Remove the engine sprocket (17).



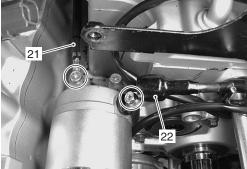
I717H1140048-01

24) Disconnect the ECT sensor coupler (18), CKP sensor coupler (19) and generator coupler (20).



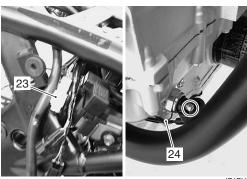
I717H1140049-0

25) Disconnect the engine ground wire coupler (21) and starter motor lead wire (22).



I717H1140050-01

26) Disconnect the GP switch coupler (23) and oil pressure switch lead wire (24).



I717H1140051-01

27) Support the engine with a proper jack.



28) Remove the engine mounting bracket (25).



I717H1140054-01

29) Remove the frame down tube (26) by removing their bolts and nuts.



I717H1140053-02

30) Remove the engine mounting bolts and nuts.



I717H1140055-02

31) Gradually lower the front side of the engine and remove the engine.

## **▲ WARNING**

Care should be taken not to drop the engine accidentally when the engine mounting bolts and nuts are removed.

## **Engine Assembly Installation**

B817H21406015

Reinstall the engine in the reverse order of engine removal. Pay attention to the following points:

• Insert the two mounting bolts from left side, and tighten their nuts.

#### **NOTE**

The engine mounting nuts are self-locking. Once the nuts have been removed, they are no longer of any use.



I717H1140055-02

## 1D-22 Engine Mechanical:

- Install the frame down tube and engine mounting brackets
- · Tighten the bolts and nuts to the specified torque.

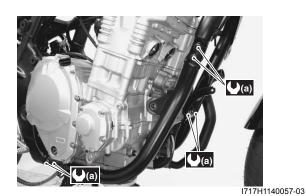
## **NOTE**

The frame down tube nuts are self-locking. Once the nuts have been removed, they are no longer of any use.

## **Tightening torque**

Frame down tube bolt (a): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)

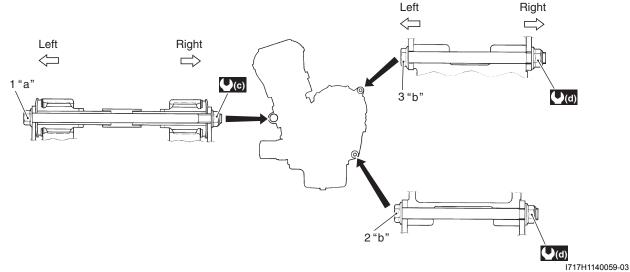
Engine mounting bracket bolts (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)





I717H1140058-01

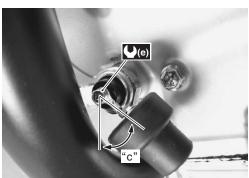
 Tighten all engine mounting bolts and nuts to the specified torque, as shown in the following illustration.



Engine mounting bolt (Front upper)	"a": 215 mm (8.5 in)	(d): 88 N·m (8.8 kgf-m, 63.5 lb-ft)
Engine mounting bolt (Rear lower)	"b": 155 mm (6.1 in)	
Engine mounting bolt (Rear upper)	(c): 55 N·m (5.5 kgf-m, 40.0 lb-ft)	

· Connect the oil pressure switch lead wire as shown.

Tightening torque
Oil pressure switch lead wire mounting bolt (e):
1.5 N·m (0.15 kgf-m, 1.1 lbf-ft)



I717H1140060-02

"c": 20° ± 10°

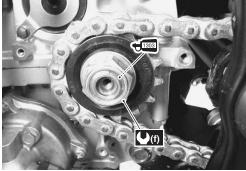
Apply THREAD LOCK SUPER to the driveshaft.

+1333 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tighten the engine sprocket nut to the specified torque.

**Tightening torque** 

Engine sprocket nut (f): 115 N·m (11.5 kgf-m, 83.0 lbf-ft)



I717H1140061-02

Tighten the speed sensor rotor bolt to the specified torque.

Tightening torque

Speed sensor rotor bolt (g): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)

 Before installing the engine sprocket inner cover, apply a small quantity of SUZUKI SUPER GREASE to the clutch push rod.

和: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1140062-03

- Install the engine sprocket inner cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- Install the gearshift link arm to the gearshift shaft in the correct position.

Gearshift lever height "d"
Standard: 44 – 55 mm (1.8 – 2.2 in)



I717H1140063-0

- Install the exhaust pipe and muffler. Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".
- Install the radiator. Refer to "Radiator / Cooling Fan Motor Removal and Installation in Section 1F (Page 1F-5)".
- Install the throttle body. Refer to "Throttle Body Removal and Installation (Page 1D-10)".

#### 1D-24 Engine Mechanical:

- After remounting the engine, route the wiring harness, cable and hoses properly. Refer to "Wiring Harness Routing Diagram (GSF650/S/A/SAK7) in Section 9A (Page 9A-8)", "Throttle Cable Routing Diagram (GSF650/S/A/SAK7) (Page 1D-2)" and "Water Hose Routing Diagram in Section 1F (Page 1F-3)".
- Pour engine coolant and engine oil. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)" and "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".
- After finishing the engine installation, check the following items.
  - Throttle cable play Refer to "Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-14)"
  - Throttle valve synchronization
     Refer to "Throttle Valve Synchronization (Page 1D-16)".
  - Drive chain slack
     Refer to "Drive Chain Inspection and Adjustment in Section 0B (Page 0B-17)".
  - Engine oil and coolant leakage
     Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".

## **Engine Top Side Disassembly**

B817H21406016

It is unnecessary to remove the engine assembly from the frame when servicing the engine top side.

#### **NOTE**

Before servicing the engine top side, remove the fuel tank, thermostat connector, PAIR control solenoid valve, ignition coil/plug cap, throttle body assembly, exhaust pipes, muffler, radiator and etc. Refer to "Engine Assembly Removal (Page 1D-18)".

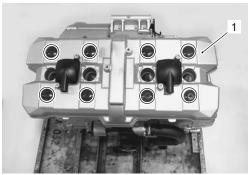
#### **⚠ CAUTION**

Identify the position of each removed part.

Organize the parts in their respective groups (e.g., intake, exhaust) so that they can be reinstalled in their original positions.

## **Cylinder Head Cover**

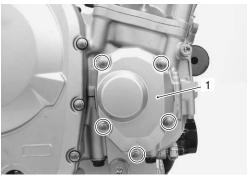
Remove the cylinder head cover (1) and its gasket.



I717H1140064-01

#### Camshaft

1) Remove the right crankshaft cover (1) and its gasket.



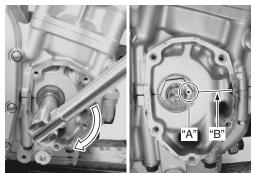
I717H1140065-01

2) Remove all of the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".

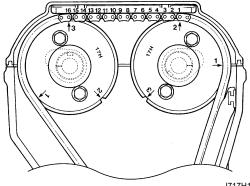
#### Special tool

1001: 09930-10121 (Spark plug wrench set)

3) Turn the crankshaft clockwise and align the match mark "A" on the crankshaft with the mating surfaces "B" of the crankcases. Also position each of the camshaft as shown.

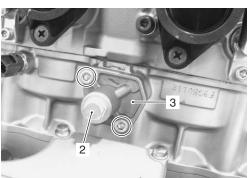


I717H1140066-01



I717H1140212-0

- 4) Remove the cam chain tension adjuster cap bolt (2) and spring.
- 5) Remove the cam chain tension adjuster (3) and its gasket.

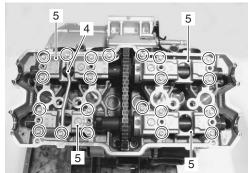


I717H1140067-03

6) Remove the oil pipe (4) and camshaft journal holders (5).

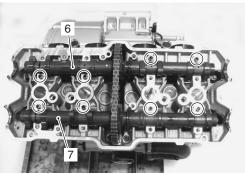
## **⚠ CAUTION**

Be sure to loosen the camshaft journal holder bolts evenly by shifting the wrench in the descending order of numbers.



I717H1140056-02

- 7) Remove the intake (6) and exhaust camshafts (7).
- 8) Remove the dowel pins.



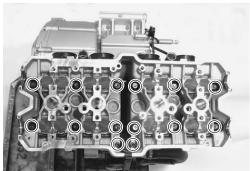
I717H1140069-02

## **Cylinder Head**

1) Remove the cylinder head.

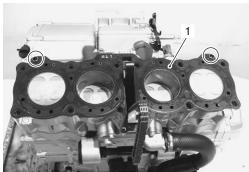
#### NOTE

When loosening the cylinder head bolts, loosen each bolt little by little diagonally.



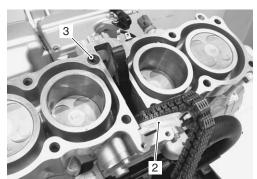
I717H1140070-01

2) Remove the cylinder head gasket (1) and dowel pins.



I717H1140071-0

3) Remove the cam chain No.1 guide (2) and O-ring (3).



I717H1140072-01

## Cylinder

- 1) Disconnect the water hose (1).
- 2) Remove the cylinder (2).

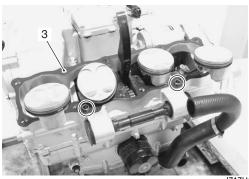
## **NOTE**

If the cylinder does not come off easily, lightly tap it using a plastic hammer.



I717H1140073-01

3) Remove the cylinder gasket (3) and dowel pins.



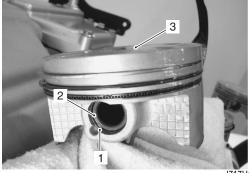
I717H1140074-01

## **Piston**

- 1) Place a clean rag over the cylinder base so as not to drop the piston pin circlips into the crankcase.
- 2) Remove each piston pin circlip (1).
- 3) Draw out each piston pin (2) and remove the pistons (3).

## **NOTE**

Scribe the cylinder number on the piston head.



I717H1140075-02

## **Engine Top Side Assembly**

B817H21406017

Assemble the engine top side in the reverse order of disassembly. Pay attention to the following points:

#### **Piston**

 When installing the piston pins, apply molybdenum oil solution onto each piston pin.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

· Install the pistons and piston pins.

#### NOTE

- Be sure to install the pistons in the cylinders from which they were removed in disassembly, refer to the cylinder numbers, #1 through #4, scribed on the piston.
- When installing the pistons, the indent "A" on the piston head must be faced to each exhaust side.



I717H1140076-01

- Place a clean rag over the cylinder base so as not to drop the piston pin circlips (1) into the crankcase.
- Install the piston pin circlips (1).

## **⚠ CAUTION**

Use new piston pin circlips (1) to prevent circlip failure which will occur with a bend one.

## NOTE

End gap of the circlip (1) should not be aligned with the cutaway in the piston pin bore.



I717H1140077-01

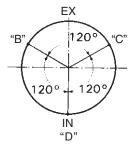
#### **↑** CAUTION

When turning the crankshaft, pull the cam chain upward, or the chain will be caught between the crankcase and the cam drive sprocket.



I717H1140078-01

 Position the piston ring gaps as shown. Before inserting each piston into its cylinder, check that the gaps are properly positioned.



I718H1140051-01

"B":	2nd ring and lower side rail
"C":	Upper side rail
"D":	1st ring and spacer

## Cylinder

• Install the dowel pins and cylinder gasket (1).

## **⚠ CAUTION**

Replace the cylinder gasket (1) with a new one.



I717H1140079-01

## 1D-28 Engine Mechanical:

 Apply molybdenum oil solution to the sliding surface of the pistons.

# M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I717H1140080-02

• Install each special tool to the #2 and #3 pistons.

#### **NOTE**

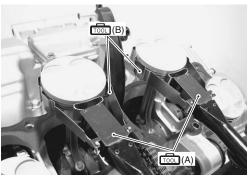
Do not overtighten the bands or piston installation into the cylinders will be difficult.

## Special tool

(A): 09916-74521 (Holder body)

ான் (B): 09916-74540 (Band (Piston diam.: 63 -

75 mm))



I717H1140081-01

- · Apply engine oil to the sliding surface of the cylinder.
- Insert the #2 and #3 pistons into the cylinder.

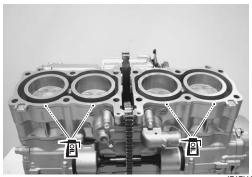
#### **NOTE**

Some light resistance must be overcome to lower the cylinder.

 After inserting the #2 and #3 pistons in place, insert the #1 and #4 pistons in the same manner of the #2 and #3 pistons.

#### **NOTE**

When installing the cylinder, keep the cam chain taut. The cam chain must not be caught between cam drive sprocket and crankcase when turning the crankshaft.



I717H1140082-03

#### Cam Chain No.1 Guide

 Pull the cam chain out of the cylinder and install the cam chain No.1 guide (1).

#### **⚠ CAUTION**

Be sure that the cam chain No.1 guide (1) is installed properly.



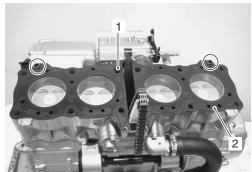
I717H1140083-01

## Cylinder Head

 Install the O-ring (1), dowel pins and cylinder head gasket (2).

## **⚠ CAUTION**

Replace the O-ring (1) and cylinder head gasket (2) with new ones.

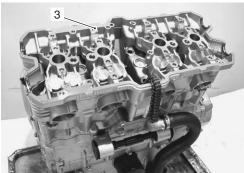


I717H1140084-01

• Place the cylinder head on the cylinder (3).

#### **NOTE**

When installing the cylinder head (3), keep the cam chain taut.



I717H1140085-01

- Apply engine oil to the bolt threads and both sides of washers.
- Tighten the cylinder head bolts (M10) to the specified two-step torque with a torque wrench sequentially and diagonally.

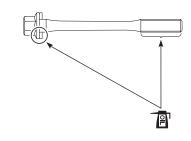
#### **Tightening torque**

Cylinder head bolt (M10) (Initial): 25 N·m (2.5 kgfm, 18.0 lbf-ft)

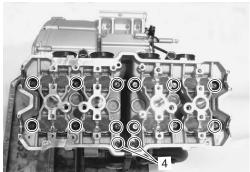
Cylinder head bolt (M10) (Final): 42 N·m (4.2 kgfm, 30.5 lbf-ft)

- After firmly tightening the cylinder head bolts (M10), install the cylinder head bolts (M6) (4).
- Tighten the cylinder head bolts (4) to the specified torque.

Tightening torque Cylinder head bolt (M6): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I717H1140086-01



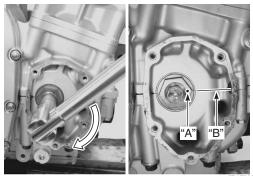
I717H1140087-01

#### Camshaft

 Turn the crankshaft clockwise and align the match mark "A" on the crankshaft with the mating surfaces "B" of crankcases.

#### **⚠ CAUTION**

- Pull the cam chain upward, or the chain will be caught between crankcase and cam drive sprocket.
- To adjust the camshaft timing correctly, be sure to align the match mark "A" with the mating surfaces "B" and hold this position when installing the camshafts.



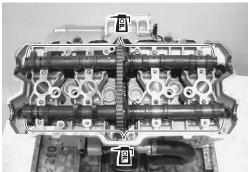
I717H1140088-01

## 1D-30 Engine Mechanical:

- Before replacing the camshafts on cylinder head, apply engine oil to their journals and cam faces.
- · Apply engine oil to the camshaft journal holders.

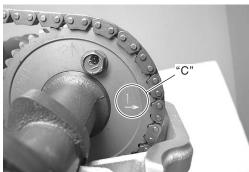
#### **NOTE**

- Before installing the camshaft, check that the tappets are installed correctly.
- The camshafts are identified by the embossed letters.



I717H1140089-01

- · Pull the cam chain lightly.
- The exhaust camshaft sprocket has an arrow marked "1" "C". Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.

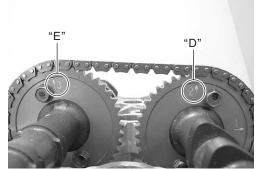


I717H1140213-01

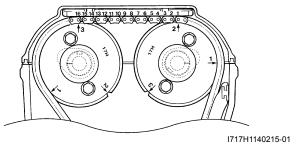
 The other arrow marked "2" "D" should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked "2" "D", count out 16 roller pins (from the exhaust camshaft side going towards the intake camshaft side). • Engage the 16th roller pin "E" on the cam chain with the marked "3" on the intake sprocket.

#### NOTE

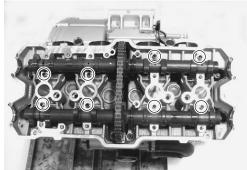
The cam chain should now be on all three sprockets. Be careful not to move the crankshaft until the camshaft journal holders and cam chain tension adjuster are secured.



I717H1140214-01



Install the dowel pins.



I717H1140090-01

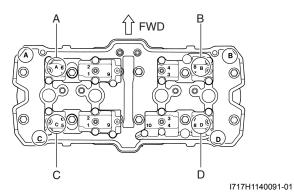
· Install the camshaft journal holders.

#### **⚠ CAUTION**

Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.

#### **NOTE**

Each camshaft journal holder is identified with an embossed letter.



 Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts lightly, in the ascending order of numbers.

#### **A** CAUTION

The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts.

Take special care not to use other types of bolts.

#### NOTE

The ascending order of numbers are indicated on the camshaft journal holders.

• Tighten the camshaft journal holder bolts in the ascending order of numbers to the specified torque.

# Tightening torque Camshaft journal holder bolt: 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)

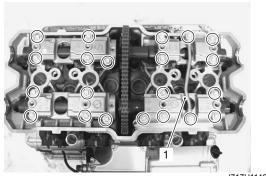
 Install the oil pipe (1) and tighten the mounting bolts to specified torque.

## NOTE

Fit the washer to each oil pipe mounting bolt.

## **Tightening torque**

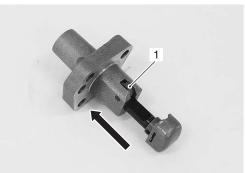
Oil pipe mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I717H1140092-01

## **Cam Chain Tension Adjuster**

• Retract the push rod by pushing the stopper (1).



I718H1140070-03

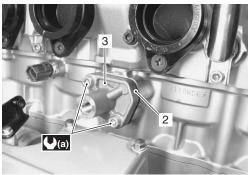
Install a new gasket (2).

#### **⚠** CAUTION

Use a new gasket to prevent oil leakage.

 Install the cam chain tension adjuster (3) and tighten its mounting bolts.

## Tightening torque Cam chain tension adjuster mounting bolt (a): 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)



I717H1140093-01

- Install the spring (4).
- Install the gasket (5) and cam chain tension adjuster cap bolt (6).

#### NOTE

Click sound is heard when the cam chain tension adjuster cap bolt is installed.

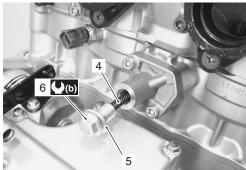
 Tighten the cam chain tension adjuster cap bolt (6) to the specified torque.

## **Tightening torque**

Cam chain tension adjuster cap bolt (b): 23 N·m ( 2.3 kgf-m, 16.5 lbf-ft)

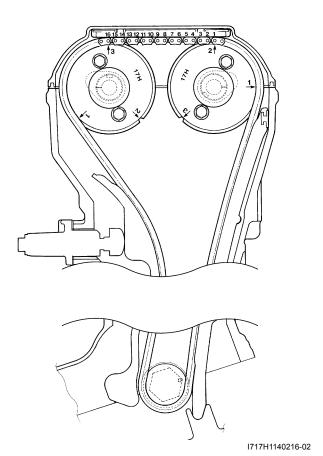
## **⚠ CAUTION**

After installing the cam chain tension adjuster, check to be sure that the adjuster works properly by checking the slack of cam chain.



I717H1140094-02

 After installing the cam chain tension adjuster, rotate the crankshaft (some turns), and recheck the positions of the camshafts.

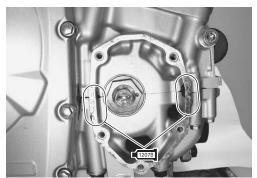


 Be sure to check and adjust the valve clearance.
 Refer to "Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-6)".

## **Right Crankshaft Cover**

 Apply SUZUKI BOND lightly to the mating surfaces at the parting line between the upper and lower crankcases as shown.

■1207日: Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

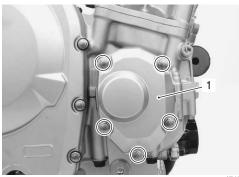


1717H1140095-01

• Install the gasket and right crankcase cover (1).

## **⚠ CAUTION**

Use a new gasket to prevent oil leakage.



I717H1140096-01

## **Spark Plug**

 Install the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)".

## **Cylinder Head Cover**

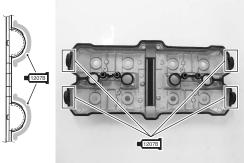
· Install a new gasket to the cylinder head cover.

#### **A** CAUTION

Use the new gasket to prevent oil leakage.

 Apply SUZUKI BOND to the cam end caps of the gasket as shown.

■1207目: Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)



I718H1140076-01

· Apply engine oil to both sides of the gaskets.

#### **⚠ CAUTION**

Use the gaskets with new ones to prevent oil leakage.

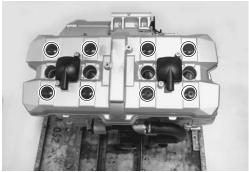


I717H1140097-01

• Tighten the cylinder head cover bolts to the specified torque.

## Tightening torque

Cylinder head cover bolt: 14 N·m (1.4 kgf-m, 10.0 lbf-ft)



I717H1140098-01

## **Valve Clearance Inspection and Adjustment**

B817H214060

Refer to "Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-6)".

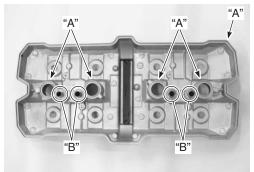
## **Cylinder Head Cover Inspection**

B817H21406019

Inspect the cylinder head cover in the following procedures:

- 1) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- Clean and check the gasket grooves "A" and PAIR reed valve gasket mating surfaces "B" of cylinder head cover.

If it is damaged, replace the cylinder head cover with a new one.



I717H1140099-01

3) Install the cylinder head cover. Refer to "Engine Top Side Assembly (Page 1D-26)".

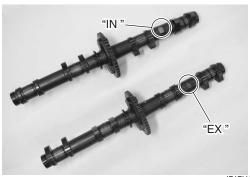
## **Camshaft Inspection**

B817H21406020

Refer to "Engine Top Side Disassembly (Page 1D-24)". Refer to "Engine Top Side Assembly (Page 1D-26)".

#### **Camshaft Identification**

The exhaust camshaft has the embossed letters "EX" and the intake camshaft has the embossed letters "IN".



I717H1140100-01

#### **Cam Wear**

Check the camshaft for wear or damage.

Measure the cam height "a" with a micrometer.

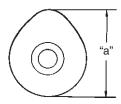
Replace a camshaft if the cams are worn to the service limit.

## Special tool

(1/100 mm, 25 – 50 mm))

#### Cam height "a"

Service limit: (IN) 35.35 mm (1.3917 in) Service limit: (EX) 35.07 mm (1.3807 in)



I649G1140199-02

#### **Camshaft Runout**

Measure the runout using the dial gauge. Replace the camshaft if the runout exceeds the limit.

#### Special tool

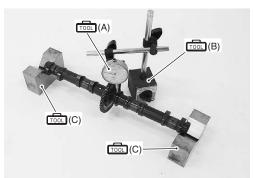
ான் (A): 09900-20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900-20701 (Magnetic stand)
(C): 09900-21304 (V-block (100 mm))

#### Camshaft runout (IN & EX)

Service limit: 0.10 mm (0.004 in)



I718H1140082-01

## **Camshaft Journal Wear**

Inspect the camshaft journal wear in the following procedures:

 Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place. 2) Use the plastigauge to read the clearance at the widest portion, which is specified as follows.

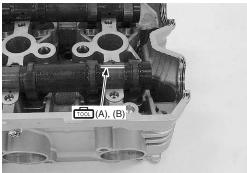
#### Special tool

(A): 09900-22301 (Plastigauge (0.025 -

0.076 mm))

(B): 09900-22302 (Plastigauge (0.051 -

0.152 mm))



I718H1140083-04

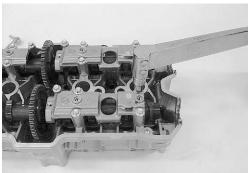
- 3) Install each camshaft journal holder to its original position. Refer to "Engine Top Side Assembly (Page 1D-26)".
- Tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque. Refer to "Engine Top Side Assembly (Page 1D-26)".

#### NOTE

Do not rotate the camshafts with the plastigauge in place.

**Tightening torque** 

Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I718H1140084-01

- 5) Remove the camshaft journal holders and measure the width of the compressed plastigauge using the envelope scale.
- 6) This measurement should be taken at the widest part of the compressed plastigauge.

Camshaft journal oil clearance (IN & EX)
Service limit: 0.150 mm (0.0059 in)



I718H1140085-01

7) If the camshaft journal oil clearance exceeds the limit, measure the inside diameter of the camshaft journal holder and the outside diameter of the camshaft journal. Replace the camshaft or the cylinder head depending upon which one exceeds the specification.

## Special tool

(C): 09900–20602 (Dial gauge (1/1000 mm, 1

mm))

(D): 09900-22403 (Small bore gauge (18 -

35 mm))

Camshaft journal holder I.D. (IN & EX)
Standard: 24.012 – 24.025 mm (0.9454 – 0.9459

in)

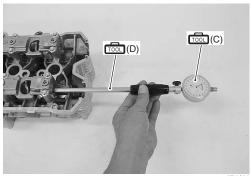
Special tool

(E): 09900-20205 (Micrometer (0 - 25 mm))

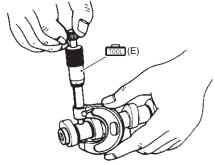
Camshaft journal O.D. (IN & EX)

Standard: 23.959 - 23.980 mm (0.9433 - 0.9441

in)



I718H1140086-01



I649G1140204-03

## **Camshaft Sprocket Inspection**

B817H21406021

Inspect the camshaft sprocket in the following procedures:

- 1) Remove the intake and exhaust camshafts. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 2) Inspect the teeth of each camshaft sprocket for wear or damage.

If they are worn or damaged, replace the sprockets and cam chain as a set.



I717H1140101-02

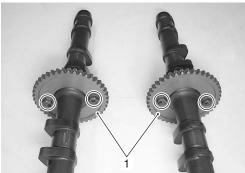
3) Install the camshafts. Refer to "Engine Top Side Assembly (Page 1D-26)".

# Camshaft Sprocket Removal and Installation B817H21406022

#### Removal

1) Remove the camshafts. Refer to "Engine Top Side Disassembly (Page 1D-24)".

2) Remove the camshaft sprockets (1).



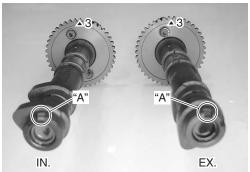
I717H1140102-02

#### Installation

1) Set the camshaft sprocket to the camshafts.

#### NOTE

Align the arrow mark "3" on camshaft sprocket with the notch "A" on the camshaft.



1717H1140217-01

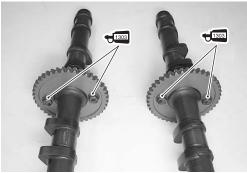
Apply THREAD LOCK SUPER to the threads of the camshaft sprocket bolts and then tighten them to the specified torque.

+3333 : Thread lock cement 99000−32030 (Thread Lock Cement Super 1303 or equivalent)

**Tightening torque** 

Camshaft sprocket bolt (Initial): 16 N·m (1.6 kgf-m, 11.5 lbf-ft)

Camshaft sprocket bolt (Final): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)



I717H1140103-02

3) Install the camshafts. Refer to "Engine Top Side Assembly (Page 1D-26)".

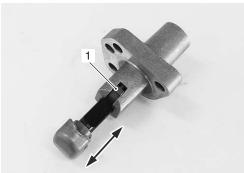
## **Cam Chain Tension Adjuster Inspection**

B817H21406023

The cam chain tension adjuster is maintained at the proper tension by an automatically adjusted.

1) Remove the cam chain tension adjuster. Refer to "Engine Top Side Disassembly (Page 1D-24)".

 Check that the push rod slides smoothly when releasing stopper (1). If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



I718H1140091-01

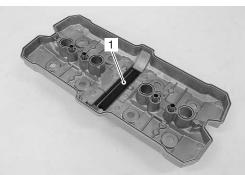
3) Install the cam chain tension adjuster. Refer to "Engine Top Side Assembly (Page 1D-26)".

## **Cam Chain Guide Removal and Installation**

B817H21406024

#### Removal

- 1) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 2) Remove the cam chain No.2 guide (1) from the cylinder head cover.



I718H1140092-01

- 3) Remove the cylinder head. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 4) Remove the cam chain No.1 guide (2).



I717H1140104-01

#### Installation

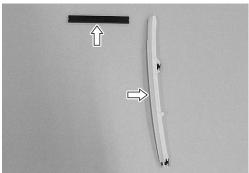
Install the cam chain guides in the reverse order of removal.

## **Cam Chain Guide Inspection**

B817H21406025

Inspect the cam chain guide in the following procedures:

- 1) Remove the cam chain No.1 and No.2 guides. Refer to "Cam Chain Guide Removal and Installation (Page 1D-37)".
- Check the contacting surface of the cam chain guide. If it is worn or damaged, replace it with a new one.



I718H1140095-01

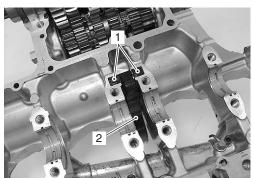
3) Install the cam chain No.1, No.2 guides. Refer to "Cam Chain Guide Removal and Installation (Page 1D-37)".

#### **Cam Chain Tensioner Inspection**

B817H21406026

Inspect the cam chain tensioner in the following procedures:

- 1) Separate the crankcases, upper and lower. Refer to "Engine Bottom Side Disassembly (Page 1D-51)".
- Remove the crankshaft assembly from the upper crankcase. Refer to "Engine Bottom Side Disassembly (Page 1D-51)".
- 3) Remove the dampers (1) of the cam chain tensioner and cam chain tensioner (2).



I718H1140096-01

4) Check the contacting surface of the cam chain tensioner. If it is worn or damaged, replace it with a new one.



I718H1140097-01

- 5) Install the cam chain tensioner and its dampers.
- 6) Reinstall the crankshaft assembly. Refer to "Engine Bottom Side Assembly (Page 1D-58)".
- 7) Reassemble the crankcases, upper and lower. Refer to "Engine Bottom Side Assembly (Page 1D-58)".

## Cylinder Head Disassembly and Assembly

B817H21406027

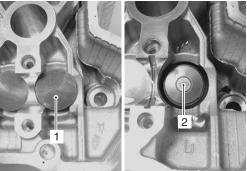
Refer to "Engine Top Side Disassembly (Page 1D-24)". Refer to "Engine Top Side Assembly (Page 1D-26)".

#### **⚠ CAUTION**

Identify the position of each removed part. Organize the parts in their respective groups (i.e., intake, exhaust, No.1 or No.2) so that they can be installed in their original locations.

### Disassembly

1) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



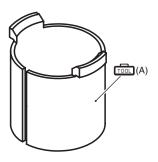
I717H1140105-02

2) When compressing the valve spring use a sleeve protector.

Cut the sleeve protector as shown in the illustration.

#### Special tool

(A): 09919-28610 (Sleeve protector)



I717H1140218-02

- 3) Install the sleeve protector between the valve spring and cylinder head.
- 4) Using the special tools, compress the valve spring and remove the two cotter halves (3) from the valve stem.

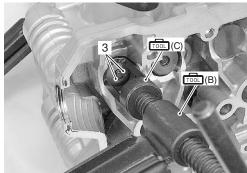
#### Special tool

(B): 09916-14510 (Valve lifter)

(C): 09916-14521 (Valve spring compressor

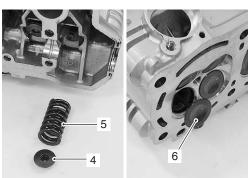
attachment)

ான்: 09916-84511 (Tweezers)



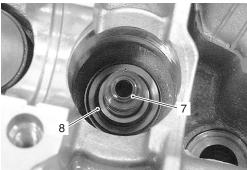
1717H1140219-01

- 5) Remove the valve spring retainer (4) and valve spring (5).
- 6) Pull out the valve (6) from the combustion chamber side.



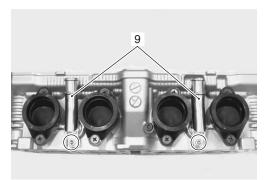
I718H1140101-01

## 7) Remove the oil seal (7) and spring seat (8).



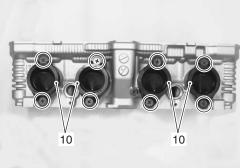
I718H1140102-01

- 8) Remove the other valves in the same manner as described previously.
- 9) Remove the water outlet pipes (9).



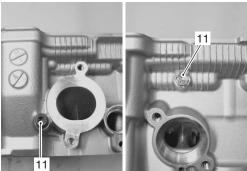
I717H1140106-01

## 10) Remove the intake pipes (10).



I717H1140107-01

## 11) Remove the oil gallery plugs (cylinder head) (11).



I717H1140108-01

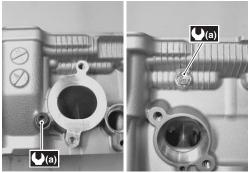
## Assembly

Assembly is in the reverse order of disassembly. Pay attention to the following points:

• Tighten the oil gallery plugs (cylinder head) to the specified torque.

## **⚠ CAUTION**

## Replace the gasket with new ones.



I717H1140109-02

# Tightening torque Oil gallery plug (cylinder head) (a): 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)

· Apply grease to O-ring of the intake pipe.

## **⚠ CAUTION**

Replace the O-rings with new ones.

# f(M): Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I718H1140109-01

## **NOTE**

- When replacing the intake pipes, identify the different intake pipes according to each I.D. code "A".
   (1-17H0 for cylinder #1)
   (2-17H0 for cylinder #2 and #3)
   (4-17H0 for cylinder #4)
- Make sure that the "1 UP" mark faces up. (for cylinder #1)
- Make sure that the "4 UP" mark faces up. (for cylinder #4)



I717H1140110-01

· Apply engine coolant to O-rings of water outlet pipe.

#### **⚠ CAUTION**

Replace the O-rings with new ones.

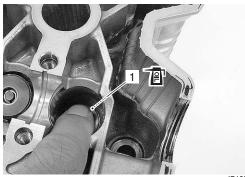


I718H1140114-01

- · Install the valve spring seat.
- Apply engine oil to the oil seal (1), and press-fit it into position.

## **A** CAUTION

Do not reuse the removed oil seal.



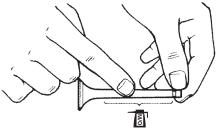
I718H1140113-03

 Insert the valve, with its stem coated with MOLYBDENUM OIL SOLUTION all around and along the full stem length without any break.

#### **⚠ CAUTION**

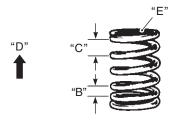
When inserting the valve, take care not to damage the lip of the oil seal.

# M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I705H1140165-01

 Install the valve spring with the small-pitch portion "B" facing cylinder head.



I718H1140004-01

"B":	Small-pitch portion	"D": UPWARD	
"C":	Large-pitch portion	"E": Paint	

 Put on the valve spring retainer (2), and using the special tools, press down the spring, fit the cotter halves to the stem end, and release the lifter to allow the cotter halves to wedge in between retainer and stem.

### **A CAUTION**

- Be sure to restore each spring and valve to their original positions.
- Be careful not to damage the valve and valve stem when handling it.

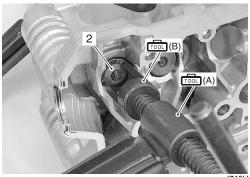
## Special tool

(A): 09916-14510 (Valve lifter)

(B): 09916-14521 (Valve spring compressor

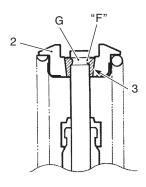
attachment)

1001: 09916-84511 (Tweezers)



I718H1140116-02

• Be sure that the rounded lip "F" of the cotter fits snugly into the groove "G" in the stem end.



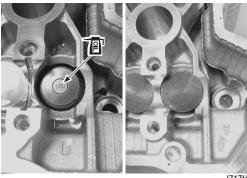
I718H1140117-02

2.	Valve spring retainer	3. Cotter

- Install the other valves and springs in the same manner as described previously.
- Install the tappet shims and the tappets to their original positions.

### NOTE

- Apply engine oil to the stem end, shim and tappet before fitting them.
- When seating the tappet shim, be sure the figure printed surface faces the tappet.



I717H1140111-01

# **Cylinder Head Related Parts Inspection**

B817H21406028

Refer to "Cylinder Head Disassembly and Assembly (Page 1D-38)".

# **Cylinder Head Distortion**

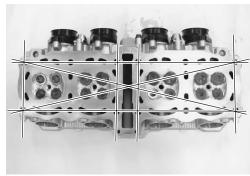
- 1) Decarbonize the combustion chambers.
- Check the gasket surface of the cylinder head for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If readings exceed the service limit, replace the cylinder head.

# Special tool

ன்: 09900-20803 (Thickness gauge)

## Cylinder head distortion

Service limit: 0.20 mm (0.008 in)



I717H1140112-01

### **Valve Stem Runout**

Support the valve using V-blocks, as shown, and check its runout using the dial gauge. If the runout exceeds the service limit, replace the valve.

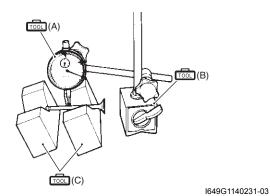
## Special tool

(A): 09900-20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))

Valve stem runout (IN. & EX.)
Service limit: 0.05 mm (0.002 in)



#### Valve Head Radial Runout

Place the dial gauge at a right angle to the valve head face and measure the valve head radial runout. If it measures more than the service limit, replace the valve.

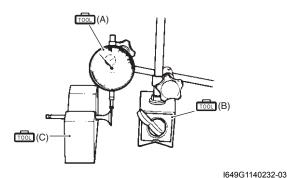
#### Special tool

(A): 09900-20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900-20701 (Magnetic stand)
(C): 09900-21304 (V-block (100 mm))

Valve head radial runout (IN. & EX.)
Service limit: 0.03 mm (0.001 in)



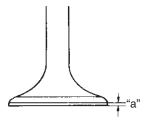
Valve Face Wear

Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve head "a". If it is out of specification replace the valve with a new one.

Special tool

(1/20 mm, 200 mm))

Valve head thickness "a" (IN. & EX.) Service limit: 0.5 mm (0.02 in)



I649G1140233-02

## **Valve Stem Deflection**

Lift the valve about 10 mm (0.39 in) "a" from the valve seat. Measure the valve stem deflection in two directions, "X" and "Y", perpendicular to each other. Position the dial gauge as shown. If the deflection exceeds the service limit, then determine whether the valve or the guide should be replaced with a new one.

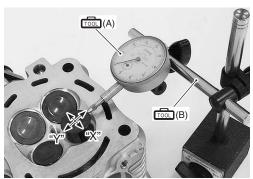
Special tool

(A): 09900-20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900-20701 (Magnetic stand)

Valve stem deflection (IN. & EX.) Service limit: 0.35 mm (0.014 in)



I718H1140121-01

### Valve Stem Wear

Measure the valve stem O.D. using the micrometer. If it is out of specification, replace the valve with a new one. If the valve stem O.D. is within specification but the valve stem deflection is not, replace the valve guide. After replacing the valve or valve guide, recheck the deflection.

## Special tool

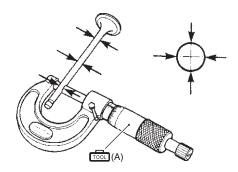
(A): 09900-20205 (Micrometer (0 - 25 mm))

#### Valve stem O.D.

Standard (IN.): 4.475 – 4.490 mm (0.1762 – 0.1768 in) Standard (EX.): 4.455 – 4.470 mm (0.1754 – 0.1760 in)

## NOTE

If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide replacement. Refer to "Valve Guide Replacement (Page 1D-44)".



I718H1140122-01

#### Valve Spring

The force of the coil spring keeps the valve seat tight. A weakened spring results in reduced engine power output and often accounts for the chattering noise coming from the valve mechanism.

Check the valve springs for proper strength by measuring their free length and also by the force required to compress them. If the spring length is less than the service limit or if the force required to compress the spring does not fall within the specified range, replace spring as a set.

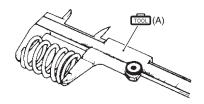
## Special tool

(A): 09900-20102 (Vernier calipers (1/20 mm, 200 mm))

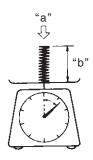
Valve spring free length (IN. & EX.) Service limit: 40.4 mm (1.59 in)

Valve spring tension (IN. & EX.)

Standard: 182 – 210 N (18.2 – 21.0 kgf, 40.1 – 46.3 lb-ft)/36.0 mm (1.42 in)



1649G1140237-03



I649G1140238-03

Tension "a"	Length "b"
182 – 210 N	36.0 mm
(18.2 – 21.0 kgf, 40.1 – 46.3 lbs)	(1.42 in)

#### Valve Seat Width

- 1) Visually check for valve seat width on each valve face. If the valve face has worn abnormally, replace the valve.
- 2) Coat the valve seat with a red lead (Prussian Blue) and set the valve in place.
- 3) Rotate the valve with light pressure.

#### Special tool

(A): 09916-10911 (Valve lapper set)

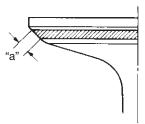


I718H1140123-01

4) Check that the transferred red lead (blue) on the valve face is uniform all around and in center of the valve face.

If the seat width "a" measured exceeds the standard value, or seat width is not uniform reface the seat using the seat cutter. Refer to "Valve Seat Repair (Page 1D-45)".

Valve seat width "a" (IN. & EX.)
Standard: 0.9 – 1.1 mm (0.035 – 0.043 in)



I649G1140246-02

## Valve Seat Sealing Condition

- 1) Clean and assemble the cylinder head and valve components.
- 2) Fill the intake and exhaust ports with gasoline to check for leaks. If any leaks occur, inspect the valve seat and face for burrs or other things that could prevent the valve from sealing. Refer to "Valve Seat Repair (Page 1D-45)".

## **▲ WARNING**

Always use extreme caution when handling gasoline.



I718H1140124-01

### **NOTE**

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. Refer to "Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-6)".

## **Valve Guide Replacement**

B817H21406029

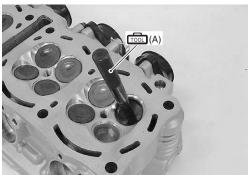
- 1) Remove the cylinder head. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 2) Remove the valves. Refer to "Cylinder Head Disassembly and Assembly (Page 1D-38)".
- 3) Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

### Special tool

் (A): 09916–43211 (Valve guide remover/installer)

#### **NOTE**

- Discard the removed valve guide sub assemblies.
- Only oversized valve guides are available as replacement parts. (Part No. 11115-17E70)



I718H1140125-01

4) Refinish the valve guide holes in the cylinder head using the reamer and handle.

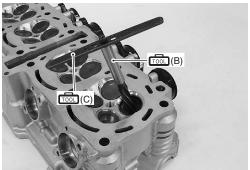
#### **⚠ CAUTION**

When refinishing or removing the reamer from the valve guide hole, always turn it clockwise.

#### Special tool

(B): 09916–34580 (Valve guide reamer (10.8 mm))

(C): 09916-34542 (Reamer handle)



I718H1140126-01

5) Cool down the new valve guides in a freezer for about one hour and heat the cylinder head to 100 – 150 °C (212 – 302 °F) with a hot plate.

## **⚠ CAUTION**

Do not use a burner to heat the valve guide hole to prevent cylinder head distortion.

- 6) Apply engine oil to each valve guide and valve guide
- 7) Drive the guide into the guide hole using the valve guide installer.

## **⚠ CAUTION**

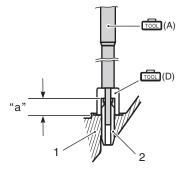
Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

## Special tool

(A): 09916-43211 (Valve guide remover/

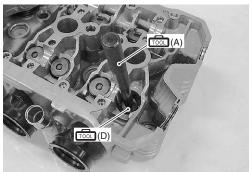
installer)

(D): 09916-43220 (Attachment)



I717H1140113-01

Cylinder head	"a": 15.0 mm (0.591 in)
<ol><li>Valve guide</li></ol>	



I718H1140128-01

8) After installing the valve guides, refinish their guiding bores using the reamer. Be sure to clean and oil the guides after reaming.

# Special tool

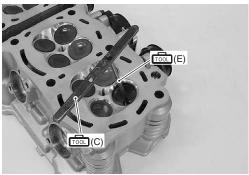
(C): 09916-34542 (Reamer handle)

(E): 09916-33210 (Valve guide reamer (4.5

mm))

### NOTE

- Be sure to cool down the cylinder head to ambient air temperature.
- Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.



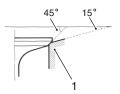
I718H1140129-0

- 9) Reassemble the cylinder head. Refer to "Cylinder Head Disassembly and Assembly (Page 1D-38)".
- 10) Install the cylinder head assembly. Refer to "Engine Top Side Assembly (Page 1D-26)".

# **Valve Seat Repair**

B817H21406030

The valve seats (1) for both the intake and exhaust valves are machined to two different angles. The seat contact surface is cut at 45°.



IN. & EX.

I717H1140222-01

	Intake	Exhaust
Seat angle	15°/45°	15°/45°
Seat width	0.9 – 1.1 mm (0.035 – 0.043 in)	<b>←</b>
Valve	23 mm	20 mm
diameter	(0.91 in)	(0.79 in)
Valve guide	4.500 – 4.512 mm	,
I.D.	(0.1772 – 0.1776 in)	<b>←</b>

### **⚠ CAUTION**

- The valve seat contact area must be inspected after each cut.
- Do not use lapping compound after the final cut is made. The finished valve seat should have a velvety smooth finish but not a highly polished or shiny finish. This will provide a soft surface for the final seating of the valve which will occur during the first few seconds of engine operation.

## **NOTE**

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. Refer to "Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-6)".

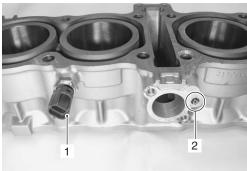
# Cylinder Disassembly and Assembly

B817H21406031

Refer to "Engine Top Side Disassembly (Page 1D-24)". Refer to "Engine Top Side Assembly (Page 1D-26)".

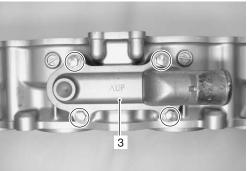
## Disassembly

1) Remove the ECT sensor (1) and oil jet (for cam chain tension adjuster) (2).



I717H1140114-01

2) Remove the water inlet connector (3).



I717H1140115-01

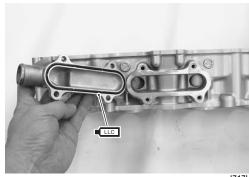
## **Assembly**

Assembly is in the reverse order of disassembly. Pay attention to the following points:

Apply engine coolant to O-ring of water inlet connector.

## **⚠ CAUTION**

Replace the O-ring with a new one.



I717H1140116-01

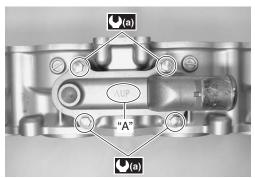
• Tighten the water inlet connector bolts to the specified torque.

## **⚠ CAUTION**

Make sure that the "up" mark "A" face up.

# **Tightening torque**

Water inlet connector bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I717H1140117-02

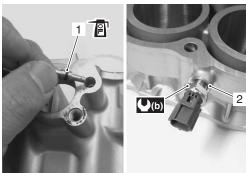
- Apply engine oil to O-ring and install the oil jet.
- Tighten the ECT sensor to the specified torque.

#### **↑** CAUTION

Replace the O-ring (1) and gasket (2) with new ones.

## **Tightening torque**

ECT sensor (b): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



I717H1140118-01

# **Cylinder Inspection**

B817H21406032

Refer to "Engine Top Side Disassembly (Page 1D-24)". Refer to "Engine Top Side Assembly (Page 1D-26)".

## **Cylinder Distortion**

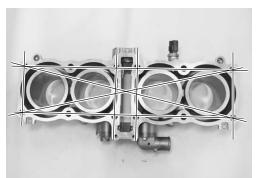
Check the gasket surface of the cylinder for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If any reading exceeds the service limit, replace the cylinder.

## Special tool

(Thickness gauge)

### Cylinder distortion

**Service limit: 0.20 mm (0.008 in)** 



I717H1140119-01

## **Cylinder Bore**

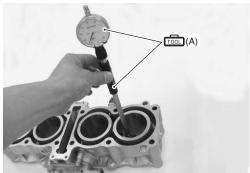
Measure the cylinder bore diameter at six places. If any one of the measurements exceed the limit, overhaul the cylinder and replace the piston with an oversize piston. The remaining cylinders must also be rebored accordingly; otherwise, the imbalance might cause excessive vibration.

# Special tool

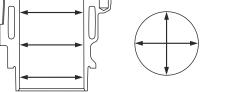
(A): 09900-20530 (Cylinder gauge set)

## Cylinder bore

Standard: 65.500 - 65.515 mm (2.5787 - 2.5793 in)



I717H1140120-01



#### I718H1140141-01

## **Piston-to-cylinder Clearance**

Refer to "Piston and Piston Ring Inspection (Page 1D-49)".

# **Piston Ring Removal and Installation**

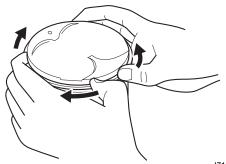
B817H21406033

#### Removal

- 1) Draw out the piston pin and remove the piston. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 2) Carefully spread the ring opening with your thumbs and then push up the opposite side of the 1st ring (2) to remove it.

## NOTE

Do not expand the piston ring excessively since it is apt to be broken down.



I718H1140142-01

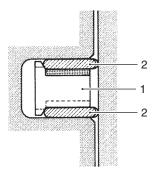
3) Remove the 2nd ring and oil ring in the same procedure.

### Installation

### **NOTE**

- When installing the piston ring, be careful not to damage the piston.
- Do not expand the piston ring excessively since it is apt to be broken down.
- 1) Install the piston rings in the order of the oil ring, second ring and top ring.
  - a) The first member to go into the of the oil ring groove is a spacer (1).

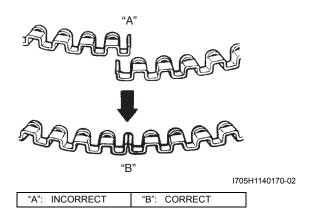
After placing the spacer, fit the two side rails (2).



I718H1140143-02

### **A CAUTION**

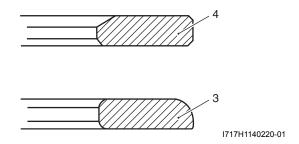
When installing the spacer, be careful so that the both edges are not overlapped.



b) Install the 2nd ring (3) and 1st ring (4) to piston.

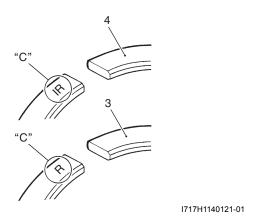
#### **NOTE**

1st ring (4) and 2nd ring (3) differ in shape.

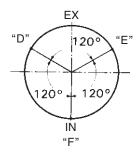


#### NOTE

Face the side with the stamped mark "C" upward when assembling.



2) Position the gaps of the three rings and side rails as shown. Before inserting piston into the cylinder, check that the gaps are so located.



I718H1140146-02

"D":	2nd ring and lower side rail
"E":	Upper side rail
"F":	1st ring and spacer

3) Install the piston and piston pin. Refer to "Engine Top Side Assembly (Page 1D-26)".

# **Piston and Piston Ring Inspection**

B817H21406034

Refer to "Piston Ring Removal and Installation (Page 1D-48)".

#### **Piston Diameter**

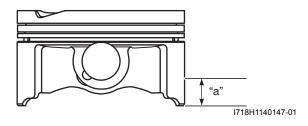
Measure the piston diameter using the micrometer at 15 mm (0.6 in) "a" from the skirt end. If the piston diameter is less than the service limit, replace the piston.

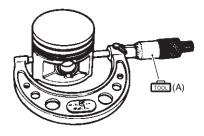
#### Special tool

(A): 09900–20203 (Micrometer (1/100 mm, 50 – 75 mm))

## Piston diameter

Service limit: 65.380 mm (2.5740 in)





I649G1140262-03

## Piston-to-cylinder Clearance

Subtract the piston diameter from the cylinder bore diameter. If the piston-to-cylinder clearance exceeds the service limit, replace both the cylinder and the piston.

#### Piston-to-cylinder clearance

Service limit: 0.120 mm (0.0047 in)

## **Piston Ring-to-groove Clearance**

Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge. If any of the clearances exceed the limit, replace both the piston and piston rings.

#### Special tool

(A): 09900–20803 (Thickness gauge)
(B): 09900–20205 (Micrometer (0 – 25 mm))

## Piston ring-to-groove clearance

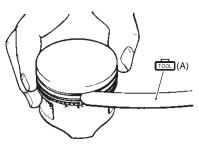
Service limit: (1st): 0.180 mm (0.0071 in) Service limit: (2nd): 0.150 mm (0.0059 in)

## Piston ring groove width

Standard: (1st): 1.01 – 1.03 mm (0.040 – 0.041 in) Standard: (2nd): 0.81 – 0.83 mm (0.032 – 0.033 in) Standard: (Oil): 1.51 – 1.53 mm (0.059 – 0.060 in)

## Piston ring thickness

Standard: (1st): 0.97 - 0.99 mm (0.038 - 0.039 in) Standard: (2nd): 0.77 - 0.79 mm (0.030 - 0.031 in)



I649G1140263-03



I649G1140264-03

# Piston Ring Free End Gap and Piston Ring End Gap

Measure the piston ring free end gap using vernier calipers. Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge. If any of the measurements exceed the service limit, replace the piston ring with a new one.

## Special tool

(A): 09900-20102 (Vernier calipers (1/20 mm, 200 mm))

## Piston ring free end gap

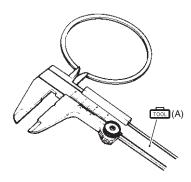
Service limit: (1st): 7.2 mm (0.28 in) Service limit: (2nd): 7.2 mm (0.28 in)

## Special tool

(B): 09900-20803 (Thickness gauge)

## Piston ring end gap

Service limit: (1st): 0.50 mm (0.020 in) Service limit: (2nd): 0.50 mm (0.020 in)



1649G1140265-03



I717H1140122-01

### **Piston Pin and Pin Bore**

Measure the piston pin bore inside diameter using the small bore gauge. If either is out of specification or the difference between these measurement is more than the limits, replace the piston.

## Special tool

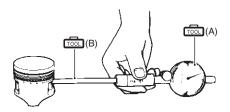
(A): 09900-20602 (Dial gauge (1/1000 mm, 1

(B): 09900-22401 (Small bore gauge (10 - 18

mm))

# Piston pin bore I.D.

Service limit: 14.030 mm (0.5524 in)



I649G1140267-03

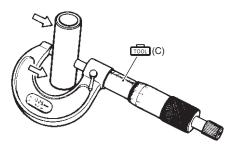
Measure the piston pin outside diameter at three positions using the micrometer. If any of the measurements are out of specification, replace the piston pin.

## Special tool

(C): 09900-20205 (Micrometer (0 - 25 mm))

### Piston pin O.D.

Service limit: 13.980 mm (0.5504 in)



I649G1140268-03

# **Engine Bottom Side Disassembly**

NOTE

B817H21406035

The crankcase must be separated to service the crankshaft and conrod.

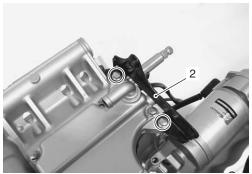
## **Engine Top Side**

- 1) Remove the engine assembly. Refer to "Engine Assembly Removal (Page 1D-18)".
- 2) Disassemble the engine top side (1). Refer to "Engine Top Side Disassembly (Page 1D-24)".



I717H1140123-01

3) Remove the regulator/rectifier bracket (2).



1717H1140124-01

# Starter Motor

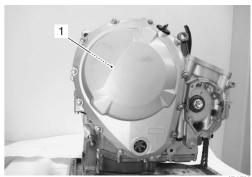
Remove the starter motor (1).



I717H1140125-01

## Clutch

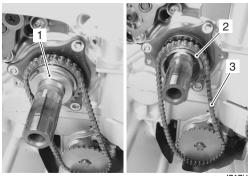
1) Remove the clutch component parts (1). Refer to "Clutch Removal in Section 5C (Page 5C-12)".



I717H1140126-01

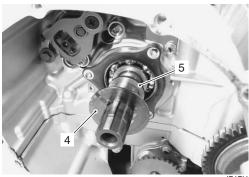
# Oil Pump

- 1) Remove the spacer (1).
- 2) Remove the oil pump drive sprocket (2) and chain (3).



I717H1140127-03

3) Remove the thrust washer (4) and washer (5).



I717H1140128-01

4) Remove the snap ring (6).

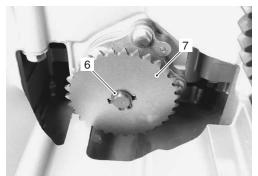
#### **NOTE**

Do not drop the snap ring (6) into the crankcase.

## Special tool

**6.5** : 09900-06107 (Snap ring pliers)

5) Remove the oil pump driven gear (7).



I717H1140129-01

6) Remove the pin (8) and washer (9).

### **NOTE**

Do not drop the pin (8) and washer (9) into the crankcase.

7) Remove the oil pump (10).



I717H1140130-01

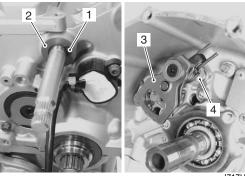
# **Gearshift System**

1) Remove the snap ring (1) and washer (2) from the gearshift shaft.

## Special tool

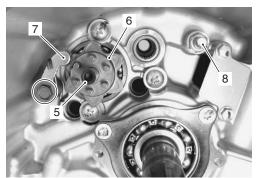
ண்: 09900-06107 (Snap ring pliers)

2) Remove the gearshift shaft assembly (3) and washer (4).



I717H1140131-01

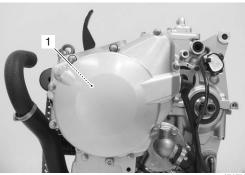
- 3) Remove the gearshift cam plate bolt (5) and gearshift cam plate (6).
- 4) Remove the gearshift cam stopper (7) and gearshift arm stopper (8).



I717H1140132-01

## Generator

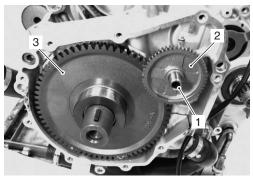
Remove the generator component parts (1). Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".



I717H1140133-02

## Starter

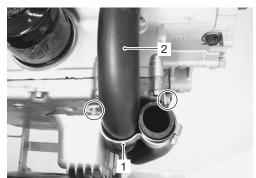
Remove the idle gear shaft (1), idle gear (2) and starter driven gear (3). Refer to "Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".



I717H1140134-01

### **Water Hose**

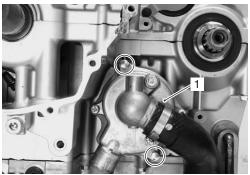
Remove the hose clamp plate (1) and water hose (2).



I717H1140135-02

# **Water Pump**

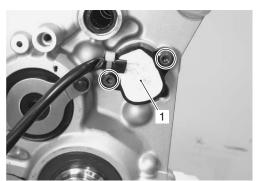
Remove the water pump (1).



I717H1140136-02

## **Gear Position Switch**

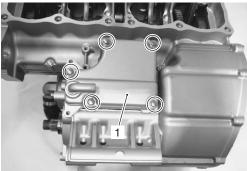
Remove the gear position switch (1).



I717H1140137-01

## **Crankcase Breather Cover**

Remove the crankcase breather cover (1).



I717H1140138-01

# **Oil Pressure Switch**

1) Remove the oil pressure switch (1).



I717H1140139-01

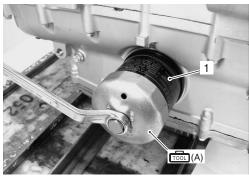
# 1D-54 Engine Mechanical:

## Oil Filter

Remove the oil filter (1) with the special tool.

# Special tool

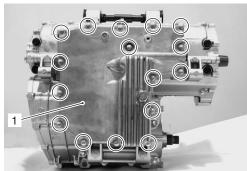
(A): 09915-40610 (Oil filter wrench)



I717H1140140-01

# Oil Pan

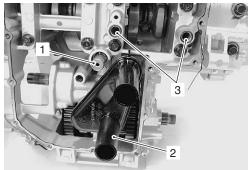
Remove the oil pan (1).



I717H1140141-01

# Oil Pressure Regulator / Oil Strainer

- 1) Remove the oil pressure regulator (1).
- 2) Remove the oil strainer (2).
- 3) Remove the O-rings (3).



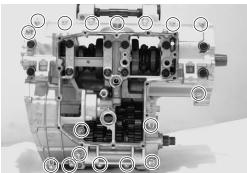
I717H1140142-01

## Crankcase

- 1) Remove the crankcase bolts (M6).
- 2) Remove the crankcase bolts (M8).

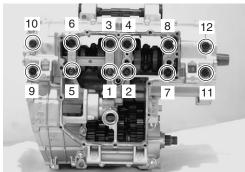


I717H1140143-01



I717H1140144-02

3) Loosen the crankcase bolts evenly by shifting the wrench in the descending order of numbers.



I717H1140145-02

4) Make sure that all of the bolts are removed. Then, tap the sides of the lower crankcase using a plastic hammer to separate the upper and lower crankcase halves and then lift the lower crankcase off of the upper crankcase.



I717H1140146-01

5) Remove the dowel pins and O-rings (1).



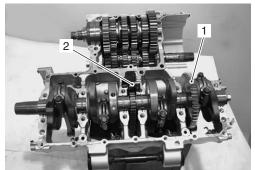
I717H1140147-01

### Crankshaft / Conrod / Cam Chain

- 1) Remove the crankshaft assembly (1) from the upper crankcase.
- 2) Remove the thrust bearings (2).

### **NOTE**

The crankshaft thrust bearings (2) are located between the crankshaft assembly and upper crankcase.

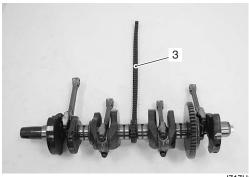


I717H1140148-01

3) Remove the cam chain (3) from the crankshaft.

#### NOTE

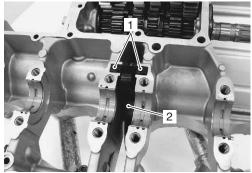
Remove the conrod if necessary. Refer to "Conrod Removal and Installation (Page 1D-67)".



I717H1140149-01

# **Cam Chain Tensioner**

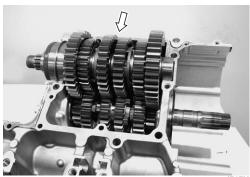
Remove the dampers (1) and cam chain tensioner (2).



I718H1140186-01

## Transmission / Gearshift

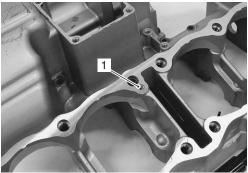
Remove the transmission component. Refer to "Transmission Removal in Section 5B (Page 5B-2)".



I717H1140150-01

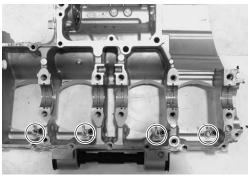
### Oil Jet

1) Remove the oil jet (1) (for engine top side) from the upper crankcase.



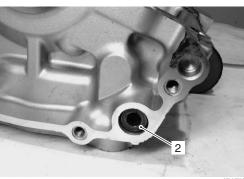
718H1140188-01

2) Remove the piston cooling oil jets from the upper crankcase.



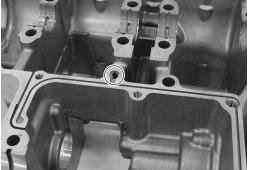
I717H1140151-01

3) Remove the oil gallery jet (2) from the upper crankcase.



I717H1140152-01

4) Remove the oil jet (for transmission) from the lower crankcase.



I718H1140191-01

# **Crankshaft Journal Bearing**

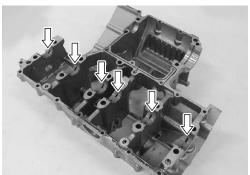
Remove the crankshaft journal bearings, upper and lower.

## **⚠ CAUTION**

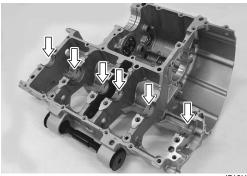
- When removing the crankshaft journal bearings, be careful not to scratch the crankcase and the crankshaft journal bearings.
- Do not touch the bearing surfaces with your hands. Grasp the bearings by their edges.

### **NOTE**

- Do not remove the crankshaft journal bearings unless absolutely necessary.
- Make a note of where the crankshaft journal bearings are removed from so that they can be reinstalled in their original positions.



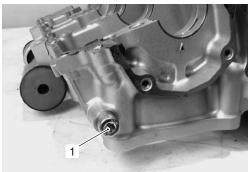
I718H1140192-01



I718H1140193-01

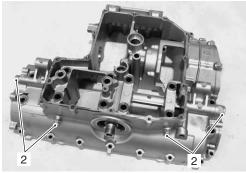
# **Oil Gallery Plug**

1) Remove the oil gallery plug (1) from the upper crankcase.



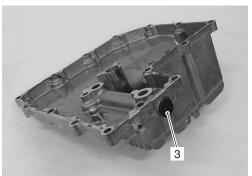
I717H1140153-01

2) Remove the oil gallery plugs (2) from the lower crankcase.



I717H1140154-01

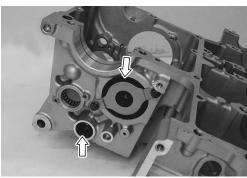
3) Remove the oil gallery plug (3) from the oil pan.



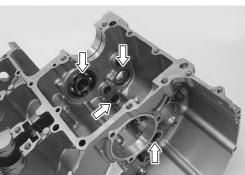
I718H1140196-01

# Oil seal /Bearing

Remove the oil seals and bearings if necessary. Refer to "Transmission Removal in Section 5B (Page 5B-2)".



I718H1140197-01



I718H1140198-01

# **Engine Mount Bushing**

Remove the engine mount bushings (1) if necessary.



I717H1140155-01

# **Engine Bottom Side Assembly**

B817H21406036

Assembly the engine bottom side in the reverse of disassembly. Pay attention to the following points:

## **NOTE**

Apply engine oil to each running and sliding part before reassembling.

## Oil Seal / Bearing

 Install the oil seals and bearings. Refer to "Transmission Installation in Section 5B (Page 5B-5)".

## Oil Gallery Plug

· Tighten each plug to the specified torque.

## **⚠ CAUTION**

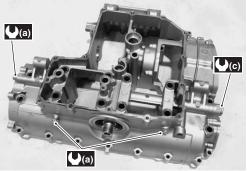
Use each new gasket.

**Tightening torque** 

Oil gallery plug (M6 and M8) (a): 10 N·m (1.0 kgfm, 7.0 lbf-ft)

Oil gallery plug (M12) (b): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)

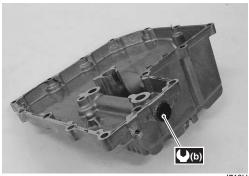
Oil gallery plug (M16) (c): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)



I717H1140156-01



I717H1140157-01



I718H1140202-01

# **Crankshaft Journal Bearing**

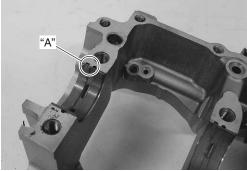
 When fitting the crankshaft journal bearings to the upper and lower crankcases, be sure to fix the stopper part "A" first and press the other end.

#### **⚠ CAUTION**

Do not touch the bearing surfaces with your hands. Grasp by the edge of the bearing shell.

### **NOTE**

Inspect and select the crankshaft journal bearing if necessary. Refer to "Crankshaft Journal Bearing Inspection and Selection (Page 1D-71)".



I718H1140203-01

#### Oil Jet

 Fit the new O-ring (1) to each piston cooling oil jet as shown and apply engine oil to them.

## **⚠ CAUTION**

Use the new O-ring to prevent oil pressure leak.

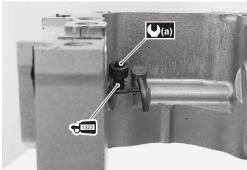


I718H1140204-01

 Apply a small quantity of THREAD LOCK to the bolts and tighten them to the specified torque.

+322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Piston cooling oil jet bolt (a): 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)



I718H1140205-02

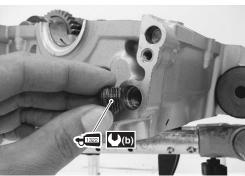
• Apply THREAD LOCK to the oil gallery jet and tighten it to the specified torque.

#### NOTE

After tightening the jet, make sure that the jet end is flush with the cover mating surface.

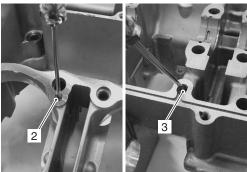
⊎322: Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Oil gallery jet (b): 22 N⋅m (2.2 kgf-m, 16.0 lbf-ft)



I718H1140206-02

• Install the oil jets, (2) and (3).



I718H1140207-02

2. Oil jet (#14)	3.	Oil jet (#18)
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### **Transmission / Gearshift**

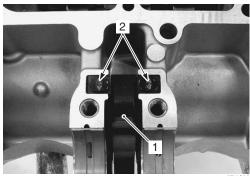
 Install the transmission and gearshift. Refer to "Transmission Installation in Section 5B (Page 5B-5)".

## **Cam Chain Tensioner**

Install the cam chain tensioner (1) and two dampers
 (2) properly.

## NOTE

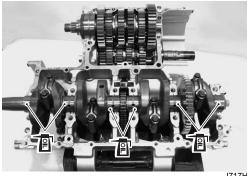
Be sure to face the arrow mark on the damper towards the front and rear, not towards the left and right.



I718H1140208-01

# 1D-60 Engine Mechanical:

- Before installing the crankshaft assembly, apply engine oil to each crankshaft journal bearing.
- Install the crankshaft assembly along with the cam chain into the upper crankcase.

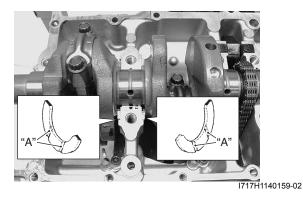


I717H1140158-01

 Insert the right and left-thrust bearings with the oil grooves "A" facing towards the crankshaft web.

### NOTE

- Right-thrust bearing has green painting.
- Inspect and select the crankshaft thrust clearance if necessary. Refer to "Crankshaft Thrust Clearance Inspection and Selection (Page 1D-73)".

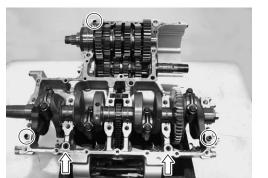


## Crankcase

 Install the dowel pins and O-rings in the upper crankcase.

## **⚠ CAUTION**

Replace the O-rings with new ones.



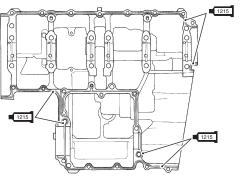
I717H1140160-01

 Apply SUZUKI BOND to the mating surface of the lower crankcase as follows.

#### **NOTE**

- Make surfaces free from moisture, oil, dust and other foreign materials.
- Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.
- Take extreme care not to apply any bond to the oil hole, oil groove and bearing.
- Apply to distorted surfaces as it forms a comparatively thick film.

•1215]: Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)



I718H1140213-01

 Tighten the crankshaft journal bolts (M9) in ascending order of numbers assigned to these bolts. Tighten each bolt a little at a time to equalize the pressure in the following two steps.

## **⚠ CAUTION**

Fit new gasket washers to the bolts ("9", "10", "11" and "12") to prevent oil leakage.

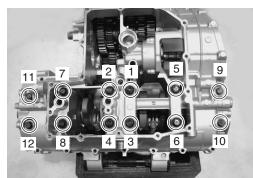
## **Tightening torque**

Crankcase journal bolt (M9) (Initial): 18 N·m (1.8

kgf-m, 13.0 lbf-ft)

Crankcase journal bolt (M9) (Final): 32 N·m (3.2

kgf-m, 23.0 lbf-ft)



I717H1140161-02

 Tighten the other crankcase bolts a little at a time to equalize the pressure.

## **⚠ CAUTION**

Fit new gasket washer to the bolt "A".

#### **NOTE**

Fit the clamp to the bolt "B".

**Tightening torque** 

Crankcase bolt (M6) (Initial): 6 N·m (0.6 kgf-m, 4.5

lbf-ft

Crankcase bolt (M6) (Final): 11 N·m (1.1 kgf-m,

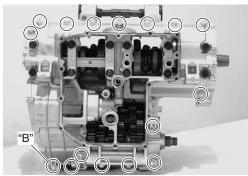
8.0 lbf-ft)

Crankcase bolt (M8) (Initial): 15 N·m (1.5 kgf-m,

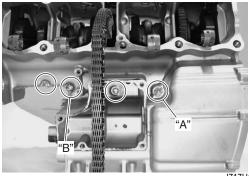
11.0 lbf-ft)

Crankcase bolt (M8) (Final): 26 N·m (2.6 kgf-m,

19.0 lbf-ft)



I717H1140164-03

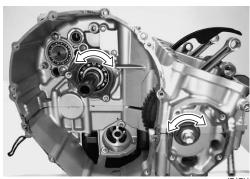


I717H1140165-01

- After the crankshaft journal bolts and crankcase bolts have been tightened, check that the crankshaft rotates smoothly.
- Also check that the driveshaft and countershaft rotate smoothly.



I717H1140162-01



I717H1140163-01

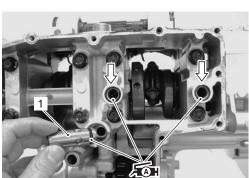
# Oil Pressure Regulator / Oil Strainer / Oil Pan

 Apply SUZUKI SUPER GREASE to the O-rings and press in the oil pressure regulator (1) to the lower crankcase.

## **⚠ CAUTION**

Replace the O-rings with new ones.

**和:** Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1140166-01

# 1D-62 Engine Mechanical:

 Apply SUZUKI SUPER GREASE to the O-ring and press in the oil strainer to the lower crankcase.

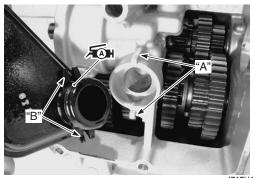
## **A** CAUTION

Replace the O-rings with new ones.

### NOTE

Align the boss "A" with the groove "B" of lower crankcase.

র्⊼्ञा: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1140167-01

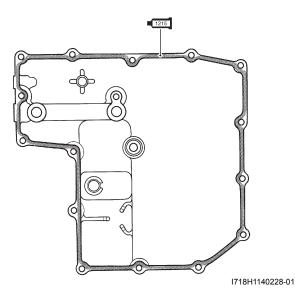
#### Oil Pan

Apply SUZUKI BOND to the mating surface of the oil pan.

### **NOTE**

- Make surfaces free from moisture, oil, dust and other foreign materials.
- Spread on surfaces thinly to from an even layer, and assemble the oil pan within few minutes.
- Apply to distorted surfaces as it forms a comparatively thick film.

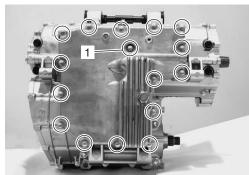
•1215]: Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)



Tighten the oil pan bolts.

## **⚠ CAUTION**

Fit a new gasket washer to the bolt (1).



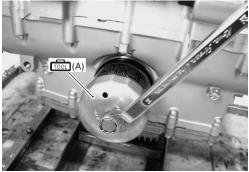
I717H1140168-01

## Oil Filter

 Install the oil filter with the special tool. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

## Special tool

(A): 09915-40610 (Oil filter wrench)



I717H1140169-01

### Oil Pressure Switch

 Apply SUZUKI BOND to the thread part of oil pressure switch and tighten oil pressure switch to the specified torque.

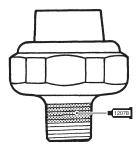
#### **NOTE**

Be careful not to apply SUZUKI BOND to the hole of thread end.

■1207目: Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

**Tightening torque** 

Oil pressure switch: 14 N·m (1.4 kgf-m, 10.0 lbf-ft)



I718H1140233-01

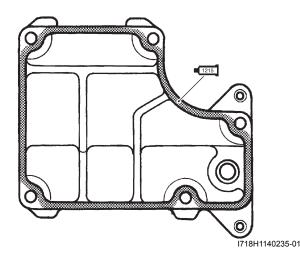
#### **Crankcase Breather Cover**

 Apply SUZUKI BOND to the mating surface of the breather cover.

### NOTE

- Make surfaces free from moisture, oil, dust and other foreign materials.
- Spread on surfaces thinly to form an even layer, and assemble the breather cover within few minutes.
- Apply to distorted surfaces as it forms a comparatively thick film.

•1215]: Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)



Tighten the breather cover bolts.



I717H1140170-01

· Apply SUZUKI SUPER GREASE to the O-ring.

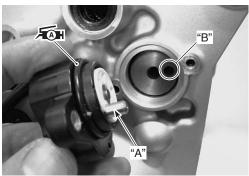
#### **⚠ CAUTION**

Replace the O-ring with a new one.

### NOTE

Align the gear position switch pin "A" with the gearshift cam hole "B".

和: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1140171-01

 Apply THREAD LOCK to the gear position switch bolts and tighten them to the specified torque.

+322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque Gear position switch mounting bolt (a): 6.5 N·m ( 0.65 kgf-m, 4.7 lbf-ft)



I717H1140172-01

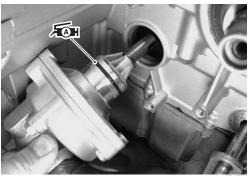
## **Water Pump**

· Apply SUZUKI SUPER GREASE to the O-ring.

#### **A CAUTION**

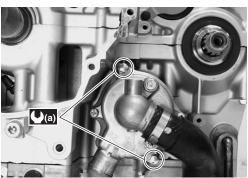
Replace the O-ring with a new one.

# 元函: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



1717H1140173-01

Tighten the water pump mounting bolts to the special torque.



I717H1140174-02

Tightening torque Water pump mounting bolt (a): 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)

### **Water Hose**

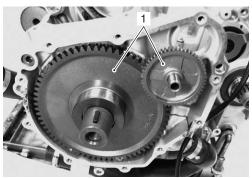
 Connect the water hose (1). Refer to "Water Hose Routing Diagram in Section 1F (Page 1F-3)".



I717H1140209-01

### Starter

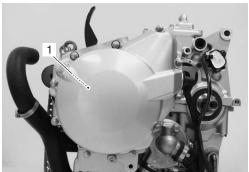
 Install the starter component parts (1). Refer to "Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".



I717H1140175-01

### Generator

 Install the generator component parts (1). Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".



I717H1140176-02

## Gearshift

Install the gearshift cam stopper (1), bolt (2), washer
 (3) and return spring (4).

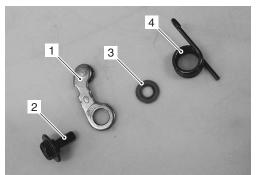
## **NOTE**

Hook the return spring end "A" to the stopper (1).

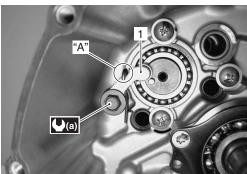
Tighten the gearshift cam stopper bolt to the special torque.

Tightening torque Gearshift cam stopper bolt (a): 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)

- · Check the gearshift cam stopper moves smoothly.
- · Locate the gearshift cam in the neutral position.



I718H1140244-01

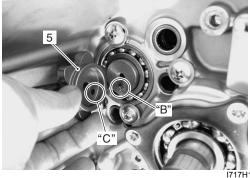


I717H1140177-02

• Install the gearshift cam stopper plate (5).

### NOTE

Align the gearshift cam pin "B" with the gearshift cam stopper plate hole "C".



I717H1140178-01

 Apply a small quantity of THREAD LOCK to the gearshift cam stopper plate bolt and tighten it to the specified torque.

€1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque Gearshift cam stopper plate bolt (b): 13 N⋅m (1.3 kgf-m, 9.5 lbf-ft)

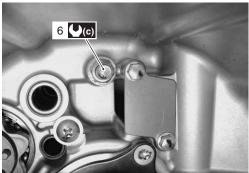


I717H1140179-02

 Apply a small quantity of THREAD LOCK to the gearshift arm stopper (6) and tighten it to the specified torque.

€1333 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque Gearshift arm stopper (c): 19 N·m (1.9 kgf-m, 13.5 lbf-ft)



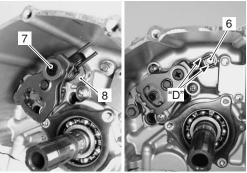
I717H1140180-01

# 1D-66 Engine Mechanical:

 Install the gearshift shaft assembly (7) and washer (8) as shown.

### **NOTE**

Pinch the gearshift arm stopper (6) with return spring ends "D".

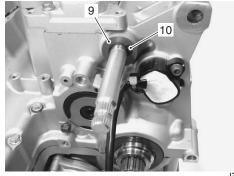


I717H1140181-02

• Install the washer (9) and snap ring (10).

## **⚠ CAUTION**

Never reuse a snap ring.



I717H1140182-01

### Oil Pump

 Install the O-ring to the oil pump and apply SUZUKI SUPER GREASE to it.

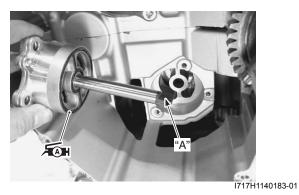
## **A** CAUTION

Replace the O-ring with a new one.

## **NOTE**

Set the oil pump shaft end "A" to the water pump shaft. Refer to "Water Pump Construction in Section 1F (Page 1F-12)".

和: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



- Install the oil pump with the oil pump mounting bolts and then tighten them.
- Install the washer (1) and pin (2).

### **NOTE**

Be careful not to drop the washer (1) and pin (2) into the crankcase.

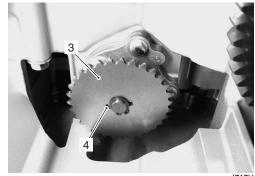


I717H1140184-01

- Install the oil pimp driven gear (3).
- Install the snap ring (4).

# **⚠ CAUTION**

Never reuse a snap ring.

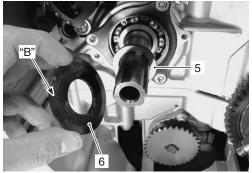


I717H1140185-01

 Install the washer (5) and thrust washer (6) onto the countershaft.

#### NOTE

The chamfer side "B" of thrust washer should face the crankcase side.



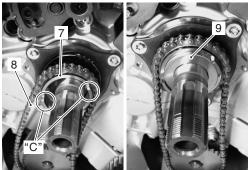
I717H1140186-01

Install the oil pump drive sprocket (7) to the countershaft.

## **NOTE**

Teeth "C" on the sprocket (7) must face the clutch side.

- Pass the chain (8) between the oil pump drive and driven sprockets.
- Install the spacer (9).



I717H1140187-01

#### Clutch

 Install the clutch component parts (1). Refer to "Clutch Installation in Section 5C (Page 5C-14)".



I717H1140188-01

### **Starter Motor**

 Install the starter motor (1). Refer to "Starter Motor Removal and Installation in Section 1I (Page 1I-4)".



I717H1140189-01

# **Engine Top Side**

 Assembly the engine top side. Refer to "Engine Top Side Assembly (Page 1D-26)".

## **Conrod Removal and Installation**

B817H21406037

#### Removal

- Remove the crankshaft assembly from the crankcase. Refer to "Engine Bottom Side Disassembly (Page 1D-51)".
- Loosen the conrod cap bolts by using a 10 mm, 12 point socket wrench, and tap the conrod cap bolts lightly with plastic hammer to remove the conrod cap.
- 3) Remove the conrods and mark them to identify their respective cylinders.



I717H1140190-01

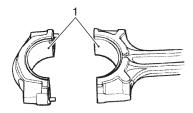
4) Remove the bearings (1).

#### **NOTE**

- Do not remove the bearings (1) unless absolutely necessary.
- Make a note of where the bearings are removed from so that they can be reinstalled in their original positions.

### **⚠ CAUTION**

When removing the bearings, be careful not to scratch the conrods and the bearings.



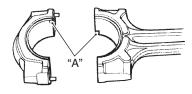
I718H1140269-01

### Installation

1) When installing the bearings into the conrod cap and conrod, be sure to install the tab "A" first, and then press in the opposite side of the bearing.

### **NOTE**

Inspect and select the conrod crank pin bearing if necessary. Refer to "Conrod Crank Pin Bearing Inspection and Selection (Page 1D-70)".



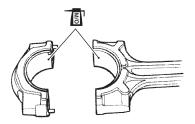
I717H1140221-02

2) Apply molybdenum oil solution to the crank pin and bearing surface.

#### **⚠ CAUTION**

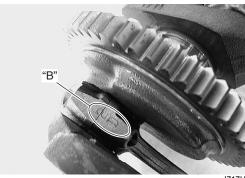
Be sure to clean the conrod big end.

M/O: Molybdenum oil (Molybdenum oil solution)



I718H1140273-01

3) When fitting the conrod cap, make sure that I.D. code "B" on each conrod faces intake side.



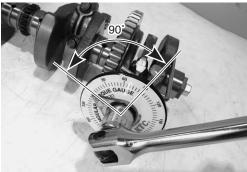
I717H1140191-01

- 4) Apply engine oil to the conrod cap bolts.
- 5) Tighten the conrod cap bolt by using a 10 mm, 12 point socket wrench in the following two steps.

Tightening torque Conrod cap bolt: 15 N·m (1.5 kgf-m, 11.0 lb-ft) then turn in 1/4 (90°) turn.



I717H1140192-01



I717H1140193-01

- 6) Check that the conrod moves smoothly.
- 7) Install the crankshaft assembly to the crankcase. Refer to "Engine Bottom Side Assembly (Page 1D-58)".

## **Conrod and Crankshaft Inspection**

B817H21406038

Refer to "Conrod Removal and Installation (Page 1D-67)".

#### Conrod Small End I.D.

Measure the conrod small end inside diameter using the small bore gauge.

If the conrod small end inside diameter exceeds the service limit, replace the conrod.

## Special tool

(A): 09900-20602 (Dial gauge (1/1000 mm, 1

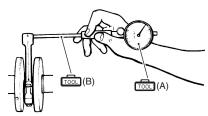
mm))

(B): 09900-22401 (Small bore gauge (10 - 18

mm))

## Conrod small end I.D.

Service limit: 14.040 mm (0.5528 in)



I718H1140280-01

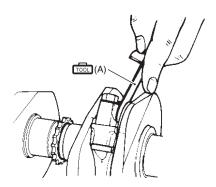
## **Conrod Big End Side Clearance**

1) Check the conrod big end side clearance using the thickness gauge.

### Special tool

(A): 09900-20803 (Thickness gauge)

Conrod big end side clearance Service limit: 0.3 mm (0.012 in)



I718H1140281-01

2) If the clearance exceeds the limit, remove the conrod and measure the conrod big end width and crank pin width. Refer to "Conrod Removal and Installation (Page 1D-67)". If any of the measurements are out of specification, replace the conrod or crankshaft.

## Special tool

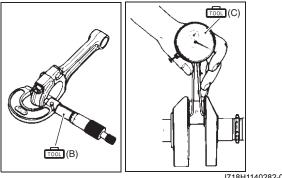
(B): 09900-20205 (Micrometer (0 - 25 mm)) ார் (C): 09900–20605 (Dial calipers (1/100 mm, 10 - 34 mm))

#### Conrod big end width

Standard: 20.95 - 21.00 mm (0.825 - 0.827 in)

# Crank pin width

Standard: 21.10 - 21.15 mm (0.831 - 0.833 in)



1718H1140282-01

#### Crankshaft Runout

Support the crankshaft using V-blocks as shown, with the two end journals resting on the blocks. Set up the dial gauge as shown, and rotate the crankshaft slowly to read the runout. Replace the crankshaft if the runout exceeds the service limit.

## Special tool

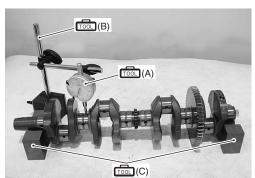
(A): 09900-20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900-20701 (Magnetic stand) ார் (C): 09900–21304 (V-block (100 mm))

### Crankshaft runout

Service limit: 0.05 mm (0.002 in)



I717H1140194-01

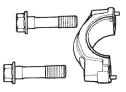
# **Conrod Crank Pin Bearing Inspection and Selection**

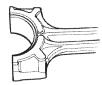
B817H21406039

Refer to "Conrod Removal and Installation (Page 1D-67)".

## Inspection

1) Inspect the bearing surfaces for any signs of fusion, pitting, burn or flaws. If any, replace them with a specified set of bearings.



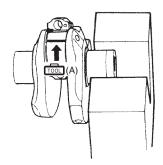


I718H1140285-01

2) Place the plastigauge axially along the crank pin, avoiding the oil hole, as shown.

## Special tool

(A): 09900-22301 (Plastigauge (0.025 - 0.076 mm))



I718H1140286-01

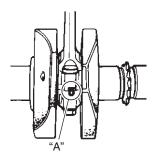
3) Tighten the conrod cap bolts to the specified torque, in two stages.

### **NOTE**

- When installing the conrod cap to the crank pin, make sure that I.D code "A" on the conrod faces towards the intake side.
- Never rotate the crankshaft or conrod when a piece of plastigauge is installed.

## **Tightening torque**

Conrod cap bolt: 15 N·m (1.5 kgf-m, 11.0 lb-ft) then turn in 1/4 (90°) turn.



I718H1140287-01

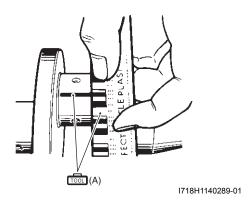
4) Remove the conrod caps and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge. If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

### Conrod big end oil clearance

Standard: 0.032 - 0.056 mm (0.0013 - 0.0022 in)

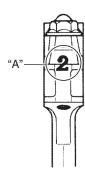
## Conrod big end oil clearance

Service limit: 0.080 mm (0.0031 in)



### Selection

1) Check the corresponding conrod I.D. code numbers ([1] or [2]) "A".

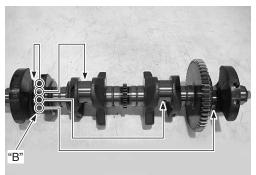


I718H1140290-01

#### Conrod I.D. specification

Code "A"	I.D. specification
1	37.000 – 37.008 mm (1.4567 – 1.4570 in)
2	37.008 – 37.016 mm (1.4570 – 1.4574 in)

2) Check the corresponding crank pin O.D. code numbers ([1], [2] or [3]) "B".



I717H1140195-01

3) Measure the conrod crank pin O.D. with the special tool. If any of the measurements are out of specification, replace the crankshaft.

# Crank pin O.D. specification

Code "B"	O.D. specification
4	33.992 – 34.000 mm
•	(1.3383 – 1.3386 in)
2	33.984 – 33.992 mm
	(1.3380 – 1.3383 in)
3	33.976 – 33.984 mm
	(1.3376 – 1.3380 in)

## Special tool

(A): 09900–20202 (Micrometer (1/100 mm, 25 – 50 mm))



I717H1140196-01

4) Select the specified bearings from the bearing selection table.

## **⚠ CAUTION**

The bearings should be replaced as a set.

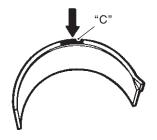
## Bearing selection table

		Crank pin O.D. "B"		
Code		1	2	3
Conrod	1	Green	Black	Brown
I.D. "A"	2	Black	Brown	Yellow

I718H1140293-01

# **Bearing thickness specification**

Color "C" (Part No.)	Thickness
Green	1.480 – 1.484 mm
(12164-26E01-0A0)	(0.0583 – 0.0584 in)
Black	1.484 – 1.488 mm
(12164-26E01-0B0)	(0.0584 – 0.0586 in)
Brown	1.488 – 1.492 mm
(12164-26E01-0C0)	(0.0586 – 0.0587 in)
Yellow	1.492 – 1.496 mm
(12164-26E01-0D0)	(0.0587 – 0.0589 in)



I649G1140336-02

"C": Color code

# **Crankshaft Journal Bearing Inspection and Selection**

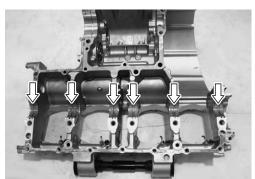
B817H21406040

Refer to "Engine Bottom Side Disassembly (Page 1D-51)".

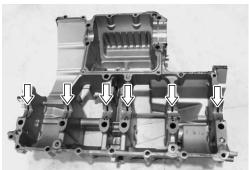
Refer to "Engine Bottom Side Assembly (Page 1D-58)".

# Inspection

1) Inspect each upper and lower crankcase bearing for any damage.



I717H1140197-01



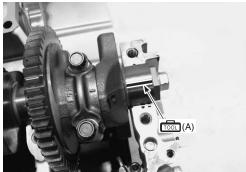
2) Install the plastigauge onto each crankshaft journal as shown.

## Special tool

(A): 09900–22301 (Plastigauge (0.025 – 0.076 mm))

### NOTE

Do not place the plastigauge on the oil hole.



I717H1140199-01

- 3) Mate the lower crankcase with the upper crankcase.
- 4) Tighten the crankshaft journal bolts (M9) in ascending order of numbers assigned to these bolts. Tighten each bolt a little at a time to equalize the pressure in the following two steps.

#### **NOTE**

Do not rotate the crankshaft when a piece of plastigauge is installed.

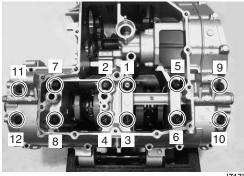
## **Tightening torque**

Crankcase journal bolt (M9) (Initial): 18 N·m (1.8

kgf-m, 13.0 lbf-ft)

Crankcase journal bolt (M9) (Final): 32 N·m (3.2

kgf-m, 23.0 lbf-ft)



I717H1140200-01

5) Remove the lower crankcase and measure the width of compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge. If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

## Crankshaft journal oil clearance

Standard: 0.016 - 0.040 mm (0.0006 - 0.0016 in)

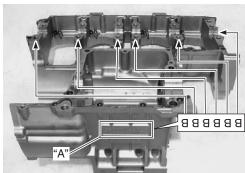
<u>Crankshaft journal oil clearance</u> Service limit: 0.080 mm (0.0031 in)



I717H1140201-01

#### Selection

 Check the corresponding crankcase journal I.D. codes ([A] or [B]) "A", which are stamped on the rear of the upper crankcase.

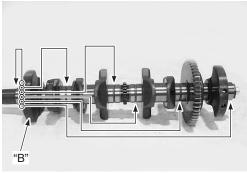


I717H1140202-01

### Crankcase journal I.D. specification

Code "A"	I.D. specification
A	37.000 – 37.008 mm (1.4567 – 1.4570 in)
В	37.008 – 37.016 mm (1.4570 – 1.4574 in)

2) Check the corresponding crankshaft journal O.D. codes ([A], [B] or [C]) "B", which are stamped on the crankshaft.



I717H1140203-02

 Measure the crankshaft O.D. with the special tool. If any of the measurements are out of specification, replace the crankshaft.

# Crankshaft journal O.D. specification

Code "B"	O.D. specification
Α	33.992 – 34.000 mm
	(1.3383 – 1.3386 in)
В	33.984 – 33.992 mm
	(1.3380 – 1.3383 in)
С	33.976 – 33.984 mm
	(1.3367 – 1.3380 in)

## Special tool

(A): 09900–20202 (Micrometer (1/100 mm, 25 – 50 mm))



I717H1140204-01

4) Select the specified bearings from the bearing selection table.

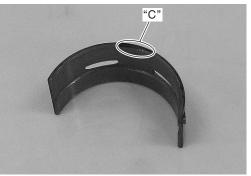
## Bearing selection table

		Crankshaft O.D. "B"		В"
	Code	Α	В	С
Crankcase I.D. "A"	Α	Green	Black	Brown
	В	Black	Brown	Yellow
				I718H1140302-02

#### 17 101111

# Bearing thickness specification

Color "C" (Part No.)	Thickness
Green	1.488 – 1.492 mm
(12229-34E00-0A0)	(0.0586 – 0.0587 in)
Black	1.492 – 1.496 mm
(12229-34E00-0B0)	(0.0587 – 0.0589 in)
Brown	1.496 – 1.500 mm
(12229-34E00-0C0)	(0.0589 – 0.0591 in)
Yellow	1.500 – 1.504 mm
(12229-34E00-0D0)	(0.0591 – 0.0592 in)



I718H1140303-01

"C": Color code

# **Crankshaft Thrust Clearance Inspection and Selection**

B817H21406041

Refer to "Engine Bottom Side Disassembly (Page 1D-51)".

Refer to "Engine Bottom Side Assembly (Page 1D-58)".

# Inspection

1) With the crankshaft's right-side and left-side thrust bearings inserted into the upper crankcase.

# 1D-74 Engine Mechanical:

2) Measure the thrust clearance "a" between the leftside thrust bearing and crankshaft using the thickness gauge. If the thrust clearance exceeds the standard range, adjust the thrust clearance.

## **NOTE**

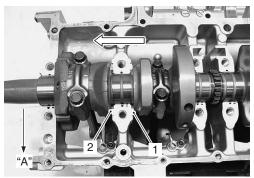
Pull the crankshaft to the left (starter clutch side) so that there is no clearance on the right-side thrust bearing.

## Special tool

(A): 09900-20803 (Thickness gauge)

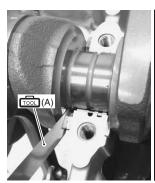
Crankshaft thrust clearance "a"

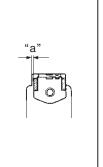
Standard: 0.055 - 0.110 mm (0.0022 - 0.0043 in)



I717H1140205-01

1.	Right side thrust bearing
2.	Left side thrust bearing
"A":	Front side





\_\_\_\_\_ | 1717H1140206-01

### Selection

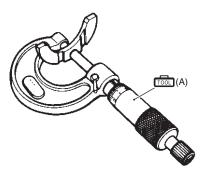
1) Remove the right-side thrust bearing and measure its thickness using the micrometer. If the thickness of the right-side thrust bearing is below standard, replace it with a new bearing and measure the thrust clearance again, as described above.

#### Special tool

(A): 09900-20205 (Micrometer (0 - 25 mm))

Right-side thrust bearing thickness

Standard: 2.425 - 2.450 mm (0.0955 - 0.0965 in)

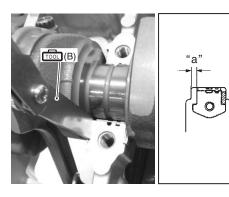


I649G1140343-02

- 2) If the right-side thrust bearing is within the standard range, reinsert the right-side thrust bearing and remove the left-side thrust bearing.
- 3) With the left-side thrust bearing removed, measure the clearance "a" using the thickness gauge as shown.

## Special tool

(B): 09900-20803 (Thickness gauge)





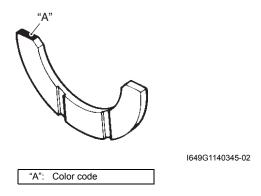
4) Select a left-side thrust bearing from the selection table.

## **NOTE**

Right-side thrust bearing has the same specification as the GREEN (12228-17E00-0D0) of left-side thrust bearing.

Left-side thrust bearing selection table

Clearance before inserting the left-side thrust bearing	Color "A" (Part No.)	Thrust bearing thickness	Thrust clearance	
2.560 – 2.585 mm	White	2.475 – 2.500 mm		
(0.1008 – 0.1018 in)	(12228-17E00-0F0)	(0.0974 – 0.0984 in)		
2.535 – 2.560 mm	Yellow	2.450 – 2.475 mm		
(0.0998 – 0.1008 in)	(12228-17E00-0E0)	(0.0965 – 0.0974 in)		
2.510 – 2.535 mm	Green	2.425 – 2.450 mm	0.060 – 0.110 mm	
(0.0988 – 0.0998 in)	(12228-17E00-0D0)	(0.0955 – 0.0965 in)	(0.0024 – 0.0043 in)	
2.485 – 2.510 mm	Blue	2.400 – 2.425 mm		
(0.0978 – 0.0988 in)	(12228-17E00-0C0)	(0.0945 – 0.0955 in)		
2.460 – 2.485 mm	Black	2.375 – 2.400 mm		
(0.0969 – 0.0978 in)	(12228-17E00-0B0)	(0.0935 – 0.0945 in)		
2.430 – 2.460 mm	Red	2.350 – 2.375 mm	0.055 – 0.110 mm	
(0.0957 – 0.0969 in)	(12228-17E00-0A0)	(0.0925 – 0.0935 in)	(0.0022 – 0.0043 in)	



5) After selecting a left-side thrust bearing, install it and then measure the thrust clearance again.

# **Specifications**

# **Service Data**

Valve + Guide

Unit: mm (in)

Item		Standard	Limit
Valve diam.	IN.	23 (0.91)	_
valve diairi.	EX.	20 (0.79)	_
Valve clearance (when cold)	IN.	0.10 - 0.20 (0.004 - 0.008)	_
	EX.	0.20 - 0.30 (0.008 - 0.012)	_
Valve guide to valve stem clearance	IN.	0.010 - 0.037 (0.0004 - 0.0015)	_
valve guide to valve sterri clearance	EX.	0.030 - 0.057 (0.0012 - 0.0022)	_
Valve stem deflection	IN. & EX.	_	0.35 (0.014)
Valve guide I.D.	IN. & EX.	4.500 – 4.512 (0.1772 – 0.1776)	_
Valve stem O.D.	IN.	4.475 – 4.490 (0.1762 – 0.1768)	_
valve stelli O.D.	EX.	4.455 – 4.470 (0.1754 – 0.1760)	_
Valve stem runout	IN. & EX.	_	0.05 (0.002)
Valve head thickness	IN. & EX.	_	0.5 (0.02)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	_
Valve head radial runout	IN. & EX.	_	0.03 (0.001)
Valve spring free length	IN. & EX.	_	40.4 (1.59)
Valve spring tension	IN. & EX.	182 – 210 N (18.2 – 21.0 kgf, 40.1 – 46.3 lbs) at length 36.0 mm (1.42 in)	<del>-</del>

# Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
Cam height	IN.	35.65 – 35.69 (1.4035 – 1.4051)	35.35 (1.3917)
Carri neight	EX.	35.37 – 35.41 (1.3925 – 1.3941)	35.07 (1.3807)
Camshaft journal oil clearance	IN. & EX.	0.032 - 0.066 (0.0013 - 0.0026)	0.150 (0.0059)
Camshaft journal holder I.D.	IN. & EX.	24.012 - 24.025 (0.9454 - 0.9459)	_
Camshaft journal O.D.	IN. & EX.	23.959 - 23.980 (0.9433 - 0.9441)	_
Camshaft runout	IN. & EX.	_	0.10 (0.004)
Cam chain pin (at arrow "3")		16th pin	_
Cylinder head distortion		_	0.20 (0.008)

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Engine Mechanical: 1D-77

# **Cylinder + Piston + Piston Ring** Unit: mm (in)

Item			Standard	Limit
Compression pressure	1 200 – 1 600 kPa (12 – 16 kgf/cm², 171 – 226 psi)		900 kPa	
Compression pressure	1 200	J – 1 0	100 KFa (12 - 10 kg//Cill , 1/1 - 220 psi)	(9 kgf/cm <sup>2</sup> , 128 psi)
Compression pressure difference				200 kPa
Compression pressure unreferice			<del>_</del>	(2 kgf/cm <sup>2</sup> , 28 psi)
Piston-to-cylinder clearance			030 - 0.040 (0.0012 - 0.0016)	0.120 (0.0047)
Cylinder bore			500 – 65.515 (2.5787 – 2.5793)	Nicks or Scratches
Piston diam.			465 – 65.480 (2.5774 – 2.5779)	65.380 (2.574)
ristori diam.	N	/leasu	re 15 mm (0.6 in) from the skirt end.	` ,
Cylinder distortion			_	0.20 (0.008)
Piston ring free end gap	1st	IR	Approx. 9.1 (0.36)	7.2 (0.28)
I istorring free end gap	2nd	R	Approx. 9.2 (0.36)	7.2 (0.28)
Piston ring end gap	1st	IR	0.06 - 0.21 (0.002 - 0.008)	0.5 (0.020)
I istorring end gap	2nd R		0.06 - 0.21 (0.002 - 0.008)	0.5 (0.020)
Piston ring-to-groove clearance	15	st		0.180 (0.007)
1 istori ririg-to-groove clearance	2n	d		0.150 (0.006)
	15	st	1.01 – 1.03 (0.040 – 0.041)	
Piston ring groove width	2nd		0.81 - 0.83 (0.032 - 0.033)	_
	0	il	1.51 – 1.53 (0.059 – 0.060)	_
Piston ring thickness		st	0.97 - 0.99 (0.038 - 0.039)	
Istorring trickriess			0.77 - 0.79 (0.030 - 0.031)	_
Piston pin bore	14.002 – 14.008 (0.5513 – 0.5515)		14.030 (0.5524)	
Piston pin O.D.		13.	995 – 14.000 (0.5510 – 0.5512)	13.980 (0.5504)

# Conrod + Crankshaft Unit: mm (in)

Item		Standard	Limit		
Conrod small end I.D.	14.010 – 14.018 (0.5516 – 0.5519)		14.010 – 14.018 (0.5516 – 0.5519)		14.040 (0.5528)
Conrod big end side clearance	0.10 - 0.20 (0.004 - 0.008)		0.30 (0.012)		
Conrod big end width		20.95 – 21.00 (0.825 – 0.827)	_		
Crank pin width		21.10 – 21.15 (0.831 – 0.833)	_		
Conrod big end oil clearance	0.032 - 0.056 (0.0013 - 0.0022)		0.080 (0.0031)		
Crank pin O.D.	37.976 – 38.000 (1.4951 – 1.4961)		_		
Crankshaft journal oil clearance	0.016 - 0.040 (0.0006 - 0.0016)		0.080 (0.0031)		
Crankshaft journal O.D.	33.976 – 34.000 (1.3376 – 1.3386)		_		
Crankshaft thrust clearance	0.055 - 0.110 (0.0022 - 0.0043)		_		
Crankshaft thrust bearing thickness	Right side	2.425 – 2.450 (0.0955 – 0.0965)	_		
Clarikshalt tillust bearing tillckness	Left side	2.350 – 2.500 (0.0925 – 0.0984)	_		
Crankshaft runout		_	0.05 (0.002)		

## **Tightening Torque Specifications**

B817H21407002

Factoring part	Ti	Tightening torque		Note
Fastening part	N⋅m	kgf-m	lbf-ft	Note
STP sensor mounting screw	3.5	0.35	2.5	☞(Page 1D-13)
ISC valve mounting screw	3.5	0.35	2.5	☞(Page 1D-14)
Fuel delivery pipe mounting screw	3.5	0.35	2.45	☞(Page 1D-15)
Frame down tube bolt	50	5.0	36.0	☞ (Page 1D-22)
Engine mounting bracket bolts	23	2.3	16.5	☞ (Page 1D-22)
Oil pressure switch lead wire mounting bolt	1.5	0.15	1.1	☞(Page 1D-23)
Engine sprocket nut	115	11.5	83.0	☞(Page 1D-23)
Speed sensor rotor bolt	25	2.5	18.0	☞(Page 1D-23)
Cylinder head bolt (M10) (Initial)	25	2.5	18.0	☞(Page 1D-29)
Cylinder head bolt (M10) (Final)	42	4.2	30.5	☞(Page 1D-29)
Cylinder head bolt (M6)	10	1.0	7.0	☞(Page 1D-29)
Camshaft journal holder bolt	40	4.0	7.0	☞(Page 1D-31) /
	10	1.0	7.0	☞(Page 1D-35)
Oil pipe mounting bolt	10	1.0	7.0	☞(Page 1D-31)
Cam chain tension adjuster mounting bolt	10	1.0	7.0	☞(Page 1D-32)
Cam chain tension adjuster cap bolt	23	2.3	16.5	☞(Page 1D-32)
Cylinder head cover bolt	14	1.4	10.0	☞(Page 1D-33)
Camshaft sprocket bolt (Initial)	16	1.6	11.5	☞(Page 1D-36)
Camshaft sprocket bolt (Final)	25	2.5	18.0	☞(Page 1D-36)
Oil gallery plug (cylinder head)	10	1.0	7.0	☞(Page 1D-39)
Water inlet connector bolt	10	1.0	7.0	☞(Page 1D-46)
ECT sensor	18	1.8	13.0	☞(Page 1D-47)
Oil gallery plug (M6 and M8)	10	1.0	7.0	☞(Page 1D-58)
Oil gallery plug (M12)	15	1.5	11.0	☞(Page 1D-58)
Oil gallery plug (M16)	35	3.5	25.5	☞(Page 1D-58)
Piston cooling oil jet bolt	10	1.0	7.0	☞(Page 1D-59)
Oil gallery jet	22	2.2	16.0	☞(Page 1D-59)
Crankcase journal bolt (M9) (Initial)	40	4.0	40.0	☞(Page 1D-60) /
	18	1.8	13.0	☞(Page 1D-72)
Crankcase journal bolt (M9) (Final)	00	0.0	00.0	☞(Page 1D-60) /
	32	3.2	23.0	☞(Page 1D-72)
Crankcase bolt (M6)	6	0.6	4.5	☞(Page 1D-61)
Crankcase bolt (M6)	11	1.1	8.0	☞(Page 1D-61)
Crankcase bolt (M8)	15	1.5	11.0	☞(Page 1D-61)
Crankcase bolt (M8)	26	2.6	19.0	☞(Page 1D-61)
Oil pressure switch	14	1.4	10.0	☞(Page 1D-63)
Gear position switch mounting bolt	6.5	0.65	4.7	☞(Page 1D-63)
Water pump mounting bolt	10	1.0	7.0	☞(Page 1D-64)
Gearshift cam stopper bolt	10	1.0	7.0	☞(Page 1D-64)
Gearshift cam stopper plate bolt	13	1.3	9.5	☞(Page 1D-65)
Gearshift arm stopper	19	1.9	13.5	☞(Page 1D-65)
Conrod cap bolt	15 N·m (1.5 kg			☞(Page 1D-68) /
·	4 (90°) turn.			☞(Page 1D-70)

## **NOTE**

The specified tightening torque is described in the following.

## Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque Specifications in Section 0B (Page 0B-24)".

<sup>&</sup>quot;Throttle Body Components (Page 1D-8)"

<sup>&</sup>quot;Throttle Body Construction (Page 1D-9)"

<sup>&</sup>quot;Engine Assembly Installation (Page 1D-21)"

Engine Mechanical: 1D-79

## **Special Tools and Equipment**

## **Recommended Service Material**

B817H21408001

Material	SUZUKI recommended produ	SUZUKI recommended product or Specification		
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	☞(Page 1D-13) /	
	equivalent		☞(Page 1D-23) /	
			☞(Page 1D-39) /	
			☞(Page 1D-61) /	
			☞(Page 1D-62) /	
			☞(Page 1D-63) /	
			☞(Page 1D-64) /	
			☞(Page 1D-66)	
Molybdenum oil	MOLYBDENUM OIL SOLUTION	_	☞(Page 1D-26) /	
			☞(Page 1D-28) /	
			☞(Page 1D-40) /	
			☞(Page 1D-68)	
Sealant	SUZUKI BOND No.1215 or	P/No.: 99000-31110	☞(Page 1D-60) /	
	equivalent		☞(Page 1D-62) /	
			☞(Page 1D-63)	
	SUZUKI BOND No.1207B or	P/No.: 99000-31140	☞(Page 1D-32) /	
	equivalent		☞(Page 1D-33) /	
			☞(Page 1D-63)	
Thread lock cement	THREAD LOCK CEMENT SUPER	P/No.: 99000-32030	☞(Page 1D-23) /	
	1303 or equivalent		☞(Page 1D-36) /	
			☞(Page 1D-65)	
	THREAD LOCK CEMENT SUPER	P/No.: 99000-32110	☞(Page 1D-59) /	
	1322 or equivalent		☞(Page 1D-59) /	
	·		☞(Page 1D-63) /	
			☞(Page 1D-65)	

## **NOTE**

Required service material is also described in the following.

## **Special Tool**

			B817H21408002
09900–06107		09900–20102	
Snap ring pliers		Vernier calipers (1/20 mm,	
		200 mm)	
☞(Page 1D-52) /	// PH	☞(Page 1D-42) /	
☞(Page 1D-52)		☞(Page 1D-43) /	
(		☞(Page 1D-50)	
		( ago 12 co)	
09900–20202	•	09900–20203	
Micrometer (1/100 mm, 25 –		Micrometer (1/100 mm, 50 –	
The state of the s		· ·	
50 mm)		75 mm)	
☞(Page 1D-34) /		☞(Page 1D-49)	
☞(Page 1D-71) /			
☞(Page 1D-73)			(COS)

<sup>&</sup>quot;Throttle Body Components (Page 1D-8)"

## 1D-80 Engine Mechanical:

09900-20205 Micrometer (0 - 25 mm)  (Page 1D-35) /  (Page 1D-43) /  (Page 1D-49) /  (Page 1D-50) /  (Page 1D-69) /  (Page 1D-74)	09900–20530 Cylinder gauge set (Page 1D-47)
09900–20602 Dial gauge (1/1000 mm, 1 mm) (Page 1D-35) / (Page 1D-50) / (Page 1D-69)	09900–20605 Dial calipers (1/100 mm, 10 – 34 mm) (Page 1D-69)
09900–20607 Dial gauge (1/100 mm, 10 mm) (Page 1D-34) / (Page 1D-42) / (Page 1D-42) / (Page 1D-42) / (Page 1D-69)	09900–20701 Magnetic stand  (Page 1D-34) /  (Page 1D-42) /  (Page 1D-42) /  (Page 1D-42) /  (Page 1D-69)
09900–20803 Thickness gauge  (Page 1D-41) /  (Page 1D-47) /  (Page 1D-50) /  (Page 1D-69) /  (Page 1D-74) /  (Page 1D-74)	09900–21304 V-block (100 mm) (Page 1D-34) / (Page 1D-42) / (Page 1D-69)
09900–22301 Plastigauge (0.025 – 0.076 mm) (Page 1D-35) / (Page 1D-70) / (Page 1D-72)	09900–22302 Plastigauge (0.051 – 0.152 mm) ☞ (Page 1D-35)
09900–22401 Small bore gauge (10 – 18 mm) (Page 1D-50) / (Page 1D-69)	09900–22403 Small bore gauge (18 – 35 mm) • (Page 1D-35)
09915–40610 Oil filter wrench (Page 1D-54) /        (Page 1D-62)	09915–63311 Compression gauge attachment  (Page 1D-4)

09915–64512	09916–10911
Compression gauge	Valve lapper set
☞(Page 1D-4)	☞(Page 1D-43)
09916–14510	09916–14521
Valve lifter	Valve spring compressor
valve litter	attachment
	1 / 0 / 5
(Page 1D-38) /	(Page 1D-38) /
(Page 1D-41)	(Page 1D-41)
09916–33210	09916–34542
Valve guide reamer (4.5	Reamer handle
mm)	Troumor namare
(Page 1D-45)	☞(Page 1D-44) /
(r age 10-40)	(Page 1D-44)
	(Page 1D-45)
•	
09916–34580	09916–43211
Valve guide reamer (10.8	Valve guide remover/
mm)	installer
☞(Page 1D-44)	☞(Page 1D-44) /
(1. 2.90 1.2 1.1)	(Page 1D-45)
	(1 dg0 12 10)
09916–43220	09916–74521
Attachment	Holder body
☞(Page 1D-45)	☞(Page 1D-28)
09916–74540	09916–84511
Band (Piston diam.: 63 – 75	Tweezers
mm)	
(Page 1D-28)	☞(Page 1D-38) /
(1 age 15-20)	(Page 1D-36)/
FI TO THE PROPERTY OF THE PROP	- (1 age 10-41)
\\	
H	\
09919–28610	09930–10121
Sleeve protector	Spark plug wrench set
☞(Page 1D-38)	☞(Page 1D-24)
[ [ ] ]	
09930–11950	_
Torx wrench	
(Page 1D-12) /	
(Page 1D-12) /	
(Page 1D-13) /	
☞(Page 1D-14)	
✓	

# **Engine Lubrication System**

## **Precautions**

## **Precautions for Engine Oil**

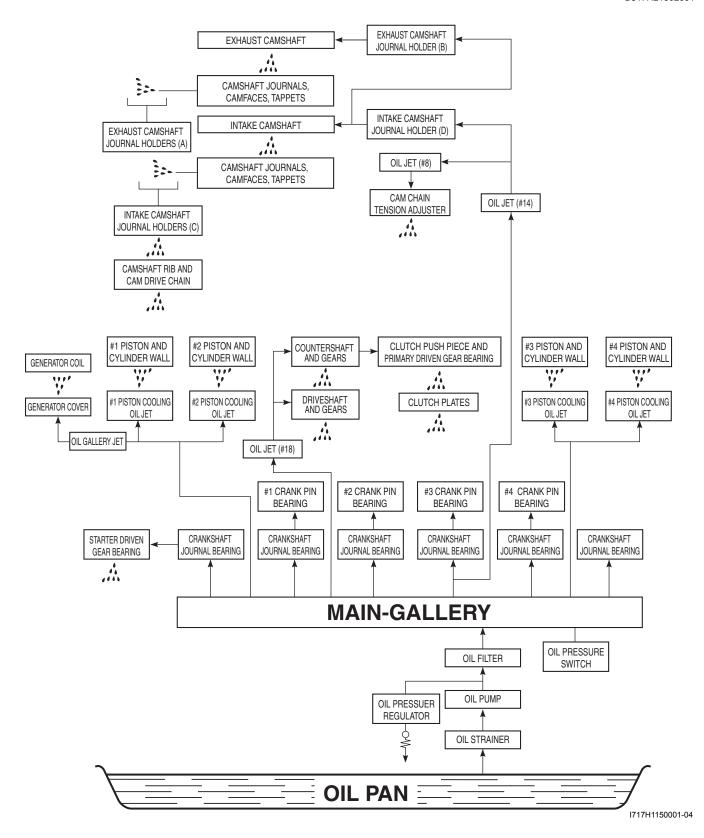
Refer to "Fuel and Oil Recommendation in Section 0A (Page 0A-3)".

B817H21500001

## **Schematic and Routing Diagram**

## **Engine Lubrication System Chart Diagram**

B817H21502001



## **Diagnostic Information and Procedures**

## **Engine Lubrication Symptom Diagnosis**

B817H21504001

Condition	Possible cause	Correction / Reference Item	
Engine overheats.	Insufficient amount of engine oil.	Check level and add.	
	Defective oil pump.	Replace.	
	Clogged oil circuit.	Clean.	
	Clogged oil cooler	Clean or replace.	
		Change.	
Exhaust smoke is dirty or	Excessive amount of engine oil.	Check level and drain.	
thick.			
Engine lacks power.	Excessive amount of engine oil.	Check level and drain.	

## Oil Pressure Check

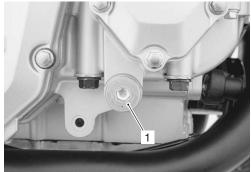
B817H21504002

Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

#### NOTE

Before checking the oil pressure, check the following.

- Oil level (Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)")
- Oil leaks (If leak is found, repair it.)
- Oil quality (If oil is discolored or deteriorated, replace it.)
- Start the engine and check if the oil pressure indicator light is turned on. If the light stays on, check the oil pressure indicator light circuit. If the circuit is OK, check the oil pressure in the following manner.
- 2) Remove the main oil gallery plug (1).



I717H1150002-01

3) Install the oil pressure gauge and attachment into the main oil gallery.

## Special tool

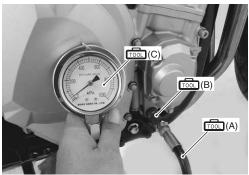
(A): 09915–74521 (Oil pressure gauge hose)

(B): 09915-74540 (Oil pressure gauge

attachment)

(C): 09915-77331 (Meter (for high

pressure))



I718H1150019-01

4) Warm up the engine as follows: Summer: 10 min. at 2 000 r/min Winter: 20 min. at 2 000 r/min

5) After warm up, increase the engine speed to 3 000 r/min (Observe the tachometer), and read the oil pressure gauge.

If the oil pressure is lower or higher than the specification, the following causes may be considered.

## Oil pressure specification

100 – 400 kPa (1.0 – 4.0 kgf/cm<sup>2</sup>, 14 – 57 psi) at 3 000 r/min, Oil temp. at 60 °C (140 °F)

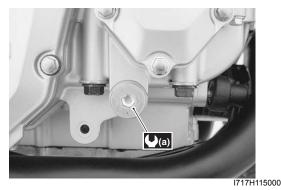
(110 1)			
High oil pressure	Low oil pressure		
<ul> <li>Engine oil viscosity is to</li> </ul>	Clogged oil filter		
high	<ul> <li>Oil leakage from the oil</li> </ul>		
<ul> <li>Clogged oil passage</li> </ul>	passage		
<ul> <li>Combination of the</li> </ul>	<ul> <li>Damaged O-ring</li> </ul>		
above items	<ul> <li>Defective oil pump</li> </ul>		
	<ul> <li>Combination of the</li> </ul>		
	above items		

- 6) Stop the engine and remove the oil pressure gauge and attachment.
- 7) Reinstall the main oil gallery plug and tighten it to the specified torque.

## **⚠ CAUTION**

Use a new gasket to oil leakage.

Tightening torque Main Oil gallery plug (M16) (a): 35 N⋅m (3.5 kgfm, 25.5 lbf-ft)



8) Check the engine oil level. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

## **Repair Instructions**

## **Engine Oil and Filter Replacement**

B817H21506001

Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

## **Engine Oil Level Inspection**

B817H21506002

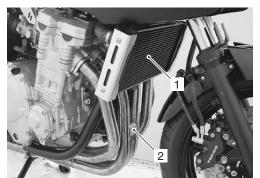
Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

# Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation

B817H21506003

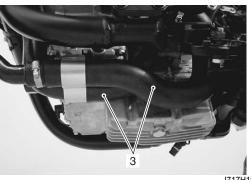
#### Removal

- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".
- 2) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".
- 3) Remove the radiator (1), exhaust pipe (2) and muffler. Refer to "Radiator / Cooling Fan Motor Removal and Installation in Section 1F (Page 1F-5)" and "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".



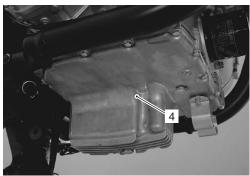
I717H1150004-01

4) Remove the water hoses (3). Refer to "Water Hose Routing Diagram in Section 1F (Page 1F-3)".



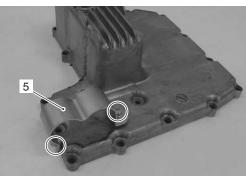
I717H1150005-0

5) Remove the oil pan (4). Refer to "Engine Bottom Side Disassembly in Section 1D (Page 1D-51)".



I717H1150006-01

6) Remove the hose clamp plate (5) from the oil pan.



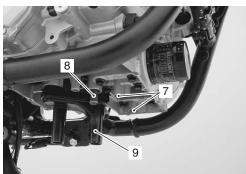
I718H1150064-01

7) Remove the oil gallery plug (6) from the oil pan.



I718H1150024-02

8) Remove the O-rings (7), oil pressure regulator (8) and oil strainer (9).



I717H1150007-01

## Installation

Installation is in the reverse order of removal. Pay attention to the following points:

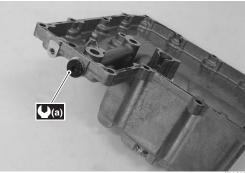
• Tighten the oil gallery plug to specified torque.

## **⚠ CAUTION**

Use a new gasket to prevent oil leakage.

## **Tightening torque**

Oil gallery plug (M12) (a): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)



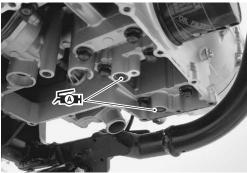
I718H1150026-01

· Apply GREASE to the O-rings and install them.

## **⚠ CAUTION**

Use new O-rings to prevent oil leakage.

র⊠।: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1150009-01

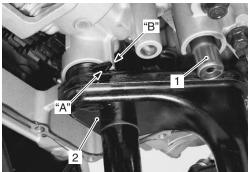


I718H1150028-01

• Install the oil pressure regulator (1) and oil strainer (2).

#### NOTE

When installing the oil strainer, fit the concave part "A" of the oil strainer onto the convex part "B" of the crankcase.



718H1150029-01

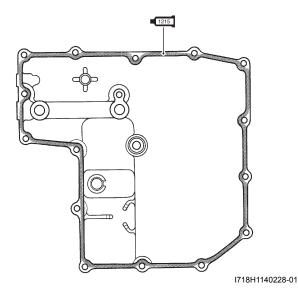
· Apply BOND to the mating surface of the oil pan.

## **NOTE**

Use of BOND is as follows:

- Make surfaces free from moisture, oil, dust and other foreign materials.
- Apply to distorted surfaces as it forms a comparatively thick film.

■1215]: Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)



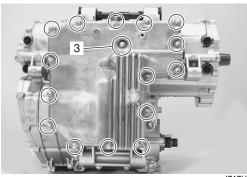
· Tighten the oil pan bolts diagonally.

#### NOTE

Fit a new gasket washer to the oil pan bolt (3).

## **⚠ CAUTION**

Use a new gasket washer to prevent oil leakage.



I717H1150010-01

 After installing the removed parts, pour engine oil and engine coolant. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)" and "Cooling System Inspection in Section 0B (Page 0B-14)".

## Oil Pressure Regulator / Oil Strainer Inspection

B817H21506004

Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation (Page 1E-4)".

## Oil pressure regulator

Inspect the operation of the oil pressure regulator by pushing on the piston with a proper bar. If the piston does not operate, replace the oil pressure regulator with a new one.



I718H1150033-01

## **Oil Strainer**

Clean the oil strainer if necessary. Inspect the oil strainer body for damage. If necessary, replace it with a new one.



I718H1150034-01

## Oil Pressure Switch Removal and Installation

B817H2

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

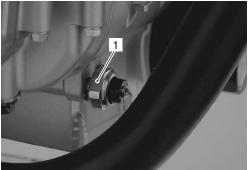
## Removal

- 1) Turn the ignition switch to OFF.
- 2) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".
- 3) Disconnect the oil pressure switch lead wire.



I717H1150012-01

4) Remove the oil pressure switch (1).



I717H1150011-01

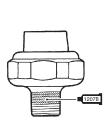
## Installation

1) Install the oil pressure switch, apply BOND to its thread and tighten it to the specified torque.

■12078]: Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

**Tightening torque** 

Oil pressure switch (a): 14 N·m (1.4 kgf-m, 10.0 lbf-ft)





1717H1150013-01

2) Connect the oil pressure switch lead wire securely. Refer to "Wiring Harness Routing Diagram (GSF650/S/A/SAK7) in Section 9A (Page 9A-8)".

Tightening torque
Oil pressure switch lead wire bolt (b): 1.5 N·m (
0.15 kgf-m, 1.1 lbf-ft)



I717H1150014-01

3) Pour engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

## **Oil Pressure Switch Inspection**

B817H21506006

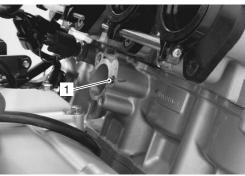
Refer to "Oil Pressure Indicator Inspection (GSF650/S/A/SAK7) in Section 9C (Page 9C-10)".

## Oil Jet Removal and Installation

B817H21506007

## Oil Jet (For Cam Chain Tension Adjuster) Removal

- 1) Remove the cam chain tension adjuster. Refer to "Engine Top Side Disassembly in Section 1D (Page 1D-24)".
- 2) Remove the oil jet (1).



I717H1150015-02

#### Installation

Installation is in the reverse order of removal. Pay attention to the following points:

· Apply engine oil to the O-ring.

## **A** CAUTION

Use a new O-ring to prevent oil leakage.



I718H1150044-01

## Oil Jet (For Cylinder Head) Removal

- 1) Remove the cylinder. Refer to "Engine Top Side Disassembly in Section 1D (Page 1D-24)".
- 2) Remove the oil jet (1).



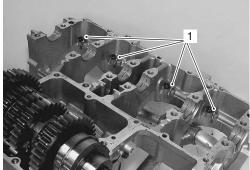
I717H1150016-01

## Installation

Installation is in the reverse order of removal. Refer to "Engine Top Side Assembly in Section 1D (Page 1D-26)".

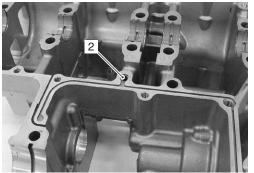
# Oil Jet (For the Piston Cooling and Transmission) Removal

- 1) Remove the engine assembly. Refer to "Engine Assembly Removal in Section 1D (Page 1D-18)".
- Separate the crankcases, upper and lower. Refer to "Engine Top Side Disassembly in Section 1D (Page 1D-24)" and "Engine Bottom Side Disassembly in Section 1D (Page 1D-51)".
- 3) Remove the crankshaft assembly. Refer to "Engine Bottom Side Disassembly in Section 1D (Page 1D-51)".
- 4) Remove the piston cooling oil jets (1) from the upper crankcase.



I718H1150046-01

5) Remove the oil jet (2) (for transmission) from the lower crankcase.



I718H1150047-0

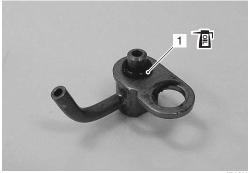
#### Installation

Installation is in the reverse order of removal. Pay attention to the following points:

 Fit new O-ring (1) to each piston cooling oil jet as shown and apply engine oil to them.

## **⚠ CAUTION**

Use new O-rings to prevent oil pressure leakage.

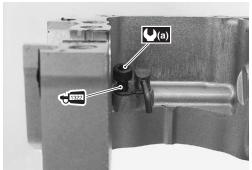


I718H1150048-01

 Apply a small quantity of THREAD LOCK to the bolts and tighten them to the specified torque.

+ 1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque Piston cooling oil jet bolt (a): 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)



I718H1150049-02

## Oil Gallery Jet Removal and Installation

B817H21506008

## Removal

- 1) Remove the generator cover. Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".
- 2) Remove the oil gallery jet (1).



1717H1150017-01

## Installation

Installation is in the reverse order of removal. Pay attention to the following point:

 Apply THREAD LOCK to the oil gallery jet and tighten it to the specified torque.

## **NOTE**

After tighten the jet, make sure that the jet end is flush with the cover mating surface.

**+** ⊕ 1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque Oil gallery jet (a): 22 N⋅m (2.2 kgf-m, 16.0 lbf-ft)



I718H1150051-02

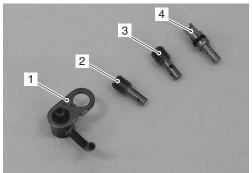
## Oil Jet / Oil Gallery Jet Inspection

B817H21506009

Refer to "Oil Jet Removal and Installation (Page 1E-8)". Refer to "Oil Gallery Jet Removal and Installation (Page 1E-9)".

## Oil Jet

Make sure that the oil jets are not clogged. If they are clogged, clean their oil passage using a wire of the proper size and compressed air.



I718H1150052-01

- 1. Piston cooling jet
- 2. Oil jet (#14) (For cylinder head)
- 3. Oil jet (#18) (For transmission)
- 4. Oil jet (#8) (For can chain tension adjuster)

## Oil Gallery Jet

Inspect the oil gallery jet for clogging. Clean the oil gallery if necessary.



I718H1150053-01

## Oil Pump Removal and Installation

B817H21506010

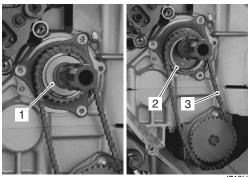
## **NOTE**

Do not drop the each parts into the crankcase.

## Removal

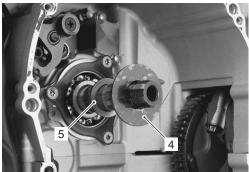
- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".
- 2) Remove the clutch. Refer to "Clutch Removal in Section 5C (Page 5C-12)".

- 3) Remove the spacer (1).
- 4) Remove the oil pump drive sprocket (2) and chain (3).



I718H1150054-01

5) Remove the thrust washer (4) and washer (5).

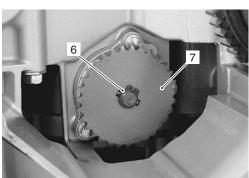


I718H1150056-01

6) Remove the snap ring (6) and oil pump driven gear

## Special tool

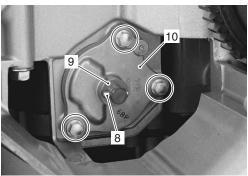
**6.5** : 09900-06107 (Snap ring pliers)



I718H1150055-01

## 1E-11 Engine Lubrication System:

- 7) Remove the pin (8) and washer (9).
- 8) Remove the oil pump (10).



I718H1150057-01

#### Installation

Installation is in reverse order of removal. Pay attention to the following points:

Apply GREASE to the O-ring.

#### **⚠ CAUTION**

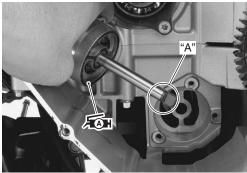
Use a new O-ring to prevent oil leakage.

元 Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

· Install the oil pump.

#### **NOTE**

Set the oil pump shaft end "A" to the water pump shaft.



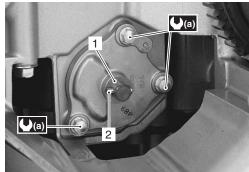
I718H1150058-01

 Install the oil pump with the oil pump mounting bolt and then tighten them to the specified torque.

## Tightening torque

Oil pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

• Install the washer (1) and pin (2).



I718H1150059-01

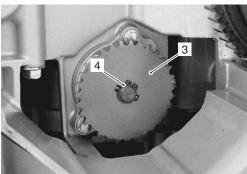
• Install the oil pump driven gear (3) and snap ring (4).

#### **⚠ CAUTION**

Never reuse a snap ring.

## Special tool

(Snap ring pliers)

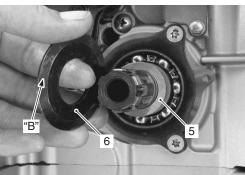


I718H1150060-01

 Install the washer (5) and thrust washer (6) onto the countershaft.

#### **NOTE**

The chamfer side "B" of thrust washer faces inside.



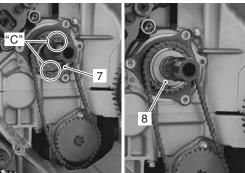
I718H1150061-01

• Install the oil pump drive sprocket (7) to the countershaft.

## **NOTE**

Teeth "C" on the sprocket must face the clutch side.

- Pass the chain between the oil pump drive and driven sprockets.
- · Install the spacer (8).



I718H1150062-01

• Reinstall the clutch. Refer to "Clutch Installation in Section 5C (Page 5C-14)".

## **Oil Pump Inspection**

B817H21506011

Inspect the oil pump in the following procedures:

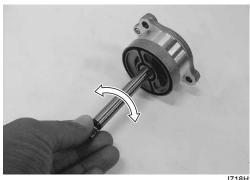
1) Remove the oil pump. Refer to "Oil Pump Removal and Installation (Page 1E-10)".

2) Rotate the oil pump by hand and check that it moves smoothly. If it does not move smoothly, replace the oil pump assembly.

## **⚠ CAUTION**

Do not attempt to disassemble the oil pump assembly.

The oil pump is available only as an assembly.



I718H1150063-01

3) Install the oil pump. Refer to "Oil Pump Removal and Installation (Page 1E-10)".

## **Specifications**

## **Service Data**

Oil Pump

B817H21507001

Item	Standard	Limit
	100 – 400 kPa	
Oil pressure (at 60 °C, 140 °F)	(1.0 – 4.0 kgf/cm <sup>2</sup> , 14 – 57 psi)	_
	at 3 000 r/min	

## Oil

Item		Specification		
Engine oil type	SAE 10W-40,	SAE 10W-40, API SF/SG or SH/SJ with JASO MA		
	Change	3 000 ml (3.2/2.6 US/lmp qt)		
Engine oil capacity	Filter change	3 500 ml (3.7/3.1 US/lmp qt)		
	Overhaul	3 700 ml (3.9/3.3 US/Imp qt)		

## **Tightening Torque Specifications**

B817H21507002

Eastoning part	Т	ightening torq	Note	
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Main Oil gallery plug (M16)	35	3.5	25.5	☞(Page 1E-4)
Oil gallery plug (M12)	15	1.5	11.0	☞(Page 1E-5)
Oil pressure switch	14	1.4	10.0	☞(Page 1E-7)
Oil pressure switch lead wire bolt	1.5	0.15	1.1	☞(Page 1E-7)
Piston cooling oil jet bolt	10	1.0	7.0	☞(Page 1E-9)
Oil gallery jet	22	2.2	16.0	☞(Page 1E-9)
Oil pump mounting bolt	10	1.0	7.0	☞(Page 1E-11)

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

## **Recommended Service Material**

B817H21508001

Material	SUZUKI recommended produc	Note	
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000–25010	
	equivalent		11)
Sealant	SUZUKI BOND No.1215 or	P/No.: 99000-31110	☞(Page 1E-6)
	equivalent		
	SUZUKI BOND No.1207B or	P/No.: 99000-31140	☞(Page 1E-7)
	equivalent		
Thread lock cement	THREAD LOCK CEMENT SUPER	P/No.: 99000-32110	
	1322 or equivalent		9)

## **Special Tool**

B817H21508002

09900–06107 Snap ring pliers ☞(Page 1E-10) / ☞(Page 1E-11)	09915–74521 Oil pressure gauge hose (Page 1E-3)	
09915–74540 Oil pressure gauge attachment ☞ (Page 1E-3)	09915–77331 Meter (for high pressure) (Page 1E-3)	

# **Engine Cooling System**

## **Precautions**

## **Engine Cooling System Warning**

B817H21600001

## **▲ WARNING**

- You can be injured by scalding fluid or steam if you open the radiator cap when the engine is hot.
   After the engine cools, wrap a thick cloth around cap and carefully remove the cap by turning it a quarter turn to allow pressure to escape and then turn the cap all the way off.
- The engine must be cool before servicing the cooling system.
- · Coolant is harmful:
  - If it comes in contact with skin or eyes, flush with water.
  - If swallowed accidentally, induce vomiting and call physician immediately.
  - Keep it away from children.

## **Precautions for Engine Coolant**

B817H21600002

Refer to "Engine Coolant Recommendation in Section 0A (Page 0A-4)".

## **General Description**

## **Engine Coolant Description**

B817H21601001

## **A** CAUTION

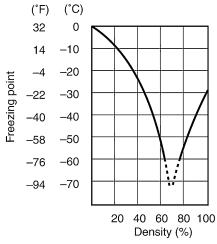
- Use a high quality ethylene glycol base anti-freeze, mixed with distilled water. Do not mix an alcohol base anti-freeze and different brands of anti-freeze.
- Do not put in more than 60% anti-freeze or less than 50%. (Refer to Fig. 1 and 2.)

At the time of manufacture, the cooling system is filled with a 50:50 mixture of distilled water and ethylene glycol anti-freeze. This 50:50 mixture will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above  $-31~^{\circ}\text{C}~(-24~^{\circ}\text{F}).$  If the vehicle is to be exposed to temperatures below  $-31~^{\circ}\text{C}~(-24~^{\circ}\text{F}),$  this mixing ratio should be increased up to 55% or 60% according to the figure.

## **Anti-freeze Proportioning Chart**

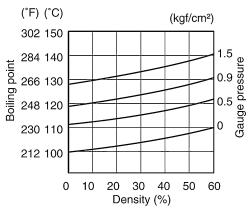
Anti-freeze density	Freezing point
50%	−31 °C (−24 °F)
55%	-40 °C (-40 °F)
60%	–55 °C (–67 °F)

## Engine coolant density-freezing point curve



I310G1160001-01

## Engine coolant density-boiling point curve

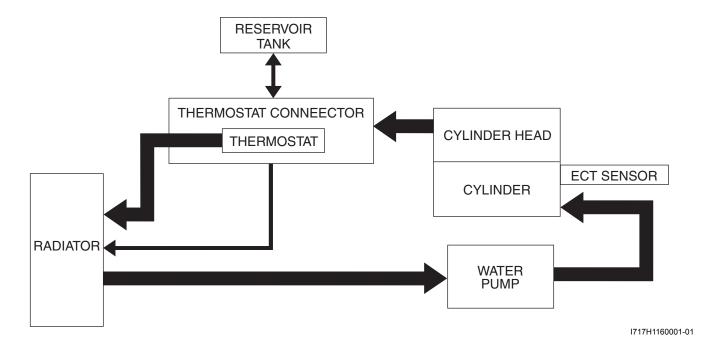


I310G1160002-01

## **Schematic and Routing Diagram**

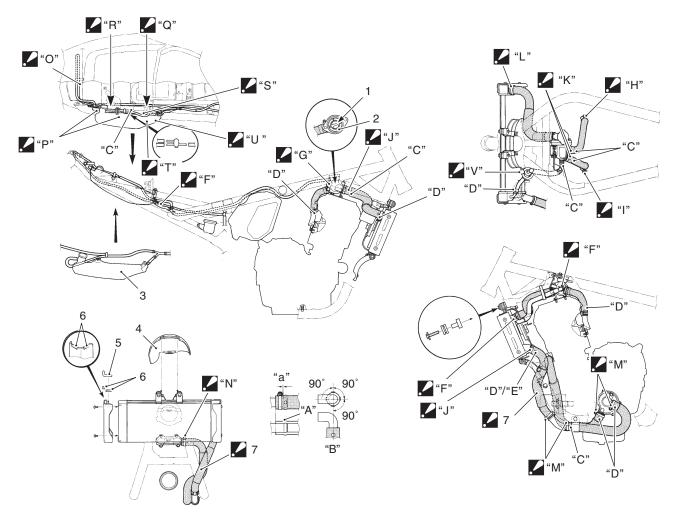
## **Cooling Circuit Diagram**

B817H21602001



## **Water Hose Routing Diagram**

B817H21602002



I717H1160002-02

"I": The clamp screw head should face left backward.
J": The clamp screw head should face upward.
"K": The clamp screw head should face left upward.
"L": The clamp screw head should face right side.
"M": The clamp screw head should face left side.
"N": The clamp screw head should face forward.
"O": Clamp the hose on yellow marking with the tail lamp harness.
"P": Clamp the hose on white marking.
"Q": Pass through the hose under the wiring harness.
"R": Pass through the hose under the seat lock plate.
"S": Be careful not to pinch the hose between seat cushion and fender.
"T": Pass through the hose between frame and reservoir tank. Be careful for the hose not to be slackened.
"U": Pass through the hose under the helmet holder.
"V": Clamp the hose with the fan motor lead wire. Be careful not to insert the coupler to the radiator heat shield hole.
"a": Clearance

## **Diagnostic Information and Procedures**

## **Engine Cooling Symptom Diagnosis**

B817H21604001

Condition	Possible cause	Correction / Reference Item
Engine overheats	Not enough engine coolant.	Add engine coolant.
	Radiator core clogged with dirt or scale.	Clean.
	Faulty cooling fan.	Repair or replace.
	Defective cooling fan relay, or open-or-	Repair or replace
	short circuited.	
	Clogged water passage.	Clean.
	Air trapped in the cooling circuit.	Bleed air.
	Defective water pump.	Replace.
	Use of incorrect engine coolant.	Replace.
	Defective thermostat.	Replace.
	Defective ECT sensor.	Replace.
	Defective ECM.	Replace.
Engine over cools	Defective cooling fan relay, or open-or-	Repair or replace
	short circuited.	
	Extremely cold weather.	Put on radiator cover.
	Defective thermostat.	Replace.
	Defective ECT sensor.	Replace.
	Defective ECM	Replace.

## **Repair Instructions**

## **Cooling Circuit Inspection**

B817H21606001

## **▲ WARNING**

- Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.
- When removing the radiator cap tester, put a rag on the filler to prevent the engine coolant from spraying out.

Inspect the cooling circuit in the following procedures:

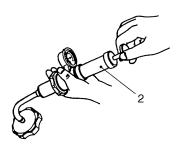
- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Remove the radiator cap (1) and connect the radiator tester (2) to the filler.
- 3) Pressurize the cooling system with 120 kPa (1.2 kgf/cm, 17 psi) of pressure, and then check if it holds the pressure for 10 seconds.

## **⚠ CAUTION**

Do not exceed the radiator cap release pressure, or the radiator cap and subsequently the radiator, can be damaged.



I717H1160003-01



I705H1160004-01

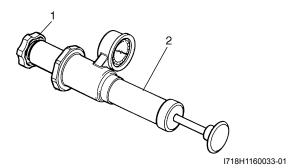
4) After finishing the cooling circuit inspection, reinstall the removed parts.

## **Radiator Cap Inspection**

B817H21606002

Inspect the radiator cap in the following procedures:

- 1) Remove the radiator cap. Refer to "Cooling Circuit Inspection (Page 1F-4)".
- 2) Attach the radiator cap (1) to the radiator tester (2) as shown.



3) Slowly apply pressure to the radiator cap.

Radiator cap release pressure
93 - 123 kPa (0.93 - 1.23 kgf/cm<sup>2</sup>, 13.2 - 17.5 psi)

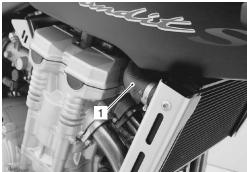
- 4) If the radiator cap does not hold the pressure for at least 10 seconds, replace it with a new one.
- 5) After finishing the radiator cap inspection, reinstall the removed parts.

# Radiator / Cooling Fan Motor Removal and Installation

B817H21606003

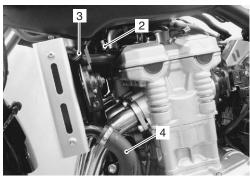
#### Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".
- 3) Disconnect the radiator inlet hose (1).



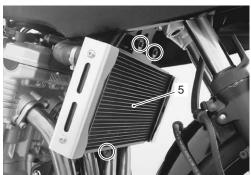
I717H1160004-01

4) Disconnect the cooling fan motor coupler (2), water bypass hose (3) and radiator outlet hose (4).



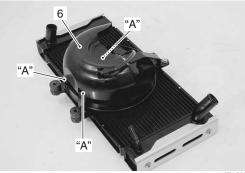
I717H1160005-0

5) Remove the radiator assembly (5) by removing the bolts



I717H1160006-01

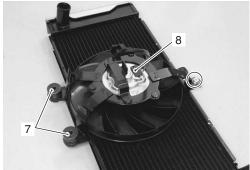
6) Remove the radiator heat shield (6).



I718H1160073-03

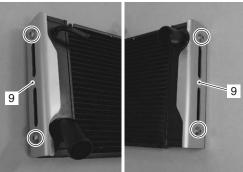
"A": Hooked point

- 7) Remove the spacers (7) and mounting bolt.
- 8) Remove the cooling fan motor from the radiator (8).



I718H1160037-02

9) Remove the radiator covers (9), left and right.



I718H1160038-02

## Installation

Install the radiator in the reverse order of removal. Pay attention to the following points:

- Connect the radiator hoses securely. Refer to "Water Hose Routing Diagram (Page 1F-3)".
- Pour engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".
- Bleed air from the cooling circuit. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".

## **Radiator Inspection and Cleaning**

B817H21606004

#### **Radiator Hose**

Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".

## Radiator

Inspect the radiator for water leaks. If any defects are found, replace the radiator with a new one. If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.



I718H1160001-01

## **Radiator Cleaning**

Blow out any foreign matter that is stuck in the radiator fins using compressed air.

## **⚠** CAUTION

- Make sure not to bend the fins when using compressed air.
- Always apply compressed air from the engine side of engine. If compressed air is applied from the front side, dirt will be forced into the pores of radiator.



717H1160009-01

## **Radiator Hose Removal and Installation**

B817H21606005

#### Removal

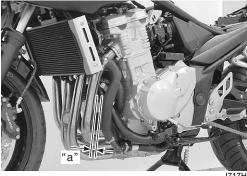
- 1) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Remove the radiator hose as shown in the radiator hose routing diagram. Refer to "Water Hose Routing Diagram (Page 1F-3)".

#### Installation

1) Install the radiator hose as shown in the radiator hose routing diagram. Refer to "Water Hose Routing Diagram (Page 1F-3)".

## **NOTE**

Check that there is at least 20 mm of clearance shown as "a" between the radiator outlet hose and the exhaust pipe.



I717H1160021-01

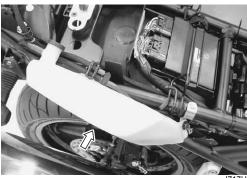
- Pour engine coolant and bleed air from the cooling circuit. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".
- 3) Reinstall the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".

## **Radiator Reservoir Tank Inspection**

B817H21606006

Inspect the radiator reservoir tank in the following procedures:

- 1) Remove the seat tail cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- Inspect the radiator reservoir tank cooling leaks. If any defects are found, replace the radiator reservoir tank with a new one.



I717H1160010-02

## **Water Hose Inspection**

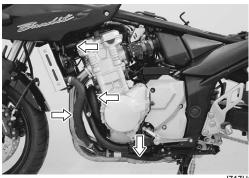
B817H21606007

Inspect the water hoses in the following procedures:

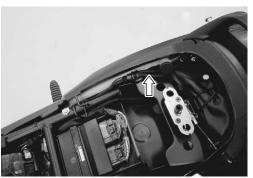
- 1) Remove the seat, right frame cover and fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Check the water hoses for crack, damage or engine coolant leakage. If any defect is found, replace the radiator hose with a new one.
- 3) Any leakage from the connecting section should be corrected by proper tightening. Refer to "Water Hose Routing Diagram (Page 1F-3)".



I717H1160011-01



I717H1160012-01



I717H1160013-0

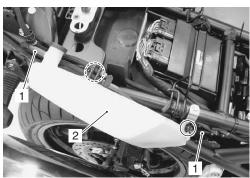
4) After finishing the water hose inspection, reinstall the removed parts.

# Radiator Reservoir Tank Removal and Installation

B817H21606008

## Removal

- Remove the seat tail cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the reservoir tank bolts.
- 3) Disconnect the hoses (1) and drain the engine coolant.
- 4) Remove the reservoir tank (2).



1717H1160014-02

## Installation

Install radiator reservoir tank in the reverse order of removal. Pay attention to the following points:

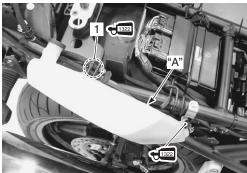
 Apply THREAD LOCK to the reservoir tank mounting bolts and tighten them.

## **NOTE**

Fit the clamp to bolt (1).

+322: Thread lock cement 99000-32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

 Fill the reservoir tank to the upper level "A". Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".



I717H1160018-01

"A": Upper level

## **Cooling Fan Inspection**

B817H21606009

# Cooling fan operating temperature Standard

(ON→OFF): Approx. 105 °C (221 °F) (OFF→ON): Approx. 100 °C (212 °F)

Inspect the cooling fan in the following procedures:

1) Disconnect the cooling fan motor coupler (1).

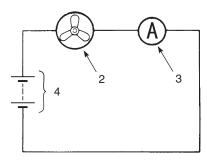


I717H1160016-01

2) Test the cooling fan motor for load current with an ammeter connected as shown in the figure. If the fan motor does not turn, replace the cooling fan assembly with a new one. Refer to "Radiator / Cooling Fan Motor Removal and Installation (Page 1F-5)".

#### **NOTE**

- When making this test, it is not necessary to remove the cooling fan.
- Make sure that the battery has a capacity enough to supply the motor with 12 V.
- With the motor running at full speed, the ammeter should indicate an amperage not higher than 5 A.



I718H1160048-01

2. Fan motor	<ol><li>Ammeter</li></ol>	4. Battery

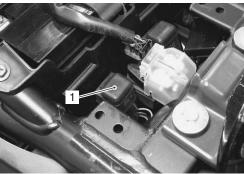
3) Connect the cooling fan motor coupler.

## **Cooling Fan Relay Inspection**

B817H21606010

Inspect the fan relay in the following procedures:

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the cooling fan relay (1).



I718H1160005-01

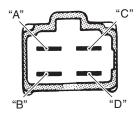
3) First check the insulation between "A" and "B" terminals with tester. Then apply 12 volts to "C" and "D" terminals, (+) to "C" and (–) to "D", and check the continuity between "A" and "B".

If there is no continuity, replace it with a new one.

## Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication set Continuity test ( •)))



I718H1160006-03

4) Reinstall the removed parts.

## **ECT Sensor Removal and Installation**

B817H21606011

Refer to "ECT Sensor Removal and Installation in Section 1C (Page 1C-2)".

## **ECT Sensor Inspection**

B817H21606012

Refer to "ECT Sensor Inspection in Section 1C (Page 1C-3)".

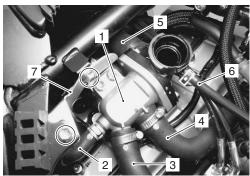
# Thermostat Connector / Thermostat Removal and Installation

B817H21606013

#### Removal

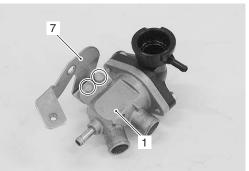
- 1) Drain a small amount of engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Disconnect the following parts from the thermostat connector (1).
  - Water bypass hose (2)
  - Cylinder outlet left hose (3)
  - Cylinder outlet right hose (4)
  - · Radiator inlet hose (5)
  - Reservoir tank inlet hose (6)

4) Remove the thermostat connector (1) along with bracket (7).



1717H1160017-01

5) Remove the bracket (7) from the thermostat connector (1).



I718H1160060-01

6) Remove the connector cap (8).



I718H1160049-01

7) Remove the thermostat (9).



I718H1160050-01

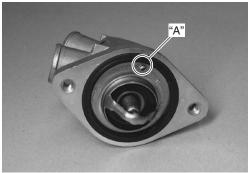
## Installation

Install the thermostat in the reverse order of removal. Pay attention to the following points:

· Install the thermostat.

#### **NOTE**

The jiggle valve "A" of the thermostat faces upside.



I718H1160007-01

Tighten the thermostat connector bolts to the specified torque.

## Tightening torque Thermostat connector bolt (a): 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)



I717H1160020-01

- Connect the water hoses securely. Refer to "Water Hose Routing Diagram (Page 1F-3)".
- Pour engine coolant and bleed air from the cooling circuit. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".

## **Thermostat Inspection**

B817H21606014

Inspect the thermostat in the following procedures:

- 1) Remove the thermostat. Refer to "Thermostat Connector / Thermostat Removal and Installation (Page 1F-9)".
- 2) Inspect the thermostat pellet for signs of cracking.

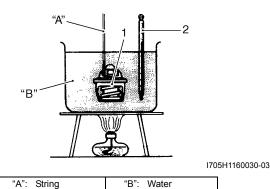


I718H1160051-01

3) Test the thermostat at the bench for control action.

#### **⚠ CAUTION**

- Do not contact the thermostat (1) and the column thermometer (2) with a pan.
- As the thermostat operating response to water temperature change is gradual, do not raise water temperature too quickly.
- The thermostat with its valve open even slightly under normal temperature must be replaced.
- 4) Immerse the thermostat (1) in the water contained in a beaker and note that the immersed thermostat is in suspension.
- 5) Heat the water by placing the beaker on a stove and observe the rising temperature on a thermometer (2).



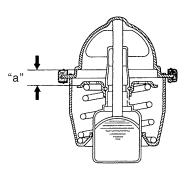
6) Read the thermometer just when opening the thermostat. If this reading, which is the temperature level at which the thermostat valve begins to open, is out of the standard value, replace the thermostat with a new one.

# Thermostat valve opening temperature Standard: Approx. 82 °C (180 °F)

- 7) Keep on heating the water to raise its temperature.
- 8) Just when the water temperature reaches specified value, the thermostat valve should have lifted by at least 8 mm (0.31 in). A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.

## Thermostat valve lift "a"

Standard: 8 mm and over at 95 °C (0.31 in and over at 203 °F)

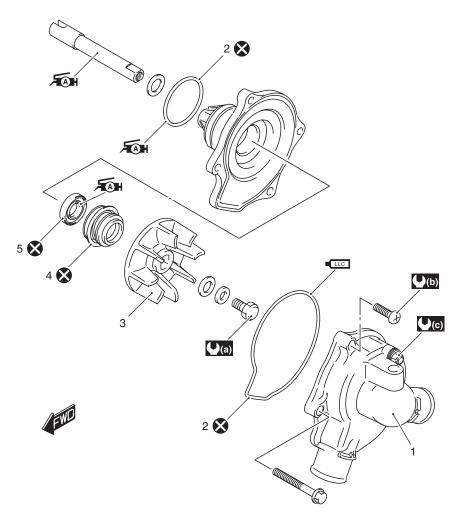


I705H1160031-04

9) Install the thermostat. Refer to "Thermostat Connector / Thermostat Removal and Installation (Page 1F-9)".

## **Water pump Components**

B817H21606015

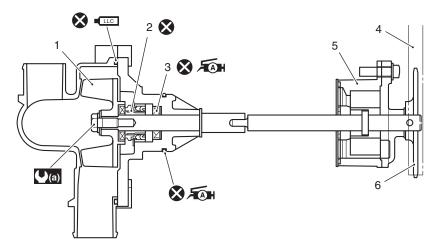


I718H1160062-01

Water pump case	Mechanical seal	(0.6 kgf-n, 4.5 lb-ft)	LLC : Apply engine coolant.
2. O-ring	5. Oil seal	(1.3 kgf-n, 9.5 lb-ft)	🔀 : Do not reuse.
3. Impeller	(0.8 kgf-n, 6.0 lb-ft)	ÆM : Apply grease.	

## **Water Pump Construction**

B817H21606016



I718H1160052-02

1. Impeller	<ol> <li>Oil pump drive chain</li> </ol>	<b>(a)</b> : 8 N⋅m (0.8 kgf-n, 6.0 lb-ft)	🐼 : Do not reuse.
Mechanical seal	5. Oil pump	ÆAH: Apply grease.	
3. Oil seal	Oil pump driven sprocket	LLC : Apply engine coolant.	

## Water Pump Removal and Installation

## Removal

B817H21606017

#### NOTE

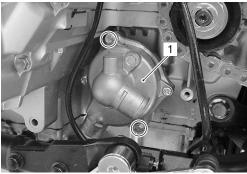
Before draining engine oil and engine coolant, inspect engine oil and coolant leakage between the water pump and crankcase. If engine oil is leaking, visually inspect the oil seal and O-ring. If engine coolant is leaking, visually inspect the mechanical seal and seal washer. Refer to "Water Pump Related Parts Inspection (Page 1F-16)".

- Drain engine oil and coolant. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)" and "Cooling System Inspection in Section 0B (Page 0B-14)".
- 2) Remove the engine sprocket covers, outer and inner. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- 3) Disconnect the water pump inlet hose (1).



I717H1160022-01

4) Remove the water pump (1).



1717H1160023-02

## Installation

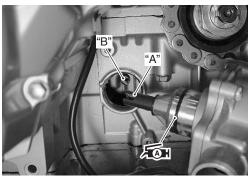
Install the water pump in the reverse order of removal. Pay attention to the following points:

· Apply GREASE to the O-ring.

## **⚠** CAUTION

Replace the O-ring with the a new one.

ர⊚்⊪ : Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent) Install the water pump assembly with the slot on the pump shaft end "A" securely engaged with the flat "B" on the oil pump shaft.



I717H1160024-01

· Tighten the water pump mounting bolts to the specified torque.

**Tightening torque** Water pump mounting bolt (a): 10 N·m (1.0 kgfm, 7.0 lbf-ft)



I717H1160025-01

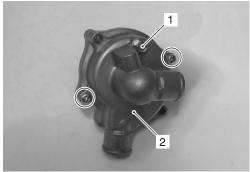
- · Connect the water hoses securely. Refer to "Water Hose Routing Diagram (Page 1F-3)".
- · Pour engine oil and coolant. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)" and "Cooling System Inspection in Section 0B (Page 0B-14)".
- · Bleed air from the cooling circuit. Refer to "Cooling System Inspection in Section 0B (Page 0B-14)".

# Water Pump Disassembly and Assembly B817H21606018

Refer to "Water Pump Removal and Installation (Page 1F-12)".

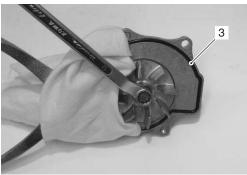
## Disassembly

- 1) Remove the air rent bolt (1) if necessary.
- 2) Remove the water pump case (2).



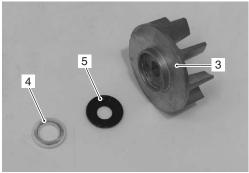
I718H1160054-01

- 3) Remove the O-ring (3).
- 4) Remove the impeller securing bolt by holding the impeller with a water pump pliers.



I718H1160012-01

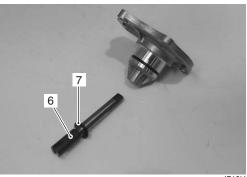
5) Remove the mechanical seal ring (4) and rubber seal (5) from the impeller (3).



I718H1160013-01

## 1F-14 Engine Cooling System:

6) Remove the impeller shaft (6) and washer (7).



I718H1160014-01

7) Remove the mechanical seal with the special tool.

## **NOTE**

If there is no abnormal condition, the mechanical seal removal is not necessary.

## Special tool

(A): 09921-20240 (Bearing remover set)



I718H1160055-01

8) Remove the oil seal.

## **NOTE**

If there is no abnormal condition, the oil seal removal is not necessary.



I718H1160016-01

## **Assembly**

1) Install the oil seal with the special tool.

## **⚠ CAUTION**

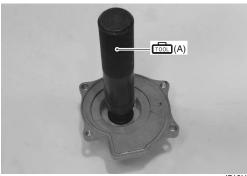
Replace the oil seal with a new one.

## **NOTE**

The stamped mark on the oil seal faces mechanical seal side.

## Special tool

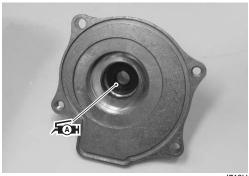
(A): 09913-70210 (Bearing installer set)



I718H1160056-01

2) Apply a small quantity of GREASE to the oil seal lip.

র⊛: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I718H1160057-01

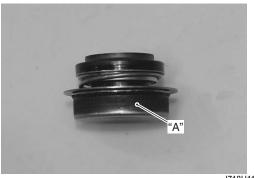
3) Install a new mechanical seal using a suitable size socket wrench.

## **⚠ CAUTION**

Replace the mechanical seal with a new one.

#### NOTE

On the new mechanical seal, the sealer "A" has been applied.



I718H1160058-01



I718H1160059-01

4) Apply GREASE to the impeller shaft.

# Æ⊪: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

5) Install the impeller shaft and washer (1) to the water pump body.

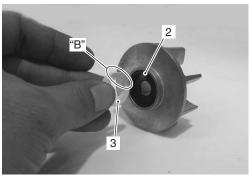


I718H1160017-01

- 6) Install the rubber seal (2) into the impeller.
- 7) After wiping off the oily or greasy matter from the mechanical seal ring (3), install it into the impeller.

#### **NOTE**

The paint marked side "B" of mechanical seal ring faces the rubber seal.

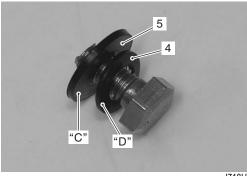


I718H1160018-01

8) Install the washer (4) and seal washer (5) onto the impeller securing bolt.

## **NOTE**

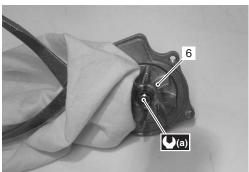
The metal side "C" of seal washer and the curved side "D" of washer face the impeller securing bolt head.



I718H1160019-02

9) Install the impeller (6) and tighten the impeller securing bolt to the specified torque.

# Tightening torque Impeller securing bolt (a): 8 N·m (0.8 kgf-m, 6.0 lbf-ft)



I718H1160021-02

10) Install a new O-ring (7) and apply engine coolant to it.

## **⚠ CAUTION**

Use a new O-ring to prevent engine coolant leakage.



I718H1160024-01

11) Fit the water pump case and tighten the water pump case screws to the specified torque.

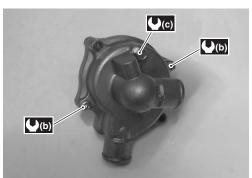
# Tightening torque Water pump case screw (b): 6 N⋅m (0.6 kgf-m, 4.5 lbf-ft)

12) Tighten the water pump air vent bolt to the specified torque.

## **⚠ CAUTION**

Use a new gasket washer to prevent engine coolant leakage.

# Tightening torque Water pump air vent bolt (c): 13 N⋅m (1.3 kgf-m, 9.5 lbf-ft)



I718H1160025-01

## Water Pump Related Parts Inspection

B817H21606019

Refer to "Water Pump Disassembly and Assembly (Page 1F-13)".

## **Mechanical Seal**

Visually inspect the mechanical seal for damage, with particular attention given to the sealing face. Replace the mechanical seal that shows indications of leakage.



I718H1160010-01

#### Oil Seal

Visually inspect the oil seal for damage, with particular attention given to the lip.

Replace the oil seal that shows indications of leakage.



I718H1160009-01

## Seal Washer

Visually inspect the seal washer for damage, with particular attention given to the sealing face. Replace the seal washer that shows indications of leakage.



I718H1160026-01

## Impeller / Shaft

Visually inspect the impeller and its shaft for damage. Replace the impeller or shaft if necessary.





I718H1160015-01

## Impeller Shaft Journal

Visually inspect the journal for damage or scratch. Replace the water pump body if necessary.



I718H1160027-01

## **Specifications**

## **Service Data**

## Thermostat + Radiator + Fan + Coolant

B817H21607001

Item	Specification		Note
Thermostat valve opening temperature	Approx. 82 °C (180 °F)		_
Thermostat valve it	8 mr	n (0.31 in) and over at 95 °C (203 °F)	_
	20 °C (68 °F)	Approx. 2.45 kΩ	_
ECT sensor resistance	50 °C (122 °F)	Approx. 0.811 kΩ	_
ECT Sensor resistance	80 °C (176 °F)	Approx. 0.318 kΩ	_
	110 °C (230 °F)	Approx. 0.142 kΩ	_
Radiator cap valve opening pressure	93 – 123 kPa (0.93 – 1.23 kgf/cm², 13.2 – 17.5 psi)		_
Cooling fan operating temperature	OFF→ON	Approx. 105 °C (221 °F)	_
	ON→OFF	Approx. 100 °C (212 °F)	_
Engine coolant type	Use an antifreeze/coolant compatible with aluminum radiator, mixed with distilled water only, at the ratio of 50:50		_
Engine coolant	Reserve tank side	Approx. 250 ml (0.3/0.2 US/lmp qt)	
Lingine coolant	Engine side	Approx. 2 750 ml (2.9/2.4 US/Imp qt)	_

## **Tightening Torque Specifications**

B817H21607002

Eastoning port	Tightening torque			Note
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Thermostat connector bolt	10	1.0	7.0	☞(Page 1F-10)
Water pump mounting bolt	10	1.0	7.0	☞(Page 1F-13)
Impeller securing bolt	8	0.8	6.0	☞(Page 1F-15)
Water pump case screw	6	0.6	4.5	☞(Page 1F-16)
Water pump air vent bolt	13	1.3	9.5	☞(Page 1F-16)

## **NOTE**

The specified tightening torque is also described in the following.

- "Water pump Components (Page 1F-11)"
- "Water Pump Construction (Page 1F-12)"

## Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

## **Recommended Service Material**

B817H21608001

Material	SUZUKI recommended produ	Note	
Grease	SUZUKI SUPER GREASE A or P/No.: 99000-25010		☞(Page 1F-12) /
	equivalent		☞(Page 1F-14) /
			☞(Page 1F-15)
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 1F-8)

## **NOTE**

Required service material is also described in the following.

- "Water pump Components (Page 1F-11)"
- "Water Pump Construction (Page 1F-12)"

## **Special Tool**

B817H21608002

_		
09900–25008	09913–70210	
Multi-circuit tester set	Bearing installer set	
☞(Page 1F-9)	☞(Page 1F-14)	
09921–20240		
Bearing remover set		
☞(Page 1F-14)		

Fuel System: 1G-1

## **Fuel System**

## **Precautions**

#### **Precautions for Fuel System**

B817H21700001

#### **▲ WARNING**

- · Keep away from fire or spark.
- During disassembling, use care to minimize spillage of gasoline.
- · Spilled gasoline should be wiped off immediately.
- · Work in a well-ventilated area.

#### **⚠ CAUTION**

- To prevent the fuel system (fuel tank, fuel hose, etc.) from contamination with foreign particles, blind all openings.
- After removing the throttle body, tape the cylinder intake section to prevent foreign particles from entering.

## **General Description**

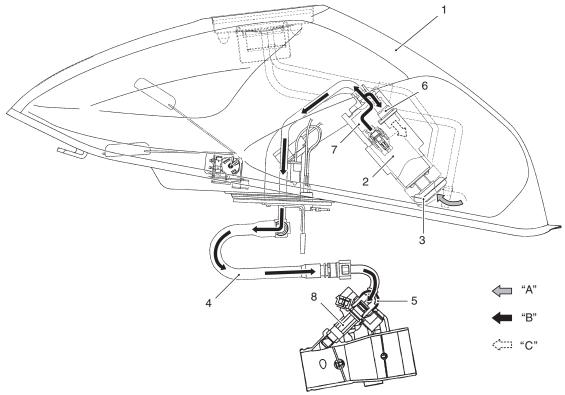
#### **Fuel System Description**

#### **Fuel System**

B817H21701001

The fuel delivery system consists of the fuel tank (1), fuel pump (2), fuel mesh filter (3), fuel feed hose (4), fuel delivery pipe (5) (including fuel injectors) and fuel pressure regulator (6). There is no fuel return hose. The fuel in the fuel tank (1) is pumped up by the fuel pump (2) and pressurized fuel flows into the injector (8) installed in the fuel delivery pipe (5). Fuel pressure is regulated by the fuel pressure regulator (6). As the fuel pressure applied to the fuel injector (8) (the fuel pressure in the fuel delivery pipe) is always kept at absolute fuel pressure of 300 kPa (3.0 kgf/cm², 43 psi), the fuel is injectored into the throttle body in conic dispersion when the injector (8) opens according to the injection signal from the ECM.

The fuel relieved by the fuel pressure regulator (6) flows back to the fuel tank (1).



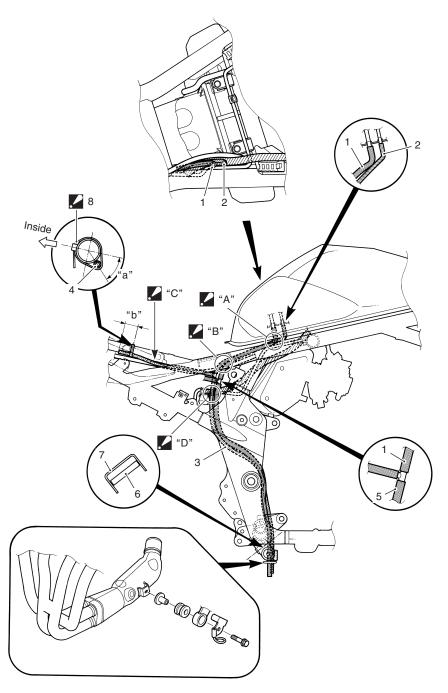
I718H1170001-02

1. Fuel tank	<ol><li>Fuel delivery pipe</li></ol>	"A": Before-pressurized fuel
2. Fuel pump	Fuel pressure regulator	"B": Pressurized fuel
Fuel mesh filter	7. Fuel filter (For high pressure)	"C": Relieved fuel
Fuel feed hose	8. Fuel injector	

## **Schematic and Routing Diagram**

## **Fuel Tank Drain Hose and Breather Hose Routing Diagram**

B817H21702001



I717H1170016-04

Fuel tank drain hose	<ul><li>8. Clamp</li><li>: Clamp end should face inside. Tip of clamp should face downward.</li></ul>
Fuel tank breather hose No.1	"A": Be careful not to bind the fuel tank drain hose and fuel tank breather hose with the other hoses and wire harness.
Fuel tank breather hose No.2	"B": Pass the breather hose and drain hose through outside the reservoir tank inlet hose.
4. Fuel tank breather hose No.3	"C": Be careful for the hose not to be slackened.
5. Air cleaner drain hose	"D": Pass the breather hose and drain hose through outside the brake pipe. Pass the breather hose and drain hose through ahead of connector.
6. Frame	"a": 45° ± 15°
7. Drain hose guide	"b": $30 \pm 10 \text{ mm} (1.2 \pm 0.4 \text{ in})$

## **Diagnostic Information and Procedures**

## **Fuel System Diagnosis**

B817H21704001

Condition	Possible cause	Correction / Reference Item
Engine will not start or is	Clogged fuel filter or fuel hose.	Clean or replace.
hard to start (No fuel	Defective fuel pump.	Replace.
reaching the intake	Defective fuel pressure regulator.	Replace.
manifold)	Defective fuel injectors.	Replace.
,	Defective fuel pump relay.	Replace.
	Defective ECM.	Replace.
	Open-circuited wiring connections.	Check and repair.
Engine will not start or is	Defective fuel pump.	Replace.
hard to start (Incorrect	Defective fuel pressure regulator.	Replace.
fuel/air mixture)	Defective TP sensor.	Replace.
·	Defective CKP sensor.	Replace.
	Defective IAP sensor.	Replace.
	Defective ECM.	Replace.
	Defective ECT sensor.	Replace.
	Defective IAT sensors.	Replace.
	Dirty throttle body.	Clean.
	Defective ISC valve.	Replace.
Engine stalls often	Defective IAP sensor or circuit.	Repair or replace.
(Incorrect fuel/air mixture)	Clogged fuel filter.	Clean or replace.
, and the second	Defective fuel pump.	Replace.
	Defective fuel pressure regulator.	Replace.
	Damaged or cracked vacuum hose.	Replace.
	Defective ECT sensor.	Replace.
	Defective thermostat.	Replace.
	Defective IAT sensor.	Replace.
	Defective ISC valve.	Replace.
Engine stalls often (Fuel	Defective fuel injectors.	Replace.
injector improperly	No injection signal from ECM.	Repair or replace.
operating)	Open or short circuited wiring	Repair or replace.
	connection.	
	Defective battery or low battery voltage.	
Engine runs poorly in	Low fuel pressure.	Repair or replace.
high speed range	Defective TP sensor.	Replace.
(Defective control circuit	Defective IAT sensor.	Replace.
or sensor)	Defective IAP sensor.	Replace.
	Defective ECM.	Replace.
	Defective STP sensor or STVA.	Replace.
	Defective GP switch.	Replace.
	Defective CKP sensor.	Replace.
Engine lacks power	Low fuel pressure.	Repair or replace.
(Defective control circuit	Defective TP sensor.	Replace.
or sensor)	Defective IAT sensor.	Replace.
	Defective CKP sensor.	Replace.
	Defective GP switch.	Replace.
	Defective IAP sensor.	Replace.
	Defective ECM.	Replace.
	Defective STP sensor or STVA.	Replace.

## **Repair Instructions**

#### **Fuel Pressure Inspection**

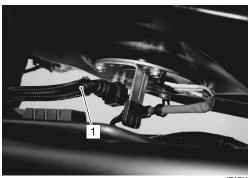
B817H21706001

#### **▲ WARNING**

- Keep away from fire or spark.
- Spilled gasoline should be wiped off immediately.
- · Work in a well-ventilated area.

Inspect the fuel pressure in the following procedures:

- 1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation (Page 1G-9)".
- 2) Place a rag under the fuel feed hose and disconnect fuel feed hose (1) from the fuel pump.



I717H1170001-01

3) Install the special tools between the fuel pump and fuel delivery pipe.

#### Special tool

(A): 09940–40211 (Fuel pressure gauge adapter)

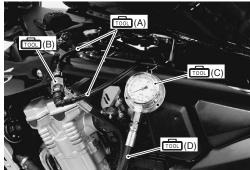
ான் (B): 09940-40220 (Fuel pressure gauge

hose attachment)

(C): 09915-77331 (Meter (for high

pressure))

(D): 09915-74521 (Oil pressure gauge hose)



I718H1170018-01

4) Turn the ignition ON and check for fuel pressure.

#### Fuel pressure Approx. 300 kPa (3.0 kgf/cm<sup>2</sup>, 43.5 psi)

If the fuel pressure is lower than the specification, check for the followings:

- Fuel hose leakage
- · Clogged fuel filter
- · Pressure regulator
- · Fuel pump

If the fuel pressure is higher than the specification, check for the followings:

- · Fuel pump
- Pressure regulator
- 5) Remove the special tools.

#### **▲ WARNING**

Before removing the special tools, turn the ignition switch OFF position and release the fuel pressure slowly.

6) Reinstall the fuel tank. Refer to "Fuel Tank Removal and Installation (Page 1G-9)".

#### **Fuel Pump Inspection**

B817H21706002

Turn the ignition switch ON and check that the fuel pump operates for a few seconds.

If the fuel pump motor does not make operating sound, inspect the fuel pump circuit connections or inspect the fuel pump relay and tip-over sensor. Refer to "Fuel Pump Relay Inspection (Page 1G-6)" and "TO Sensor Inspection in Section 1C (Page 1C-3)".

If the fuel pump relay, tip-over sensor and fuel pump circuit connections are OK, the fuel pump may be faulty, replace the fuel pump with a new one. Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation (Page 1G-11)".

#### **Fuel Discharge Amount Inspection**

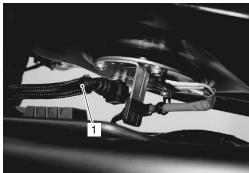
B817H21706003

#### **▲ WARNING**

- Keep away from fire or spark.
- Spilled gasoline should be wiped off immediately.
- Work in a well-ventilated area.

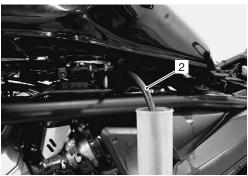
Inspect the fuel discharge amount in the following procedures:

- 1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation (Page 1G-9)".
- 2) Place a rag under the fuel feed hose (1) from the fuel pump.



I717H1170001-01

- 3) Connect a proper fuel hose (2) to the fuel pump.
- 4) Place the measuring cylinder and insert the fuel hose end into the measuring cylinder.



1718H1170014-01

5) Disconnect the fuel pump lead wire coupler (3).



I717H1170002-01

6) Connect a proper lead wire into the fuel pump lead wire coupler (fuel pump side) and apply 12 V to the fuel pump (between (+) Y/R wire and (–) B/W wire) for 10 seconds and measure the amount of fuel discharged.

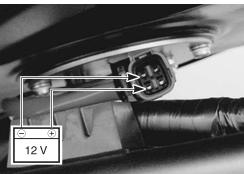
If the discharge amount is out of the specification, the probable cause may be failure of the fuel pump or clogged fuel filter.

#### NOTE

The battery must be in fully charged condition.

#### Fuel discharge amount

166 ml (5.6/5.8 US/Imp oz) and more/10 seconds



I717H1170003-01

7) After finishing the fuel discharge inspection, reinstall the fuel tank. Refer to "Fuel Tank Removal and Installation (Page 1G-9)".

### **Fuel Pump Relay Inspection**

B817H21706004

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

Inspect the fuel pump relay in the following procedures:

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the fuel pump relay (1).



I717H1170004-01

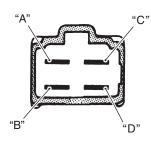
Fuel System: 1G-7

3) First, check for insulation with the tester between terminals "A" and "B". Next, check for continuity between "A" and "B" with 12 V voltage applied, positive (+) to terminal "C" and negative (-) to terminal "D". If continuity does not exist, replace the relay with a new one.

#### Special tool

: 09900-25008 (Multi-circuit tester set)

## Tester knob indication Continuity test ( •)))



I718H1170013-01

### **Fuel Hose Leakage Inspection**

B817H21706005

Refer to "Fuel Line Inspection in Section 0B (Page 0B-12)".

#### **Fuel Level Gauge Inspection**

B817H21706006

Refer to "Fuel Level Gauge Inspection in Section 9C (Page 9C-9)".

#### **Fuel Level Indicator Inspection**

B817H21706007

Refer to "Fuel Level Indicator Inspection in Section 9C (Page 9C-7)".

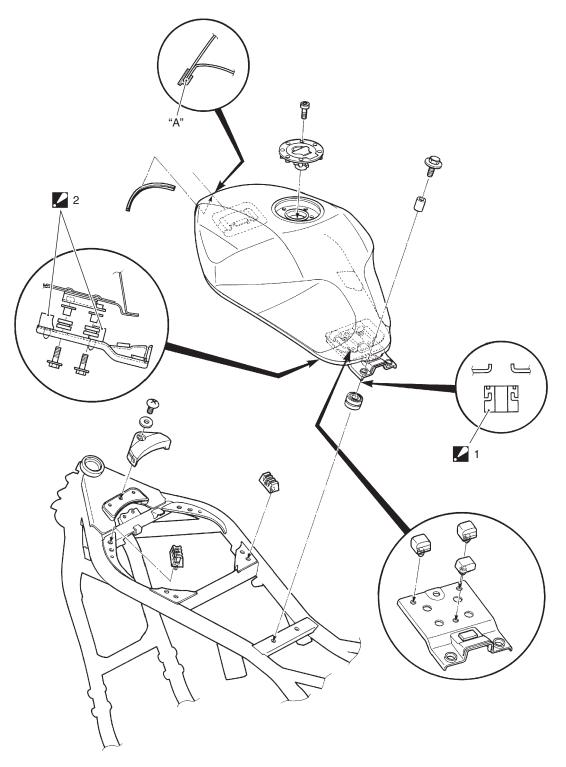
## **Fuel Level Indicator Switch (Thermistor) Inspection**

B817H21706008

Refer to "Fuel Level Indicator Switch (Thermistor) Inspection in Section 9C (Page 9C-8)".

### **Fuel Tank Construction**

B817H21706009



I717H1170005-04

Fuel tank rear cushion : Be careful not to mistake the assembling position and direction.

Rear bracket cushionBe careful not to mistake the assembling position and direction.

"A": Apply adhesive agent to the cushion rubber.

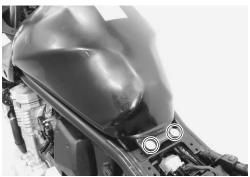
#### **Fuel Tank Removal and Installation**

B817H21706010

#### Removal

#### **▲ WARNING**

- · Keep away from fire or spark.
- Spilled gasoline should be wiped off immediately.
- · Work in a well-ventilated area.
- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the fuel tank mounting bolts.

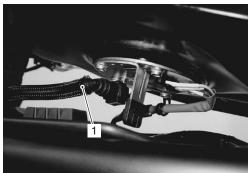


1717H1170006-0

3) Place a rag under the fuel feed hose and disconnect the fuel feed hose (1).

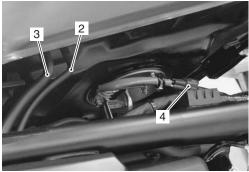
#### **⚠ CAUTION**

When removing the fuel tank, do not leave the fuel feed hose (1) on the fuel pump side.



I717H1170001-01

- 4) Disconnect the fuel tank air breather hose (2) and water drain hose (3).
- 5) Disconnect the fuel pump lead wire coupler (4).
- 6) Remove the fuel tank.



I717H1170007-01

#### Installation

Install the fuel tank in the reverse order of removal. Pay attention to the following points:

#### **⚠ CAUTION**

Be careful not to bend the hoses. Refer to "Fuel Tank Drain Hose and Breather Hose Routing Diagram (Page 1G-3)".

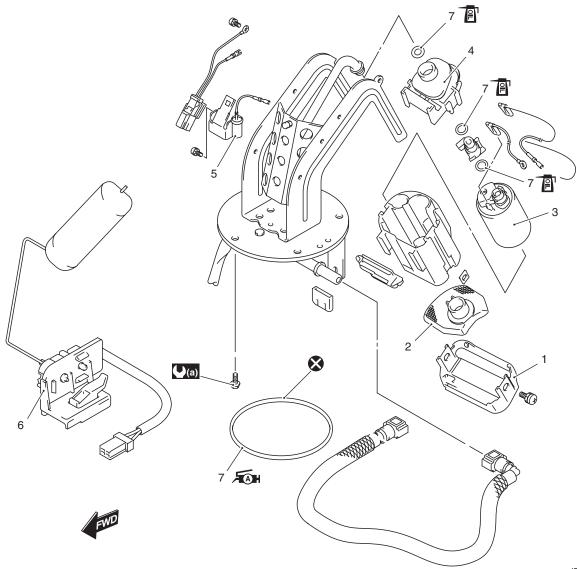
 Connect the fuel feed hose (1) until it locks securely (a click is heard).



I717H1170001-01

## **Fuel Pump Components**

B817H21706011



1718	H117	7000	2-03

1. Vessel	5. Thermistor	ÆAH: Apply grease.
Fuel mesh filter	Fuel level gauge	🗴 : Do not reuse.
3. Fuel pump	7. O-ring	(a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Fuel pressure regulator assembly	: Apply engine oil.	

## Fuel Pump Assembly / Fuel Level Gauge Removal and Installation

B817H21706012

#### Removal

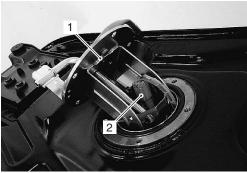
#### **▲ WARNING**

- Spilled gasoline should be wiped off immediately.
- · Keep away from fire or spark.
- · Work in a well-ventilated area.
- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation (Page 1G-9)".
- 2) Remove the fuel pump mounting bolts diagonally.



I717H1170008-02

3) Remove the fuel pump assembly (1) and disconnect the fuel level gauge lead wire coupler (2).



I718H1170025-02

4) Remove the fuel level gauge (3) while pushing the pawl end "A".

#### **⚠ CAUTION**

Do not pull the lead wire when removing the fuel gauge.



I718H1170026-02

#### Installation

Install the fuel pump assembly in the reverse order of removal. Pay attention the following points:

• Install the fuel level gauge (1) into the fuel tank.

#### **NOTE**

Push the lock position "A" fully until the clicking sound heard.



I718H1170024-02

· Apply grease to the O-ring (2).

#### **A** CAUTION

Replace the O-ring with a new one.

**AM:** Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I718H1170027-02

 When installing the fuel pump assembly, first tighten all the fuel pump mounting bolts lightly and then to the specified torque as shown.

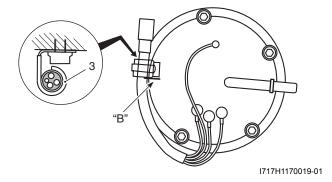
#### **NOTE**

Install the clamp (3) so that its base is located in parallel with the line "B" on the fuel pump.

Tightening torque Fuel pump mounting bolt: 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)



I717H1170009-02



## Fuel Level Gauge and Fuel Level Indicator Switch Inspection

B817H21706013

Refer to "Fuel Level Gauge Inspection in Section 9C (Page 9C-9)" and "Fuel Level Indicator Switch (Thermistor) Inspection in Section 9C (Page 9C-8)".

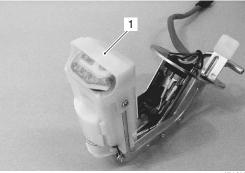
### **Fuel Pump Disassembly and Assembly**

B817H2170601

Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation (Page 1G-11)".

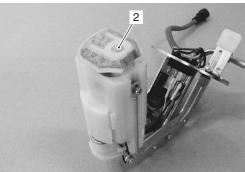
#### Disassembly

1) Remove the vessel (1).



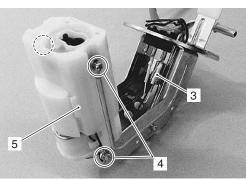
I718H1170029-01

2) Remove the fuel mesh filter (2).



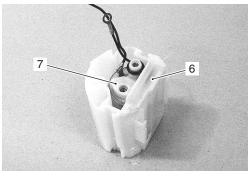
I718H1170030-01

- 3) Disconnect the lead wire (BI) (3) and remove the connecting screw (4).
- 4) Remove the fuel pump assembly (5).



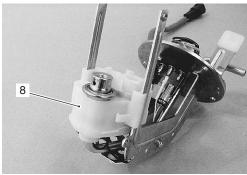
I717H1170010-01

5) Remove the cup cover (6) and fuel pump (7) from the reservoir cup.



1717H1170011-01

6) Remove the fuel pressure regulator holder (8).

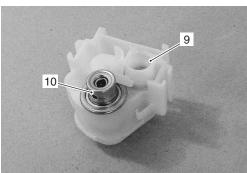


I717H1170012-01

7) Remove the joint (9).

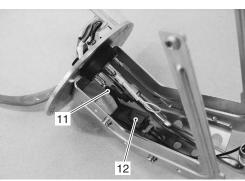
#### **⚠ CAUTION**

Never remove the fuel pressure regulator (10) from the holder.



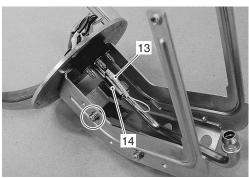
I717H1170013-01

8) Disconnect the lead wire (BI) (11) and remove the fuel level gauge coupler (12).



I717H1170014-01

9) Disconnect the lead wire (W) (13) and remove the thermistor (14).



I717H1170015-01

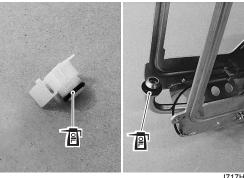
#### Assembly

Refer to "Fuel Mesh Filter Inspection and Cleaning (Page 1G-14)".

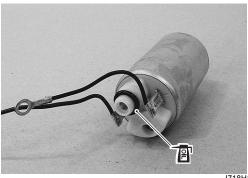
Assemble the fuel tank pump in the reverse order of the disassembly. Pay attention to the following points:

#### **⚠** CAUTION

- · To prevent fuel leakage, each O-ring must be replaced with a new one.
- · Apply engine oil lightly to each of the Orings.

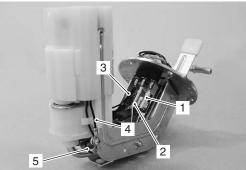


I717H1170017-01



I718H1170039-01

Connect all wiring couplers securely so as not to cause contact failure.



I718H1170037-01

- 1. Fuel pump (+) lead wire (BI)
- 2. Fuel level thermistor lead wire (W)
- Fuel level gauge (+) lead wire (BI)
- Fuel pump (-) lead wire (B)
- 5. Fuel level gauge (-) lead wire (B)

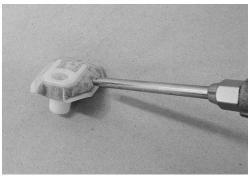
# Fuel Mesh Filter Inspection and Cleaning B817H21706015

Inspect the fuel mesh filter in the following procedures:

- 1) Remove the fuel mesh filter. Refer to "Fuel Pump Disassembly and Assembly (Page 1G-12)".
- 2) If the fuel mesh filter is clogged with foreign particles, it hinders smooth gasoline flow resulting in loss of engine power. Such a filter should be cleaned by blowing with compressed air.

#### NOTE

When the fuel mesh filter is dirtied excessively, replace the fuel filter cartridge with a new one.



I718H1170003-01

3) After finishing the fuel mesh filter inspection, reinstall the fuel mesh filter. Refer to "Fuel Pump Disassembly and Assembly (Page 1G-12)".

#### **Fuel Hose Inspection**

B817H21706016

Refer to "Fuel Line Inspection in Section 0B (Page 0B-12)".

#### Fuel Injector / Fuel Delivery Pipe / T-joint Removal and Installation

B817H21706017

Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-11)".

Fuel System: 1G-15

### **Fuel Injector Inspection and Cleaning**

B817H21706018

Inspect the fuel injector in the following procedures:

- 1) Remove the fuel injector. Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-11)".
- 2) Check the fuel injector filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in the fuel lines and fuel tank.



I718H1170012-01

3) Install the fuel injector. Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-11)".

## **Specifications**

#### **Service Data**

#### Injector + Fuel Pump + Fuel Pressure Regulator

B817H21707001

Item	Specification	Note
Injector resistance	Approx. 11 – 13 Ω at 20 °C (68 °F)	_
Fuel pump discharge amount	166 ml and more For 10 sec., at 300 kPa (3.0 kgf/cm², 43 psi)	_
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm <sup>2</sup> , 43 psi)	_

#### Fuel

Item	Specification	Note	
	Use only unleaded gasoline of at least 87 pump or		
	octane (R/2 + M/2) or higher rated by the research	h method.	
	Gasoline containing MTBE (Methyl Tertiary Butyl E	Ether), less E-28	
Fuel type	than 10% ethanol, or less than 5% methanol with		
appropriate cosolvents and corrosion inhibitor is permissible.		ermissible.	
	Gasoline used should be graded 91 octane or hig	Gasoline used should be graded 91 octane or higher. An Others	
	unleaded gasoline type is recommended.	Others	
Fuel tank capacity	Including reserve 19 L (5.0/4.2 US/Imp g	gal)	

### **Tightening Torque Specifications**

B817H21707002

Eastoning part	Tightening torque			Note
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Fuel pump mounting bolt	10	1.0	7.0	☞(Page 1G-12)

#### **NOTE**

The specified tightening torque is also described in the following.

"Fuel Pump Components (Page 1G-10)"

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

### **Recommended Service Material**

B817H21708001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	☞(Page 1G-12)
	equivalent		

### **NOTE**

Required service material is also described in the following. "Fuel Pump Components (Page 1G-10)"

## **Special Tool**

B817H21708002

		B817H21708002
09900–25008	09915–74521	
Multi-circuit tester set	Oil pressure gauge hose	
☞(Page 1G-7)	☞(Page 1G-5)	
09915–77331	09940–40211	
Meter (for high pressure)	Fuel pressure gauge adapter	
☞(Page 1G-5)	☞(Page 1G-5)	
09940–40220		
Fuel pressure gauge hose		
attachment		
☞(Page 1G-5)		

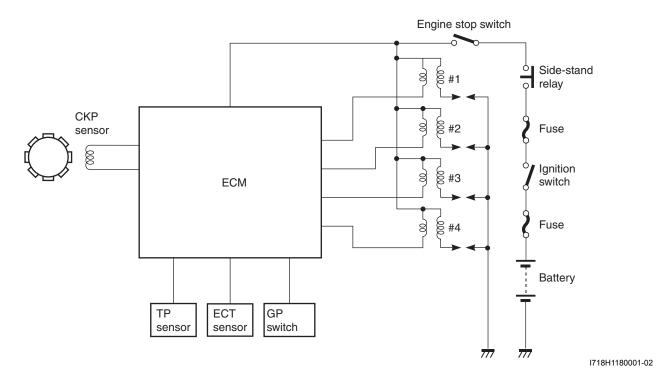
## **Ignition System**

## **Schematic and Routing Diagram**

#### **Ignition System Diagram**

B817H21802001

Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".



### **Ignition System Components Location**

B817H21802002

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

## **Diagnostic Information and Procedures**

### **Ignition System Symptom Diagnosis**

B817H21804001

Condition	Possible cause	Correction / Reference Item
Spark plug not sparking	Damaged spark plug.	Replace.
	Fouled spark plugs.	Clean or replace.
	Wet spark plugs.	Clean and dry or replace.
	Defective ignition coil/plug caps.	Replace.
	Defective CKP sensor.	Replace.
	Defective ECM.	Replace.
	Open-circuited wiring connections.	Repair or replace.
Engine stalls easily. (No	Fouled spark plugs.	Clean or replace.
spark)	Defective CKP sensor.	Replace.
	Defective ECM.	Replace.
Spark plug is wet or	Excessively rich air/fuel mixture.	Inspect FI system.
quickly becomes fouled	Excessively high idling speed.	Inspect FI system.
with carbon.	Incorrect gasoline.	Change.
	Dirty air cleaner element.	Clean or replace.
	Incorrect spark plug (Cold type).	Change to hot type spark plug.

## 1H-2 Ignition System:

Condition	Possible cause	Correction / Reference Item
Spark plug quickly	Worn piston rings.	Replace.
becomes fouled with oil	Worn pistons.	Replace.
or carbon.	Worn cylinders.	Rebore or replace.
	Excessive valve-stem to valve-guide	Replace.
	clearance.	
	Worn valve stem oil seals.	Replace.
Spark plug electrodes	Incorrect spark plug (Hot type).	Change to cold type spark plug.
overheat or burn.	Overheated engine.	Tune-up.
	Loose spark plugs.	Tighten.
	Excessively lean air/fuel mixture.	Inspect FI system.

## No Spark or Poor Spark

B817H21804002

## Troubleshooting

#### NOTE

Check that the transmission is in neutral and the engine stop switch is in the "RUN" position. Grasp the clutch lever. Check that the fuse is not blown and the battery is fully-charged before diagnosing.

Step	Action	Yes	No
1	Check the ignition system couplers for poor connections.  Is there connection in the ignition system couplers?	Go to step 2.	Poor connection of couplers.
3	Measure the battery voltage between input lead wires at the ECM with the ignition switch in the "ON" position. (E02, 19: O/G, E28: O/W)  Is the voltage OK?  Measure the ignition coil primary peak voltage. Refer to	Go to Step 3.  Go to step 4.	<ul> <li>Faulty ignition switch.</li> <li>Faulty turn signal/ side-stand relay.</li> <li>Faulty engine stop switch.</li> <li>Broken wire harness or poor connection of related circuit couplers.</li> <li>Go to step 5.</li> </ul>
	"Ignition Coil / Plug Cap Inspection (Page 1H-4)".  NOTE  This inspection method is applicable only with the multi-circuit tester and the peak volt adaptor.  Is the peak voltage OK?		or to stop or
4	Inspect the spark plugs. Refer to "Spark Plug Inspection and Cleaning in Section 0B (Page 0B-5)".  Is the spark plug(-s) OK?	Go to Step 5.	Faulty spark plug(-s).
5	Inspect the ignition coil/plug cap(-s). Refer to "Ignition Coil / Plug Cap Inspection (Page 1H-4)".  Is the ignition coil/plug cap(-s) OK?	Go to step 6.	<ul> <li>Faulty ignition coil/ plug cap(-s).</li> <li>Poor connection of the ignition coil/plug cap(-s).</li> </ul>
6	Measure the CKP sensor peak voltage and its resistance. Refer to "CKP Sensor Inspection (Page 1H-6)".  NOTE  The CKP sensor peak voltage inspection is applicable only with the multi-circuit tester and peak volt adaptor.	<ul> <li>Faulty ECM.</li> <li>Open or short circuit in wire harness.</li> <li>Poor connection of ignition couplers.</li> </ul>	<ul> <li>Faulty CKP sensor.</li> <li>Metal particles or foreign material being stuck on the CKP sensor and rotor tip.</li> </ul>
	Is the peak voltage and resistance OK?		

## **Repair Instructions**

## Ignition Coil / Plug Cap and Spark Plug Removal and Installation

Removal

B817H21806001

#### **▲ WARNING**

The hot engine can burn you.

Wait until the engine is cool enough to touch.

- 1) Turn the ignition switch OFF position.
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Remove the frame head cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)". (GSF650)
- 4) Disconnect all lead wire couplers (1) from ignition coil/plug caps.

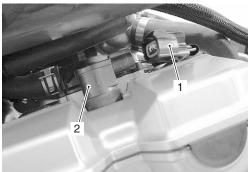
#### **⚠ CAUTION**

Disconnect the lead wire coupler before removing the ignition coil/plug cap to avoid lead wire coupler damage.

5) Remove the ignition coils/plug caps (2).

#### **⚠** CAUTION

- Do not pry up the ignition coil/plug cap with a screw driver or a bar to avoid its damage.
- Be careful not to drop the ignition coil/plug cap to prevent short/open circuit.

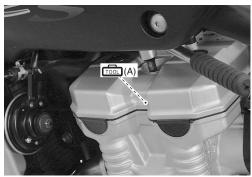


I717H1180001-01

6) Remove the spark plugs with a spark plug wrench.

#### Special tool

(A): 09930-10121 (Spark plug wrench set)



I717H1180002-02

#### Installation

Install the spark plugs in the reverse order of removal. Pay attention to the following points:

 Screw the spark plugs into the cylinder head with fingers, and then tighten them to the specified torque.

#### **⚠ CAUTION**

Do not cross thread or over tighten the spark plug, or such an operation will damage the aluminum threads of the cylinder head.

#### Special tool

(A): 09930-10121 (Spark plug wrench set)

#### **Tightening torque**

Spark plug: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

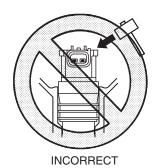


717H1180003-02

 Install the ignition coil/plug caps and connect their lead wire couplers.

#### **⚠ CAUTION**

Do not hit the ignition coil/plug cap with a plastic hammer when installing it.



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1717H1180004-01

#### Spark Plug Inspection and Cleaning

B817H21806002

Refer to "Spark Plug Inspection and Cleaning in Section 0B (Page 0B-5)".

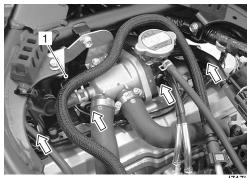
#### Ignition Coil / Plug Cap Inspection

B817H21806003

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

#### **Ignition Coil Primary Peak Voltage**

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Disconnect all ignition coil/plug cap and PAIR control solenoid valve coupler (1). Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation (Page 1H-3)".



1717H1180005-01

- 3) Connect new spark plug to each ignition coil/spark plug cap.
- 4) Connect all the ignition coil/plug cap lead wire couplers to the ignition coil/plug caps respectively, and ground them on the cylinder head.

#### **NOTE**

Be sure that all the spark plugs are connected properly and the battery used is in fully-charged condition.



I718H1180015-01

5) Insert the needle pointed probe to the lead wire coupler.

#### NOTE

Use the special tool, to prevent the rubber of the water proof coupler from damage.

6) Connect the multi-circuit tester with the peak voltage adaptor as follows.

#### **⚠ CAUTION**

Before using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

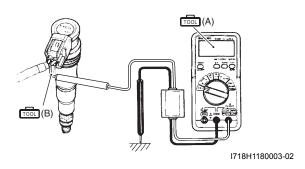
#### Special tool

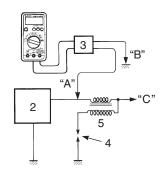
(A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe

set)

#### Tester knob indication: Voltage ( == )

	((+) Probe)	((-) Probe)
Ignition coil/Plug cap #1	Green wire terminal	Ground
Ignition coil/Plug cap #2	W/BI wire terminal	Ground
Ignition coil/Plug cap #3	Black wire terminal	Ground
Ignition coil/Plug cap #4	Yellow wire terminal	Ground





I718H1180004-02

2. ECM	"A": (+) probe
<ol><li>Peak voltage adaptor</li></ol>	"B": (–) probe
New spark plug	"C": For engine stop switch
5. Ignition coil	

7) Measure the ignition coil primary peak voltage in the following procedures.

#### **A WARNING**

Do not touch the tester probes and spark plugs to prevent an electric shock while testing.

- a) Shift the transmission into neutral, turn the ignition switch ON and grasp the clutch lever.
- b) Press the starter button and allow the engine to crank for a few seconds, and then measure the ignition coil primary peak voltage.

8) Repeat the b) procedure a few times and measure the highest peak voltage.

If the voltage is lower than standard range, inspect the ignition coil/plug cap and the CKP sensor.

## Ignition coil primary peak voltage 80 V and more

9) After measuring the ignition coil primary peak voltage, reinstall the removed parts.

#### Ignition Coil / Plug Cap Resistance

- 1) Remove the ignition coil/plug caps. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation (Page 1H-3)".
- 2) Measure the ignition coil/plug cap for resistance in both primary and secondary coils. If the resistance is not within the standard range, replace the ignition coil/plug cap with a new one.

#### Special tool

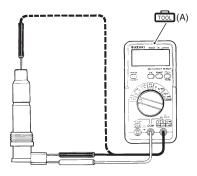
(A): 09900-25008 (Multi-circuit tester set)

#### Tester knob indication

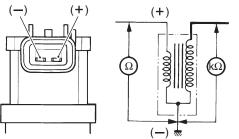
Resistance ( $\Omega$ )

#### **Ignition coil resistance**

Primary: 1.1 – 1.9  $\Omega$  ((+) terminal – (–) terminal) Secondary: 10.8 – 16.2 k $\Omega$  (Spark plug cap – (–) terminal)



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I718H1180006-01

3) After measuring the ignition coil/plug cap resistance, reinstall the removed parts.

#### **CKP Sensor Inspection**

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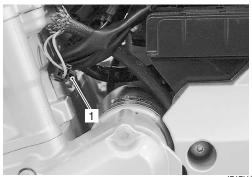
Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

#### **CKP Sensor Peak Voltage**

1) Disconnect the CKP sensor coupler (1).

#### **NOTE**

Be sure that all of the couplers are connected properly and the battery is fully-charged.



I717H1180006-01

2) Connect the multi-circuit tester with the peak volt adaptor as follows.

#### **⚠ CAUTION**

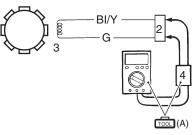
Before using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

#### Special tool

(A): 09900-25008 (Multi-circuit tester set)

Tester knob indication: Voltage ( === )

Ignitor coupler	(+) Probe	(–) Probe
ignitor coupler	BI/Y	G



I718H1180007-02

CKP sensor coupler	Peak voltage adaptor
<ol><li>CKP sensor</li></ol>	

- Measure the CKP sensor peak voltage in the following procedure.
  - a) Shift the transmission into neutral, turn the ignition switch ON and grasp the clutch lever.
  - b) Press the starter button and allow the engine to crank for a few seconds, and then measure the CKP sensor peak voltage.

4) Repeat the b) procedure a few times and measure the highest CKP sensor peak voltage.

#### CKP sensor peak voltage 2.0 V and more (B/BI – Y/W)

5) If the peak voltage is within the specification, check the continuity between the CKP sensor coupler and ECM coupler.

#### **↑** CAUTION

Normally, use the needle pointed probe to the backside of the lead wire coupler to prevent the terminal bend and terminal alignment.

6) After measuring the CKP sensor peak voltage, connect the CKP sensor coupler.

#### **CKP Sensor Resistance**

1) Disconnect the CKP sensor coupler (1).

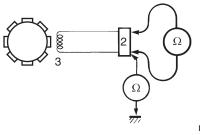


I717H1180007-01

2) Measure the resistance between the lead wires and ground. If the resistance is not within the standard range, replace the CKP sensor with a new one. Refer to "CKP Sensor Removal and Installation (Page 1H-7)".

## Tester knob indication Resistance ( $\Omega$ )

#### CKP sensor resistance Approx. 90 – 150 $\Omega$ (BI/Y – Green) $\infty$ $\Omega$ (BI/Y – Ground)



I718H1180008-02

CKP sensor coupler
 3. CKP sensor

3) After measuring the CKP sensor resistance, connect the CKP sensor coupler.

#### **CKP Sensor Removal and Installation**

3817H21806005

Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".

#### **Engine Stop Switch Inspection**

B817H21806006

Inspect the engine stop switch in the following procedures:

- 1) Turn the ignition switch OFF.
- 2) Remove the right frame head cover. (GSF650) Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the right handlebar switch coupler (1).



I718H1180017-01

4) Inspect the engine stop switch for continuity with a tester.

If any abnormality is found, replace the right handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".

#### Special tool

: 09900-25008 (Multi-circuit tester set)

## Tester knob indication Continuity ( •)))

Color	B/BI	B/R
OFF (⋈)		
RUN ()	<u> </u>	
		I649G1180022-02

5) After finishing the engine stop switch inspection, reinstall the removed parts.

### **Ignition Switch Inspection**

B817H21806007

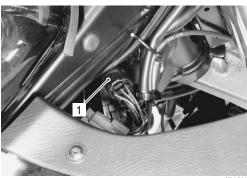
Refer to "Ignition Switch Inspection in Section 9C (Page 9C-11)".

#### **Ignition Switch Removal and Installation**

3817H21806008

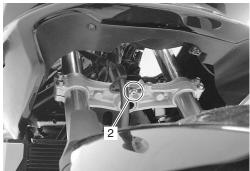
#### Removal

- 1) Support the motorcycle with the center stand.
- 2) Remove the right frame head cover (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the ignition switch coupler (1) and clamp.



I718H1180018-01

4) Remove the brake hose clamp bolt (2).



I717H1180008-01

- 5) Remove the combination meter bracket bolts (GSF650) or cable guides (3) (GSF650S).
- 6) Dismount the handlebars by removing the handlebar holder set nuts.

#### NOTE

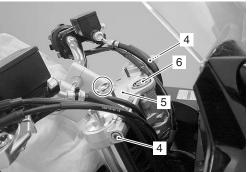
Place a rag on the fuel tank to prevent the fuel tank scratched.



I717H1180009-03

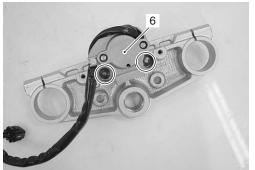
#### 1H-8 Ignition System:

- 7) Loosen the front fork upper clamp bolts (4).
- 8) Remove the steering stem head nut and washer.
- 9) Remove the steering stem upper bracket (5) along with the ignition switch (6).



I717H1180010-02

- 10) Using a center punch, remove the ignition switch mounting bolts.
- 11) Remove the ignition switch (6) from the upper bracket.



I717H1180011-01

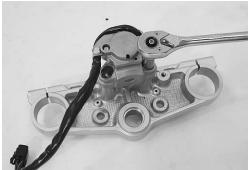
#### Installation

Install the ignition switch in the reverse order of removal. Pay attention to the following points:

- · Install the ignition switch and new bolts.
- · Tighten each bolt until its head is broken off.

#### **NOTE**

The spare ignition switch comes equipped with the special bolts, however, the bolts are also individually available as spare parts.



I717H1180012-01

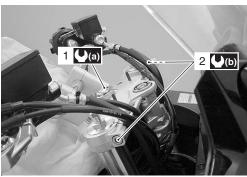
• First tighten the steering stem head nut (1), then tighten the front fork upper clamp bolts (2).

#### **Tightening torque**

32.5 lbf-ft)

Steering stem head nut (a): 65 N·m (6.5 kgf-m, 47.0 lbf-ft)

Front fork upper clamp bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



1717H1180013-0

 Tighten the handlebar holder set nuts (3) to the specified torque.

## Tightening torque Handlebar holder set nut (c): 45 N⋅m (4.5 kgf-m,

 Route the cables, hoses and lead wires. Refer to "Throttle Cable Routing Diagram (GSF650/S/A/SAK7) in Section 1D (Page 1D-2)", "Front Brake Hose Routing Diagram (GSF650) in Section 4A (Page 4A-1)", "Front Brake Hose Routing Diagram (GSF650S) in Section 4A (Page 4A-2)", "Wiring Harness Routing Diagram (GSF650/S/A/SAK7) in Section 9A (Page 9A-8)".



1717H1180014-01

## **Specifications**

#### **Service Data**

B817H21807001

Electrical Unit: mm (in)

Item	Specification		Note
Firing order	1 · 2 · 4 · 3		
	Туре	NGK: CR9E DENSO: U27ESR-N	
Spark plug	Gap	0.7 – 0.8 (0.028 – 0.031)	
Spark performance	C	Over 8 (0.3) at 1 atm.	
CKP sensor resistance		90 – 150 Ω	
CKP sensor peak voltage		2.0 V and more	When cranking
Ignition coil resistance	Primary	1.1 – 1.9 Ω	Terminal – Terminal
Ignition con resistance	Secondary	10.8 – 16.2 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage	80 V and more		When cranking

## **Tightening Torque Specifications**

B817H21807002

Eastoning part	Т	ightening torq	Note	
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Spark plug	11	1.1	8.0	☞(Page 1H-3)
Steering stem head nut	65	6.5	47.0	☞(Page 1H-8)
Front fork upper clamp bolt	23	2.3	16.5	☞(Page 1H-8)
Handlebar holder set nut	45	4.5	32.5	☞(Page 1H-8)

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

Special Tool

B817H21808001

		B01/H21000001
09900–25008 Multi-circuit tester set (Page 1H-4) / (Page 1H-	Needle pointed probe set (Page 1H-4)	
5) / F(Page 1H-6) / F(Page 1H-7)		
09930–10121		
Spark plug wrench set  (Page 1H-3) / (Page 1H-3)		

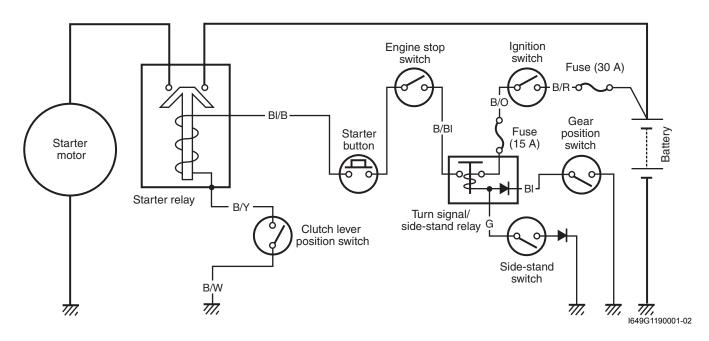
## **Starting System**

## **Schematic and Routing Diagram**

### **Starting System Diagram**

Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".

B817H21902001



## **Component Location**

#### **Starting System Components Location**

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

B817H21903001

## **Diagnostic Information and Procedures**

### **Starting System Symptom Diagnosis**

B817H21904001

Condition	Possible cause	Correction / Reference Item
Engine does not turn	Faulty starter clutch	Replace.
though the starter motor		
runs		
Starter button is not	Run down battery.	Repair or replace.
effective	Defective switch contacts.	Replace.
	Brushes not seating properly on starter	Repair or replace.
	motor commutator.	
	Defective starter relay or starter interlock	Replace.
	switch.	
	Defective main fuse.	Replace.

Starting System: 11-2

#### Starter motor will not run

NOTE

B817H21904002

Make sure the fuses are not blown and the battery is fully-charged before diagnosing.

#### **Troubleshooting**

Step	Action	Yes	No
1	<ol> <li>Shift the transmission into neutral.</li> <li>Grasp the clutch lever, turn on the ignition switch with the engine stop switch in the "RUN" position and listen for a click from the starter relay when the starter button is pushed.</li> </ol> Is a click sound heard?	Go to step 2.	Go to step 3.
2	Check if the starter motor runs when its terminal is connected to the battery (+) terminal. (Do not use thin "wire" because a large amount of current flows.)  Does the starter motor run?	<ul> <li>Faulty starter relay</li> <li>Loose or disconnected starter motor lead wire</li> <li>Loose or disconnected between starter relay and battery (+) terminal.</li> </ul>	Faulty starter motor.
3	Measure the starter relay voltage at the starter relay connectors (between B/BI (+) and B/Y (–)) when the starter button is pushed.  Is a voltage OK?	Go to Step 4.	<ul> <li>Faulty ignition switch</li> <li>Faulty engine stop switch</li> <li>Faulty clutch lever position switch</li> <li>Faulty gear position switch</li> <li>Faulty turn signal/ side-stand relay</li> <li>Faulty starter button</li> <li>Faulty side-stand switch</li> <li>Poor contact of connector</li> <li>Open circuit in wire harness</li> </ul>
4	Check the starter relay. Refer to "Starter Relay Inspection (Page 1I-7)".	Poor contact of the starter relay.	Faulty starter relay.
	Is the starter relay OK?		

### Starter Motor Runs but Does not Crank the Engine

B817H2190400

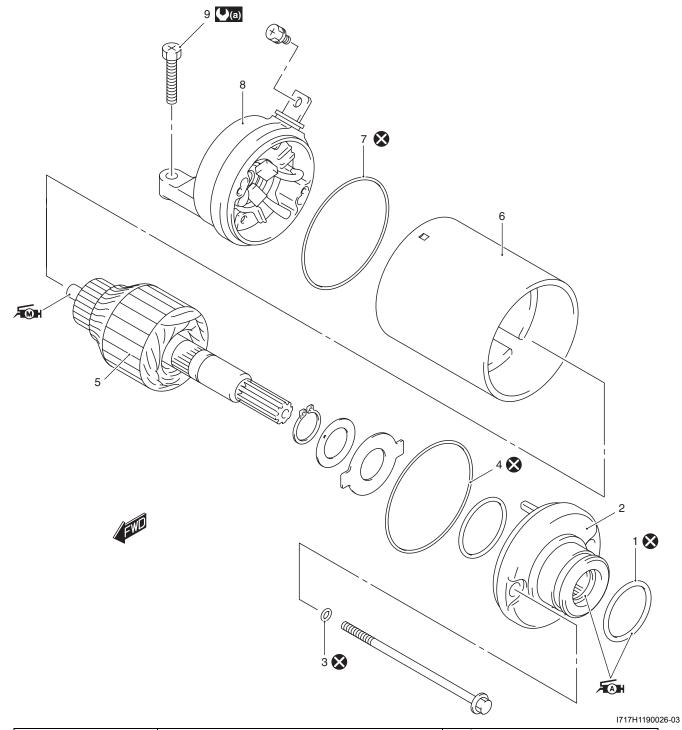
The starter motor runs when the transmission is in neutral, but does not run when the transmission is in any position other than neutral, with the side-stand up.

Step	Action	Yes	No
1	Check the side-stand switch. Refer to "Side-stand / Ignition	Go to Step 2.	Faulty side-stand
	Interlock System Parts Inspection (Page 1I-8)".		switch.
	Is the side-stand switch OK?		
	Check the starter clutch. Refer to "Starter Clutch Inspection (Page 1I-11)".	Open circuit in wire harness	Faulty starter clutch.
	Is the starter clutch OK?	Poor contact of connector	

## **Repair Instructions**

## **Starter Motor Components**

B817H21906001



1. O-ring	Starter motor case	► Apply grease to sliding surface.
<ol><li>Housing end (Inside)</li></ol>	7. O-ring	Apply moly past to sliding surface.
3. O-ring	8. Housing end assembly (Outside)	🔇 : Do not reuse.
4. O-ring	Starter motor lead wire nut	
5. Armature	(a): 5 N·m (0.5 kgf-m, 3.5 lb-ft)	

#### **Starter Motor Removal and Installation**

817H21906002

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

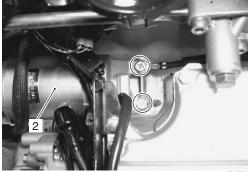
#### Removal

- 1) Turn the ignition switch OFF position and disconnect the battery (–) lead wire. Refer to "Battery Removal and Installation in Section 1J (Page 1J-12)".
- Remove the throttle body. Refer to "Throttle Body Removal and Installation in Section 1D (Page 1D-10)".
- 3) Remove the regulator/rectifier. Refer to "Regulator / Rectifier Inspection in Section 1J (Page 1J-8)".
- 4) Disconnect the starter motor lead wire (1).



I717H1190001-01

5) Remove the starter motor (2).



I717H1190002-01

#### Installation

Install the starter motor in the reverse order of removal. Pay attention to the following points:

Apply grease to the starter motor O-ring.

「★○別: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

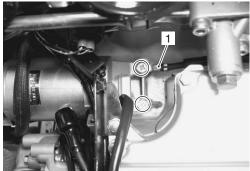
**⚠ CAUTION** 

Replace the O-ring with a new one.



I717H1190003-01

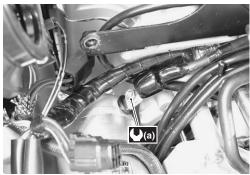
 Tighten the starter motor mounting bolt with the battery (–) lead wire (1). Refer to Wiring Harness Routing Diagram (GSF650/S/A/SAK7) in Section 9A (Page 9A-8)".



I717H1190005-01

• Tighten the starter motor lead wire to the specified torque.

Tightening torque Starter motor lead wire mounting nut (a): 5 N·m ( 0.5 kgf-m, 3.5 lbf-ft)



I717H1190004-01

#### **Starter Motor Disassembly and Assembly**

B817H21906003

Refer to "Starter Motor Removal and Installation (Page 1I-4)".

#### Disassembly

Disassemble the starter motor as shown in the starter motor components diagram. Refer to "Starter Motor Components (Page 1I-3)".

#### **Assembly**

Reassemble the starter motor in the reverse order of removal. Pay attention to the following points:

#### **⚠ CAUTION**

Replace the O-rings with new ones to prevent oil leakage and moisture.

· Apply GREASE to the lip of the oil seal and bearing.

ÆM: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1190006-01

Fit the washer to the housing end correctly as shown.



I717H1190007-01

 Apply a small quantity of moly paste to the armature shaft.

**Fim**: Moly paste 99000–25140 (SUZUKI Moly paste or equivalent)



I717H1190008-01

- Fit the projection of the starter motor case to the depression of the housing end.
- · Tighten the starter motor housing bolts.



I717H1190009-01

### **Starter Motor Inspection**

B817H21906004

Refer to "Starter Motor Disassembly and Assembly (Page 1I-4)".

#### **Carbon Brush**

Inspect the carbon brushes for abnormal wear, cracks or smoothness in the brush holder.

If either carbon brush is defective, replace the brush holder set with a new one.

Measure the length "a" of the carbon brushes using a vernier calipers. If the measurement is less then the service limit, replace the housing end assembly with a new one.

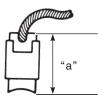
#### Brush length "a"

Service limit: 3.5 mm (0.14 in)

#### Special tool

: 09900–20102 (Vernier calipers (1/20 mm, 200

mm))



I717H1190010-01

#### Commutator

Inspect the commutator for discoloration, abnormal wear or undercut "A".

If the commutator is abnormally worn, replace the armature.

If the commutator surface is discolored, polish it with #400 sandpaper and wipe it using a clean, dry cloth. If there is no undercut, scrape out the insulator (1) with a saw blade.



I649G1190016-02

#### **Armature Coil**

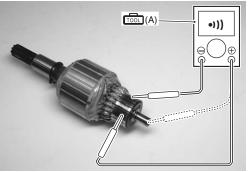
Measure for continuity between each segment. Measure for continuity between each segment and the armature shaft.

If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature with a new one.

#### Special tool

(A): 09900-25008 (Multi-circuit tester set)

## Tester knob indication Continuity set ( •)))



I717H1190011-02

#### Oil Seal

Check the seal lip for damage.

If any damage is found, replace the housing end (Inside).



I717H1190012-01

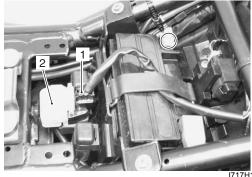
### Starter Relay Removal and Installation

B817H21906005

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

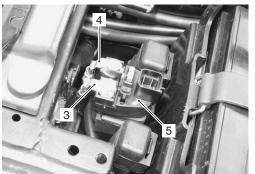
#### Removal

- 1) Turn the ignition switch OFF position.
- 2) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the battery (-) lead wire from the battery.
- 4) Disconnect the starter relay coupler (1) and remove the starter relay cover (2).



I717H1190013-01

- 5) Disconnect the starter motor lead wire (3) and battery (+) lead wire (4).
- 6) Remove the starter relay (5).



I717H1190014-01

#### Installation

Install the starter relay in the reverse order of removal.

#### **Starter Relay Inspection**

B817H21906006

Inspect the starter relay in the following procedures:

- 1) Remove the starter relay. Refer to "Starter Relay Removal and Installation (Page 1I-6)".
- 2) Apply 12 V to "A" and "B" terminals and check for continuity between the positive and negative terminals using the multi-circuit tester. If the starter relay clicks and continuity is found, the relay is ok.

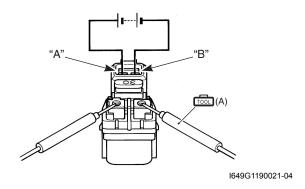
#### **⚠ CAUTION**

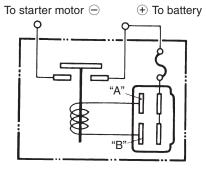
Do not apply battery voltage to the starter relay for five seconds and more, since the relay coil may overheat and get damaged.

#### Special tool

(A): 09900-25008 (Multi-circuit tester set)

## Tester knob indication Continuity test ( •)))





I649G1190022-02

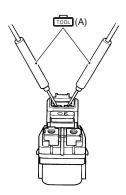
3) Measure the relay coil resistance between the terminals using the multi-circuit tester. If the resistance is not within the specified value, replace the starter relay with a new one.

#### Special tool

(A): 09900-25008 (Multi-circuit tester set)

#### Starter relay resistance

 $3-6\Omega$ 



I649G1190023-03

4) Install the starter relay. Refer to "Starter Relay Removal and Installation (Page 1I-6)".

## Turn Signal / Side-stand Relay Removal and Installation

B817H21906007

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

#### Removal

- 1) Turn the ignition switch OFF position.
- 2) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Remove the turn signal/side-stand relay (1).



I717H1190015-01

#### Installation

Install the turn signal/side-stand relay in the reverse order of removal.

## **Side-stand / Ignition Interlock System Parts Inspection**

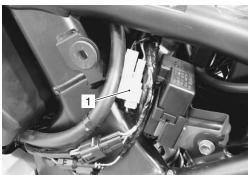
B817H21906008

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

Check the interlock system for proper operation. If the interlock system does not operate properly, check each component for damage or abnormalities. If any abnormality is found, replace the component with a new one.

#### Side-stand Switch

- 1) Turn the ignition switch OFF position.
- 2) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the side-stand switch coupler (1).



I717H1190016-01

4) Measure the voltage between Green and Black/ White lead wires.

#### Special tool

: 09900-25008 (Multi-circuit tester set)

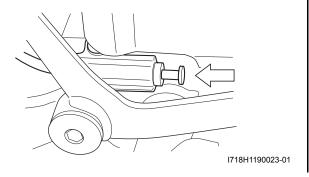
#### **Tester knob indication**

Diode test ( ⊢← )

	G	B/W
	((+) probe)	((–) probe)
ON (Side-stand up)	0.4 – 0.6 V	
OFF	1.4 V and more	
(Side-stand down)	d down) (Tester's battery voltage)	

#### NOTE

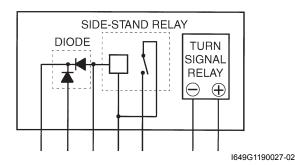
If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.



- 5) Connect the side-stand switch coupler.
- 6) Install the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

#### Turn Signal / Side-stand Relay

The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.



#### Side-stand relay

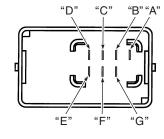
- 1) Remove the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 1I-7)".
- 2) Check the insulation between "D" and "E" terminals using the multi-circuit tester.
- 3) Apply 12 V to terminals "D" and "C" ((+) to "D" and (– ) to "C") and check the continuity between "D" and "E". If there is no continuity, replace the turn signal/ side-stand relay with a new one. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 1I-7)".

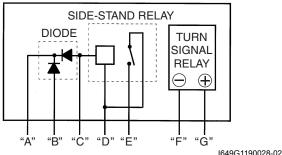
#### Special tool

**1001**: 09900–25008 (Multi-circuit tester set)

## Tester knob indication

Continuity test (•)))





4) Install the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 1I-7)".

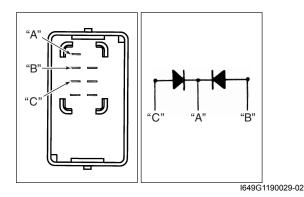
#### **Diode inspection**

- 1) Remove the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 1I-7)".
- 2) Measure the voltage between the "A", "B" and "C" terminals using the multi-circuit tester.

#### Special tool

: 09900-25008 (Multi-circuit tester set)

#### Tester knob indication Diode test ( ⊢ ← )



	Probe of tester to:		
Probe of tester to:		"B", "C"	"A"
	"B","C"		1.4 V and more (Tester's battery voltage)
	"A"	0.4 – 0.6 V	

I649G1190046-04

#### NOTE

If the multi circuit tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

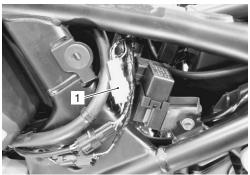
 Install the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 1I-7)".

#### **Gear Position Switch**

- Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the gear position switch coupler (1).

#### **⚠ CAUTION**

When disconnecting and connecting the gear position switch coupler, make sure to turn off the ignition switch, or electronic parts may get damaged.



I717H1190017-01

3) Check the continuity between Blue and Black/White lead wires with the transmission in "NEUTRAL".

#### Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication Continuity test ( •)))

	BI	B/W
ON (Neutral)	0	0
OFF (Except neutral)		

1649G1190045-03

- 4) Connect the gear position switch coupler to the wiring harness.
- 5) Insert the needle pointed probes to the lead wire coupler.
- 6) Turn the ignition switch ON and side-stand to upright position.
- 7) Measure the voltage between Pink and Black/White lead wires using the multi-circuit tester when shifting the gearshift lever from low to top.

#### Special tool

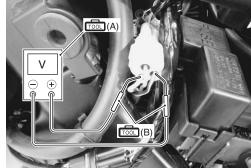
(A): 09900–25008 (Multi-circuit tester set)
(B): 09900–25009 (Needle pointed probe set)

### **Tester knob indication**

Voltage ( === )

## Gear position switch voltage (Except neutral position)

0.6 V and more ((+) P - (-) B/W)



I717H1190018-01

- 8) Turn the ignition switch OFF.
- 9) Install the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

### Starter Clutch Removal and Installation

B817H21906009

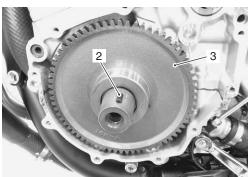
#### Removal

- 1) Drain engine oil.
- 2) Remove the generator rotor assembly (1). Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".



I717H1190019-01

3) Remove the key (2) and starter driven gear (3).

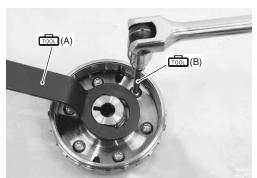


I717H1190020-01

4) Hold the generator rotor with the special tools and remove the starter clutch bolts.

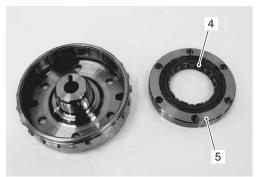
#### Special tool

(A): 09930–44530 (Rotor holder) (国): 09930–11920 (Torx bit (JT40H))



I717H1190021-01

5) Remove the one way clutch (4) from the guide (5).



I717H1190022-01

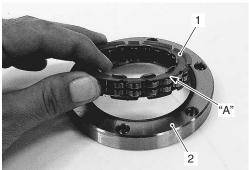
#### Installation

Install the starter clutch in the reverse order of removal. Pay attention to the following points:

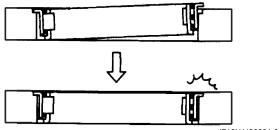
• When inserting the one way clutch (1) into the guide (2), fit the flange "A" in the step of the guide (2).

#### NOTE

Be sure to seat the flange "A" of the one way clutch (1) to the guide (2).



I718H1190030-02

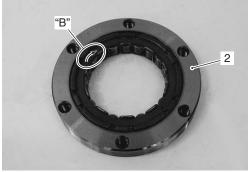


I718H1190031-01

· Install the guide (2) to the generator rotor.

#### **NOTE**

The arrow mark "B" must face to the generator rotor side.



I718H1190032-01

 Apply THREAD LOCK to the bolts, and then tighten them to the specified torque with the special tools.

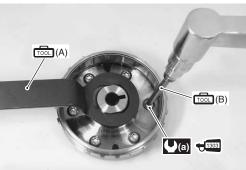
⊕ : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Special tool

(A): 09930-44530 (Rotor holder)
(B): 09930-11920 (Torx bit (JT40H))

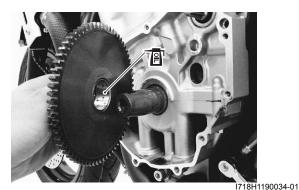
**Tightening torque** 

Starter clutch bolt (a): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)



I717H1190023-01

 Apply engine oil to the bushing of the starter driven gear.



Fit the key (3) in the key slot on the crankshaft.



I717H1190024-01

 Install the generator rotor assembly onto crankshaft.
 Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".

#### **Starter Clutch Inspection**

B817H21906010

Refer to "Starter Clutch Removal and Installation (Page 1I-10)".

#### Starter Clutch

- 1) Install the starter driven gear onto the starter clutch.
- 2) Turn the starter driven gear by hand to inspect the starter clutch for a smooth movement. The gear turns in one direction only. If a large resistance is felt for rotation, inspect the starter clutch or the starter clutch contacting surface on the starter driven gear for wear or damage.

If they are found to be damaged, replace them with new ones.



I718H1190035-01

Starting System: 1I-12

# **Starter Driven Gear Bearing**

Inspect the starter driven gear bearing for wear or damage.



I718H1190036-01

# **Starter Button Inspection**

B817H21906011

Inspect the starter button in the following procedures:

- 1) Remove the right frame head cover (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the right handlebar switch coupler (1).



I717H1190025-01

3) Inspect the starter button for continuity with a tester. If any abnormality is found, replace the right handle switch assembly with a new one. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".

## Special tool

: 09900-25008 (Multi-circuit tester set)

# Tester knob indication

Continuity ( •)))

Color Position	B/R	Bl/B
•		
PUSH	0	<del></del> 0

I649G1190044-03

4) After finishing the starter button inspection, reinstall the removed parts.

# **Specifications**

#### **Service Data**

Unit: mm (in)

B817H21907001

Item		Specification	Note
Starter motor brush length	Standard	7.0 (0.28)	
Starter motor brush length	Limit	3.5 (0.14)	
Starter relay resistance		3 – 6 Ω	

# **Tightening Torque Specifications**

B817H21907002

Fastening part	Т	Note		
l asterning part	N⋅m	kgf-m	lbf-ft	Note
Starter motor lead wire mounting nut	5	0.5	3.5	☞(Page 1I-4)
Starter clutch bolt	25	2.5	18.0	☞(Page 1I-11)

#### **NOTE**

The specified tightening torque is also described in the following.

"Starter Motor Components (Page 1I-3)"

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

# **Special Tools and Equipment**

# **Recommended Service Material**

B817H21908001

Material	SUZUKI recommended produc	Note	
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	
	equivalent		
Moly paste	SUZUKI Moly paste or equivalent	P/No.: 99000-25140	☞(Page 1I-5)
Thread lock cement	THREAD LOCK CEMENT SUPER	P/No.: 99000-32030	☞(Page 1I-11)
	1303 or equivalent		

# **NOTE**

Required service material is also described in the following.

"Starter Motor Components (Page 1I-3)"

# **Special Tool**

B817H21908002

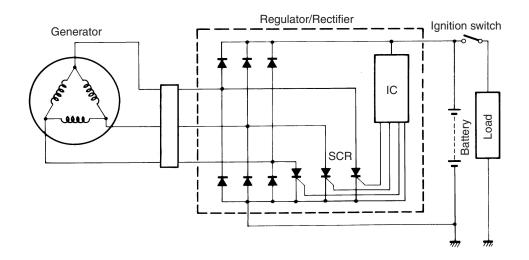
09900–20102	09900–25008	
Vernier calipers (1/20 mm,	Multi-circuit tester set	
200 mm)		
☞(Page 1I-5)		
	/ @ (Page 1I-7) / @ (Page 1I-	
	8) / * (Page 1I-8) /	
	/ @(Page 1I-9) / @(Page 1I-	
09900–25009	 12) 09930–11920	
Needle pointed probe set	Torx bit (JT40H)	
(Page 1I-9)	(Page 1I-10) / ☞ (Page 1I-	
- (1 age 11-3)	11)	
	,	
09930–44530		·
Rotor holder		
11)		

# **Charging System**

# **Schematic and Routing Diagram**

# **Charging System Diagram**

B817H21A02001



I718H11A0001-01

# **Component Location**

# **Charging System Components Location**

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

B817H21A03001

# **Diagnostic Information and Procedures**

# **Charging System Symptom Diagnosis**

B817H21A04001

Condition	Possible cause	Correction / Reference Item
Generator does not	Open- or short-circuited lead wires, or	Repair, replace or connect properly.
charge	loose lead connections.	
	Short-circuited, grounded or open	Replace.
	generator coil.	
	Short-circuited or punctured regulator/	Replace.
	rectifier.	
Generator does charge,	Lead wires tend to get short- or open-	Repair or retighten.
but charging rate is below	circuited or loosely connected at	
the specification	terminals.	
	Grounded or open-circuited generator	Replace.
	coil.	
	Defective regulator/rectifier.	Replace.
	Defective cell plates in the battery.	Replace the battery.
Generator overcharges	Internal short-circuit in the battery.	Replace the battery.
	Damaged or defective regulator/rectifier.	Replace.
	Poorly grounded regulator/rectifier.	Clean and tighten ground connection.
Unstable charging	Lead wire insulation frayed due to	Repair or replace.
	vibration, resulting in intermittent short-	
	circuitting.	
	Internally short-circuited generator.	Replace.
	Defective regulator/rectifier.	Replace.

# 1J-2 Charging System:

Condition	Possible cause	Correction / Reference Item
Battery overcharges	Faulty regulator/rectifier.	Replace.
	Faulty battery.	Replace.
	Poor contact of generator lead wire	Repair.
	coupler.	
"Sulfation", acidic white	Cracked battery case.	Replace the battery.
powdery substance or	Battery has been left in a run-down	Replace the battery.
spots on surfaces of cell	condition for a long time.	
plates		
Battery runs down quickly	Trouble in charging system.	Check the generator, regulator/rectifier and
		circuit connections and make necessary
		adjustments to obtain specified charging
		operation.
	Cell plates have lost much of their active	Replace the battery and correct the charging
	materials a result of overcharging.	system.
	Internal short-circuit in the battery.	Replace the battery.
	Too low battery voltage.	Recharge the battery fully.
	Too old battery.	Replace the battery.
Battery "sulfation"	Incorrect charging rate. (When not in	Replace the battery.
	use battery should be checked at least	
	once a month to avoid sulfation.)	
	The battery was left unused in a cold	Replace the battery if badly sulfated.
	climate for too long.	

# **Battery Runs Down Quickly**

# Troubleshooting

B817H21A04002

Step	Action	Yes	No
1	Check accessories which use excessive amounts of electricity.	Remove accessories.	Go to Step 2.
	Are accessories being installed?		
2	Check the battery for current leakage. Refer to "Battery Current Leakage Inspection (Page 1J-3)".	Go to Step 3.	Short circuit of wire harness
	Is the battery for current leakage OK?		Faulty electrical equipment
3	Measure the regulated voltage between the battery	<ul> <li>Faulty battery</li> </ul>	Go to Step 4.
	terminals. Refer to "Regulated Voltage Inspection (Page 1J-3)".	Abnormal driving condition	
	Is the regulated voltage OK?		
4	Measure the resistance of the generator coil. Refer to "Generator Inspection (Page 1J-3)".	Go to Step 5.	<ul><li>Faulty generator coil</li><li>Disconnected lead</li></ul>
	Is the resistance of generator coil OK?		wires
5	Measure the generator no-load performance. Refer to "Generator Inspection (Page 1J-3)".	Go to Step 6.	Faulty generator
	Is the generator no-load performance OK?		
6	Inspect the regulator/rectifier. Refer to "Regulator / Rectifier Inspection (Page 1J-8)".	Go to Step 7.	Faulty regulator/rectifier
	Is the regulator/rectifier OK?		
7	Inspect wirings.	Faulty battery	Short circuit of wire harness
	Is the wirings OK?		<ul> <li>Poor contact of couplers</li> </ul>

# **Repair Instructions**

# **Battery Current Leakage Inspection**

B817H21A06001

Inspect the battery current leakage in the following procedures:

- 1) Turn the ignition switch OFF.
- 2) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the battery (–) lead wire.
- 4) Measure the current between (–) battery terminal and the (–) battery lead wire using the multi-circuit tester. If the reading exceeds the specified value, leakage is evident.

#### **A** CAUTION

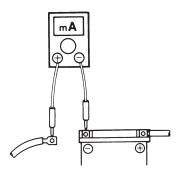
- In case of a large current leak, turn the tester to high range first to avoid tester damage.
- Do not turn the ignition switch ON when measuring current.

Special tool

(A): 09900-25008 (Multi-circuit tester set)

Tester knob indication Current ( --- , 20 mA)

Battery current (Leak) Under 3 mA



I649G11A0002-02

5) Connect the (–) battery terminal and install the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

# **Regulated Voltage Inspection**

B817H21A06002

Inspect the regulated voltage in the following procedures:

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Start the engine and keep it running at 5 000 r/min with the dimmer switch turned HI position.

3) Measure the DC voltage between the (+) and (–) battery terminals using the multi-circuit tester. If the voltage is not within the specified value, inspect the generator and regulator/rectifier. Refer to "Generator Inspection (Page 1J-3)" and "Regulator / Rectifier Inspection (Page 1J-8)".

## NOTE

When making this test, be sure that the battery is in fully charged condition.

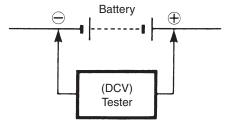
#### Special tool

(A): 09900-25008 (Multi-circuit tester set)

# **Tester knob indication**

Voltage ( \_\_\_ )

Regulated voltage (Charging output)
Standard: 14.0 – 15.5 V at 5 000 r/min



I649G11A0003-02

4) Install the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

#### **Generator Inspection**

B817H21A06003

#### **Generator Coil Resistance**

1) Disconnect the generator coupler (1).



I717H11A0001-01

# 1J-4 Charging System:

2) Measure the resistance between the three lead wires.

If the resistance is out of specified value, replace the stator with a new one. Also, check that the generator core is insulated properly.

#### NOTE

When making this test, be sure that the battery is in fully charged condition.

Special tool

: 09900-25008 (Multi-circuit tester set)

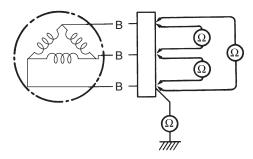
**Tester knob indication** 

Resistance ( $\Omega$ )

**Generator coil resistance** 

 $0.2 - 0.8 \Omega (B - B)$ 

 $\infty \Omega$  (B – Ground)



I718H11A0005-02

3) Connect the generator coupler.

#### **No-load Performance**

1) Disconnect the generator coupler (1).



I717H11A0001-01

2) Start the engine and keep it running at 5 000 r/min.

3) Using the multi-circuit tester, measure the voltage between three lead wires.

If the tester reads under the specified value, replace the generator with a new one.

Special tool

: 09900-25008 (Multi-circuit tester set)

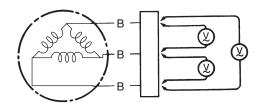
**Tester knob indication** 

Voltage (~)

Generator no-load performance (When engine is

cold)

60 V (AC) and more at 5 000 r/min



I718H11A0006-02

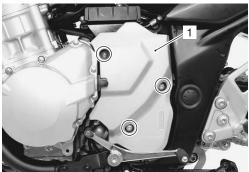
# **Generator Removal and Installation**

B817H21A06004

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

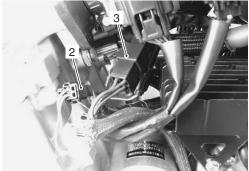
#### Removal

- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".
- 2) Remove the engine sprocket outer cover (1).



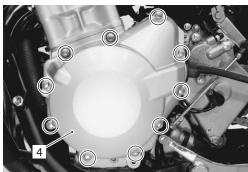
1717H11A0002-01

3) Disconnect the CKP sensor coupler (2) and generator coupler (3).



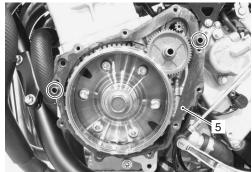
I717H11A0003-01

4) Remove the generator cover (4).



I717H11A0004-01

5) Remove the gasket (5) and dowel pins.



I717H11A0005-01

6) Remove the idle gear shaft (6) and starter idle gear (7).



I717H11A0006-01

7) Hold the generator rotor with the special tool.

## Special tool

(A): 09930-44530 (Rotor holder)

8) Loosen the generator rotor bolt.

#### NOTE

When loosen the rotor bolt, do not remove it. The rotor bolt is used in conjunction with the rotor remover when removing the rotor.



I717H11A0007-01

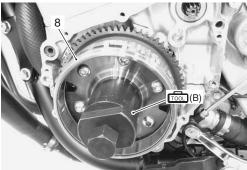
9) Remove the generator rotor assembly (8) with the special tool.

# **NOTE**

Remove the starter clutch if necessary. Refer to "Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".

# Special tool

(B): 09930-34970 (Rotor remover set)



I717H11A0008-01

10) Remove the generator stator (9) along with the CKP sensor (10).



I717H11A0009-01

## Installation

Install the generator in the reverse order of removal. Pay attention to the following points:

 Tighten the generator startor set bolts and CKP sensor mounting bolts to the specified torque.

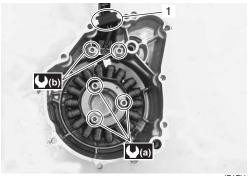
#### **NOTE**

Be sure the grommet (1) to the generator cover.

**Tightening torque** 

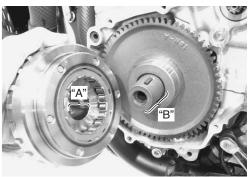
Generator stator set bolt (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

CKP sensor mounting bolt (b): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



I717H11A0010-01

- Degrease the tapered portion "A" of generator rotor and also the crankshaft "B". Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.
- · Install the generator rotor onto crankshaft.



I717H11A0011-01

• Hold the generator rotor with the special tool and tighten its bolt to the specified torque.

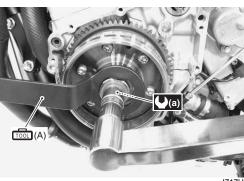
Special tool

(A): 09930-44530 (Rotor holder)

**Tightening torque** 

Generator rotor bolt (a): 120 N·m (12.0 kgf-m, 87.0

lbf-ft)



I717H11A0012-03

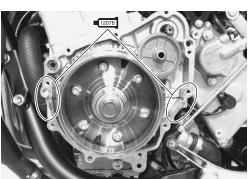
 Apply molybdenum oil solution to the idle gear shaft holes.



I717H11A0013-01

 Apply BOND lightly to the mating surfaces at the parting line between the upper and lower crankcases as shown.

■1207日: Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)



I717H11A0014-01

• Install the dowel pins and new gasket (2).

# **⚠ CAUTION**

Use a new gasket to prevent oil leakage.



I717H11A0015-01

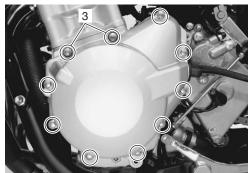
• Install the generator cover and tighten the generator cover bolts.

# **▲ WARNING**

Be careful not to pinch the finger between the generator cover and the crankcase.

# **⚠ CAUTION**

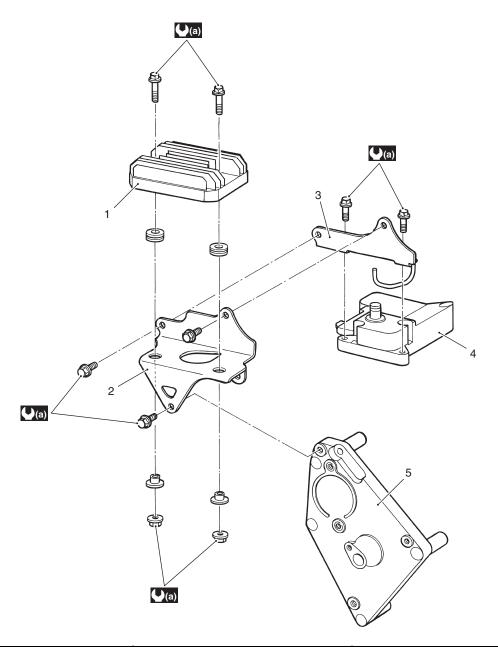
Fit new gasket washer to the bolt (3).



I717H11A0016-01

# **Regulator / Rectifier Construction**

B817H21A06005



I718H11A0002-01

Regulator/rectifier	<ol><li>Regulator/rectifier bracket No.2</li></ol>	<ol><li>Engine sprocket inner cover</li></ol>
Regulator/rectifier bracket No.1	Breather cover	(a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)

# Regulator / Rectifier Inspection

B817H21A06006

Inspect the regulator/rectifier in the following procedures:

- 1) Turn the ignition switch OFF.
- 2) Disconnect the regulator/rectifier couplers (1).
- 3) Remove the regulator/rectifier (2).



I717H11A0017-01

4) Measure the voltage between the terminals using the multi-circuit tester as indicated in the following table. If the voltage is not within the specified value, replace the regulator/rectifier with a new one.

#### NOTE

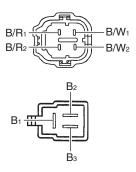
If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

## Special tool

: 09900-25008 (Multi-circuit tester set)

# **Tester knob indication**

Diode test ( ⊢← )



I717H11A0019-02

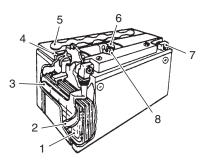
Unit: V

		(+) probe of tester to:						
		B/R₁	B/R <sub>2</sub>	B <sub>1</sub>	$B_2$	$B_3$	B/W <sub>1</sub>	B/W <sub>2</sub>
	B/R₁	_	0	0.2 - 0.8	0.2 - 0.8	0.2 - 0.8	0.4 - 1.0	0.4 - 1.0
	B/R <sub>2</sub>	0	_	0.2 - 0.8	0.2 - 0.8	0.2 - 0.8	0.4 – 1.0	0.4 – 1.0
( ) probe of	B <sub>1</sub>	*	*	_	0.6 – 1.2	0.6 – 1.2	0.2 - 0.8	0.2 - 0.8
(–) probe of tester to:	B <sub>2</sub>	*	*	0.6 – 1.2	_	0.6 – 1.2	0.2 - 0.8	0.2 - 0.8
lester to.	$B_3$	*	*	0.6 – 1.2	0.6 - 1.2	_	0.2 - 0.8	0.2 - 0.8
	B/W <sub>1</sub>	*	*	0.3 - 1.0	0.3 - 1.0	0.3 - 1.0	_	0
	B/W <sub>2</sub>	*	*	0.3 – 1.0	0.3 – 1.0	0.3 - 1.0	0	_
1.4 V and more (tester's battery voltage)								

5) Install the regulator/rectifier.

## **Battery Components**

B817H21A06007



I649G11A0046-03

Anode plates	5. Stopper
2. Separator (Fiberglass plate)	6. Filter
3. Cathode plates	7. Terminal
Upper cover breather	Safety valve

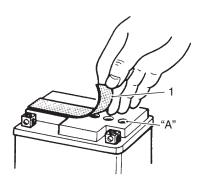
# **Battery Charging**

Initial Charging Filling electrolyte

#### NOTE

When filling electrolyte, the battery must be removed from the vehicle and must be put on the level ground.

1) Remove the aluminum tape (1) which seals the battery filler holes "A".



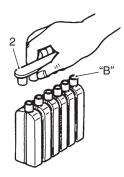
I649G11A0039-03

B817H21A06008

2) Remove the caps (2) from the electrolyte container.

#### **NOTE**

- Do not remove or pierce the sealed areas "B" of the electrolyte container.
- After filling the electrolyte completely, use the removed cap (2) as sealing caps of battery-filler holes.

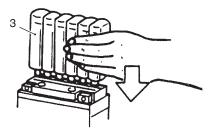


I649G11A0040-03

- 3) Insert the nozzles of the electrolyte container (3) into the electrolyte filler holes of the battery.
- 4) Hold the electrolyte container firmly so that it does not fall.

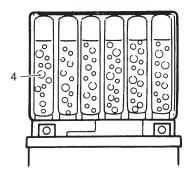
#### **NOTE**

Do not allow any of the electrolyte to spill.



I649G11A0041-03

5) Make sure that air bubbles (4) rise to the top of each electrolyte container, and leave in this position for about more than 20 minutes.

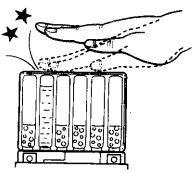


I649G11A0042-03

## **NOTE**

If no air bubbles are coming up from a filler port, tap the bottom of the electrolyte container two or three times.

Never remove the container from the battery.

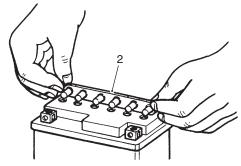


I310G11A0024-01

- 6) After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery.
- 7) Wait for about 20 minutes.
- 8) Insert the caps (2) into the filler holes, pressing in firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.

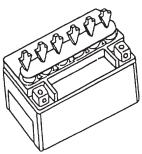
## **⚠ CAUTION**

- Once install the caps to the battery, do not remove the caps.
- Do not tap the caps with a hammer when installing them.

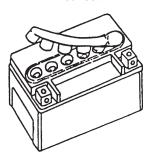


I718H11A0027-01





Incorrect



I649G11A0047-02

# Charging

For initial charging, use the charger specially designed for MF battery.

#### **⚠ CAUTION**

- For charging the battery, make sure to use the charger specially designed for MF battery. Otherwise, the battery may be overcharged resulting in shortened service life.
- Do not remove the cap during charging.
- Position the battery with the cap facing upward during charging.

#### **Battery Recharging**

#### **⚠ CAUTION**

Do not remove the caps on the battery top while recharging.

#### NOTE

When the motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.

1) Remove the battery from the motorcycle. Refer to "Battery Removal and Installation (Page 1J-12)".

2) Measure the battery voltage using the multi-circuit tester.

If the voltage reading is less than the 12 V (DC), recharge the battery with a battery charger.

#### Recharging time

0.9 A for 5 to 10 hours or 4 A for 1 hour.

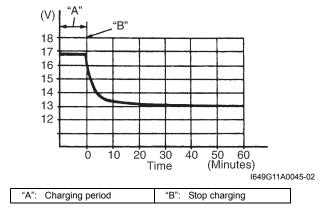
#### **↑** CAUTION

Be careful not to permit the charging current to exceed 4 A at any time.

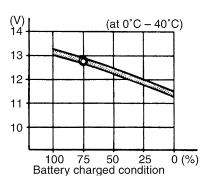
3) After recharging, wait at least 30 minutes and then measure the battery voltage using the multi-circuit tester.

If the battery voltage is less than 12.5 V, recharge the battery again.

If the battery voltage is still less than 12.5 V after recharging, replace the battery with a new one.



4) Install the battery to the motorcycle. Refer to "Battery Removal and Installation (Page 1J-12)".



I310G11A0030-01

## **Battery Removal and Installation**

B817H21A06009

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

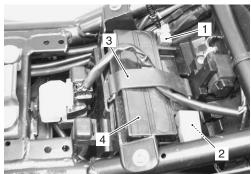
#### Removal

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the battery (-) lead wire (1).
- 3) Disconnect the battery (+) lead wire (2).

#### **NOTE**

Be sure to disconnect the battery (-) lead wire (1) first, then disconnect the battery (+) lead wire (2).

- 4) Remove the rubber band (3).
- 5) Remove the battery (4) from the motorcycle.



I717H11A0018-01

#### Installation

Install the battery in the reverse order of removal. Pay attention to following points:

#### **⚠** CAUTION

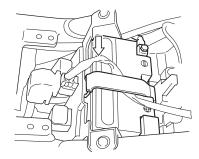
Never use anything except the specified battery.

· Install the rubber band.

#### **⚠ CAUTION**

Be careful not to slack the wiring harness between the battery and starter relay.

Tighten the battery lead wire mounting bolts securely.



I718H11A0029-01

# **Battery Visual Inspection**

B817H21A06010

Inspect the battery in the following procedures:

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one.
  - If the battery terminals are found to be coated with rust or an acidic white powdery substance, clean the battery terminals with sandpaper.
- Install the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

Charging System: 1J-13

# **Specifications**

## **Service Data**

**Battery** 

B817H21A07001

# **⚠ CAUTION**

Never use anything except the specified battery.

Item	Specification	Note
Type designation	YTX9-BS	
Capacity	12 V, 28.8 kC (8 Ah)/10HR	
Standard electrolyte S.G.	1.320 at 20 °C (68 °F)	

# Generator

Item	Specification	Note
Generator coil resistance	$0.2-0.8~\Omega$	
Generator maximum output	Approx. 400 W at 5 000 r/min	
Generator no-load voltage	60 V (AC) and more at 5 000 r/min	
(When engine is cold)	ou v (AC) and more at 5 000 min	
Regulated voltage	14.0 – 15.5 V at 5 000 r/min	

# **Tightening Torque Specifications**

B817H21A07002

Fastening part	Tightening torque			Note
l asterning part	N⋅m	kgf-m	lbf-ft	Note
Generator stator set bolt	11	1.1	8.0	☞(Page 1J-6)
CKP sensor mounting bolt	11	1.1	8.0	☞(Page 1J-6)
Generator rotor bolt	120	12.0	87.0	☞(Page 1J-6)

## **NOTE**

The specified tightening torque is also described in the following.

# Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

# **Special Tools and Equipment**

# **Recommended Service Material**

B817H21A08001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI BOND No.1207B or	P/No.: 99000-31140	☞(Page 1J-6)
	equivalent		

<sup>&</sup>quot;Regulator / Rectifier Construction (Page 1J-8)"

Special Tool

	B817H21A08002
09930–34970	
Rotor remover set	
☞(Page 1J-5)	
, , ,	
	Rotor remover set (Page 1J-5)

Exhaust System: 1K-1

# **Exhaust System**

# **Precautions**

# **Precautions for Exhaust System**

B817H21B00001

# **▲ WARNING**

To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system is cool.

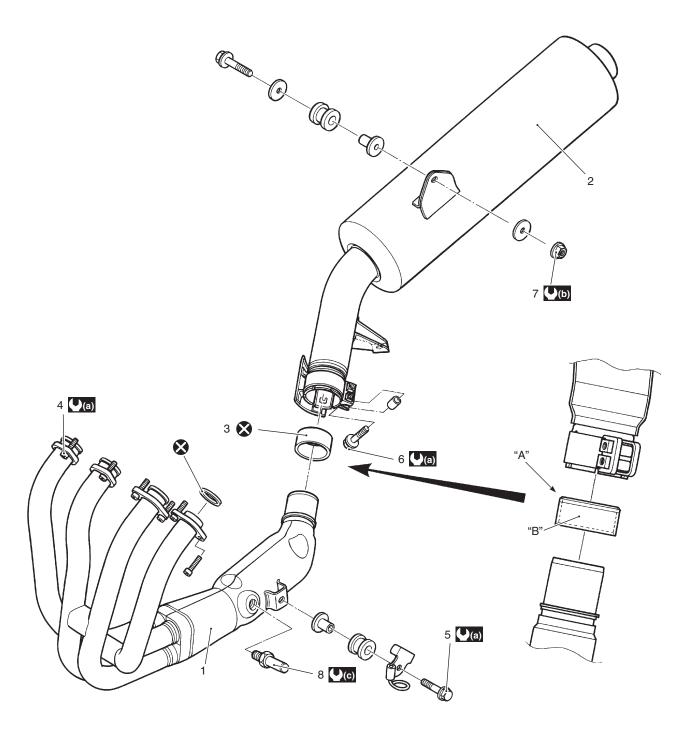
## **⚠ CAUTION**

Make sure that the exhaust pipe and muffler have enough clearance from the rubber parts and plastic parts to avoid melting.

# **Repair Instructions**

# **Exhaust System Construction**

B817H21B06001



# I718H11B0001-03

Exhaust pipe	<ol><li>Exhaust pipe mounting bolt</li></ol>	"A": Chamfer	(c): 25 N·m (2.5 kgf-m, 18.0 lb-ft)
2. Muffler	Muffler connecting bolt	"B": Apply exhaust gas sealer.	🗴 : Do not reuse.
Muffler connector	7. Muffler mounting nut	(a): 23 N⋅m (2.3 kgf-m, 16.5 lb-ft)	
Exhaust pipe bolt	8. HO2 sensor	(b): 25 N·m (2.5 kgf-m, 18.0 lb-ft)	

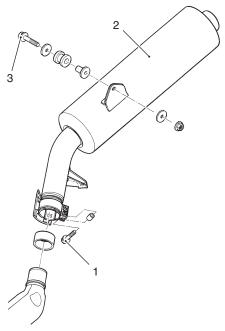
# Exhaust Pipe / Muffler Removal and Installation

#### Removal

- 1) Loosen the muffler connecting bolts (1).
- 2) Remove the muffler (2) by removing the mounting bolt (3) and nut.

## **NOTE**

Support the muffler to prevent it from falling.



I717H11B0001-01

- 3) Remove the radiator. Refer to "Radiator / Cooling Fan Motor Removal and Installation in Section 1F (Page 1F-5)".
- 4) Disconnect the HO2 sensor coupler (4) and clamps. Refer to "Heated Oxygen Sensor (HO2S) Removal and Installation in Section 1B (Page 1B-5)".



I717H11B0002-01

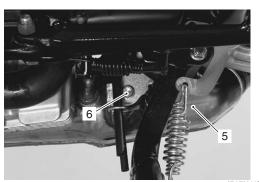
5) Remove the exhaust pipe (5) by removing the exhaust pipe bolts and mounting bolt (6).

#### **NOTE**

Support the exhaust pipe to prevent it from falling.



I717H11B0003-01

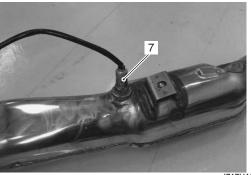


I717H11B0004-01

6) Remove the HO2 sensor (7) from the exhaust pipe.

# **⚠ CAUTION**

- Be careful not to expose it to excessive shock.
- Be careful not to twist or damage the sensor lead wire.



I717H11B0007-01

#### Installation

Installation is in the reverse order of removal. Pay attention to the following points:

• Tighten the HO2 sensor to the specified torque.

**Tightening torque** 

HO2 sensor (a): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)

#### **⚠ CAUTION**

- Be careful not to expose it to excessive shock.
- Do not use an impact wrench while installing the HO2 sensor.
- Be careful not to twist or damage the sensor lead wires.
- Do not apply oil or other materials to the sensor air hole.



I718H11B0011-01

 Install the exhaust pipe gaskets (1) and muffler connector (2).

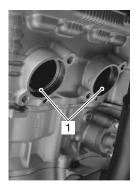
#### **⚠ CAUTION**

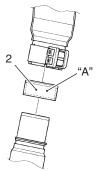
Replace the gaskets and connector with new ones.

#### NOTE

When installing a new muffler connector, remove all of the old sealer from the exhaust pipe and muffler. Apply the exhaust gas sealer "A" to both the inside and outside of the new muffler connector.

: Exhaust gas sealer (PERMATEX 1372 (commercially available))





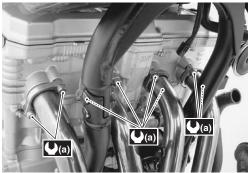
I717H11B0005-02

Tighten the exhaust pipe bolts and exhaust pipe mounting bolt to the specified torque.

# **Tightening torque**

Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

Exhaust pipe mounting bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I717H11B0006-01



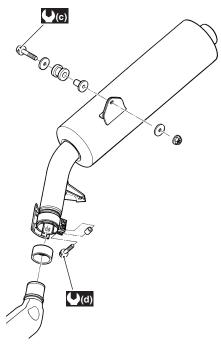
I718H11B0014-01

- Route the HO2 sensor lead wire. Refer to "Throttle Body Construction in Section 1D (Page 1D-9)".
- Tighten the muffler mounting nut and muffler connecting bolts to the specified torque.

#### **Tightening torque**

Muffler mounting nut (c): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)

Muffler connecting bolt (d): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I718H11B0015-02

# **Exhaust System Inspection**

B817H21B06003

Inspect the exhaust pipe connection and muffler connection for exhaust gas leakage and mounting condition. If any defect is found, replace the exhaust pipe or muffler with a new one.

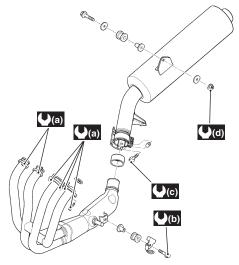
Check the exhaust pipe bolts, muffler connecting bolts and muffler mounting nut are tightened to their specified torque.

## **Tightening torque**

Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft) Exhaust pipe mounting bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

Muffler connecting bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ff)

Muffler mounting nut (d): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)



I718H11B0013-02

# **Specifications**

# **Tightening Torque Specifications**

B817H21B07001

Eastoning part	1	Tightening torque		Note
Fastening part	N⋅m	kgf-m	lbf-ft	Note
HO2 sensor	25	2.5	18.0	☞(Page 1K-4)
Exhaust pipe bolt	23	2.3	16.5	☞(Page 1K-4) /
	23	2.3	10.5	☞(Page 1K-5)
Exhaust pipe mounting bolt	23	2.3	16.5	☞(Page 1K-4) /
	23	2.3	10.5	☞(Page 1K-5)
Muffler mounting nut	25	2.5	18.0	☞(Page 1K-5) /
	25	2.5	10.0	☞(Page 1K-5)
Muffler connecting bolt	23	2.3	16.5	☞(Page 1K-5) /
	23	2.3	10.5	☞(Page 1K-5)

# **NOTE**

The specified tightening torque is also described in the following.

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

# **Special Tools and Equipment**

# **Recommended Service Material**

B817H21B08001

Material	SUZUKI recommended product or Specification		Note
Exhaust gas sealer	PERMATEX 1372 (commercially	_	☞(Page 1K-4)
	available)		

<sup>&</sup>quot;Exhaust System Construction (Page 1K-2)"

# Section 2

# Suspension

# **CONTENTS**

Precautions for Suspension 2-1 Precautions for Suspension 2-1 Precautions for Suspension 2-1 Diagnostic Information and Procedures 2-1 Suspension and Wheel Symptom Diagnosis 2-1 Front Suspension and Wheel Symptom Diagnosis 2-1 Repair Instructions 2-1 Front Suspension 2-1 Repair Instructions 2-1 Front Fork Components 2-1 Front Fork Components 2-1 Front Fork Removal and Installation 2-1 Front Fork Parts Inspection 2-1 Service Data 2-1 Rear Suspension 2-1 Rear Suspension Assembly 2-1 Rear Suspension Components 2-1 Rear Suspension Assembly Construction (GSF650/S/I/SUK7) 2-1 Rear Suspension Components 2-1 Rear Suspension Components 2-1 Rear Suspension Assembly Construction (GSF650/SI/JSUK7) 2-1 Rear Suspension Components 2-1 Rear Suspension Assembly Construction (GSF650/SI/JSUK7) 2-1 Rear Suspension Assembly Construction (GSF650/SI/JSUK7) 2-1 Rear Wheel Assembly Removal and Installation 2-1 Rear Wheel Assembly Removal and Installation 2-1 Rear Suspension Assembly Construction (GSF650/SI/JSUK7) 2-1 Rear Wheel Components (GSF650/SI/JSUK7) 2-1 Rear Wheel Dust Seal / Bearing Removal and Installation (GSF650/SI/JSUK7) 2-1 Rear Wheel Assembly Removal and Installation 2-1 Rear Wheel Assembly Removal and Installation 2-1 Rear Wheel Components (GSF650/SI/JSUK7) 2-1 Rear Wheel Assembly Removal and Installation (GSF650/SI/JSUK7) 2-1 Rear Wheel Components (GSF650/SI/JSUK7) 2-1 Rear W	Precautions	2-1	Recommended Service Material	
Suspension General Diagnosis	Precautions	2-1	Special Tool	2C-14
Diagnostic Information and Procedures Suspension and Wheel Symptom Diagnosis Suspension and Wheel Symptom Diagnosis Suspension and Wheel Symptom Diagnosis Suspension Inspection Suspension Inspection Suspension Inspection Suspension Suspension Inspection Suspension	Precautions for Suspension	2-1	Wheels and Tires	. 2D-1
Diagnostic Information and Procedures Suspension and Wheel Symptom Diagnosis Suspension and Wheel Symptom Diagnosis Suspension and Wheel Symptom Diagnosis Suspension	Suspension General Diagnosis	2A-1	Precautions	2D-1
Front Suspension and Wheel Symptom Diagnosis 2A-1 Repair Instructions 2B-1 Front Fork Components 2B-1 Front Fork Removal and Installation 2B-2 Front Fork Removal and Installation 2B-2 Front Fork Inspection 2B-9 Front Fork Parts Inspection 2B-9 Specifications 2B-10 Service Data 2B-10 Recommended Service Material 2B-10 Recommended Service Material 2B-10 Repair Instructions 2C-1 Repair Instructions 2C-1 Repair Instructions 2D-10 Recommended Service Material 2B-10 Recommended Service Material 2B-10 Recommended Service Material 2B-10 Repair Instructions 2C-1 Rear Suspension Components 2C-1 Rear Suspension Adjustment 2C-1 Rear Suspension Inspection 2C-2 Rear Shock Absorber Disposal 2C-2 Rear Shock Absorber Inspection 2C-3 Cushion Lever Removal and Installation 2C-3 Cushion Lever Removal and Installation 2C-3 Swingarm / Cushion Rod Removal and Installation 2C-3 Swingarm Related Parts Inspection 2C-10 Swingarm Related Parts Inspection 2C-11 Specifications 2C-13 Tightening Torque Specifications 2C-14	•			
Front Suspension 2B-1 Repair Instructions 2B-1 Front Fork Components 2B-1 Front Fork Components 2B-1 Front Fork Disassembly and Assembly 2B-3 Front Fork Disassembly and Assembly 2B-3 Front Fork Parts Inspection 2B-9 Front Fork Parts Inspection 2B-0 Service Data 2B-10 Recommended Service Material 2B-10 Special Tool 3 and Equipment 2B-10 Special Tool 3 and Equipment 2B-10 Special Tool 3 and Equipment 2B-10 Special Tool 3B-10 Spec			Repair Instructions	2D-2
Repair Instructions   2B-1   Front Fork Components   2B-1   Front Fork Components   2B-1   Front Fork Removal and Installation   2B-2   Front Fork Inspection   2B-9   Front Fork Inspection   2B-9   Front Fork Inspection   2B-9   Front Fork Parts Inspection   2B-9   Front Fork Parts Inspection   2B-9   Front Wheel Related Parts Inspection   2D-7   Repair Instructions   2B-10   Recommended Service Material   2B-10   Rear Suspension Components   2C-1   Rear Suspension Assembly Construction   2C-3   Rear Shock Absorber Removal and Installation   2C-3   Rear Shock Absorber Inspection   2C-4   Rear Suspension Inspection   2C-4   Rear Suspension Adjustment   2C-4   Rear Suspension Adjustment   2C-4   Rear Shock Absorber Disposal   2C-5   Cushion Lever Removal and Installation   2C-5   Cushion Lever Removal and Installation   2C-7   Swingarm / Cushion Rod Removal and Installation   2C-7   Swingarm Related Parts Inspection   2C-8   Swingarm Related Parts Inspection   2C-1   Specifications   2C-13   Tightening Torque Specifications   2C-13   Service Data   2C-15   Specifications   2C-15   Specificati	caspension and wheel cymptom Blaghools.	27 \ 1	-	
Repair Instructions	Front Suspension	2B-1		2D-2
Front Fork Components. 2B-1 Front Fork Components. 2B-2 Front Fork Disassembly and Assembly. 2B-3 Front Fork Inspection 2B-9 Front Wheel Related Parts Inspection 2D-7 Special Tools and Equipment 2B-10 Special Tools and Equipment 2B-10 Special Tool 2B-11 Rear Suspension 2B-10 Rear Suspension 2B-11 Rear Suspension Components 2C-1 Rear Suspension Assembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-3 Rear Suspension Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-7 Swingarm Related Parts Inspection 2C-10 Swingarm Related Parts Inspection 2C-11 Specifications 2C-13 Tightening Torque Specifications 2C-13 Tightening Torque Specifications 2C-13 Tightening Torque Specifications 2C-13 Ti	-		Front Wheel Assembly Construction	
Front Fork Removal and Installation			(GSF650/S/U/SUK7)	2D-3
Front Fork Disassembly and Assembly. 2B-3 Front Fork Inspection 2B-9 Front Fork Parts Inspection 2B-9 Specifications 2B-10 Service Data 2B-10 Tightening Torque Specifications 2B-10 Recommended Service Material 2B-10 Special Tools and Equipment 2B-10 Special Tool 2B-11 Rear Suspension 2C-1 Rear Suspension Components 2C-1 Rear Suspension Assembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-3 Rear Suspension Inspection 2C-4 Rear Suspension Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Suspension Adjustment 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Inspection 2C-5 Cushion Lever Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-10 Swingarm Bearing Removal and Installation 2C-15 Specifications 2C-13 Service Data 2C-13 Tightening Torque Specifications 2B-10 Rear Wheel Components (GSF650/S/U/SUK7) 2D-10 Rear Wheel Assembly Construction (GSF650/S/U/SUK7) 2D-11 Rear Wheel Related Parts Inspection 2C-10 Swingarm Related Parts Inspection 2C-10 Swingarm Related Parts Inspection 2C-13 Service Data 2C-13 Tightening Torque Specifications 2B-10 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Shock Absorber Disposal 2C-5 Swingarm Related Parts Inspection 2C-10 Swingarm Related Parts Inspection 2C-10 Swingarm Bearing Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Assembly C				
Front Fork Inspection 2B-9 Front Fork Parts Inspection 2B-9 Specifications 2B-10 Service Data 2B-10 Tightening Torque Specifications 2B-10 Record Tool 3D-9 Special Tools and Equipment 2B-10 Repair Instructions 2C-1 Rear Suspension Components 2C-1 Rear Suspension Components 2C-1 Rear Suspension Components 2C-1 Rear Suspension Nassembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-3 Rear Suspension Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Suspension Adjustment 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-6 Cushion Lever Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-1 Swingarm Related Parts Inspection 2C-1 Specifications 2C-1 Specifications 2C-1 Tightening Torque Specifications 2C-13 Tightening Torque Specifications 2C-13 Tightening Torque Specifications 2C-13 Tightening Torque Specifications 2C-13 Service Data 2C-13 Tightening Torque Specifications 2C-14 Specifications 2C-14 Tight Part All Part Al			Installation (GSF650/S/U/SUK7)	2D-4
Front Fork Parts Inspection 2B-9 Specifications 2B-10 Service Data 2B-10 Tightening Torque Specifications 2B-10 Recommended Service Material 2B-10 Special Tool and Equipment 2B-10 Special Tool 2B-11 Rear Suspension 2B-11 Rear Suspension 2B-11 Rear Suspension Components 2C-1 Repair Instructions 2C-1 Rear Suspension Assembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-2 Rear Shock Absorber Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-6 Cushion Lever Removal and Installation 2C-6 Swingarm Related Parts Inspection 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm Felated Parts Inspection 2C-1 Swingarm Related Parts Inspection 2C-1 Specifications 2C-13 Tightening Torque Specifications 2B-10 Rear Wheel Components (GSF650/S/U/SUK7) 2D-24 Rear Wheel Assembly Removal and Installation 2D-16 Rear Wheel Assembly Removal and Installation 2D-16 Rear Wheel Assembly Construction 2D-13 Tire Removal and Installation 2D-15 Wheel J Tire / Air Valve Inspection and Cleaning 2D-16 Air Valve Removal and Installation 2D-17 Wheel Balance Check and Adjustment 2D-17 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-19 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal			Front Wheel Related Parts Inspection	2D-6
Specifications 2B-10 Service Data 2B-10 Tightening Torque Specifications 2B-10 Recommended Service Material 2B-10 Special Tools and Equipment 2B-10 Recommended Service Material 2B-10 Special Tool 2B-11 Rear Suspension 2C-1 Rear Suspension 2C-1 Rear Suspension Components 2C-1 Rear Suspension Components 2C-1 Rear Suspension Nassembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-3 Rear Suspension Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-1 Specifications 2C-1 Specifications 2C-13 Service Data 2C-14 Tightening Torque Specifications 2B-10 Rear Wheel Components (GSF650/S/U/SUK7) 2D-10 Rear Wheel Assembly Construction (GSF650/S/U/SUK7) 2D-10 Rear Wheel Assembly Removal and Installation 2D-13 Tire Removal and Installation 2D-15 Wheel / Tire / Air Valve Inspection and Cleaning 2D-16 Air Valve Removal and Installation 2D-17 Wheel Balance Check and Adjustment 2D-17 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-18 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-19 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-16 Air Valve Removal and Installation 2D-17 Wheel Balance Check and Adjustment 2D-17 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Install			Front Wheel Dust Seal / Bearing Removal	
Service Data			and Installation	2D-7
Tightening Torque Specifications				
Special Tools and Equipment				2D-9
Recommended Service Material 2B-10 Special Tool 2B-11  Rear Suspension 2C-1 Repair Instructions 2C-1 Rear Suspension Components 2C-1 Rear Suspension Components 2C-1 Rear Suspension Assembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-3 Rear Suspension Inspection 2C-4 Rear Suspension Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Inspection 2C-5 Cushion Lever Removal and Installation 2C-5 Cushion Lever Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-7 Swingarm Related Parts Inspection 2C-10 Swingarm Rearing Removal and Installation 2C-11 Specifications 2C-13 Service Data 2C-13 Tightening Torque Specifications 2C-13 Service Data 5Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-14 Rear Wheel Assembly Rear Value Inspection 2D-13 Tight Rear Wheel Dust Seal / Bearing Removal and Installation 2D-15 Wheel / Tire / Air Valve Inspection and Cleaning 2D-16 Air Valve Removal and Installation 2D-17 Wheel Balance Check and Adjustment 2D-17 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-18 Front Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-19 Front Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Parts Inspection 2D-16 Air Valve Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-18 Front Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel				
Rear Suspension				2D-10
Rear Suspension 2C-1 Repair Instructions 2C-1 Rear Suspension Components 2C-1 Rear Suspension Assembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-3 Rear Shock Absorber Inspection 2C-4 Rear Suspension Inspection 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-6 Cushion Lever Removal and Installation 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-10 Swingarm Related Parts Inspection 2C-11 Specifications 2C-13 Tightening Torque Specifications 2C-13 Tightening Torque Specifications 2C-14 Rear Wheel Related Parts Inspection 2C-14 Rear Wheel Dust Seal / Bearing Removal and Installation 2D-15 Wheel Dust Seal / Bearing Removal and Installation 2D-15 Wheel Dust Seal / Bearing Removal and Installation 2D-15 Wheel V Tire / Air Valve Inspection and Cleaning 2D-16 Air Valve Removal and Installation 2D-17 Wheel Balance Check and Adjustment 2D-17 Front Wheel Components (GSF650A/UA/SA/ASUK7) 2D-18 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Related Parts Inspection 2D-15 Wheel / Tire / Air Valve Inspection and Cleaning 2D-16 Air Valve Removal and Installation 2D-17 Wheel Balance Check and Adjustment 2D-17 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-18 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Related Parts Inspection 2D-15 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Related Parts Inspection 2D-15 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Related Parts Inspection		_		
Repair Instructions				
Repair Instructions	Rear Suspension	2C-1		2D-12
Rear Suspension Components 2C-1 Rear Suspension Assembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-3 Rear Suspension Inspection 2C-4 Rear Suspension Inspection 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-10 Swingarm Bearing Removal and Installation 2C-11 Specifications 2C-13 Tiphtening Torque Specifications 2C-13 Tightening Torque Specifications 2C-14 Rear Suspension Assembly Construction 2C-15 Wheel / Tire / Air Valve Inspection and Cleaning 2D-16 Air Valve Removal and Installation 2D-17 Wheel Balance Check and Adjustment 2D-17 Wheel Balance Check and Adjustment 2D-17 Front Wheel Components (GSF650A/UA/SA/ASUK7) 2D-18 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-23 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Specifications 2D-26 Specifications 2D-26 Specifications 2D-26				
Rear Suspension Assembly Construction 2C-2 Rear Shock Absorber Removal and Installation 2C-3 Rear Suspension Inspection 2C-3 Rear Suspension Inspection 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Shock Absorber Disposal 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-6 Cushion Lever Inspection 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-10 Swingarm Bearing Removal and Installation 2C-11 Specifications 2C-13 Tightening Torque Specifications 2C-13 Tightening Torque Specifications 2C-12 Rear Shock Absorber Removal and Installation 2C-14 Rear Shock Absorber Removal and Installation 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Shock Absorber Inspection 2C-5 Cushion Lever Removal and Installation 2C-5 Cushion Lever Inspection 2C-6 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-7 Swingarm Bearing Removal and Installation 2C-10 Specifications 2C-13 Tightening Torque Specifications 2C-13 Service Data 2C-13 Service Data 2C-14 Specifications 2C-14 Specifications 2C-15 Service Data 2C-15 Service Data 2C-16 Specifications 2C-17 Service Data 2C-18 Service Data 2C-18 Service Data 2C-19 Service Data 2C-19 Service Data 2C-10 Ser				
Rear Shock Absorber Removal and Installation 2C-3 Rear Suspension Inspection 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-6 Cushion Lever Inspection 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-8 Swingarm Related Parts Inspection 2C-10 Swingarm Bearing Removal and Installation 2C-15 Specifications 2C-13 Tightening Torque Specifications 2C-14 Rear Shock Absorber Inspection 2C-4 Rear Suspension Inspection 2C-4 Rear Suspension Inspection 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Shock Absorber Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-6 Cushion Lever Inspection 2C-6 Cushion Lever Bearing Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-19 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel				2D-15
Rear Suspension Inspection			·	00.40
Rear Suspension Inspection	Installation	2C-3	•	
Rear Shock Absorber Inspection 2C-4 Rear Suspension Adjustment 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-6 Cushion Lever Inspection 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-10 Swingarm Bearing Removal and Installation 2C-11 Specifications 2C-13 Service Data 2C-13 Tightening Torque Specifications 2C-13 Tightening Torque Specifications 2C-13 Rear Shock Absorber Inspection 2C-4 Rear Suspension Adjustment 2D-17 Front Wheel Components (GSF650A/UA/SA/ASUK7) 2D-18 Front Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-23 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Specifications 2C-13 Service Data 2C-13 Service Data 2D-26				
Rear Suspension Adjustment 2C-4 Rear Shock Absorber Disposal 2C-5 Cushion Lever Removal and Installation 2C-6 Cushion Lever Inspection 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-7 Swingarm Related Parts Inspection 2C-10 Swingarm Bearing Removal and Installation 2C-11 Specifications 2C-13 Service Data 2C-13 Tightening Torque Specifications 2C-26 Rear Shock Absorber Disposal 2C-5 ASUK7) 2D-18 Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Components (GSF650A/UA/SA/ASUK7) 2D-20 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-23 Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) 2D-24 Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) 2D-24 Specifications 2C-13 Service Data 2D-26 Service Data 2D-26	·		•	2D-17
Cushion Lever Removal and Installation 2C-6 Cushion Lever Inspection 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Cushion Lever Bearing Removal and Installation 2C-7 Swingarm / Cushion Rod Removal and Installation 2C-8 Swingarm Related Parts Inspection 2C-10 Swingarm Bearing Removal and Installation 2C-11 Specifications 2C-13 Service Data 2C-13 Tightening Torque Specifications 2C-13 Tracks and Equipment 2C-14  Specifications 2C-13	·		·	2D 40
Cushion Lever Inspection	Rear Shock Absorber Disposal	2C-5	,	2D-18
Cushion Lever Inspection Cushion Lever Bearing Removal and Installation Swingarm / Cushion Rod Removal and Installation Installation Swingarm Related Parts Inspection Swingarm Bearing Removal and Installation Specifications Service Data Tightening Torque Specifications  2C-13 Special Table and Equipment  Front Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7) Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) Specifications Specificatio	Cushion Lever Removal and Installation	2C-6		2D 40
Installation	Cushion Lever Inspection	2C-7	,	20-19
Swingarm / Cushion Rod Removal and Installation	Cushion Lever Bearing Removal and			3D 30
Swingarm 7 Cushion Rod Removal and Installation	Installation	2C-7		2D-20
Swingarm Related Parts Inspection	Swingarm / Cushion Rod Removal and			3D 33
Swingarm Related Parts Inspection	Installation	2C-8	,	20-23
Specifications	Swingarm Related Parts Inspection	2C-10		3D 34
Service Data	Swingarm Bearing Removal and Installation.	2C-11		20-24
Service Data	Specifications	2C-13		2D-24
Special Tools and Equipment 2C-13 Service Data			•	
Chaoial Taola and Equipment 2C 12	Tightening Torque Specifications	2C-13	•	
	Special Tools and Equipment	2C-13		

# 2-ii Table of Contents

Special Tools and Equipment	2D-27	Special Tool	2D-27
Recommended Service Material	2D-27		

# **Precautions**

# **Precautions**

# **Precautions for Suspension**

Refer to "General Precautions in Section 00 (Page 00-1)".

B817H22000001

# **▲ WARNING**

All suspensions, bolts and nuts are an important part in that it could affect the performance of vital parts. They must be tightened to the specified torque periodically and if the suspension effect is lost, replace it with a new one.

## **⚠ CAUTION**

Never attempt to heat, quench or straighten any suspension part. Replace it with a new one, or damage to the part may result.

# **Suspension General Diagnosis**

# **Diagnostic Information and Procedures**

# **Suspension and Wheel Symptom Diagnosis**

B817H22104001

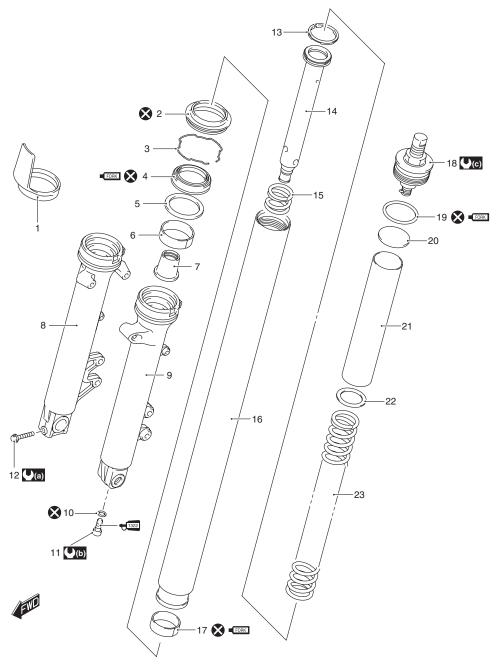
Condition	Possible cause	Correction / Reference Item
Wobbly front wheel	Distorted wheel rim.	Replace.
	Worn front wheel bearings.	Replace.
	Defective or incorrect tire.	Replace.
	Loose front axle nut.	Tighten.
	Loose front axle pinch bolt.	Tighten.
	Incorrect fork oil level.	Adjust.
Front suspension too soft	Weak spring.	Replace.
	Insufficient fork oil.	Check level and add.
	wrong weight fork oil.	Replace.
Front suspension too stiff	Excessively viscous fork oil.	Replace.
	Excessive fork oil.	Check level and drain.
	Bent front axle.	Replace.
Front suspension too	Insufficient fork oil.	Check level and add.
noisy	Loose front suspension fastener.	Tighten.
Wobbly rear wheel	Distorted wheel rim.	Replace.
	Worn rear wheel bearing.	Replace.
	Defective or incorrect tire.	Replace.
	Worn swingarm bearing.	Replace.
	Worn rear suspension bushing.	Replace.
	Loose rear suspension fastener.	Tighten.
Rear suspension too soft	Weak rear shock absorber spring.	Replace.
	Rear shock absorber leaks oil.	Replace.
	Improperly suspension setting.	Adjust.
Rear suspension too stiff	Improper suspension setting.	Adjust.
	Bent rear shock absorber shaft.	Replace.
	Bent swingarm.	Replace.
	Worn swingarm and rear suspension	Replace.
	related bearings.	
Rear suspension too	Loose rear suspension fastener.	Tighten.
noisy	Worn rear suspension bushing.	Replace.
	Worn swingarm bearing.	Replace.

# **Front Suspension**

# **Repair Instructions**

# **Front Fork Components**

B817H22206001



I717H1220036-03

1.	Front fork protector	11. Cylinder bolt	21. Spacer
2.	Dust seal	12. Front axle pincj bolt	22. Washer
3.	Oil seal stopper ring	13. Ring	23. Spring
4.	Oil seal	14. Cylinder	(a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
5.	Oil seal retainer	15. Spring	(b): 30 N·m (3.0 kgf-m, 21.5 lb-ft)
6.	Outer tube slide metal	16. Inner tube	(2.3 kgf-m, 16.5 lb-ft)
7.	Oil lock piece	17. Inner tube slide metal	1322 : Apply thread lock to thread part.
8.	Outer tube (right)	18. Front fork cap bolt	FORK : Apply fork oil.
9.	Outer tube (left)	19. O-ring	🔇 : Do not reuse.
10.	Gasket	20. Spring seat	

# Front Fork Removal and Installation

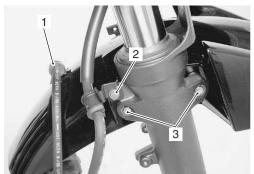
B817H22206002

#### Removal

1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-4)".

## **⚠ CAUTION**

- Make sure that the motorcycle is supported securely.
- Do not operate the front brake lever with the front wheel removed.
- 2) Disconnect the brake hose clamp (1) from the front fender.
- 3) Remove the brake hose clamp bolt (2).
- 4) Remove the front fender by removing the bolts (3), left and right.



I717H1220001-01

5) Loose the front fork upper clamp bolt (4).

#### NOTE

Slightly loosen the front fork cap bolt (5) to facilitate later disassembly.

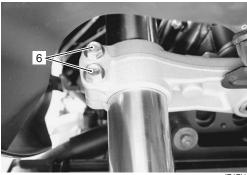


I717H1220002-03

6) Loosen the front fork lower clamp bolts (6) and remove the front fork.

# **NOTE**

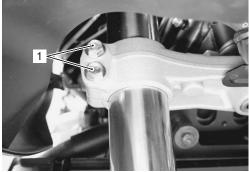
Hold the front fork by the hand to prevent sliding out of the steering stem.



I717H1220003-01

#### Installation

1) Set the front fork to the front fork lower bracket temporarily by tightening the lower clamp bolts (1).

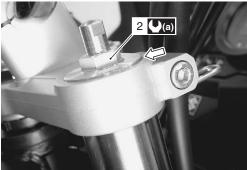


I717H1220004-01

2) Tighten the front fork cap bolt (2) to the specified torque with the special tool.

# Tightening torque Front fork cap bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

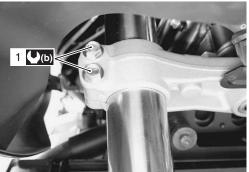
3) Loosen the lower clamp bolts and set the top end of the inner tube to the upper surface of the steering stem upper bracket.



I717H1220005-01

4) Tighten the front fork lower clamp bolts (1).

**Tightening torque** Front fork lower clamp bolt (b): 23 N·m (2.3 kgfm, 16.5 lbf-ft)



I717H1220006-01

5) Tighten the front fork upper fork clamp bolt (3).

Tightening torque Front fork upper clamp bolt (c): 23 N·m (2.3 kgfm, 16.5 lbf-ft)



I717H1220007-01

6) Set the front fender plate nut to the front fender.

# NOTE

Face the triangle mark on the front fender brace to the front side "A".



I718H1220010-02

- 7) Remount the front fender along with the fender plate
- 8) Install the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/ S/U/SUK7) in Section 2D (Page 2D-4)".

#### **NOTE**

Before tightening the front axle and front axle pinch bolts, move the front fork up and down four or five times.

#### **▲ WARNING**

After remounting the brake caliper, pump the brake lever until the pistons push the pads correctly.



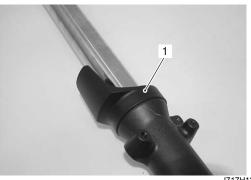
717H1220009-01

# Front Fork Disassembly and Assembly B817H22206003

Refer to "Front Fork Removal and Installation (Page 2B-2)".

## Disassembly

1) Remove the front fork protector (1).



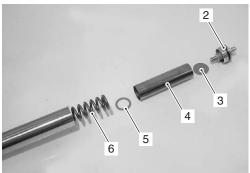
I717H1220010-01

2) Remove the front fork cap bolt (2).

## **⚠ CAUTION**

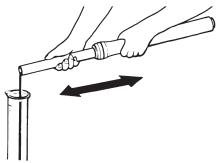
Hold the front fork cap bolt when removing it, or it will jump out due to the spring pressure.

3) Remove the spring seat (3), spacer (4), washer (5) and spring (6).



I717H1220012-02

- 4) Invert the fork and stroke it several times to drain out fork oil
- 5) Hold the fork inverted for a few minutes to drain oil.



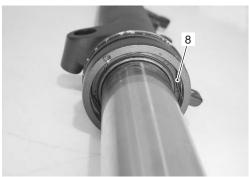
I649G1220012-02

6) Remove the dust seal (7).



I717H1220013-02

7) Remove the oil seal stopper ring (8).

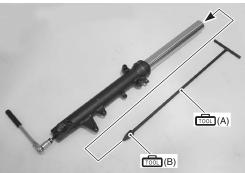


I717H1220014-02

8) Remove the cylinder bolt using the special tools.

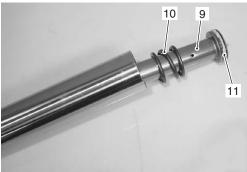
# Special tool

(A): 09940-34520 (T handle)
(B): 09940-34531 (Attachment A)



I717H1220015-01

9) Remove the cylinder (9), rebound spring (10) and ring (11).

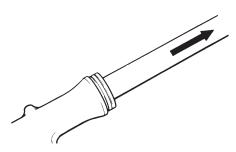


I717H1220016-02

10) Remove the oil seal by slowly pulling out the inner tube.

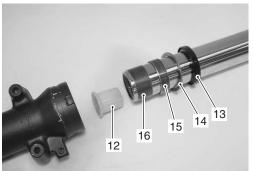
#### NOTE

Be careful not to damage the inner tube.



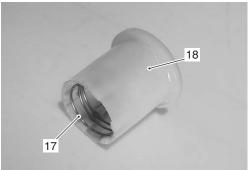
I717H1220017-01

- 11) Remove the following parts.
  - Oil lock piece (12)
  - Oil seal (13)
  - · Oil seal retainer (14)
  - Outer tube slide metal (15)
  - Inner tube slide metal (16)



I717H1220018-03

12) Remove the spring (17) from the oil lock piece (18).



I717H1220019-02

## **Assembly**

Assemble the front fork in the reverse order of disassembly. Pay attention to the following points:

# **⚠ CAUTION**

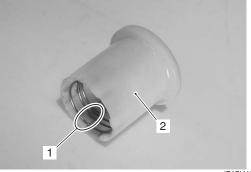
- Thoroughly wash all the component parts being assembled.
   Insufficient washing can result in oil leakage or premature wear of the parts.
- When reassembling the front fork, use new fork oil.
- Use the specified fork oil for the front fork.
- When reassembling, replace the slide metal, guide metal, oil seal, dust seal and cylinder bolt gasket with the new ones.
- Use care not to cause damage to the slide metal surfaces since the surfaces are teflon coated.

#### Oil lock piece

• Install the spring (1) into the oil lock piece (2) securely.

#### NOTE

Check the installation of the spring (1) when reassemble the oil lock piece.



I717H1220020-01

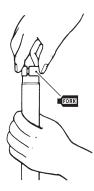
#### Inner tube

• Hold the inner tube vertically, clean the metal groove and install the inner tube slide metal by hand.

## **⚠ CAUTION**

Do not damage the Teflon coated surface of the inner tube's slide metal when mounting it. · Apply fork oil to the inner tube slide metal.

# Fork Oil 99000–99044–10G (SUZUKI FORK OIL G-10 or equivalent)



I649G1220021-02

- Install the following parts onto the inner tube.
  - Outer tube slide metal (1)
  - Oil seal retainer (2)
  - Oil seal (3)

#### **⚠** CAUTION

When installing the oil seal to inner tube, be careful not to damage the oil seal lip.

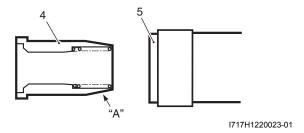
· Apply fork oil to the outer slide metal and oil seal lip.

# FORK: Fork Oil 99000–99044–10G (SUZUKI FORK OIL G-10 or equivalent)



I717H1220021-01

 When installing the oil lock piece (4), insert the tapered end "A" of the oil lock piece into the inner tube (5).



• Install the inner tube into the outer tube with care not to drop the oil lock piece out.

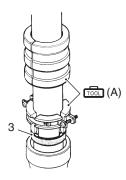
#### **NOTE**

After installing the inner tube into the outer tube, keep the oil lock piece into the inner tube by compressing the front fork fully.

• Install the oil seal (3) into the outer tube using the special tool.

### Special tool

(A): 09940-52861 (Front fork oil seal installer)



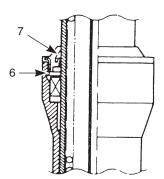
I717H1220024-01

• Install the oil seal stopper ring (6).

#### **⚠ CAUTION**

Make sure that the oil seal stopper ring is fitted securely.

Install the dust seal (7).



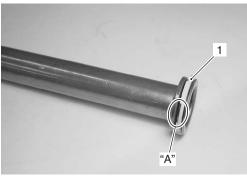
I717H1220025-01

# Cylinder bolt

· Install the ring (1) to the cylinder.

#### NOTE

The cylinder ring should be installed onto the cylinder with its oil passage notches "A" facing downward.

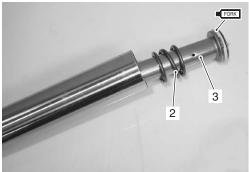


I717H1220026-01

- Install the rebound spring (2) to the cylinder (3).
- · Apply fork oil to the cylinder ring.

Fork Oil 99000–99044–10G (SUZUKI FORK OIL G-10 or equivalent)

• Insert the cylinder (3) into the inner tube.



I717H1220027-01

 Apply thread lock to the cylinder bolt and tighten it to the specified torque with a 6-mm hexagon wrench and special tools.

## **⚠ CAUTION**

Use a new cylinder bolt gasket to prevent oil leakage.

## **NOTE**

Check the front fork for smoothness by stroking it after installing the cylinder.

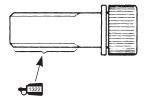
## Special tool

(A): 09940-34520 (T handle)
(B): 09940-34531 (Attachment A)

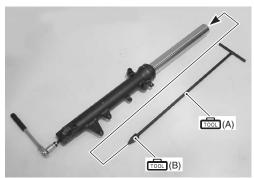
+322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

# **Tightening torque**

Front fork cylinder bolt: 30 N·m (3.0 kgf-m, 21.5 lbf-ft)



I718H1220012-03



I717H1220028-01

#### Fork oil

- · Place the front fork vertically without spring.
- · Compress it fully.
- Pour specified front fork oil up to the top level of the inner tube.

FORK: Fork Oil 99000-99044-10G (SUZUKI FORK OIL G-10 or equivalent)

Capacity (each leg)

GSF650: 458 ml (15.5/16.1 US/Imp oz) GSF650S: 459 ml (15.5/16.2 US/Imp oz)

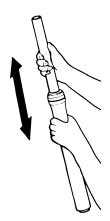


I649G1220026-02

- Move the inner tube up and down several strokes until bubbles do not come out from the oil.
- Keep the front fork vertically and wait 5 6 minutes.

#### **NOTE**

Take extreme attention to pump out air completely.



I717H1220029-01

Hold the front fork vertically and adjust fork oil level with the special tool.

#### **NOTE**

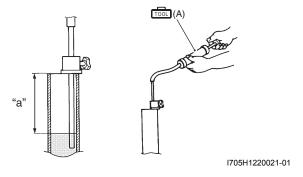
When adjusting the fork oil level, remove the fork spring and compress the inner tube fully.

#### Special tool

(A): 09943-74111 (Fork oil level gauge)

Fork oil level "a"

GSF650: 133 mm (5.2 in.) GSF650S: 132 mm (5.2 in.)

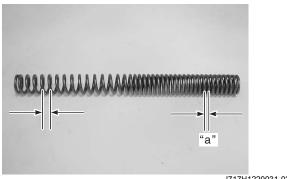


### Fork spring

· Install the fork spring as shown.

## **NOTE**

The smaller pitch "a" should face to the bottom side of the front fork.



I717H1220031-02

## Front fork cap bolt

• Apply fork oil lightly to the O-ring (1).

#### **↑** CAUTION

Use a new O-ring (1) to prevent oil leakage.

# FORK: Fork Oil 99000–99044–10G (SUZUKI FORK OIL G-10 or equivalent)

 Install the front fork cap bolt to the inner tube temporarily.

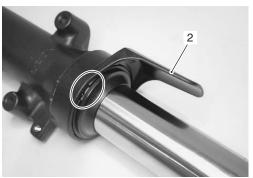


I717H1220032-01

• Install the front fork protector (2).

#### **NOTE**

Fit the projection of the front fork protector to the depression of the front fork outer tube.



I717H1220033-01

# **Front Fork Inspection**

B817H22206004

Refer to "Front Fork Inspection in Section 0B (Page 0B-21)".

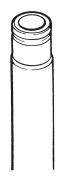
## **Front Fork Parts Inspection**

B817H22206005

Refer to "Front Fork Disassembly and Assembly (Page 2B-3)".

### **Inner and Outer Tubes**

Inspect the inner tube sliding surface and outer tube sliding surface for scuffing.



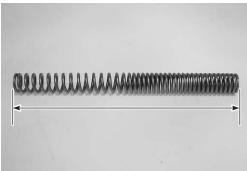


I649G1220035-03

# **Fork Spring**

Measure the fork spring free length. If it is shorter than the service limit, replace it with a new one.

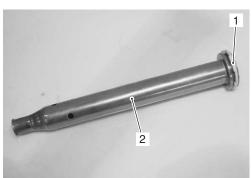
Front fork spring free length Service limit: 368 mm (14.5 in.)



I717H1220034-01

# Cylinder / cylinder ring

Inspect the cylinder (1) and cylinder ring (2) for wear or damage. If any defects are found, replace the cylinder or cylinder ring with a new one.



I717H1220035-01

# **Specifications**

## **Service Data**

**Front Fork** 

B817H22207001

Unit:	mm	(in)
OTHE.		("'')

Item		Limit	
Front fork stroke		_	
Front fork inner tube O.D.		_	
Front fork spring free length		368 (14.5)	
Front fork oil level (without spring,	GSF650/U	133 (5.2)	_
outer tube fully compressed )	GSF650S/SU	132 (5.2)	_
Front fork spring adjuster	GSF650/U	5th groove from top	
Front lork spring adjuster	GSF650S/SU	our groove nom top	_

#### Oil

Item		Note	
Front fork oil type	F		
Front fork oil capacity (each leg)	GSF650/U	458 ml (15.5/16.1 US/lmp oz)	
	GSF650S/SU	459 ml (15.5/16.2 US/Imp oz)	

# **Tightening Torque Specifications**

B817H22207002

Fastening part	Tightening torque			Note
l asterning part	N⋅m	kgf-m	lbf-ft	Note
Front fork cap bolt	23	2.3	16.5	☞(Page 2B-2)
Front fork lower clamp bolt	23	2.3	16.5	☞(Page 2B-3)
Front fork upper clamp bolt	23	2.3	16.5	☞(Page 2B-3)
Front fork cylinder bolt	30	3.0	21.5	☞(Page 2B-7)

## **NOTE**

The specified tightening torque is also described in the following.

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

# **Special Tools and Equipment**

# **Recommended Service Material**

B817H22208001

Material	SUZUKI recommended produc	Note	
Fork Oil	SUZUKI FORK OIL G-10 or	P/No.: 99000-99044-	☞(Page 2B-6) / ☞(Page 2B-
	equivalent	10G	6) / ଙ (Page 2B-7) /
			☞(Page 2B-8) / ☞(Page 2B-
			9)
Thread lock cement	THREAD LOCK CEMENT SUPER	P/No.: 99000-32110	☞(Page 2B-7)
	1322 or equivalent		

## **NOTE**

Required service material is also described in the following.

"Front Fork Components (Page 2B-1)"

<sup>&</sup>quot;Front Fork Components (Page 2B-1)"

Special Tool

09940–34520
T handle

(Page 2B-4) / (Page 2B-7)

09940–52861
Front fork oil seal installer

(Page 2B-6)

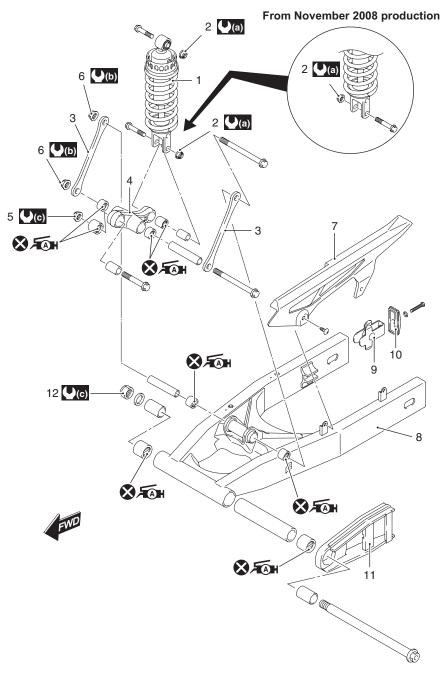
09943–74111
Fork oil level gauge
(Page 2B-8)

## **Rear Suspension**

## **Repair Instructions**

#### **Rear Suspension Components**

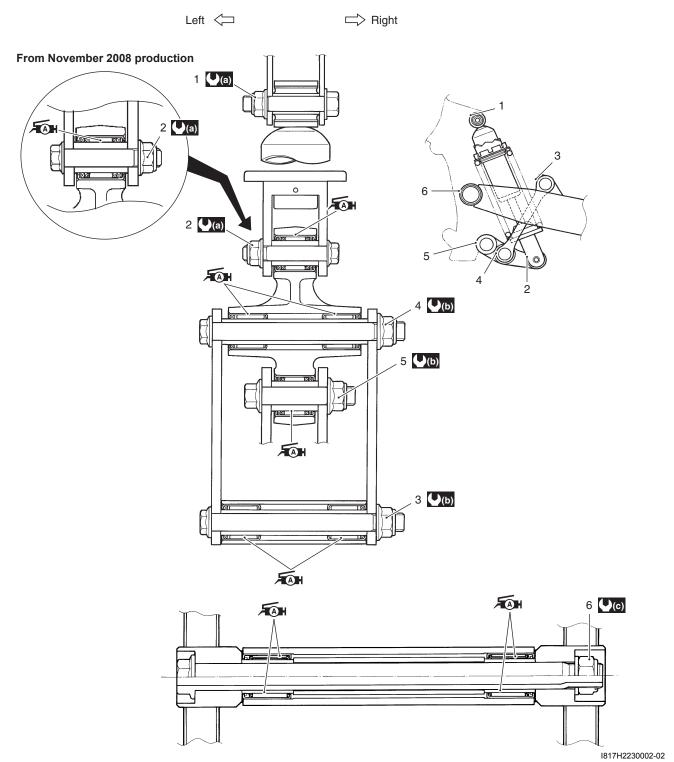
B817H22306001



Rear shock absorber	7. Chain case	(a): 50 N·m (5.0 kgf-m, 36.0 lb-ft)
Rear shock absorber mounting nut	8. Swingarm	(7.8 kgf-m, 56.5 lb-ft)
Cushion rod	Chain adjuster	(10.0 kgf-m, 72.5 lb-ft)
Cushion lever	10. Chain adjuster guide	Apply grease to the bearing.
Cushion lever mounting nut	11. Chain buffer	🔀 : Do not reuse.
Cushion rod mounting nut	12. Swingarm pivot nut	

### **Rear Suspension Assembly Construction**

B817H22306002



Rear shock absorber mounting nut (Upper)	Cushion lever mounting nut	(c): 100 N m (10.0 kgf-m 72.5 lb-ft)
Rear shock absorber mounting nut (Lower)	Swingarm pivot nut	★AH: Apply grease to the bearing.
Cushion rod mounting nut (Upper)	<b>(a)</b> : 50 N m (5.0 kgf-m 36.0 lb-ft)	
Cushion rod mounting nut (Lower)	(b): 78 N m (7.8 kgf-m 56.5 lb-ft)	

### Rear Shock Absorber Removal and Installation

#### Removal

- Place the motorcycle on the center stand and support the motorcycle with a jack to be no load for the rear shock absorber.
- 2) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- Remove the rear brake master cylinder mounting bolts.



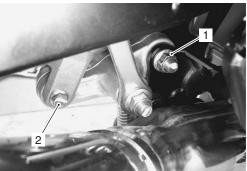
I717H1230002-01

4) Remove the front footrest bracket mounting bolts.



I717H1230003-02

5) Remove the shock absorber lower mounting bolt and nut (1), and cushion lever mounting bolt and nut (2).



I717H1230004-01

6) Remove the shock absorber upper mounting bolt and nut.



I717H1230005-01

7) Remove the shock absorber.



I717H1230006-01

#### Installation

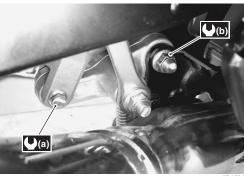
Install the rear shock absorber in the reverse order of removal. Pay attention to the following points:

- Temporary install the rear shock absorber and cushion lever.
- Tighten the rear shock absorber upper/lower mounting bolts and nuts.

Tightening torque Rear shock absorber mounting nut (a): 50 N·m ( 5.0 kgf-m, 36.0 lbf-ft) · Tighten the cushion lever mounting bolt and nut.

Tightening torque Cushion lever mounting nut (b): 78 N⋅m (7.8 kgfm, 56.5 lbf-ft)





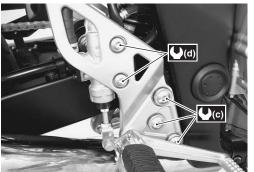
I717H1230008-01

· Tighten the front footrest bracket mounting bolts.

# Tightening torque Front footrest bracket mounting bolts (c): 35 N⋅m (3.5 kgf-m, 25.5 lbf-ft)

Tighten the rear brake master cylinder mounting bolts.

## Tightening torque Rear brake master cylinder (d): 23 N⋅m (2.3 kgf-m, 16.5 lbf-ft)



I717H1230009-01

#### **Rear Suspension Inspection**

B817H22306004

Refer to "Rear Suspension Inspection in Section 0B (Page 0B-21)".

#### **Rear Shock Absorber Inspection**

B817H22306005

Inspect the rear shock absorber in the following procedures:

- Remove the rear shock absorber. Refer to "Rear Shock Absorber Removal and Installation (Page 2C-3)".
- 2) Inspect the rear shock absorber for damage and oil leakage, and absorber bushing for wear and damage. If any defect is found, replace the rear shock absorber with a new one.

#### **↑** CAUTION

Do not attempt to disassemble the rear shock absorber. It is unserviceable.



I717H1230010-01

3) Install the rear shock absorber. Refer to "Rear Shock Absorber Removal and Installation (Page 2C-3)".

#### **Rear Suspension Adjustment**

B817H22306006

After installing the rear suspension, adjust the spring pre-load and damping force as follows.

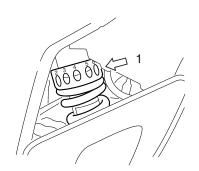
#### **Spring Pre-load Adjustment**

Turn the spring tension ring (1) to the desired position.

#### NOTE

Position 1 provides the softest spring tension and position 7 provides the stiffest.

## STD position 3rd position



I717H1230011-01

#### **Damping Force Adjustment**

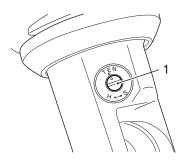
Turn the damping force adjuster (1) to the desired position.

#### **NOTE**

Turn the adjuster clockwise to stiffen the damping force and turn it counterclockwise to soften the damping force.

#### STD position

#### 1-1/4 turns out from stiffest position



I717H1230012-01

#### **Rear Shock Absorber Disposal**

B817H22306007

Refer to "Rear Shock Absorber Removal and Installation (Page 2C-3)".

The rear shock absorber unit contains high-pressure nitrogen gas.

#### **▲ WARNING**

- · Mishandling can cause explosion.
- Keep away from fire and heat. High gas pressure caused by heat can cause an explosion.
- · Release gas pressure before disposing.

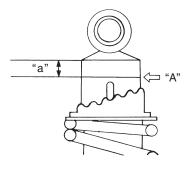
#### **Gas Pressure Release**

Make sure to observe the following precautions.

#### **▲ WARNING**

- Never apply heat or disassemble the damper unit since it can explode or oil can splash hazardously.
- When discarding the rear cushion unit, be sure to release gas pressure from the unit following the procedures.

1) Mark the drill center at the location "A" using a center punch.



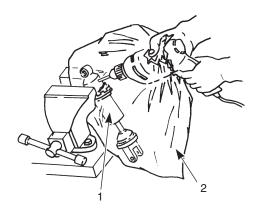
1649G1230008-02

'a": 10 mm (0.39 in.) "A": Mark the drill hole

- 2) Wrap rear shock absorber (1) with a vinyl bag (2) and fix it on a vise as shown.
- 3) Drill a 2 3 mm (0.08 0.12 in.) hole at the marked drill center using a drilling machine and let out gas while taking care not to get the vinyl bag entangled with the drill bit.

#### **▲ WARNING**

- Be sure to wear protective glasses since drilling chips and oil may fly off with blowing gas when the drill bit has penetrated through the body.
- Make sure to drill at the specified position.
   Otherwise, pressurized oil many spout out forcefully.



I649G1230009-03

#### **Cushion Lever Removal and Installation**

B817H22306008

#### Removal

- Place the motorcycle on the center stand and support the motorcycle with a jack to be no load for the cushion lever.
- 2) Remove the rear brake master cylinder mounting bolts.



I717H1230013-01

3) Remove the front footrest bracket mounting bolts.



I717H1230014-02

4) Remove the cushion lever (1) by removing its related bolts and nuts.



I717H1230015-01

#### Installation

Install the cushion lever in the reverse order of removal. Pay attention to the following point:

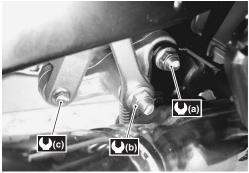
· Tighten each nut to the specified torque.

#### **Tightening torque**

Cushion lever mounting nut (a): 78 N·m (7.8 kgfm, 56.5 lbf-ft)

Cushion rod mounting nut (b): 78 N·m (7.8 kgf-m, 56.5 lbf-ft)

Rear shock absorber mounting nut (c): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



I717H1230016-0

· Tighten the front footrest bracket mounting bolts.

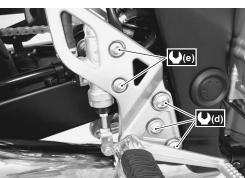
#### **Tightening torque**

Front footrest bracket mounting bolts (d): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)

· Tighten the rear brake master cylinder mounting bolts.

#### **Tightening torque**

Rear brake master cylinder mounting bolts (e): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I717H1230017-01

#### **Cushion Lever Inspection**

B817H22306009

Refer to "Cushion Lever Removal and Installation (Page 2C-6)".

#### Spacer

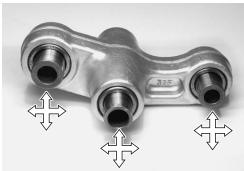
- 1) Remove the spacers from the cushion lever.
- 2) Inspect the spacers for any flaws or other damage. If any defects are found, replace the spacers with new ones.



I718H1230009-01

#### **Cushion Lever Bearing**

- 1) Insert the spacers into bearings.
- 2) Check the play by moving the spacers up and down. If excessive play is noted, replace the bearing with a new one. Refer to "Cushion Lever Bearing Removal and Installation (Page 2C-7)".



I718H1230010-01

#### **Cushion Lever**

Inspect the cushion lever for damage. If any defect is found, replace the cushion lever with a new one.



I718H1230011-01

#### **Cushion Rod**

Refer to "Swingarm Related Parts Inspection (Page 2C-10)".

## Cushion Lever Bearing Removal and Installation

B817H22306010

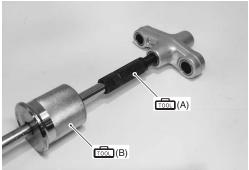
#### Removal

- 1) Remove the cushion lever. Refer to "Cushion Lever Removal and Installation (Page 2C-6)".
- 2) Remove the cushion lever bearings using the special tools.

#### Special tool

(A): 09923–73210 (Bearing remover)
(G): 09930–30104 (Rotor remover sliding

(C): 09913-70210 (Bearing installer set)



I718H1230012-01



I718H1230013-01



I718H1230015-01

#### Installation

#### **⚠ CAUTION**

The removed bearings must be replaced with new ones.

1) Press the bearings into the cushion lever with the special tool.

#### NOTE

When installing the bearing, stamped mark on the bearing must face outside.

#### Special tool

(A): 09924-84521 (Bearing installer set)



I718H1230014-02

2) Apply grease to the bearings.

## ÆM: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I718H1230016-01

3) Install the cushion lever. Refer to "Rear Shock Absorber Removal and Installation (Page 2C-3)".

## Swingarm / Cushion Rod Removal and Installation

B817H22306011

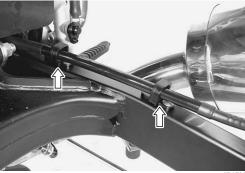
#### Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-11)".
- 2) Remove the drive chain cover (1).



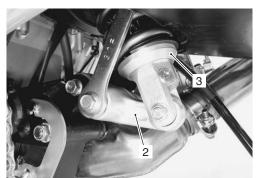
I717H1230018-01

3) Remove the brake hose from the brake hose clamps.



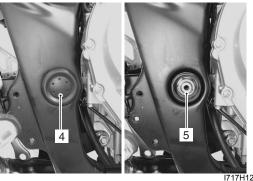
I717H1230019-01

4) Remove the cushion lever (2) and rear shock absorber (3). Refer to "Rear Shock Absorber Removal and Installation (Page 2C-3)" and "Cushion Lever Removal and Installation (Page 2C-6)".



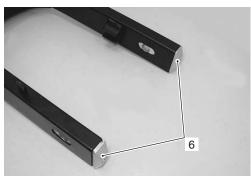
I717H1230020-01

- 5) Remove the pivot shaft end caps (4), left and right.
- 6) Remove the swingarm by removing the pivot shaft and nut (5) and washer.



717H1230021-01

7) Remove the chain adjusters (6).



I717H1230022-02

8) Remove the brake hose clamps.



I717H1230023-01

9) Remove the chain buffer (7).



I717H1230024-01

10) Remove the cushion rods (8).



I717H1230025-01

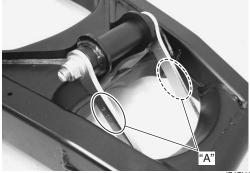
#### Installation

Install the swingarm in the reverse order of removal. Pay attention to the following points:

· Temporarily the cushion rod mounting nut.

#### **NOTE**

The stamped marks "A" on the cushion rod should be face out side.



I717H1230026-01

- · Install the washer and swingarm pivot nut.
- Tighten the swingarm pivot nut to the specified torque.

Tightening torque Swingarm pivot nut (a): 100 N⋅m (10.0 kgf-m, 72.5 lbf-ft)



717H1230027-01

• Tighten the cushion lever, cushion rod and rear shock absorber mounting nut to the specified torque.

#### **Tightening torque**

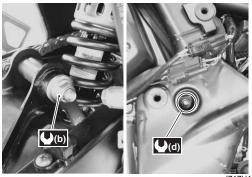
Cushion rod mounting nut (b): 78 N·m (7.8 kgf-m, 56.5 lbf-ft)

Cushion lever mounting nut (c): 78 N·m (7.8 kgfm, 56.5 lbf-ft)

Rear shock absorber mounting nut (d): 50 N·m ( 5.0 kgf-m, 36.0 lbf-ft)



I717H1230028-01



I717H1230029-01

#### **Swingarm Related Parts Inspection**

B817H22306012

Refer to "Swingarm / Cushion Rod Removal and Installation (Page 2C-8)".

#### **Spacers**

- 1) Remove the spacers from the swingarm.
- Inspect the spacers for wear and damage. If any defects are found, replace the spacers with new ones.



I717H1230030-01

#### **Chain Buffer**

Inspect the chain buffer for wear and damage. If any defect is found, replace the chain buffer with a new one.



I717H1230031-01

#### **Swingarm Bearing and Cushion Rod Bearing**

- 1) Insert the spacers into bearings.
- 2) Check the play by moving the spacers up and down. If excessive play is noted, replace the bearing with a new one. Refer to "Swingarm Bearing Removal and Installation (Page 2C-11)".



I717H1230032-01

#### Swingarm

Inspect the swingarm for damage. If any defect is found, replace the swingarm with a new one.



I717H1230033-01

#### **Cushion Rod**

Inspect the cushion rods for damage and bend. If any defects are found, replace the cushion rods with new ones.



I717H1230034-01

#### **Swingarm Pivot Shaft**

Measure the swingarm pivot shaft runout using the dial gauge. If the runout exceeds the service limit, replace the pivot shaft.

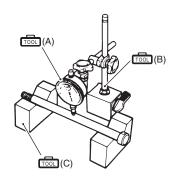
#### Special tool

(A): 09900-20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))

Swingarm pivot shaft runout Service limit: 0.3 mm (0.01 in)



I649G1230034-03

## Swingarm Bearing Removal and Installation B817H22306013

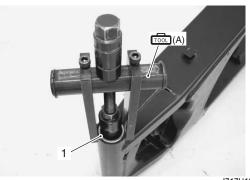
#### Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-11)".
- 2) Remove the swingarm. Refer to "Swingarm / Cushion Rod Removal and Installation (Page 2C-8)".

3) Draw out the swingarm pivot bearings (1) using the special tool.

#### Special tool

(A): 09921-20240 (Bearing remover set)



I717H1230035-01

4) Remove the center spacer (2).

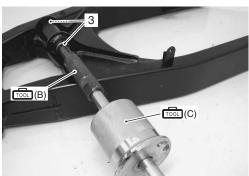


I717H1230036-01

5) Remove the swingarm cushion rod bearings (3) using the special tools.

#### Special tool

(B): 09923–73210 (Bearing remover) (C): 09930–30104 (Rotor remover sliding shaft)



I717H1230037-03

Rear Suspension: 2C-12

#### Installation

#### **⚠ CAUTION**

The removed bearings must be replaced with new ones.

1) Press the swingarm cushion rod bearings with the special tool.

#### NOTE

When installing the bearing, stamped mark on the bearing must face outside.

Special tool

(A): 09924-84521 (Bearing installer set)



I717H1230038-01

- 2) Install the bearing and center spacer.
- 3) Press the bearings into the swingarm pivot with the special tool.

#### **NOTE**

When installing the bearing, stamped mark on the bearing must face outside.

Special tool

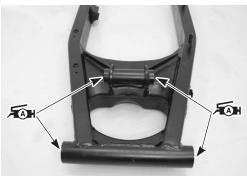
(B): 09941-34513 (Steering race installer)



I717H1230039-01

4) Apply grease to the bearings.

元 Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



1717H1230040 0

- 5) Install the swingarm. Refer to "Swingarm / Cushion Rod Removal and Installation (Page 2C-8)".
- 6) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-11)".

### **Specifications**

#### **Service Data**

Unit: mm (in)

B817H22307001

Item	Standard Limit		
Rear shock absorber spring adjuster		3rd position	
Rear shock absorber damping force adjuster	Rebound	1-1/4 turns out from stiffest position	_
Rear wheel travel	128 (5.0)		_
Swingarm pivot shaft runout	—		0.3 (0.01)

#### **Tightening Torque Specifications**

B817H22307002

Eastoning part	Tightening torque			Note
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Rear shock absorber mounting nut				☞(Page 2C-3) /
	50	5.0	36.0	☞(Page 2C-6) /
				☞(Page 2C-10)
Cushion lever mounting nut				☞(Page 2C-4) /
	78	7.8	56.5	☞(Page 2C-6) /
				☞(Page 2C-10)
Front footrest bracket mounting bolts	35	3.5	25.5	☞(Page 2C-4) /
	33	3.5	25.5	☞(Page 2C-6)
Rear brake master cylinder	23	2.3	16.5	☞(Page 2C-4)
Cushion rod mounting nut	78	7.8	56.5	☞(Page 2C-6) /
	70	7.0	30.3	☞(Page 2C-10)
Rear brake master cylinder mounting bolts	23	2.3	16.5	☞(Page 2C-6)
Swingarm pivot nut	100	10.0	72.5	☞(Page 2C-9)

#### **NOTE**

The specified tightening torque is described in the following.

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

### **Special Tools and Equipment**

#### **Recommended Service Material**

B817H22308001

Material	SUZUKI recommended produc	ct or Specification	Note
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	
	equivalent		12)

#### **NOTE**

Required service material is also described in the following.

<sup>&</sup>quot;Rear Suspension Components (Page 2C-1)"

<sup>&</sup>quot;Rear Suspension Assembly Construction (Page 2C-2)"

<sup>&</sup>quot;Rear Suspension Components (Page 2C-1)"

<sup>&</sup>quot;Rear Suspension Assembly Construction (Page 2C-2)"

### **Special Tool**

	B817H22308002
09900–20607 Dial gauge (1/100 mm, 10 mm) (Page 2C-11)	09900–20701 Magnetic stand (Page 2C-11)
09900–21304 V-block (100 mm) (Page 2C-11)	09913–70210 Bearing installer set  (Page 2C-7)
09921–20240 Bearing remover set  (Page 2C-11)	09923–73210 Bearing remover  (Page 2C-7) / (Page 2C-11)
09924–84521 Bearing installer set  (Page 2C-8) / (Page 2C-12)	09930–30104 Rotor remover sliding shaft   (Page 2C-7) / (Page 2C-11)
09941–34513 Steering race installer (Page 2C-12)	

## Wheels and Tires

#### **Precautions**

#### **Precautions for Wheel and Tire**

B817H22400001

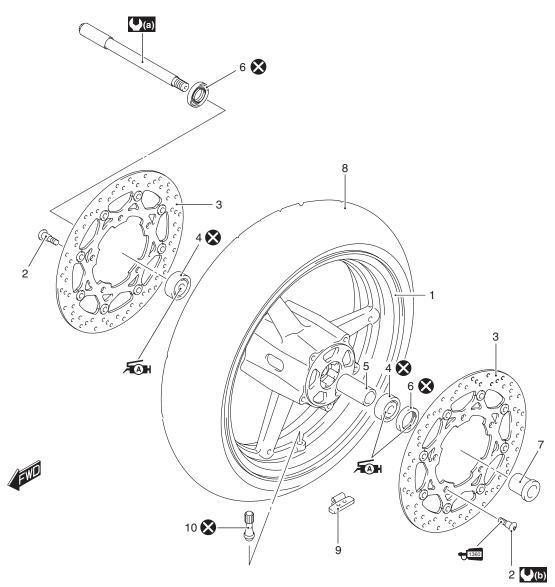
#### **▲ WARNING**

- Proper tire pressure and proper tire loading are important factors. Over loading tire can lead to tire failure and loss of motorcycle control.
- Under-inflated tires make smooth cornering difficult, and can result in rapid tire wear.
- Over-inflated tires have a smaller amount of tire in contact with the load, which can contribute to skidding and loss of control.
- Replace the wheel when wheel runout exceed the service limit or if find damage such as distortion, crack, nick or scratch.
- When tire replacement is necessary, the original equipment type tire should be used.
- Do not mix different types of tires on the same vehicle such as radial and bias-belted tires except in emergencies, because handling may be seriously affected and may result in loss of control.
- · Replacement wheel must be equivalent to the original equivalent wheel.

## **Repair Instructions**

### Front Wheel Components (GSF650/S/U/SUK7)

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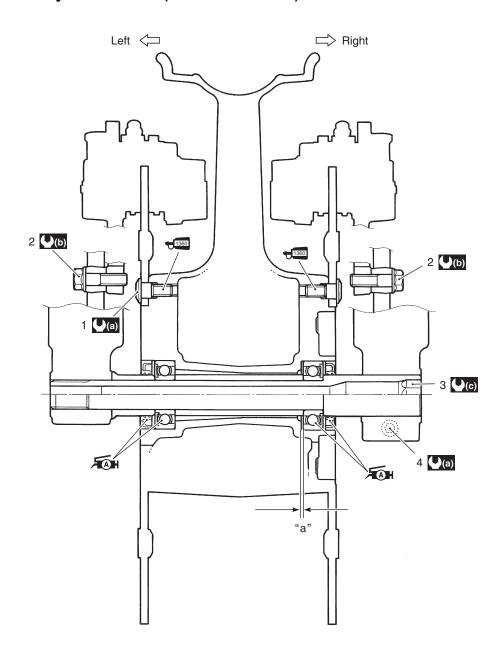


I717H1240040-04

Front axle	6. Dust seal	<b>(a)</b> : 100 N⋅m (10.0 kgf-m, 72.5 lb-ft)
Brake disc bolt	7. Collar	<b>(b)</b> : 23 N⋅m (2.3 kgf-m, 16.5 lb-ft)
<ol><li>Brake disc</li></ol>	8. Tire	Æn : Apply grease.
4. Bearing	Wheel balancer	1360 : Apply thread lock to thread part.
5. Spacer	10. Air valve	🔇 : Do not reuse.

### Front Wheel Assembly Construction (GSF650/S/U/SUK7)

B817H22406002





I717H1240001-03

Brake disc bolt	"a": Clearance	Apply grease.
Brake caliper mounting bolt	<b>(2.3 kgf-m, 16.5 lb-ft)</b>	₹1360 : Apply thread lock to thread part.
Front axle bolt	(b): 25 N·m (2.5 kgf-m, 18.0 lb-ft)	
Front axle pinch bolt	(10.0 kgf-m, 72.5 lb-ft)	

## Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7)

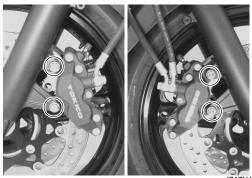
B817H22406003

#### Removal

1) Remove the brake calipers. Refer to "Front Brake Caliper Removal and Installation in Section 4B (Page 4B-2)".

#### **⚠ CAUTION**

Do not operate the brake lever while removing the caliper.



I717H1240002-01

- 2) Loosen axle pinch bolt (1) on the right front fork leg.
- 3) Loosen the front axle (2).

#### Special tool

(A): 09944–28320 (Hexagon socket (19 mm))



I717H1240003-01

4) Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

#### **A CAUTION**

Do not carry out the work with the motorcycle resting on the side-stand. DO not support the motorcycle with the exhaust pipe. Make sure that the motorcycle is supported securely.

5) Draw out the front axle and remove the front wheel.

#### NOTE

After removing the front wheel, fit the calipers temporarily to the original positions.



I717H1240004-01

6) Remove the collar (3).



I717H1240005-02

#### Installation

1) Install the collar (1) into the left side of the wheel.



I717H1240006-02

2) Install the front wheel with the front axle and tighten the front axle temporarily.

#### **▲ WARNING**

The directional arrow on the tire should point to the wheel rotation, when remounting the wheel.



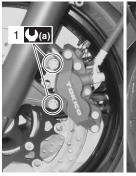
3) Tighten the brake caliper mounting bolts (1) to the specified torque.

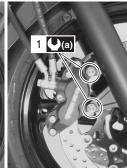
#### **A WARNING**

After remounting the brake calipers, pump the brake lever until the pistons push the pad correctly.

Tightening torque

Front brake caliper mounting bolt (a): 23 N·m ( 2.3 kgf-m, 16.5 lbf-ft)





I717H1240009-01

4) Tighten the front axle (2) to the specified torque.

Special tool

: 09944-28320 (Hexagon socket (19 mm))

Tightening torque

Front axle (b): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)



I717H1240010-01

5) Move the front fork up and down 4 or 5 times.



I717H1240011-0

6) Tighten axle pinch bolt (3) to the specified torque.

**Tightening torque** 

Front axle pinch bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I717H1240013-01

#### **Front Wheel Related Parts Inspection**

B817H22406004

Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-4)"

#### Tire

Refer to "Tire Inspection in Section 0B (Page 0B-20)".

#### **Front Brake Disc**

Refer to "Front Brake Disc Inspection in Section 4B (Page 4B-6)".

#### **Dust Seal**

Inspect the dust seal lips for wear or damage. If any defects are found, replace the dust seal with the new ones. Refer to "Front Wheel Dust Seal / Bearing Removal and Installation (Page 2D-7)".



I717H1240014-01

#### Wheel Axle

Using a dial gauge, check the wheel axle for runout. If the runout exceeds the limit, replace the axle shaft.

#### Special tool

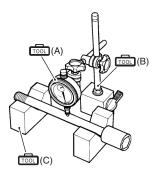
(A): 09900–20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))

#### Wheel axle runout

Service limit: 0.25 mm (0.010 in.)



1649G1240054-02

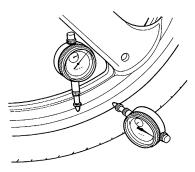
#### Wheel

Inspect the wheel in the following procedures:

- 1) Remove the brake pads. Refer to "Front Brake Pad Replacement in Section 4B (Page 4B-2)".
- 2) Make sure that the wheel runout checked as shown does not exceed the service limit. An excessive runout is usually due to worn or loosened wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.
- 3) Install the brake pads. Refer to "Front Brake Pad Replacement in Section 4B (Page 4B-2)".

#### Wheel rim runout

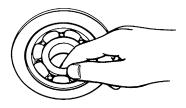
Service limit (Axial and Radial): 2.0 mm (0.08 in.)



I649G1240014-02

#### Wheel Bearing

Inspect the play of the wheel bearings by finger while they are in the wheel. Rotate the inner race by finger to inspect for abnormal noise and smooth rotation. Replace the bearing in the following procedure if there is anything unusual. Refer to "Front Wheel Dust Seal / Bearing Removal and Installation (Page 2D-7)".



I649G1240015-02

## Front Wheel Dust Seal / Bearing Removal and Installation

B817H22406005

#### Removal

- 1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-4)".
- 2) Remove the dust seals (1) on both sides using the special tool.

#### Special tool

(A): 09913-50121 (Oil seal remover)



I717H1240015-01

Remove the bearings (2) on both sides using the special tool.

#### Special tool

(B): 09921-20240 (Bearing remover set)



I717H1240016-01

#### Installation

#### **⚠ CAUTION**

The removed dust seals and bearings must be replaced with new ones.

1) Apply grease to the wheel bearings.

र्ह्⊞: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1240019-02

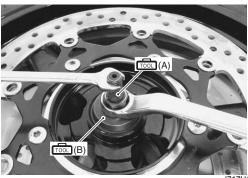
2) First install the left wheel bearing, then install the spacer (1) and right wheel bearing with the special tool.

#### Special tool

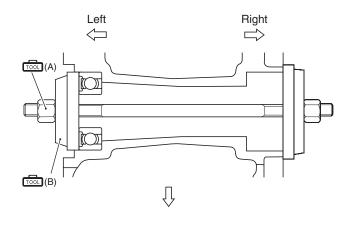
(A): 09924-84510 (Bearing installer set)
(B): 09941-34513 (Steering race installer)

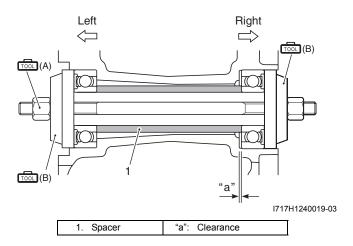
#### **⚠ CAUTION**

The sealed cover of the bearing must face outside.



I/1/H1240018-01





3) Install the dust seals with the special tool.

#### Special tool

(C): 09913-70210 (Bearing installer set)



I717H1240020-01

4) Apply grease to the lip of dust seals.

## ⊼ञा: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

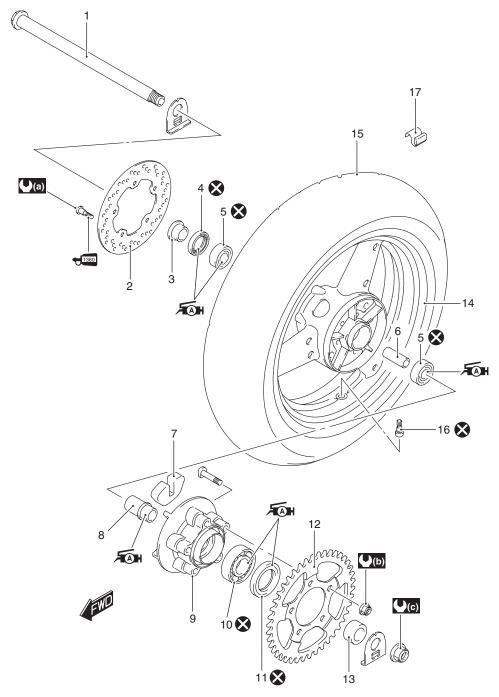


I717H1240021-01

5) Install the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-4)".

### Rear Wheel Components (GSF650/S/U/SUK7)

B817H22406006

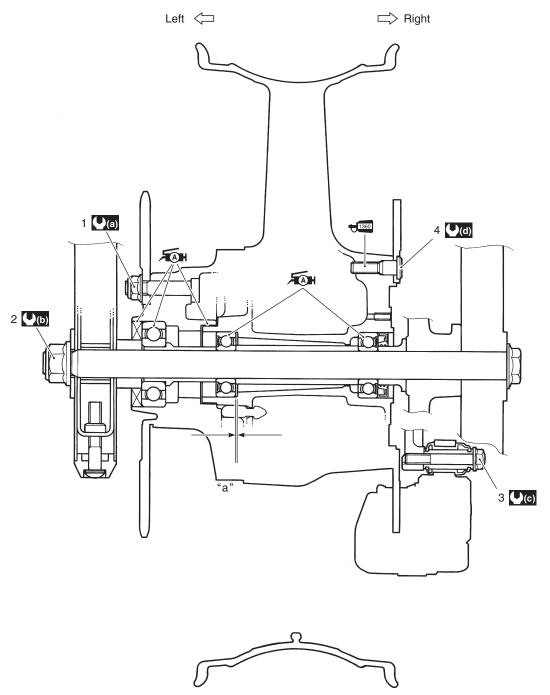


I717H1240041-02

Rear axle	Sprocket mounting drum	17. Wheel balancer
Brake disc	10. Bearing	<b>(a)</b> : 23 N⋅m (2.3 kgf-m, 16.5 lb-ft)
3. Spacer	11. Dust seal	(6.0 kgf-m, 43.5 lb-ft)
Dust seal	12. Sprocket	(10.0 kgf-m, 72.5 lb-ft)
5. Bearing	13. Collar	Apply grease.
6. Spacer	14. Rear wheel	₹1360 : Apply thread lock to thread part.
7. Wheel damper	15. Tire	🔇 : Do not reuse.
8. Retainer	16. Air valve	

### Rear Wheel Assembly Construction (GSF650/S/U/SUK7)

B817H22406007



171	7H1240022-	n

Rear sprocket nut	"a": Clearance	(d): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Rear axle nut	(a): 60 N·m (6.0 kgf-m, 43.5 lb-ft)	Apply grease.
Brake caliper mounting bolt	(b): 100 N·m (10.0 kgf-m, 72.5 lb-ft)	1360 : Apply thread lock to thread part.
Brake disc bolt	(2.2 kgf-m, 16.0 lb-ft)	

## Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7)

B817H22406008

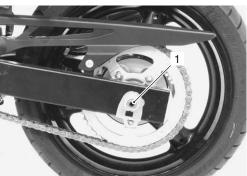
#### Removal

1) Support the motorcycle with the center stand.

#### **A** CAUTION

Make sure that the motorcycle is supported securely.

2) Remove the rear axle nut (1) and draw out the rear axle.



I717H1240023-01

- 3) Remove the rear axle and disengage the drive chain from the rear sprocket.
- 4) Remove the rear wheel assembly.

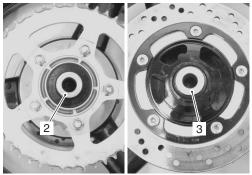
#### **⚠ CAUTION**

Do not operate the rear brake pedal with the rear wheel removed.



I717H1240024-01

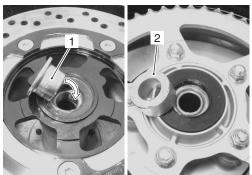
5) Remove the spacer (2) and collar (3).



I717H1240025-01

#### Installation

1) Install the spacer (1) and collar (2).



I717H1240026-01

2) Install the rear wheel with the rear axle and tighten the rear axle nut temporarily.

#### **▲ WARNING**

The directional arrow on the tire should point to the wheel rotation, when remounting the wheel.



I717H1240027-01

Wheels and Tires: 2D-12

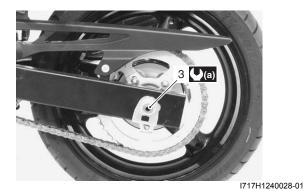
- 3) Adjust the drive chain slack after installing the rear wheel. Refer to "Drive Chain Inspection and Adjustment in Section 0B (Page 0B-17)".
- 4) Tighten the rear axle nut (3) to the specified torque.

#### **Tightening torque**

Rear axle nut (a): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)

#### **▲ WARNING**

After remounting the rear wheel, pump the brake pedal a few times to check for proper brake operation.



#### **Rear Wheel Related Parts Inspection**

B817H22406009

Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-11)".

#### **Tire**

Refer to "Tire Inspection in Section 0B (Page 0B-20)".

#### **Rear Brake Disc**

Refer to "Rear Brake Disc Inspection in Section 4C (Page 4C-7)".

#### **Wheel Damper**

Refer to "Drive Chain Related Components in Section 3A (Page 3A-1)".

#### **Sprocket**

Refer to "Drive Chain Related Parts Inspection in Section 3A (Page 3A-5)".

#### **Dust Seal**

Inspect the dust seal lip for wear or damage. If any defects is found, replace the dust seal with a new one. Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation (Page 2D-13)".



I717H1240029-01

#### Wheel Axle

Using a dial gauge, check the wheel axle for runout, If the runout exceeds the limit, replace the axle shaft.

#### Wheel axle runout

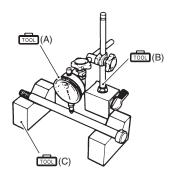
Service limit: 0.25 mm (0.010 in.)

#### Special tool

(A): 09900-20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))



I649G1230034-03

#### Wheel

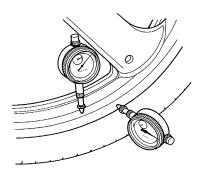
Inspect the wheel in the following procedures:

- 1) Remove the brake pads. Refer to "Rear Brake Pad Replacement in Section 4C (Page 4C-2)".
- 2) Make sure that the wheel runout checked as shown does not exceed the service limit. An excessive runout is usually due to worn or loosened wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.

3) Install the brake pads. Refer to "Rear Brake Pad Replacement in Section 4C (Page 4C-2)".

#### Wheel rim runout

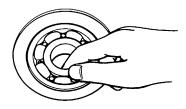
Service limit (Axial and Radial): 2.0 mm (0.08 in.)



I649G1240014-02

#### **Bearing**

Inspect the play of the wheel bearings by hand while they are in the wheel. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual. Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation (Page 2D-13)".



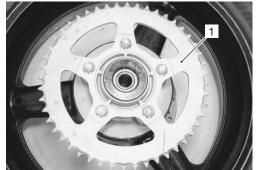
I649G1240015-02

## Rear Wheel Dust Seal / Bearing Removal and Installation

B817H22406010

#### Removal

- Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/ S/U/SUK7) (Page 2D-11)".
- 2) Remove the rear sprocket mounting drum assembly (1) from the rear wheel.



I717H1240030-01

3) Remove the dust seal (2).

#### Special tool

(A): 09913-50121 (Oil seal remover)



I717H1240031-01

4) Remove the bearings (3) on both sides using the special tool and spacer.

#### Special tool

(B): 09921-20240 (Bearing remover set)



I717H1240032-01

#### Installation

#### **⚠ CAUTION**

The removed dust seals and bearings must be replaced with new ones.

1) Apply grease to the wheel bearings.

র⊛: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1240019-02

2) First install the right wheel bearing, then install the spacer (1) and left wheel bearing with the special tools.

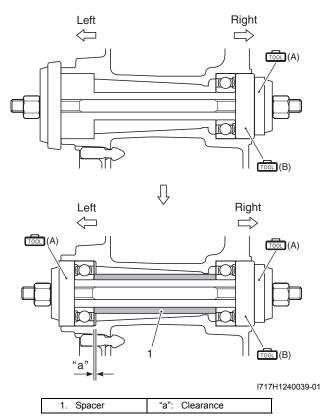
#### Special tool

(A): 09941–34513 (Steering race installer)
(B): 09913–70210 (Bearing installer set)

#### **⚠ CAUTION**

The sealed cover of the bearing must face outside.





3) Install a new dust seal with the special tool.

#### Special tool

(C): 09913-70210 (Bearing installer set)



I717H1240035-01

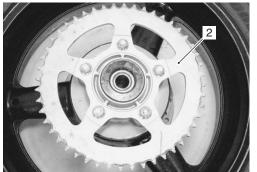
4) Apply grease to the dust seal lip.

⊼ञा: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



1717H1240036-01

5) Install the rear sprocket mounting drum assembly (2).



I717H1240037-01

6) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-11)".

#### Tire Removal and Installation

B817H22406011

#### Removal

The most critical factor of a tubeless tire is the seal between the wheel rim and the tire bead. For this reason, it is recommended to use a tire changer that can satisfy this sealing requirement and can make the operation efficient as well as functional.

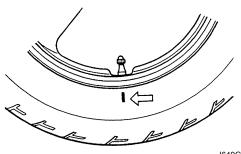
- 1) Removal the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-4)" and "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-11)".
- 2) Remove the mounting drum from the rear wheel. Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation (Page 2D-13)".
- 3) Remove the valve core.
- 4) Remove the tire using the tire changer.

#### **↑** CAUTION

For operating procedures, refer to the instructions supplied by the tire changer manufacturer.

#### NOTE

When removing the tire in case of repair or inspection, mark the tire with a chalk to indicate the tire position relative to the valve position. Even though the tire is refitted to the original position after repairing puncture, the tire may have to be balanced again since such a repair can cause imbalance.



1649G1240037-02

#### Installation

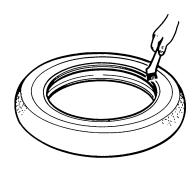
#### **↑** CAUTION

Do not reuse the valve which has been once removed.

1) Apply tire lubricant to the tire bead.

#### **⚠ CAUTION**

Never use oil, grease or gasoline on the tire bead in place of tire lubricant.



I649G1240038-02

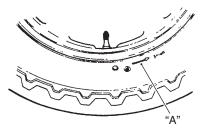
2) Install the tire onto the wheel.

#### **⚠ CAUTION**

For installation procedure of tire onto the wheel, follow the instructions given by the tire changer manufacturer.

#### NOTE

- When installing the tire, the arrow "A" on the side wall should point to the direction of wheel rotation.
- Align the chalk mark put on the tire at the time of removal with the valve position.



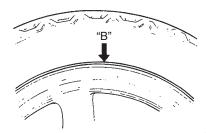
I649G1240039-02

- Bounce the tire several times while rotating. This
  makes the tire bead expand outward to contact the
  wheel, thereby facilitating air inflation.
- 4) Install the valve core and inflate the tire.

#### **▲ WARNING**

- Do not inflate the tire to more than 400 kPa (4.0 kgf/cm²). If inflated beyond this limit, the tire can burst and possibly cause injury. Do not stand directly over the tire while inflating.
- In the case of preset pressure air inflator, pay special care for the set pressure adjustment.
- 5) In this condition, check the "grim line" "B" cast on the tire side walls. The line must be equidistant from the wheel rim all around.

6) If the distance between the rim line and wheel rim varies, this indicates that the bead is not properly seated. If this is the case, deflate the tire completely and unseat the bead for both sides. Coat the bead with lubricant and fit the tire again.



1649G1240040-02

- 7) When the bead has been fitted properly, adjust the pressure to specification.
- 8) As necessary, adjust the tire balance. Refer to "Wheel Balance Check and Adjustment (Page 2D-17)".

#### Cold inflation tire pressure

	Front	Rear
Cala ridina	250 kPa	250 kPa
Solo riding	(2.50 kgf/cm <sup>2</sup> )	(2.50 kgf/cm <sup>2</sup> )
Dual riding	250 kPa	290 kPa
	(2.50 kgf/cm <sup>2</sup> )	(2.90 kgf/cm <sup>2</sup> )

- 9) Install the mounting drum to the rear wheel. (For rear wheel) Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation (Page 2D-13)".
- 10) Install the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/ SUK7) (Page 2D-4)" and "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-11)".

## Wheel / Tire / Air Valve Inspection and Cleaning B817H22406012

Refer to "Tire Removal and Installation (Page 2D-15)".

#### Wheel

Wipe the wheel clean and check for the following points:

- · Distortion and crack
- Any flaws and scratches at the bead seating area.
- · Wheel rim runout. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-4)" and "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-11)".



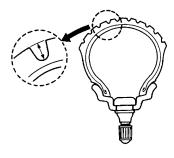
#### Tire

Tire must be checked for the following points:

- Nick and rupture on side wall
- Tire tread depth (Refer to "Tire Inspection in Section 0B (Page 0B-20)".)
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner



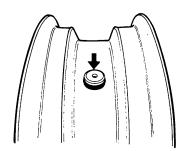
I649G1240042-02



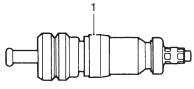
I649G1240043-02

#### Air Valve

Inspect the air valve for peeling and damage. If any defect is found, replace the air valve with a new one. Refer to "Air Valve Removal and Installation (Page 2D-17)".



Inspect the valve core seal (1) for wear and damage. If any defect is found, replace the valve core with a new one. Refer to "Air Valve Removal and Installation (Page 2D-17)".



Seal 1.

I649G1240045-02

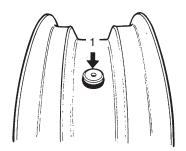
1649G1240041-02

#### Air Valve Removal and Installation

B817H22406013

#### Removal

- Remove the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/ SUK7) (Page 2D-4)" and "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-11)".
- 2) Remove the tire. Refer to "Tire Removal and Installation (Page 2D-15)".
- 3) Remove the air valve (1) from the wheel.

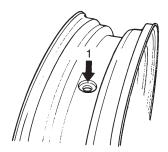


1649G1240046-02

#### Installation

Install the air valve in the reverse order of removal. Pay attention to the following points:

 Any dust or rust around the valve hole (1) must be cleaned off.



I718H1240054-01

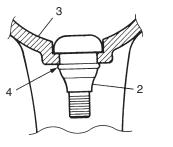
• Install the air valve (2) in the wheel (3).

#### **⚠ CAUTION**

- Be careful not to damage the lip (4) of valve.
- Replace the air valve with a new one.

#### **NOTE**

To properly install the valve into the valve hole, apply a special tire lubricant or neutral soapy liquid to the valve.



I718H1240055-01

2. Valve	3. Wheel	4. Valve lip	
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#### Wheel Balance Check and Adjustment

B817H22406014

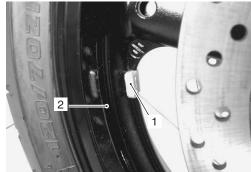
Check and adjust the wheel balance in the following procedures:

- 1) Removal the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-4)" and "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-11)".
- 2) Remove the mounting drum from the rear wheel. Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation (Page 2D-13)".
- 3) Check the wheel balance using the balancer and adjust the wheel balance if necessary.

#### **⚠** CAUTION

For operating procedures, refer to the instructions supplied by the wheel balancer manufacturer.

When installing the balancer weight (1) to the wheel
 set the balancer weight on center rib of the wheel.

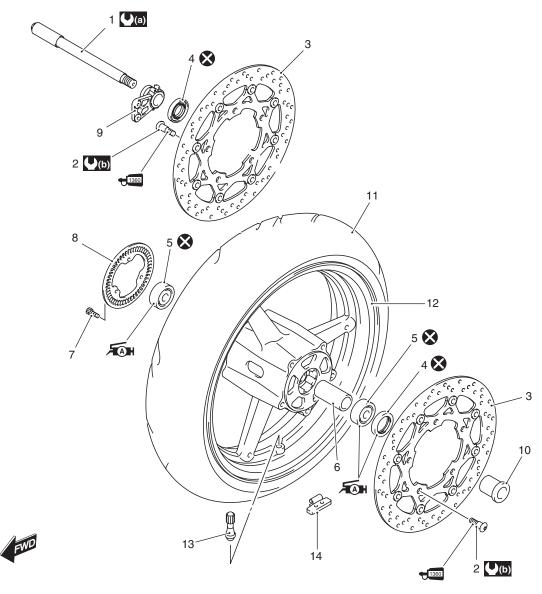


I717H1240038-01

- 5) Recheck the wheel balance.
- Install the mounting drum to the rear wheel. (For rear wheel)
  - Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation (Page 2D-13)".
- 7) Install the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/ SUK7) (Page 2D-4)" and "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) (Page 2D-11)".

### Front Wheel Components (GSF650A/UA/SA/ASUK7)

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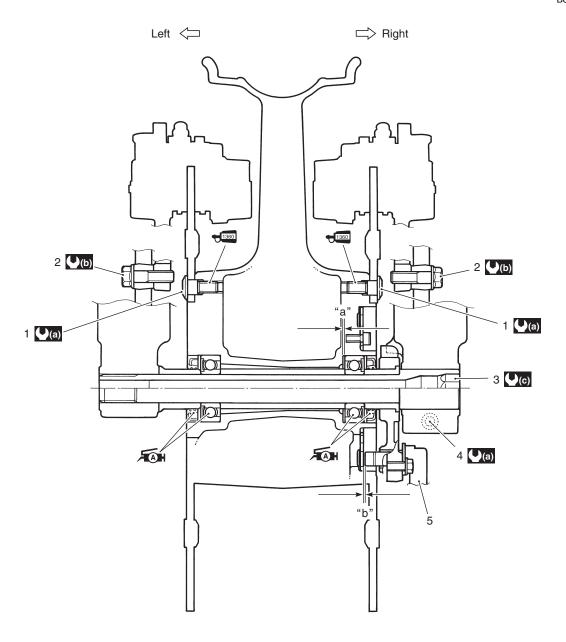


I717H2240001-01

Front axle	6. Spacer	11. Tire	(b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
<ol><li>Brake disc bolt</li></ol>	7. Sensor rotor bolt	12. Front wheel	ĀÃĦ: Apply grease.
<ol><li>Brake disc</li></ol>	Wheel speed sensor rotor	13. Air valve	1360 : Apply thread lock to thread part.
4. Dust seal	Wheel speed sensor bracket	14. Wheel balancer	🗴 : Do not reuse.
5. Bearing	10. Collar	(a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)	

### Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7)

B817H22406016





I717H2240002-03

Brake disc bolt	"a": Clearance	ÃÃH: Apply grease.
Brake caliper mounting bolt	"b": 0.3 – 1.5 mm (0.012 – 0.059 in.)	1360 : Apply thread lock to thread part.
3. Front axle	<b>(a)</b> : 23 N⋅m (2.3 kgf-m, 16.5 lb-ft)	
Front axle pinch bolt	(b): 25 N·m (2.5 kgf-m, 18.0 lb-ft)	
<ol><li>Front wheel speed sensor</li></ol>	(c): 100 N·m (10.0 kgf-m, 72.5 lb-ft)	

2D-20

## Front Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7)

B817H22406017

#### Removal

- Remove the front wheel speed sensor by removing the mounting bolts. Refer to "Front Wheel Speed Sensor Removal and Installation in Section 4E (Page 4E-70)".
- 2) Remove the brake calipers. Refer to "Front Brake Caliper Removal and Installation in Section 4B (Page 4B-2)".

#### **⚠ CAUTION**

Do not operate the brake lever while removing the caliper.

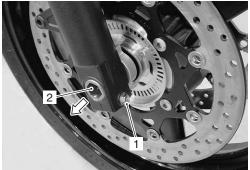


I717H2240005-01

- 3) Loosen the axle pinch bolt (1).
- 4) Remove the front axle (2) using the special tool.

#### Special tool

(Hexagon socket (19 mm))



I717H2240006-01

5) Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

#### **⚠ CAUTION**

Do not carry out the work with the motorcycle resting on the side-stand. Do not support the motorcycle with the exhaust pipes. Make sure that the motorcycle is supported securely.

6) Draw out the front axle and remove the front wheel.

#### NOTE

After removing the front wheel, fit the calipers temporarily to the original positions.

7) Remove the collar (3) and front wheel speed sensor bracket (4).



I717H2240007-01



I717H2240008-01

#### Installation

1) Install the collar (1) and front wheel speed sensor bracket (2) into the right side of the wheel.

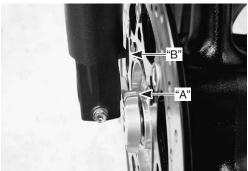


I717H2240009-01



I717H2240010-01

2) Align the recess "A" on the speed sensor bracket with the stopper "B" on the right front fork.



I717H2240011-01

3) Install the front wheel with the front axle and tighten the front axle temporarily.

#### **▲ WARNING**

The directional arrow on the tire should point to the wheel rotation, when remounting the wheel.



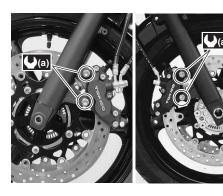
I717H2240012-01

4) Tighten the brake caliper mounting bolts to the specified torque.

Tightening torque Front brake caliper mounting bolt (a): 25 N·m ( 2.5 kgf-m, 18.0 lbf-ft)

#### **▲ WARNING**

After remounting the brake calipers, pump the brake lever until the pistons push the pad correctly.



I717H2240013-02

5) Tighten the front axle to the specified torque.

Special tool

(A): 09944–28320 (Hexagon socket (19 mm))

**Tightening torque** 

Front axle (a): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)



I717H2240014-01

6) Move the front fork up and down 4 or 5 times.



I717H2240015-02

7) Tighten the axle pinch bolt to the specified torque.

**Tightening torque** 

Front axle pinch bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I717H2240016-01

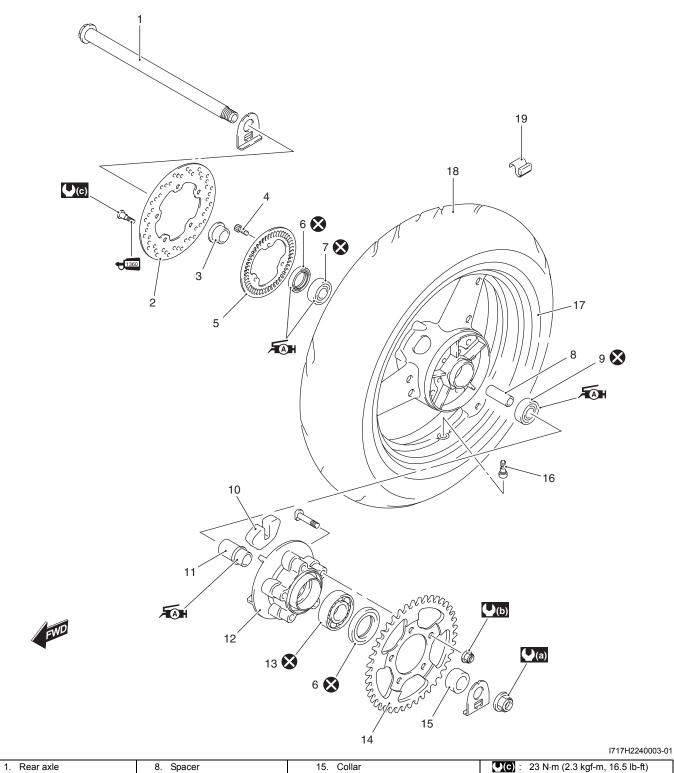
- 8) Install the front wheel speed sensor mounting bolts. Refer to "Front Wheel Speed Sensor Removal and Installation in Section 4E (Page 4E-70)".
- Check the clearance between the front wheel speed sensor and sensor rotor. Refer to "Front Wheel Speed Sensor Removal and Installation in Section 4E (Page 4E-70)".

14. Sprocket

7. Bearing

## Rear Wheel Components (GSF650A/UA/SA/ASUK7)

B817H22406018

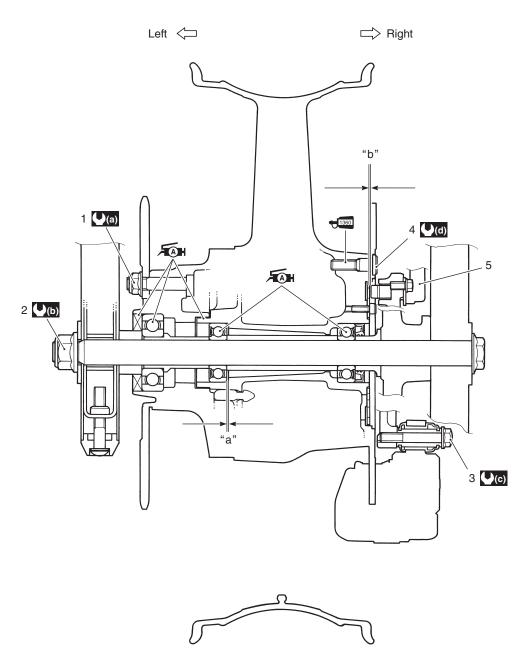


2.	Brake disc	9.	Bearing	16.	Air valve	ÆΑ	: Apply grease.	l
3.	Spacer	10.	Wheel damper	17.	Rear wheel	1360	: Apply thread lock to thread part.	l
4.	Sensor rotor bolt	11.	Retainer	18.	Tire	8	: Do not reuse.	l
5.	Wheel speed sensor rotor	12.	Sprocket mounting drum	19.	Wheel balancer			l
6.	Dust seal	13.	Bearing	<b>(</b> (a) :	100 N·m (10.0 kgf-m, 72.5 lb-ft)			ı

(b): 60 N·m (6.0 kgf-m, 43.5 lb-ft)

## Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7)

B817H22406019



		I717H2240004-01
Rear sprocket nut	"a": Clearance	(d): 23 N⋅m (2.3 kgf-m, 16.5 lb-ft)
Rear axle nut	"b": 0.3 – 1.5 mm (0.012 – 0.059 in)	Apply grease.
Brake caliper mounting bolt	(6.0 kgf-m, 43.5 lb-ft)	₹1360 : Apply thread lock to thread part.
Brake disc bolt	(10.0 kgf-m, 72.5 lb-ft)	
Rear wheel speed sensor	(c): 22 N·m (2.2 kgf-m, 16.0 lb-ft)	

## Rear Wheel Assembly Removal and Installation (GSF650A/UA/SA/ASUK7)

B817H22406020

## Removal

1) Support the motorcycle with the center stand.

## **⚠ CAUTION**

Make sure that the motorcycle is supported securely.

2) Remove the rear wheel speed sensor by removing the mounting bolts. Refer to "Rear Wheel Speed Sensor Removal and Installation in Section 4E (Page 4E-70)".

3) Remove the rear axle nut (1) and draw out the rear axle



1717H2240017-01

- 4) Remove the rear axle and disengage the drive chain from the rear sprocket.
- 5) Remove the rear wheel assembly.

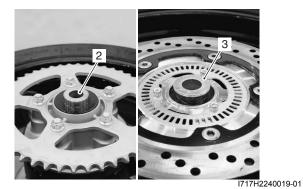
#### **⚠ CAUTION**

Do not operate the rear brake pedal with the rear wheel removed.



I717H2240018-01

6) Remove the collar (2) and spacer (3).



Installation

Refer to "Wheel Speed Sensor and Sensor Rotor Inspection in Section 4E (Page 4E-73)".

1) Install the collar (1) and spacer (2).





I717H2240020-01

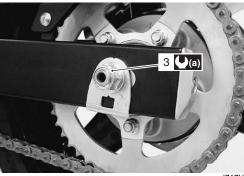
- 2) Install the rear wheel with the rear axle and tighten the rear axle nut temporarily.
- 3) Adjust the drive chain slack after installing the rear wheel. Refer to "Drive Chain Inspection and Adjustment in Section 0B (Page 0B-17)".
- 4) Tighten the rear axle nut (3) to the specified torque.

Tightening torque

Rear axle nut (a): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)

## **▲ WARNING**

After remounting the rear wheel, pump the brake pedal several times to check for proper brake operation.



I717H2240021-01

- 5) Install the rear wheel speed sensor mounting bolts. Refer to "Rear Wheel Speed Sensor Removal and Installation in Section 4E (Page 4E-70)".
- 6) Check the clearance between the rear wheel speed sensor. Refer to "Rear Wheel Speed Sensor Removal and Installation in Section 4E (Page 4E-70)".

Wheels and Tires: 2D-26

## **Specifications**

## **Service Data**

B817H22407001

Wheel

Unit: mm (in.)

Item	Standard		Limit
Wheel rim runout	Axial	_	2.0 (0.08)
Vineer initi runout	Radial	_	2.0 (0.08)
Wheel axle runout	Front	_	0.25 (0.010)
Wheel axie fullout	Rear	_	0.25 (0.010)
Wheel rim size	Front	17 M/C x MT3.50	_
VVIICEI IIIII SIZE	Rear	17 M/C x MT5.00	_

### Tire

Item	Standard			Limit
Cold inflation tire pressure	Front	250 kPa (2.50 kgf/cm², 36 psi)		_
(Solo riding)	Rear	250 kPa (2.50 kgf/cm², 36 psi)		_
Cold inflation tire pressure	Front	250 kPa (2.50 kgf/cm², 36 psi)		_
(Dual riding)	Rear	290 kPa (2.90 kgf/cm², 42 psi)		_
Tire size	Front	120/70 ZR17M/C (58 W)		_
THE SIZE	Rear	160/60 ZR17M/C (69 W)		_
	Front	GSF650/U	BRIDGESTON BT011F G	_
Tire type	1 1011	GSF650S/SU	BRIDGESTON BT011F M	
	Rear	BRID	GESTON BT020R G	_
Tire tread depth	Front	_		1.6 mm (0.06 in.)
(Recommended depth)	Rear	_		2.0 mm (0.08 in.)

## **Tightening Torque Specifications**

B817H22407002

Factoring part	T	ightening torq	Note	
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Front brake caliper mounting bolt	23	2.3	16.5	☞(Page 2D-5)
Front axle	100	10.0	72.5	☞(Page 2D-5) /
	100	10.0	12.5	☞(Page 2D-22)
Front axle pinch bolt	23	2.3	16.5	☞(Page 2D-5) /
	23	2.5	10.5	☞(Page 2D-22)
Rear axle nut	100	10.0	72.5	☞(Page 2D-12) /
	100	10.0	12.5	☞(Page 2D-25)
Front brake caliper mounting bolt	25	2.5	18.0	☞(Page 2D-21)

## **NOTE**

The specified tightening torque is also described in the following.

### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

<sup>&</sup>quot;Front Wheel Components (GSF650/S/U/SUK7) (Page 2D-2)"

<sup>&</sup>quot;Front Wheel Assembly Construction (GSF650/S/U/SUK7) (Page 2D-3)"

<sup>&</sup>quot;Rear Wheel Components (GSF650/S/U/SUK7) (Page 2D-9)"

<sup>&</sup>quot;Rear Wheel Assembly Construction (GSF650/S/U/SUK7) (Page 2D-10)"

<sup>&</sup>quot;Front Wheel Components (GSF650A/UA/SA/ASUK7) (Page 2D-18)"

<sup>&</sup>quot;Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) (Page 2D-19)"

<sup>&</sup>quot;Rear Wheel Components (GSF650A/UA/SA/ASUK7) (Page 2D-23)"

<sup>&</sup>quot;Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) (Page 2D-24)"

## **Special Tools and Equipment**

## **Recommended Service Material**

B817H22408001

Material	SUZUKI recommended produc	Note	
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000–25010	☞(Page 2D-7) / ☞(Page 2D-
	equivalent		8) / ☞(Page 2D-13) /
			☞(Page 2D-14)

## NOTE

Required service material is also described in the following.

- "Front Wheel Components (GSF650/S/U/SUK7) (Page 2D-2)"
- "Front Wheel Assembly Construction (GSF650/S/U/SUK7) (Page 2D-3)"
- "Rear Wheel Components (GSF650/S/U/SUK7) (Page 2D-9)"
- "Rear Wheel Assembly Construction (GSF650/S/U/SUK7) (Page 2D-10)"
- "Front Wheel Components (GSF650A/UA/SA/ASUK7) (Page 2D-18)"
- "Front Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) (Page 2D-19)"
- "Rear Wheel Components (GSF650A/UA/SA/ASUK7) (Page 2D-23)"
- "Rear Wheel Assembly Construction (GSF650A/UA/SA/ASUK7) (Page 2D-24)"

## Special Tool

Opecial 1001		B817H22408002
09900–20607 Dial gauge (1/100 mm, 10 mm) (Page 2D-6) / (Page 2D-12)	09900–20701 Magnetic stand	
09900–21304 V-block (100 mm) (Page 2D-6) / (Page 2D-12)	09913–50121 Oil seal remover (Page 2D-7) / (Page 2D-13)	
09913–70210 Bearing installer set  (Page 2D-8) / (Page 2D-14) / (Page 2D-14)	09921–20240 Bearing remover set (Page 2D-7) / (Page 2D-13)	
09924–84510 Bearing installer set ☞(Page 2D-7)	09941–34513 Steering race installer (Page 2D-7) / (Page 2D-14)	
09944–28320 Hexagon socket (19 mm) (Page 2D-4) / (Page 2D-5) / (Page 2D-20) / (Page 2D-22)		

## **Section 3**

## **Driveline / Axle**

## **CONTENTS**

Precautions	3-1
Precautions	3-1
Precautions for Driveline / Axle	
Drive Chain / Drive Train / Drive Shaft.	3A-1
Diagnostic Information and Procedures	3A-1
Drive Chain and Sprocket Symptom	
Diagnosis	3A-1
Repair Instructions	3A-1
Drive Chain Related Components	
Engine Sprocket Removal and Installation	3A-2

3A-4
3A-5
3A-6
3A-7
3A-10
3A-10
3A-11
<b>3A-1</b> 1
3A-11
3A-11

## **Precautions**

## **Precautions**

### **Precautions for Driveline / Axle**

Refer to "General Precautions in Section 00 (Page 00-1)".

B817H23000001

## **▲ WARNING**

Never inspect or adjust the drive chain while the engine is running.

### **⚠** CAUTION

- Do not use trichloroethylene, gasoline or any similar solvent. These fluids will damage the O-rings
  of the drive chain.
- Clean the drive chain with a spray-type chain cleaner and blow dry with compressed air. If the drive chain cannot be cleaned with a spray cleaner, it may be necessary to use a kerosine. Always follow the chemical manufacturer's instructions on proper use, handling and storage.
- Lubricate the drive chain with a heavy weight motor oil. Wipe off any excess oil or chain lubricant. Do not use any oil sold commercially as "drive chain oil". Such oil can damage the O-rings.
- The standard drive chain is RK 525SMOZ7Y. Suzuki recommends to use this standard drive chain as a replacement.

## **Drive Chain / Drive Train / Drive Shaft**

## **Diagnostic Information and Procedures**

## **Drive Chain and Sprocket Symptom Diagnosis**

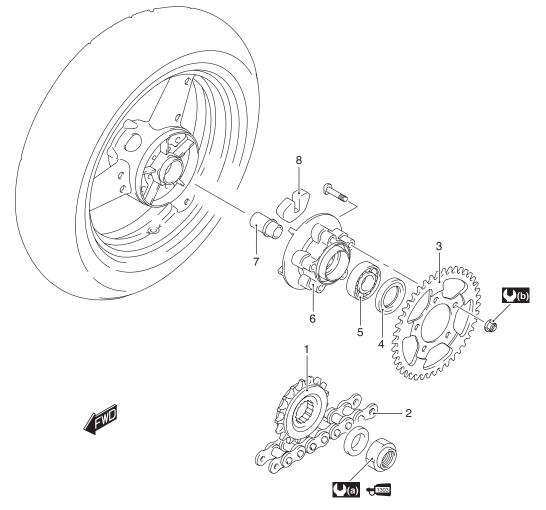
B817H23104001

Condition	Possible cause	Correction / Reference Item
Noisy Drive Chain	Worn sprocket.	Replace.
	Worn drive chain.	Replace.
	Stretched drive chain.	Replace.
	Too large drive chain slack.	Adjust.
	Drive chain out of adjustment.	Adjust.

## **Repair Instructions**

## **Drive Chain Related Components**

B817H23106001



I717H1310032-03

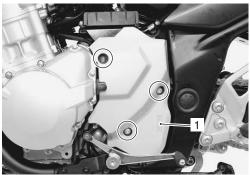
Engine sprocket	5. Bearing	<b>(a)</b> : 115 N⋅m (11.5 kgf-m, 83.0 lb-ft)
2. Drive chain	Sprocket mounting drum	(6.0 kgf-m, 43.5 lb-ft)
<ol><li>Rear sprocket</li></ol>	7. Retainer	Apply grease.
4. Dust seal	8. Wheel damper	€1303 : Apply thread lock to thread part.

## **Engine Sprocket Removal and Installation**

B817H23106002

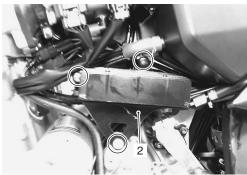
### Removal

- 1) Support the motorcycle with the center stand.
- 2) Remove the engine sprocket outer cover (1).



I717H1310002-02

3) Remove the regulator/rectifier bracket (2).



I717H1310003-03

4) Remove the gearshift link arm (3).

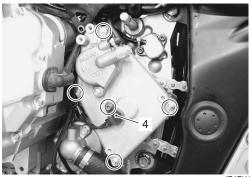
## NOTE

Mark the marking to the matching surface of gearshift link arm before removing.



I717H1310004-02

- 5) Remove the speed sensor (4).
- 6) Remove the engine sprocket cover along with the clutch release cylinder.



I717H1310005-03

7) Remove the speed sensor rotor (5) by removing its bolt while depressing the rear brake pedal.



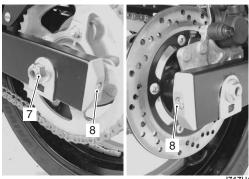
I717H1310006-05

8) Remove the engine sprocket nut (6) while depressing the rear brake pedal.



I717H1310007-01

- 9) Loosen the rear axle nut (7).
- 10) Loosen the chain adjuster bolts (8) to provide additional chain slack, left and right.



I717H1310008-01

11) Remove the spacer (9) engine sprocket (10).



I717H1310009-01

### Installation

Install the engine sprocket in the reverse order of removal. Pay attention to the following points:

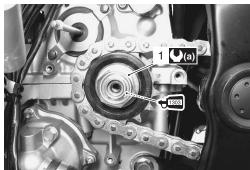
- · Install the spacer and engine sprocket.
- Apply Thread lock super to the driveshaft.

+1333 : Thread lock cement 99000–32030 (Thread Lock Cement Super 1303 or equivalent)

• Tighten the engine sprocket nut (1) to the specified torque.

## **Tightening torque**

Engine sprocket nut (a): 115 N·m (11.5 kgf-m, 83.0 lbf-ft)



I717H1310010-01

 Apply a small quantity of Thread lock to the speed sensor rotor bolt (2).

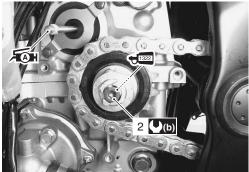
€322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

• Tighten the speed sensor rotor bolt (2) to the specified torque.

Tightening torque Speed sensor rotor bolt (b): 25 N⋅m (2.5 kgf-m, 18.0 lbf-ft)

 Before installing the engine sprocket inner cover, apply a small quantity of suzuki super grease to the clutch push rod.

f(M): Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1310011-02

Install the engine sprocket inner cover (3).

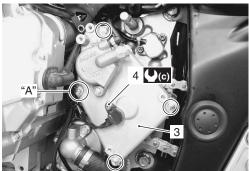
## NOTE

Fit the clamp to the bolt "A".

 Tighten the speed sensor mounting bolt (4) to the special torque.

### **Tightening torque**

Speed sensor mounting bolt (c): 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)



I717H1310012-01

 Install the gearshift lever to the gearshift shaft in the correct position.

Gearshift lever height "a"
Standard: 45 – 55 mm (1.8 – 2.2 in)



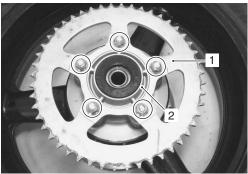
 Adjust the drive chain slack. Refer to "Drive Chain Inspection and Adjustment in Section 0B (Page 0B-17)".

## Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation

B817H23106003

## Removal

- 1) Remove the rear wheel assembly by disengaging the drive chain. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-11)".
- 2) Remove the rear sprocket nuts and separate the rear sprocket (1) from its mounting drum (2).
- 3) Draw out the mounting drum (2) from the wheel hub.



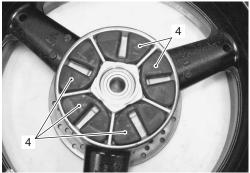
I717H1310014-02

4) Remove the retainer (3).



I717H1310015-01

5) Remove the wheel dampers (4).



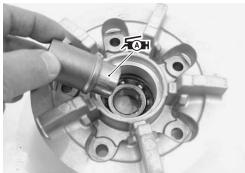
I717H1310016-01

### Installation

Install the rear sprocket and rear sprocket mounting drum in the reverse order of removal. Pay attention to the following points:

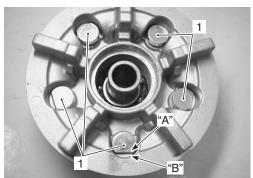
· Apply grease to the retainer.

## 元函: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1310017-01

 Install the rear sprocket bolts (1), engage two flats "A" on the end of rear sprocket bolts face with the same shaped hole "B" on the rear sprocket mounting drum.



I717H1310018-01

· Temporarily tighten the rear sprocket nuts.

#### NOTE

The stamped mark "C" on the sprocket should face outside.



I717H1310019-01

 Apply grease to the contacting surface between the rear wheel hub and the mounting drum.

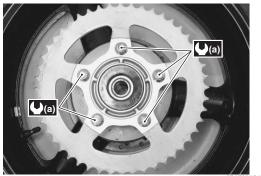
## 元 : Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1310020-02

Tighten the rear sprocket nuts to the specified torque.

# Tightening torque Rear sprocket nut (a): 60 N⋅m (6.0 kgf-m, 43.5 lbf-ft)



I717H1310021-0

 Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/ SUK7) in Section 2D (Page 2D-11)".

## **Drive Chain Related Parts Inspection**

B817H23106004

Refer to "Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation (Page 3A-4)"

#### **Dust Seal**

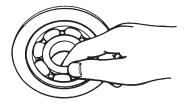
Inspect the sprocket mounting drum dust seal for wear or damage. If any damage is found, replace the dust seal with a new one.



I717H1310022-01

#### Bearing

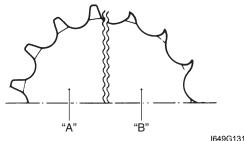
Inspect the play of the sprocket mounting drum bearings by hand while they are in the wheel and drum. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



I649G1310015-02

## **Engine Sprocket and Rear Sprocket**

Inspect the sprocket teeth for wear. If they are worn as shown, replace the engine sprocket, rear sprocket and drive chain as a set.



I649G1310016-02

"A": Normal wear "B": Excessive wear

## **Wheel Damper**

Inspect the dampers for wear and damage. Replace the damper if there is anything unusual.



I717H1310023-01

### **Drive Chain**

Refer to "Drive Chain Inspection and Adjustment in Section 0B (Page 0B-17)".

## Sprocket Mounting Drum Dust Seal / Bearing Removal and Installation

B817H23106005

#### Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-11)".
- 2) Remove the rear sprocket mounting drum assembly from the rear wheel. Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation in Section 2D (Page 2D-13)".
- 3) Remove the retainer (1).

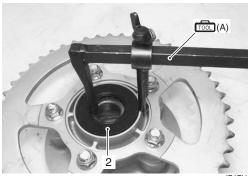


I717H1310024-01

4) Remove the sprocket mounting drum dust seal (2) using the special tool.

### Special tool

(A): 09913-50121 (Oil seal remover)

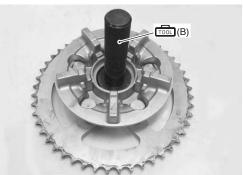


I717H1310025-01

5) Remove the sprocket mounting drum bearing using the special tool.

## Special tool

(B): 09913-70210 (Bearing installer set)



I717H1310026-02

#### Installation

## **⚠** CAUTION

The removed dust seal and bearing must be replaced with new ones.

1) Apply grease to the bearing before installing.

র⊛: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1310020-02

2) Install the bearing to the sprocket mounting drum using the special tool.

## Special tool

(A): 09913-70210 (Bearing installer set)



I717H1310027-01

3) Install the dust seal using the special tool.

## Special tool

(A): 09913-70210 (Bearing installer set)

4) Apply grease to the dust seal lip.

元函: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1310028-01

5) Apply grease to the retainer before installing the rear sprocket mounting drum.



I717H1310029-01

- 6) Install the rear sprocket mounting drum assembly to rear wheel. Refer to "Front Wheel Dust Seal / Bearing Removal and Installation in Section 2D (Page 2D-7)".
- 7) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-11)".

## **Drive Chain Replacement**

B817H23106006

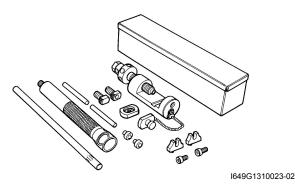
Use the special tool in the following procedures, to cut and rejoin the drive chain.

### NOTE

When using the special tool, apply a small quantity of grease to the threaded parts of the special tool.

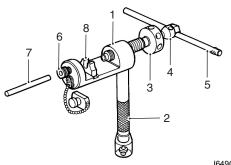
## Special tool

col : 09922–22711 (Drive chain cutting and joining tool)



## **Drive Chain Cutting**

1) Set up the special tool as shown in the illustration.

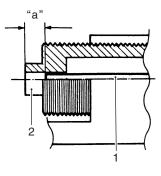


I649G1310024-02

1.	Tool body
2.	Grip handle
3.	Pressure bolt [A]
4.	Pressure bolt [B]
5.	Bar
6.	Adjuster bolt (With through hole)
7.	Pin remover
8.	Chain holder (Engraved mark 500) with reamer bolt M5 x 10

### **NOTE**

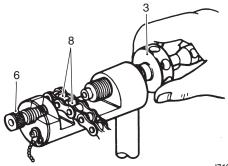
The tip of pin remover (1) should be positioned inside "a" approximately 5 mm (0.2 in) from the end face of pressure bolt [A] (2) as shown in the illustration.



I649G1310025-02

"a": 5 mm (0.2 in)

- 2) Place the drive chain link being disjointed on the holder part (8) of the tool.
- 3) Turn in both the adjuster bolt (6) and pressure bolt [A] (3) so that each of their end hole fits over the chain joint pin properly.
- 4) Tighten the pressure bolt [A] (3) with the bar.



I718H1310032

5) Turn in the pressure bolt [B] (4) with the bar (5) and force out the drive chain joint pin (9).

## **⚠ CAUTION**

Continue turning in the pressure bolt [B] (4) until the joint pin has been completely pushed out of the chain.

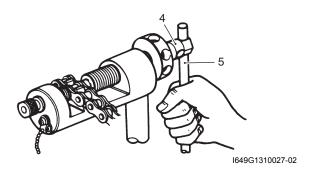
## NOTE

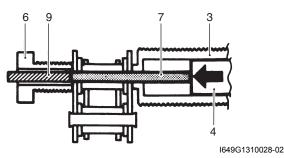
After the joint pin (9) is removed, loosen the pressure bolt [B] (4) and then pressure bolt [A] (3).

6) Remove the joint pin (9) of the other side of joint plate.

#### **⚠ CAUTION**

Never reuse joint pins, O-rings and plates.





## **Drive Chain Connecting**

## **A WARNING**

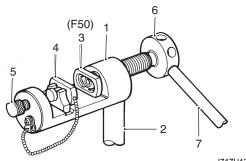
Do not use joint clip type of drive chain. The joint clip may have a chance to drop which may cause severe damage to motorcycle and severe injury.

#### **⚠ CAUTION**

Replace the joint pins (8), O-rings (9) and plates (10) with new ones.

## Joint plate installation

1) Set up the special tool as shown in the illustration.

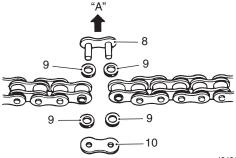


I717H1310001-01

1.	Tool body
2.	Grip handle
3.	Joint plate holder (Engraved mark "F50")
4.	Wedge holder & wedge pin
5.	Adjuster bolt (Without hole)
6.	Pressure bolt [A]
7.	Bar

- 2) Apply grease to the joint pins (8), O-rings (9) and plates (10).
- 3) Connect both ends of the drive chain with the joint pin (8) inserted from the wheel side "A" as installed on the motorcycle.

Joint set part number RK: 27620 – 06G00



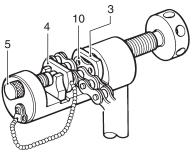
I649G1310030-02

4) Apply grease on the recessed portion of the joint plate holder (3) and set the joint plate (10).

#### **NOTE**

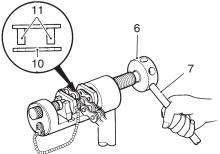
When positioning the joint plate (10) on the tool, its stamp mark must face the joint plate holder (3) side.

5) Set the drive chain on the tool as illustrated and turn in the adjuster bolt (5) to secure the wedge holder & wedge pin (4).



I649G1310031-03

- 6) Turn in the pressure bolt [A] (6) and align two joint pins (11) properly with the respective holes of the joint plate (10).
- 7) Turn in the pressure bolt [A] (6) further using the bar (7) to press the joint plate over the joint pins.



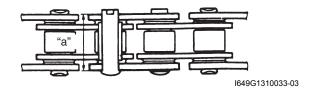
I649G1310032-02

8) Continue pressing the joint plate until the distance between the two joint plates come to the specification.

Joint plate distance specification "a" 18.60 – 18.90 mm (0.732 – 0.744 in)

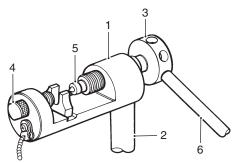
#### **⚠ CAUTION**

Should pressing of the joint plate be made excessively beyond the specified dimension, the work should be redone using the new joint parts.



## Joint pin staking

1) Set up the special tool as shown in the illustration.



I649G1310034-02

1.	Tool body
2.	Grip handle
3.	Pressure bolt "A"
4.	Adjuster bolt (Without hole)
5.	Staking pin (Stowed inside grip handle behind rubber cap)
6	Bar

## **NOTE**

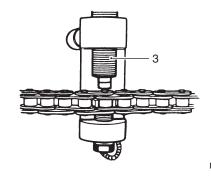
Before staking the joint pin, apply a small quantity of grease to the staking pin (5).

2) Stake the joint pin by turning (approximately 7/8 turn) the pressure bolt [A] (3) with the bar until the pin end diameter becomes the specified dimension.

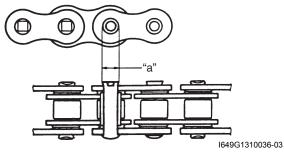
### **⚠ CAUTION**

- After joining of the chain has been completed, check to make sure that the link is smooth and no abnormal condition is found.
- Should any abnormal condition be found, reassemble the chain link using the new joint parts.

<u>Pin end diameter specification "a"</u> RK: 5.45 – 5.85 mm (0.215 – 0.230 in)



1649G1310035-02



3) Adjust the drive chain slack, after connecting it. Refer to "Drive Chain Inspection and Adjustment in Section 0B (Page 0B-17)".

## **Specifications**

### **Service Data**

Drive Chain

Unit: mm (in)

Item		Standard	
Final reduction ratio		3.200 (48/15)	
	Туре	RK 525SMOZ7Y	_
Drive chain	Links	118 links	_
	20-pitch length		323.8 (12.75)
Drive chain slack		20 – 30 (1.8 – 2.2)	

## **Tightening Torque Specifications**

B817H23107002

Fastening part	Tightening torque			Note
rastering part	N⋅m	kgf-m	lbf-ft	Note
Engine sprocket nut	115	11.5	83.0	☞(Page 3A-3)
Speed sensor rotor bolt	25	2.5	18.0	☞(Page 3A-3)
Speed sensor mounting bolt	6.5	0.65	4.7	☞(Page 3A-3)
Rear sprocket nut	60	6.0	43.5	☞(Page 3A-5)

## **NOTE**

The specified tightening torque is also described in the following.

"Drive Chain Related Components (Page 3A-1)"

### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

## **Recommended Service Material**

B817H23108001

Material	SUZUKI recommended produc	Note	
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	
	equivalent		4) / 🎤 (Page 3A-5) /
			☞(Page 3A-6) / ☞(Page 3A-
			7)
Thread lock cement	Thread Lock Cement Super 1303 or	P/No.: 99000-32030	☞(Page 3A-3)
	equivalent		
	THREAD LOCK CEMENT SUPER	P/No.: 99000-32110	☞(Page 3A-3)
	1322 or equivalent		

### **NOTE**

Required service material is also described in the following.

"Drive Chain Related Components (Page 3A-1)"

## **Special Tool**

B817H23108002

		T	Be111120100002
09913–50121		09913–70210	
Oil seal remover	Ca.	Bearing installer set	
☞(Page 3A-6)		☞(Page 3A-6) / ☞(Page 3A-	
(I age SA-0)			
		7) / ☞(Page 3A-7)	
	ð		
09922–22711			
	^		
Drive chain cutting and			
joining tool			
☞(Page 3A-7)			
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## **Section 4**

## **Brake**

## **CONTENTS**

Precautions4-1	Front Brakes	4B-1
Precautions 4-1	Repair Instructions	4B-1
Precautions for Brake System 4-1	Front Brake Components	4B-1
Brake Fluid Information 4-1	Front Brake Pad Inspection	4B-1
D   0   10   10   10   1   14	Front Brake Pad Replacement	
Brake Control System and Diagnosis 4A-1	Front Brake Caliper Removal and Installation	4B-2
Schematic and Routing Diagram4A-1	Front Brake Caliper Disassembly and	
Front Brake Hose Routing Diagram (GSF650) 4A-1	Assembly	
Front Brake Hose Routing Diagram	Front Brake Caliper Parts Inspection	
(GSF650S)4A-2	Front Brake Disc Removal and Installation	
Rear Brake Hose Routing Diagram4A-3	Front Brake Disc Inspection	
Diagnostic Information and Procedures4A-4	Specifications	
Brake Symptom Diagnosis4A-4	Service Data	
Repair Instructions4A-4	Tightening Torque Specifications	4B-7
Brake Pedal Height Inspection and	Special Tools and Equipment	4B-7
Adjustment4A-4	Recommended Service Material	4B-7
Front Brake Light Switch Inspection4A-4	Special Tool	4B-8
Rear Brake Light Switch Inspection4A-5	B	40.4
Rear Brake Light Switch Inspection and	Rear Brakes	
Adjustment4A-5	Repair Instructions	
Brake Fluid Level Check4A-5	Rear Brake Components	
Brake Hose Inspection4A-5	Rear Brake Pad Inspection	
Air Bleeding from Brake Fluid Circuit4A-5	Rear Brake Pad Replacement	
Brake Fluid Replacement4A-7	Rear Brake Caliper Removal and Installation	4C-3
Brake Hose Removal and Installation4A-8	Rear Brake Caliper Disassembly and	_
Front Brake Master Cylinder Components4A-9	Assembly	
Front Brake Master Cylinder Assembly	Rear Brake Caliper Parts Inspection	
Removal and Installation4A-9	Rear Brake Disc Removal and Installation	
Front Brake Master Cylinder / Brake Lever	Rear Brake Disc Inspection	
Disassembly and Assembly4A-10	Specifications	
Front Brake Master Cylinder Parts Inspection 4A-12	Service Data	
Rear Brake Master Cylinder Components4A-12	Tightening Torque Specifications	
Rear Brake Master Cylinder Assembly	Special Tools and Equipment	
Removal and Installation	Recommended Service Material	
Rear Brake Master Cylinder Disassembly and	Special Tool	4C-8
Assembly	ADC	45.4
Rear Brake Master Cylinder Parts Inspection4A-15	ABS	
Specifications	Precautions	
Service Data	Precautions for ABS	
Tightening Torque Specifications	ABS Information	
Special Tools and Equipment4A-16	General Description	
Recommended Service Material	Wheel Speed Sensor Description	
Special Tool4A-16	ABS Control Unit Description	
	Hydraulic Unit (HU) Description	4E-4

## 4-ii Table of Contents

Self-diagnosis Function and ABS Indicator	DTC "43" (C1643): Wheel Speed Sensor
Light Description4E-5	Circuit Short (F)4E-52
Fail-safe Function Description4E-6	DTC "44" (C1644): Wheel Speed Sensor
Schematic and Routing Diagram4E-7	Signal Malfunction (R)4E-54
ABS Wiring Diagram4E-7	DTC "45" (C1645): Wheel Speed Sensor
ABS Unit Diagram4E-8	Circuit Open (R)4E-56
Front Wheel Speed Sensor Routing Diagram4E-9	DTC "46" (C1646): Wheel Speed Sensor
Rear Wheel Speed Sensor Routing Diagram 4E-11	Circuit Short (R)4E-60
Component Location4E-12	DTC "47" (C1647): Supply Voltage
ABS Components Location4E-12	(Increased)4E-62
Diagnostic Information and Procedures4E-13	DTC "48" (C1648): Supply Voltage
ABS Troubleshooting4E-13	(Decreased)4E-64
Pre-diagnosis Inspection4E-15	DTC "55" (C1655): ABS Control Unit
ABS Indicator Light Inspection4E-17	Malfunction4E-66
DTC (Diagnostic Trouble Code) Output4E-23	DTC "61" (C1661): ABS Solenoid Malfunction4E-68
DTC (Diagnostic Trouble Code) Deleting4E-26	Repair Instructions4E-69
SDS Check4E-29	ABS Control Unit Coupler Disconnect and
Active Control Inspection4E-30	Connect4E-69
DTC Table4E-33	Front Wheel Speed Sensor Removal and
DTC "13" (C1613): Wheel Speed Sensor	Installation4E-70
Rotor Malfunction (F)4E-35	Rear Wheel Speed Sensor Removal and
DTC "14" (C1614): Wheel Speed Sensor	Installation4E-70
Rotor Malfunction (R)4E-37	Front Wheel Speed Sensor Rotor Removal
DTC "22" (C1622): ABS Actuator Circuit	and Installation4E-71
Malfunction (F)4E-39	Rear Wheel Speed Sensor Rotor Removal
DTC "23" (C1623): ABS Actuator Circuit	and Installation4E-72
Malfunction (R)4E-40	Wheel Speed Sensor and Sensor Rotor
DTC "25" (C1625): Wheel Speed Sensor	Inspection4E-73
Related Malfunction4E-42	ABS Control Unit/HU Removal and
DTC "35" (C1635): ABS Motor Malfunction4E-44	Installation4E-73
DTC "41" (C1641): Wheel Speed Sensor	Specifications4E-75
Signal Malfunction (F)4E-46	Tightening Torque Specifications4E-75
DTC "42" (C1642): Wheel Speed Sensor	Special Tools and Equipment4E-75
Circuit Open (F)4E-47	Special Tool4E-75

## **Precautions**

## **Precautions**

## **Precautions for Brake System**

Refer to "General Precautions in Section 00 (Page 00-1)".

B817H24000001

## **Brake Fluid Information**

B817H24000002

## **▲ WARNING**

- This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid, such as silicone-based or petroleum-based.
- Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or which has been stored for long periods of time.
- When storing brake fluid, seal the container completely and keep it away from children.
- · When replenishing brake fluid, take care not to get dust into the fluid.
- . When washing brake components, use new brake fluid. Never use cleaning solvent.
- A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the disc with high quality brake cleaner or neutral detergent.

### **A CAUTION**

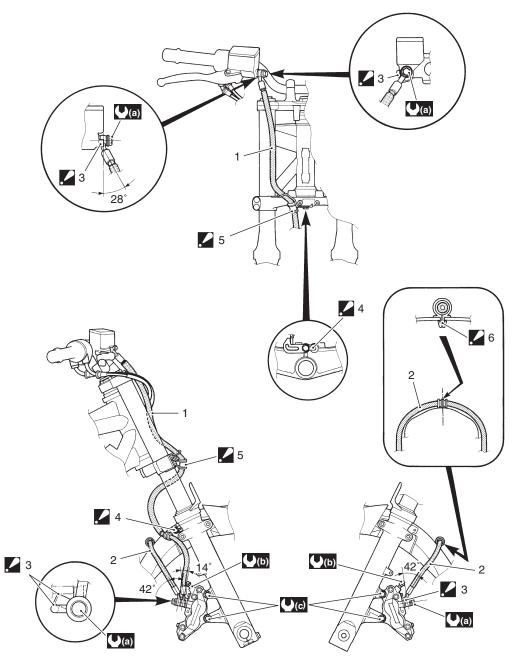
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

## **Brake Control System and Diagnosis**

## **Schematic and Routing Diagram**

Front Brake Hose Routing Diagram (GSF650)

B817H24102001

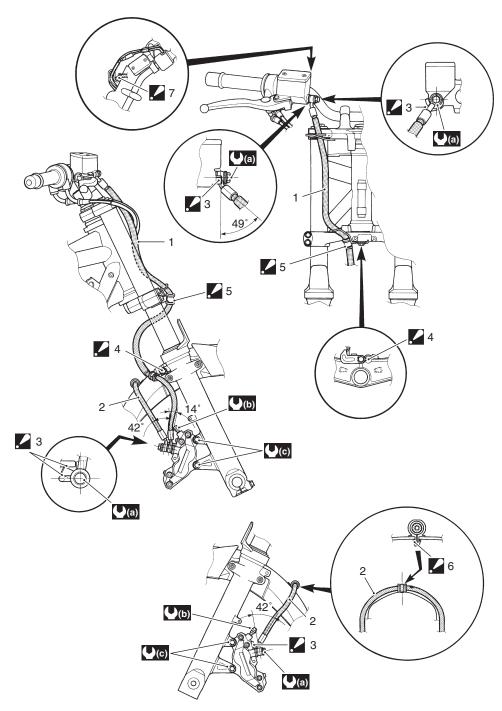


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17 1	1111410021-0	

1.	Front brake hose No.1	<b>.</b> 6:	Clamp : Insert the clamp to the hole of the front fender fully.
2.	Front brake hose No.2	<b>( (</b> a) :	23 N·m (2.3 kgf-m, 16.5 lb-ft)
3:	Stopper : After the brake hose union has contacted the stopper, tighten the union bolt.	<b>(</b> (b):	8.5 N·m (0.85 kgf-m, 6.1 lb-ft)
4:	Clamp : After positioning the clamp with the stopper, tighten the clamp bolt.	<b>(</b> (c):	25 N·m (2.5 kgf-m, 18.0 lb-ft)
<b>.</b> 5:	Brake hose : Clamp the brake hose firmly.		

## Front Brake Hose Routing Diagram (GSF650S)

B817H24102002

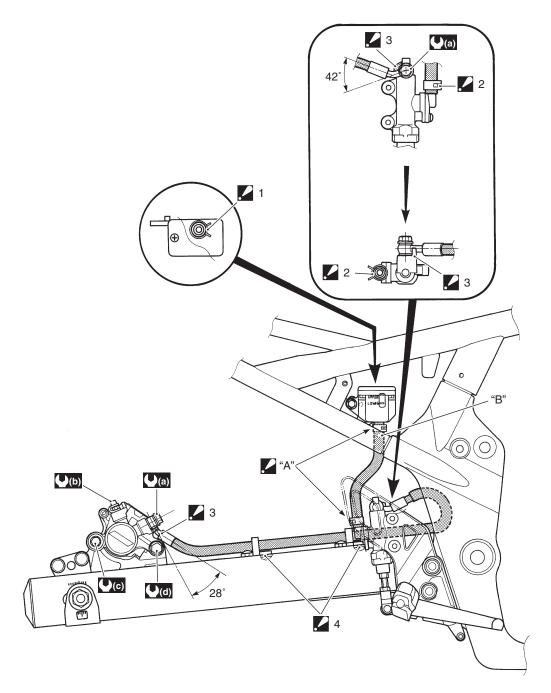


I717H1410028-01

Front brake hose No.1	
2. Front brake hose No.2	<ul><li>7: Front brake hose No.1</li><li>: Pass the front brake hose No.1 to the brake hose guide.</li></ul>
<ul><li>3: Stopper</li><li>: After the brake hose union has contacted the stopper, tighten the union bolt.</li></ul>	<b>(U(a)</b> : 23 N⋅m (2.3 kgf-m, 16.5 lb-ft)
<ul><li>4: Clamp</li><li>: After positioning the clamp with the stopper, tighten the clamp bolt.</li></ul>	(L) : 8.5 N·m (0.85 kgf-m, 6.1 lb-ft)
<ul><li>5: Brake hose</li><li>: Clamp the brake hose firmly.</li></ul>	(2.5 kgf-m, 18.0 lb-ft)

## **Rear Brake Hose Routing Diagram**

B817H24102003



I717H1410001-03

1.	Brake hose clamp : Brake hose clamp ends should face forward.	"B": White paint
2.	Brake hose clamp : Brake hose clamp ends should face backward.	(2.3 kgf-m, 16.5 lb-ft)
<b>3</b> :	Stopper : After the brake hose union has contacted the stopper, tighten the union bolt.	(0.6 kgf-m, 4.5 lb-ft)
4:	Guide: Position the guide with hole of swinging arm before tightening.	(2.2 kgf-m, 16.0 lb-ft)
. "A":	Insert reservoir hose into root of reservoir tank firmly.	(d): 27 N·m (2.7 kgf-m, 19.5 lb-ft)

## **Diagnostic Information and Procedures**

## **Brake Symptom Diagnosis**

B817H24104001

Condition	Possible cause	Correction / Reference Item	
Insufficient brake power	Leakage of brake fluid from hydraulic	Repair or replace.	
-	system.		
	Worn pads.	Replace.	
	Oil adhesion on friction surface of pads.	Clean disc and pads.	
	Worn disc and disk.	Replace.	
	Air in hydraulic system.	Bleed air.	
	Not enough brake fluid in the reservoir.	Replenish.	
Brake squeaking	Carbon adhesion on pad surface.	Repair surface with sandpaper.	
	Tilted pad.	Correct pad fitting or replace.	
	Damaged wheel bearing.	Replace.	
	Loose front-wheel axle or rear-wheel	Tighten to specified torque.	
	axle.		
	Worn pads and disc.	Replace.	
	Foreign material in brake fluid.	Replace brake fluid.	
	Clogged return port of master cylinder.	Disassemble and clean master cylinder.	
Excessive brake lever	Air in hydraulic system.	Bleed air.	
stroke	Insufficient brake fluid.	Replenish fluid to specified level; bleed air.	
	Improper quality of brake fluid.	Replace with correct fluid.	
Leakage of brake fluid	Insufficient tightening of connection	Tighten to specified torque.	
	joints.		
	Cracked hose.	Replace.	
	Worn piston and/or cup.	Replace piston and/or cup.	
	Worn piston seal and dust seal.	Replace piston seal and dust seal.	
Brake drags	Rusty part.	Clean and lubricate.	
_	Insufficient brake lever or brake pedal	Lubricate.	
	pivot lubrication.		

## **Repair Instructions**

## Brake Pedal Height Inspection and Adjustment

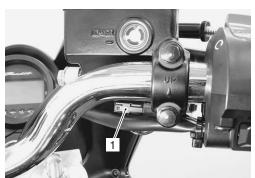
Refer to "Brake System Inspection in Section 0B (Page 0B-18)".

## **Front Brake Light Switch Inspection**

B817H24106002

Inspect the front brake light switch in the following procedures:

1) Disconnect the front brake light switch lead coupler (1).



I717H1410002-01

2) Inspect the switch for continuity with a tester. If any abnormality is found, replace the front brake light switch with a new one. Refer to "Front Brake Master Cylinder / Brake Lever Disassembly and Assembly (Page 4A-10)".

Special tool

**1001**: 09900–25008 (Multi-circuit tester set)

Tester knob indication Continuity ( •)))

Color	Terminal (B/G)	Terminal (B)
OFF		
ON	0	0

I649G1410004-03

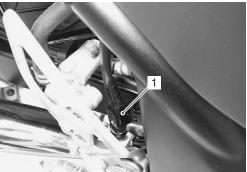
3) Connect the front brake light switch lead coupler.

## **Rear Brake Light Switch Inspection**

B817H24106003

Inspect the rear brake light switch in the following procedures:

1) Disconnect the rear brake light switch lead coupler (1).



I717H1410003-01

2) Inspect the switch for continuity with a tester.
If any abnormality is found, replace the rear brake light switch with a new one.

## Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication Continuity ( •)))

## Rear brake light switch

Color	Terminal (O/G)	Terminal (W/B)
ON	0	0
OFF		

1649G141000

3) Connect the rear brake light switch lead coupler.

## Rear Brake Light Switch Inspection and Adjustment

B817H24106004

Check the rear brake light switch so that the brake light will come on just before pressure is felt when the brake pedal is depressed. If the brake light switch adjustment is necessary, turn the adjuster nut (1) in or out while holding the brake pedal.





I717H1410004-01

## **Brake Fluid Level Check**

B817H24106005

Refer to "Brake System Inspection in Section 0B (Page 0B-18)".

## **Brake Hose Inspection**

B817H24106006

Refer to "Brake System Inspection in Section 0B (Page 0B-18)".

## Air Bleeding from Brake Fluid Circuit

B817H24106007

Air trapped in the brake fluid circuit acts like a cushion to absorb a large proportion of the pressure developed by the master cylinder and thus interferes with the full braking performance of the brake caliper. The presence of air is indicated by "sponginess" of the brake lever and also by lack of braking force. Considering the danger to which such trapped air exposes the machine and rider, it is essential that after remounting the brake and restoring the brake system to the normal condition, the brake fluid circuit be purged of air in the following manner:

#### **⚠ CAUTION**

Handle brake fluid with care: the fluid reacts chemically with paint, plastic, rubber materials, etc.

#### **Front Brake**

 Fill the master cylinder reservoir to the top of the inspection window. Place the reservoir cap to prevent dirt from entering.



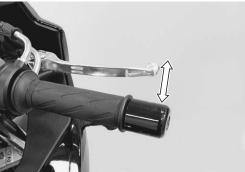
I717H1410005-01

- 2) Attach a hose to the air bleeder valve, and insert the free end of the hose into a receptacle.
- Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it.

4) Loosen the air bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handlebar grip.



I717H1410006-01



I717H1410013-01

- 5) Close the air bleeder valve, pump and squeeze the lever, and open the valve.
- 6) Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.

## NOTE

While bleeding the brake system, replenish the brake fluid in the reservoir as necessary. Make sure that there is always some fluid visible in the reservoir.

7) Close the air bleeder valve and disconnect the hose.

## Tightening torque Air bleeder valve (Front brake): 8.5 N·m (0.85 kgf-m, 6.1 lbf-ft)

8) Fill the reservoir with brake fluid to the upper line of the reservoir.



717H1410007-01

9) Install the reservoir cap.

#### **Rear Brake**

Bleed air from the rear brake system as the same manner of front brake.

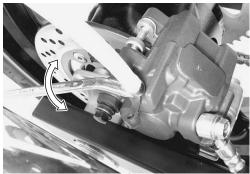
 Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

### NOTE

The only difference of bleeding operation from the front brake is that the rear master cylinder is actuated by a pedal.

## **Tightening torque**

Air bleeder valve (Rear brake): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I717H1410008-01



I717H1410009-01



I717H1410010-01

Install the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

## **Brake Fluid Replacement**

B817H24106008

### **⚠ CAUTION**

Handle brake fluid with care: the fluid reacts chemically with paint, plastic, rubber materials, etc.

#### **Front Brake**

- 1) Place the motorcycle on a level surface and keep the handlebars straight.
- 2) Remove the brake fluid reservoir cap and diaphragm.
- 3) Suck up the old brake fluid as much as possible.

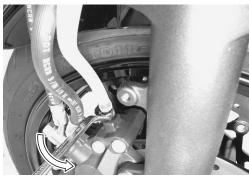


717H1410011-01

4) Fill the reservoir with new brake fluid.

## BF: Brake fluid (DOT 4)

5) Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.



I717H1410012-01

6) Loosen the air bleeder valve and pump the brake lever until the old brake fluid flows out of the brake system.



7) Close the air bleeder valve and disconnect the clear hose.

Tightening torque
Air bleeder valve (Front brake) (a): 8.5 N·m (0.85 kgf-m, 6.1 lbf-ft)

Fill the reservoir with brake fluid to the upper line reservoir.



I717H1410007-01

9) Install the reservoir cap.

#### Rear Brake

- 1) Place the motorcycle on a level surface.
- 2) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- Remove the brake fluid reservoir cap and diaphragm.
- 4) Suck up the old brake fluid as much as possible.



I717H1410014-01

5) Fill the reservoir with new brake fluid.

## BF: Brake fluid (DOT 4)

6) Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.

7) Loosen the air bleeder valve and pump the brake pedal until the old brake fluid flows out of the brake system.



7H1410015-01



I717H1410009-01

8) Close the air bleeder valve and disconnect the clear hose.

Tightening torque Air bleeder valve (Rear brake) (a): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

9) Fill the reservoir with brake fluid to the upper mark reservoir.



I717H1410010-01

## **Brake Hose Removal and Installation**

### Removal

- 1) Drain brake fluid. Refer to "Brake Fluid Replacement (Page 4A-7)".
- 2) Remove the front and rear brake hoses as shown in the front and rear brake hose routing diagram. Refer to "Front Brake Hose Routing Diagram (GSF650) (Page 4A-1)" or "Front Brake Hose Routing Diagram (GSF650S) (Page 4A-2)" and "Rear Brake Hose Routing Diagram (Page 4A-3)".

### Installation

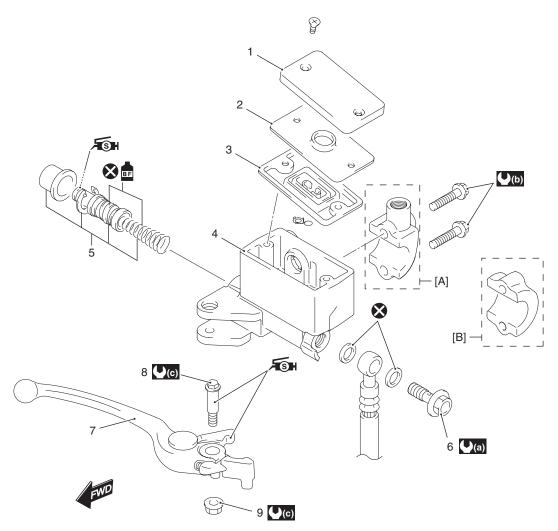
## **A** CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

- 1) Install the front and rear brake hoses as shown in the front and rear brake hose routing diagram. Refer to "Front Brake Hose Routing Diagram (GSF650) (Page 4A-1)" or "Front Brake Hose Routing Diagram (GSF650S) (Page 4A-2)" and "Rear Brake Hose Routing Diagram (Page 4A-3)".
- 2) Bleed air from the front and rear brake system. Refer to "Air Bleeding from Brake Fluid Circuit (Page 4A-5)".

## **Front Brake Master Cylinder Components**

B817H24106010



I718H1410070-01

Reservoir cap	7. Brake lever	(b): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
2. Plate	Brake lever pivot bolt	(0.6 kgf-m, 4.5 lb-ft)
3. Diaphragm	Brake lever pivot bolt lock-nut	EF: Apply brake fluid.
Master cylinder	[A]: For GSF650	Apply silicone grease.
5. Piston/Cup set	[B]: For GSF650S	🗴 : Do not reuse.
Brake hose union bolt	(a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)	

## Front Brake Master Cylinder Assembly Removal and Installation

B817H24106011

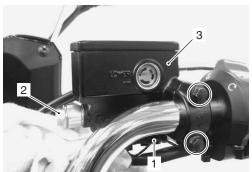
## Removal

- 1) Drain brake fluid. Refer to "Brake Fluid Replacement (Page 4A-7)".
- 2) Disconnect the front brake light switch lead coupler (1).
- 3) Place a rag underneath the brake hose union bolt (2) on the master cylinder to catch any spilt brake fluid.

## **A** CAUTION

The brake fluid reacts chemically with paint, plastics, rubber materials, etc., and will damage them severely.

- 4) Remove the brake hose union bolt (2) and disconnect the brake hose.
- 5) Remove the right rear view mirror. (GSF650S)
- 6) Remove the master cylinder assembly (3).



I717H1410016-02

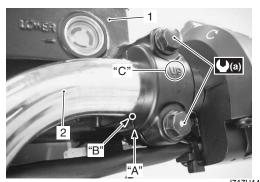
### Installation

Install the front brake master cylinder in the reverse order of removal. Pay attention to the following points:

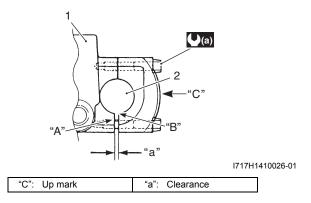
 When installing the master cylinder (1) onto the handlebars (2), align the master cylinder holder's mating surface "A" with the punch mark "B" on the handlebars (2) and tighten the upper holder bolt first.

## Tightening torque

Master cylinder holder bolt (Upper and Lower) (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I717H1410017-01



 After setting the brake hose union to the stopper, tighten the union bolt to the specified torque.

## **⚠ CAUTION**

The seal washers should be replaced with the new ones to prevent fluid leakage.

## Tightening torque

Brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I717H1410018-01

 Bleed air from the brake system. Refer to "Air Bleeding from Brake Fluid Circuit (Page 4A-5)".

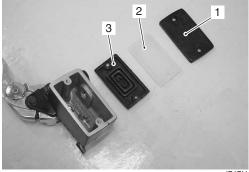
## Front Brake Master Cylinder / Brake Lever Disassembly and Assembly

B817H24106012

Refer to "Front Brake Master Cylinder Assembly Removal and Installation (Page 4A-9)".

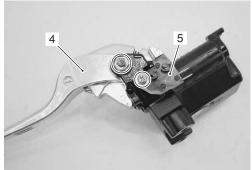
### Disassembly

1) Remove the reservoir cap (1), plate (2) and diaphragm (3).



I717H1410019-01

2) Remove the brake lever (4) and brake light switch (5).

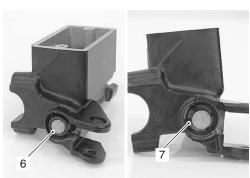


I717H1410020-01

3) Pull out the dust boot (6) and remove the snap ring (7).

## Special tool

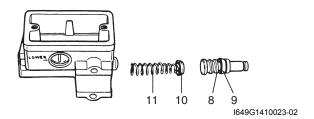
ான்: 09900-06108 (Snap ring pliers)



I718H1410054-02

## 4A-11 Brake Control System and Diagnosis:

- 4) Remove the following parts from the master cylinder.
  - Piston (8)
  - Secondary cup (9)
  - Primary cup (10)
  - Spring (11)



## **Assembly**

Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

### **⚠ CAUTION**

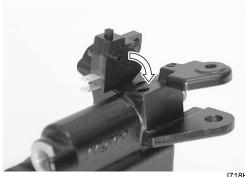
- Wash the master cylinder components with new brake fluid before reassembly.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.

BF: Brake fluid (DOT 4)



I649G1410024-02

 When installing the brake light switch, align the projection on the switch with the hole in the master cylinder.



I718H1410055-01

- Apply grease to the brake lever pivot bolt.
- Apply grease to the contact point between piston and brake lever.

**元**新: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I717H1410021-01

Tighten the pivot bolt and lock-nut to the specified torque.

**Tightening torque** 

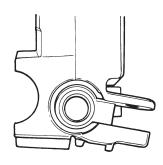
Brake lever pivot bolt: 6 N·m (0.6 kgf-m, 4.5 lbf-ft) Brake lever pivot bolt lock-nut: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

# Front Brake Master Cylinder Parts Inspection B817H24106013 Refer to "Front Brake Master Cylinder / Brake Lever"

Disassembly and Assembly (Page 4A-10)".

## **Master Cylinder**

Inspect the master cylinder bore for any scratches or other damage.



I649G1410027-02

## **Piston**

Inspect the piston surface for any scratches or other

## **Rubber Parts**

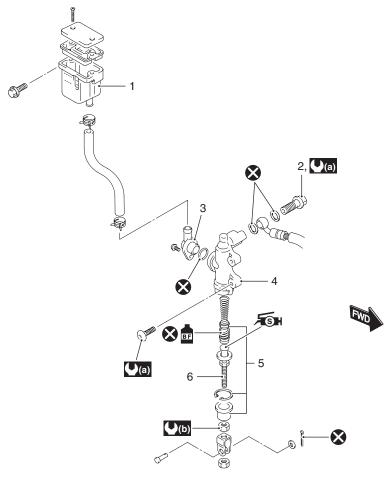
Inspect the primary cup, secondary cup and dust boot for wear or damage.



I649G1410028-02

## **Rear Brake Master Cylinder Components**

B817H24106014



I649G1410029-06

Reservoir tank	4. Master cylinder	(a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)	: Apply brake fluid.
<ol><li>Brake hose union bolt</li></ol>	<ol><li>Piston/Cup set</li></ol>	(b): 18 N·m (1.8 kgf-m, 13.0 lb-ft)	🐼 : Do not reuse.
Brake hose connector	6. Push rod	Ash: Apply silicone grease.	

## Rear Brake Master Cylinder Assembly Removal and Installation

B817H24106015

#### Removal

- Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Drain brake fluid. Refer to "Brake Fluid Replacement (Page 4A-7)".
- 3) Remove the reservoir mounting bolt (1).



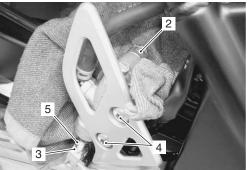
I717H1410022-01

4) Place a rag underneath the brake hose union bolt (2) on the master cylinder to catch any spilt brake fluid.

## **A** CAUTION

The brake fluid reacts chemically with paint, plastics, rubber materials, etc., and will damage them severely.

- 5) Remove the brake hose union bolt (2) and disconnect the brake hose.
- 6) Loosen the lock-nut (3).
- 7) Remove the master cylinder mounting bolts (4).
- 8) Remove the master cylinder along with the reservoir by turning the push rod (5).



I717H1410023-01

### Installation

Install the rear brake master cylinder in the reverse order of removal. Pay attention to the following points:

## **⚠ CAUTION**

The seal washers should be replaced with the new ones to prevent fluid leakage.

- Tighten the master cylinder mounting bolts (1) to the specified torque.
- Tighten the lock-nut (2) to the specified torque.
- After setting the brake hose union to the stopper, tighten the union bolt (3) to the specified torque.

## **Tightening torque**

Rear brake master cylinder mounting bolt (a): 23

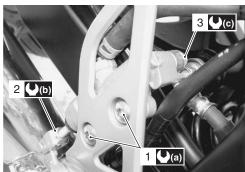
N·m (2.3 kgf-m, 16.5 lbf-ft)

Rear brake master cylinder rod lock-nut (b): 18

N·m (1.8 kgf-m, 13.0 lbf-ft)

Brake hose union bolt (c): 23 N·m (2.3 kgf-m, 16.5

Ibf-ft)



I717H1410025-02

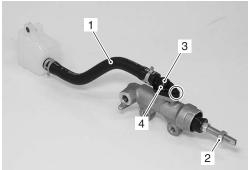
- Bleed air from the system after reassembling the master cylinder. Refer to "Brake System Inspection in Section 0B (Page 0B-18)".
- Adjust the brake pedal height. Refer to "Brake System Inspection in Section 0B (Page 0B-18)".

## Rear Brake Master Cylinder Disassembly and Assembly

B817H24106016

#### Disassembly

- 1) Disconnect the reservoir hose (1).
- 2) Remove the lock-nut (2).
- 3) Remove the brake hose connector (3) and O-ring (4).

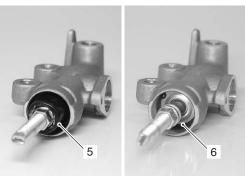


I718H1410059-04

4) Pull out the dust boot (5) and remove the snap ring (6).

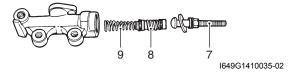
#### Special tool

**6.5** : 09900-06108 (Snap ring pliers)



I718H1410060-01

5) Remove the push rod (7), piston/cup set (8) and spring (9).



#### Assembly

Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

#### **⚠ CAUTION**

- Wash the master cylinder components with new brake fluid before reassembly.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.

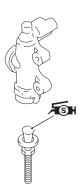
#### BF: Brake fluid (DOT 4)



I649G1410036-02

Apply grease to the push rod end.

## র্জ্জ: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I649G1410041-03

• Install the O-ring (1).

#### **⚠ CAUTION**

Replace the O-ring (1) with a new one.



I718H1410061-01

### **Rear Brake Master Cylinder Parts Inspection**

Refer to "Rear Brake Master Cylinder Disassembly and Assembly (Page 4A-14)".

#### **Master Cylinder**

Inspect the master cylinder bore for any scratches or other damage.



I649G1410038-02

#### **Piston**

Inspect the piston surface for any scratches or other damage.

#### **Rubber Parts**

Inspect the primary cup, secondary cup and dust boot for wear or damage.





I649G1410039-02

B817H24107001

## **Specifications**

#### **Service Data**

**Brake** 

Unit: mm (in)

Item		Standard	Limit
Rear brake pedal height		50 - 65 (2.0 - 2.6)	_
Master cylinder bore	Front	14.000 – 14.043 (0.5512 – 0.5529)	_
I waster cyllider bore	Rear	14.000 – 14.043 (0.5512 – 0.5529)	_
Master cylinder piston diameter	Front	13.957 – 13.984 (0.5495 – 0.5506)	_
Master cylinder piston diameter	Rear	13.957 - 13.984 (0.5495 - 0.5506)	_

### Oil

Item	Specification	Note
Brake fluid type	DOT 4	

### **Tightening Torque Specifications**

B817H24107002

Eastening next	Т	ightening torq	Note	
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Air bleeder valve (Front brake)	8.5	0.85	6.1	☞(Page 4A-6) /
	0.5	0.05	0.1	☞(Page 4A-7)
Air bleeder valve (Rear brake)	6	0.6	4.5	☞(Page 4A-6) /
	U	0.0	4.5	☞(Page 4A-8)
Master cylinder holder bolt (Upper and Lower)	10	1.0	7.0	☞(Page 4A-10)
Brake hose union bolt	23	2.3	16.5	☞(Page 4A-10) /
	23	2.3	10.5	☞(Page 4A-13)
Brake lever pivot bolt	6	0.6	4.5	☞(Page 4A-11)
Brake lever pivot bolt lock-nut	6	0.6	4.5	☞(Page 4A-11)
Rear brake master cylinder mounting bolt	23	2.3	16.5	☞(Page 4A-13)
Rear brake master cylinder rod lock-nut	18	1.8	13.0	☞(Page 4A-13)

#### NOTE

The specified tightening torque is also described in the following.

#### Reference

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

#### **Recommended Service Material**

B817H24108001

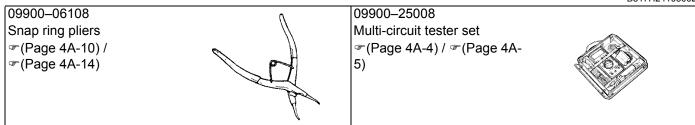
			20200001	
Material	SUZUKI recommended pr	SUZUKI recommended product or Specification		
Brake fluid	DOT 4	_		
			7) / ☞(Page 4A-11) /	
			☞(Page 4A-14)	
Grease	SUZUKI Silicone Grease or	P/No.: 99000-25100	☞(Page 4A-11) /	
	equivalent		☞(Page 4A-14)	

#### **NOTE**

Required service material is also described in the following.

#### **Special Tool**

B817H24108002



<sup>&</sup>quot;Front Brake Hose Routing Diagram (GSF650) (Page 4A-1)"

<sup>&</sup>quot;Front Brake Hose Routing Diagram (GSF650S) (Page 4A-2)"

<sup>&</sup>quot;Rear Brake Hose Routing Diagram (Page 4A-3)"

<sup>&</sup>quot;Front Brake Master Cylinder Components (Page 4A-9)"

<sup>&</sup>quot;Rear Brake Master Cylinder Components (Page 4A-12)"

<sup>&</sup>quot;Front Brake Master Cylinder Components (Page 4A-9)"

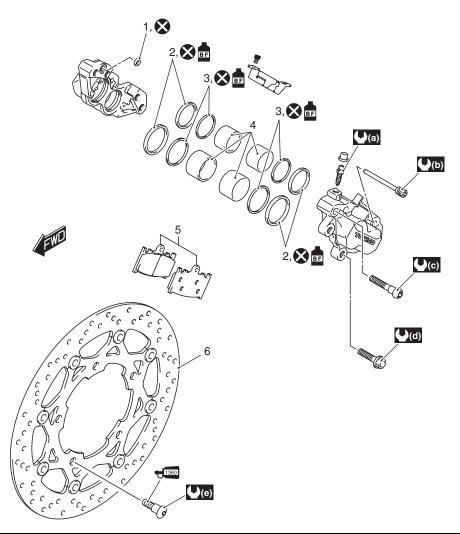
<sup>&</sup>quot;Rear Brake Master Cylinder Components (Page 4A-12)"

## **Front Brakes**

## **Repair Instructions**

#### **Front Brake Components**

B817H24206001



I649G1420001-05

1. O-ring	Front brake disc	(e): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Piston seal	<b>(a)</b> : 8.5 N⋅m (0.85 kgf-m, 6.1 lb-ft)	₹1360 : Apply thread lock to thread part.
3. Dust seal	(1.6 kgf-m, 11.5 lb-ft)	BF: Apply brake fluid.
4. Piston	(c): 22 N·m (2.2 kgf-m, 16.0 lb-ft)	💸 : Do not reuse.
<ol><li>Front brake pad set</li></ol>	(d): 26 N·m (2.5 kgf-m, 18.0 lb-ft)	

#### **Front Brake Pad Inspection**

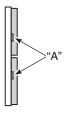
B817H24206002

The extent of brake pads wear can be checked by observing the grooved limit line "A" on the pads. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to "Front Brake Pad Replacement (Page 4B-2)".

#### **⚠ CAUTION**

Replace the brake pad as a set, otherwise braking performance will be adversely affected.





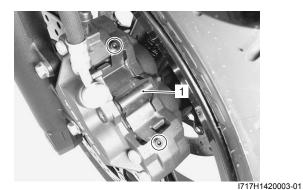
I717H1420002-01

Front Brakes: 4B-2

#### Front Brake Pad Replacement

B817H24206003

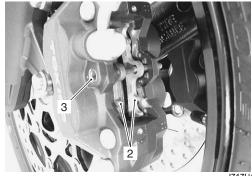
1) Remove the spring (1).



2) Remove the brake pads (2) by removing the pad mounting pin (3).

#### **NOTE**

When removing the pads, push the piston all the way into the brake caliper.



I717H1420004-01

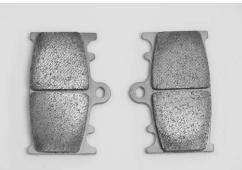
#### **⚠ CAUTION**

Do not operate the brake lever while dismounting the pads.

- 3) Clean up the caliper especially around the caliper piston.
- 4) Install the new brake pads.

#### **A CAUTION**

Replace the brake pads as a set, otherwise braking performance will be adversely affected.



I718H1420003-01

5) Tighten the pad mounting pin to the specified torque.

## Tightening torque Front brake pad mounting pin (a): 16 N⋅m (1.6 kgf-m, 11.5 lbf-ft)



I717H1420005-01

#### NOTE

After replacing the brake pads, pump the brake lever several times to check for proper brake operation and then check the brake fluid level.

#### Front Brake Caliper Removal and Installation

B817H24206004

#### Removal

- 1) Drain brake fluid. Refer to "Brake Fluid Replacement in Section 4A (Page 4A-7)".
- 2) Remove the brake hoses from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.

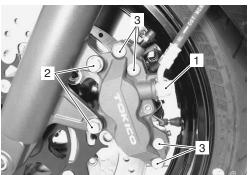
#### NOTE

- Place a rag underneath the union bolt on the brake caliper to catch any spilt brake fluid.
- Slightly loosen the brake caliper housing bolts (3) to facilitate later disassembly, if necessary.

#### Special tool

(Torx bit (JT 40H)) : 09930–11940 (Bit holder)

3) Remove the brake caliper by removing the caliper mounting bolts (2).



I717H1420006-01

#### Installation

Install the brake caliper in the reverse order of removal. Pay attention to the following points:

· Tighten each bolt to the specified torque.

#### Tightening torque

Front brake caliper mounting bolt (a): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)

Front brake caliper housing bolt (b): 22 N·m (2.2 kgf-m, 16.0 lbf-ft)

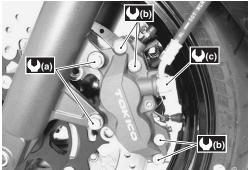
 After setting the brake hose union to the stopper, tighten the union bolt to the specified torque.

#### **⚠ CAUTION**

The seal washers should be replaced with the new ones to prevent fluid leakage.

#### **Tightening torque**

Front brake hose union bolt (c): 23 N·m (2.3 kgfm, 16.5 lbf-ft)



I717H1420007-01

- Bleed air from the brake system after installing the caliper. Refer to "Brake System Inspection in Section 0B (Page 0B-18)".
- · Check the brake fluid leakage and brake operation.

#### **▲ WARNING**

Brake fluid, if it leaks, will interfere with safe running and discolor painted surfaces. Check the brake hose and hose joints for cracks and fluid leakage.

### Front Brake Caliper Disassembly and Assembly

B817H242

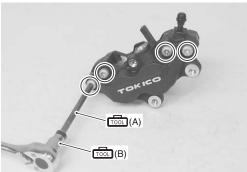
Refer to "Front Brake Caliper Removal and Installation (Page 4B-2)".

#### Disassembly

- 1) Remove the brake pads. Refer to "Front Brake Pad Replacement (Page 4B-2)".
- 2) Separate the caliper halves by removing the caliper housing bolts with special tools.

#### Special tool

ன் (A): 09930–11920 (Torx bit (JT 40H)) ரன் (B): 09930–11940 (Bit holder)



I649G1420021-02

3) Remove the O-ring.



I649G1420009-02

4) Place a rag over the pistons to prevent it from popping out and then force out the pistons using compressed air.

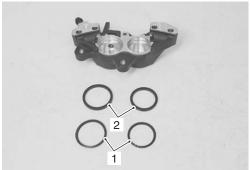
#### **⚠ CAUTION**

Do not use high pressure air to prevent piston damage.



1649G1420010-02

5) Remove the dust seals (1) and piston seals (2).



I718H1420008-01

#### **Assembly**

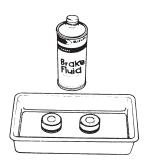
Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

 Wash the caliper bores and pistons with specified brake fluid. Particularly wash the dust seal grooves and piston seal grooves.

#### BF: Brake fluid (DOT 4)

#### **⚠ CAUTION**

- Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.



1649G1420012-02

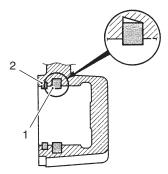
 Apply the brake fluid to piston seals (1) and dust seals (2).

#### **⚠ CAUTION**

Replace the piston seals (1) and dust seals (2) with new ones.

#### BF: Brake fluid (DOT 4)

· Install the piston seals as shown.



I649G1420013-02

Install a new O-ring and reassemble caliper halves.

#### **⚠ CAUTION**

Replace the O-ring with a new one.



I649G1420014-02

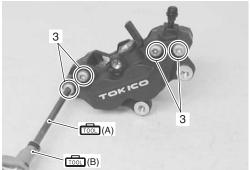
 Temporarily tighten the brake caliper housing bolts (3).

#### **A** CAUTION

After installing the brake caliper to the front fork, tighten the brake caliper housing bolts to the specified torque. Refer to "Front Brake Caliper Removal and Installation (Page 4B-2)".

#### Special tool

(A): 09930–11920 (Torx bit (JT 40H)) (B): 09930–11940 (Bit holder)



I717H1420008-01

#### Front Brake Caliper Parts Inspection

B817H24206006

Refer to "Front Brake Caliper Disassembly and Assembly (Page 4B-3)".

#### **Brake Caliper Cylinder**

Inspect the brake caliper cylinder wall for nicks, scratches or other damage. If any damage is found, replace the caliper with a new one.



I649G1420015-02

#### **Brake Caliper Piston**

Inspect the brake caliper piston surface for any scratches or other damage. If any damage is found, replace the piston with a new one.



I649G1420016-02

#### **Brake Caliper Mounting Pin**

Inspect the brake caliper mounting pin for wear and other damage. If any damage is found, replace the mounting pin with a new one.



I717H1420009-01

#### Brake Pad Spring

Inspect the brake pad springs for damage and excessive bend. If any defects are found, replace them with new ones.



I717H1420010-01

#### Front Brake Disc Removal and Installation

B817H24206007

#### Removal

- 1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-4)".
- 2) Remove the front brake disc.



I717H1420011-01

#### Installation

Install the front brake disc in the reverse order of removal. Pay attention to the following points:

- Make sure that the brake discs are clean and free of any grease.
- Apply thread lock to the brake disc bolts and tighten them to the specified torque.

चाउँ : Thread lock cement 99000–32130 (Thread Lock Cement Super 1360 or equivalent)

**Tightening torque** 

Brake disc bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



717H1420012-01

### **Front Brake Disc Inspection**

B817H24206008

#### **Brake Disc Thickness**

Check the brake disc for damage or cracks and measure the thickness using the micrometer.

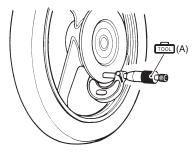
Replace the brake disc if the thickness is less than the service limit or if defect is found.

#### Special tool

(A): 09900-20205 (Micrometer (0 - 25 mm))

#### **Brake disc thickness**

Service limit (Front): 4.5 mm (0.18 in)



I649G1420019-03

#### **Brake Disc Runout**

- Remove the front brake caliper. Refer to "Front Brake Caliper Removal and Installation (Page 4B-2)".
- Measure the runout using the dial gauge.
   Replace the disc if the runout exceeds the service limit.

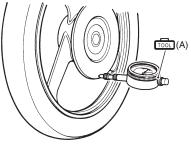
#### Special tool

(A): 09900-20607 (Dial gauge (1/100 mm, 10 mm))

(Magnetic stand)

#### **Brake disc runout**

Service limit: 0.30 mm (0.012 in)



1649G1420020-0

3) Install the front brake caliper. Refer to "Front Brake Caliper Removal and Installation (Page 4B-2)".

## **Specifications**

#### **Service Data**

**Brake** 

Unit: mm (in)

 Standard
 Limit

 Front
 4.8 - 5.2 (0.189 - 0.205)
 4.5 (0.18)

Brake disc thickness	Front		4.8 – 5.2 (0.189 – 0.205)	4.5 (0.18)
Brake disc runout			_	0.30 (0.012)
Brake caliper cylinder bore	Front	Leading	27.050 - 27.126 (1.0650 - 1.0680)	_
Brake Caliper Cyllrider Dore	FIOIL	Trailing	30.280 – 30.356 (1.1921 – 1.1951)	_
Brake caliper piston diameter	Front	Leading	26.920 - 26.970 (1.0598 - 1.0618)	_
Brake caliper pistori diarrieter	FIOR	Trailing	30.150 - 30.200 (1.1870 - 1.1890)	_

#### Oil

Item	Specification	Note
Brake fluid type	DOT 4	

#### **Tightening Torque Specifications**

Item

B817H24207002

B817H24207001

Eastoning part	Т	ightening torq	Note	
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Front brake pad mounting pin	16	1.6	11.5	☞(Page 4B-2)
Front brake caliper mounting bolt	25	2.5	18.0	☞(Page 4B-3)
Front brake caliper housing bolt	22	2.2	16.0	☞(Page 4B-3)
Front brake hose union bolt	23	2.3	16.5	☞(Page 4B-3)
Brake disc bolt	23	2.3	16.5	☞(Page 4B-6)

#### NOTE

The specified tightening torque is also described in the following.

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

#### **Recommended Service Material**

B817H24208001

Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	_	☞(Page 4B-4) / ☞(Page 4B-
			4)
Thread lock cement	Thread Lock Cement Super 1360 or	P/No.: 99000-32130	☞(Page 4B-6)
	equivalent		

#### **NOTE**

Required service material is also described in the following.

"Front Brake Components (Page 4B-1)"

<sup>&</sup>quot;Front Brake Components (Page 4B-1)"

### **Special Tool**

B817H24208002

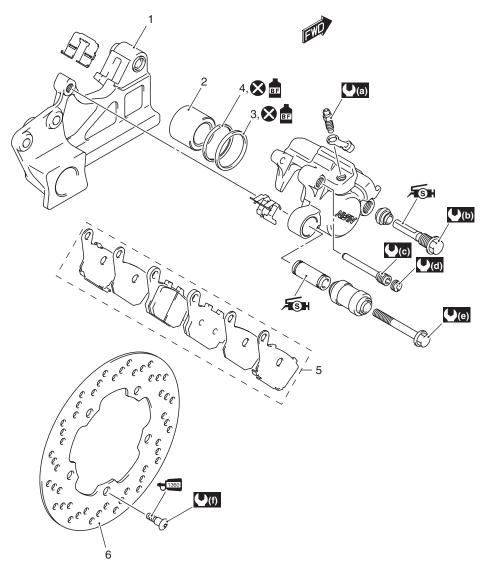
09900-20205 09900-20607 Dial gauge (1/100 mm, 10 Micrometer (0 – 25 mm) mm) ☞(Page 4B-6) ☞(Page 4B-6) 09900-20701 09930-11920 Magnetic stand Torx bit (JT40H) ☞(Page 4B-6) 3) / @(Page 4B-5) 09930-11940 Bit holder 3) / @(Page 4B-5)

## **Rear Brakes**

## **Repair Instructions**

### **Rear Brake Components**

B817H24306001



I649G1430001-05

Rear caliper bracket	<b>(a)</b> : 6 N⋅m (0.6 kgf-m, 4.5 lb-ft)	Apply silicone grease to sliding surface.
2. Piston	(b): 27 N·m (2.7 kgf-m, 19.5 lb-ft)	₹1360 : Apply thread lock to thread part.
3. Piston seal	(1.7 kgf-m, 12.5 lb-ft)	EF: Apply brake fluid.
4. Dust seal	(d): 2.5 N·m (0.25 kgf-m, 1.8 lb-ft)	🔇 : Do not reuse.
<ol><li>Rear brake pad/Shim set</li></ol>	(e): 22 N⋅m (2.2 kgf-m, 16.0 lb-ft)	
6. Rear brake disc	(2.3 kgf-m, 16.5 lb-ft)	

#### **Rear Brake Pad Inspection**

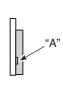
B817H24306002

The extent of brake pads wear can be checked by observing the grooved limit line "A" on the pads. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to "Rear Brake Pad Replacement (Page 4C-2)".

#### **⚠ CAUTION**

Replace the brake pad as a set, otherwise braking performance will be adversely affected.





I717H1430001-01

#### **Rear Brake Pad Replacement**

B817H24306003

1) Remove the plug (1).

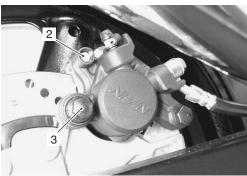


I717H1430002-01

- 2) Remove the pad mounting pin (2).
- 3) Remove the caliper mounting bolt (3).

#### **⚠ CAUTION**

Do not operate the brake pedal while dismounting the pads.

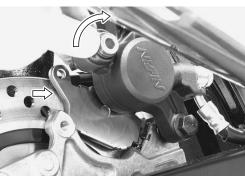


1717H1430003-0

4) Remove the brake pads with the rear caliper pivoted up.

#### **NOTE**

When removing the pads, push the piston all the way into brake caliper.

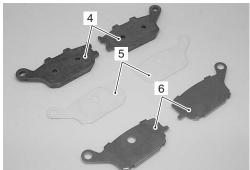


1717H1430004-0

- 5) Clean up the caliper especially around the caliper piston.
- 6) Assemble the new brake pad (4), insulator (5) and shim (6).

#### **⚠ CAUTION**

Replace the brake pads as a set, otherwise braking performance will be adversely affected.

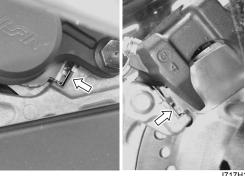


I718H1430019-02

7) Install the new brake pads.

#### NOTE

Make sure that the detent of the pad is seated onto the retainer on the caliper bracket.



I717H1430005-01

8) Tighten the caliper mounting bolt (7) and pad mounting pin (8) to the specified torque.

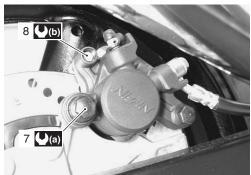
#### **Tightening torque**

Rear brake caliper mounting bolt (a): 22 N·m (

2.2 kgf-m, 16.0 lbf-ft)

Rear brake pad mounting pin (b): 17 N·m (1.7

kgf-m, 12.5 lbf-ft)



I717H1430006-01

9) Install the plug (9) to the specified torque.

#### **Tightening torque**

Pad pin plug (c): 2.5 N·m (0.25 kgf-m, 1.8 lbf-ft)

#### **NOTE**

After replacing the brake pads, pump the brake pedal few times to check for proper brake operation and then check the brake fluid level.



717H1430007-01

## Rear Brake Caliper Removal and Installation

#### Removal

- 1) Drain brake fluid. Refer to "Brake Fluid Replacement in Section 4A (Page 4A-7)".
- 2) Remove the brake hose from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.

#### **NOTE**

- Place a rag underneath the union bolt on the brake caliper to catch any spilt brake
- Slightly loosen the sliding pin (2) to facilitate later disassembly, if necessary.



- 3) Remove the brake pads. Refer to "Rear Brake Pad Replacement (Page 4C-2)".
- 4) Pivot the caliper up and remove the caliper from the caliper bracket.



I717H1430009-01

#### Installation

Install the brake caliper in the reverse order of removal. Pay attention to the following points:

• Tighten the sliding pin (1) to the specified torque.

## Tightening torque Rear brake caliper sliding pin (a): 27 N⋅m (2.7 kgf-m, 19.5 lbf-ft)

 After setting the brake hose union to the stopper, tighten the union bolt (2) to the specified torque.

#### **⚠ CAUTION**

The seal washers should be replaced with the new ones to prevent fluid leakage.

## Tightening torque

Brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I717H1430010-03

- Bleed air from the brake system after installing the caliper. Refer to "Brake System Inspection in Section 0B (Page 0B-18)".
- Check the brake fluid leakage and brake operation.

#### **▲ WARNING**

Brake fluid, if it leaks, will interfere with safe running and discolor painted surfaces. Check the brake hose and hose joints for cracks and fluid leakage.

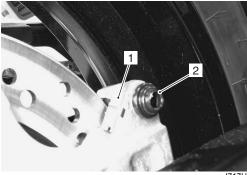
### Rear Brake Caliper Disassembly and Assembly

3817H243

Refer to "Rear Brake Caliper Removal and Installation (Page 4C-3)".

#### Disassembly

1) Remove the pad spring (1) and rubber boot (2).



I717H1430011-01

2) Remove the pad spring (3).



I649G1430014-02

- 3) Remove the spacer (4) and rubber boot (5) from the caliper.
- 4) Remove the slide pin (6).



I649G1430015-03

5) Place a rag over the piston to prevent it from popping out and then force out the piston using compressed air.

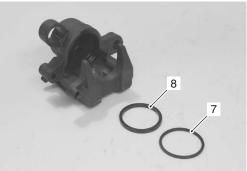
#### **A** CAUTION

Do not use high pressure air to prevent piston damage.



I649G1430016-02

6) Remove the dust seal (7) and piston seal (8).



I649G1430017-02

#### **Assembly**

Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

 Wash the caliper bore and piston with specified brake fluid. Particularly wash the dust seal groove and piston seal groove.

#### BF: Brake fluid (DOT 4)

#### **⚠ CAUTION**

- Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.



I649G1430018-02

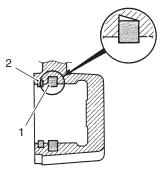
 Apply the brake fluid to piston seal (1) and dust seal (2).

#### **A** CAUTION

Replace the piston seal (1) and dust seal (2) with new ones.

#### BF: Brake fluid (DOT 4)

Install the piston seals as shown.



I649G1420013-02

Apply grease to the inside of the boot.

#### র্জ্জ: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)

 Temporarily tighten the sliding pin (3) and apply grease to the sliding pin.

## র্জা: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I717H1430012-01

#### **Rear Brake Caliper Parts Inspection**

B817H24306006

Refer to "Rear Brake Caliper Disassembly and Assembly (Page 4C-4)".

#### **Brake Caliper Cylinder**

Inspect the brake caliper cylinder wall for nicks, scratches or other damage. If any damage is found, replace the caliper with a new one.



I649G1430020-02

#### **Brake Caliper Piston**

Inspect the brake caliper piston surface for any scratches or other damage. If any damage is found, replace the piston with a new one.



I649G1430021-02

#### **Brake Caliper Sliding Pin**

Inspect the brake caliper sliding pin for wear and other damage. If any damage is found, replace the sliding pin with a new one.



I649G1430022-02

#### **Boot and Spacer**

Inspect the boots and spacer for damage and wear. If any defects are found, replace them with new ones.



I649G1430023-02

#### **Brake Pad Spring**

Inspect the brake pad springs for damage and excessive bend. If any defects are found, replace them with new ones.



I649G1430024-02

#### **Rear Brake Disc Removal and Installation**

B817H24306007

#### Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-11)".
- 2) Remove the rear brake disc.



1717H1430013-01

#### Installation

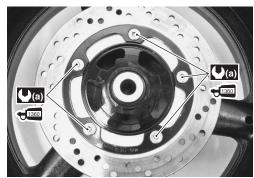
Install the rear brake disc in the reverse order of removal. Pay attention to the following points:

- Make sure that the brake discs are clean and free of any grease.
- Apply thread lock to the brake disc bolts and tighten them to the specified torque.

+issi : Thread lock cement 99000−32130 (Thread Lock Cement Super 1360 or equivalent)

**Tightening torque** 

Brake disc bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



1717H1430014-01

#### **Rear Brake Disc Inspection**

B817H24306008

#### **Brake Disc Thickness**

Check the brake disc for damage or cracks and measure the thickness using the micrometer.

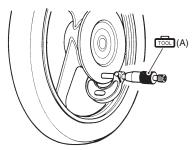
Replace the brake disc if the thickness is less than the service limit or if defect is found.

Special tool

(A): 09900-20205 (Micrometer (0 - 25 mm))

Brake disc thickness

Service limit (Rear): 4.5 mm (0.18 in)



I649G1430027-03

#### **Brake Disc Runout**

- 1) Remove the rear brake caliper. Refer to "Rear Brake Caliper Removal and Installation (Page 4C-3)".
- Measure the runout using the dial gauge.
   Replace the disc if the runout exceeds the service limit.

Special tool

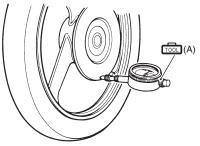
(A): 09900-20607 (Dial gauge (1/100 mm, 10

mm))

(B): 09900–20701 (Magnetic stand)

**Brake disc runout** 

Service limit: 0.30 mm (0.012 in)



I649G1430028-03

3) Install the rear brake caliper. Refer to "Rear Brake Caliper Removal and Installation (Page 4C-3)".

## **Specifications**

#### **Service Data**

B817H24307001

Brake

Unit: mm (in)

Item		Standard	Limit
Brake disc thickness	Rear	4.8 – 5.2 (0.189 – 0.205)	4.5 (0.18)
Brake disc runout		<del>-</del>	0.30 (0.012)
Brake caliper cylinder bore	Rear	38.180 – 38.230 (1.5031 – 1.5051)	_
Brake caliper piston diameter	Rear	38.080 – 38.130 (1.4992 – 1.5012)	_

#### Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Rear Brakes: 4C-8

### **Tightening Torque Specifications**

B817H24307002

Fastening part	T	ightening torq	Note	
Fastering part	N⋅m	kgf-m	lbf-ft	Note
Rear brake caliper mounting bolt	22	2.2	16.0	☞(Page 4C-3)
Rear brake pad mounting pin	17	1.7	12.5	☞(Page 4C-3)
Pad pin plug	2.5	0.25	1.8	☞(Page 4C-3)
Rear brake caliper sliding pin	27	2.7	19.5	☞(Page 4C-4)
Brake hose union bolt	23	2.3	16.5	☞(Page 4C-4)
Brake disc bolt	23	2.3	16.5	☞(Page 4C-7)

#### NOTE

The specified tightening torque is also described in the following.

"Rear Brake Components (Page 4C-1)"

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

#### **Recommended Service Material**

B817H24308001

Material	SUZUKI recommended produc	Note	
Brake fluid	DOT 4	_	
			5)
Grease	SUZUKI Silicone Grease or	P/No.: 99000-25100	
	equivalent		5)
Thread lock cement	Thread Lock Cement Super 1360 or	P/No.: 99000-32130	☞(Page 4C-7)
	equivalent		

#### **NOTE**

Required service material is also described in the following.

#### **Special Tool**

B817H24308002

			B817H243U8UU2
09900–20205		09900–20607	
Micrometer (0 – 25 mm)		Dial gauge (1/100 mm, 10 mm)	
☞(Page 4C-7)		☞(Page 4C-7)	
09900-20701			
Magnetic stand	<b>A</b>		
☞(Page 4C-7)			

<sup>&</sup>quot;Rear Brake Components (Page 4C-1)"

## **ABS**

#### **Precautions**

#### **Precautions for ABS**

B817H24500001

Refer to "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".

#### ABS Information

B817H24500002

#### **A WARNING**

- Be sure to bleed air from the brake fluid circuit when the brake is felt spongy or when a brake relating part is replaced.
- Never ride the motorcycle before bleeding the air.

- · Be sure to route the brake hoses correctly.
- The ABS does not shorten the motorcycle's braking distance. When riding down slopes or on wet or bumpy roads the braking distance is lengthened as compared to a motorcycle without ABS. In addition, braking distance increases more, when the road is slippery.
- The ABS does not control slides which may occur when braking while turning. As with a motorcycle that does not have ABS, it is best not apply the brakes while turning.
- The brake levers may move by themselves when they are applied. This is not a malfunction.

B817H24501001

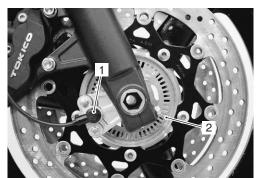
· Only use the specified tires.

## **General Description**

#### **Wheel Speed Sensor Description**

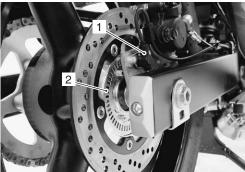
Wheel speed sensor consists of wheel speed sensor (1) and sensor rotor (2).

**Front** 



I717H2450001-01

#### Rear

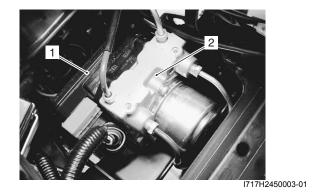


I717H2450002-01

### **ABS Control Unit Description**

B817H24501002

ABS control unit (1) calculates signals input from each one of front and rear wheel speed sensors, monitors the slipping conditions of the wheels and, at the same time, sends control signal to Hydraulic Unit (HU) (2). This ABS control unit/HU can not be disassembled.

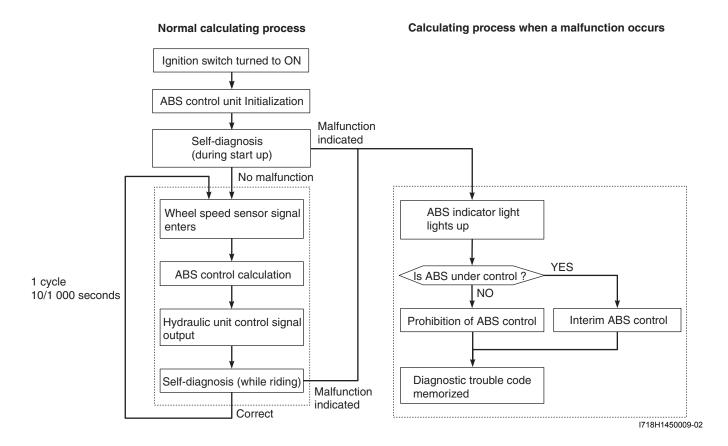


ABS contorl unit/HU ABS contorl unit Input interface Output interface Front wheel Wheel Indicator light circuit ABS indicator speed sensor speed light sensor Rear wheel circuit Front IN/V speed sensor Solenoid ► Front OUT/V Main valve Brake light switch o SW input -**□** Rear IN/V CPU circuit Mode selection switch o circuit Rear OUT/V Motor Communication SDS o MMotor circuit Reciprocal checking Power Ignition @ Watch IC unit Battery 0 OUT/V: Outlet solenoid valve

IN/V: Inlet solenoid valve
1718H1450008-01

#### **ABS Control Unit Calculating Process**

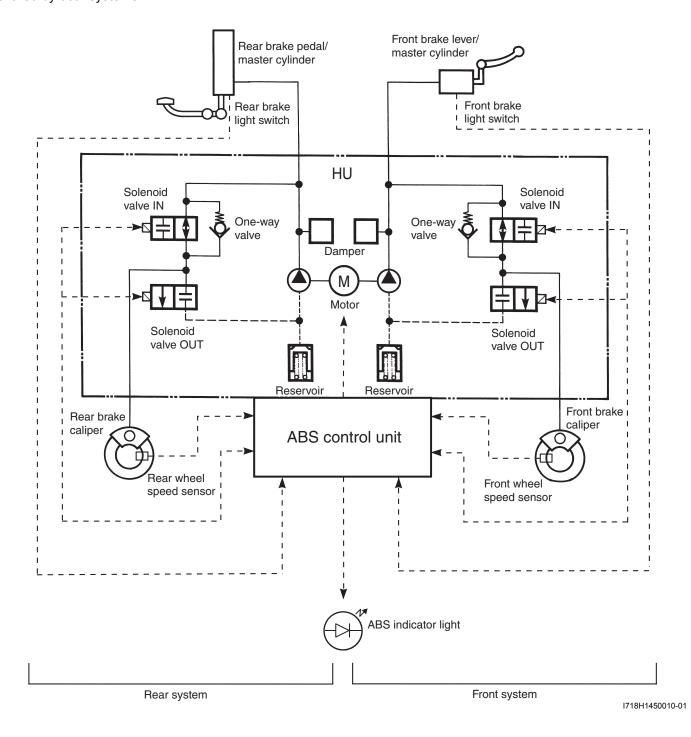
The ABS controls and its calculations, in addition to the self-diagnosing and the fail-safe processes, occur during the ABS control unit calculating process. ABS control is performed in one cycle every 10/1 000 seconds. In addition, if a malfunction is detected by the self-diagnosis function, the brake stops being controlled by the ABS and a diagnostic trouble code is stored.



#### **Hydraulic Unit (HU) Description**

B817H24501003

The hydraulic unit operates the solenoid valves based upon the signal which is output from the ABS control unit. The brake fluid pressure is then adjusted accordingly. The hydraulic unit controls the front and rear brake systems individually by operating separate components for the front and the rear, except for the pump drive motor, which is shared by both systems.



#### Self-diagnosis Function and ABS Indicator Light Description

B817H24501004

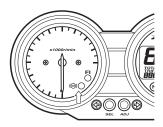
The ABS control unit performs the self-diagnosis and can store any electronically detected malfunctions as diagnostic trouble codes. If a malfunction has occurred, the indicator light lights up to inform the rider of the malfunction. The special tool, when connected to the mode select coupler, enables the ABS indicator light to display the diagnostic trouble codes.

#### **ABS Indicator Light**

The ABS indicator light informs the rider of any ABS malfunctions. If a malfunction occurred, the ABS indicator light flashes, during the self-diagnosis, to indicate the diagnostic trouble code so that the correct part can be repaired.

When the ignition switch is turned to ON, the ABS indicator light lights up even if no malfunction has occurred, to indicate that the bulb is not burnt out. It will go off after the motorcycle is ridden at more than 10 km/h (6.2 mile/h).

 If an ABS malfunction has occurred, the ABS indicator light keeps lighting up.



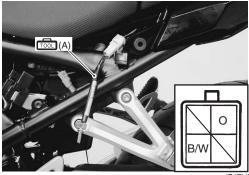
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#### **NOTE**

When a malfunction has occurred in the ABS, connect the special tool to the mode select coupler to display the diagnostic trouble code on the ABS indicator light. Refer to "DTC (Diagnostic Trouble Code) Output (Page 4E-23)".

#### Special tool

(A): 09930-82710 (Mode select switch)

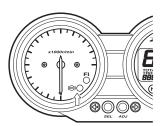


I717H2450004-01

#### **ABS Operation and ABS Indicator Light**

The ABS indicator light shows the ABS operating condition. During normal operation, the ABS indicator light lights up when the ignition switch is turned to ON and goes off after the motorcycle is ridden at more than 10 km/h (6.2 mile/h). If a malfunction has occurred, the ABS indicator light keeps lighting up.

The ABS indicator light goes off when the motorcycle is	The ABS is normally activated.
ridden at more than 10 km/h.	
The ABS indicator light keeps lighting up even though the	One or more malfunction has been found and ABS
motorcycle is ridden at more than 10 km/h (6.2 mile/h).	activation been hanged up.
The ABS indicator light does not light up when turning the	Check the wire harness and combination meter. Refer to
ignition switch ON.	"ABS Indicator Light Inspection (Page 4E-17)".



I718H1450122-04

#### **Stored DTCs (Diagnostic Trouble Codes)**

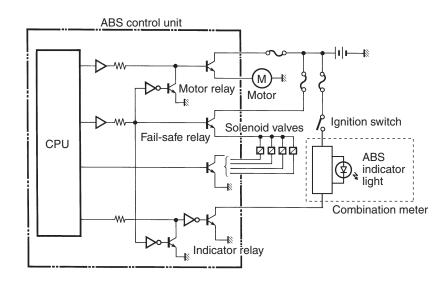
As for the diagnostic trouble code, the code of the first malfunction occurred during one ignition ON period will be stored. Pay attention to the fact that even though there may occur several malfunctions in one ON-period, only one code will be stored. Codes of malfunction that occurred in the past are all stored, but the same diagnostic trouble code will not be redundant.

Check and see if any diagnostic trouble code remains, by actually running the machine to activate ABS and by carrying out the self-diagnosis after deleting the diagnostic trouble code once the malfunctioned part is repaired.

### **Fail-safe Function Description**

B817H24501005

If malfunction occurs in the ABS electric system, this sets fail-safe relay OFF. Consequently, motor relay will be set OFF and the indicator light ON, and no current will be applied to motor solenoid valve inactivating ABS and turning ABS indicator light ON. In this case, it functions as the normal brake. However, if malfunctions occurs while ABS is being activated, when ABS control unit diagnoses that the operation can continue, it will effectuate ABS provisional control (turning the ABS indicator light ON). Upon the moment when ABS provisional control is over, the fail-safe relay will be set OFF.



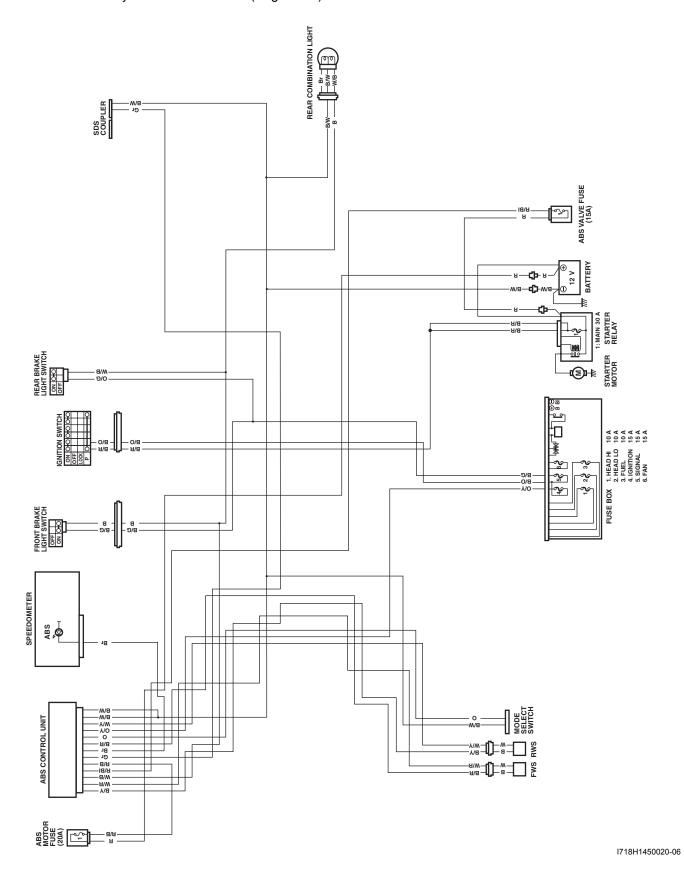
I717H2450035-01

## **Schematic and Routing Diagram**

## **ABS Wiring Diagram**

B817H24502001

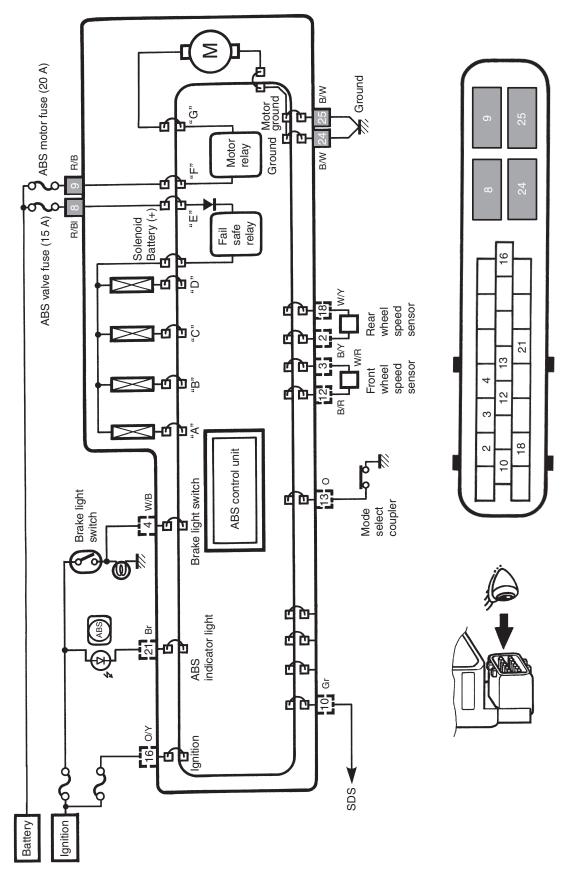
Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".



### **ABS Unit Diagram**

Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".

B817H24502002

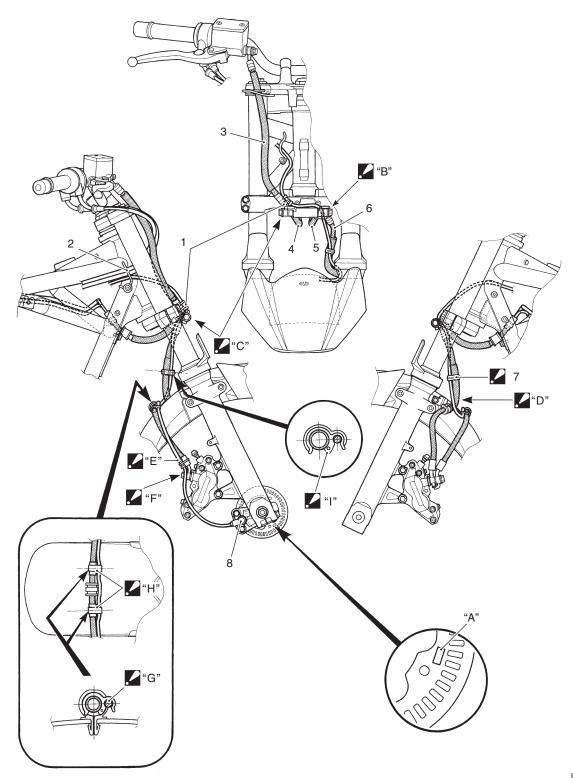


I718H1450021-04
-----------------

"A": Rear brake solenoid OUT	"C": Front brake solenoid OUT	"E": Fail safe (+) B	"G": Motor (+) B
"B": Rear brake solenoid IN	"D": Front brake solenoid IN	"F": Motor relay (+) B	

# Front Wheel Speed Sensor Routing Diagram GSF650A/UA

B817H24502003

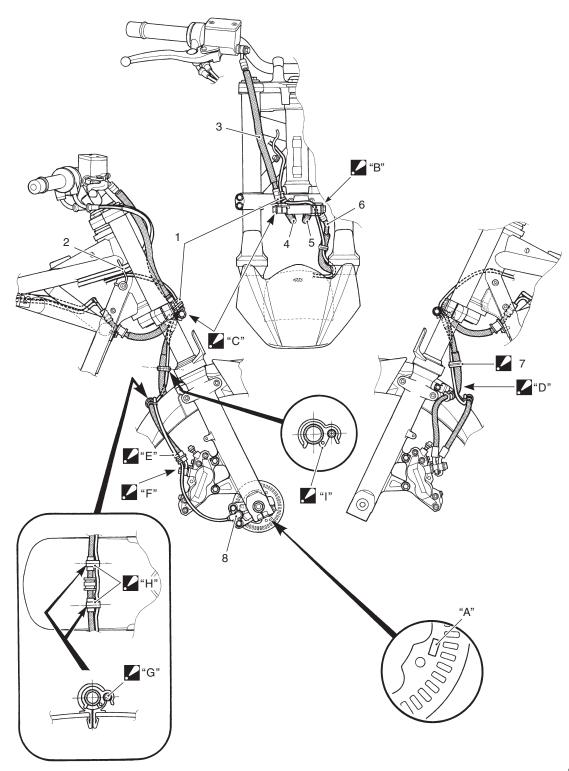


I717H2450006-01

1. Clamp	"B": Pass through the sensor lead wire between brake hose No.2 and brake hose No.2 (L).
2. Guide	"C": Pass through the sensor lead wire in front of the brake hose.
3. Front brake hose No.1	"D": Pass through the sensor lead wire outside of the brake hose.
Front brake hose No.1 (L)	"E": Clamp the sensor lead wire sleeve with the brake hose.
5. Front brake hose No.2	F": Pass through the sensor lead wire outside of the brake hose union bolt.
6. Front brake hose No.2 (L)	"G": Clamp the sensor lead wire at front side of the brake hose. Make clearance from the front fender.
<ul><li>7: Clamp</li><li>: Clamp the sensor lead wire at the white marking.</li></ul>	"H": Clamp the sensor lead wire on the protector of brake hose.

Front wheel speed sensor	"I": Clamp the sensor lead wire at front side of the brake hose.
"A": Outside mark	

### GSF650SA/ASU



I717H2450007-03

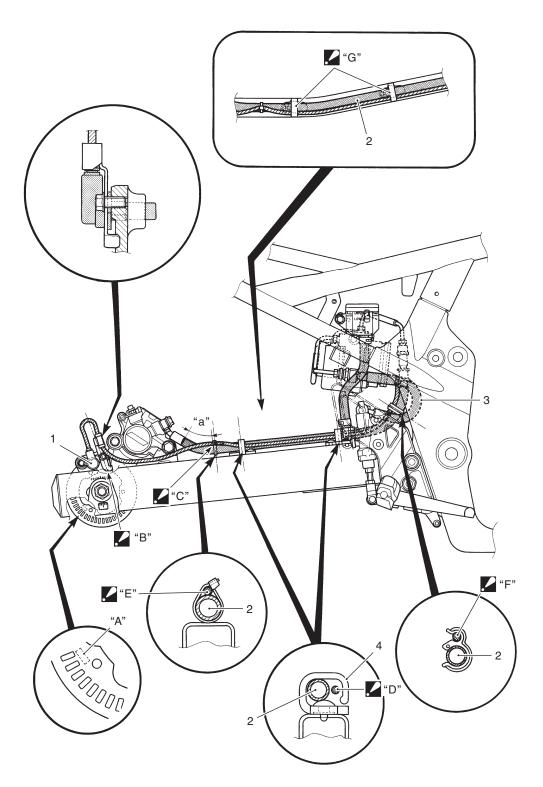
1. Clamp	"B": Pass through the sensor lead wire between brake hose No.2 and brake hose No.2 (L).
2. Guide	"C": Pass through the sensor lead wire in front of the brake hose.
<ol><li>Front brake hose No.1</li></ol>	"D": Pass through the sensor lead wire outside of the brake hose.
4. Front brake hose No.1 (L)	"E": Clamp the sensor lead wire sleeve with the brake hose.
<ol><li>Front brake hose No.2</li></ol>	"F": Pass through the sensor lead wire outside of the brake hose union bolt.
6. Front brake hose No.2 (L)	"G": Clamp the sensor lead wire at front side of the brake hose. Make clearance from the front fender.

### 4E-11 ABS:

	7:	Clamp : Clamp the sensor lead wire at the white marking.	<b>∠</b> "H":	Clamp the sensor lead wire on the protector of brake hose.
Ī	8.	Front wheel speed sensor	<b></b> "I":	Clamp the sensor lead wire at front side of the brake hose.

## **Rear Wheel Speed Sensor Routing Diagram**

B817H24502004



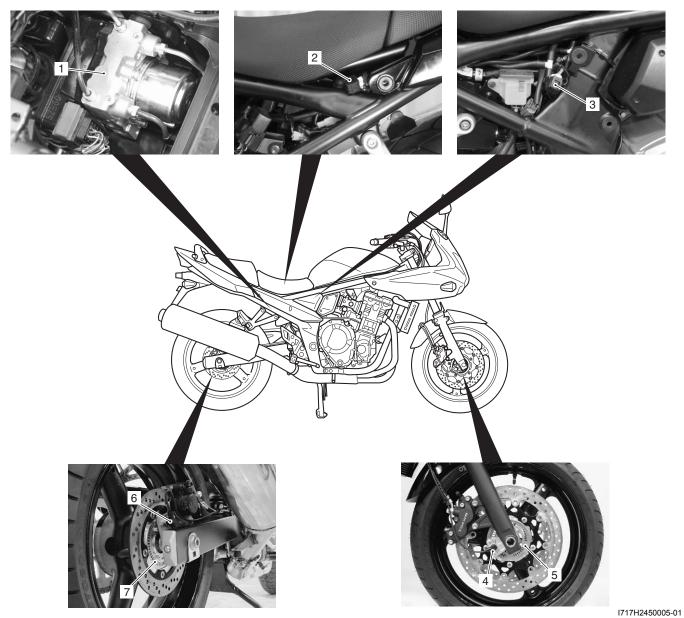
I717H2450008-01

Rear wheel speed sensor	C": Clamp sensor lead wire with white tape matched green paint of brake hose.
2. Brake hose No.2	"D": Pass through the sensor lead wire inside of the brake hose guide.
3. Brake hose No.1	E": Pass through the sensor lead wire on the brake hose.
Brake hose guide	F": Clamp the sensor lead wire upper side of brake hose.
"A": Outside mark	"G": Pass through the sensor lead wire inside of the brake hose.
"B": After the clamp has contacted to the stopper, tighten the bolt.	"a": 35 mm (1.4 in)

## **Component Location**

## **ABS Components Location**

B817H24503001



ABS control unit/HU	SDS coupler	Front wheel speed sensor rotor	Rear wheel speed sensor rotor
Mode select coupler	Front wheel speed sensor	Rear wheel speed sensor	

## **Diagnostic Information and Procedures**

#### **ABS Troubleshooting**

B817H2450400

Many of the ABS malfunction diagnosing operations are performed by checking the wiring continuity. Quick and accurate detection of malfunctions within the complex circuitry assures the proper operation of the ABS. Before beginning any repairs, thoroughly read and understand this Supplementary Service Manual.

The ABS is equipped with a self-diagnosis function. The detected malfunction is stored as a diagnostic trouble code which causes the ABS indicator light to light up or flash in set patterns to indicate the malfunction. Diagnostic trouble codes are stored even when the ignition switch is turned to OFF and they can only be erased manually. In order to repair the ABS correctly, ask the customer for the exact circumstances under which the malfunction occurred, then check the ABS indicator light and the output diagnostic trouble codes. Explain to the customer that depending on how the motorcycle is operated (e.g., if the front wheel is off the ground), the ABS indicator light may light up even though the ABS is operating correctly.

#### **Troubleshooting Procedure**

Troubleshooting should be proceed as follows. If the order is performed incorrectly or any part is omitted, an error in misdiagnosis may result.

- 1) Gather information from the customer.
- 2) Perform the pre-diagnosis inspection. Refer to "Pre-diagnosis Inspection (Page 4E-15)".
- 3) Inspect the ABS indicator light. Refer to "ABS Indicator Light Inspection (Page 4E-17)".
- 4) Output the DTCs stored in the ABS control unit. Refer to "DTC (Diagnostic Trouble Code) Output (Page 4E-23)".

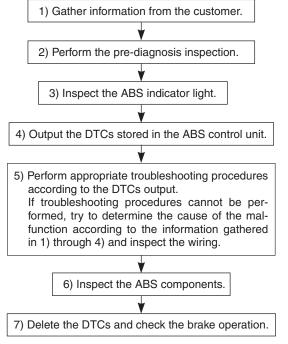
5) Perform appropriate troubleshooting procedures according to the DTCs output. Refer to "DTC Table (Page 4E-33)".

If troubleshooting procedures cannot be performed, try to determine the cause of the malfunction according to the information gathered in 1) through 4) and inspect the wiring. Refer to "ABS Wiring Diagram (Page 4E-7)" and "ABS Unit Diagram (Page 4E-8)".

#### **⚠ CAUTION**

- When disconnecting couplers and turning the ignition switch ON, disconnect the ABS control unit coupler in order to prevent a DTC from being stored.
- Each time a resistance is measured, the ignition switch should be set to OFF.
- 6) Inspect the ABS components. Refer to "Wheel Speed Sensor and Sensor Rotor Inspection (Page 4E-73)".
- Delete the DTCs and check the brake operation.
   Refer to "DTC (Diagnostic Trouble Code) Deleting (Page 4E-26)".

#### **Basic Troubleshooting Diagram**



I718H1450120-01

#### **Information Gathering**

To properly diagnose a malfunction, one must not make guesses or assumptions about the circumstances that caused it. Proper diagnosis and repair require duplicating the situation in which the malfunction occurred. If a diagnosis is made without duplicating the malfunction, even an experienced service technician may make a misdiagnosis and not perform the servicing procedure correctly, resulting in the malfunction not being repaired. For example, a malfunction that occurs only while braking on slippery surfaces will not occur if the motorcycle is ridden on a non-slippery surface. Therefore, in order to properly diagnose and repair the motorcycle, the customer must be questioned about the conditions at the time that the malfunction occurred making "Information gathering" very important. In order that the information obtained from the customer to be used as a reference during troubleshooting, it is necessary to ask certain important questions concerning the malfunction. Therefore, a questionnaire has been created to improve the information-gathering procedure.

#### **EXAMPLE: CUSTOMER PROBLEM INSPECTION FORM**

User name:	Model:	VIN:	Date of issue:
Date Reg.	Date of problem:	Mileage:	

PROBLEM SYMPTOMS		
ABS operation	Past malfunctions and repairs	
ABS does not work		
ABS works so often with		
Too long stopping distance		
Other		

CONDITION WHEN MALFUNCTION OCCURED				
ABS indicator light	Riding conditions			
Does not light up	While stopping			
Lights up	Over 10 km/h			
Goes off after running over 10 km/h: Yes / No	When turning			
Flashes	Others			
Tires	Brake operating conditions			
Abnormal air pressure	Usual braking			
Less thread depth	Quick/hard braking			
No specified tires installed				
	Interface			
Road surface	Too big pulsations at brake levers			
Paved road:	Too large brake lever strokes			
Dry / Wet / Others	Others			
Unpaved road:				
Gravel / Muddy / Uneven / Others	Others			
	Abnormal noise from the ABS control unit/HU			
	Skid noise from the calipers			
	Vibration at the brake levers			
NOTE:				

#### **NOTE**

This form is a standard sample. The form should be modified according to conditions and characteristic of each market.

#### **Pre-diagnosis Inspection**

B817H24504002

The mechanical and hydraulic components of the brake system should be inspected prior to performing any electrical checks. These inspections may find problems that the ABS could not detect; thus, shortening repair time

#### **Brake**

#### Brake fluid level check

Refer to "Brake System Inspection in Section 0B (Page 0B-18)".

#### Brake pad inspection

Refer to "Brake System Inspection in Section 0B (Page 0B-18)".

#### Brake fluid circuit air bleeding

Refer to "Air Bleeding from Brake Fluid Circuit in Section 4A (Page 4A-5)".

#### **Tire**

#### Tire type

#### Tire type

Front: BRIDGESTONE BT011F G (GSF650A/UA)
Front: BRIDGESTONE BT011F M (GSF650SA/ASU)

Rear: BRIDGESTONE BT020R G

#### Tire pressure

Refer to "Tire Inspection in Section 0B (Page 0B-20)".

#### **⚠ CAUTION**

- The standard tire fitted on this motorcycle is 120/70ZR17M/C (58W) for front and 160/ 60ZR17M/C (69W) for rear. The use of tires other than those specified may cause instability. It is highly recommended to use a SUZUKI Genuine Tire.
- Replace the tire as a set, otherwise the DTC "25" (C1625) may be stored.

#### Wheel

Refer to "Front Wheel Related Parts Inspection in Section 2D (Page 2D-6)" and "Rear Wheel Related Parts Inspection in Section 2D (Page 2D-12)".

#### **Battery**

### Battery voltage inspection

- 1) Turn the ignition switch OFF.
- 2) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

3) Measure the voltage between the (+) and (–) battery terminals using the multi-circuit tester.

If the voltage is less than 12.0 V, charge or replace the battery and inspect the charging system. Refer to "Battery Runs Down Quickly in Section 1J (Page 1J-2)".

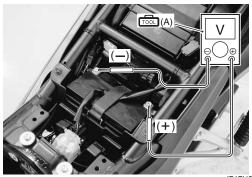
#### Special tool

(A): 09900-25008 (Multi-circuit tester set)

#### **Tester knob indication**

Voltage ( === )

## Battery voltage 12.0 V and more



I717H2450010-01

4) Reinstall the seat.

#### **ABS Component**

## Wheel speed sensor – sensor rotor clearance inspection

Inspect the clearance between the wheel speed sensor and sensor rotor for each wheel using the thickness gauge.

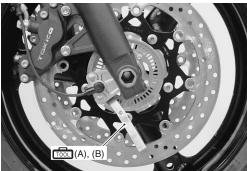
#### Special tool

(A): 09900-20803 (Thickness gauge) (B): 09900-20806 (Thickness gauge)

Wheel speed sensor - Sensor rotor clearance

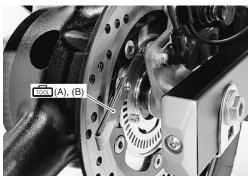
0.3 - 1.5 mm (0.012 - 0.059 in)

#### Front



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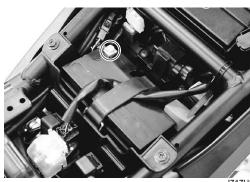
#### Rear



I717H2450011-01

#### ABS control unit/HU ground wire inspection

- 1) Turn the ignition switch OFF.
- 2) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the battery (-) lead wire.



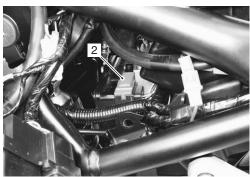
I717H2450012-01

- 4) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 5) Remove the fuse box mounting bolt (1).



I718H1450028-01

6) Disconnect the ABS control unit coupler (2).



I718H1450115-01

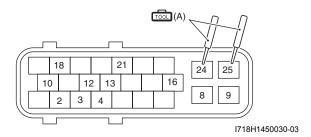
7) Check for continuity between "24" (B/W) at the coupler and the battery (–) terminal, also "25" (B/W) at the coupler and the battery (–) terminal.

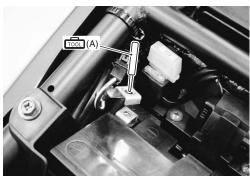
#### Special tool

(A): 09900-25008 (Multi-circuit tester set)

Tester knob indication Continuity ( •)))

#### ABS control unit coupler (Harness end)





I717H2450013-01

## **ABS Indicator Light Inspection**

**Wiring Diagram**Refer to "ABS Unit Diagram (Page 4E-8)".

### **Troubleshooting**

Step	Action	Yes	No
1	1) Check if the ABS indicator light lights up when turning the ignition switch ON.	Go to Step 2.	Go to Step 3.
	I718H1450122-04		
	Does the ABS indicator light up?		
2	(The ABS indicator light lights up)  1) Ride the motorcycle at more than 10 km/h (6.2 mile/h).	Normal (No DTC exists)	<ul> <li>DTC output (Refer to "DTC (Diagnostic Trouble Code) Output (Page 4E-23)".)</li> <li>If DTC can not be output (the ABS indicator light does not flash), go to Step 7.</li> </ul>
	I717H2450014-01		
	Does the ABS indicator light go off?		

B817H24504003

Step	Action	Yes	No
3	(The ABS indicator light does not light up)	Go to Step 4.	Replace the ignition
	<ol> <li>Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".</li> </ol>		fuse.
	2) Remove the fuse box (1) by removing the mounting bolt.		
	T718H1450034-01  3) Open the fuse box and inspect the ignition fuse (2).  ⚠ CAUTION		
	If a fuse is blown, find the cause of the problem and correct it before replacing the fuse.		
	Ignition fuse 15 A  2  15 A  15 A  10 A  15 A  10 A  15 A  10 A  15 A  10 A  FAN  FUEL  10 A  10 A  FAN  FUEL  10 A  10 A  FAN  FUEL  10 A  FOR  FUEL  10 A  FUEL  10 A		
	Is the ignition fuse OK?		

Step		Action	Yes	No
4	1)	Turn the ignition switch OFF.	Go to Step 5.	Inspect the wire
	2)	Disconnect the ABS control unit coupler. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)".		harness. (Faulty ignition or ground wire)
	3)	Turn the ignition switch ON with the ABS control unit coupler disconnected, measure the voltage between "16" (O/Y) and "24" (B/W) at the coupler.		
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( )		
		Normal value ("16" – "24") Battery voltage (12.0 V and more)		
		ABS control unit coupler (Harness end)		
		(-) 18 21 24 25 10 12 13 16 8 9 2 3 4		
	Is t	he voltage between "16" and "24" normal?		
5	1)	Turn the ignition switch ON with the ABS control unit coupler disconnected, measure the voltage between "21" (Br) and "24" (B/W) at the coupler.  Special tool  (A): 09900–25008 (Multi-circuit tester set)	Go to Step 6.	<ul> <li>Inspect the wire harness. (Faulty indicator light wire)</li> <li>Signal fuse or indicator light is</li> </ul>
		Tester knob indication Voltage ( )		blown.
		Normal value ("21" – "24") 7.0 V and more		
		ABS control unit coupler (Harness end)		
	le.	(+) (-) (-) (18		
	ıs t	he voltage between "21" and "24" normal?		

Step		Action	Yes	No
6	1)	Turn the ignition switch OFF.	Replace the ABS	Inspect the wire
	2)	Check for continuity between "24" (B/W) at the coupler and body ground, also "25" (B/W) at the coupler and body ground.	control unit/HU.	harness. (Faulty ground wire)
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity ( •))))		
		ABS control unit coupler (Harness end)		
		18 21 24 25 10 12 13 16 8 9 I718H1450038-02		
	Are	there continuity between "24", "25" and body ground?		
7	I -	ne ABS indicator light does not go off)	Go to Step 8.	Replace the ignition fuse.
		Turn the ignition switch OFF.		iuse.
	2)	Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		
	3)	Remove the fuse box mounting bolt. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)".		
	4)	Open the fuse box and inspect the ignition fuse (1).		
		<u> </u>		
		If a fuse is blown, find the cause of the problem and correct it before replacing the fuse.		
		Ignition fuse 15 A		
	ls t	11 15A 10A 15A PARE SPARE SPAR		

Step		Action	Yes	No
8	1)	Turn the ignition switch OFF.	Go to Step 9.	Inspect the wire
	2)	Disconnect the ABS control unit coupler. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)"		harness. (Faulty ignition or ground wire)
	3)	Turn the ignition switch ON with the ABS control unit coupler disconnected, measure the voltage between "16" (O/Y) and "24" (B/W) at the coupler.		
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( <del></del> )		
		Normal value ("16" – "24") Battery voltage (12.0 V and more)		
		ABS control unit coupler (Harness end)		
		(-) 18 21 24 25 10 12 13 16 8 9 (+) 1718H1450036-04		
	ls t	he voltage between "16" and "24" normal?		
9	1)	Turn the ignition switch ON with the ABS control unit coupler disconnected, measure the voltage between "21" (Br) and "24" (B/W) at the coupler.  Special tool	Go to Step 10.	Inspect the wire harness. (Faulty indicator light wire)
		(A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Voltage ( )		
		Normal value ("21" – "24") 7.0 V and more		
		ABS control unit coupler (Harness end)		
		(+) (-) (-) (18   12   13   16   8   9   1718H1450037-02		
	Is t	he voltage between "21" and "24" normal?		

Step		Action	Yes	No
10	1)	Turn the ignition switch OFF.	Replace the ABS	Inspect the wire
	2)	Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".	control unit/HU.	harness. (Faulty mode select switch wire)
	3)	Short the mode select coupler terminals (O $-B/W)$ using the special tool.		
		Special tool (A): 09930–82710 (Mode select switch)		
	4)	Check for continuity between "13" (O) and "24" (B/W) at the coupler.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Continuity ( •))))		
		ABS control unit coupler (Harness end)		
		(-) 18 21 24 25 10 12 13 16 8 9 1718H1450043-02		
	Is t	there continuity between "13" and "24"?		

### **DTC (Diagnostic Trouble Code) Output**

B817H24504004

#### **NOTE**

- Even through the ABS is operating correctly, a DTC is memorized in any of the following conditions.
  - If the motorcycle is put on its centerstand, the engine is started and only the rear wheel is rotated.
  - Previous malfunctions were repaired, but the DTCs were not deleted.
- After carrying out DTC deleting and ABS operation check, explain to the customer that the ABS is operating correctly. Refer to "DTC (Diagnostic Trouble Code) Deleting (Page 4E-26)".

#### **Use of Mode Select Switch**

Connect the special tool to the mode select coupler to output the memorized DTCs on the ABS indicator light.

- 1) Turn the ignition switch OFF.
- 2) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Connect the special tool to the mode select coupler (1) (O B/W).

## Special tool

(A): 09930-82710 (Mode select switch)



I718H1450044-02



I718H1450045-02

4) Switch the special tool to ON.



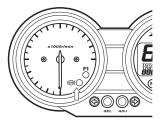
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5) Turn the ignition switch ON.

The ABS indicator light starts flashing to indicate the DTC. Refer to "DTC Table (Page 4E-33)".

#### NOTE

- If there is a DTC, the ABS indicator light keeps flashing cyclically and repeatedly.
- If there is no DTC, the ABS indicator light keeps lighting on.
- If the DTCs are to be output for a long time, remove the HEAD-LO fuse in order to prevent the battery from discharging.



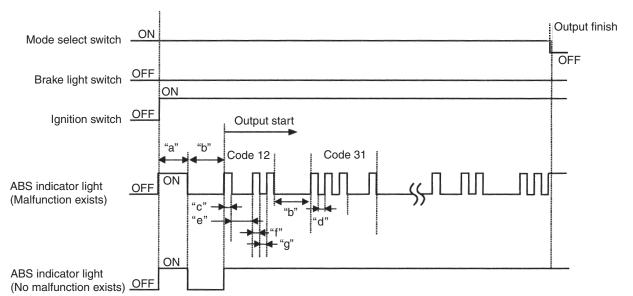
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6) Turn the ignition switch OFF and disconnect the special tool.

### **Understanding the DTC (Diagnostic Trouble Code)**

A two-digit DTC is shown through the flashing pattern of the ABS indicator light. A number between 1 and 9 is represented by the number of times that the ABS indicator light lights up in interval of 0.4 seconds and the separation between the tens and ones are indicated by the light staying off for 1.6 seconds. In addition, the separation between the start code and the DTC is indicated by the light being off for 3.6 seconds. After the start code is displayed, DTCs appear from the smallest number code.

If no DTCs are memorized, the ABS indicator light keeps lighting up.



1718H1450	120 0

"a": Initial minimum light ON time (About 2 seconds)	"e": Main-sub code interval (1.6 seconds)
"b": Error code interval (About 3.6 seconds)	"f": Sub code light ON time (0.4 seconds)
"c": Main code light ON time (0.4 seconds)	"g": Sub code light OFF time (0.4 seconds)
"d": Main code light OFF time (0.4 seconds)	

#### **Use of SDS**

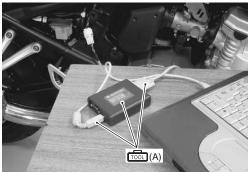
#### **NOTE**

- Don't disconnect couplers from ABS HU, the battery cable from the battery, ABS HU ground wire harness from the engine or main fuse before confirming the malfunction code (self-diagnostic trouble code) stored in memory. Such disconnection will erase the memorized information in ABS HU memory.
- DTC stored in ABS HU memory can be checked by the SDS.
- 1) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

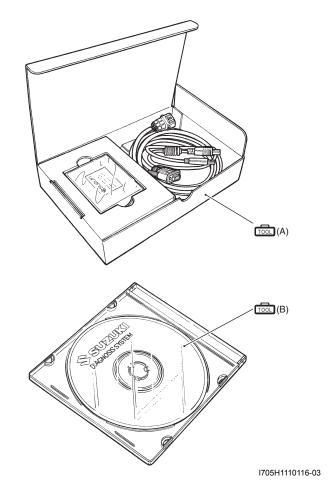
Special tool

(A): 09904-41010 (SDS set)

(B): 99565-01010-010 (CD-ROM Ver.10)



I718H1450047-01



3) Read the DTC (Diagnostic Trouble Code) and show data when trouble (displaying data at the time of DTC) according to instructions displayed on SDS.

#### NOTE

- Not only is SDS used for detecting Diagnostic Trouble Codes but also for reproducing and checking on screen the failure condition as described by customers using the trigger.
- How to use trigger. (Refer to the SDS operation manual for further details.)
- 4) Close the SDS tool and turn the ignition switch OFF.

# DTC (Diagnostic Trouble Code) Deleting B817H24504005

### **Use of Mode Select Switch**

1) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".



I718H1450049-02

2) Connect the special tool to the mode select coupler (O – B/W) and output the DTCs.

### Special tool

(A): 09930-82710 (Mode select switch)



I718H1450045-02

3) While the DTCs are being output, set the special tool to OFF.

### **⚠ CAUTION**

The DTC deletion mode starts 12.5 seconds after the switch is set to OFF.



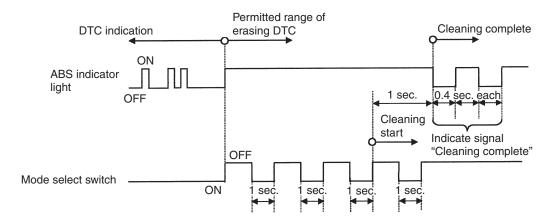
I718H1450050-01

4) In the DTC deletion mode, switch the ABS test switch from OFF to ON three times, each time leaving it at ON for more than 1 second.



I718H1450051-01

### **DTC Deleting Diagram**



I718H1450052-01

5) After deleting the DTCs, repeat the code output procedure and make sure that no DTCs remain (the ABS indicator light no longer flashes).

#### **NOTE**

If any DTCs remain, perform the appropriate procedures, then delete the codes. If DTCs are left stored, confusion may occur and unnecessary repairs may be made.

- 6) Disconnect the mode select switch and install the left frame cover.
- 7) Afterwards, ride the motorcycle at more than 30 km/ h (18.6 mile/h) and quickly apply the brakes to check that the ABS activates correctly.



I717H2450014-01

### Use of SDS

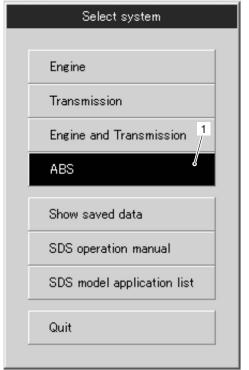
- 1) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) After repairing the trouble, turn OFF the ignition switch and turn ON again.
- 3) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

#### Special tool

100 : 09904-41010 (SDS set)

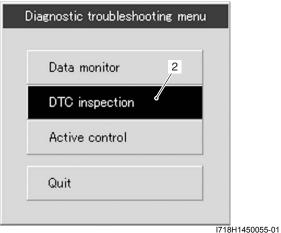
(CD-ROM Ver.10)

4) Click the ABS button (1).



I718H1450054-01

5) Click the "DTC inspection" button (2).



6) Check the DTC.

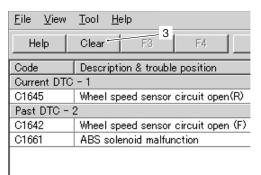
#### NOTE

The previous malfunction history code (Past DTC) still remains stored in the ABS HU. Therefore, erase the history code memorized in the ABS HU using SDS tool.

7) Click "Clear" (3) to delete history code (Past DTC).

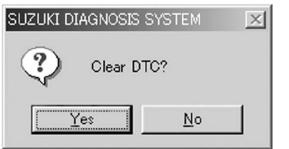
#### NOTE

The DTC is memorized in the ABS HU also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.

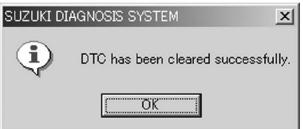


I718H1450056-01

8) Follow the displayed instructions.

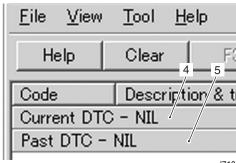


I705H1110006-01



I705H1110009-01

9) Check that both "Current DTC" (4) and "Past DTC"
 (5) are deleted (NIL).



I718H1450057-01

- 10) Close the SDS tool and turn the ignition switch OFF.
- 11) Disconnect the SDS tool and install the left frame cover.
- 12) Ride the motorcycle at more than 30 km/h (18.6 mile/h) and quickly apply the brakes to check that the ABS activates correctly.



I717H2450014-01

SDS Check

B817H24504006

Using SDS, take the sample of data from the new motorcycle and at the time of periodic maintenance at your dealer. Save the data in the computer or by printing and filing the hard copies. The saved or filed data are useful for troubleshooting as they can be compared periodically with changes over time or failure conditions of the motorcycle. For example, when a motorcycle is brought in for service but the troubleshooting is difficult, comparison with the normal data that have been saved or filed can allow the specific ABS failure to be determined.

- 1) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Set up the SDS tool. (Refer to "SDS operation manual for further details.)

#### **NOTE**

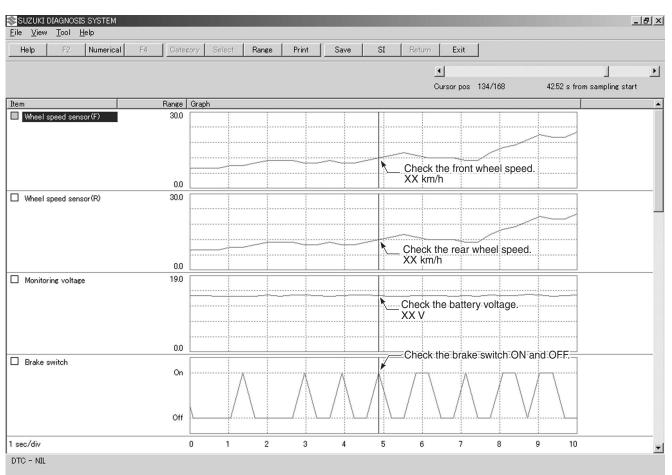
- Before taking the sample of data, check and clear the Past DTC. Refer to "DTC (Diagnostic Trouble Code) Deleting (Page 4E-26)".
- · A number of different data under a fixed condition as shown should be saved or filed as sample.

#### Special tool

(SDS set) : 09904-41010

: 99565-01010-010 (CD-ROM Ver.10)

### **DATA sampled from ABS HU system**

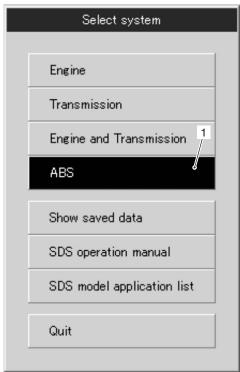


I718H1450048-03

# **Active Control Inspection**

B817H24504007

- 1) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- 3) Click "ABS" (1).



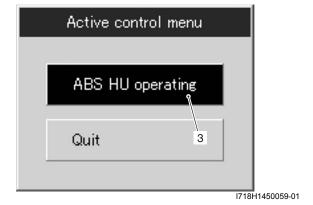
I718H1450054-01

4) Click "Active control" (2).

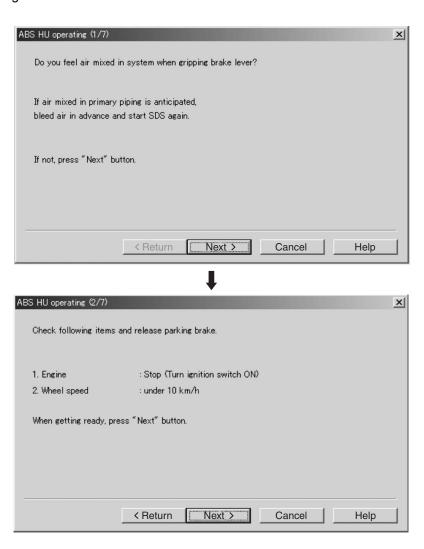


I718H1450058-01

5) Click "ABS HU operating" (3).



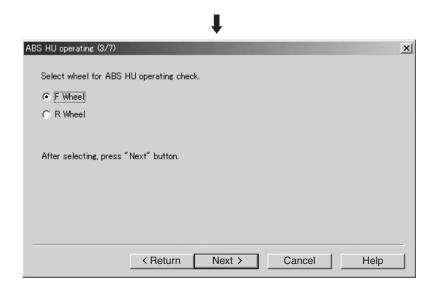
6) Click "Next" according to the screen indication.



I718H1450060-02

### **NOTE**

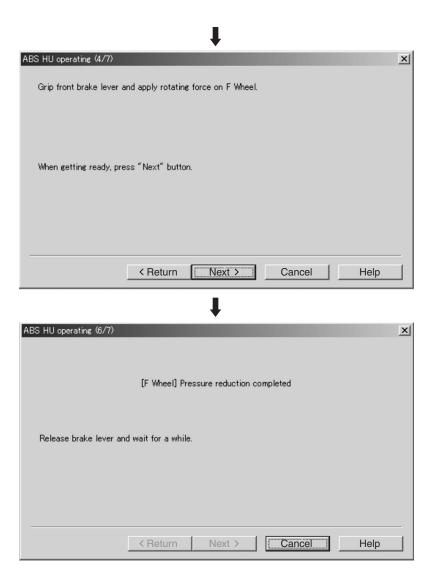
Skip this screen as this vehicle is not equipped with parking brake.



I718H1450121-01

#### **NOTE**

- If the front wheel is selected, place the motorcycle on the center stand and lift the front wheel off the ground using a jack.
- Two operators are needed in this work; One should apply a rotational force to the front wheel.

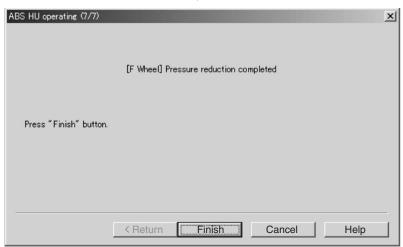


I718H1450061-01

### **NOTE**

- In normal cases, the front brake lever feels a reaction force and the front wheel turns discontinuously. At the same time, the ABS HU operating sound will be heard.
- The ABS HU motor operates for 6 seconds and then stops automatically.





I718H1450062-01

### **NOTE**

- Inspect the rear brake in the same manner of front brake.
- · If the ABS does not function, the cause may lie in the ABS control unit/HU.
- In checking the rear brake at the time of pressure reduction drive (4/7), "brake lever" appears on the screen. This is because the present screen shares with other model having front brake only. Therefore, in the case of rear brake pedal equipped vehicle, ignore this instruction and operate the rear brake pedal.
- 7) Close the SDS tool and turn the ignition switch OFF.
- 8) Disconnect the SDS tool and install the right frame cover.

### **DTC Table**

B817H24504008

DTC	Malfunction cause	Indicator status	Reference
None	Normal	ON *1	_
13 (C1613)	Wheel speed sensor rotor malfunction (F)	ON	Refer to "DTC "13" (C1613): Wheel Speed Sensor Rotor Malfunction (F) (Page 4E-35)".
14 (C1614)	Wheel speed sensor rotor malfunction (R)	ON	Refer to "DTC "14" (C1614): Wheel Speed Sensor Rotor Malfunction (R) (Page 4E-37)".
22 (C1622)	ABS actuator circuit malfunction (F)	ON	Refer to "DTC "22" (C1622): ABS Actuator Circuit Malfunction (F) (Page 4E-39)".
23 (C1623)	ABS actuator circuit malfunction (R)	ON	Refer to "DTC "23" (C1623): ABS Actuator Circuit Malfunction (R) (Page 4E-40)".
25 (C1625)	Wheel speed sensor related malfunction	ON	Refer to "DTC "25" (C1625): Wheel Speed Sensor Related Malfunction (Page 4E-42)".
35 (C1635)	ABS motor malfunction	ON	Refer to "DTC "35" (C1635): ABS Motor Malfunction (Page 4E-44)".
41 (C1641)	Wheel speed sensor signal malfunction (F) *2	ON	Refer to "DTC "41" (C1641): Wheel Speed Sensor Signal Malfunction (F) (Page 4E-46)".
42 (C1642)	Wheel speed sensor circuit open (F) *2	ON	Refer to "DTC "42" (C1642): Wheel Speed Sensor Circuit Open (F) (Page 4E-47)".

DTC	Malfunction cause	Indicator status	Reference
			Refer to "DTC "43" (C1643): Wheel
43 (C1643)	Wheel speed sensor circuit short (F) *2	ON	Speed Sensor Circuit Short (F)
			(Page 4E-52)".
			Refer to "DTC "44" (C1644): Wheel
44 (C1644)	Wheel speed sensor signal malfunction (R) *2	ON	Speed Sensor Signal Malfunction
			(R) (Page 4E-54)".
			Refer to "DTC "45" (C1645): Wheel
45 (C1645)	Wheel speed sensor circuit open (R) *2	ON	Speed Sensor Circuit Open (R)
			(Page 4E-56)".
			Refer to "DTC "46" (C1646): Wheel
46 (C1646)	Wheel speed sensor circuit short (R) *2	ON	Speed Sensor Circuit Short (R)
			(Page 4E-60)".
47 (C1647)	Supply voltage (Increased)	ON	Refer to "DTC "47" (C1647): Supply
(0.0)	oupply rollage (moreacea)		Voltage (Increased) (Page 4E-62)".
			Refer to "DTC "48" (C1648): Supply
48 (C1648)	Supply voltage (Decreased)	ON	Voltage (Decreased) (Page 4E-
			64)".
(0.4)			Refer to "DTC "55" (C1655): ABS
55 (C1655)	ABS control unit malfunction	ON	Control Unit Malfunction (Page 4E-
			66)".
			Refer to "DTC "61" (C1661): ABS
61 (C1661)	ABS solenoid malfunction	ON	Solenoid Malfunction (Page 4E-
			68)".

<sup>\*1:</sup> It goes off after running at more than 10 km/h (6.2 mile/h).

### **⚠ CAUTION**

When disconnecting couplers and turning the ignition switch ON, disconnect the ABS control unit coupler in order to prevent a DTC from being stored. Each time a resistance is measured, the ignition switch should be set to OFF.

<sup>\*2:</sup> The wheel speed sensor lead wire is connected to the ABS control unit, but a short-circuit or faulty continuity inside the ABS control unit caused this DTC to appear, therefore, the ABS control unit/HU assembly must be replaced. An insufficient wheel speed sensor output voltage is the cause of a malfunction in which the ABS is activated even if the brakes are not suddenly applied. If this occurs frequently even though the wheel speed sensor is operating correctly, the ABS control unit/HU assembly should be replaced.

# DTC "13" (C1613): Wheel Speed Sensor Rotor Malfunction (F)

B817H24504009

# Possible Cause

- Front wheel speed sensor rotor distortion
- · Faulty front wheel speed sensor or wiring discontinuity, etc.

Step	Action	Yes	No
1	<ol> <li>Inspect the clearance between the front wheel speed sensor and sensor rotor using the thickness gauge.</li> </ol>	Go to Step 2.	Adjust the clearance.
	Special tool ক্রো (A): 09900–20803 (Thickness gauge) ক্রো (B): 09900–20806 (Thickness gauge)		
	Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)		
	1717H2450009-01		
2	<ul><li>Is the clearance OK?</li><li>1) Inspect the front wheel speed sensor rotor for damage</li></ul>	Go to Step 3.	Clean or replace the
	and check that no foreign objects are caught in the rotor openings.	GO to diep 3.	sensor rotor.
	I718H1450064-01		
	Is the sensor rotor OK?		

Step	Action	Yes	No
3	Check that the front wheel speed sensor is mounted	Go to Step 4.	Tighten the mounting
	securely.		bolts or replace the
			bracket if necessary.
	1717H2450015-01		
	Is the sensor mounted securely?		
4	Inspect the front tire and wheel.	Replace the ABS	Adjust or replace the
	Tire type and size	control unit/HU.	front tire and wheel.
	GSF650A/UA: BRIDGESTONE BT011F G 120/		
	70ZR17M/C (58W)		
	GSF650SA/ASU: BRIDGESTONE BT011F M 120/		
	70ZR17M/C (58W)		
	Cold inflation tire pressure (Solo riding)		
	250 kPa (2.50 kgf/cm², 36 psi)		
	Cold inflation tire pressure (Dual riding)		
	250 kPa (2.50 kgf/cm², 36 psi)		
	Wheel runout		
	Service limit (axial and radial): 2.0 mm (0.08 in)		
	I717H2450016-01		
	Are the front tire type, tire pressure and wheel runout OK?		

# DTC "14" (C1614): Wheel Speed Sensor Rotor Malfunction (R)

B817H24504010

# Possible Cause

- Rear wheel speed sensor rotor distortion
- Faulty rear wheel speed sensor or wiring discontinuity, etc.

Step	Action	Yes	No
1	Inspect the clearance between the rear wheel speed sensor and sensor rotor using the thickness gauge.	Go to Step 2.	Adjust the clearance.
	Special tool ক্তিয় (A): 09900–20803 (Thickness gauge) ক্তিয় (B): 09900–20806 (Thickness gauge)		
	Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)		
	I717H2450011-01		
2	<ul><li>Is the clearance OK?</li><li>1) Inspect the rear wheel speed sensor rotor for damage</li></ul>	Go to Step 3.	Clean or replace the
2	and check that no foreign objects are caught in the rotor openings.	GO to Glep 3.	sensor rotor.
	1718H1450064.01		
	I718H1450064-01		
	Is the sensor rotor OK?		

Step Action 3 1) Check that the rear wheel speed sensor is mounted	Yes	No
securely.    Tith 12450017-01	Go to Step 4.	Tighten the mounting bolts or replace the bracket if necessary.
1) Inspect the rear tire and wheel.  Tire type and size BRIDGESTONE BT020R G 160/60ZR17M/C (69W)  Cold inflation tire pressure (Solo riding) 250 kPa (2.50 kgf/cm², 36 psi)  Cold inflation tire pressure (Dual riding) 290 kPa (2.90 kgf/cm², 42 psi)  Wheel runout Service limit (axial and radial): 2.0 mm (0.08 in)	Replace the ABS control unit/HU.	Adjust or replace the rear tire and wheel.

# DTC "22" (C1622): ABS Actuator Circuit Malfunction (F)

B817H24504011

# Possible Cause

- Wire harness discontinuity
- Front wheel locking, etc.

Step		Action	Yes	No
1	1)	Raise the front wheel off the ground and support the motorcycle with a jack or wooden block.	Inspect the front brake master cylinder and the	Go to step 2.
	2)	Inspect the dragging of the front brake.	calipers.	
		I717H2450016-01		
	Is	there any dragging in the front brake?		
2	1)	Inspect the clearance between the front wheel speed	Go to Step 3.	Adjust the clearance.
		sensor and sensor rotor using the thickness gauge.		
		Special tool (A): 09900–20803 (Thickness gauge)		
		(B): 09900–20806 (Thickness gauge)		
		Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)		
	ls:	1717H2450009-01		

Step		Action	Yes	No
3	1)	Check that the front wheel speed sensor is mounted securely.  1717H2450015-01	Replace the ABS control unit/HU.	Tighten the mounting bolts or replace the bracket if necessary.
	Is	the sensor mounted securely?		

# DTC "23" (C1623): ABS Actuator Circuit Malfunction (R)

B817H24504012

	Possible Cause	
Ī	Wire harness discontinuity	1
	Rear wheel locking, etc.	

Step		Action	Yes	No
1	1)	Support the motorcycle with its center stand.		Go to step 2.
	2)	Inspect the dragging of the rear brake.	master cylinder and the caliper.	
		T717H2450018-01		
	Is t	here any dragging in the rear brake?		

# 4E-41 ABS:

Step	Action	Yes	No
2	1) Inspect the clearance between the rear wheel speed sensor and sensor rotor using the thickness gauge.  Special tool  (A): 09900–20803 (Thickness gauge)  (B): 09900–20806 (Thickness gauge)  Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)	Go to Step 3.	Adjust the clearance.
3	Check that the rear wheel speed sensor is mounted securely.    The second of the secure is a secure in the secure in the secure is a secure in the secure in the secure in the secure is a secure in the secure in the secure is a secure in the secure in the secure is a secure in the secure in th	Replace the ABS control unit/HU.	Tighten the mounting bolts or replace the bracket if necessary.
	Is the sensor mounted securely?		

# DTC "25" (C1625): Wheel Speed Sensor Related Malfunction

B817H24504013

# Possible Cause

- · Incorrect tire size, poor tire pressure
- · Deformed wheel, etc.

1 1) Check that the specified tires are installed.  Tire type and size Front: BRIDGESTONE BT011F G 120/70 ZR17M/C (58W) (GSF650AUA) Front: BRIDGESTONE BT011F M 120/70 ZR17M/C (58W) (GSF650SA/ASU) Rear: BRIDGESTONE BT020R G 160/60ZR17M/C (69W)  Are the tires OK?  2 1) Make sure the tire pressure for each tire. Refer to "Tire Inspection in Section 0B (Page 0B-20)".  Cold inflation tire pressure (Solo riding) Front: 250 kPa (2.50 kgf/cm², 36 psi) Rear: 250 kPa (2.50 kgf/cm², 36 psi) Cold inflation tire pressure (Dual riding) Front: 250 kPa (2.50 kgf/cm², 36 psi) Rear: 290 kPa (2.50 kgf/cm², 42 psi)	Step Action Yes	No
1) Make sure the tire pressure for each tire. Refer to "Tire Inspection in Section 0B (Page 0B-20)".  Cold inflation tire pressure (Solo riding) Front: 250 kPa (2.50 kgf/cm², 36 psi) Rear: 250 kPa (2.50 kgf/cm², 36 psi) Cold inflation tire pressure (Dual riding) Front: 250 kPa (2.50 kgf/cm², 42 psi)  Cold inflation tire pressure (Dual riding) Rear: 290 kPa (2.90 kgf/cm², 42 psi)	Tire type and size Front: BRIDGESTONE BT011F G 120/70 ZR17M/C (58W) (GSF650A/UA) Front: BRIDGESTONE BT011F M 120/70 ZR17M/C (58W) (GSF650SA/ASU) Rear: BRIDGESTONE BT020R G 160/60ZR17M/C (69W)	pecified tires.
Us the tire pressure for each tire correct?	1) Make sure the tire pressure for each tire. Refer to "Tire Inspection in Section 0B (Page 0B-20)".  Cold inflation tire pressure (Solo riding) Front: 250 kPa (2.50 kgf/cm², 36 psi) Rear: 250 kPa (2.50 kgf/cm², 36 psi) Cold inflation tire pressure (Dual riding) Front: 250 kPa (2.50 kgf/cm², 36 psi) Rear: 290 kPa (2.90 kgf/cm², 42 psi)	e tire pressure.

Step	Action	Yes	No
3	<ol> <li>Inspect both wheel speed sensor rotors for damage and check that no foreign objects are caught in the rotor openings.</li> </ol>	Go to Step 4.	Clean or replace the rotor.
	1718H1450064-01		
	Are the rotors OK?		
4	Inspect the clearances of the front and rear wheel speed sensor – sensor rotor using the thickness gauge.	Replace the ABS control unit/HU.	Adjust the clearance.
	Special tool ক্রি (A): 09900–20803 (Thickness gauge) ক্রি (B): 09900–20806 (Thickness gauge)		
	Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)		
	Front		
	1717H2450009-01  Rear		
	I717H2450011-01		
	Are the clearances OK?		

# DTC "35" (C1635): ABS Motor Malfunction

B817H24504014

D	OSS	ih	7	5	116

- Faulty HU motor
- Faulty wiring, etc.

Wiring Diagram
Refer to "ABS Unit Diagram (Page 4E-8)".

		looting		
Step		Action	Yes	No
1	1)	mepoor in the paring meter manes tarining motor by columny	Faulty HU motor	Go to Step 2.
		the ignition switch to ON from OFF when the vehicle	<ul> <li>Replace the ABS</li> </ul>	
		stands still.	control unit/HU.	
		I717H2450020-01		
	Do	es the pump motor make any turning noise?		
2	1)	Remove the seat. Refer to "Exterior Parts Removal and	Go to Step 3.	Replace the ABS motor
	,	Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		fuse.
	2)			
	2)	inspect the Abo motor ruse.		
		<b>⚠ CAUTION</b>		
		If a fuse is blown, find the cause of the problem and correct it before replacing the fuse.		
	ls t	ABS motor fuse 20 A  Title 450021-01  The ABS motor fuse OK?		

Step		Action	Yes	No
3	1)	Turn the ignition switch OFF.	Replace the ABS	Inspect the wire
	2)	Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".	control unit/HU.	harness. (Faulty motor power supply or ground wire)
	3)	Remove the fuse box mounting bolt. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)".		
	4)	Check the ABS control unit coupler for loose or poor contacts. If OK, then disconnect the ABS control unit coupler.		
	5)	Measure the voltage between "9" (R/B) and "25" (B/W) at the coupler.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( )		
		Normal value ("9" – "25") Battery voltage (12.0 V and more)		
		ABS control unit coupler (Harness end)		
		18 21 24 25 10 12 13 16 8 9 (+)		
	Is t	he voltage between "9" and "25" normal?		

# DTC "41" (C1641): Wheel Speed Sensor Signal Malfunction (F)

B817H24504015

# Possible Cause

- Poor contact in the front wheel speed sensor coupler
- · Faulty front wheel speed sensor, etc.

Step	Action	Yes	No
1	Inspect the clearance between the front wheel speed sensor and sensor rotor using the thickness gauge.	Go to Step 2.	Adjust the clearance.
	Special tool ক্তি৷ (A): 09900–20803 (Thickness gauge) ক্তি৷ (B): 09900–20806 (Thickness gauge)		
	Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)		
	I717H2450009-01		
	Is the clearance OK?		
2	<ol> <li>Inspect the front wheel speed sensor rotor for damage and check that no foreign objects are caught in the rotor openings.</li> </ol>	Go to Step 3.	Clean or replace the sensor rotor.
	Is the sensor rotor OK?		

### 4E-47 ABS:

Step		Action	Yes	No
3	1)	Check that the front wheel speed sensor is mounted securely.	Go to DTC "42" (C1642). (Refer to "DTC	Tighten the mounting
		1717H2450015-01	47)".)	
	Is	the sensor mounted securely?		

# DTC "42" (C1642): Wheel Speed Sensor Circuit Open (F)

B817H24504016

# Possible Cause

- Poor contact in the front wheel speed sensor coupler
- Faulty front wheel speed sensor, etc.

# **Wiring Diagram**

Refer to "ABS Unit Diagram (Page 4E-8)".

Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 3.	Go to Step 2.
	2)	Remove the right frame head cover. (GSF650A/UA) Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		
	3)	Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		
	4)	Remove the fuse box mounting bolt. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)".		
	5)	Check the ABS control unit coupler and front wheel speed sensor coupler for loose or poor contacts. If OK, then disconnect the ABS control unit coupler.		
		I718H1450077-01		
	6)	Measure the resistance between "12" (B/R) and ground at the ABS control unit coupler.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Resistance ( $\Omega$ )		
		Normal value ("12" – Ground) $\infty \Omega$ (Infinity)		
		$\Omega$ $\Omega$ $0$ $0$ $0$ $18$ $10$ $12$ $13$ $16$ $8$ $9$ $ABS control unit coupler (Harness end)$		
		I718H1450078-04		
	Is t	he resistance between "12" and ground OK?		

Step		Action	Yes	No
2	1)	Disconnect the front wheel speed sensor coupler.	Inspect the wire	Faulty front wheel
	2)	Measure the resistance between "A" (B) and ground at the front wheel speed sensor coupler.	harness. (Faulty B/R wire)	speed sensor
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
,		Tester knob indication Resistance ( $\Omega$ )		
		Normal value ("A" – Ground) $\infty \Omega$ (Infinity)		
		Sensor side  "A"  1718H1450079-03		
	ls i	the resistance between "A" and ground OK?		
3		Measure the resistance between "3" (W/R) and ground at the ABS control unit coupler.	Go to Step 5.	Go to Step 4.
		Special tool (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Resistance ( $\Omega$ )		
		Normal value ("3" – Ground) $\infty \Omega$ (Infinity)		
		Δ		
		//// I718H1450080-04		
	Is i	the resistance between "3" and ground OK?		

Step		Action	Yes	No
4	1)		Inspect the wire	Faulty front wheel
	ľ	the front wheel speed sensor coupler.	harness. (Faulty W/R	speed sensor
		Special tool	wire)	
		(A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication		
		Resistance ( $\Omega$ )		
		Normal value ("B" – Ground) $\infty \Omega$ (Infinity)		
		Sensor side		
		(A) Ω (B") (T18H1450081-03		
	10	the resistance between "B" and ground OK?		
5		Check for continuity between "12" (B/R) on the ABS control unit coupler and "C" (B/R) on the front wheel speed sensor coupler.	Go to Step 6.	Inspect the wire harness. (Faulty B/R wire)
		Special tool (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		Normal value ("12" – "C") Continuity ( •))))		
		Harness side  "C"  (A)		
		(B)		
		18 21 24 25 10 12 13 16 8 9		
		ABS control unit coupler (Harness end)  1718H1450082-04		
	Is	there continuity between "12" and "C"?		

Step	Action	Yes	No
6	1) Check for continuity between "3" (W/R) on the ABS	Go to Step 7.	Inspect the wire
	control unit coupler and "D" (W/R) on the front wheel		harness. (Faulty W/R
	speed sensor coupler.		wire)
	Special tool		
	(B): 09900–25009 (Needle pointed probe set)		
	Tester knob indication		
	Continuity test ( •))))		
	Normal value ("3" – "D") Continuity ( •))))		
	Harness side		
	"D"		
	18 21 24 25 10 M2 13 16 8 9		
	ABS control unit coupler (Harness end)		
	I718H1450083-04		
	Is there continuity between "3" and "D"?		
7	Connect the front wheel speed sensor coupler.	Replace the ABS	Faulty front wheel
	2) Connect timee 1.5 v dry cens a in series as shown and	control unit/HU.	speed sensor
	make sure that their total voltage is more than 4.5 V.		
	Measure the current between (+) dry cell terminal and "12" (B/R) on the ABS control unit coupler.		
	Special tool		
	(A): 09900–25008 (Multi-circuit tester set)		
	ான் (B): 09900–25009 (Needle pointed probe set)		
	Tester knob indication Current ( , 20 mA)		
	Normal value		
	3 – 14 mA		
	ABS control unit coupler (Harness end)		
	/ 120 control and couplet (Figuresc end)		
	18 21 24 25		
	234		
	(B)		
	DCmA "a"		
	I718H1450084-03		
	Is the current OK?		

# DTC "43" (C1643): Wheel Speed Sensor Circuit Short (F)

B817H24504017

# Possible Cause

- Poor contact in the front wheel speed sensor coupler
- · Faulty front wheel speed sensor, etc.

# **Wiring Diagram**

Refer to "ABS Unit Diagram (Page 4E-8)".

coupler disconnected, measure the voltage between "3" (W/R) and "24" (B/W) at the coupler.  Special tool  (A): 09900–25008 (Multi-circuit tester set)	Step 3.
Is there continuity between "2" and "3"?  3 1) Turn the ignition switch ON with the ABS control unit coupler disconnected, measure the voltage between "3" (W/R) and "24" (B/W) at the coupler.  Special tool  (A): 09900–25008 (Multi-circuit tester set)	
1) Turn the ignition switch ON with the ABS control unit coupler disconnected, measure the voltage between "3" (W/R) and "24" (B/W) at the coupler.  Special tool  (A): 09900–25008 (Multi-circuit tester set)  Replace the ABS control unit/HU.  Replace the ABS control unit/HU.  Special tool  wire)	
1) Turn the ignition switch ON with the ABS control unit coupler disconnected, measure the voltage between "3" (W/R) and "24" (B/W) at the coupler.  Special tool  (A): 09900–25008 (Multi-circuit tester set)  Replace the ABS control unit/HU.  Replace the ABS control unit/HU.  Special tool  wire)	
Tester knob indication	t the wire s. (Faulty sensor or power supply
Voltage ( )  Normal value ("3" – "24")  0 V	
ABS control unit coupler (Harness end)	
(-)  18 21 24 25  10 12 13 16 8 9  2 3 4 8 9  (+)	
I718H1450087-02	
Is the voltage between "3" and "24" normal value?	

## DTC "44" (C1644): Wheel Speed Sensor Signal Malfunction (R)

B817H24504018

## Possible Cause

- Poor contact in the rear wheel speed sensor coupler
- · Faulty rear wheel speed sensor, etc.

Step	Action	Yes	No
1	Inspect the clearance between the rear wheel speed sensor and sensor rotor using the thickness gauge.	Go to Step 2.	Adjust the clearance.
	Special tool ক্রি (A): 09900–20803 (Thickness gauge) ক্রি (B): 09900–20806 (Thickness gauge)		
	Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)		
	I717H2450011-01		
2	<ul><li>Is the clearance OK?</li><li>1) Inspect the rear wheel speed sensor rotor for damage</li></ul>	Go to Step 3.	Clean or replace the
2	and check that no foreign objects are caught in the rotor openings.	•	sensor rotor.
	I718H1450064-01		
	Is the sensor rotor OK?		

## 4E-55 ABS:

Step		Action	Yes	No
3	1)	Check that the rear wheel speed sensor is mounted securely.    Title   Title	Go to DTC "45" (C1645). (Refer to "DTC "45" (C1645): Wheel Speed Sensor Circuit Open (R) (Page 4E- 56)".)	Tighten the mounting bolts or replace the bracket if necessary.
	IS I	the sensor mounted securely?		

## DTC "45" (C1645): Wheel Speed Sensor Circuit Open (R)

B817H24504019

## Possible Cause

- Poor contact in the rear wheel speed sensor coupler
- · Faulty rear wheel speed sensor, etc.

## **Wiring Diagram**

Refer to "ABS Unit Diagram (Page 4E-8)".

Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 3.	Go to Step 2.
	2)	Remove the frame covers, left and right. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		
	3)	Remove the fuse box mounting bolt. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)".		
	4)	Check the ABS control unit coupler and rear wheel speed sensor coupler for loose or poor contacts. If OK, then disconnect the ABS control unit coupler.		
	5)	T718H1450116-01  Measure the resistance between "2" (B/Y) and ground at the ABS control unit coupler.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Resistance ( $\Omega$ )		
		Normal value ("2" – Ground) $\infty \Omega$ (Infinity)		
		Ω		
		//// I718H1450088-03		
	ls t	the resistance between (2) and ground OK?		
	Is t	ne resistance between (2) and ground OK?		

Step		Action	Yes	No
2		Disconnect the rear wheel speed sensor coupler.	Inspect the wire	Replace the rear wheel
	2)	Measure the resistance between "A" (B) and ground at the rear wheel speed sensor coupler.	harness. (Faulty B/Y wire)	speed sensor.
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Resistance ( $\Omega$ )		
		Normal value ("A" – Ground) $\infty \Omega$ (Infinity)		
	ls i	Sensor side  "A"  1718H1450079-03  The resistance between "A" and ground OK?		
3	1)		Go to Step 5.	Go to Step 4.
		Special tool (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Resistance ( $\Omega$ )		
		Normal value ("18" – Ground) $\infty \Omega$ (Infinity)		
		Ω Ω (A) Ω (B) (B) (A) (A) (A) (A) (A) (A) (A) (A) (A) (A		
	,.	1718H1450089-03		
	IS I	the resistance between "18" and ground OK?		

Step		Action	Yes	No
4	1)	` '	Inspect the wire	Replace the rear wheel
		the rear wheel speed sensor coupler.	harness. (Faulty W/Y	speed sensor.
		Special tool	wire)	
		(A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Resistance ( $\Omega$ )		
		Normal value ("B" – Ground) $\infty \Omega$ (Infinity)		
		Sensor side		
		(A) Ω (B") 1718H1450081-03		
	Is :	the resistance between "B" and ground OK?		
5		Check for continuity between "2" (B/Y) on the ABS control unit coupler and "C" (B/Y) on the rear wheel speed sensor coupler.	Go to Step 6.	Inspect the wire harness. (Faulty B/Y wire)
		Special tool (A): 09900–25008 (Multi-circuit tester set) (B): 09900–25009 (Needle pointed probe set)		
		Tester knob indication Continuity test ( •)))		
		Normal value ("2" – "C") Continuity ( •))))		
		Harness side		
		"C" (A)		
		18 21 24 25 10 12 13 16 8 9		
		ABS control unit coupler (Harness end)  1718H1450090-03		
	Is i	there continuity between "2" and "C"?		

Step	Action	Yes	No
6	<ol> <li>Check the continuity between "18" (W/Y) on the ABS control unit coupler and "D" (W/Y) on the rear wheel speed sensor coupler.</li> </ol>	Go to Step 7.	Inspect the wire harness. (Faulty W/Y wire)
	Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
	Tester knob indication Continuity test ( •)))		
	Normal value ("18" – "D") Continuity ( •))))		
	Harness side  "D"  (B)		
	ABS control unit coupler (Harness end)		
	Is the resistance between "18" and "D"?		
7	<ol> <li>Connect the rear wheel speed sensor coupler.</li> <li>Connect three 1.5 V dry cells "a" in series as shown and make sure that their total voltage is more than 4.5 V. Measure the current between (+) dry cell terminal and "2" (B/Y) on the ABS control unit coupler.</li> </ol>	Replace the ABS control unit/HU.	Replace the rear wheel speed sensor.
	Special tool  (A): 09900–25008 (Multi-circuit tester set)  (B): 09900–25009 (Needle pointed probe set)		
	Tester knob indication Current ( , 20 mA)		
	Normal value 3 – 14 mA		
	ABS control unit coupler (Harness end)		
	18 21 24 25 10 10 12 13 16 8 9 100 (A) DCmA "a"		
	I718H1450091-04		
	Is the current OK?		

## DTC "46" (C1646): Wheel Speed Sensor Circuit Short (R)

B817H24504020

## Possible Cause

- Poor contact in the rear wheel speed sensor coupler
- Faulty rear wheel speed sensor, etc.

## **Wiring Diagram**

Refer to "ABS Unit Diagram (Page 4E-8)".

Step		Action		Yes	No
1	1)	Turn the ignition switch OFF.	•	Inspect the wire	Go to Step 2.
	2)	Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		harness. (Faulty sensor wire) Faulty rear wheel	
	3)	Remove the fuse box mounting bolt. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)".		speed sensor	
	4)	Check the ABS control unit coupler for loose or poor contacts. If OK, then disconnect the ABS control unit coupler.			
	5)	Check for continuity between "2" (B/Y) and "18" (W/Y) at the coupler.			
		Special tool  (A): 09900–25008 (Multi-circuit tester set)			
		Tester knob indication Continuity ( •))))			
		ABS control unit coupler (Harness end)			
		18 21 24 25 10 12 13 16 8 9 1718H1450093-02			
	Is t	here continuity between "2" and "18"?			

Step		Action	Yes	No
2	1)	Check for continuity between "12" (B/R) and "18" (W/Y) at the coupler.  Special tool  (A): 09900–25008 (Multi-circuit tester set)	<ul> <li>Inspect the wire harness. (Faulty sensor wire)</li> <li>Faulty wheel speed sensor</li> </ul>	Go to Step 3.
		Tester knob indication Continuity ( •))))		
		ABS control unit coupler (Harness end)		
		18 21 24 25 10 10 12 13 16 8 9 1718H1450094-03		
	Is t	there continuity between "12" and "18"?		
3		Turn the ignition switch ON with the ABS control unit coupler disconnected, measure the voltage between "2" (B/Y) and "24" (B/W) at the coupler.  Special tool  (A): 09900–25008 (Multi-circuit tester set)	Replace the ABS control unit/HU.	Inspect the wire harness. (Faulty sensor signal or power supply wire)
		Tester knob indication Voltage ( )		
		Normal value ("2" - "24") 0 V		
		ABS control unit coupler (Harness end)		
		(-)  18 21 24 25  10 12 13 16 8 9  1718H1450095-02		
	ls t	the voltage between "2" and "24" 0 V?		

## DTC "47" (C1647): Supply Voltage (Increased)

B817H24504021

## Possible Cause

- Faulty regulator/rectifier
- Faulty ABS control unit
- Faulty wire harness, etc.

## **Wiring Diagram**

Refer to "ABS Unit Diagram (Page 4E-8)".

Step		Action	Yes	No
1	1)	Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".	Go to Step 2.	Charge or replace the battery.
	2)	Measure the voltage between the (+) and (–) battery terminals using the multi-circuit tester.		
		Special tool তিত্ৰ (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Voltage ( )		
		Battery voltage 12.0 V and more		
		(+) I717H2450010-01		
2	1)	he voltage over 12 V? Start the engine at 5 000 r/min with the dimmer switch set to HI.  Measure the voltage between the (+) and (–) battery terminals.	Go to Step 3.	Inspect the regulator/ rectifier. Refer to "Regulator / Rectifier Inspection in Section 1J
		Special tool ক্রি: 09900–25008 (Multi-circuit tester set)		(Page 1J-8)".
		Tester knob indication Voltage ( )		
		Regulated voltage 14.0 – 15.5 V at 5 000 r/min		
	Is t	he voltage 14.0 – 15.5 V?		

## 4E-63 ABS:

Step		Action	Yes	No
3	1)	Turn the ignition switch OFF.	Replace the ABS	Inspect the wire
	2)	Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".	control unit/HU.	harness. (Faulty ignition or ground wire)
	3)	Remove the fuse box mounting bolt. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)".		
	4)	Check the ABS control unit coupler for loose or poor contacts. If OK, then disconnect the ABS control unit coupler.		
	5)	Start the engine at 5 000 r/min with the dimmer switch set to HI.		
	6)	Measure the voltage between "16" (O/Y) and "24" (B/W) at the coupler.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		Tester knob indication Voltage ( )		
		(-) 18 21 24 25 10 12 13 16 8 9 (+) 1718H1450036-04		
	Is t	he voltage same as Step 2?		
	10 1	no voltago samo do otop z.		

## DTC "48" (C1648): Supply Voltage (Decreased)

B817H24504022

## Possible Cause

- Faulty generator or regulator/rectifier
- Faulty ABS control unit
- Faulty wire harness, etc.

## **Wiring Diagram**

Refer to "ABS Unit Diagram (Page 4E-8)".

Step		Action	Yes	No
1	1)	Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".	Go to Step 2.	Charge or replace the battery.
	2)	Measure the voltage between the (+) and (–) battery terminals using the multi-circuit tester.		
		Special tool (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( —— )		
		Battery voltage 12.0 V and more		
		(+) I717H2450010-01		
2		Start the engine at 5 000 r/min with the dimmer switch set to HI.  Measure the voltage between the (+) and (–) battery terminals.  Special tool  100 : 09900–25008 (Multi-circuit tester set)  Tester knob indication  Voltage ( )	Go to Step 3.	Inspect the generator and regulator/rectifier. Refer to "Generator Inspection in Section 1J (Page 1J-3)" and "Regulator / Rectifier Inspection in Section 1J (Page 1J-8)".
		Regulated voltage 14.0 – 15.5 V at 5 000 r/min		
	ls t	the voltage 14.0 – 15.5 V?		

## 4E-65 ABS:

Step		Action	Yes	No
3	1)	Turn the ignition switch OFF.	Replace the ABS	Inspect the wire
	2)	Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".	control unit/HU.	harness. (Faulty ignition or ground wire)
	3)	Remove the fuse box mounting bolt. Refer to "ABS Control Unit Coupler Disconnect and Connect (Page 4E-69)".		
	4)	Check the ABS control unit coupler for loose or poor contacts. If OK, then disconnect the ABS control unit coupler.		
	5)	Start the engine at 5 000 r/min with the dimmer switch set to HI.		
	6)	Measure the voltage between "16" (O/Y) and "24" (B/W) at the coupler.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( )		
		ABS control unit coupler (Harness end)		
		(-) 18 21 24 25 10 12 13 16 8 9 2 3 4		
	Is t	the voltage same as Step 2?		

ABS: 4E-66

## DTC "55" (C1655): ABS Control Unit Malfunction

B817H24504023

	Possible Cause
Faulty ABS control unit	

Step	Action	Yes	No
1	1) Inspect the clearances of the front and rear wheel speed	Go to Step 2.	Adjust the clearance.
	sensor – sensor rotor using the thickness gauge.		
	Special tool		
	ண் (A): 09900–20803 (Thickness gauge)		
	rooi (B): 09900–20806 (Thickness gauge)		
	Wheel speed sensor – sensor rotor clearance		
	0.3 – 1.5 mm (0.012 – 0.059 in)		
	Front		
	1717H2450009-01  Rear		
	1717H2450011-01		
	Are the clearances OK?		
2	Inspect both of the wheel speed sensor rotors for damage and check that no foreign objects are caught in	Go to Step 3.	Clean or replace the rotor.
	the rotor openings.		TOIOI.
	1.5 .5.6. opogo.		
	1718H1450064-01		
	Are the rotors OK?		

## 4E-67 ABS:

Step	Action	Yes	No
3	1) Check that the front and rear wheel speed sensors are mounted securely.    Tith 2450022-01	Go to Step 4.	Tighten the mounting bolts or replace the bracket if necessary.
4	1) Delete DTCs and repeat the code output procedure. Refer to "DTC (Diagnostic Trouble Code) Deleting (Page 4E-26)" and "DTC (Diagnostic Trouble Code) Output (Page 4E-23)".  Is the DTC "55" (C1655) output again?	Replace the ABS control unit/HU.	Intermittent trouble.

## DTC "61" (C1661): ABS Solenoid Malfunction

B817H24504024

	Possible Cause
Faulty solenoid valve or relay	

Step		Action	Yes	No
1	1)	Turn the ignition switch OFF.	Go to Step 2.	Replace the ABS
	2)	Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".		solenoid valve fuse.
	3)	Inspect the ABS solenoid valve fuse.		
		<b>△</b> CAUTION		
		If a fuse is blown, find the cause of the problem and correct it before replacing the fuse.		
		ABS solenoid valve fuse 15 A  I717H2450023-01		
	ls t	the ABS solenoid valve fuse OK?		

Step		Action	Yes	No
2	1)	Check the ABS control unit coupler for loose or poor	Replace the ABS	Inspect the wire
		contacts.	control unit/HU.	harness. (Faulty
		If OK, then disconnect the ABS control unit coupler.		solenoid or ground wire)
	2)	Measure the voltage between "8" (R/BI) and "24" (B/W) at the coupler.		
		Special tool  (A): 09900–25008 (Multi-circuit tester set)		
		<u>Tester knob indication</u> Voltage ( )		
		Normal value ("8" – "24") Battery voltage (12.0 V and more)		
		ABS control unit coupler (Harness end)		
		(-)  18 21 24 25  10 12 13 16 8 9  (+)  1718H1450096-02		
	Is t	he voltage between "8" and "24" normal?		

## **Repair Instructions**

# **ABS Control Unit Coupler Disconnect and Connect**

**Disconnect** 

B817H24506001

- 1) Turn the ignition switch OFF.
- 2) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Remove the fuse box mounting bolt (1).



I718H1450028-01

4) Disconnect the ABS control unit coupler (2).



I718H1450029-01

### Connect

Connect the ABS control unit coupler in the reverse order of disconnect.

## Front Wheel Speed Sensor Removal and Installation

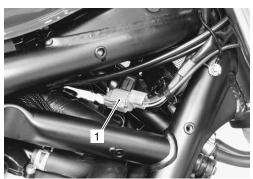
B817H24506002

#### **⚠ CAUTION**

- The ABS is made up of many precision parts; never subject it to strong impacts or allow it to become dirty or dusty.
- The wheel speed sensor cannot be disassembled.

#### Removal

- 1) Turn the ignition switch OFF.
- 2) Remove the right frame head cover. (GSF650A/UA) Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the front wheel speed sensor coupler (1).



I718H1450100-01

4) Remove the front wheel speed sensor mounting bolts.



I717H2450024-01

5) Remove the front wheel speed sensor as shown in the front wheel speed sensor routing diagram. Refer to "Front Wheel Speed Sensor Routing Diagram (Page 4E-9)".

#### Installation

Refer to "Wheel Speed Sensor and Sensor Rotor Inspection (Page 4E-73)".

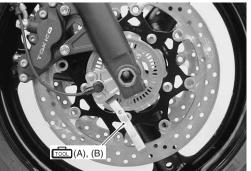
Install the front wheel speed sensor in the reverse order of removal. Pay attention to the following points:

- Install the front wheel speed sensor as shown in the front wheel speed sensor routing diagram. Refer to "Front Wheel Speed Sensor Routing Diagram (Page 4E-9)".
- Check the clearance between the front wheel speed sensor and sensor rotor using the thickness gauge.

#### Special tool

(A): 09900-20803 (Thickness gauge) (B): 09900-20806 (Thickness gauge)

Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)



I717H2450009-01

# Rear Wheel Speed Sensor Removal and Installation

B817H24506003

## **⚠** CAUTION

- The ABS is made up of many precision parts; never subject it to strong impacts or allow it to become dirty or dusty.
- The wheel speed sensor cannot be disassembled.

#### Removal

- 1) Turn the ignition switch OFF.
- 2) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Disconnect the rear wheel speed sensor coupler (1).



I718H1450102-01

4) Remove the rear wheel speed sensor mounting bolts.



I717H2450025-01

5) Remove the rear wheel speed sensor as shown in the rear wheel speed sensor routing diagram. Refer to "Rear Wheel Speed Sensor Routing Diagram (Page 4E-11)".

#### Installation

Refer to "Wheel Speed Sensor and Sensor Rotor Inspection (Page 4E-73)".

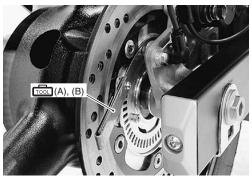
Install the rear wheel speed sensor in the reverse order of removal. Pay attention to the following points:

 Install the rear wheel speed sensor as shown in the rear wheel speed sensor routing diagram. Refer to "Rear Wheel Speed Sensor Routing Diagram (Page 4E-11)".  Check the clearance between the rear wheel speed sensor and sensor rotor using the thickness gauge.

#### Special tool

(A): 09900-20803 (Thickness gauge)
(B): 09900-20806 (Thickness gauge)

Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)



I717H2450011-01

## Front Wheel Speed Sensor Rotor Removal and Installation

B817H24506004

#### **⚠ CAUTION**

- The ABS is made up of many precision parts; never subject it to strong impacts or allow it to become dirty or dusty.
- Do not hit the front wheel speed sensor rotor when dismounting the front wheel.

#### Removal

- 1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-4)".
- 2) Remove the front wheel speed sensor rotor (1).

#### **A** CAUTION

When replacing the tire, make sure not to damage the sensor rotor.



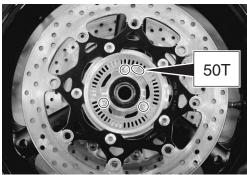
I717H2450026-01

#### Installation

Refer to "Wheel Speed Sensor and Sensor Rotor Inspection (Page 4E-73)".

Install the front wheel speed sensor rotor in the reverse order of removal. Pay attention to the following points:

 Install the wheel speed sensor rotor as the letters "50T" face outside.



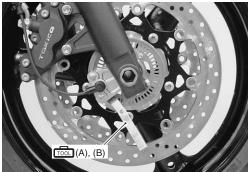
I717H2450027-0

- Install the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/ SUK7) in Section 2D (Page 2D-4)".
- Check the clearance between the front wheel speed sensor and sensor rotor using the thickness gauge.

### Special tool

(A): 09900-20803 (Thickness gauge) (B): 09900-20806 (Thickness gauge)

Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)



1717H2450009-01

# Rear Wheel Speed Sensor Rotor Removal and Installation

B817H24506005

#### **⚠ CAUTION**

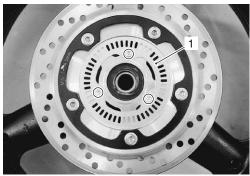
- The ABS is made up of many precision parts; never subject it to strong impacts or allow it to become dirty or dusty.
- Do not hit the rear wheel speed sensor rotor when dismounting the rear wheel.

#### Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-11)".
- 2) Remove the rear wheel speed sensor rotor (1).

#### **⚠ CAUTION**

When replacing the tire, make sure not to damage the sensor rotor.



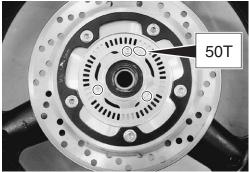
I717H2450028-01

#### Installation

Refer to "Wheel Speed Sensor and Sensor Rotor Inspection (Page 4E-73)".

Install the rear wheel speed sensor rotor in the reverse order of removal. Pay attention to the following points:

 Install the wheel speed sensor rotor as the letters "50T" face outside.



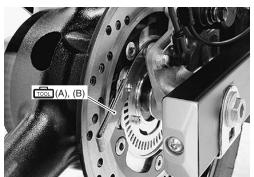
I717H2450029-0

 Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation (GSF650/S/U/ SUK7) in Section 2D (Page 2D-11)".  Check the clearance between the rear wheel speed sensor and sensor rotor using the thickness gauge.

#### Special tool

(A): 09900-20803 (Thickness gauge) (B): 09900-20806 (Thickness gauge)

Wheel speed sensor – sensor rotor clearance 0.3 – 1.5 mm (0.012 – 0.059 in)



I717H2450011-01

# Wheel Speed Sensor and Sensor Rotor Inspection

B817H24506006

### Wheel Speed Sensor

- Remove the wheel speed sensor. Refer to "Front Wheel Speed Sensor Removal and Installation (Page 4E-70)" and "Rear Wheel Speed Sensor Removal and Installation (Page 4E-70)".
- 2) Inspect the wheel speed sensor for damage. Clean the sensor if any metal particle or foreign material stuck on it.



I718H1450108-01

3) After finishing the speed sensor inspection, install the wheel speed sensor.

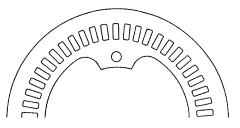
### **Wheel Speed Sensor Rotor**

1) Raise the wheel off the ground and support the motorcycle with a jack or wooden block.

#### **⚠ CAUTION**

Make sure that the motorcycle is supported securely.

Check that no wheel speed sensor rotor teeth are broken and that no foreign objects are caught in the wheel speed sensor.



I718H1450064-01

## ABS Control Unit/HU Removal and Installation B817H2450600

## Removal

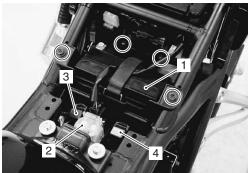
## **▲ WARNING**

When storing the brake fluid, seal the container completely and keep away from children.

#### **⚠ CAUTION**

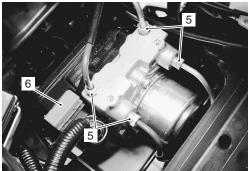
- This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not mix different types of fluid such as siliconebased or petroleum-based.
- Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for long periods.
- Handle brake fluid with care: the fluid reacts chemically with paint, plastics, rubber materials etc. and will damage then severely.
- The ABS is made up of many precision parts; never subject it to strong impacts or allow it to become dirty or dusty.
- The ABS control unit/HU cannot be disassembled.

- 1) Remove the seat and frame covers. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the battery (1). Refer to "Battery Removal and Installation in Section 1J (Page 1J-12)".
- 3) Remove the starter relay (2) from the battery case.
- 4) Remove the cooling fan relay (3) and fuel pump relay (4) from the battery case.
- 5) Remove the battery case.



717H2450030-02

- 6) Drain the brake fluid. Refer to "Brake Fluid Replacement in Section 4A (Page 4A-7)".
- 7) Loosen the flare nuts (5) and disconnect the brake pipes.
- 8) Disconnect the ABS control unit coupler (6).



I717H2450031-01

- 9) Remove the reservoir mounting bolt. Refer to "Rear Brake Master Cylinder Assembly Removal and Installation in Section 4A (Page 4A-13)".
- 10) Remove the ABS control unit/HU by removing the mounting bolts.



I717H2450032-01



I717H2450033-0

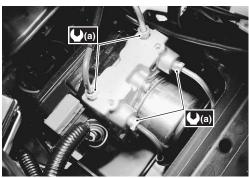
#### Installation

Installation is in the reverse order of removal. Pay attention to the following points:

#### **⚠ CAUTION**

- Route the brake hoses and pipes correctly. Refer to "Front Brake Hose Routing Diagram (GSF650) in Section 4A (Page 4A-1)", "Front Brake Hose Routing Diagram (GSF650S) in Section 4A (Page 4A-2)" or "Rear Brake Hose Routing Diagram in Section 4A (Page 4A-3)".
- Make sure to hold the brake pipe when tightening the flare nut, or it may be misaligned.
- Tighten the brake pipe flare nuts to the specified torque.

Tightening torque
Brake pipe flare nut (a): 16 N⋅m (1.6 kgf-m, 11.5 lbf-ft)



I717H2450034-0

Bleed air from the brake fluid circuit. Refer to "Air Bleeding from Brake Fluid Circuit in Section 4A (Page 4A-5)".

## **Specifications**

## **Tightening Torque Specifications**

B817H24507001

Eastoning part	Ti	ghtening torq	Note	
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Brake pipe flare nut	16	1.6	11.5	☞(Page 4E-74)

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

## **Special Tools and Equipment**

## **Special Tool**

☞(Page 4E-73)

B817H24508001 09900-20803 09900-20806 Thickness gauge Thickness gauge @(Page 4E-15) / @(Page 4E-15) / @(Page 4E-35) / @(Page 4E-35) / @(Page 4E-37) / @(Page 4E-37) / @(Page 4E-39) / @(Page 4E-39) / @(Page 4E-41) / @(Page 4E-41) / @(Page 4E-43) / @(Page 4E-43) / @(Page 4E-46) / @(Page 4E-46) / @(Page 4E-54) / @(Page 4E-54) / @(Page 4E-66) / @(Page 4E-66) / @(Page 4E-70) / @(Page 4E-70) / @(Page 4E-71) / @(Page 4E-71) / @(Page 4E-72) / @(Page 4E-72) /

09900–25008	09900–25009
Multi-circuit tester set	
	Needle pointed probe set
(Page 4E-15) /	(Page 4E-48) /
(Page 4E-16) /	(Page 4E-49) /
(Page 4E-19) /	(Page 4E-50) /
(Page 4E-19) /	(Page 4E-51) /
(Page 4E-20) /	(Page 4E-51) /
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SDS set	Mode select switch
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(Page 4E-27) /	
☞(Page 4E-29)	

## **Section 5**

# **Transmission / Transaxle**

## **CONTENTS**

Precautions	5-1
Precautions	5-1
Precautions for Transmission / Transaxle	5-1
Manual Transmission	
Diagnostic Information and Procedures	5B-1
Manual Transmission Symptom Diagnosis	5B-1
Repair Instructions	
Transmission Components	
Transmission Removal	
Transmission Installation	
Transmission Construction	5B-8
Countershaft Gear / Driveshaft Gear	
Disassembly and Assembly	
Transmission Related Parts Inspection	
Gear Position Switch Inspection	5B-12
Gear Position Switch Removal and	
Installation	
Gearshift lever Construction	
Gearshift lever Removal and Installation	5B-14
Gearshift Lever Height Inspection and	5D 44
Adjustment	5B-14
Gearshift Shaft / Gearshift Cam Plate	5D 44
Components	
Gearshift Construction	5B-14
	ED 15
Removal and Installation	
Gearshift Linkage Inspection Gearshift Shaft Oil Seal / Bearing Removal	3D-10
and Installation	5R 18
Specifications  Service Data	
Tightening Torque Specifications	
Special Tools and Equipment	
Recommended Service Material	
Special Tool	5B-21

Clutch	5C-1
Precautions	5C-1
Precautions for Clutch System	
Clutch Fluid (Brake Fluid) Information	
Schematic and Routing Diagram	
Clutch Hose Routing Diagram	
Diagnostic Information and Procedures	5C-3
Clutch System Symptom Diagnosis	5C-3
Repair Instructions	5C-3
Clutch Lever Position Switch Inspection	
Clutch Fluid Level Check	5C-3
Clutch Hose Inspection	5C-3
Air Bleeding from Clutch Fluid Circuit	5C-3
Clutch Fluid Replacement	
Clutch Hose Removal and Installation	
Clutch Control System Components	5C-6
Clutch Master Cylinder Assembly Removal	
and Installation	5C-6
Clutch Master Cylinder / Clutch Lever	
Disassembly and Assembly	
Clutch Master Cylinder Parts Inspection	5C-9
Clutch Release Cylinder / Push Rod Removal	FC 0
and Installation Clutch Push Rod (Left) Inspection	
Clutch Release Cylinder Disassembly and	50-10
Assembly	5C 10
Clutch Release Cylinder Inspection	
Clutch Components	
Clutch Removal	
Clutch Installation	
Clutch Parts Inspection	
Specifications	
Service Data	
Tightening Torque Specifications	
Special Tools and Equipment	
Recommended Service Material	
Special Tool	

## **Precautions**

## **Precautions**

## **Precautions for Transmission / Transaxle**

Refer to "General Precautions in Section 00 (Page 00-1)".

B817H25000001

## **Manual Transmission**

## **Diagnostic Information and Procedures**

## **Manual Transmission Symptom Diagnosis**

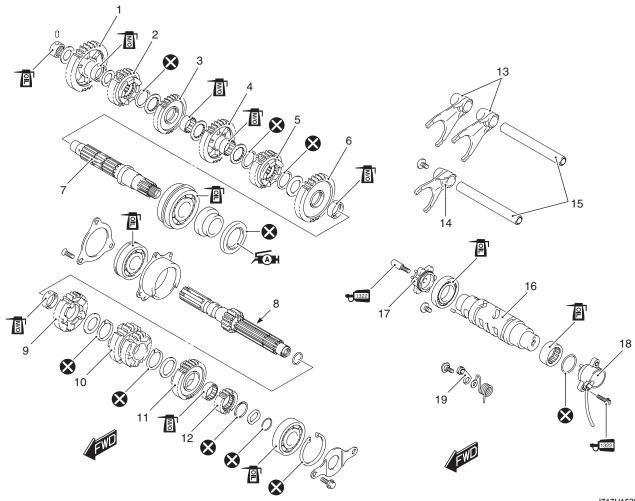
B817H25204001

Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise	Worn or rubbing gear.	Replace.
seems to come from the	Worn countershaft spline.	Replace countershaft.
transmission).	Worn driveshaft spline.	Replace driveshaft.
	Worn or rubbing primary gear.	Replace.
	Worn bearing.	Replace.
Transmission will not	Broken gearshift cam.	Replace.
shift.	Distorted gearshift fork.	Replace.
	Worn gearshift pawl.	Replace.
Transmission will not	Broken gearshift shaft return spring.	Replace.
shift back.	Rubbing or stuck gearshift shaft.	Repair or replace.
	Worn or distorted gearshift fork.	Replace.
Transmission jumps out	Worn gear.	Replace.
of gear.	Worn or distorted gearshift fork.	Replace.
	Weakened gearshift stopper spring.	Replace.
	Worn gearshift pawl.	Replace.

## **Repair Instructions**

## **Transmission Components**

B817H25206001



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1. 1st driven gear	9. 5th drive gear	17. Gearshift cam plate
5th driven gear	10. 3rd/4th drive gear	18. Gear position switch
4th driven gear	11. 6th drive gear	19. Gearshift cam stopper plate
3rd driven gear	12. 2nd drive gear	Apply oil.
5. 6th driven gear	13. Gearshift fork No.1	: Apply molybdenum oil solution.
6. 2nd driven gear	14. Gearshift fork No.3	Apply grease to oil seal lip.
7. Driveshaft	15. Gearshift fork	₹1322 : Apply thread lock to thread part.
Countershaft/1st drive gear	16. Gearshift cam	🐼 : Do not reuse.

## **Transmission Removal**

B817H25206002

- 1) Remove the engine assembly from the frame. Refer to "Engine Assembly Removal in Section 1D (Page 1D-18)".
- 2) Disassemble the engine top side (1). Refer to "Engine Top Side Disassembly in Section 1D (Page 1D-24)".



I717H1520028-01

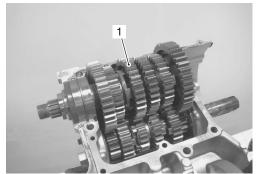
3) Separate the upper and lower crankcases. Refer to "Engine Bottom Side Disassembly in Section 1D (Page 1D-51)".



I717H1520001-01

## **Driveshaft Assembly**

1) Remove the driveshaft assembly (1).

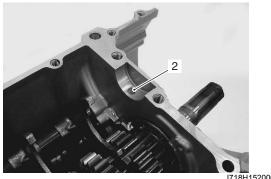


I717H1520002-02

2) Remove the bearing pin (2).

#### **NOTE**

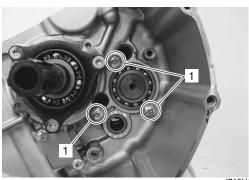
Do not lose the bearing pin (2).



I718H1520006-01

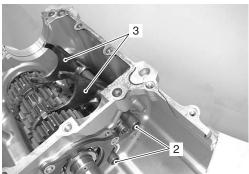
## **Gearshift Cam / Gearshift Fork**

1) Remove the retainer screws (1).



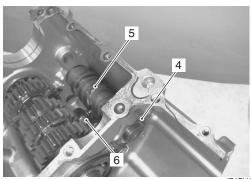
I718H1520007-01

2) Remove the gearshift fork shafts (2) and No.1 gearshift forks (3).



I717H1520003-02

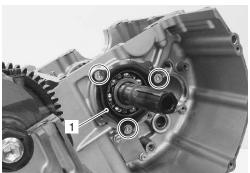
- 3) Remove the gearshift cam bearing (4) and gearshift cam (5).
- 4) Remove the No.3 gearshift fork (6).



I717H1520004-01

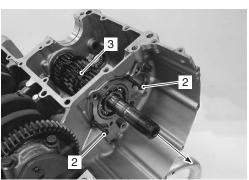
## **Countershaft Assembly**

1) Remove the bearing retainer (1).



I718H1520010-01

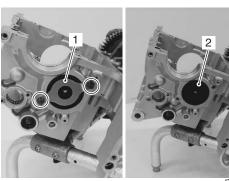
2) By using suitable size bolts (2), pull out the countershaft assembly (3).



I718H1520011-01

## Bearing / Oil Seal

1) Remove the oil seal retainer (1) and oil seal (2).

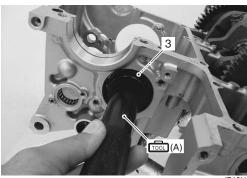


I718H1520012-01

2) Remove the countershaft bearing (3) with the special tool

## Special tool

(A): 09913-70210 (Bearing installer set)

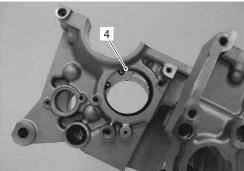


I718H1520013-01

3) Remove the snap ring (4).

#### Special tool

(Snap ring pliers)

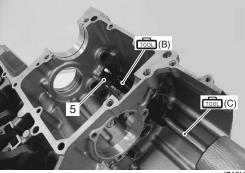


I718H1520014-01

4) Remove the gearshift cam bearing (5) with the special tools.

### Special tool

(B): 09923–74511 (Bearing remover) (C): 09930–30104 (Rotor remover sliding shaft)



I718H1520015-01

### **Transmission Installation**

B817H25206003

Install the transmission in the reverse order of removal. Pay attention to the following points:

## Bearing / Oil Seal

### **⚠ CAUTION**

Replace the removed oil seal, bearings and snap ring with new ones.

• Install the bearings (1), (2) with the special tool.

### **NOTE**

- The stamped mark side of gearshift cam bearing (1) faces inside.
- The sealed side of countershaft bearing (2) faces outside.

### Special tool

(A): 09913-70210 (Bearing installer set)



I718H1520016-02



I718H1520017-02

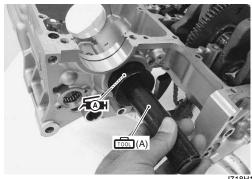
Install the oil seal with the special tool.

## Special tool

(A): 09913-70210 (Bearing installer set)

Apply grease to the oil seal lip.

র⊗н: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



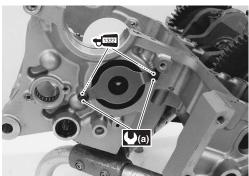
I718H1520018-02

 Apply a small quantity of thread lock to the oil seal bolts and tighten them to the specified torque.

€322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

### **Tightening torque**

Push rod oil seal bolt (a): 12 N·m (1.2 kgf-m, 8.5 lbf-ft)



I717H1520029-02

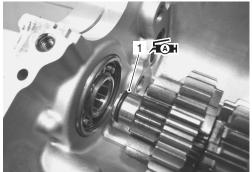
## **Countershaft Assembly**

· Apply grease to the O-ring.

#### **⚠** CAUTION

Replace the O-ring (1) with new one.

## FAH: Grease 99000-25010 (SUZUKI SUPER **GREASE A or equivalent)**

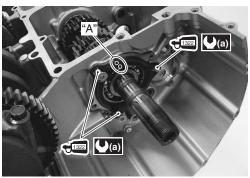


- Align the punch marks "A" on the countershaft bearing housing and bearing retainer.
- · Apply a small quantity of thread lock to the bearing retainer screw and tighten them to the specified torque.

+1322 : Thread lock cement 99000-32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

**Tightening torque** 

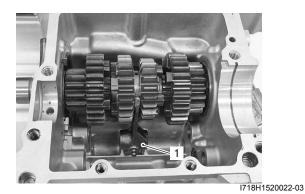
Countershaft bearing retainer screw (a): 12 N·m ( 1.2 kgf-m, 8.5 lbf-ft)



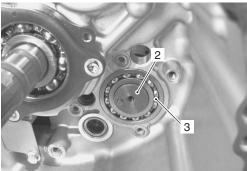
I717H1520030-01

### **Gearshift Cam and Gearshift Fork**

Install the No.3 gearshift fork (1) as shown.



• Install the gearshift cam (2) with the bearing (3) fitted.

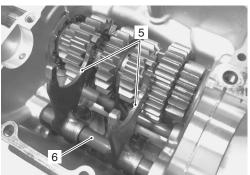


With engaging the No.3 gearshift fork (1) end to the cam groove, insert the fork shaft (4).



I717H1520008-01

With engaging each forks (5) end to the cam groove, insert the fork shaft (6).



· Apply thread lock to the screws and tighten them to the specified torque.

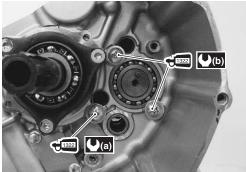
+1322 : Thread lock cement 99000-32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

**Tightening torque** 

Gearshift fork shaft retainer screw (a): 10 N·m ( 1.0 kgf-m, 7.0 lbf-ft)

Gearshift cam retainer screw (b): 10 N·m (1.0 kgf-

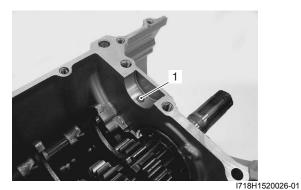
m, 7.0 lbf-ft)



I717H1520031-01

## **Driveshaft Assembly**

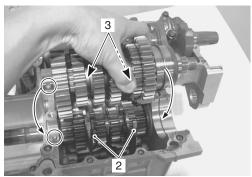
Install the bearing pin (1).



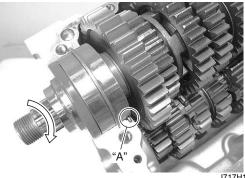
Install the driveshaft assembly on the upper crankcase.

## NOTE

- Align the gearshift forks (2) with their grooves (3).
- Align the C-ring with the groove of bearing and the bearing pin with the indent on the bearing.



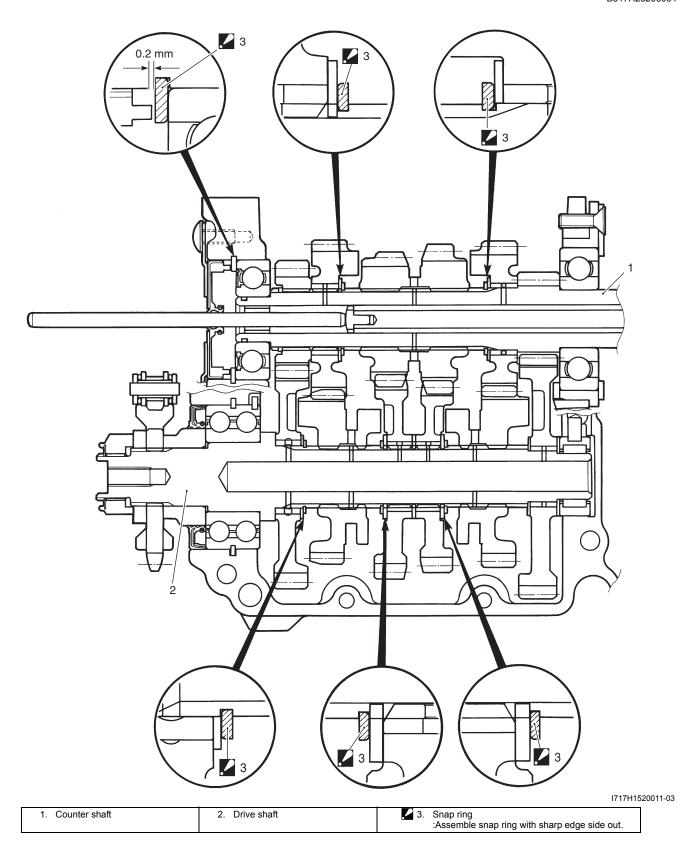
Turn the bearing to fit the bearing dowel pin in the position "A".



- · Assemble the engine. Refer to "Engine Bottom Side Disassembly in Section 1D (Page 1D-51)" and "Engine Top Side Assembly in Section 1D (Page 1D-26)".
- Remount the engine assembly. Refer to "Engine Assembly Installation in Section 1D (Page 1D-21)".

## **Transmission Construction**

B817H25206004



# Countershaft Gear / Driveshaft Gear Disassembly and Assembly

B817H25206005

Refer to "Transmission Removal (Page 5B-2)" and "Transmission Installation (Page 5B-5)".

## Disassembly

## **⚠ CAUTION**

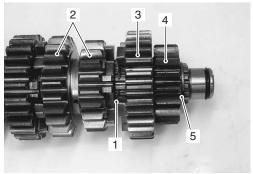
Identify the position of each removed part. Organize the parts in their respective groups (i.e., drive or driven) so that they can be reinstalled in their original positions.

Disassemble the countershaft and driveshaft as shown in the transmission construction. Refer to "Transmission Construction (Page 5B-8)".

Pay attention to the following points:

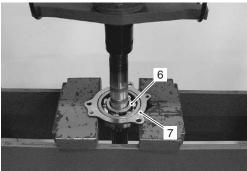
#### Countershaft

- Remove the 6th drive gear snap ring (1) from its groove and slide it towards the 3rd/4th drive gears (2).
- Slide the 6th (3) and 2nd (4) drive gears toward the 3rd/4th drive gears (2), then remove the 2nd drive gear circlip (5).



I717H1520012-01

• Remove the countershaft bearing (6) along with the housing (7), using the hydraulic press.

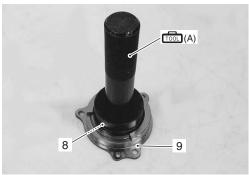


I717H1520013-01

 Remove the countershaft bearing (8) from the housing (9), using the special tool.

### Special tool

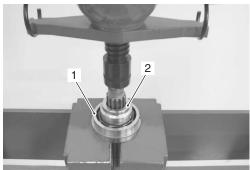
(A): 09913-70210 (Bearing installer set)



I718H1520032-02

#### **Driveshaft**

 Remove the driveshaft bearing (1) along with the spacer (2), using the hydraulic press.



I717H1520014-01

## **Assembly**

#### NOTE

When reassembling the transmission gears, attention must be given to the locations and positions of washers and snap rings. The cross sectional view shows the correct position of the gears, bushings, washers and snap rings. Refer to "Transmission Construction (Page 5B-8)".

#### **⚠ CAUTION**

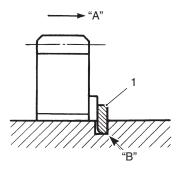
- Never reuse a snap rings. After a snap rings has been removed from a shaft, it should be discarded and a new snap rings must be installed.
- When installing a new snap rings, do not expand the end gap larger than required to slip the snap rings over the shaft.
- After installing a snap rings, make sure that it is completely seated in its groove and securely fitted.

#### NOTE

- Rotate the bearing by hand to inspect for abnormal noises and smooth rotation.
   Replace the bearing if there is anything unusual.
- Before installing the gears, apply engine oil to the driveshaft and countershaft.
- Before installing the oil seal, apply grease to the oil seal lip.

# र्ह्⊞: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

 When installing a new snap ring (1), pay attention to its direction. Fit it to the side where the thrust is as shown in the illustration.



I649G1520049-02

"A": Thrust	"B": Sharp edge	<ol> <li>Snap ring</li> </ol>

#### **Driveshaft**

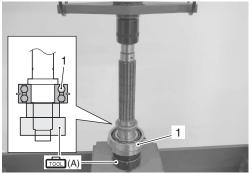
 Install the driveshaft bearing (1), using the hydraulic press and special tool.

#### **⚠** CAUTION

Never reuse driveshaft bearing (1).

#### Special tool

(A): 09913-70210 (Bearing installer set)

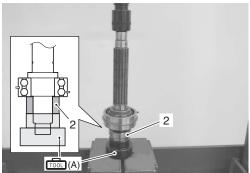


I717H1520015-01

 Install the spacer (2), using the hydraulic press and special tool.

#### Special tool

(A): 09913-70210 (Bearing installer set)

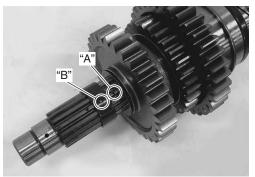


717H1520016-01

 When installing the gear bushing onto the driveshaft, align the shaft oil hole "A" with the bushing oil hole "B".



I718H1520036-01



I718H1520037-01

### Countershaft

 Install the countershaft bearing (1) into the housing (2), using the special tool.

### **⚠ CAUTION**

Never reuse countershaft bearing (1).

### Special tool

(A): 09913-70210 (Bearing installer set)

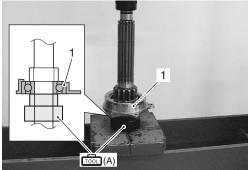


I717H1520017-01

• Install the countershaft bearing (1) to the countershaft, using the hydraulic press and special tool.

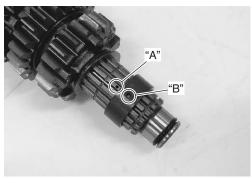
### Special tool

(A): 09913-70210 (Bearing installer set)



I718H1520039-01

When installing the gear bushing onto the countershaft (3), align the shaft oil hole "A" with the bushing oil hole "B".



I718H1520040-01

### **Transmission Related Parts Inspection**

B817H25206006

Refer to "Transmission Removal (Page 5B-2)", "Transmission Installation (Page 5B-5)" and "Countershaft Gear / Driveshaft Gear Disassembly and Assembly (Page 5B-9)".

### **Gearshift Fork to Groove Clearance**

#### NOTE

The clearance for each gearshift fork plays an important role in the smoothness and positiveness of the shifting action.

Using a thickness gauge, check the gearshift fork clearance in the groove of its gear.

If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.

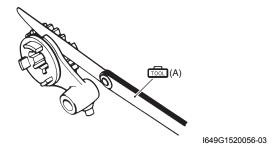
### Special tool

ார் (A): 09900-20803 (Thickness gauge)

Gearshift fork to gearshift fork groove clearance

Standard: 0.1 – 0.3 mm (0.004 – 0.012 in)

Service limit: 0.5 mm (0.02 in)



### **Gearshift Fork Groove Width**

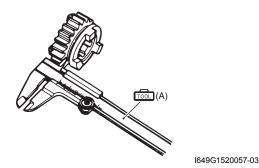
Measure the gearshift fork groove width using the vernier calipers.

### Special tool

(A): 09900-20102 (Vernier calipers (1/20 mm, 200 mm))

### Gearshift fork groove width

Standard (No.1, No.2 & No.3): 5.0 – 5.1 mm (0.197 – 0.201 in)



### **Gearshift Fork Thickness**

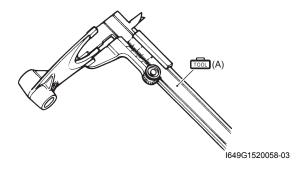
Measure the gearshift fork thickness using the vernier calipers.

### Special tool

(A): 09900-20102 (Vernier calipers (1/20 mm, 200 mm))

### Gearshift fork thickness

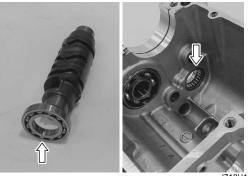
Standard (No.1, No.2 & No.3): 4.8 – 4.9 mm (0.189 – 0.193 in)



### **Gearshift Cam Bearing**

Inspect the gearshift cam bearings, left and right for abnormal noise and smooth rotation.

Replace the bearing if there is anything unusual. Refer to "Transmission Removal (Page 5B-2)" and "Transmission Installation (Page 5B-5)".



I718H1520041-01

### **Gear Position Switch Inspection**

B817H25206007

Refer to "Side-stand / Ignition Interlock System Parts Inspection in Section 1I (Page 1I-8)".

### **Gear Position Switch Removal and Installation**

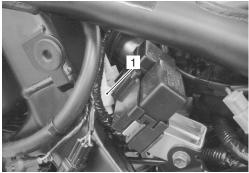
B817H25206008

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

Refer to "Wiring Harness Routing Diagram (GSF650/S/A/SAK7) in Section 9A (Page 9A-8)".

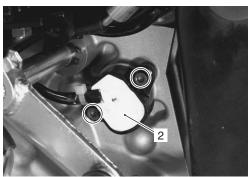
### Removal

- 1) Turn the ignition switch OFF.
- 2) Remove the left flame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 3) Remove the engine sprocket outer cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- 4) Disconnect the gear position switch coupler (1).



I717H1520018-01

### 5) Remove the gear position switch (2).



I718H1520043-01

### Installation

Install the gear position switch in the reverse order of removal. Pay attention to the following points:

· Apply grease to the O-ring.

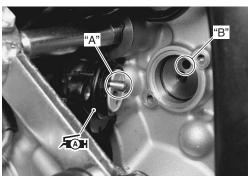
### **⚠ CAUTION**

Replace the O-ring with a new one.

### **NOTE**

Align the gear position switch pin "A" with the gearshift cam hole "B".

র⊗н: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



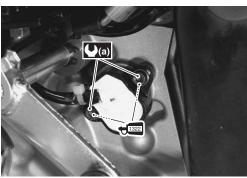
I718H1520044-01

• Apply thread lock to the gear position switch bolts and tighten them to the specified torque.

€322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

**Tightening torque** 

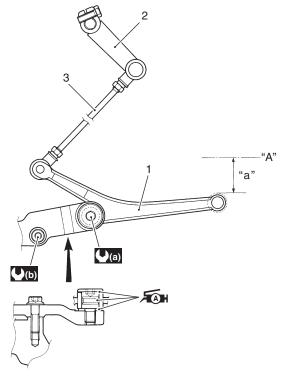
GP switch mounting bolt (a): 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)



I718H1520045-02

 Route the gear position switch lead wire. Refer to "Wiring Harness Routing Diagram (GSF650/S/A/SAK7) in Section 9A (Page 9A-8)".

### **Gearshift lever Construction**



I718H1520074-02

1.	Gearshift lever	"a":	45 – 55 mm (1.8 – 2.2 in)
2.	Gearshift link arm	<b>( (</b> a) :	40 N·m (4.0 kgf-m, 29.0 lb-ft)
3.	Gearshift link rod	<b>(</b> (b) :	23 N·m (2.3 kgf-m, 16.5 lb-ft)
"A":	Footrest top surface	<b>≨</b> @#∶	Apply grease.

### Gearshift lever Removal and Installation

B817H25206010

### Removal

- 1) Place the motorcycle on the center stand.
- 2) Remove the gearshift lever as shown in the gearshift lever construction. Refer to "Gearshift lever Construction (Page 5B-13)".

#### Installation

- 1) Install the gearshift lever as shown in the gearshift lever construction. Refer to "Gearshift lever Construction (Page 5B-13)".
- 2) After installing the gearshift lever, check the gearshift lever height. Refer to "Gearshift Lever Height Inspection and Adjustment (Page 5B-14)".

## Gearshift Lever Height Inspection and Adjustment

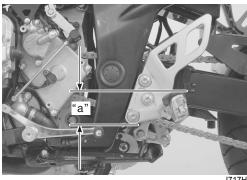
B817H25206011

Inspect and adjust the gearshift lever height in the following procedures:

 Inspect the gearshift lever height "a" between the pedal top face and footrest.
 Adjust the gearshift lever height if necessary.

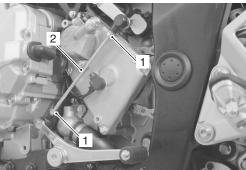
### Gearshift lever height "a"

Standard: 45 - 55 mm (1.8 - 2.2 in.)



I717H1520019-01

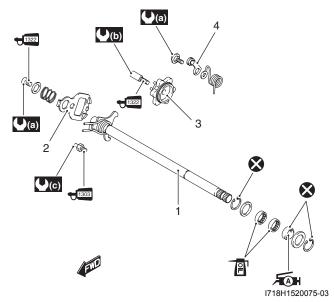
- 2) Loosen the lock-nuts (1).
- 3) Turn the gearshift link rod (2) until the gearshift lever is 45 55 mm (1.8 2.2 in.) below the top of the footrest.
- 4) Tighten the lock-nuts securely.



I717H1520020-02

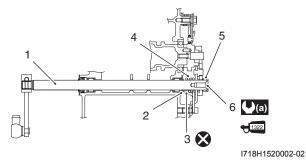
## Gearshift Shaft / Gearshift Cam Plate Components

B817H25206012



1.	Gearshift shaft
2.	Gearshift cam drive plate
3.	Gearshift cam plate
4.	Gearshift cam stopper
<b>(</b> (a) :	10 N·m (1.0 kgf-m, 7.0 lb-ft)
<b>(</b> b) :	13 N·m (1.3 kgf-m, 9.5 lb-ft)
<b>(</b> (c) :	19 N·m (1.9 kgf-m, 13.5 lb-ft)
1303 :	Apply thread lock to thread part.
1322 :	Apply thread lock to thread part.
Æ <b>A</b> H∶	Apply grease to oil seal lip.
<u></u>	Apply engine oil.
<b>※</b> :	Do not reuse.

### **Gearshift Construction**



1.	Gearshift shaft
2.	Washer
3.	Snap ring
4.	Gearshift shaft return spring
5.	Gearshift plate return spring
6.	Gearshift shaft end bolt
<b>(</b> (a) :	10 N·m (1.0 kgf-m, 7.0 lb-ft)
1322 :	Apply thread lock to thread part.
<b>⊗</b> :	Do not reuse.

### Gearshift Shaft / Gearshift Cam Plate Removal and Installation

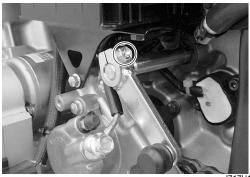
B817H25206014

### Removal

- 1) Remove the engine sprocket outer cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- 2) Disengage the gearshift lever link by removing the

### **NOTE**

Mark the gearshift shaft head at which the gearshift link arm slit set for correct reinstallation.



I717H1520021-01

- 3) Remove the clutch components. Refer to "Clutch Removal in Section 5C (Page 5C-12)".
- 4) Remove the snap ring (1) from the gearshift shaft.

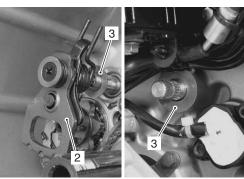
### Special tool

(Snap ring pliers)



I718H1520047-01

5) Remove the gearshift shaft assembly (2) and washers (3).

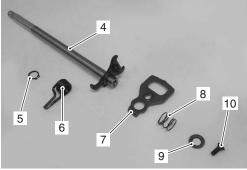


I718H1520048-02

- 6) Remove the following parts from the gearshift shaft (4).
  - Snap ring (5)
  - · Gearshift return spring (6)
  - Gearshift cam drive plate (7)
  - Plate return spring (8)
  - · Washer (9)
  - End bolt (10)

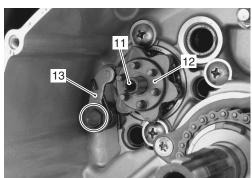
### Special tool

**600**: 09900-06107 (Snap ring pliers)



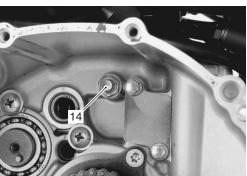
I718H1520049-02

- 7) Remove the gearshift cam plate bolt (11) and gearshift cam plate (12).
- 8) Remove the gearshift cam stopper (13).



I718H1520050-01

9) Remove the gearshift arm stopper (14).



I718H1520051-01

### Installation

Install the gearshift shaft and gearshift cam plate in the reverse order of removal. Pay attention to the following points:

#### **⚠ CAUTION**

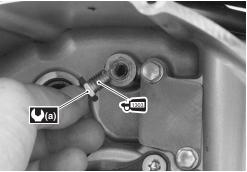
The removed snap rings must be replaced with new ones.

 Apply a small quantity of thread lock to the gearshift arm stopper and tighten it to the specified torque.

+1503: Thread lock cement 99000-32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

**Tightening torque** 

Gearshift arm stopper (a): 19 N·m (1.9 kgf-m, 13.5 lbf-ft)



I718H1520052-01

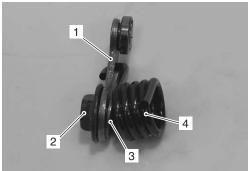
- Install the gearshift cam stopper (1), bolt (2), washer
   (3) and return spring (4).
- Tighten the gearshift cam stopper bolt (2) to the specified torque.

### **NOTE**

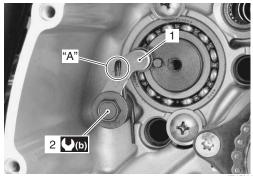
Hook the return spring end "A" to the stopper (1).

Tightening torque

Gearshift cam stopper bolt (b): 10 N·m (1.0 kgfm, 7.0 lbf-ft)



I718H1520003-03

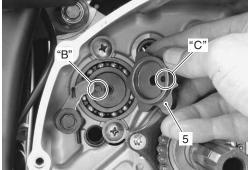


717H1520022-0

- Check the gearshift cam stopper moves smoothly.
- · Locate the gearshift cam in the neutral position.
- Install the gearshift cam stopper plate (5).

### **NOTE**

Align the gearshift cam pin "B" with the gearshift cam stopper plate hole "C".

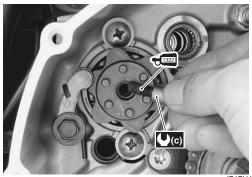


I718H1520054-01

 Apply a small quantity of thread lock to the gearshift cam stopper plate bolt and tighten it to the specified torque.

+322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque Gearshift cam stopper plate bolt (c): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)



I717H1520032-01

 Apply a small quantity of thread lock to the gearshift shaft end bolt and tighten it to the specified torque.

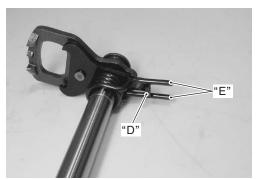
€322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque Gearshift shaft end bolt (d): 10 N⋅m (1.0 kgf-m, 7.0 lbf-ft)



I717H1520033-01

 When installing the gearshift shaft return spring, position the stopper "D" of gearshift arm between the shaft return spring ends "E".

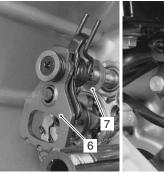


I718H1520057-01

Install the gearshift shaft assembly (6) and washers
 (7) as shown.

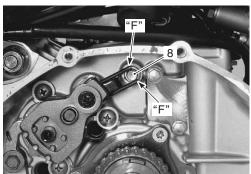
### NOTE

Pinch the gearshift arm stopper (8) with return spring ends "F".





I718H1520058-02

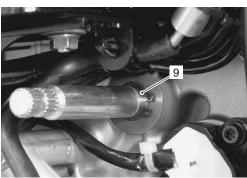


I718H1520059-02

• Install a new snap ring (9).

### Special tool

(Snap ring pliers)



I717H1520023-01

 After installing the gearshift lever, check the gearshift lever height. Refer to "Gearshift Lever Height Inspection and Adjustment (Page 5B-14)".

### **Gearshift Linkage Inspection**

B817H25206015

Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation (Page 5B-15)".

### **Gearshift Shaft**

Check the gearshift shaft for bend or wear.
Check the return spring for damage or fatigue.
If any defects are found, replace the defective part(-s).



I718H1520061-01

#### Gearshift Shaft Oil Seal

Inspect the gearshift shaft oil seal lip for damage or wear. If any defect is found, replace the oil seal with a new one.



I718H1520062-01

### **Gearshift Shaft Bearing**

Inspect the gearshift shaft bearing for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.





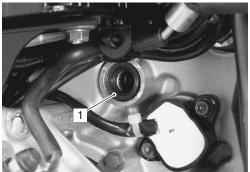
I718H1520063-01

## Gearshift Shaft Oil Seal / Bearing Removal and Installation

#### Removal

1) Remove the gearshift shaft. Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation (Page 5B-15)".

2) Remove the gearshift shaft oil seal (1).



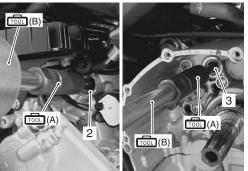
I718H1520064-0

B817H25206016

3) Remove the bearings (2), (3) with the special tools.

### Special tool

(A): 09921–20210 (Bearing remover)
(B): 09930–30104 (Rotor remover sliding shaft)



I718H1520065-01

#### Installation

Install the oil seal and bearing in the reverse order of removal. Pay attention to the following points:

### **⚠ CAUTION**

The removed oil seal and bearings must be replaced with new ones.

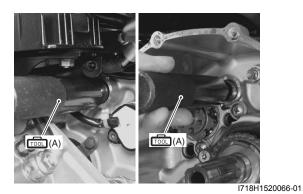
· Install the bearings with the special tool.

### **NOTE**

The stamped mark side of gearshift shaft bearing faces outside.

### Special tool

(A): 09913-70210 (Bearing installer set)



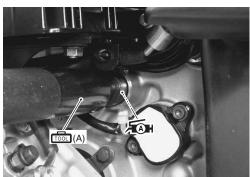
Special tool

(A): 09913-70210 (Bearing installer set)

· Apply grease to the oil seal lip.

· Install the oil seal with the special tool.

ÆM: Grease 99000-25010 (SUZUKI SUPER **GREASE A or equivalent)** 



### **Specifications**

### **Service Data**

### **Transmission + Drive Chain**

Unit: mm (in) Except ratio

Item		Standard		Limit
Primary reduction	n ratio	1.700 (85/50)		_
Final reduction ratio 3.200 (48/15)		3.200 (48/15)	_	
	Low		3.076 (40/13)	_
	2nd		2.058 (35/17)	_
Gear ratios	3rd		1.600 (32/20)	_
Geal Tallos	4th	1.363 (30/22)		_
	5th	1.208 (29/24)		_
	Тор	1.107 (31/28)		_
Gearshift-fork to groove clearance	_	No.1, No.2 & No.3	0.1 – 0.3 (0.004 – 0.012)	0.50 (0.020)
Gearshift fork gro	pove width	No.1, No.2 & No.3	5.0 – 5.1 (0.197 – 0.201)	_
Gearshift fork this	ckness	No.1, No.2 & No.3	4.8 – 4.9 (0.189 – 0.193)	_
Gearshift lever height		45 – 55 (1.8 – 2.2)		

### **Tightening Torque Specifications**

B817H25207002

Eastoning part	Т	ightening torqu	Note	
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Push rod oil seal bolt	12	1.2	8.5	☞(Page 5B-5)
Countershaft bearing retainer screw	12	1.2	8.5	☞(Page 5B-6)
Gearshift fork shaft retainer screw	10	1.0	7.0	☞(Page 5B-7)
Gearshift cam retainer screw	10	1.0	7.0	☞(Page 5B-7)
GP switch mounting bolt	6.5	0.65	4.7	☞(Page 5B-13)
Gearshift arm stopper	19	1.9	13.5	☞(Page 5B-16)
Gearshift cam stopper bolt	10	1.0	7.0	☞(Page 5B-16)
Gearshift cam stopper plate bolt	13	1.3	9.5	☞(Page 5B-17)
Gearshift shaft end bolt	10	1.0	7.0	☞(Page 5B-17)

### NOTE

The specified tightening torque is described in the following.

### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

### **Special Tools and Equipment**

### **Recommended Service Material**

B817H25208001

Material	SUZUKI recommended produ	ct or Specification	Note
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	
	equivalent		6) / ☞(Page 5B-10) /
			☞(Page 5B-13) /
			☞(Page 5B-19)
Thread lock cement	THREAD LOCK CEMENT SUPER	P/No.: 99000-32030	☞(Page 5B-16)
	1303 or equivalent		
	THREAD LOCK CEMENT SUPER	P/No.: 99000-32110	
	1322 or equivalent		6) / ☞(Page 5B-7) /
			☞(Page 5B-13) /
			☞(Page 5B-17) /
			☞(Page 5B-17)

### **NOTE**

Required service material is also described in the following.

<sup>&</sup>quot;Gearshift lever Construction (Page 5B-13)"

<sup>&</sup>quot;Gearshift Shaft / Gearshift Cam Plate Components (Page 5B-14)"

<sup>&</sup>quot;Gearshift Construction (Page 5B-14)"

<sup>&</sup>quot;Transmission Components (Page 5B-2)"

<sup>&</sup>quot;Gearshift lever Construction (Page 5B-13)"

<sup>&</sup>quot;Gearshift Shaft / Gearshift Cam Plate Components (Page 5B-14)"

<sup>&</sup>quot;Gearshift Construction (Page 5B-14)"

### **Special Tool**

•		B817H25208002
09900–06107 Snap ring pliers (Page 5B-15) / (Page 5B-15) / (Page 5B-17)	09900–06108 Snap ring pliers (Page 5B-4)	
09900–20102 Vernier calipers (1/20 mm, 200 mm) (Page 5B-12) / (Page 5B-12)	09900–20803 Thickness gauge ☞(Page 5B-11)	
09913–70210 Bearing installer set  (Page 5B-4) / (Page 5B-5) /  (Page 5B-9) / (Page 5B-10) /  (Page 5B-11) /  (Page 5B-11) /  (Page 5B-19) /  (Page 5B-19)	09921–20210 Bearing remover (Page 5B-18)	
09923–74511 Bearing remover (Page 5B-4)	09930–30104 Rotor remover sliding shaft (Page 5B-4) / (Page 5B-18)	

### Clutch

### **Precautions**

### **Precautions for Clutch System**

Refer to "General Precautions in Section 00 (Page 00-1)".

B817H25300001

### Clutch Fluid (Brake Fluid) Information

B817H25300002

### **▲ WARNING**

- This clutch system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based.
- Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for long periods.
- When storing brake fluid, seal the container completely and keep away from children.
- · When replenishing brake fluid, take care not to get dust into fluid.
- · When washing clutch components, use fresh brake fluid. Never use cleaning solvent.

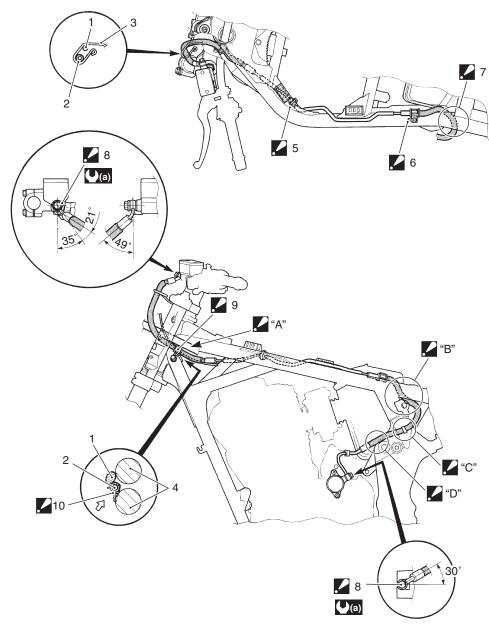
### **⚠ CAUTION**

Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

### **Schematic and Routing Diagram**

### **Clutch Hose Routing Diagram**

B817H25302001



I718H1530005-05

1.	Wiring harness	<b>_</b> 9.	Clutch hose No.3 clamp : After positioning the clamp with stopper, tighten the bolt.
2.	Clutch hose	<b>1</b> 0.	Grommet : Install the grommet of the clutch hose to the clutch hose guide properly.
3.	Guide (GSF650S only)	. <b>/</b> "A":	Pass the wiring harness through upper the clutch hose No.3 clamp.
4.	Frame	<b>∠</b> "B":	Clutch hose : Pass through the clutch hose between the frame and fuel tank rail. Be careful not to contact the clutch hose and frame cover bracket.
<b>.</b> 5.	Clutch hose clamp : Insert the clutch hose clamp end to the hole of the frame fully.	<b>2</b> "C":	pass the clutch hose through outside of the frame.
<b>.</b> 6.	Clutch hose No.2 clamp : After positioning the clamp with stopper, tighten the bolt.	<b>∠</b> "D":	Pass the clutch hose through outside of the wiring harness.
<b>.</b> 7.	Clutch hose : Pass through the clutch hose under the frame.	<b>(</b> (a) :	23 N·m (2.3 kgf-m, 16.5 lb-ft)
<b>.</b> 8.	Union bolt : After the clutch hose union has contacted the stopper, tighten the union bolt.		

### **Diagnostic Information and Procedures**

### **Clutch System Symptom Diagnosis**

B817H25304001

Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise	Worn countershaft spline.	Replace countershaft.
seems to come from the	Worn clutch hub spline.	Replace clutch hub.
clutch).	Worn clutch plate teeth.	Replace clutch plate.
	Distorted clutch plate.	Replace.
	Worn clutch release bearing.	Replace.
	Weakened clutch damper.	Replace primary driven gear.
Clutch slips.	Weakened clutch spring.	Replace.
	Worn or distorted clutch pressure plate.	Replace.
	Distorted clutch plate.	Replace.
Clutch drags.	Leakage of clutch fluid.	Repair or replace.
	Worn or damaged clutch cylinder/	Replace.
	release cylinder.	
	Some clutch springs are weak, while	Replace.
	others are not.	
	Worn or distorted clutch pressure plate.	Replace.
	Distorted clutch plate.	Replace.

### **Repair Instructions**

### **Clutch Lever Position Switch Inspection**

B817H25306001 the following

Inspect the clutch lever position switch in the following procedures:

 Disconnect the clutch lever position switch lead wires.



I717H1530027-01

Inspect the switch for continuity with a tester.If any abnormality is found, replace the switch with a new one.

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication Continuity ( •)))

### Clutch lever position switch

Color Position	Terminal (B/Y)	Terminal (B/W)
FREE		
•	0	
		I649G1530004-03

3) Connect the clutch lever position switch lead wires.

### Clutch Fluid Level Check

B817H25306002

Refer to "Clutch System Inspection in Section 0B (Page 0B-16)".

### **Clutch Hose Inspection**

B817H25306003

Refer to "Clutch System Inspection in Section 0B (Page 0B-16)".

### Air Bleeding from Clutch Fluid Circuit

B817H25306004

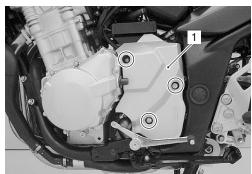
### **⚠ CAUTION**

Handle brake fluid with care: the fluid reacts chemically with paint, plastics, rubber materials, etc.

The clutch fluid circuit may be purged of air in the following manner:

- 1) Keep the motorcycle upright and place the handlebars straight.
- 2) Fill up the master cylinder reservoir to the upper end of the inspection window. Replace the reservoir cap to prevent entry of dirt.

3) Remove the engine sprocket outer cover (1).



I717H1530036-01

4) Attach a pipe to the bleeder valve and insert the free end of the pipe into a receptacle.



I717H1530028-01

5) Squeeze and release the clutch lever several times in rapid succession, and squeeze the lever fully without releasing it.



I718H1530010-01

- 6) Loosen the bleeder valve by turning it a quarter of a turn so that the fluid runs into the receptacle; this will remove the tension of the clutch lever causing it to touch the handlebar grip.
- 7) Close the valve, pump and squeeze the lever, and open the valve.
- 8) Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.
- 9) Close the bleeder valve and disconnect the pipe.

# Tightening torque Air bleeder valve (Clutch): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

10) Fill the reservoir with brake fluid to the upper end of the inspection window.

11) Reinstall the removed parts.

### **Clutch Fluid Replacement**

B817H25306005

### **A** CAUTION

Handle brake fluid with care: the fluid reacts chemically with paint, plastic, rubber materials, etc.

- 1) Place the motorcycle on a level surface and keep the handlebars straight.
- 2) Remove the clutch fluid reservoir cap and diaphragm.
- 3) Suck up the old clutch fluid as much as possible.

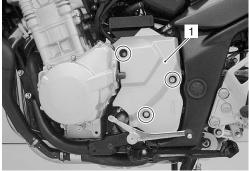


I718H1530011-01

4) Fill the reservoir with new clutch fluid.

### BF: Brake fluid (DOT 4)

5) Remove the engine sprocket outer cover (1).



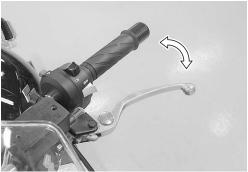
I717H1530036-0

6) Connect a clear hose to the air bleeder valve and insert the other end of hose into a receptacle.



I717H1530028-01

7) Loosen the air bleeder valve and pump the clutch lever until old clutch fluid flows out of the bleeder system.



I718H1530010-01

8) Close the air bleeder valve and disconnect a clear hose.

Tightening torque Air bleeder valve (Clutch) (a): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I717H1530029-01

- Fill the reservoir with new fluid to the upper mark of the reservoir.
- 10) Reinstall the removed parts.

### **Clutch Hose Removal and Installation**

B817H25306006

#### Removal

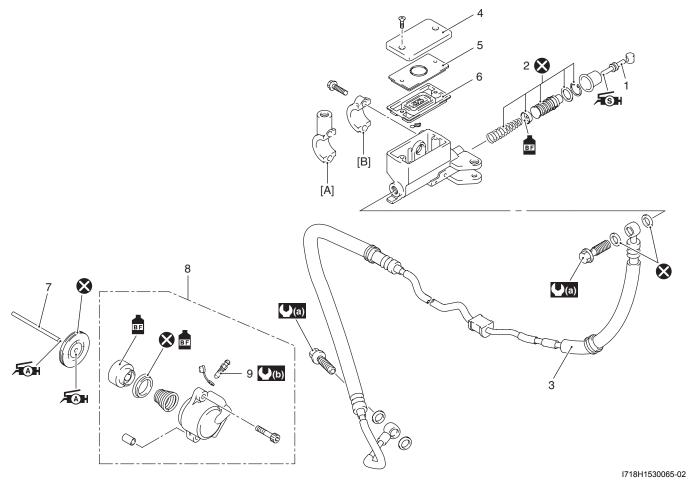
- 1) Drain clutch fluid. Refer to "Clutch Fluid Replacement (Page 5C-4)".
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Remove the left frame cover and engine sprocket outer cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)" and "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- 4) Remove the clutch hose as shown in the clutch hose routing diagram. Refer to "Clutch Hose Routing Diagram (Page 5C-2)".

### Installation

- Install the clutch hose as shown in the clutch hose routing diagram. Refer to "Clutch Hose Routing Diagram (Page 5C-2)".
- 2) Bleed air from the clutch system. Refer to "Air Bleeding from Clutch Fluid Circuit (Page 5C-3)".
- 3) Reinstall the removed parts.

### **Clutch Control System Components**

B817H25306007



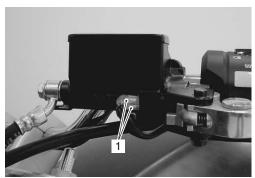
Push rod	7. Push rod	(b): 6 N·m (0.6 kgf-m, 4.5 lb-ft)
2. Piston/Cup set	Clutch release cylinder set	: Apply brake fluid.
3. Clutch hose	9. Air bleeder	ÆAH: Apply grease.
Reservoir cap	[A]: For GSF650	Apply silicone grease.
5. Plate	[B]: For GSF650S	🐼 : Do not reuse.
6. Diaphragm	(2.3 kgf-m, 16.5 lb-ft)	

## **Clutch Master Cylinder Assembly Removal and Installation**

B817H25306008

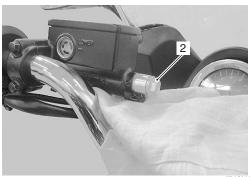
### Removal

- 1) Drain clutch fluid. Refer to "Clutch Fluid Replacement (Page 5C-4)".
- 2) Disconnect the clutch lever position switch lead wires (1).



I717H1530030-01

- Place a rag underneath the clutch hose union bolt
   on the master cylinder to catch any spilt brake fluid.
- 4) Remove the clutch hose union bolt (2) and disconnect the clutch hose.



I718H1530018-01

- 5) Remove the left rear view mirror. (GSF650)
- 6) Remove the master cylinder assembly.



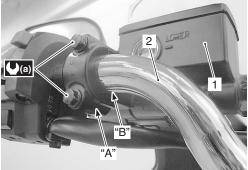
I718H1530019-01

#### Installation

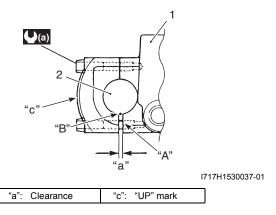
Install the clutch master cylinder in the reverse order of removal. Pay attention to the following points:

 When installing the master cylinder (1) onto the handlebars (2), align the master cylinder holder's mating surface "A" with the punch mark "B" on the handlebars (2) and tighten the upper holder bolt first.

### Tightening torque Clutch master cylinder holder bolt (a): 10 N·m ( 1.0 kgf-m, 7.0 lbf-ft)



I718H1530020-01

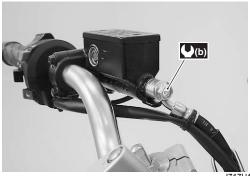


• After setting the clutch hose union to the stopper, tighten the union bolt to the specified torque.

### **⚠ CAUTION**

The seal washers should be replaced with the new ones to prevent fluid leakage.

# Tightening torque Clutch hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I717H1530038-01

Bleed air from the clutch system. Refer to "Air Bleeding from Clutch Fluid Circuit (Page 5C-3)".

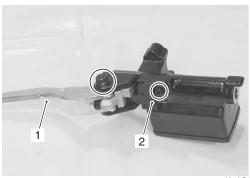
## Clutch Master Cylinder / Clutch Lever Disassembly and Assembly

B817H25306009

Refer to "Clutch Master Cylinder Assembly Removal and Installation (Page 5C-6)".

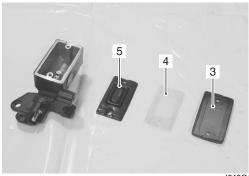
### Disassembly

1) Remove the clutch lever (1) and clutch lever position switch (2).



I649G1530012-02

2) Remove the reservoir cap (3), plate (4) and diaphragm (5).

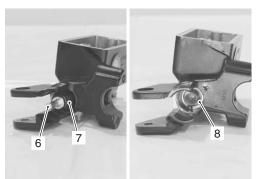


I649G1530013-02

- 3) Pull out the push rod (6) and dust boot (7).
- 4) Remove the snap ring (8).

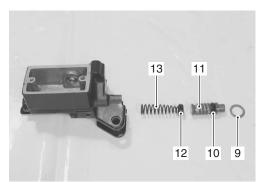
#### Special tool

(Snap ring pliers)



I649G1530014-02

- 5) Remove the following parts from the master cylinder.
  - Washer (9)
  - Secondary cup (10)
  - Piston (11)
  - Primary cup (12)
  - Spring (13)



I649G1530015-02

### **Assembly**

Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

### **⚠ CAUTION**

- Wash the master cylinder components with new brake fluid before reassembly.
- Do not wipe the clutch fluid off after washing the components.
- When washing the components, use the specified clutch fluid (Brake fluid). Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.

BF: Brake fluid (DOT 4)



I649G1530016-02

· Apply SILICONE GREASE to the push rod end.

## র্জ্জ: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I649G1530017-03

 When installing the clutch lever position switch, align the projection on the switch with the hole in the master cylinder.



I649G1530018-02

 Apply SILICONE GREASE to the clutch lever pivot bolt when installing.

## র্জ্জ: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I717H1530031-01

**Tightening torque** 

Clutch lever pivot bolt: 6 N·m (0.6 kgf-m, 4.5 lbf-ff)

Clutch lever pivot bolt lock-nut: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

### **Clutch Master Cylinder Parts Inspection**

B817H25306010

Refer to "Clutch Master Cylinder / Clutch Lever Disassembly and Assembly (Page 5C-8)".

### **Master Cylinder**

Inspect the master cylinder bore for any scratches or other damage.



I649G1530020-02

#### **Piston**

Inspect the piston surface for any scratches or other damage.

### **Rubber Parts**

Inspect the primary cup, secondary cup and dust boot for wear or damage.



I649G1530021-02

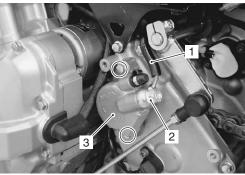
## Clutch Release Cylinder / Push Rod Removal and Installation

B817H25306011

### Removal

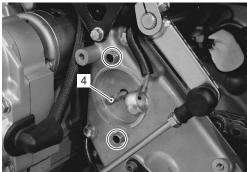
- 1) Drain clutch fluid. Refer to "Clutch Fluid Replacement (Page 5C-4)".
- 2) Remove the engine sprocket outer cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- 3) Disconnect the clutch hose (1) by removing the union bolt (2).

4) Remove the clutch release cylinder (3).



I717H1530032-01

5) Remove the dowel pins and push rod (4).



I717H1530033-01

#### Installation

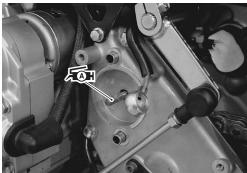
Install the clutch release cylinder in the reverse order of removal. Pay attention to the following points:

### **⚠ CAUTION**

The seal washers should be replaced with the new ones to prevent fluid leakage.

 Apply a small quantity of GREASE "A" to the push rod.

## ⊼्रा: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1530034-01

- Install the clutch hose as shown in the clutch hose routing diagram. Refer to "Clutch Hose Routing Diagram (Page 5C-2)".
- Bleed air from the clutch system. Refer to "Air Bleeding from Clutch Fluid Circuit (Page 5C-3)".

### Clutch Push Rod (Left) Inspection

B817H25306012

Inspect the push rod in the following procedures:

- 1) Remove the clutch push rod. Refer to "Clutch Release Cylinder / Push Rod Removal and Installation (Page 5C-9)".
- 2) Inspect the push rod for wear or bend. If any defects are found, replace it with a new one.



I718H1530025-01

3) Reinstall the removed parts. Refer to "Clutch Release Cylinder / Push Rod Removal and Installation (Page 5C-9)".

## Clutch Release Cylinder Disassembly and Assembly

B817H25306013

Refer to "Clutch Release Cylinder / Push Rod Removal and Installation (Page 5C-9)".

### Disassembly

- 1) Place a rag over the piston to prevent popping up.
- 2) Force out the piston by using air gun.

#### **↑** CAUTION

Do not use high pressure air to prevent piston damage.





I718H1530026-01

### **Assembly**

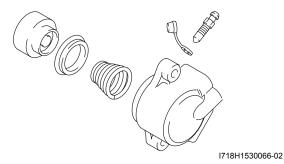
Assemble the clutch cylinder in the reverse order of disassembly. Pay attention to the following points:

 Wash the cylinder bore and piston with specified brake fluid.

BF: Brake fluid (DOT 4)

### **⚠ CAUTION**

- Wash the cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.



 Bleed air from the clutch system. Refer to "Air Bleeding from Clutch Fluid Circuit (Page 5C-3)".

### **Clutch Release Cylinder Inspection**

B817H25306014

Refer to "Clutch Release Cylinder Disassembly and Assembly (Page 5C-10)".

Inspect the clutch cylinder bore wall for nicks, scratches or other damage.

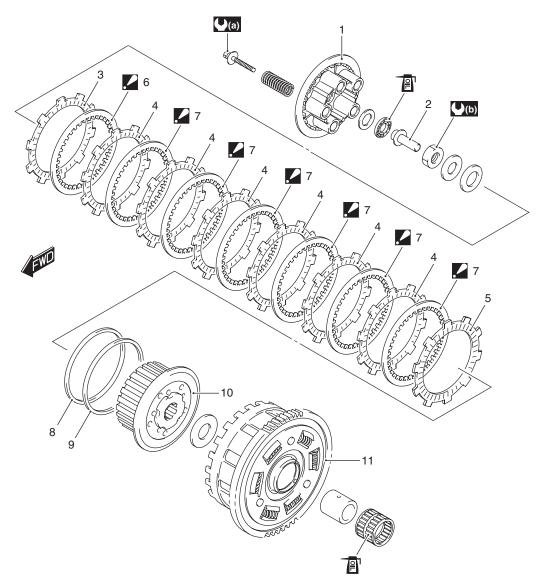
Inspect the piston surface for any scratches or other damage.



I718H1530028-03

### **Clutch Components**

B817H25306015



I717H1530001-01

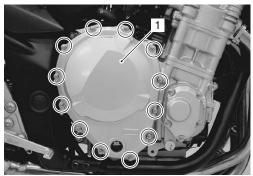
Clutch pressure plate	<ul> <li>6. No.1 driven plate (0 – 2 pcs)</li> <li>: The No.1 and No.2 driven plates are 7 in total.</li> </ul>	11. Primary driven gear assembly
Clutch push piece	<ul> <li>7. No.2 driven plate (5 – 7 pcs)</li> <li>: The No.1 and No.2 driven plates are 7 in total.</li> </ul>	(15.0 kgf-m, 108.5 lb-ft)
3. No.2 drive plate	Spring washer	(b): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
4. No.1 drive plate	Spring washer seat	: Apply engine oil.
5. No.3 drive plate	10. Clutch sleeve hub	

### **Clutch Removal**

B817H25306016

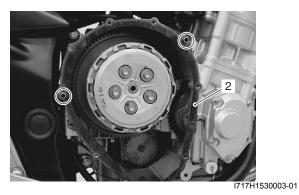
1) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

2) Remove the clutch cover (1).



I717H1530002-01

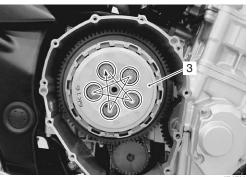
3) Remove the gasket (2) and dowel pins.



4) Remove the clutch spring set bolts, clutch springs and pressure plate (3).

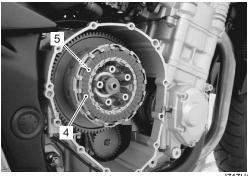
### **NOTE**

Loosen the clutch spring set bolts little by little and diagonally.



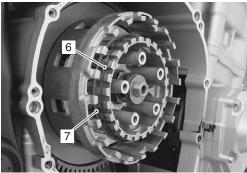
I717H1530004-01

5) Remove the clutch drive plates (4) and driven plates (5).



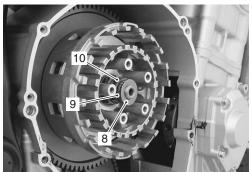
I717H1530005-01

6) Remove the spring washer (6) and its seat (7).



I717H1530006-02

7) Remove the thrust washer (8), bearing (9) and clutch push piece (10).



I717H1530007-01

8) Remove the clutch push rod (11).

### **NOTE**

If it is difficult to pull out the push rod (11), use a magnetic hand or a wire.



I717H1530008-01

9) Unlock the clutch sleeve hub nut.



I717H1530009-01

10) Hold the clutch sleeve hub with the special tools.

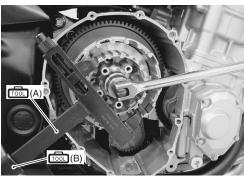
### Special tool

(A): 09920-53740 (Clutch sleeve hub

holder)

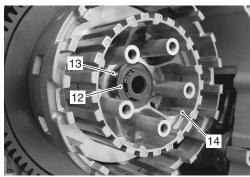
(B): 09920-31020 (Extension handle)

11) Remove the clutch sleeve hub nut.



I717H1530010-0

12) Remove the conical spring washer (12), washer (13) and clutch sleeve hub (14).

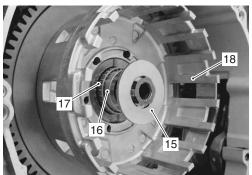


I717H1530011-01

- 13) Remove the thrust washer (15), spacer (16) and bearing (17).
- 14) Remove the primary driven gear assembly (18).

### **NOTE**

If it is difficult to remove the primary driven gear, rotate the crankshaft.



I717H1530012-01

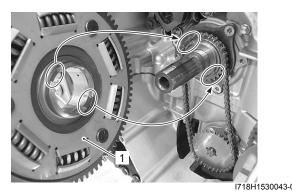
### **Clutch Installation**

B817H25306017

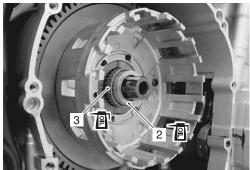
1) Install the primary driven gear assembly (1).

### **NOTE**

- If it is difficult to install the primary driven gear, rotate the crankshaft.
- Be sure to engage the oil pump drive sprocket with the primary driven gear.



2) Install the spacers (2) and bearing (3), and apply engine oil to them.



I717H1530013-01

3) Install the thrust washer (4).

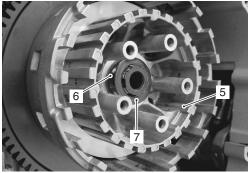


I717H1530014-01

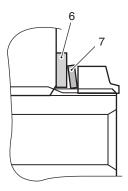
4) Install the clutch sleeve hub (5), washer (6) and spring washer (7)

### **NOTE**

The conical curve side of spring washer (7) faces outside.



I717H1530015-01



I718H1530068-02

5) Hold the clutch sleeve hub with the special tool.

### Special tool

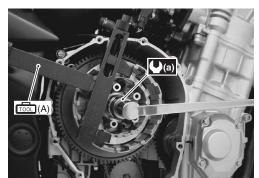
(A): 09920-53740 (Clutch sleeve hub holder)

(B): 09920-31020 (Extension handle)

6) Tighten the clutch sleeve hub nut to the specified torque.

### **Tightening torque**

Clutch sleeve hub nut (a): 150 N·m (15.0 kgf-m, 108.5 lbf-ft)



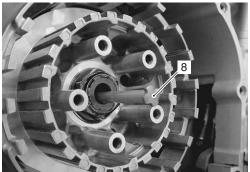
I717H1530016-01

7) Lock the clutch sleeve hub nut with a center punch.



I717H1530017-01

8) Install the clutch push rod (8) into the countershaft.

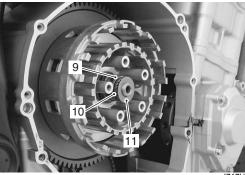


I717H1530018-01

9) Install the clutch push piece (9), bearing (10) and thrust washer (11) to the countershaft.

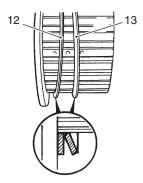
### **NOTE**

Thrust washer (11) is located between the pressure plate and bearing (10).



I717H1530019-01

10) Install the spring washer seat (12) and spring washer (13) onto the clutch sleeve hub correctly.

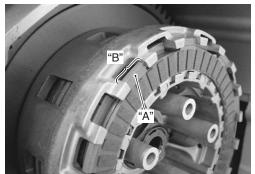


I718H1530051-01

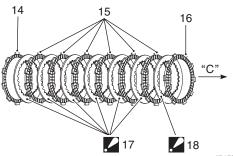
11) Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order.

### **NOTE**

Insert the outermost No.2 drive plate claws "A" to the other slits "B" of clutch housing as shown.



I717H1530020-01



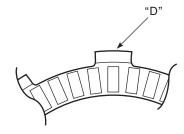
I717H1530021-02

14. No.3 drive plate	17. No.1 driven plate (5 – 7 pcs) : The No.1 and No.2 driven plates are 7 in total.
15. No.1 drive plate	18. No.2 driven plate (0 – 2 pcs) : The No.1 and No.2 driven plates are 7 in total.
16. No.2 drive plate	"C": Direction of outside

### NOTE

### For drive plate

Three kinds of the drive plate (No.1, No.2 and No.3) are equipped in the clutch system, they can be distinguished by the inside diameter and paint "D".



I717H1530035-03

Drive plate	I.D.	Paint "D"
No.1	101 mm (5.0 in)	Black
No.2	101 mm (5.0 in)	Green
No.3	108 mm (5.3 in)	_

### NOTE

### For driven plate

Two kinds of the driven plate (No.1 and No.2) are equipped in the clutch system, they can be distinguished by the thickness. The No.1 and No.2 driven plates are 7 in total. The driven plate No.2 should be used within 2 pcs. The driven plate No.2 should be installed pressure plate side.

Driven plate	Thickness
No.1	2.6 mm (0.10 in)
No.2	2.3 mm (0.09 in)

- 12) Install the clutch springs.
  - Tighten the clutch spring set bolts to the specified torque.

### NOTE

Tighten the clutch spring set bolts diagonally.

### Tightening torque

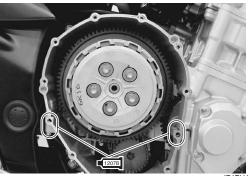
Clutch spring set bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I717H1530022-02

13) Apply a light coat of the BOND to the clutch cover gasket mating surface as shown.

■1207日: Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

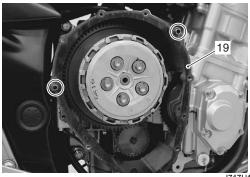


1717H1530023-01

14) Install the dowel pins and gasket (19).

### **⚠ CAUTION**

Use a new gasket to prevent oil leakage.



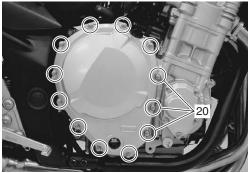
I717H1530024-01

15) Fit new gasket washer to the bolt (20).

### **⚠ CAUTION**

Use the gasket washers to prevent oil leakage.

16) Install the clutch cover and tighten the clutch cover bolts.



717H1530025-02

17) Pour Engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

### **Clutch Parts Inspection**

B817H25306018

Refer to "Clutch Removal (Page 5C-12)" and "Clutch Installation (Page 5C-14)".

#### **Clutch Drive and Driven Plate**

#### NOTE

Wipe off the engine oil from the drive and driven plates with a clean rag.

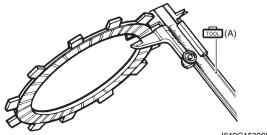
Measure the thickness of drive plates with a vernier calipers. If the drive plate thickness is found to have reached the limit, replace it with a new one.

#### Special tool

(A): 09900-20102 (Vernier calipers (1/20 mm, 200 mm))

### Clutch drive plate thickness

Service limit (No.1, No.2 and No.3 drive plates): 2.62 mm (0.103 in)



I649G1530056-03

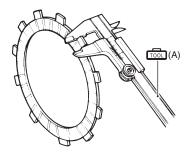
Measure the claw width of drive plates with a vernier calipers. Replace the drive plates found to have worn down to the limit.

#### Special tool

(A): 09900-20102 (Vernier calipers (1/20 mm, 200 mm))

### Clutch drive plate claw width

Service limit (No.1, No.2 and No.3 drive plates): 13.0 mm (0.51 in)



I649G1530057-03

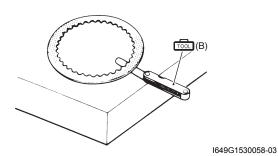
Measure each driven plate for distortion with a thickness gauge and surface plate.

Replace driven plates which exceed the limit.

Special tool

(B): 09900-20803 (Thickness gauge)

Clutch driven plate distortion Service limit: 0.10 mm (0.004 in)



### **Clutch Spring**

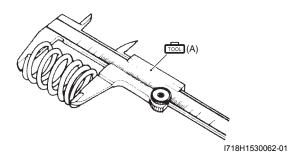
Measure the free length of each coil spring with a vernier calipers, and compare the length with the specified limit. Replace all the springs if any spring is not within the limit.

Special tool

(A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Clutch spring free length

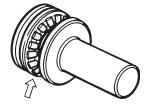
Service limit: 51.5 mm (2.01 in)



### **Clutch Release Bearing**

Inspect the clutch release bearing for any abnormality, especially cracks. When removing the bearing from the clutch, decide whether it can be reused or if it should be replaced.

Smooth engagement and disengagement of the clutch depends on the condition of this bearing.



I649G1530059-02

### Push Rod (Right)

Inspect the push rod for wear and damage.
If any defects are found, replace the push rod with a new one.



I718H1530063-01

### Clutch Sleeve Hub and Primary Driven Gear Assembly

Inspect the slot of the clutch sleeve hub and primary driven gear assembly for damage or wear caused by the clutch plates. If necessary, replace it with a new one.



I717H1530026-01

### **Specifications**

### **Service Data**

Clutch

Unit: mm (in)

Item	Standard		Limit
Clutch drive plate thickness	No.1, 2, 3	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
Clutch drive plate claw width	No.1, 2, 3	13.7 – 13.8 (0.539 – 0.543)	13.0 (0.51)
Clutch driven plate distortion		_	0.10 (0.004)
Clutch spring free length	54.15 (2.13)		51.5 (2.0)
Clutch master cylinder bore	14.000 – 14.043 (0.5511 – 0.5529)		_
Clutch master cylinder piston diam	13.957 – 13.984 (0.5495 – 0.5506)		_
Clutch release cylinder bore	38.18 - 38.23 (1.503 - 1.505)		_
Clutch release cylinder piston diam	38.08 – 38.13 (1.500 – 1.501)		_
Clutch fluid type	Brake fluid DOT 4		_

### **Tightening Torque Specifications**

B817H25307002

B817H25307001

Fastening part	Tightening torque			Note
rastening part	N⋅m	kgf-m	lbf-ft	Note
Air bleeder valve (Clutch)	6	0.6	4.5	☞(Page 5C-4) /
	0	0.0	4.5	☞(Page 5C-5)
Clutch master cylinder holder bolt	10	1.0	7.0	☞(Page 5C-7)
Clutch hose union bolt	23	2.3	16.5	☞(Page 5C-7)
Clutch lever pivot bolt	6	0.6	4.5	☞(Page 5C-9)
Clutch lever pivot bolt lock-nut	6	0.6	4.5	☞(Page 5C-9)
Clutch sleeve hub nut	150	15.0	108.5	☞(Page 5C-15)
Clutch spring set bolt	10	1.0	7.0	☞(Page 5C-16)

### **NOTE**

The specified tightening torque is also described in the following.

### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

<sup>&</sup>quot;Clutch Hose Routing Diagram (Page 5C-2)"

<sup>&</sup>quot;Clutch Control System Components (Page 5C-6)"

<sup>&</sup>quot;Clutch Components (Page 5C-12)"

### **Special Tools and Equipment**

### **Recommended Service Material**

B817H25308001

Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	_	
			8) / ☞(Page 5C-11)
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	☞(Page 5C-10)
	equivalent		
	SUZUKI Silicone Grease or	P/No.: 99000-25100	
	equivalent		9)
Sealant	SUZUKI BOND No.1207B or	P/No.: 99000-31140	☞(Page 5C-17)
	equivalent		

### NOTE

Required service material is also described in the following.

"Clutch Control System Components (Page 5C-6)"

### **Special Tool**

09900–06108 Snap ring pliers ☞(Page 5C-8)	09900–20102 Vernier calipers (1/20 mm, 200 mm) © (Page 5C-17) / © (Page 5C-17) / © (Page 5C-18)
09900–20803	09900–25008
Thickness gauge	Multi-circuit tester set
☞(Page 5C-18)	(Page 5C-3)
09920–31020	09920–53740
Extension handle	Clutch sleeve hub holder
(Page 5C-14) /	(Page 5C-14) /
(Page 5C-15)	(Page 5C-15)

<sup>&</sup>quot;Clutch Components (Page 5C-12)"

### Section 6

## **Steering**

### **CONTENTS**

Precautions	6-1
Precautions	6-1
Precautions for Steering	6-1
Steering General Diagnosis	. 6A-1
Diagnostic Information and Procedures	6A-1
Steering Symptom Diagnosis	6A-1
Steering / Handlebar	. 6B-1
Repair Instructions	6B-1
Handlebars Components	6B-1
Handlebar Construction (GSF650/S/A/SAK7)	6B-2
Handlebars Removal and Installation	6B-3
Handlebars Inspection	6B-4

Handlebar Height Adjustment	6B-4
Steering Components	6B-5
Steering Removal and Installation	6B-6
Steering Related Parts Inspection	6B-8
Steering System Inspection	6B-9
Steering Stem Bearing Removal and	
Installation	6B-9
Steering Tension Adjustment	6B-10
Handlebar Construction (GSX650FK8)	6B-11
Specifications	6B-11
Tightening Torque Specifications	6B-11
Special Tools and Equipment	6B-12
Recommended Service Material	6B-12
Special Tool	6B-12

### **Precautions**

### **Precautions**

### **Precautions for Steering**

Refer to "General Precautions in Section 00 (Page 00-1)".

## **Steering General Diagnosis**

### **Diagnostic Information and Procedures**

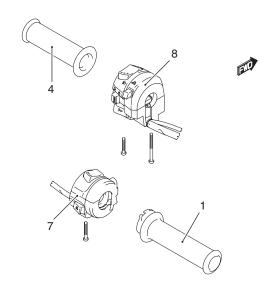
### **Steering Symptom Diagnosis**

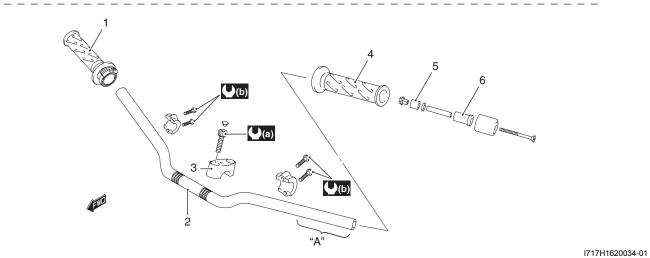
Condition	Possible cause	Correction / Reference Item
Heavy Steering	Over tightened steering stem nut.	Adjust.
	Broken bearing in steering stem.	Replace.
	Distorted steering stem.	Replace.
	Not enough pressure in tires.	Adjust.
Wobbly Handlebars	Loss of balance between right and left	Replace fork or adjust fork oil level or replace
	front forks.	spring.
	Distorted front fork.	Repair or replace.
	Distorted front axle or crooked tire.	Replace.
	Loose steering stem nut.	Adjust.
	Worn or incorrect tire or wrong tire	Adjust or replace.
	pressure.	
	Worn bearing/race in steering stem.	Replace.

## **Steering / Handlebar**

### **Repair Instructions**

### **Handlebars Components**

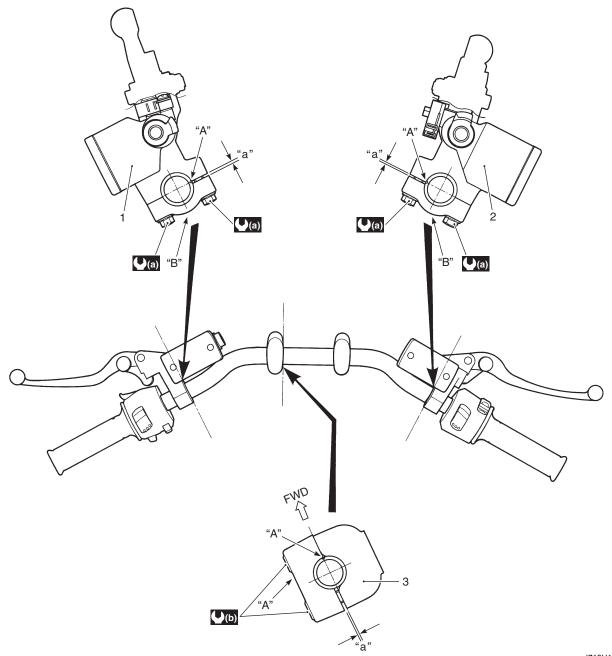




Throttle grip	5. Handle expander	"A": Apply handle grip bond.
2. Handlebars	Handle balancer expander	<b>(a)</b> : 23 N⋅m (2.3 kgf-m, 16.5 lb-ft)
3. Handlebar holder (Upper)	7. Right handlebar switch box	<b>(b)</b> : 10 N⋅m (1.0 kgf-m, 7.0 lb-ft)
Grip rubber	Left handlebar switch box	

## Handlebar Construction (GSF650/S/A/SAK7)

B817H26206002



I718H1620040-0	1
17 10111020040-0	

Clutch master cylinder	"A": Punch mark	<b>(</b> (a) : 10 N⋅m (1.0 kgf-m, 7.0 lb-ft)
Front brake master cylinder	"B": UP mark	<b>(b)</b> : 23 N⋅m (2.3 kgf-m, 16.5 lb-ft)
Handlebar holder	"a": Clearance	

## **Handlebars Removal and Installation**

B817H26206003

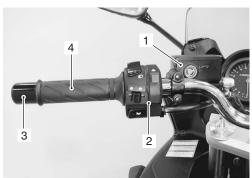
#### Removal

- 1) Remove the following parts from the left handlebar.
  - a) Rear view mirror (GSF650)
  - b) Clutch master cylinder/clutch lever (1)

## **⚠ CAUTION**

Do not turn the clutch master cylinder upside down.

- c) Left handlebar switch box (2)
- d) Handlebar balancer (3)
- e) Grip rubber (4)



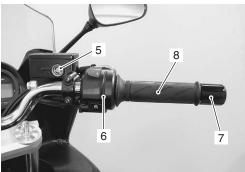
717H1620001-01

- 2) Remove the following parts from the right handlebar.
  - a) Rear view mirror (GSF650)
  - b) Front brake master cylinder/Front brake lever (5)

## **⚠ CAUTION**

Do not turn the front brake master cylinder upside down.

- c) Right handlebar switch box (6)
- d) Handlebar balancer (7)
- e) Throttle grip (8)



I717H1620002-02

3) Remove the caps and handlebar holder bolts.

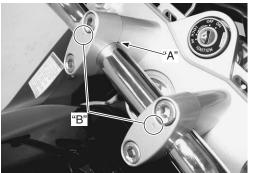


I717H1620003-02

## Installation

Install the handlebars in the reverse order of removal. Pay attention to the following points:

- Set the handlebars so that its punch mark "A" aligns with the mating surface of the left handlebar holder.
- Set the handlebar holders with their punch marks "B" forward.



717H1620004-02

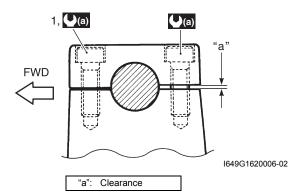
· Tighten the handlebar holder bolts.

#### **NOTE**

First tighten the handlebar holder bolts (1) (front ones) to the specified torque.

## **Tightening torque**

Handlebar holder bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



 Apply SUZUKI SUPER GREASE to the end of the throttle cables and cable pulley.

# Æ⊪: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

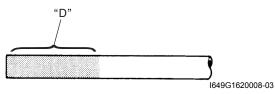
 Insert the projection "C" of the right handlebar switch box into the hole of the handlebars.



I717H1620005-01

- Install the front brake master cylinder. Refer to "Front Brake Master Cylinder Assembly Removal and Installation in Section 4A (Page 4A-9)".
- Apply a handle grip bond "D" onto the left handlebar before installing the handlebar grip.

# ■BOND : Handle grip bond (Handle Grip Bond (commercially available))



• Insert the projection "D" of the left handlebar switch box into the hole of the handlebars.



17H1620007-02

- Install the clutch master cylinder. Refer to "Clutch Master Cylinder Assembly Removal and Installation in Section 5C (Page 5C-6)".
- After installing the steering, the following adjustments are required before driving.
  - Cable routing (Refer to "Throttle Cable Routing Diagram (GSF650/S/A/SAK7) in Section 1D (Page 1D-2)".)
  - Throttle cable play (Refer to "Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-14)".)

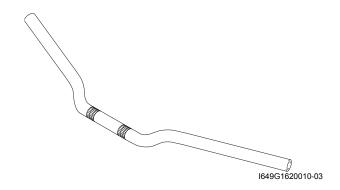
## **Handlebars Inspection**

B817H26206004

Refer to "Handlebars Removal and Installation (Page 6B-3)".

Inspect the handlebars for distortion and damage.

If any defect is found, replace the handlebars with a new one.



## **Handlebar Height Adjustment**

B817H26206005

Handlebars height adjustment in the following procedures:

## **▲ WARNING**

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

- 1) Remove the handlebar holder set nuts and handlebar spacers (1), left and right.
- 2) Dismount the handlebars.

#### NOTE

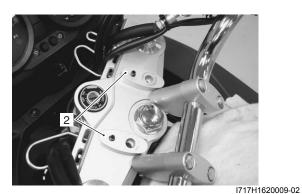
Place a rag on the fuel tank to prevent the fuel tank scratched.





I717H1620008-01

3) Insert the spacers (2) between the steering upper bracket and handlebar holders.

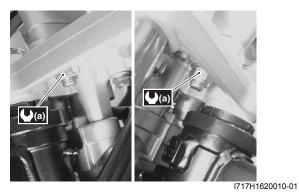


\_

4) Set the handlebars.

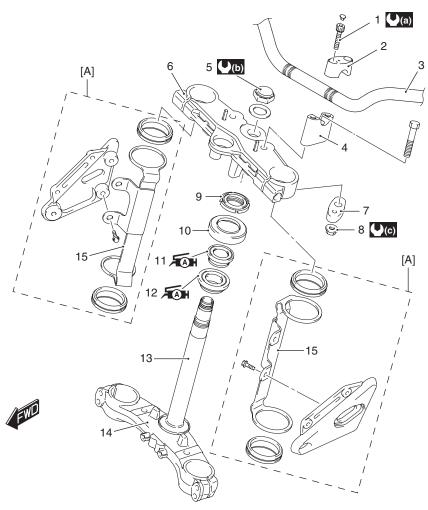
5) Tighten the handlebar holder set nuts to the specified torque.

Tightening torque Handlebar holder set nut (a): 45 N⋅m (4.5 kgf-m, 32.5 lbf-ft)



## **Steering Components**

B817H26206006



I717H1620035-03

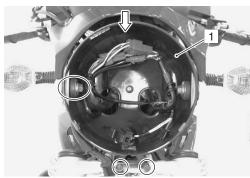
Handlebar holder bolt	Handlebar holder set nut	<ol><li>Headlight housing bracket</li></ol>
Handlebar holder (Upper)	Steering stem nut	[A]: For GSF650
3. Handlebars	10. Dust seal	(2.3 kgf-m, 16.5 lb-ft)
Handlebar holder (Lower)	11. Steering stem upper bearing	(6.5 kgf-m, 47.0 lb-ft)
Steering stem head nut	12. Steering stem lower bearing	(4.5 kgf-m, 32.5 lb-ft)
Steering stem upper bracket	13. Steering stem lower bracket	Apply grease to bearing.
7. Handlebar spacer	14. Lower seal	

## Steering Removal and Installation

B817H26206007

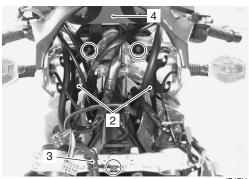
#### Removal (GSF650)

- 1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-4)".
- 2) Remove the front forks. Refer to "Front Fork Removal and Installation in Section 2B (Page 2B-2)".
- 3) Remove the headlight. Refer to "Headlight Removal and Installation (GSF650/S/A/SAK7) in Section 9B (Page 9B-2)".
- 4) Disconnect the couplers.
- 5) Remove the headlight housing (1).



I717H1620011-01

- 6) Remove the headlight housing brackets (2).
- 7) Remove the brake hose clamp (3).
- 8) Remove the combination meter unit (4).



717H1620012

9) Demount the handlebars and steering upper bracket. Refer to "Ignition Switch Removal and Installation in Section 1H (Page 1H-7)".

#### NOTE

If necessary, remove the ignition switch from the upper bracket. Refer to "Ignition Switch Removal and Installation in Section 1H (Page 1H-7)". 10) Remove the steering stem nut using the special tool.

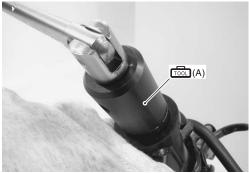
#### NOTE

When loosening the stem nuts, hold the steering stem lower bracket to prevent it from falling.

### Special tool

ன் (A): 09940–14911 (Steering stem nut wrench)

11) Remove the steering stem lower bracket.



1717H1620016-02

12) Remove the dust seal (5) and steering stem upper bearing (6).

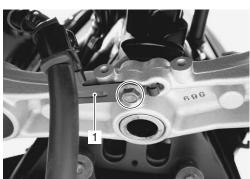




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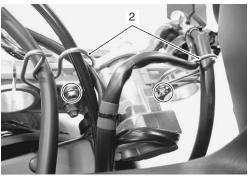
#### Removal (GSF650S)

- 1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (GSF650/S/U/SUK7) in Section 2D (Page 2D-4)".
- 2) Remove the front forks. Refer to "Front Fork Removal and Installation in Section 2B (Page 2B-2)".
- 3) Remove the brake hose clamp (1).



I717H1620018-01

4) Remove the cable guides (2).



I717H1620019-01

5) Dismount the handlebars and steering upper bracket. Refer to "Ignition Switch Removal and Installation in Section 1H (Page 1H-7)".

#### **NOTE**

If necessary, remove the ignition switch from the upper bracket. Refer to "Ignition Switch Removal and Installation in Section 1H (Page 1H-7)".

6) Remove the steering stem nut using the special tool.

#### NOTE

When loosening the stem nuts, hold the steering stem lower bracket to prevent it from falling.

Special tool

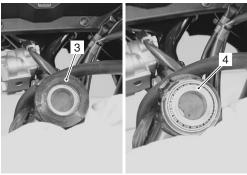
(A): 09940-14911 (Steering stem nut wrench)

7) Remove the steering stem lower bracket.



I717H1620023-02

8) Remove the dust seal (3) and steering stem upper bearing (4).



I717H1620024-02

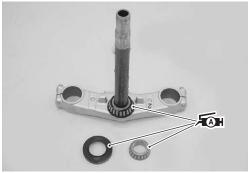
#### Installation

Install the steering in the reverse order of removal. Pay attention to the following points:

## **Bearing**

 Apply SUZUKI SUPER GREASE to the bearings, races and dust seals before remounting the steering stem.

# 和: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I717H1620025-01

## Steering stem nut

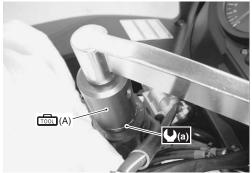
 Tighten the steering stem nut to the specified torque using the special tool.

#### Special tool

(A): 09940-14911 (Steering stem nut wrench)

#### **Tightening torque**

Steering stem nut (a): 45 N·m (4.5 kgf-m, 32.5 lb-ft) then turn back 1/2 - 1/4.

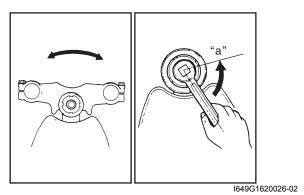


I717H1620026-01

- Turn the steering stem lower bracket about five or six times to the left and right so that the angular ball bearings seat properly.
- Loosen the steering stem nut 1/4 1/2 turn "a".

#### **NOTE**

This adjustment will vary from motorcycle to motorcycle.



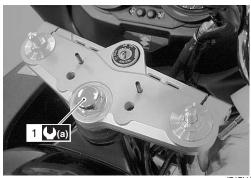
#### Steering stem upper bracket

Install the front forks and steering stem upper bracket in the following steps:

- 1) Temporarily install the upper bracket, washer and steering stem head nut (1).
- 2) Set the headlight housing brackets. (GSF650)
- 3) Temporarily install the front forks.

4) Tighten the steering stem head nut (1).

Tightening torque Steering stem head nut (a): 65 N·m (6.5 kgf-m, 47.0 lbf-ft)



1717H1620027-04

5) Tighten the front fork upper and lower clamp bolts. Refer to "Front Fork Removal and Installation in Section 2B (Page 2B-2)".

#### Handlebars

Tighten the handlebar holder set nuts to the specified torque.

Tightening torque Handlebar holder set nut (a): 45 N⋅m (4.5 kgf-m, 32.5 lbf-ft)



I717H1620029-04

## Inspection After Installation

 Check the steering tension. Refer to "Steering Tension Adjustment (Page 6B-10)".

## **Steering Related Parts Inspection**

B817H26206008

Refer to "Steering Removal and Installation (Page 6B-6)".

Inspect the removed parts for the following abnormalities.

- Distortion of the steering stem
- Bearing wear or damage
- · Abnormal bearing noise
- · Race wear or damage
- · Bearing lower seal damage
- Rubber dust seal wear or damage

If any abnormal points are found, replace defective parts with new ones. Refer to "Ignition Switch Removal and Installation in Section 1H (Page 1H-7)".



I717H1620030-01



I717H1620031-01

## Steering System Inspection

B817H26206009

Refer to "Steering System Inspection in Section 0B (Page 0B-21)".

## Steering Stem Bearing Removal and Installation

B817H26206010

#### Removal

- 1) Remove the dust seal and steering stem upper bearing. Refer to "Steering Removal and Installation (Page 6B-6)".
- 2) Remove the steering stem lower bearing and inner race using a chisel.



I649G1620033-02

3) Remove the steering stem upper and lower bearing races using the special tools.

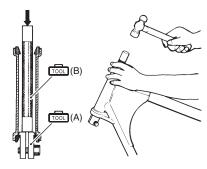
#### Special tool

(A): 09941-54911 (Bearing outer race

remover)

(B): 09941-74911 (Steering bearing

installer)



1649G1620034-03

#### Installation

Install the steering stem bearings in the reverse order of removal. Pay attention to the following points:

#### **A** CAUTION

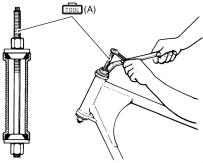
The removed bearings and races should be replaced with new ones.

#### Outer race

 Press in the upper and lower outer races using the special tool.

#### Special tool

(A): 09941-34513 (Steering race installer)



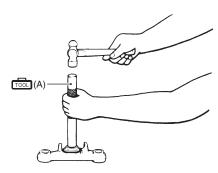
1649G1620035-03

#### Inner race

 Press in the lower inner race and bearing using the special tool.

## Special tool

(A): 09941-74911 (Steering bearing installer)



I649G1620036-03

 Install the steering. Refer to "Steering Removal and Installation (Page 6B-6)".

## **Steering Tension Adjustment**

B817H26206011

Check the steering movement in the following procedures:

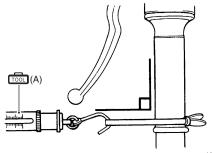
- 1) By supporting the motorcycle with a jack, lift the front wheel unit is off the floor 20 30 mm (0.8 1.2 in).
- 2) Check to make sure that the cables and wire harnesses are properly routed.
- 3) With the front wheel in the straight ahead state, hitch the spring scale (special tool) on one handlebar grip end as shown in the figure and read the graduation when the handlebar starts moving.

### Initial force

200 - 500 grams

## Special tool

ான் (A): 09940-92720 (Spring scale)



I649G1620040-02

- 4) Do the same on the other grip end.
- 5) If the initial force read on the scale when the handlebar starts turning is either to heavy or too light, adjust it till it satisfies the specification.
  - a) First, loosen the front fork upper and lower clamp bolts, steering stem head nut and steering stem nut, and then adjust the steering stem nut by loosening or tightening it.

#### Special tool

(B): 09910-60611 (Universal clamp wrench)



I717H1620032-01

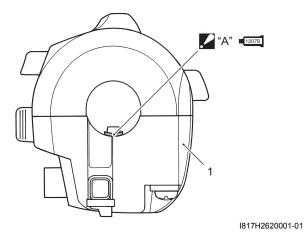
- b) Tighten the steering stem nut, stem head nut and front fork upper and lower clamp bolts to the specified torque and recheck the initial force with the spring scale according to the previously described procedure.
- c) If the initial force is found within the specified range, adjustment has been completed.

#### NOTE

Hold the front fork legs, move them back and forth and make sure that the steering is not loose.

## **Handlebar Construction (GSX650FK8)**

B817H26206012



1.	Handlebar switch (LH)	1207B : Apply bond.
"A":	Apply a small amount of the bond 1207B to inside of the handlebar switchbox.	

## **Specifications**

## **Tightening Torque Specifications**

B817H26207001

Fastening part	Tightening torque			Note
rastering part	N⋅m	kgf-m	lbf-ft	Note
Handlebar holder bolt	23	2.3	16.5	☞(Page 6B-3)
Handlebar holder set nut	45	4.5		☞(Page 6B-5) /
	45	4.5	32.3	☞(Page 6B-8)
Steering stem nut	45 N·m (4.5 kg	f-m, 32.5 lb-ft)	then turn back	☞(Page 6B-8)
	1/2 - 1/4.			
Steering stem head nut	65	6.5	47.0	☞(Page 6B-8)

## **NOTE**

The specified tightening torque is also described in the following.

## Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque Specifications in Section 0B (Page 0B-24)".

<sup>&</sup>quot;Handlebars Components (Page 6B-1)"

<sup>&</sup>quot;Handlebar Construction (GSF650/S/A/SAK7) (Page 6B-2)"

<sup>&</sup>quot;Steering Components (Page 6B-5)"

## **Special Tools and Equipment**

## **Recommended Service Material**

B817H26208001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or	P/No.: 99000-25010	
	equivalent		7)
Handle grip bond	Handle Grip Bond (commercially	_	☞(Page 6B-4)
	available)		

## **NOTE**

Required service material is also described in the following.

- "Steering Components (Page 6B-5)"
- "Handlebar Construction (GSX650FK8) (Page 6B-11)"

## **Special Tool**

		B817H26208002
09910–60611	09940–14911	_
Universal clamp wrench	Steering stem nut wrench	
☞(Page 6B-10)		
(, 23, 22, 13)	7) / @(Page 6B-8)	7
	(1 dgs 52 s)	
09940–92720	09941–34513	
Spring scale	Steering race installer	
☞(Page 6B-10)	☞(Page 6B-9)	
(1 age of 10)	(1 ago 52 5)	
09941–54911	09941–74911	
Bearing outer race remover	Steering bearing installer	
☞(Page 6B-9)	(Page 6B-9) / (Page 6B-	
(Fage ob-9)	10)	
		/ /
	1//	$\searrow$
	$\sim$ $\mid$	
		9

## **Section 9**

# **Body and Accessories**

## **CONTENTS**

Precautions9-1	Turn Signal Light Bulb Replacement	9B-9
Precautions9-1	Reflex Refractor Construction (GSF650/S/A/	
Precautions for Electrical System 9-1	SAK7)	
Component Location9-1	Turn Signal / Side-stand Relay Inspection	.9B-10
Electrical Components Location 9-1	Turn Signal / Side-stand Relay Removal and Installation	9R_10
Minimus Occatoure	Hazard Switch Inspection	
Wiring Systems9A-1	Turn Signal Switch Inspection	
Schematic and Routing Diagram9A-1		
Wiring Diagram (GSF650K7)9A-1	Passing Light Switch Inspection	
Wiring Diagram (GSF650SK7)9A-3	Dimmer Switch Inspection	
Wiring Diagram (GSF650A/UAK7)9A-5	Headlight Components (GSX650FK8)	.96-12
Wiring Diagram (GSF650SA/ASUK7)9A-6	Headlight Removal and Installation	00.40
Wiring Harness Routing Diagram (GSF650/S/	(GSX650FK8)(GSX650FK8)	
A/SAK7)9A-8	Headlight Bulb Replacement (GSX650FK8)	
Wiring Diagram (GSX650FK8)9A-11	Headlight Beam Adjustment (GSX650FK8)	
Wiring Harness Routing Diagram	Reflex Refractor Construction (GSX650FK8)	
(GSX650FK8)9A-13	Specifications	
Specifications9A-14	Service Data (GSF650/S/A/SAK7)	
Service Data (GSF650/S/U/SUK7)9A-14	Service Data (GSX650FK8)	
Service Data (GSF650A/UA/SA/ASUK7)9A-14	Tightening Torque Specifications	.9B-16
Tightening Torque Specifications	Special Tools and Equipment	.9B-16
rightening rorque opecinications	Special Tool	.9B-16
Lighting Systems9B-1	·	
Lighting Systems	Combination Meter / Fuel Meter / Horn.	. 9C-1
Repair Instructions9B-1	Combination Meter / Fuel Meter / Horn.	
Repair Instructions9B-1 Headlight Components (GSF650/AK7)9B-1	Combination Meter / Fuel Meter / Horn. General Description	
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description	9C-1
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description (GSF650/S/A/SAK7)	9C-1
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description	<b>9C-1</b> 9C-1
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description (GSF650/S/A/SAK7)  Combination Meter System Description (GSX650FK8)	9 <b>C-1</b> 9C-1 9C-2
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions	9 <b>C-1</b> 9C-1 9C-2
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description	9C-1 9C-1 9C-2 9C-3
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)	9C-1 9C-1 9C-2 9C-3
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description	9C-1 9C-1 9C-2 9C-3
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description (GSF650/S/A/SAK7)  Combination Meter System Description (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation (GSF650/S/A/SAK7)	9C-1 9C-1 9C-2 9C-3
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and	9C-19C-29C-39C-3
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and  Assembly (GSF650/S/A/SAK7)	9C-19C-29C-39C-3
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and  Assembly (GSF650/S/A/SAK7)  Combination Meter Inspection (GSF650/S/A/SAK7)	9C-19C-29C-39C-39C-5
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and  Assembly (GSF650/S/A/SAK7)  Combination Meter Inspection (GSF650/S/A/SAK7)	9C-19C-29C-39C-3
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and  Assembly (GSF650/S/A/SAK7)  Combination Meter Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Indicator Light	9C-19C-29C-39C-39C-59C-5
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description	9C-19C-29C-39C-39C-59C-5
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and  Assembly (GSF650/S/A/SAK7)  Combination Meter Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Indicator Light Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Removal and	9C-19C-29C-39C-39C-59C-5
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and  Assembly (GSF650/S/A/SAK7)  Combination Meter Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Indicator Light Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Removal and Installation	9C-19C-29C-39C-39C-59C-59C-69C-7
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and  Assembly (GSF650/S/A/SAK7)  Combination Meter Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Indicator Light Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Removal and Installation  Fuel Level Indicator Inspection	9C-19C-29C-39C-39C-59C-59C-69C-7
Repair Instructions	Combination Meter / Fuel Meter / Horn.  General Description  Combination Meter System Description  (GSF650/S/A/SAK7)  Combination Meter System Description  (GSX650FK8)  Repair Instructions  Combination Meter Components (GSF650/S/A/SAK7)  Combination Meter Removal and Installation  (GSF650/S/A/SAK7)  Combination Meter Disassembly and  Assembly (GSF650/S/A/SAK7)  Combination Meter Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Indicator Light Inspection (GSF650/S/A/SAK7)  Engine Coolant Temperature Removal and Installation	9C-19C-29C-39C-59C-59C-69C-7

## 9-ii Table of Contents

Fuel Level Gauge Inspection	9C-9	Front Fender Construction	9D-4
Speedometer Inspection		Frame Cover Cushion Construction	9D-4
Speed Sensor Removal and Installation.		Engine Sprocket Outer Cover Cushion	9D-5
Speed Sensor Inspection		Fastener Removal and Installation	
Oil Pressure Indicator Inspection (GSF65		Exterior Parts Removal and Installation	
A/SAK7)		(GSF650/S/A/SAK7)	9D-6
Oil Pressure Switch Removal and Installa		Seat Height Adjustment	
Ignition Switch Inspection	9C-11	Cowling Construction (GSX650FK8)	
Ignition Switch Removal and Installation.		Under Cowl Construction (GSX650FK8)	
Horn Inspection (GSF650/S/A/SAK7)		Under Cowl Bracket Cushion Attachment	
Horn Removal and Installation (GSF650/		(GSX650FK8)	9D-12
SAK7)		Under Cowl Protector Cushion Attachment	
Combination Meter Components		(GSX650FK8)	9D-12
(GSX650FK8)	9C-13	Upper Panel Cushion Attachment	
Combination Meter Removal and Installa	tion	(GSX650FK8)	9D-13
(GSX650FK8)	9C-13	Windscreen Cushion Attachment	
Combination Meter Disassembly and		(GSX650FK8)	9D-13
Assembly (GSX650FK8)		Intake Net Cover Construction Attachment	
Combination Meter Inspection (GSX650F	FK8)9C-14	(GSX650FK8)	9D-14
Engine Coolant Temperature Indicator Li	ght	Exterior Parts Removal and Installation	
Inspection (GSX650FK8)	9C-15	(GSX650FK8)	9D-14
Oil Pressure Indicator Inspection		Ded Otestes	<b>0</b> E 4
(GSX650FK8)		Body Structure	
Horn Inspection (GSX650FK8)		Repair Instructions	9E-1
Horn Removal and Installation (GSX650)	FK8)9C-16	Body Frame Construction	9E-1
Specifications	9C-17	Engine Mounting Bracket Bushing	
Service Data (GSF650/S/A/SAK7)	9C-17	Replacement	
Service Data (GSX650FK8)	9C-17	Engine Mount Bushing Replacement	
Tightening Torque Specifications	9C-17	Front Footrest Bracket Construction	
Special Tools and Equipment	9C-17	Side-stand Construction	
Special Tool	9C-17	Side-stand Removal and Installation	
		Center Stand Construction	
Exterior Parts	9D-1	Center Stand Removal and Installation	
Schematic and Routing Diagram	9D-1	Specifications	
Seat Lock Cable Routing Diagram	9D-1	Tightening Torque Specifications	9E-5
Repair Instructions			OE E
Repair instructions	9D-2	Special Tools and Equipment	9⊑-ວ
Exterior Parts Construction (GSF650S/S/		Special Tools and Equipment	
	4K7)9D-2		

# **Precautions**

## **Precautions**

## **Precautions for Electrical System**

B817H29000001

Refer to "General Precautions in Section 00 (Page 00-1)" and "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".

## **Component Location**

## **Electrical Components Location**

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

B817H29003001

# Wiring Systems

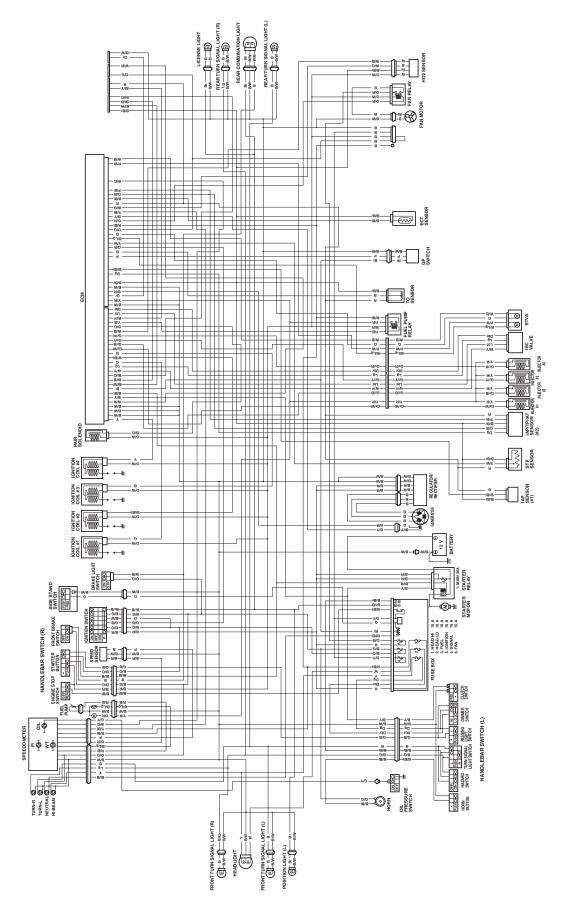
## **Schematic and Routing Diagram**

## Wiring Diagram (GSF650K7)

Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".

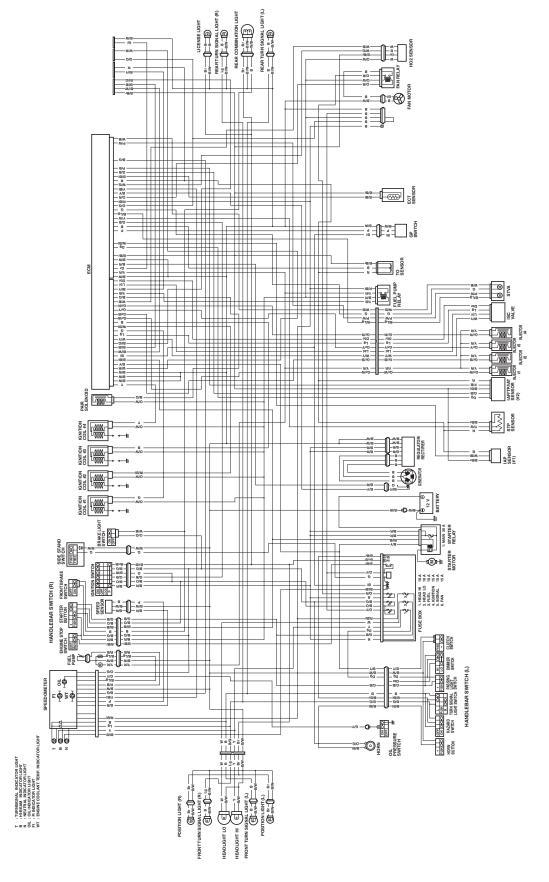
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For E-02, 19

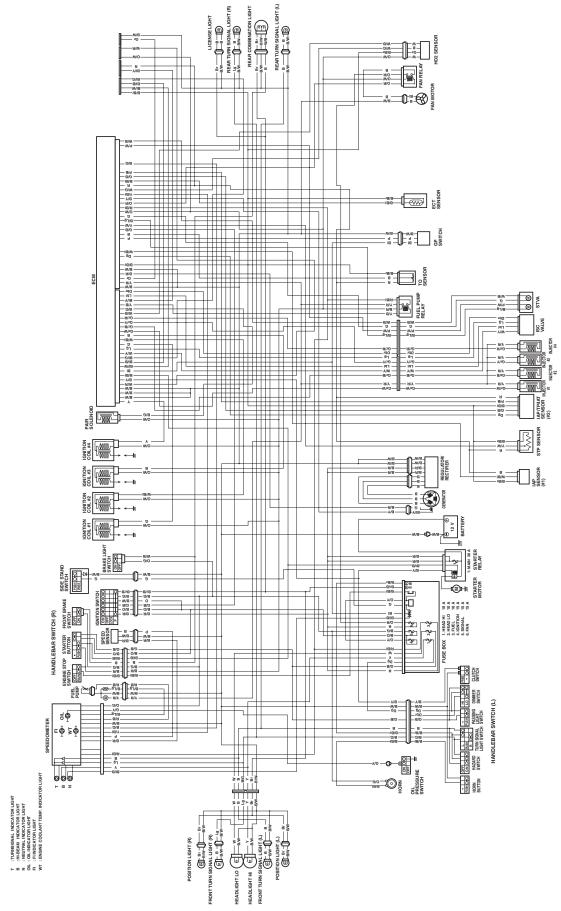


Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".

For E-02, 19

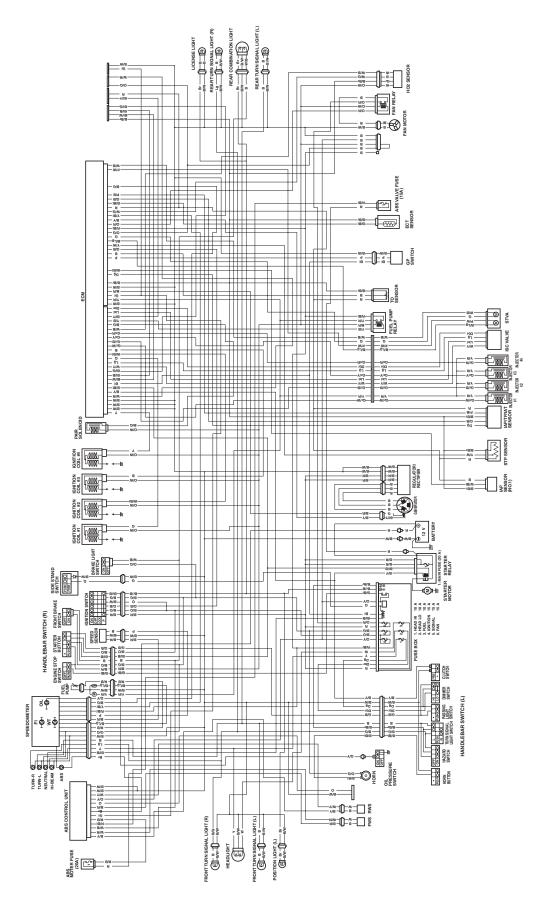


For E-28



Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".

For E-02, 19

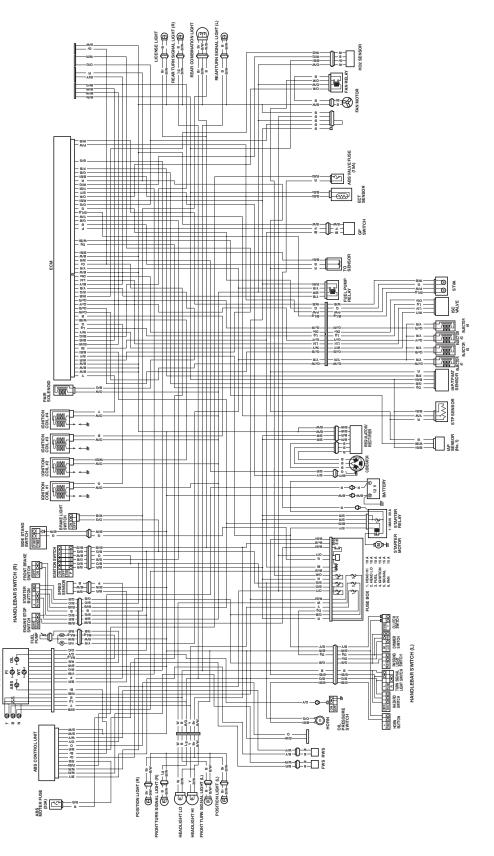


## Wiring Diagram (GSF650SA/ASUK7)

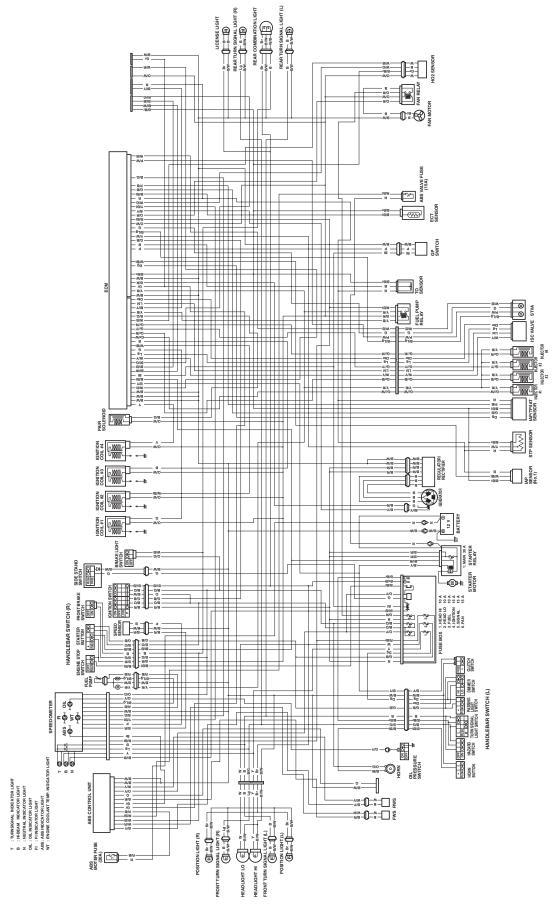
Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".

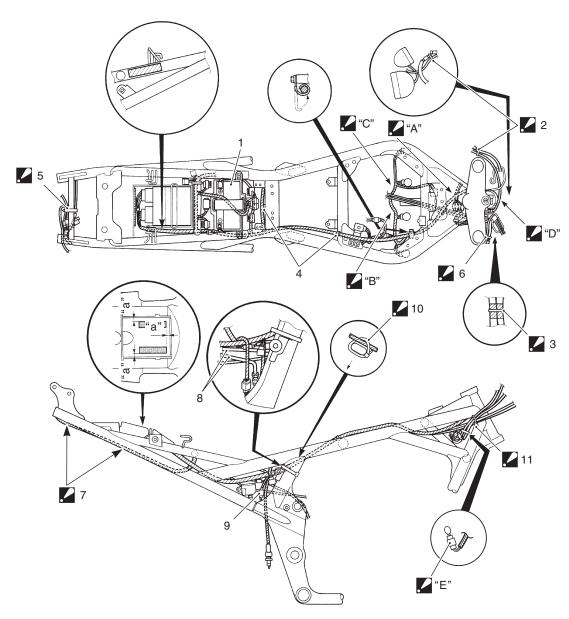
For E-02,19

B817H29102005



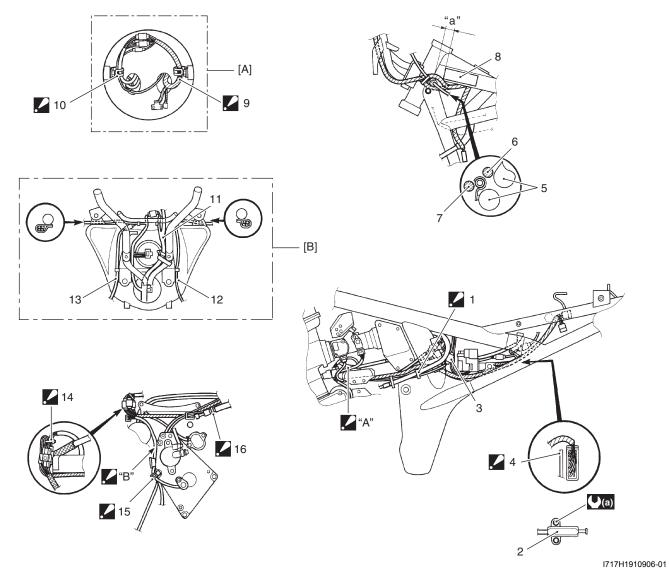
For E-28



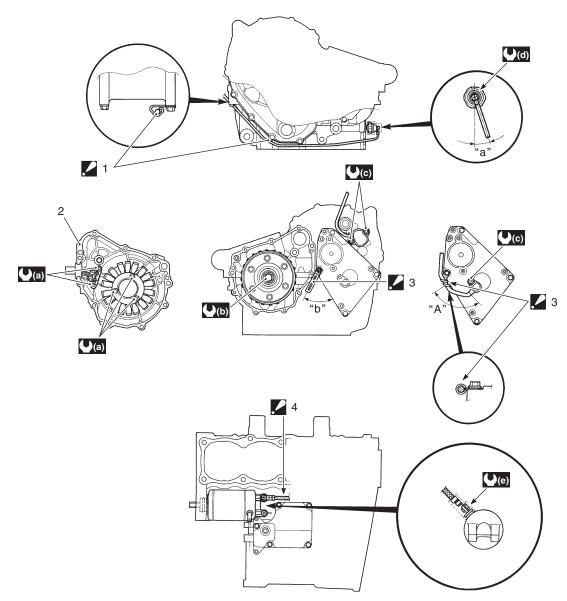


I717H1910907-03

	1/1/1191090/-
1. Battery	<ul><li>10. Clamp</li><li>: Clamp the lead wire and brake hose (ABS) (GSF650A/SA).</li></ul>
<ul> <li>Clamp (Except GSF650S/SA only)</li> <li>Pass through the speed meter lead right side of ignition switch.</li> </ul>	<ul> <li>11. Clamp         <ul> <li>Clamp the handle bar lead wires, ignition switch lead wire and front wheel speed sensor lead wire (ABS) (GSF650A/SA).</li> </ul> </li> </ul>
<ul> <li>3. Clamp (GSF650S/SA only)</li> <li>: Clamp the handle switch right and left lead at the middle of blue taping.</li> </ul>	"A": Pass through the horn and fan lead wire upper the brake hose (ABS) (GSF650A/SA).
4. Clamp	"B": Pass through the lead wire under the water hoses.
<ul><li>Clamp</li><li>Clamp tip backward.</li></ul>	"C": Slack the lead wire downward.
<ul><li>Clamp</li><li>Cut the tip of clamp after clamping.</li></ul>	"D": Do not make slacked lead wire.
<ul><li>7. Wiring harness</li><li>Be careful not to pinch the wiring harness with the frame and fender.</li></ul>	"E": Set coupler vertically.
8. Brake hose (ABS). (GSF650A/SA only)	"a": 5 – 10 mm (0.2 – 0.4 in)
9. Rear wheel speed sensor (GSF650A/SA only)	



<ul> <li>Clamp</li> <li>Clamp the speed sensor lead wire and HO2 sensor lead wire.</li> </ul>	12. Turn signal lead wire (RH)
Side-stand switch	13. Turn signal lead wire (LH)
HO2 sensor coupler	<ul> <li>14. Clamp         <ul> <li>Clamp the regulator/rectifier lead wire and generator lead wire.</li> </ul> </li> </ul>
<ul> <li>ABS control unit/HU bracket (GSF650A/SA only)</li> <li>Do not contact the ABS unit wiring harness with the bracket.</li> </ul>	15. Clamp : Clamp the speed sensor lead wire, HO2 sensor lead wire and side- stand switch lead wire.
5. Frame	<ul><li>16. Clamp</li><li>: Clamp the lead wire inside of clutch hose.</li></ul>
6. Wiring harness (GSF650/A)	"A": Pass the regulator/rectifier lead wire behind hose.
7. Wiring harness (GSF650S/SA)	"B": Set the generator lead wire between starter motor and sprocket inner cover.
8. ICES CANADA label (E-28 only)	<b>(a)</b> : 14 N⋅m (1.4 kgf-m, 10.0 lb-ft)
<ul><li>9. Clamp</li><li>: Clamp the lead wire at the white marking.</li></ul>	"a": $20 \pm 5 \text{ mm } (0.8 \pm 0.2 \text{ in})$
<ul><li>10. Clamp</li><li>: Clamp the speed meter lead wire and turn signal lead wires.</li></ul>	[A]: For GSF650/GSF650A
11. Wiring harness	[B]: For GSF650S/GSF650SA

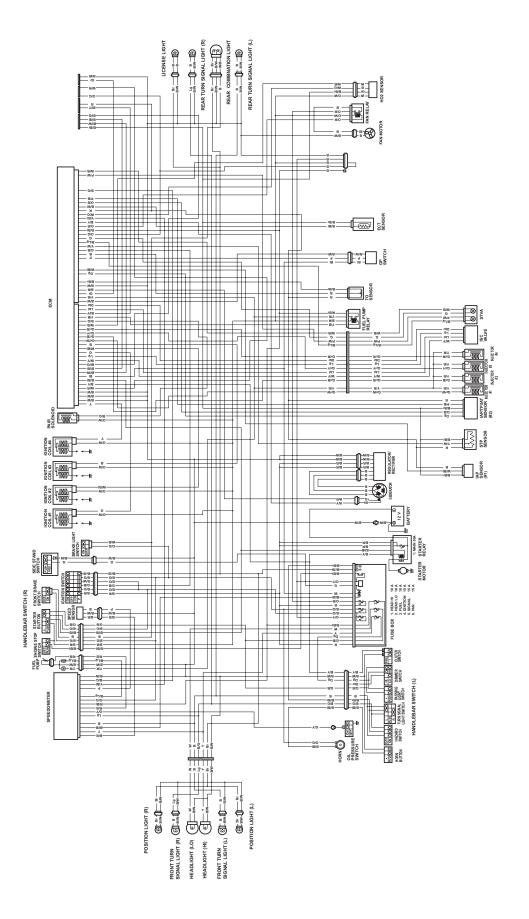


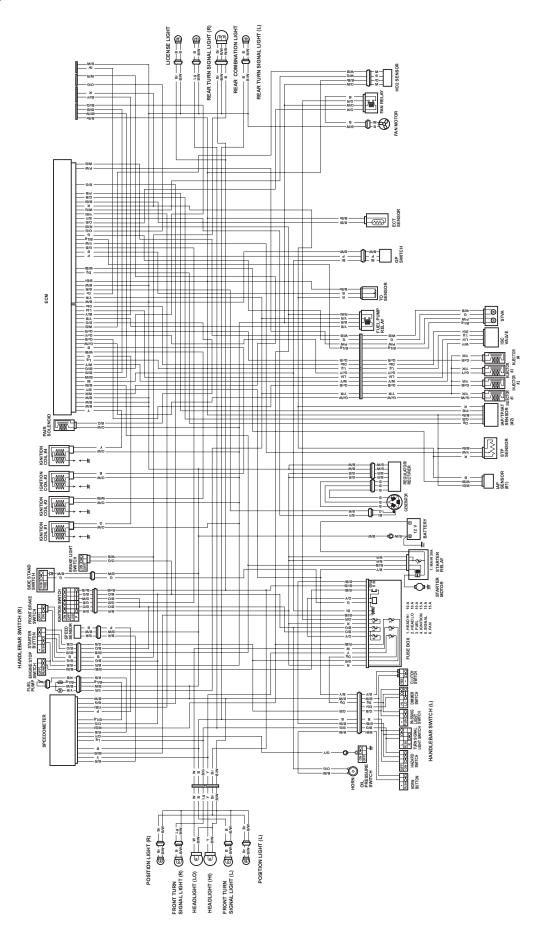
I717H1910902-05

<ul><li>1. Oil pressure lead wire</li><li>: Be careful not to slacken the oil pressure lead wire.</li></ul>	<b>(○(c)</b> : 6.5 N·m (0.65 kgf-m, 4.7 lb-ft)
Generator cover	( <b>U(d)</b> : 1.5 N⋅m (0.15 kgf-m, 1.0 lb-ft)
<ul><li>3. Clamp</li><li>: Push the clamp inside after clamping lead wire.</li></ul>	(0.5 kgf-m, 3.5 lb-ft)
<ul><li>4. Battery (-) lead wire</li><li>: Set lead wire horizontally for right.</li></ul>	"a": 20° ± 10°
(a): 11 N·m (1.1 kgf-m, 8.0 lb-ft)	"b": 60° ± 10°
<b>((b)</b> : 120 N⋅m (12 kgf-m, 87 lb-ft)	"A": Not slacken lead wire between sensor and clamp.

Refer to "Wire Color Symbols in Section 0A (Page 0A-5)".

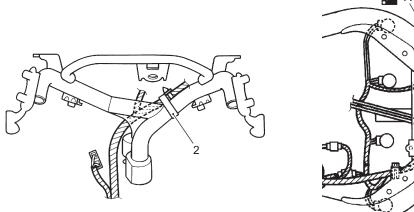
For E-02, 19

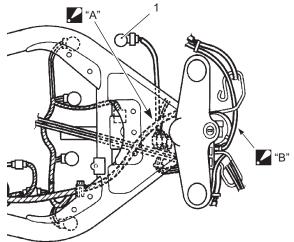


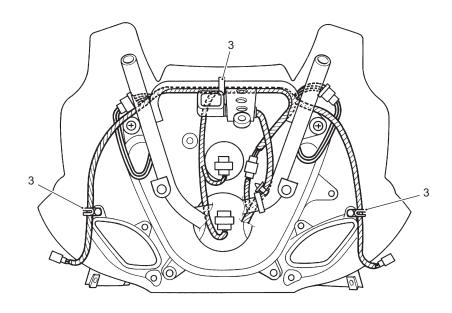


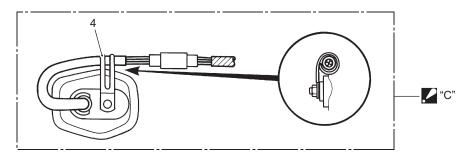
## Wiring Harness Routing Diagram (GSX650FK8)

B817H29102008









I817H2910903-02

EVAP purge control valve (E-33 only)	"A": Pass the EVAP purge control valve lead wire lower the clutch hose (E-33 only).
2. Wiring harness No. 1	B": Do not make slacked lead wire.
3. Wiring harness No. 2	"C": Left & Right are symmetry.
Front turn signal	

Wiring Systems: 9A-14

## **Specifications**

## Service Data (GSF650/S/U/SUK7)

**Electrical** 

B817H2910S001

Item			Specification	Note
Fuse size	Headlight	HI	10 A	
		LO	10 A	
	Fuel		10 A	
	Ignition		15 A	
	Signal		15 A	
	Main		30 A	

## Service Data (GSF650A/UA/SA/ASUK7)

**Electrical** 

B817H2910S002

Item		Specification	Note
Fuse size	ABS motor	20 A	
	ABS valve	15 A	

## **Tightening Torque Specifications**

B817H2910S003

**NOTE** 

The specified tightening torque is also described in the following.

"Wiring Harness Routing Diagram (GSF650/S/A/SAK7) (Page 9A-8)"

## Reference:

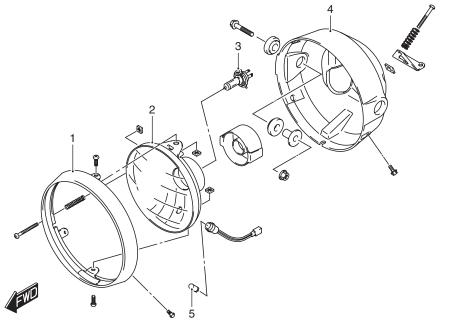
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

# **Lighting Systems**

## **Repair Instructions**

## Headlight Components (GSF650/AK7)

B817H29206001

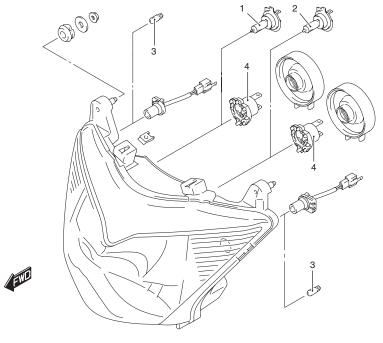


Headlight rim	<ol><li>Headlight bulb (12 V 60/55 W, H4)</li></ol>	<ol><li>Position light bulb (12 V 5 W)</li></ol>
Headlight unit	Headlight housing	_

## Headlight Components (GSF650S/SAK7)

B817H29206002

I718H1920047-02



I718H1920048-02

1. Headlight low beam bulb (12 V 55 W, H7) 2. Headlight highbeam bulb (12 V 55 W, H7) 3. Position light bulb (12 V 5 W x 2) 4. Socket

# Headlight Removal and Installation (GSF650/S/A/SAK7)

#### GSF650/AK7

#### Removal

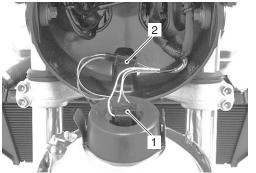
1) Removal the headlight mounting screws.



I718H1920006-01

B817H29206003

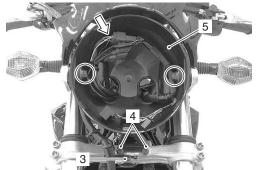
2) Disconnect the headlight coupler (1) and position light coupler (2).



I718H1920007-01

- 3) Remove the front brake hose clamp bolt (3) (GSF650/AK7).
- 4) Remove the headlight beam vertical adjuster plate mounting bolts (4).
- 5) Disconnect the respective couplers and remove the headlight housing (5).

## GSF650/AK7



I717H1920001-01

#### Installation

Installation is in the reverse order of removal. Pay attention to the following point:

After installing, be sure to inspect the headlight beam.
 Refer to "Headlight Beam Adjustment (GSF650/S/A/SAK7) (Page 9B-4)".

## GSF650S/SAK7

#### Removal

- 1) Remove the cowling. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the headlight and position light couplers.
- 3) Remove the headlight assembly.



I717H1920002-01

#### Installation

Installation is in the reverse order of removal. Pay attention to the following point:

After installing, be sure to inspect the headlight beam.
 Refer to "Headlight Beam Adjustment (GSF650/S/A/SAK7) (Page 9B-4)".

# Headlight Bulb Replacement (GSF650/S/A/SAK7)

B817H29206004

### **A** CAUTION

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

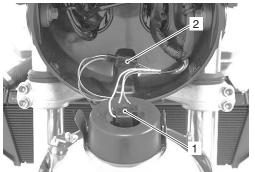
## GSF650/AK7

1) Remove the headlight mounting screws.



I718H1920006-01

2) Disconnect the headlight coupler (1) and position light coupler (2).



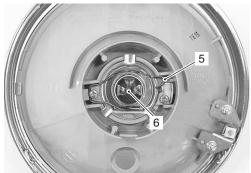
I718H1920014-0

- 3) Remove the position light socket (3) and replace the position light bulb.
- 4) Remove the bulb socket rubber cap (4).



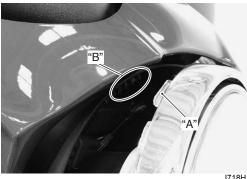
I718H1920015-01

5) Replace the headlight bulb (6) by unhooking the bulb holder spring (5).



I718H1920016-01

- 6) Reassemble the headlight.
- 7) Install the headlight assembly so that the hook "A" on the headlight bezel engages with "B" of the housing.



I718H1920017-03

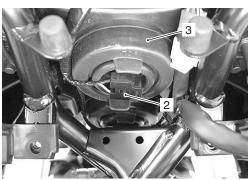
## GSF650S/SAK7

- 1) Remove the combination meter assembly. Refer to "Combination Meter Removal and Installation (GSF650/S/A/SAK7) in Section 9C (Page 9C-5)".
- 2) Remove the position light sockets (1) and replace the position light bulbs.



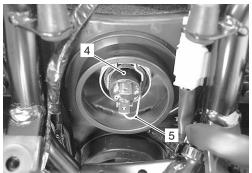
I718H1920009-01

3) Disconnect the headlight (Low beam) coupler (2) and remove the bulb socket rubber cap (3).



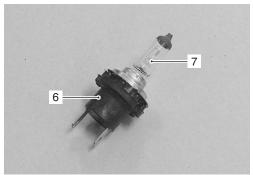
I718H1920010-02

4) Replace the headlight bulb/socket (Low beam) (4) by unhooking the bulb holder spring (5).



1718H1020011-01

- 5) Disconnect the headlight bulb (7) from the socket (6).
- 6) Replace the headlight bulb (7) with a new one.



I718H1920049-02

7) Replace the headlight bulb (High beam) in the same way as that of the low beam one.



I717H1920004-01

8) Reinstall the removed parts.

# Headlight Beam Adjustment (GSF650/S/A/SAK7)

## GSF650/AK7

B817H29206005

Adjust the headlight beam, both horizontally and vertically.

#### **NOTE**

To adjust the headlight beam, adjust the beam horizontally first, then vertically.



I717H1920005-01

Horizontal adjuster

2. Vertical adjuster

#### GSF650S/SAK7

1) Insert 5 mm hexagon wrench as shown and adjust the Low and High headlight beam horizontally.

#### NOTE

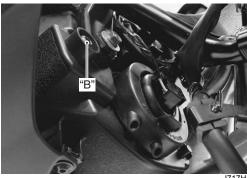
To adjust the headlight beam, adjust the beam horizontally first, then vertically.



I718H1920041-01

"A": Horizontal adjuster (For both Low and High beam)

2) Adjust the Low and High headlight beam vertically from the lower side.

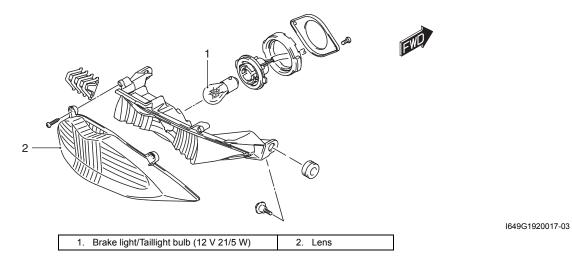


I717H1920006-01

"B": Vertical adjuster (For both Low and High beam)

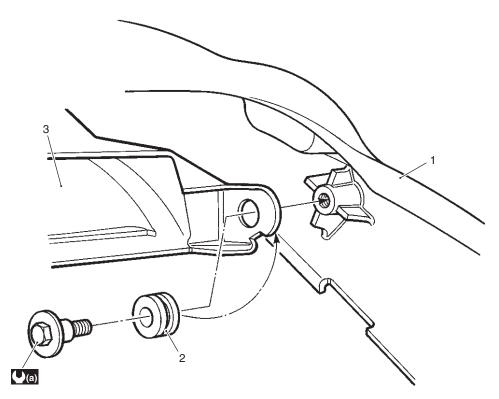
## **Rear Combination Light Components**

B817H29206006



## **Rear Combination Light Construction**

B817H29206007



Seat tail cover	Rear combination light
2. Cushion	<b>(a)</b> : 2.0 N⋅m (0.2 kgf-m, 1.5 lb-ft)

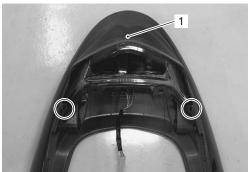
I649G1920018-02

# Rear Combination Light Removal and Installation

B817H29206008

#### Removal

- 1) Remove the seat tail cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the rear combination light (1) from the seat tail cover.



I718H1920018-01

#### Installation

Install the rear combination right in the reverse order of removal. Pay attention to the following point:

• Tighten the rear combination light mounting bolts to the specified torque.

## **Tightening torque**

Rear combination light mounting bolt: 2 N·m (0.2 kgf-m, 1.5 lbf-ft)

## Brake Light Bulb / Taillight Bulb Replacement

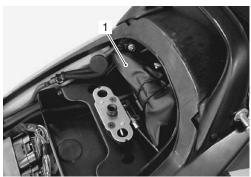
B817H29206009

#### **⚠ CAUTION**

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

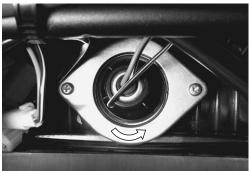
1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

2) Remove the tool set (1).



I717H1920007-01

3) Remove the bulb socket by turning it counterclockwise.



I718H1920020-01

4) Replace the bulb (2).

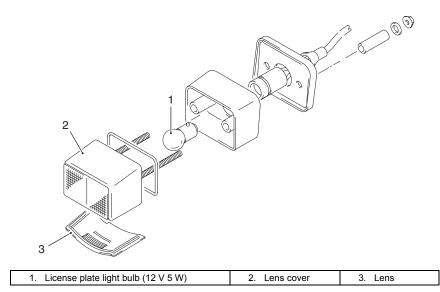


I718H1920021-01

5) Reinstall the removed parts.

## **License Plate Light Components**

B817H29206010

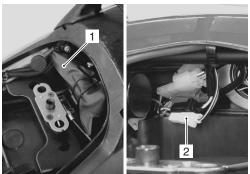


1649G1920023-03

# License Plate Light Removal and Installation B817H29206011

#### Removal

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the tool set (1) and disconnect the license plate light coupler (2).



I717H1920008-01

3) Remove the license plate light by removing the nuts.



I718H1920023-01

### Installation

Install the license plate light in the reverse order of removal.

## **License Plate Light Bulb Replacement**

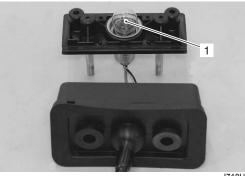
B817H29206012

- 1) Remove the license plate light. Refer to "License Plate Light Removal and Installation (Page 9B-7)".
- 2) Remove the lens by removing the screws.



I718H1920024-01

3) Replace the bulb (1).

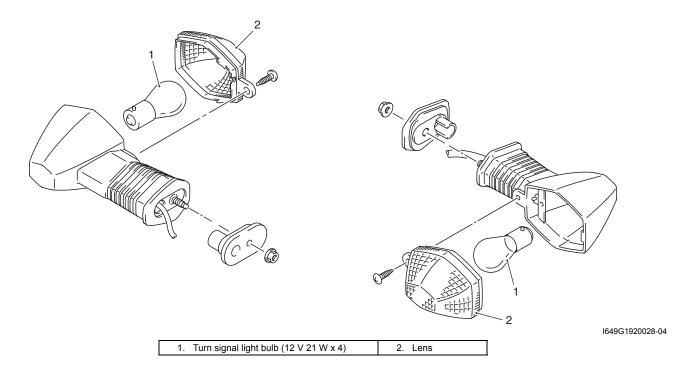


I718H1920026-01

4) Reinstall the removed parts.

# **Turn Signal Light Components**

B817H29206013



# Front Turn Signal Light Removal and Installation

**GSF650** 

B817H29206014

### Removal

- 1) Remove the headlight housing. Refer to "Headlight Removal and Installation (GSF650/S/A/SAK7) (Page 9B-2)".
- 2) Remove the front turn signal light (1) by removing the nut.



I718H1920027-01

#### Installation

Install the front turn signal light in the reverse order of removal.

#### **GSF650S**

#### Removal

1) Remove the wind screen and upper panel. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

- 2) Disconnect the turn signal light coupler.
- 3) Remove the front turn signal light (1) by removing the nut and turn signal lead wire clamp.



I718H1920043-01

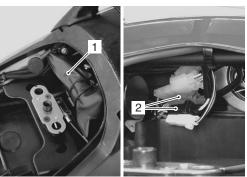
#### Installation

Install the front turn signal light in the reverse order of removal.

# Rear Turn Signal Light Removal and Installation B817H29206015 Removal

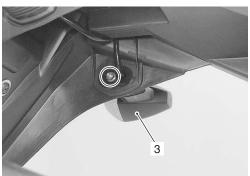
1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".

2) Remove the tool set (1) and disconnect the turn signal light coupler (RH: Black, LH: Gray) (2).



I717H1920009-01

3) Remove the turn signal light (3) by removing the nut.



I718H1920029-02

#### Installation

Install the rear turn signal light in the reverse order of removal.

# **Turn Signal Light Bulb Replacement**

B817H29206016

## **⚠ CAUTION**

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

1) Remove the lens by removing the screw.



I718H1920030-01

2) Replace the bulb (1).

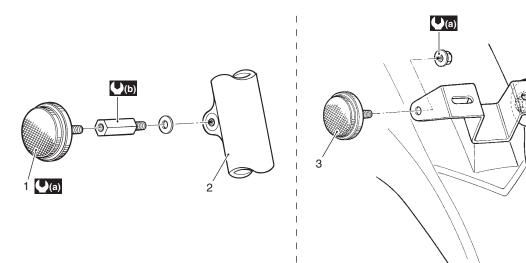


I718H1920031-01

3) Reinstall the lens.

# Reflex Refractor Construction (GSF650/S/A/SAK7)

B817H29206017



I718H1920044-05

Front reflex refractor (For E-28)	3. Rear reflex refractor (For E-28)	(0.18 kgf-m, 1.3 lb-ft)
2. Front fork	Rear fender	(b): 4.5 N·m (0.45 kgf-m, 3.25 lb-ft)

## Turn Signal / Side-stand Relay Inspection

B817H29206018

Refer to "Electrical Components Location in Section 0A (Page 0A-10)".

#### NOTE

### Make sure that the battery is fully charged.

Before removing the turn signal/side-stand relay, check the operation of the turn signal light. If the turn signal light does not illuminate, inspect the

If the turn signal light does not illuminate, inspect the bulb, turn signal switch and circuit connection. If the bulb, turn signal switch and circuit connection are OK, the turn signal relay may be faulty; therefore, replace the turn signal/side-stand relay with a new one. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 9B-10)".

# Turn Signal / Side-stand Relay Removal and Installation

B817H29206019

#### Removal

- 1) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the turn signal/side-stand relay (1).



I717H1920010-01

#### Installation

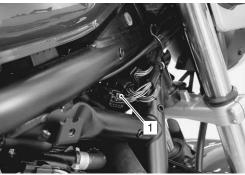
Install the turn signal/side-stand relay in the reverse order of removal.

### **Hazard Switch Inspection**

B817H29206020

Inspect the hazard switch in the following procedures:

 Remove the right frame head cover (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/ S/A/SAK7) in Section 9D (Page 9D-6)". 2) Disconnect the left handlebar switch coupler (1).



I717H1920011-02

3) Inspect the hazard switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".

#### Special tool

1001 : 09900-25008 (Multi-circuit tester set)

# Tester knob indication

Continuity ( •)))

Color Position	В	B/Br	B/G
OFF			
ON	0	0	
			I718H1920045-01

1/18H1

4) After finishing the hazard switch inspection, reinstall the removed parts.

#### **Turn Signal Switch Inspection**

B817H29206021

Inspect the turn signal switch in the following procedures:

- 1) Remove the right frame head cover (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the left handlebar switch coupler (1).



I717H1920011-02

3) Inspect the turn signal switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication Continuity ( •))))

Color Position	B/G	B/Br	В
L		<u> </u>	
PUSH			
R,	0		

I649G1920037-02

4) After finishing the turn signal switch inspection, reinstall the removed parts.

### **Passing Light Switch Inspection**

B817H29206022

Inspect the passing light switch in the following procedures:

- 1) Remove the right frame head cover (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the left handlebar switch coupler (1).



I717H1920011-02

3) Inspect the passing light switch for continuity with a

If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication Continuity ( •))))

Color	G/B	Dg
•		
PUSH	0—	<del></del> 0

I649G1920038-02

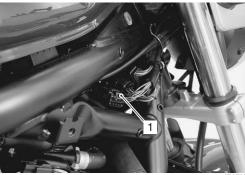
4) After finishing the passing light switch inspection, reinstall the removed parts.

## **Dimmer Switch Inspection**

B817H29206023

Inspect the dimmer switch in the following procedures:

- 1) Remove the right frame head cover (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the left handlebar switch coupler (1).



1717H1020011-02

3) Inspect the dimmer switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication Continuity ( •))))

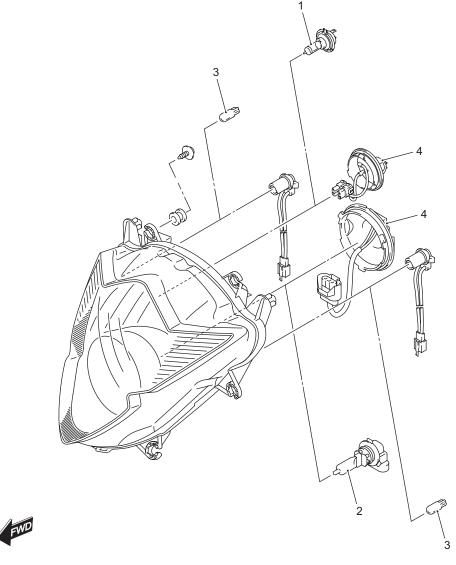
Color Position	Dbr	Dg	G/B
HI		0	0
LO	0		0

I718H1920046-04

4) After finishing the dimmer switch inspection, reinstall the removed parts.

# Headlight Components (GSX650FK8)

B817H29206024



I817H2920001-01

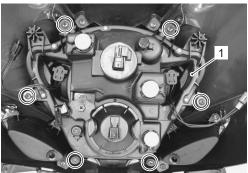
1. Headlight low beam bulb (12 V 55 W, H7)	3. Position light bulb (12 V 5 W x 2)
2. Headlight high beam bulb (12 V 60 W, HB3)	4. Bulb cap

# Headlight Removal and Installation (GSX650FK8)

#### Removal

1) Remove the body cowling assembly. Refer to "Exterior Parts Removal and Installation (GSX650FK8) in Section 9D (Page 9D-14)".

2) Remove the headlight assembly (1).



1817H2920002-01

B817H29206025

#### Installation

Installation is in the reverse order of removal. Pay attention to the following point:

 After installing, be sure to inspect the headlight beam.
 Refer to "Headlight Beam Adjustment (GSX650FK8) (Page 9B-14)".

## Headlight Bulb Replacement (GSX650FK8)

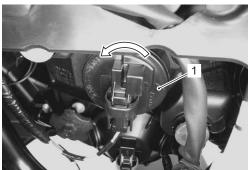
B817H29206026

#### **⚠ CAUTION**

When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

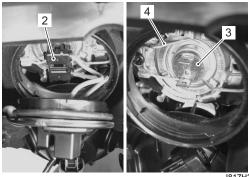
#### Low Beam

- 1) Remove the combination meter assembly. Refer to "Combination Meter Removal and Installation (GSX650FK8) in Section 9C (Page 9C-13)".
- 2) Remove the bulb cap (1) by turning it counterclockwise.



I817H2920003-01

- 3) Disconnect the low beam lead wire coupler (2).
- 4) Replace the low beam bulb (3) by unhooking the bulb holder spring (4).



I817H2920006-02

5) Reinstall the removed parts.

### **High Beam**

1) Remove the bulb cap (1) by turning it counterclockwise.



I817H2920007-01

2) Remove the bulb socket (2) by turning it counterclockwise.



I817H2920008-01

Lighting Systems: 9B-14

3) Replace the high beam bulb (3).



I817H2920009-01

4) Reinstall the removed parts.

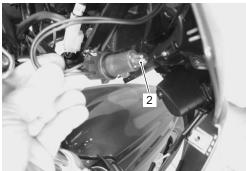
#### **Position Light**

- 1) Remove the combination meter assembly. Refer to "Combination Meter Removal and Installation (GSX650FK8) in Section 9C (Page 9C-13)".
- 2) Remove the upper panel. Refer to "Exterior Parts Removal and Installation (GSX650FK8) in Section 9D (Page 9D-14)".
- 3) Remove the position light socket (1).



I817H2920010-01

4) Replace the position light bulb (2).



I817H2920011-01

5) Reinstall the removed parts.

# **Headlight Beam Adjustment (GSX650FK8)**

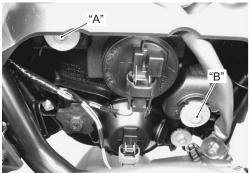
B817H29206027

- 1) Remove the combination meter assembly. Refer to "Combination Meter Removal and Installation (GSX650FK8) in Section 9C (Page 9C-13)".
- 2) Insert 8 mm hexagon wrench as shown and adjust the Low and High headlight beam horizontally.

#### NOTE

Adjust the beam horizontally first, then vertically.

#### Low beam

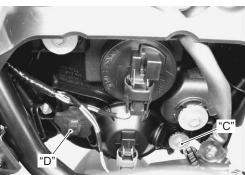


I817H2920012-02

"A": Horizontal adjuster

"B": Vertical adjuster

## High beam



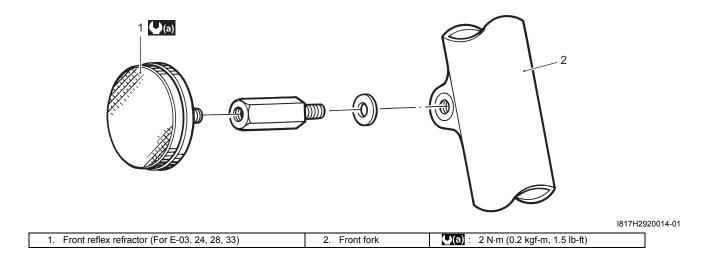
I817H2920013-02

"C": Horizontal adjuster

"D": Vertical adjuster

# **Reflex Refractor Construction (GSX650FK8)**

B817H29206028



# **Specifications**

# Service Data (GSF650/S/A/SAK7)

Wattage

Unit: W

B817H29207001

Item		Specification		
		GSF650/A	GSF650S/SA	
Hoodlight	HI	60	55	
Headlight	LO	55	55	
Parking or position light		5	5 x 2	
Brake light/Taillight		21/5	<b>←</b>	
Turn signal light		21 x 4	<b>←</b>	
License plate light		5	<b>←</b>	

# Service Data (GSX650FK8)

Wattage

Unit: W

· · · · · ·		
Item		Specification
Headlight	HI	60
Headilgrit	LO	55
Parking or position light		5 x 2
Brake light/Taillight		21/5
Turn signal light		21 x 4
License plate light		5

B817H29207003

Lighting Systems: 9B-16

# **Tightening Torque Specifications**

B817H29207004

Eastoning part	Tightening torque			Note
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Rear combination light mounting bolt	2	0.2	1.5	☞(Page 9B-6)

## NOTE

The specified tightening torque is also described in the following.

- "Rear Combination Light Construction (Page 9B-5)"
- "Reflex Refractor Construction (GSF650/S/A/SAK7) (Page 9B-9)"
- "Reflex Refractor Construction (GSX650FK8) (Page 9B-15)"

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

# **Special Tools and Equipment**

Special Tool

	B0171123230001
09900–25008	
Multi-circuit tester set	
☞(Page 9B-10) /	
☞(Page 9B-11) /	
☞(Page 9B-11) /	
☞(Page 9B-11)	
,	

# **Combination Meter / Fuel Meter / Horn**

# **General Description**

## Combination Meter System Description (GSF650/S/A/SAK7)

B817H29301001

This combination meter mainly consists of the stepping motor, LCD (Liquid Crystal Display) and LED (Light Emitting Diode).

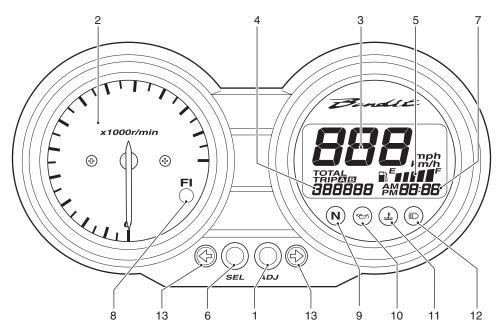
The rpm pointer is driven by the stepping motor.

The LCDs indicate Speed, Odo / Trip A / Trip B, Fuel level indicator and Clock / FI (DTC) respectively.

#### **LED (Light Emitting Diode)**

LED is used for the illumination light and each indicator light.

LED is maintenance free. LED is less electric-power consuming and stronger to vibration resistance compared to the bulb.



I717H1930001-01

Adjust switch (Trip / Clock)	6. Select switch (Odo / Trip A / Trip B)	11. LED (Engine coolant temperature indicator light)
2. Tachometer	7. LCD (FI / Clock)	12. LED (High-beam indicator light)
LCD (Speedometer)	LED (FI indicator light)	13. LED (Turn signal indicator light)
4. LCD (Odo / Trip A / Trip B)	LED (Neutral indicator light)	
<ol><li>LCD (Fuel level indicator)</li></ol>	10. LED (Oil pressure indicator light)	

# **Combination Meter System Description (GSX650FK8)**

B817H29301002

This combination meter mainly consists of the stepping motor, LCD (Liquid Crystal Display) and LED (Light Emitting Diode).

The rpm pointer is driven by the stepping motor.

The LCDs indicate Speed, Odo / Trip 1 / Trip 2 / Fuel reserve's trip / Clock / FI (DTC), Gear position, Engine revolution indicator and Fuel level indicator respectively.

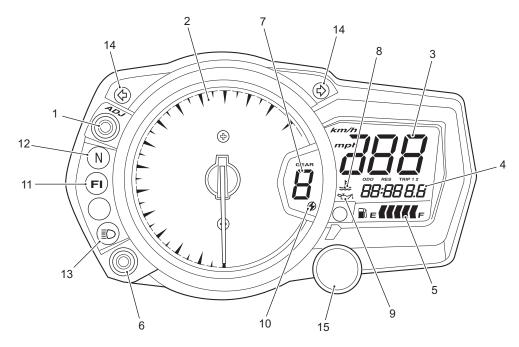
### **LED (Light Emitting Diode)**

LED is used for the illumination light and each indicator light.

LED is maintenance free. LED is less electric-power consuming and stronger to vibration resistance compared to the bulb.

#### **Engine Revolution Indicator Lamp**

This speedometer is equipped the engine revolution indicator lamp. The engine revolution indicator lamp is adjustable from 6 000 – 12 500 r/min. (from 6 000 r/min to 10 000 r/min, every 500 r/min and 10 000 r/min to 12 500 r/min, every 250 r/min: Initial setting: 11 000 r/min)



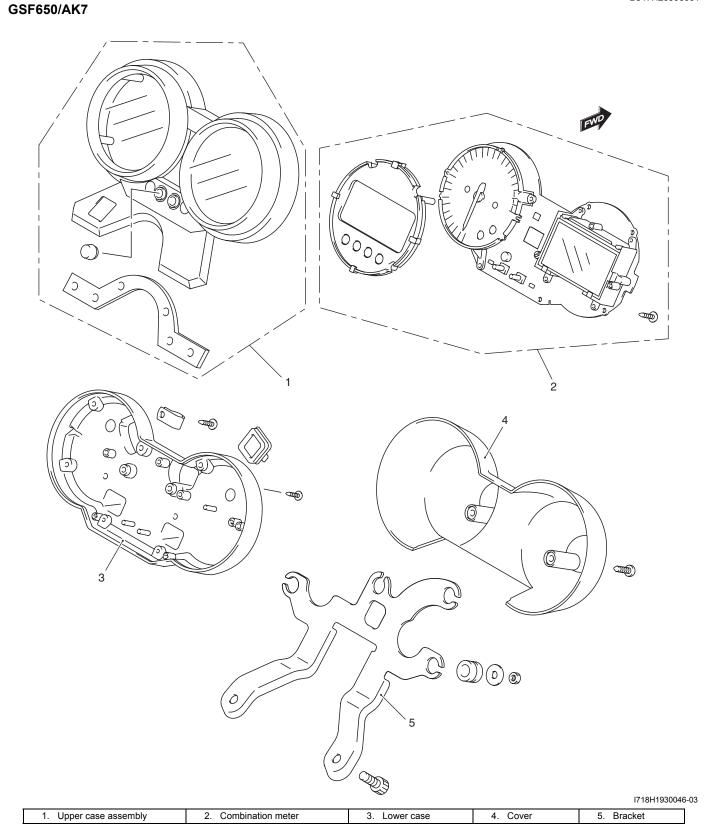
I817H2930001-02

Adjust switch (Trip / Engine revolution / Clock)	LCD (Oil pressure indicator light)
2. LED (Tachometer)	10. LCD (Engine revolution indicator)
3. LCD (Speedometer)	11. LED (FI indicator light)
4. LCD (Odo / Trip 1/ Trip 2 / Clock / FI (DTC))	12. LED (Neutral indicator light)
LCD (Fuel level indicator)	13. LED (High-beam indicator light)
6. Select switch (Odo / Trip 1 / Trip 2 / Fuel reserve's trip / Clock)	14. LED (Turn signal indicator light)
7. LCD (Gear position)	15. LED (Engine revolution indicator light)
LCD (Engine coolant temperature indicator light)	

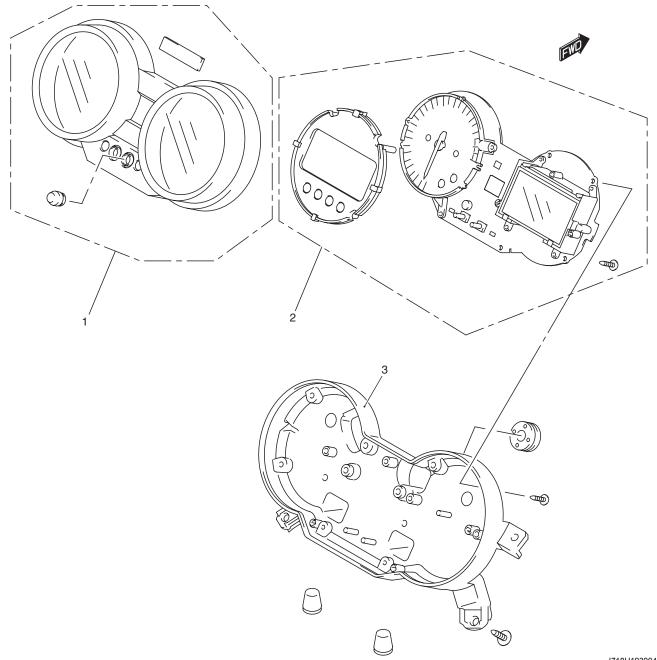
# **Repair Instructions**

# Combination Meter Components (GSF650/S/A/SAK7)

B817H29306001



# GSF650S/SAK7



I718H1930047-02

1. Upper case assembly 2. Combination meter 3. Lower case

# Combination Meter Removal and Installation (GSF650/S/A/SAK7)

#### **GSF650/AK7**

#### Removal

1) Remove the combination meter mounting bolts from steering stem upper bracket.

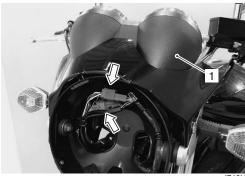




I717H1930014-01

B817H29306002

- 2) Remove the headlight. Refer to "Headlight Removal and Installation (GSF650/S/A/SAK7) in Section 9B (Page 9B-2)".
- 3) Disconnect the combination meter couplers and remove the combination meter assembly (1).



I718H1930058-01

#### Installation

Install the combination meter in the reverse order of removal.

#### GSF650S/SAK7

#### Removal

1) Removal the meter panel (1) by loosen the two bolts.



I717H1930008-02

2) Disconnect the combination meter coupler and remove the combination meter assembly.



I717H1930009-01

3) Remove the combination meter (2).



I717H1930010-01

#### Installation

Install the combination meter in the reverse order of removal.

#### **NOTE**

Fix the boor of the combination meter coupler properly.

# Combination Meter Disassembly and Assembly (GSF650/S/A/SAK7)

B817H2930600

Refer to "Combination Meter Removal and Installation (GSF650/S/A/SAK7) (Page 9C-5)".

#### Disassembly

Disassemble the combination meter as shown in the combination meter components. Refer to "Combination Meter Components (GSF650/S/A/SAK7) (Page 9C-3)".

## **Assembly**

Assemble the combination meter as shown in the combination meter components. Refer to "Combination Meter Components (GSF650/S/A/SAK7) (Page 9C-3)".

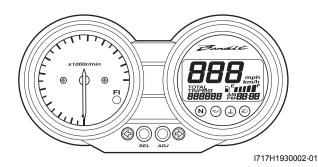
#### Combination Meter Inspection (GSF650/S/A/ SAK7) B817H29306004

#### **LED Inspection**

Check that the LEDs (FI indicator light, Oil pressure, Engine coolant temperature indicator light and Meter panel illumination) immediately light up when the ignition switch is turned to ON.

Check that other LEDs (Neutral indicator light, Highbeam indicator light and Turn signal indicator lights) light up/go off by operating each switch.

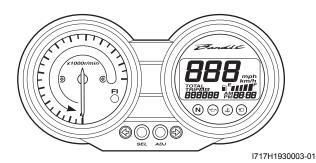
If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler. Refer to "Combination Meter Removal and Installation (GSF650/S/A/SAK7) (Page 9C-5)".



### **Stepping Motor Inspection and Adjustment**

1) Check that the pointer calibrates itself immediately after turning the ignition switch on and stops at zero point.

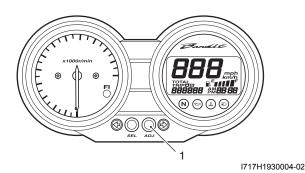
If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler.



#### NOTE

- The pointer may not return to the proper position even turning the ignition switch on under low temperature condition. In that case, you can reset the pointer to the proper position by following the instruction.
- Complete the operation within 10 seconds after the ignition switch has been turned on.

- 2) With the adjuster switch (1) pressed, turn the ignition switch on.
- 3) Release the adjuster switch (1), 3 to 5 seconds after turning the ignition switch on.
- 4) Press the adjuster switch (1) twice (within 1 second). → Reset



Time Ignition switch Adjuster switch (1) **OFF PUSH** 0 ON 3 sec. 5 sec. Release • Push Push→Reset 10 sec.

5) Pointer will return to the starting point right after the completion of the operation. In the case of the pointer not returning to the proper position after doing above, replace the combination meter unit. Refer to "Combination Meter Removal and Installation (GSF650/S/A/SAK7) (Page 9C-5)".

# Engine Coolant Temperature Indicator Light Inspection (GSF650/S/A/SAK7)

B817H29306005

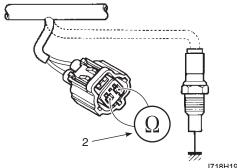
Inspect the engine coolant temperature indicator light in the following procedures:

1) Disconnect the ECT sensor coupler (1).



I718H1930007-03

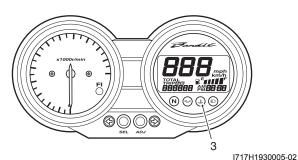
2) Connect the variable resistor (2) between the terminals.



I718H1930009-05

- 3) Turn the ignition switch ON.
- 4) Check the LED operation when the resistance is adjusted to the specified values. If either one or all indications are abnormal, replace the combination meter with a new one. Refer to "Combination Meter Removal and Installation (GSF650/S/A/SAK7) (Page 9C-5)".

Resistance	LED (3)	Water temperature
2.45 kΩ and over	OFF	19 °C and below
Approx. 0.811 kΩ	OFF	Approx. 50 °C
Approx. 0.1 kΩ	ON	120 – 139 °C
0 Ω (Jumper wire)	ON	140 °C and over



. . .

5) Connect the ECT sensor coupler.

# **Engine Coolant Temperature Removal and Installation**

B817H29306006

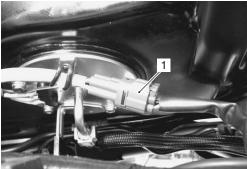
Refer to "ECT Sensor Removal and Installation in Section 1C (Page 1C-2)".

## **Fuel Level Indicator Inspection**

B817H29306007

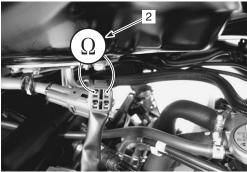
Inspect the fuel level indicator in the following procedures:

- 1) Support the motorcycle with the center stand.
- Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)"
- 3) Disconnect the fuel pump coupler (1).



I717H1930011-01

4) Connect variable resistor (2) between the R/B and B/W lead wires from the wire harness.



I717H1930012-01

5) Turn the ignition switch to ON.

Check the display of fuel level indicator (LCD) as shown.

If any abnormality is found, replace the combination meter with a new one. Refer to "Combination Meter Removal and Installation (GSF650/S/A/SAK7) (Page 9C-5)".

#### NOTE

It takes approx. 40 seconds that the fuel level indicator indicates the detected fuel level.

Resistance	Thermistor	Fuel level meter
More than 168 Ω	ON	Flicker
More than 168 $\Omega$	OFF	Flicker
160 – 168 Ω	OFF	°N E I I I I I I I
93 – 129 Ω	OFF	°N E IIIF
46 – 76 Ω	OFF	°N E IIIF
Less than 36 $\Omega$	OFF	ON E

I717H1930015-01

7) Connect the fuel pump coupler and reinstall the fuel

Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".

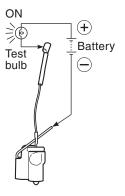
# **Fuel Level Indicator Switch (Thermistor) Inspection**

B817H29306008

Inspect the fuel level indicator switch in the following procedures:

- Remove the fuel pump. Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation in Section 1G (Page 1G-11)".
- 2) Remove the thermistor from the fuel pump. Refer to "Fuel Pump Disassembly and Assembly in Section 1G (Page 1G-12)".

3) Connect 12 V battery and test bulb (12 V, 3.4 W) to the fuel level indicator switch as shown in the figure. The bulb should come on after one minutes if the switch is in good condition.

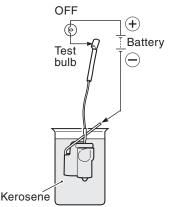


I717H1930016-01

4) When the switch is immersed in kerosene under the above condition, the bulb should go out. If the bulb remains lit, replace the unit with a new one.

#### NOTE

- When the bulb turns off, immediately pick up the switch from kerosene.
- After the check has been completed, wash the switch with gasoline.



I717H1930017-01

- 5) Install the thermistor. Refer to "Fuel Pump Disassembly and Assembly in Section 1G (Page 1G-12)".
- 6) Install the fuel pump. Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation in Section 1G (Page 1G-11)".

### **Fuel Level Gauge Inspection**

B817H29306009

Inspect the fuel level gauge in the following procedures:

- 1) Remove the fuel level gauge. Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation in Section 1G (Page 1G-11)".
- Measure the resistance at each fuel level gauge float position. If the resistance is incorrect, replace fuel level gauge with a new one.

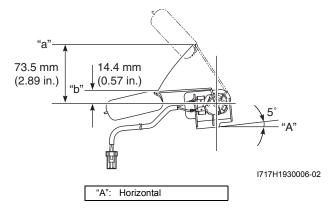
#### Special tool

: 09900-25008 (Multi-circuit tester set)

# **Tester knob indication**

Resistance ( $\Omega$ )

Float position	Resistance
Full "a"	Approx. 10 $\Omega$
Empty "b"	Approx. 216 $\Omega$



3) Install the fuel level gauge. Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation in Section 1G (Page 1G-11)".

#### Speedometer Inspection

B817H29306010

If the speedometer, odometer or tripmeter does not function properly, inspect the speed sensor and the coupler connections. If the speed sensor and coupler connections are OK, replace the combination meter unit with a new one. Refer to "Combination Meter Removal and Installation (GSF650/S/A/SAK7) (Page 9C-5)".

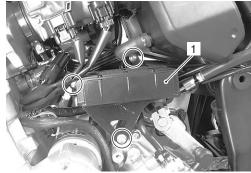
#### Speed Sensor Removal and Installation

B817H29306011

#### Removal

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- Remove the engine sprocket outer cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".

4) Move the regulator/rectifier assembly (1) by removing the regulator/rectifier bracket bolts.

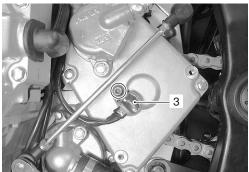


I718H1930023-02

- 5) Disconnect the speed sensor coupler (2).
- 6) Release the speed sensor lead wire from the clamps.



7) Remove the speed sensor (3).



I718H1930024-03

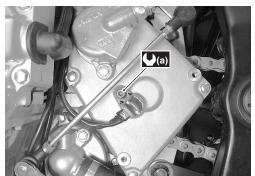
#### Installation

Install the speed sensor in the reverse order of removal. Pay attention to the following points:

Tighten the speed sensor mounting bolt to the specified torque.

**Tightening torque** 

Speed sensor bolt (a): 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)



I718H1930044-03

 Route the speed sensor lead wire. Refer to "Wiring Harness Routing Diagram (GSF650/S/A/SAK7) in Section 9A (Page 9A-8)".

## **Speed Sensor Inspection**

B817H29306012

Inspect the speed sensor in the following procedures:

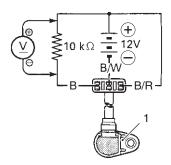
- 1) Remove the speed sensor. Refer to "Speed Sensor Removal and Installation (Page 9C-9)".
- 2) Connect a 12 V battery (between B and B/W), 10 k $\Omega$  resistor (between B/R and B) and multi-circuit tester (tester (+) probe to B and tester (–) probe to B/R) as shown.

Special tool

: 09900-25008 (Multi-circuit tester set)

**Tester knob indication** 

Voltage ( \_\_\_ )



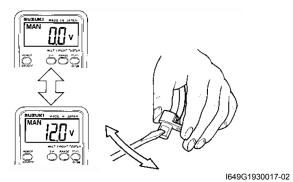
Speed sensor

I717H1930018-01

3) Move a screwdriver back and forth across the pick-up surface of the speed sensor. The voltage readings should cycle as follows (0 V → 12 V or 12 V → 0 V). If the voltage reading does not change, replace the speed sensor with a new one.

#### NOTE

While testing, the highest voltage reading should be the same as the battery voltage (12 V).



# Oil Pressure Indicator Inspection (GSF650/S/A/SAK7)

B817H29306013

Inspect the oil pressure indicator in the following procedures:

#### **NOTE**

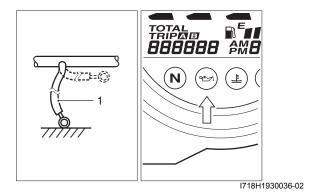
Before inspecting the oil pressure switch, check if the engine oil level is correct. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

1) Disconnect the oil pressure switch lead wire (1) from the oil pressure switch.



I717H1930013-01

- 2) Turn the ignition switch to ON.
- 3) Check if the oil pressure indicator (LED) will light up when grounding the lead wire (1). If the oil pressure indicator does not light up, replace the combination meter unit with a new one after checking connection of couplers.



#### Oil Pressure Switch Removal and Installation

B817H29306014

Refer to "Oil Pressure Switch Removal and Installation in Section 1E (Page 1E-7)".

### Ignition Switch Inspection

B817H29306015

Inspect the ignition switch in the following procedures:

- 1) Remove the right frame head cover (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the ignition switch coupler (1).



I718H1930026-05

3) Inspect the ignition switch for continuity with a tester. If any abnormality is found, replace the ignition switch with a new one.

#### Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication Continuity ( •))))

Color Position	B/R	В/О	G/B	B/W	B/G	Br/B
ON	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\overline{}$	$\bigcirc$	
OFF						
LOCK						
Р	ig					
I649G1180025-02						

4) After finishing the ignition switch inspection, reinstall the removed parts.

#### Ignition Switch Removal and Installation

B817H29306016

Refer to "Ignition Switch Removal and Installation in Section 1H (Page 1H-7)".

### Horn Inspection (GSF650/S/A/SAK7)

B817H29306017

#### **NOTE**

If the horn sound condition is normal, it is not necessary to inspect the horn button continuity.

#### **Horn Button Inspection**

- 1) Remove the right frame head cover (GSF650). Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) in Section 9D (Page 9D-6)".
- 2) Disconnect the left handlebar switch coupler (1).



I718H1930045-01

3) Inspect the horn button for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".

Special tool

: 09900-25008 (Multi-circuit tester set)

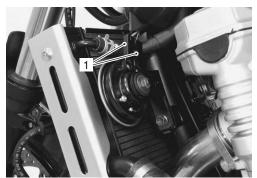
**Tester knob indication** Continuity ( •)))

Color	B/BI	B/W
•		
PUSH	0	0

I718H1930028-03

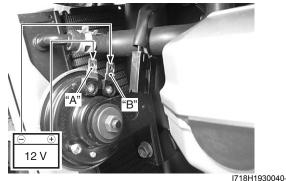
#### **Horn Inspection**

1) Disconnect the horn couplers (1).



H1930030-01

2) Connect a 12 V battery to terminal "A" and terminal "B". If the sound is not heard from the horn, replace the horn with a new one.



I718H1930040-02

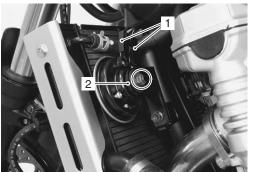
3) Connect the horn coupler.

# Horn Removal and Installation (GSF650/S/A/ SAK7)

B817H29306018

#### Removal

- 1) Disconnect the horn couplers (1).
- 2) Remove the horn (2) by removing the mounting nut.



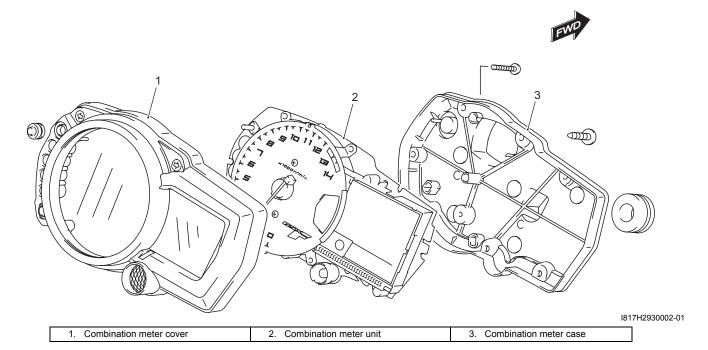
I718H1930031-03

#### Installation

Install the horn in the reverse order of removal.

# **Combination Meter Components (GSX650FK8)**

B817H29306019

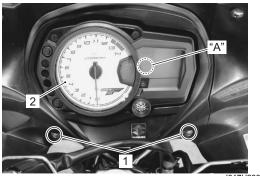


# Combination Meter Removal and Installation (GSX650FK8)

## Removal

B817H29306020

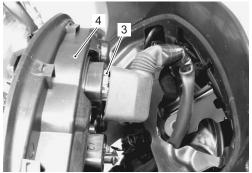
1) Remove the screws (1) and pull out the combination meter assembly (2) from the upper panel.



I817H2930003-01

"A": Hooked point

2) Disconnect the combination meter coupler (3) and remove the combination meter assembly (4).



I817H2930004-01

3) Remove the combination meter (5).



I817H2930005-01

#### Installation

Install the combination meter in the reverse order of removal.

#### NOTE

Fix the boot of the combination meter coupler properly.



I817H2930006-02

# Combination Meter Disassembly and Assembly (GSX650FK8)

B817H29306021

Refer to "Combination Meter Removal and Installation (GSX650FK8) (Page 9C-13)".

## Disassembly

Disassemble the combination meter as shown in the combination meter components. Refer to "Combination Meter Components (GSX650FK8) (Page 9C-13)".

#### **Assembly**

Assemble the combination meter as shown in the combination meter components. Refer to "Combination Meter Components (GSX650FK8) (Page 9C-13)".

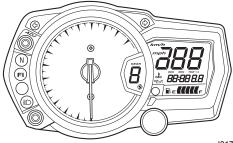
#### **Combination Meter Inspection (GSX650FK8)**

B817H29306022

# **LED Inspection**

Check that the LEDs (FI indicator light, Engine revolution indicator light and Meter panel illumination) immediately light up when the ignition switch is turned to ON. Check that other LEDs (Neutral indicator light, Highbeam indicator light and Turn signal indicator lights) light up/go off by operating each switch.

If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler. Refer to "Combination Meter Removal and Installation (GSX650FK8) (Page 9C-13)".

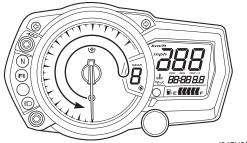


I817H2930007-01

## **Stepping Motor Inspection and Adjustment**

1) Check that the pointer calibrates itself immediately after turning the ignition switch on and stops at zero point.

If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler.

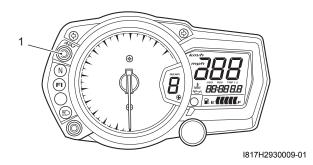


I817H2930008-01

### NOTE

- The pointer may not return to the proper position even turning the ignition switch on under low temperature condition. In that case, you can reset the pointer to the proper position by following the instruction.
- Complete the operation within 10 seconds after the ignition switch has been turned on.

- 2) With the adjuster switch (1) pressed, turn the ignition switch on.
- 3) Release the adjuster switch (1), 3 to 5 seconds after turning the ignition switch on.
- 4) Press the adjuster switch (1) twice (within 1 second). → Reset



Time	Ignition switch	Adjuster switch (1)
	OFF	PUSH
0	ON	
•		
	L	
3 sec.		
5 sec.		Release
•		Push
•		Push→Reset
10 sec.		

5) Pointer will return to the starting point right after the completion of the operation. In the case of the pointer not returning to the proper position after doing above, replace the combination meter unit. Refer to "Combination Meter Removal and Installation (GSX650FK8) (Page 9C-13)".

# **Engine Coolant Temperature Indicator Light** Inspection (GSX650FK8)

Inspect the engine coolant temperature indicator light in the following procedures:

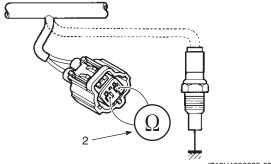
1) Remove the left under cowling. Refer to "Exterior Parts Removal and Installation (GSX650FK8) in Section 9D (Page 9D-14)".

2) Disconnect the ECT sensor coupler (1).



I718H1930007-03

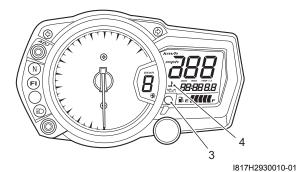
3) Connect the variable resistor (2) between the terminals.



I718H1930009-05

- 4) Turn the ignition switch ON.
- 5) Check the LED (3) and LCD (4) operations when the resistance is adjusted to the specified values. If either one or all indications are abnormal, replace the combination meter with a new one. Refer to "Combination Meter Removal and Installation (GSX650FK8) (Page 9C-13)".

Resistance	I ED (3)	LCD (4)	Water
ixesistance	LLD (3)	LCD (4)	temperature
2.45 kΩ and over	OFF		19 °C (67 °F) and
2.45 K22 and 0Vei	OH	_	below
Approx. 0.811 kΩ	x. 0.811 kΩ OFF		Approx. 50 °C
Αρριολ. 0.011 κ22	OH	_	(122 °F)
Approx. 0.1 kΩ	ON	ON	120 – 139 °C
Αρριολ. 0.1 κ22	ON	ON	(248 – 282 °F)
0 Ω (Jumper wire)	ON	ON	140 °C (283 °F)
10 22 (Juilibei Mile)	el wile) ON		and over



6) Connect the ECT sensor coupler.

## Oil Pressure Indicator Inspection (GSX650FK8)

B817H293060

Inspect the oil pressure indicator in the following procedures:

#### **NOTE**

Before inspecting the oil pressure switch, check if the engine oil level is correct. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-12)".

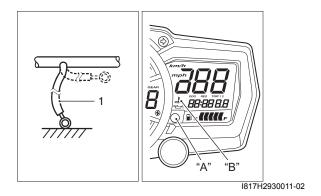
- Remove the right under cowling. Refer to "Exterior Parts Removal and Installation (GSX650FK8) in Section 9D (Page 9D-14)".
- 2) Disconnect the oil pressure switch lead wire (1) from the oil pressure switch.



I717H1930013-01

- 3) Turn the ignition switch to ON.
- 4) Check if the oil pressure indicator (LED) "A" and (LCD) "B" will light up when grounding the lead wire (1).

If the oil pressure indicator does not light up, replace the combination meter unit with a new one after checking connection of couplers.



## **Horn Inspection (GSX650FK8)**

B817H29306025

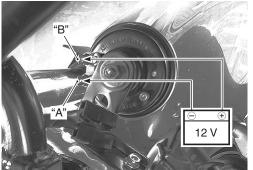
Inspect the horn in the following procedures:

1) Disconnect the couplers (1).



I817H2930012-01

2) Connect a 12 V battery to terminal "A" and terminal "B". If the sound is not heard from the horn, replace the horn with a new one.



I817H2930014-02

Connect the horn coupler.

### Horn Removal and Installation (GSX650FK8)

#### Removal

B817H29306026

- 1) Disconnect the horn couplers (1).
- 2) Remove the horn (2) by removing the mounting nut.



I817H2930013-02

#### Installation

Install the horn in the reverse order of removal.

# **Specifications**

# Service Data (GSF650/S/A/SAK7)

Wattage Unit: W B817H29307001

Item	Specification		
item	GSF650/A	GSF650S/SA	
Speedometer light	LED	←	
Tachometer light	LED	<b>←</b>	
Turn signal indicator light	LED x 2	<b>←</b>	
High beam indicator light	LED	<b>←</b>	
Neutral position indicator light	LED	<b>←</b>	
Oil pressure indicator light	LED	←	
Coolant temperature indicator light	LED	<b>←</b>	
FI indicator light	LED	<b>←</b>	

# Service Data (GSX650FK8)

Wattage

B817H29307003

Unit: W

Item	Specification
Speedometer light	LED
Tachometer light	LED
Turn signal indicator light	LED x 2
High beam indicator light	LED
Neutral position indicator light	LED
Oil pressure/Engine coolant temperature indicator light	LED
FI indicator light	LED
Engine RPM indicator light	LED

# **Tightening Torque Specifications**

B817H29307004

Eastoning part	Tightening torque			Note
Fastening part	N⋅m	kgf-m	lbf-ft	Note
Speed sensor bolt	6.5	0.65	4.7	☞(Page 9C-10)

#### Reference:

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

# **Special Tools and Equipment**

**Special Tool** 

B817H29308001

09900–25008
Multi-circuit tester set
☞(Page 9C-9) / ☞(Page 9C-
10) / ☞(Page 9C-11) /
☞(Page 9C-12)

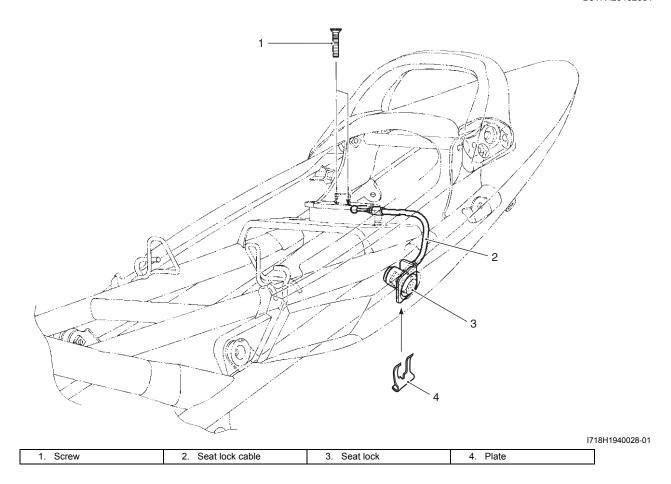


# **Exterior Parts**

# **Schematic and Routing Diagram**

# **Seat Lock Cable Routing Diagram**

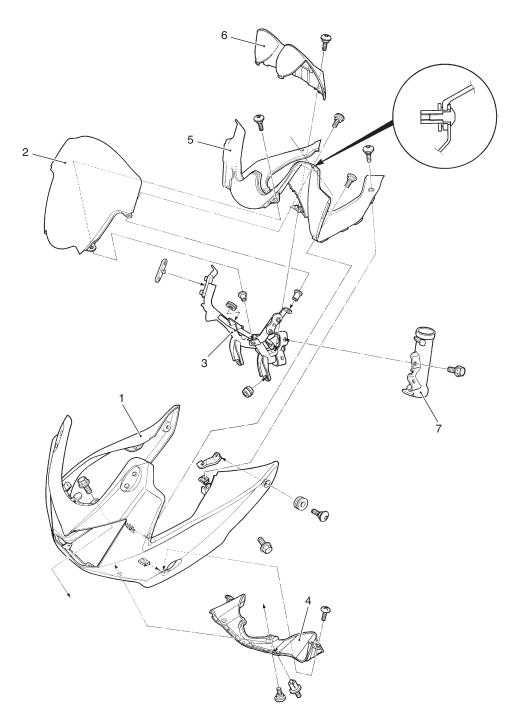
B817H29402001



# **Repair Instructions**

# Exterior Parts Construction (GSF650S/SAK7)

B817H29406001

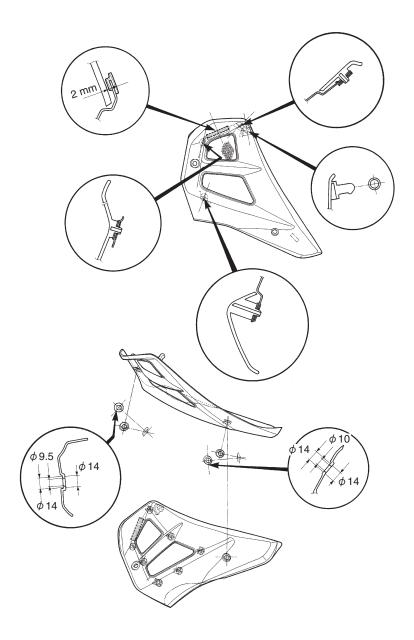


I717H1940001-01

Cowling body	Cowling brace	<ol><li>Upper panel</li></ol>	7. Head pipe
<ol><li>Wind screen</li></ol>	Lower panel	<ol><li>Meter panel lid</li></ol>	

# Frame head cover construction (GSF650/AK7)

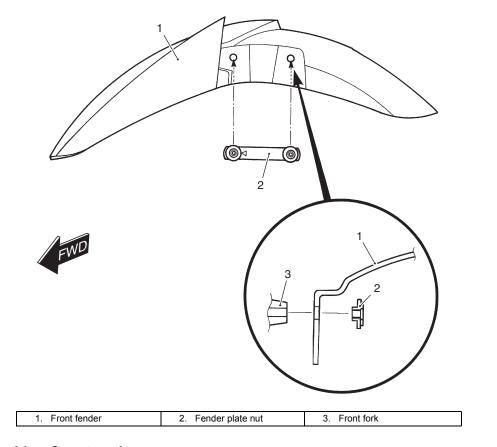
B817H29406002



I717H1940013-04

# **Front Fender Construction**

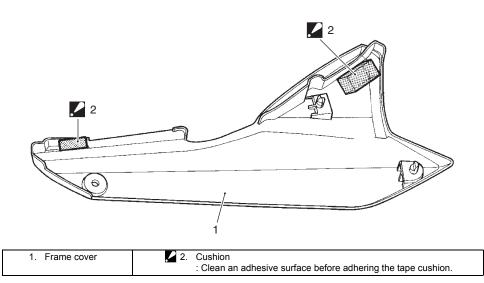
B817H29406003



# **Frame Cover Cushion Construction**

B817H29406004

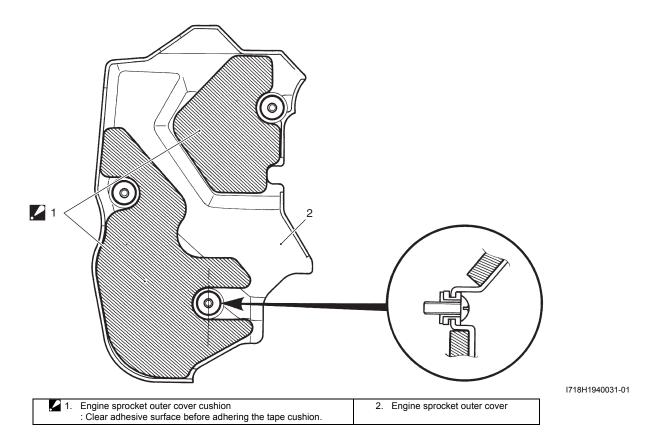
I718H1940029-01



I718H1940030-01

# **Engine Sprocket Outer Cover Cushion**

B817H29406005

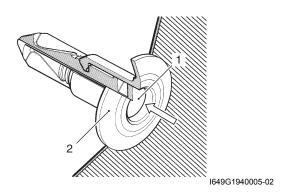


#### **Fastener Removal and Installation**

#### Removal

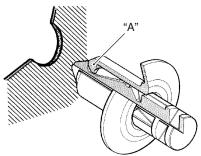
B817H29406006

- 1) Depress the head of fastener center piece (1).
- 2) Pull out the fastener (2).



#### Installation

1) Let the center piece stick out toward the head so that the pawls "A" close.

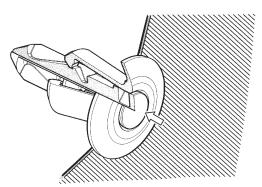


1649G1940006-02

2) Insert the fastener into the installation hole.

## **NOTE**

To prevent the pawl "A" from damage, insert the fastener all the way into the installation hole. 3) Push in the head of center piece until it becomes flush with the fastener outside face.



I649G1940007-02

# Exterior Parts Removal and Installation (GSF650/S/A/SAK7)

B817H29406007

#### Seat

#### Removal

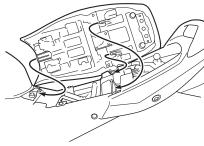
- 1) Unlock the seat with the ignition key.
- 2) Remove the front and rear seats as an assembly.



I717H1940002-01

#### Installation

Slide the seat hooks into the seat hook retainers and push down firmly until the seat snaps into the locked position.



I718H1940032-03

### **Frame Cover**

#### Removal

Remove the frame covers (1), left and right.



"A": Hooked point

#### Installation

Install the frame covers in the reverse order of removal.

## Pillion Rider Handle and Seat Tail Cover

#### Removal

- 1) Remove the seat.
- 2) Remove the frame covers, left and right.
- 3) Remove the pillion rider handle (1).



I717H1940003-01

4) Remove the fasteners. Refer to "Fastener Removal and Installation (Page 9D-5)".



I718H1940007-01

- 5) Disconnect the brake light/taillight lead wire coupler (2).
- 6) Unhook the seat lock cable (3).
- 7) Remove the seat tail cover (4).



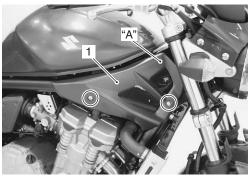
I717H1940004-02

#### Installation

Install the seat tail cover and pillion rider handle in the reverse order of removal.

# Frame Head Cover (GSF650/AK7) Removal

Removal the frame head covers (1), left and right.



I717H1940005-01

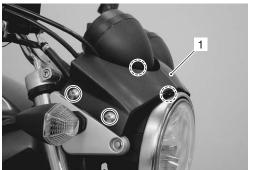
"A": Hooked point

#### Installation

Install the frame head covers in the reverse order of removal.

# Headlight Housing Cover (GSF650/AK7) Removal

Remove the headlight housing cover (1).



I717H1940006-01

#### Installation

Install the headlight housing cover in the reverse order of removal.

# Cowling and Cowling Brace (GSF650S/SAK7) Removal

- 1) Remove the caps.
- 2) Remove the rear view mirrors, left and right.



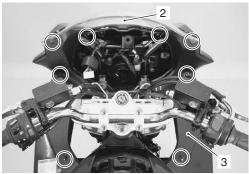
I718H1940011-01

3) Remove the combination meter assembly (1). Refer to "Combination Meter Removal and Installation (GSF650/S/A/SAK7) in Section 9C (Page 9C-5)".



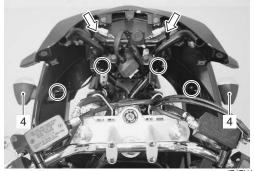
I717H1940007-0

4) Remove the wind screen (2) and upper panel (3).



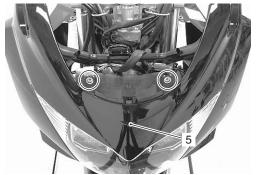
I717H1940008-01

5) Disconnect the turn signal lead wire couplers and remove the turn signal lead wire clamps and turn signal lights (4), left and right. Refer to "Front Turn Signal Light Removal and Installation in Section 9B (Page 9B-8)".



I717H1940012-01

6) Remove the cowling (5) along with the lower panel (6).

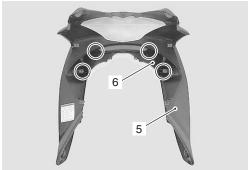


I718H1940015-01



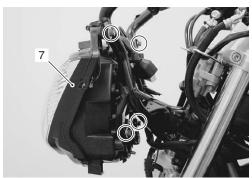
I717H1940009-01

7) Remove the lower panel (6) from the cowling (5).



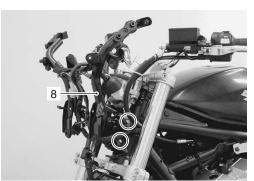
I718H1940017-01

- 8) Disconnect the headlight and position light couplers.
- 9) Remove the headlight assembly (7).



I717H1940010-01

10) Remove the cowling brace (8).



I717H1940011-01

#### Installation

Install the cowling and cowling brace in the reverse order of removal. Pay attention to the following point:

After installing, be sure to inspect the headlight beam.
 Refer to "Headlight Beam Adjustment (GSF650/S/A/SAK7) in Section 9B (Page 9B-4)".

#### Front Fender

Refer to "Front Fork Removal and Installation in Section 2B (Page 2B-2)".

#### **Seat Height Adjustment**

B817H29406008

Adjust the seat height in the following procedures:

- 1) Remove the seat assembly. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) (Page 9D-6)".
- 2) Remove the seat height adjust dampers.



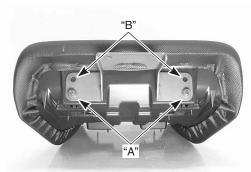
I718H1940020-01

3) Remove the front seat from the rear seat.



I718H1940021-02

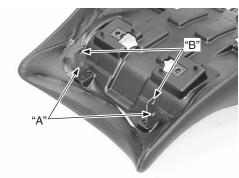
4) Adjust the seat height adjuster position "A" or "B".



I718H1940022-01

"A":	For low (Normal) position	"B": For high position

5) Reinstall the front seat and adjust the seat height adjuster position "A" or "B".



I718H1940023-01

"A": For low (Normal) position	"P": For high position

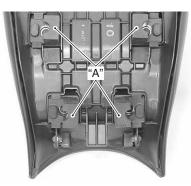
6) Install the seat height adjust dampers.

#### **NOTE**

Dampers are used in two ways "A" or "B". Pay attention to the direction of dampers when installing them.

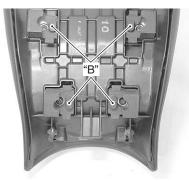
#### **A** CAUTION

Position of adjuster and direction of dampers must be unified either "A" or "B".



I718H1940024-01

"A": For low (Normal) position



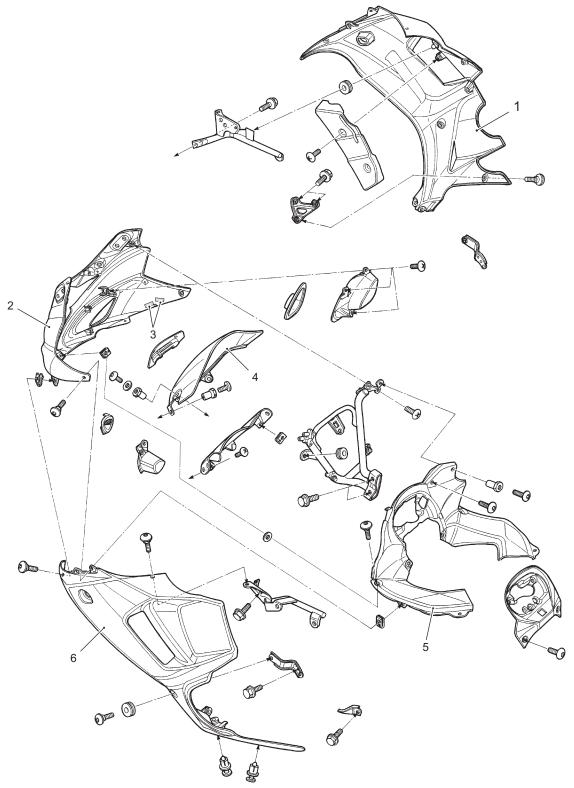
I718H1940025-01

"B": For high position

7) Reinstall the seat assembly. Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) (Page 9D-6)".

# **Cowling Construction (GSX650FK8)**

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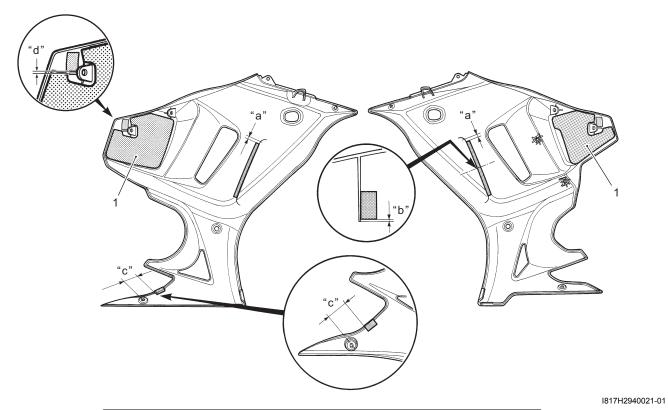


1817	H294	1001	4-03

Under cowling (R)	3. Cushion	5. Upper panel
Body cowling	<ol><li>Windscreen</li></ol>	<ol><li>Under cowling (L)</li></ol>

# Under Cowl Construction (GSX650FK8)

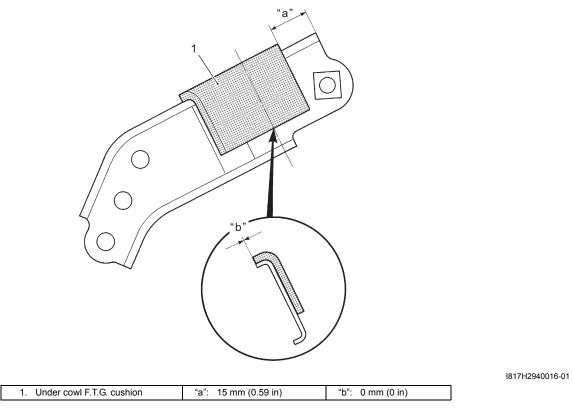
B817H29406012



Heat shield	"a": Max. 5 mm (0.19 in)	"c": 55 mm (2.17 in)
2. Cushion	"b": 0 − 1 mm (0 − 0.039 in)	"d": 3 mm (0.12 in)

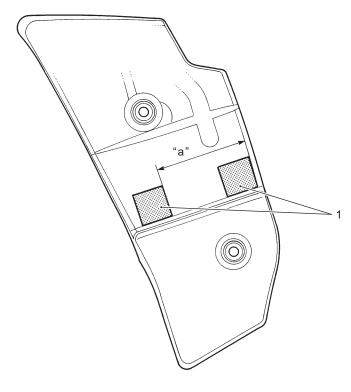
### **Under Cowl Bracket Cushion Attachment (GSX650FK8)**

B817H29406013



### **Under Cowl Protector Cushion Attachment (GSX650FK8)**

B817H29406014

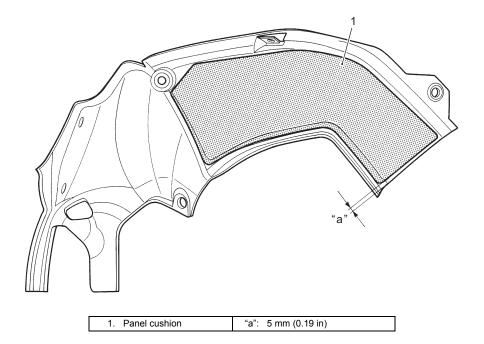


1. Cushion "a": 85 mm (3.35 in)

I817H2940017-01

## **Upper Panel Cushion Attachment (GSX650FK8)**

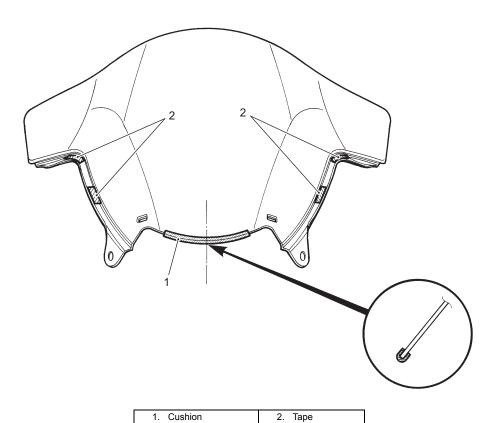
B817H29406015



## Windscreen Cushion Attachment (GSX650FK8)

B817H29406016

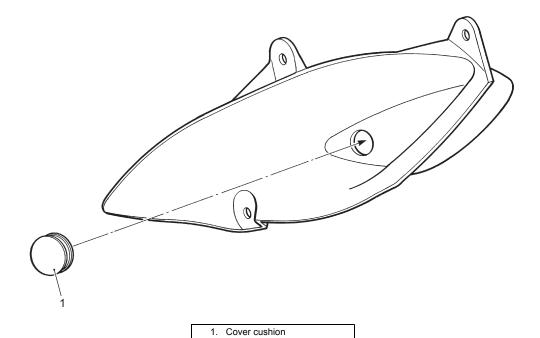
I817H2940018-01



I817H2940019-01

#### Intake Net Cover Construction Attachment (GSX650FK8)

B817H29406017



I817H2940020-01

# Exterior Parts Removal and Installation (GSX650FK8)

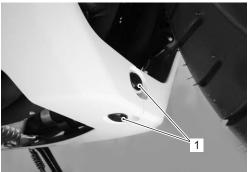
### **Under Cowling**

B817H29406010

Refer to "Exterior Parts Removal and Installation (GSF650/S/A/SAK7) (Page 9D-6)".

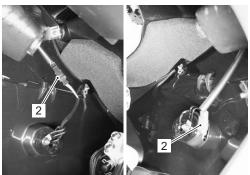
#### Removal

1) Remove the fasteners (1).



I817H2940001-01

2) Disconnect the turn signal light couplers (2), left and right.

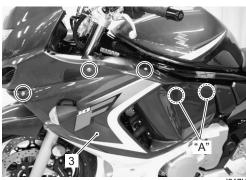


I817H2940002-01

3) Remove the left under cowling (3) and right under cowling (4).



I817H2940006-01



I817H2940003-01



I817H2940004-01



I817H2940005-02

"A": Hooked point

#### Installation

Install the under cowlings in the reverse order of removal.

# Upper Panel Removal

- 1) Remove the combination meter assembly. Refer to "Combination Meter Removal and Installation (GSX650FK8) in Section 9C (Page 9C-13)".
- 2) Remove the upper panel (1).



I817H2940007-01



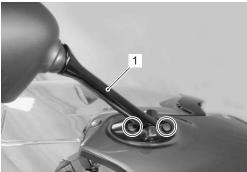
I817H2940008-01

#### Installation

Install the under panel in the reverse order of removal.

# **Body Cowling** Removal

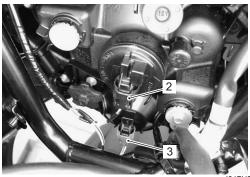
1) Remove the caps and rear view mirror (1), left and right.



I817H2940009-01

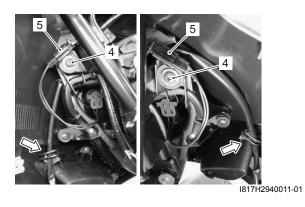
2) Remove the upper panel.

3) Disconnect the high beam light coupler (2) and low beam light coupler (3).



I817H2940010-01

- 4) Remove the screws (4).
- 5) Disconnect the position lights (5) and clamps, left and right.

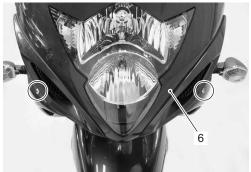


6) Remove the screws.



I817H2940012-01

7) Remove the body cowling assembly (6).



I817H2940013-02

#### Installation

Install the body cowling in the reverse order of removal.

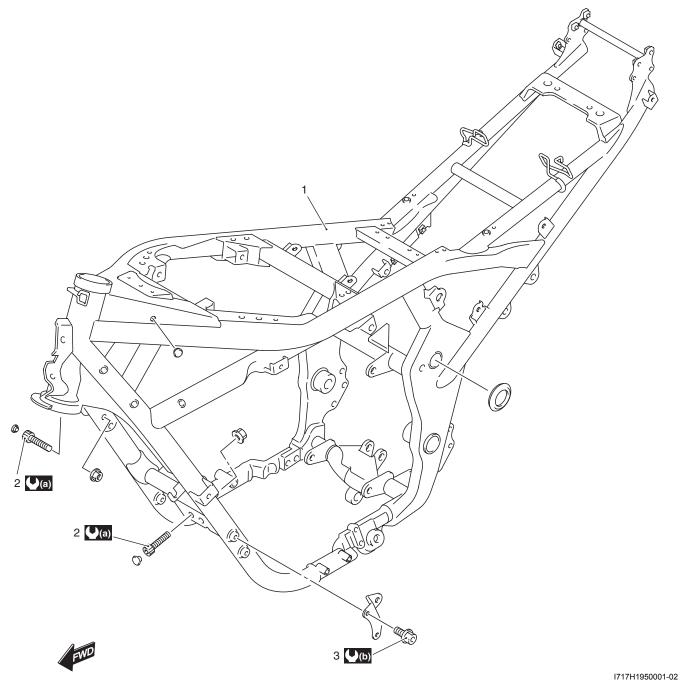
**Body Structure: 9E-1** 

# **Body Structure**

# **Repair Instructions**

# **Body Frame Construction**

B817H29506001



1. Frame	(a): 50 N·m (5.0 kgf-m, 36.0 lb-ft)
Frame down tube bolt	(b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
3 Engine mount No 1 bracket helt	

#### **Engine Mounting Bracket Bushing Replacement**

B817H29506002

Replace the engine mounting bracket bushing if necessary, as shown in the body frame construction. Refer to "Body Frame Construction (Page 9E-1)".

#### **Engine Mount Bushing Replacement**

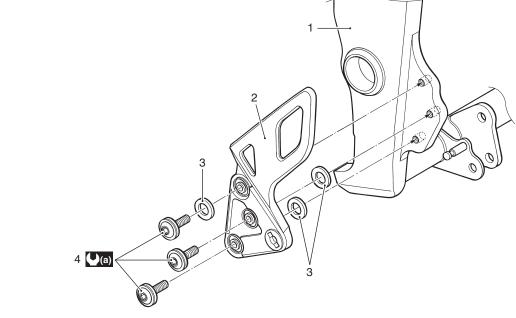
B817H29506003

Replace the engine mount bushing if necessary, as shown in the body frame construction. Refer to "Body Frame Construction (Page 9E-1)".

# Front Footrest Bracket Construction GSF650S

B817H29506004

I718H1950001-04

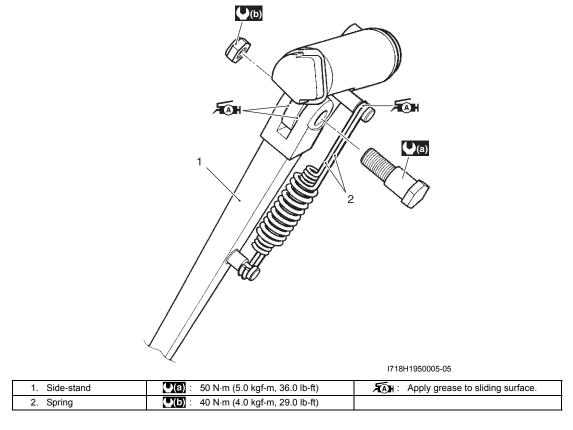


1. Frame 2. Footrest bracket 3. Washer 4. Bolt (2.3 kgf-m, 16.5 lb-ft)

**Body Structure: 9E-3** 

#### **Side-stand Construction**

B817H29506005



#### Side-stand Removal and Installation

B817H29506006

#### Removal

- 1) Support the motorcycle with the center stand.
- 2) Remove the side-stand as shown in the side-stand construction. Refer to "Side-stand Construction (Page 9E-3)".

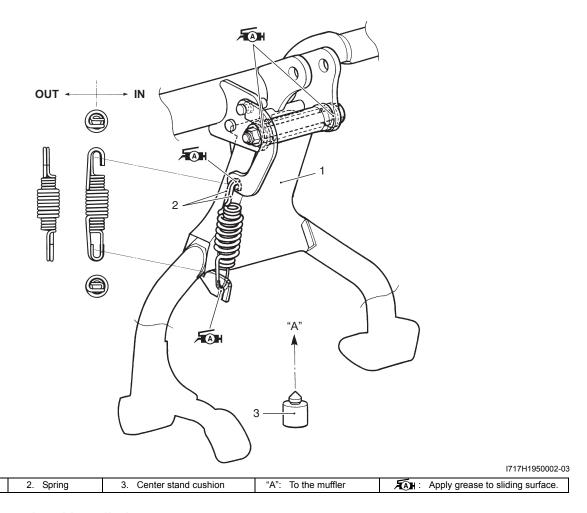
#### Installation

Install the side-stand as shown in the side-stand construction. Refer to "Side-stand Construction (Page 9E-3)".

#### **Center Stand Construction**

B817H29506007

B817H29506008



#### **Center Stand Removal and Installation**

#### Removal

1) Support the motorcycle using a jack.

#### **⚠ CAUTION**

1. Center stand

#### Make sure that the motorcycle is supported securely.

2) Remove the center stand as shown in the center stand construction. Refer to "Center Stand Construction (Page 9E-4)".

#### Installation

Install the center stand as shown in the center stand construction. Refer to "Center Stand Construction (Page 9E-4)".

**Body Structure: 9E-5** 

# **Specifications**

#### **Tightening Torque Specifications**

B817H29507001

The specified tightening torque is also described in the following.

- "Body Frame Construction (Page 9E-1)"
- "Front Footrest Bracket Construction (Page 9E-2)"
- "Side-stand Construction (Page 9E-3)"

#### Reference

**NOTE** 

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

# **Special Tools and Equipment**

#### **Recommended Service Material**

B817H29508001

**NOTE** 

Required service material is also described in the following.

- "Side-stand Construction (Page 9E-3)"
- "Center Stand Construction (Page 9E-4)"

# Prepared by

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