SUZUKI

GSX-R1000

SERVICE MANUAL

99500-39380-01E

FOREWORD

This manual contains an introductory description on the SUZUKI GSX-R1000 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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Section 00

Precautions

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Precautions

Precautions

Warning / Caution / Note

B947H10000001

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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⚠ 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 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, self-locking 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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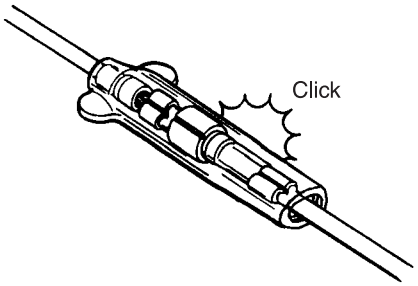
When handling the electrical parts or servicing FI system, observe the following points for the safety of the systems.

Electrical Parts

Connector / Coupler

- Faulty FI system is often related to poor electrical contact of connector/coupler. Before servicing individual electronic part, check electrical contact of the connector/coupler.
- When connecting a connector, be sure to push it in until a click is felt.



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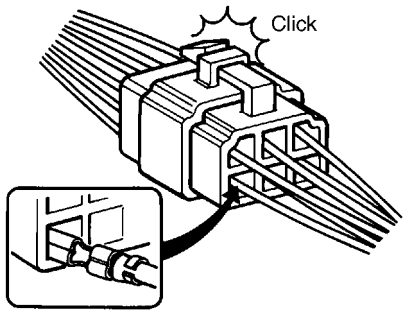
- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.
- Push in the coupler straightly. An angled or skewed insertion may cause the terminal to be deformed, possibly resulting in poor electrical contact.
- Inspect each terminal for corrosion and contamination. The terminals must be clean and free of any foreign material which could impede proper terminal contact.
- Before refitting the sealed coupler, make sure its seal rubber is positioned properly. The seal rubber may possibly come off the position during disconnecting work and if the coupler is refitted with the seal rubber improperly positioned, it may result in poor water sealing.



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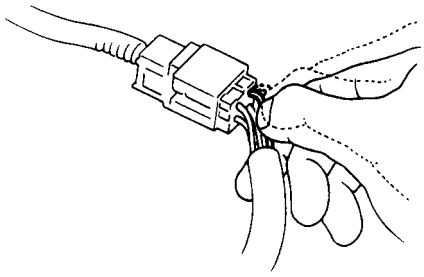
- Inspect each lead wire circuit for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.



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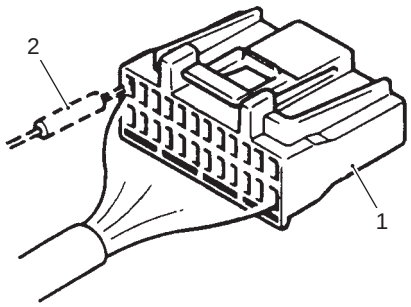
- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (rear) of the connector/coupler.



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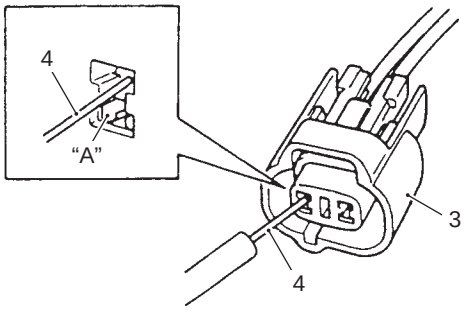
1. Coupler	2. Probe

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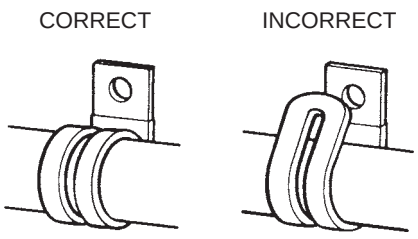
3. Coupler	4. Probe	"A": Where male terminal fits

- Avoid applying grease or other similar material to connector/coupler terminals to prevent electric trouble.

Clamp

- Clamp the wire harness at such positions as indicated in "Wiring Harness Routing Diagram" in Section 9A (Page 9A-7).
- 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.



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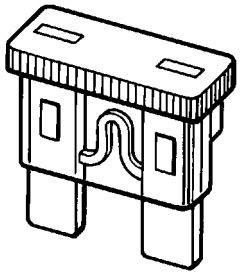
Fuse

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



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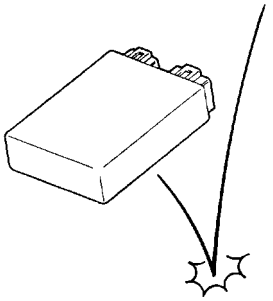
Switch

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 severe impacts during removal and installation.



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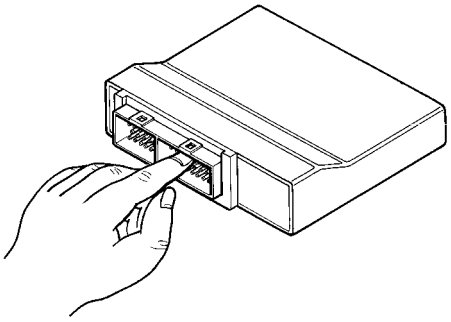
- Be careful not to touch the electrical terminals of the electronic parts (ECM, etc.). The static electricity from your body may damage them.



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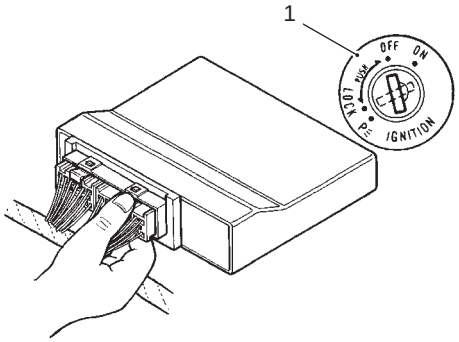
- When disconnecting and connecting the coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



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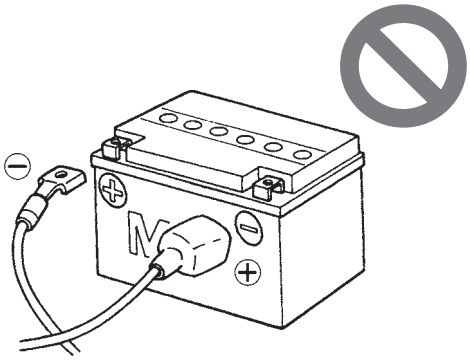
1. Ignition switch

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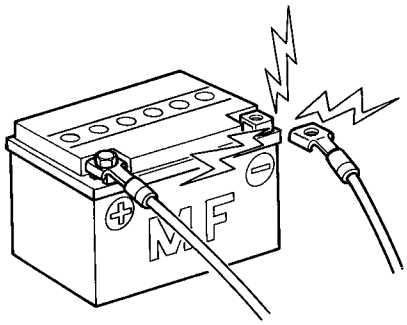
- Removing any battery terminal of a running engine is strictly prohibited. The moment such removal is made, damaging counter electromotive force will be applied to the electronic unit which may result in serious damage.



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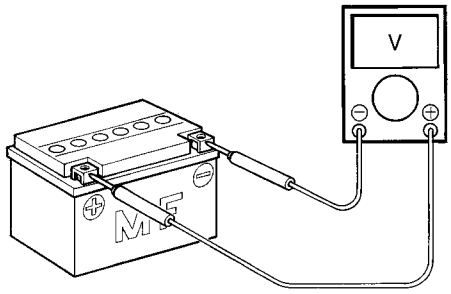
- Before measuring voltage at each terminal, check to make sure that battery voltage is 11 V or higher. Terminal voltage check with a low battery voltage will lead to erroneous diagnosis.



I310G1000012-02

- Never connect any tester (voltmeter, ohmmeter, or whatever) to the electronic unit when its coupler is disconnected. Otherwise, damage to electronic unit may result.
- Never connect an ohmmeter to the electronic unit 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

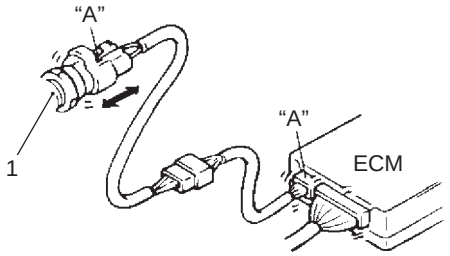
Possible causes for the open circuit are as follows. As the cause can exist in the connector/coupler or terminal, they need to be checked carefully.

- 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.

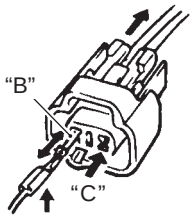
2) Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.



I718H1000005-02

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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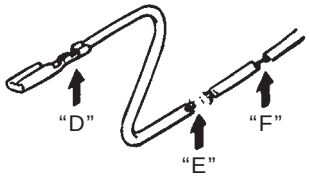
"B": Check contact tension by inserting and removing
"C": Check each terminal for bend and proper alignment

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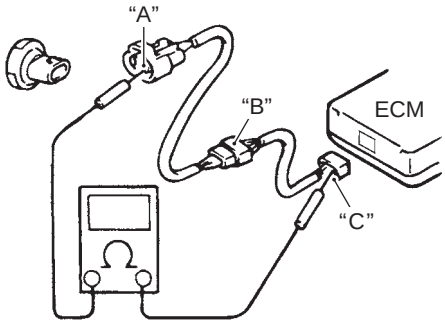
"D": Looseness of crimping
"E": Open
"F": Thin wire (A few strands left)

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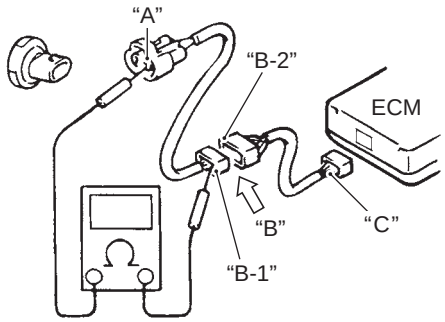
2) Disconnect the coupler "B" and measure resistance between couplers "A" and "B-1".
If no continuity is indicated, the circuit is open between couplers "A" and "B-1". If continuity is indicated, there is an open circuit between couplers "B-2" and "C" or an abnormality in coupler "B-2" or coupler "C".



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Voltage check

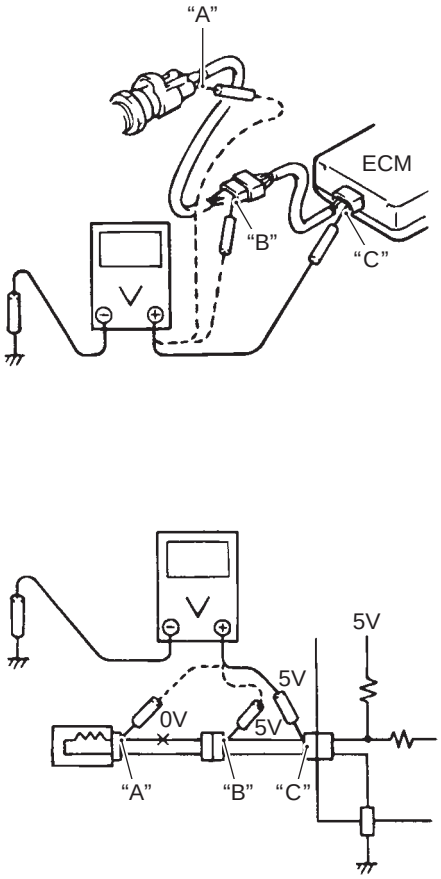
If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

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 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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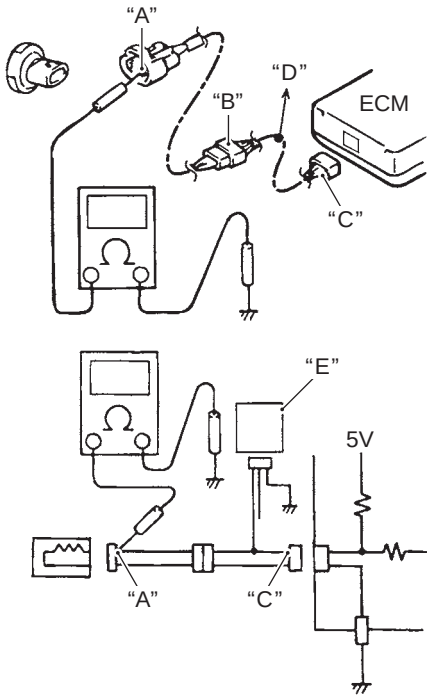
Short circuit check (Wire harness to ground)

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 wrong.

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”.



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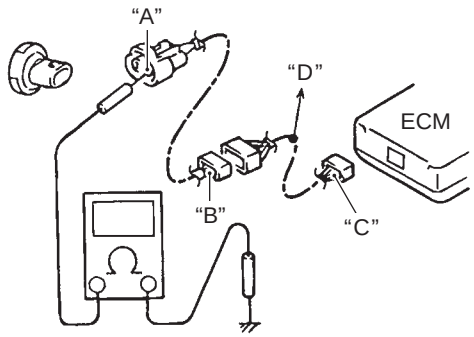
“D”: To other parts	“E”: Other parts

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 ground between terminals “A” and “B”.



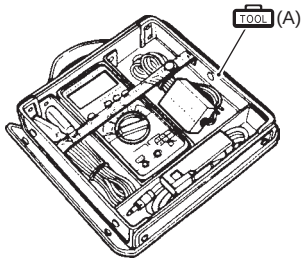
I705H1000009-02

“D”: To other parts

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
TOOL (A): 09900–25008 (Multi circuit tester set)



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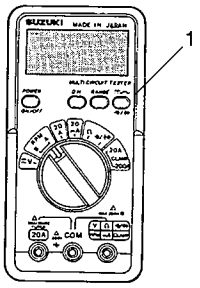
Using the testers

- Incorrectly connecting the (+) and (–) probes may cause the inside of the tester to be burned.
- If the voltage and current are not known, make measurements using the highest range.
- When measuring the resistance with the multi-circuit tester (1), ∞ will be shown as 10.00 MΩ 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
TOOL : 09900–25008 (Multi circuit tester set)



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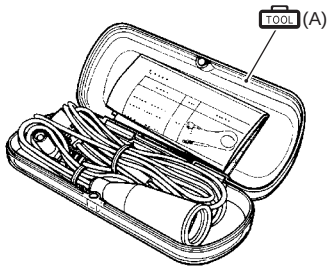
NOTE

- **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 terminal damage.**

Special tool
TOOL (A): 09900–25009 (Needle-point probe set)



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Section 0

General Information

CONTENTS

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
	Torque control required. Data beside it indicate specified torque.
	Apply oil. Use engine oil unless otherwise specified.
	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1).
	Apply SUZUKI SUPER GREASE “A” or equivalent. 99000-25010
	Apply SUZUKI MOLY PASTE or equivalent. 99000-25140
	Apply SUZUKI SILICONE GREASE or equivalent. 99000-25100
	Apply SUZUKI BOND “1207B” or equivalent. 99000-31140
	Apply THREAD LOCK CEMENT SUPER “1303” or equivalent. 99000-32030
	Apply THREAD LOCK CEMENT SUPER “1322” or equivalent. 99000-32110
	Apply THREAD LOCK CEMENT SUPER “1360” or equivalent. 99000-32130
	Use engine coolant or equivalent. 99000-99032-11X
	Use fork oil or equivalent. 99000-99001-SS5
	Apply MUFFLER SEAL LOCTITE “5920” (commercially available) or equivalent.
	Apply or use brake fluid.
	Use special tool.
	Do not reuse.
	Note on reassembly.

Abbreviations

B947H10101002

A:
ABDC: After Bottom Dead Center
AC: Alternating Current
ACL: Air Cleaner, Air Cleaner Box
API: American Petroleum Institute
ATDC: After Top Dead Center
ATM Pressure: Atmospheric Pressure, Atmospheric Pressure Sensor (APS, AP Sensor)
A/F: Air Fuel Mixture
B:
BARO: Barometric pressure (Atmospheric pressure)
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)
CMP Sensor: Camshaft Position Sensor (CMPS)
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)
EVAP: Evaporative Emission
EXC System: Exhaust Control System (EXCS)
EXC Valve: Exhaust Control Valve (EXCV)
EXCV Actuator: Exhaust Control Valve Actuator (EXCVA)
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
O:
OHC: Over Head Camshaft
OPS: Oil Pressure Switch
P:
PAIR: Pulsed Secondary Air Injection
PCM: Power Control Module
PCV: Positive Crankcase Ventilation (Crankcase Breather)
R:
RH: Right Hand
ROM: Read Only Memory
S:
SAE: Society of Automotive Engineers
SDS: Suzuki Diagnosis System
SRAD: Suzuki Ram Air Direct
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

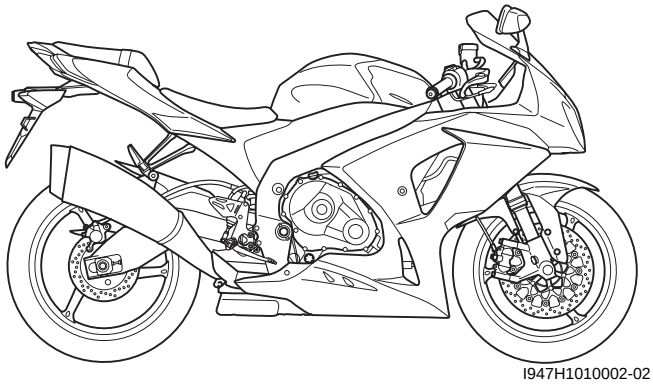
B947H10101003

NOTE

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

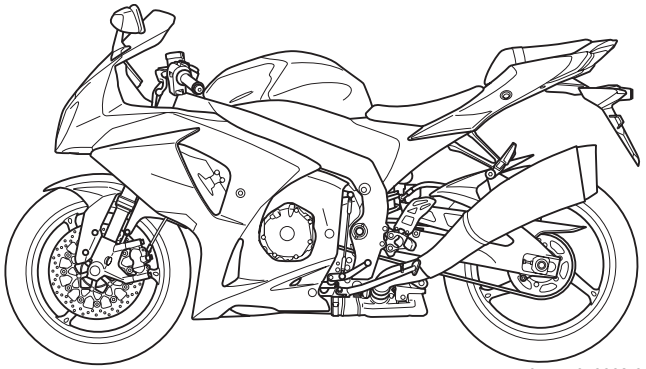
SUZUKI GSX-R1000 (2009-model)

Right Side



I947H1010002-02

Left Side

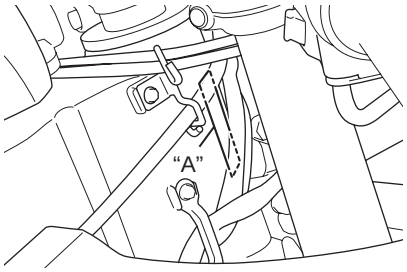


I947H1010003-01

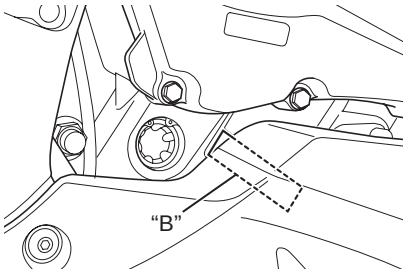
Vehicle Identification Number

B947H10101004

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



I947H1010004-02



I947H1010005-01

Fuel and Oil Recommendation

B947H10101005

Fuel (For USA and Canada)

Use only unleaded gasoline of at least 90 pump octane (R/2 + M/2).

Gasoline containing MTBE (Meltyl 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 95 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.

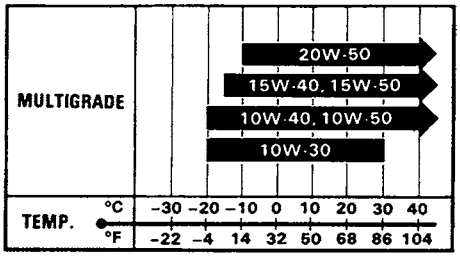
Suzuki recommends the use of SUZUKI PERFORMANCE 4 MOTOR OIL or equivalent engine oil. Use of SF/SG or SH/SJ in API with MA in JASO.

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 SS-05 or equivalent fork oil.

Engine Coolant Recommendation

B947H10101006

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 anti-freeze/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)
2 750 ml (2.9/2.4 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

B947H10101007

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:

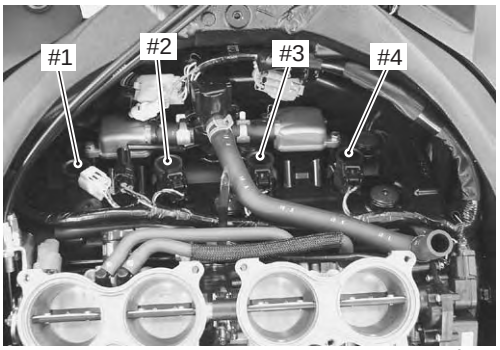
   Speed limits
   Initial 800 km (500 miles): Below 7 000 r/min
   Up to 1 600 km (1 000 miles): Below 10 500 r/min
   Over 1 600 km (1 000 miles): Below 13 750 r/min

2) 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 13 750 r/min at any time.

Cylinder Identification

B947H10101008

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).



I947H1010001-02

Country and Area Codes

B947H10101009

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

Code	Country or Area	Effective Frame No.
GSX-R1000 K9 (E-02)	U.K.	JS1CY111100100001 –
GSX-R1000 K9 (E-14)	Thailand	JS1CY121400100001 –
GSX-R1000 K9 (E-19)	E.U.	JS1CY111100100001 –
GSX-R1000UF K9 (E-19)	E.U.	JS1CY211100100001 –
GSX-R1000 K9 (E-03)	U.S.A. (Except for California)	JS1GT78A 92100001 –
GSX-R1000 K9 (E-24)	Australia	JS1CY111200100001 –
GSX-R1000 K9 (E-28)	Canada	JS1GT78A 92100001 –
GSX-R1000 K9 (E-33)	California (U.S.A.)	JS1GT78A 92100001 –
GSX-R1000 K9 (E-51)	Korea	JS1CY111390100001 –

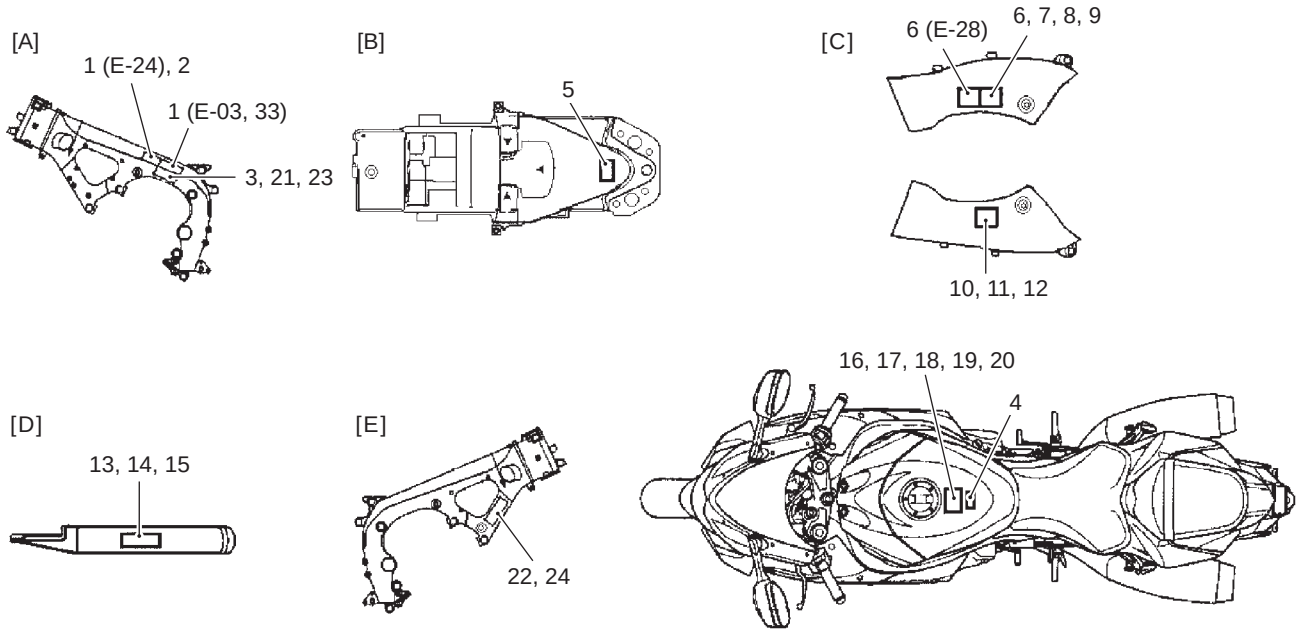
Wire Color Symbols

B947H10101010

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

Warning, Caution and Information Labels Location

B947H10101011



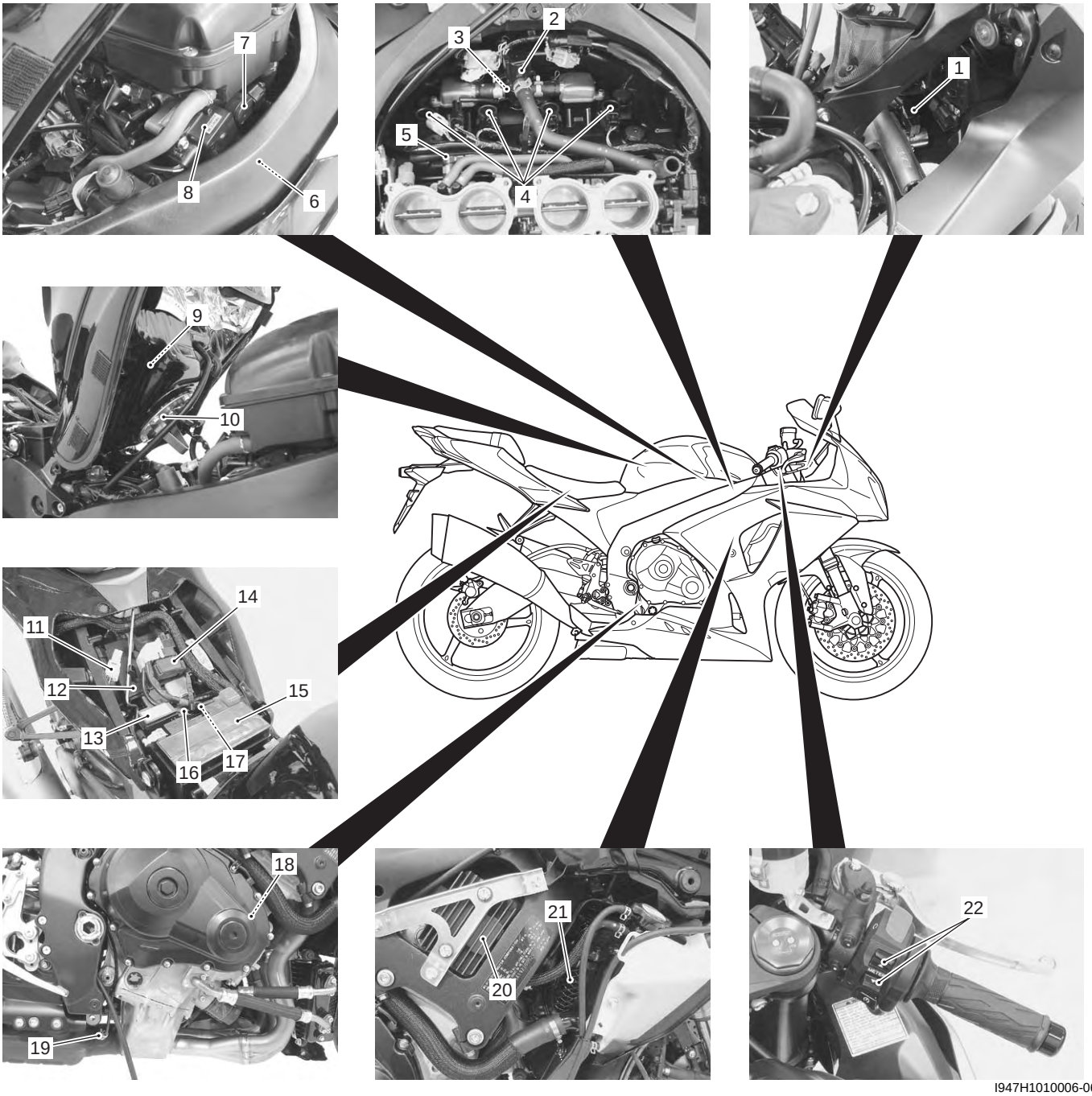
I947H1010008-04

1. Noise label (For E-03, 24, 33)	16. General warning label (English) (For E-02, 03, 24, 33)
2. Information label (For E-03, 28, 33, 51)	17. General warning label (French) (For GSX-R1000UF E-19)
3. Vacuum hose routing label (For E-33)	18. General warning label (English/French) (For E-28)
4. Fuel information label (For E-02, 03, 19, 24, 28, 33, 51, GSX-R1000UF E-19)	19. General warning label (French/German/Italian/Swedish) (For E-19)
5. Manual notice label (For E-03, 33)	20. General warning label (Korean) (For E-51)
6. Screen label (English) (For E-02, 03, 24, 28, 33)	21. ICES Canada label (For E-28)
7. Screen label (French) (For E-28, GSX-R1000UF E-19)	22. I.D. plate (For E-02, 19, 24, GSX-R1000UF E-19)
8. Screen label (French/German/Italian/Swedish) (For E-19)	23. I.D. label (For GSX-R1000UF E-19)
9. Screen label (Korean) (For E-51)	24. Safety plate (For E-03, 28, 33, 51)
10. Steering warning label (English) (For E-03, 33)	[A]: Frame (LH)
11. Steering warning label (French/German/English) (For E-02, 19, 24, 28, GSX-R1000UF E-19)	[B]: Rear fender, front
12. Steering warning label (Korean) (For E-51)	[C]: Intake cover
13. Tire information label (English) (For E-03, 33)	[D]: Chain case
14. Tire information label (French/German/English) (For E-02, 19, 24, 28, GSX-R1000UF E-19)	[E]: Frame (RH)
15. Tire information label (Korean) (For E-51)	

Component Location

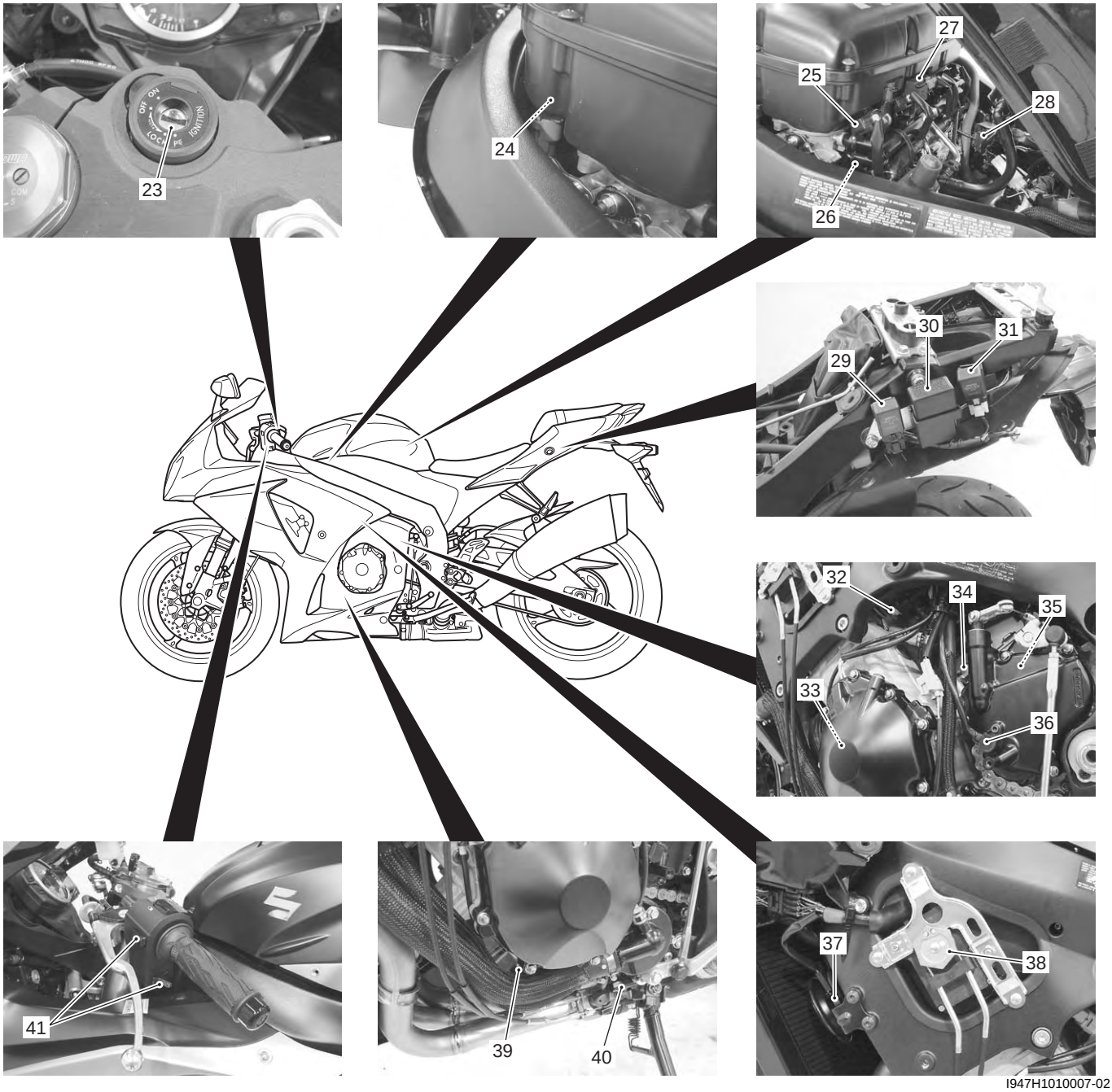
Electrical Components Location

B947H10103001



I947H1010006-06

1. Steering damper solenoid valve	9. Fuel level gauge	17. TO sensor
2. PAIR control solenoid valve	10. Fuel pump	18. CKP sensor
3. CMP sensor	11. Mode select switch/SDS coupler	19. HO2 sensor
4. Ignition coil	12. ECM	20. Regulator/Rectifier
5. ISC valve	13. Fuse box	21. Cooling fan
6. TP sensor	14. Starter relay/Main fuse	22. Lap time counter switch
7. STP sensor	15. Battery	
8. STV actuator	16. AP sensor	



I947H1010007-02

23. Ignition switch/Immobilizer antenna (E-02, 19, 24, 51)	30. Turn signal/Side-stand relay	37. Horn
24. IAT sensor	31. Cooling fan relay	38. EXCV actuator
25. Secondary fuel injector	32. ECT sensor	39. Oil pressure switch
26. Primary fuel injector	33. Generator	40. Side-stand switch
27. IAP sensor	34. Starter motor	41. Drive mode selector
28. EVAP system purge control solenoid valve (E-33 only)	35. GP switch	
29. Fuel pump relay	36. Speed sensor	

Specifications

Specifications

B947H10107001

NOTE

These specifications are subject to change without notice.

Dimensions and dry mass

Item	Specification	Remark
Overall length	2 045 mm (80.5 in)	
Overall width	720 mm (28.3 in)	
Overall height	1 130 mm (44.5 in)	
Wheelbase	1 405 mm (55.3 in)	
Ground clearance	130 mm (5.1 in)	
Seat height	810 mm (31.9 in)	
Curb mass	205 kg (452 lbs)	

Engine

Item	Specification	Remark
Type	4-stroke, Liquid-cooled, DOHC	
Number of cylinders	4	
Bore	74.5 mm (2.933 in)	
Stroke	57.3 mm (2.256 in)	
Displacement	999 cm^3 (61.0 cu. in)	
Compression ratio	12.8 : 1	
Fuel system	Fuel injection system	
Air cleaner	Paper element	
Starter system	Electric	
Lubrication system	Wet sump	
Idle speed	1 150 $\pm$ 100 r/min	

Drive train

Item		Specification	Remark
Clutch		Wet multi-plate type	
Transmission		6-speed constant mesh	
Gearshift pattern		1-down, 5-up	
Primary reduction ratio		1.617 (76/47)	
Gear ratios	Low	2.562 (41/16)	
	2nd	2.052 (39/19)	
	3rd	1.714 (36/21)	
	4th	1.500 (36/24)	
	5th	1.360 (34/25)	
	Top	1.269 (33/26)	
Final reduction ratio		2.470 (42/17)	
Drive chain		DID50VAZ, 114 links	

Chassis

Item	Specification	Remark
Front suspension	Inverted telescopic, coil spring, oil damped	
Rear suspension	Link type, coil spring, oil damped	
Front suspension stroke	125 mm (4.9 in)	
Rear wheel travel	130 mm (5.1 in)	
Caster	23° 50’	
Trail	98 mm (3.86 in)	
Steering angle	27° (right & left)	
Turning radius	3.4 m (11.2 ft)	
Front brake	Disc brake, twin	
Rear brake	Disc brake	
Front tire size	120/70ZR17M/C (58W), tubeless	
Rear tire size	190/50ZR17M/C (73W), tubeless	

Electrical

Item		Specification	Remark
Ignition type		Electronic ignition (Transistorized)	
Ignition timing		4° B.T.D.C. at 1 150 r/min	
Spark plug		NGK CR9EIA-9 or DENSO IU27D	
Battery		12 V 36.0 kC (10 Ah)/10 HR	
Generator		Three-phase A.C. generator	
Main fuse		30 A	
Fuse		30/10/10/15/10/10/15 A	
Headlight	High	12 V 65 W (H9)	
	Low	12 V 55 W (H11)	
Position light		12 V 5 W	
Brake light/Taillight		LED	
License plate light		12 V 5 W	
Turn signal light		12 V 21 W	
Speedometer light		LED	
Tachometer light		LED	
Fuel level indicator light		LED	
Turn signal indicator light		LED	
Neutral indicator light		LED	
High beam indicator light		LED	
Oil pressure/Coolant temperature indicator light		LED	
FI indicator light/Sd indicator light		LED	
Engine R.P.M. indicator light		LED	
Immobilizer indicator light		LED	E-02, 19, 24, 51

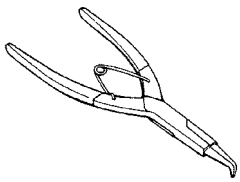
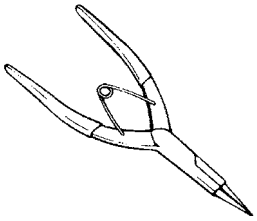
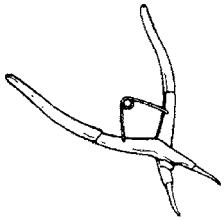
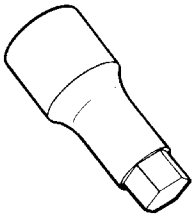
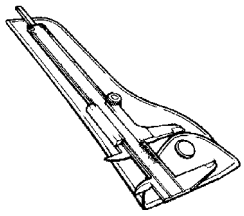
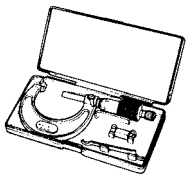
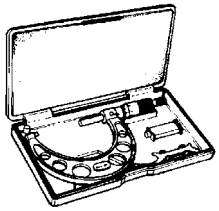
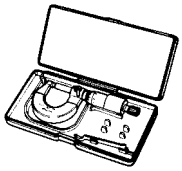
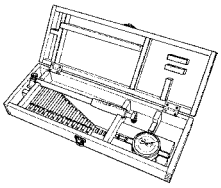
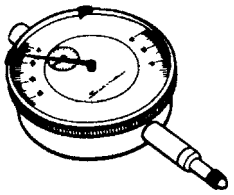
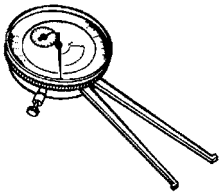
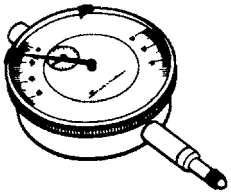
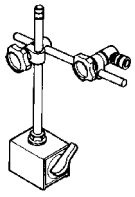
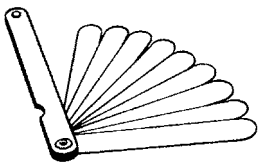
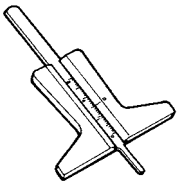
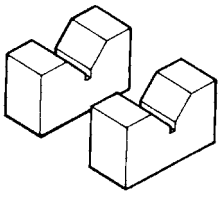
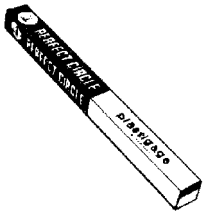
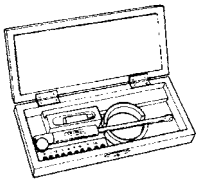
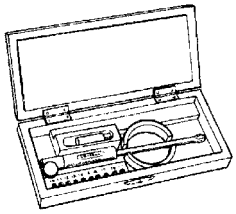
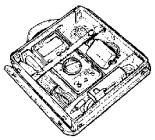
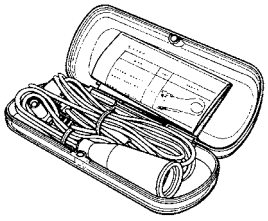
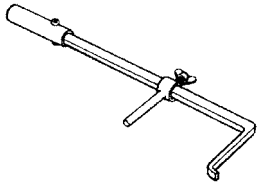
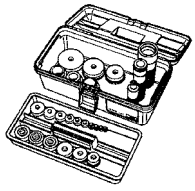
Capacities

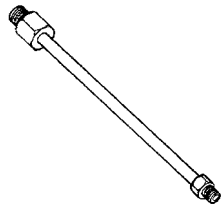
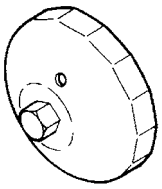
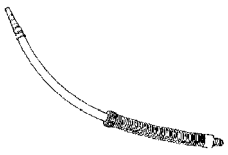
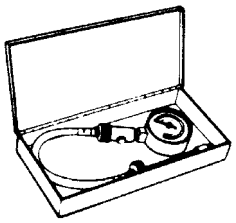
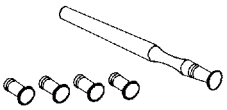
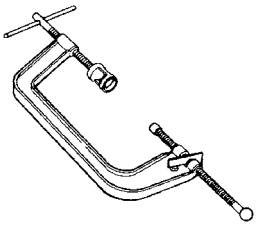
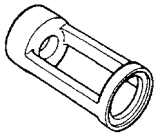
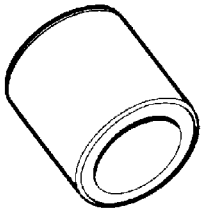
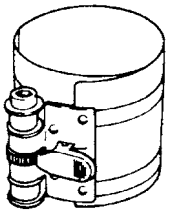
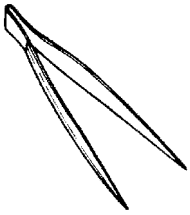
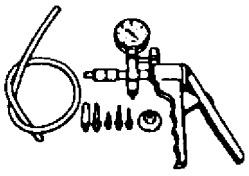
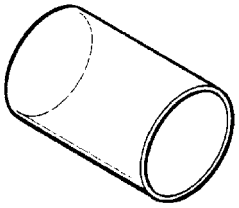
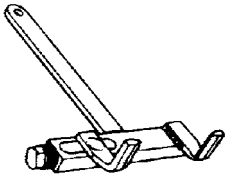
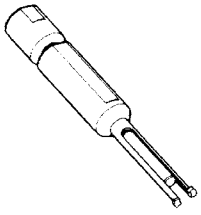
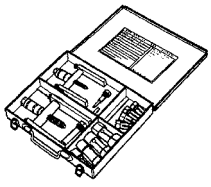
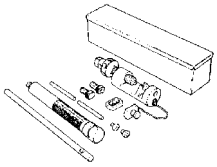
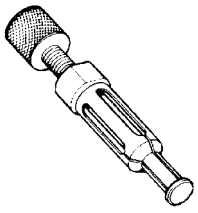
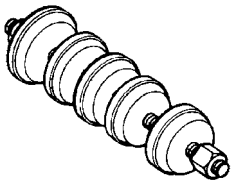
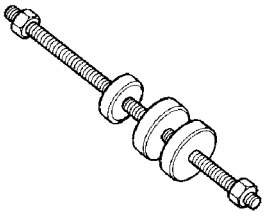
Item		Specification	Remark
Fuel tank		16.5 L (4.4/3.6 US/Imp gal)	E-33
		17.5 L (4.6/3.8 US/Imp gal)	Others
Engine oil	Oil change	2 800 ml (3.0/2.5 US/Imp qt)	
	With filter change	3 300 ml (3.5/3.0 US/Imp qt)	
	Overhaul	3 600 ml (3.8/3.2 US/Imp qt)	
Engine coolant		2 750 ml (2.8/2.4 US/Imp qt)	

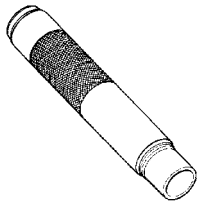
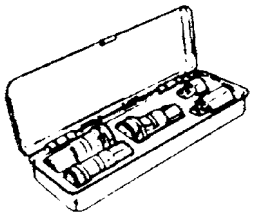
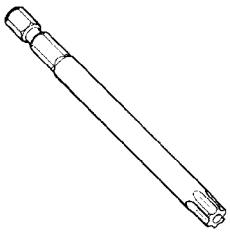
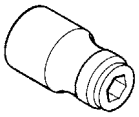
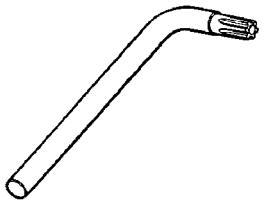
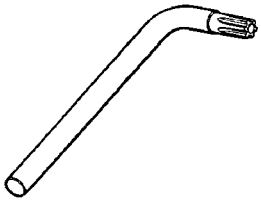
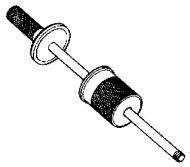
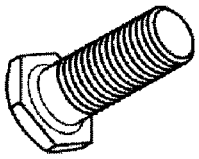
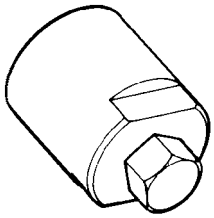
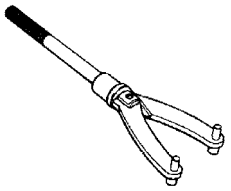
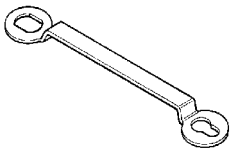
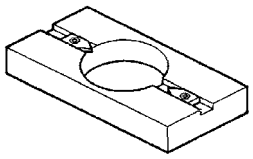
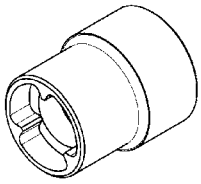
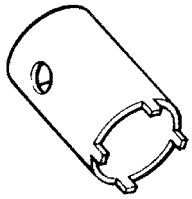
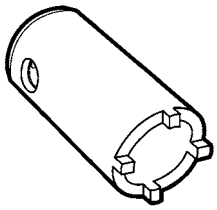
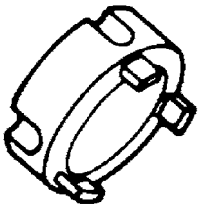
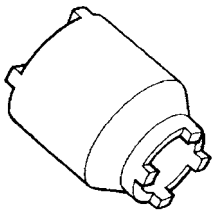
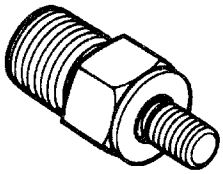
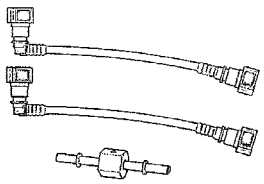
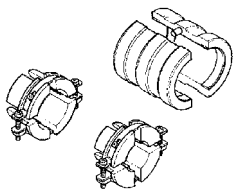
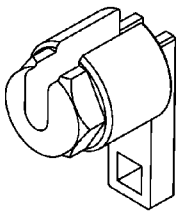
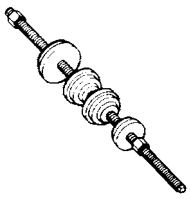
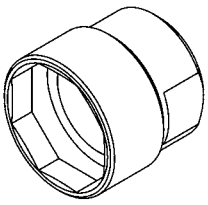
Special Tools and Equipment

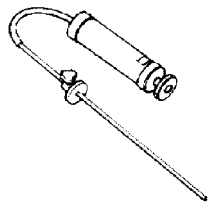
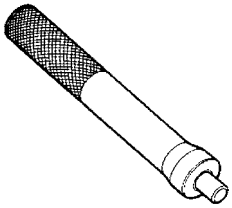
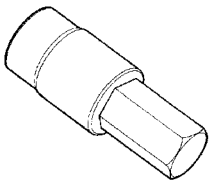
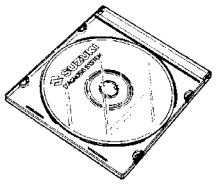
Special Tool

B947H10108002

 **09900–06104** Snap ring remover (Open type)	 **09900–06107** Snap ring remover (Open type)	 **09900–06108** Snap ring remover (Close type)	 **09900–18740** Hexagon socket (24 mm)	 **09900–20102** Vernier calipers (200 mm)
 **09900–20202** Micrometer (25 – 50 mm)	 **09900–20203** Micrometer (50 – 75 mm)	 **09900–20205** Micrometer (0 – 25 mm)	 **09900–20530** Cylinder gauge set	 **09900–20602** Dial gauge
 **09900–20605** Dial calipers (10 – 34 mm)	 **09900–20607** Dial gauge	 **09900–20701** Dial gauge chuck	 **09900–20803** Thickness gauge	 **09900–20805** Tire depth gauge
 **09900–21304** V blocks	 **09900–22301** Plastigage (0.025 – 0.076 mm)	 **09900–22302** Plastigage (0.051 – 0.152 mm)	 **09900–22401** Small bore gauge (10 – 18 mm)	 **09900–22403** Small bore gauge (18 – 35 mm)
 **09900–25008** Multi circuit tester set	 **09900–25009** Needle-point probe set	 **09904–41010** SUZUKI Diagnostic system set	 **09913–50121** Oil seal remover	 **09913–70210** Bearing installing set (10 – 75 Φ)

 **09915–17410** Oil pressure gauge adapter	 **09915–40610** Oil filter wrench	 **09915–63311** Compression gauge attachment	 **09915–64512** Compression gauge	 **09915–74521** Adapter hose
 **09915–77331** Oil pressure gauge (1000 kPa)	 **09916–10911** Valve lapper set	 **09916–14510** Valve lifter	 **09916–14522** Valve lifter attachment	 **09916–33210** Valve guide reamer (4.5 mm)
 **09916–33320** Valve guide reamer (9.8 mm)	 **09916–34542** Reamer handle	 **09916–43211** Valve guide installer & remover	 **09916–53380** Valve guide installer attachment	 **09916–77310** Piston ring compressor
 **09916–84511** Tweezer	 **09917–47011** Vacuum pump gauge set	 **09919–28620** Sleeve protector	 **09920–53740** Clutch sleeve hub holder	 **09921–20210** Bearing remover (12 mm)
 **09921–20240** Bearing remover set	 **09922–22711** Drive chain cutting and joint tool set	 **09923–74511** Bearing remover	 **09924–84510** Bearing installer set	 **09924–84521** Bearing installer set

 **09925–18011** Bearing installer	 **09930–10121** Spark plug wrench set	 **09930–11920** Torx bit (JT40H)	 **09930–11940** Torx bit holder	 **09930–11950** Torx wrench (5 mm)
 **09930–11960** Torx wrench (4 mm)	 **09930–30104** Rotor remover sliding shaft	 **09930–30460** Rotor remover bolt	 **09930–34970** Rotor remover	 **09940–40113** Flywheel rotor holder
 **09930–44530** Rotor holder	 **09930–73170** Starter torque limiter holder	 **09930–73181** Starter torque limiter socket	 **09930–82720** Mode selection switch	 **09940–14911** Steering stem nut socket wrench
 **09940–14940** Swingarm pivot thrust adjuster wrench	 **09940–14960** Steering stem nut socket wrench	 **09940–14990** Engine mounting adjust wrench	 **09940–40211** Fuel pressure gauge adapter	 **09940–40220** Fuel pressure gauge attachment
 **09940–52861** Front fork oil seal installer set	 **09940–84710** Rod guide case wrench	 **09940–92720** Spring scale	 **09941–34513** Bearing installer	 **09941–53670** Front fork cap socket wrench (45 mm)

 **09943–74111** Front fork oil level gauge	 **09943–88211** Pinion bearing installer	 **09944–28321** Hexagon socket (19 mm)	 **99565–01010–020** CD-ROM Ver.20	

Maintenance and Lubrication

Precautions

Precautions for Maintenance

B947H10200001

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

B947H10201001

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

B947H10205001

NOTE

I = Inspect and clean, adjust, replace or lubricate as necessary.
R = Replace.
T = Tighten.

Item	Interval					
	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	I	R	I
Exhaust pipe bolts and muffler bolts		T	—	T	—	T
Exhaust control valve		I	—	I	—	I
Valve clearance		—	—	—	—	I
Spark plugs		—	I	R	I	R
Fuel line		—	I	I	I	I
Evaporative emission control system (E-33 only)		—	—	I	—	I
Engine oil		R	R	R	R	R
Engine oil filter		R	—	—	R	—
Throttle cable play		I	I	I	I	I
PAIR (air supply) system		—	—	I	—	I
Throttle valve synchronization		I (E-33 only)	—	I	—	I
Engine coolant		Replace every 2 years.				
Radiator hose		—	I	I	I	I
Clutch cable play		—	I	I	I	I
Drive chain		I	I	I	I	I
		Clean and lubricate every 1 000 km (600 miles).				
Brakes		I	I	I	I	I
Brake fluid		—	I	I	I	I
		Replace every 2 years.				
Brake hoses		—	I	I	I	I
		Replace every 4 years.				
Tires		—	I	I	I	I
Steering		I	—	I	—	I
Front fork		—	—	I	—	I
Rear suspension		—	—	I	—	I
Chassis bolts and nuts		T	T	T	T	T

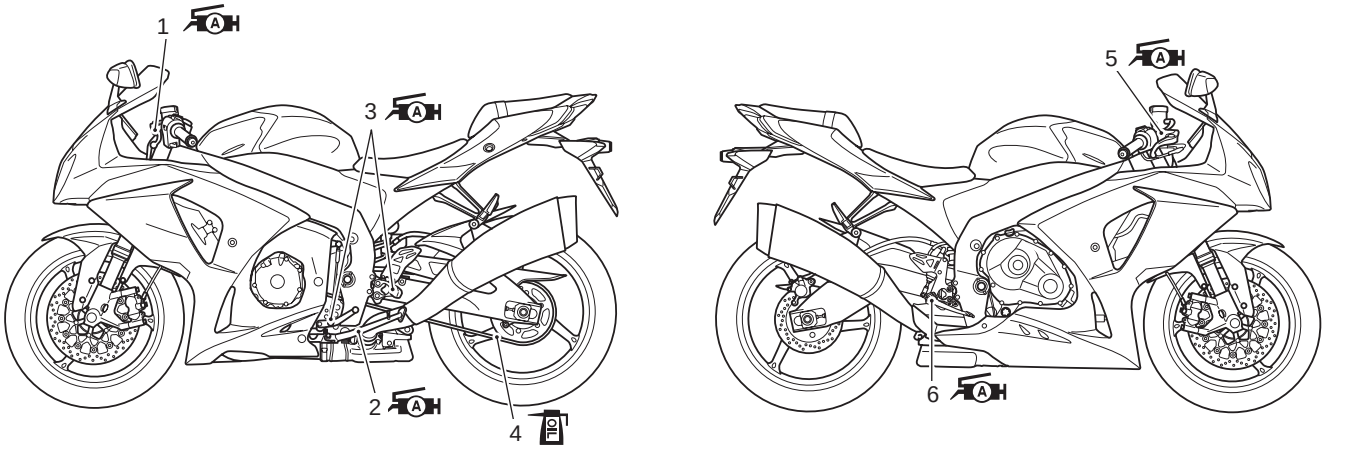
Lubrication Points

B947H10205002

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.**



I947H1020033-02

1. Clutch lever holder	5. Brake lever holder
2. Side stand pivot and spring hook	6. Brake pedal pivot and footrest pivot
3. Gearshift lever pivot and footrest pivot	: Apply grease.
4. Drive chain	: Apply oil.

Repair Instructions

Air Cleaner Element Replacement

B947H10206001

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-6).

Air Cleaner Element Inspection

B947H10206002

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-6).
2) Inspect the air cleaner element for clogging. If it is clogged with dirt, replace it with a new one.

⚠ CAUTION

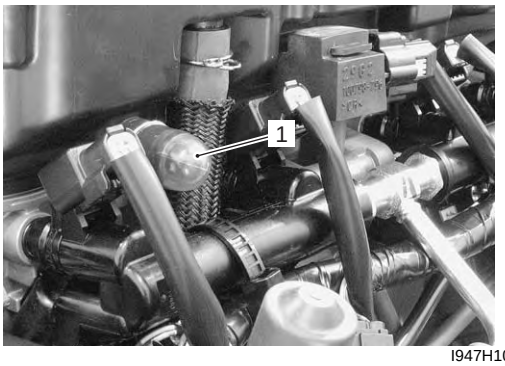
Do not blow the air cleaner element with compressed air.

NOTE

If driving under dusty conditions, replace the air cleaner element more frequently. Make sure that the air cleaner is in good condition at all times. The life of the engine depends largely on this component.

I947H1020001-01

3) Drain water from the air cleaner box by removing the drain plug (1).



I947H1020002-01

4) Reinstall the removed parts.

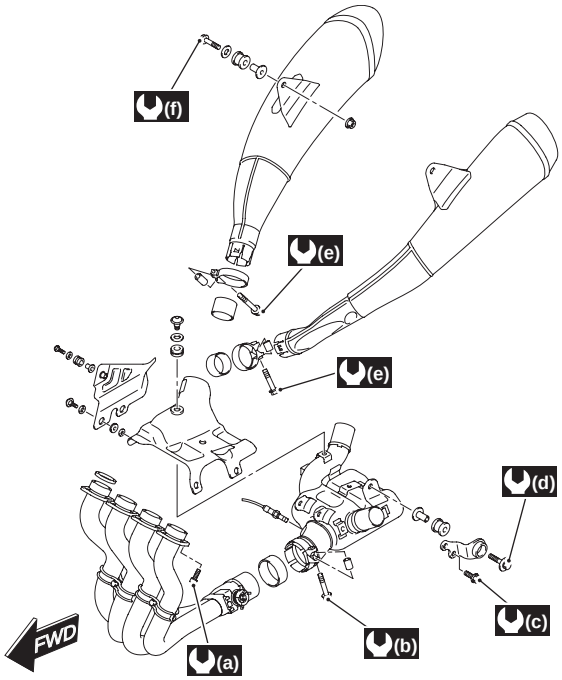
Exhaust Pipe Bolt and Muffler Bolt Inspection

B947H10206003

Tighten exhaust pipe bolts and muffler bolts
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 and muffler bolts to the specified torque.

Tightening torque
Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Muffler chamber connecting bolt (b): 30 N·m (3.0 kgf-m, 21.5 lbf-ft)
Muffler chamber bracket bolt (c): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)
Muffler chamber mounting bolt (d): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Muffler connecting bolt (e): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Muffler mounting bolt (f): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)



I947H1020053-01

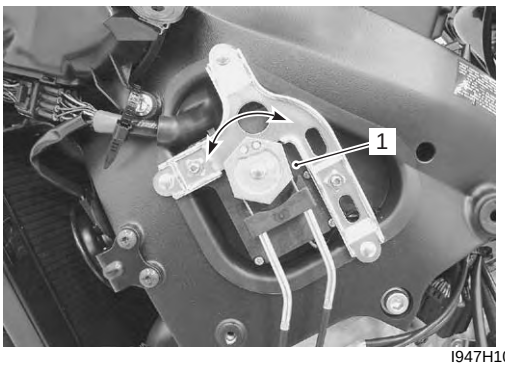
Exhaust Control Valve Inspection

B947H10206004

Inspect exhaust control valve
Initially at 1 000 km (600 miles, 2 months) and every 12 000 km (7 500 miles, 24 months) thereafter

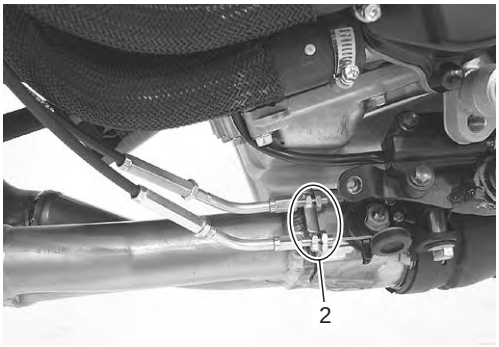
Inspect exhaust control valve as follows:

1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Check the exhaust control valve actuator (1) for its smooth movement when the ignition switch is turned on. If the exhaust valve actuator does not move smoothly, check exhaust valve actuator electrical circuit. Refer to “EXCVA Inspection” in Section 1K (Page 1K-9).



I947H1020003-02

3) Check the lock-nuts (2) for tightness. If the lock-nuts (2) are loose, tighten them after adjusting the cable length. Refer to “EXCV Cable Removal and Installation” in Section 1K (Page 1K-6).



I947H1020004-01

Valve Clearance Inspection and Adjustment

B947H10206005

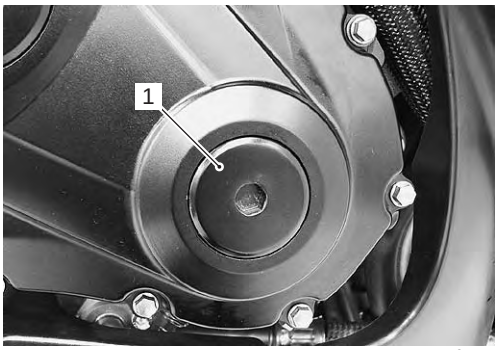
Inspect valve clearance
Initially every 24 000 km (14 500 miles, 48 months)

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) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
3) Remove the cylinder head cover. Refer to “Engine Top Side Disassembly” in Section 1D (Page 1D-26).
4) Remove the spark plugs. Refer to “Ignition Coil and Spark Plug Removal and Installation” in Section 1H (Page 1H-6).

   Valve clearance (When cold)
   IN: 0.08 – 0.18 mm (0.003 – 0.007 in)
   EX: 0.18 – 0.28 mm (0.007 – 0.011 in)

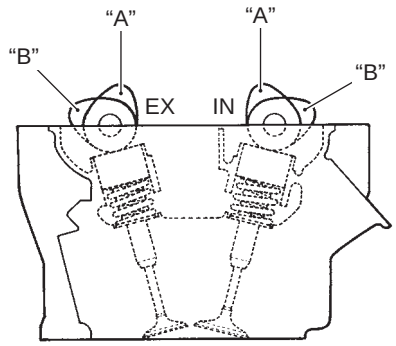
5) Remove the valve timing inspection cap (1).



I947H1020005-01

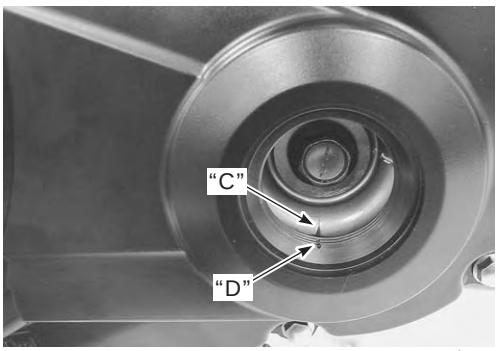
NOTE

- **The cam must be at positions, “A” or “B”, when checking 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 valve clearance checking, be sure to use a wrench, and rotate in the normal running direction.**

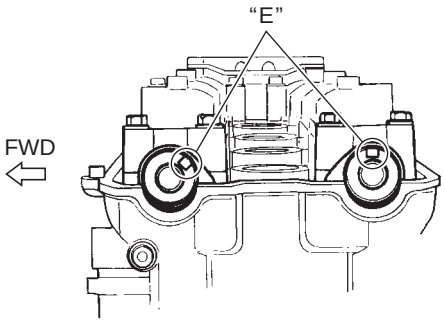


I823H1020007-01

6) Turn the crankshaft to bring the line “C” on the CKP sensor rotor to the slit “D” of cap hole thread and also to bring the notches “E” on the left ends of both camshafts (EX and IN) to the positions as shown.



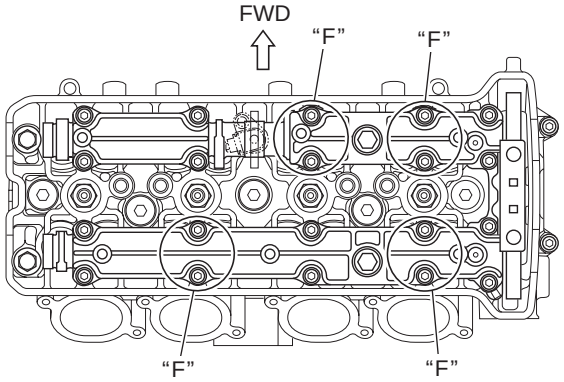
I947H1020006-02



I947H1020036-01

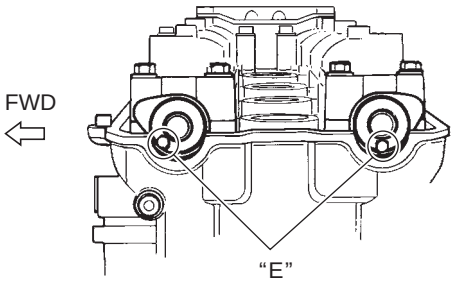
7) In this condition, read the valve clearance at the valves “F” (IN and EX of No. 4 cylinder, EX of No. 3 and IN of No. 2). If the clearance is out of specification, adjust the clearance.

Special tool
TOOL : 09900–20803 (Thickness gauge)



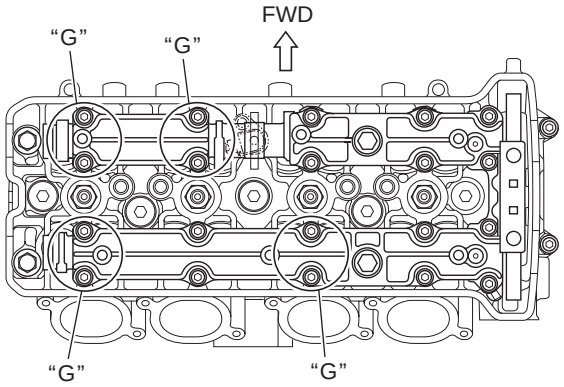
I947H1020050-01

8) Turn the crankshaft 360° degrees (one rotation) to bring the line on the CKP sensor rotor to the rib behind the clutch cover and also to bring the notches “E” to the position as shown.



I947H1020037-01

9) Read the clearance at the rest of the valves “G” and adjust the clearance if necessary.



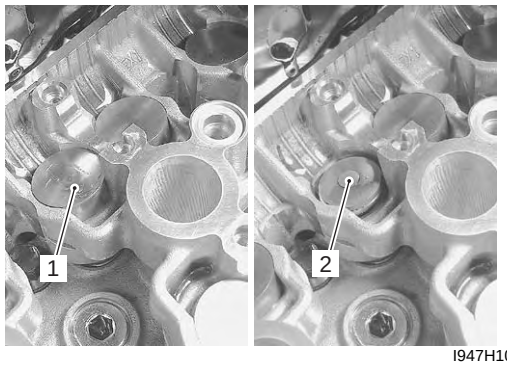
I947H1020051-01

Cam position	Notch “E” position	
	Exhaust camshaft	Intake camshaft
“F”	← FWD	← FWD
“G”	← FWD	← FWD

I837H1020013-01

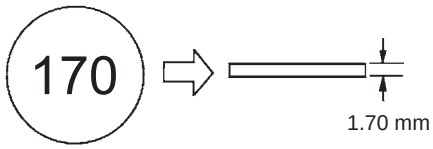
Adjustment
The clearance is adjusted by replacing the existing tappet shim with a thicker or thinner shim.

1) Remove the intake or exhaust camshaft. Refer to “Engine Top Side Disassembly” in Section 1D (Page 1D-26).
2) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



I947H1020034-01

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

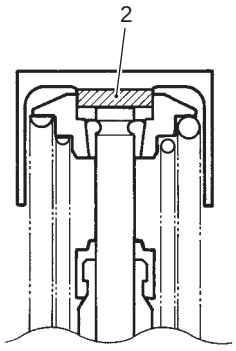


I837H1020014-01

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.
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.**



I947H1020007-02

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

TAPPET SHIM SET (12800-05830)

MEASURED VALVE CLEARANCE (mm) / SUFFIX NO.	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
PRESENT SHIM SIZE (mm)	1.20	1.25	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
0.00 – 0.02			1.20	1.25	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
0.03 – 0.07		1.20	1.25	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
0.08 – 0.18	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																				
0.19 – 0.28	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	2.20	
0.29 – 0.33	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			
0.34 – 0.38	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				
0.39 – 0.43	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					
0.44 – 0.48	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						
0.49 – 0.53	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							
0.54 – 0.58	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								
0.59 – 0.63	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
0.64 – 0.68	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
0.69 – 0.73	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20											
0.74 – 0.78	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20												
0.79 – 0.83	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20													
0.84 – 0.88	1.90	1.95	2.00	2.05	2.10	2.15	2.20														
0.89 – 0.93	1.95	2.00	2.05	2.10	2.15	2.20															
0.94 – 0.98	2.00	2.05	2.10	2.15	2.20																
0.99 – 1.03	2.05	2.10	2.15	2.20																	
1.04 – 1.08	2.10	2.15	2.20																		
1.09 – 1.13	2.15	2.20																			
1.14 – 1.18	2.20																				

HOW TO USE THIS CHART:

I. Measure valve clearance. “ENGINE IS COLD”
II. Measure present shim size.
III. Match clearance in vertical column with present shim size in horizontal column.

EXAMPLE

Valve clearance is	0.23 mm
Present shim size	1.70 mm
Shim size to be used	1.80 mm

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

TAPPET SHIM SET (12800-05830)

MEASURED VALVE CLEARANCE (mm) / SUFFIX NO.	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
PRESENT SHIM SIZE (mm)	1.20	1.25	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
0.03 – 0.07				1.20	1.25	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
0.08 – 0.12			1.20	1.25	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
0.13 – 0.17		1.20	1.25	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
0.18 – 0.28	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																				
0.29 – 0.38	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	2.20	
0.39 – 0.43	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			
0.44 – 0.48	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				
0.49 – 0.53	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					
0.54 – 0.58	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						
0.59 – 0.63	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							
0.64 – 0.68	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								
0.69 – 0.73	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
0.74 – 0.78	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
0.79 – 0.83	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20											
0.84 – 0.88	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20												
0.89 – 0.93	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20													
0.94 – 0.98	1.90	1.95	2.00	2.05	2.10	2.15	2.20														
0.99 – 1.03	1.95	2.00	2.05	2.10	2.15	2.20															
1.04 – 1.08	2.00	2.05	2.10	2.15	2.20																
1.09 – 1.13	2.05	2.10	2.15	2.20																	
1.14 – 1.18	2.10	2.15	2.20																		
1.19 – 1.23	2.15	2.20																			
1.24 – 1.28	2.20																				

(EXHAUST SIDE)

HOW TO USE THIS CHART:

I. Measure valve clearance. “ENGINE IS COLD”
II. Measure present shim size.
III. Match clearance in vertical column with present shim size in horizontal column.

EXAMPLE

Valve clearance is	0.33 mm
Present shim size	1.70 mm
Shim size to be used	1.80 mm

I837H1020016-02

6) Install the camshafts and cam chain tension adjuster. Refer to “Engine Top Side Assembly” in Section 1D (Page 1D-28).
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-28).

Spark Plug Replacement

B947H10206006

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

Refer to “Ignition Coil and Spark Plug Removal and Installation” in Section 1H (Page 1H-6).

Spark Plug Inspection and Cleaning

B947H10206007

Inspect spark plug
Every 6 000 km (4 000 miles, 12 months)

Heat Range

1) Remove the spark plugs. Refer to “Ignition Coil and Spark Plug Removal and Installation” in Section 1H (Page 1H-6).
2) Check spark plug heat range by observing electrode color. If the electrode of the spark plug is wet appearing or dark color, replace the spark plug with hotter type one. If it is white or glazed appearing, replace the spark plug with colder type one.

Heat range

	Hot type	Standard	Cold type
NGK	CR8EIA-9	CR9EIA-9	CR10EIA-9
ND	IU24D	IU27D	IU31D

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

Tightening torque
Spark plug: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

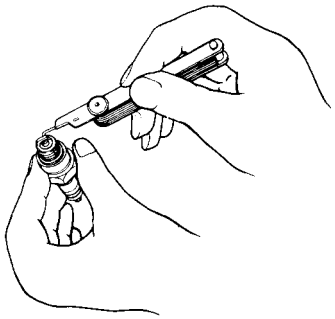
Spark Plug Gap

1) Remove the spark plugs. Refer to “Ignition Coil and Spark Plug Removal and Installation” in Section 1H (Page 1H-6).
2) Measure the spark plug gap using a wire gauge. If it is not within the specification, replace the spark plug.

⚠ CAUTION

- **To prevent the damage of iridium center electrode, use a wire gauge to check the gap.**
- **Never adjust the spark plug gap.**

Spark plug gap
0.8 – 0.9 mm (0.031 – 0.035 in)



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

Tightening torque
Spark plug: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

Electrodes Condition

1) Remove the spark plugs. Refer to “Ignition Coil and Spark Plug Removal and Installation” in Section 1H (Page 1H-6).
2) Check the worn or burnt condition of the electrodes. If it is extremely worn or burnt, replace the spark plug. And also replace the spark plug if it has a broken insulator, or damaged thread.

⚠ CAUTION

Confirm the thread size and reach when replacing the plug. If the reach is too short, carbon will be deposited on the screw portion of the plug hole and engine damage may result.

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

Tightening torque
Spark plug: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

Fuel Line Inspection

B947H10206008

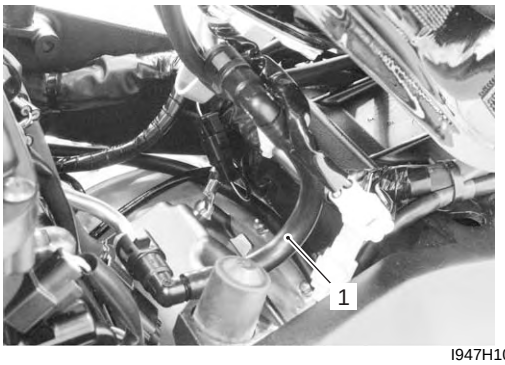
Inspect fuel line
Every 6 000 km (4 000 miles, 12 months)

Inspect the fuel line in the following procedures:

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Inspect the fuel feed hose (1) for damage and fuel leakage. If any defects are found, the fuel feed hose must be replaced.

⚠ WARNING

When disconnecting the fuel feed hose from E-33 model, drain fuel from the fuel tank first to prevent fuel leakage.



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3) After finishing the fuel feed hose inspection, reinstall the removed parts.

Evaporative Emission Control System Inspection (E-33 only)

B947H10206009

Inspect evaporative emission control system
Every 12 000 km (7 500 miles, 24 months)

Inspect the evaporative emission control system periodically (E-33 only). Refer to “Evaporative Emission Control System Inspection (Only for E-33)” in Section 1B (Page 1B-14).

Engine Oil and Filter Replacement

B947H10206010

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) Place the motorcycle on the side-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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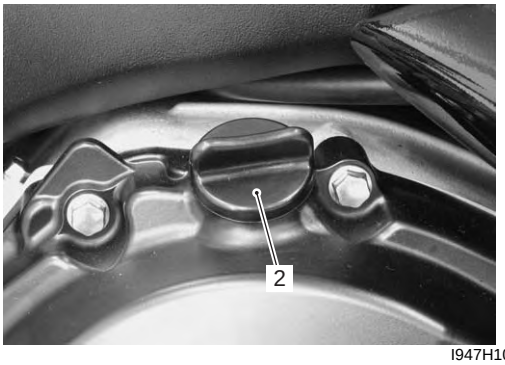

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3) Tighten the oil drain plug (1) to the specified torque.

⚠ CAUTION

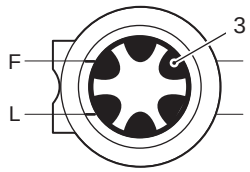
Replace the gasket washer with a new one.

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

I947H1020011-01

4) Pour new oil through the oil filler. When performing an oil change (without oil filter replacement), the engine will hold about 2.8 L (3.0/2.5 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.

7) Hold the motorcycle vertically and check the oil level through the inspection window (3). The oil level should be between the low level “L” and full level “F”.



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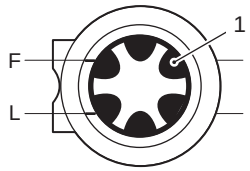
Oil Level Inspection

1) Place the motorcycle on the side-stand.
2) Start up the engine and allow it to run for several minutes at idle speed.
3) Turn off the engine and wait about three minutes.
4) Hold the motorcycle vertically and check the oil level through the inspection window (1). The oil level should be between the low level “L” and full level “F”.



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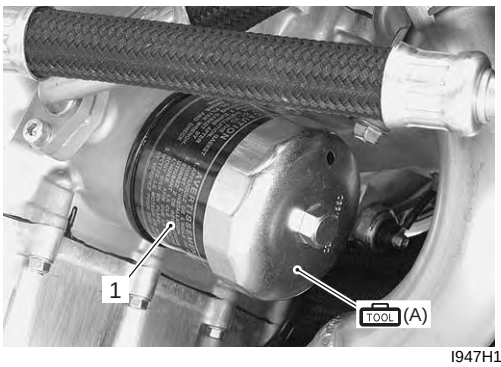
Oil Filter Replacement

1) Remove the right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Drain engine oil as described in the engine oil replacement procedure.
3) Remove the oil filter (1) using the special tool.

Special tool
TOOL (A): 09915–40610 (Oil filter wrench)



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4) 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.

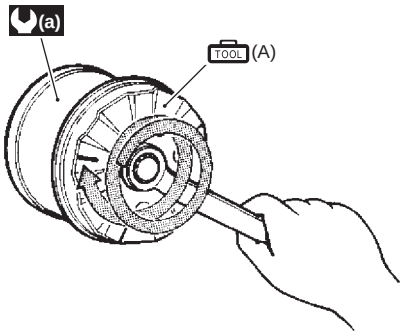
5) Install new oil filter. Turn it by hand until you feel that the oil filter O-ring contacts the oil filter mounting surface. Then, tighten the oil filter two full turns (or to specified torque) using the special tool.

NOTE

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

Special tool
TOOL (A): 09915–40610 (Oil filter wrench)

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



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6) 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: 2 800 ml (3.0/2.5 US/Imp qt)
Oil and filter change: 3 300 ml (3.5/3.0 US/Imp qt)
Engine overhaul: 3 600 ml (2.8/3.2 US/Imp qt)

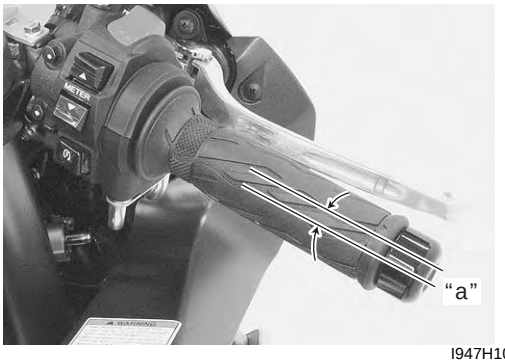
Throttle Cable Play Inspection and Adjustment

B947H10206011

Inspect throttle cable play
Initially at 1 000 km (600 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)



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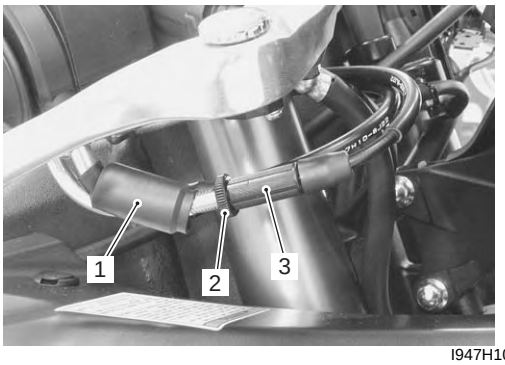
1) Remove the boot (1).
2) Loosen the lock-nut (2) of the throttle pulling cable.
3) Turn the adjuster (3) in or out until the throttle cable play “a” (at the throttle grip) is within 2 – 4 mm (0.08 – 0.16 in).
4) Tighten the lock-nut (2) while holding the adjuster (3).
5) Fit the boot (1) positively onto the adjuster.



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⚠ 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.

PAIR System Inspection

B947H10206012

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-9).

Throttle Valve Synchronization

B947H10206013

Inspect throttle valve synchronization
Initially at 1 000 km (600 miles, 2 months) (E-33 only) and 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).

Cooling System Inspection

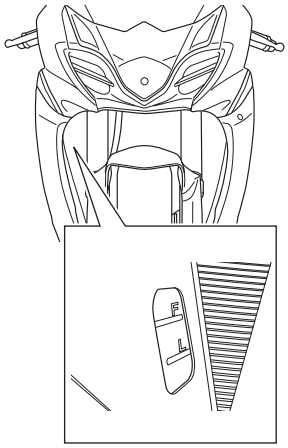
B947H10206014

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

Replace engine coolant
Every 2 years

Engine Coolant Level Inspection

1) Hold the motorcycle vertically.
2) Check the engine coolant level by observing the “F” and “L” lines on the engine coolant reservoir tank. If the level is below the “L” line, add engine coolant to the “F” line from the engine coolant reservoir tank filler (1) behind the right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).



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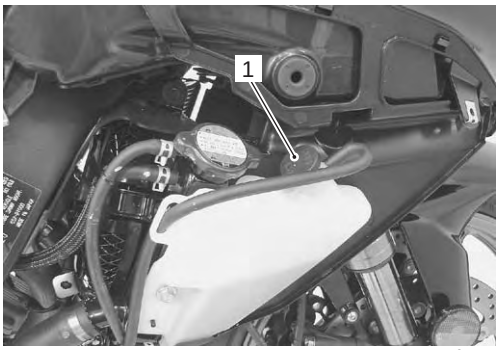

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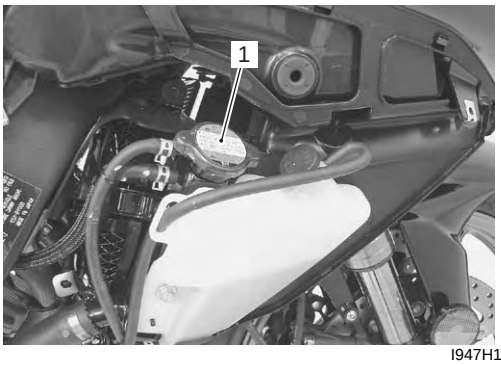
Engine Coolant Change
Refer to “Engine Coolant Description” in Section 1F (Page 1F-1).

⚠ 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 right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the radiator cap (1).



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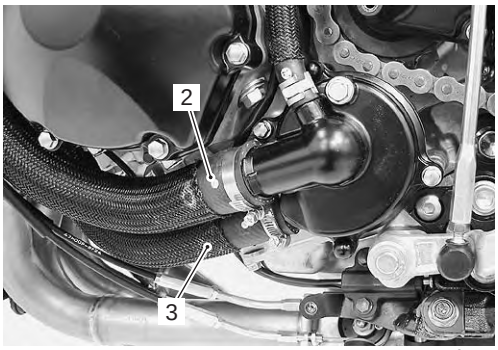
3) Drain engine coolant by disconnecting the radiator outlet hose (2) and cylinder inlet hose (3).



I947H1020015-01

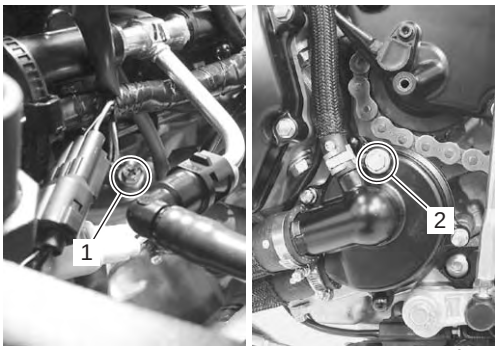
4) Flush the radiator with fresh water if necessary.
5) Reconnect the hoses.
6) Pour the specified engine coolant up to the radiator inlet.

Engine coolant capacity (excluding reservoir)
2 500 ml (2.6/2.2 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) Remove the side cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Add engine coolant up to the radiator inlet.
3) Support the motorcycle upright.
4) Slowly swing the motorcycle, right and left, to bleed the air trapped in the cooling circuit.
5) Add engine coolant up to the radiator inlet.
6) Start up the engine and bleed air from the radiator inlet completely.
7) Repeat the procedures 5) to 6) until no air bleeds from the radiator inlet.
8) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
9) Loosen the air bleeder bolt (1) and (2), then check the engine coolant flows out.



I947H1020016-02

10) Tighten the air bleeder bolt.

Tightening torque
Water pump air bleeder bolt: 13 N·m (1.3 kgf-m, 4.5 lbf-ft)

11) Close the radiator cap securely.
12) 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.

13) Reinstall the removed parts.

Radiator Hose Inspection
Check the radiator hoses for crack, damage or engine coolant leakage. Refer to “Water Hose Inspection” in Section 1F (Page 1F-7).

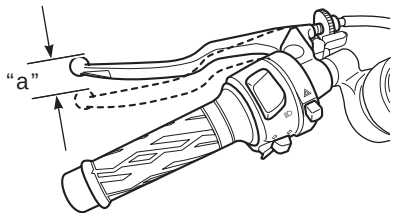
Clutch Cable Play Inspection and Adjustment

B947H10206015

Inspect clutch cable play
Every 6 000 km (4 000 miles, 12 months)

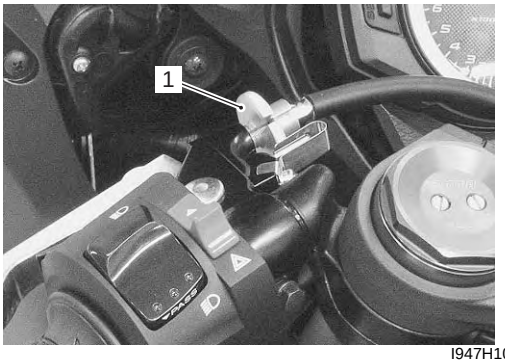
Inspect and adjust the clutch cable play “a” as follows.

Clutch cable play “a”
10 – 15 mm (0.4 – 0.6 in)



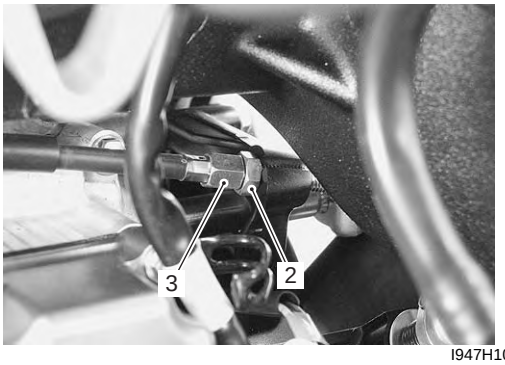
I947H1020055-01

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Turn in the adjuster (1) all the way into the clutch lever assembly.



I947H1020017-02

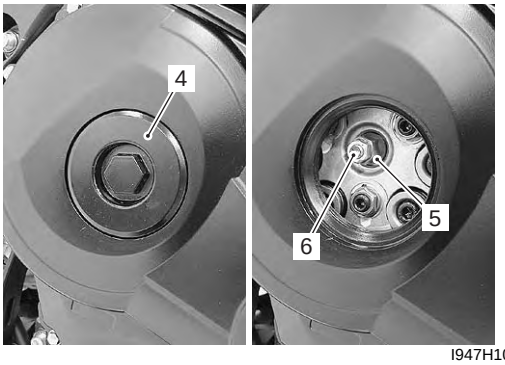
3) Loosen the lock-nut (2) and turn the clutch cable adjuster (3) to obtain proper cable play.



I947H1020018-02

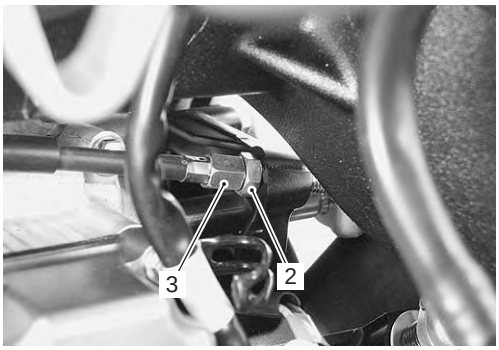
4) Remove the clutch release adjuster cap (4).
5) Loosen the lock-nut (5) and turn out the clutch release adjusting screw (6) two or three rotations.
6) From that position, slowly turn in the clutch release adjusting screw (6) until resistance is felt.
7) From this position, turn out the clutch release adjusting screw (6) 1 rotation, and tighten the lock-nut (5) while holding the screw (6).

Tightening torque
Clutch release adjusting screw lock-nut: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I947H1020019-01

8) Turn the cable adjuster (3) to obtain 10 – 15 mm (0.4 – 0.6 in) of free play “a” at the clutch lever end.
9) Tighten the lock-nut (2).



I947H1020018-02

10) Install the clutch release adjuster cap (4).

Tightening torque
Clutch release adjuster cap: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

11) Reinstall the fuel tank.

Drive Chain Inspection and Adjustment

B947H10206016

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

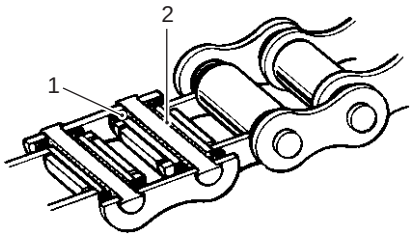
Drive Chain Visual Check

1) With the transmission in neutral, support the motorcycle using a jack 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.

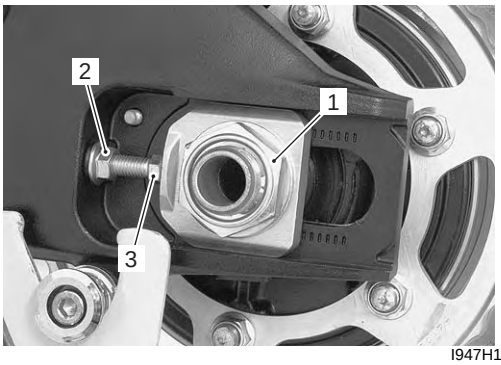


I649G1020032-02

1. O-ring seal	2. Grease

Drive Chain Length Inspection

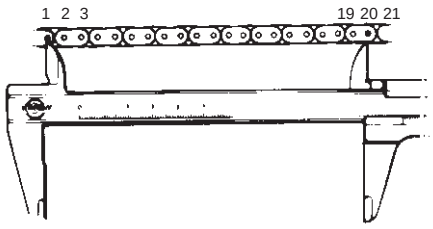
1) Loosen the axle nut (1).
2) Loosen the left and right chain adjuster lock-nuts (2).
3) Give tension to the drive chain fully by turning both chain adjuster bolts (3).



I947H1020020-01

4) 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.

Drive chain 20-pitch length
Service limit: 319.4 mm (12.57 in)



I649G1020034-02

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

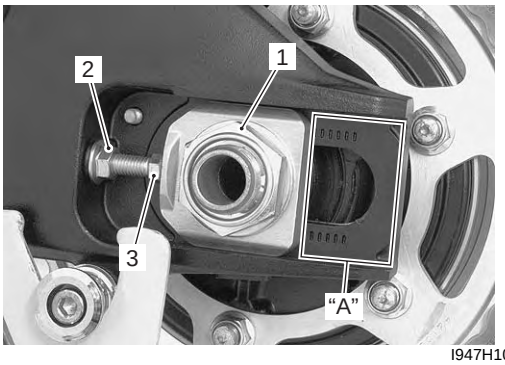
Drive Chain Slack Adjustment

1) Support the motorcycle with a jack.
2) Loosen the axle nut (1).
3) Loosen the left and right chain adjuster lock-nuts (2).
4) Loosen or tighten both chain adjuster bolts (3) until there is 20 – 30 mm (0.8 – 1.2 in) of slack “a” at the middle of the chain between the engine and rear sprockets as shown in the figure.

⚠ 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)



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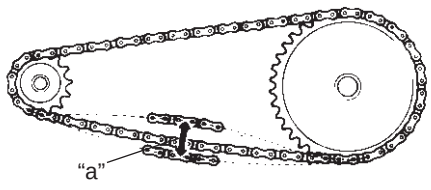


I649G1020036-02

5) 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)

6) Tighten both chain adjuster lock-nuts (2) securely.
7) Recheck the drive chain slack after tightening the axle nut.

Drive Chain Cleaning and Lubricating

B947H10206017

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

Clean and lubricate the drive chain in the following procedures:

1) 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 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 DID 50VAZ. SUZUKI recommends to use this standard drive chain as a replacement.**

I947H1020022-01

Brake System Inspection

B947H10206018

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

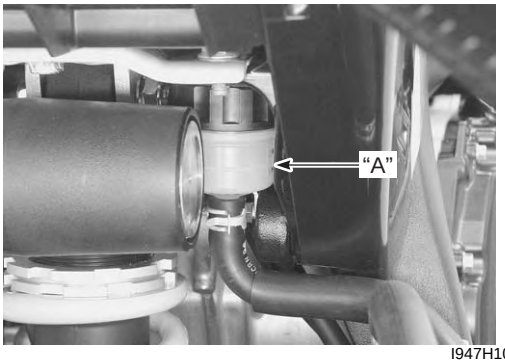
- **The brake system of this motorcycle is filled with a glycol-based brake fluid. Do not use or mix different types of fluid such as silicone-based and petroleum-based fluids. Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing 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 line "A" on the front and rear brake fluid reservoirs. When the brake fluid level is below the lower limit line "A", replenish with brake fluid that meets the following specification.

BF: Brake fluid (DOT 4)

I947H1020023-01

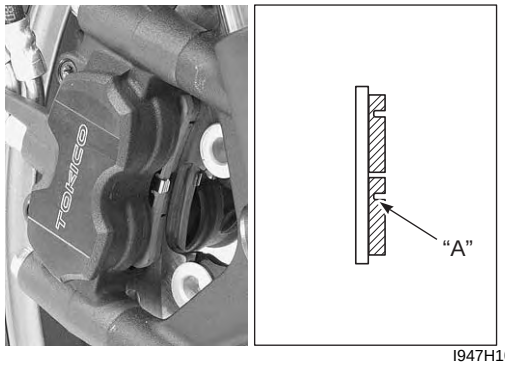


I947H1020024-02

Brake Pads Check
The extent of brake pad 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” in Section 4B (Page 4B-2) and “Rear Brake Pad Replacement” in Section 4C (Page 4C-2).

⚠ CAUTION

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



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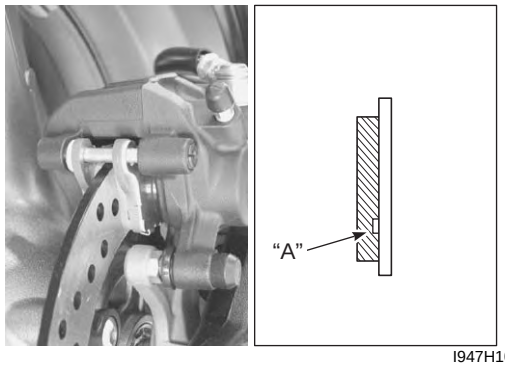
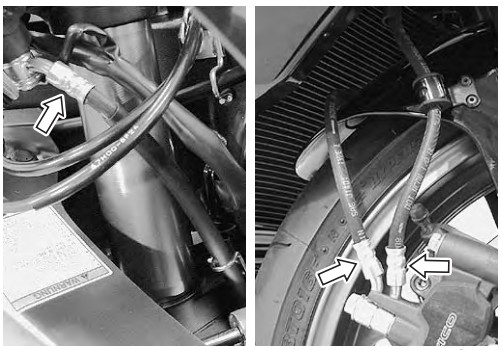


I947H1020026-03

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 “Front Brake Hose Removal and Installation” in Section 4A (Page 4A-8) and “Rear Brake Hose Removal and Installation” in Section 4A (Page 4A-8).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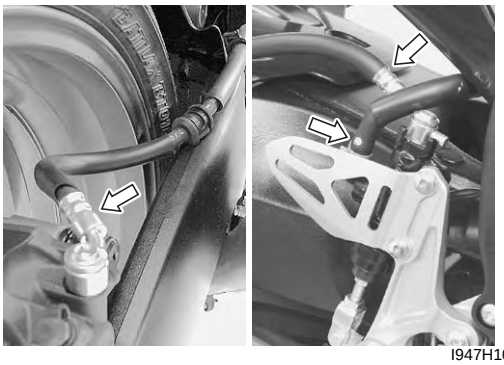

I947H1020028-03

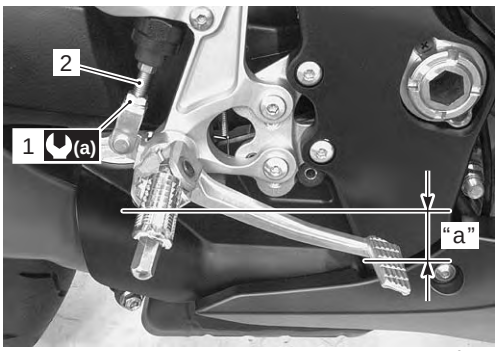
Brake Pedal Height Inspection and Adjustment

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: 65 – 75 mm (2.6 – 3.0 in)

2) Loosen the lock-nut (1).
3) Turn the push rod (2) until the brake pedal becomes 65 – 75 mm (2.6 – 3.0 in) “a” below the top of the footrest.
4) Tighten the lock-nut (1) securely.

   Tightening torque
   Rear master cylinder rod lock-nut (a): 17 N·m (1.7 kgf-m, 12.5 lbf-ft)



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Brake Hose Replacement

Replace brake hose
Every 4 years

Refer to “Front Brake Hose Removal and Installation” in Section 4A (Page 4A-8) and “Rear 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-6).

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

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

Tire Inspection

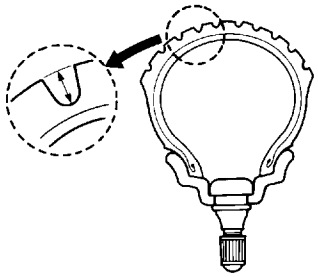
B947H10206019

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
TOOL : 09900–20805 (Tire depth gauge)

Tire tread depth (Service limit)
Front: 1.6 mm (0.06 in)
Rear: 2.0 mm (0.08 in)



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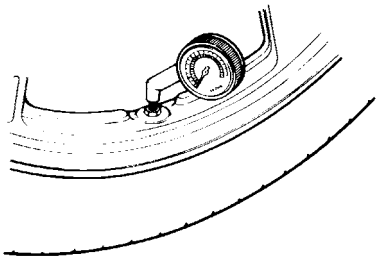
Tire Pressure
If the tire pressure is too high or too low, steering will be adversely affected and tire wear increased. Therefore, maintain the correct tire pressure for good roadability, or shorter tire life will result. Cold inflation tire pressure is as follows.

Cold inflation tire pressure

	Solo riding			Dual riding		
	kPa	kgf/cm²	psi	kPa	kgf/cm²	psi
Front	250	2.50	36	250	2.50	36
Rear	290	2.90	42	290	2.90	42



I310G1020069-02

⚠ CAUTION

The standard tire fitted on this motorcycle is 120/70 ZR17 M/C (58W) for front and 190/50 ZR17 M/C (73W) for rear. The use of tires other than those specified may cause instability. It is highly recommended to use the specified tires.

Tire type
BRIDGESTONE
- **Front: BT016F N**
- **Rear: BT016R N**

Steering System Inspection

B947H10206020

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.
2) 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-11).

I947H1020030-02

Front Fork Inspection

B947H10206021

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 Disassembly and Assembly” in Section 2B (Page 2B-4).

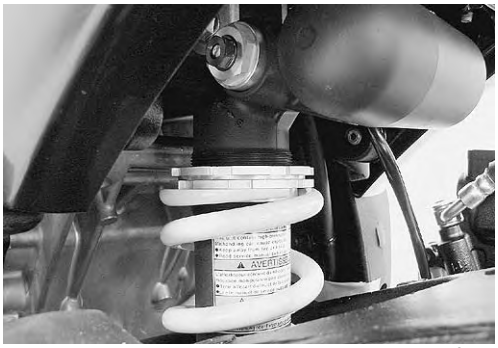
I947H1020031-01

Rear Suspension Inspection

B947H10206022

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

Inspect the rear shock absorber 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-7) and “Swingarm Removal and Installation” in Section 2C (Page 2C-9).



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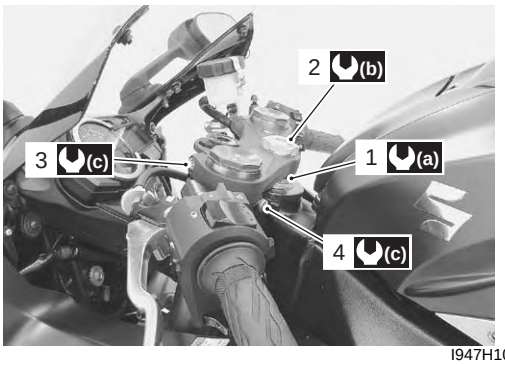
I947H1020039-01

Chassis Bolt and Nut Inspection

B947H10206023

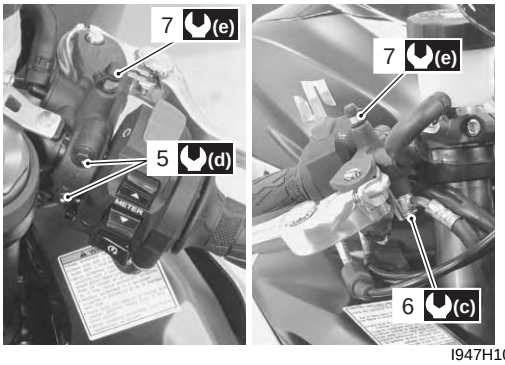
Tighten chassis bolt and nut
Initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter

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



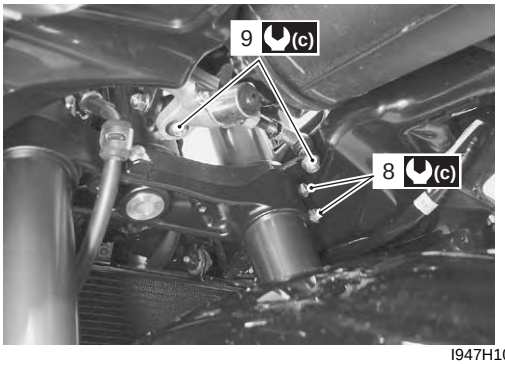
I947H1020040-01

1	(a)	Steering stem lock-nut 80 N·m (8.0 kgf-m, 58.0 lbf-ft)
2	(b)	Steering stem head nut 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
3	(c)	Front fork upper clamp bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
4	(c)	Handlebar clamp bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



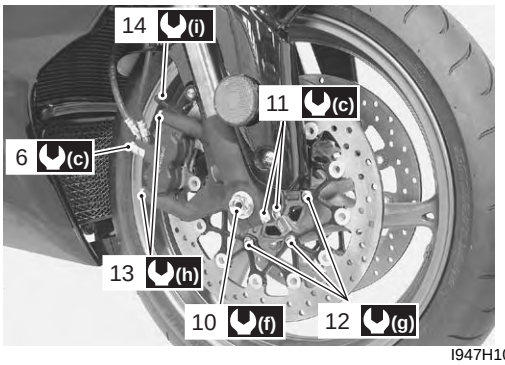
I947H1020041-02

5	(d)	Front brake master cylinder mounting bolt 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
6	(c)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
7	(e)	Front master cylinder air bleeder valve 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



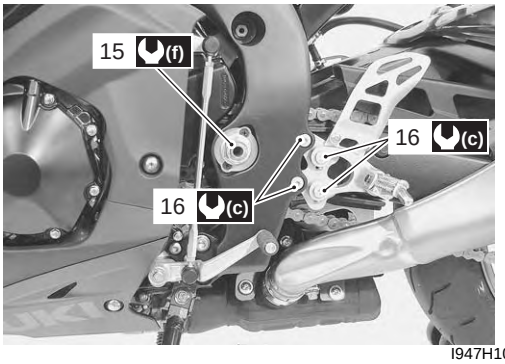
I947H1020042-01

8	(c)	Front fork lower clamp bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
9	(c)	Steering damper bolt/nut 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



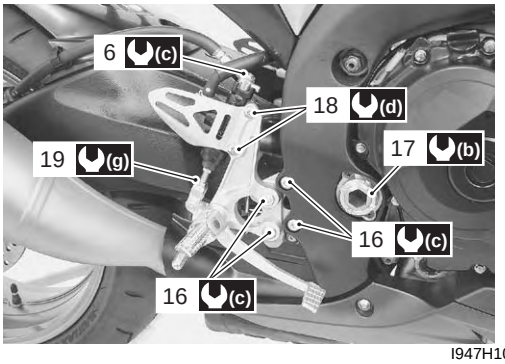
I947H1020043-02

6	(c)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
10	(f)	Front axle bolt 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
11	(c)	Front axle pinch bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
12	(g)	Front brake disc bolt 18 N·m (1.8 kgf-m, 13.0 lbf-ft)
13	(h)	Front brake caliper mounting bolt 39 N·m (3.9 kgf-m, 28.0 lbf-ft)
14	(i)	Brake caliper air bleeder valve 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)



I947H1020044-03

15	(f)	Swingarm pivot nut 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
16	(c)	Front footrest bracket bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

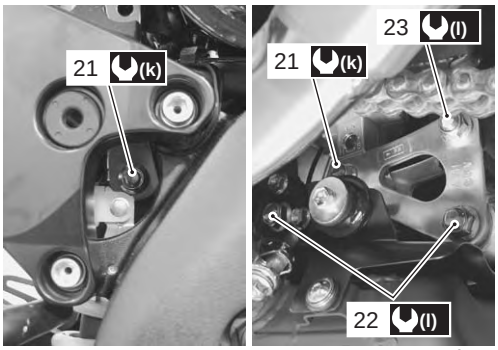


I947H1020045-03

6	(c)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
16	(c)	Front footrest bracket bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
17	(b)	Swingarm pivot lock-nut 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
18	(d)	Rear brake master cylinder mounting bolt 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
19	(g)	Rear brake master cylinder rod lock-nut 18 N·m (1.8 kgf-m, 13.0 lbf-ft)

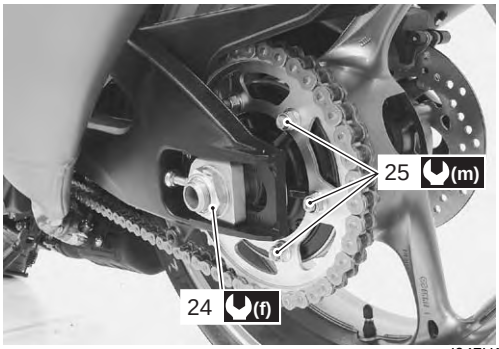
I947H1020046-02

20	(j)	Rear shock absorber bracket nut 115 N·m (11.5 kgf-m, 83.0 lbf-ft)



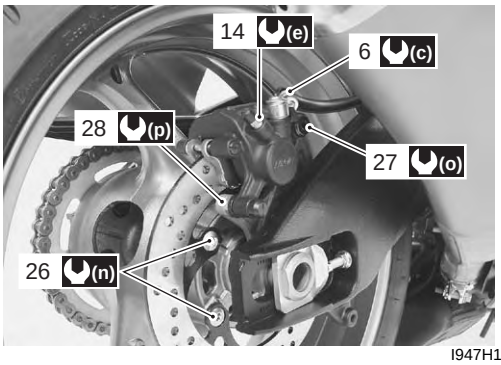
I947H1020047-02

21	(k)	Rear shock absorber mounting bolt/nut (Upper and Lower) 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
22	(l)	Cushion rod bolt/nut (Front and Rear) 98 N·m (9.8 kgf-m, 71.0 lbf-ft)
23	(l)	Cushion lever mounting bolt/nut 98 N·m (9.8 kgf-m, 71.0 lbf-ft)



I947H1020048-02

24	(f)	Rear axle nut 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
25	(m)	Rear sprocket nut 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I947H1020049-04

6	(c)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
14	(e)	Brake caliper air bleeder valve 6 N·m (0.6 kgf-m, 4.5 lbf-ft)
26	(n)	Rear brake disc bolt 35 N·m (3.5 kgf-m, 25.5 lbf-ft)
27	(o)	Rear brake caliper sliding pin (Front) 27 N·m (2.7 kgf-m, 19.5 lbf-ft)
28	(p)	Rear brake caliper sliding pin (Rear) 12 N·m (1.2 kgf-m, 8.5 lbf-ft)

Compression Pressure Check

B947H10206024

Refer to “Compression Pressure Check” in Section 1D (Page 1D-3).

Oil Pressure Check

B947H10206025

Refer to “Oil Pressure Check” in Section 1E (Page 1E-5).

SDS Check

B947H10206026

Refer to “SDS Check” in Section 1A (Page 1A-16).

Specifications

Tightening Torque Specifications

B947H10207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Exhaust pipe bolt	23	2.3	16.5	☞(Page 0B-4)
Muffler chamber connecting bolt	30	3.0	21.5	☞(Page 0B-4)
Muffler chamber bracket bolt	25	2.5	18.0	☞(Page 0B-4)
Muffler chamber mounting bolt	23	2.3	16.5	☞(Page 0B-4)
Muffler connecting bolt	23	2.3	16.5	☞(Page 0B-4)
Muffler mounting bolt	25	2.5	18.0	☞(Page 0B-4)
Spark plug	11	1.1	8.0	☞(Page 0B-9) / ☞(Page 0B-9) / ☞(Page 0B-9)
Oil drain plug	23	2.3	16.5	☞(Page 0B-10)
Oil filter	20	2.0	14.5	☞(Page 0B-11)
Water pump air bleeder bolt	13	1.3	4.5	☞(Page 0B-13)
Clutch release adjusting screw lock-nut	6	0.6	4.5	☞(Page 0B-14)
Clutch release adjuster cap	11	1.1	8.0	☞(Page 0B-14)
Rear axle nut	100	10.0	72.5	☞(Page 0B-15)
Rear master cylinder rod lock-nut	17	1.7	12.5	☞(Page 0B-17)

NOTE

The specified tightening torque is described in the following.
“Chassis Bolt and Nut Inspection” (Page 0B-19)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H10208001

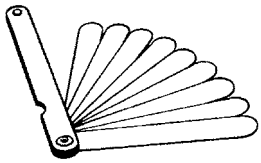
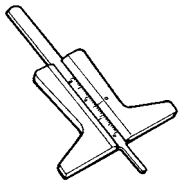
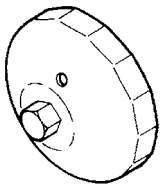
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 0B-16)

NOTE

Required service material is also described in the following.
“Lubrication Points” (Page 0B-3)

Special Tool

B947H10208002

09900–20803 Thickness gauge ☞(Page 0B-6) 	09900–20805 Tire depth gauge ☞(Page 0B-18) 
09915–40610 Oil filter wrench ☞(Page 0B-11) / ☞(Page 0B-11) 	

Service Data

Specifications

Service Data

B947H10307001

Valve + Guide

Unit: mm (in)

Item	Standard		Limit
Valve diam.	IN.	31.0 (1.22)	—
	EX.	25.0 (0.98)	—
Valve clearance (when cold)	IN.	0.08 – 0.18 (0.003 – 0.007)	—
	EX.	0.18 – 0.28 (0.007 – 0.011)	—
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0015)	—
	EX.	0.030 – 0.057 (0.0012 – 0.0022)	—
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)	—
	EX.	4.455 – 4.470 (0.1754 – 0.1760)	—
Valve stem deflection	IN. & EX.	—	0.25 (0.010)
Valve stem runout	IN. & EX.	—	0.05 (0.002)
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	Inner	—	30.1 (1.19)
	Outer	—	35.3 (1.39)
Valve spring tension	Inner	31.3 – 38.3 N (3.2 – 3.9 kgf, 7.0 – 8.6 lbs) at length 27.55 mm (1.085 in)	—
	Outer	91.3 – 105.1 N (9.3 – 10.7 kgf, 20.5 – 23.6 lbs) at length 33.05 mm (1.301 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
Cam height	IN.	37.68 – 37.73 (1.483 – 1.485)	37.38 (1.472)
	EX.	36.88 – 36.93 (1.452 – 1.454)	36.58 (1.440)
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	—		0.10 (0.004)
Cam chain pin (at arrow “3”)	14th pin		—
Cylinder head distortion	—		0.02 (0.0008)

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard			Limit
Compression pressure	1 400 – 1 800 kPa (14 – 18 kgf/cm^2, 199 – 256 psi)			1 000 kPa (10 kgf/cm^2, 142 psi)
Compression pressure difference	—			200 kPa (2 kgf/cm^2, 28 psi)
Piston-to-cylinder clearance	0.030 – 0.040 (0.0012 – 0.0016)			0.120 (0.0047)
Cylinder bore	74.500 – 74.515 (2.9331 – 2.9337)			Nicks or scratches
Piston diam.	74.465 – 74.480 (2.9317 – 2.9323) Measure 10 mm (0.4 in) from the skirt end.			74.380 (2.9283)
Cylinder distortion	—			0.02 (0.0008)
Piston ring free end gap	1st		Approx. 7.0 (0.28)	5.6 (0.22)
	2nd	T	Approx. 8.0 (0.32)	6.4 (0.25)
Piston ring end gap	1st		0.06 – 0.18 (0.002 – 0.007)	0.50 (0.020)
	2nd		0.06 – 0.18 (0.002 – 0.007)	0.50 (0.020)
Piston ring-to-groove clearance	1st		—	0.180 (0.0071)
	2nd		—	0.150 (0.0059)
Piston ring groove width	1st		0.83 – 0.85 (0.0327 – 0.0335) 1.30 – 1.32 (0.0512 – 0.0520)	—
	2nd		0.81 – 0.83 (0.0319 – 0.0327)	—
	Oil		1.51 – 1.53 (0.0594 – 0.0602)	—
Piston ring thickness	1st		0.76 – 0.81 (0.0299 – 0.0319) 1.08 – 1.10 (0.0425 – 0.0433)	—
	2nd		0.77 – 0.79 (0.0303 – 0.0311)	—
Piston pin bore	15.002 – 15.008 (0.5906 – 0.5909)			15.030 (0.5917)
Piston pin O.D.	14.995 – 15.000 (0.5903 – 0.5512)			14.980 (0.5898)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard		Limit
Conrod small end I.D.	15.010 – 15.018 (0.5909 – 0.5913)		15.040 (0.5921)
Conrod big end side clearance	0.10 – 0.20 (0.004 – 0.008)		0.30 (0.012)
Conrod big end width	19.95 – 20.00 (0.7854 – 0.7874)		—
Crank pin width	20.10 – 20.15 (0.7913 – 0.7933)		—
Conrod big end oil clearance	0.040 – 0.064 (0.0016 – 0.0025)		0.080 (0.0031)
Crank pin O.D.	34.976 – 35.000 (1.3770 – 1.3780)		—
Crankshaft journal oil clearance	0.016 – 0.034 (0.0006 – 0.0013)		0.080 (0.0031)
Crankshaft journal O.D.	34.982 – 35.000 (1.3772 – 1.3780)		—
Crankshaft thrust bearing thickness	Right side	2.420 – 2.440 (0.0953 – 0.0961)	—
	Left side	2.360 – 2.500 (0.0929 – 0.0984)	—
Crankshaft thrust clearance	0.060 – 0.110 (0.0024 – 0.0043)		—
Crankshaft runout	—		0.05 (0.002)

Balancer

Unit: mm (in)

Item	Standard	Limit
Balancer shaft journal oil clearance	0.028 – 0.052 (0.0011 – 0.0020)	0.080 (0.0031)
Balancer shaft journal O.D.	19.992 – 20.000 (0.7871 – 0.7874)	—

Oil Pump

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	100 – 400 kPa (1.0 – 4.0 kgf/cm^2, 14 – 57 psi) at 3 000 r/min	—

Clutch

Unit: mm (in)

Item	Standard		Limit
Clutch drive plate thickness	No. 1 & 2	3.22 – 3.38 (0.127 – 0.133)	2.92 (0.115)
Clutch drive plate claw width	No. 1 & 2	13.7 – 13.8 (0.539 – 0.543)	12.9 (0.508)
Clutch driven plate distortion	—		0.10 (0.004)
Clutch spring free length	58.18 (2.29)		55.3 (2.18)
Clutch lifter pin height	0.2 – 0.4 (0.008 – 0.016)		—
Wave spring washer height	—		4.30 (0.169)
Clutch lever play	10 – 15 (0.4 – 0.6)		—
Clutch release screw	1 turn back		—

Drive Train

Unit: mm (in) Except ratio

Item		Standard		Limit
Primary reduction ratio		1.617 (76/47)		—
Final reduction ratio		2.470 (42/17)		—
Gear ratios	Low	2.562 (41/16)		—
	2nd	2.052 (39/19)		—
	3rd	1.714 (36/21)		—
	4th	1.500 (36/24)		—
	5th	1.360 (34/25)		—
	Top	1.269 (33/26)		—
Gearshift fork to groove clearance		0.1 – 0.3 (0.004 – 0.012)		0.5 (0.02)
Gearshift fork groove width		5.0 – 5.1 (0.197 – 0.201)		—
Gearshift fork thickness		4.8 – 4.9 (0.189 – 0.193)		—
Drive chain		Type	DID50VAZ	—
		Links	114 links	—
		20-pitch length	—	319.4 (12.57)
Drive chain slack (on side-stand)		20 – 30 (0.8 – 1.2)		—
Gearshift lever height		65 – 75 (2.6 – 3.0)		—

Thermostat + Radiator + Cooling Fan + Coolant

Item	Standard/Specification		Note
Thermostat valve opening temperature	Approx. 82 °C (180 °F)		—
Thermostat valve lift	Over 8 mm (0.31 in) and at 95 °C (203 °F)		—
ECT sensor resistance	20 °C (68 °F)	Approx. 2.45 kΩ	—
	50 °C (122 °F)	Approx. 0.811 kΩ	—
	80 °C (176 °F)	Approx. 0.318 kΩ	—
	110 °C (230 °F)	Approx. 0.142 kΩ	—
Radiator cap valve opening pressure	93 – 123 kPa (0.9 – 1.2 kgf/cm^2, 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 anti-freeze/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/Imp qt)	—
	Engine side	Approx. 2 500 ml (2.6/2.2 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	222 ml (7.5/7.8 US/Imp oz) and more/10 sec.	
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm^2, 43 psi)	

FI Sensors

Item	Standard/Specification		Note
CKP sensor resistance	142 – 194 Ω		
CKP sensor peak voltage	0.5 V and more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.7 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.4 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	0.15 – 4.85 V		
IAT sensor resistance	Approx. 2.58 kΩ at 20 °C (68 °F)		
AP sensor input voltage	4.5 – 5.5 V		
AP sensor output voltage	Approx. 3.6 V at 100 kPa (760 mmHg)		
TO sensor resistance	16.5 – 22.3 kΩ		
TO sensor voltage	Normal	0.4 – 1.4 V	
	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
HO2 sensor output voltage	0.3 V and less at idle speed		
	0.6 V and more at 5 000 r/min		
HO2 sensor heater resistance	6.7 – 9.5 Ω at 23 °C (73 °F)		
PAIR control solenoid valve resistance	20 – 24 Ω at 20 – 30 °C (68 – 86 °F)		
STP sensor input voltage	4.5 – 5.5 V		
STP sensor output voltage	Closed	Approx. 0.7 V	
	Opened	Approx. 4.1 V	
STVA resistance	Approx. 6.5 Ω		
EXCVA position sensor input voltage	4.5 – 5.5 V		
EXCVA position sensor output voltage	Closed	0.45 – 1.4 V	
	Opened	3.6 – 4.55 V	
EXCVA position sensor resistance	Approx. 3.1 kΩ		At adjustment position
EVAP system purge control solenoid valve resistance	Approx. 32 Ω at 20 °C (68 °F)		E-33 only
ISC valve resistance	Approx. 80 Ω at 20 °C (68 °F)		
Steering damper solenoid valve resistance	Approx. 12.5 Ω at 20 °C (68 °F)		
Steering damper solenoid valve voltage	Approx. 10 V		When battery fully charged

Throttle Body

Item	Specification
Bore size	44 mm (1.73 in)
I.D. No.	47H1 (For E-33), 47H0 (For others)
Idle r/min	1 150 ± 100 r/min
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)

Electrical

Unit: mm

Item			Specification		Note
Firing order			1 · 2 · 4 · 3		
Spark plug			Type	NGK: CR9EIA-9 DENSO: IU27D	
			Gap	0.8 – 0.9 (0.031 – 0.035)	
Spark performance			Over 8 (0.3) at 1 atm.		
CKP sensor resistance			142 – 194 Ω		
CKP sensor peak voltage			0.5 V and more		When cranking
Ignition coil resistance			Primary	1.1 – 1.9 Ω	Terminal – Terminal
			Secondary	6.4 – 9.6 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage			80 V and more		When cranking
Generator coil resistance			0.12 – 0.6 Ω		
Generator maximum output			Approx. 375 W at 5 000 r/min		
Generator no-load voltage (When engine is cold)			85 V (AC) and more at 5 000 r/min		
Regulated voltage			14.0 – 15.5 V at 5 000 r/min		
Starter motor brush length			Standard	7.0 (0.28)	
			Limit	3.5 (0.14)	
Starter relay resistance			3 – 6 Ω		
Battery	Type designation		FT12A-BS		
	Capacity		12 V 36.0 kC (10 Ah)/10 HR		
Fuse size	Headlight	HI	10 A		
		LO	10 A		
	Ignition		15 A		
	Signal		10 A		
	Fuel		10 A		
	Fan		15 A		
	Main		30 A		

Wattage

Unit: W

Item		Specification	
		E-02, 19, 24, 51	E-03, 14, 28, 33
Headlight	HI	65	←
	LO	55	←
Position light		5 x 2	←
Brake light/Taillight		LED	←
Turn signal light		21 x 4	←
License plate light		5	←
Combination meter light		LED	←
Turn signal indicator light		LED	←
High beam indicator light		LED	←
Neutral position indicator light		LED	←
Oil pressure/Engine coolant temp. indicator light		LED	←
FI/Steering damper indicator light		LED	←
Fuel level indicator light		LED	←
Engine RPM indicator light		LED	←
Immobilizer indicator light		LED	—

Brake + Wheel

Unit: mm (in)

Item	Standard			Limit
Rear brake pedal height	65 – 75 (2.6 – 3.0)			—
Brake disc thickness	Front	5.3 – 5.7 (0.21 – 0.22)		5.0 (0.20)
	Rear	4.8 – 5.2 (0.19 – 0.20)		4.5 (0.18)
Brake disc runout	—			0.30 (0.012)
Master cylinder bore	Front	17.460 – 17.503 (0.6874 – 0.6891)		—
	Rear	14.000 – 14.043 (0.5512 – 0.5529)		—
Master cylinder piston diam.	Front	17.417 – 17.444 (0.6857 – 0.6868)		—
	Rear	13.957 – 13.984 (0.5495 – 0.5506)		—
Brake caliper cylinder bore	Front	Leading	30.280 – 30.330 (1.1921 – 1.1941)	—
		Trailing	32.080 – 32.130 (1.2630 – 1.2650)	—
	Rear	30.230 – 30.280 (1.1902 – 1.1921)		—
Brake caliper piston diam.	Front	Leading	30.167 – 30.200 (1.1877 – 1.1890)	—
		Trailing	31.967 – 32.000 (1.2585 – 1.2588)	—
	Rear	30.148 – 3.0198 (1.1869 – 1.1889)		—
Brake fluid type	DOT 4			—
Wheel rim runout	Axial	—		2.0 (0.08)
	Radial			
Wheel rim size	Front	17 M/C x MT 3.50		—
	Rear	17 M/C x MT 6.00		—
Wheel axle runout	Front	—		0.25 (0.010)
	Rear			

Tire

Item	Standard		Limit
Cold inflation tire pressure (Solo riding)	Front	250 kPa (2.50 kgf/cm^2, 36 psi)	—
	Rear	290 kPa (2.90 kgf/cm^2, 42 psi)	—
Cold inflation tire pressure (Dual riding)	Front	250 kPa (2.50 kgf/cm^2, 36 psi)	—
	Rear	290 kPa (2.90 kgf/cm^2, 42 psi)	—
Tire size	Front	120/70 ZR17M/C (58 W)	—
	Rear	190/50 ZR17M/C (73 W)	—
Tire type	Front	BRIDGESTONE BT016F N	—
	Rear	BRIDGESTONE BT016R N	—
Tire tread depth (Recommended depth)	Front	—	1.6 mm (0.06 in)
	Rear	—	2.0 mm (0.08 in)

Suspension

Unit: mm (in)

Item	Standard		Limit
Front fork stroke	125 (4.9)		—
Front fork spring free length	241 (9.49)		236 (9.29)
Front fork oil level (Without spring, outer tube fully compressed)	75 (2.95) 70 (2.76) 10 min. after adjustment		—
Front fork oil type	SUZUKI FORK OIL SS-05 or an equivalent fork oil		—
Front fork oil capacity (Each leg)	476 ml (16.1/16.8 US/lmp oz)		—
Front fork inner tube O.D.	43 (1.7)		—
Front fork spring adjuster	4 turns in from softest position		—
Front fork damping force adjuster	Rebound	4 turns out from stiffest position	—
	Compression	5 turns from stiffest position	—
Rear shock absorber spring pre-set length	184.3 (7.26)		—
Rear shock absorber damping force adjuster	Rebound	2-3/4 turns from stiffed position	—
	Compression	Lo: 2-1/4 turns from stiffest position Hi: 3 turns from stiffest position	—
Rear wheel travel	130 (5.12)		—
Swingarm pivot shaft runout	—		0.3 (0.01)

Fuel + Oil

Item	Specification		Note
Fuel type	Use only unleaded gasoline of at least 90 pump octane (R/2 + M/2). Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.		E-03, 14, 28, 33
	Gasoline used should be graded 95 octane (Research Method) or higher. Unleaded gasoline is recommended.		E-02, 19, 24, 51
Fuel tank capacity	Including reserve	16.5 L (4.4/3.6 US/lmp gal)	E-33
		17.5 L (4.6/3.8 US/lmp gal)	Others
	Fuel level indicator light lighting	Approx. 3.5 L (0.9/0.8 US/lmp gal)	
Engine oil type	SAE 10W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	2 800 ml (3.0/2.5 US/lmp qt)	
	Filter change	3 300 ml (3.5/2.9 US/lmp qt)	
	Overhaul	3 600 ml (3.8/3.2 US/lmp qt)	

Tightening Torque List

B947H10307002

Engine

Item			N·m	kgf-m	lbf-ft
Exhaust pipe bolt			23	2.3	16.5
Muffler chamber connecting bolt			30	3.0	21.5
Muffler chamber bracket bolt			25	2.5	18.0
Muffler chamber mounting bolt			23	2.3	16.5
Muffler connecting bolt			23	2.3	16.5
Muffler mounting bolt			25	2.5	18.0
Speed sensor rotor bolt			28	2.8	20.0
Speed sensor mounting bolt			6.5	0.65	4.5
Engine sprocket nut			145	14.5	105.0
Engine mounting bolt (Cylinder)			55	5.5	39.8
Engine mounting nut (Crankcase)			75	7.5	54.0
Engine mounting thrust adjuster			23	2.3	16.5
Engine mounting thrust adjuster lock-nut			45	4.5	32.5
Engine mounting pinch bolt			23	2.3	16.5
Cylinder head cover bolt	Initial		10	1.0	7.0
	Final		14	1.4	10.0
PAIR reed valve cover bolt			10	1.0	7.0
Spark plug			11	1.1	8.0
Cam chain guide No. 2 bolt			10	1.0	7.0
Cam chain guide No. 1 bolt			23	2.3	16.5
Camshaft journal holder bolt			10	1.0	7.0
Cam chain tension adjuster service cap			23	2.3	16.5
Cam chain tension adjuster mounting bolt			10	1.0	7.0
Cam chain tensioner bolt			23	2.3	16.5
Cylinder head bolt	[M10]		31 N·m (3.1 kgf-m, 22.5 lbf-ft) then turn in 1/6 (60°) turn		
	[M6]		10	1.0	7.0
Water jacket plug			9.5	0.95	6.9
Clutch cover bolt			10	1.0	7.0
Clutch sleeve hub nut			95	9.5	68.5
Clutch spring set bolt			10	1.0	7.0
Clutch release adjuster cap			11	1.1	8.0
Clutch release adjusting screw lock-nut			6	0.6	4.5
Clutch lifter pin lock-nut			23	2.3	16.5
Valve timing inspection cap			11	1.1	8.0
Starter clutch bolt			54	5.4	39.0
Generator cover bolt			10	1.0	7.0
Generator rotor bolt			145	14.5	105.0
Generator stator set bolt			11	1.1	8.0
Generator lead wire set bolt			5.5	0.55	4.0
Oil pressure switch			14	1.4	10.0
Oil pressure switch lead wire screw			1.5	0.15	1.0
Oil filter			20	2.0	14.5
Crankshaft journal bolt	[M9]		18 N·m (1.8 kgf-m, 13.0 lbf-ft) then turn in 50°		
Crankcase bolt	[M6]		12	1.2	8.5
	[M8]	Initial	15	1.5	11.0
		Final	26	2.6	19.0
Oil gallery plug	Cylinder head		10	1.0	7.0
	[M6]		10	1.0	7.0
	[M10]		18	1.8	13.0
	[M12]		15	1.5	11.0
	[M26]		11	1.1	8.0
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
Oil pump driven sprocket bolt			10	1.0	7.0

Item	N·m	kgf-m	lbf-ft
Conrod cap bolt	37 N·m (3.7 kgf-m, 26.5 lbf-ft) then turn in 1/6 (60°) turn		
Breather cover bolt	10	1.0	7.0
Oil pan bolt	10	1.0	7.0
Oil cooler mounting bolt	10	1.0	7.0
Driveshaft bearing case bolt (LH and RH)	12	1.2	8.7
Driveshaft oil seal retainer screw	12	1.2	8.7
Gearshift arm stopper	19	1.9	13.5
Gearshift cam stopper bolt	10	1.0	7.0
Gearshift cam plate bolt	13	1.3	9.5
Gearshift cam bearing retainer screw	10	1.0	7.0
Gearshift shaft end screw	8.5	0.85	6.0
GP switch mounting bolt	6.5	0.65	4.5
Starter motor mounting bolt	10	1.0	7.0
Starter motor lead wire mounting bolt	3	0.3	2.0
Starter motor housing bolt	5	0.5	3.5
Regulator/rectifier mounting bolt	10	1.0	7.0
Intake pipe bolt	8.5	0.85	6.5
Bypass hose union	12	1.2	8.5

FI System + Intake Air System

Item	N·m	kgf-m	lbf-ft
CMP sensor bolt	10	1.0	7.0
TP sensor mounting screw	3.5	0.35	2.5
STP sensor mounting screw	3.5	0.35	2.5
ISC valve mounting screw	2	0.2	1.5
CKP sensor mounting bolt	6.5	0.65	4.5
HO2 sensor	25	2.5	18.0
Fuel delivery pipe mounting screw	3.5	0.35	2.5
Fuel pump mounting bolt	10	1.0	7.0
EXCVA pulley mounting bolt	5	0.5	3.5
IAT sensor mounting screw	1.3	0.13	1.0
EVAP system purge control solenoid valve mounting nut (E-33 only)	6.5	0.65	4.5
EVAP system purge control solenoid valve bracket bolt (E-33 only)	10	1.0	7.0

Cooling System

Item	N·m	kgf-m	lbf-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
ECT sensor	18	1.8	13.0
Thermostat cover bolt	10	1.0	7.0
Water inlet connector bolt	10	1.0	7.0
Water pump air bleeder bolt	13	1.3	9.5

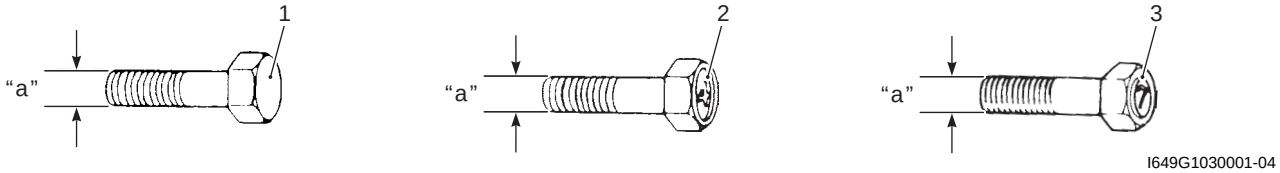
Chassis

Item	N·m	kgf-m	lbf-ft
Steering stem head nut	90	9.0	65.0
Steering stem lock-nut	80	8.0	58.0
Steering damper bolt	23	2.3	16.5
Steering damper nut	23	2.3	16.5
Front fork clamp bolt (Upper and Lower)	23	2.3	16.5
Front fork cap	35	3.5	25.5
Front fork piston rod nut	28	2.8	20.0
Rod guide case	90	9.0	65.0
Front axle bolt	100	10.0	72.5
Front axle pinch bolt	23	2.3	16.5
Handlebar clamp bolt	23	2.3	16.5
Front brake master cylinder holder bolt (Upper and Lower)	10	1.0	7.0
Front brake caliper mounting bolt	39	3.9	28.0
Front brake pad mounting pin	15	1.5	11.0
Brake hose union bolt	23	2.3	16.5
Air bleeder valve (Front caliper)	7.5	0.75	5.5
Air bleeder valve (Rear caliper)	6	0.6	4.5
Air bleeder valve (Front master cylinder)	6	0.6	4.5
Brake disc bolt (Front)	18	1.8	13.0
Brake disc bolt (Rear)	35	3.5	25.5
Rear brake pad mounting pin	17	1.7	12.5
Rear brake pad mounting pin plug	2.5	0.25	2.0
Rear brake master cylinder mounting bolt	10	1.0	7.0
Rear brake master cylinder rod lock-nut	17	1.7	12.5
Rear brake caliper sliding pin A	27	2.7	19.5
Rear brake caliper sliding pin B	12	1.2	8.5
Brake lever pivot bolt	1	0.1	0.7
Brake lever pivot bolt lock-nut	6	0.6	4.5
Swingarm pivot shaft	15	1.5	11.0
Swingarm pivot nut	100	10.0	72.5
Swingarm pivot lock-nut	90	9.0	65.0
Swingarm pivot boss nut	65	6.5	47.0
Cushion lever mounting nut	98	9.8	71.0
Cushion rod mounting nut (Front and Rear)	98	9.8	71.0
Rear shock absorber bracket nut	115	11.5	83.0
Rear shock absorber mounting nut (Upper and Lower)	50	5.0	36.0
Rear axle nut	100	10.0	72.5
Rear sprocket nut	60	6.0	43.0
Rear combination light mounting bolt	2.8	0.28	2.0
License plate light mounting nut	5	0.5	3.5
Side-stand nut	40	4.0	29.0
Side-stand bolt	50	5.0	36.0
Side-stand bracket mounting bolt	50	5.0	36.0
Bank sensor bolt	18	1.8	13.0
Footrest bracket bolt	23	2.3	16.5
Footrest guard screw	4.5	0.45	3.0
Footrest holder bolt	35	3.5	25.5
Seat rail mounting bolt	50	5.0	36.0
Cowling brace mounting bolt	23	2.3	16.5
Rear view mirror mounting nut	10	1.0	7.0

Tightening Torque Chart

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

Bolt Diameter "a" (mm)	Conventional or "4" marked bolt			"7" marked bolt		
	N·m	kgf-m	lbf-ft	N·m	kgf-m	lbf-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



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1. Conventional bolt	2. "4" marked bolt	3. "7" marked bolt

Section 1

Engine

CONTENTS

Precautions

Precautions

Precautions for Engine

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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

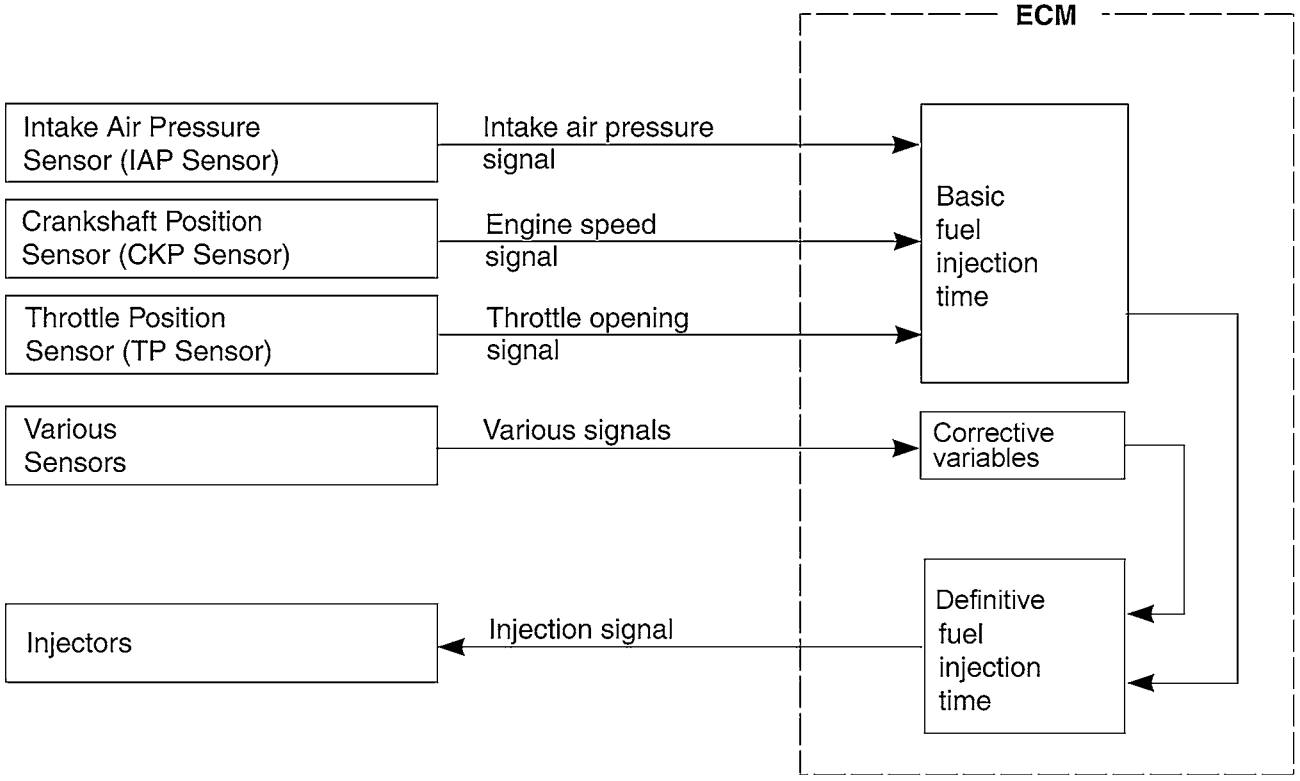
General Description

Injection Timing Description

B947H11101001

Injection Time (Injection Volume)

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
ATMOSPHERIC PRESSURE SENSOR SIGNAL	When atmospheric pressure is low, the sensor sends the signal to the ECM and reduce the injection time (volume).
ENGINE COOLANT TEMPERATURE SENSOR SIGNAL	When engine coolant temperature is low, injection time (volume) is increased.
INTAKE AIR TEMPERATURE SENSOR SIGNAL	When intake air temperature is low, injection time (volume) is increased.
HEATED OXYGEN SENSOR SIGNAL	Air/fuel ratio is compensated to the theoretical ratio from density of oxygen in exhaust gas. The compensation occurs in such a way that more fuel is supplied if detected air/fuel ratio is lean and less fuel is supplied if it is rich.
BATTERY VOLTAGE SIGNAL	ECM operates on the battery voltage and at the same time, it monitors the voltage signal for compensation of the fuel injection 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. This is the compensation of the SRAD.
STARTING SIGNAL	When starting engine, additional fuel is injected during cranking engine.
ACCELERATION SIGNAL/DECELERATION SIGNAL	During acceleration, the fuel injection time (volume) is increased, in accordance with the throttle opening speed and engine rpm. During deceleration, the fuel injection time (volume) is decreased.

Injection Stop Control

Signal	Descriptions
TIP-OVER SENSOR SIGNAL (FUEL SHUT-OFF)	When the motorcycle tips over, the tip-over sensor sends a signal 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 injectors stop operation when engine rpm reaches rev. limit rpm. The fuel cut-off circuit is incorporated in this ECM in order to prevent over-running of engine. When engine speed reaches 13 500 r/min, this circuit cuts off fuel at the fuel injectors. But under no load, the clutch lever is pulled or the gear position is in neutral, this circuit cuts off fuel when engine speed reaches 13 100 r/min. **⚠ CAUTION** **Under no load, the engine can run over 13 100 r/min through the fuel cut-off circuit is effective, which may possibly cause engine damage. Do not run the engine without load over 13 100 r/min at anytime.**

Self-Diagnosis Function

B947H11101002

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”		Odd / Trip / Clock / Panel light brightness / Lap time counter	—	—
“YES”	Engine can start	Odd / Trip / Clock / Panel light brightness / Lap time counter and “FI” letters *1	FI indicator light turns ON.	Each 2 sec. Odd / Trip / Clock / Panel light brightness / Lap time counter and “FI” is indicated.
	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 Odd / Trip / Clock / Panel light brightness / Lap time counter are indicated in the LCD panel and motorcycle can run.

***2**

The injection signal is stopped, when the camshaft position sensor signal, crankshaft position sensor signal, tip-over sensor signal, #1, #2, #3 and #4 ignition signals, #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.

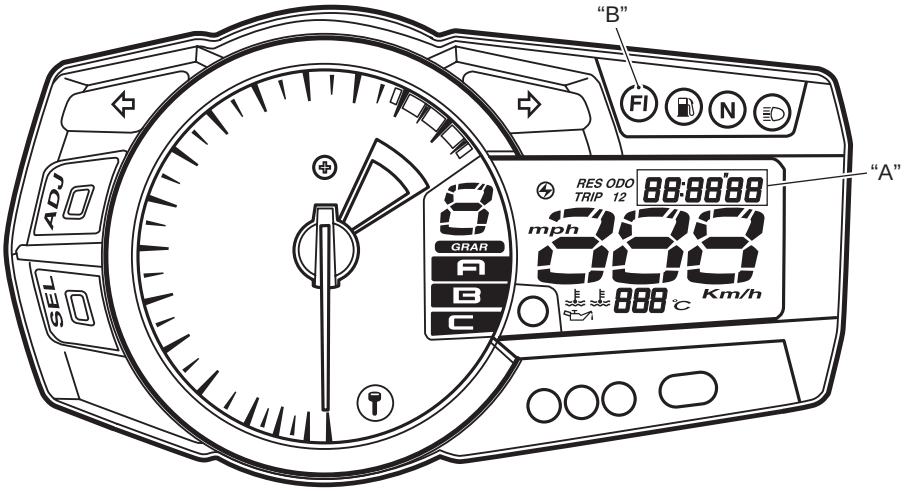
For Example:

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 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.

“Sd”:

The LCD panel indicates “Sd” when the steering damper solenoid malfunction, battery abnormal voltage and speed sensor malfunction occurred.



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Dealer Mode

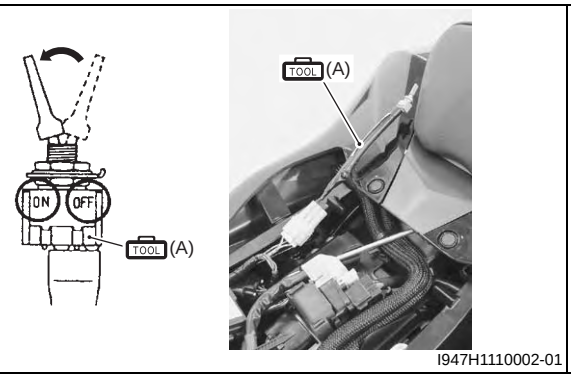
The defective function is memorized in the computer. Use the special tool's coupler to connect to the mode select switch. The memorized malfunction code is displayed on LCD (DISPLAY) panel. Malfunction means that the ECM does not receive signal from the devices. These affected devices are indicated in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

TOOL (A): 09930–82720 (Mode selection switch)



I947H1110002-01

I947H1110003-01

Malfunction	LCD (DISPLAY) INDICATION	FI LIGHT INDICATION	INDICATION MODE
"NO"	C00	FI indicator light turns OFF.	—
"YES"	C** code is indicated from small numeral to large one.		For each 2 sec., code is indicated.

Schematic and Routing Diagram

FI System Wiring Diagram

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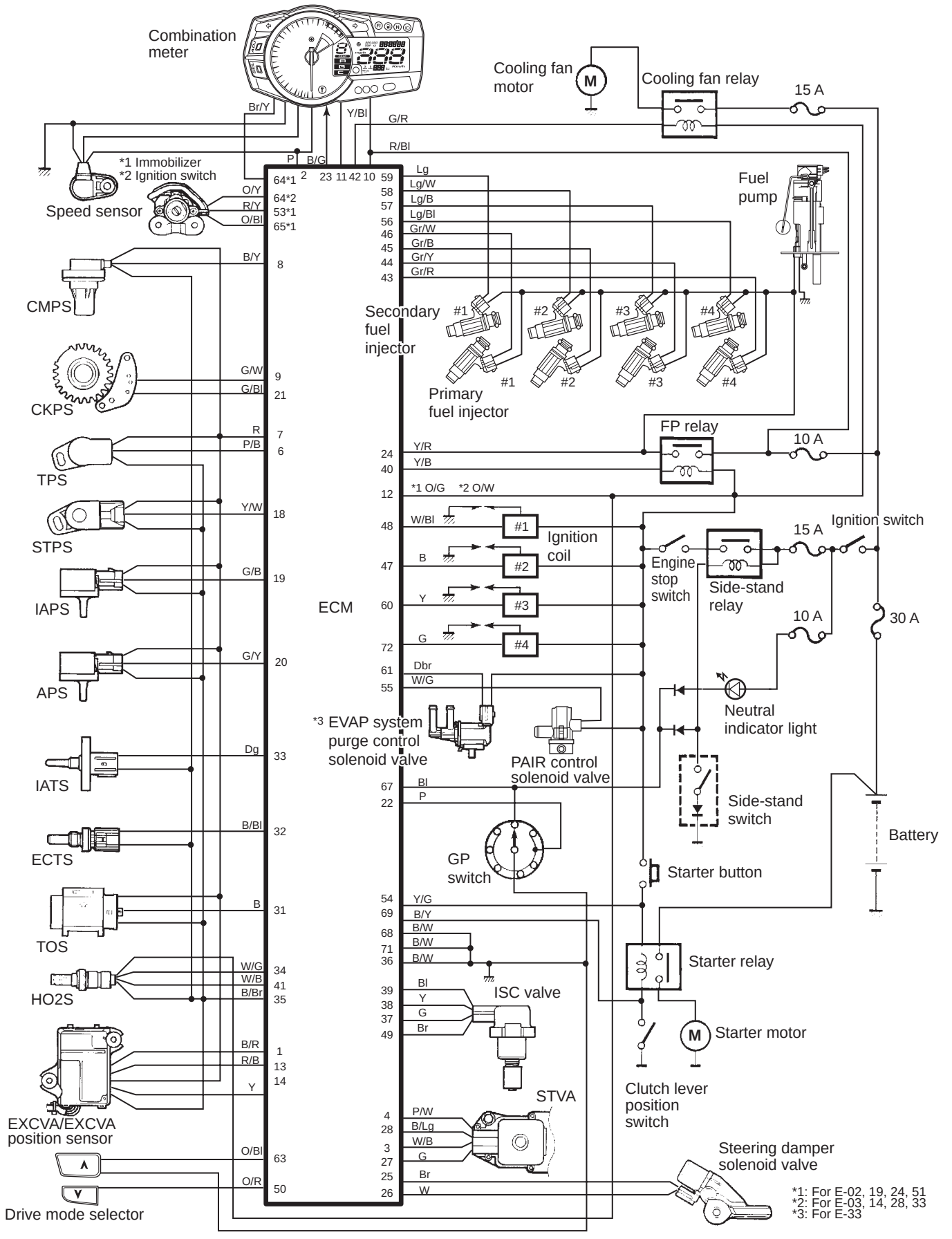
Combination meter
Cooling fan motor
Cooling fan relay
15 A
Br/Y
Y/Bl
G/R
R/Bl
*1 Immobilizer
*2 Ignition switch
Speed sensor
Fuel pump
CMPS
CKPS
TPS
STPS
IAPS
APS
IATS
ECTS
TOS
HO2S
EXCVA/EXCVA position sensor
Drive mode selector
Secondary fuel injector
Primary fuel injector
FP relay
10 A
ECM
Ignition coil
Engine stop switch
Side-stand relay
15 A
Ignition switch
10 A
30 A
*3 EVAP system purge control solenoid valve
PAIR control solenoid valve
Neutral indicator light
Side-stand switch
Battery
GP switch
Starter button
Starter relay
ISC valve
Starter motor
Clutch lever position switch
STVA
Steering damper solenoid valve
*1: For E-02, 19, 24, 51
*2: For E-03, 14, 28, 33
*3: For E-33
I947H1110004-02

Terminal Alignment of ECM Coupler

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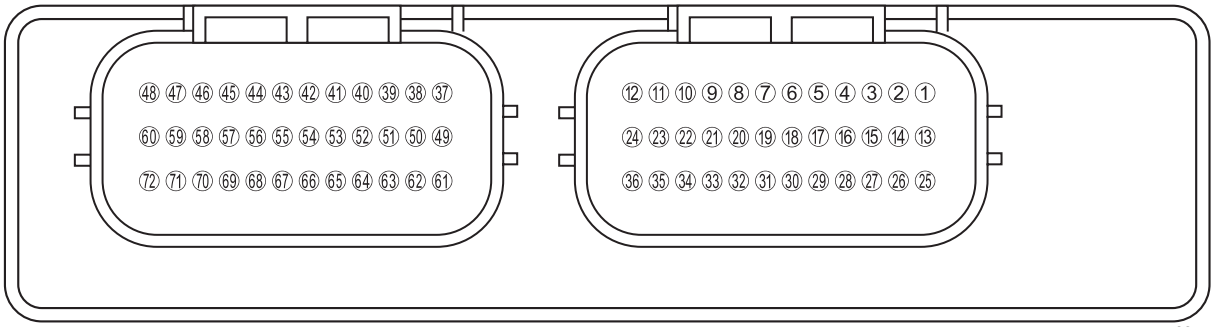

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TERMINAL NO.	CIRCUIT	TERMINAL NO.	CIRCUIT
1	EXCVA power (MO+)	37	ISC valve signal (ISC, 2A)
2	Speed sensor signal	38	ISC valve signal (ISC, 1B)
3	STVA signal (STVA, 2A)	39	ISC valve signal (ISC, 1A)
4	STVA signal (STVA, 1A)	40	Fuel pump relay (FP relay)
5	—	41	HO2 sensor heater (HO2SH)
6	TP sensor signal (TPS)	42	Cooling fan relay (FAR)
7	Power source for sensors (VCC)	43	Primary injector #4 (#41)
8	CMP sensor (CMPS+)	44	Primary injector #3 (#31)
9	CKP sensor (CKPS+)	45	Primary injector #2 (#21)
10	Power source for back-up (BATT)	46	Primary injector #1 (#11)
11	Tachometer	47	Ignition coil #2
12	Power source (+B)	48	Ignition coil #1
13	EXCVA power (MO–)	49	ISC valve signal (ISC, 2B)
14	EXCVA position sensor (MPS)	50	Drive mode selector 2 (DMS 2)
15	—	51	—
16	—	52	—
17	Blank	53	Immobilizer communication (For E-02, 19, 24, 51)
18	STP sensor (STPS)	54	Starter switch
19	IAP sensor signal (IAPS)	55	PAIR control solenoid (PAIR)
20	AP sensor signal (APS)	56	Secondary injector #4 (#42)
21	CKP sensor signal (CKPS–)	57	Secondary injector #3 (#32)
22	Gear position switch signal (GP)	58	Secondary injector #2 (#22)
23	Serial data for speedometer	59	Secondary injector #1 (#12)
24	Power source for fuel injectors (VM)	60	Ignition coil #3
25	Steering damper solenoid (SSO–)	61	EVAP system purge control solenoid valve (For E-33)
26	Steering damper solenoid (SSO+)	62	Serial data for self-diagnosis
27	STVA signal (STVA, 2B)	63	Drive mode selector 1 (DMS 1)
28	STVA signal (STVA, 1B)	64	Immobilizer indicator (For E-02, 19, 24, 51)/ Ignition switch signal (For E-03, 14, 28, 33)
29	Blank	65	Immobilizer communication (For E-02, 19, 24, 51)
30	Blank	66	—
31	TO sensor signal (TOS)	67	Neutral signal
32	ECT sensor signal (ECTS)	68	General ground (E01)
33	IAT sensor signal (IATS)	69	Clutch lever switch
34	HO2 sensor (HO2S)	70	Mode select switch
35	Sensor ground (E2)	71	Ignition system ground (E03)
36	ECM ground (E1)	72	Ignition coil #4

Component Location

FI System Parts Location

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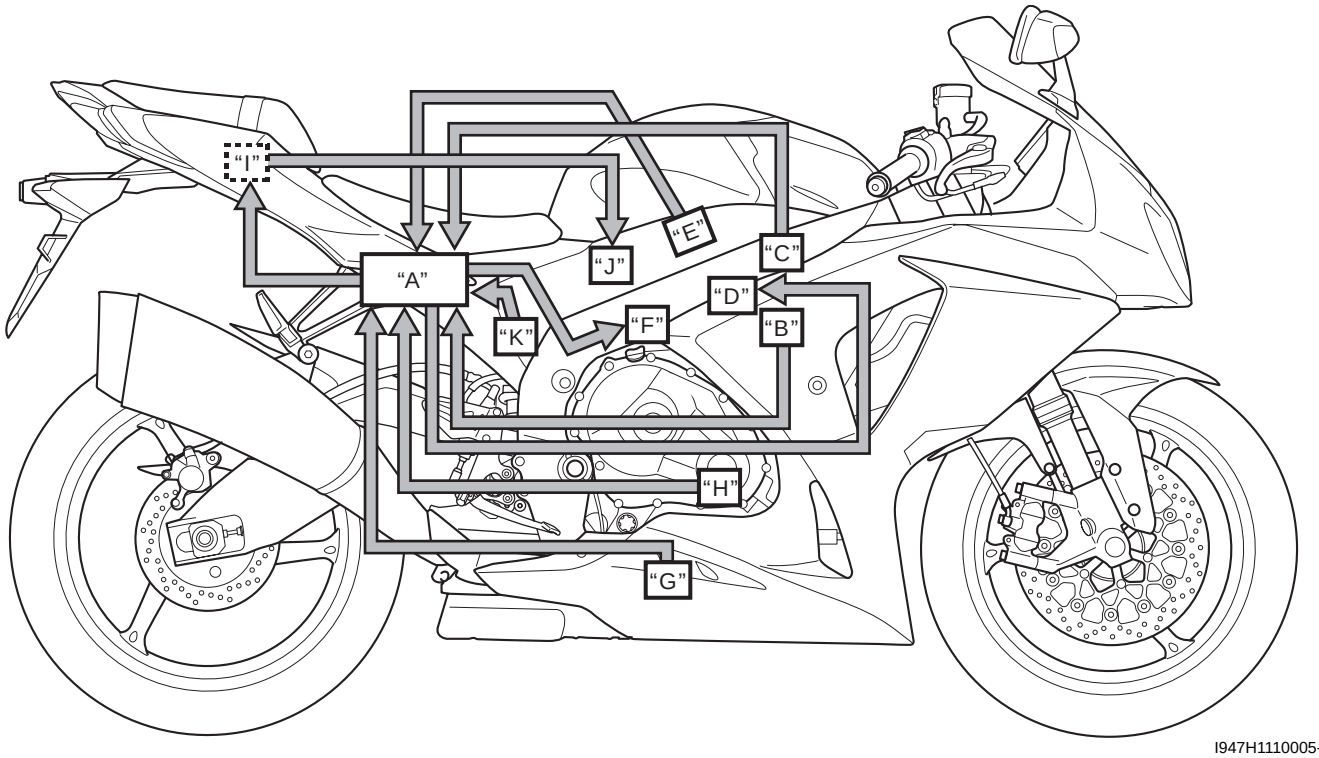

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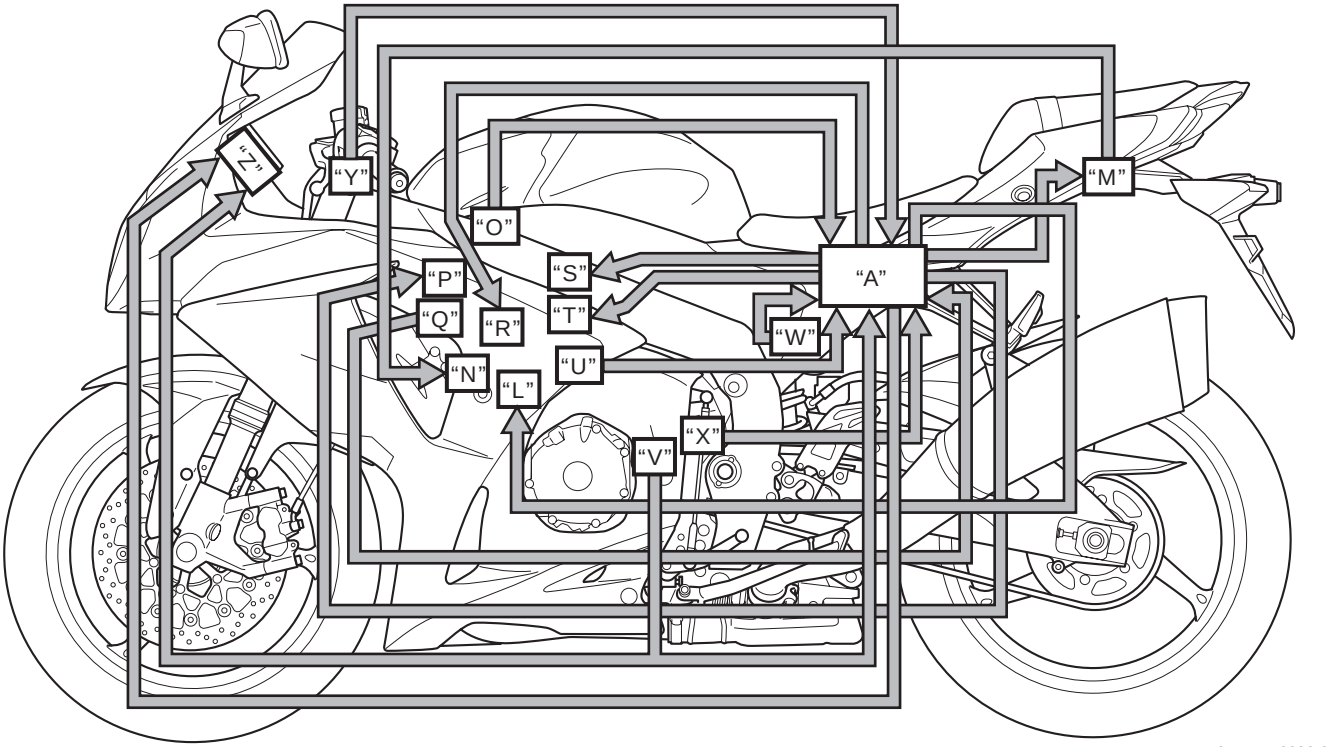
"A": ECM	"E": Intake air pressure sensor (IAPS)	"I": Fuel pump relay (FP relay)
"B": Throttle position sensor (TPS)	"F": EVAP system purge control solenoid valve (E-33 only)	"J": Fuel pump (FP)
"C": Secondary throttle position sensor (STPS)	"G": Heated oxygen sensor (HO2S)	"K": Tip-over sensor (TOS)
"D": Secondary throttle valve actuator (STVA)	"H": Crankshaft position sensor (CKPS)	



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"A": ECM	"Q": Camshaft position sensor (CMPS)	"W": Atmospheric pressure sensor (APS)
"L": Exhaust control valve actuator (EXCVA)	"R": Ignition coil (IG coil)	"X": Gear position switch (GP switch)
"M": Cooling fan relay	"S": Secondary fuel injector	"Y": Drive mode selector
"N": Cooling fan	"T": Primary fuel injector	"Z": Combination meter
"O": Intake air temperature sensor (IATS)	"U": Engine coolant temperature sensor (ECTS)	
"P": PAIR control solenoid valve	"V": Speed sensor	

Diagnostic Information and Procedures

Engine Symptom Diagnosis

B947H11104001

Condition	Possible cause	Correction / Reference Item
Engine will not start or is hard to start (Compression too low)	Valve clearance out of adjustment.	*Adjust.*
	Worn valve guide or poor seating of valve.	*Repair or replace.*
	Mistimed valve.	*Adjust.*
	Excessively worn piston ring.	*Replace.*
	Worn-down cylinder bore.	*Replace.*
	Too slow Starter motor cranking.	*Refer to "Starting System Diagram" in Section 1I (Page 1I-1).*
	Poor seating of spark plug.	*Retighten.*
Engine will not start or is hard to start (Plug not sparking)	Fouled spark plug.	*Clean.*
	Wet spark plug.	*Clean and dry.*
	Defective ignition coil.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connection.	*Repair or replace.*
Engine will not start or is hard to start (No fuel reaching the intake manifold)	Clogged fuel filter or fuel hose.	*Clean or replace.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective fuel injector.	*Replace.*
	Defective fuel pump relay.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connection.	*Check and repair.*

Condition	Possible cause	Correction / Reference Item
Engine will not start or is hard to start (Incorrect fuel/air mixture)	TP sensor out of adjustment.	*Adjust.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective IAP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Defective AP sensor.	*Replace.*
	Clogged ISC valve air passage way.	*Repair or replace.*
Engine idles poorly	Valve clearance out of adjustment.	*Adjust.*
	Poor seating of valve.	*Replace or repair.*
	Defective valve guide.	*Replace.*
	Worn down camshaft.	*Replace.*
	Too wide spark plug gap.	*Adjust or replace.*
	Defective ignition coil/plug cap.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective fuel pump.	*Replace.*
	Imbalanced throttle valve.	*Adjust.*
	Damaged or cranked vacuum hose.	*Replace.*
	Damaged or clogged ISC valve.	*Repair or replace.*
	ISC incorrect learning.	*Reset learned value.*
Engine stalls often (Incorrect fuel/air mixture)	Defective IAP sensor or circuit.	*Repair or replace.*
	Clogged fuel filter.	*Clean or replace.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective thermostat.	*Replace.*
	Defective IAT sensors.	*Replace.*
	Damaged or cracked vacuum hose.	*Replace.*
	Damaged or cogged ISC valve.	*Replace or repair.*
Engine stalls often (Fuel injector improperly operating)	Defective fuel injector.	*Replace.*
	No injection signal from ECM.	*Repair or replace.*
	Open or short circuited wiring connection.	*Repair or replace.*
	Defective battery or low battery voltage.	*Replace or recharge.*
Engine stalls often (Control circuit or sensor improperly operating)	Defective ECM.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensors.	*Replace.*
	Defective CMP sensors.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective fuel pump relay.	*Replace.*
	Defective ISC valve.	*Replace.*
	ISC incorrect learning.	*Reset learned value.*
Engine stalls often (Engine internal parts improperly operating)	Fouled spark plug.	*Clean.*
	Defective CKP sensor or ECM.	*Replace.*
	Clogged fuel hose.	*Clean.*
	Out of valve clearance adjustment.	*Adjust.*
Noisy engine (Excessive valve chatter)	Too large valve clearance.	*Adjust.*
	Weakened or broken valve spring.	*Replace.*
	Worn tappet or cam surface.	*Replace.*
	Worn or burnt camshaft journal.	*Replace.*

Condition	Possible cause	Correction / Reference Item
Noisy engine (Noise seems to come from piston)	Worn down piston or cylinder.	*Replace.*
	Combustion chamber fouled with carbon.	*Clean.*
	Worn piston pin or piston pin bore.	*Replace.*
	Worn piston ring or ring groove.	*Replace.*
Noisy engine (Noise seems to come from cam chain)	Stretched cam chain.	*Replace.*
	Worn sprocket.	*Replace.*
	Cam chain tension adjuster not working.	*Repair or replace.*
Noisy engine (Noise seems to come from clutch)	Worn splines of countershaft or hub.	*Replace.*
	Worn teeth of clutch plate.	*Replace.*
	Distorted clutch plate.	*Replace.*
	Worn clutch release bearing.	*Replace.*
	Weakened clutch damper.	*Replace the primary driven gear.*
	Worn clutch lifter related parts.	*Replace related parts as a set.*
Noisy engine (Noise seems to come from crankshaft)	Rattling bearing due to wear.	*Replace.*
	Worn or burnt big-end bearing.	*Replace.*
	Worn or burnt journal bearing.	*Replace.*
	Too large thrust clearance.	*Replace thrust bearing.*
Noisy engine (Noise seems to come from balancer)	Worn and burnt journal bearings.	*Replace.*
Noisy engine (Noise seems to come from transmission)	Worn or rubbing gear.	*Replace.*
	Worn spline.	*Replace.*
	Worn or rubbing primary gear.	*Replace.*
	Worn bearing.	*Replace.*
Noisy engine (Noise seems to come from water pump)	Too much play on pump shaft bearing.	*Replace.*
	Worn or damaged impeller shaft.	*Replace.*
	Worn or damaged mechanical seal.	*Replace.*
	Contact between pump case and impeller.	*Replace.*
Engine runs poorly in high speed range (Defective engine internal/ electrical parts)	Weakened valve spring.	*Replace.*
	Worn camshaft.	*Replace.*
	Valve timing out of adjustment.	*Adjust.*
	Too narrow spark plug gap.	*Adjust.*
	Ignition not advanced sufficiently due to poorly. working timing advance circuit.	*Replace ECM.*
	Defective ignition coil.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Clogged air cleaner element.	*Clean.*
	Clogged fuel hose, resulting in inadequate fuel. supply to injector.	*Clean and prime.*
	Defective fuel pump.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective STP sensor or STVA.	*Replace.*
Engine runs poorly in high speed range (Defective air flow system)	Clogged air cleaner element.	*Clean or replace.*
	Defective throttle valve.	*Adjust or replace.*
	Defective secondary throttle valve.	*Adjust or replace.*
	Sucking air from throttle body joint.	*Repair or replace.*
	Defective ECM.	*Replace.*
	Imbalancing throttle valve synchronization.	*Adjust.*
	Defective STP sensor or STVA.	*Replace.*

Condition	Possible cause	Correction / Reference Item
Engine runs poorly in high speed range (Defective control circuit or sensor)	Low fuel pressure.	*Repair or replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensors.	*Replace.*
	Defective CMP 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 and/or STVA.	*Replace.*
	Defective EXCVA.	*Replace.*
Engine lacks power (Defective engine internal/ electrical parts)	Loss of valve clearance.	*Adjust.*
	Weakened valve spring.	*Replace.*
	Valve timing out of adjustment.	*Adjust.*
	Worn piston ring or cylinder.	*Replace.*
	Poor seating of valve.	*Repair.*
	Fouled spark plug.	*Clean or replace.*
	Incorrect spark plug.	*Adjust or replace.*
	Clogged fuel injector.	*Replace.*
	Defective secondary fuel injector.	*Replace.*
	TP sensor out of adjustment.	*Adjust.*
	Clogged air cleaner element.	*Replace.*
	Imbalancing throttle valve synchronization.	*Adjust.*
	Sucking air from throttle valve or vacuum hose.	*Retighten or replace.*
	Too much engine oil.	*Drain out excess oil.*
	Defective fuel pump or ECM.	*Replace.*
	Defective CKP sensor and ignition coil.	*Replace.*
	Defective STP sensor or STVA.	*Replace.*
Engine lacks power (Defective control circuit or sensor)	Low fuel pressure.	*Repair or replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective GP switch.	*Replace.*
	Defective IAP sensor.	*Replace.*
	Defective AP sensor.	*Replace.*
	TP sensor out of adjustment.	*Adjust.*
	Defective STP sensor and/or STVA.	*Replace.*
	Defective EXCVA.	*Replace.*
Engine overheats (Defective engine internal parts)	Heavy carbon deposit on piston crown.	*Clean.*
	Not enough oil in the engine.	*Add oil.*
	Defective oil pump or clogged oil circuit.	*Replace or clean.*
	Sucking air from intake pipe.	*Retighten or replace.*
	Use of incorrect engine oil.	*Change.*
	Defective cooling system.	*See radiator section.*
Engine overheats (Lean fuel/air mixture)	Short-circuited IAP sensor/lead wire.	*Repair or replace.*
	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 (Other factors)	Ignition timing is too advanced due to defective timing advance system (ECT sensor, GP switch, CKP sensor or ECM).	*Replace.*
	Too tight drive chain.	*Adjust.*
	ISC incorrect learning.	*Reset learned value.*

Condition	Possible cause	Correction / Reference Item
Dirty or heavy exhaust smoke	Too much engine oil.	*Check with inspection window, drain out excess oil.*
	Worn piston ring or cylinder.	*Replace.*
	Worn valve guide.	*Replace.*
	Scored or scuffed cylinder wall.	*Replace.*
	Worn valve stem.	*Replace.*
	Defective stem seal.	*Replace.*
	Worn oil ring side rail.	*Replace.*

Self-Diagnostic Procedures

B947H11104002

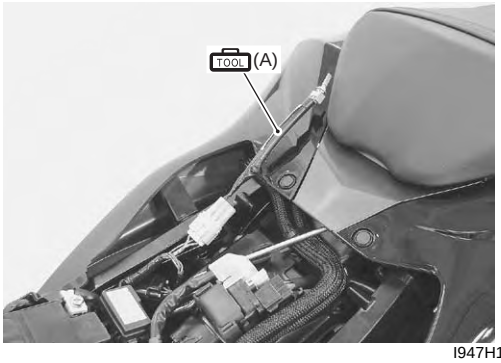
Use of Mode Select Switch

NOTE

- **Do not disconnect the coupler from ECM, battery cable from battery, ECM ground wire from engine or main fuse before confirming DTC (Diagnostic Trouble Code) stored in memory. Such disconnection may 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" (Page 1A-3).) 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 front seat. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Connect the special tool to the mode select switch coupler.

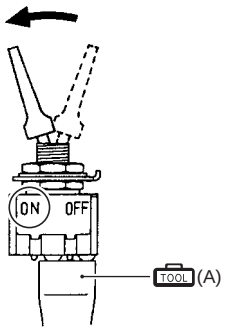
Special tool
TOOL (A): 09930–82720 (Mode selection switch)



I947H1110007-01

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-20).

Special tool
TOOL (A): 09930–82720 (Mode selection switch)



I718H1110006-04

I947H1110008-01

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 lead wire coupler of any sensor is disconnected. Therefore, when a lead 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-14).**

7) Turn the ignition switch OFF and disconnect the special tool from the mode select switch coupler.
8) Reinstall the front seat.

Use of SDS

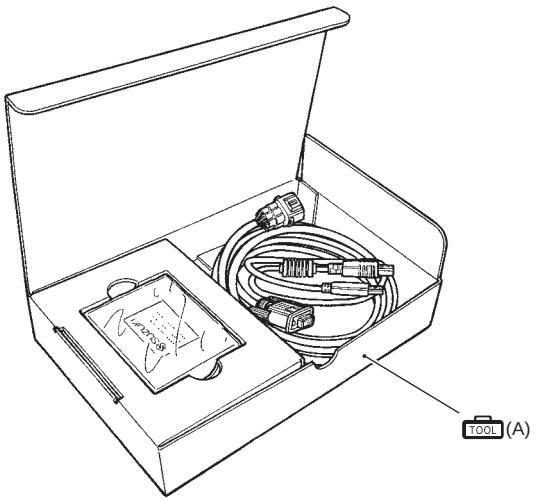
NOTE

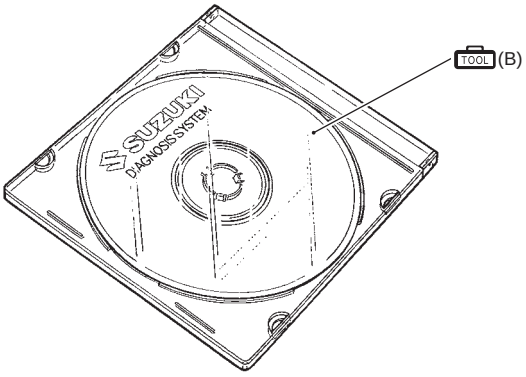
- **Do not disconnect the coupler from ECM, battery cable from battery, ECM ground wire from the engine or main fuse before confirming DTC (Diagnostic Trouble Code) stored in memory. Such disconnection may erase the memorized information in ECM memory.**
- **DTC stored in ECM memory can be checked by 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 front seat. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Set up the SDS tools. (Refer to the SDS operation manual for further details.)

Special tool
TOOL (A): 09904–41010 (SUZUKI Diagnostic system set)
TOOL (B): 99565–01010–020 (CD-ROM Ver.20)

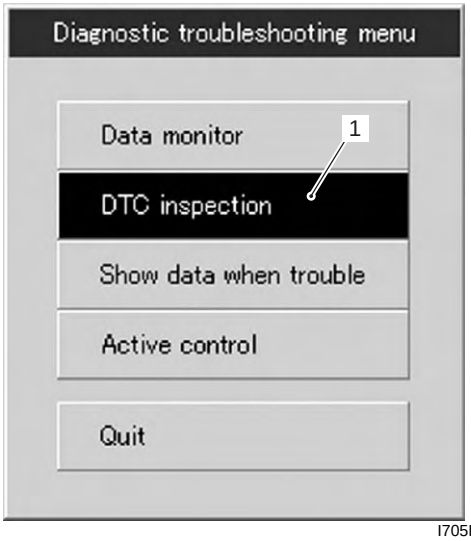
I947H1110009-01





I705H1110116-03

3) Click the DTC inspection button (1).



I705H1110003-01

4) Start the engine or crank the engine for more than 4 seconds.
5) Check the DTC to determine the malfunction part. Refer to “DTC Table” (Page 1A-20).

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.**
- **SDS is not used only 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 (Displaying Data at the Time of DTC)” (Page 1A-15).)**
- **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-14).
7) Close the SDS tool and turn the ignition switch OFF.
8) Disconnect the SDS tool and install the front seat.

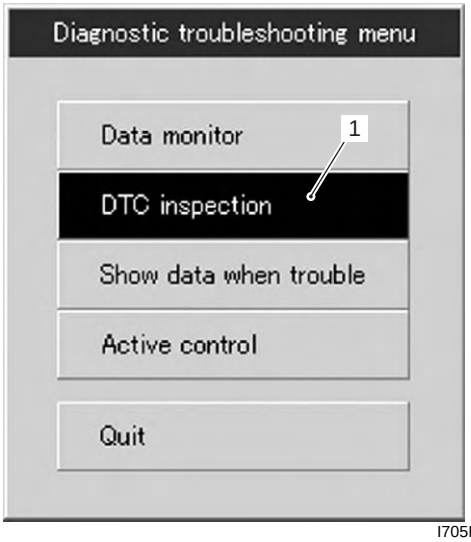
Use of SDS Diagnosis Reset Procedures

B947H11104003

NOTE

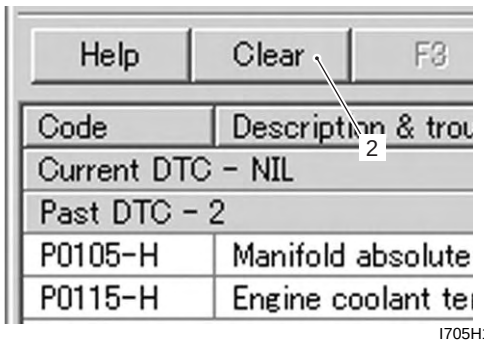
The malfunction code is memorized in the ECM also when the lead wire coupler of any sensor is disconnected. Therefore, when a lead wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.

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



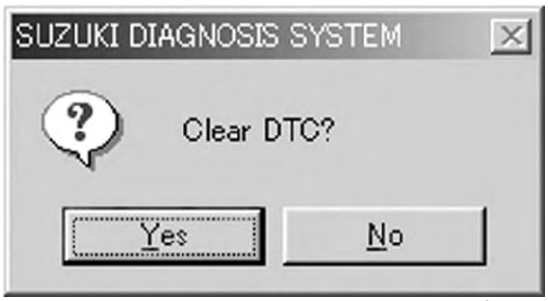
I705H1110003-01

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

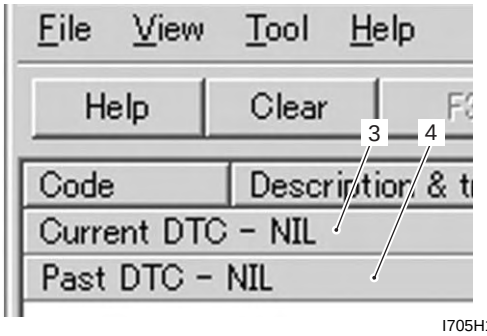
6) Follow the displayed instructions.



I947H1110144-01

I947H1110145-01

7) Check that both “Current DTC” (3) and “Past DTC” (4) are deleted (NIL).



I705H1110008-01

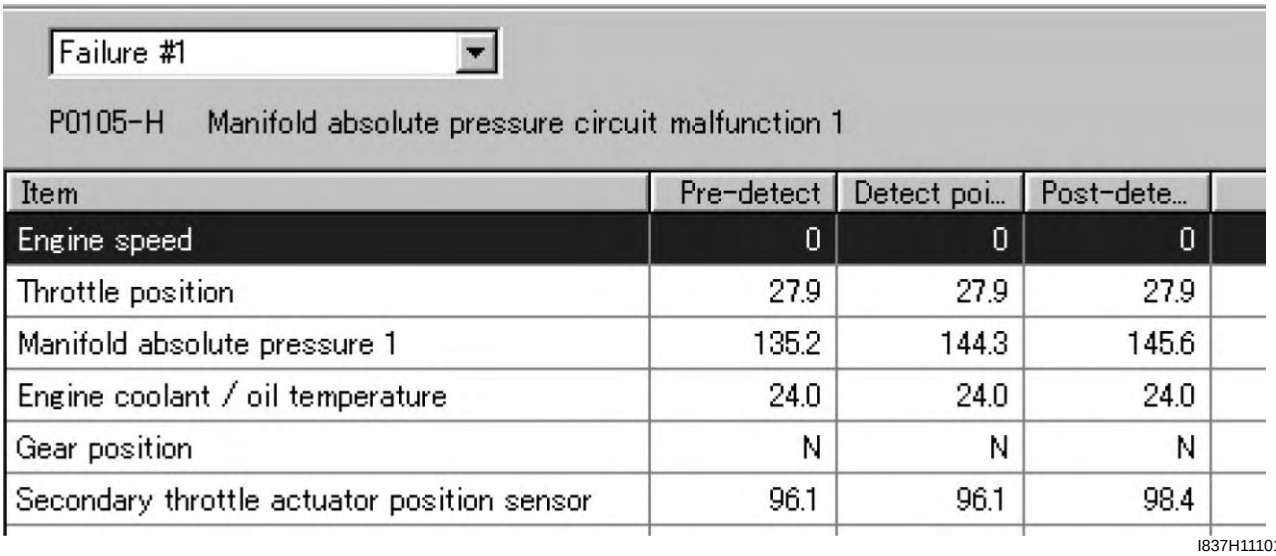
8) Close the SDS tool and turn the ignition switch OFF.
9) Disconnect the SDS tool and install the front seat.

Show Data When Trouble (Displaying Data at the Time of DTC)

B947H11104004

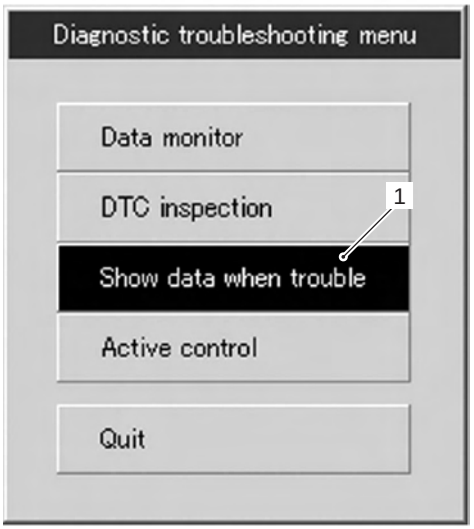
Use of SDS

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 of occurrence 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.



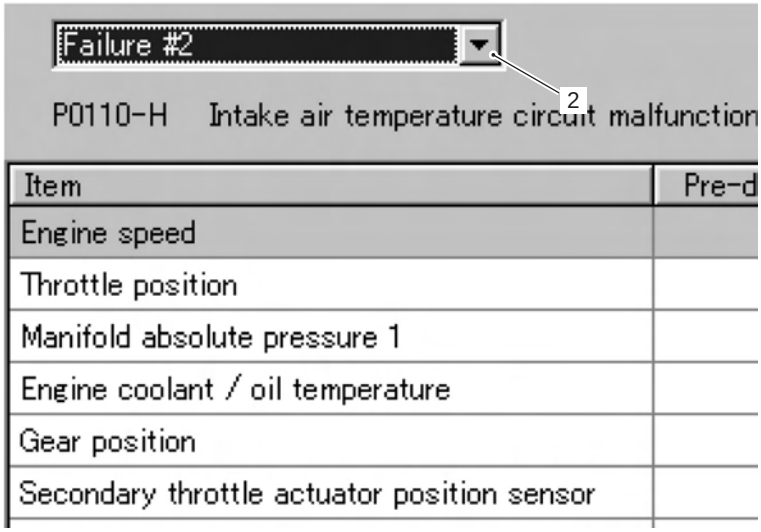
I837H1110167-01

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



I718H1110269-02

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



I718H1110270-01

SDS Check

B947H11104005

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 to facilitate the troubleshooting.

1) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

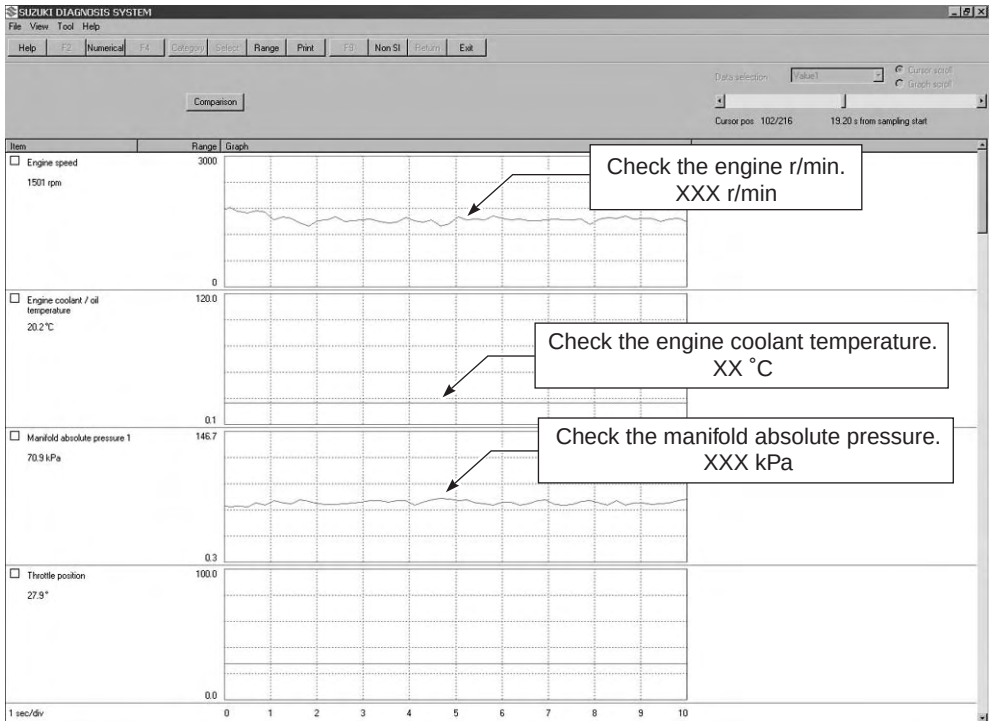
Special tool
TOOL : 09904–41010 (SUZUKI Diagnostic system set)
TOOL : 99565–01010–020 (CD-ROM Ver.20)

NOTE

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

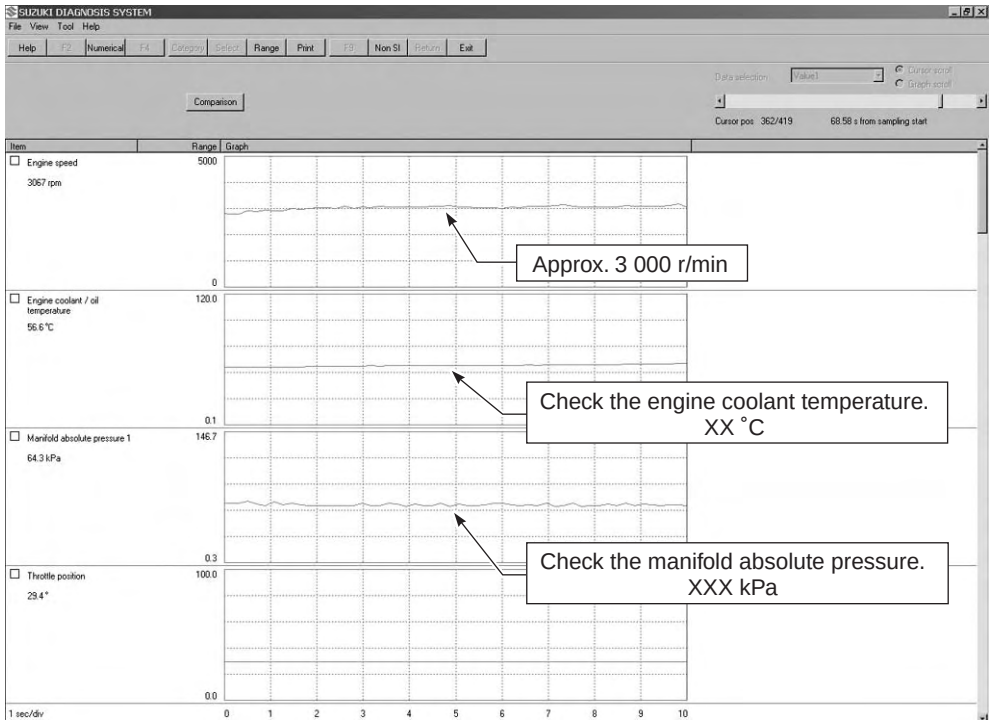
Sample

Data sampled from cold starting through warm-up



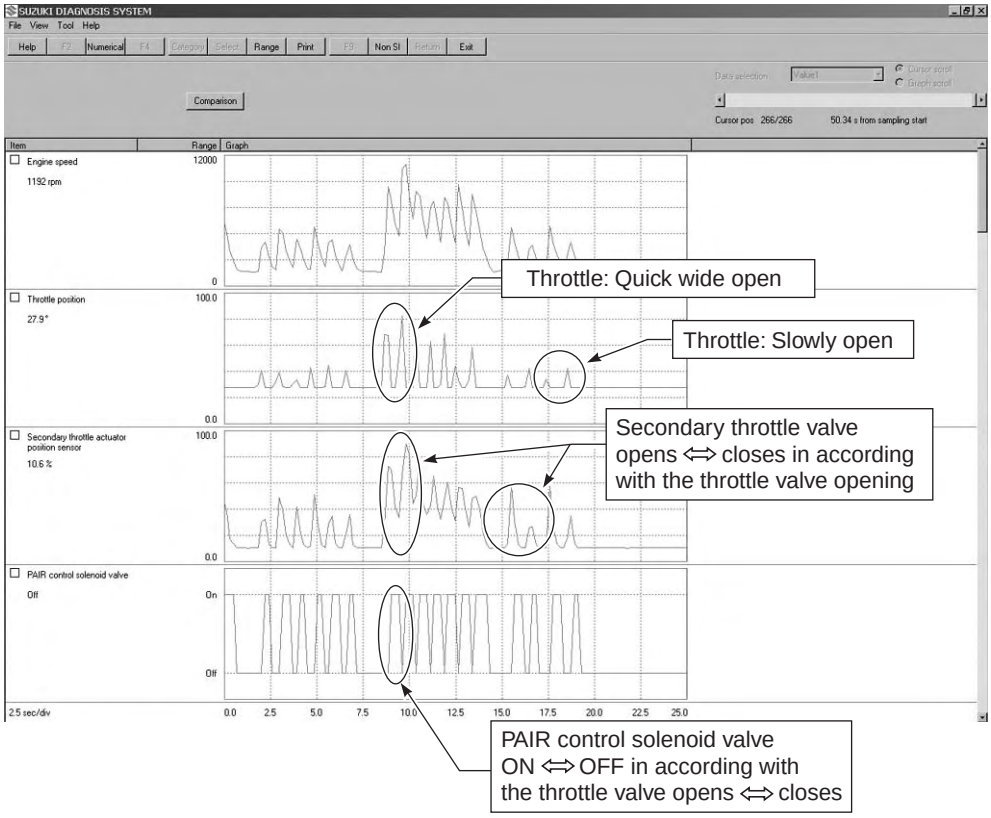
I947H1110146-01

Data at 3 000 r/min under no load



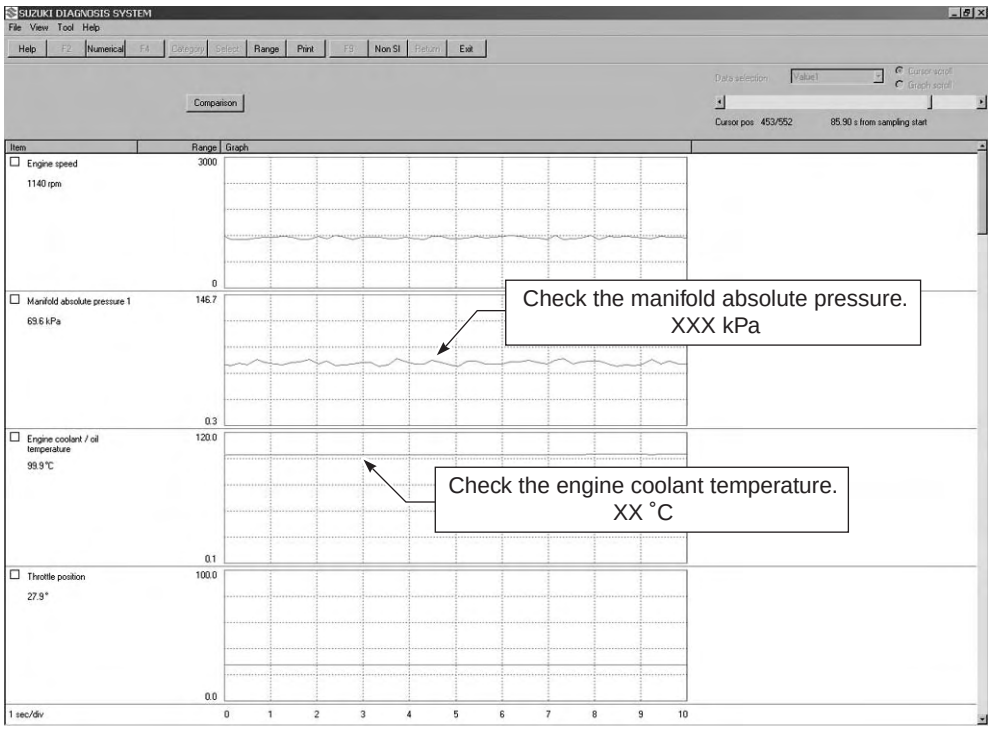
I947H1110147-01

Data at the time of racing



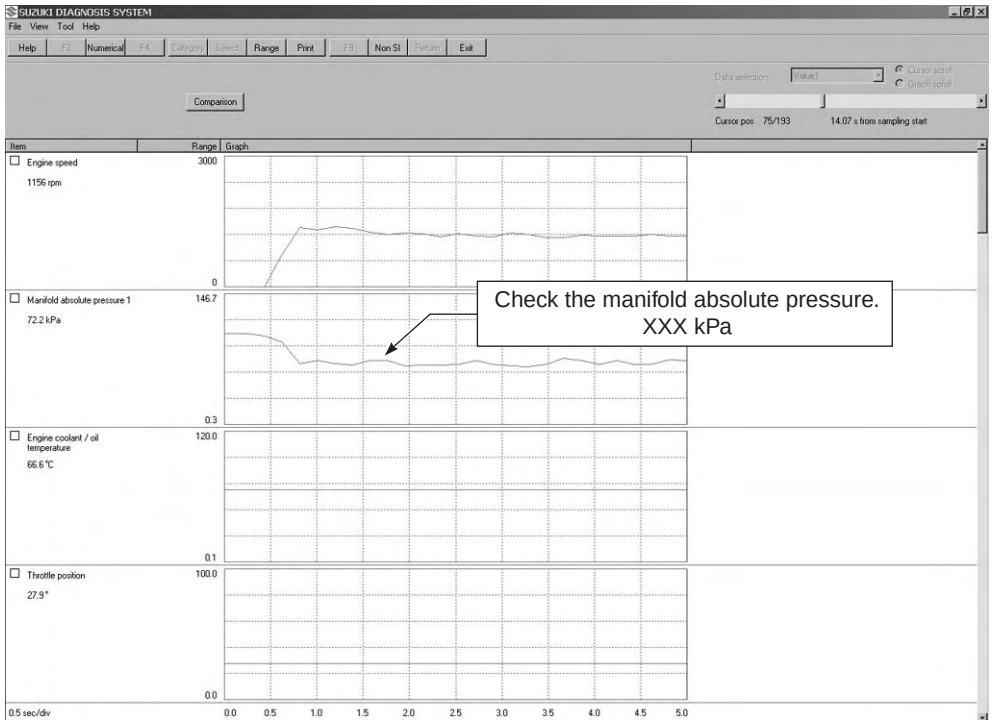
I947H1110148-01

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



I947H1110149-01

Data of manifold absolute pressure operation at the time of starting



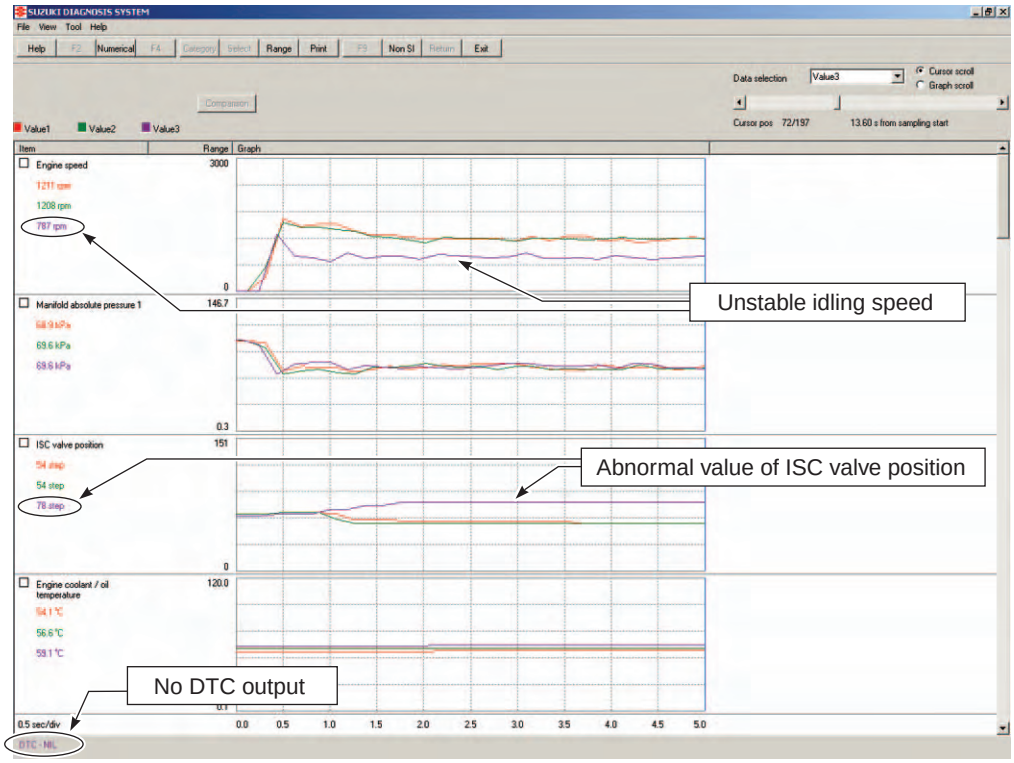
I947H1110150-01

Example of Trouble

Three data; value 3 (current data 3), value 1 (past data 1) and value 2 (past data 2); 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 engine idling speed and ISC valve stepping position are found to be abnormal than the data saved previously, the possible cause may probably lie in the hardware side such as ISC valve air inlet hose crumple, bend, etc.



I947H1110151-02

DTC Table

B947H11104006

Code	Malfunction Part	Remarks
C00	None	No defective part
C11 (P0340) ☞(Page 1A-29)	Camshaft position sensor (CMPS)	
C12 (P0335) ☞(Page 1A-32)	Crankshaft position sensor (CKPS)	Pick-up coil signal, signal generator
C13 (P0105-H/L) ☞(Page 1A-35)	Intake air pressure sensor (IAPS)	
C14 (P0120-H/L) ☞(Page 1A-43)	Throttle position sensor (TPS)	*1
C15 (P0115-H/L) ☞(Page 1A-50)	Engine coolant temperature sensor (ECTS)	
C21 (P0110-H/L) ☞(Page 1A-55)	Intake air temperature sensor (IATS)	
C22 (P1450-H/L) ☞(Page 1A-60)	Atmospheric pressure sensor (APS)	
C23 (P1651-H/L) ☞(Page 1A-68)	Tip-over sensor (TOS)	
C24 (P0351) ☞(Page 1A-75)	Ignition signal #1 (IG coil #1)	For #1 cylinder

Code	Malfunction Part	Remarks
C25 (P0352) ☞(Page 1A-75)	Ignition signal #2 (IG coil #2)	For #2 cylinder
C26 (P0353) ☞(Page 1A-75)	Ignition signal #3 (IG coil #3)	For #3 cylinder
C27 (P0354) ☞(Page 1A-75)	Ignition signal #4 (IG coil #4)	For #4 cylinder
C28 (P1655) ☞(Page 1A-75)	Secondary throttle valve actuator (STVA)	
C29 (P1654-H/L) ☞(Page 1A-79)	Secondary throttle position sensor (STPS)	
C31 (P0705) ☞(Page 1A-86)	Gear position signal (GP switch)	
C32 (P0201) ☞(Page 1A-88)	Primary Injector signal #1	For #1 cylinder
C33 (P0202) ☞(Page 1A-88)	Primary Injector signal #2	For #2 cylinder
C34 (P0203) ☞(Page 1A-88)	Primary Injector signal #3	For #3 cylinder
C35 (P0204) ☞(Page 1A-88)	Primary Injector signal #4	For #4 cylinder
C36 (P1764) ☞(Page 1A-91)	Secondary Injector signal #1	For #1 cylinder
C37 (P1765) ☞(Page 1A-91)	Secondary Injector signal #2	For #2 cylinder
C38 (P1766) ☞(Page 1A-91)	Secondary Injector signal #3	For #3 cylinder
C39 (P1767) ☞(Page 1A-91)	Secondary Injector signal #4	For #4 cylinder
C40 (P0505/P0506/ P0507) ☞(Page 1A-94)	Idle speed control valve (ISC valve)	
C41 (P0230-H/L, P2505) ☞(Page 1A-98) / ☞(Page 1A-101)	Fuel pump control system (FP control system), ECM/PCM power input signal	Fuel pump, fuel pump relay
C42 (P1650) ☞(Page 1A-103)	Ignition switch signal (Anti-theft)	Ignition switch for E-03, 14, 28, 33/immobilizer for E-02, 19, 24, 51
C44 (P0130, P0135) ☞(Page 1A-103)	Heated oxygen sensor (HO2S)	
C46 (P1657-H/L, P1658) ☞(Page 1A-109)	Exhaust control valve actuator (EXCVA)	
C49 (P1656) ☞(Page 1A-121)	PAIR control solenoid valve	
C60 (P0480) ☞(Page 1A-124)	Cooling fan control system	Cooling fan relay
C62 (P0443) ☞(Page 1A-127)	EVAP system purge control solenoid valve	E-33 only
C91 (P0500) ☞(Page 1A-131)	Vehicle speed sensor	
C93 (P1769) ☞(Page 1A-134)	Steering damper solenoid valve	

In the LCD (DISPLAY) panel, the malfunction code is indicated from small code to large code.
*1 To get the proper signal from the throttle position sensor, the sensor basic position is indicated in the LCD (DISPLAY) panel. The malfunction code is indicated in three digits. In front of the three digits, a line appears in any of the three positions, upper, middle or lower line. If the indication is upper or lower line when engine rpm is 1 200 r/min, slightly turn the throttle position sensor and bring the line to the middle.

Fail-Safe Function Table

B947H11104007

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
CMP sensor	When camshaft position signal has failed during running, the ECM determines the cylinder positions as # to be the same as before occurrence of such a failure.	"NO"	"YES"
		Motorcycle can run, but once engine stops, engine can not start.	
IAP sensor	Intake air pressure value 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). Cooling fan is fixed on position.	"YES"	"YES"
IAT sensor	Intake air temperature value is fixed to 40 °C (104 °F).	"YES"	"YES"
AP sensor	Atmospheric pressure is fixed to 101 kPa (760 mmHg).	"YES"	"YES"
Ignition signal	#1 fuel-cut (primary side and secondary side)	"YES"	"YES"
		#2, #3 & #4 cylinders can run.	
	#2 fuel-cut (primary side and secondary side)	"YES"	"YES"
		#1, #3 & #4 cylinders can run.	
	#3 fuel-cut (primary side and secondary side)	"YES"	"YES"
		#1, #2 & #4 cylinders can run.	
	#4 fuel-cut (primary side and secondary side)	"YES"	"YES"
		#1, #2 & #3 cylinders can run.	
Primary injection signal	—	"YES"	"YES"
		#2, #3 & #4 cylinders can run.	
	—	"YES"	"YES"
		#1, #3 & #4 cylinders can run.	
	—	"YES"	"YES"
		#1, #2 & #4 cylinders can run.	
	—	"YES"	"YES"
		#1, #2 & #3 cylinders can run.	
Secondary injection signal	—	—	"YES"
		#2, #3 & #4 cylinders can run.	
	—	—	"YES"
		#1, #3 & #4 cylinders can run.	
	—	—	"YES"
		#1, #2 & #4 cylinders can run.	
	—	—	"YES"
		#1, #2 & #3 cylinders can run.	
STV actuator	Secondary throttle valve is fixed to full close position. When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"
STP sensor	Secondary throttle valve is fixed to full open 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"
EXCV actuator	EXCV actuator is fixed to full open position. When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"
ISC valve	When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"

Item	Fail-Safe Mode	Starting Ability	Running Ability
EVAP system purge control solenoid valve (E-33 only)	ECM stops controlling EVAP system purge control solenoid valve.	"YES"	"YES"
Vehicle speed sensor	ECM stops controlling steering damper solenoid valve.	"YES"	"YES"
Steering damper solenoid valve	ECM stops controlling steering damper solenoid valve.	"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.

FI System Troubleshooting

B947H11104008

Customer Complaint Analysis

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 standard sample. The form should be modified according to conditions and characteristic of each market.

EXAMPLE: CUSTOMER PROBLEM INSPECTION FORM

User name:	**Model:**	**VIN:**	
Date of issue:	**Date Reg.:**	**Date of problem:**	**Mileage:**

Malfunction indicator light condition (LED)	**☐ Always ON / ☐ Sometimes ON / ☐ Always OFF / ☐ Good condition**
Malfunction display/code (LCD)	**User mode: ☐ No display / ☐ Malfunction display ( )**
	Dealer mode: ☐ No code / ☐ Malfunction code ( )

PROBLEM SYMPTOMS	
☐ Difficult Starting **☐ No cranking** **☐ No initial combustion** **☐ No combustion** **☐ Poor starting at** **(☐ cold / ☐ warm / ☐ always)** **☐ Other**	**☐ Poor Driveability** **☐ Hesitation on acceleration** **☐ Back fire / ☐ After fire** **☐ Lack of power** **☐ Surging** **☐ Abnormal knocking** **☐ Engine rpm jumps briefly** **☐ Other**
☐ Poor Idling **☐ Poor fast Idle** **☐ Abnormal idling speed** **(☐ High / ☐ Low) (r/min)** **☐ Unstable** **☐ Hunting (r/min to r/min)** **☐ Other**	**☐ Engine Stall when** **☐ Immediately after start** **☐ Throttle valve is opened** **☐ Throttle valve is closed** **☐ Load is applied** **☐ Other**
☐ OTHERS:	

MOTORCYCLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental condition	
Weather	**☐ Fair / ☐ Cloudy / ☐ Rain / ☐ Snow / ☐ Always / ☐ Other**
Temperature	**☐ Hot / ☐ Warm / ☐ Cool / ☐ Cold (°C / °F) / ☐ Always**
Frequency	**☐ Always / ☐ Sometimes (times / day, month) / ☐ Only once**
	☐ Under certain condition
Road	**☐ Urban / ☐ Suburb / ☐ Highway / ☐ Mountainous (☐ Uphill / ☐ Downhill)**
	☐ Tarmacadam / ☐ Gravel / ☐ Other
Motorcycle condition	
Engine condition	**☐ Cold / ☐ Warming up phase / ☐ Warmed up / ☐ Always / ☐ Other at starting**
	☐ Immediately after start / ☐ Racing without load / ☐ Engine speed (r/min)
Motorcycle condition	**During driving: ☐ Constant speed / ☐ Accelerating / ☐ Decelerating**
	☐ Right hand corner / ☐ Left hand corner
	☐ At stop / ☐ Motorcycle speed when problem occurs (km/h, mile/h)
	☐ Other:

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-10).
- 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-10).
- Clogged air cleaner element. Refer to “Air Cleaner Element Inspection” in Section 0B (Page 0B-3).
- Battery condition.
- Throttle cable play. Refer to “Throttle Cable Play Inspection and Adjustment” in Section 0B (Page 0B-12).
- Vacuum hose looseness, bend and disconnection.
- Broken fuse.
- FI indicator light operation. Refer to “Combination Meter Inspection” in Section 9C (Page 9C-3).
- Each warning indicator light operation. Refer to “Combination Meter Inspection” in Section 9C (Page 9C-3).
- Speedometer operation. Refer to “Speedometer Inspection” in Section 9C (Page 9C-5).
- Exhaust gas leakage and noise. Refer to “Exhaust System Inspection” in Section 1K (Page 1K-13).
- Each coupler disconnection.
- Clogged radiator fins. Refer to “Radiator Inspection and Cleaning” in Section 1F (Page 1F-5).

Malfunction Code and Defective Condition Table

B947H11104009

Malfunction Code		Detected Item	Detected Failure Condition	Check For
C00		NO FAULT	—	—
C11		CMP sensor	The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	CMP sensor wiring and mechanical parts CMP sensor, intake cam pin, wiring/coupler connection
P0340				
C12		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
P0335				
C13		IAP sensor	The sensor should produce following voltage. 0.5 V ≤ Sensor voltage < 4.85 V In other than the above range, C13 (P0105) is indicated.	IAP sensor, lead wire/coupler connection
P0105	H		Sensor voltage is higher than specified value.	IAP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	IAP sensor circuit open or shorted to ground or VCC circuit open
C14		TP sensor	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
P0120	H		Sensor voltage is higher than specified value.	TP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TP sensor circuit open or shorted to ground or VCC circuit open
C15		ECT sensor	The sensor voltage should be the following. 0.15 V ≤ Sensor voltage < 4.85 V In other than the above range, C15 (P0115) is indicated.	ECT sensor, lead wire/coupler connection
P0115	H		Sensor voltage is higher than specified value.	ECT sensor circuit open or ground circuit open
	L		Sensor voltage is lower than specified value.	ECT sensor circuit shorted to ground
C21		IAT sensor	The sensor voltage should be the following. 0.15 V ≤ Sensor voltage < 4.85 V In other than the above range, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection
P0110	H		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 ground
C22		AP sensor	The sensor voltage should be the following. 0.5 V ≤ Sensor voltage < 4.85 V In other than the above range, C22 (P1450) is indicated.	AP sensor, lead wire/coupler connection
P1450	H		Sensor voltage is higher than specified value.	AP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	AP sensor circuit open or shorted to ground or VCC circuit open

Malfunction Code		Detected Item	Detected Failure Condition	Check For
C23		TO sensor	The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V ≤ Sensor voltage < 4.8 V In other than the above value, C23 (P1651) is indicated.	TO sensor, lead wire/coupler connection
P1651	H		Sensor voltage is higher than specified value.	TO sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TO sensor circuit open or shorted to ground or VCC circuit open
C24/C25 C26/C27		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
P0351/P0352 P0353/P0354				
C28		STV 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 properly or its motor locked.	STVA motor, STVA lead wire/ coupler connection
P1655				
C29		STP sensor	The sensor should produce following voltage. 0.15 V ≤ Sensor voltage < 4.85 V In other than the above range, C29 (P1654) is indicated.	STP sensor, lead wire/coupler connection
P1654	H		Sensor voltage is higher than specified value.	STP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	STP sensor circuit open or shorted to 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.
P0705				
C32/C33 C34/C35		Primary fuel injector	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.	Primary fuel injector, wiring/ coupler connection, power supply to the injector
P0201/P0202 P0203/P0204				
C36/C37 C38/C39		Secondary fuel injector	Some failure exists in the fuel injector signal in a high load, high revolution condition. In this case, the code C36 (P1764), C37 (P1765), C38 (P1766) or C39 (P1767) is indicated.	Secondary fuel injector, wiring/ coupler connection, power supply to the injector
P1764/P1765 P1766/P1767				
C40/P0505		ISC valve	The circuit voltage of motor drive is unusual.	ISC valve circuit open or shorted to ground Power source circuit open
C40/P0506			Idle speed is lower than the desired idle speed.	Air passage clogged ISC valve is fixed ISC valve preset position is incorrect
C40/P0507			Idle speed is higher than the desired idle speed.	ISC valve hose connection ISC valve is fixed ISC valve preset position is incorrect

Malfunction Code		Detected Item	Detected Failure Condition	Check For
C41		FP relay	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	H		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)
	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/P2505		ECM/PCM power input signal	No voltage is applied to the ECM.	Lead wire/coupler connection of ECM terminal to fuel fuse
C42		Ignition switch	Ignition switch signal is not input to the ECM. * When the I.D. agreement is not verified. * ECM does not receive communication signal from the immobilizer antenna.	Ignition switch, lead wire/ coupler, etc. * Immobilizer/anti-theft system
P1650				
C44/P0130		HO2 sensor	HO2 sensor output voltage is not input to ECM during engine operation and running condition. (Sensor voltage > 1.0 V) C44 (P0130) is indicated.	HO2 sensor is circuit open or shorted to the power source
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 ground Battery voltage supply to the HO2 sensor
C46		EXCV actuator	EXCVA position sensor produces following voltage. 0.14 V ≤ sensor voltage < 4.9 V In other than the above range, C46 (P1675) is indicated. When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or operation voltage does not reach EXCVA motor, C46 (P1658) is indicated. EXCVA can not operate.	EXCVA, EXCVA lead wire/ coupler
P1657	H		EXCVA position sensor voltage is higher than specified value.	EXCVA position sensor circuit shorted to VCC or ground circuit open
	L		EXCVA position sensor voltage is lower than specified value.	EXCVA position sensor circuit open or shorted to ground or VCC circuit open
P1658			When no operation voltage reaches EXCVA motor, C46 (P1658) is indicated. EXCVA motor can not be operated.	EXCVA, EXCVA motor lead wire/coupler
C49		PAIR control solenoid valve	PAIR control solenoid valve voltage is not input to ECM.	PAIR control solenoid valve, lead wire/coupler connection
P1656				
C60		Cooling fan relay	Cooling fan relay signal is not input to ECM.	Cooling fan relay, lead wire/ coupler connection
P0480				
C62		EVAP system purge control solenoid valve (E-33 only)	EVAP system purge control solenoid valve voltage is not input to ECM.	EVAP system purge control solenoid valve, lead wire/ coupler connection
P0443				

Malfunction Code		Detected Item	Detected Failure Condition	Check For
C91		Vehicle speed sensor	Speedometer does not receive signal from the vehicle speed sensor for more than 6 sec. when the motorcycle is running. ECM does not receive signal from the vehicle speed sensor for more than 6 sec. when the motorcycle is running. Failure in communication between ECM and speedometer with reference to vehicle speed.	Speed sensor and speedometer wiring/coupler connection between ECM and speedometer
P0500				
C93		Steering damper solenoid valve	Steering damper control current does not flow to the solenoid valve. With IG turned ON, ECM detects a failure of internal circuit element. Solenoid current does not converge to the target value. Battery voltage is 10 V or below with the engine running.	Steering damper solenoid valve circuit interrupter element shorted, feedback current convergence failure, low battery voltage
P1769	H		Steering damper control current is higher than specified value. An abnormal current is detected during the vehicle standstill. Solenoid current is 0.7 A or above.	Steering damper solenoid valve circuit shorted to VCC
	L		Steering damper control current is lower than specified value. With IG turned ON, ECM detects a discontinuity. An abnormal current is detected during the vehicle standstill.	Steering damper solenoid valve circuit open or shorted

* : Immobilizer system equipped model only. (E-02, 19, 24, 51)

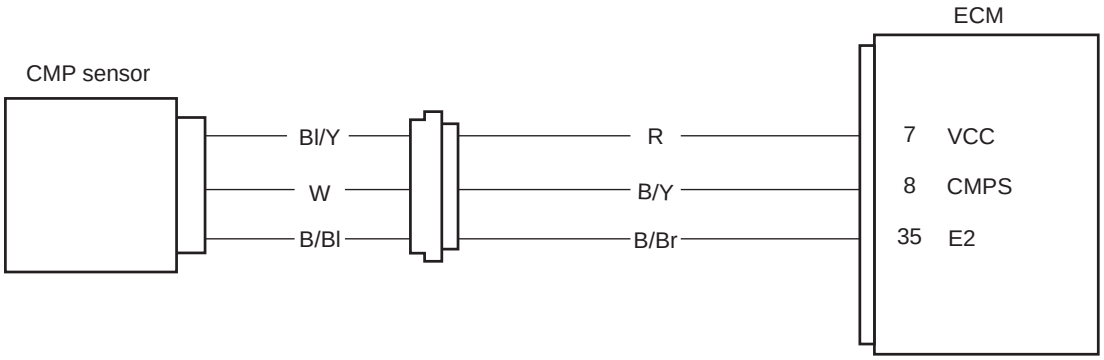
DTC “C11” (P0340): CMP Sensor Circuit Malfunction

B947H11104010

Detected Condition and Possible Cause

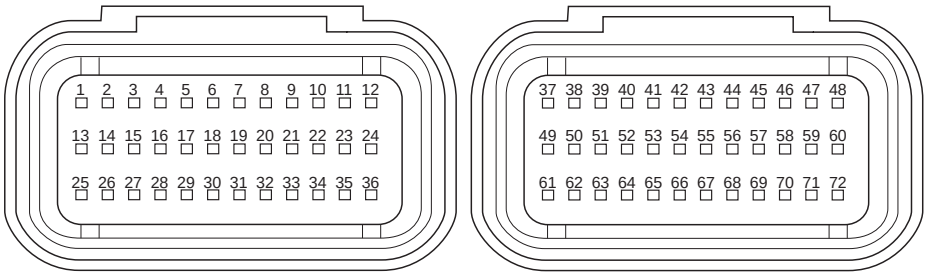
Detected Condition	Possible Cause
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• CMP sensor circuit open or short. • CMP sensor malfunction. • ECM malfunction.

Wiring Diagram



I837H1110006-01

ECM coupler (Harness side)



I837H1110007-02

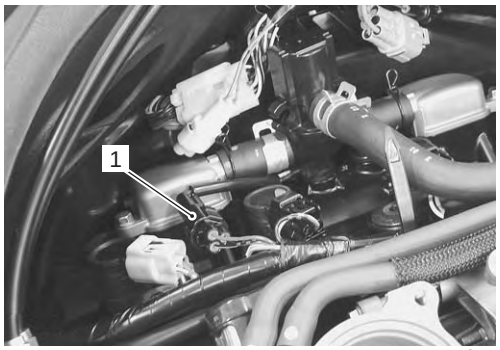
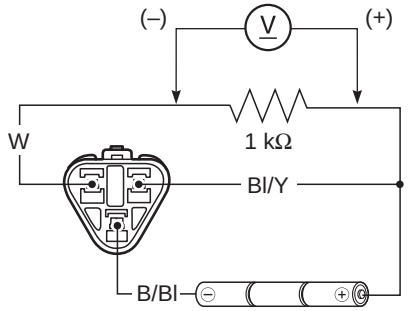
Troubleshooting

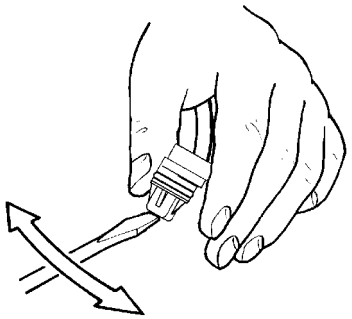
⚠ CAUTION

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

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	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) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7). 4) Check the CMP sensor coupler (1) for loose or poor contacts. If OK, remove the CMP sensor. Refer to “CMP Sensor Removal and Installation” in Section 1C (Page 1C-2).  I947H1110010-01 5) Connect 3 new 1.5 V batteries in series, 1 kΩ resistor and the multi-circuit tester as shown in the figure. **Special tool** **TOOL : 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)**  I823H1110005-04	• B/Y, R or B/Br wire open or shorted to ground. • Loose or poor contacts on the CMP sensor coupler or ECM coupler (Terminal “7”, “8” or “35”). • If wires 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.	• Inspect that metal particles or foreign material stuck on the CMP sensor and camshaft tip. • If there are no metal particles and foreign material, then replace the CMP sensor with a new one.

Step	Action	Yes	No
1	6) Under this condition, if a suitable screwdriver touching the pick-up surface of the CMP sensor is moved, the tester reading voltage changes (0.8 V and less ↔ 4.3 V and more).  I823H1110007-01 *Is the voltage OK?*	• B/Y, R or B/Br wire open or shorted to ground. • Loose or poor contacts on the CMP sensor coupler or ECM coupler (Terminal “7”, “8” or “35”). • If wires 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.	• Inspect that metal particles or foreign material stuck on the CMP sensor and camshaft tip. • If there are no metal particles and foreign material, then replace the CMP sensor with a new one.

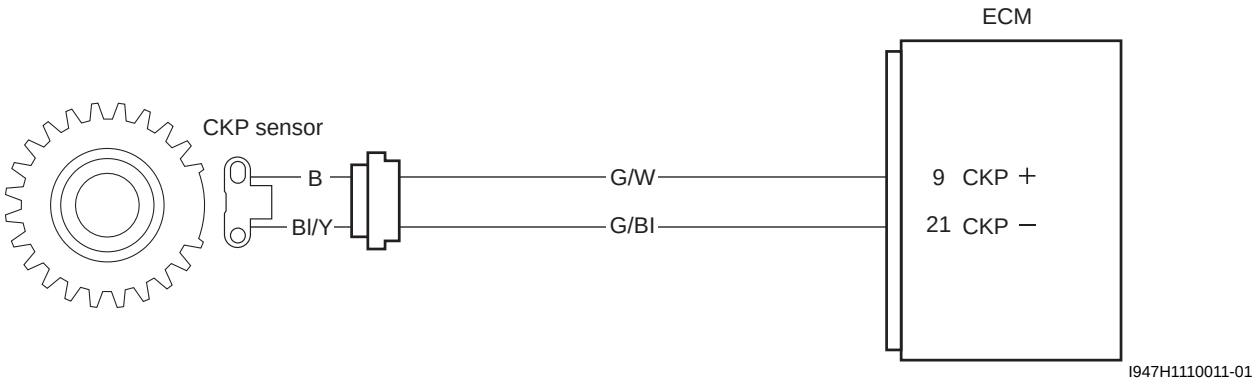
DTC “C12” (P0335): CKP Sensor Circuit Malfunction

B947H11104011

Detected Condition and Possible Cause

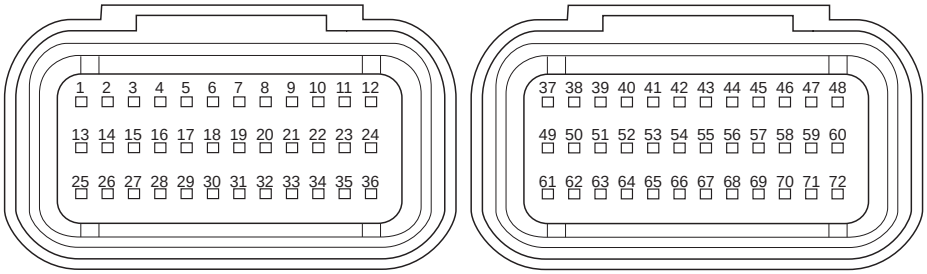
Detected Condition	Possible Cause
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• Metal particles or foreign material being stuck on the CKP sensor and rotor tip. • CKP sensor circuit open or short. • CKP sensor malfunction. • ECM malfunction.

Wiring Diagram



I947H1110011-01

ECM coupler (Harness side)



I837H1110007-02

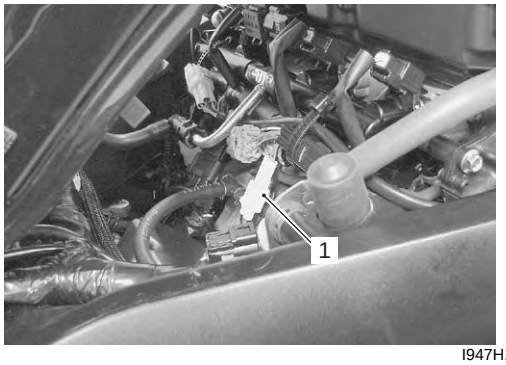
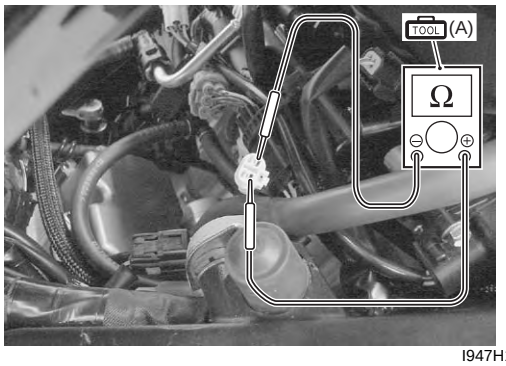
Troubleshooting

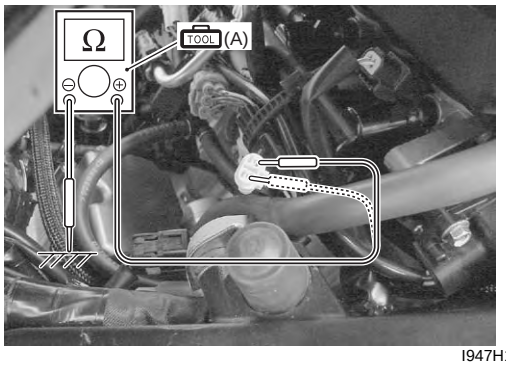
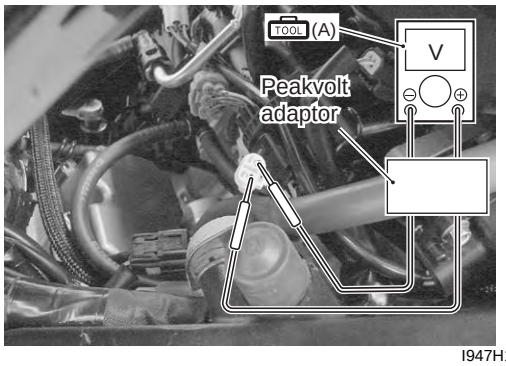
⚠ CAUTION

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

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	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 CKP sensor coupler (1) for loose or poor contacts. If OK, then measure the CKP sensor resistance.  I947H1110012-01 4) Disconnect the CKP sensor coupler and measure the CKP sensor resistance. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **CKP sensor resistance** **142 – 194 Ω (B – Bl/Y)**  I947H1110013-01	Go to Step 2.	Replace the CKP sensor with a new one.

Step	Action	Yes	No
1	5) If OK, then check the continuity between each terminal and ground. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **CKP sensor continuity** **∞ Ω (Infinity) (B – Ground, Bl/Y– Ground)**  I947H1110014-01 *Are the resistance and continuity OK?*	Go to Step 2.	Replace the CKP sensor with a new one.
2	1) Crank the engine several seconds with the starter motor, and measure the CKP sensor peak voltage at the coupler. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **CKP sensor peak voltage** **0.5 V and more** **((+) terminal: B – (–) terminal: Bl/Y)**  I947H1110015-01 2) Repeat the 1) test procedures several times and measure the highest peak voltage. *Is the voltage OK?*	• B or Bl/Y wire of the harness side open or shorted to ground. • Loose or poor contacts on the CKP sensor coupler or ECM coupler (Terminal “9” or “21”). • If the wires 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).	• Inspect that metal particles or foreign material stuck on the CKP sensor and rotor tip. • If there are no metal particles and foreign material, then replace the CKP sensor with a new one. Refer to “CKP Sensor Removal and Installation” in Section 1C (Page 1C-2).

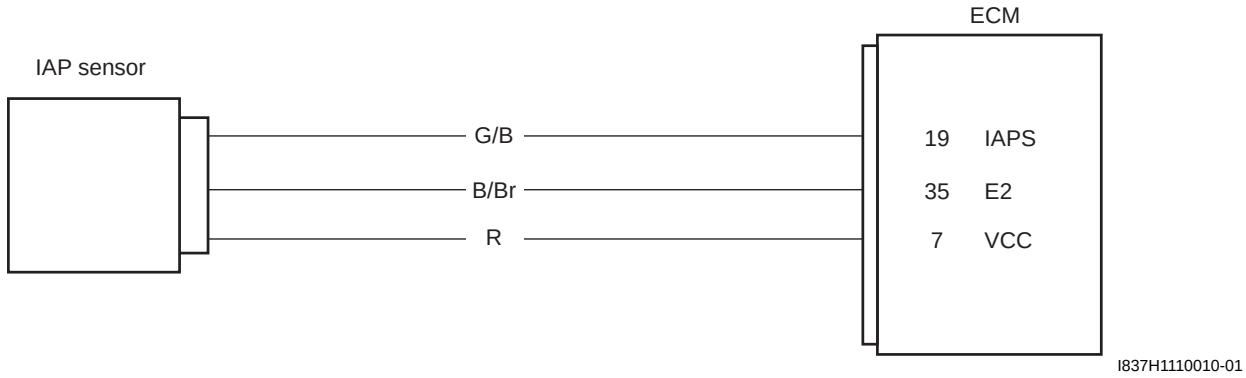
DTC “C13” (P0105-H/L): IAP Sensor Circuit Malfunction

B947H11104012

Detected Condition and Possible Cause

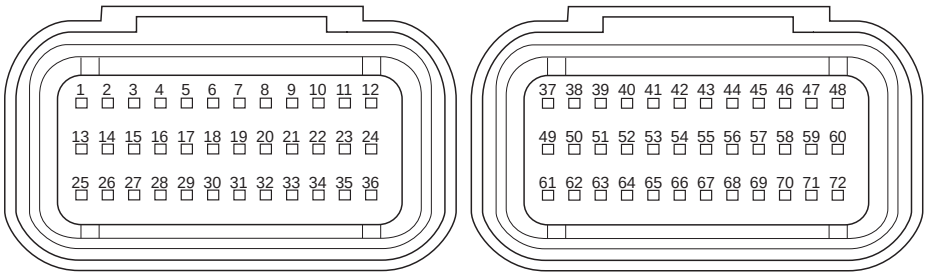
Detected Condition			Possible Cause
C13		IAP sensor voltage is not within the following range. 0.5 V ≤ Sensor voltage < 4.85 V **NOTE** **Note that atmospheric pressure varies depending on weather conditions as well as altitude. Take that into consideration when inspecting voltage.**	• Clogged vacuum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

Wiring Diagram



I837H1110010-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

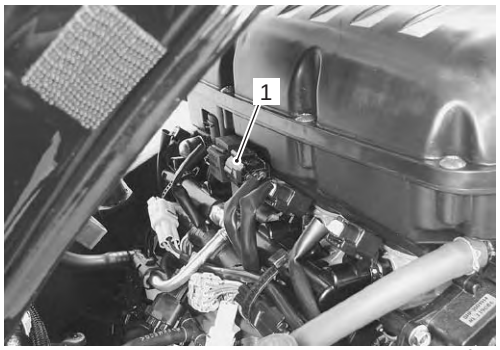
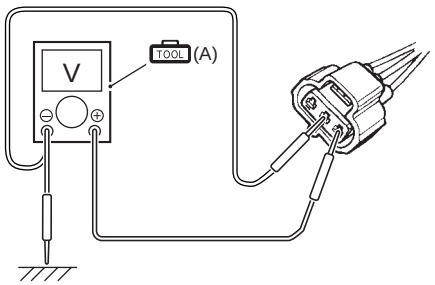
⚠ CAUTION

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

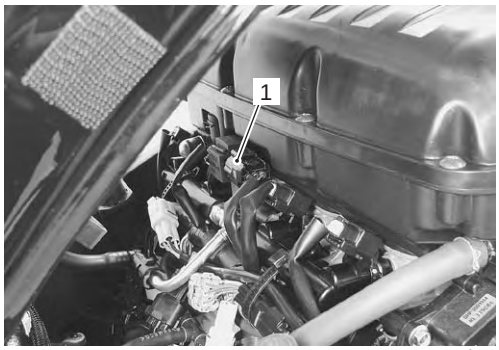
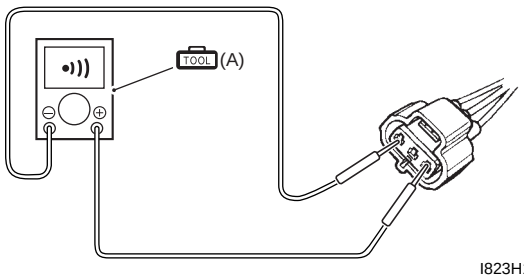
NOTE

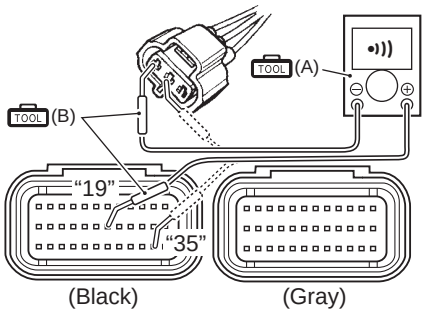
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

C13 (Use of mode select switch)

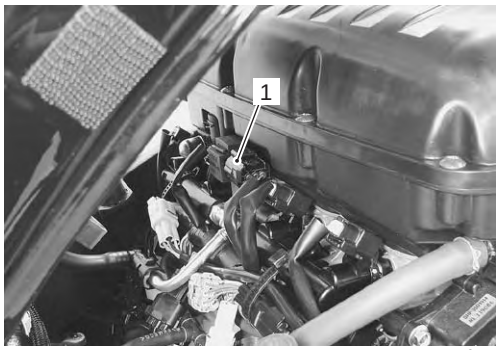
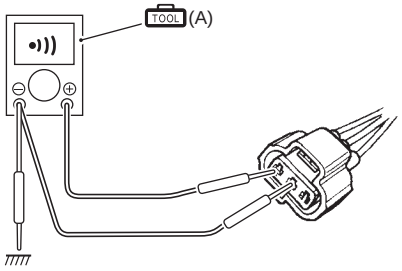
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9). 3) Check the IAP sensor coupler (1) for loose or poor contacts. If OK, then measure the IAP sensor input voltage.  I947H1110016-01 4) Disconnect the IAP sensor coupler. 5) Turn the ignition switch ON. 6) Measure the input voltage between the R wire and ground. If OK, then measure the voltage between the R wire and B/Br wire. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **IAP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I823H1110016-05 *Is the voltage OK?*	Go to Step 3.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the R or B/Br wire.

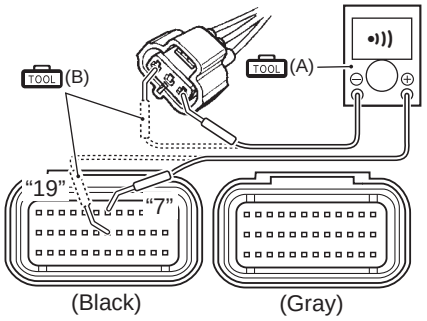
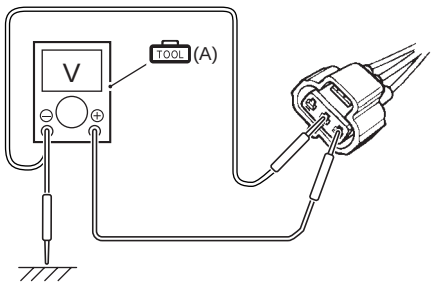
P0105-H for IAP sensor (Use of SDS)

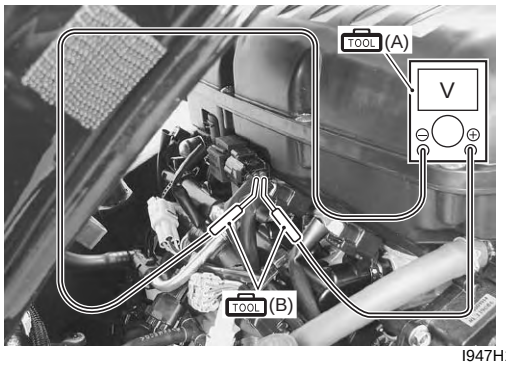
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9). 3) Check the IAP sensor coupler (1) for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.  I947H1110017-01 4) Disconnect the IAP sensor coupler. 5) Check the continuity between the R wire and G/B wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•))))**  I823H1110017-05 6) Disconnect the ECM couplers. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1). 7) Insert the needle pointed probes to the lead wire coupler.	Go to Step 3.	G/B wire shorted to VCC, or B/Br wire open.

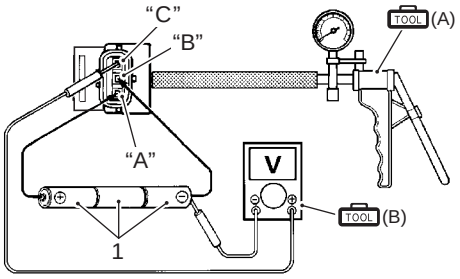
Step	Action	Yes	No
1	8) Check the continuity between the G/B wire and terminal “19”. If OK, then check the continuity between the B/Br wire and terminal “35”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•)))** **ECM couplers (Harness side)**  I837H1110017-01 *Is the continuity OK?*	Go to Step 3.	G/B wire shorted to VCC, or B/Br wire open.

P0105-L for IAP sensor (Use of SDS)

Step	Action	Yes	No
1	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 (1) for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.  I947H1110018-01 4) Disconnect the IAP sensor coupler. 5) Check the continuity between the G/B wire and ground. Also, check the continuity between the G/B wire and B/Br wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•)))**  I823H1110019-02 6) Disconnect the ECM couplers. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1). 7) Insert the needle pointed probes to the lead wire coupler.	Go to Step 2.	R and G/B wire open, G/B wire shorted to ground.

Step	Action	Yes	No
1	8) Check the continuity between the R wire and terminal “7”. Also, check the continuity between the G/B wire and terminal “19”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity (•)))** **ECM couplers (Harness side)**  I837H1110019-02 *Is the continuity OK?*	Go to Step 2.	R and G/B wire open, G/B wire shorted to ground.
2	1) Connect the ECM couplers. 2) Turn the ignition switch ON. 3) Measure the input voltage between the R wire and ground. If OK, then measure the voltage between the R wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **IAP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I823H1110016-05 *Is the voltage OK?*	Go to Step 3.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the R or B/Br wire.

Step	Action	Yes	No
3	1) Turn the ignition switch OFF. 2) Connect the ECM couplers and IAP sensor coupler. 3) Insert the needle pointed probes to the lead wire coupler. 4) Run the engine at idle speed and measure the IAP sensor output voltage between the G/B wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **IAP sensor output voltage** **Approx. 2.7 V at idle speed** **((+) terminal: G/B – (–) terminal: B/Br)**  I947H1110020-01 *Is the voltage OK?*	Go to Step 4.	• Check the vacuum hose for crack or damage. • Open or short circuit in the G/B wire. • If vacuum hose and wire are OK, replace the IAP sensor with a new one. Refer to "IAP Sensor Removal and Installation" in Section 1C (Page 1C-2).

<table>
<tr><th>Step</th><th>Action</th><th>Yes</th><th>No</th></tr>
<tr>
<td>4</td>
<td>1) Turn the ignition switch OFF.
2) Remove the IAP sensor. Refer to “IAP Sensor Removal and Installation” in Section 1C (Page 1C-2).
3) Connect the vacuum pump gauge to the vacuum port of the IAP sensor.
4) Arrange 3 new 1.5 V batteries (1) in series (check that total voltage is 4.5 – 5.0 V) and connect (–) terminal to the ground terminal “B” and (+) terminal to the VCC terminal “A”.
5) Check the voltage between Vout terminal “C” and ground. Also, check if voltage reduces when vacuum is applied by using vacuum pump gauge.
Special tool
TOOL (A): 09917–47011 (Vacuum pump gauge set)
TOOL (B): 09900–25008 (Multi circuit tester set)
<u>Tester knob indication</u>
Voltage (⎓)
 

I718H1110030-02
<table>
<tr><th colspan="2">ALTITUDE (Reference)</th><th colspan="2">ATOMOSPHERIC PRESSURE</th><th>OUTPUT VOLTAGE</th></tr>
<tr><th>m</th><th>ft</th><th>kPa</th><th>mmHg</th><th>V</th></tr>
<tr><td>0 – 610</td><td>0 – 2 000</td><td>100 – 94</td><td>760 – 707</td><td>3.1 – 3.6</td></tr>
<tr><td>611 – 1 524</td><td>2 001 – 5 000</td><td>94 – 85</td><td>707 – 634</td><td>2.8 – 3.4</td></tr>
<tr><td>1 525 – 2 438</td><td>5 001 – 8 000</td><td>85 – 76</td><td>634 – 567</td><td>2.6 – 3.1</td></tr>
<tr><td>2 439 – 3 048</td><td>8 001 – 10 000</td><td>76 – 70</td><td>567 – 526</td><td>2.4 – 2.9</td></tr>
</table>
I823H1110023-02

Is the voltage OK?</td>
<td>• G/B, R or B/Br wire open or shorted to ground, or poor “19”, “7” or “35” connection.
• 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).</td>
<td>If check result is not satisfactory, replace the IAP sensor with a new one. Refer to “IAP Sensor Removal and Installation” in Section 1C (Page 1C-2).</td>
</tr>
</table>

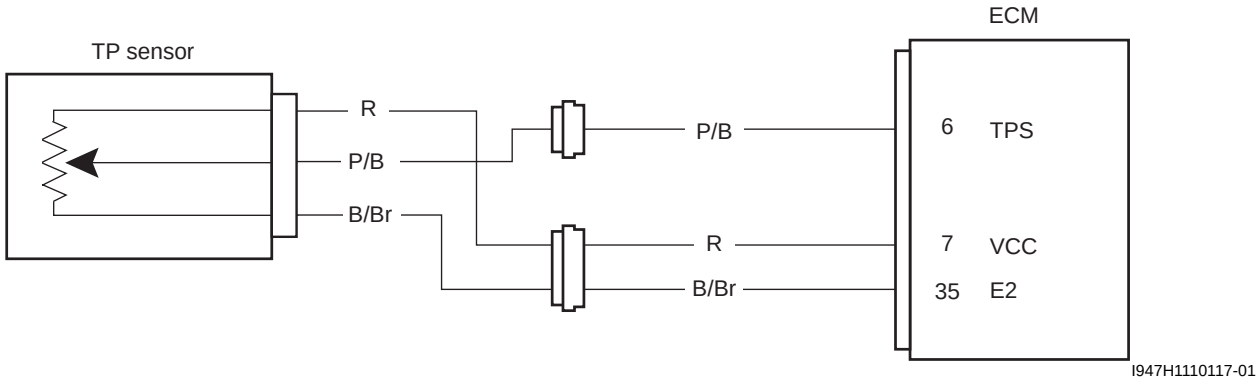
DTC “C14” (P0120-H/L): TP Sensor Circuit Malfunction

B947H11104013

Detected Condition and Possible Cause

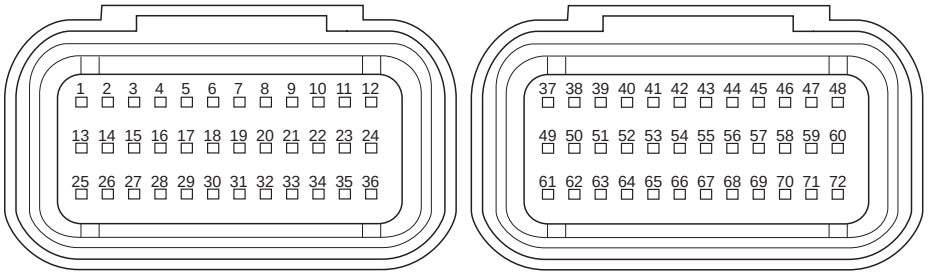
Detected Condition			Possible Cause
C14		Output voltage is not within the following range. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. 0.2 V ≤ Sensor voltage < 4.8 V	• TP sensor maladjusted. • TP sensor circuit open or short. • TP sensor malfunction.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

Wiring Diagram



I947H1110117-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

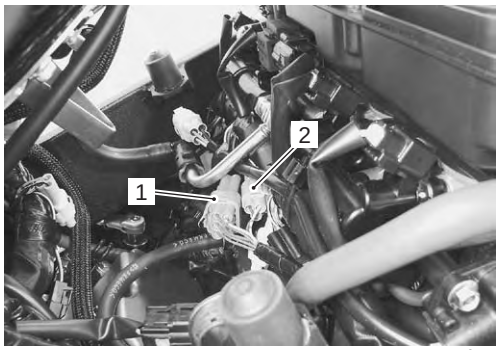
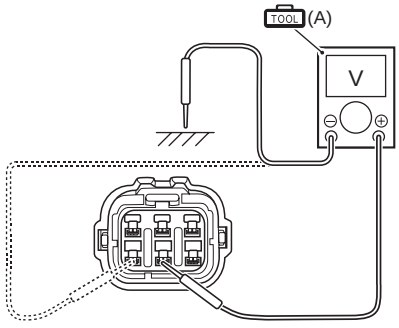
⚠ CAUTION

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

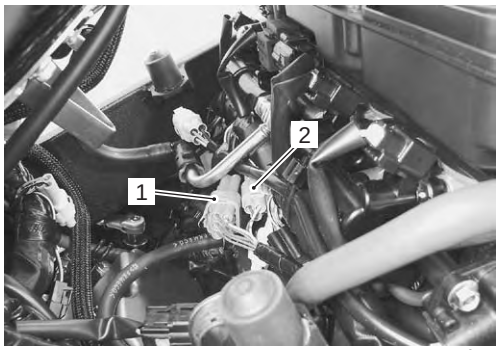
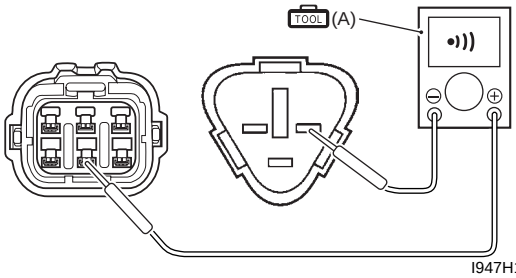
NOTE

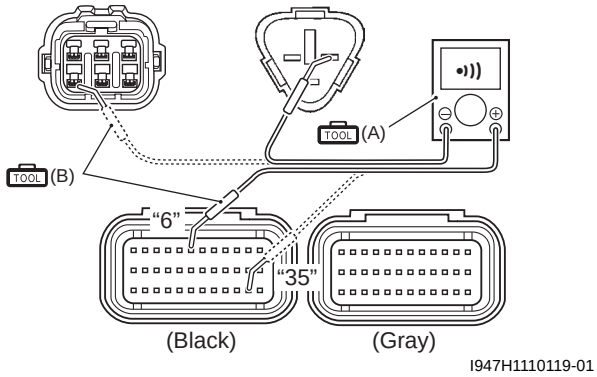
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

C14 (Use of mode select switch)

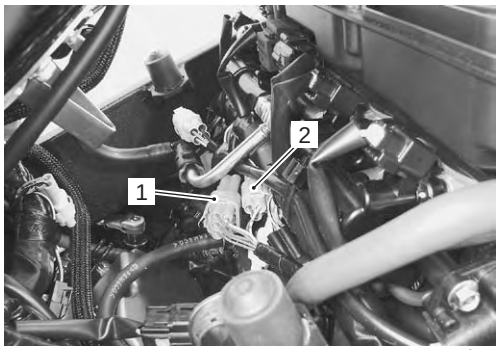
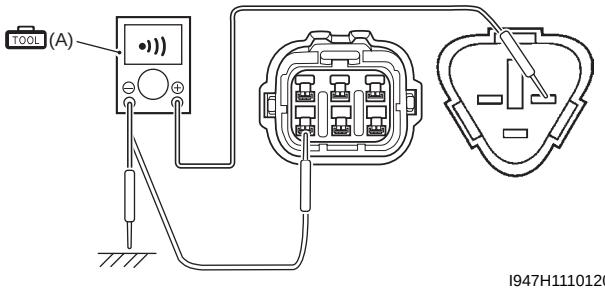
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9). 3) Check the TP sensor couplers (1) and (2) for loose or poor contacts. If OK, then measure the TP sensor input voltage.  I947H1110021-02 4) Disconnect the TP sensor coupler (1). 5) Turn the ignition switch ON. 6) Measure the input voltage between the R wire and ground. Also, measure the voltage between the R wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **TP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I947H1110045-01 *Is the voltage OK?*	Go to Step 3.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the R wire or B/Br wire.

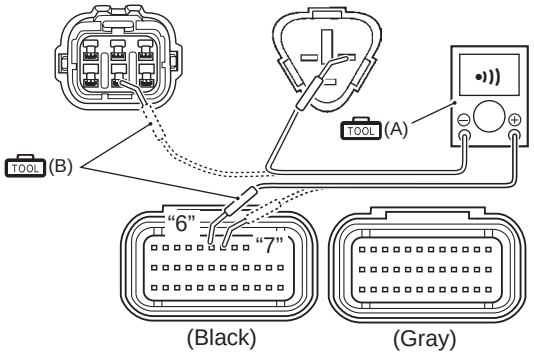
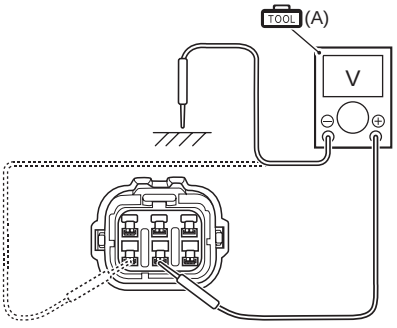
P0120-H (Use of SDS)

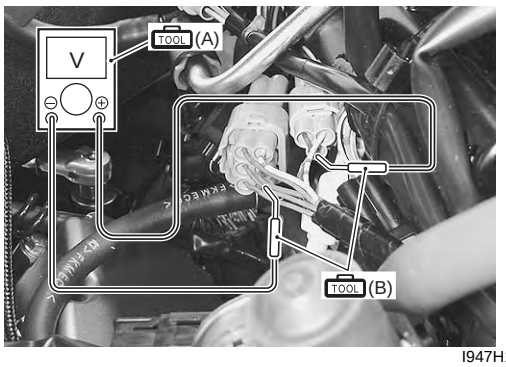
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9). 3) Check the TP sensor couplers (1) and (2) for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  I947H1110022-02 4) Disconnect the TP sensor couplers (1) and (2). 5) 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** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•)))**  I947H1110118-01 6) Disconnect the ECM couplers. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1).	Go to Step 3.	P/B wire shorted to VCC, or B/Br wire open.

Step	Action	Yes	No
1	7) Check the continuity between the P/B wire and terminal “6”. Also, check the continuity between the B/Br wire and terminal “35”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•)))** **ECM couplers (Harness side)**  I947H1110119-01 *Is the continuity OK?*	Go to Step 3.	P/B wire shorted to VCC, or B/Br wire open.

P0120-L (Use of SDS)

Step	Action	Yes	No
1	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 TP sensor couplers (1) and (2) for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  I947H1110023-02 4) Disconnect the TP sensor couplers (1) and (2). 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. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity test (•)))**  I947H1110120-01 6) Disconnect the ECM couplers. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1).	Go to Step 2.	R or P/B wire open, or Y/W wire shorted to ground.

Step	Action	Yes	No
1	7) Check the continuity between the P/B wire and terminal “6”. Also, check the continuity between the R wire and terminal “7”. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•))))** **ECM couplers (Harness side)**  I947H1110121-02 *Is the continuity OK?*	Go to Step 2.	R or P/B wire open, or Y/W wire shorted to ground.
2	1) Connect the ECM couplers. 2) Turn the ignition switch ON. 3) Measure the input voltage between the R wire and ground. Also, measure the input voltage between the R wire and B/Br wire. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **TP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I947H1110122-01 *Is the voltage OK?*	Go to Step 3.	Open or short circuit in the R or B/Br wire.

Step	Action	Yes	No
3	1) Turn the ignition switch OFF. 2) Connect the ECM couplers and TP sensor couplers. 3) Insert the needle point probes to the lead wire coupler. 4) Turn the ignition switch ON. 5) Measure the TP sensor output voltage between the P/B wire (+) and B/Br wire (–) with turning the throttle grip open and close. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **TP sensor output voltage** **Throttle valve is closed: Approx. 1.1 V** **Throttle valve is opened: Approx. 4.4 V** **((+) terminal: P/B – (–) terminal: B/Br)**  I947H1110123-01 *Is the voltage OK?*	• P/B, R or B/Br wire open or shorted to ground, or poor “6”, “7” or “35” connection. • 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).	If check result is not satisfactory, replace TP sensor with a new one. Refer to “Throttle Body Disassembly and Assembly” in Section 1D (Page 1D-11).

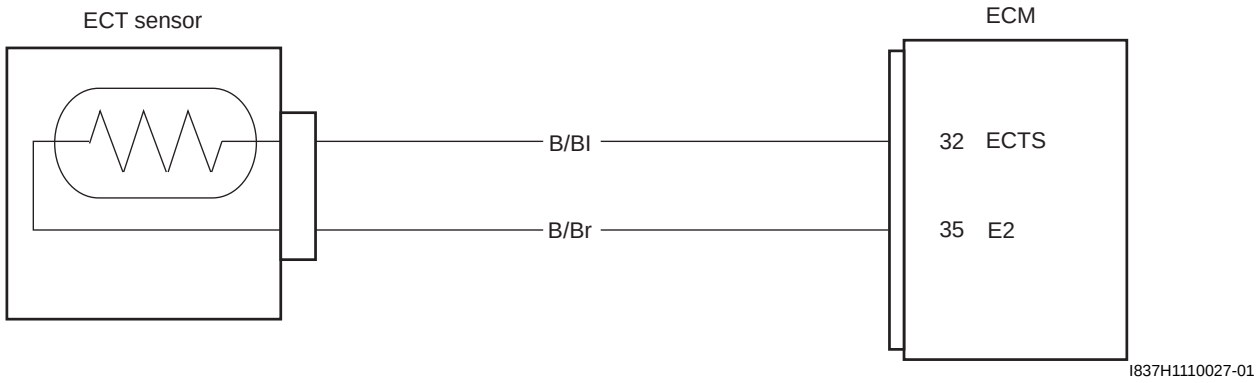
DTC “C15” (P0115-H/L): ECT Sensor Circuit Malfunction

B947H11104014

Detected Condition and Possible Cause

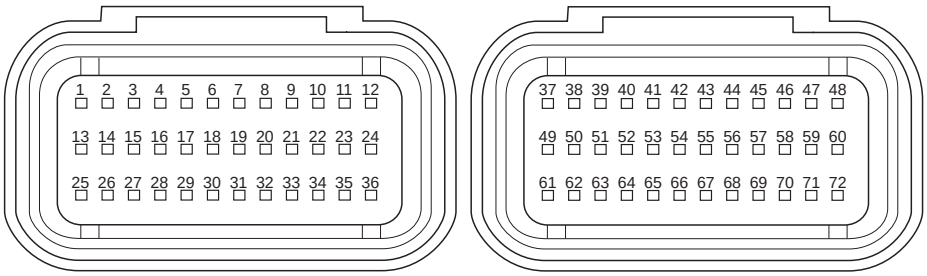
Detected Condition			Possible Cause
C15		Output voltage is not with in the following range. 0.15 V ≤ Sensor voltage < 4.85 V	• ECT sensor circuit open or short. • ECT sensor malfunction. • ECM malfunction.
P0115	H	Sensor voltage is higher than specified value.	• ECT sensor circuit is open or ground circuit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

Wiring Diagram



I837H1110027-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

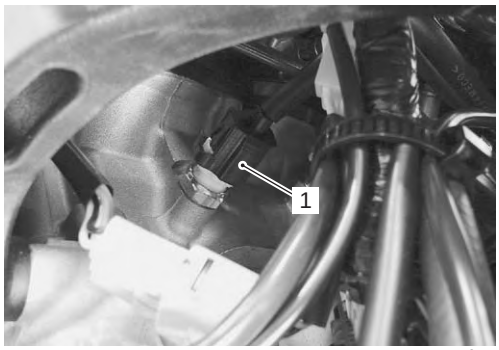
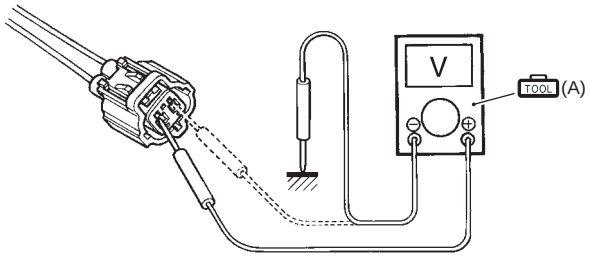
⚠ CAUTION

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

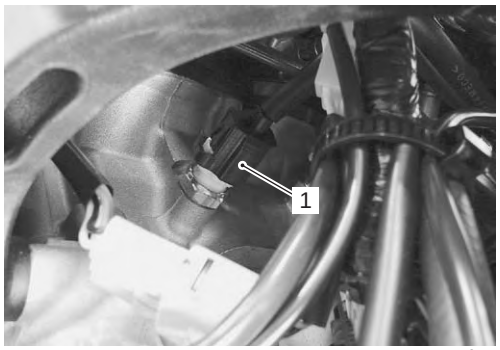
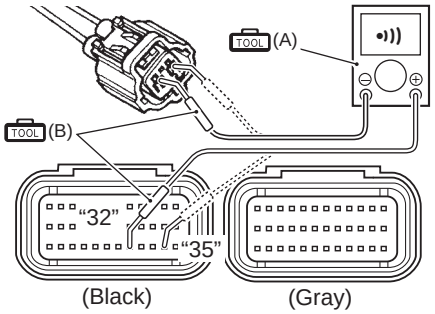
NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

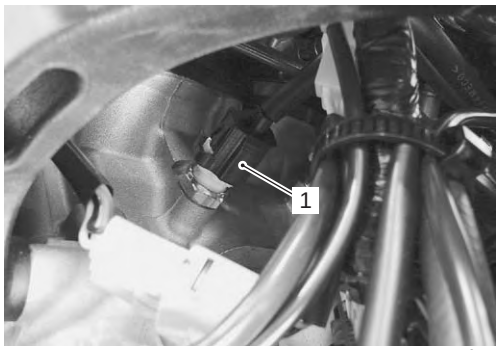
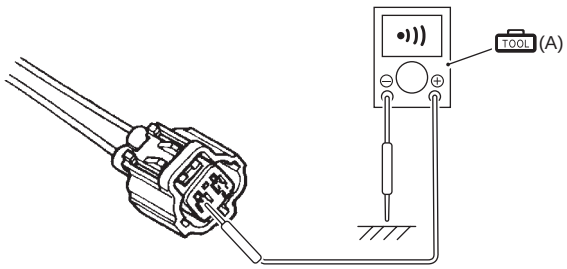
C15 (Use of mode select switch)

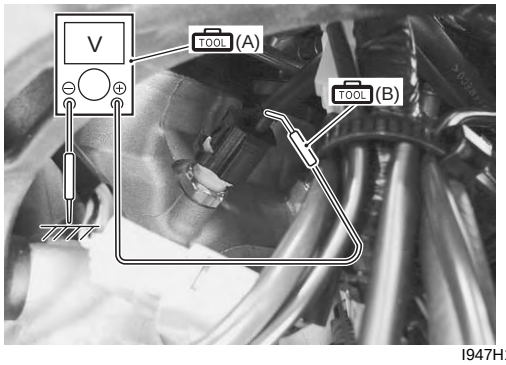
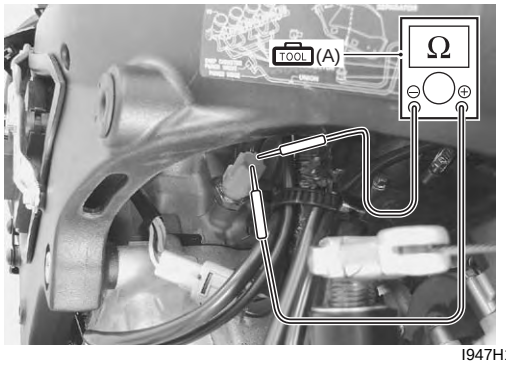
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the ECT sensor coupler (1) for loose or poor contacts. If OK, then measure the ECT sensor input voltage.  I947H1110114-01 4) Disconnect the ECT coupler and turn the ignition switch ON. 5) Measure the input voltage between the B/Bl wire and ground. If OK, then measure the input voltage between the B/Bl wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **ECT sensor input voltage** **4.5 – 5.5 V** **((+) terminal: B/Bl – (–) terminal: Ground, (+) terminal: B/Bl – (–) terminal: B/Br)**  I718H1110048-03 *Is the voltage OK?*	Go to Step 2.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the B/Bl or B/Br wire.

P0115-H (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the ECT sensor coupler (1) for loose or poor contacts. If OK, then check the ECT sensor lead wire continuity.  I947H1110115-01 4) Disconnect the ECT sensor coupler. 5) Disconnect the ECM coupler. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1). 6) Insert the needle pointed probes to the lead wire coupler. 7) Check the continuity between the B/Bl wire and terminal “32”. Also, check the continuity between the B/Br wire and terminal “35”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•))))** **ECM couplers (Harness side)**  I837H1110030-01 *Is the continuity OK?*	Go to Step 2.	B/Bl or B/Br wire open.

P0115-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the ECT sensor coupler (1) for loose or poor contacts. If OK, then check the ECT sensor lead wire continuity.  I947H1110116-01 4) Disconnect the ECT sensor coupler. 5) Check the continuity between the B/Bl wire and ground. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity test (•))))**  I718H1110054-03 6) Connect the ECT sensor coupler. 7) Insert the needle pointed probes to the lead wire coupler. 8) Turn the ignition switch ON.	Go to Step 2.	• B/Bl wire shorted to ground. • If wire is OK, go to Step 2.

Step	Action	Yes	No
1	9) Measure the output voltage between the B/Bl wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **ECT sensor output voltage** **0.15 – 4.85 V** **((+) terminal: B/Bl – (–) terminal: Ground)**  I947H1110024-01 *Are the continuity and voltage OK?*	Go to Step 2.	• B/Bl wire shorted to ground. • If wire is OK, go to Step 2.
2	1) Turn the ignition switch OFF. 2) Disconnect the ECT sensor coupler. 3) Measure the ECT sensor resistance. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **ECT sensor resistance** **Approx. 2.45 kΩ at 20 °C (68 °F)** **(Terminal – Terminal)**  I947H1110025-01 **NOTE** **Refer to “ECT Sensor Inspection” in Section 1C (Page 1C-4) for details.** *Is the resistance OK?*	• B/Bl or B/Br wire open or shorted to ground, or poor “32” or “35” connection. • 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).	Replace the ECT sensor with a new one. Refer to “ECT Sensor Removal and Installation” in Section 1C (Page 1C-4).

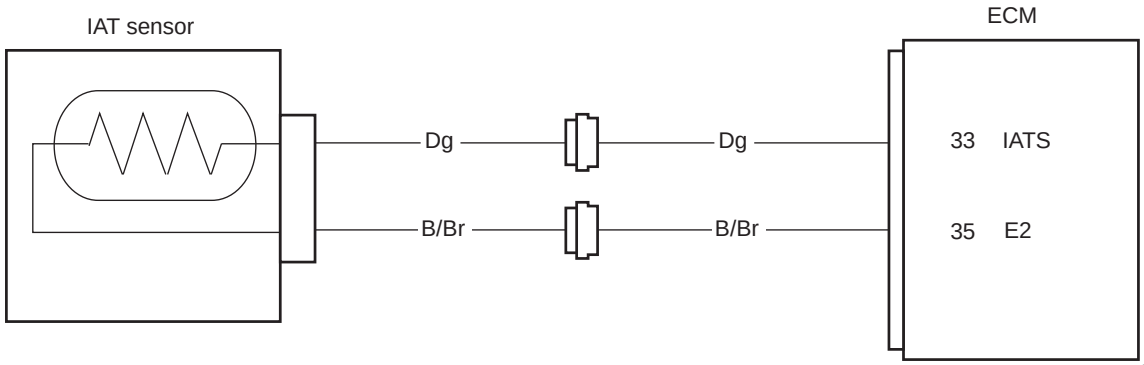
DTC “C21” (P0110-H/L): IAT Sensor Circuit Malfunction

B947H11104015

Detected Condition and Possible Cause

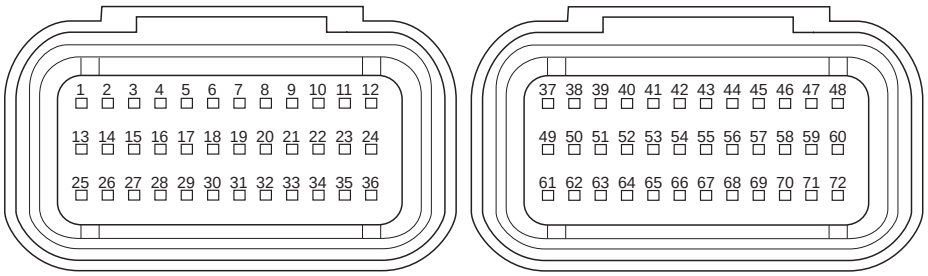
Detected Condition			Possible Cause
C21		Output voltage is not with in the following range. 0.15 V ≤ Sensor voltage < 4.85 V	• IAT sensor circuit open or short. • IAT sensor malfunction. • ECM malfunction.
P0110	H	Sensor voltage is higher than specified value.	• IAT sensor circuit open or ground circuit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

Wiring Diagram



I947H1110124-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

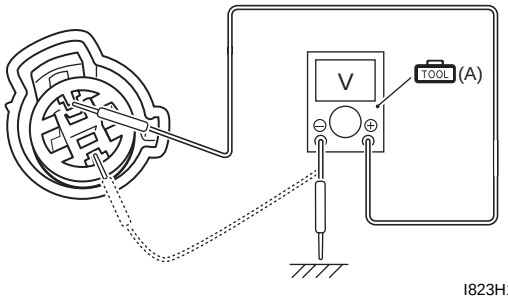
⚠ CAUTION

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

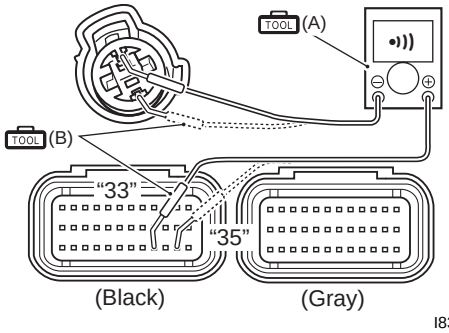
NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

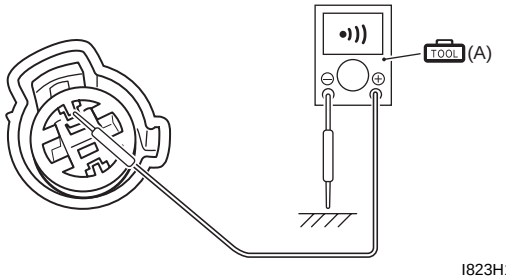
C21 (Use of mode select switch)

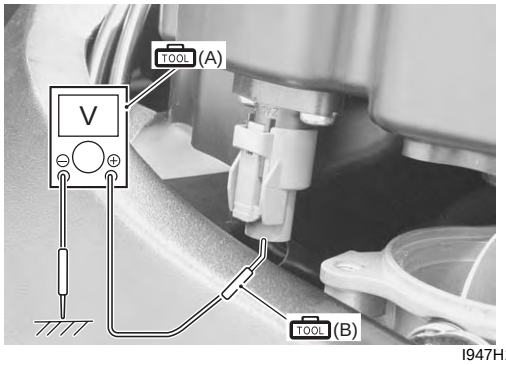
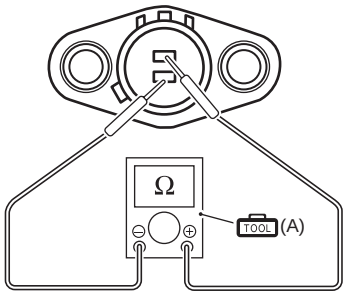
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9). 3) Move the air cleaner box upward. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7). 4) Check the IAT sensor coupler (1) for loose or poor contacts. If OK, then measure the IAT sensor input voltage.  I947H1110026-01 5) Disconnect the IAT sensor coupler and turn the ignition switch ON. 6) Measure the input 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** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **IAT sensor input voltage** **4.5 – 5.5 V** **((+) terminal: Dg – (–) terminal: Ground, (+) terminal: Dg – (–) terminal: B/Br)**  I823H1110040-03 *Is the voltage OK?*	Go to Step 2.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the Dg or B/Br wire.

P0110-H (Use of SDS)

Step	Action	Yes	No
1	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) Move the air cleaner box upward. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7). 4) Check the IAT sensor coupler (1) for loose or poor contacts. If OK, then check the IAT sensor lead wire continuity.  I947H1110027-01 5) Disconnect the IAT sensor coupler. 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. 8) Check the continuity between the Dg wire and terminal “33”. Also, check the continuity between the B/Br wire and terminal “35”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•)))** **ECM couplers (Harness side)**  I837H1110037-01 *Is the continuity OK?*	Connect the ECM coupler and go to Step 2.	Dg or B/Br wire open.

P0110-L (Use of SDS)

Step	Action	Yes	No
1	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) Move the air cleaner box upward. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7). 4) Check the IAT sensor coupler (1) for loose or poor contacts. If OK, then check the IAT sensor lead wire continuity.  I947H1110028-01 5) Disconnect the IAT sensor coupler. 6) Check the continuity between the Dg wire and ground. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity test (•))))**  I823H1110042-03 7) Connect the IAT sensor coupler. 8) Turn the ignition switch ON. 9) Insert the needle pointed probes to the lead wire coupler.	Go to Step 2.	• Dg wire shorted to ground. • If wire is OK, go to Step 2.

Step	Action	Yes	No
1	10) Measure the output voltage between the Dg wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **IAT sensor output voltage** **0.15 – 4.85 V** **((+) terminal: Dg – (–) terminal: Ground)**  I947H1110029-01 *Are the continuity and voltage OK?*	Go to Step 2.	• Dg wire shorted to ground. • If wire is OK, go to Step 2.
2	1) Turn the ignition switch OFF. 2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7). 3) Measure the IAT sensor resistance. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **IAT sensor resistance** **Approx. 2.58 kΩ at 20 °C (68 °F)** **(Terminal – Terminal)**  I815H1110031-01 **NOTE** **IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to “ECT Sensor Inspection” in Section 1C (Page 1C-4).** *Is the resistance OK?*	• Dg or B/Br wire open or shorted to ground, or poor “33” or “35” connection. • 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).	Replace the IAT sensor with a new one. Refer to “IAT Sensor Removal and Installation” in Section 1C (Page 1C-5).

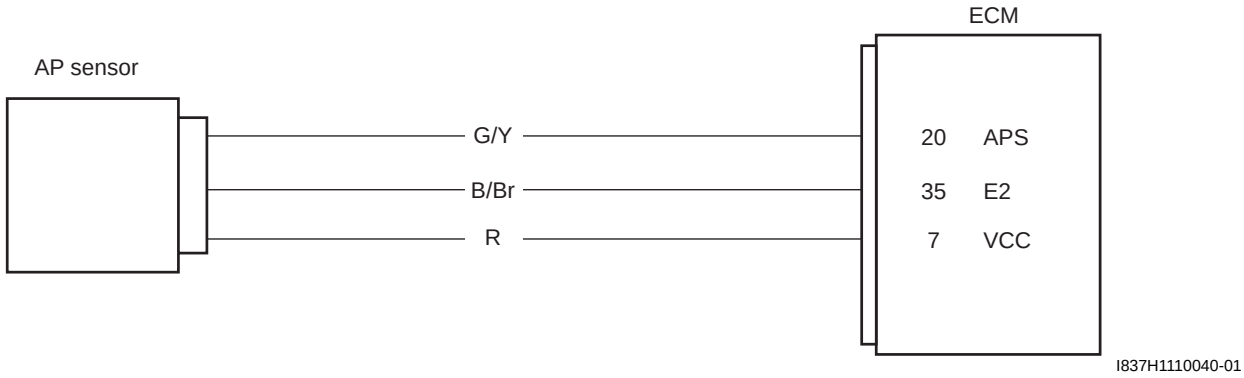
DTC “C22” (P1450-H/L): AP Sensor Circuit Malfunction

B947H11104016

Detected Condition and Possible Cause

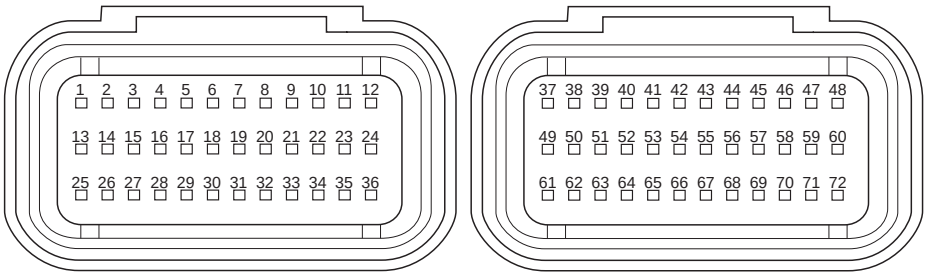
Detected Condition			Possible Cause
C22		AP sensor voltage is not within the following range. 0.5 V ≤ Sensor voltage < 4.85 V **NOTE** **Note that atmospheric pressure varies depending on weather conditions as well as altitude. Take that into consideration when inspecting voltage.**	• Clogged vacuum passage with dust. • AP sensor circuit open or shorted to ground. • AP sensor malfunction. • ECM malfunction.
P1450	H	Sensor voltage is higher than specified value.	• AP sensor circuit is open or shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• AP sensor circuit is shorted to ground or VCC circuit open.

Wiring Diagram



I837H1110040-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

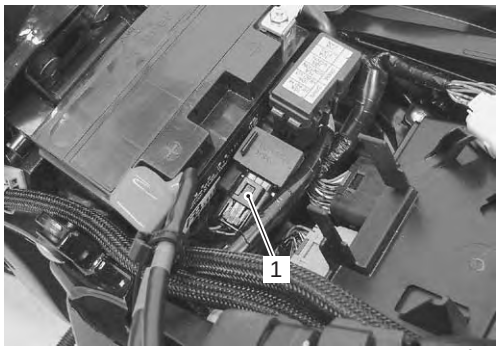
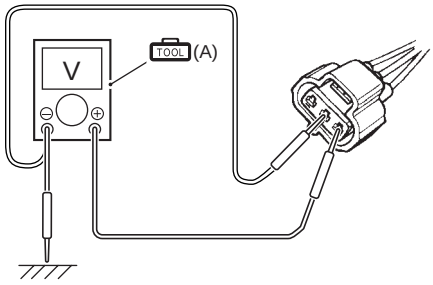
⚠ CAUTION

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

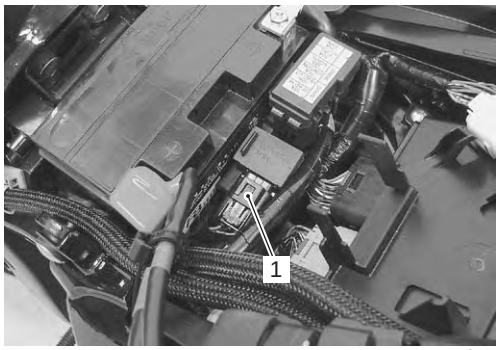
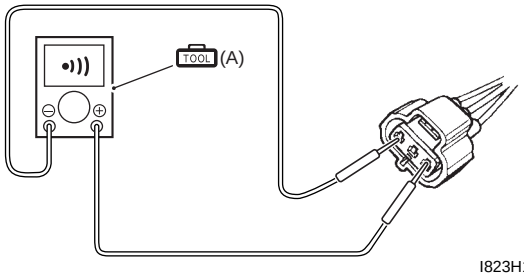
NOTE

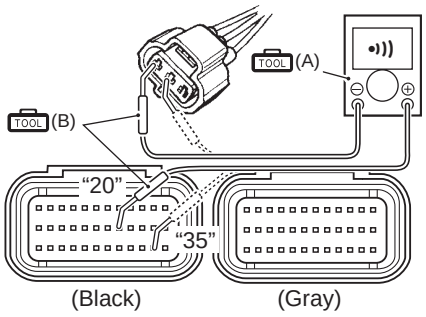
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

C22 (Use of mode select switch)

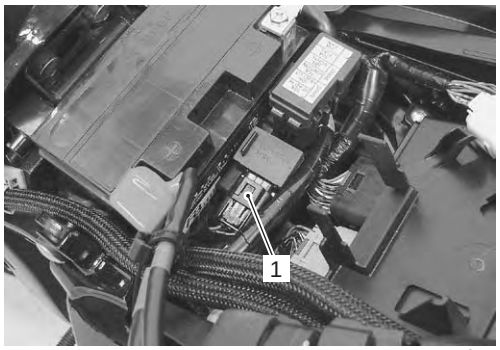
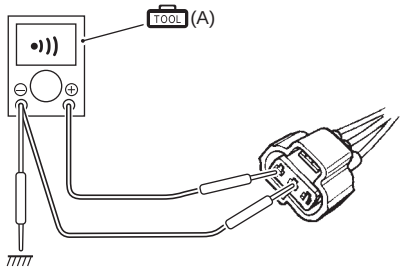
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Remove the starter relay from the bracket. 4) Check the AP sensor coupler (1) for loose or poor contacts. If OK, then measure the AP sensor input voltage.  I947H1110030-01 5) Disconnect the AP sensor coupler. 6) Turn the ignition switch ON. 7) Measure the input voltage between the R wire and ground. If OK, then measure the voltage between the R wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **AP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I823H1110016-05 *Is the voltage OK?*	Go to Step 3.	• Loose or poor contacts on the ECM couplers. • Open or short circuit in the R or B/Br wire.

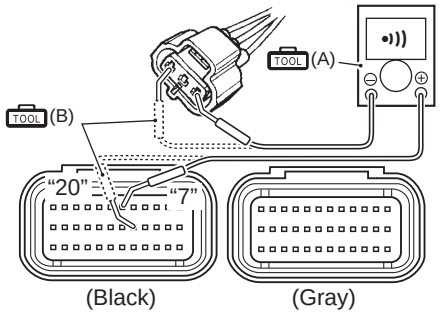
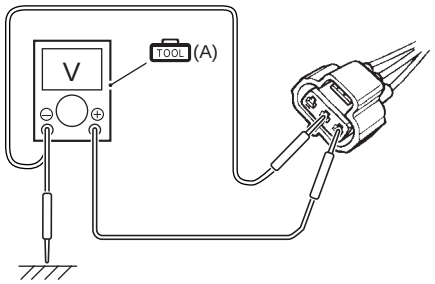
P1450-H (Use of SDS)

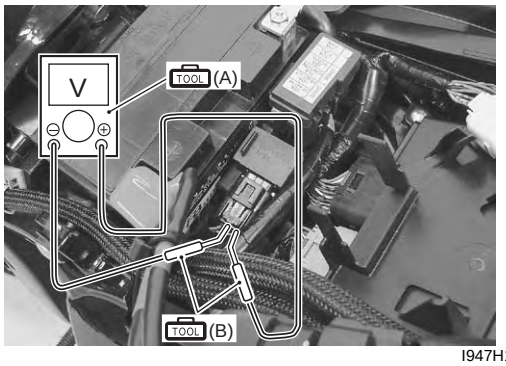
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Remove the starter relay from the bracket. 4) Check the AP sensor coupler (1) for loose or poor contacts. If OK, then check the AP sensor lead wire continuity.  I947H1110031-01 5) Disconnect the AP sensor coupler. 6) Check the continuity between the R wire and G/Y wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•)))**  I823H1110017-05 7) Disconnect the ECM couplers. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1). 8) Insert the needle pointed probes to the lead wire coupler.	Go to Step 3.	G/Y wire shorted to VCC, or B/Br wire open.

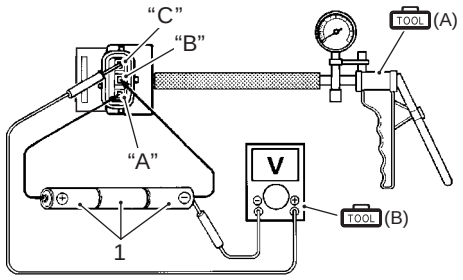
Step	Action	Yes	No
1	9) Check the continuity between the G/Y wire and terminal “20”. If OK, then check the continuity between the B/Br wire and terminal “35”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•)))** **ECM coupler (Harness side)**  I837H1110043-01 *Is the continuity OK?*	Go to Step 3.	G/Y wire shorted to VCC, or B/Br wire open.

P1450-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Remove the starter relay from the bracket. 4) Check the AP sensor coupler (1) for loose or poor contacts. If OK, then check the AP sensor lead wire continuity.  I947H1110032-01 5) Disconnect the AP sensor coupler. 6) Check the continuity between the G/Y wire and ground. Also, check the continuity between the G/Y wire and B/Br wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•))))**  I823H1110019-02 7) Disconnect the ECM couplers. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1). 8) Insert the needle pointed probes to the lead wire coupler.	Go to Step 2.	R and G/Y wire open, G/Y wire shorted to ground.

Step	Action	Yes	No
1	9) Check the continuity between the R wire and terminal "7". Also, check the continuity between the G/Y wire and terminal "20". **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity (•))))** **ECM coupler (Harness side)**  I837H1110045-02 *Is the continuity OK?*	Go to Step 2.	R and G/Y wire open, G/Y wire shorted to ground.
2	1) Connect the ECM couplers. 2) Turn the ignition switch ON. 3) Measure the input voltage between the R wire and ground. If OK, then measure the voltage between the R wire and B/Br wire. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **AP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I823H1110016-05 *Is the voltage OK?*	Go to Step 3.	• Loose or poor contacts on the ECM couplers. • Open or short circuit in the R or B/Br wire.

Step	Action	Yes	No
3	1) Turn the ignition switch OFF. 2) Connect the ECM couplers and AP sensor coupler. 3) Insert the needle pointed probes to the lead wire coupler. 4) Run the engine at idle speed and measure the AP sensor output voltage between the G/Y wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **AP sensor output voltage** **Approx. 3.6 V at 100 kPa (760 mmHg)** **((+) terminal: G/Y – (–) terminal: B/Br)**  I947H1110033-02 *Is the voltage OK?*	Go to Step 4.	• Check the vacuum port for crack or damage. • Open or short circuit in the G/Y wire. • If vacuum hose and lead wire are OK, replace the AP sensor with a new one. Refer to “AP Sensor Removal and Installation” in Section 1C (Page 1C-5).

<table>
<tr><th>Step</th><th>Action</th><th>Yes</th><th>No</th></tr>
<tr>
<td>4</td>
<td>1) Turn the ignition switch OFF.
2) Remove the AP sensor. Refer to “AP Sensor Removal and Installation” in Section 1C (Page 1C-5).
3) Connect the vacuum pump gauge to the vacuum port of the AP sensor.
4) Arrange 3 new 1.5 V batteries in series (1) (check that total voltage is 4.5 – 5.0 V) and connect (–) terminal to the ground terminal “B” and (+) terminal to the VCC terminal “A”.
5) Check the voltage between Vout terminal “C” and ground. Also, check if voltage reduces when vacuum is applied up to 53 kPa (400 mmHg) by using vacuum pump gauge.
Special tool
TOOL (A): 09917–47011 (Vacuum pump gauge set)
TOOL (B): 09900–25008 (Multi circuit tester set)
<u>Tester knob indication</u>
Voltage (⎓)
 

I718H1110030-02
<table><tr><th colspan="2">ALTITUDE (Reference)</th><th colspan="2">ATOMOSPHERIC PRESSURE</th><th>OUTPUT VOLTAGE</th></tr><tr><td>m</td><td>ft</td><td>kPa</td><td>mmHg</td><td>V</td></tr><tr><td>0 – 610</td><td>0 – 2 000</td><td>100 – 94</td><td>760 – 707</td><td>3.1 – 3.6</td></tr><tr><td>611 – 1 524</td><td>2 001 – 5 000</td><td>94 – 85</td><td>707 – 634</td><td>2.8 – 3.4</td></tr><tr><td>1 525 – 2 438</td><td>5 001 – 8 000</td><td>85 – 76</td><td>634 – 567</td><td>2.6 – 3.1</td></tr><tr><td>2 439 – 3 048</td><td>8 001 – 10 000</td><td>76 – 70</td><td>567 – 526</td><td>2.4 – 2.9</td></tr></table>I823H1110023-02
Is the voltage OK?</td>
<td>• G/Y, R or B/Br wire open or shorted to ground, or poor “7”, “20” or “35” connection.
• 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).</td>
<td>If check result is not satisfactory, replace the AP sensor with a new one. Refer to “AP Sensor Removal and Installation” in Section 1C (Page 1C-5).</td>
</tr>
</table>

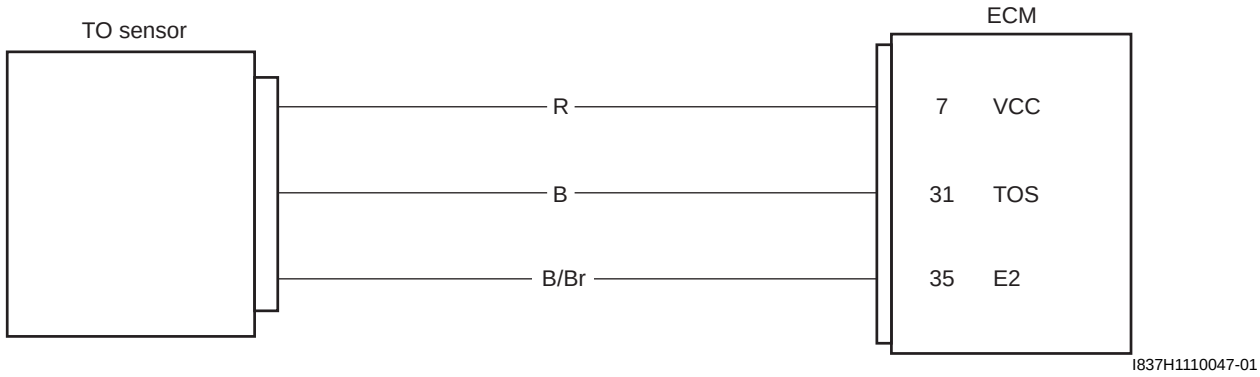
DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction

B947H11104017

Detected Condition and Possible Cause

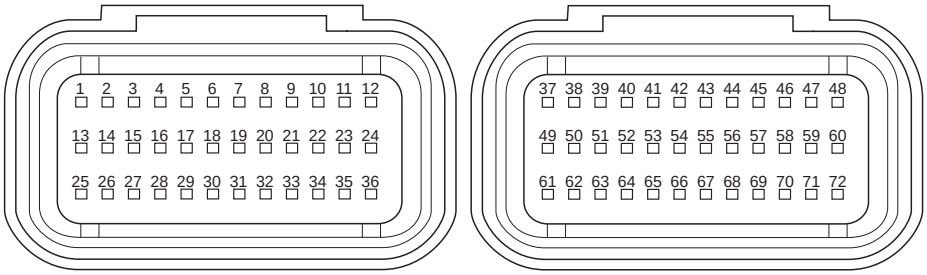
Detected Condition			Possible Cause
C23		The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V ≤ Sensor voltage < 4.8 V	• TO sensor circuit open or short. • TO sensor malfunction. • ECM malfunction.
P1651	H	Sensor voltage is higher than specified value.	• TO sensor circuit is open or ground circuit open.
	L	Sensor voltage is lower than specified value.	• TO sensor circuit is open or shorted to ground or VCC circuit open.

Wiring Diagram



I837H1110047-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

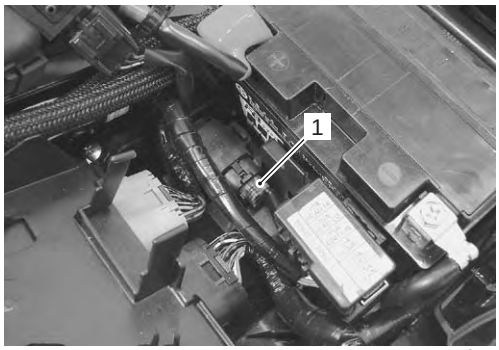
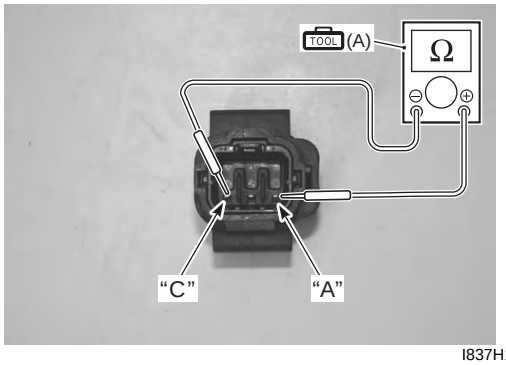
⚠ CAUTION

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

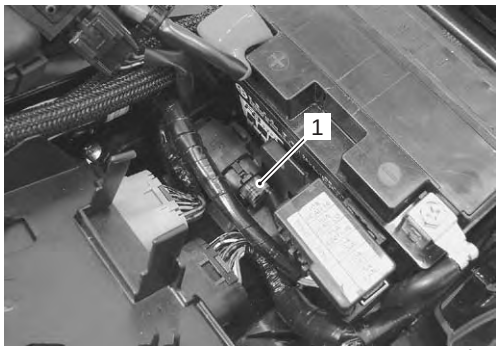
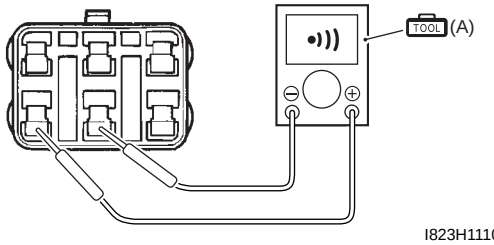
NOTE

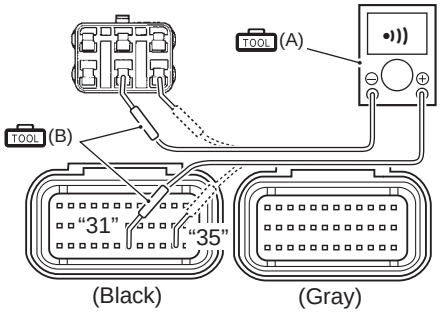
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

C23 (Use of mode select switch)

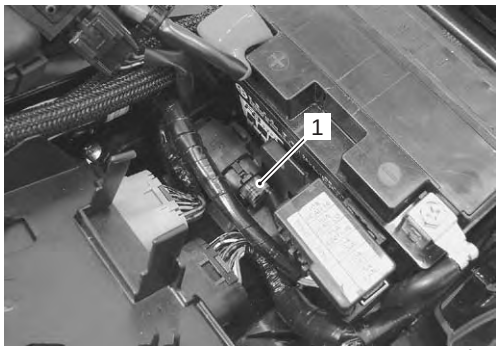
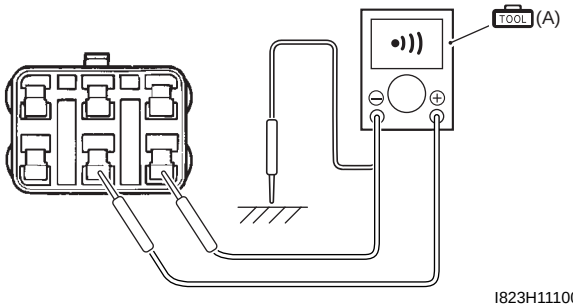
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Remove the AP sensor from the bracket. 4) Check the TO sensor coupler (1) for loose or poor contacts. If OK, then measure the TO sensor resistance.  I947H1110034-01 5) Remove the TO sensor. 6) Measure the resistance between terminal “A” and terminal “C”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **TO sensor resistance** **16.5 – 22.3 kΩ** **(Terminal “A” – Terminal “C”)**  I837H1110049-01 *Is the resistance OK?*	Go to Step 2.	Replace the TO sensor with a new one. Refer to “TO Sensor Removal and Installation” in Section 1C (Page 1C-6).

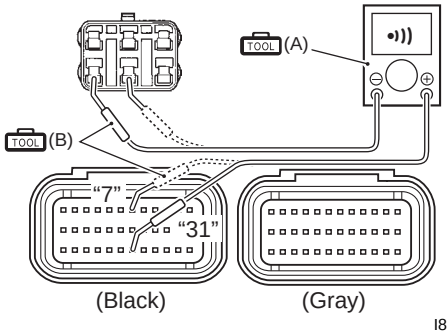
P1651-H (Use of SDS)

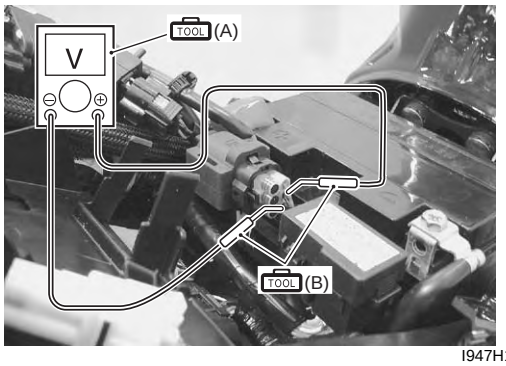
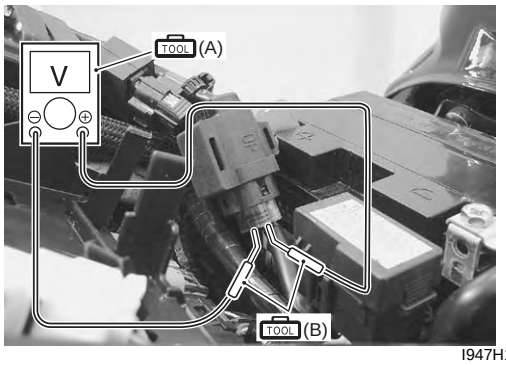
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the TO sensor coupler (1) for loose or poor contacts. If OK, then check the TO sensor lead wire continuity.  I947H1110035-01 4) Disconnect the TO sensor coupler. 5) Check the continuity between the R wire and B wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity test (•)))**  I823H1110051-01 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.	Go to Step 2.	B wire shorted to VCC, or B/Br wire open.

Step	Action	Yes	No
1	8) Check the continuity between the B wire and terminal “31”. Also, check the continuity between B/Br wire and terminal “35”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•))))** **ECM coupler (Harness side)**  I837H1110051-01 *Is the continuity OK?*	Go to Step 2.	B wire shorted to VCC, or B/Br wire open.

P1651-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the TO sensor coupler (1) for loose or poor contacts. If OK, then check the TO sensor lead wire continuity.  I947H1110036-01 4) Disconnect the TO sensor coupler. 5) Check the continuity between the B wire and ground. Also, check the continuity between the B wire and B/Br wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity test (•)))**  I823H1110053-02 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.	Go to Step 2.	R or B wire open, or B wire shorted to ground.

Step	Action	Yes	No
1	8) Check the continuity between the R wire and terminal “7”. Also, then check the continuity between B wire and terminal “31”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•))))** **ECM coupler (Harness side)**  I837H1110053-01 *Is the continuity OK?*	Go to Step 2.	R or B wire open, or B wire shorted to ground.

Step	Action	Yes	No
2	1) Connect the ECM coupler and TO sensor coupler. 2) Insert the needle pointed probes to the lead wire coupler. 3) Turn the ignition switch ON. 4) Measure the voltage at the wire side coupler between B wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **TO sensor voltage (Normal)** **0.4 – 1.4 V** **((+) terminal: B – (–) terminal: B/Br)**  I947H1110037-02 5) Dismount the TO sensor from its bracket and measure the voltage when it is leaned 65° and more, left and right, from the horizontal level. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **TO sensor voltage (Leaning)** **3.7 – 4.4 V** **((+) terminal: B – (–) terminal: B/Br)**  I947H1110038-01 *Is the voltage OK?*	• R, B or B/Br wire open or shorted to ground, or poor “7”, “31” or “35” connection. • 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).	• Loosen or poor contacts on the ECM coupler. • Open or short circuit. • Replace the TO sensor with a new one. Refer to “TO Sensor Removal and Installation” in Section 1C (Page 1C-6).

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

B947H11104018

NOTE

Refer to “No Spark or Poor Spark” in Section 1H (Page 1H-5) for details.

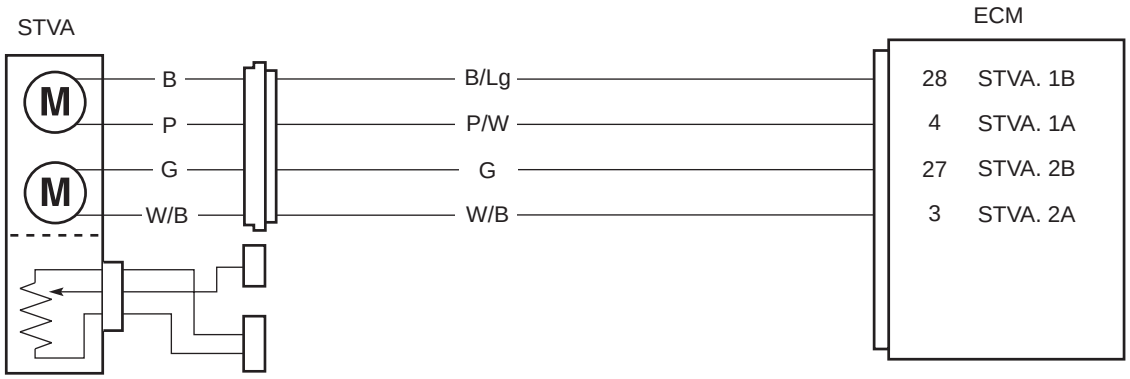
DTC “C28” (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction

B947H11104019

Detected Condition and Possible Cause

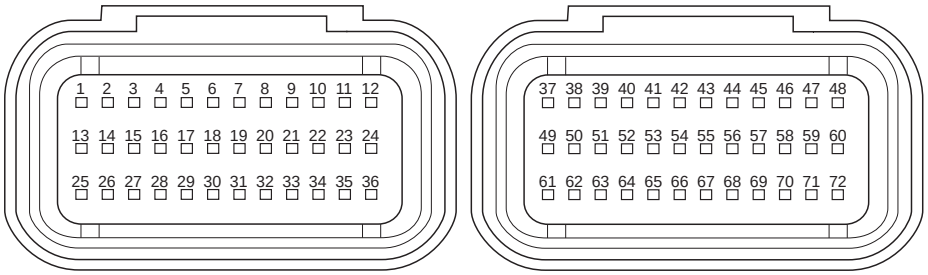
Detected Condition	Possible Cause
The operation voltage does not reach the STVA. ECM does not receive communication signal from the STVA. STVA can not operate properly or its motor locked.	• STVA malfunction. • STVA circuit open or short. • STVA motor malfunction.

Wiring Diagram



I947H1110039-01

ECM coupler (Harness side)



I837H1110007-02

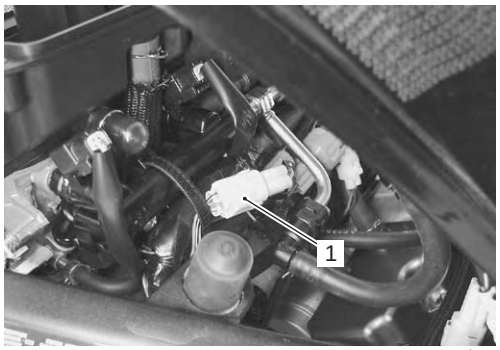
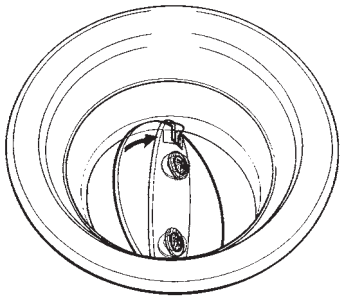
Troubleshooting

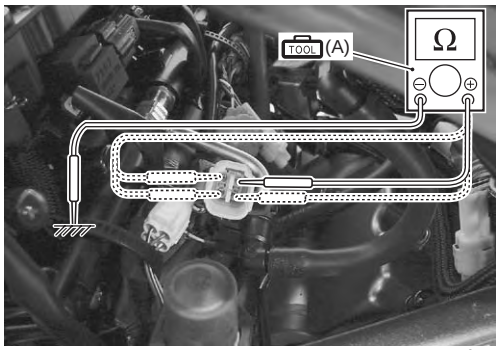
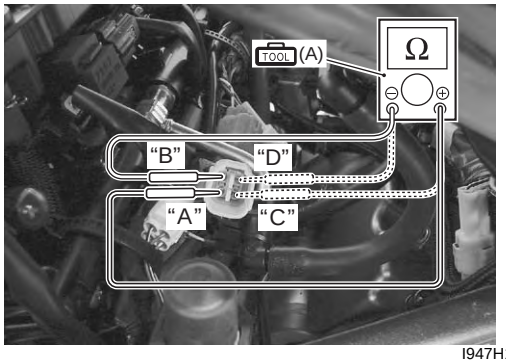
⚠ CAUTION

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

NOTE

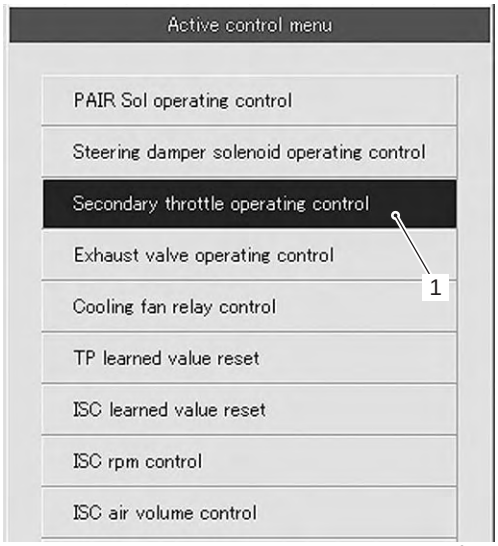
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9). 2) Remove the air cleaner box cover. Refer to “Air Cleaner Element Removal and Installation” in Section 1D (Page 1D-6). 3) Check the STVA lead wire coupler (1) for loose or poor contacts.  I947H1110040-01 4) Check whether the STVs open by turning the ignition switch ON.  I947H1110127-01 *Is the operation OK?*	Go to Step 2.	• Loose or poor contacts on the STVA coupler. • Open or short circuit in the B/Lg, P/W, G or W/B wire. • If wire and connection are OK, go to Step 2.

Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Disconnect the STVA lead wire coupler. 3) Check the continuity between each terminal and ground. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **STVA continuity** **∞ Ω (Infinity)** **(Terminal – Ground)**  I947H1110041-02 4) If OK, then measure the STVA resistance (between the P wire “A” and B wire “B”) and (between the W/B wire “C” and G wire “D”). **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **STVA resistance** **Approx. 6.5 Ω** **(Terminal “A” – Terminal “B”, Terminal “C” – Terminal “D”)**  I947H1110042-02 *Is the resistance OK?*	• B/Lg, P/W, G and W/B wire open or shorted to ground, or poor “3”, “4”, “27” and “28” connection. • 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).	• Loose or poor contacts on the ECM coupler. • Replace the throttle body assembly with a new one. Refer to “Throttle Body Disassembly and Assembly” in Section 1D (Page 1D-11).

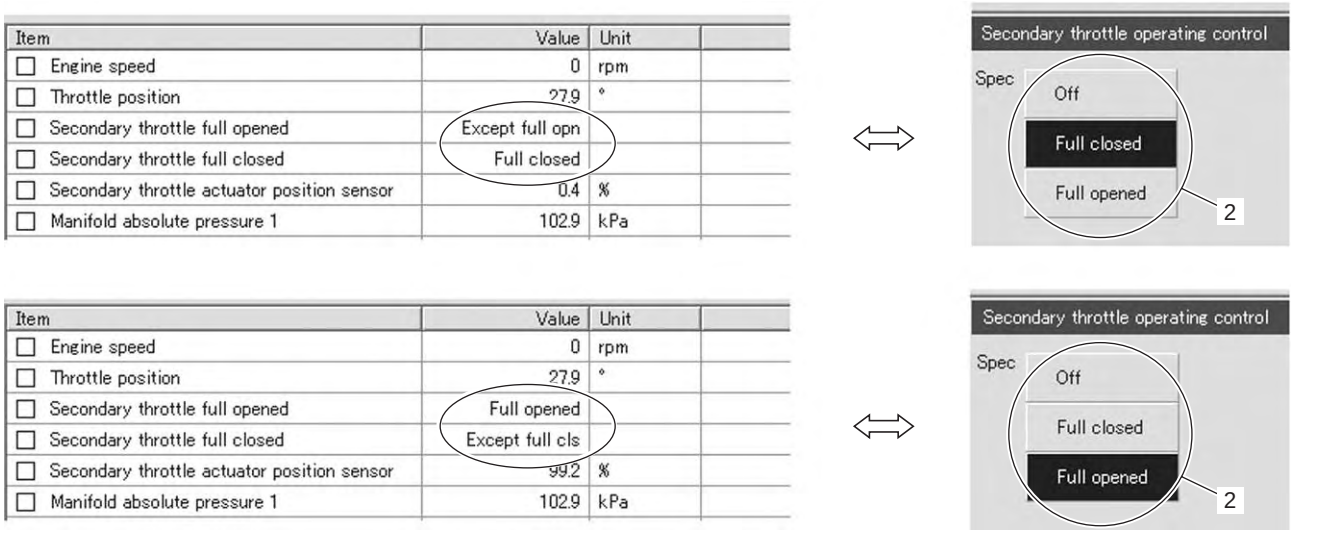
Active Control Inspection

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).



I947H1110128-01

4) Click each button (2).
At this time, if an operation sound is heard from the STVA, the function is normal.



I947H1110129-01

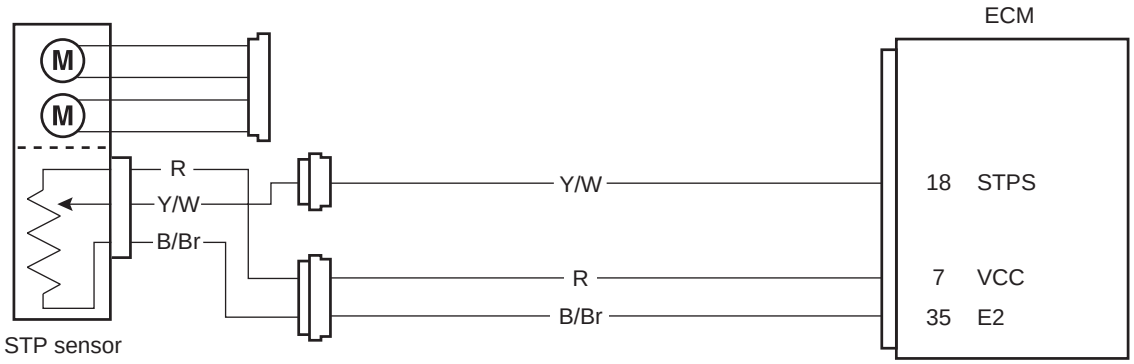
DTC “C29” (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction

B947H11104020

Detected Condition and Possible Cause

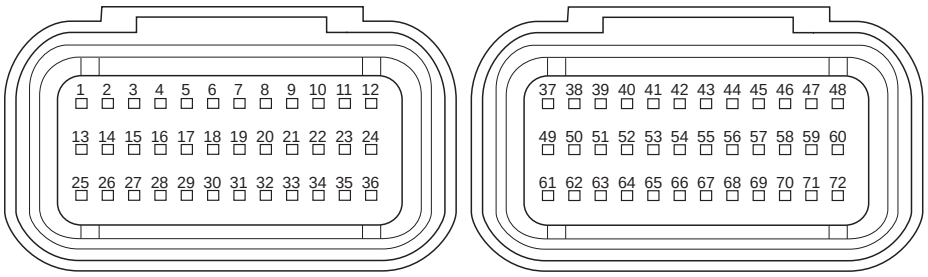
Detected Condition			Possible Cause
C29		Output voltage is not within the following range. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. 0.15 V ≤ Sensor voltage < 4.85 V	• STP sensor maladjusted. • STP sensor circuit open or short. • STP sensor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

Wiring Diagram



I947H1110043-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

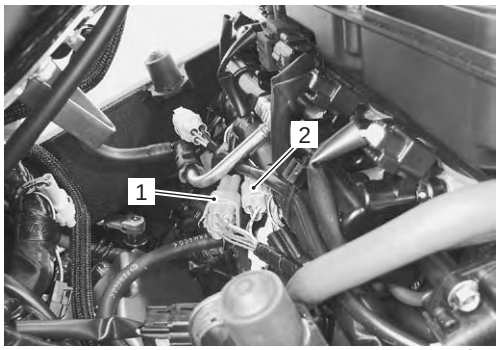
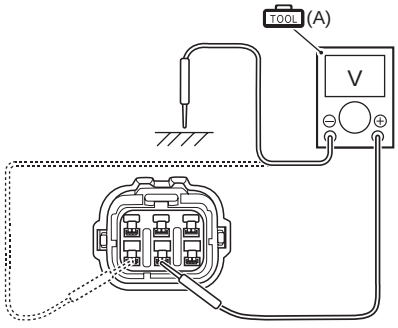
⚠ CAUTION

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

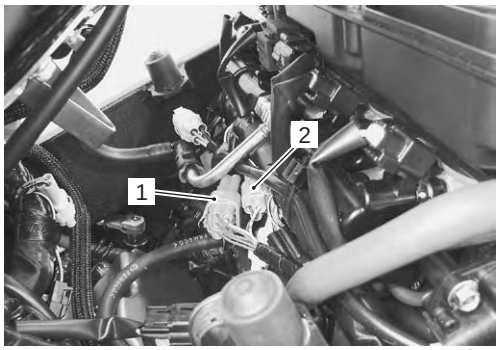
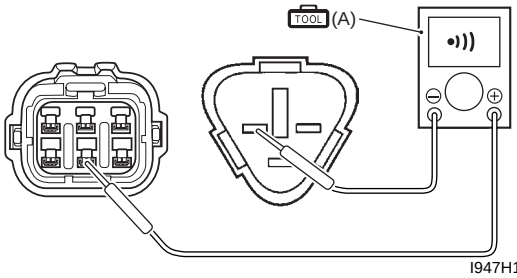
NOTE

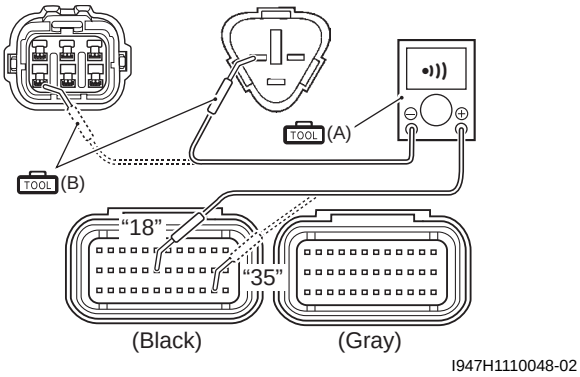
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

C29 (Use of mode select switch)

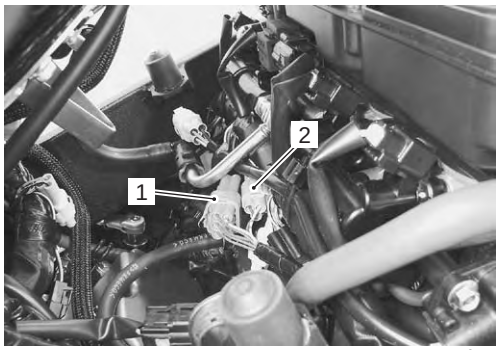
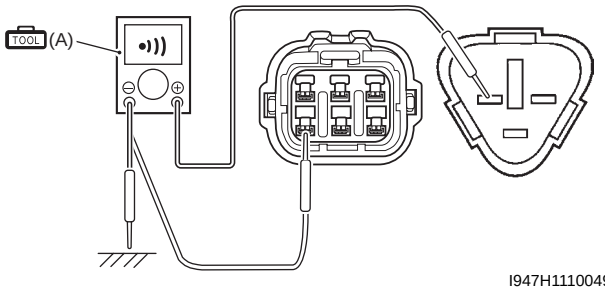
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9). 3) Check the STP sensor couplers (1) and (2) for loose or poor contacts. If OK, then measure the STP sensor input voltage.  I947H1110044-01 4) Disconnect the STP sensor coupler (1). 5) Turn the ignition switch ON. 6) Measure the input voltage between the R wire and ground. Also, measure the voltage between the R wire and B/Br wire. **Special tool** **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)**  I947H1110045-01 *Is the voltage OK?*	Go to Step 3.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the R wire or B/Br wire.

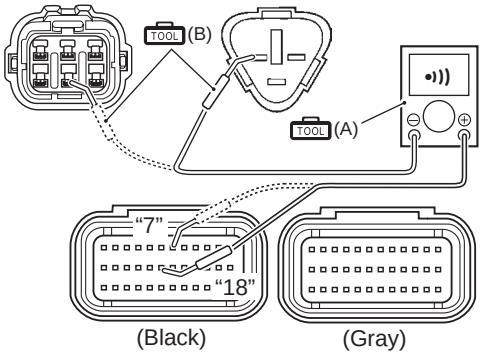
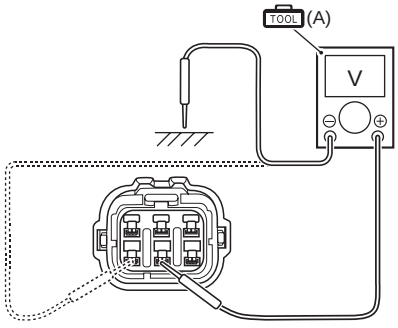
P1654-H (Use of SDS)

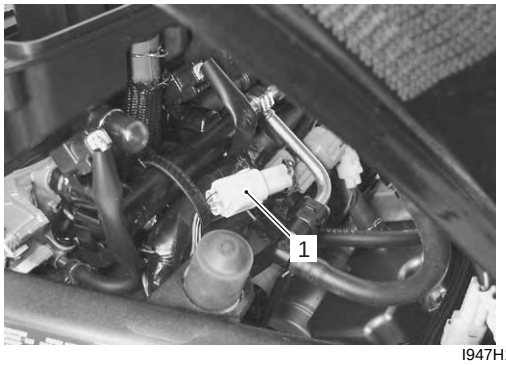
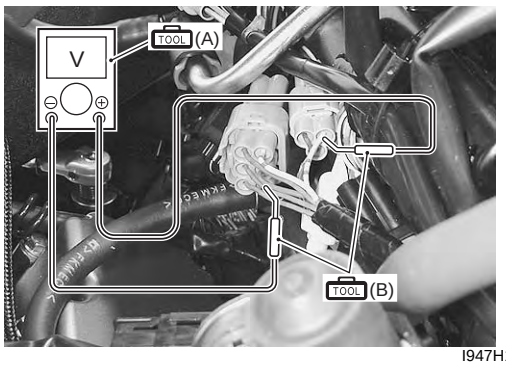
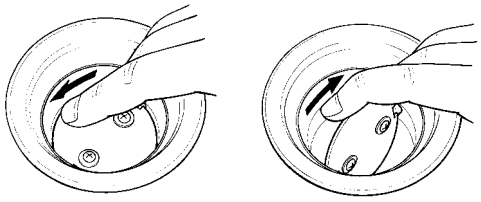
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9). 3) Check the STP sensor couplers (1) and (2) for loose or poor contacts. If OK, then check the STP sensor lead wire continuity.  I947H1110046-01 4) Disconnect the STP sensor couplers (1) and (2). 5) 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. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•)))**  I947H1110047-02 6) Disconnect the ECM couplers. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1).	Go to Step 3.	Y/W wire shorted to VCC, or B/Br wire open.

Step	Action	Yes	No
1	7) Check the continuity between the Y/W wire and terminal “18”. Also, check the continuity between the B/Br wire and terminal “35”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•)))** **ECM couplers (Harness side)**  I947H1110048-02 *Is the continuity OK?*	Go to Step 3.	Y/W wire shorted to VCC, or B/Br wire open.

P1654-L (Use of SDS)

Step	Action	Yes	No
1	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 STP sensor couplers (1) and (2) for loose or poor contacts. If OK, then check the STP sensor lead wire continuity.  I947H1110054-01 4) Disconnect the STP sensor couplers (1) and (2). 5) 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. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity test (•)))**  I947H1110049-01 6) Disconnect the ECM couplers. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1).	Go to Step 2.	R or Y/W wire open, or Y/W wire shorted to ground.

Step	Action	Yes	No
1	7) Check the continuity between the Y/W wire and terminal “18”. Also, check the continuity between the R wire and terminal “7”. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test ( )** **ECM couplers (Harness side)**  I947H1110050-01 *Is the continuity OK?*	Go to Step 2.	R or Y/W wire open, or Y/W wire shorted to ground.
2	1) Connect the ECM couplers. 2) Turn the ignition switch ON. 3) Measure the input voltage between the R wire and ground. Also, measure the input voltage between 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)**  I947H1110051-01 *Is the voltage OK?*	Go to Step 3.	Open or short circuit in the R or B/Br wire.

Step	Action	Yes	No
3	1) Turn the ignition switch OFF. 2) Connect the ECM couplers and STP sensor couplers. 3) Remove the air cleaner box cover. Refer to “Air Cleaner Element Removal and Installation” in Section 1D (Page 1D-6). 4) Disconnect the STVA lead wire coupler (1).  I947H1110052-01 5) Insert the needle point probes to the lead wire coupler. 6) Turn the ignition switch ON. 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 your finger. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **STP sensor output voltage** **Secondary throttle valve is closed: Approx. 0.7 V** **Secondary throttle valve is opened: Approx. 4.1 V** **((+) terminal: Y/W – (–) terminal: B/Br)**  I947H1110053-01  I705H1110071-01 *Is the voltage OK?*	• R, Y/W or B/Br wire open or shorted to ground, or poor “7”, “18” or “35” connection. • 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).	If check result is not satisfactory, replace the STP sensor with a new one. Refer to “STP Sensor Removal and Installation” in Section 1C (Page 1C-7).

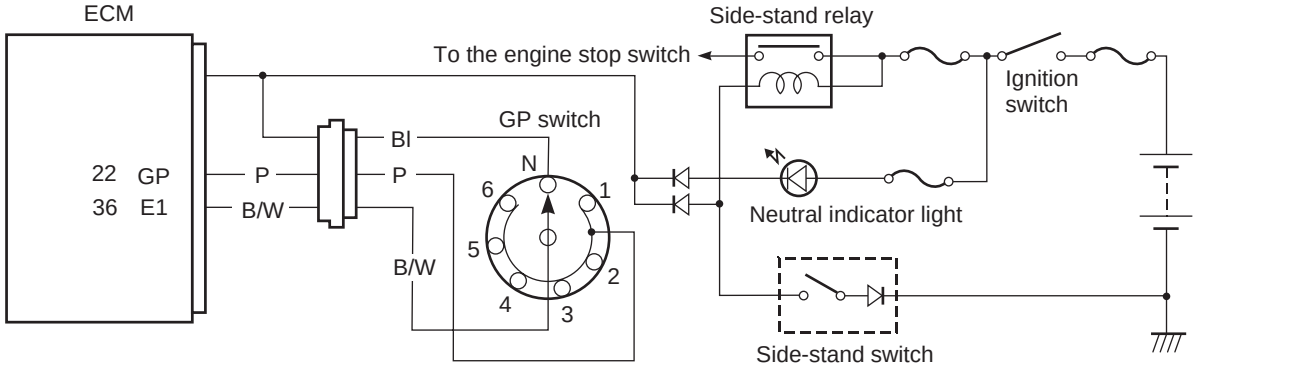
DTC “C31” (P0705): GP Switch Circuit Malfunction

B947H11104021

Detected Condition and Possible Cause

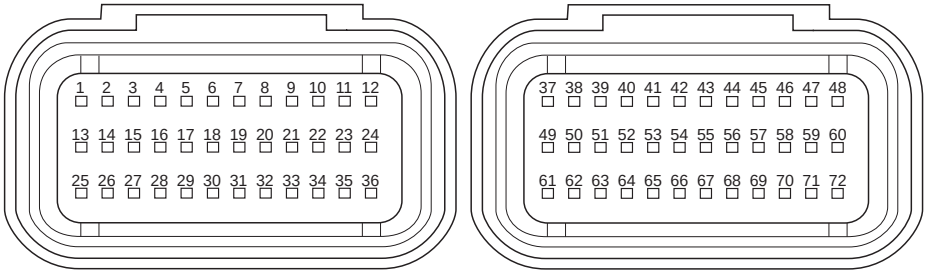
Detected Condition	Possible Cause
No Gear Position switch voltage GP switch voltage is not within the following range. GP switch voltage > 0.6 V	• GP switch circuit open or short. • GP switch malfunction. • ECM malfunction.

Wiring Diagram



I837H1110067-01

ECM coupler (Harness side)



I837H1110007-02

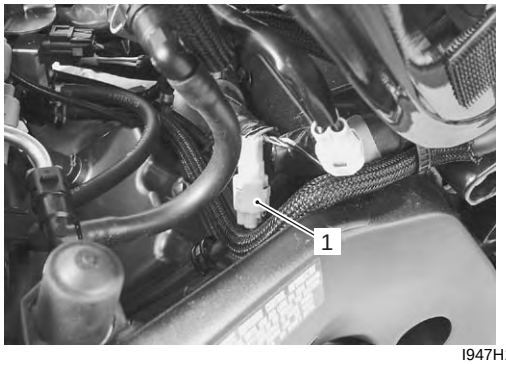
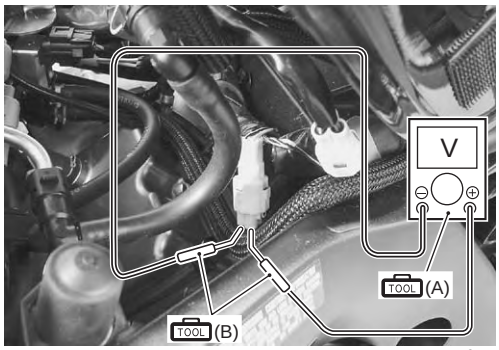
Troubleshooting

⚠ 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 terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	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 GP switch coupler (1) for loose or poor contacts. If OK, then measure the GP switch voltage.  I947H1110055-01 4) Support the motorcycle with a jack. 5) Fold the side-stand to up position. 6) 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 between the P and B/W wire, when shifting the gearshift lever from 1st to Top. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **GP switch voltage** **0.6 V and more** **((+) terminal: P – (–) terminal: B/W)**  I947H1110056-01 *Is the voltage OK?*	• P wire open or shorted to ground. • 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).	• P or B/W wire open, or P wire shorted to ground. • 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 Position (GP) Switch Removal and Installation” in Section 5B (Page 5B-14).

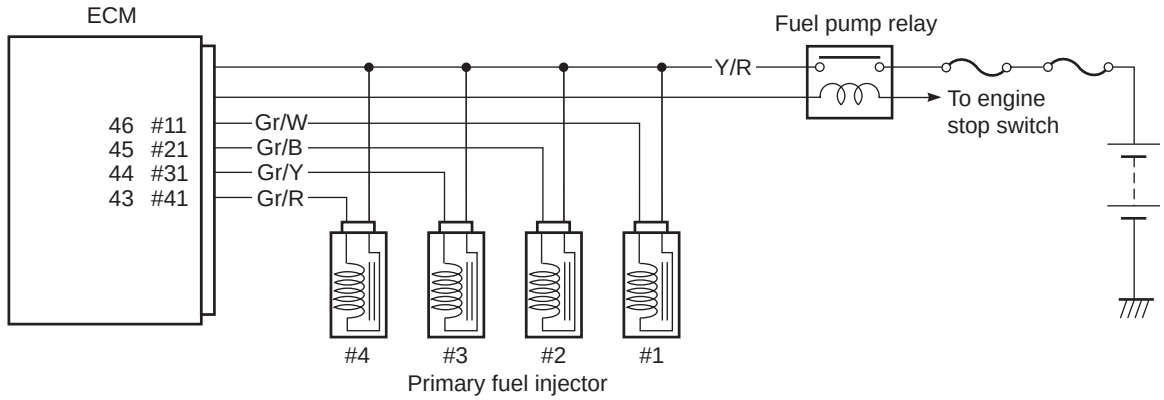
DTC “C32” (P0201), “C33” (P0202), “C34” (P0203) or “C35” (P0204): Primary Fuel Injector Circuit Malfunction

B947H11104022

Detected Condition and Possible Cause

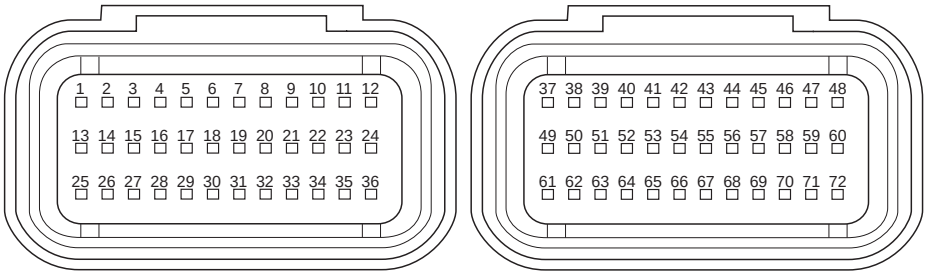
Detected Condition	Possible Cause
CKP signal is produced but fuel injector signal is interrupted by 4 times or more continuity.	• Injector circuit open or short. • Injector malfunction. • ECM malfunction.

Wiring Diagram



I837H1110070-02

ECM coupler (Harness side)



I837H1110007-02

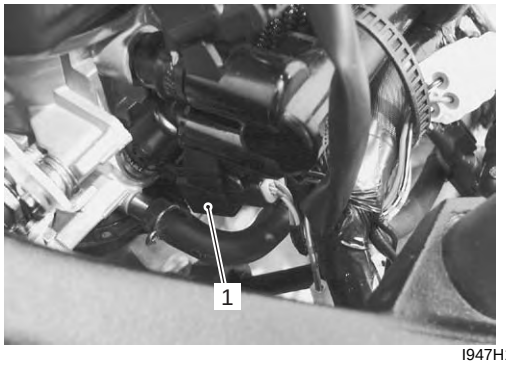
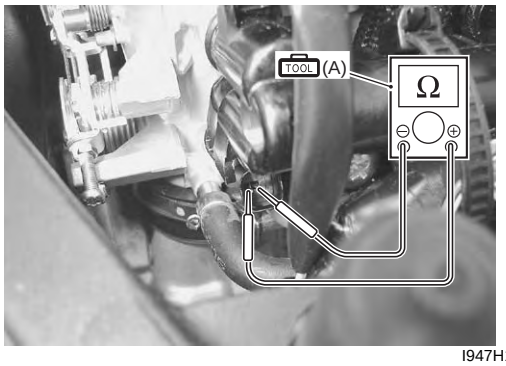
Troubleshooting

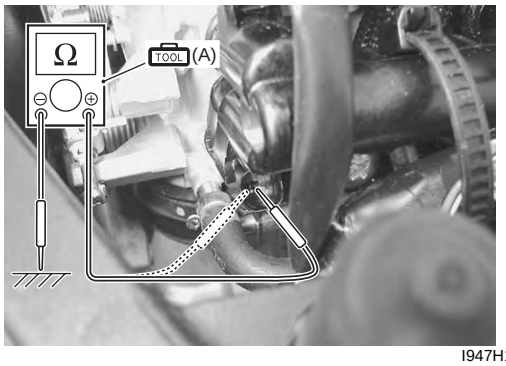
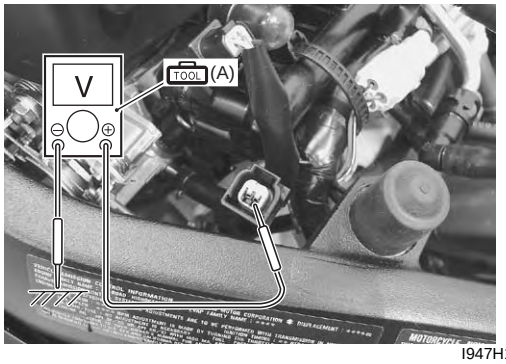
⚠ CAUTION

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

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	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 primary fuel injector coupler (1) for loose or poor contacts. If OK, then measure the injector resistance.  I947H1110057-01 4) Disconnect the injector coupler and measure the resistance between terminals. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **Injector resistance** **11 – 13 Ω at 20 °C (68 °F)** **(Terminal – Terminal)**  I947H1110058-01	Go to Step 2.	Replace the injector with a new one. Refer to “Throttle Body Disassembly and Assembly” in Section 1D (Page 1D-11).

Step	Action	Yes	No
1	5) If OK, then check the continuity between each terminal and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Injector continuity** **∞ Ω (Infinity)**  I947H1110059-01 *Are the resistance and continuity OK?*	Go to Step 2.	Replace the injector with a new one. Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-11).
2	1) Turn the ignition switch ON. 2) Measure the injector voltage between the Y/R wire and ground. **NOTE** **Injector voltage can be detected only for 3 seconds after ignition switch is turned ON.** **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Injector voltage** **Battery voltage** **((+) terminal: Y/R – (–) terminal: Ground)**  I947H1110060-01 *Is the voltage OK?*	• Gr/W wire open or shorted to ground, or poor "46" connection (#1 cylinder side). • Gr/B wire open or shorted to ground, or poor "45" connection (#2 cylinder side). • Gr/Y wire open or shorted to ground, or poor "44" connection (#3 cylinder side). • Gr/R wire open or shorted to ground, or poor "43" connection (#4 cylinder side). • 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 circuit in the Y/R wire.

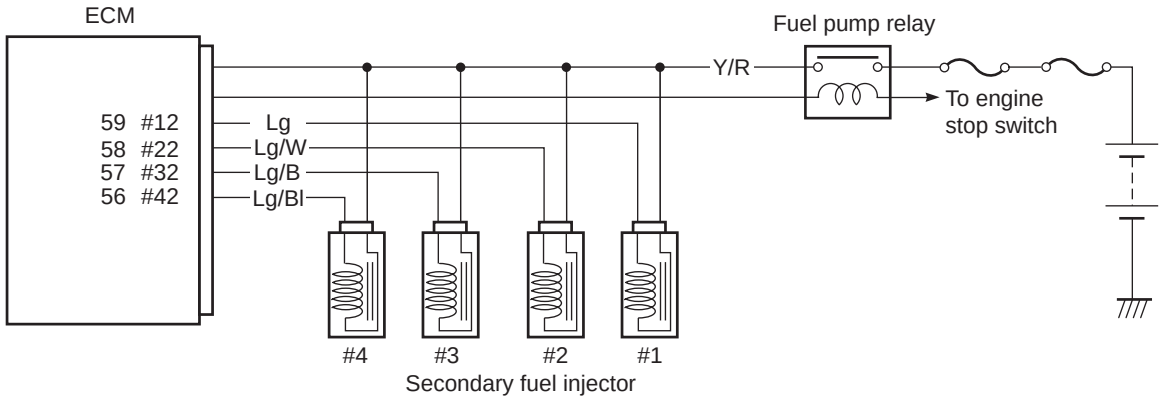
DTC “C36” (P1764), “C37” (P1765), “C38” (P1766) or “C39” (P1767): Secondary Fuel Injector Circuit Malfunction

B947H11104023

Detected Condition and Possible Cause

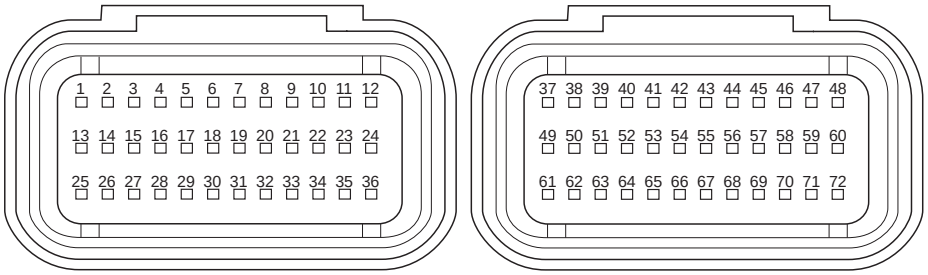
Detected Condition	Possible Cause
Some failure exists in the fuel injector signal in a high load, high revolution condition.	• Injector circuit open or short. • Injector malfunction. • ECM malfunction.

Wiring Diagram



I947H1110125-01

ECM coupler (Harness side)



I837H1110007-02

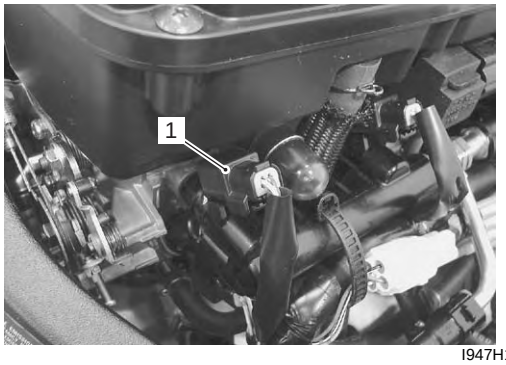
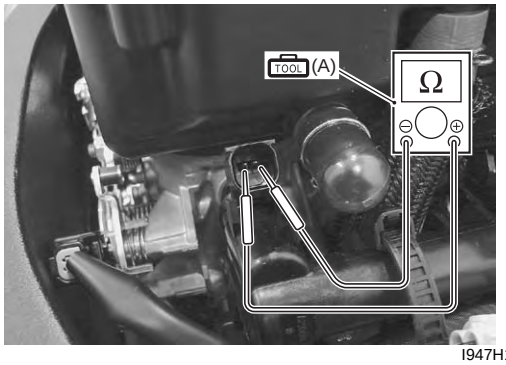
Troubleshooting

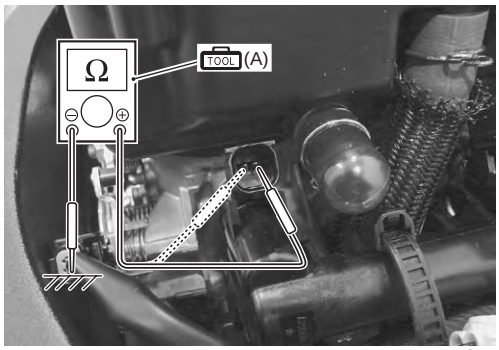
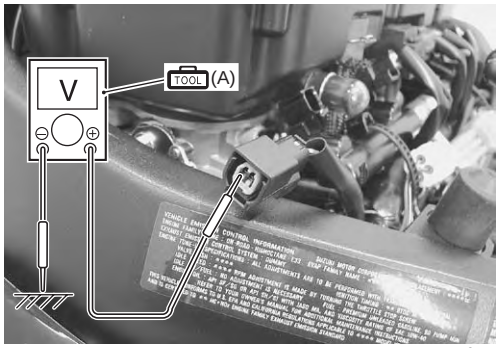
⚠ CAUTION

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

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	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 secondary fuel injector coupler (1) for loose or poor contacts. If OK, then measure the injector resistance.  I947H1110061-01 4) Disconnect the injector coupler and measure the resistance between terminals. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **Injector resistance** **11 – 13 Ω at 20 °C (68 °F)** **(Terminal – Terminal)**  I947H1110062-01	Go to Step 2.	Replace the injector with a new one. Refer to “Throttle Body Disassembly and Assembly” in Section 1D (Page 1D-11).

Step	Action	Yes	No
1	5) If OK, then check the continuity between each terminal and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Injector continuity** **∞ Ω (Infinity)**  I947H1110063-01 *Are the resistance and continuity OK?*	Go to Step 2.	Replace the injector with a new one. Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-11).
2	1) Turn the ignition switch ON. 2) Measure the injector voltage between the Y/R wire and ground. **NOTE** **Injector voltage can be detected only for 3 seconds after ignition switch is turned ON.** **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Injector voltage** **Battery voltage** **((+) terminal: Y/R – (–) terminal: Ground)**  I947H1110064-01 *Is the voltage OK?*	• Lg wire open or shorted to ground, or poor "59" connection (#1 cylinder side). • Lg/W wire open or shorted to ground, or poor "58" connection (#2 cylinder side). • Lg/B wire open or shorted to ground, or poor "57" connection (#3 cylinder side). • Lg/Bl wire open or shorted to ground, or poor "56" connection (#4 cylinder side). • 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 circuit in the Y/R wire.

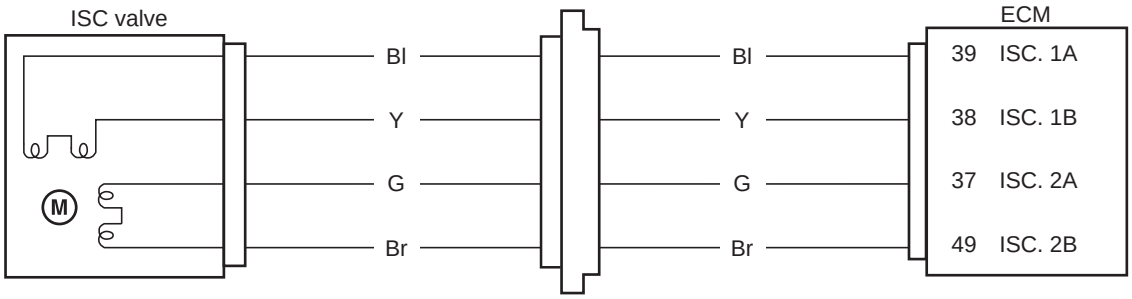
DTC “C40” (P0505 / P0506 / P0507): ISC Valve Circuit Malfunction

B947H11104024

Detected Condition and Possible Cause

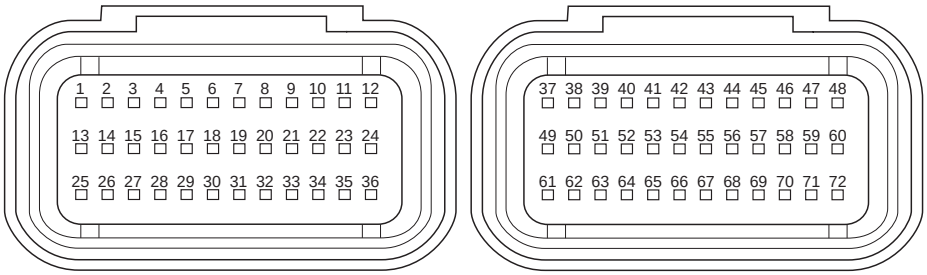
Detected Condition		Possible Cause
C40/P0505	The circuit voltage of motor drive is unusual.	• ISC valve circuit open or shorted to ground.
C40/P0506	Idle speed is lower than the desired idle speed.	• Air passage clogged. • ISC valve is fixed. • ISC valve preset position is incorrect.
C40/P0507	Idle speed is higher than the desired idle speed.	• Disconnected ISC valve hose. • ISC valve is fixed. • ISC valve preset position is incorrect.

Wiring Diagram



I947H1110065-01

ECM coupler (Harness side)



I837H1110007-02

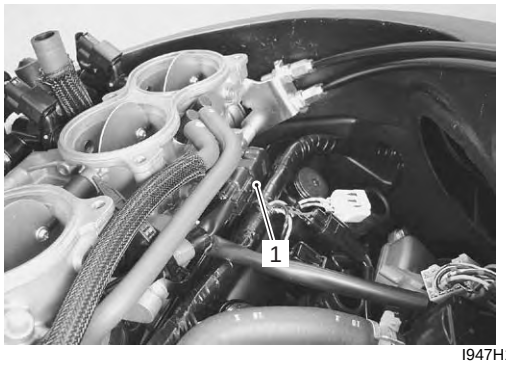
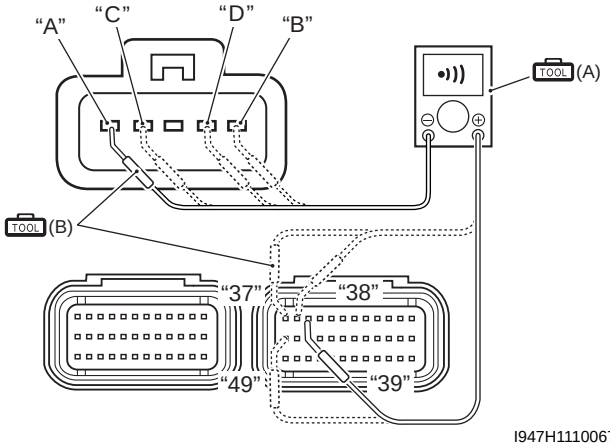
Troubleshooting

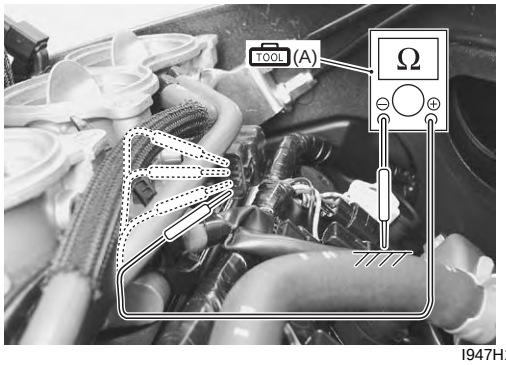
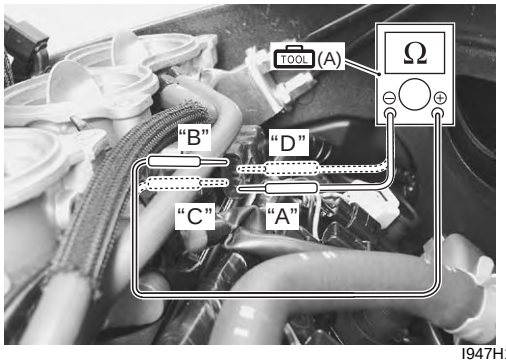
⚠ CAUTION

- **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 unusual value being written in the 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 terminal damage.**

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

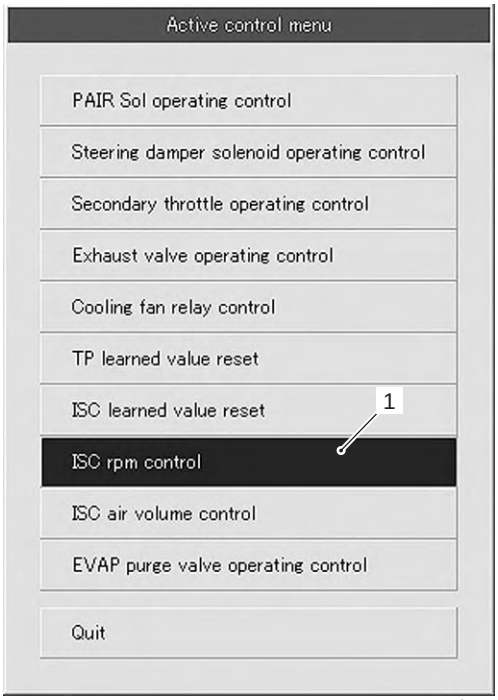
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7). 3) Check the ISC valve coupler (1) for loose or poor contacts. If OK, then check the ISC valve lead wire continuity.  I947H1110066-01 4) Disconnect the ISC valve coupler and ECM coupler. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1). 5) Check the continuity between terminal “A” and terminal “39”, terminal “B” and terminal “38”, terminal “C” and terminal “37”, terminal “D” and terminal “49”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity test (•)))** **ECM couplers (Harness side)**  I947H1110067-01 *Is the continuity OK?*	Go to Step 2.	Bl, Y, G or Br wire open.

Step	Action	Yes	No
2	1) Check the continuity between each ISC valve terminal and ground. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **ISC valve continuity** **∞ Ω (Infinity)** **(Terminal – Ground)**  I947H1110068-01 2) If OK, then measure the resistance (between the Bl wire terminal “A” and Y wire terminal “B”) and (between the G wire terminal “C” and Br wire terminal “D”). **ISC valve resistance** **Approx. 80 Ω at 20 °C (68 °F)** **(Terminal: “A” – Terminal: “B”, Terminal: “C” – Terminal: “D”)**  I947H1110069-01 *Is the resistance OK?*	If wire is OK, intermittent trouble or faulty ECM.	Replace the ISC valve with a new one. Refer to “Throttle Body Removal and Installation” in Section 1D (Page 1D-10).

ACTIVE CONTROL INSPECTION (ISC RPM CONTROL)

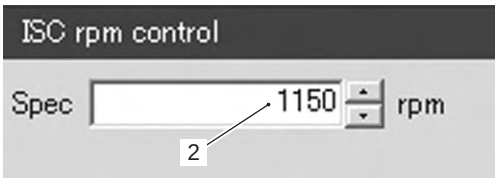
Check 1

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).



I947H1110130-02

5) Check that the “Spec” (2) is idle speed 1 150 ± 100 rpm.
6) Check that the “Desired idle speed” (3) is within the specified idle rpm.



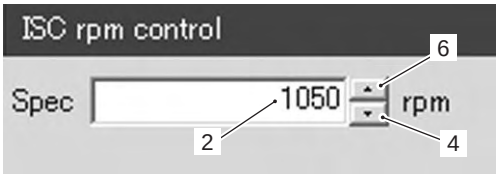
I947H1110152-01

Item		Value	Unit
Engine speed	3	1158	rpm
Desired idle speed		1155	rpm
ISC valve position		46	step
Manifold absolute pressure 1		68.3	kPa

I947H1110153-01

Check 2

1) Click the button (4) and decrease the “Spec” (2) to 1 050 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.



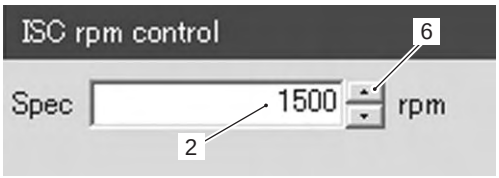
I947H1110154-01

Item		Value	Unit
Engine speed	3	1096	rpm
Desired idle speed		1054	rpm
ISC valve position		38	step
Manifold absolute pressure 1	5	67.6	kPa

I947H1110155-01

Check 3

1) Click the button (6) and increase the “Spec” (2) to 1 500 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.



I947H1110156-01

Item		Value	Unit
Engine speed	3	1544	rpm
Desired idle speed		1506	rpm
ISC valve position		58	step
Manifold absolute pressure 1	5	68.3	kPa

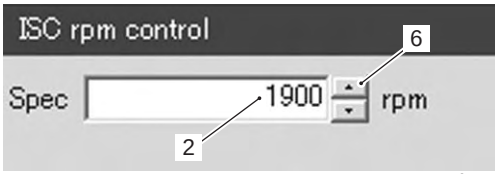
I947H1110157-01

Check 4

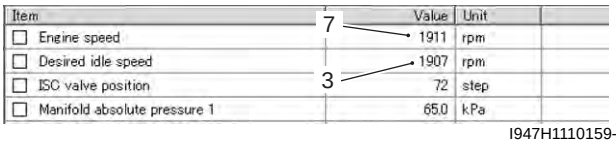
1) Click the button (6) and increase the “Spec” (2) to 1 900 rpm.
2) Check that the “Desired idle speed” (3) is approx. 1 900 rpm.
3) Check that the “Engine speed” (7) is close to 1 900 rpm.

NOTE

Be careful not to increase the “Spec” to 2 000 rpm, or the “Engine speed” may reach the upper limit.



I947H1110158-01



I947H1110159-01

If the ISC valve does not function properly, inspect the ISC valve or replace the ISC valve. Refer to “DTC “C40” (P0505 / P0506 / P0507): ISC Valve Circuit Malfunction” (Page 1A-94) or “Throttle Body Disassembly and Assembly” in Section 1D (Page 1D-11).

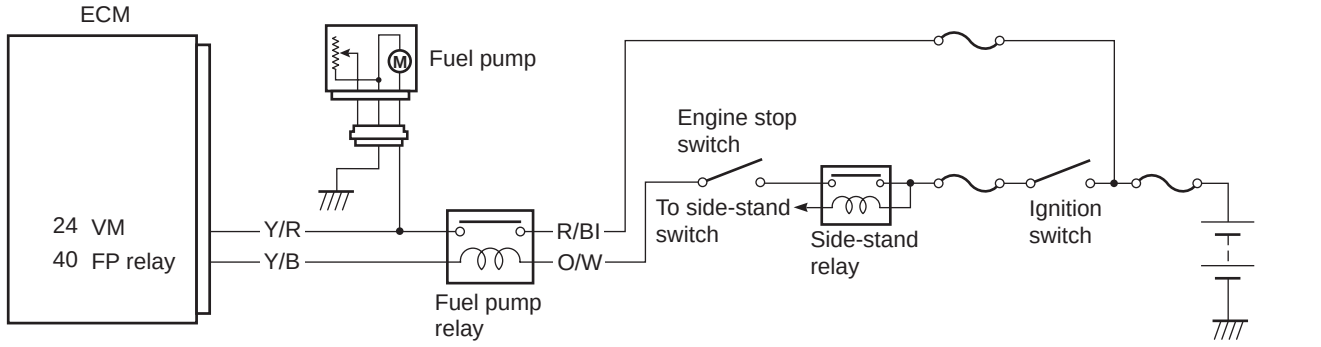
DTC “C41” (P0230-H/L): FP Relay Circuit Malfunction

B947H11104025

Detected Condition and Possible Cause

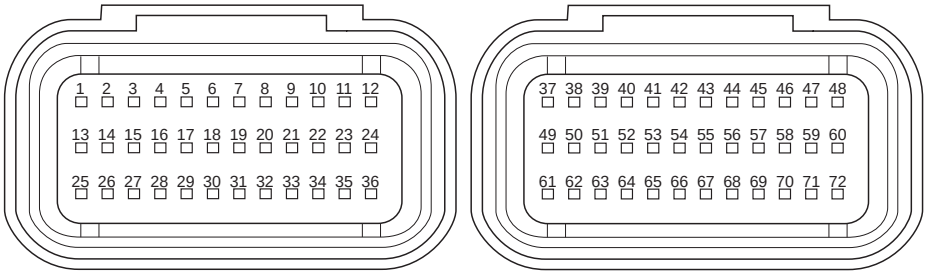
Detected Condition			Possible Cause
C41		No voltage is applied to fuel pump.	• Fuel pump relay circuit open or short. • Fuel pump relay malfunction.
P0230	H	Voltage is applied to fuel pump although fuel pump relay is turned OFF.	• Fuel pump relay switch circuit is shorted to power source. • Faulty pump relay (switch side).
	L	No voltage is applied to fuel pump although fuel pump relay is turned ON.	• Fuel pump relay coil circuit open or short. • Faulty pump relay (coil side).

Wiring Diagram



I837H1110088-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

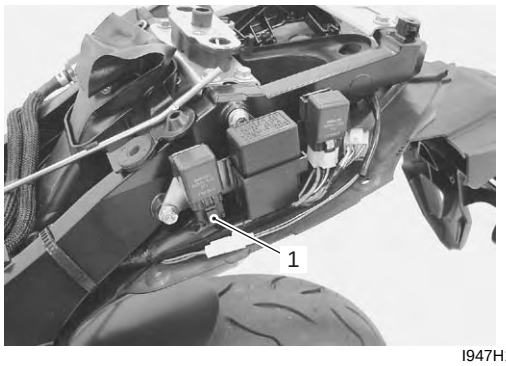
⚠ CAUTION

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

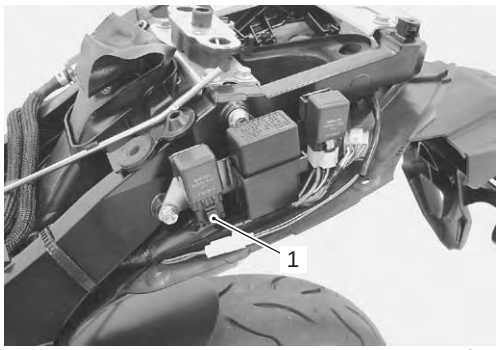
NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures" (Page 1A-14).

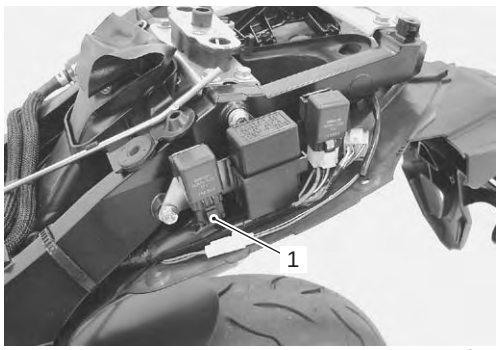
C41 (Use of mode select switch)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the frame covers. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6). 3) Check the FP relay coupler (1) for loose or poor contacts. If OK, then check the FP relay. Refer to "Fuel Pump Relay Inspection" in Section 1G (Page 1G-7).  I947H1110070-01 *Is the FP relay OK?*	• ECM power input signal malfunction. Refer to "DTC "C41" (P2505): ECM Power Input Signal Malfunction" (Page 1A-101). • Y/B or O/W wire open or short or poor "40" connection. • Y/R or R/Bl wire open, shorted or poor "24" connection. • 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).	Replace the FP relay with a new one.

P0230-H (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the FP relay coupler (1) for loose or poor contacts. If OK, then check the FP relay. Refer to “Fuel Pump Relay Inspection” in Section 1G (Page 1G-7).  I947H1110071-01 *Is the FP relay OK?*	• Y/B wire shorted to power source. • Y/B wire shorted to ground. • 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).	Replace the FP relay with a new one.

P0230-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the FP relay coupler (1) for loose or poor contacts. If OK, then check the FP relay. Refer to “Fuel Pump Relay Inspection” in Section 1G (Page 1G-7).  I947H1110072-01 *Is the FP relay OK?*	• Y/B wire open or poor “40” connection. • O/W wire open or shorted to ground. • R/Bl or Y/R wire open or shorted to ground, or poor “24” connection. • If wire and connection are OK, intermittent trouble of 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).	Replace the FP relay with a new one.

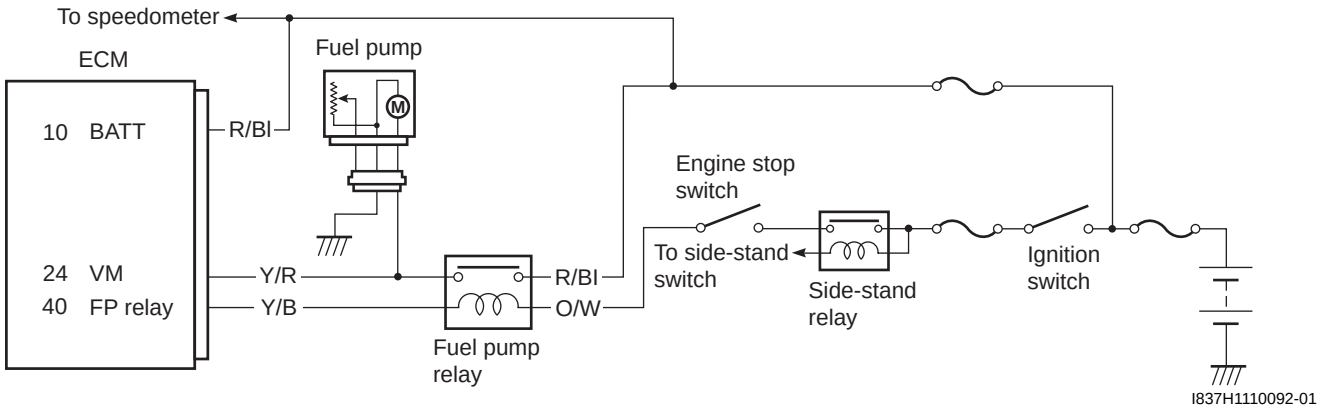
DTC “C41” (P2505): ECM Power Input Signal Malfunction

B947H11104026

Detected Condition and Possible Cause

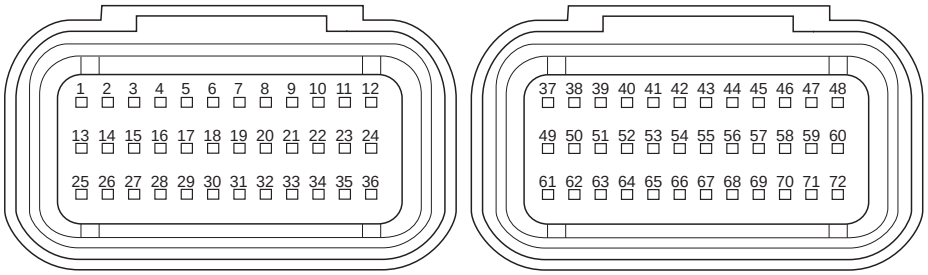
Detected Condition		Possible Cause
C41/P2505	No voltage is applied to the ECM.	• Lead wire/coupler connection of ECM terminal to fuel fuse. • Fuel fuse.

Wiring Diagram



I837H1110092-01

ECM coupler (Harness side)



I837H1110007-02

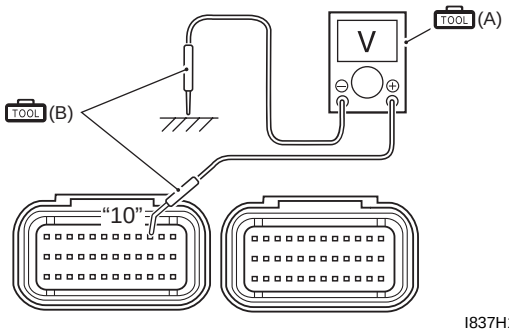
Troubleshooting

⚠ 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 terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the ECM coupler for loose or poor contacts. If OK, then measure the ECM input voltage.  I947H1110073-01 4) Disconnect the ECM coupler. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1). 5) Insert the needle pointed probe to ECM coupler. 6) Measure the voltage between terminal “10” and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **ECM input voltage** **Battery voltage** **((+) terminal: “10” – (–) terminal: Ground)** **ECM couplers (Harness side)**  I837H1110093-01 *Is the voltage OK?*	• Fuel pump relay circuit malfunction. Refer to “DTC “C41” (P0230-H/L): FP Relay Circuit Malfunction” (Page 1A-98). • R/Bl wire open or short or poor “10” connection. • Power source of speedometer shorted to the grand or open. • 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 R/Bl wire.

DTC “C42” (P1650): IG Switch Circuit Malfunction

B947H11104027

Detected Condition and Possible Cause

Detected Condition	Possible Cause
Ignition switch signal is not input to the ECM.	• Ignition system circuit open or short. • ECM malfunction.
When the ID agreement is not verified. ECM does not receive communication signal from the immobilizer antenna. (For E-02, 19, 24, 51)	• Immobilizer system malfunction. (For E-02, 19, 24, 51)

Troubleshooting

NOTE

- **Refer to “Ignition Switch Inspection” in Section 9C (Page 9C-7) for details.**
- **After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).**

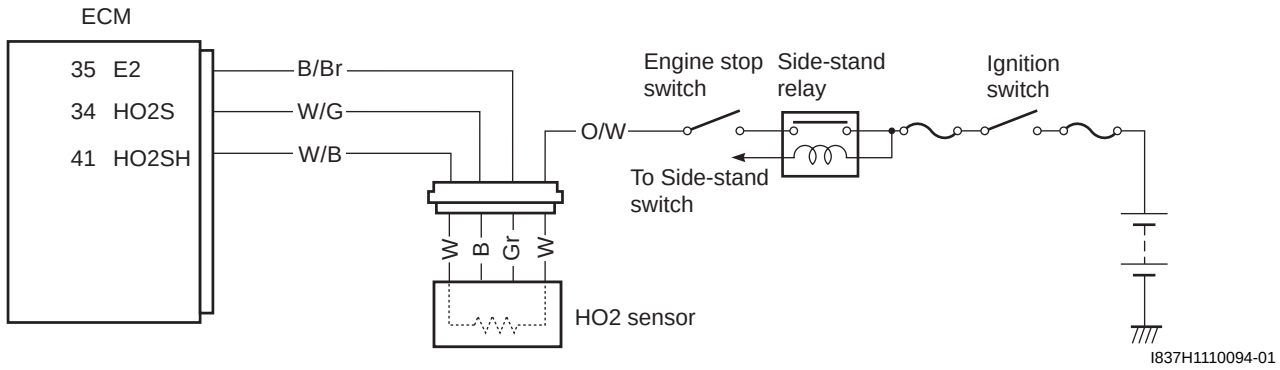
DTC “C44” (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction

B947H11104028

Detected Condition and Possible Cause

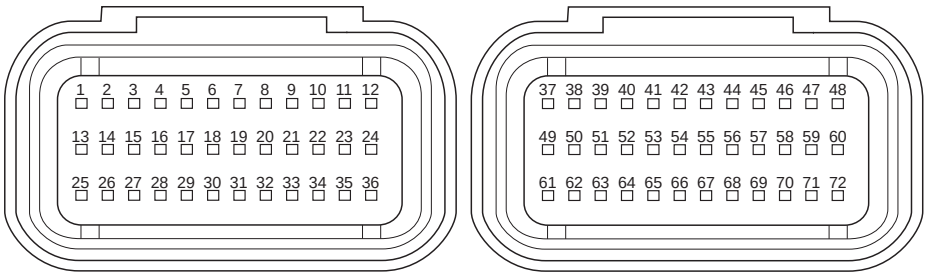
Detected Condition		Possible Cause
C44/P0130	HO2 sensor output voltage is not input to ECM during engine operation and running condition. Sensor voltage > 1.0 V	• HO2 sensor circuit is open or shorted to the power source.
C44/P0135	The heater can not operate so that heater operation voltage is not supplied to the oxygen heater circuit.	• Heated circuit is open or shorted to ground. • Battery voltage is not supply to the HO2 sensor.

Wiring Diagram



I837H1110094-01

ECM coupler (Harness side)



I837H1110007-02

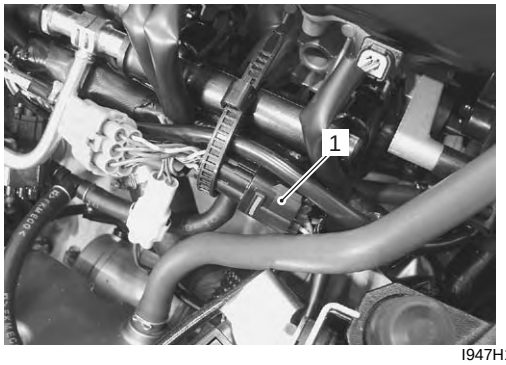
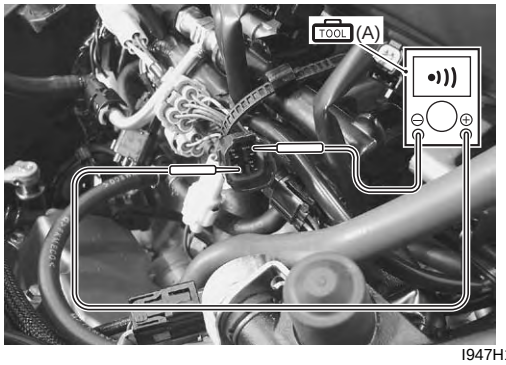
Troubleshooting (When Indicating C44/P0130:)

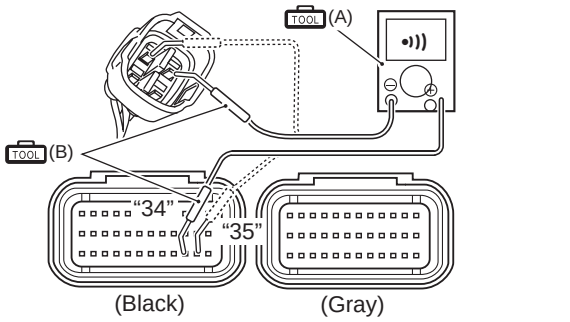
⚠ CAUTION

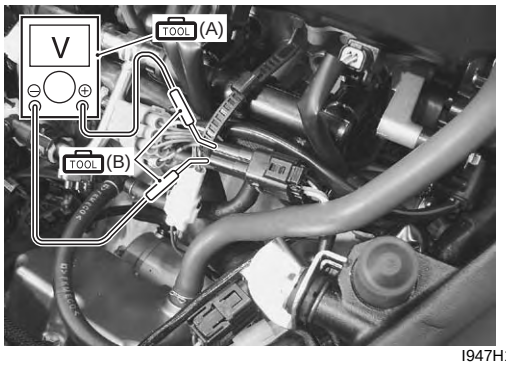
When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures" (Page 1A-14).

Step	Action	Yes	No
1	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 HO2 sensor coupler (1) for loose or poor contacts. If OK, then check the HO2 sensor lead wire continuity.  I947H1110074-01 4) 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** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity test (•))))**  I947H1110075-01	Go to Step 2.	W/G wire shorted to the power source, or W/G or B/Br wire open.

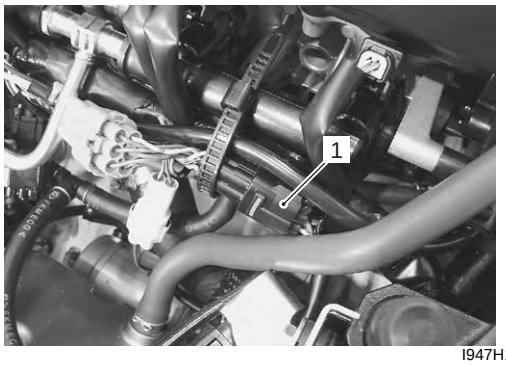
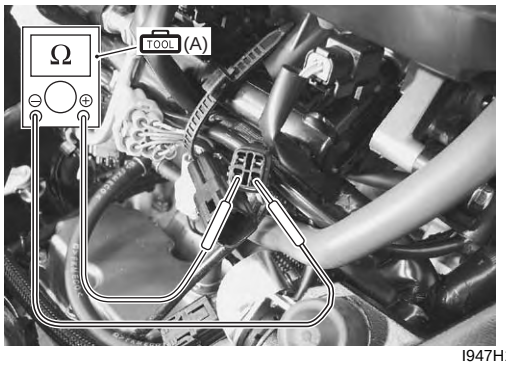
Step	Action	Yes	No
1	6) Disconnect the ECM coupler. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1). 7) Check the continuity between the W/G wire and terminal “34”. Also, check the continuity between the B/Br wire and terminal “35”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity (•))))** **ECM couplers (Harness side)**  I837H1110095-01 *Is the continuity OK?*	Go to Step 2.	W/G wire shorted to the power source, or W/G or B/Br wire open.

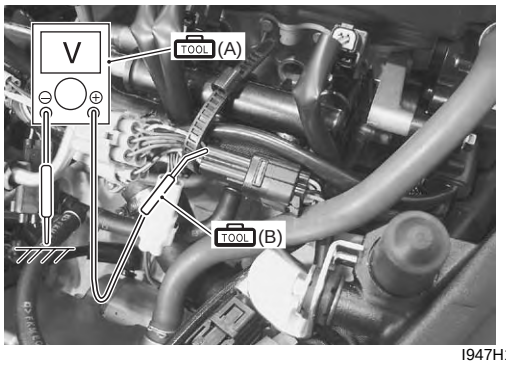
Step	Action	Yes	No
2	1) Connect the ECM coupler and HO2 sensor coupler. 2) Warm up the engine enough. 3) Insert the needle pointed probes to the lead wire coupler. 4) Measure the HO2 sensor output voltage between the W/G (B) wire and B/Br (Gr) wire, in idling condition. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **HO2 sensor output voltage at idle speed** **0.3 V and less** **((+) terminal: W/G (B) – (–) terminal: B/Br (Gr))**  I947H1110076-01 5) If OK, then remove the air cleaner box and pinch the PAIR hose (1) with a proper hose clamp.  I947H1110077-01 6) Measure the HO2 sensor output voltage while holding the engine speed at 5 000 r/min. **HO2 sensor output voltage at 5 000 r/min** **0.6 V and more** **((+) terminal: W/G – (–) terminal: B/Br)** *Is the voltage OK?*	• W/G or B/Br wire open or shorted to the power source, or poor “34” or “35” connection. • 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 inspection it again. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1).	Replace the HO2 sensor with a new one. Refer to “HO2 Sensor Removal and Installation” in Section 1C (Page 1C-8).

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-14).

Step	Action	Yes	No
1	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 HO2 sensor coupler (1) for loose or poor contacts. If OK, then measure the HO2 sensor resistance.  I947H1110078-01 4) Disconnect the HO2 sensor coupler and measure the resistance between terminals. **⚠ CAUTION** **• Temperature of the sensor affects resistance value largely.** **• Make sure that the sensor heater is in atmospheric temperature.** **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **HO2 sensor heater resistance** **6.7 – 9.5 Ω at 23 °C (73 °F)** **(W – W)**  I947H1110079-01 *Is the resistance OK?*	Go to Step 2.	Replace the HO2 sensor with a new one. Refer to "HO2 Sensor Removal and Installation" in Section 1C (Page 1C-8).

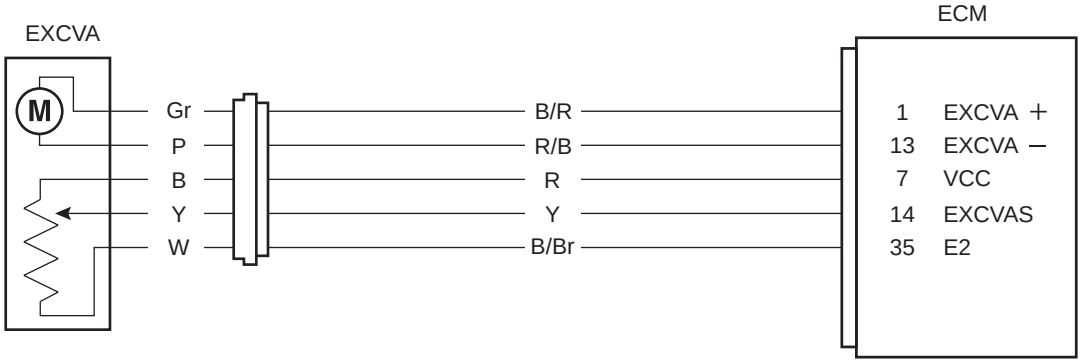
Step	Action	Yes	No
2	1) Connect the HO2 sensor coupler. 2) Insert the needle pointed probes to the lead wire coupler. 3) Turn the ignition switch ON and measure the heater voltage between the W/B wire and ground. If the tester voltage indicates the battery voltage, it is good condition. **NOTE** **Battery voltage can be detected only before starting the engine.** **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **Heater voltage** **Battery voltage** **((+) terminal: W/B – (–) terminal: Ground)**  I947H1110080-01 *Is the voltage OK?*	• O/W or W/B wire open or shorted to ground, or poor “41” connection. • Recheck each terminal and wire harness for open circuit and poor connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • 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 W/B wire or O/W wire. • Loose or poor contacts on the ECM coupler or HO2 sensor coupler.

DTC “C46” (P1657-H/L or P1658): EXCV Actuator Circuit Malfunction

B947H11104029

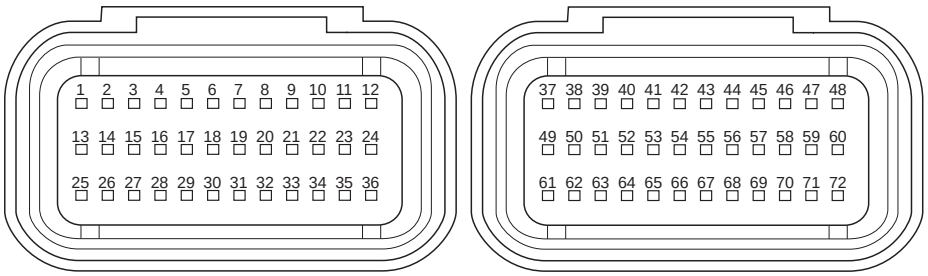
Detected Condition			Possible Cause
C46		The operation signal does not reach the EXCV actuator. EXCVA position sensor voltage low or high 0.14 V ≤ Sensor voltage < 4.9 V (without the above range) EXCVA can not operate properly.	• EXCVA maladjusted. • EXCVA circuit open or short. • EXCVA motor malfunction. • EXCVA position sensor malfunction. • EXCVA position sensor circuit shorted to VCC or ground circuit open. • EXCVA position sensor circuit open or shorted to ground or VCC circuit open. • EXCVA motor circuit open or short. • EXCVA motor malfunction.
P1657	H	Sensor voltage is higher than specified value.	
	L	Sensor voltage is lower than specified value.	
P1658		The operation signal does not reach the EXCVA motor. EXCVA can not operate properly.	

Wiring Diagram



I947H1110081-01

ECM coupler (Harness side)



I837H1110007-02

Troubleshooting

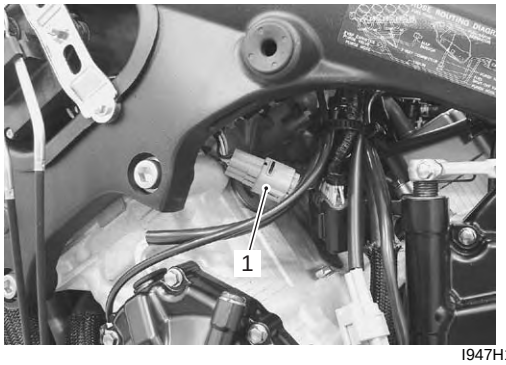
⚠ CAUTION

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

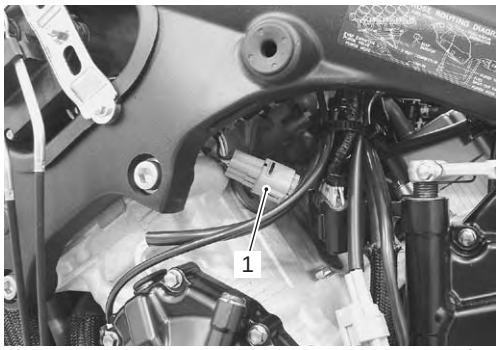
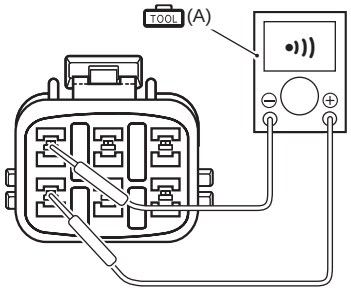
NOTE

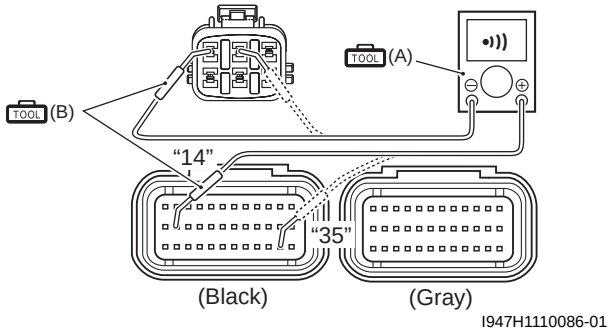
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

C46 (Use of mode select switch)

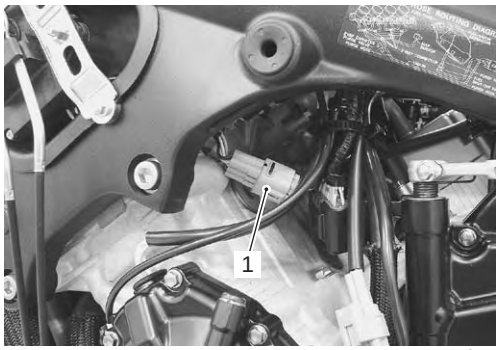
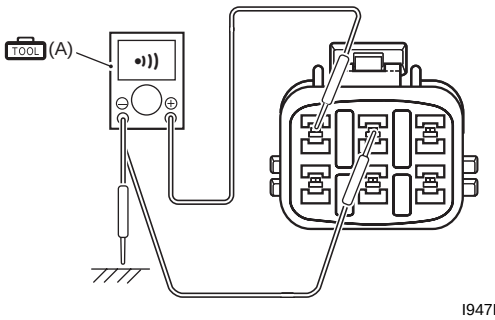
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the EXCVA coupler (1) for loose or poor contacts.  I947H1110082-01 4) Turn the ignition switch ON. 5) Check the operation of the EXCVA. (EXCVA operation order: Full close → Full open → Approx. 80% open)  I947H1110083-01 *Is the operation OK?*	Go to Step 2.	Go to Step 6.

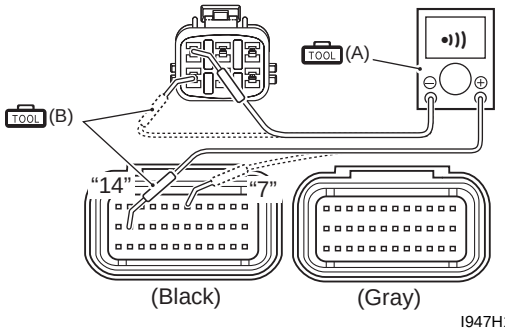
P1657-H (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the EXCVA coupler (1) for loose or poor contacts. If OK, then check the EXCVA position sensor lead wire continuity.  I947H1110084-01 4) Disconnect the EXCVA coupler. 5) Check the continuity between R wire and Y wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•)))**  I947H1110085-01 6) Disconnect the ECM couplers. 7) Check the continuity between Y wire and terminal “14”.	Go to Step 4.	Y wire shorted to VCC, or B/Br wire open.

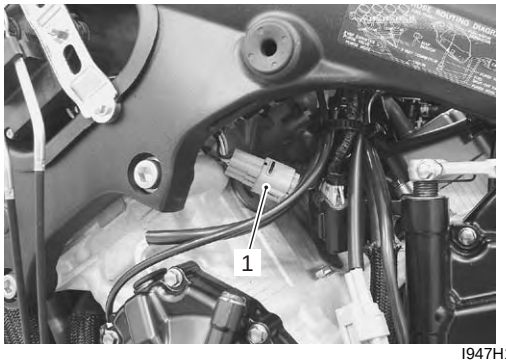
Step	Action	Yes	No
1	8) Also, check the continuity between B/Br wire and terminal “35”. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity (•)))** **EXCVA lead wire continuity** **Continuity (•)))** **ECM couplers (Harness side)**  I947H1110086-01 *Is the continuity OK?*	Go to Step 4.	Y wire shorted to VCC, or B/Br wire open.

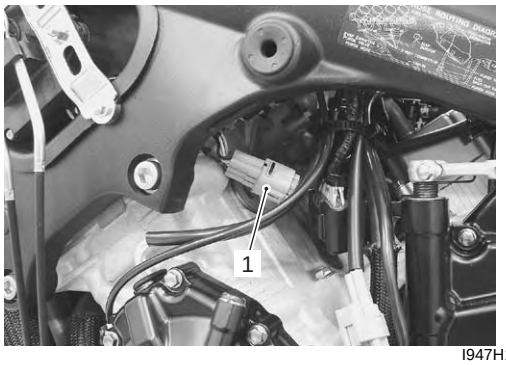
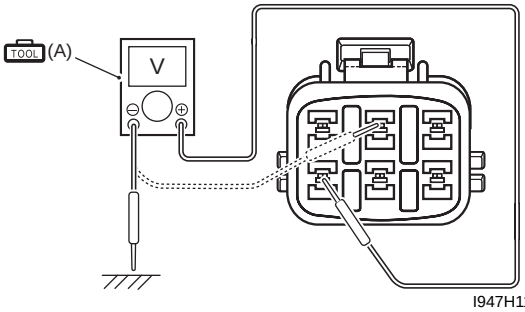
P1657-L (Use of SDS)

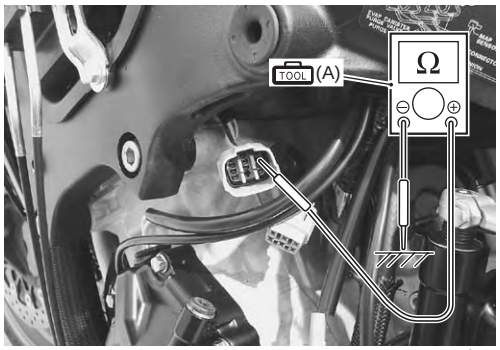
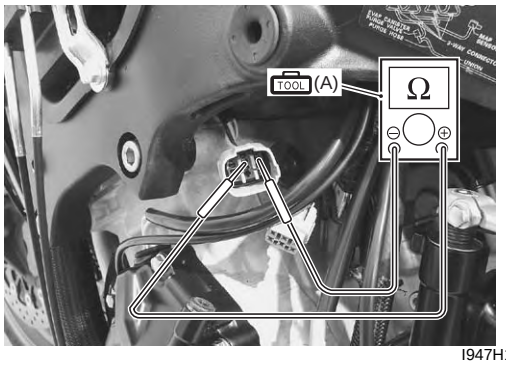
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the EXCVA coupler (1) for loose or poor contacts. If OK, then check the EXCVA position sensor lead wire continuity.  I947H1110087-01 4) Disconnect the EXCVA coupler. 5) Check the continuity between Y wire and ground. 6) Also, check the continuity between Y wire and B/Br wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (•)))**  I947H1110088-01 7) Disconnect the ECM coupler. 8) Check the continuity between Y wire and terminal “14”.	Go to Step 2 and go to Step 4.	R or Y wire open, or Y wire shorted to ground.

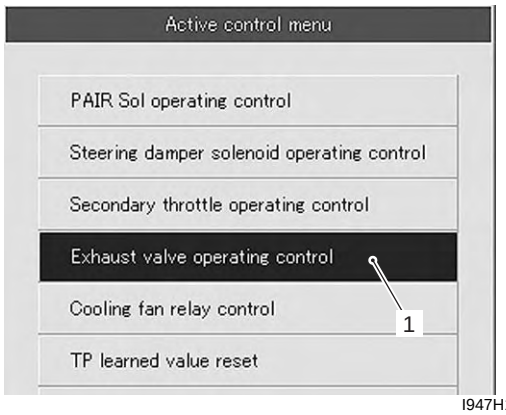
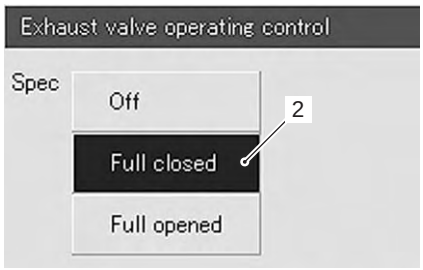
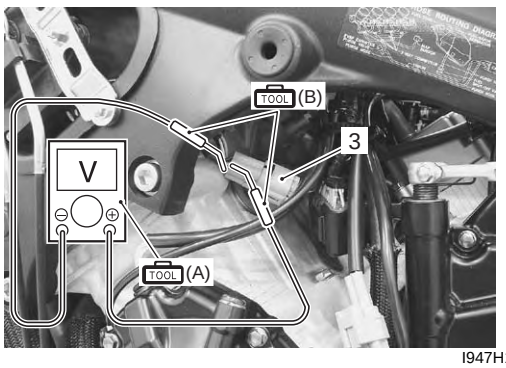
Step	Action	Yes	No
1	9) Also, check the continuity between R wire and terminal "7". **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity (•)))** **EXCVA lead wire continuity** **Continuity (•)))** **ECM couplers (Harness side)**  I947H1110089-01 *Is the continuity OK?*	Go to Step 2 and go to Step 4.	R or Y wire open, or Y wire shorted to ground.

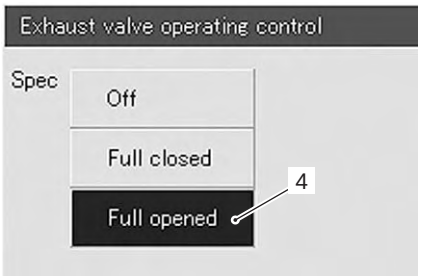
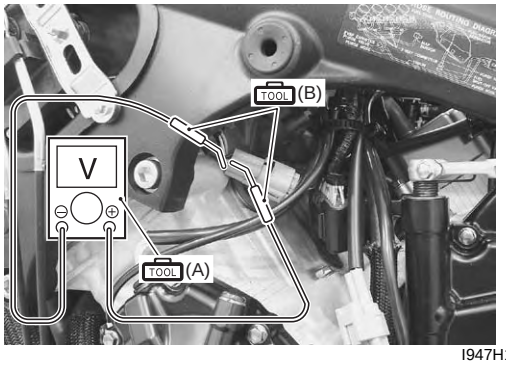
P1658 (Use of SDS)

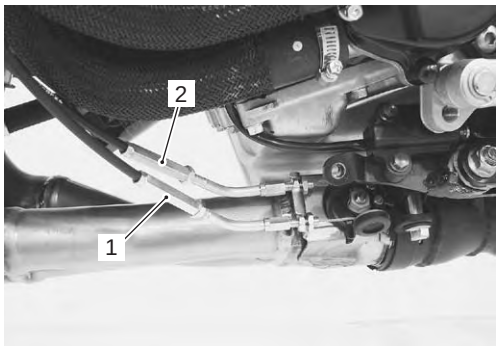
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left side cowling. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6). 3) Check the EXCVA coupler (1) for loose or poor contacts.  I947H1110090-01 *Is the connection OK?*	Go to Step 6.	Loose or poor contacts on the EXCVA coupler.

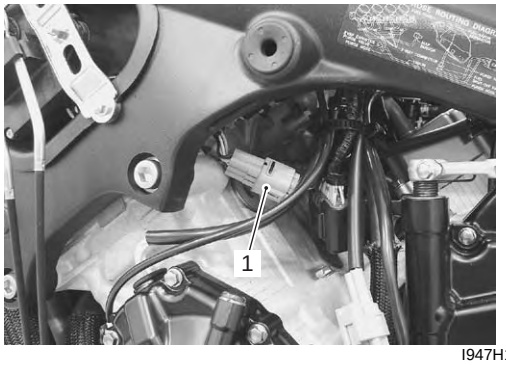
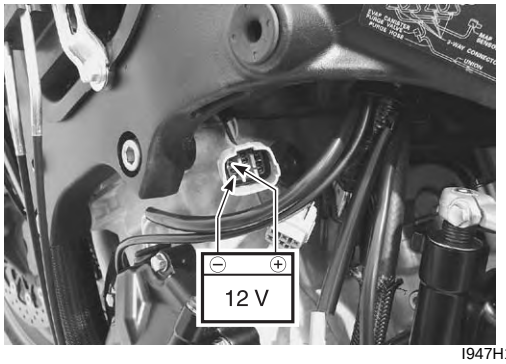
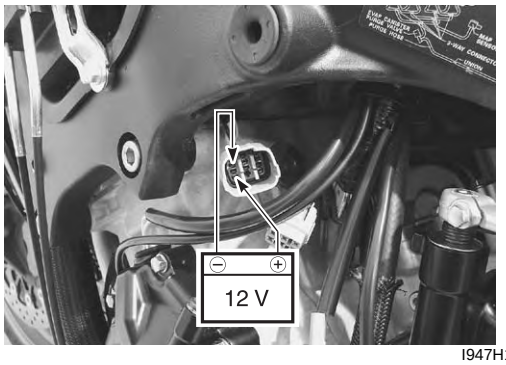
Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Check the installation of EXCV cables. If it is necessary, adjust the EXCV cables. Refer to “EXCV Cable Removal and Installation” in Section 1K (Page 1K-6).  I947H1110091-01 3) Disconnect the EXCVA coupler (1).  I947H1110092-01 4) Turn the ignition switch ON. 5) Measure the voltage between the R wire and ground. 6) If OK, then measure the voltage between the R wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **EXCVA position sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground)** **((+) terminal: R – (–) terminal: B/Br)**  I947H1110093-01 *Is the voltage OK?*	Go to Step 3.	• Loose or poor contacts on the ECM coupler (terminal “7” or “35”). • Open or short circuit in the R or B/Br wire.

Step	Action	Yes	No
3	1) Turn the ignition switch OFF. 2) Check the continuity between Y wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **EXCVA position sensor continuity** **∞ Ω (Infinity)**  I947H1110094-01 3) If OK, then measure the EXCVA position sensor resistance. 4) Connect the EXCVA coupler and set the EXCVA to adjustment position. Refer to “EXCV Cable Removal and Installation” in Section 1K (Page 1K-6). 5) Disconnect the EXCVA coupler and measure the resistance between Y and W wires. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **EXCVA position sensor resistance at adjustment position** **Approx. 3.1 kΩ** **((+) Y – (–) W)**  I947H1110095-02 *Is the resistance OK?*	Go to Step 4.	Replace the EXCVA with a new one.

Step	Action	Yes	No
4	1) Turn the ignition switch OFF. 2) Connect the EXCVA coupler. 3) Set up the SDS tools. Refer to “Self-Diagnostic Procedures” (Page 1A-12). 4) Turn the ignition switch ON. 5) Click “Exhaust valve operating control” (1).  I947H1110131-01 6) Click “Full closed” (2).  I947H1110132-01 7) Insert the needle pointed probes into the back side of the EXCVA coupler (3). ((+) Y – (–) W) 8) Measure the EXCVA position sensor output voltage at EXCV fully closed position. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **EXCVA position sensor output voltage** **EXCV is fully closed: 0.45 – 1.4 V** **((+) Y – (–) W)**  I947H1110097-01	Replace the ECM with a known good one, and inspect it again.	Go to Step 5.

Step	Action	Yes	No
4	9) Click “Full opened” (4).  I947H1110098-02 10) Measure the EXCVA position sensor output voltage at EXCV fully opened position. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **EXCVA position sensor output voltage** **EXCV is fully opened: 3.6 – 4.55 V** **((+) Y – (–) W)**  I947H1110099-01 *Is the voltage OK?*	Replace the ECM with a known good one, and inspect it again.	Go to Step 5.

Step	Action	Yes	No
5	1) If the EXCVA position sensor output voltage is 0.45 V and less at EXCV fully closed position, adjust the output voltage to the specified value by turning the No. 1 cable adjuster (1). Refer to “EXCV Cable Removal and Installation” in Section 1K (Page 1K-6). 2) Repeat the procedure in Step 4 until the output voltage is set within the specified value. (If C46/P1657 code is indicated after adjusting the voltage, increase the voltage to 0.9 V). **⚠ CAUTION** • **Adjusting the cable with the EXCV fully opened or fully closed can damage the EXCVA. Be sure to adjust the cable with the EXCV set in the adjustment position. Refer to “EXCV Cable Removal and Installation” in Section 1K (Page 1K-6).** • **Do not turn the EXCVA pulley using a wrench.** 3) If the EXCVA position sensor output voltage is 4.55 V and more at EXCV fully opened position, adjust the output voltage to the specified value by turning the No. 2 cable adjuster (2). Refer to “EXCV Cable Removal and Installation” in Section 1K (Page 1K-6). Repeat the procedure in Step 4 until the output voltage is set within the specified value. **EXCVA position sensor output voltage** **EXCV is fully closed: 0.45 ≤ Output voltage ≤ 1.4** **EXCV is fully opened: 3.6 ≤ Output voltage ≤ 4.55**  I947H1110100-01 *Is the voltage OK?*	Replace the ECM with a known good one, and inspect it again.	Replace the EXCVA with a new one.

Step	Action	Yes	No
6	1) Turn the ignition switch OFF. 2) Disconnect the EXCVA coupler (1).  I947H1110101-01 3) Apply 12 V to the terminals and check the operation of EXCVA.  I947H1110102-01 4) Then, switch the wires supplied 12 V and check the operation of EXCVA. (Check the operation of EXCVA in both way.)  I947H1110103-01 *Is the operation OK?*	• Loose or poor contacts on the EXCVA or ECM coupler (terminal “13” or “1”). • Open or short circuit in the B/R wire or R/B wire. • 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.	• Replace the EXCVA with a new one. • Inspect that the EXCV and two cables move smoothly.

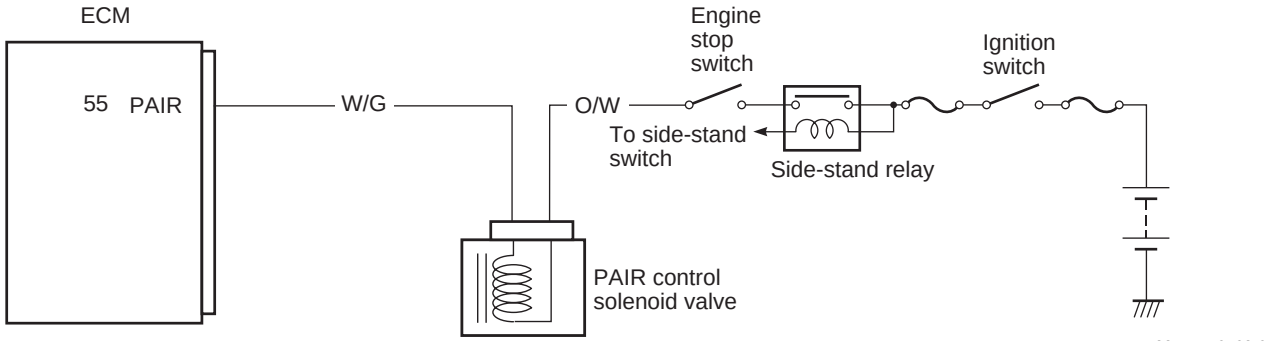
DTC “C49” (P1656): PAIR Control Solenoid Valve Circuit Malfunction

B947H11104030

Detected Condition and Possible Cause

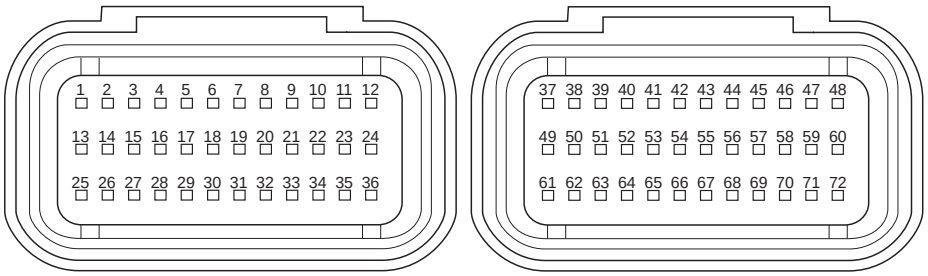
Detected Condition	Possible Cause
PAIR control solenoid valve voltage is not input to ECM.	• PAIR control solenoid valve circuit open or short. • PAIR control solenoid valve malfunction. • ECM malfunction.

Wiring Diagram



I837H1110103-01

ECM coupler (Harness side)



I837H1110007-02

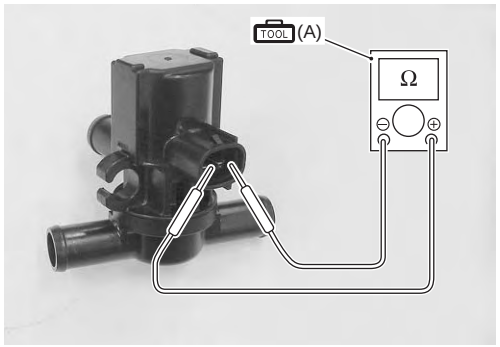
Troubleshooting

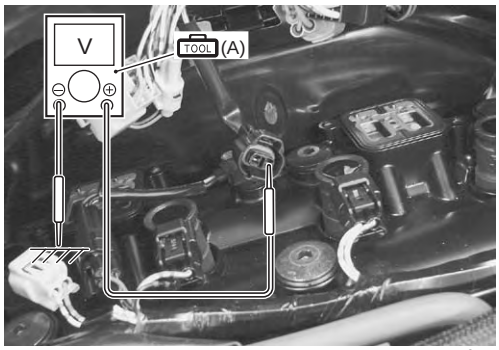
⚠ CAUTION

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

NOTE

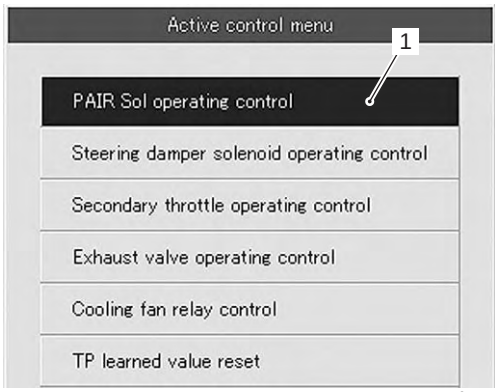
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7). 3) Check the PAIR control solenoid valve coupler (1) for loose or poor contacts. If OK, then measure the PAIR control solenoid valve resistance.  I947H1110143-01 4) Remove the PAIR control solenoid valve. Refer to “PAIR Control Solenoid Valve Removal and Installation” in Section 1B (Page 1B-9). 5) Measure the resistance between terminals. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **PAIR control solenoid valve resistance** **20 – 24 Ω at 20 – 30 °C (68 – 86 °F)** **(Terminal – Terminal)**  I947H1110105-01 *Is the resistance OK?*	Go to Step 2.	Replace the PAIR control solenoid valve with a new one. Refer to “PAIR Control Solenoid Valve Removal and Installation” in Section 1B (Page 1B-9).

Step	Action	Yes	No
2	1) Turn the ignition switch ON. 2) Measure the voltage between the O/W wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **PAIR control solenoid valve voltage** **Battery voltage** **((+) terminal: O/W – (–) terminal: Ground)**  I947H1110106-02 *Is the voltage OK?*	• W/G wire open or shorted to ground, or poor “55” 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.

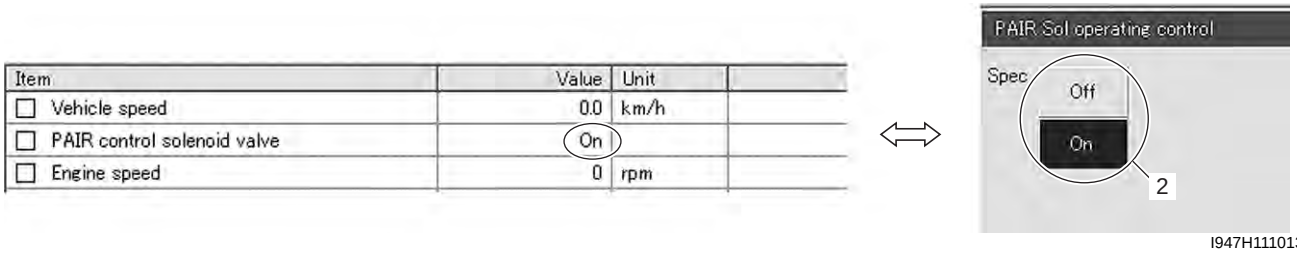
Active Control Inspection

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).



I947H1110133-01

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



I947H1110134-01

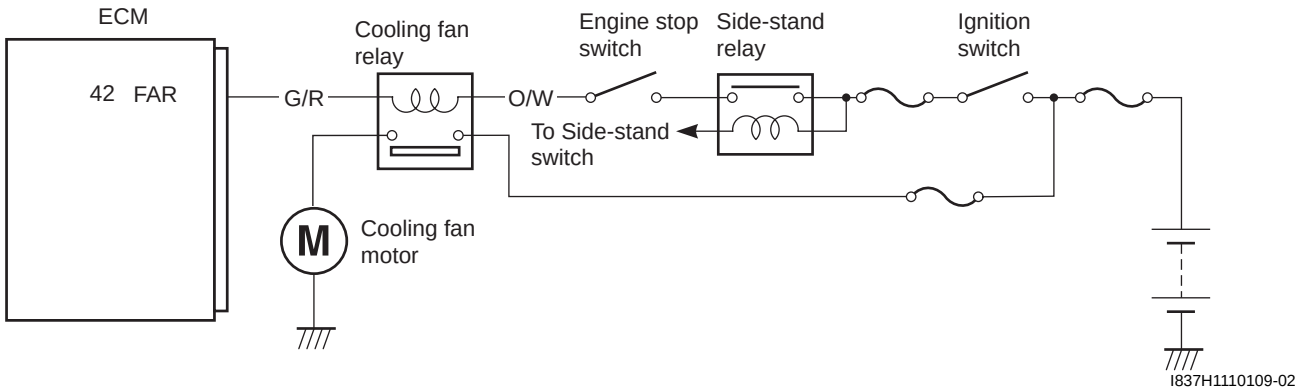
DTC “C60” (P0480): Cooling Fan Relay Circuit Malfunction

B947H11104031

Detected Condition and Possible Cause

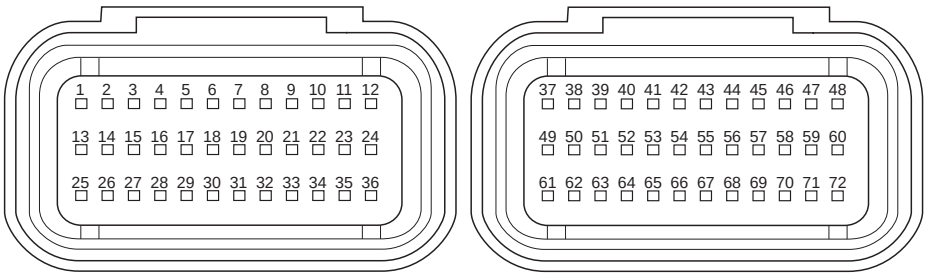
Detected Condition	Possible Cause
Cooling fan relay signal is not input to ECM.	• Cooling fan relay circuit open or short. • ECM malfunction.

Wiring Diagram



I837H1110109-02

ECM coupler (Harness side)



I837H1110007-02

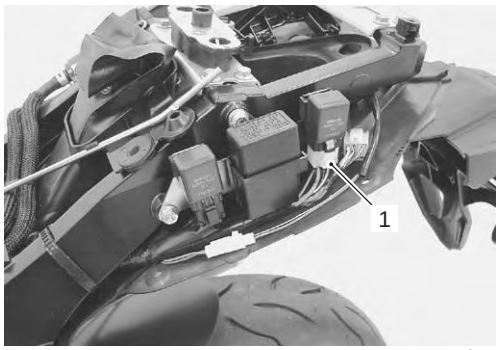
Troubleshooting

⚠ 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 terminal damage.

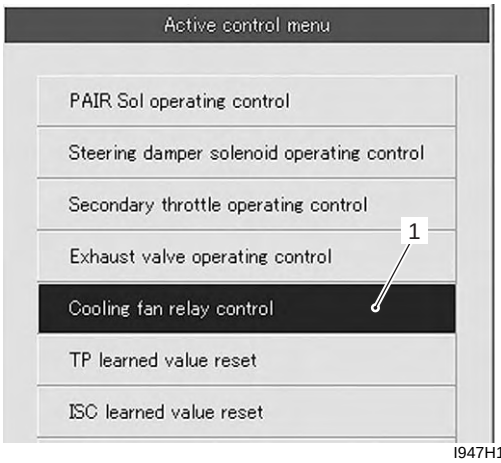
NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6). 3) Check the cooling fan relay (1) coupler for loose or poor contacts. If OK, then inspection the cooling fan relay. Refer to “Cooling Fan Inspection” in Section 1F (Page 1F-9).  I947H1110107-01 *Is the cooling fan relay OK?*	• O/W and G/R wire open or shorted to ground, or poor “42” connection. • 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).	Replace the cooling fan relay with a new one.

Active Control Inspection

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

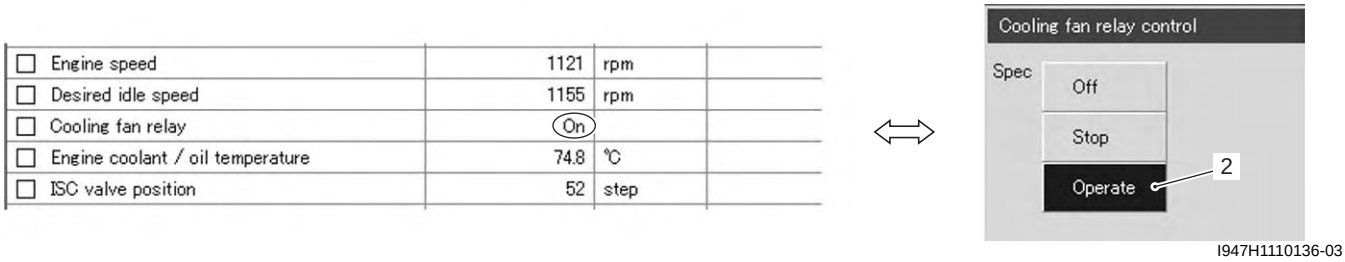


I947H1110135-01

4) Click the “Operate” (2).
At this time, if an operation sound is heard from the cooling fan relay and cooling fan motors are operated, the function is normal.

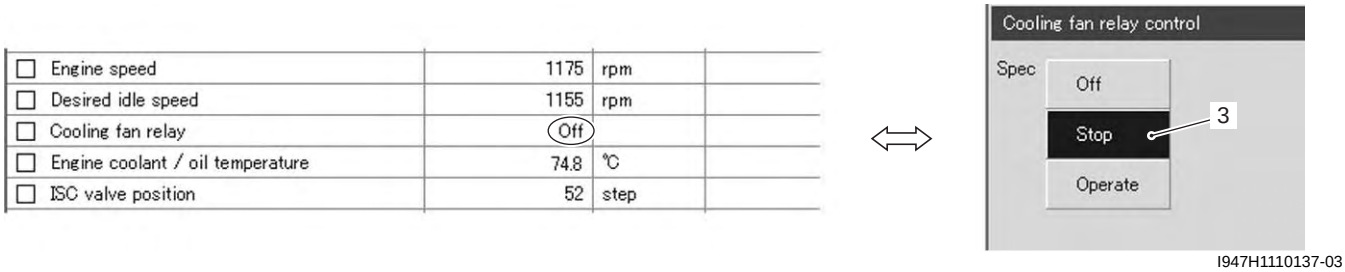
NOTE

The cooling fan relay and cooling fan motor inspection is operational at any engine coolant temperature until reaching 100 °C (212 °F). In a hot engine condition with the intake air temperature exceeding 40 °C (104 °F), however, the engine coolant temperature at which the inspection is operational will be restricted to 95 °C (203 °F).



I947H1110136-03

5) Click the “Stop” (3) to check the operation properly.

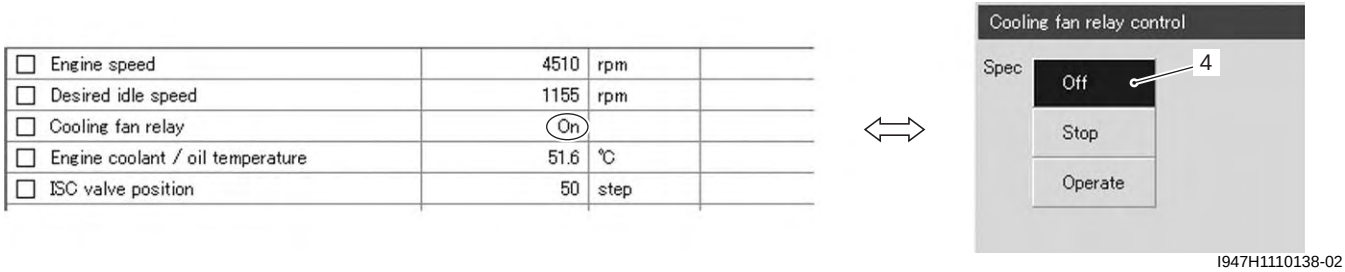


I947H1110137-03

6) Click the “Off” (4) to check the cooling fan relay and cooling fan motor operation.

NOTE

- **This inspection should be begun from when the engine coolant temperature is below 50 °C (122 °F). Check that the cooling fan relay operates for a few seconds as the engine coolant temperature reaches each temp. of 50 °C (122 °F), 70 °C (158 °F), 90 °C (194 °F) and 110 °C (230 °F)/above 4 000 r/min. It is cooling fan motor malfunction or its circuit failure when the motor would not run even if the relay turns ON.**
- **There is a tolerance of operating temperature of cooling fan relay.**



I947H1110138-02

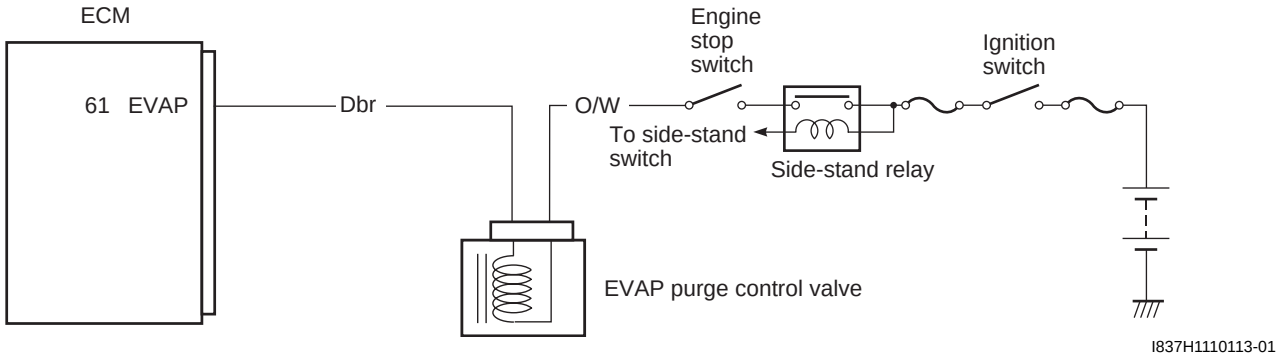
DTC “C62” (P0443): EVAP System Purge Control Solenoid Valve Circuit Malfunction (E-33 only)

B947H11104032

Detected Condition and Possible Cause

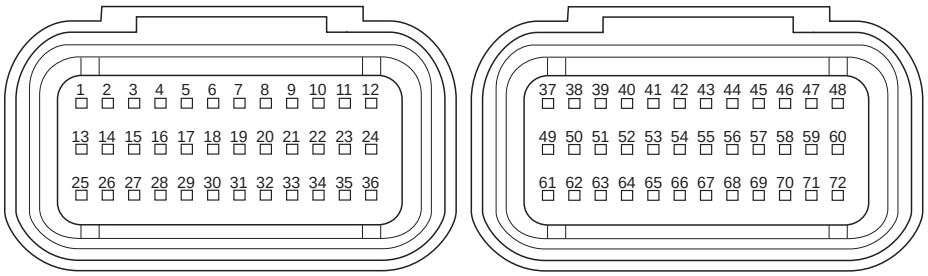
Detected Condition	Possible Cause
EVAP system purge control valve voltage is not input to ECM.	• EVAP system purge control valve circuit open or short. • EVAP system purge control valve malfunction. • ECM malfunction.

Wiring Diagram



I837H1110113-01

ECM coupler (Harness side)



I837H1110007-02

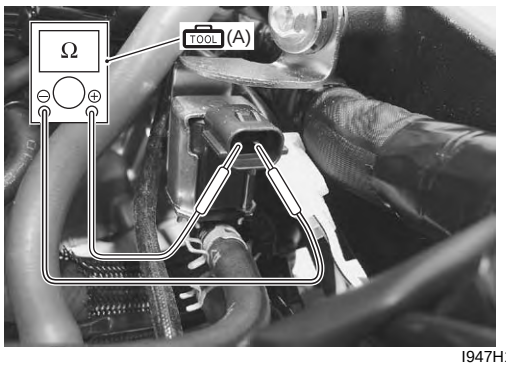
Troubleshooting

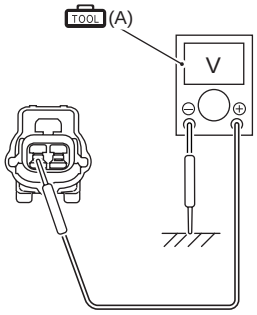
⚠ CAUTION

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

NOTE

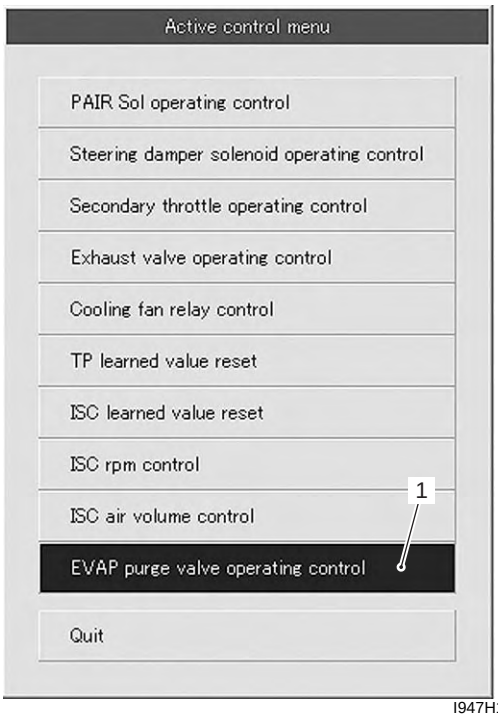
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	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 EVAP system purge control valve coupler (1) for loose or poor contacts. If OK, then measure the EVAP system purge control valve resistance.  I947H1110108-01 4) Disconnect the EVAP system purge control valve coupler. 5) Measure the resistance between terminals. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **EVAP system purge control valve resistance** **Approx. 32 Ω at 20 °C (68 °F)** **(Terminal – Terminal)**  I947H1110109-01 *Is the resistance OK?*	Go to Step 2.	Replace the EVAP system purge control with a new one. Refer to “Evaporative Emission Control System Removal and Installation (Only for E-33)” in Section 1B (Page 1B-12).

Step	Action	Yes	No
2	1) Turn the ignition switch ON. 2) Measure the voltage between the O/W wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **EVAP system purge control valve voltage** **Battery voltage** **((+) terminal: O/W – (–) terminal: Ground)**  I718H2110003-01 *Is the voltage OK?*	• Dbr wire open or shorted to ground, or poor “61” 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.

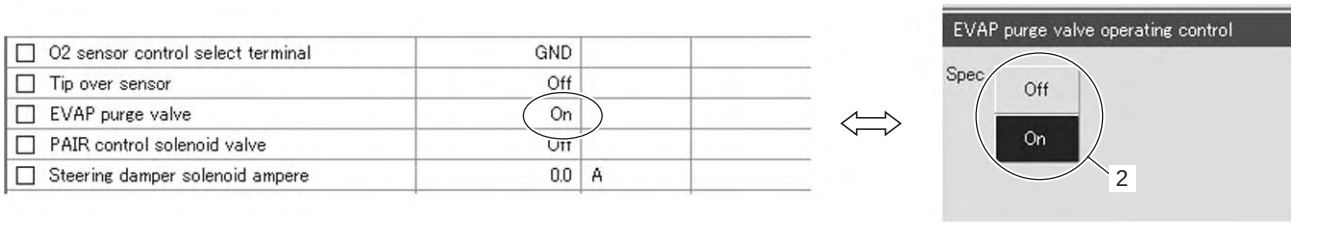
Active Control Inspection

1) Set up the SDS tool. (Refer to SDS operation manual for further details.)
2) Turn the ignition switch ON.
3) Click “EVAP purge valve operating control” (1).



I947H1110139-01

4) Click each button (2). At this time, if an operating sound is heard from the EVAP system purge control valve, the function is normal.



I947H1110140-01

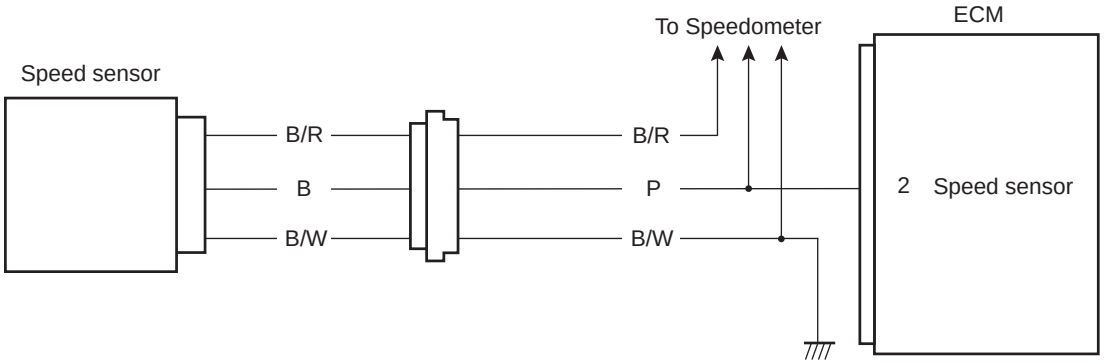
DTC “C91” (P0500): Vehicle Speed Sensor Circuit Malfunction

B947H11104033

Detected Condition and Possible Cause

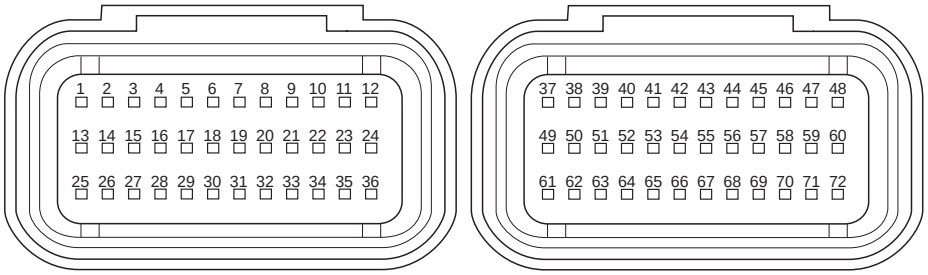
Detected Condition	Possible Cause
Speedometer does not receive signal from the vehicle speed sensor for more than 6 sec. when the motorcycle is running. ECM does not receive signal from the vehicle speed sensor for more than 6 sec. when the motorcycle is running. Failure in communication between ECM and speedometer with reference to vehicle speed.	• Speed sensor circuit open or short. • Speed sensor malfunction. • Speedometer malfunction. • ECM malfunction.

Wiring Diagram



I837H1110116-01

ECM coupler (Harness side)



I837H1110007-02

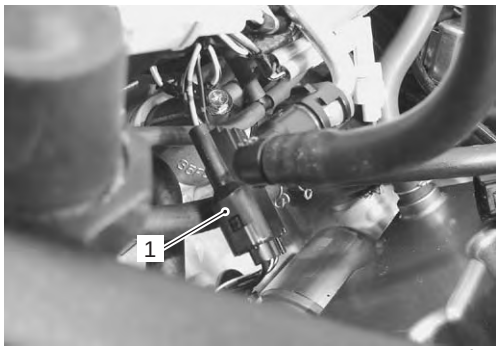
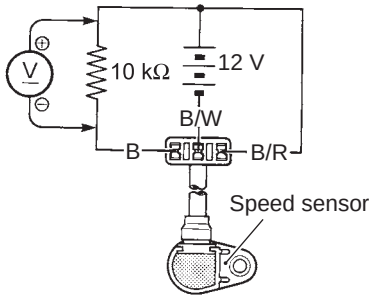
Troubleshooting

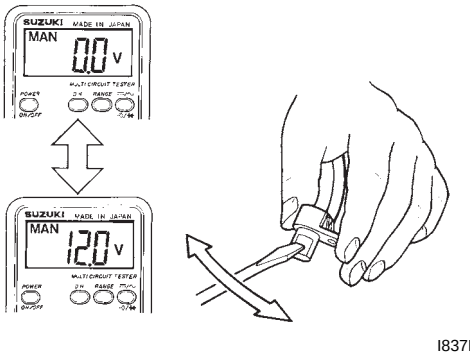
⚠ CAUTION

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

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	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 speed sensor coupler (1) for loose or poor contacts. If OK, remove the speed sensor. Refer to “Speed Sensor Removal and Installation” in Section 9C (Page 9C-5).  I947H1110110-01 4) Connect 12 V battery, 10 kΩ resistor and the multi-circuit tester as shown in the figure. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)**  I837H1110118-01	• P wire open or shorted to ground. • Loose or poor contacts on the speed sensor coupler or ECM coupler (terminal “2”). • If wires 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.	• Inspect that metal particles or foreign material stuck on the speed sensor and rotor tip. • If there are no metal particles and foreign material, then replace the speed sensor with a new one.

Step	Action	Yes	No
1	5) Under this condition, if a suitable screwdriver touching the pick-up surface of the speed sensor is moved, the tester reading voltage changes (0 V → 12 V or 12 V → 0 V). If the tester reading voltage does not change, replace the speedometer sensor with a new one. **NOTE** **While testing, the highest voltage reading should be the same as the battery voltage (12 V).**  I837H1110119-01 *Is the voltage OK?*	• P wire open or shorted to ground. • Loose or poor contacts on the speed sensor coupler or ECM coupler (terminal “2”). • If wires 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.	• Inspect that metal particles or foreign material stuck on the speed sensor and rotor tip. • If there are no metal particles and foreign material, then replace the speed sensor with a new one.

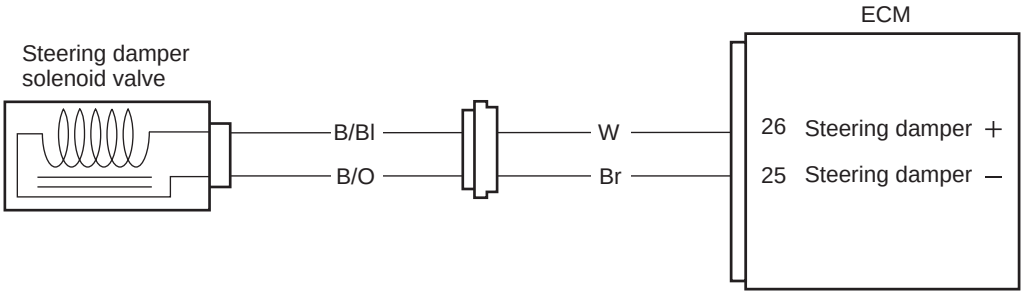
DTC “C93” (P1769): Steering Damper Solenoid Valve Circuit Malfunction

B947H11104034

Detected Condition and Possible Cause

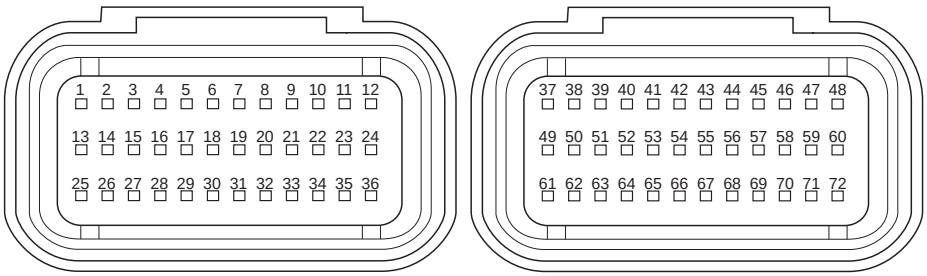
Detected Condition			Possible Cause
C93		Steering damper control current does not flow to the solenoid valve. With IG turned ON, ECM detects a failure of internal circuit element. Solenoid current does not converge to the target value. Battery voltage is 10 V or below with the engine running.	• Steering damper solenoid valve circuit interrupter element shorted. • Feedback current convergence failure. • Low battery voltage. • ECM malfunction.
P1769	H	Steering damper control current is higher than specified value. An abnormal current is detected during the vehicle standstill. Solenoid current is 0.7 A or above.	• Steering damper solenoid valve circuit shorted to VCC.
	L	Steering damper control current is lower than specified value. With IG turned ON, ECM detects a discontinuity. An abnormal current is detected during the vehicle standstill.	• Steering damper solenoid valve circuit open. • Steering damper solenoid valve circuit shorted.

Wiring Diagram



I947H1110111-02

ECM coupler (Harness side)



I837H1110007-02

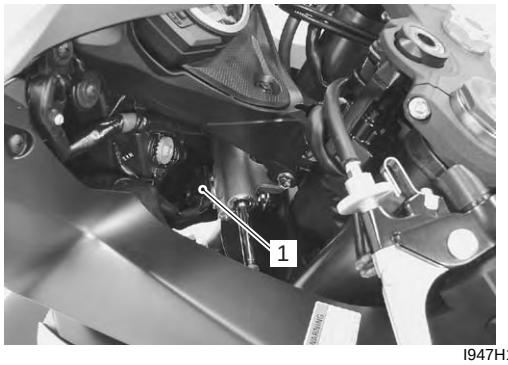
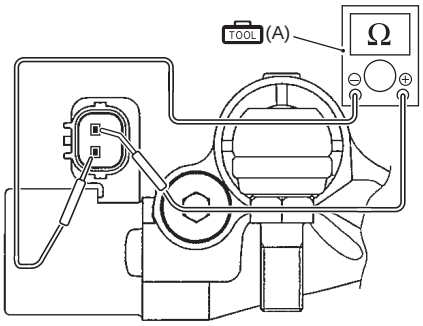
Troubleshooting

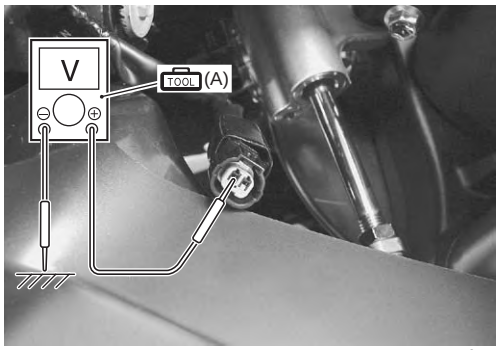
⚠ CAUTION

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

NOTE

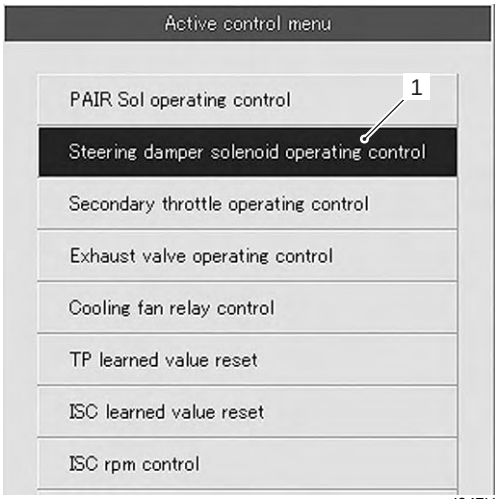
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures” (Page 1A-14).

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Check the steering damper solenoid valve coupler (1) for loose or poor contacts. If OK, then measure the steering damper solenoid valve resistance.  I947H1110112-01 3) Disconnect the steering damper solenoid valve coupler. 4) Measure the steering damper solenoid valve resistance. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Resistance (Ω)** **Steering damper solenoid valve resistance** **Approx. 12.5 Ω at 20 °C (68 °F)**  I837H1110121-01 *Is the resistance OK?*	Go to Step 2.	Replace the steering damper with a new one.

Step	Action	Yes	No
2	1) Turn the ignition switch ON. 2) Measure the voltage between B/Bl wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Steering damper solenoid valve voltage** **Approx. 10 V when battery is fully charged condition ((+) terminal: B/Bl – (–) terminal: Ground)**  I947H1110113-01 *Is the voltage OK?*	• B/Bl (W) wire shorted to VCC, or poor “26” connection failure. • B/O (Br) wire open or shorted to ground, or poor “25” 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.	• Low battery voltage or fuse is blown. • B/Bl (W) wire open or shorted to ground, or poor “26” 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.

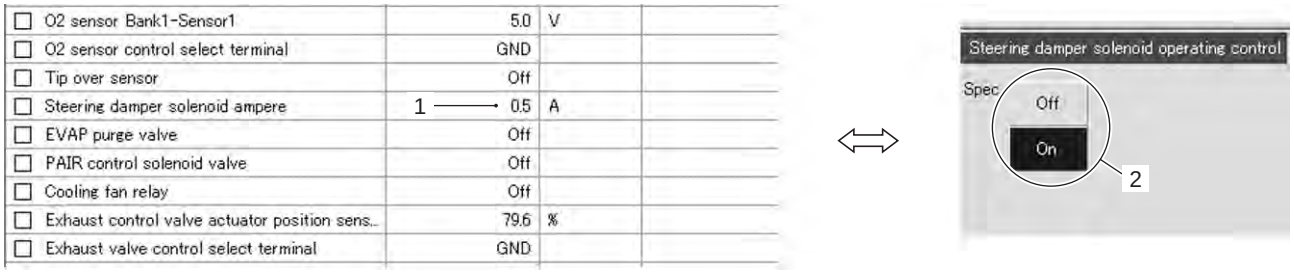
Active Control Inspection

1) Set up the SDS tool. (Refer to SDS operation manual for further details.)
2) Raise the front wheel off the ground.
3) Turn the ignition switch ON.
4) Click “Steering damper solenoid operating control” (1).



I947H1110141-01

5) Click each button (2) ON/OFF while turning the handlebars left and right.



I947H1110142-01

NOTE

At this time, if the steering damping resistance changes from light to heavy by switching ON/OFF, the function is normal.

Specifications

Service Data

B947H11107001

Injector + Fuel Pump + Fuel Pressure Regulator

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

FI Sensors

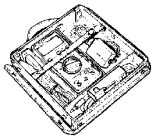
Item	Standard/Specification		Note
CKP sensor resistance	142 – 194 Ω		
CKP sensor peak voltage	0.5 V and more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.7 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.4 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	0.15 – 4.85 V		
IAT sensor resistance	Approx. 2.58 kΩ at 20 °C (68 °F)		
AP sensor input voltage	4.5 – 5.5 V		
AP sensor output voltage	Approx. 3.6 V at 100 kPa (760 mmHg)		
TO sensor resistance	16.5 – 22.3 kΩ		
TO sensor voltage	Normal	0.4 – 1.4 V	
	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
HO2 sensor output voltage	0.3 V and less at idle speed		
	0.6 V and more at 5 000 r/min		
HO2 sensor heater resistance	6.7 – 9.5 Ω at 23 °C (73 °F)		
PAIR control solenoid valve resistance	20 – 24 Ω at 20 – 30 °C (68 – 86 °F)		
STP sensor input voltage	4.5 – 5.5 V		
STP sensor output voltage	Closed	Approx. 0.7 V	
	Opened	Approx. 4.1 V	
STVA resistance	Approx. 6.5 Ω		
EXCVA position sensor input voltage	4.5 – 5.5 V		
EXCVA position sensor output voltage	Closed	0.45 – 1.4 V	
	Opened	3.6 – 4.55 V	
EXCVA position sensor resistance	Approx. 3.1 kΩ		At adjustment position
EVAP system purge control solenoid valve resistance	Approx. 32 Ω at 20 °C (68 °F)		E-33 only
ISC valve resistance	Approx. 80 Ω at 20 °C (68 °F)		
Steering damper solenoid valve resistance	Approx. 12.5 Ω at 20 °C (68 °F)		
Steering damper solenoid valve voltage	Approx. 10 V		Battery fully charged

Special Tools and Equipment

Special Tool

B947H11108001

09900–25008
Multi circuit tester set



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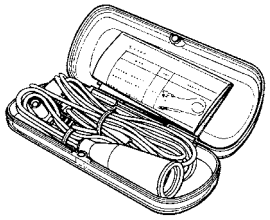
09900–25009
Needle-point probe set



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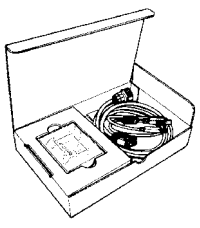
09904–41010
SUZUKI Diagnostic system set



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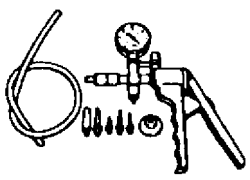
09917–47011
Vacuum pump gauge set



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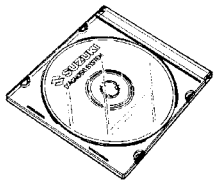
09930–82720 Mode selection switch ☞(Page 1A-4) / ☞(Page 1A-12) / ☞(Page 1A-12) 	99565–01010–020 CD-ROM Ver.20 ☞(Page 1A-13) / ☞(Page 1A-16) 

Emission Control Devices

Precautions

Precautions for Emission Control Devices

B947H11200001

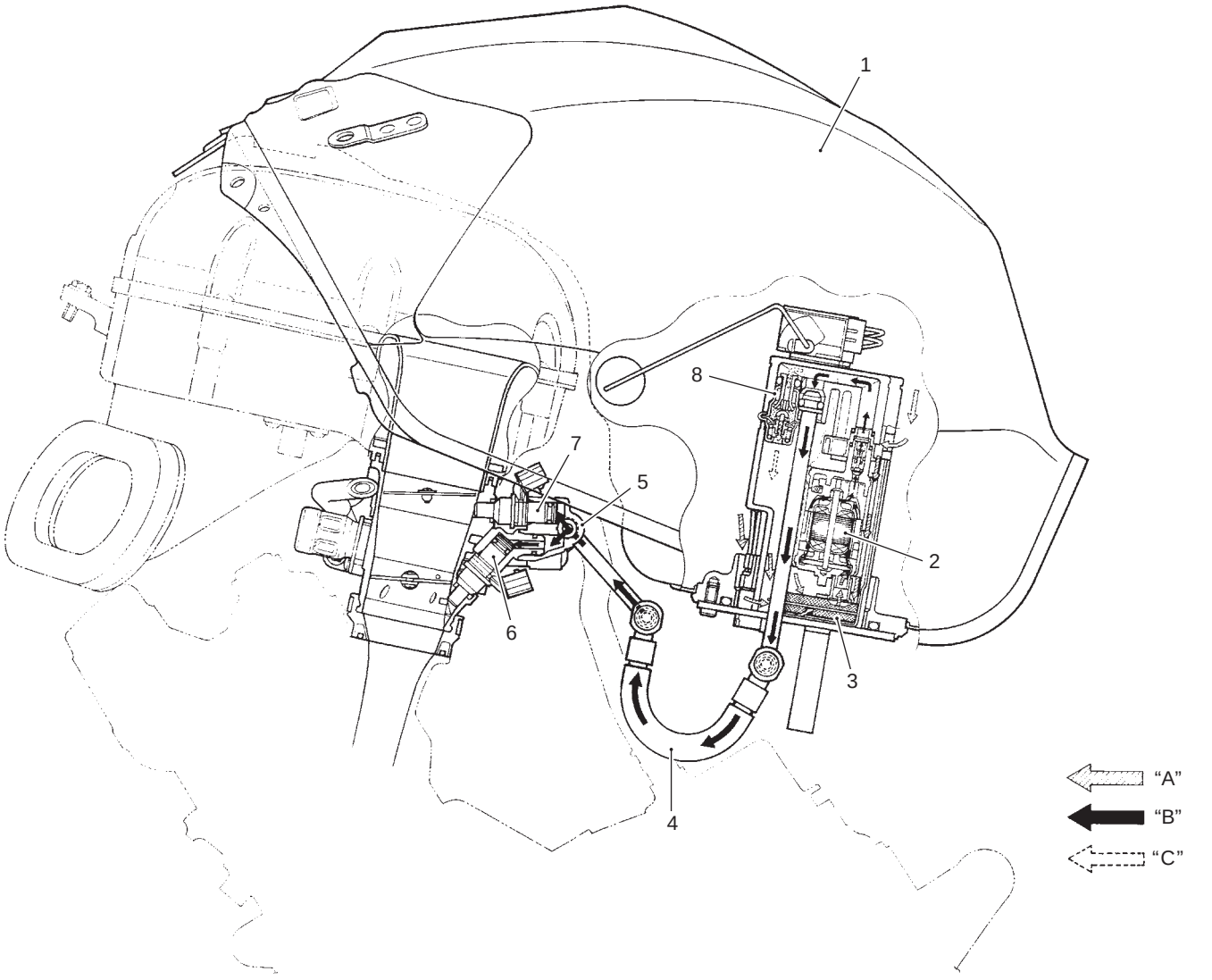
Refer to “General Precautions” in Section 00 (Page 00-1).

General Description

Fuel Injection System Description

B947H11201001

GSX-R1000 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.



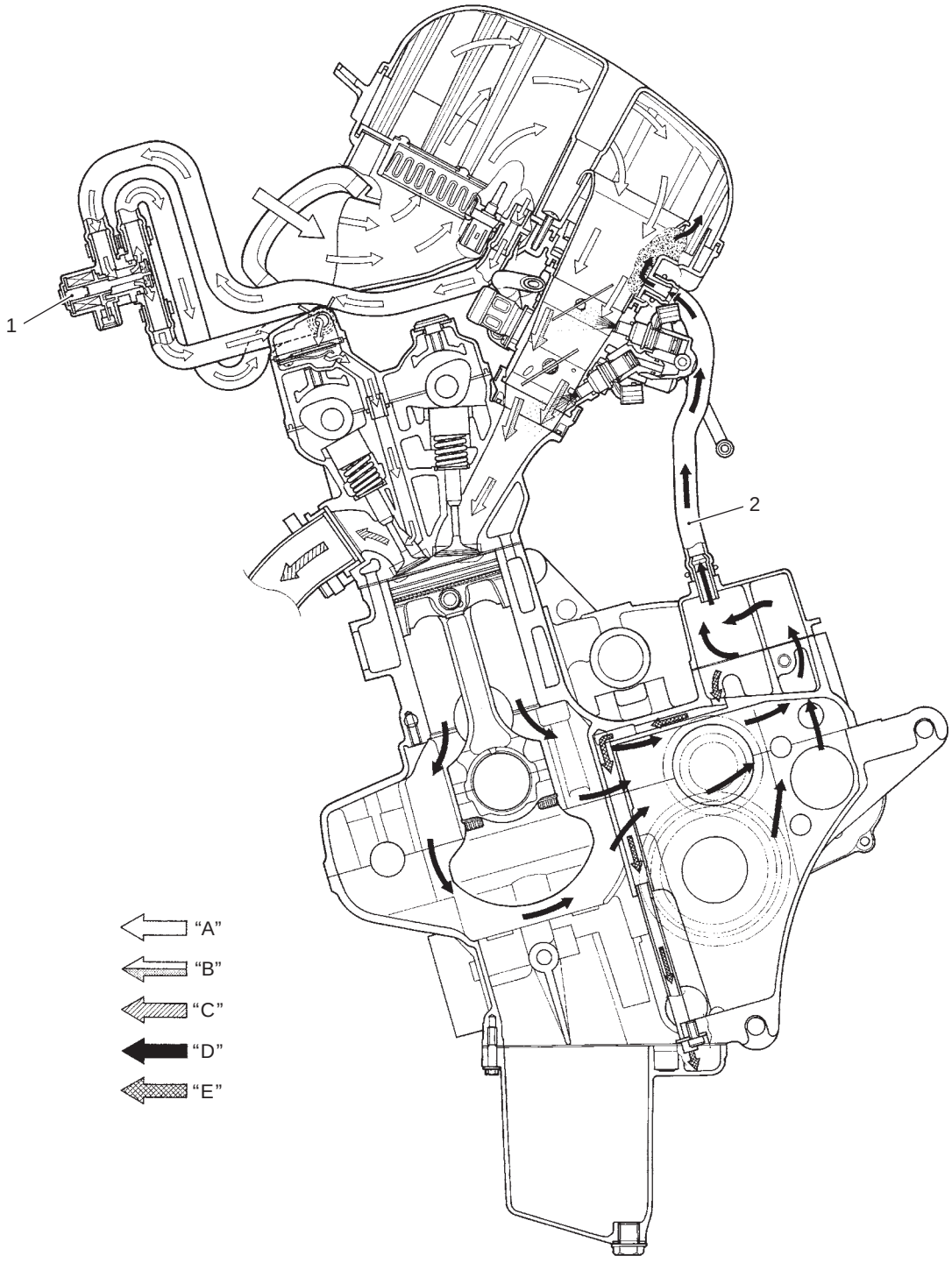
I947H1120001-03

1. Fuel tank	4. Fuel feed hose	7. Secondary fuel injector	“B”: Pressurized fuel
2. Fuel pump	5. Fuel delivery pipe	8. Fuel pressure regulator	“C”: Relieved fuel
3. Fuel mesh filter	6. Primary fuel injector	“A”: Pre-pressurized fuel	

Crankcase Emission Control System Description

B947H11201002

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.



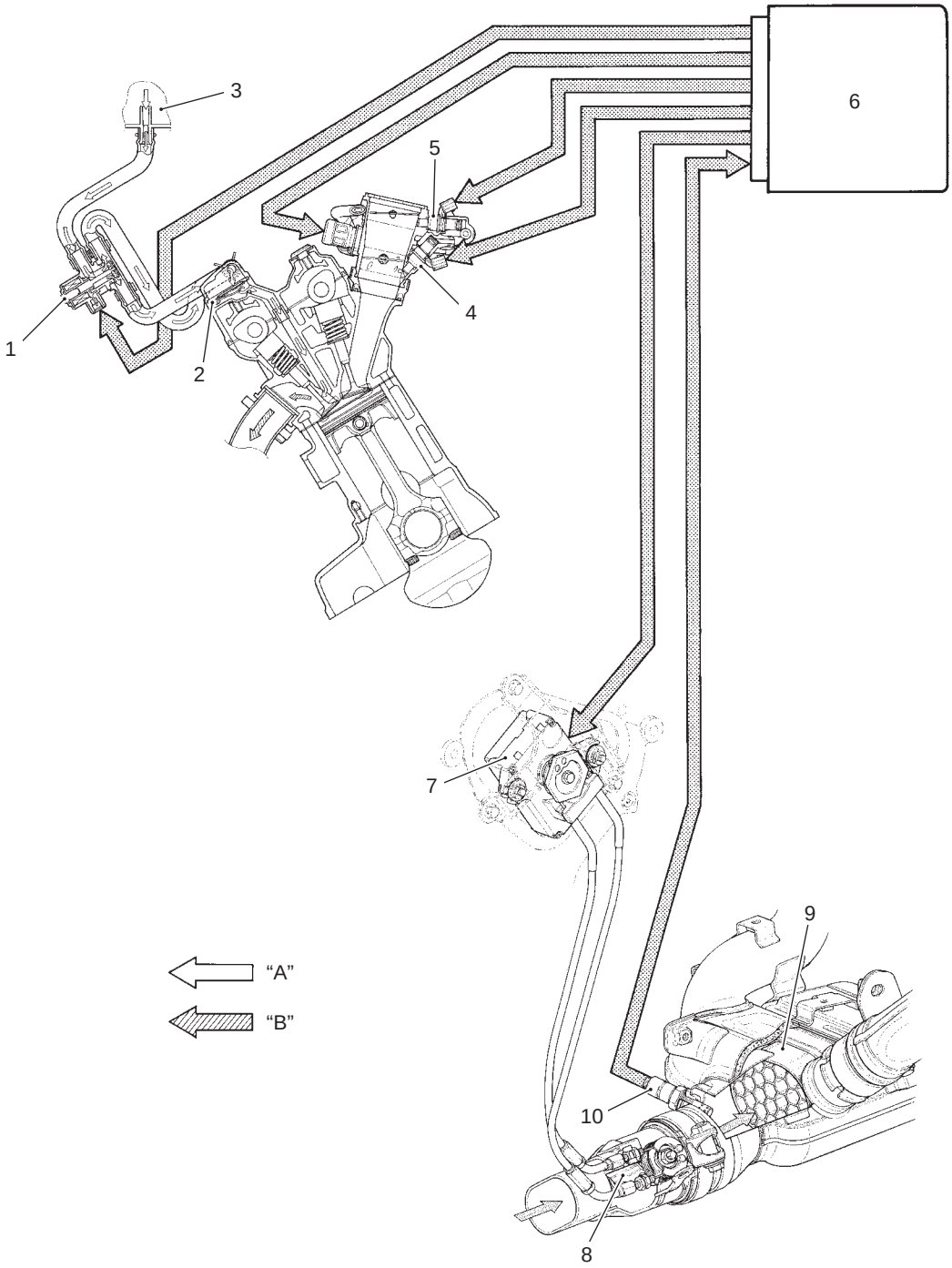
I947H1120002-02

1. PAIR control solenoid valve	“A”: Fresh air	“C”: Exhaust gas	“E”: Return oil
2. PCV hose	“B”: Fuel/Air mixture	“D”: Blow-by gas	

Exhaust Emission Control System Description

B947H11201003

The exhaust emission control system is composed of the PAIR system, exhaust control system, HO2 sensor, three-way catalyst system and ISC system. The fresh air is drawn into the exhaust ports through the PAIR control solenoid valve and PAIR reed valves. The PAIR control solenoid valve is operated by the ECM, which is controlled according to the signals from TPS, ECTS, IAPS and CKPS. The exhaust gas flow is performed by the exhaust control valve actuator which is controlled by the ECM by changing the exhaust control valve angle. 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.

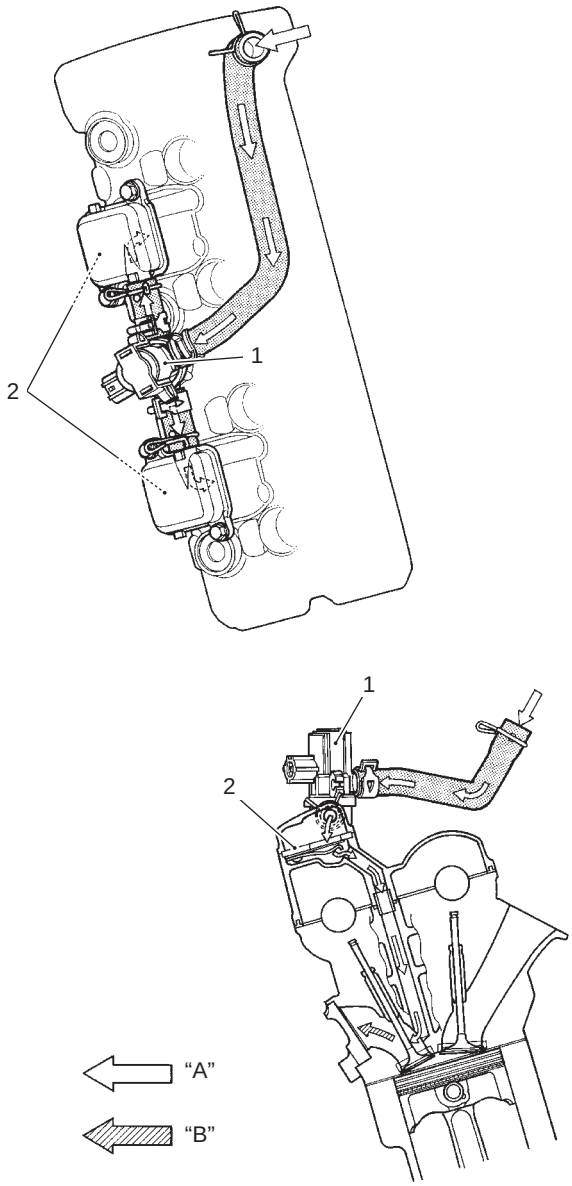


I947H1120003-01

1. PAIR control solenoid valve	4. Primary fuel injector	7. Exhaust control valve actuator	10. HO2 sensor
2. PAIR reed valve	5. Secondary fuel injector	8. Exhaust control valve	"A": Fresh air
3. Air cleaner box	6. ECM	9. Three-way catalyst	"B": Exhaust gas

PAIR System Diagram

B947H11201006



I947H1120004-01

1. PAIR control solenoid valve	2. PAIR reed valve	"A": Fresh air	"B": Exhaust gas

Noise Emission Control System Description

B947H11201004

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

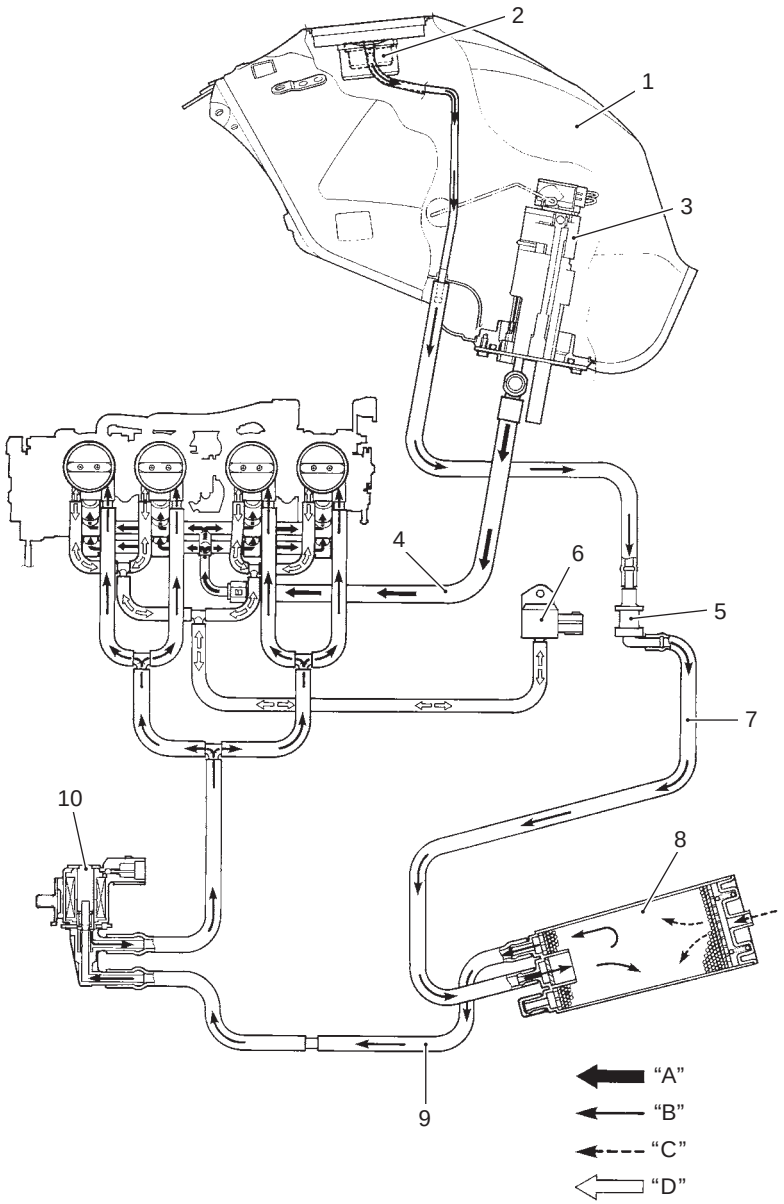
- The removal or rendering inoperative by any person, other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or
- 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.

Evaporative Emission Control System Diagram (Only for E-33)

B947H11201005



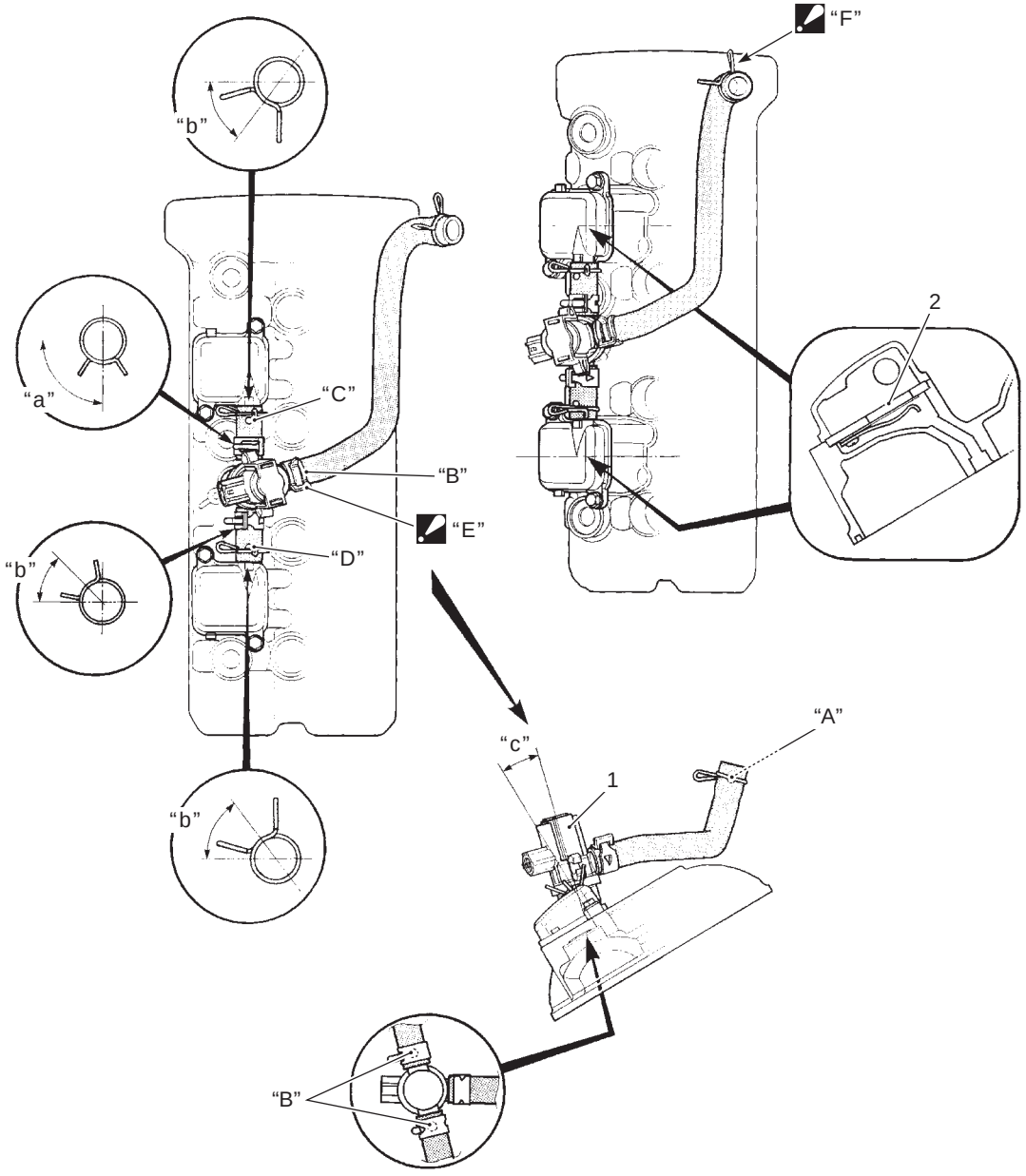
I947H1120005-02

1. Fuel tank	6. IAP sensor	"A": Fuel
2. Fuel-vapor separator	7. Surge hose	"B": HC vapor
3. Fuel pump	8. EVAP canister	"C": Fresh air
4. Fuel feed hose	9. Purge hose	"D": Vacuum
5. Fuel shut-off valve	10. EVAP system purge control solenoid valve	

Schematic and Routing Diagram

PAIR System Hose Routing Diagram

B947H11202001

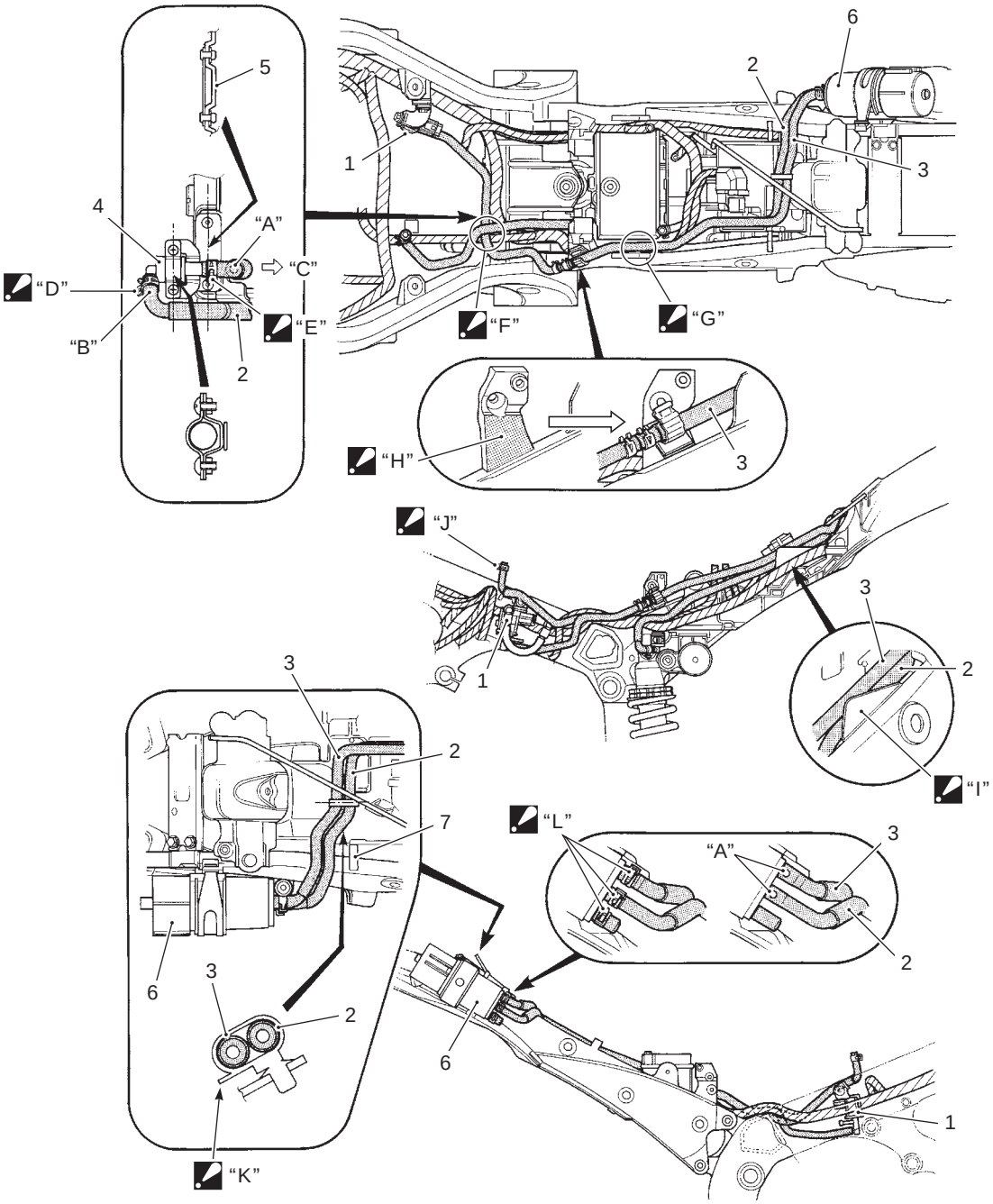


I947H1120006-03

1. PAIR control solenoid valve	"C": Blue marking	"a": 90°
2. PAIR reed valve	"D": Red marking	"b": 45°
"A": White marking (hidden side)	"E": Face the clamp end to the top.	"c": 15°
"B": Yellow marking	"F": Make sure the clamp is not contacted to the frame or air cleaner box.	

EVAP Canister Hose Routing Diagram (Only for E-33)

B947H11202002



I947H1120007-03

1. EVAP system purge control solenoid valve	"A": White marking	"H": Stick the clamp firmly in this area.
2. Surge hose	"B": Yellow marking	"I": Pass the hoses inside the parts holder.
3. Purge hose	"C": UP	"J": Face the clamp end forward.
4. Fuel shut-off valve	"D": Face the clamp end downward.	"K": Face the clamp end backward.
5. Rear fender	"E": Face the clamp end to the left.	"L": Face the clamp end to the outside.
6. EVAP canister	"F": Pass the hoses above the harness.	
7. Seat hook	"G": Pass the hoses between the seat rail and battery holder.	

Repair Instructions

Heated Oxygen Sensor (HO2S) Removal and Installation

B947H11206001

Removal

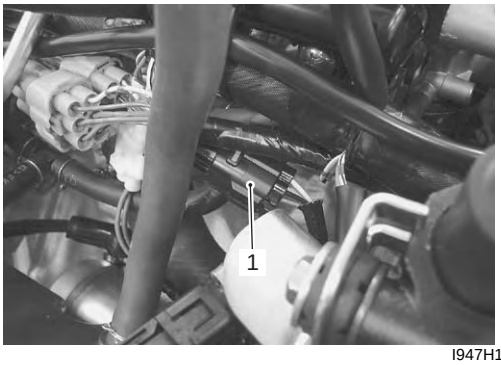
⚠ WARNING

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 HO2 sensor lead wires.**

1) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Disconnect the HO2 sensor coupler (1).



I947H1120008-01

3) Remove the HO2 sensor (2).

I947H1120009-01

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)

I947H1120010-01

Heated Oxygen Sensor (HO2S) Inspection

B947H11206002

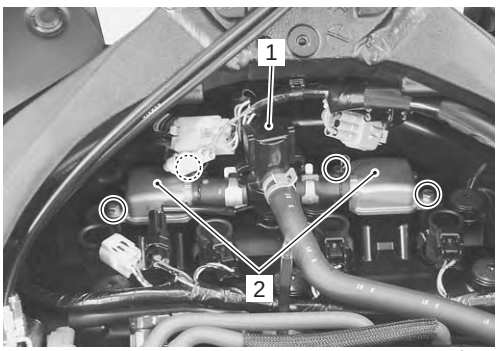
Refer to “DTC “C44” (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction” in Section 1A (Page 1A-103).

PAIR Reed Valve Removal and Installation

B947H11206003

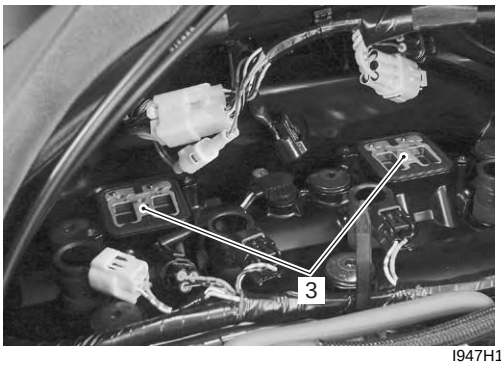
Removal

1) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
3) Remove the PAIR control solenoid valve (1) along with the PAIR reed valve covers (2). Refer to “PAIR Control Solenoid Valve Removal and Installation” (Page 1B-9).



I947H1120011-02

4) Remove the PAIR reed valves (3).



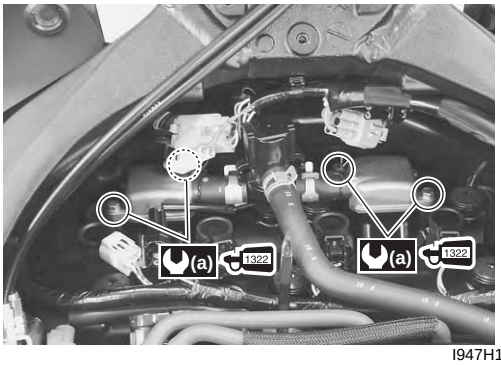
I947H1120013-01

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

- Apply thread lock to the PAIR reed valve cover bolts and tighten them to the specified torque.

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

  Tightening torque
  PAIR reed valve cover bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



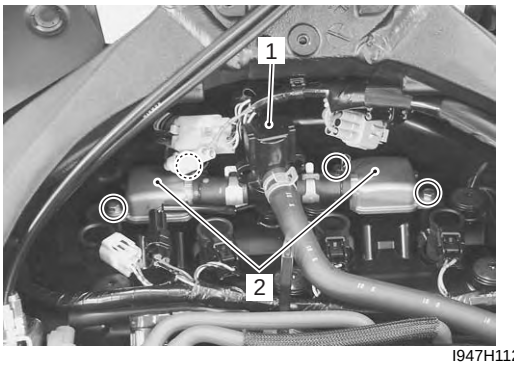
I947H1120014-02

PAIR Control Solenoid Valve Removal and Installation

B947H11206004

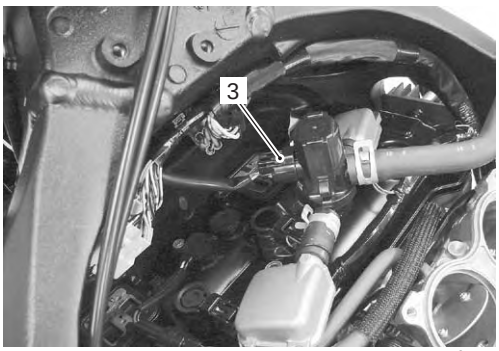
Removal

1) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
3) Remove the PAIR control solenoid valve (1) along with the PAIR reed valve covers (2).



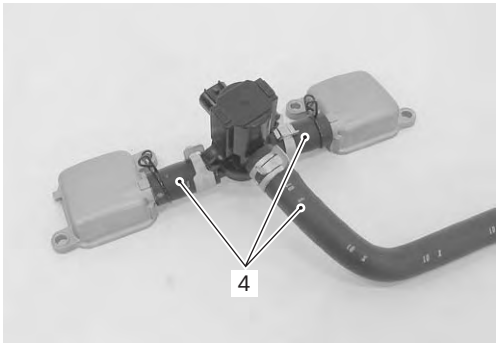
I947H1120015-02

4) Disconnect the PAIR control solenoid valve coupler (3).



I947H1120016-02

5) Disconnect the PAIR hoses (4).



I947H1120042-01

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

- Connect the PAIR hoses properly. Refer to “PAIR System Hose Routing Diagram” (Page 1B-6).

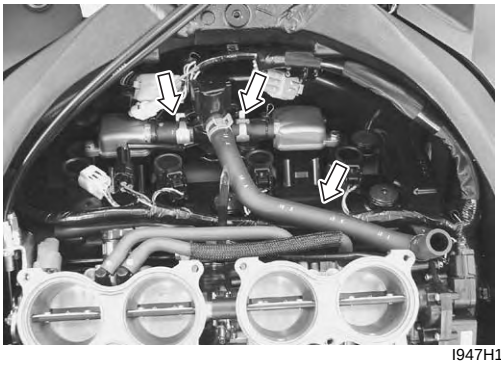
PAIR System Inspection

B947H11206005

PAIR Hose

1) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).

3) Inspect the PAIR 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-6).



I947H1120017-01

4) Reinstall the removed parts.

PAIR Reed Valve

1) Remove the PAIR reed valves. Refer to “PAIR Reed Valve Removal and Installation” (Page 1B-8).
2) Inspect the reed valves for carbon deposit.
If carbon deposit is found on the reed valve, replace the PAIR reed valve with a new one.

I947H1120018-01

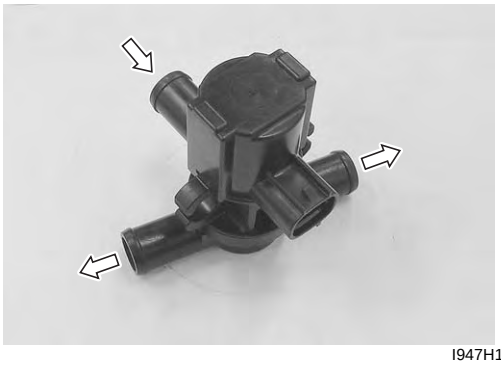
3) Reinstall the PAIR reed valves. Refer to “PAIR Reed Valve Removal and Installation” (Page 1B-8).

PAIR Control Solenoid Valve

NOTE

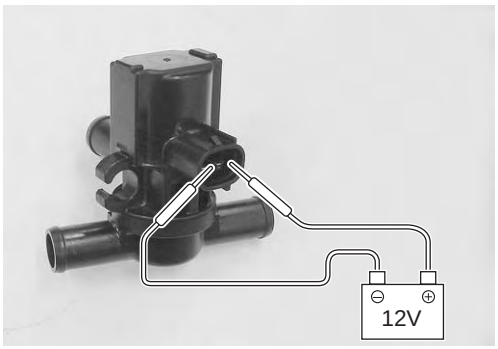
PAIR control solenoid valve can be checked without removing it from the motorcycle. Refer to “DTC “C49” (P1656): PAIR Control Solenoid Valve Circuit Malfunction” in Section 1A (Page 1A-121).

1) Remove the PAIR control solenoid valve. Refer to “PAIR Control Solenoid Valve Removal and Installation” (Page 1B-9).
2) Check that air flows through the air inlet port to the air outlet ports. If air does not flow out, replace the PAIR control solenoid valve with a new one.



I947H1120019-01

3) 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 in normal condition.



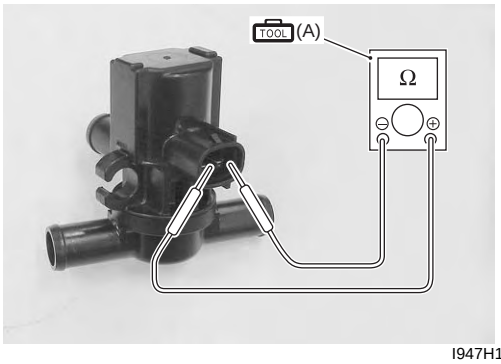
I947H1120020-01

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

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)

Tester knob indication
Resistance (Ω)

PAIR control solenoid valve resistance
20 – 24 Ω at 20 – 30 °C (68 – 86 °F)



I947H1120021-01

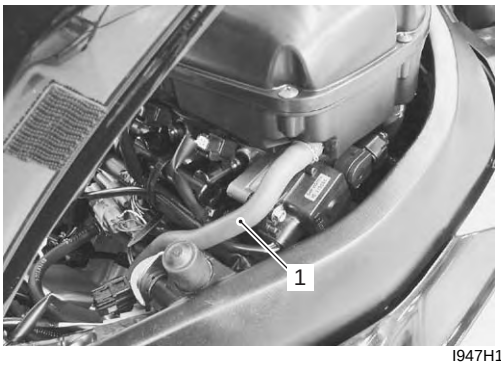
5) Reinstall the PAIR control solenoid valve. Refer to “PAIR Control Solenoid Valve Removal and Installation” (Page 1B-9).

Crankcase Breather (PCV) Hose Inspection

B947H11206006

Inspect the crankcase breather (PCV) hose in the following procedures:

1) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Inspect the crankcase breather (PCV) hose (1) for wear and damage.
   If it is worn or damaged, replace the crankcase breather (PCV) hose with a new one.
3) Check that the crankcase breather (PCV) hose (1) is securely connected.



I947H1120022-01

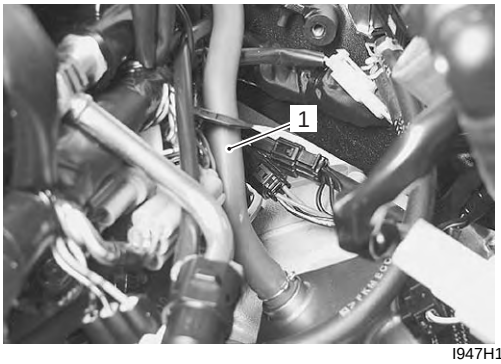
4) Install the removed parts.

Crankcase Breather (PCV) Hose / Reed Valve / Cover Removal and Installation

B947H11206007

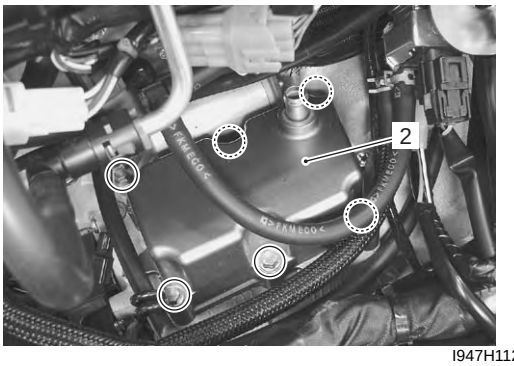
Removal

1) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
3) Disconnect the crankcase breather (PCV) hose (1).



I947H1120023-01

4) Remove the crankcase breather (PCV) cover (2).



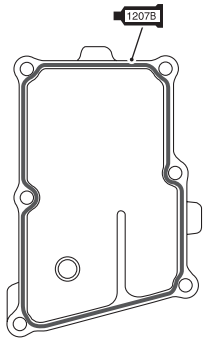
I947H1120024-02

Installation

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

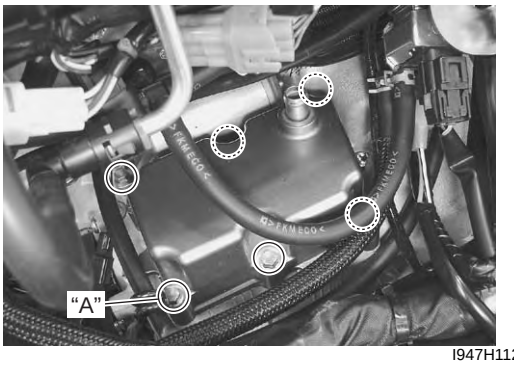
- Apply bond to the hatching part of crankcase breather (PCV) cover.

  1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)



I947H1140293-01

- Fit the clamp to the bolt “A”.



I947H1120025-03

- Connect the crankcase breather (PCV) hose securely. Refer to “Throttle Body Construction” in Section 1D (Page 1D-9).

Crankcase Breather (PCV) Cover Inspection

B947H11206008

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

1) Remove the crankcase breather (PCV) cover. Refer to “Crankcase Breather (PCV) Hose / Reed Valve / Cover Removal and Installation” (Page 1B-11).
2) Inspect the crankcase breather (PCV) cover for carbon deposit. If carbon deposit is found in the crankcase breather (PCV) cover, remove the carbon.

I947H1120026-01

3) Reinstall the crankcase breather (PCV) cover. Refer to “Crankcase Breather (PCV) Hose / Reed Valve / Cover Removal and Installation” (Page 1B-11).

Evaporative Emission Control System Removal and Installation (Only for E-33)

B947H11206010

Hose

Removal

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Remove the frame cover assembly. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Remove the EVAP hoses as shown in the EVAP canister hose routing diagram. Refer to “PAIR System Hose Routing Diagram” (Page 1B-6).

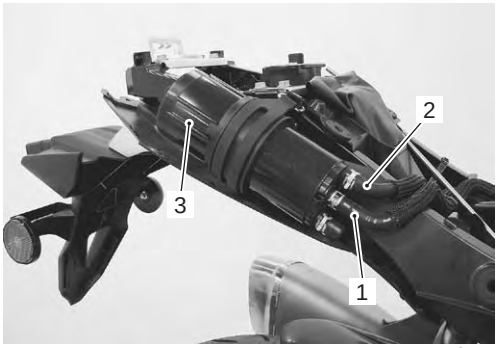
Installation

1) Install the EVAP hoses as shown in the EVAP canister hose routing diagram. Refer to “EVAP Canister Hose Routing Diagram (Only for E-33)” (Page 1B-7).
2) Reinstall the removed parts.

EVAP Canister

Removal

1) Remove the frame cover assembly. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the surge hose (1) and purge hose (2).
3) Remove the EVAP canister (3) from the bracket.



I947H1120027-01

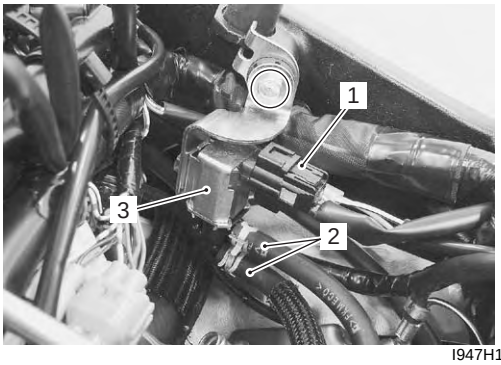
Installation

1) Install the EVAP canister as shown in the EVAP canister hose routing diagram. Refer to “EVAP Canister Hose Routing Diagram (Only for E-33)” (Page 1B-7).
2) Reinstall the removed parts.

EVAP System Purge Control Solenoid Valve

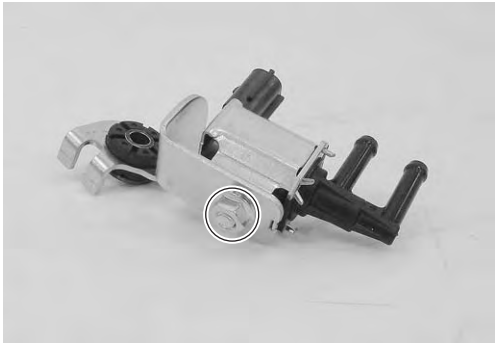
Removal

1) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Disconnect the coupler (1) and purge hoses (2).
3) Remove the EVAP system purge control solenoid valve (3) with the bracket.



I947H1120028-01

4) Remove the EVAP system purge control solenoid valve from the bracket.



I947H1120029-01

Installation

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

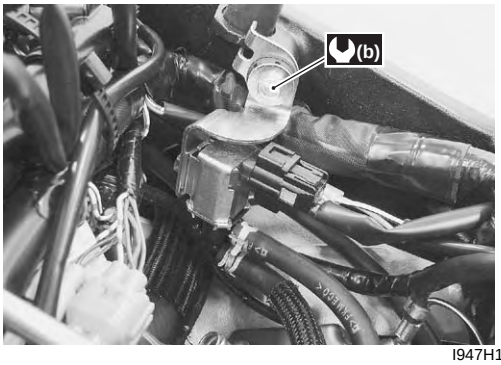
- Tighten the EVAP system purge control solenoid valve mounting nut to the specified torque.

  Tightening torque
  EVAP system purge control solenoid valve mounting nut (a): 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)

I947H1120030-01

- Tighten the EVAP system purge control solenoid valve bracket bolt.

  Tightening torque
  EVAP system purge control solenoid valve bracket bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

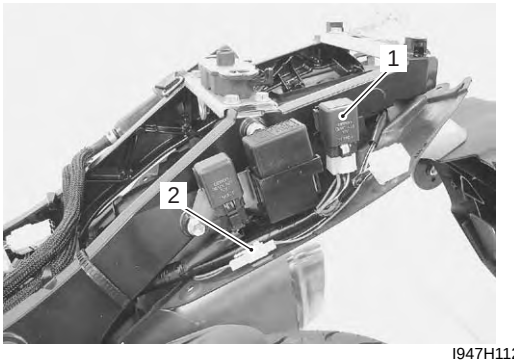


I947H1120041-01

Fuel Shut-off Valve

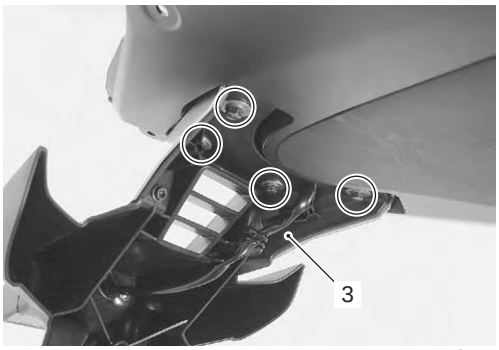
Removal

1) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the battery. Refer to “Battery Removal and Installation” in Section 1J (Page 1J-11).
3) Remove the ECM. Refer to “ECM Removal and Installation” in Section 1C (Page 1C-1).
4) Remove the frame cover assembly. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
5) Disconnect the cooling fan relay (1) from the rear fender (front).
6) Disconnect the license plate light coupler (2).



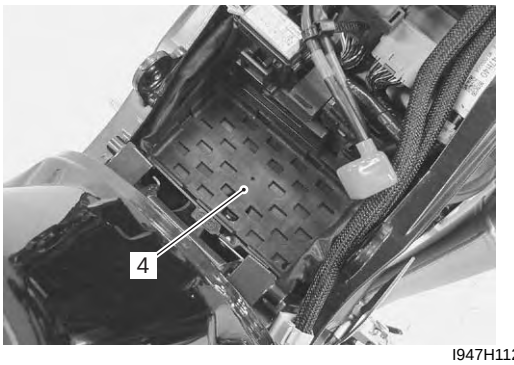
I947H1120031-01

7) Remove the rear fender (rear) (3).



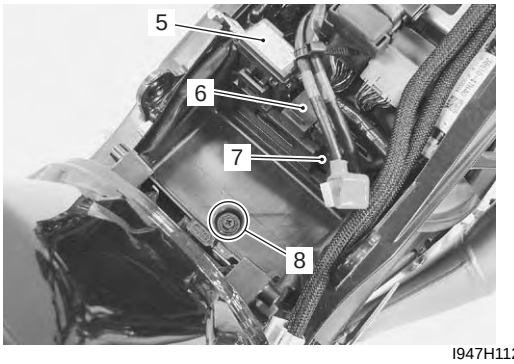
I947H1120032-01

8) Remove the battery mat (4).



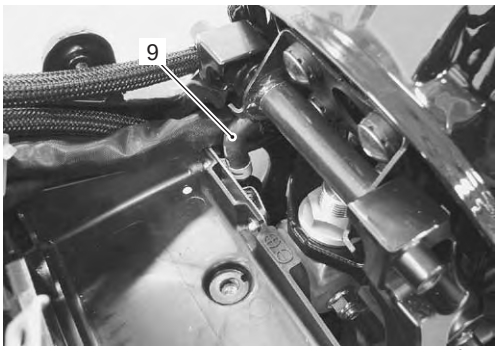
I947H1120033-01

9) Disconnect the fuse box (5), AP sensor (6) and TO sensor (7) from the rear fender (front).
10) Remove the rear fender (front) mounting bolt (8).



I947H1120034-01

11) Disconnect the surge hose (9).

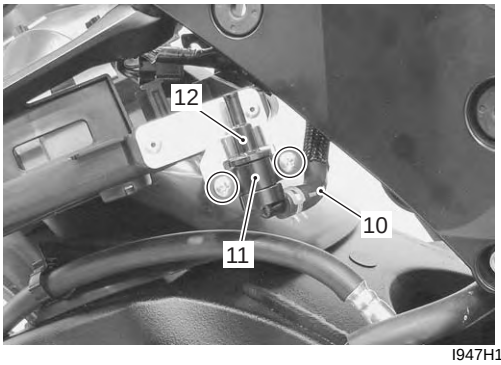


I947H1120035-01

12) Move the rear fender (front) backward.

13) Disconnect the surge hose (10).

14) Remove the bracket (11) and fuel shaft-off valve (12).



I947H1120036-01

Installation

Install the fuel shut-off valve in the reverse order of removal. Pay attention to the following point:

- Install the fuel shut-off valve as shown in the EVAP canister hose routing diagram. Refer to “EVAP Canister Hose Routing Diagram (Only for E-33)” (Page 1B-7).

Evaporative Emission Control System Inspection (Only for E-33)

B947H11206011

Refer to “Evaporative Emission Control System Removal and Installation (Only for E-33)” (Page 1B-12).

Hose

Inspect the hoses for wear or damage. If it is worn or damage, replace the hose with a new one.

NOTE

Make sure that the hoses are securely connected.

EVAP Canister

Inspect the EVAP canister for damage to the body. If any defect is found, replace the EVAP canister with a new one.

I947H1120037-01

EVAP System Purge Control Solenoid Valve

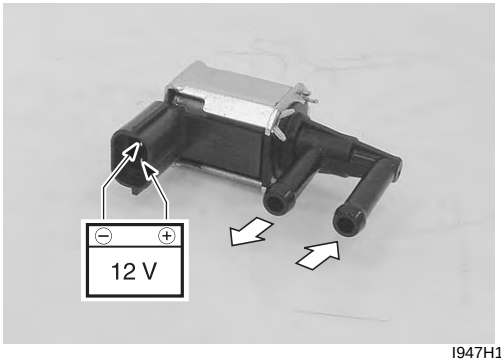
NOTE

EVAP system purge control solenoid valve can be checked without removing it from the motorcycle. Refer to “DTC “C62” (P0443): EVAP System Purge Control Solenoid Valve Circuit Malfunction (E-33 only)” in Section 1A (Page 1A-127).

1) Check that no air flows through both of the air inlet and outlet ports. If air flows out, replace the EVAP system purge control solenoid valve with a new one.

I947H1120038-01

2) Connect the 12 V battery to the terminals of the EVAP system purge control solenoid valve and check the air flow. If air flows out, the solenoid valve is in normal condition.



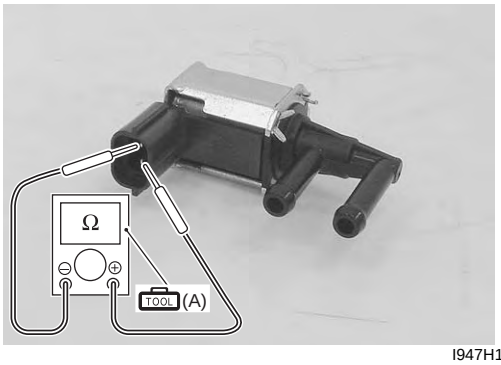
I947H1120039-01

3) Check the resistance between the terminals of the EVAP system purge control solenoid valve. If the resistance is not within the standard range, replace the EVAP system purge control solenoid valve with a new one.

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)

Tester knob indication
Resistance (Ω)

EVAP system purge control solenoid valve resistance
Approx. 32 Ω at 20 °C (68 °F)



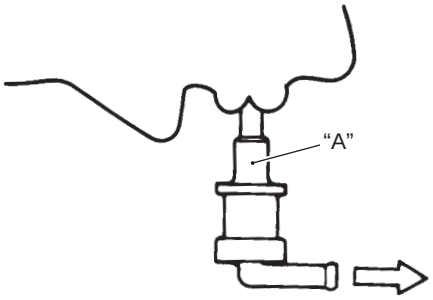
I947H1120040-01

Fuel Shut-off Valve

⚠ WARNING

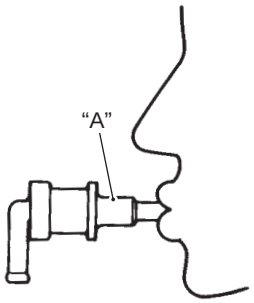
Gasoline and gasoline vapor is toxic. A small amount of fuel remains in the fuel shut-off valve when checking it. Do not swallow the fuel when blowing the fuel shut-off valve.

1) When air is blown into the fuel shut-off valve with its side “A” positioned upward, the air can pass through to the canister side.



I823H1120037-01

2) When air is blown into the fuel shut-off valve with its side “A” positioned sideways, the air cannot pass through to the canister side. If the fuel shut-off valve operates otherwise, it must be replaced.



I823H1120038-02

Specifications

Service Data

B947H11207001

FI sensors

Item	Specification	Note
HO2 sensor output voltage	0.3 V and less at idle speed	
	0.6 V and more at 5 000 r/min	
HO2 sensor heater resistance	6.7 – 9.5 Ω at 23 °C (73 °F)	
PAIR control solenoid valve resistance	20 – 24 Ω at 20 – 30 °C (68 – 86 °F)	
EVAP system purge control solenoid valve resistance	Approx. 32 Ω at 20 °C (68 °F)	E-33 only

Tightening Torque Specifications

B947H11207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
HO2 sensor	25	2.5	18.0	☞(Page 1B-8)
PAIR reed valve cover bolt	10	1.0	7.0	☞(Page 1B-9)
EVAP system purge control solenoid valve mounting nut	6.5	0.65	4.5	☞(Page 1B-13)
EVAP system purge control solenoid valve bracket bolt	10	1.0	7.0	☞(Page 1B-13)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

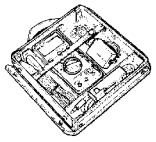
Recommended Service Material

B947H11208001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1B-11)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 1B-9)

Special Tool

B947H11208002

09900–25008 Multi circuit tester set ☞(Page 1B-10) / ☞(Page 1B-15)		

Engine Electrical Devices

Precautions

Precautions for Engine Electrical Device

B947H11300001

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

B947H11303001

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

Diagnostic Information and Procedures

Engine Symptom Diagnosis

B947H11304001

Refer to “Engine Symptom Diagnosis” in Section 1A (Page 1A-8).

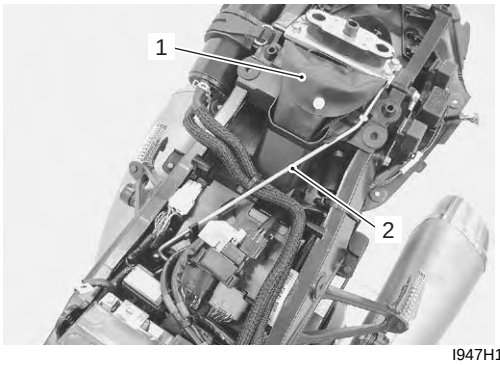
Repair Instructions

ECM Removal and Installation

B947H11306001

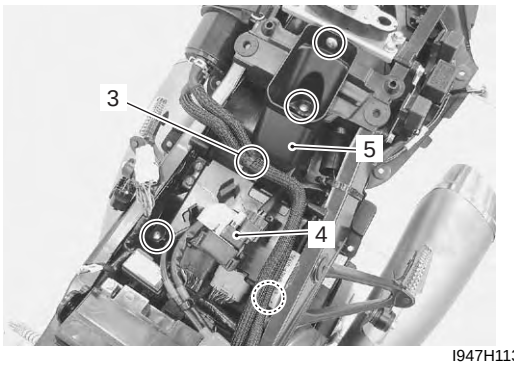
Removal

1) Remove the frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the battery (–) lead wire.
3) Remove the tool set (1) and prop stay (2).



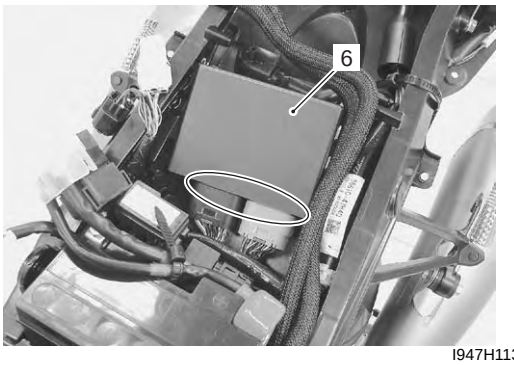
I947H1130001-01

4) Disconnect the hose clamp (3) (E-33 only) and starter relay (4).
5) Remove the electric parts holder bracket (5).



I947H1130002-01

6) Disconnect the couplers and remove the ECM (6).



I947H1130003-01

Installation

Install the ECM in the reverse order of removal.

CMP Sensor Inspection

B947H11306002

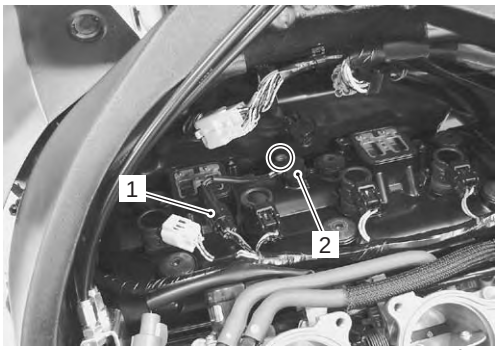
Refer to “DTC “C11” (P0340): CMP Sensor Circuit Malfunction” in Section 1A (Page 1A-29).

CMP Sensor Removal and Installation

B947H11306003

Removal

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Remove the PAIR control solenoid valve. Refer to “PAIR Control Solenoid Valve Removal and Installation” in Section 1B (Page 1B-9).
3) Disconnect the coupler (1) and remove the CMP sensor (2).



I947H1130004-02

Installation

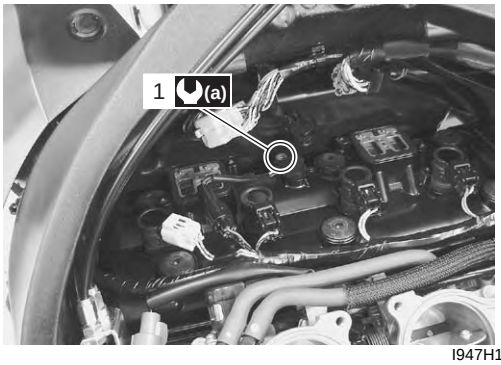
Install the CMP sensor in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

When installing the CMP sensor, make sure to clean the sensor surface.

- Tighten the CMP sensor bolt (1) to the specified torque.

  Tightening torque
  CMP sensor bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1130005-02

CKP Sensor Inspection

B947H11306004

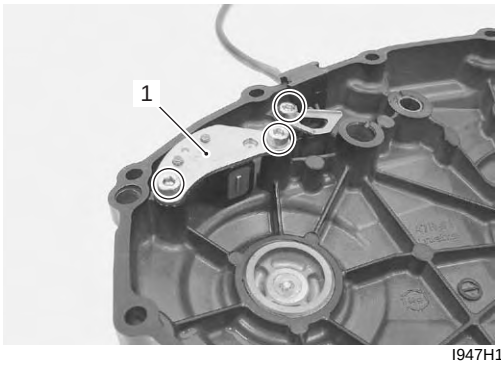
Refer to “CKP Sensor Inspection” in Section 1H (Page 1H-9).

CKP Sensor Removal and Installation

B947H11306005

Removal

1) Remove the clutch cover. Refer to “Clutch Removal” in Section 5C (Page 5C-5).
2) Remove the CKP sensor (1).



I947H1130006-01

Installation

Install the CKP sensor in the reverse order of removal. Refer to “Clutch Installation” in Section 5C (Page 5C-7).

IAP Sensor Inspection

B947H11306006

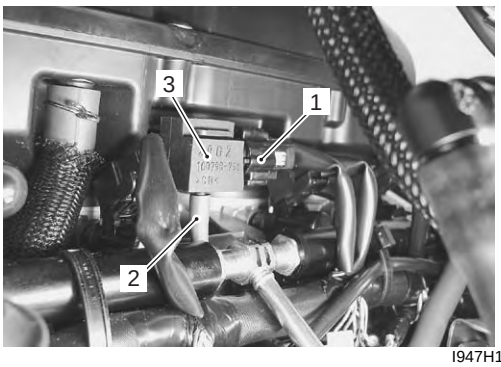
Refer to “DTC “C13” (P0105-H/L): IAP Sensor Circuit Malfunction” in Section 1A (Page 1A-35).

IAP Sensor Removal and Installation

B947H11306007

Removal

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Disconnect the coupler (1) and vacuum hose (2).
3) Remove the IAP sensor (3) from the air cleaner box.



I947H1130007-01

Installation

Install the IAP sensor in the reverse order of removal.

TP Sensor Inspection

B947H11306008

Refer to “DTC “C14” (P0120-H/L): TP Sensor Circuit Malfunction” in Section 1A (Page 1A-43).

TP Sensor Removal and Installation

B947H11306009

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

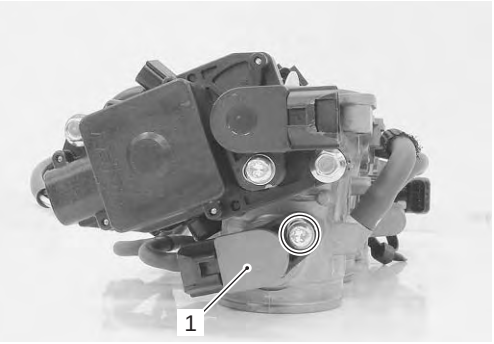
Removal

1) Remove the throttle body. Refer to “Throttle Body Removal and Installation” in Section 1D (Page 1D-10).
2) Remove the TP sensor (1) with the special tool.

Special tool
TOOL : 09930–11950 (Torx wrench (5 mm))

NOTE

Prior to disassembly, mark the TP sensor’s original position with a paint or scribe for accurate reinstallation.



I947H1130008-01

Installation

Install the TP sensor in the reverse order of removal. Refer to “Throttle Body Disassembly and Assembly” in Section 1D (Page 1D-11).

TP Sensor Adjustment

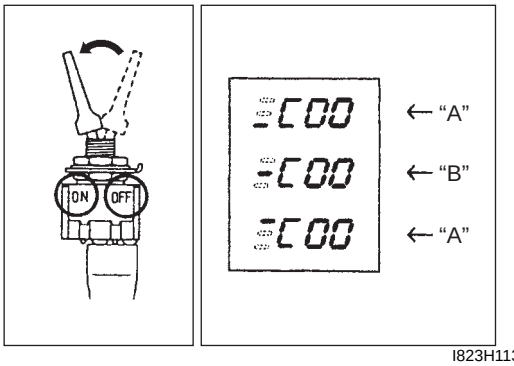
B947H11306010

Inspect the TP sensor setting position and adjust it if necessary in the following procedures:

1) Connect the special tool (Mode select switch) to the dealer mode coupler. Refer to “Self-Diagnostic Procedures” in Section 1A (Page 1A-12).

Special tool
TOOL : 09930–82720 (Mode selection switch)

2) Warn up the engine and keep it running in idling speed.
3) Turn the mode select switch ON.
4) Check the position of the bar in the left of C code displayed on the LCD panel.



I823H1130022-01

“A”: Incorrect position	“B”: Correct position

5) If the TP sensor adjustment is necessary, turn off the engine and lift up the throttle body from the intake pipes. Refer to “Throttle Body Removal and Installation” in Section 1D (Page 1D-10).
6) Loosen the TP sensor mounting screw using the special tool and turn the TP sensor to bring the bar to the correct position.

Special tool
TOOL : 09930–11950 (Torx wrench (5 mm))

I947H1130009-01

7) Tighten the TP sensor mounting screw to the specified torque.

Tightening torque
TP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)

8) Reinstall the throttle body.
9) Turn on the engine and make sure that the TP sensor bar is at the correct position.
10) Turn off the engine and reinstall the removed parts.

ECT Sensor Removal and Installation

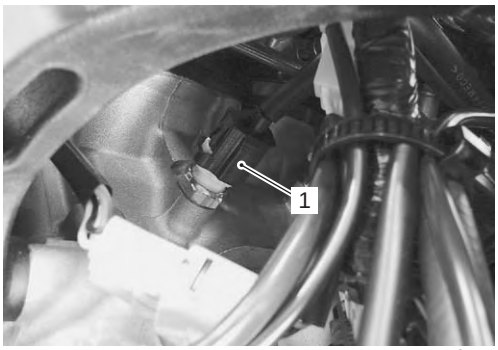
B947H11306011

Removal

1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Drain engine coolant. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).
3) Disconnect the coupler and remove the ECT sensor (1).

⚠ CAUTION

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



I947H1130010-01

Installation

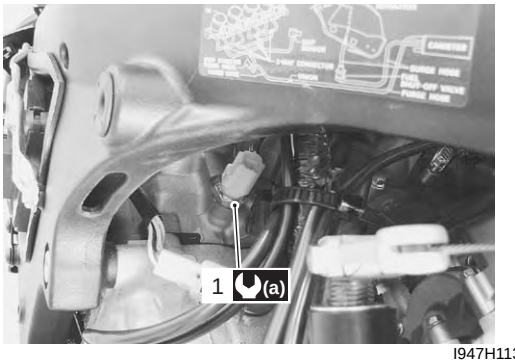
Install the ECT sensor in the reverse order of removal. Pay attention to the following points:

- Tighten the ECT sensor (1) to the specified torque.

⚠ CAUTION

Use new gasket washer to prevent engine coolant leakage.

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



I947H1130011-01

- Pour engine coolant. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).

ECT Sensor Inspection

B947H11306012

Refer to “DTC “C15” (P0115-H/L): ECT Sensor Circuit Malfunction” in Section 1A (Page 1A-50).
Inspect the ECT sensor in the following procedures:

1) Remove the ECT sensor. Refer to “ECT Sensor Removal and Installation” (Page 1C-4).
2) Connect the ECT sensor (1) to the 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 ohmmeter.
   If the ECT sensor ohmic value does not change in the proportion indicated, replace it with a new one.

⚠ CAUTION

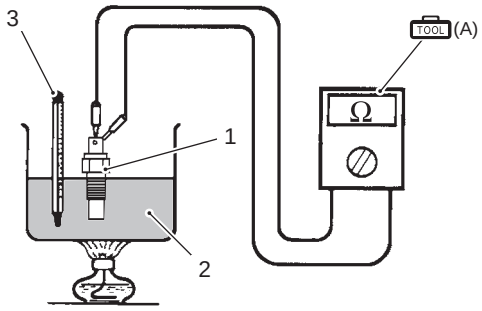
- **Take special care when handling the ECT sensor. It may cause damage if it gets an excessive sharp impact.**
- **Do not contact the ECT sensor and column thermometer with a pan.**

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)

Tester knob indication
Resistance (Ω)

ECT sensor specification

Temperature	Standard resistance
20 °C (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.811 kΩ
80 °C (176 °F)	Approx. 0.318 kΩ
110 °C (230 °F)	Approx. 0.142 kΩ



I718H1130014-01

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

IAT Sensor Removal and Installation

B947H11306013

Removal

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Remove the IAT sensor (1) from the air cleaner box.

I947H1130012-01

Installation

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

- Tighten the IAT sensor screw (1) to the specified torque.

Tightening torque
IAT sensor mounting screw (a): 1.3 N·m (0.13 kgf-m, 1.0 lbf-ft)

I947H1130013-01

IAT Sensor Inspection

B947H11306014

Refer to “DTC “C21” (P0110-H/L): IAT Sensor Circuit Malfunction” in Section 1A (Page 1A-55).
Inspect the IAT sensor.

NOTE

IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to “ECT Sensor Inspection” (Page 1C-4).

⚠ CAUTION

- **The IAT sensor operative temperature range is –30 – 120 °C (–22 – 248 °F).**
- **Do not heat the oil up to 120 °C (248 °F) or more for this inspection.**

IAT sensor specification

Temperature	Standard resistance
20 °C (68 °F)	Approx. 2.58 kΩ
40 °C (104 °F)	Approx. 1.14 kΩ
100 °C (212 °F)	Approx. 0.16 kΩ

AP Sensor Inspection

B947H11306015

Refer to “DTC “C22” (P1450-H/L): AP Sensor Circuit Malfunction” in Section 1A (Page 1A-60).

AP Sensor Removal and Installation

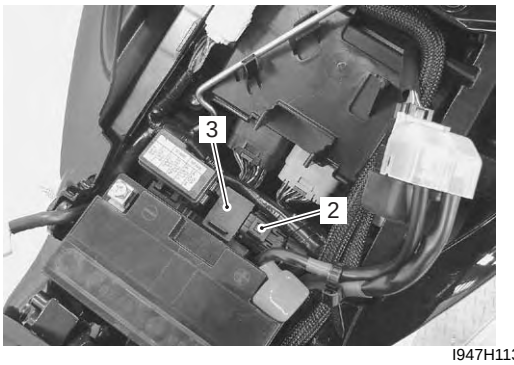
B947H11306016

Removal

1) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the starter relay (1) from the holder.

I947H1130014-01

3) Disconnect the coupler (2) and remove the AP sensor (3).



I947H1130015-01

Installation

Install the AP sensor in the reverse order of removal.

TO Sensor Inspection

B947H11306017

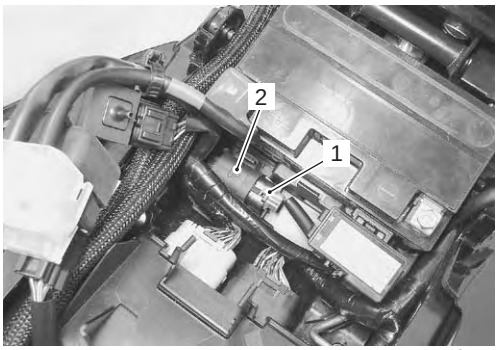
Refer to “DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction” in Section 1A (Page 1A-68).

TO Sensor Removal and Installation

B947H11306018

Removal

1) Remove the AP sensor. Refer to “AP Sensor Removal and Installation” (Page 1C-5).
2) Disconnect the coupler (1) and remove the TO sensor (2).

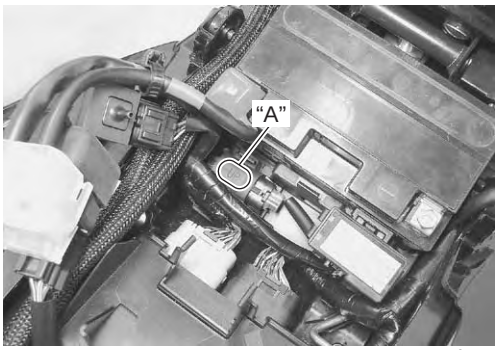


I947H1130016-01

Installation

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

- When installing the TO sensor, bring the “UP” letters “A” upward.



I947H1130017-01

STP Sensor Inspection

B947H11306019

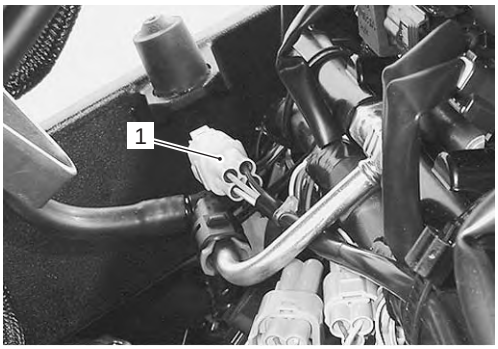
Refer to “DTC “C29” (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction” in Section 1A (Page 1A-79).

STP Sensor Adjustment

B947H11306020

Adjust the STP sensor in the following procedures:

1) Remove the air cleaner box cover. Refer to “Air Cleaner Element Removal and Installation” in Section 1D (Page 1D-6).
2) Disconnect the STVA lead wire coupler (1).



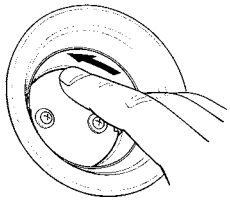
I947H1130018-01

3) Insert the needle pointed probes to the STP sensor coupler (between Y/W and B/Br wires).
4) Turn the ignition switch ON.
5) Close the secondary throttle valve by finger and measure the STP sensor output voltage.

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)
TOOL (B): 09900–25009 (Needle-point probe set)

Tester knob indication
Voltage (⎓)

STP sensor output voltage
ST valve is fully closed: Approx. 0.7 V ((+): Y/W – (–): B/Br)



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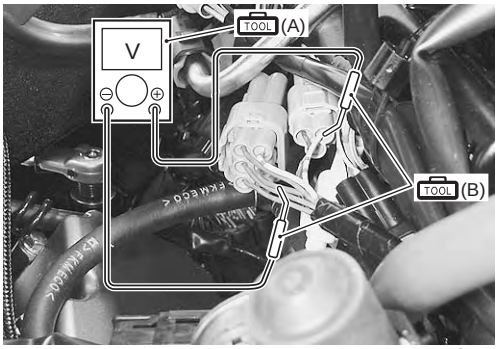


I947H1130019-01

6) Move the throttle body upward by loosing the throttle body mounting screws.
7) Loosen the STP sensor mounting screw using the special tool and adjust the STP sensor until the output voltage comes within the specified value.

Special tool
TOOL : 09930–11950 (Torx wrench (5 mm))

8) Tighten the STP sensor mounting screw to the specified torque.

Tightening torque
STP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)

I947H1130020-01

9) Reinstall the removed parts.

STP Sensor Removal and Installation

B947H11306021

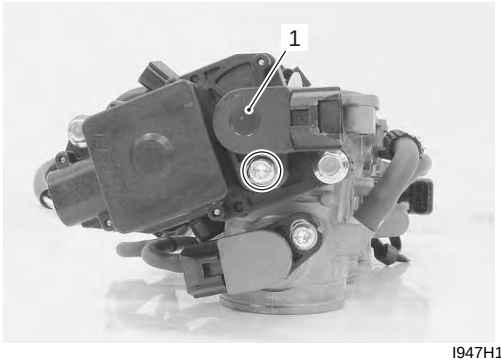
Removal

1) Remove the throttle body. Refer to “Throttle Body Removal and Installation” in Section 1D (Page 1D-10).
2) Remove the STP sensor (1) with the special tool.

Special tool
TOOL : 09930–11950 (Torx wrench (5 mm))

NOTE

Prior to disassembly, mark the STP sensor’s original position with a paint or scribe for accurate reinstallation.



I947H1130021-01

Installation
Install the STP sensor in the reverse order of removal. Refer to “Throttle Body Disassembly and Assembly” in Section 1D (Page 1D-11).

STV Actuator Inspection

B947H11306022

Refer to “DTC “C28” (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction” in Section 1A (Page 1A-75).

STV Actuator Removal and Installation

B947H11306023

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

⚠ CAUTION

Never remove the STVA from the throttle body.

ISC Valve Inspection

B947H11306024

Refer to “DTC “C40” (P0505 / P0506 / P0507): ISC Valve Circuit Malfunction” in Section 1A (Page 1A-94).

ISC Valve Removal and Installation

B947H11306025

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

⚠ CAUTION

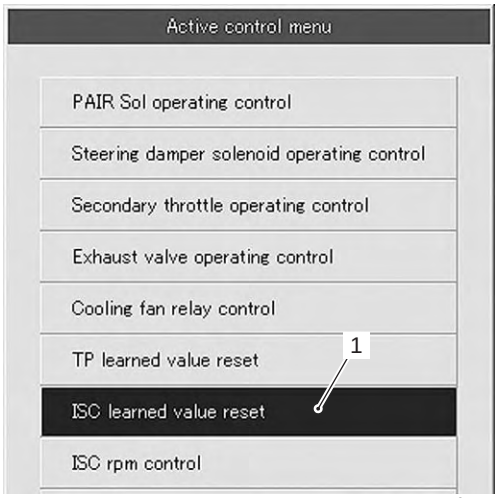
- **Be careful not to disconnect the ISC valve coupler at least 5 seconds after ignition switch is turned to OFF. If the ECM coupler or ISC valve coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an unusual valve position being written in ECM and causing an error of ISC valve operation.**
- **When the throttle body assembly is replaced with a new one, the ISC valve must be set present position. Refer to “ISC Valve Preset and Opening Initialization” (Page 1C-8).**

ISC Valve Preset and Opening Initialization

B947H11306026

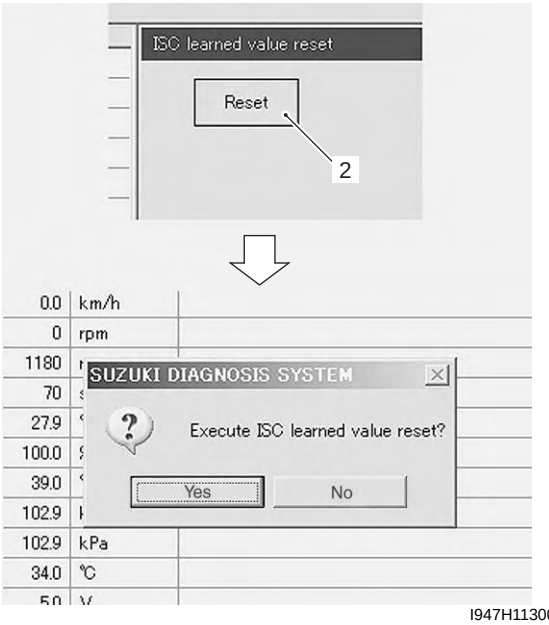
When removing or replacing the ISC valve, set the ISC valve to the following procedures:

1) Turn the ignition switch ON.
2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
3) Click the “Active control”.
4) Click the “ISC learned value reset” (1).



I947H1130022-01

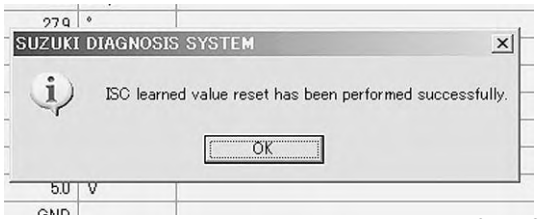
5) Click the “Reset” button (2) to clear the ISC leaned value.



I947H1130023-01

NOTE

The leaned value of the ISC valve is set at Preset position.



I947H1130024-01

6) Close the SDS tool and turn the ignition switch OFF.

NOTE

The ISC valve opening initialization is automatically started after the ignition switch is turned OFF position.

HO2 Sensor Inspection

B947H11306027

Refer to “DTC “C44” (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction” in Section 1A (Page 1A-103).

HO2 Sensor Removal and Installation

B947H11306028

Refer to “Heated Oxygen Sensor (HO2S) Removal and Installation” in Section 1B (Page 1B-8).

GP Switch Inspection

B947H11306029

Refer to “Side-stand / Ignition Interlock System Parts Inspection” in Section 1I (Page 1I-7).

GP Switch Removal and Installation

B947H11306030

Refer to “Gear Position (GP) Switch Removal and Installation” in Section 5B (Page 5B-14).

Specifications

Service Data

B947H11307001

FI Sensors

Item	Standard/Specification		Note
CKP sensor resistance	142 – 194 Ω		
CKP sensor peak voltage	0.5 V and more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.7 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.4 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	0.15 – 4.85 V		
IAT sensor resistance	Approx. 2.58 kΩ at 20 °C (68 °F)		
AP sensor input voltage	4.5 – 5.5 V		
AP sensor output voltage	Approx. 3.6 V at 100 kPa (760 mmHg)		
TO sensor resistance	16.5 – 22.3 kΩ		
TO sensor voltage	Normal	0.4 – 1.4 V	
	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
HO2 sensor output voltage	0.3 V and less at idle speed		
	0.6 V and more at 5 000 r/min		
HO2 sensor heater resistance	6.7 – 9.5 Ω at 23 °C (73 °F)		
PAIR control solenoid valve resistance	20 – 24 Ω at 20 – 30 °C (68 – 86 °F)		
STP sensor input voltage	4.5 – 5.5 V		
STP sensor output voltage	Closed	Approx. 0.7 V	
	Opened	Approx. 4.1 V	
STVA resistance	Approx. 6.5 Ω		
EVAP system purge control solenoid valve resistance	Approx. 32 Ω at 20 °C (68 °F)		E-33 only
ISC valve resistance	Approx. 80 Ω at 20 °C (68 °F)		

Tightening Torque Specifications

B947H11307002

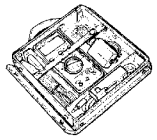
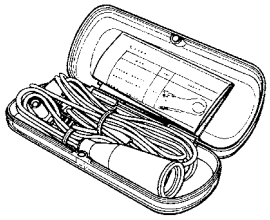
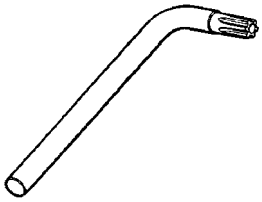
Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
CMP sensor bolt	10	1.0	7.0	☞(Page 1C-2)
TP sensor mounting screw	3.5	0.35	2.5	☞(Page 1C-3)
ECT sensor	18	1.8	13.0	☞(Page 1C-4)
IAT sensor mounting screw	1.3	0.13	1.0	☞(Page 1C-5)
STP sensor mounting screw	3.5	0.35	2.5	☞(Page 1C-7)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Special Tool

B947H11308001

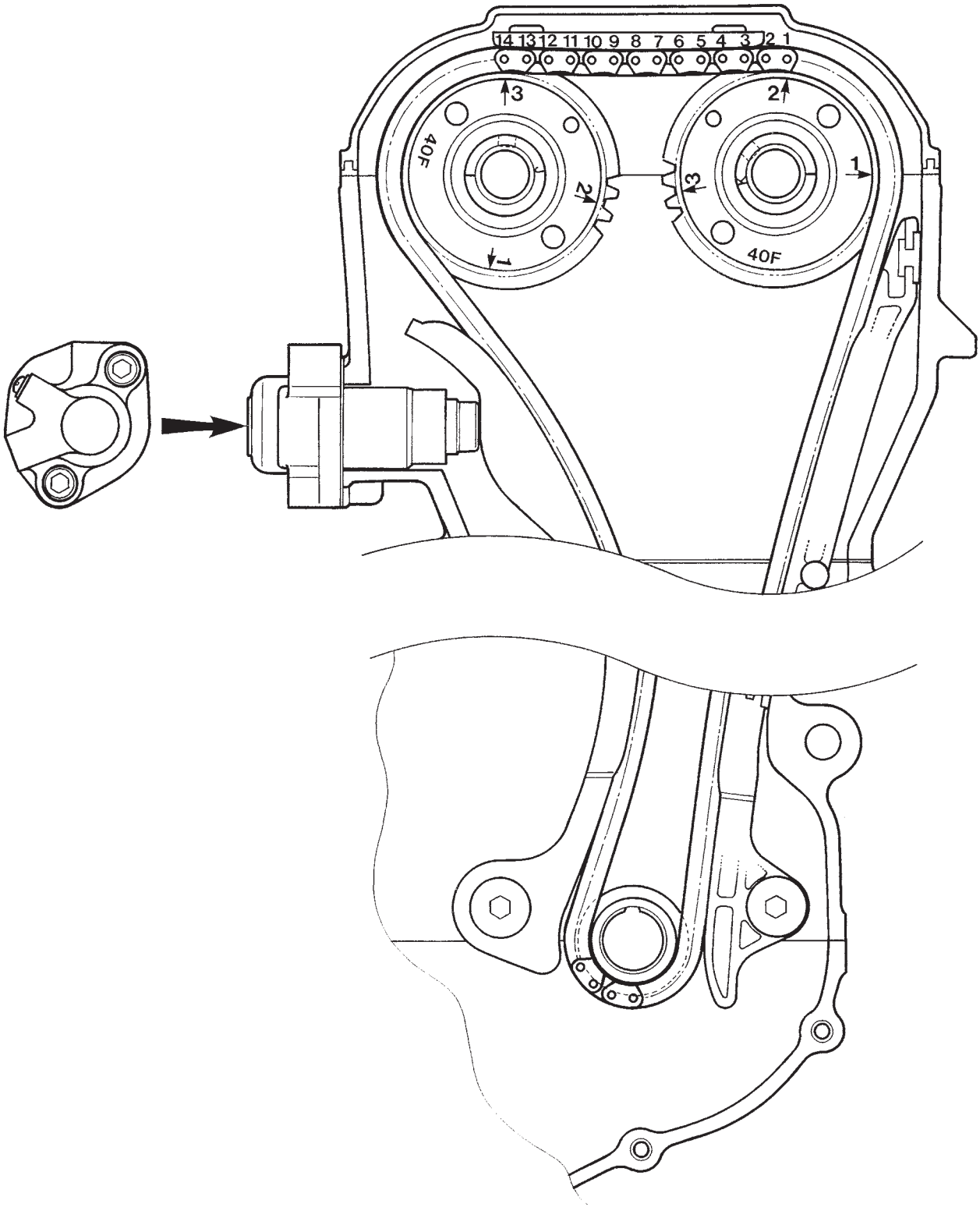
09900–25008 Multi circuit tester set ☞(Page 1C-4) / ☞(Page 1C-6)	
09900–25009 Needle-point probe set ☞(Page 1C-6)	
09930–11950 Torx wrench (5 mm) ☞(Page 1C-3) / ☞(Page 1C-3) / ☞(Page 1C-6) / ☞(Page 1C-7)	
09930–82720 Mode selection switch ☞(Page 1C-3)	

Engine Mechanical

Schematic and Routing Diagram

Camshaft and Sprocket Assembly Diagram

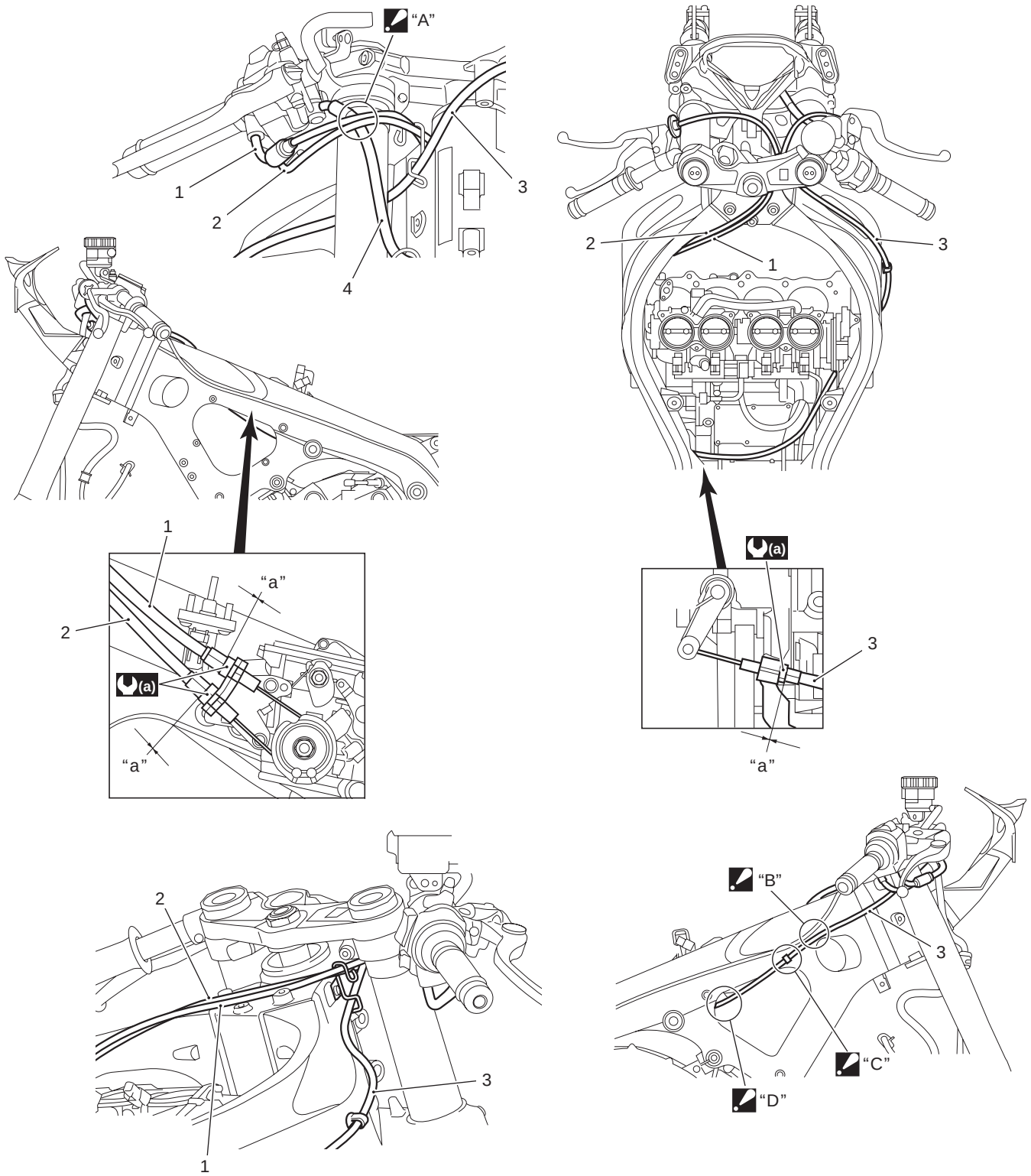
B947H11402001



I947H1140249-02

Throttle Cable Routing Diagram

B947H11402002



I947H1140250-02

1. Throttle cable No. 1	"B": Pass the clutch cable above the right air intake pipe.
2. Throttle cable No. 2	"C": Clamp the clutch cable at the white taping point and make sure it does not slip out of the clamped position when steering. Cut off the excess tip of the clamp.
3. Clutch cable	"D": Pass the clutch cable outside of the regulator/rectifier harness and water bypass hose.
4. Front brake hose	(a): 4.5 Nm (0.45 kgf-m, 3.0 lbf-ft)
"A": Pass the throttle cables in front of the front brake hose.	"a": 0 – 1 mm (0 – 0.04 in)

Diagnostic Information and Procedures

Engine Mechanical Symptom Diagnosis

B947H11404001

Refer to “Engine Symptom Diagnosis” in Section 1A (Page 1A-8).

Compression Pressure Check

B947H11404002

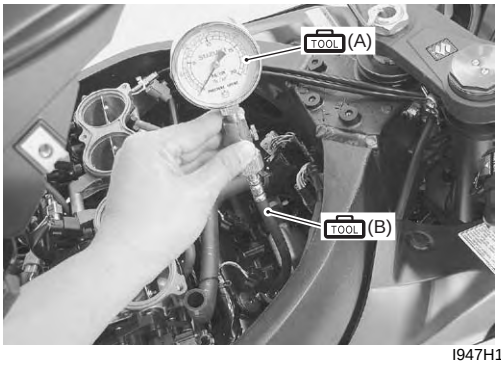
The compression pressure reading of a cylinder is a good indicator of its internal condition.
The decision to overhaul the cylinder is often based on the results of a compression test. Periodic maintenance records kept at your dealership should include compression readings for each maintenance service.

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 fully-charged condition.**

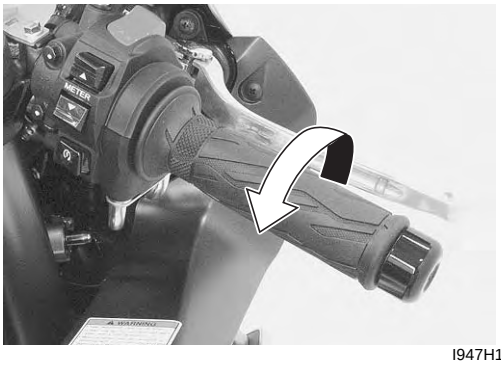
1) Warm up the engine.
2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
3) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” (Page 1D-7).
4) Remove all the spark plugs. Refer to “Ignition Coil and Spark Plug Removal and Installation” in Section 1H (Page 1H-6).
5) Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.

Special tool
TOOL (A): 09915–64512 (Compression gauge)
TOOL (B): 09915–63311 (Compression gauge attachment)



I947H1140294-01

6) Keep the throttle grip in the fully-opened position.



I947H1140251-01

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
1 400 – 1 800 kPa (14 – 18 kgf/cm^2, 199 – 256 psi)	1 000 kPa (10 kgf/cm^2, 142 psi)	200 kPa (2 kgf/cm^2, 28 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 gasket

Overhaul the engine in the following cases:

- Compression pressure in one of the cylinders is 1 000 kPa (10 kgf/cm^2, 142 psi) and less.
- The difference in compression pressure between any two cylinders is 200 kPa (2 kgf/cm^2, 28 psi) and more.
- All compression pressure readings are below 1 400 kPa (14 kgf/cm^2, 199 psi) even when they measure 1 000 kPa (10 kgf/cm^2, 142 psi) and more.

9) After checking the compression pressure, reinstall the removed parts.

Repair Instructions

Engine Components Removable with the Engine in Place

B947H11406001

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-6).	Refer to “Air Cleaner Element Inspection” in Section 0B (Page 0B-3).	Refer to “Air Cleaner Element Removal and Installation” (Page 1D-6).
PAIR control solenoid valve	Refer to “PAIR Control Solenoid Valve Removal and Installation” in Section 1B (Page 1B-9).	Refer to “PAIR System Inspection” in Section 1B (Page 1B-9).	Refer to “PAIR Control Solenoid Valve Removal and Installation” in Section 1B (Page 1B-9).
Cylinder head cover	Refer to “Engine Top Side Disassembly” (Page 1D-26).	—	Refer to “Engine Top Side Assembly” (Page 1D-28).
Camshafts	Refer to “Engine Top Side Disassembly” (Page 1D-26).	Refer to “Camshaft Inspection” (Page 1D-36).	Refer to “Engine Top Side Assembly” (Page 1D-28).
Throttle body	Refer to “Throttle Body Removal and Installation” (Page 1D-10).	Refer to “Throttle Body Inspection and Cleaning” (Page 1D-16).	Refer to “Throttle Body Removal and Installation” (Page 1D-10).
Thermostat	Refer to “Thermostat Removal and Installation” in Section 1F (Page 1F-10).	Refer to “Thermostat Inspection” in Section 1F (Page 1F-11).	Refer to “Thermostat Removal and Installation” in Section 1F (Page 1F-10).
Crankcase breather cover	Refer to “Crankcase Breather (PCV) Hose / Reed Valve / Cover Removal and Installation” in Section 1B (Page 1B-11).	Refer to “Crankcase Breather (PCV) Cover Inspection” in Section 1B (Page 1B-12).	Refer to “Crankcase Breather (PCV) Hose / Reed Valve / Cover Removal and Installation” in Section 1B (Page 1B-11).
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).
Oil filter	Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).	—	Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
Oil cooler	Refer to “Oil Cooler / Oil Cooler Hose Removal and Installation” in Section 1E (Page 1E-8).	—	Refer to “Oil Cooler / Oil Cooler Hose Removal and Installation” in Section 1E (Page 1E-8).
Exhaust pipe/Muffler	Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).	Refer to “Exhaust System Inspection” in Section 1K (Page 1K-13).	Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).

Engine Right Side

Item	Removal	Inspection	Installation
Cam chain tension adjuster	Refer to “Engine Top Side Disassembly” (Page 1D-26).	Refer to “Cam Chain Tension Adjuster Inspection” (Page 1D-38).	Refer to “Engine Top Side Assembly” (Page 1D-28).
Clutch cover	Refer to “Clutch Removal” in Section 5C (Page 5C-5).	—	Refer to “Clutch Installation” in Section 5C (Page 5C-7).
Clutch plates	Refer to “Clutch Removal” in Section 5C (Page 5C-5).	Refer to “Clutch Parts Inspection” in Section 5C (Page 5C-11).	Refer to “Clutch Installation” in Section 5C (Page 5C-7).
Clutch sleeve hub	Refer to “Clutch Removal” in Section 5C (Page 5C-5).	—	Refer to “Clutch Installation” in Section 5C (Page 5C-7).
Primary driven gear	Refer to “Clutch Removal” in Section 5C (Page 5C-5).	Refer to “Clutch Parts Inspection” in Section 5C (Page 5C-11).	Refer to “Clutch Installation” in Section 5C (Page 5C-7).
Oil pump drive sprocket	Refer to “Engine Bottom Side Disassembly” (Page 1D-49).	—	Refer to “Engine Bottom Side Assembly” (Page 1D-56).
Gearshift shaft	Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation” in Section 5B (Page 5B-17).	Refer to “Gearshift Linkage Inspection” in Section 5B (Page 5B-20).	Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation” in Section 5B (Page 5B-17).
CKP sensor rotor/Cam chain drive sprocket	Refer to “Engine Bottom Side Disassembly” (Page 1D-49).	—	Refer to “Engine Bottom Side Assembly” (Page 1D-56).
Cam chain tensioner	Refer to “Engine Bottom Side Disassembly” (Page 1D-49).	Refer to “Cam Chain Tensioner Inspection” (Page 1D-40).	Refer to “Engine Bottom Side Assembly” (Page 1D-56).
CKP sensor	Refer to “CKP Sensor Removal and Installation” in Section 1C (Page 1C-2).	Refer to “CKP Sensor Inspection” in Section 1C (Page 1C-2).	Refer to “CKP Sensor Removal and Installation” in Section 1C (Page 1C-2).
Starter idle gear	Refer to “Starter Clutch Removal and Installation” in Section 1I (Page 1I-10).	—	Refer to “Starter Clutch Removal and Installation” in Section 1I (Page 1I-10).
Starter clutch	Refer to “Starter Clutch Removal and Installation” in Section 1I (Page 1I-10).	Refer to “Starter Clutch Inspection” in Section 1I (Page 1I-11).	Refer to “Starter Clutch Removal and Installation” in Section 1I (Page 1I-10).
Starter torque limiter	Refer to “Starter Torque Limiter Removal and Installation” in Section 1I (Page 1I-9).	Refer to “Starter Torque Limiter Inspection” in Section 1I (Page 1I-10).	Refer to “Starter Torque Limiter Removal and Installation” in Section 1I (Page 1I-9).

Engine Left Side

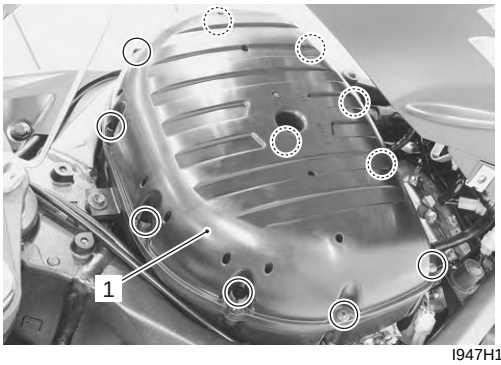
Item	Removal	Inspection	Installation
Speed sensor	Refer to “Speed Sensor Removal and Installation” in Section 9C (Page 9C-5).	Refer to “Speed Sensor Inspection” in Section 9C (Page 9C-6).	Refer to “Speed Sensor Removal and Installation” in Section 9C (Page 9C-5).
Engine sprocket	Refer to “Engine Sprocket Removal and Installation” in Section 3A (Page 3A-2).	Refer to “Drive Chain Related Parts Inspection” in Section 3A (Page 3A-5).	Refer to “Engine Sprocket Removal and Installation” in Section 3A (Page 3A-2).
Drive chain	Refer to “Drive Chain Replacement” in Section 3A (Page 3A-7).	Refer to “Drive Chain Inspection and Adjustment” in Section 0B (Page 0B-14).	Refer to “Drive Chain Replacement” in Section 3A (Page 3A-7).
Gear position switch	Refer to “Gear Position (GP) Switch Removal and Installation” in Section 5B (Page 5B-14).	Refer to “Gear Position (GP) Switch Inspection” in Section 5B (Page 5B-13).	Refer to “Gear Position (GP) Switch Removal and Installation” in Section 5B (Page 5B-14).
Generator cover	Refer to “Generator Removal and Installation” in Section 1J (Page 1J-4).	—	Refer to “Generator Removal and Installation” in Section 1J (Page 1J-4).
Generator rotor	Refer to “Generator Removal and Installation” in Section 1J (Page 1J-4).	—	Refer to “Generator Removal and Installation” in Section 1J (Page 1J-4).
Water pump	Refer to “Water Pump Removal and Installation” in Section 1F (Page 1F-13).	Refer to “Water Pump Related Parts Inspection” in Section 1F (Page 1F-17).	Refer to “Water Pump Removal and Installation” in Section 1F (Page 1F-13).
Oil pressure switch	Refer to “Oil Pressure Switch Removal and Installation” in Section 1E (Page 1E-9).	Refer to “Oil Pressure Indicator Inspection” in Section 9C (Page 9C-6).	Refer to “Oil Pressure Switch Removal and Installation” in Section 1E (Page 1E-9).

Air Cleaner Element Removal and Installation

B947H11406002

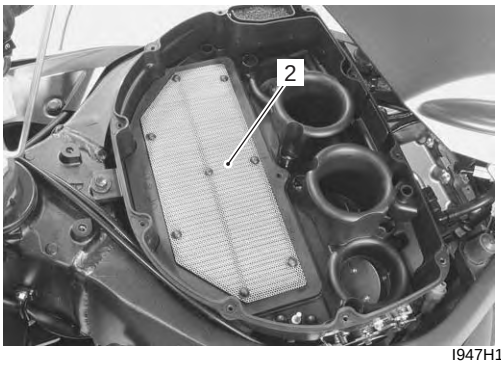
Removal

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Remove the air cleaner box cover (1).



I947H1140001-02

3) Remove the air cleaner element (2).



I947H1140002-01

Installation

Installation is in the reverse order of removal.

Air Cleaner Box Removal and Installation

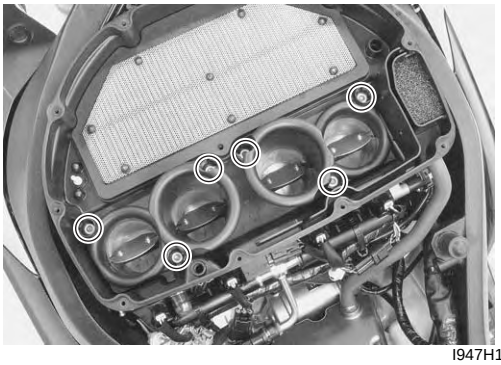
B947H11406003

Removal

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Remove the air cleaner box cover. Refer to “Air Cleaner Element Removal and Installation” (Page 1D-6).
3) Remove the air cleaner mounting bolt.

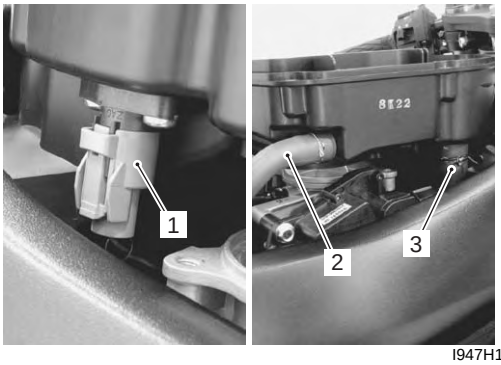
I947H1140003-01

4) Remove the air cleaner box bolt.



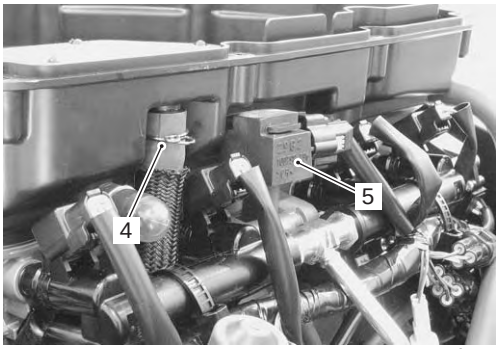
I947H1140004-01

5) Disconnect the IAT sensor coupler (1), PCV hose (2) and PAIR hose (3).



I947H1140005-01

6) Disconnect ISC hose (4) and IAP sensor (5).
7) Remove the air cleaner box.



I947H1140006-01

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).
- Tighten air cleaner box bolts in the ascending order. Refer to “Throttle Body Construction” (Page 1D-9).

Air Cleaner Element Inspection and Cleaning

B947H11406004

Refer to “Air Cleaner Element Inspection” in Section 0B (Page 0B-3).

Throttle Cable Removal and Installation

B947H11406005

Removal

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” (Page 1D-7).
2) Remove the right handlebar switch box. Refer to “Handlebar Removal and Installation” in Section 6B (Page 6B-2).
3) Remove the throttle cables as shown in the cable routing diagram. Refer to “Throttle Cable Routing Diagram” (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” (Page 1D-2).
- Check the throttle cable play and proper operation. Refer to “Throttle Cable Play Inspection and Adjustment” in Section 0B (Page 0B-12).

Throttle Cable Inspection

B947H11406006

Check that the throttle grip moves smoothly from full open to full close. If it does not move smoothly, lubricate the throttle cables.

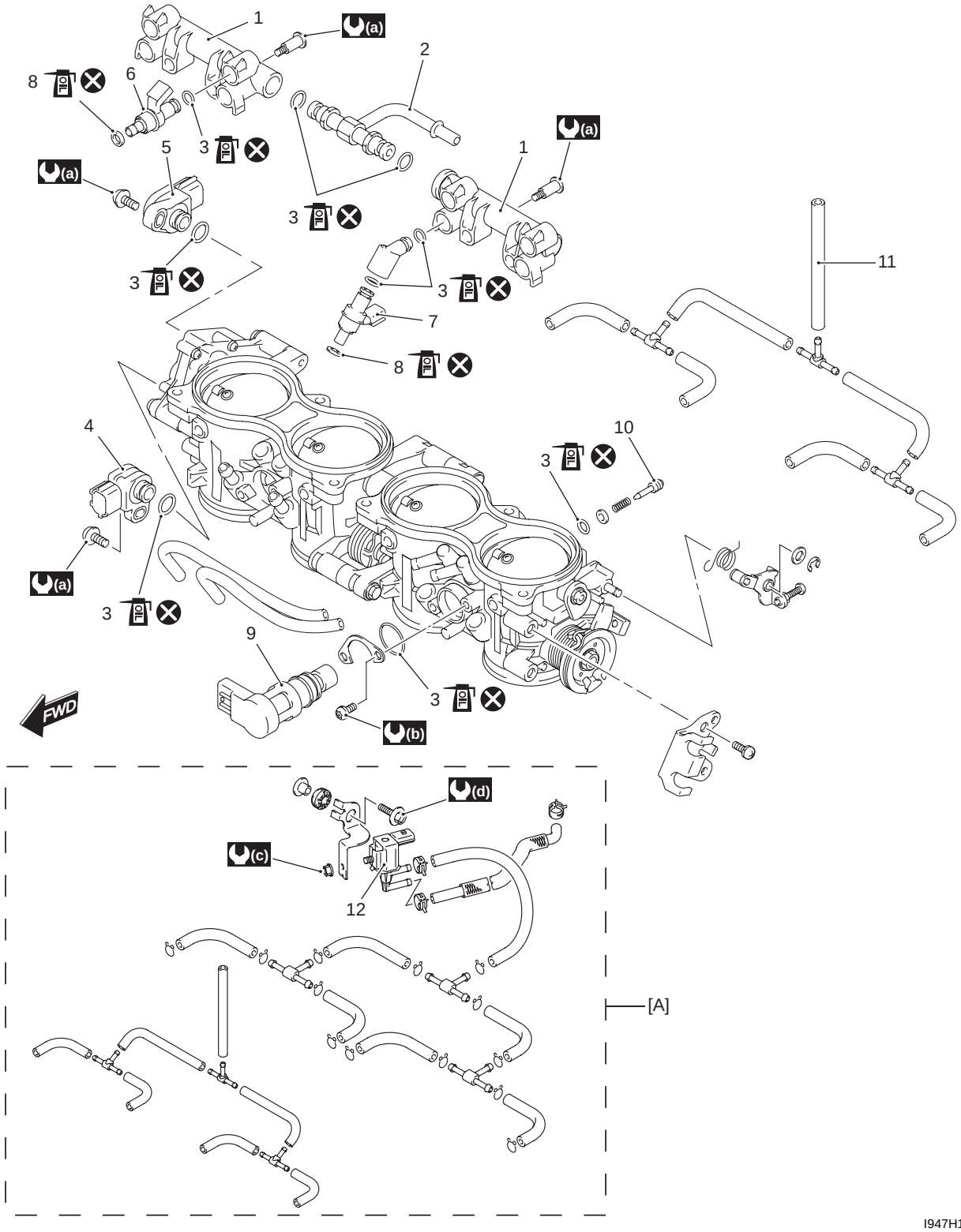
Throttle Cable Play Inspection and Adjustment

B947H11406007

Refer to “Throttle Cable Play Inspection and Adjustment” in Section 0B (Page 0B-12).

Throttle Body Components

B947H11406008

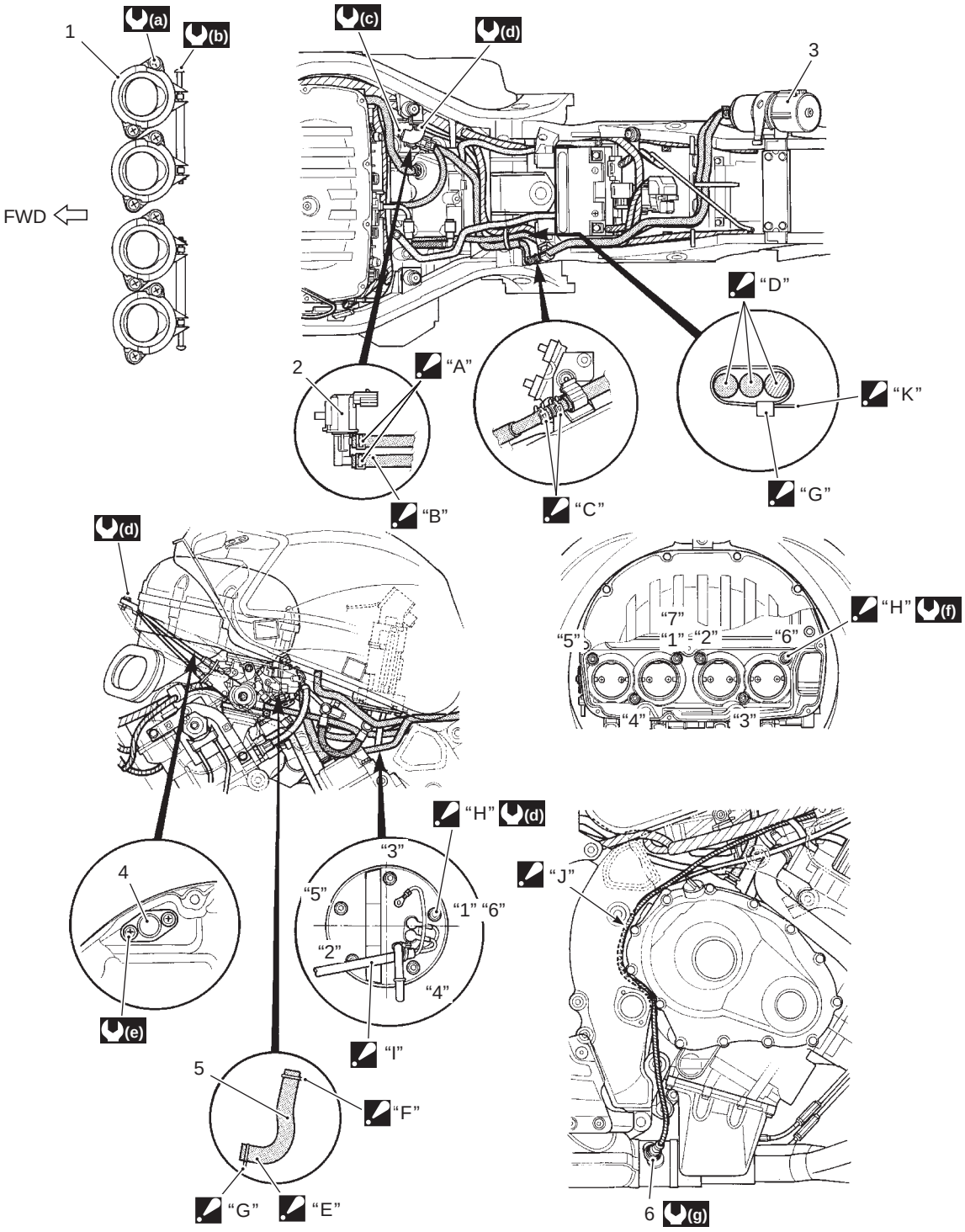


I947H1140252-03

1. Fuel delivery pipe	6. Secondary fuel injector	11. Vacuum hose	(c) : 6.5 Nm (0.65 kgf-m, 4.5 lbf-ft)
2. Fuel delivery pipe T-joint	7. Primary fuel injector	12. EVAP system purge control solenoid valve	(d) : 10 Nm (1.0 kgf-m, 7.0 lbf-ft)
3. O-ring	8. Cushion seal	[A]: For E-33 only	: Apply engine oil.
4. TP sensor	9. ISC valve	(a) : 3.5 Nm (0.35 kgf-m, 2.5 lbf-ft)	: Do not reuse.
5. STP sensor	10. Air screw	(b) : 2 Nm (0.2 kgf-m, 1.5 lbf-ft)	

Throttle Body Construction

B947H11406009



I947H1140253-03

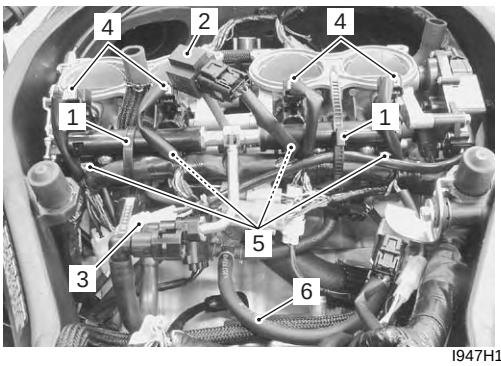
1. Intake pipe	"C": Face the end of clamps upward and keep clearance from the seat rail and fuel tank.	"K": Face the clamp end right side.
2. EVAP system purge control solenoid valve (E-33 only)	"D": Arrange the hose and wiring harnesses in parallel to the frame bridge.	(a) : 8.5 N·m (0.85 kgf-m, 6.5 lbf-ft)
3. EVAP canister (E-33 only)	"E": Yellow paint should face downward.	(b) : 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)
4. IAT sensor	"F": Face the clamp end backward.	(c) : 7 N·m (0.7 kgf-m, 5.0 lbf-ft)
5. ISC valve hose	"G": Face the clamp end downward.	(d) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
6. HO2 sensor	"H": Tighten the bolts in the ascending of numbers.	(e) : 1.3 N·m (0.13 kgf-m, 1.0 lbf-ft)
"A": Face the clamp end left side.	"I": Route the fuel pump lead wire above the fuel nipple.	(f) : 4.3 N·m (0.43 kgf-m, 3.0 lbf-ft)
"B": Yellow marking should face upward.	"J": Pass the HO2 sensor lead wire between the frame and engine.	(g) : 25 N·m (2.5 kgf-m, 18.0 lbf-ft)

Throttle Body Removal and Installation

B947H11406010

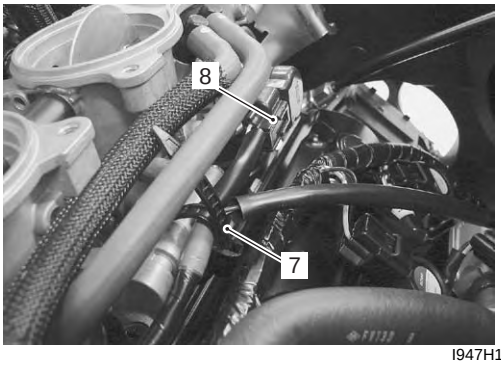
Removal

1) Remove the side cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” (Page 1D-7).
3) Remove the clamps (1).
4) Disconnect the IAP sensor (2) from the vacuum hose.
5) Disconnect the STVA lead wire coupler (3).
6) Disconnect secondary fuel injector couplers (4) and primary fuel injector couplers (5).
7) Disconnect the purge hose (6) from the EVAP system purge control solenoid valve. (E-33 only)



I947H1140254-01

8) Remove the clamp (7).
9) Disconnect the ISC valve coupler (8).



I947H1140255-01

10) Place a rag under the fuel feed hose (9) and disconnect the fuel feed hose from the fuel pump.

⚠ WARNING

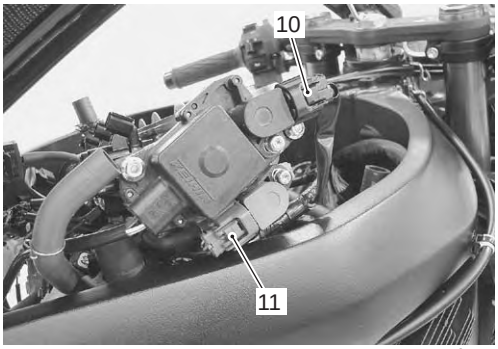
For E-33 models, drain fuel from the fuel tank before disconnecting the fuel feed hose to prevent fuel leakage.

I947H1140007-02

11) Loosen the throttle body clamp screws, left and right.

I947H1140256-01

12) Lift up the throttle body from the intake pipes.
13) Disconnect the STP sensor coupler (10) and TP sensor coupler (11).



I947H1140257-02

14) Disconnect the throttle cables.

⚠ CAUTION

After disconnecting the throttle cables, do not snap the throttle valve from full open to full close. It may cause damage to the throttle valve and throttle body.

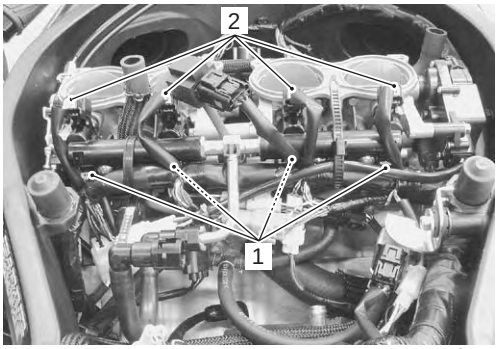
15) Remove the throttle body.

I947H1140258-01

Installation

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

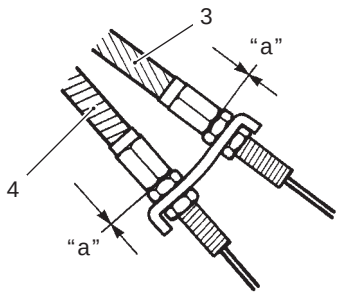
- Connect the primary injector couplers (1) and secondary injector couplers (2) to the respective fuel injectors. Make sure that each coupler is installed in the correct position. The color on each lead wire refers to the appropriate fuel injector.



I947H1140259-01

	Primary injector	Secondary injector
#1	Y/R and Gr/W	Y/R and Lg
#2	Y/R and Gr/B	Y/R and Lg/W
#3	Y/R and Gr/Y	Y/R and Lg/B
#4	Y/R and Gr/R	Y/R and Lg/Bl

- Connect the throttle cable No. 1 (3) and throttle cable No. 2 (4) to the throttle cable drum.



I837H1140016-01

"a": 0 – 1 mm (0 – 0.04 in)

- 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 – 1 mm (0 – 0.04 in).
- Tighten each lock-nut.

Tightening torque
Throttle cable lock-nut: 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)

- Adjust the throttle cable play. Refer to "Throttle Cable Play Inspection and Adjustment" in Section 0B (Page 0B-12).
- Reset the ISC valve and TP sensor learned values. Refer to "ISC Valve Reset" (Page 1D-18) and "TP Reset" (Page 1D-19).

Throttle Body Disassembly and Assembly

B947H11406011

Refer to "Throttle Body Removal and Installation" (Page 1D-10).

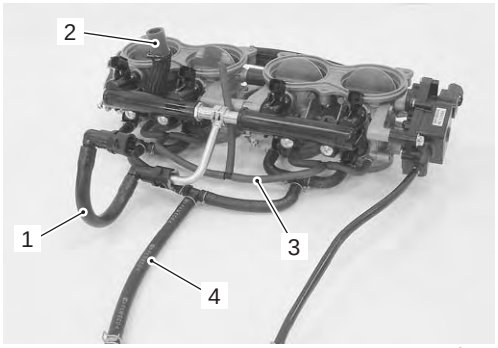
Disassembly

⚠ 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) Disconnect the fuel feed hose (1), ISC valve hose (2) and vacuum hoses (3).

2) Disconnect the purge hose (4). (E-33 only)

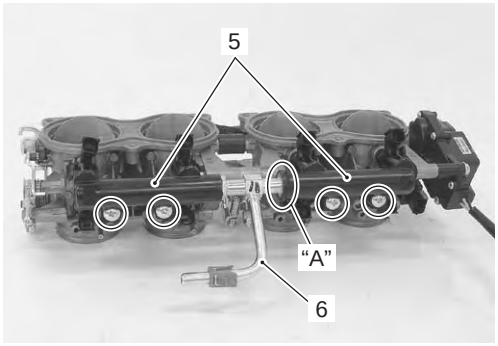


I947H1140299-01

3) Remove the fuel delivery pipe assembly (5).

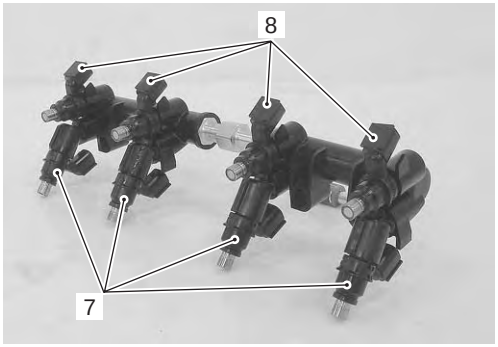
⚠ CAUTION

Be careful not to twist the fuel delivery pipes and T-joint (6) when removing them, or joint part "A" of the fuel delivery pipe get damage.



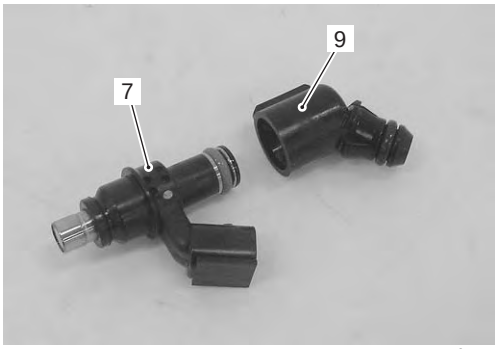
I947H1140008-01

4) Remove the primary fuel injectors (7) and secondary fuel injectors (8) from the fuel delivery pipes.



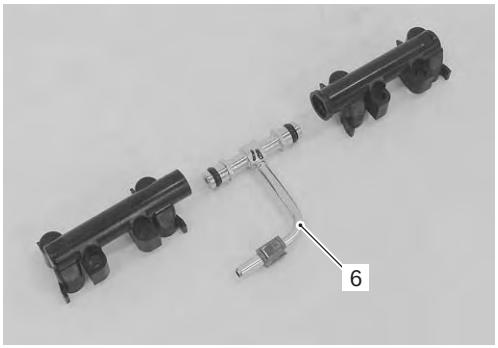
I947H1140009-01

5) Remove the fuel pipe (9) from the primary fuel injectors (7).



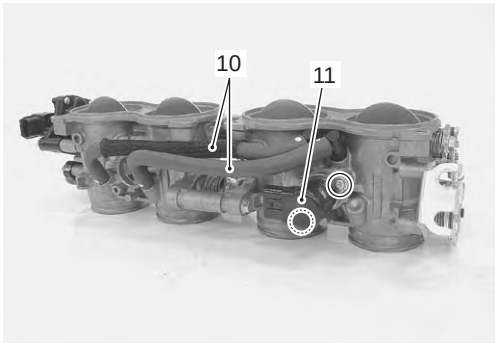
I947H1140010-01

6) Remove the T-joint (6) from the fuel delivery pipes.



I947H1140011-01

7) Remove the ISC valve hoses (10) and ISC valve (11).



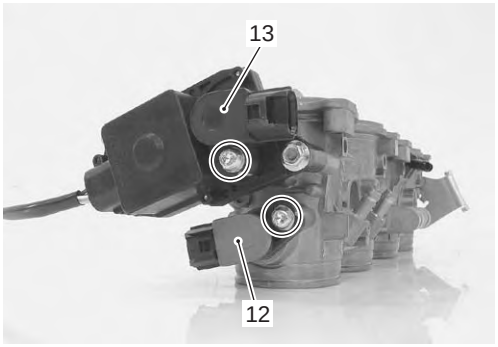
I947H1140012-01

8) Remove the TP sensor (12) and STP sensor (13) with the special tool.

Special tool
TOOL : 09930–11950 (Torx wrench (5 mm))

NOTE

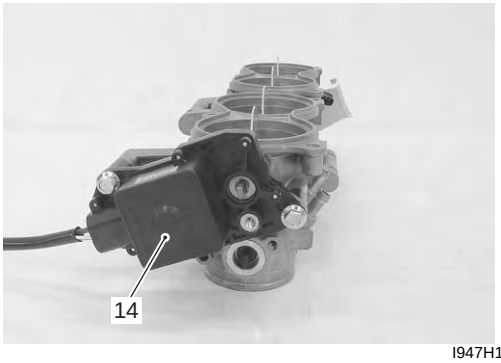
Prior to disassembly, mark each sensor's original position with a paint or scribe for accurate reinstallation.



I947H1140013-01

⚠ CAUTION

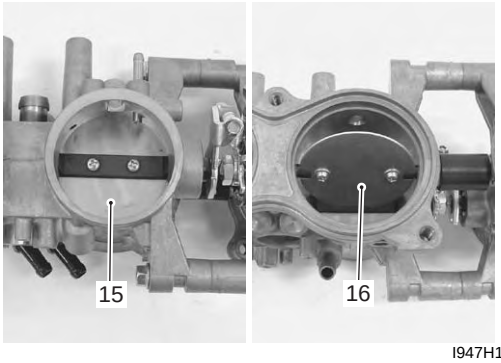
Never remove the STVA (14) from the throttle body.



I947H1140014-01

⚠ CAUTION

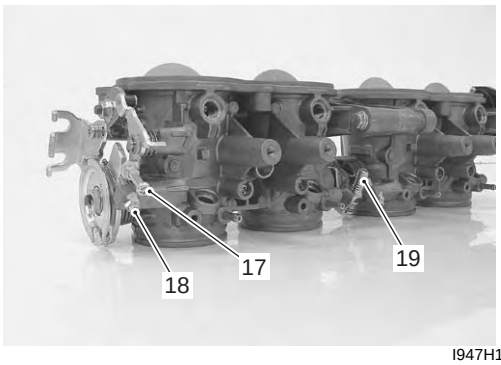
Never remove the throttle valves (15) and secondary throttle valves (16).



I947H1140015-01

⚠ CAUTION

- **These adjusting screws (17), (18) and (19) are factory-adjusted at the time of delivery and do not turn or remove them.**
- **Do not separate the throttle body.**



I947H1140016-01

Assembly
Reassemble the throttle body in the reverse order of disassembly. Pay attention to the following points:

- With the secondary throttle valves fully opened, install the STP sensor (Black) and tighten the STP sensor mounting screw to the specified torque.

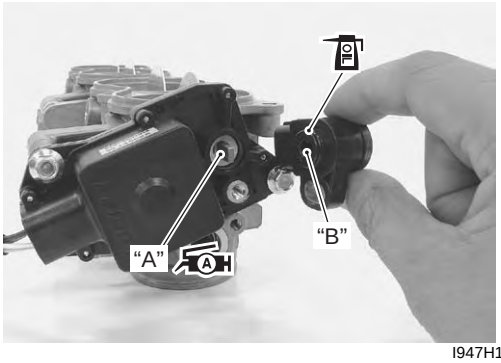
NOTE

- **Apply thin coat of engine oil to the O-ring.**
- **Align the secondary throttle valve shaft end "A" with the groove "B" of the STP sensor.**
- **Apply grease to the secondary throttle valve shaft end "A" if necessary.**

A : Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

Special tool
TOOL : 09930–11950 (Torx wrench (5 mm))

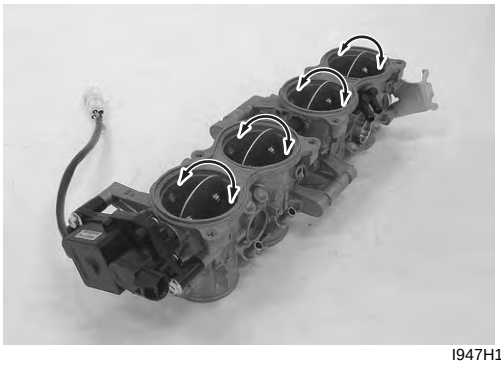
Tightening torque
STP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



I947H1140017-01

NOTE

- **Make sure the secondary throttle valves smoothly open and close.**
- **If necessary, adjust the STP sensor. Refer to "STP Sensor Adjustment" in Section 1C (Page 1C-6).**



I947H1140018-01

- With the throttle valves fully closed, install the TP sensor (Gray) and tighten the TP sensor mounting screw to the specified torque.

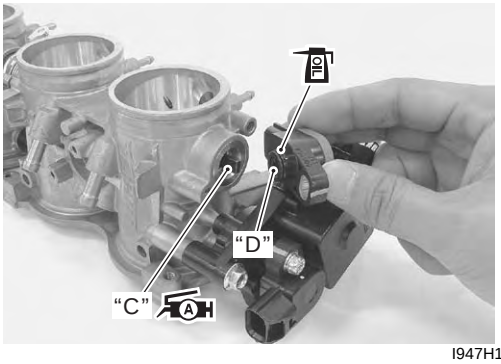
⚠ CAUTION

- **Apply thin coat of engine oil to the O-ring.**
- **Align the throttle valve shaft end "C" with the groove "D" of the TP sensor.**
- **Apply grease to the throttle valve shaft end "C" if necessary.**

: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

Special tool
TOOL : 09930–11950 (Torx wrench (5 mm))

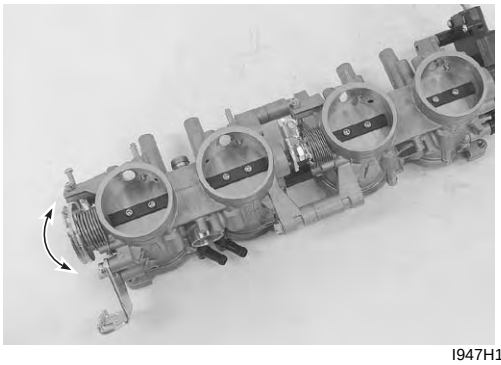
Tightening torque
TP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



I947H1140019-01

NOTE

- **Make sure the throttle valves smoothly open and close.**
- **If necessary, adjust the TP sensor. Refer to "TP Sensor Adjustment" in Section 1C (Page 1C-3).**

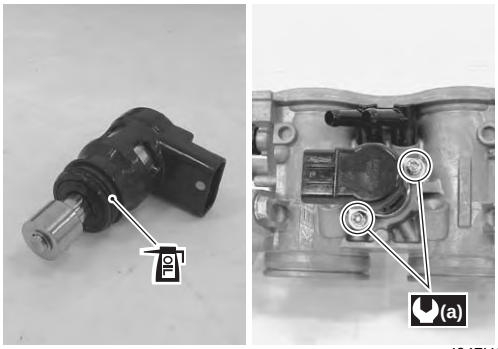


I947H1140020-01

- Apply a thin coat of engine oil to the O-ring, install the ISC valve to the throttle body and tighten the ISC valve mounting screw to the specified torque.

Special tool
TOOL : 09930–11960 (Torx wrench (4 mm))

Tightening torque
ISC valve mounting screw (a): 2 N·m (0.2 kgf-m, 1.5 lbf-ft)

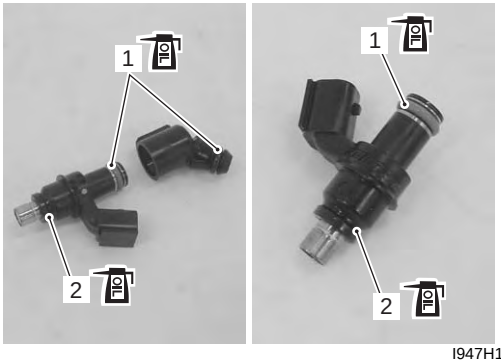


I947H1140021-01

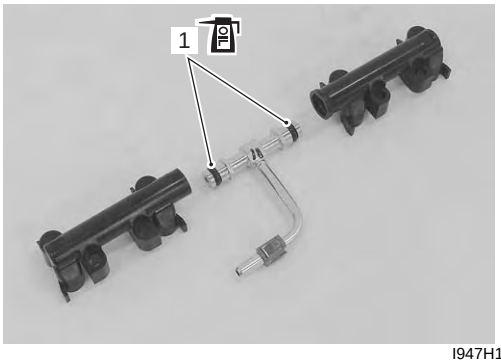
- Apply thin coat of engine oil to the new O-rings (1) and cushion seals (2).

⚠ CAUTION

Replace the O-rings and cushion seals with new ones.



I947H1140022-01

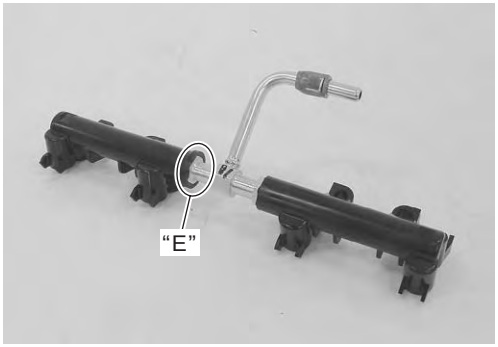


I947H1140023-01

- Assemble the fuel delivery pipes so the T-joint is set in proper angle as shown in the figure.

⚠ CAUTION

Be careful not to twist the fuel delivery pipes and T-joint when installing them, or joint part "E" of the fuel delivery pipe may get damage.



I947H1140024-01

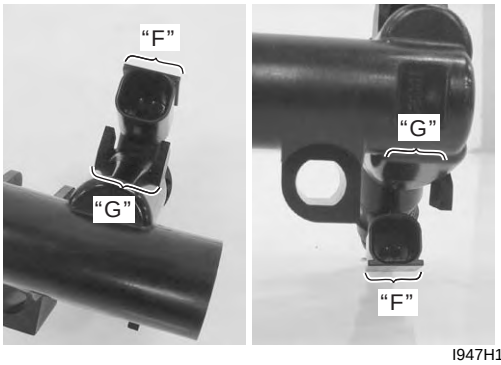
- Install each fuel injector by pushing it straight to the delivery pipe.

⚠ CAUTION

Never turn the injector while pushing it.

NOTE

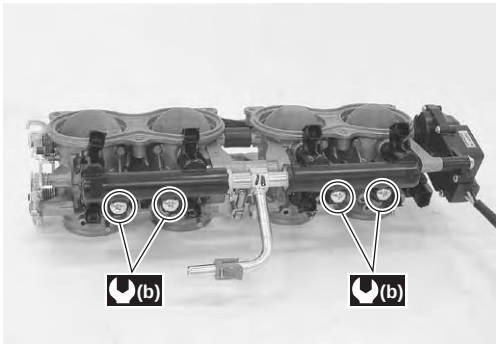
Align the coupler "F" of injector with boss "G" of the delivery pipe.



I947H1140025-01

- Install the fuel delivery pipe assembly to the throttle body.
- Tighten the fuel delivery pipe mounting screws to the specified torque.

Tightening torque
Fuel delivery pipe mounting screw (b): 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



I947H1140026-01

- Connect the hoses properly. Refer to "Throttle Body Construction" (Page 1D-9).

Throttle Body Inspection and Cleaning

B947H11406012

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 throttle body main bore. 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.

Inspection

Check following items for any defects or clogging. Replace the damaged part if necessary.

- O-rings
- Throttle valves
- Secondary throttle valves
- Vacuum hoses
- ISC valve hoses
- Fuel delivery pipes
- Cushion seals
- Fuel injectors

ISC Valve Visual Inspection

B947H11406013

Visually inspect the ISC valve if necessary.

- Inspect the ISC valve for any carbon deposition defects. Clean or replace the ISC valve if necessary.

I947H1140027-01

Throttle Valve Synchronization

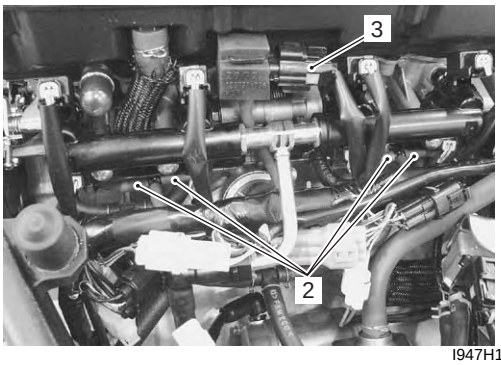
B947H11406014

Check and adjust the throttle valve synchronization among four cylinders.

1) Start the engine and run it in idling condition for warming up.
2) Stop the warmed-up engine.
3) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
4) Remove the clamps (1).

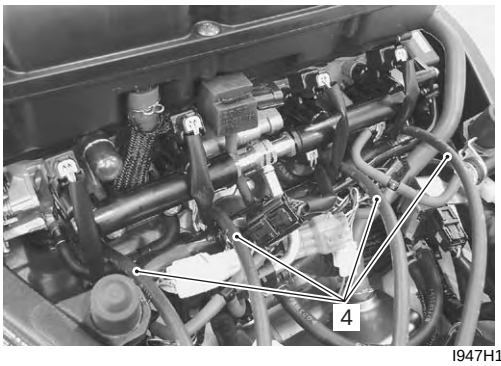
I947H1140308-01

5) Disconnect the respective vacuum hoses (2) from vacuum nipples on the throttle body.
6) Disconnect the IAP sensor coupler (3).



I947H1140309-01

7) Connect the respective vacuum tester hoses (4) to the vacuum nipples.



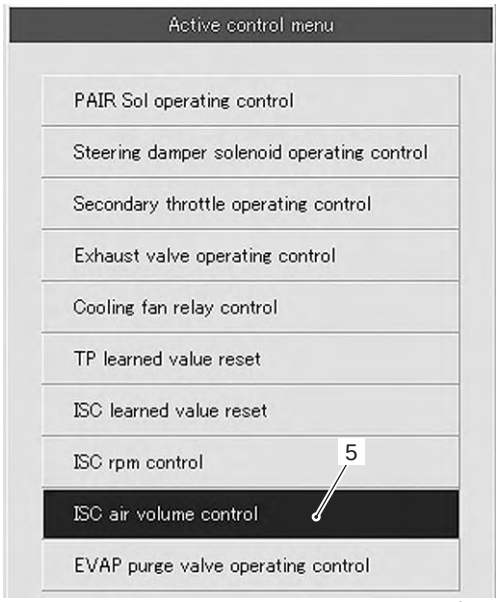
I947H1140310-01

8) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
9) Start the engine.
10) Click “Data monitor”.
11) Warm up the engine (Engine coolant temp. more than 80 °C (176 °F)).

☐ Manifold absolute pressure 1	146.7	kPa
☐ Engine coolant / oil temperature	81.7	℃
☐ Throttle position	27.9	%

I947H1140311-01

12) Click “Active control”.
13) Click “ISC air volume control” (5).



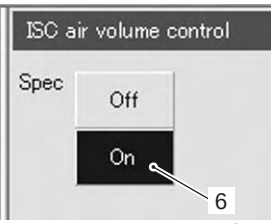
I947H1140300-02

14) Click “ON” button (6) to fix the ISC air volume of four cylinders.

NOTE

When making this synchronization, be sure that the engine coolant temperature is within 80 – 100 °C (176 – 212 °F).

Item	Value	Unit
☐ Engine speed	“A” → 1145	rpm
☐ Desired idle speed	1155	rpm
☐ ISC valve position	“B” → 48	step
☐ Manifold absolute pressure 1	146.7	kPa
☐ Engine coolant / oil temperature	88.0	℃



I947H1140312-01

“A”: Engine speed: Approx 1 150 rpm	“B”: ISC valve position: Approx 48 step

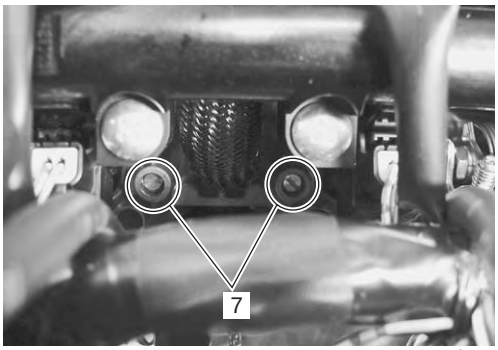
15) Check for the synchronization of vacuum from #1 to #4 cylinders.

I947H1140313-01

16) Equalize the vacuum of the cylinders by turning each air screw (7) and keep it running at idling speed.

NOTE

Always set the engine rpm at idle rpm.



I947H1140314-01

17) 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 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.**

18) Repeat the procedures from 9) to 16).

19) Close the SDS tool and turn the ignition switch OFF.

20) Disconnect the vacuum tester and reinstall the removed parts.

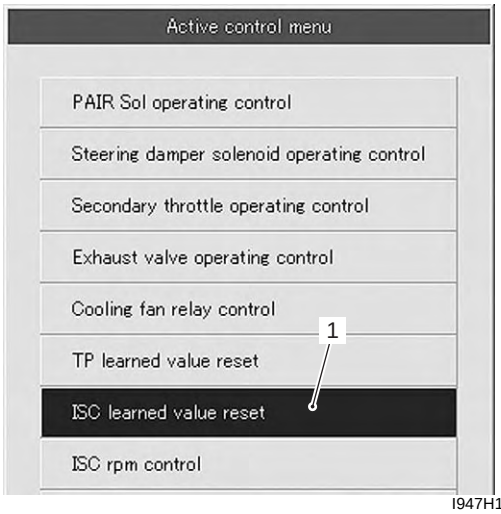
21) After completing the throttle valve synchronization, clear the DTC and reset the ISC learned value using SDS tool. Refer to “ISC Valve Preset and Opening Initialization” in Section 1C (Page 1C-8).

ISC Valve Reset

B947H11406015

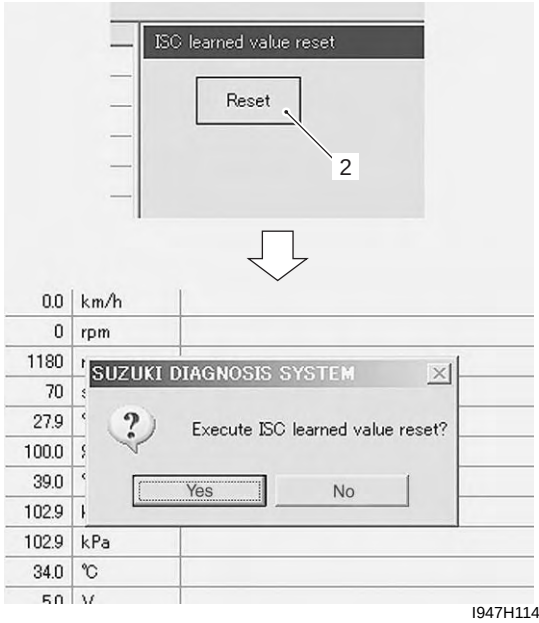
When removing or replacing the throttle body assembly, reset the ISC valve learned value in the following procedures:

1) Turn the ignition switch ON position.
2) Set up the SDS tools. (Refer to the SDS operation manual for further details.)
3) Click “Active control”.
4) Click “ISC learned value reset” (1).



I947H1140301-01

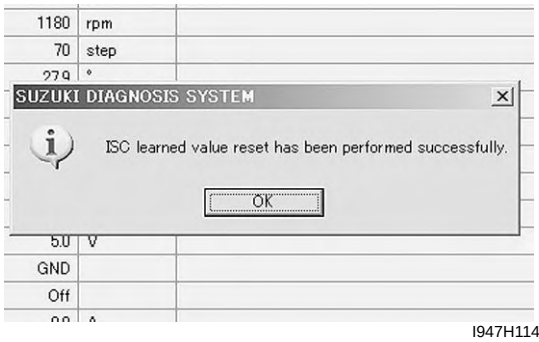
5) Click “Reset” button (2) to clear the ISC learned value.



I947H1140302-01

NOTE

The learned value of the ISC valve is set at RESET position.



I947H1140303-01

6) Close the SDS tool.
7) Turn the ignition switch OFF position.

NOTE

The ISC valve opening initialization is automatically started after the ignition switch is turned OFF.

TP Reset

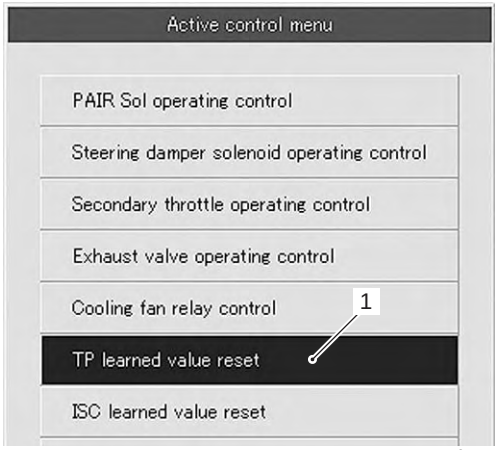
B947H11406016

When replacing the throttle body assembly or TP sensor with a new one or reinstalling the TP sensor, reset the TP learned value in the following procedures:

NOTE

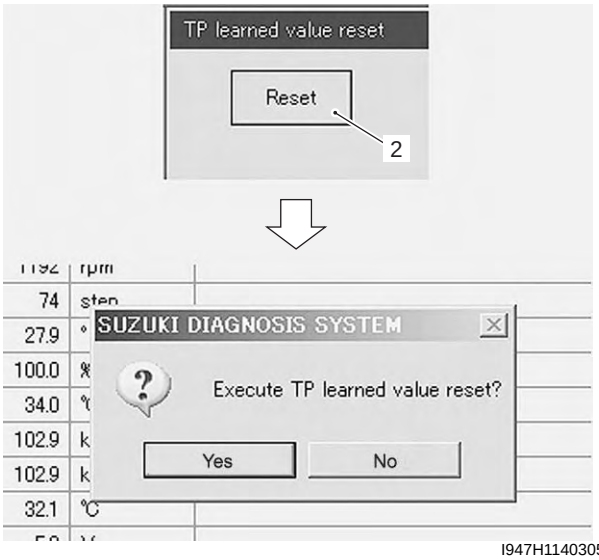
Keep the throttle valves fully closed while resetting the TP learned value.

1) Turn the ignition switch ON.
2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
3) Click the “Active control”.
4) Click the “TP learned value reset” (1).



I947H1140304-01

5) Click the “Reset” button (2) to clear the TP learned value.



I947H1140305-01

NOTE

The leaned value of the TP sensor is set at Preset position.

I947H1140306-01

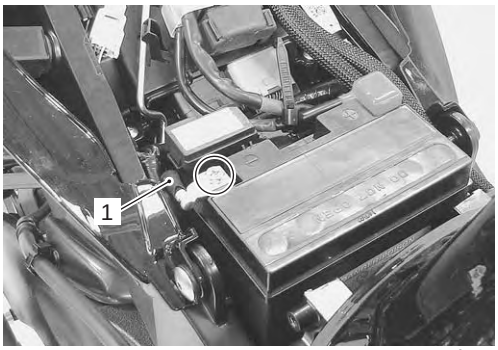
6) Close the SDS tool and turn the ignition switch OFF.

Engine Assembly Removal

B947H11406017

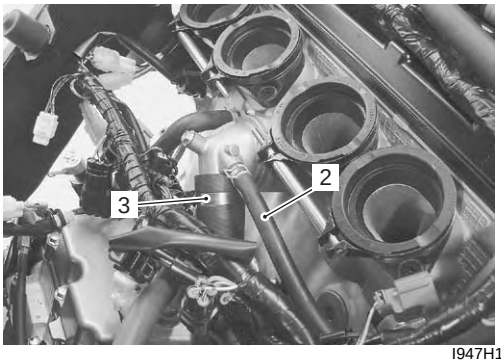
Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps:

1) Remove the side cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Disconnect the battery (–) lead wire (1).



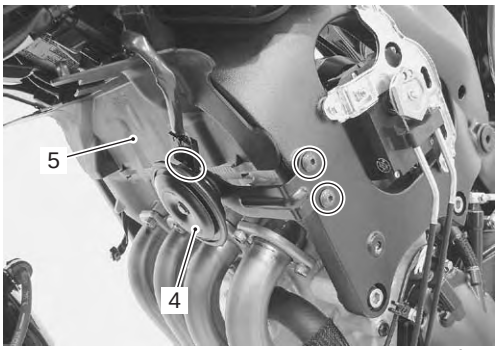
I947H1140260-02

4) Jack up the motorcycle and fix it for safety.
5) Drain engine oil. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
6) Drain engine coolant. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
7) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
8) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” (Page 1D-7).
9) Remove the throttle body assembly. Refer to “Throttle Body Removal and Installation” (Page 1D-10).
10) Remove the oil cooler and hoses. Refer to “Oil Cooler / Oil Cooler Hose Removal and Installation” in Section 1E (Page 1E-8).
11) Remove the radiator assembly. Refer to “Radiator / Cooling Fan Motor Removal and Installation” in Section 1F (Page 1F-6).
12) Disconnect the water/air bleed hose (2) and radiator inlet hose (3).



I947H1140261-01

13) Remove the horn (4) and radiator heat guard (5).



I947H1140262-01

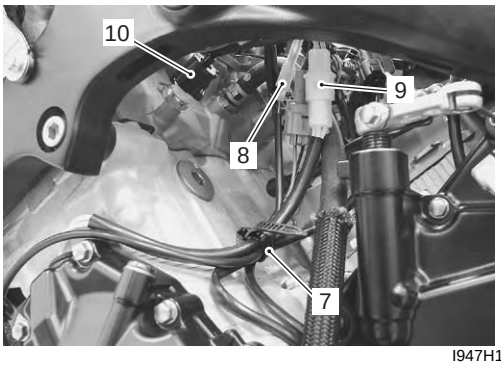
14) Remove the radiator/oil cooler mounting bracket (6).

I947H1140263-01

15) Remove the exhaust system components. Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).

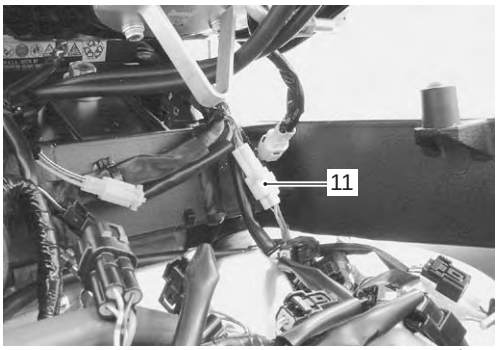
16) Remove the clamp (7).

17) Disconnect the oil pressure switch lead wire coupler (8), generator lead wire coupler (9) and ECT sensor coupler (10).



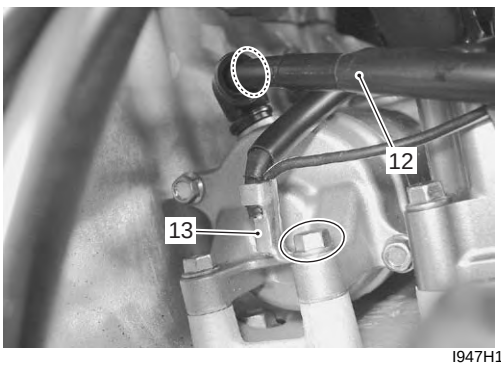
I947H1140264-01

18) Disconnect the GP switch lead wire coupler (11).



I947H1140265-01

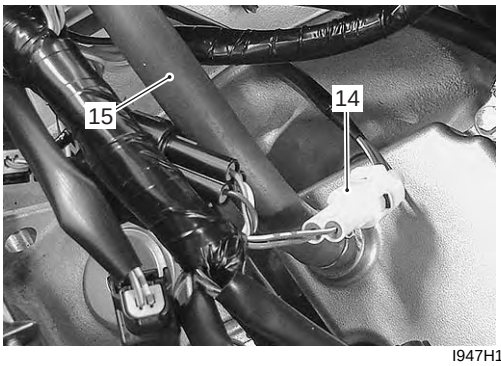
19) Disconnect the starter motor lead wire (12) and engine ground lead wire (13).



I947H1140266-02

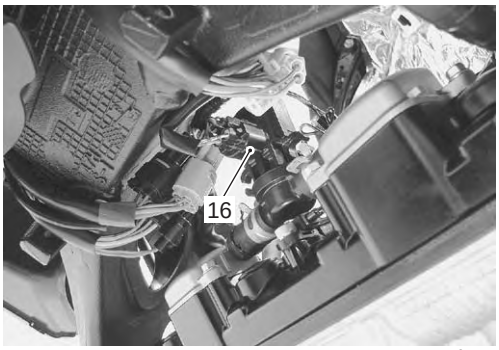
20) Disconnect the CKP sensor lead wire coupler (14).

21) Remove the crankcase breather (PCV) hose (15).



I947H1140267-03

22) Disconnect the PAIR solenoid valve coupler (16).



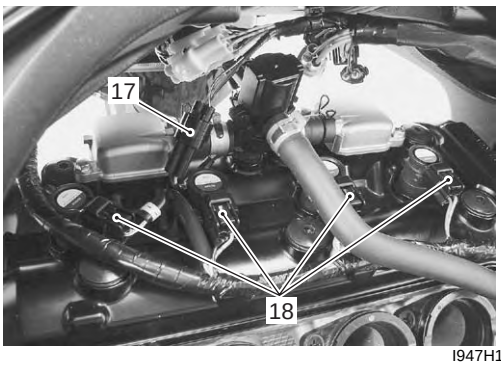
I947H1140268-01

23) Disconnect the CMP sensor lead wire coupler (17) and ignition coil couplers (18).

24) Remove the ignition coils.

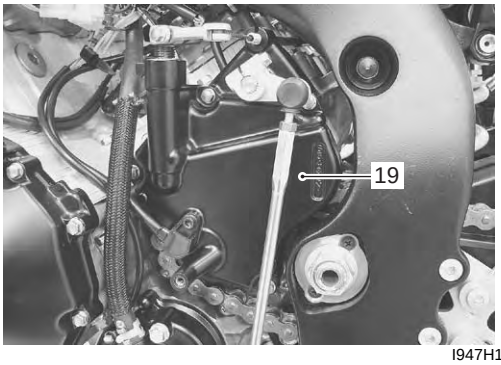
⚠ CAUTION

- **Do not remove the ignition coil before disconnecting its coupler.**
- **Do not pry up the ignition coil/plug cap with a screwdriver or a bar to avoid its damage.**
- **Be careful not to drop the ignition coil/plug cap to prevent its short or open circuit.**



I947H1140269-02

25) Remove the engine sprocket cover (19). Refer to “Engine Sprocket Removal and Installation” in Section 3A (Page 3A-2).

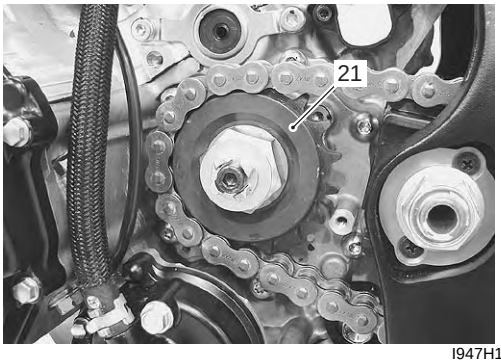


I947H1140271-02

26) Remove the dowel pins and clutch push rod (20).

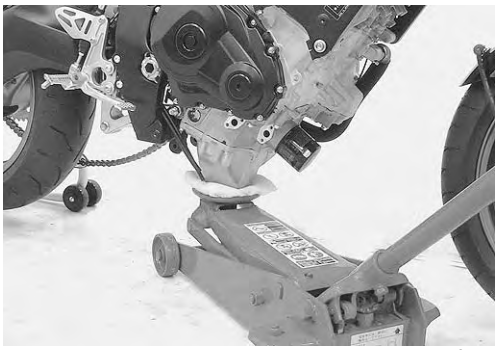
I947H1140272-03

27) Remove the engine sprocket (21). Refer to “Engine Sprocket Removal and Installation” in Section 3A (Page 3A-2).



I947H1140273-02

28) Support the engine using an engine jack.

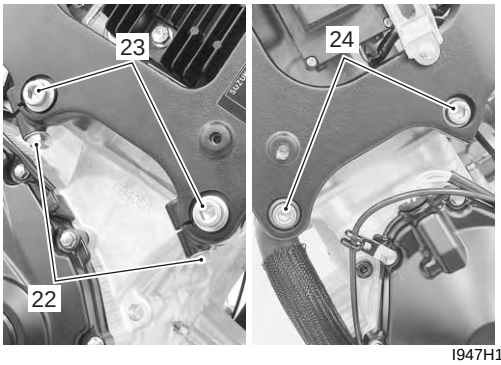


I947H1140274-01

29) Loosen the engine mounting pinch bolts (22) (RH).

30) Remove the engine mounting bolts (23) (RH).

31) Remove the engine mounting bolts (24) (LH).



I947H1140275-02

32) Remove the engine mounting nut (25).

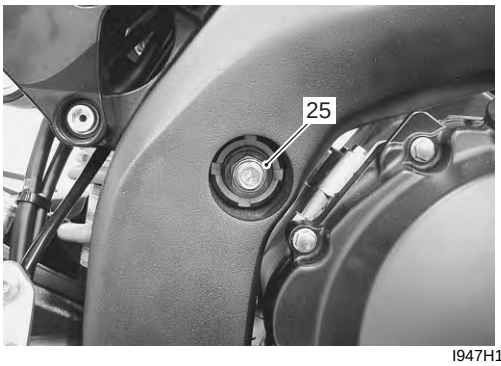
33) Remove the engine mounting thrust adjuster lock-nut (26) with the special tool.

34) Loosen the engine mounting thrust adjuster (27) fully.

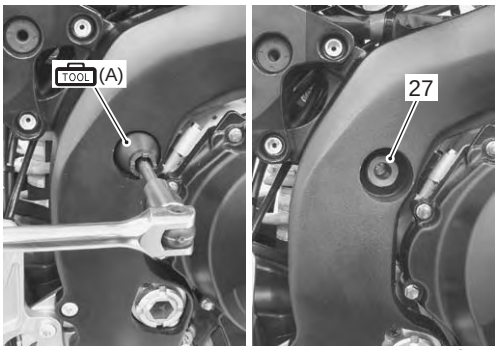
Special tool
TOOL (A): 09940–14990 (Engine mounting adjust wrench)

NOTE

Do not remove the engine mounting bolt at this stage.



I947H1140276-03



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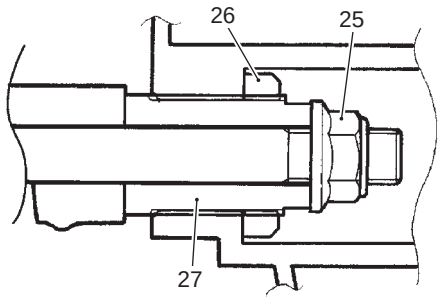


I947H1140278-02

35) Remove the engine mounting nut (28).

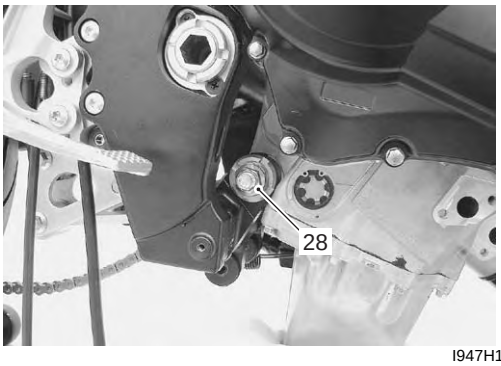
36) Loosen the engine mounting thrust adjuster lock-nut (29) with the special tool.

37) Loosen the engine mounting thrust adjuster (30) fully.

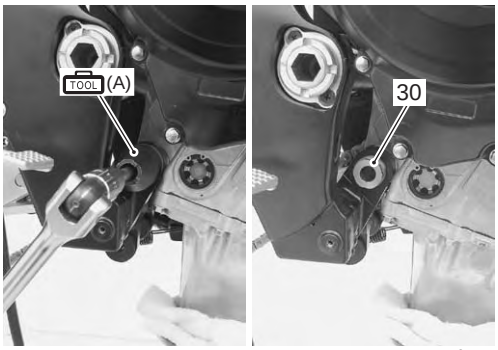
Special tool
TOOL (A): 09940–14990 (Engine mounting adjust wrench)

NOTE

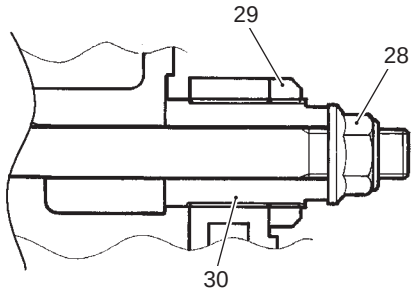
Do not remove the engine mounting bolt at this stage.



I947H1140279-03



I947H1140280-03



I947H1140281-02

38) Remove the engine mounting bolts and gradually lower the front side of the engine. Then, take off the drive chain from the driveshaft.

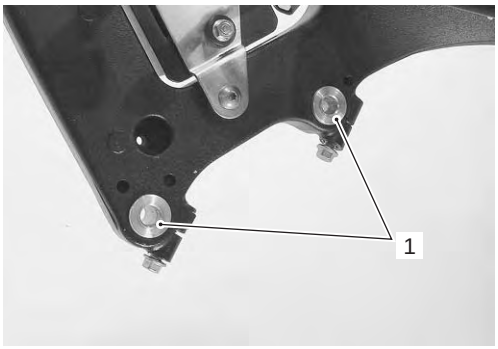
39) Remove the engine assembly.

Engine Assembly Installation

B947H11406018

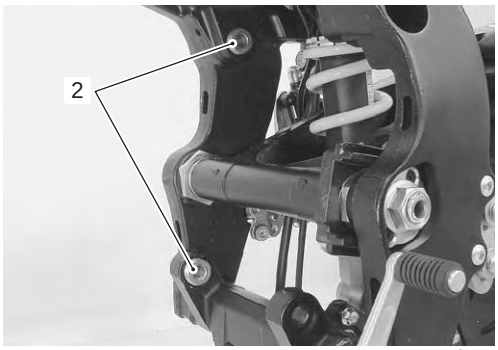
Install the engine in the reverse order of engine removal. Pay attention to the following points:

- Before installing the engine, install the collars (1).



I947H1140282-01

- Before installing the engine, install the engine mounting thrust adjusters (2).

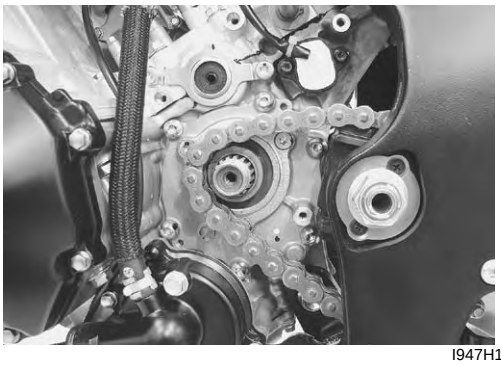


I947H1140283-01

- Gradually raise the rear side of the engine assembly, and then put the drive chain on the driveshaft.

⚠ CAUTION

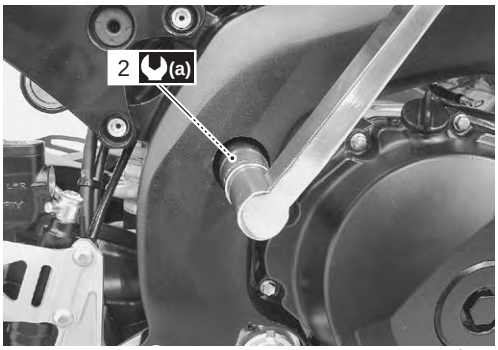
Be careful not to catch the wiring harness between the frame and the engine.



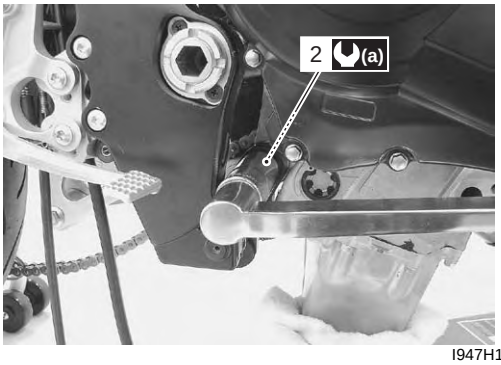
I947H1140284-01

- Install all engine mounting bolts and tighten them temporarily.
- Tighten the engine mounting thrust adjusters (2) to the specified torque.

Tightening torque
Engine mounting thrust adjuster (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I947H1140285-02

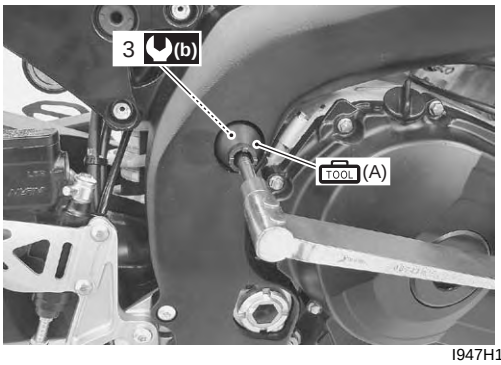


I947H1140286-02

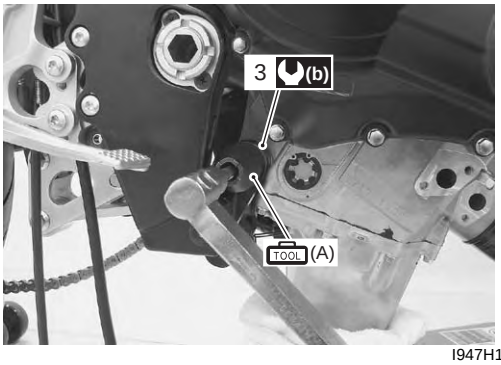
- Tighten the engine mounting thrust adjuster lock-nuts (3) to the specified torque with the special tool.

Tightening torque
Engine mounting thrust adjuster lock-nut (b): 45 N·m (4.5 kgf-m, 32.5 lbf-ft)

Special tool
TOOL (A): 09940–14990 (Engine mounting adjust wrench)



I947H1140287-02



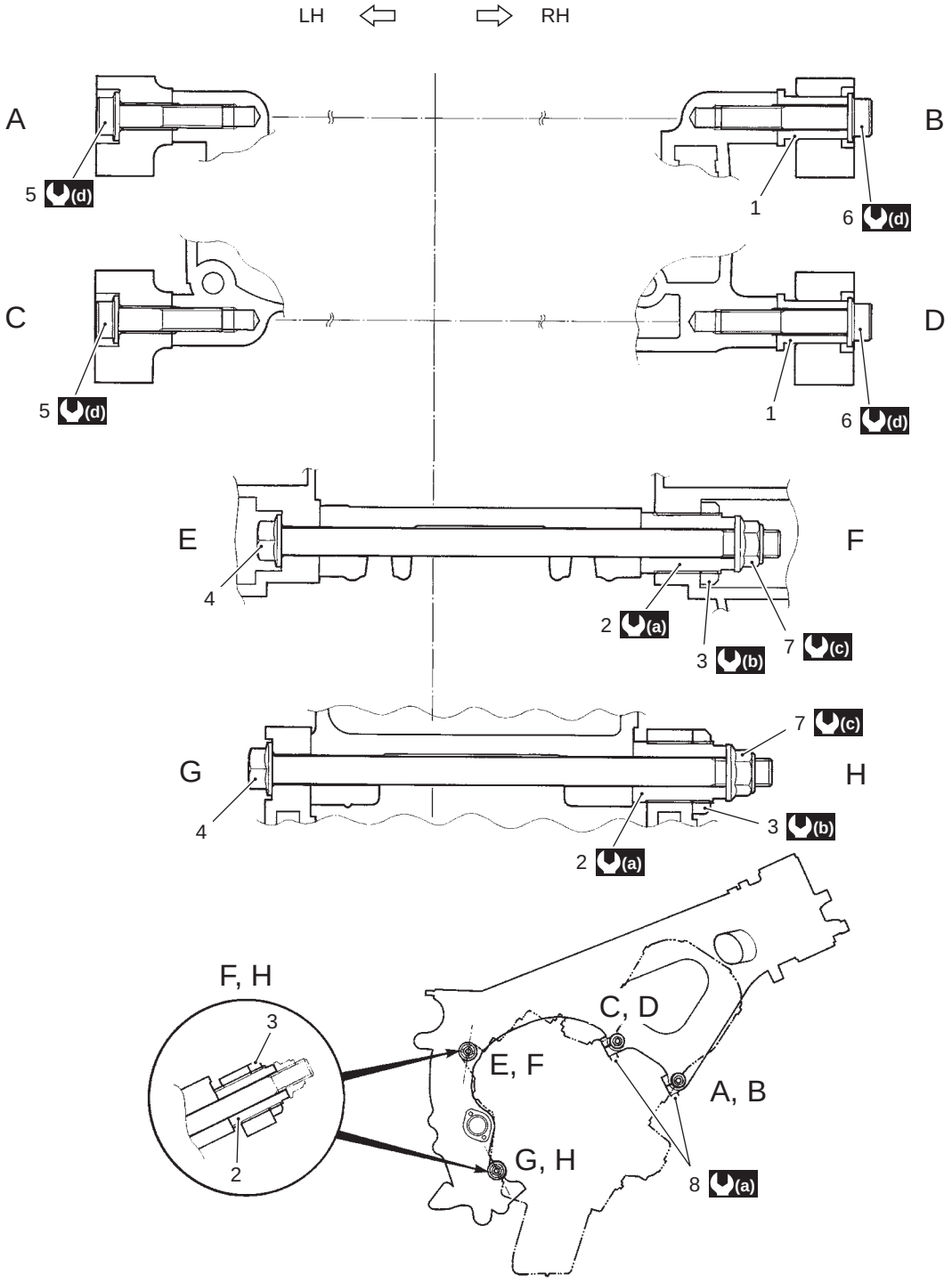
I947H1140288-02

- Tighten all engine mounting bolts and nuts to the specified torque, as shown in the following illustration.

NOTE

The engine mounting nuts are self-locking. Once the nuts have been removed, they are no longer of any use.

- Tighten the engine mounting pinch bolt to the specified torque, as shown in the following illustration.



I947H1140289-02

1. Collar	5. Engine mounting bolt (45 mm)	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Engine mounting thrust adjuster	6. Engine mounting bolt (55 mm)	(b) : 45 N·m (4.5 kgf-m, 32.5 lbf-ft)
3. Engine mounting thrust adjuster lock-nut	7. Engine mounting nut	(c) : 75 N·m (7.5 kgf-m, 54.0 lbf-ft)
4. Engine mounting bolt (220 mm)	8. Engine mounting pinch bolt	(d) : 55 N·m (5.5 kgf-m, 40.0 lbf-ft)

- Install the engine sprocket. Refer to “Engine Sprocket Removal and Installation” in Section 3A (Page 3A-2).
- Install the exhaust pipe assembly and muffler. Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).
- Install the radiator. Refer to “Radiator / Cooling Fan Motor Removal and Installation” in Section 1F (Page 1F-6).
- Install the throttle body. Refer to “Throttle Body Removal and Installation” (Page 1D-10).
- Install the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” (Page 1D-7).
- After remounting the engine, route the wiring harness, cable and hoses properly. Refer to “Wiring Harness Routing Diagram” in Section 9A (Page 9A-7), “Throttle Cable Routing Diagram” (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-12) and “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
- 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-12).
  - Throttle valve synchronization
    Refer to “Throttle Valve Synchronization” (Page 1D-16).
  - Clutch cable play
    Refer to “Clutch Cable Play Inspection and Adjustment” in Section 0B (Page 0B-14).
  - Drive chain slack
    Refer to “Drive Chain Inspection and Adjustment” in Section 0B (Page 0B-14).
  - Engine oil and coolant leakage
    Refer to “Cooling Circuit Inspection” in Section 1F (Page 1F-4).

Engine Top Side Disassembly

B947H11406019

It is unnecessary to remove the engine assembly from the frame when servicing the cylinder head cover and camshafts.

NOTE

Before servicing the engine top side components (until camshafts removal) with the engine in place, remove the following parts:

- **Air cleaner box**
- **Throttle body**

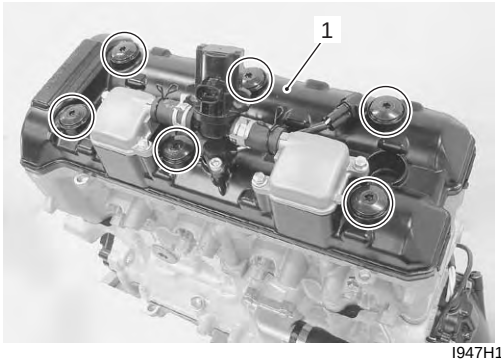
Other parts except for these “Engine Top Side Components” can not be serviced with the engine installed in the frame. Refer to “Engine Assembly Removal” (Page 1D-20) and “Engine Assembly Installation” (Page 1D-24).

⚠ 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.

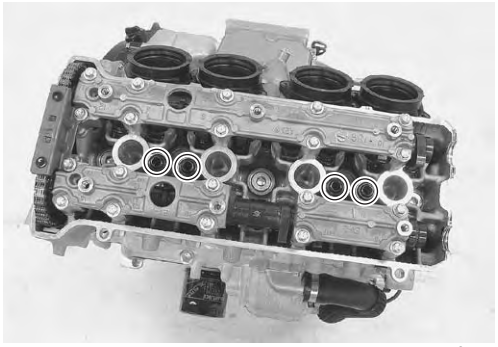
Cylinder Head Cover

1) Remove the spark plugs. Refer to “Ignition Coil and Spark Plug Removal and Installation” in Section 1H (Page 1H-6).
2) Remove the cylinder head cover (1) and its gasket.



I947H1140028-03

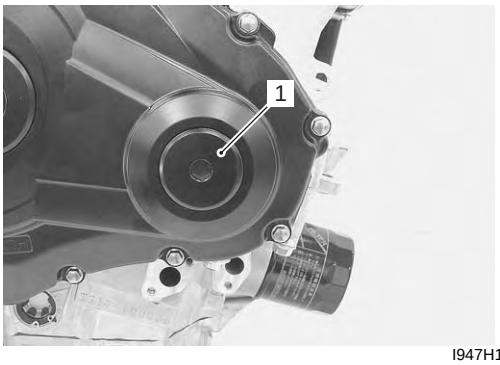
3) Remove the dowel pins and O-rings.



I947H1140029-01

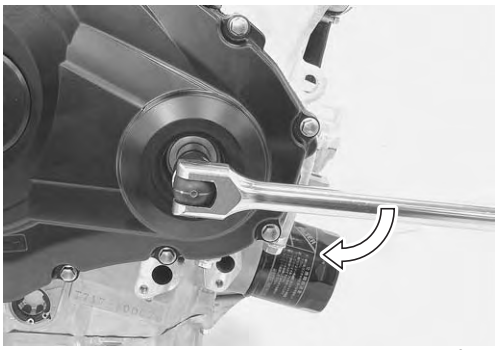
Camshafts

1) Remove the valve timing inspection cap (1).

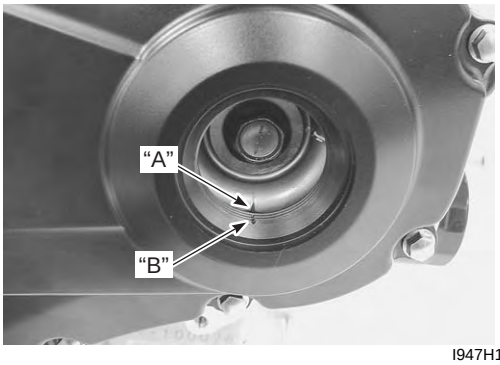


I947H1140030-01

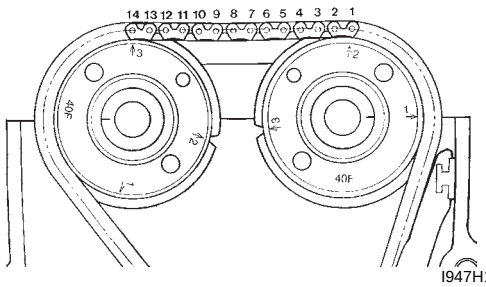
2) Turn the crankshaft to bring the line “A” on the CKP sensor rotor to the slit “B” of cap hole thread and also to bring the camshafts to the position as shown.



I947H1140031-01

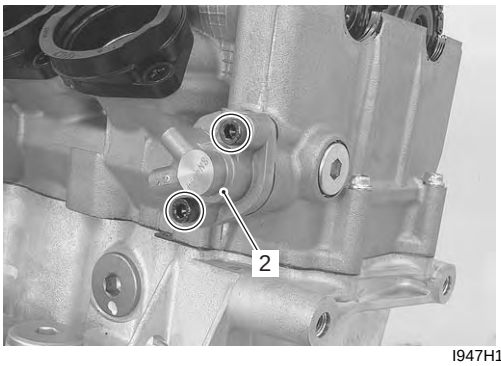


I947H1140295-01



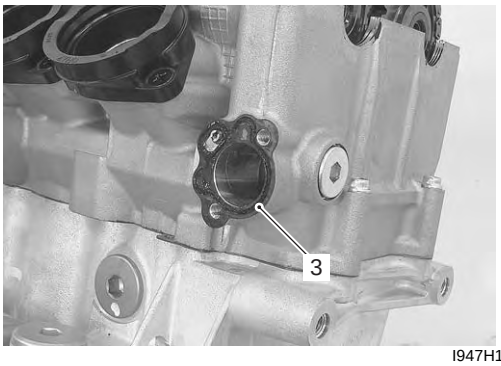
I947H1140033-02

3) Remove the cam chain tension adjuster (2).



I947H1140034-02

4) Remove the gasket (3).



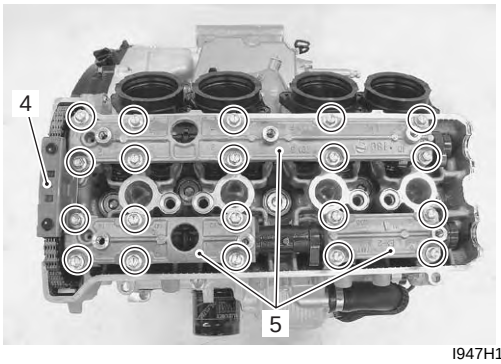
I947H1140035-01

5) Remove the cam chain guide No. 2 (4).

6) Remove the camshaft journal holders (5).

⚠ CAUTION

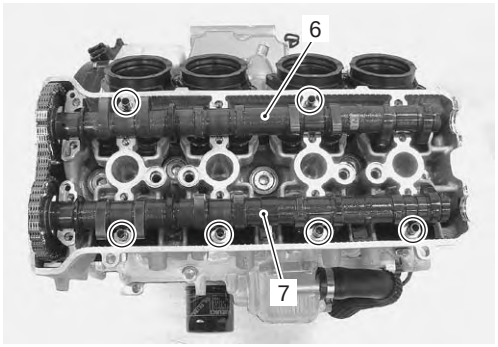
Be sure to loosen the camshaft journal holder bolts evenly by shifting the wrench in the descending order of numbers.



I947H1140036-01

7) Remove the dowel pins.

8) Remove the intake camshaft (6) and exhaust camshaft (7).



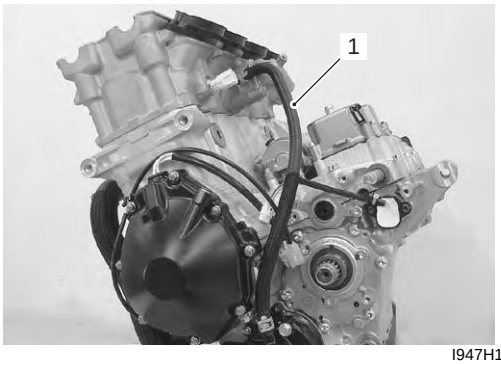
I947H1140037-01

Cylinder Head

NOTE

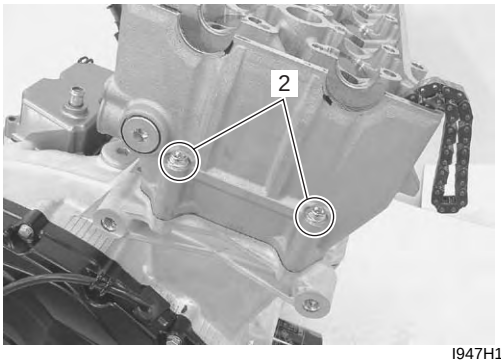
The cylinder head can not be serviced with the engine installed in the frame.

1) Disconnect the water bypass hose (1).



I947H1140038-01

2) Remove the cylinder head bolts (M6) (2).



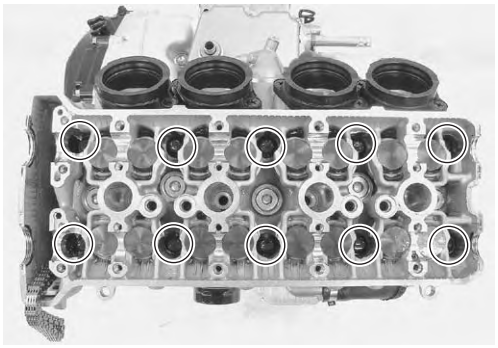
I947H1140039-01

3) Remove the cylinder head bolts (M10) and washers.

NOTE

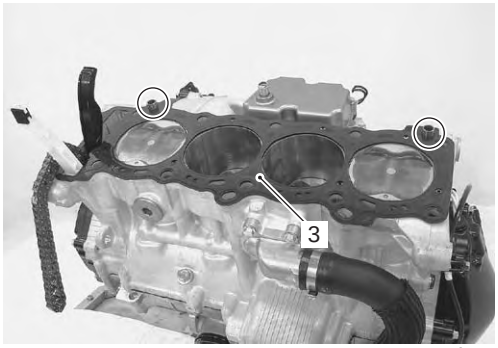
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

4) Remove the cylinder head.



I947H1140040-01

5) Remove the dowel pins and cylinder head gasket (3).



I947H1140041-01

Engine Top Side Assembly

B947H11406020

Assemble the engine top side in the reverse order of disassembly. Pay attention to the following points:

Cylinder Head

- Install the dowel pins and a new cylinder head gasket (1) to the cylinder.

⚠ CAUTION

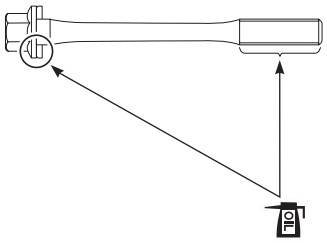
Use a new gasket to prevent gas leakage.

I947H1140042-01

- Place the cylinder head on the gasket.

NOTE

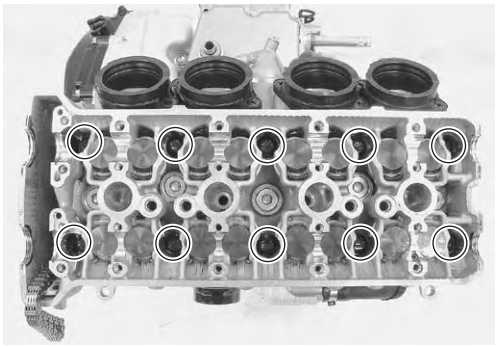
- **When installing the cylinder head, keep the cam chain taut.**
- **Apply engine oil to the washer and thread portion of the cylinder head bolts (M10) before tightening them.**



I823H1140063-01

- Tighten the cylinder head bolts (M10) to the specified torque with a torque wrench sequentially and diagonally.
- Additionally tighten the cylinder head bolts with the specified angles diagonally using an angular torque gauge.

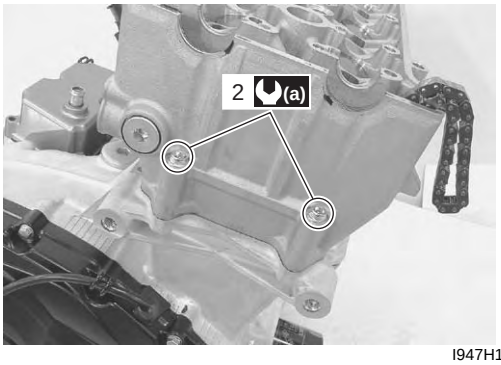
Tightening torque
Cylinder head bolt (M10): 31 N·m (3.1 kgf-m, 22.5 lbf-ft) then turn in 1/6 (60°) turn



I947H1140043-01

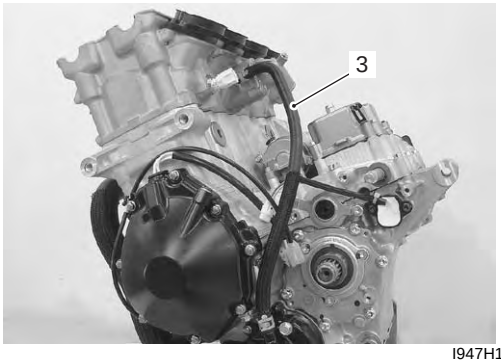
- After firmly tightening the cylinder head bolts (M10), tighten the cylinder head bolts (M6) (2).

Tightening torque
Cylinder head bolt (M6) (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1140044-01

- Connect the water bypass hose (3).

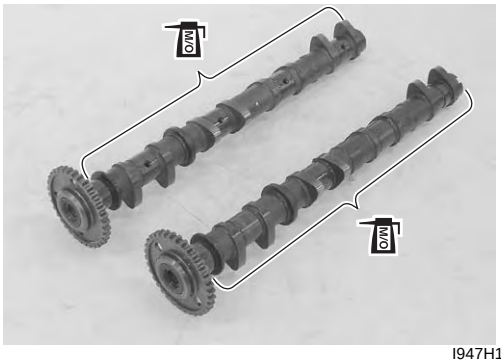


I947H1140045-01

Camshaft

- The camshafts are identified by the embossed letters.
  IN: Intake camshaft
  EX: Exhaust camshaft
- Before placing the camshafts on the cylinder head, apply molybdenum oil to their journals, cam faces and holders.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



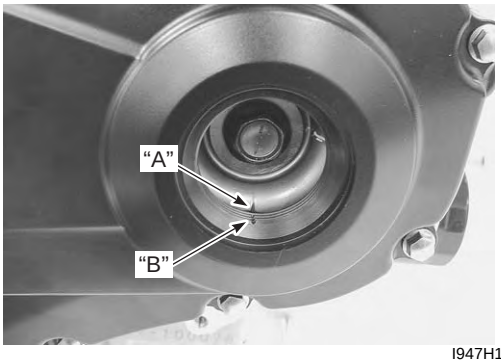
I947H1140046-01

- Turn the crankshaft clockwise and align the line “A” on the CKP sensor rotor to the slit “B” of cap hole thread while keeping the cam chain pulled upward.

⚠ 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 line “A” with slit “B” and hold this position when installing the camshafts.**

I947H1140047-01



I947H1140296-01

- Pull the cam chain lightly.
- Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head. (The exhaust camshaft sprocket has an arrow marked “1” “C”.)
- Engage the cam chain with the exhaust camshaft sprocket.

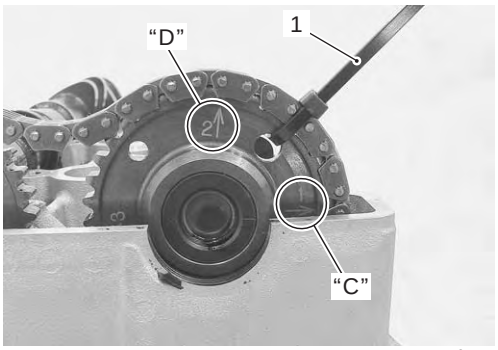
NOTE

Before installing the camshaft, check that the tappets are installed correctly.

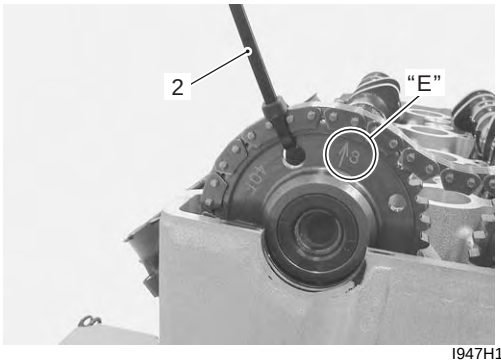
- Bind the cam chain and the sprocket with a proper clamp (1) to prevent the cam chain disengagement while installing the camshaft journal holders.
- The other arrow marked “2” “D” should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked “2” “D”, count out 14 roller pins (from the exhaust camshaft side going towards the intake camshaft side).
- Engage the 14th roller pin “E” on the cam chain with the arrow marked “3” on the intake camshaft sprocket.
- Bind the cam chain and the sprocket with a proper clamp (2) to prevent the cam chain disengagement while installing the camshaft journal holders.

NOTE

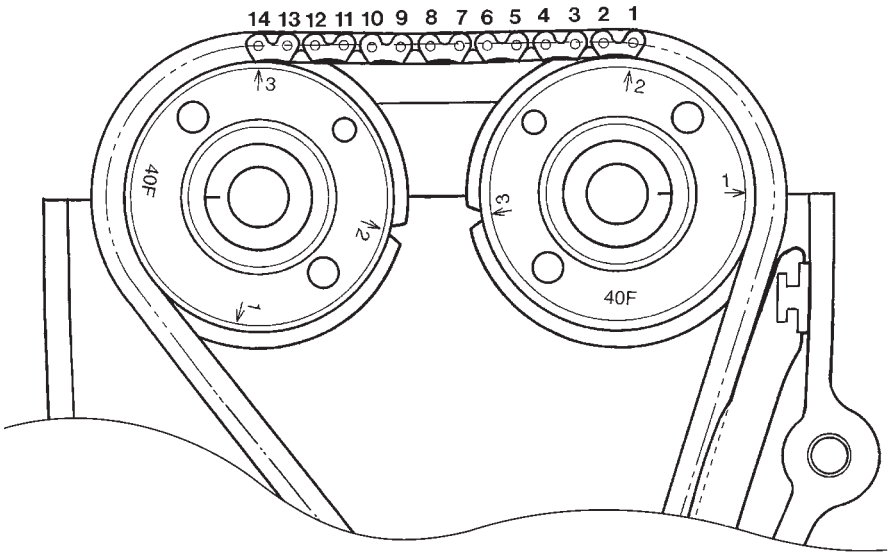
The cam chain should now be on all three sprockets. Be careful not to move the crankshaft until the camshaft journal holders and cam chain tension adjuster are secured.



I947H1140049-01



I947H1140050-01



I947H1140051-01

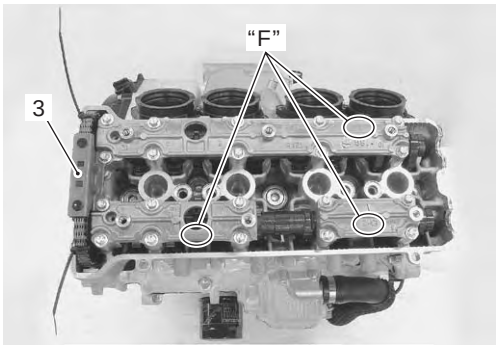
- Install the dowel pins.

I947H1140052-01

- Install the camshaft journal holders and cam chain guide No. 2 (3).
- Have the camshaft journal holders seated evenly by tightening the camshaft journal holder bolts lightly, in the ascending order of numbers.

NOTE

- **Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.**
- **Each camshaft journal holder is identified with a cast-on letter "F".**
- **The ascending order of numbers are indicated on the camshaft journal holders.**



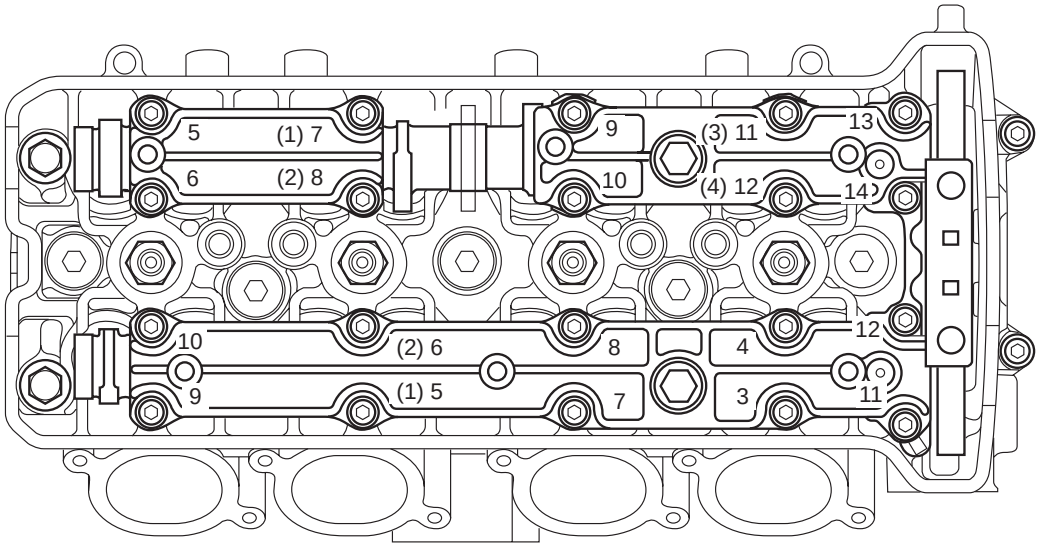
I947H1140053-02

- Tighten the camshaft journal holder bolts in 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)

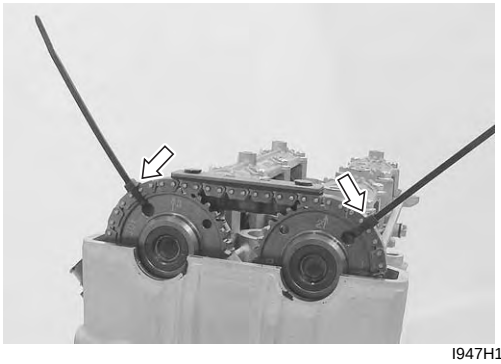
⚠ CAUTION

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.



I947H1140054-03

- Remove the clamps.



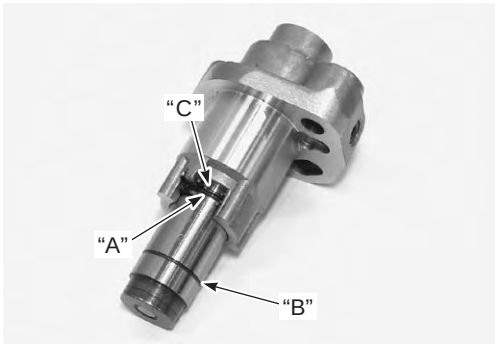
I947H1140055-01

Cam Chain Tension Adjuster

- Holding the cam chain tension adjuster as shown in the figure, compress the plunger by turning the adjuster body until the outer circlip “A” reaches the groove “B”.

⚠ CAUTION

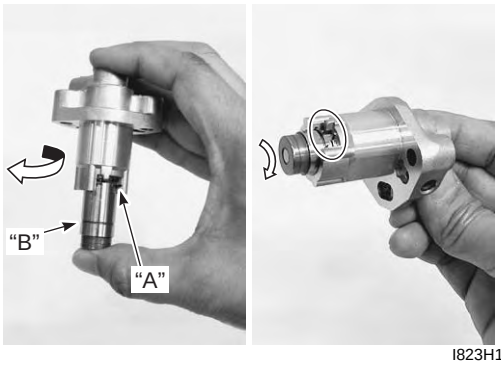
Do not turn the adjuster body until the outer circlip “A” exceeds the groove “B”.
If the inner circlip “C” is caught in the groove “B”, plunger may not go out automatically from the adjuster body even if pushing force is applied on the head.
In such case, it needs to be disassembled.



I823H1140365-01

I823H1140366-01

- Hook the outer circlip “A” into the groove “B”, then turn the plunger head clockwise more than 90° to make a little play in the inner thread mechanism.

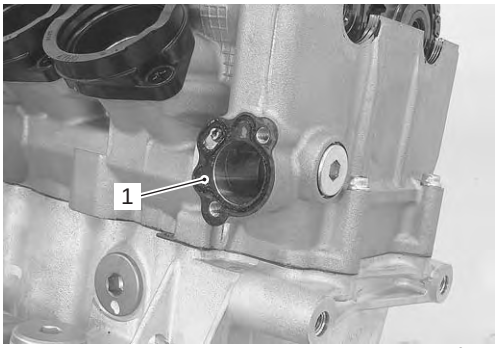


I823H1140355-01

- Fit a new gasket (1).

⚠ CAUTION

Use a new gasket to prevent oil leakage.

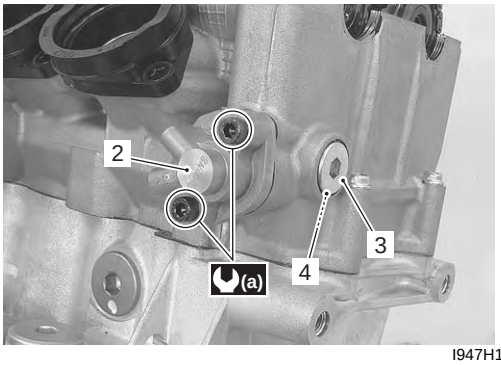


I947H1140056-01

- Install the cam chain tension adjuster (2).

Tightening torque
Cam chain tension adjuster mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Remove the cam chain tension adjuster service cap (3) and gasket (4).



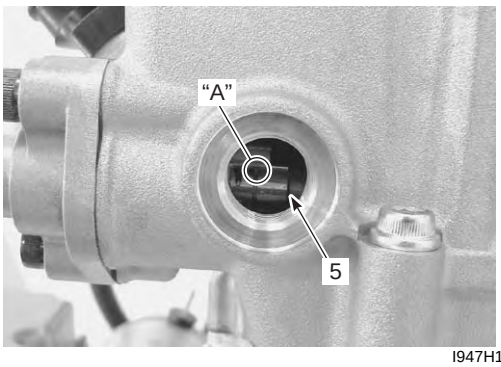
I947H1140057-01

- Unhook the outer circlip “A” from its groove by pushing the stepped part (5) of the plunger head with a screwdriver.

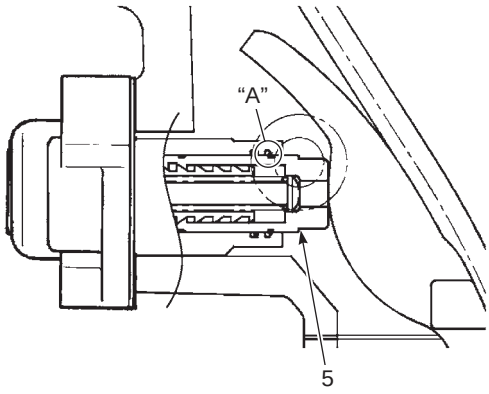
- Rotate the crankshaft (some turns) and recheck the valve timing.

⚠ CAUTION

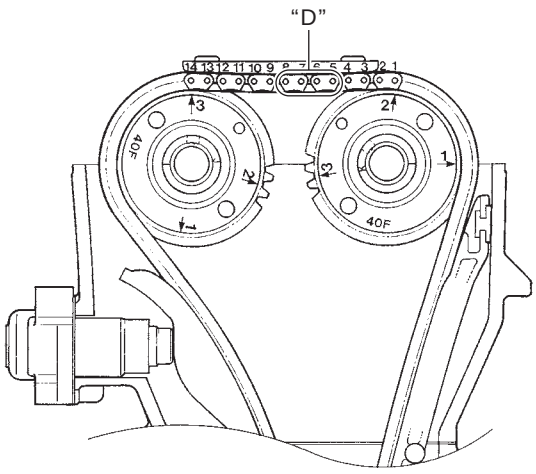
Make sure that the adjuster works properly by checking no slack at point “D”.



I947H1140058-01



I837H1140308-02



I947H1140246-03

NOTE

The cam chain tension adjuster can be serviced with the engine installed in the frame.

- Tighten the cam chain tension adjuster service cap (6) to the specified torque.

⚠ CAUTION

Use a new gasket to prevent oil leakage.

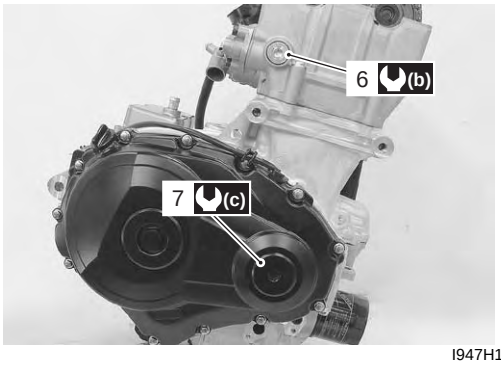
Tightening torque
Cam chain tension adjuster service cap (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

- Tighten the valve timing inspection cap (7) to the specified torque.

⚠ CAUTION

Use a new O-ring to prevent oil leakage.

Tightening torque
Valve timing inspection cap (c): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



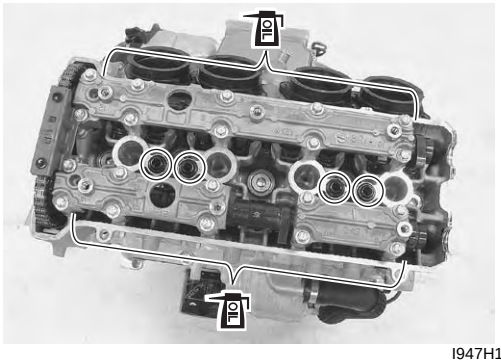
I947H1140059-01

Cylinder Head Cover

- Check and adjust the valve clearance. Refer to “Valve Clearance Inspection and Adjustment” in Section 0B (Page 0B-5).
- Pour engine oil in each oil pocket on the cylinder head.
- Install the dowel pins and O-rings.

⚠ CAUTION

Replace the O-rings with new ones.



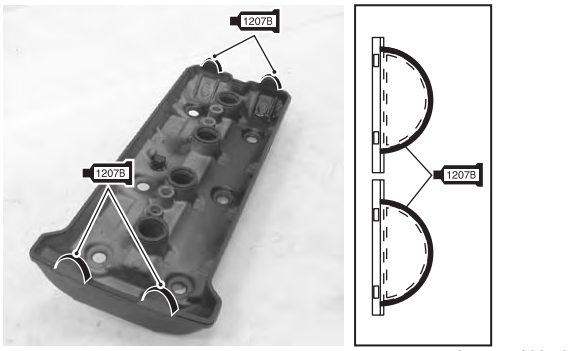
I947H1140060-01

- Install new gaskets to the cylinder head cover.
- Apply bond to the cam end cap points of the gasket as shown.

1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

⚠ CAUTION

Use new gaskets to prevent oil leakage.



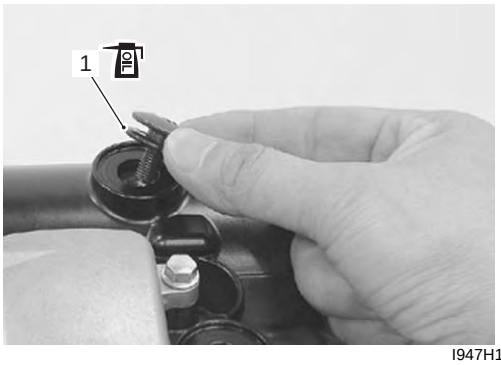
I947H1140061-01

- Place the cylinder head cover on the cylinder head.
- Fit a new gasket (1) to each head cover bolt.

⚠ CAUTION

Use new gaskets to prevent oil leakage.

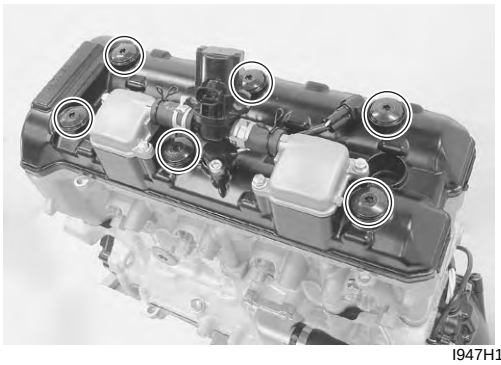
- Apply engine oil to both sides of the gaskets.



I947H1140062-03

- Tighten the cylinder head cover bolts to the specified torque in two steps.

  Tightening torque
  Cylinder head cover bolt (Initial): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
  Cylinder head cover bolt (Final): 14 N·m (1.4 kgf-m, 10.0 lbf-ft)



I947H1140063-02

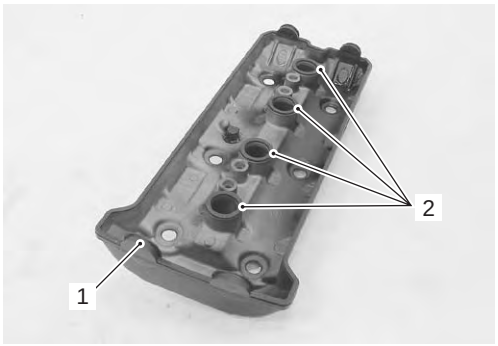
- Install the spark plugs. Refer to “Ignition Coil and Spark Plug Removal and Installation” in Section 1H (Page 1H-6).

Cylinder Head Cover Disassembly and Assembly

B947H11406045

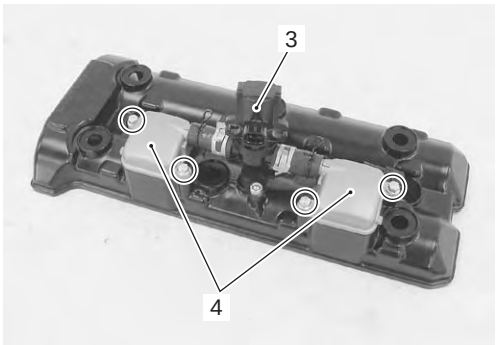
Disassembly

1) Remove the cylinder head cover. Refer to “Engine Top Side Disassembly” (Page 1D-26).
2) Remove the gaskets (1) and (2).



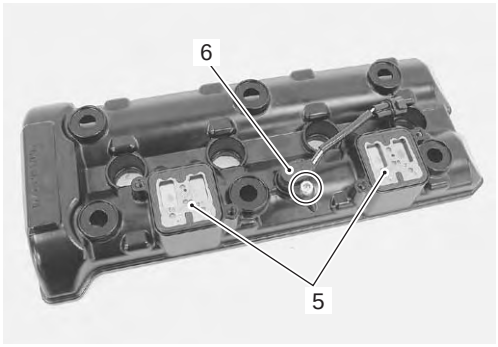
I947H1140100-01

3) Remove the PAIR control solenoid valve (3) along with the PAIR reed valve covers (4).



I947H1140102-02

4) Remove the PAIR reed valves (5) and CMP sensor (6).



I947H1140103-02

Assembly

Assembly is in the reverse order of disassembly. Pay attention to the following points:

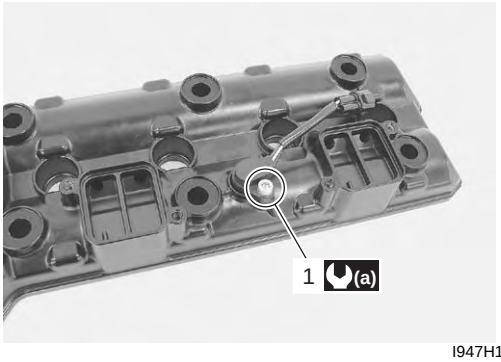
- Install the CMP sensor.

  NOTE

  When installing the CMP sensor, clean the sensor surface.

- Tighten the CMP sensor bolt (1) to the specified torque.

  Tightening torque
  CMP sensor bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



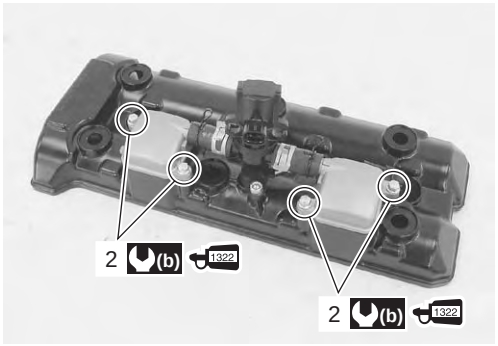
I947H1140105-02

- Install the PAIR reed valves.

- Apply thread lock to the PAIR reed valve cover bolts (2) and tighten them to the specified torque.

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

  Tightening torque
  PAIR reed valve cover bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1140104-02

- Fit new gaskets and install the cylinder head cover to the cylinder head. Refer to “Engine Top Side Assembly” (Page 1D-28).

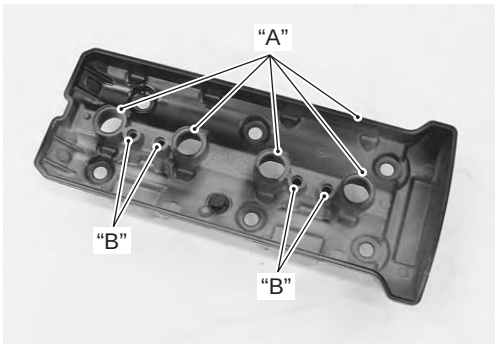
Cylinder Head Cover Related Parts Inspection

B947H11406046

Refer to “Engine Top Side Disassembly” (Page 1D-26).
Refer to “Engine Top Side Assembly” (Page 1D-28).
Refer to “Cylinder Head Cover Disassembly and Assembly” (Page 1D-35).

Cylinder Head Cover

Clean and check the gasket grooves “A” and PAIR reed valve mating surfaces “B” of the cylinder head cover.
If there is anything unusual, replace the cylinder head cover with a new one.



I947H1140290-02

CMP Sensor

NOTE

CMP sensor can be checked without removing it from the cylinder head cover. Refer to “DTC “C11” (P0340): CMP Sensor Circuit Malfunction” in Section 1A (Page 1A-29).

PAIR Reed Valve

Inspect the PAIR reed valves for carbon deposit. If the carbon deposit is found, replace the reed valve with a new one.

I947H1140106-01

Camshaft Inspection

B947H11406021

Refer to “Engine Top Side Disassembly” (Page 1D-26).
Refer to “Engine Top Side Assembly” (Page 1D-28).

Camshaft Identification

The exhaust camshaft has the embossed letters “EX” and the intake camshaft has the embossed letters “IN”.

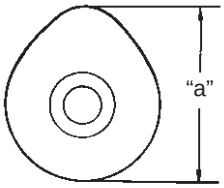
I947H1140064-01

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
TOOL : 09900–20202 (Micrometer (25 – 50 mm))

Cam height “a”
Service limit (IN.): 37.38 mm (1.472 in)
Service limit (EX.): 36.58 mm (1.440 in)

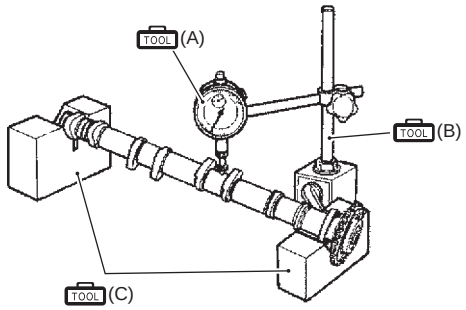


I649G1140199-02

Camshaft Runout
Measure the runout using the dial gauge. Replace the camshaft if the runout exceeds the limit.

Special tool
(A): 09900–20607 (Dial gauge)
(B): 09900–20701 (Dial gauge chuck)
(C): 09900–21304 (V blocks)

Camshaft runout (IN. & EX.)
Service limit: 0.10 mm (0.004 in)

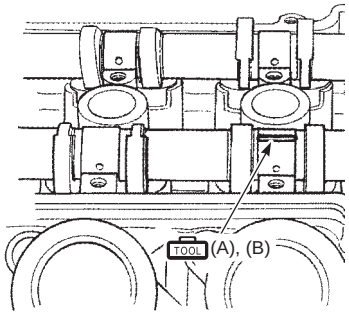


I837H1140240-02

Camshaft Journal Wear
Inspect the camshaft journal wear in the following procedures:

1) 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 (Plastigage (0.025 – 0.076 mm))
(B): 09900–22302 (Plastigage (0.051 – 0.152 mm))



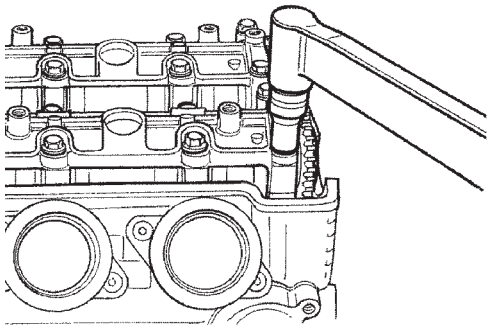
I947H1140065-01

3) Install each camshaft journal holder to its original position. Refer to “Engine Top Side Assembly” (Page 1D-28).
4) Tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque. Refer to “Engine Top Side Assembly” (Page 1D-28).

NOTE

Do not rotate the camshafts with the plastigauge in place.

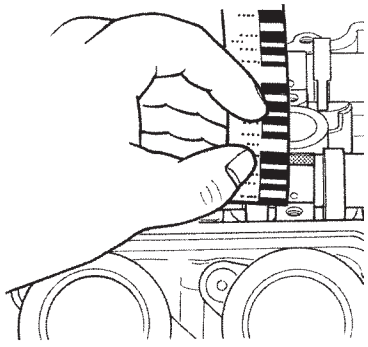
Tightening torque
Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1140066-01

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)



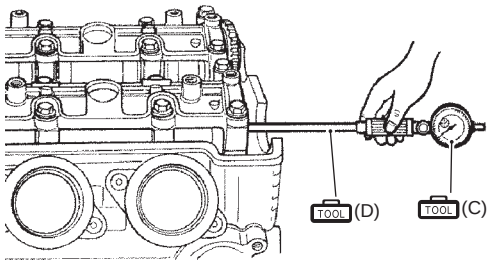
I947H1140067-01

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.

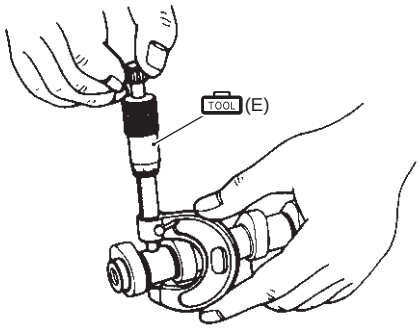
Special tool
(C): 09900–20602 (Dial gauge)
(D): 09900–22403 (Small bore gauge (18 – 35 mm))
(E): 09900–20205 (Micrometer (0 – 25 mm))

Camshaft journal holder I.D. (IN. & EX.)
Standard: 24.012 – 24.025 mm (0.9454 – 0.9459 in)

Camshaft journal O.D. (IN. & EX.)
Standard: 23.959 – 23.980 mm (0.9433 – 0.9441 in)



I947H1140068-01



I649G1140204-03

Camshaft Sprocket

B947H11406022

Inspect the camshaft sprocket in the following procedures:

1) Remove the intake and exhaust camshafts. Refer to “Engine Top Side Disassembly” (Page 1D-26).
2) Inspect the teeth of each camshaft sprocket for wear or damage.
   If they are worn or damaged, replace the sprocket/ camshaft assembly and cam chain as a set.

I947H1140069-01

3) Install the camshafts. Refer to “Engine Top Side Assembly” (Page 1D-28).

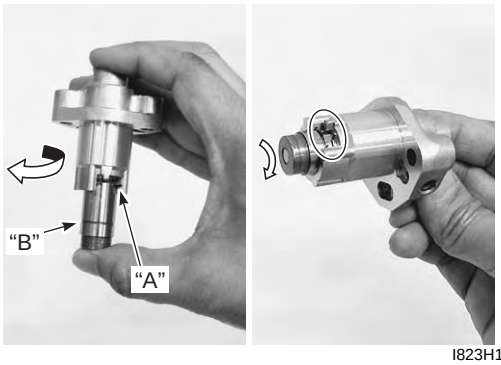
Cam Chain Tension Adjuster Inspection

B947H11406023

The cam chain tension adjuster is maintained to proper tension automatically.

1) Remove the cam chain tension adjuster. Refer to “Engine Top Side Disassembly” (Page 1D-26).
2) Holding the cam chain tension adjuster as shown in the figure, compress the plunger by turning the adjuster body until the outer circlip “A” reaches the groove “B”.

3) Hook the outer circlip “A” into the groove “B”, then turn the plunger head clockwise more than 90° to make a little play in the inner thread mechanism.



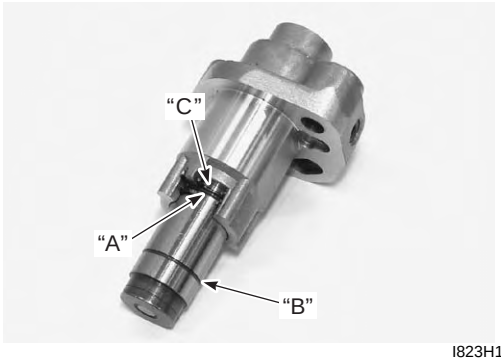
I823H1140355-01

NOTE

If it is difficult to compress the plunger because of internal engine oil, disassemble the adjuster by releasing the inner circlip “C” and spill out the oil.

⚠ CAUTION

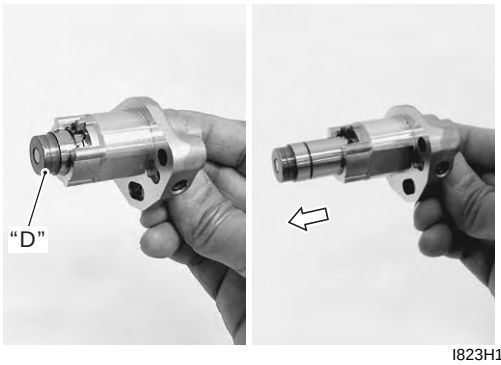
Do not turn the adjuster body until the outer circlip “A” exceeds the groove “B”.
If the inner circlip “C” is caught in the groove “B”, plunger may not go out automatically from the adjuster body even if pushing force is applied on the head.
In such case, it needs to be disassembled.



I823H1140365-01

I823H1140366-01

4) Check that the plunger goes out automatically when its head “D” is tapped. If it does not work smoothly, replace the cam chain tension adjuster with a new one.



I823H1140367-01

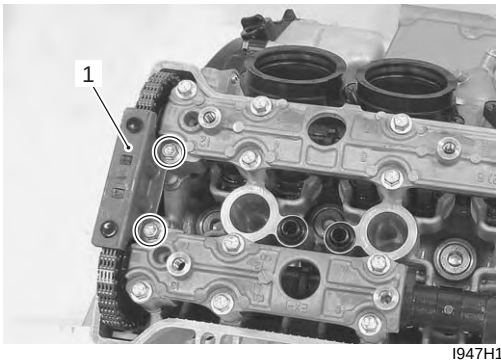
5) Install the cam chain tension adjuster. Refer to “Engine Top Side Assembly” (Page 1D-28).

Cam Chain Guide / Cam Chain Tensioner Removal and Installation

B947H11406024

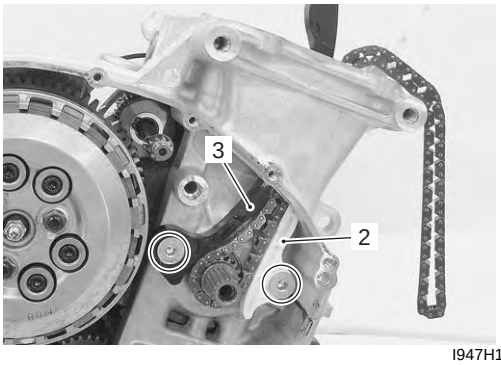
Removal

1) Remove the cylinder head cover. Refer to “Engine Top Side Disassembly” (Page 1D-26).
2) Remove the cam chain guide No. 2 (1).



I947H1140070-01

3) Remove the cylinder head. Refer to “Engine Top Side Disassembly” (Page 1D-26) and “Engine Bottom Side Disassembly” (Page 1D-49).
4) Remove the starter clutch. Refer to “Starter Clutch Removal and Installation” in Section 1I (Page 1I-10).
5) Remove the cam chain guide No. 1 (2) and cam chain tensioner (3).



I947H1140247-01

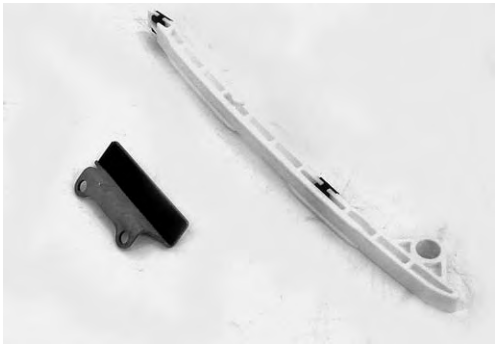
Installation
Install the cam chain guides/cam chain tensioner in the reverse order of removal.

Cam Chain Guide Inspection

B947H11406025

Inspect the cam chain guide in the following procedures:

1) Remove the cam chain guides. Refer to “Cam Chain Guide / Cam Chain Tensioner Removal and Installation” (Page 1D-39).
2) Check the contacting surface of the cam chain guides. If it is worn or damaged, replace it with a new one.



I947H1140291-01

3) Install the cam chain guides. Refer to “Cam Chain Guide / Cam Chain Tensioner Removal and Installation” (Page 1D-39).

Cam Chain Tensioner Inspection

B947H11406026

Inspect the cam chain tensioner in the following procedures:

1) Remove the cam chain tensioner. Refer to “Cam Chain Guide / Cam Chain Tensioner Removal and Installation” (Page 1D-39).
2) Check the contacting surface of the cam chain tensioner. If it is worn or damaged, replace it with a new one.

I947H1140292-01

3) Install the cam chain tensioner. Refer to “Cam Chain Guide / Cam Chain Tensioner Removal and Installation” (Page 1D-39).

Cylinder Head Disassembly and Assembly

B947H11406027

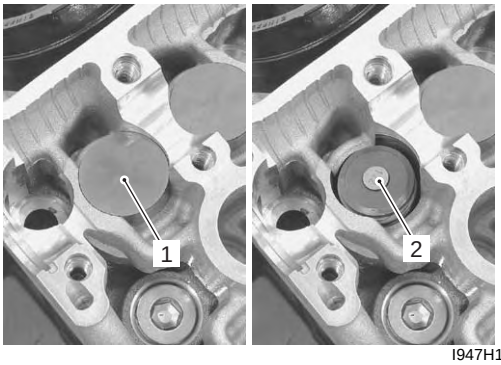
Refer to “Engine Top Side Disassembly” (Page 1D-26).
Refer to “Engine Top Side Assembly” (Page 1D-28).

⚠ 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.



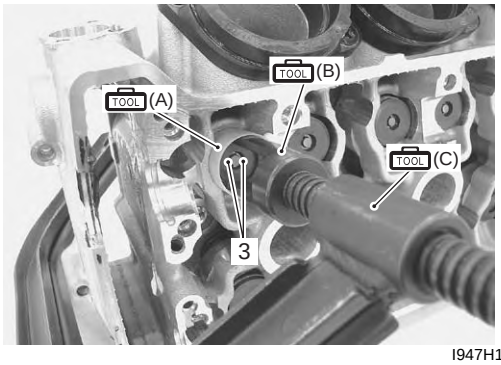
I947H1140071-01

2) Insert the special tool (A) between the valve springs and cylinder head.
3) Using the special tools, compress the valve springs and remove the two cotter halves (3) from the valve stem.

⚠ CAUTION

Be careful not to damage the tappet sliding surface with the special tool.

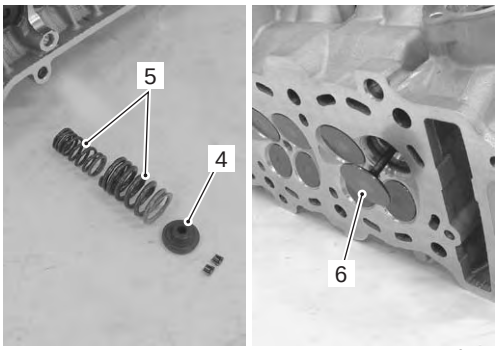
Special tool
TOOL (A): 09919–28620 (Sleeve protector)
TOOL (B): 09916–14522 (Valve lifter attachment)
TOOL (C): 09916–14510 (Valve lifter)
TOOL : 09916–84511 (Tweezer)



I947H1140072-01

4) Remove the valve spring retainer (4) and valve springs (5).

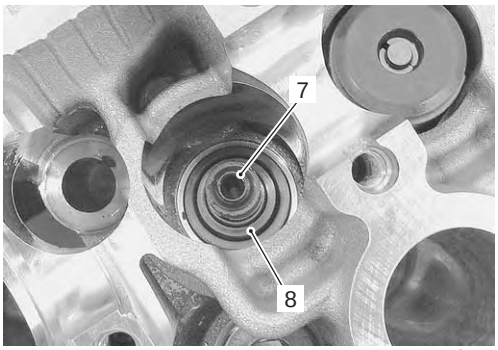
5) Pull out the valve (6) from the combustion chamber side.



I947H1140073-01

6) Remove the oil seal (7) and spring seat (8).

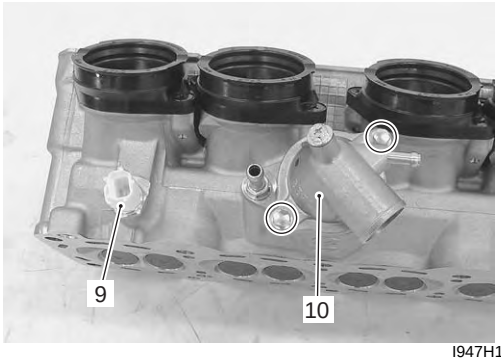
7) Remove the other valves in the same manner as described previously.



I947H1140074-01

8) Remove the ECT sensor (9).

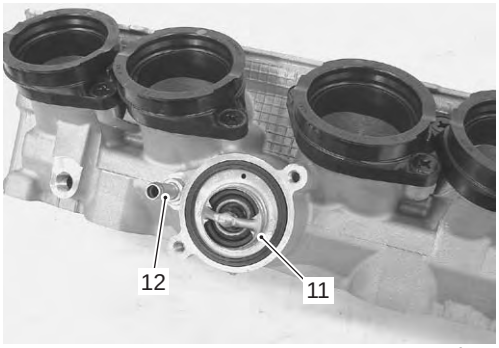
9) Remove the thermostat cover (10).



I947H1140075-01

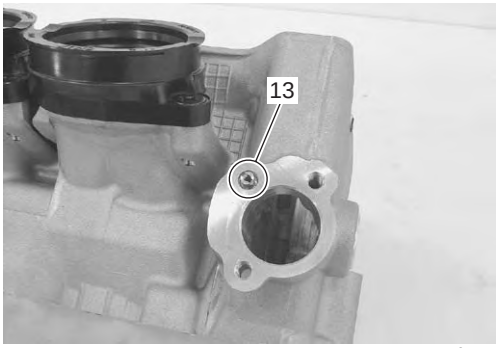
10) Remove the thermostat (11).

11) Remove the bypass hose union (12).



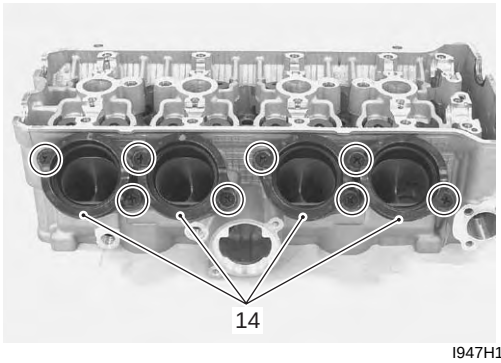
I947H1140076-01

12) Remove the oil jet (13).



I947H1140077-01

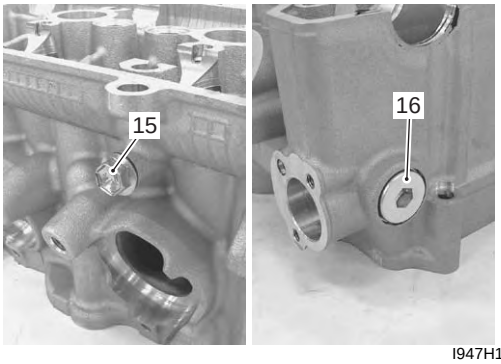
13) Remove the intake pipes (14).



I947H1140078-01

14) Remove the oil gallery plug (15).

15) Remove the cam chain tension adjuster service cap (16).



I947H1140079-01

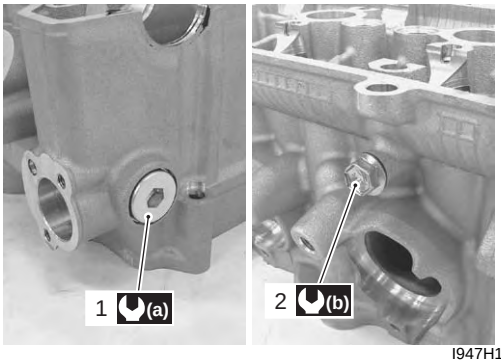
Assembly
Assembly is in the reverse order of disassembly. Pay attention to the following points:

- Tighten the cam chain tension adjuster service cap (1) and oil gallery plug (2) to the specified torque.

⚠ CAUTION

Replace the gaskets with new ones.

Tightening torque
Cam chain tension adjuster service cap (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Oil gallery plug (Cylinder head) (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



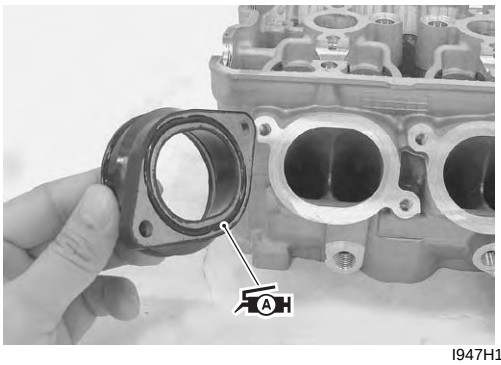
I947H1140080-01

- Apply grease to O-rings of the intake pipes.

⚠ CAUTION

Replace the O-rings with new ones.

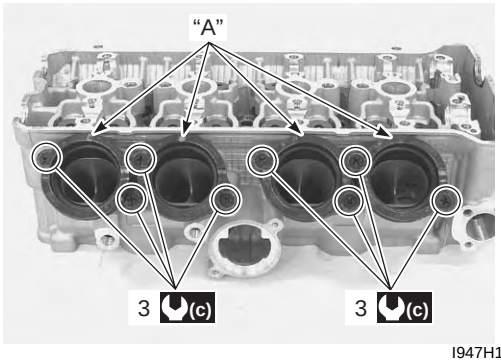
A : Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



I947H1140081-01

- Install the intake pipes with the UP mark “A” facing top side.
- Tighten the intake pipe bolts (3) to the specified torque.

Tightening torque
Intake pipe bolt (c): 8.5 N·m (0.85 kgf-m, 6.5 lbf-ft)

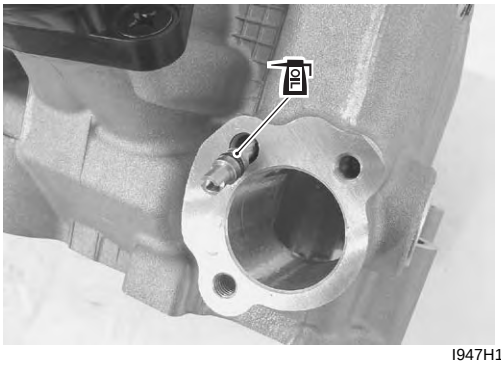


I947H1140082-01

- Apply engine oil to the O-ring and install the oil jet.

⚠ CAUTION

Use new O-ring to prevent oil pressure leakage.

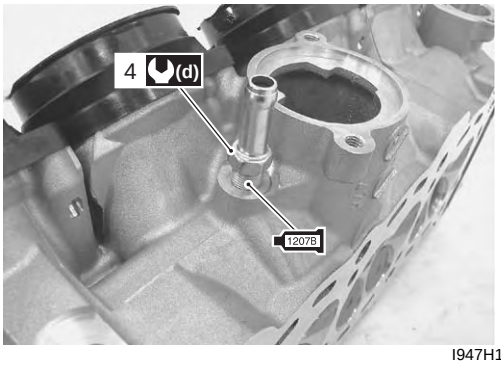


I947H1140083-01

- Apply bond to the thread part of bypass hose union (4) and tighten it to the specified torque.

1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

Tightening torque
Bypass hose union (d): 12 N·m (1.2 kgf-m, 8.5 lbf-ft)



I947H1140084-01

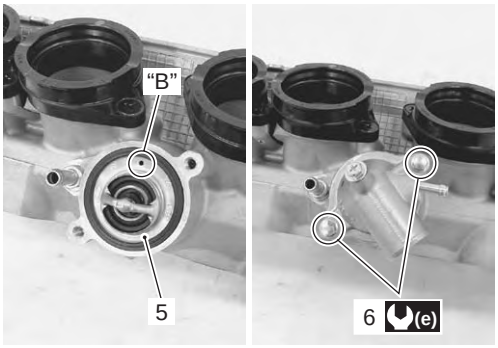
- Install the thermostat (5).

NOTE

The air bleeder hole “B” of the thermostat faces upside.

- Tighten the thermostat cover bolts (6) to the specified torque.

Tightening torque
Thermostat cover bolt (e): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



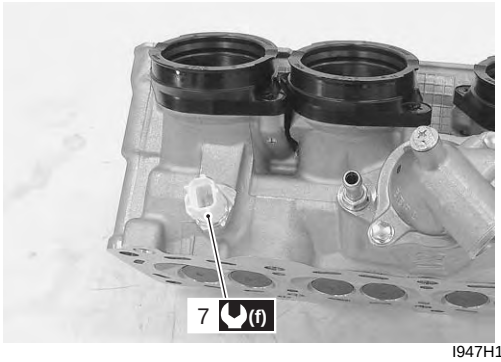
I947H1140085-01

- Tighten the ECT sensor (7) to the specified torque.

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

⚠ CAUTION

- **Take special care when handling the temperature sensor. It may cause damage if it gets a sharp impact.**
- **Replace a gasket with a new one.**



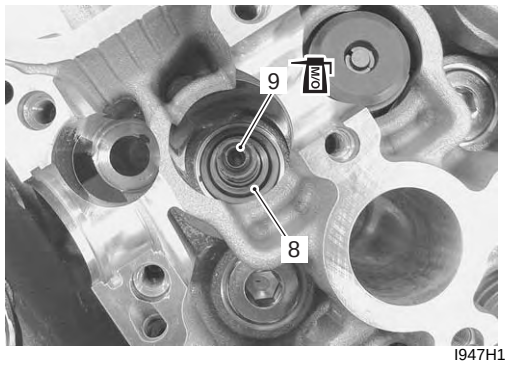
I947H1140086-01

- Install the valve spring seat (8).
- Apply molybdenum oil to the oil seal (9), and press-fit it into the position.

⚠ CAUTION

Do not reuse the removed oil seal.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



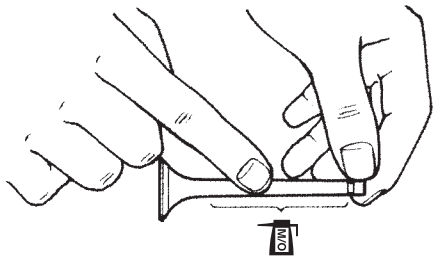
I947H1140087-01

- Insert the valve, with its stem coated with molybdenum oil solution all around and along the full stem length without any break.

⚠ CAUTION

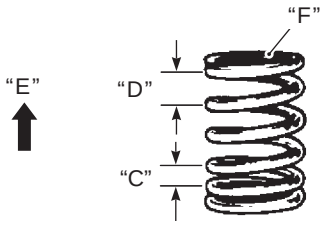
When inserting the valve, take care not to damage the lip of the oil seal.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I705H1140165-01

- Install each valve spring with the small-pitch portion "C" facing cylinder head.



I947H1140088-01

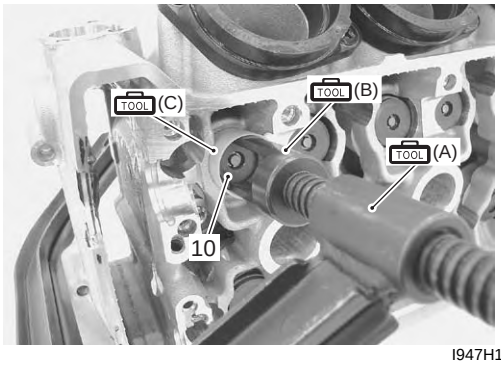
"C": Small-pitch portion	"E": Upward
"D": Large-pitch portion	"F": Paint

- Put on the valve spring retainer (10), and using the special tools, press down the springs, fit the cotter halves to the stem end, and release the lifter to allow the cotter halves to wedge in between retainer and stem.

⚠ CAUTION

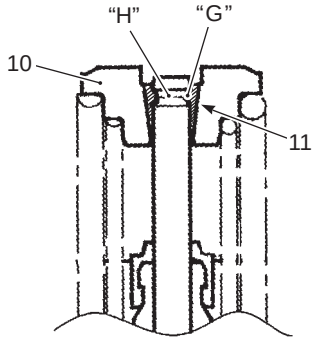
- **Be sure to restore each spring and valve to their original positions.**
- **Be careful not to damage the valve and valve stem when handling them.**
- **Be careful not to damage the tappet sliding surface with the special tool.**

Special tool
TOOL (A): 09916–14510 (Valve lifter)
TOOL (B): 09916–14522 (Valve lifter attachment)
TOOL (C): 09919–28620 (Sleeve protector)
TOOL : 09916–84511 (Tweezer)



I947H1140089-01

- Be sure that the rounded lip “G” of the cotter fits snugly into the groove “H” in the stem end.



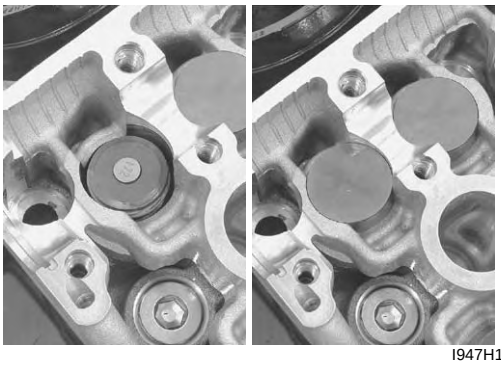
I947H1140090-02

10. Valve spring retainer	11. 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.**



I947H1140091-01

Cylinder Head Related Parts Inspection

B947H11406028

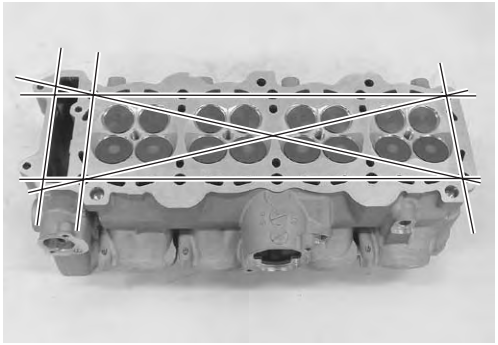
Refer to “Cylinder Head Disassembly and Assembly” (Page 1D-40).

Cylinder Head Distortion

1) Decarbonize the combustion chambers.
2) 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
TOOL : 09900–20803 (Thickness gauge)

Cylinder head distortion
Service limit: 0.02 mm (0.0008 in)

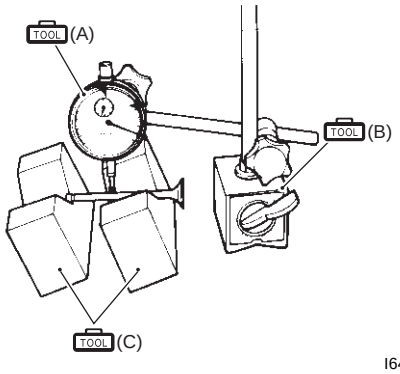


I947H1140092-02

Valve Stem Runout
Support the valve using V-blocks, as shown in the figure, 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)
(B): 09900–20701 (Dial gauge chuck)
(C): 09900–21304 (V blocks)

Valve stem runout (IN. & EX.)
Service limit: 0.05 mm (0.002 in)

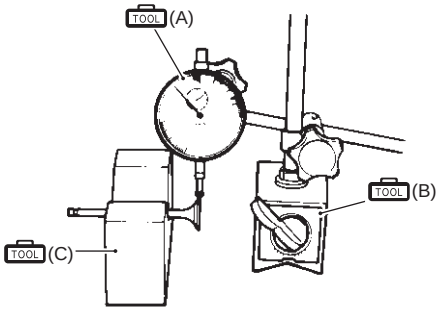


I649G1140231-03

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)
(B): 09900–20701 (Dial gauge chuck)
(C): 09900–21304 (V blocks)

Valve head radial runout (IN. & EX.)
Service limit: 0.03 mm (0.001 in)



I649G1140232-03

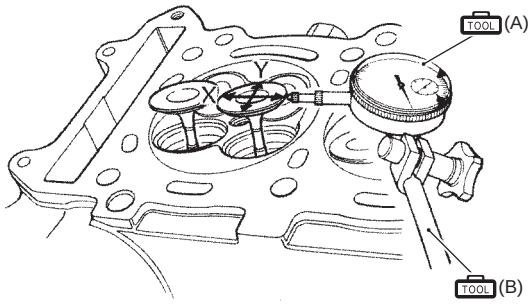
Valve Stem and Valve Face Wear Condition
Visually inspect each valve stem and valve face for wear and pitting. If it is worn or damaged, replace the valve with a new one.


I947H1140093-01

Valve Stem Deflection
Lift the valve about 10 mm (0.39 in) 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)
(B): 09900–20701 (Dial gauge chuck)

Valve stem deflection (IN. & EX.)
Service limit: 0.25 mm (0.010 in)



I837H1140061-03

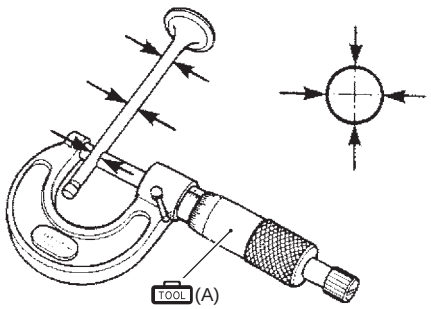
Valve Stem Wear
Measure the valve stem O.D. using the micrometer. If it is out of specification, replace the valve with a new one. If the valve stem O.D. is within specification but the valve stem deflection is not, replace the valve guide. After replacing the valve or valve guide, recheck the deflection.

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-47).



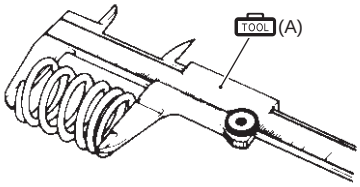
I718H1140122-01

Valve Spring
The force of the coil springs keep 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 both the inner and outer springs as a set.

Special tool
(A): 09900–20102 (Vernier calipers (200 mm))

Valve spring free length (IN. & EX.)
Service limit: Inner: 30.1 mm (1.19 in)
Service limit: Outer: 35.3 mm (1.39 in)

Valve spring tension (IN. & EX.)
Standard: Inner: 31.3 – 38.3 N (3.2 – 3.9 kgf, 7.0 – 8.6 lbs)/27.55 mm (1.085 in)
Standard: Outer: 91.3 – 105.1 N (9.3 – 10.7 kgf, 20.5 – 23.6 lbs)/33.05 mm (1.301 in)



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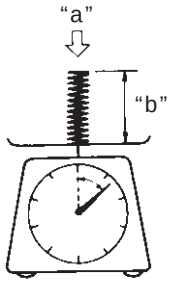


I649G1140238-03

	Tension "a"	Length "b"
Inner	31.3 – 38.3 N (3.2 – 3.9 kgf, 7.0 – 8.6 lbs)	27.55 mm (1.085 in)
Outer	91.3 – 105.1 N (9.3 – 10.7 kgf, 20.5 – 23.6 lbs)	33.05 mm (1.301 in)

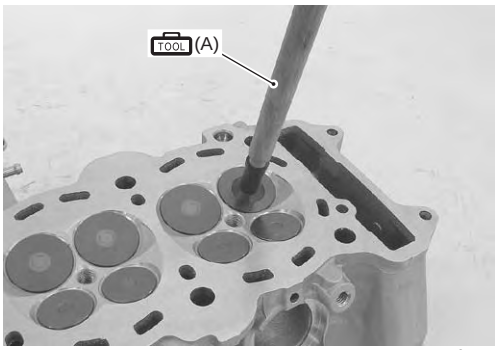
Valve Seat Width
1) Visually check for valve seat width on each valve face. If the valve face has worn abnormally, replace the valve.
2) Coat the valve seat with a red lead (Prussian Blue) and set the valve in place.

⚠ CAUTION

Do not use lapping compound.

3) Rotate the valve with light pressure.

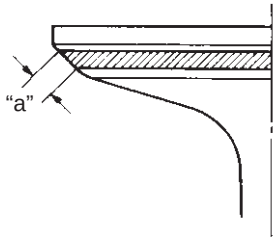
Special tool
(A): 09916–10911 (Valve lapper set)



I947H1140094-01

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-49).

Valve seat width “a” (IN. & EX.)
Standard: 0.9 – 1.1 mm (0.035 – 0.043 in)



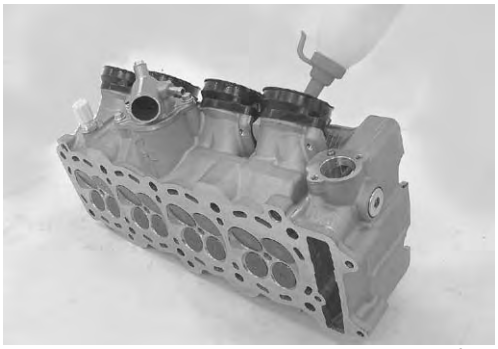
I649G1140246-02

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-49).

⚠ WARNING

Always use extreme caution when handling gasoline.



I947H1140095-01

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-5).

Valve Guide Replacement

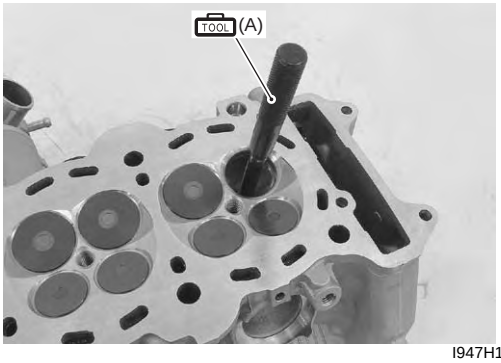
B947H11406029

1) Remove the cylinder head. Refer to “Engine Top Side Disassembly” (Page 1D-26).
2) Remove the valves. Refer to “Cylinder Head Disassembly and Assembly” (Page 1D-40).
3) Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

Special tool
TOOL (A): 09916–43211 (Valve guide installer & remover)

NOTE

- **Discard the removed valve guide sub-assemblies.**
- **Only oversized valve guides are available as replacement parts. (Part No. 11115-29G70)**



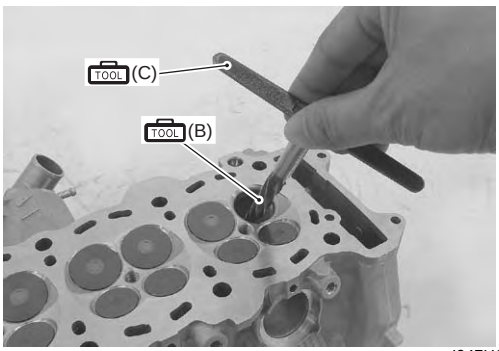
I947H1140096-01

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
TOOL (B): 09916–33320 (Valve guide reamer (9.8 mm))
TOOL (C): 09916–34542 (Reamer handle)



I947H1140097-01

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.

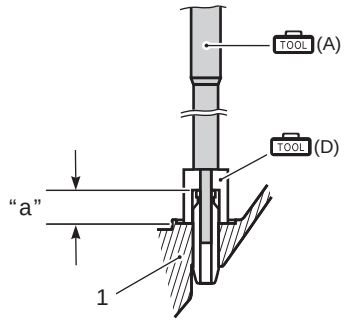
6) Apply engine oil to each valve guide and valve guide hole.

7) Drive the guide into the guide hole using the valve guide installer.

⚠ CAUTION

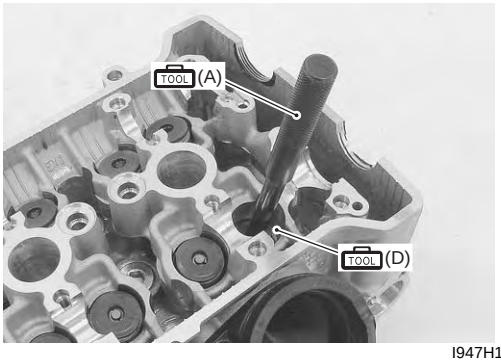
Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

Special tool
TOOL (A): 09916–43211 (Valve guide installer & remover)
TOOL (D): 09916–53380 (Valve guide installer attachment)



I838H1140077-01

1. Cylinder head	"a": 13.7 – 13.9 mm (0.54 – 0.55 in) [IN and EX]



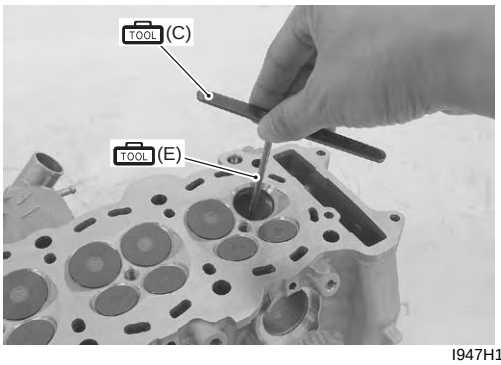
I947H1140098-01

8) After installing the valve guides, refinish their guiding bores using the reamer. Be sure to clean and oil the guides after reaming.

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.**

Special tool
TOOL (C): 09916–34542 (Reamer handle)
TOOL (E): 09916–33210 (Valve guide reamer (4.5 mm))



I947H1140099-01

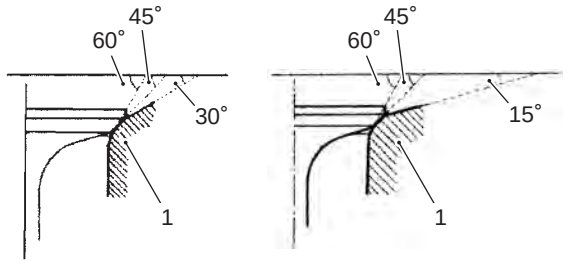
9) Reassemble the cylinder head. Refer to "Cylinder Head Disassembly and Assembly" (Page 1D-40).

10) Install the cylinder head assembly. Refer to "Engine Top Side Assembly" (Page 1D-28).

Valve Seat Repair

B947H11406030

The valve seats (1) for both the intake and exhaust valves are machined to three different angles. The seat contact surface is cut at 45°.



[A] [B]

I837H1140069-01

[A]: Intake valve	[B]: Exhaust valve

	Intake	Exhaust
Seat angle	30°/45°/60°	15°/45°/60°
Seat width	0.9 – 1.1 mm (0.035 – 0.043 in)	←
Valve diameter	31.0 mm (1.22 in)	25.0 mm (0.98 in)
Valve guide I.D.	4.500 – 4.512 mm (0.1772 – 0.1776 in)	←

⚠ 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.**
- **The titanium valves are coated with an oxidized membrane treatment to resist wear but the membrane tend to removed if lapped after valve seat servicing.**

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-5).

Engine Bottom Side Disassembly

B947H11406031

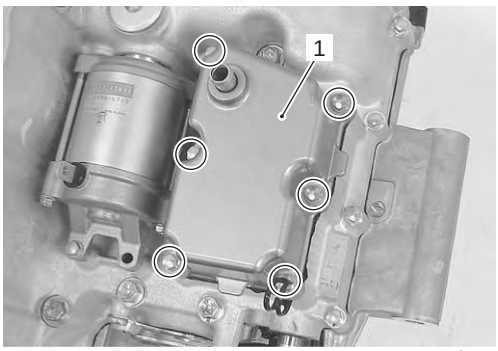
NOTE

The crankcase must be separated to service the crankshaft and conrod.

1) Remove the engine assembly from the frame. Refer to "Engine Assembly Removal" (Page 1D-20).
2) Remove the engine top side (1). Refer to "Engine Top Side Disassembly" (Page 1D-26).

Crankcase Breather (PCV) Cover

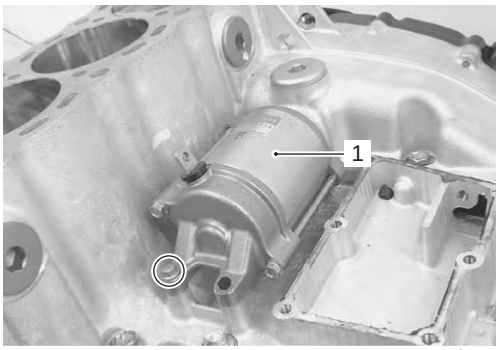
Remove the crankcase breather (PCV) cover (1).



I947H1140107-02

Starter Motor

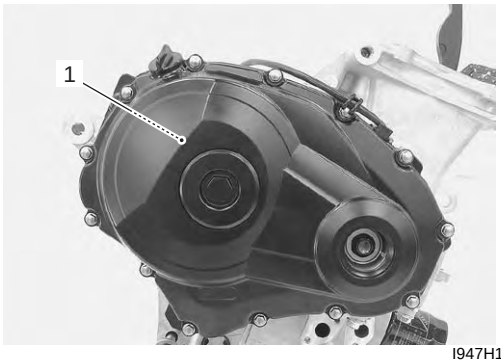
Remove the starter motor (1).



I947H1140108-03

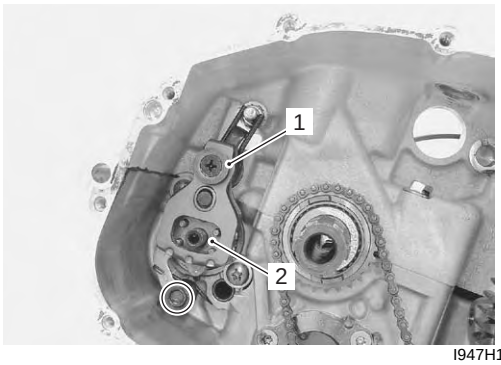
Clutch

Remove the clutch component parts (1). Refer to "Clutch Removal" in Section 5C (Page 5C-5).



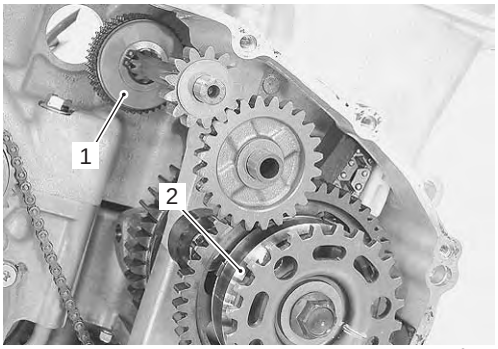
I947H1140109-01

Gearshift System
Remove the gearshift shaft (1) and gearshift cam plate (2). Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation” in Section 5B (Page 5B-17).



I947H1140110-02

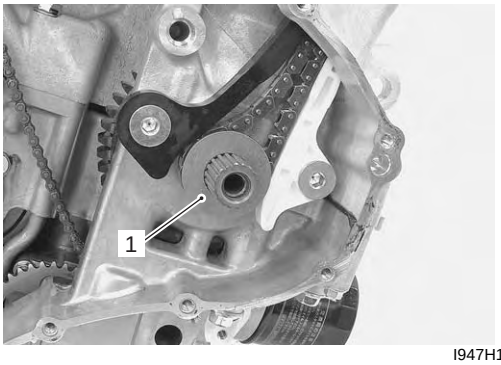
Starter Torque Limiter / Starter Clutch
Remove the starter torque limiter (1) and starter clutch (2) component parts. Refer to “Starter Torque Limiter Removal and Installation” in Section 1I (Page 1I-9) and “Starter Clutch Removal and Installation” in Section 1I (Page 1I-10).



I947H1140111-02

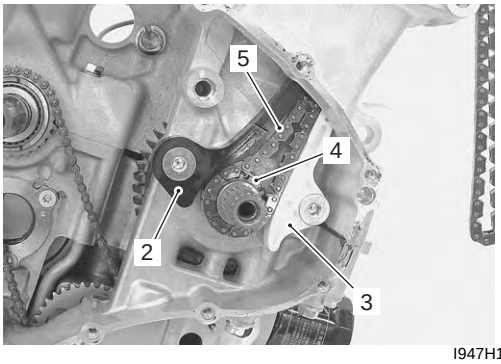
Cam Chain / Cam Chain Tensioner / Cam Chain Guide No. 1

1) Remove the washer (1).



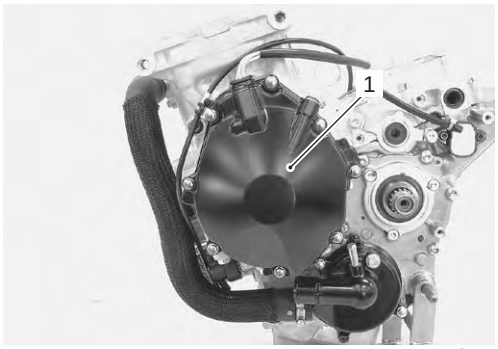
I947H1140112-01

2) Remove the cam chain tensioner (2) and cam chain guide No. 1 (3).
3) Remove the cam chain drive sprocket (4) and cam chain (5).



I947H1140113-02

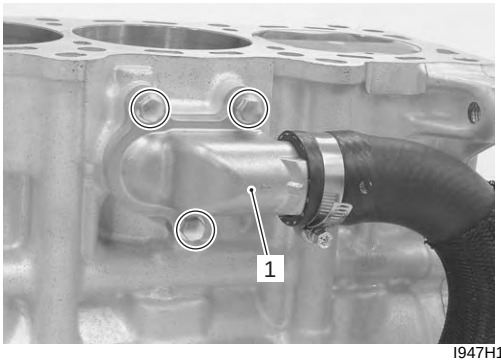
Generator
Remove the generator cover (1) and rotor. Refer to “Generator Removal and Installation” in Section 1J (Page 1J-4).



I947H1140114-01

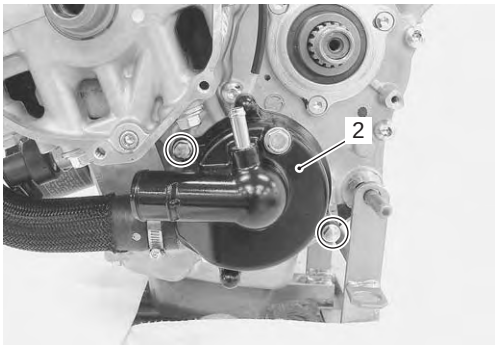
Water Pump

1) Remove the water inlet connector (1).



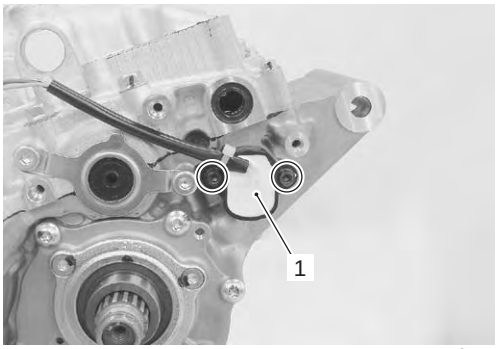
I947H1140115-01

2) Remove the water pump (2).



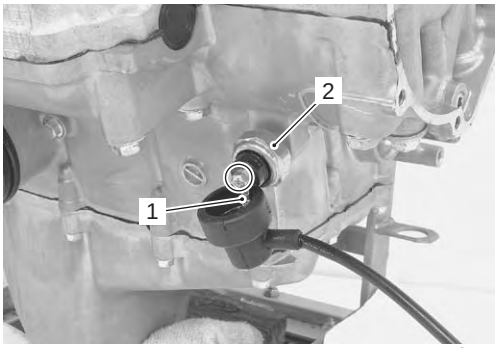
I947H1140116-01

Gear Position Switch
Remove the gear position switch (1).



I947H1140117-01

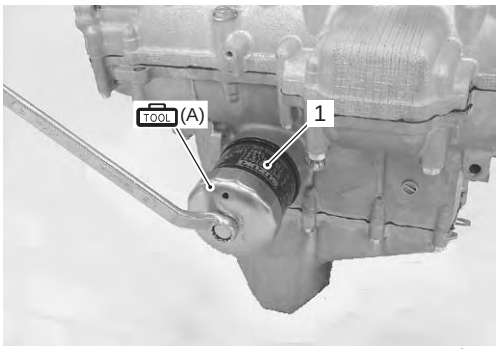
Oil Pressure Switch
Remove the oil pressure switch lead wire (1) and switch (2).



I947H1140118-01

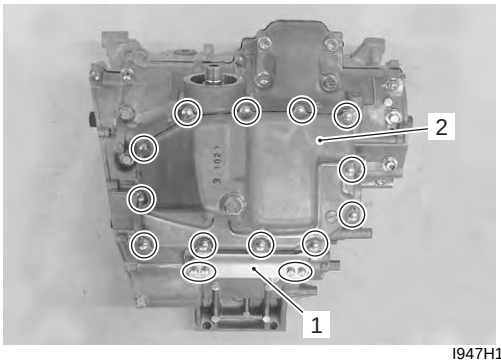
Oil Filter
Remove the oil filter (1) with the special tool.

Special tool
TOOL (A): 09915–40610 (Oil filter wrench)



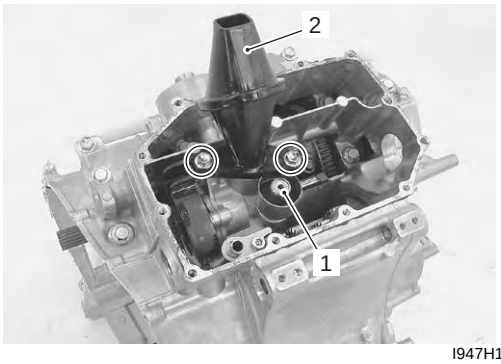
I947H1140119-01

Oil Pan
1) Remove the plate (1).
2) Remove the oil pan (2) and gasket.



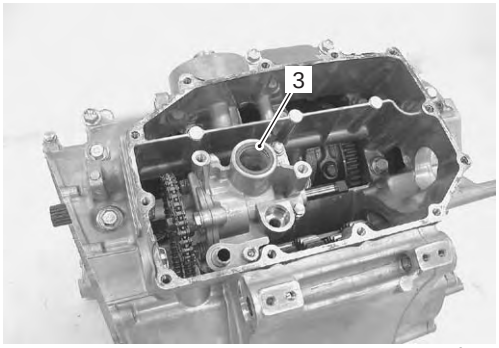
I947H1140297-01

Oil Pressure Regulator / Oil Strainer
1) Remove the oil pressure regulator (1).
2) Remove the oil strainer (2).



I947H1140121-01

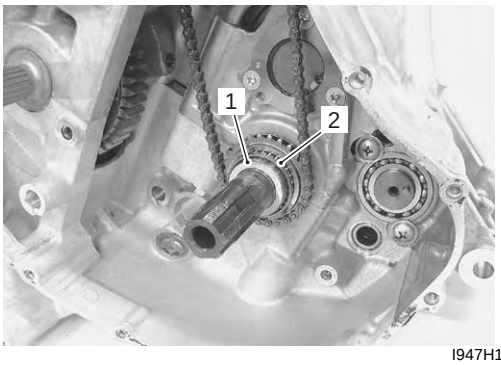
3) Remove the O-ring (3).



I947H1140122-01

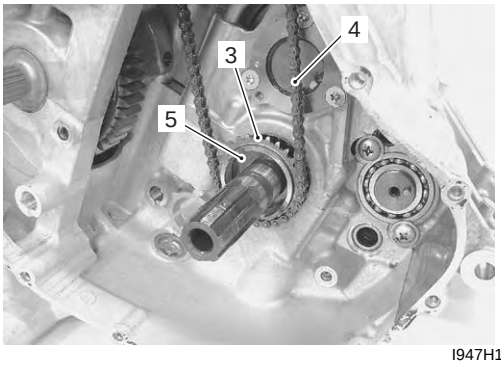
Oil Pump

1) Remove the spacer (1) and bearing (2).



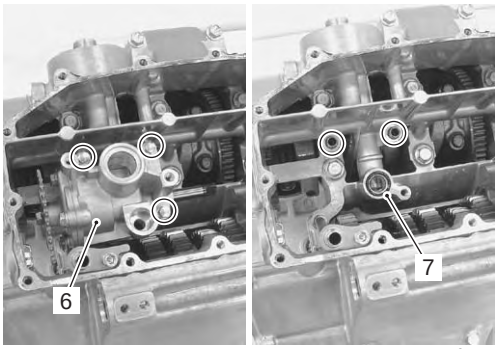
I947H1140126-01

2) Remove the oil pump drive sprocket (3) and chain (4).
3) Remove the thrust washer (5).



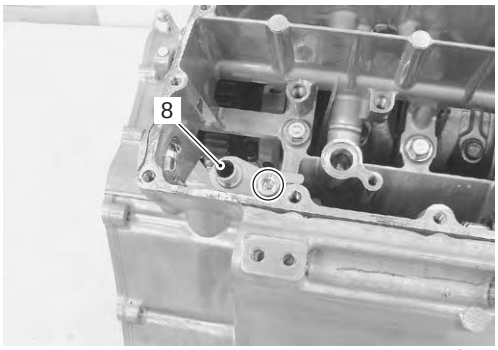
I947H1140127-01

4) Remove the oil pump assembly (6).
5) Remove the dowel pins and O-ring (7).



I947H1140128-02

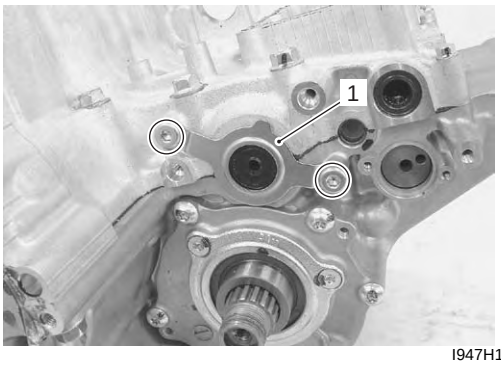
6) Remove the breather oil return pipe (8).



I947H1140129-02

Crankcase

1) Remove the clutch push rod oil seal retainer (1).

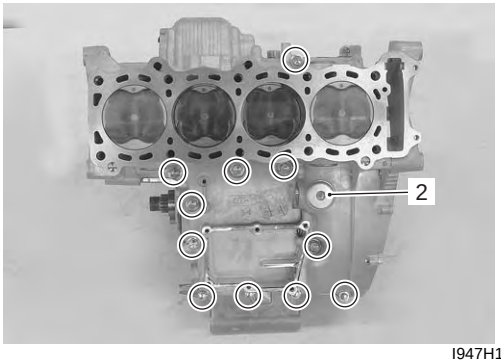


I947H1140123-01

2) Remove the cap (2).
3) Remove the crankcase bolts from upper side.

NOTE

Loosen the crankcase bolts diagonally and smaller size ones first.

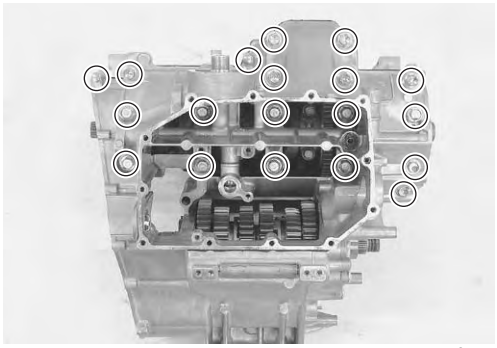


I947H1140124-02

I947H1140125-02

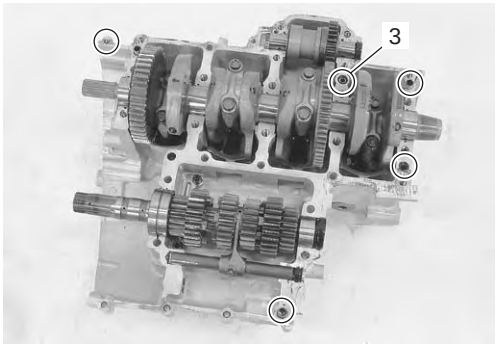
4) Remove the crankcase bolts from lower side.

5) Remove the crankshaft journal bolts (M9).



I947H1140130-01

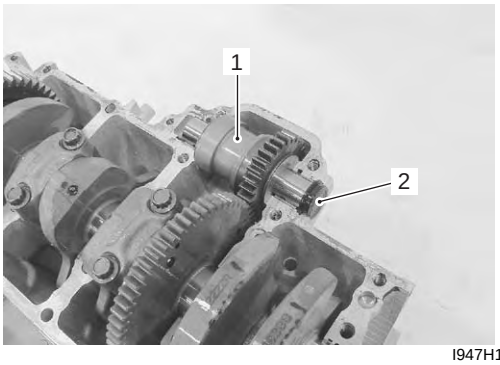
6) Make sure that all of the bolts are removed. Then, tap the sides of the lower crankcase using a plastic hammer to separate the upper and lower crankcase halves and then lift the lower crankcase off the upper crankcase.
7) Remove the dowel pins and O-rings (3).



I947H1140131-04

Balancer Shaft

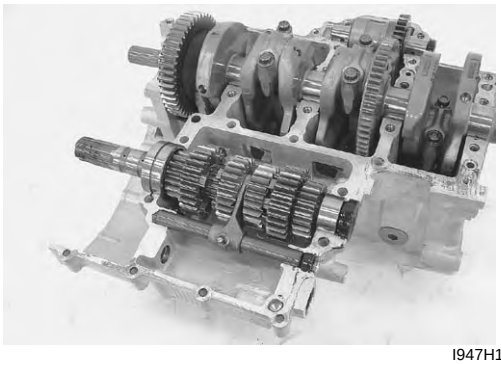
Remove the balancer shaft assembly (1) and plug (2).



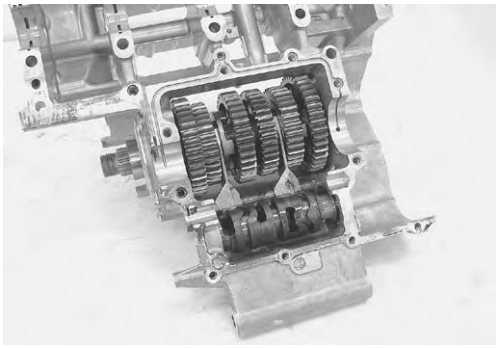
I947H1140132-01

Transmission

Remove the transmission component. Refer to “Transmission Removal” in Section 5B (Page 5B-3).



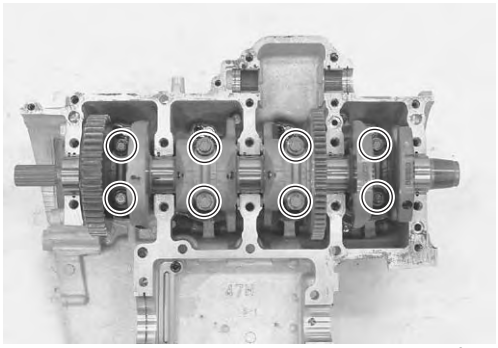
I947H1140133-01



I947H1140134-01

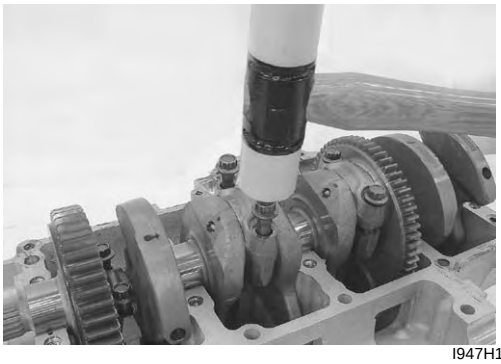
Crankshaft

1) Loosen the conrod cap bolts using a 10 mm, 12-point socket wrench.



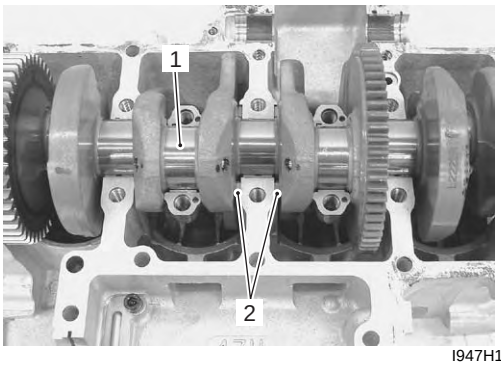
I947H1140135-01

2) Remove the conrod caps by tapping the bolts lightly with a plastic hammer.



I947H1140136-01

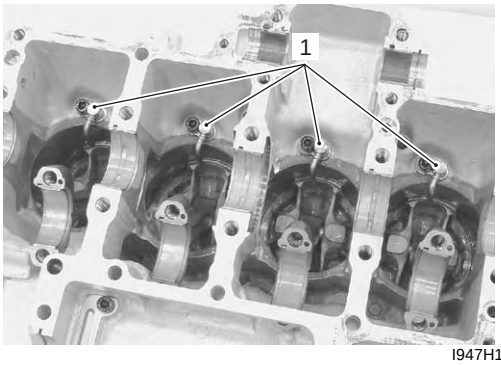
3) Remove the crankshaft (1) and thrust bearings (2).



I947H1140137-01

Piston Cooling Oil Jet

Remove the piston cooling oil jet (1) from the upper crankcase.



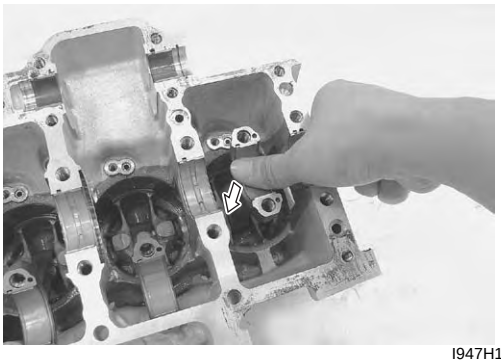
I947H1140138-01

Piston / Conrod

1) Push the conrod to cylinder head side and remove the piston and conrod from the upper crankcase.

⚠ CAUTION

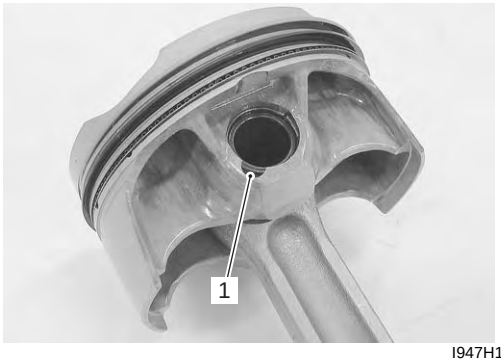
Be careful not to damage the cylinder wall by the conrod.



I947H1140139-02

I947H1140140-01

2) Remove the piston pin circlip (1).

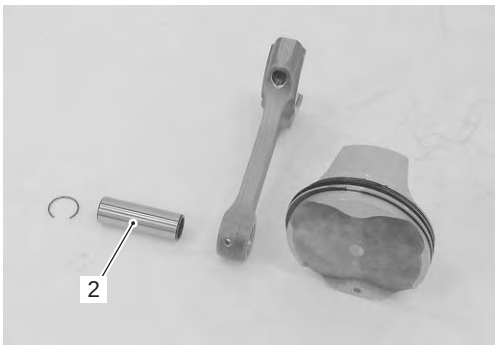


I947H1140141-01

3) Draw out the piston pin (2) and remove the piston from the conrod.

NOTE

Scribe the cylinder number on the piston head.



I947H1140142-01

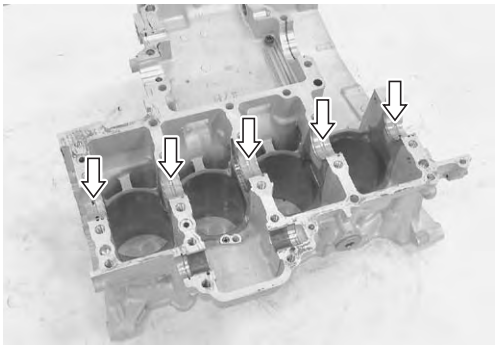
Crankshaft Journal Bearing
Remove the crankshaft journal bearings, upper and lower.

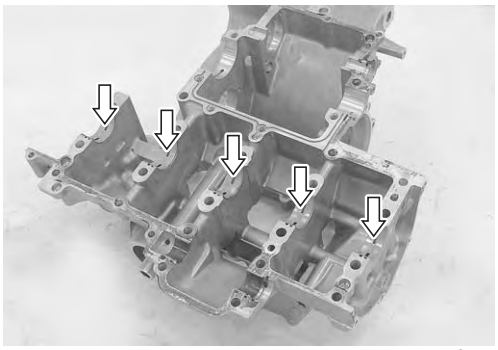
⚠ CAUTION

- **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.**

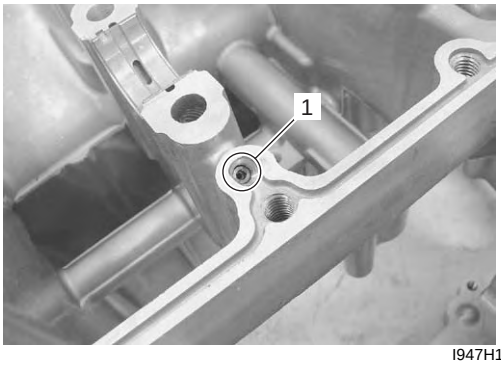
NOTE

- **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.**


I947H1140143-01

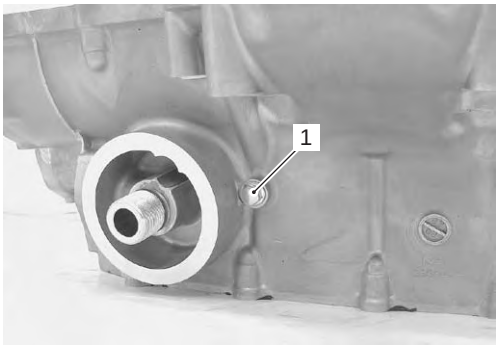

I947H1140144-01

Oil Jet
Remove the oil jet (1) (for transmission) from the lower crankcase.

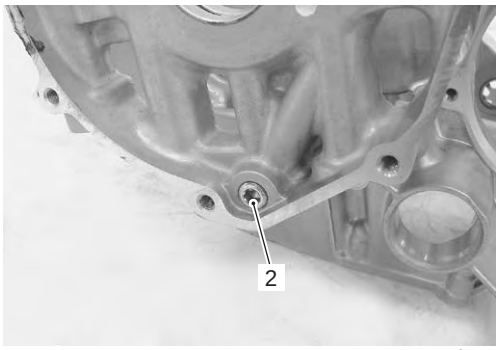


I947H1140145-01

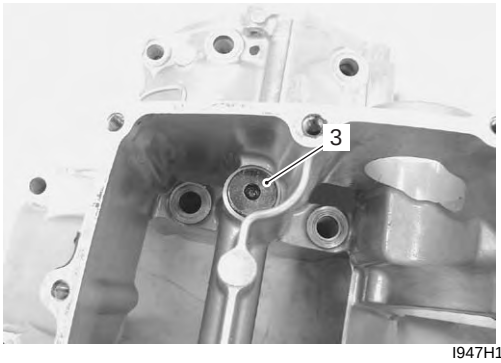
Oil Gallery Plug
1) Remove the oil gallery plug (1), (2) and (3) from the lower crankcase.



I947H1140146-01

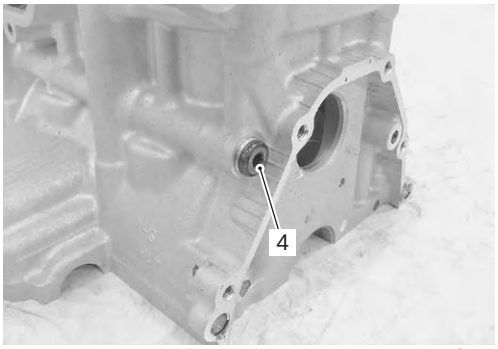


I947H1140147-01



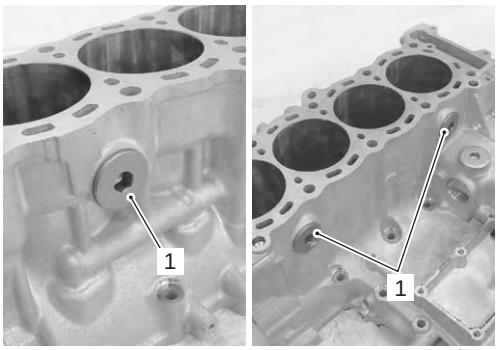
I947H1140148-01

2) Remove the oil gallery plug (4) from the upper crankcase.



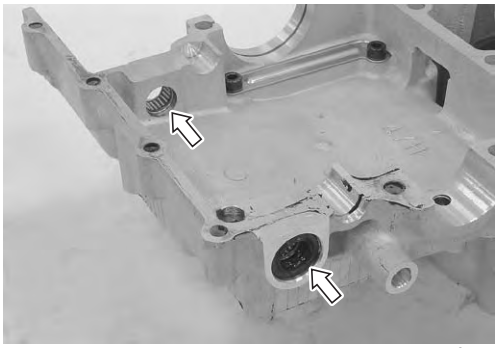
I947H1140149-01

Water Jacket Plug
Remove the water jacket plugs (1) from the upper crankcase.



I947H1140150-01

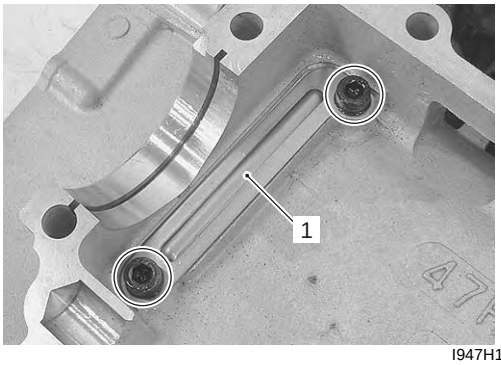
Oil Seal / Bearing
Remove the oil seal and bearings if necessary. Refer to “Transmission Removal” in Section 5B (Page 5B-3).



I947H1140151-01

I947H1140152-01

Breather Oil Return Plate
Remove the breather oil return plate (1) from the upper crankcase.



I947H1140153-01

Engine Bottom Side Assembly

B947H11406032

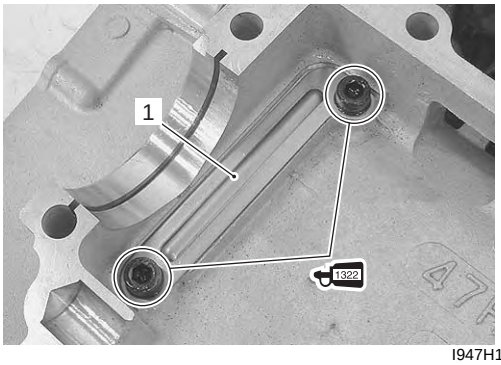
Assemble the engine bottom side in the reverse order of disassembly. Pay attention to the following points:

NOTE

Apply engine oil to each running and sliding part before reassembling.

Breather Oil Return Plate
When installing the breather oil return plate (1), apply thread lock to the bolts.

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



I947H1140154-01

Oil Seal / Bearing
Install the oil seal and bearings. Refer to “Transmission Installation” in Section 5B (Page 5B-5).

Water Jacket Plug

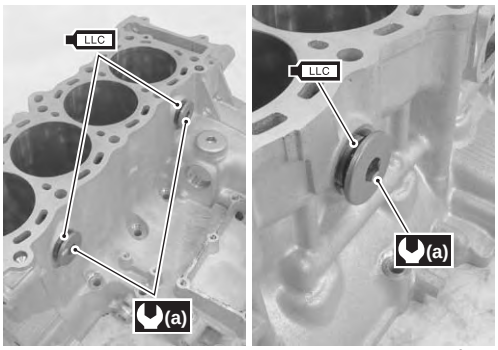
- Apply engine coolant to the O-rings of the water jacket plugs.

- Tighten each plug to the specified torque.

⚠ CAUTION

Replace the O-rings with new ones.

Tightening torque
Water jacket plug (a): 9.5 N·m (0.95 kgf-m, 6.9 lbf-ft)



I947H1140155-01

Oil Gallery Plug

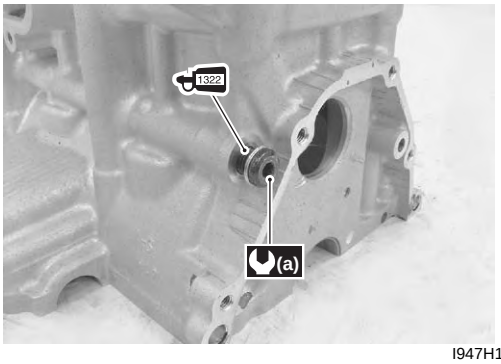
⚠ CAUTION

Replace the gaskets with new ones.

- Apply thread lock to the oil gallery plug (M10) and tighten it to the specified torque.

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

Tightening torque
Oil gallery plug (M10) (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)

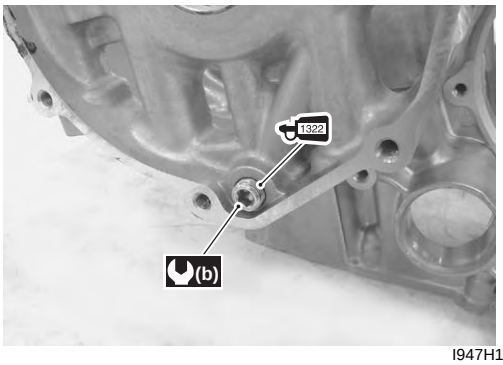


I947H1140156-01

- Apply thread lock to the oil gallery plug (M12) and tighten it to the specified torque.

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

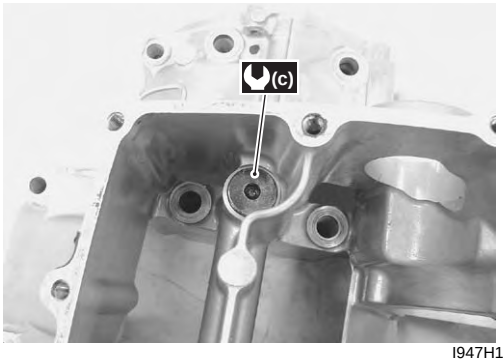
Tightening torque
Oil gallery plug (M12) (b): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)



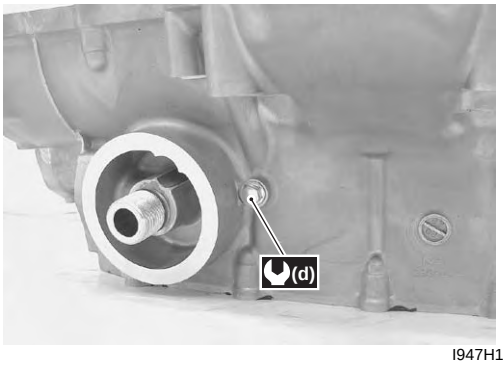
I947H1140157-01

- Tighten the oil gallery plugs to the specified torque.

Tightening torque
Oil gallery plug (M26) (c): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
Oil gallery plug (M6) (d): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

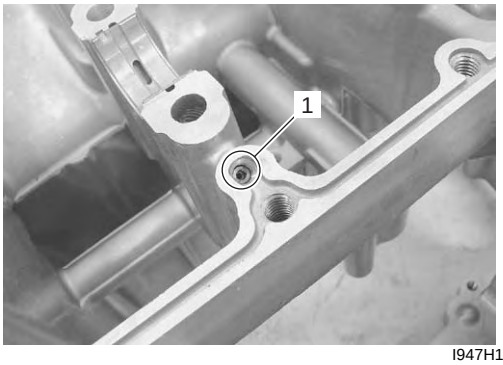


I947H1140159-01



I947H1140158-01

Oil Jet
Install the oil jet (1) (for transmission).



I947H1140160-01

Crankshaft Journal Bearing

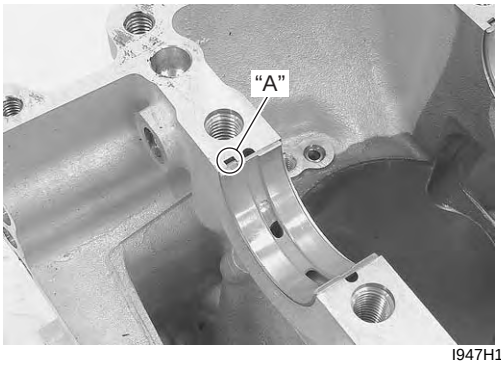
When fitting the crankshaft journal bearings to the upper and lower crankcases, be sure to fix the stopper part “A” first and press the other end.

⚠ 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-79).



I947H1140161-01

Piston and Conrod

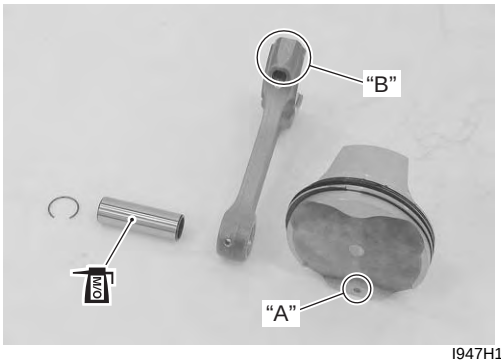
- Apply a small quantity of molybdenum oil solution onto each piston pin.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

- Assemble the piston and conrod.

NOTE

When installing the pistons, the indent “A” on the piston head must be brought to the other side of ID code “B” on the conrod big end.



I947H1140162-01

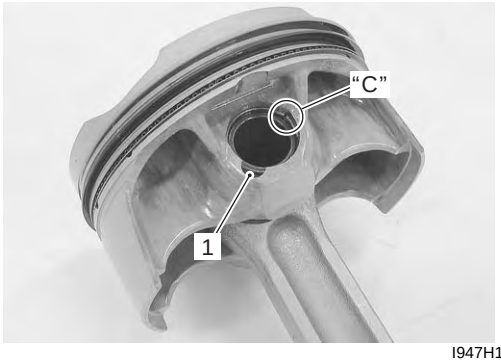
- Install the piston pin circlips (1).

⚠ CAUTION

Use new piston pin circlips (1) to prevent circlip failure which will occur when it is bent.

NOTE

End gap of the circlip “C” should not be aligned with the cutaway in the piston pin bore.



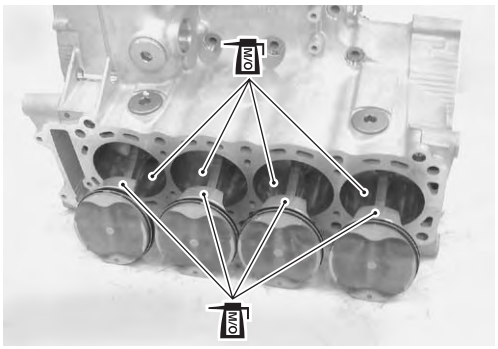
I947H1140163-01

- Apply a small quantity of molybdenum oil solution to the sliding surface of the pistons and cylinder walls.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

NOTE

Be sure to install the pistons in the cylinders from which they were removed in disassembly, referring to the cylinder numbers, #1 through #4, scribed on the piston.



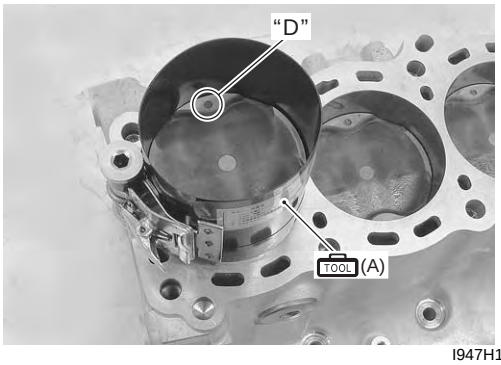
I947H1140164-01

- Install the pistons with conrods into the cylinders from topside using the special tool.

NOTE

When installing the pistons, the indent “D” of each piston head must be brought to the exhaust side.

Special tool
TOOL (A): 09916–77310 (Piston ring compressor)

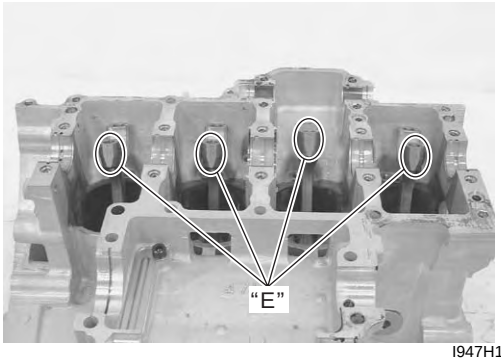


I947H1140165-01

- Check that I.D. code “E” on each conrod faces intake side.

⚠ CAUTION

Be sure to clean the conrod big end.



I947H1140166-01

Piston Cooling Oil Jet

- Fit new O-ring (1) to each piston cooling oil jet and apply engine oil to it.

⚠ CAUTION

Use new O-ring to prevent oil pressure leakage.

I947H1140167-01

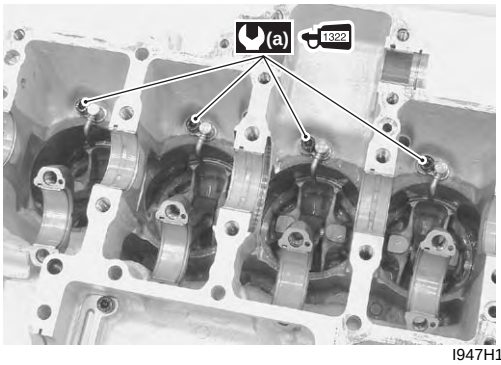
- Install each piston cooling oil jet.

NOTE

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)

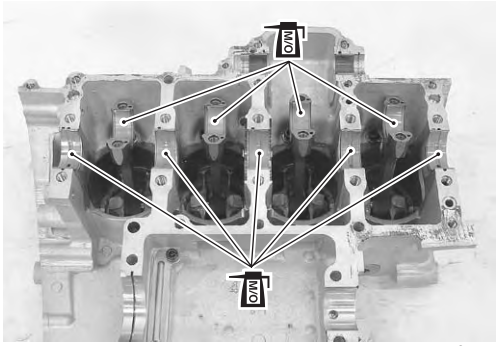


I947H1140168-02

Crankshaft

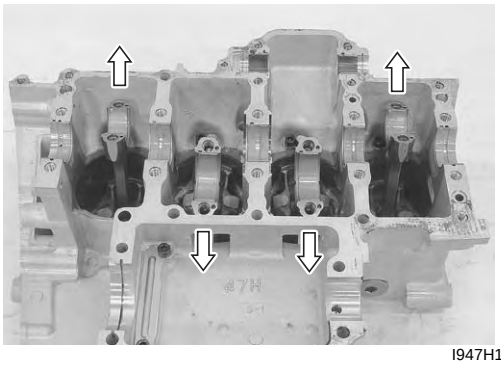
1) Apply molybdenum oil to each crank pin bearing surface and crankshaft journal bearing surface.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



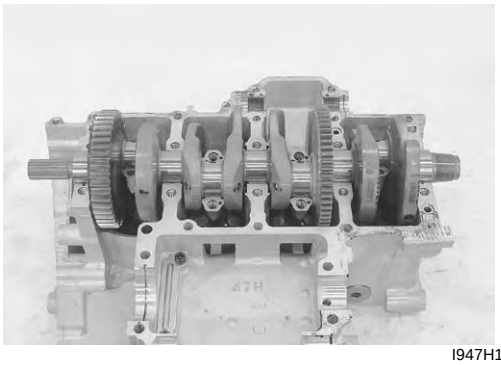
I947H1140169-01

2) Position the No. 2 and No. 3 conrod big ends on the same side, and the No. 1 and No. 4 conrod big ends on the opposite side of No. 2 and No. 3.



I947H1140170-01

3) Set the crankshaft onto the conrods and upper crankcase.



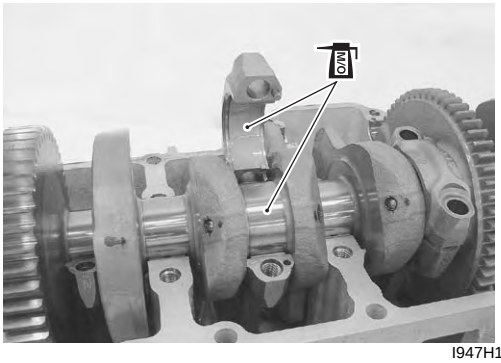
I947H1140171-01

4) Apply molybdenum oil to each crank pin and bearing surface.

⚠ CAUTION

Be sure to clean the conrod big end.

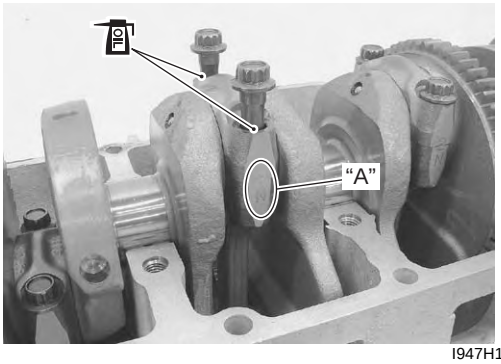
M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I947H1140172-01

5) When fitting the conrod cap, make sure that I.D. code “A” on each conrod faces intake side.

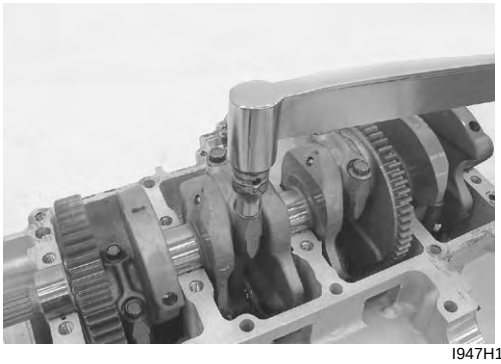
6) Apply engine oil to the conrod cap bolts.



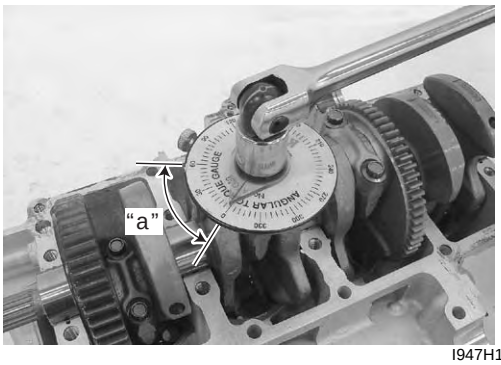
I947H1140173-01

7) Tighten the conrod cap bolt by using a 10 mm, 12 point socket wrench in the following two steps.

Tightening torque
Conrod cap bolt: 37 N·m (3.7 kgf-m, 26.5 lbf-ft) then turn in 1/6 (60°) turn



I947H1140174-01



I947H1140175-01

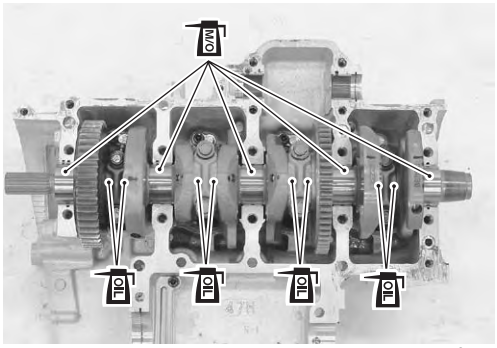
“a”: 60°

8) Apply engine oil to the conrod big end side surfaces.

9) Apply molybdenum oil to each crankshaft journal and bearing lightly.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

10) Check the conrod movement for smooth turning.

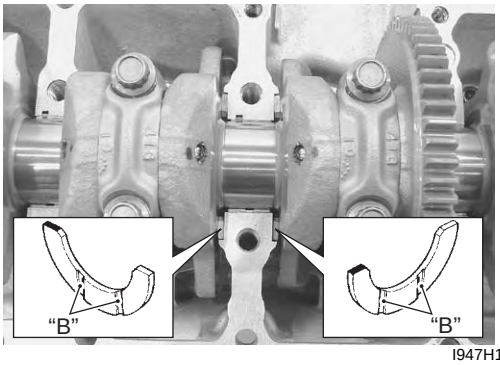


I947H1140176-01

11) Insert the right and left thrust bearings with the oil grooves “B” facing towards the crankshaft web.

NOTE

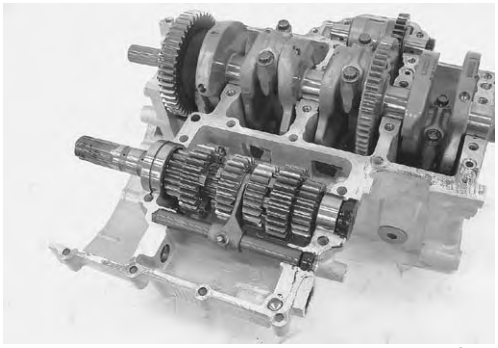
- **Right-thrust bearing has green painting.**
- **Inspect and select the crankshaft thrust clearance if necessary. Refer to “Crankshaft Thrust Clearance Inspection and Selection” (Page 1D-82).**



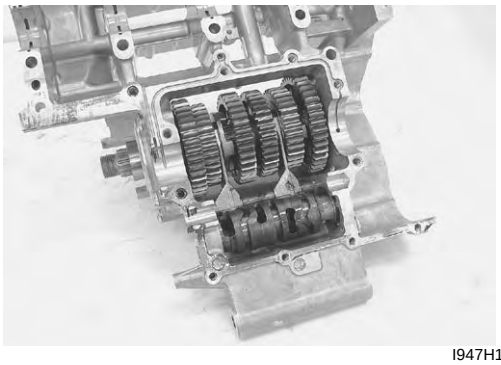
I947H1140177-02

Transmission

Install the transmission. Refer to “Transmission Installation” in Section 5B (Page 5B-5).



I947H1140178-01



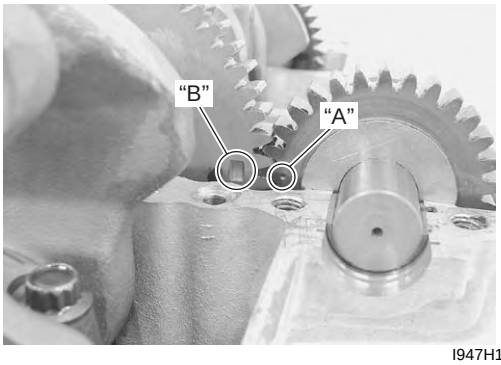
I947H1140179-01

Balancer Shaft

- Apply a molybdenum oil solution to each balancer shaft journal and bearing lightly.

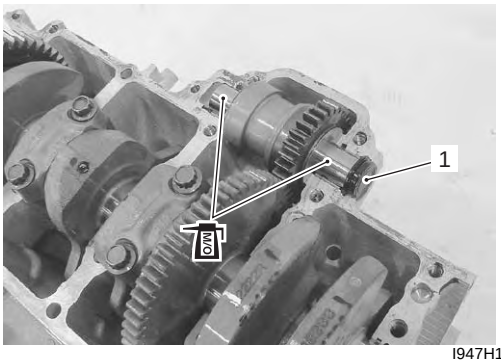
  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

- Set the balancer shaft so that its punch mark “A” is aligned with the index “B” on the crankshaft.



I947H1140180-01

- Install the plug (1).



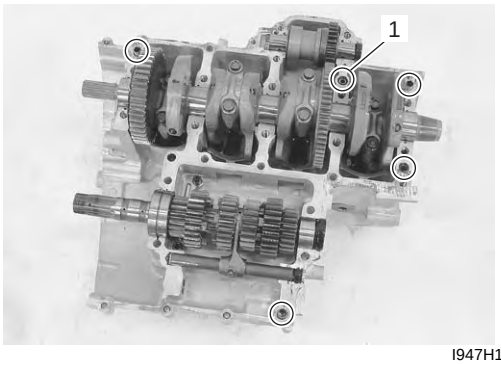
I947H1140181-01

Crankcase

- Install the dowel pins and O-rings (1).

⚠ CAUTION

Replace the O-rings with new ones.



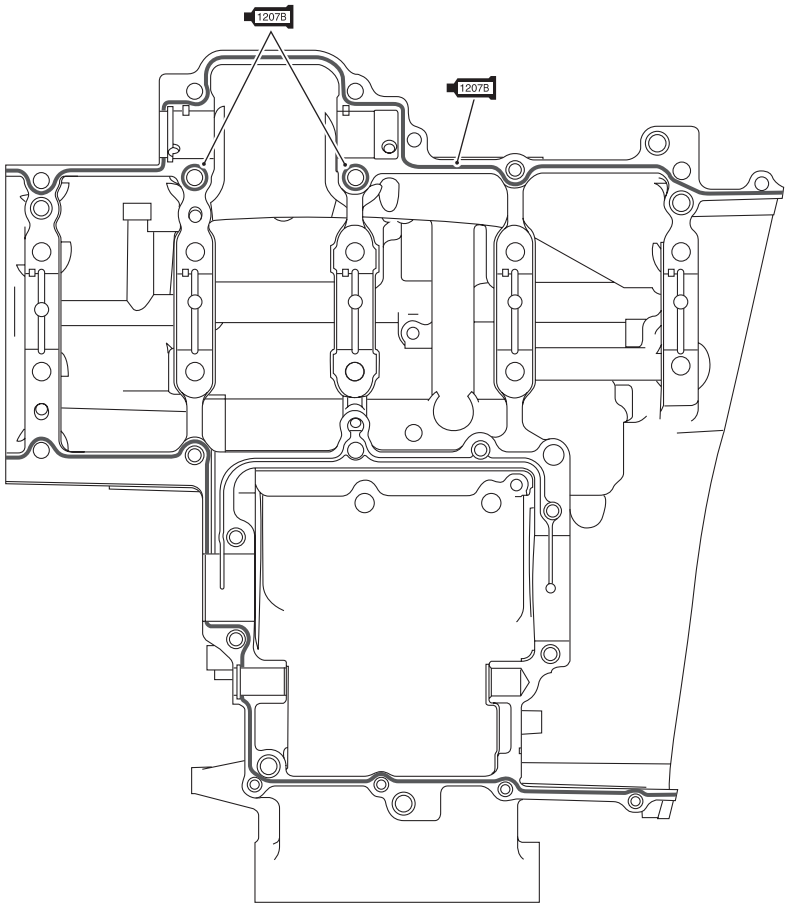
I947H1140182-02

- Apply bond to the mating surface of the lower crankcase as follows.

NOTE

- **Make mating surfaces free from moisture, oil, dust and other foreign materials.**
- **Spread the sealant on surfaces thinly to form an even layer, and assemble the crankcases within a few minutes.**
- **Take extreme care not to apply sealant to any oil hole, oil groove and bearing.**
- **Apply sealant to distorted surfaces as it forms a comparatively thick film.**

1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)



I947H1140183-02

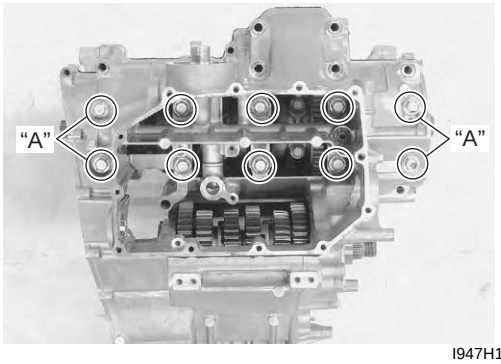
1207B : Apply bond.

- Tighten the crankshaft journal bolts (M9). 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 “A” to prevent oil leakage.

Tightening torque
Crankshaft journal bolt (M9): 18 N·m (1.8 kgf-m, 13.0 lbf-ft) then turn in 50°



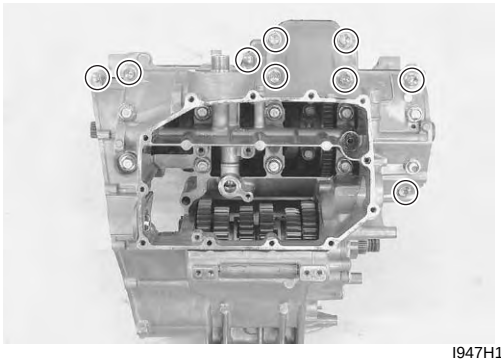
I947H1140184-01

- Tighten the crankcase bolts a little at a time to equalize the pressure.
- Install the cap (2).

⚠ CAUTION

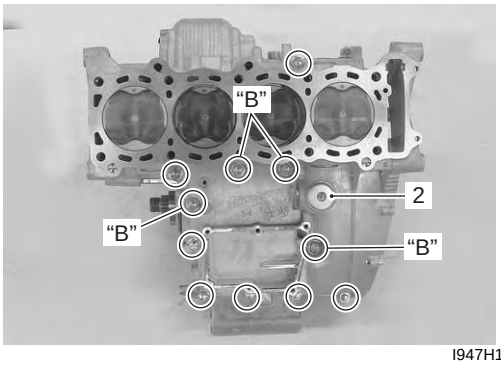
- **Fit new gasket washers to the bolts “B” to prevent oil leakage.**
- **Fit new O-ring to the cap (2) and apply grease to it.**

Tightening torque
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)
Crankcase bolt (M6): 12 N·m (1.2 kgf-m, 8.5 lbf-ft)



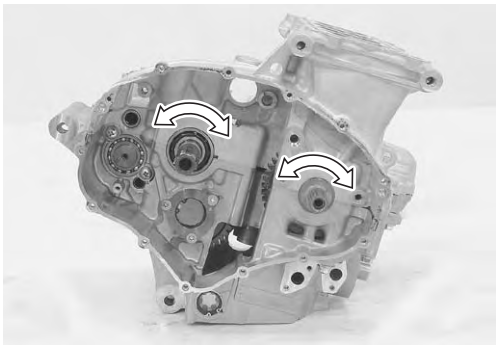
I947H1140185-01

I947H1140186-02

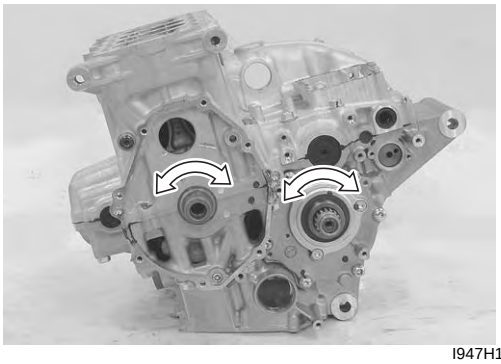


I947H1140187-03

- 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.



I947H1140188-01

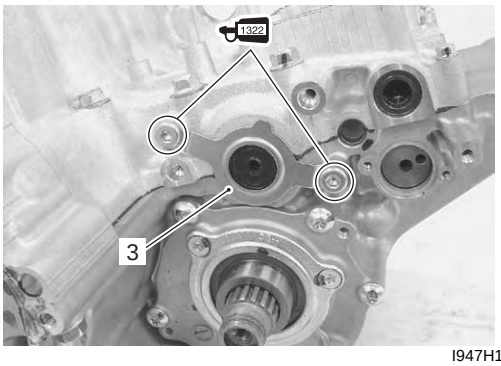


I947H1140189-01

- Install the clutch push rod oil seal retainer (3).

- Apply thread lock to the bolts.

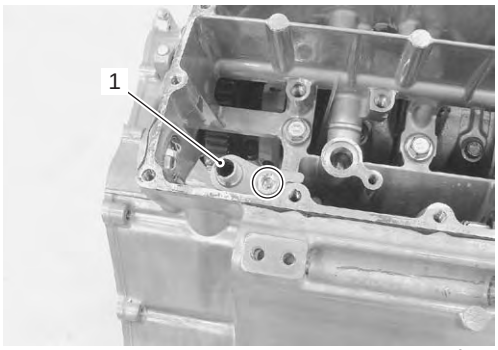
  : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER “1322” or equivalent)



I947H1140190-02

Oil Pump

- Install the breather oil return pipe (1).



I947H1140191-01

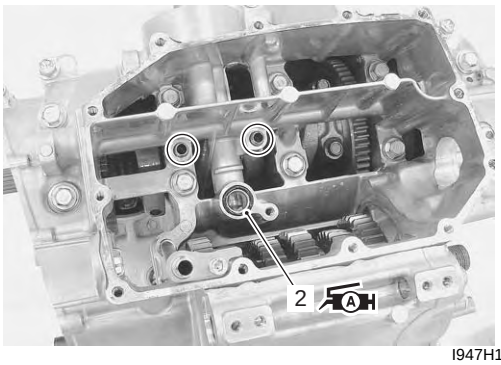
- Apply grease to new O-ring (2).

  : Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

  ⚠ CAUTION

  Use a new O-ring to prevent oil leakage.

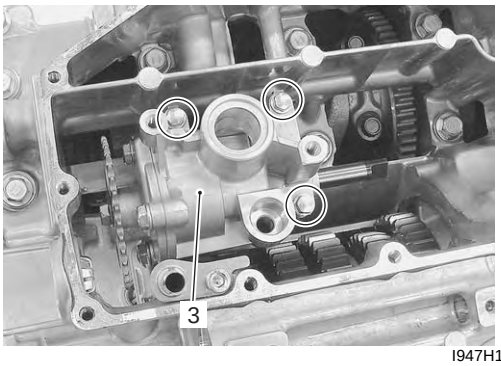
- Install the O-ring and dowel pins.



I947H1140192-01

- Install the oil pump (3) and tighten the oil pump bolts to the specified torque.

  Tightening torque
  Oil pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

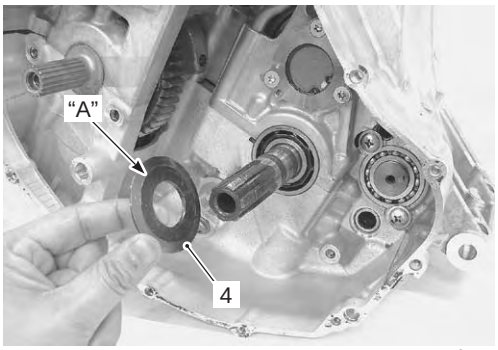


I947H1140193-01

- Install the thrust washer (4) to the countershaft.

  NOTE

  The chamfer side “A” of thrust washer should face the crankcase side.



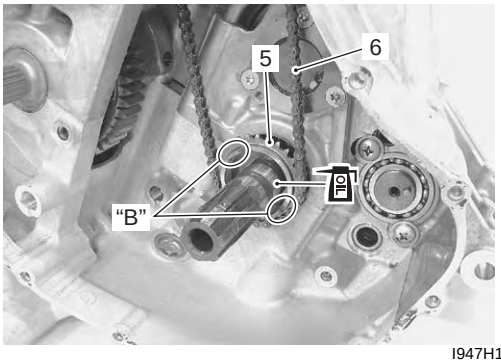
I947H1140194-01

- Install the oil pump drive sprocket (5) to the countershaft.

  NOTE

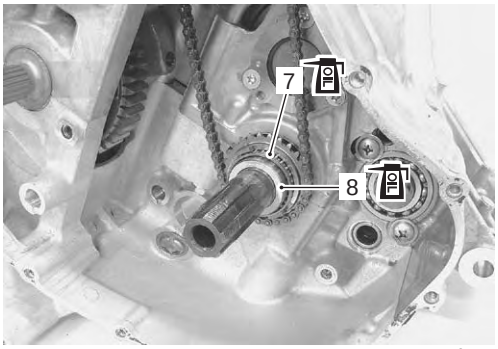
  Teeth “B” on the sprocket must face the clutch side.

- Pass the chain (6) between the oil pump drive and driven sprockets.
- Apply engine oil to the countershaft.



I947H1140195-02

- Apply engine oil to the bearing (7) and spacer (8) and install them into the sprocket.



I947H1140196-01

Oil Strainer / Oil Pressure Regulator

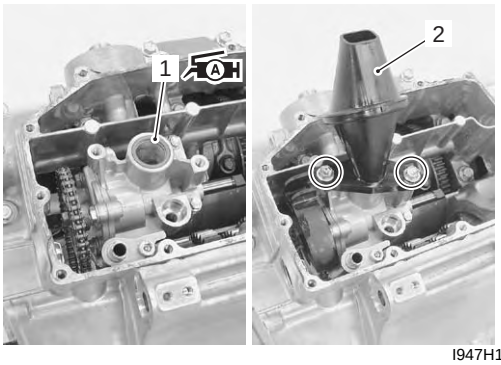
- Apply grease to new O-ring (1).

⚠ CAUTION

Use a new O-ring to prevent oil leakage.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

- Install the oil strainer (2).



I947H1140197-01

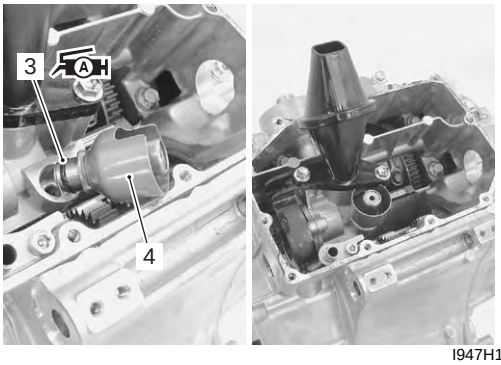
- Apply grease to new O-ring (3).

⚠ CAUTION

Use a new O-ring to prevent oil leakage.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

- Push in the oil pressure regulator (4) to the oil pump as shown.



I947H1140198-02

Oil Pan

- Install new gasket.

⚠ CAUTION

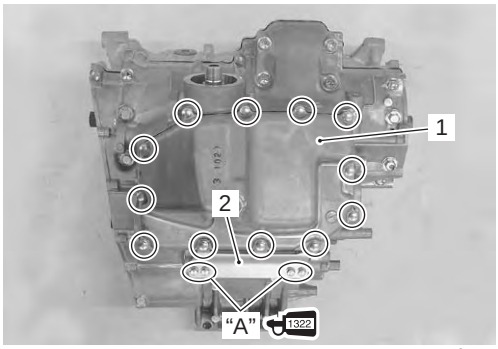
Use new gasket to prevent oil leakage.

- Install the oil pan (1) and plate (2).
- Apply thread lock to the plate bolts “A”.

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

- Tighten the oil pan bolts and plate bolts diagonally to the specified torque.

Tightening torque
Oil pan bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

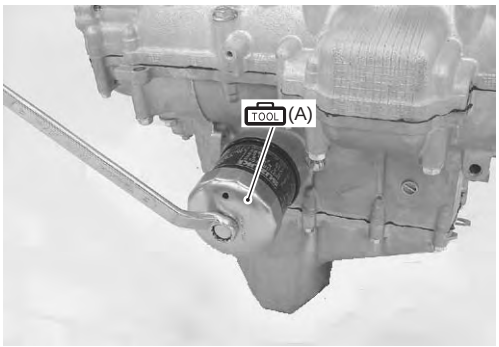


I947H1140298-01

Oil Filter

Install the oil filter with the special tool. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).

Special tool
(A): 09915–40610 (Oil filter wrench)



I947H1140201-01

Oil Pressure Switch

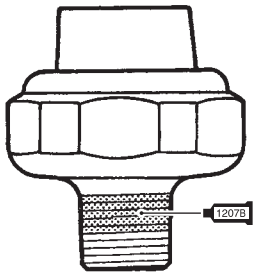
- Apply bond to the thread part of oil pressure switch and tighten oil pressure switch to the specified torque.

NOTE

Be careful not to apply bond to the hole of thread end.

1207B : 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

- Route the oil pressure switch lead wire properly and tighten the screw to the specified torque. Refer to “Wiring Harness Routing Diagram” in Section 9A (Page 9A-7).

Gear Position Switch

- Apply grease to the O-ring.

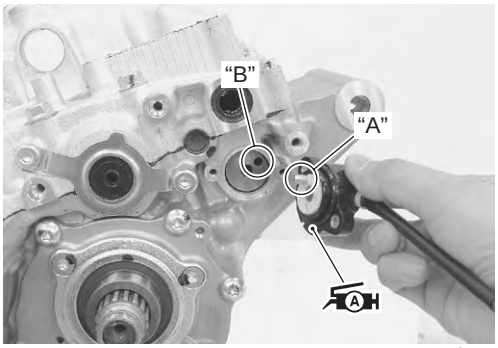
⚠ CAUTION

Replace the O-ring with a new one.

NOTE

Insert the gear position switch pin “A” into the gearshift cam hole “B”.

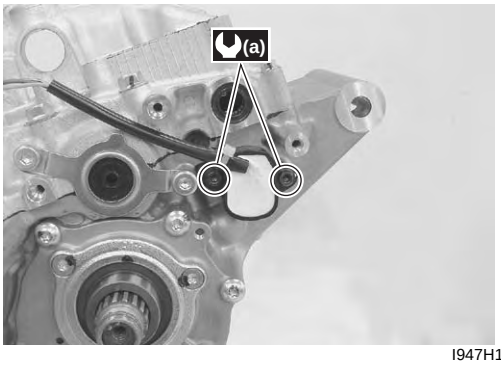
A : Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



I947H1140202-01

- Tighten the gear position switch mounting bolts to the specified torque.

Tightening torque
Gear position switch mounting bolt (a): 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)



I947H1140203-01

Water Pump

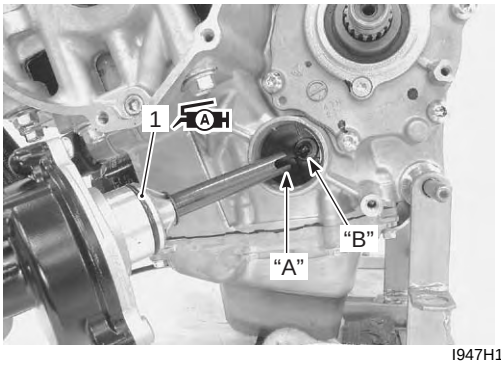
- Apply grease to new O-ring (1).

⚠ CAUTION

Use the new O-ring to prevent oil leakage.

A : Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

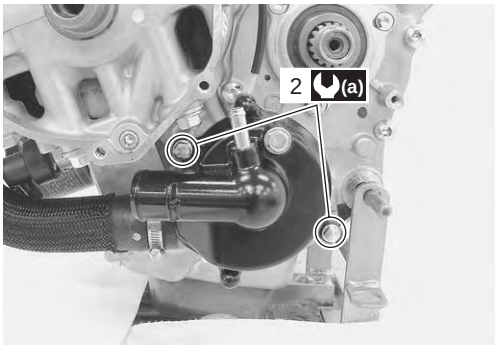
- Install the water pump assembly with the slot of the pump shaft end “A” securely engaged with the flat “B” of the oil pump shaft.



I947H1140204-02

- Tighten the water pump mounting bolts (2) to the specified torque.

  Tightening torque
  Water pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



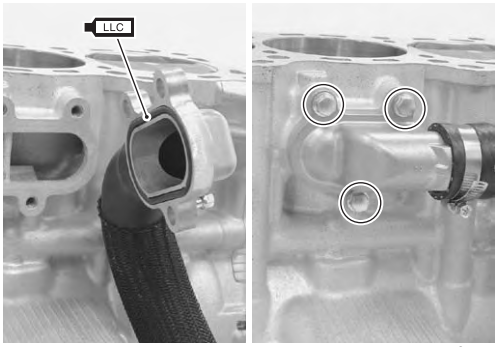
I947H1140205-02

- Apply engine coolant to the O-ring.

  ⚠ CAUTION

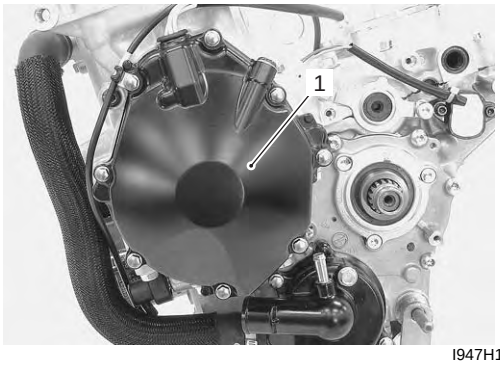
  Replace the O-ring with a new one.

- Tighten the water inlet connector mounting bolts.



I947H1140206-01

Generator
Install the generator rotor and cover (1). Refer to "Generator Removal and Installation" in Section 1J (Page 1J-4).



I947H1140207-01

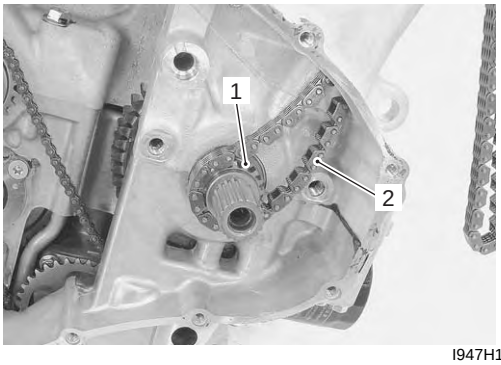
Cam Chain / Cam Chain Tensioner / Cam Chain Guide No. 1

- Install the cam chain drive sprocket (1) to the crankshaft.

  NOTE

  When installing the cam chain drive sprocket, align the wide spline teeth of the sprocket and crankshaft.

- Install the cam chain (2).



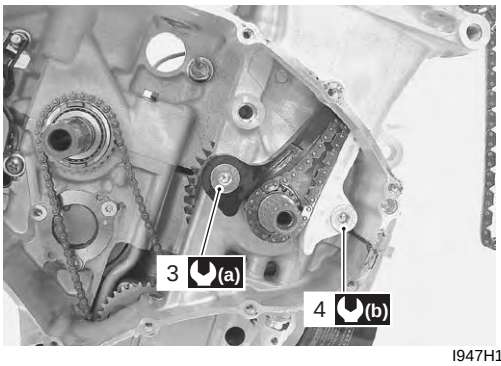
I947H1140208-01

- Insert the cam chain tensioner and tighten the cam chain tensioner bolt (3) to the specified torque.

  Tightening torque
  Cam chain tensioner bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

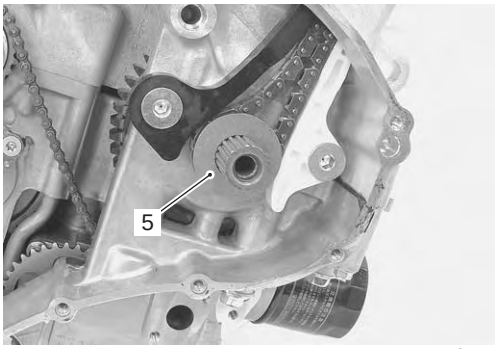
- Insert the cam chain guide No. 1 while pulling the chain upward.
- Tighten the cam chain guide No. 1 bolt (4) to the specified torque.

  Tightening torque
  Cam chain guide No. 1 bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



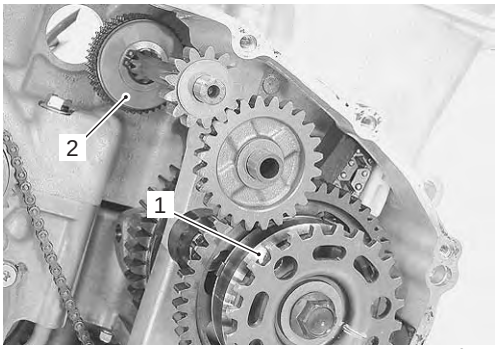
I947H1140209-01

- Install the washer (5).



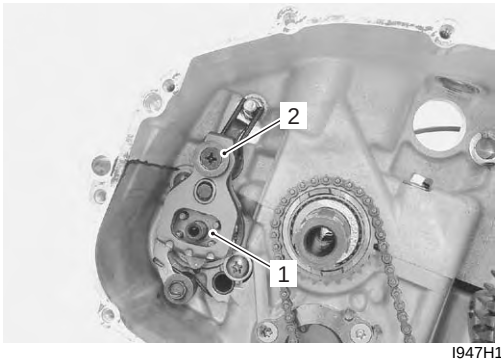
I947H1140210-01

Starter Clutch / Starter Torque Limiter
Install the starter clutch (1) and starter torque limiter (2) component parts. Refer to “Starter Clutch Removal and Installation” in Section 1I (Page 1I-10) and “Starter Torque Limiter Removal and Installation” in Section 1I (Page 1I-9).



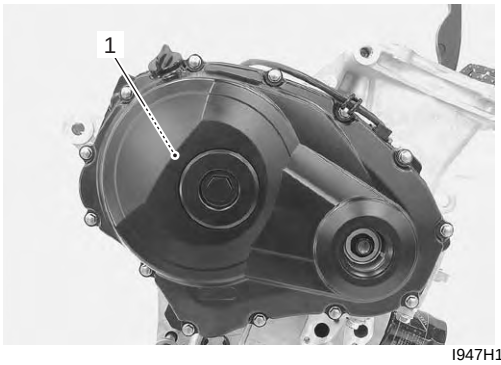
I947H1140211-02

Gearshift System
Install the gearshift cam plate (1) and gearshift shaft (2). Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation” in Section 5B (Page 5B-17).



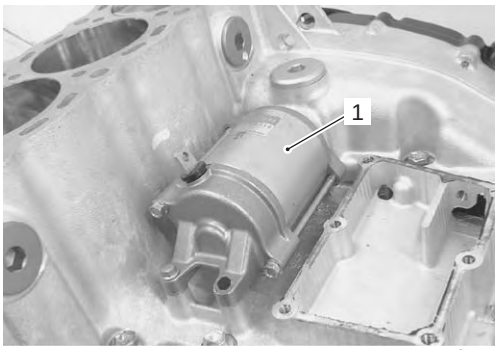
I947H1140212-01

Clutch
Install the clutch component parts (1). Refer to “Clutch Installation” in Section 5C (Page 5C-7).



I947H1140213-01

Starter Motor
Install the starter motor (1). Refer to “Starter Motor Removal and Installation” in Section 1I (Page 1I-4).

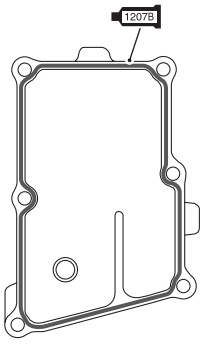


I947H1140214-02

Crankcase Breather (PCV) Cover

- Apply bond to the hatching part of crankcase breather (PCV) cover.

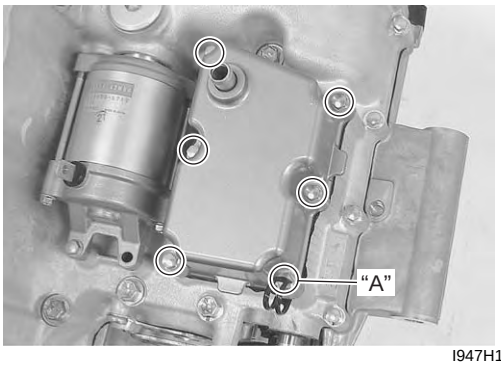
  1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)



I947H1140293-01

- Fit the clamp to the bolt “A”. Refer to “Wiring Harness Routing Diagram” in Section 9A (Page 9A-7).

- Tighten the crankcase breather (PCV) cover bolts.



I947H1140215-03

Engine Top Side
Assemble the engine top side. Refer to "Engine Top Side Disassembly" (Page 1D-26).

Cylinder Inspection

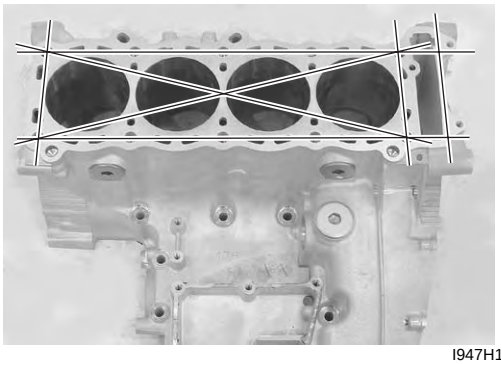
B947H11406033

Refer to "Engine Top Side Disassembly" (Page 1D-26).
Refer to "Engine Top Side Assembly" (Page 1D-28).

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 crankcase set.

Special tool
TOOL : 09900–20803 (Thickness gauge)

Cylinder distortion
Service limit: 0.02 mm (0.0008 in)

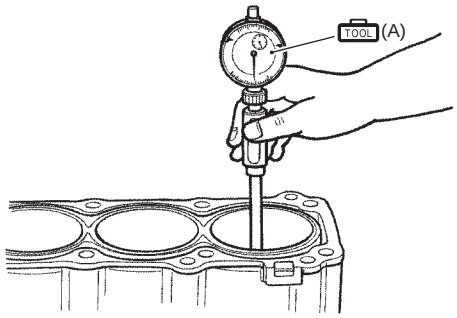


I947H1140216-01

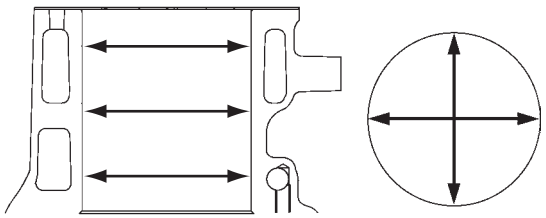
Cylinder Bore
Measure the cylinder bore diameter at six places. If any one of the measurements exceed the limit, overhaul the cylinder and replace the piston with an oversize piston. The remaining cylinders must also be rebored accordingly; otherwise, the imbalance might cause excessive vibration.

Special tool
TOOL (A): 09900–20530 (Cylinder gauge set)

Cylinder bore
Standard: 74.500 – 74.515 mm (2.9331 – 2.9337 in)



I947H1140217-02



I837H1140180-01

Piston-to-cylinder Clearance
Refer to "Piston and Piston Ring Inspection" (Page 1D-71).

Piston Ring Removal and Installation

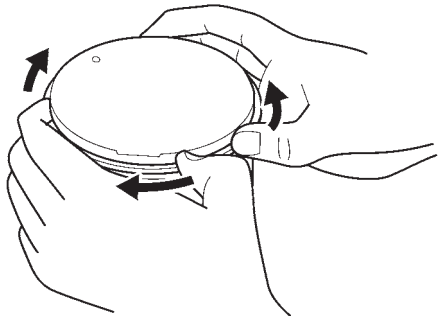
B947H11406034

Removal

1) Remove the piston. Refer to "Engine Bottom Side Disassembly" (Page 1D-49).
2) Carefully spread the ring opening with your thumbs and then push up the opposite side of the 1st ring to remove it.

NOTE

Do not expand the piston ring excessively since it is apt to be broken down.



I837H1140181-01

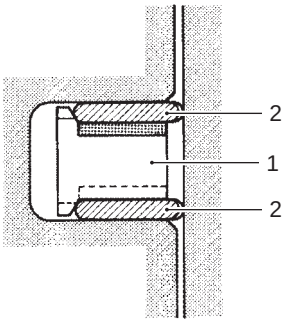
3) Remove the 2nd ring and oil ring in the same manner.

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.**

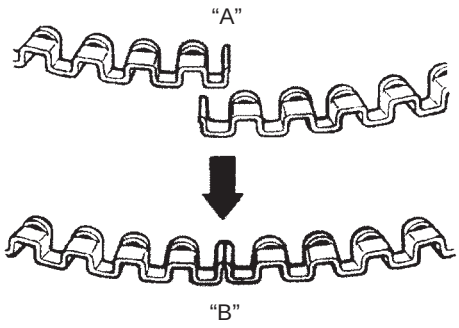
1) Install the piston rings in the order of the oil ring, second ring and top ring.
   a) The first member to go into the oil ring groove is the spacer (1).
   After placing the spacer, fit the two side rails (2).



I718H1140143-02

⚠ CAUTION

When installing the spacer, be careful not to allow its two ends to overlap in the groove.



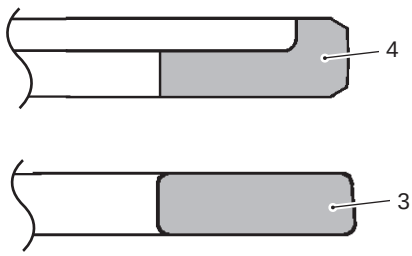
I705H1140170-02

"A": INCORRECT	"B": CORRECT

   b) Install the 2nd ring (3) and 1st ring (4) to piston.

NOTE

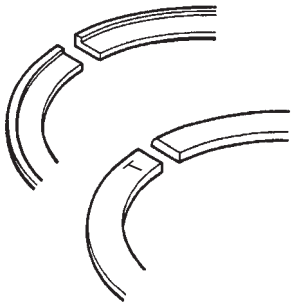
1st ring (4) and 2nd ring (3) differ in shape.



I947H1140218-01

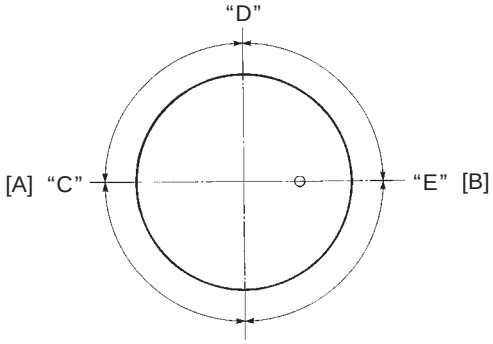
NOTE

Face the side with the stamped mark upward when assembling.



I947H1140219-01

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.



I837H1140282-02

"C":	1st ring and upper side rail
"D":	Spacer
"E":	2nd ring and lower side rail
[A]:	IN
[B]:	EX

3) Install each piston and piston pin. Refer to "Engine Bottom Side Assembly" (Page 1D-56).

Piston and Piston Ring Inspection

B947H11406035

Refer to “Piston Ring Removal and Installation” (Page 1D-69).

Piston Diameter

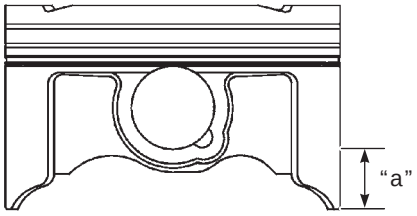
Measure the piston diameter using the micrometer at 15 mm (0.6 in) “a” from the skirt end. If the piston diameter is less than the service limit, replace the piston.

Special tool

(A): 09900–20203 (Micrometer (50 – 75 mm))

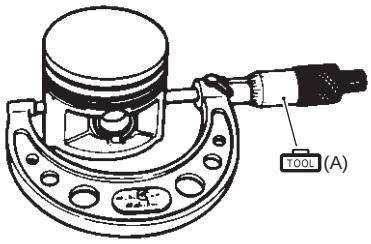
Piston diameter

Service limit: 74.380 mm (2.9283 in)



I837H1140184-01

“a”: 10 mm (0.4 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): 0.83 – 0.85 mm (0.0327 – 0.0335 in)

Standard (1st): 1.30 – 1.32 mm (0.0512 – 0.0520 in)

Standard (2nd): 0.81 – 0.83 mm (0.0319 – 0.0327 in)

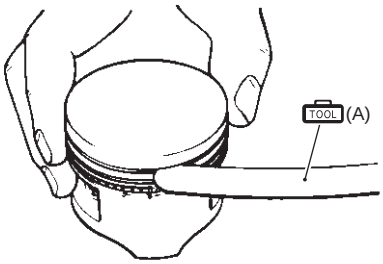
Standard (Oil): 1.51 – 1.53 mm (0.0594 – 0.0602 in)

Piston ring thickness

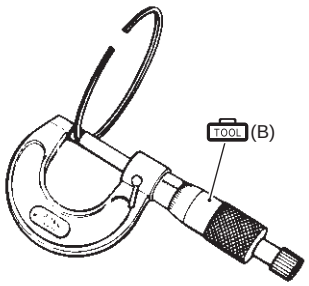
Standard (1st): 0.76 – 0.81 mm (0.0299 – 0.0319 in)

Standard (1st): 1.08 – 1.10 mm (0.0425 – 0.0433 in)

Standard (2nd): 0.77 – 0.79 mm (0.0303 – 0.0311 in)



I649G1140263-03



I649G1140264-03

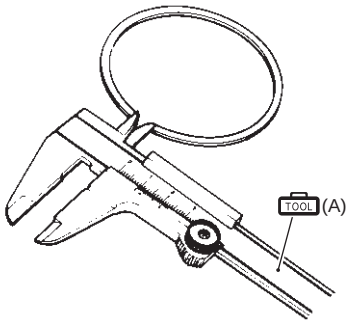
Piston Ring Free End Gap and Piston Ring End Gap
Measure the piston ring free end gap using vernier calipers. Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge. If any of the measurements exceed the service limit, replace the piston ring with a new one.

Special tool
(A): 09900–20102 (Vernier calipers (200 mm))

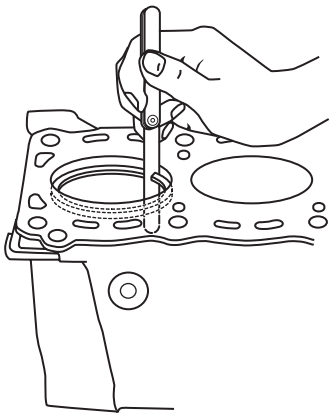
Piston ring free end gap
Service limit (1st): 5.6 mm (0.22 in)
Service limit (2nd): 6.4 mm (0.25 in)

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)



I649G1140265-03

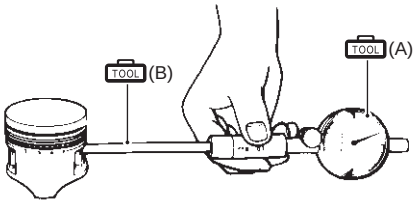


I947H1140307-01

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 measurements surpass limits, replace the piston.

Special tool
(A): 09900–20602 (Dial gauge)
(B): 09900–22401 (Small bore gauge (10 – 18 mm))

Piston pin bore
Service limit: 15.030 mm (0.5917 in)

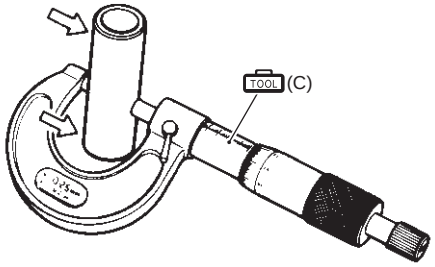


I649G1140267-03

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: 14.980 mm (0.5898 in)



I649G1140268-03

Balancer Shaft Disassembly and Assembly

B947H11406036

Refer to “Engine Bottom Side Disassembly” (Page 1D-49).
Refer to “Engine Bottom Side Assembly” (Page 1D-56).

Disassembly

1) Remove the balancer shaft. Refer to “Engine Bottom Side Disassembly” (Page 1D-49).
2) Remove the washers, balancer gear and dampers from the shaft.

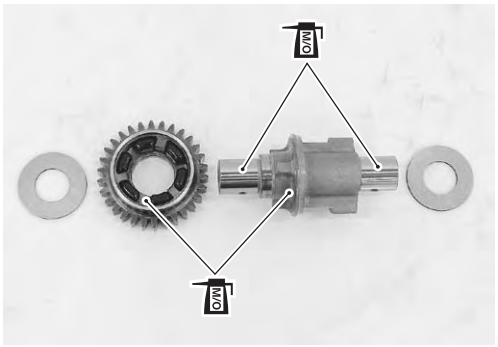
I947H1140221-01

Assembly

Assembly is in the reverse order of disassembly. Pay attention to the following points:

- Apply molybdenum oil solution to each part.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

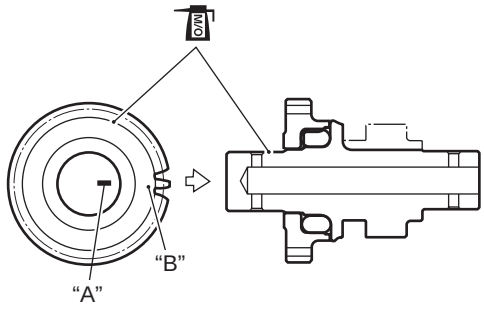


I947H1140222-01

- Set the dampers and install the balancer shaft to balancer gear.

  NOTE

  - **Fit the stopper of the balancer shaft between the dampers.**
  - **Align the line “A” on the balancer shaft with the punch “B” on the balancer gear.**



I838H1140055-01

Balancer Shaft Inspection

B947H11406037

Refer to “Balancer Shaft Disassembly and Assembly” (Page 1D-73).

Balancer Shaft

Inspect the balancer shaft for wear or damage. Replace the balancer shaft if there is anything unusual.

Damper

Inspect the dampers for wear and damage, replace them if any defects are found.

I947H1140223-01

Balancer Shaft Journal Bearing Removal and Installation

B947H11406038

Refer to “Engine Bottom Side Disassembly” (Page 1D-49).
Refer to “Engine Bottom Side Assembly” (Page 1D-56).

Removal

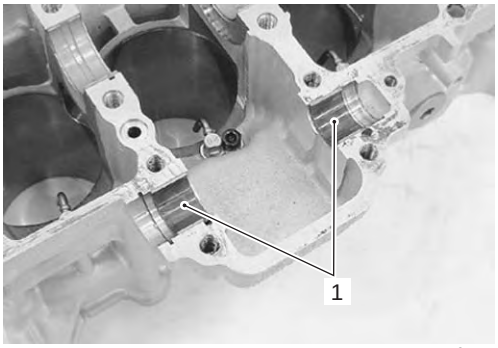
Remove the balancer shaft journal bearings (1).

NOTE

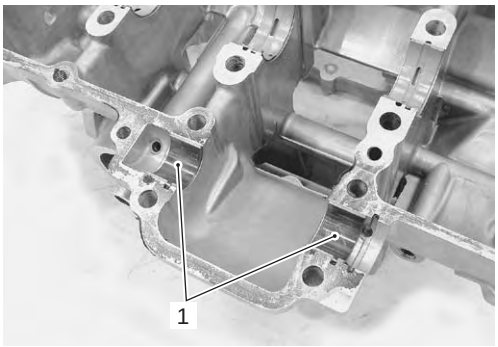
- **Do not remove the bearings (1) unless absolutely necessary.**
- **Make a note of where the bearings are removed from so that they can be reinstalled in their original positions.**

⚠ CAUTION

When removing the bearings, be careful not to scratch the bearings.



I947H1140224-02



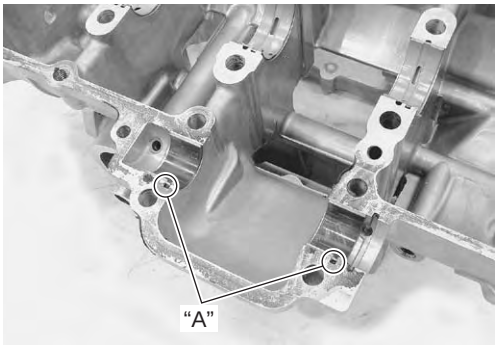
I947H1140225-01

Installation

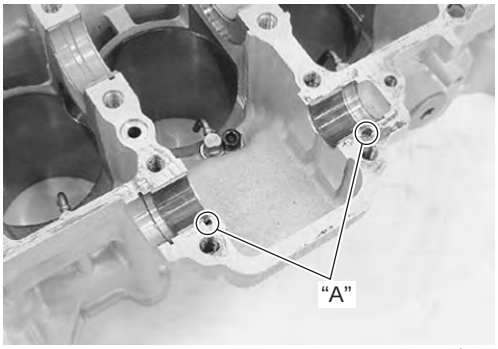
When installing the bearings to the crankcases, be sure to install the tab “A” first, and then press in the other opposite side of the bearing.

NOTE

Inspect and select the balancer shaft journal bearing if necessary. Refer to “Balancer Shaft Journal Bearing Inspection and Selection” (Page 1D-75).



I947H1140226-01



I947H1140227-02

Balancer Shaft Journal Bearing Inspection and Selection

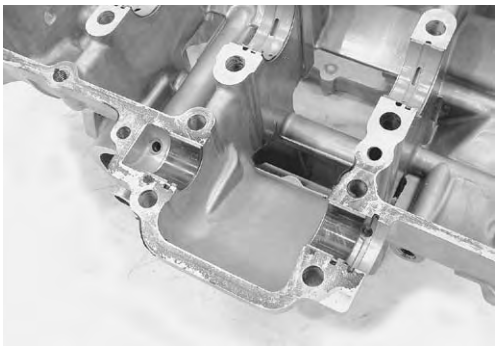
B947H11406039

Refer to “Engine Bottom Side Disassembly” (Page 1D-49).
Refer to “Engine Bottom Side Assembly” (Page 1D-56).

Inspection

Inspect the bearing surfaces for any signs of fusion, pitting, burn or flaws. If any, replace them with a specified set of bearings.

I947H1140228-02



I947H1140229-01

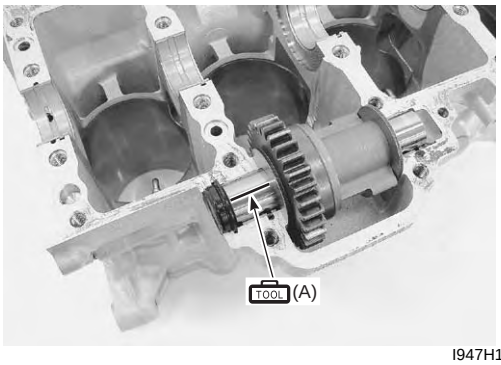
Selection

1) Place the plastigauge axially along the balancer shaft journal as shown.

Special tool
TOOL (A): 09900–22301 (Plastigage (0.025 – 0.076 mm))

⚠ CAUTION

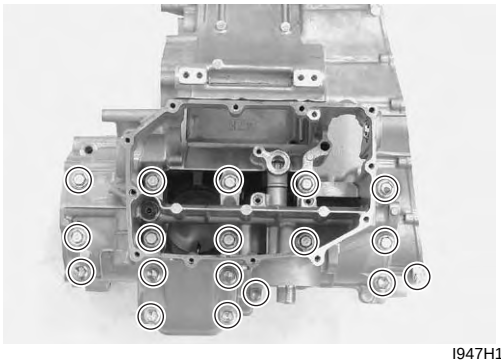
Never rotate the balancer shaft when a piece of plastigauge is installed.



I947H1140230-01

2) Mate the lower crankcase with the upper crankcase, and tighten the crankcase bolts (M8) and crankshaft journal bolts (M9) to the specified torque.

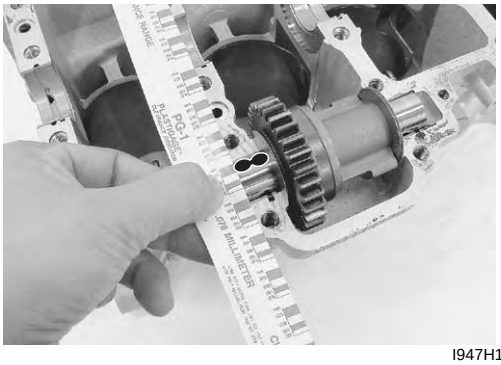
Tightening torque
Crankshaft journal bolt (M9): 18 N·m (1.8 kgf-m, 13.0 lbf-ft) then turn in 50°
Crankcase bolt (M8) (Initial): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
Crankcase bolt (M8) (Final): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)
Crankcase bolt (M6): 12 N·m (1.2 kgf-m, 8.5 lbf-ft)



I947H1140231-01

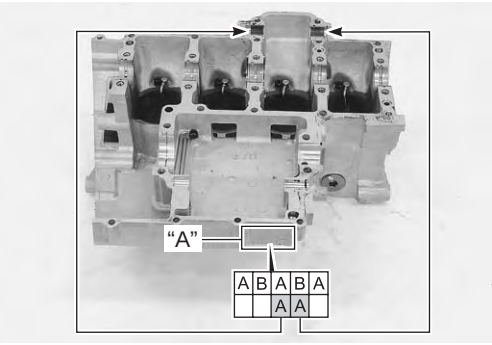
3) Remove the lower crankcase and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge. If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

Balancer shaft journal oil clearance
Standard: 0.028 – 0.052 mm (0.0011 – 0.0020 in)
Service limit: 0.080 mm (0.0031 in)



I947H1140232-01

4) Check the corresponding crankcase journal I.D. code number “A”, [A], [B] or [C] which is stamped on the rear of upper crankcase.



I947H1140233-01

Bearing selection table

Crankcase I.D. “A”	**A**	**Green**
	B	**Black**
	C	**Brown**

Crankcase I.D. specification

Code	I.D. specification
A	**23.000 – 23.008 mm (0.9055 – 0.9058 in)**
B	**23.008 – 23.016 mm (0.9058 – 0.9061 in)**
C	**23.016 – 23.024 mm (0.9061 – 0.9065 in)**

Balancer shaft journal O.D. specification
19.992 – 20.000 mm (0.7871 – 0.7874 in)

Bearing thickness specification

Color (Part No.)	Thickness
Green (12229-47H00-0A0)	**1.482 – 1.486 mm (0.0583 – 0.0585 in)**
Black (12229-47H00-0B0)	**1.486 – 1.490 mm (0.0585 – 0.0587 in)**
Brown (12229-47H00-0C0)	**1.490 – 1.494 mm (0.0587 – 0.0588 in)**

NOTE

The balancer shaft journal bearings on upper and lower crankcases are the same.

I947H1140234-01

Conrod Crank Pin Bearing Removal and Installation

B947H11406040

Refer to “Engine Bottom Side Disassembly” (Page 1D-49).
Refer to “Engine Bottom Side Assembly” (Page 1D-56).

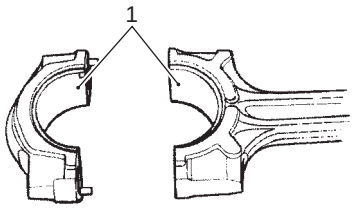
Removal
Remove the conrod crank pin bearings (1).

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.

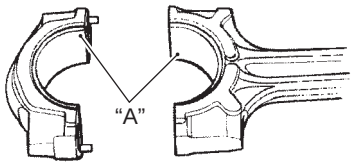


I718H1140269-01

Installation
When installing the bearings into the conrod cap and conrod, be sure to install the tab “A” first, and then press in the other 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-78).



I823H1140578-01

Conrod and Crankshaft Inspection

B947H11406041

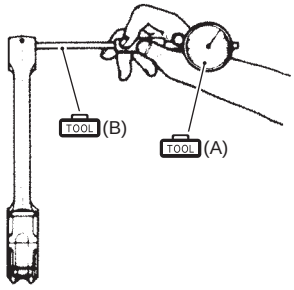
Refer to “Engine Bottom Side Disassembly” (Page 1D-49).
Refer to “Engine Bottom Side Assembly” (Page 1D-56).

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)
(B): 09900–22401 (Small bore gauge (10 – 18 mm))

Conrod small end I.D.
Service limit: 15.040 mm (0.5921 in)



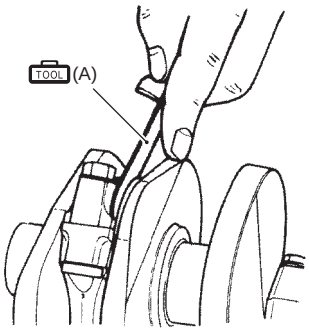
I823H1140280-01

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: 0.30 mm (0.012 in)



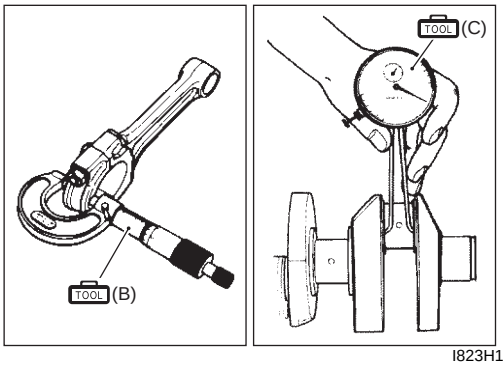
I823H1140281-01

2) If the clearance exceeds the limit, remove the conrod and measure the conrod big end width and crank pin width. Refer to “Engine Bottom Side Assembly” (Page 1D-56). If any of the measurements are out of specification, replace the conrod or crankshaft.

Special tool
(B): 09900–20205 (Micrometer (0 – 25 mm))
(C): 09900–20605 (Dial calipers (10 – 34 mm))

Conrod big end width
Standard: 19.95 – 20.00 mm (0.7854 – 0.7874 in)

Crank pin width
Standard: 20.10 – 20.15 mm (0.7913 – 0.7933 in)



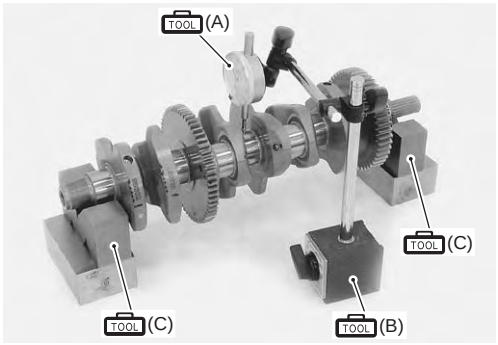
I823H1140282-01

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)
(B): 09900–20701 (Dial gauge chuck)
(C): 09900–21304 (V blocks)

Crankshaft runout
Service limit: 0.05 mm (0.002 in)



I947H1140235-01

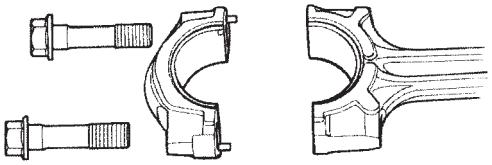
Conrod Crank Pin Bearing Inspection and Selection

B947H11406042

Refer to “Engine Bottom Side Disassembly” (Page 1D-49).
Refer to “Engine Bottom Side Assembly” (Page 1D-56).

Inspection

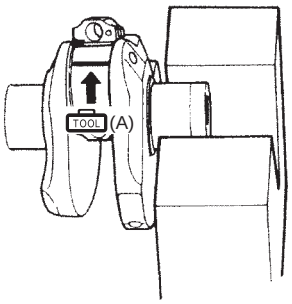
1) Inspect the bearing surfaces for any signs of fusion, pitting, burn or flaws. If any, replace them with a specified set of bearings.



I718H1140285-01

2) Place the plastigauge axially along the crank pin, avoiding the oil hole, as shown in the figure.

Special tool
TOOL (A): 09900–22301 (Plastigage (0.025 – 0.076 mm))



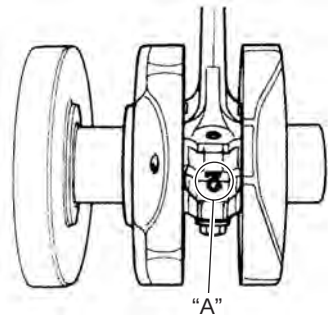
I718H1140286-01

3) Tighten the conrod cap bolts to the specified torque, in two stages.

NOTE

- **When installing the conrod cap bolts 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: 37 N·m (3.7 kgf-m, 26.5 lb-ft) then turn in 1/6 (60°) turn



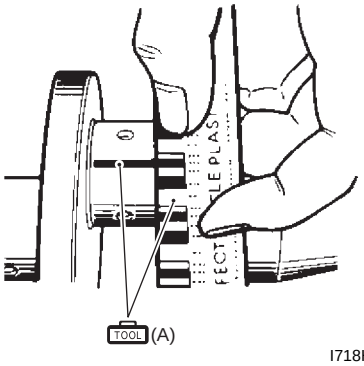
I823H1140284-01

4) Remove the conrod cap bolts 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.

Special tool
TOOL (A): 09900–22301 (Plastigage (0.025 – 0.076 mm))

Conrod big end oil clearance
Standard: 0.040 – 0.064 mm (0.0016 – 0.0025 in)

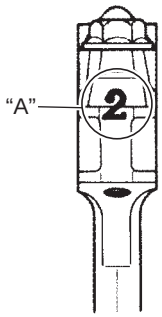
Conrod big end oil clearance
Service limit: 0.080 mm (0.0031 in)



I718H1140289-01

Selection

1) Check the corresponding conrod I.D. code numbers ([1] or [2]) “A”.

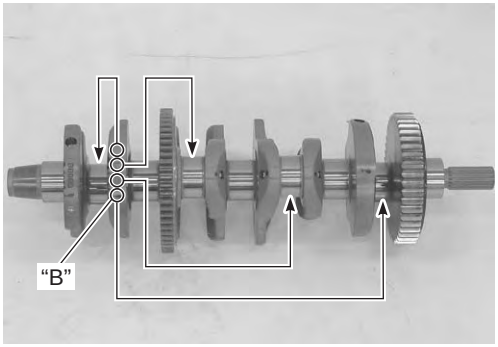


I718H1140290-01

Conrod I.D. specification

Code “A”	I.D. specification
1	38.000 – 38.008 mm (1.4961 – 1.4964 in)
2	38.008 – 38.016 mm (1.4964 – 1.4967 in)

2) Check the corresponding crank pin O.D. code numbers ([1], [2] or [3]) “B”.



I947H1140236-01

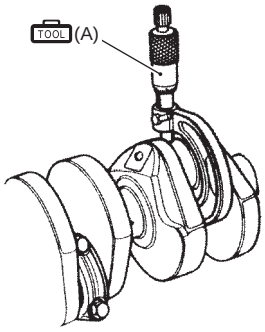
3) Measure the conrod crank pin O.D. with the special tool. If any of the measurements are out of specification, replace the crankshaft.

Crank pin O.D. specification

Code “B”	O.D. specification
1	34.992 – 35.000 mm (1.3776 – 1.3780 in)
2	34.984 – 34.992 mm (1.3773 – 1.3776 in)
3	34.976 – 34.984 mm (1.3770 – 1.3773 in)

Special tool

(A): 09900–20202 (Micrometer (25 – 50 mm))



I823H1140286-01

4) Select the specified bearings from the bearing selection table.

⚠ CAUTION

The bearings should be replaced as a set.

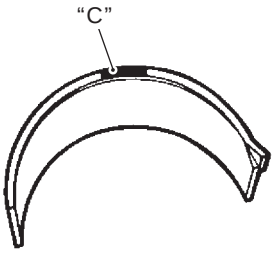
Bearing selection table

		Crank pin O.D. “B”		
	Code	1	2	3
Conrod I.D. “A”	1	Green	Black	Brown
	2	Black	Brown	Yellow

I718H1140293-01

Bearing thickness specification

Color “C” (Part No.)	Thickness
Yellow (12164-47H00-0D0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Brown (12164-47H00-0C0)	1.484 – 1.488 mm (0.0584 – 0.0586 in)
Black (12164-47H00-0B0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)
Green (12164-47H00-0A0)	1.476 – 1.480 mm (0.0581 – 0.0583 in)



I823H1140595-01

“C”: Color code

Crankshaft Journal Bearing Inspection and Selection

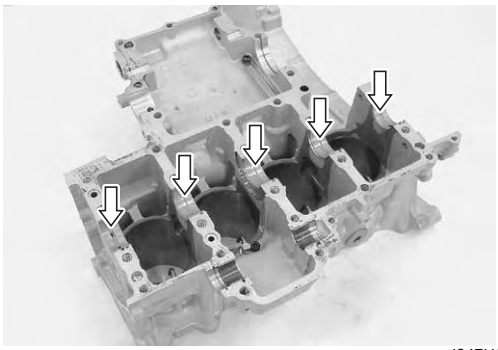
B947H11406043

Refer to “Engine Bottom Side Disassembly” (Page 1D-49).

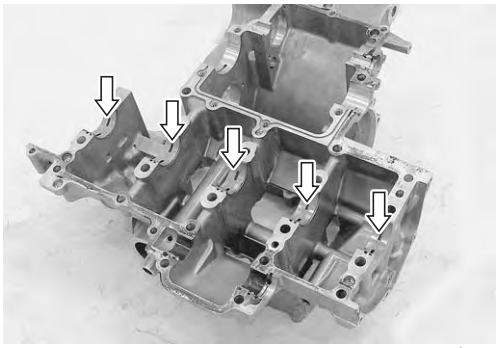
Refer to “Engine Bottom Side Assembly” (Page 1D-56).

Inspection

1) Inspect each upper and lower crankcase bearing for any damage.



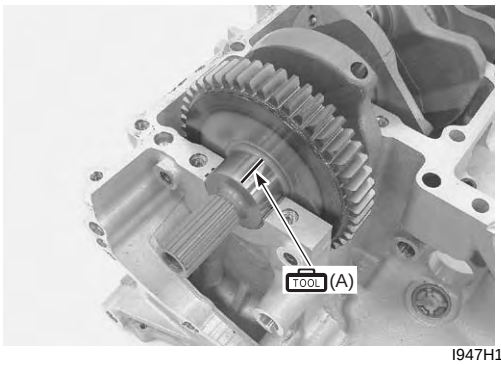
I947H1140237-01



I947H1140238-01

2) Set the crankshaft onto the upper crank case.
3) Install the plastigauge onto each crankshaft journal.

Special tool
(A): 09900–22301 (Plastigage (0.025 – 0.076 mm))



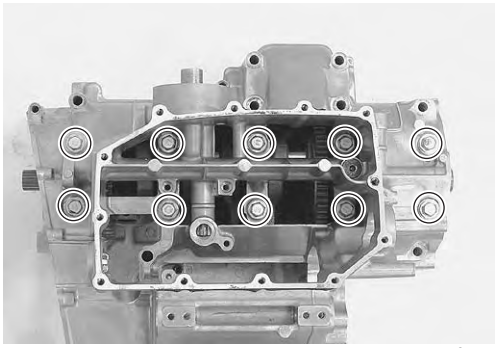
I947H1140239-01

4) Mate the lower crankcase with the upper crankcase.
5) Tighten the crankshaft journal bolts (M9). 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
Crankshaft journal bolt (M9): 18 N·m (1.8 kgf-m, 13.0 lbf-ft) then turn in 50°

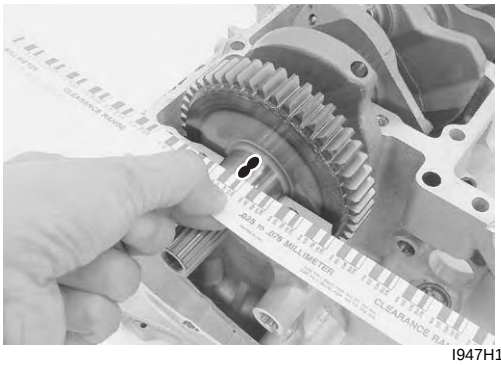


I947H1140240-01

6) 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 – 0.034 mm (0.0006 – 0.0013 in)

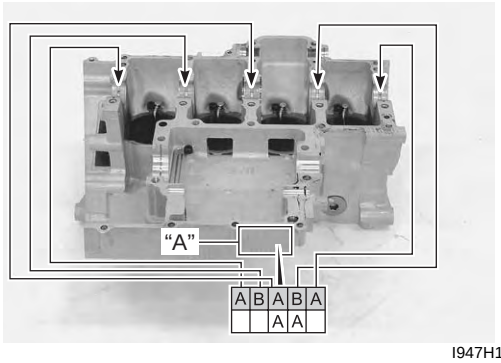
Crankshaft journal oil clearance
Service limit: 0.080 mm (0.0031 in)



I947H1140241-01

Selection

1) Check the corresponding crankcase journal I.D. codes “A” ([A], [B] or [C]), which are stamped on the rear of the upper crankcase.

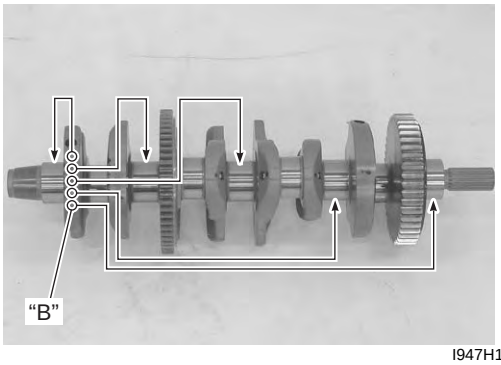


I947H1140242-01

Crankcase journal I.D. specification

Code “A”	I.D. specification
A	38.000 – 38.006 mm (1.4961 – 1.4963 in)
B	38.006 – 38.012 mm (1.4963 – 1.4965 in)
C	38.012 – 38.018 mm (1.4965 – 1.4968 in)

2) Check the corresponding crankshaft journal O.D. codes “B” ([A], [B] or [C]), which are stamped on the crankshaft.



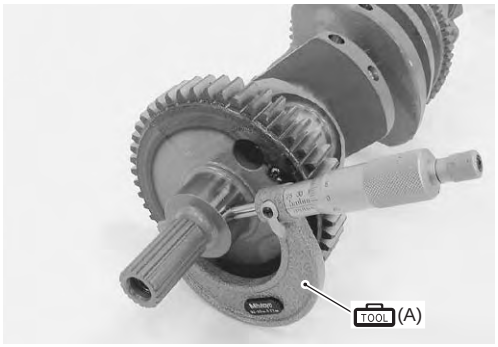
I947H1140243-01

3) 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
A	**34.994 – 35.000 mm (1.3777 – 1.3780 in)**
B	**34.988 – 34.994 mm (1.3775 – 1.3777 in)**
C	**34.982 – 34.988 mm (1.3772 – 1.3775 in)**

Special tool
TOOL (A): 09900–20202 (Micrometer (25 – 50 mm))



I947H1140244-01

4) Select the specified bearings from the bearing selection table.

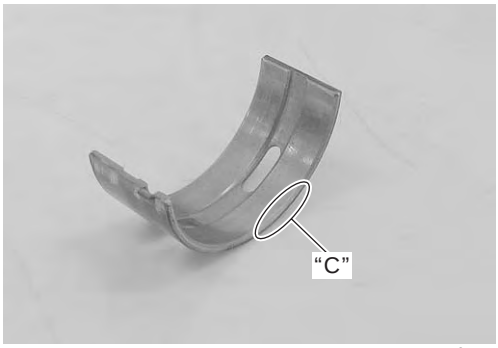
Bearing selection table

		Crankshaft O.D. “B”		
	Code	A	B	C
Crankcase I.D. “A”	A	Green	Black	Brown
	B	Black	Brown	Yellow
	C	Brown	Yellow	Blue

I823H1140299-01

Bearing thickness specification

Color “C” (Part No.)	Thickness
Blue (12229-47H10-0E0)	**1.501 – 1.504 mm (0.0591 – 0.0592 in)**
Yellow (12229-47H10-0D0)	**1.498 – 1.501 mm (0.0590 – 0.0591 in)**
Brown (12229-47H10-0C0)	**1.495 – 1.498 mm (0.0589 – 0.0590 in)**
Black (12229-47H10-0B0)	**1.492 – 1.495 mm (0.0587 – 0.0589 in)**
Green (12229-47H10-0A0)	**1.489 – 1.492 mm (0.0586 – 0.0587 in)**



I947H1140245-01

“C”: Color code

Crankshaft Thrust Clearance Inspection and Selection

B947H11406044

Refer to “Engine Bottom Side Disassembly” (Page 1D-49).
Refer to “Engine Bottom Side Assembly” (Page 1D-56).

Inspection

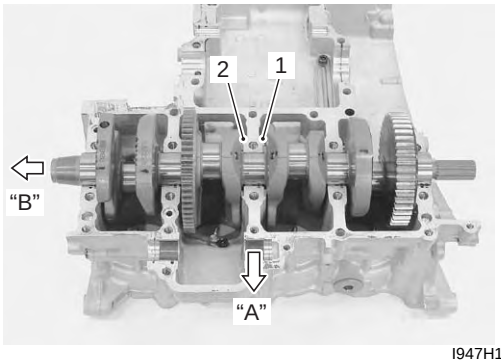
1) With the crankshaft’s right-side and left-side thrust bearings inserted into the upper crankcase.
2) Measure the thrust clearance “a” between the left-side thrust bearing and crankshaft using the thickness gauge. If the thrust clearance exceeds the standard range, adjust the thrust clearance.

NOTE

Pull the crankshaft to the left (generator side) so that there is no clearance on the right-side thrust bearing.

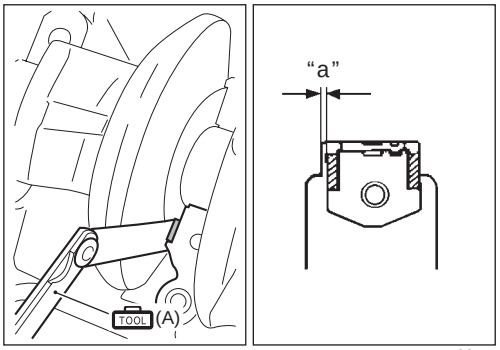
Special tool
TOOL : 09900–20803 (Thickness gauge)

Crankshaft thrust clearance “a”
Standard: 0.060 – 0.110 mm (0.0024 – 0.0043 in)



I947H1140248-01

1. Right-side thrust bearing	“A”: Front side
2. Left-side thrust bearing	“B”: Left side



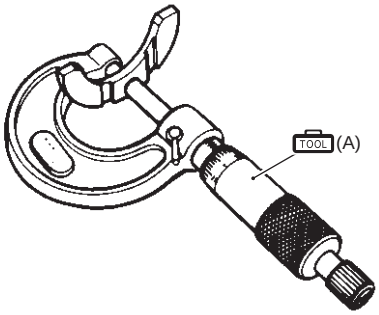
I837H1140197-02

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 in Inspection 1) and 2).

Special tool
TOOL (A): 09900–20205 (Micrometer (0 – 25 mm))

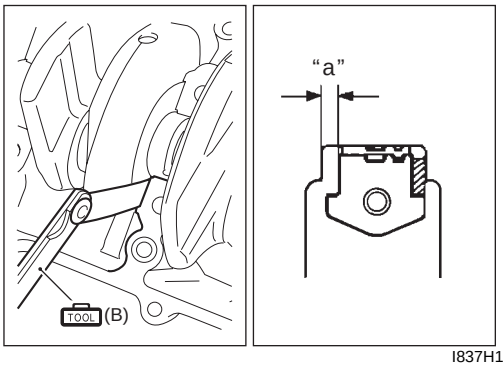
Right-side thrust bearing thickness
Standard: 2.420 – 2.440 mm (0.0953 – 0.0961 in)



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
TOOL (B): 09900–20803 (Thickness gauge)



I837H1140198-02

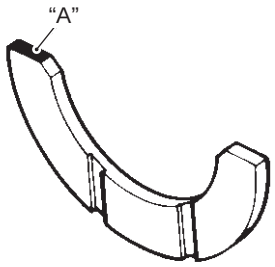
4) Select a left-side thrust bearing from the selection table.

NOTE

Right-side thrust bearing has the same specification as the GREEN (12228-48B00-0E0) of left-side thrust bearing.

Thrust bearing selection table

Clearance before inserting left-side thrust bearing	Color "A" (Part No.)	Thrust bearing thickness	Thrust clearance
2.570 – 2.590 mm (0.1012 – 0.1020 in)	Brown (12228-48B00-0B0)	2.480 – 2.500 mm (0.0976 – 0.0984 in)	0.070 – 0.110 mm (0.0028 – 0.0043 in)
2.550 – 2.570 mm (0.1004 – 0.1012 in)	Red (12228-48B00-0C0)	2.460 – 2.480 mm (0.0969 – 0.0976 in)	
2.530 – 2.550 mm (0.0996 – 0.1004 in)	Yellow (12228-48B00-0D0)	2.440 – 2.460 mm (0.0961 – 0.0969 in)	
2.510 – 2.530 mm (0.0988 – 0.0996 in)	Green (12228-48B00-0E0)	2.420 – 2.440 mm (0.0953 – 0.0961 in)	
2.490 – 2.510 mm (0.0980 – 0.0988 in)	Blue (12228-48B00-0F0)	2.400 – 2.420 mm (0.0945 – 0.0953 in)	
2.470 – 2.490 mm (0.0972 – 0.0980 in)	Orange (12228-48B00-0G0)	2.380 – 2.400 mm (0.0937 – 0.0945 in)	
2.440 – 2.470 mm (0.0961 – 0.0972 in)	Black (12228-48B00-0H0)	2.360 – 2.380 mm (0.0929 – 0.0937 in)	0.060 – 0.110 mm (0.0024 – 0.0043 in)



I649G1140345-02

"A": Color code

5) After selecting a left-side thrust bearing, install it and then measure the thrust clearance again.

Specifications

Service Data

B947H11407001

Valve + Guide

Unit: mm (in)

Item	Standard		Limit
Valve diam.	IN.	31.0 (1.22)	—
	EX.	25.0 (0.98)	—
Valve clearance (when cold)	IN.	0.08 – 0.18 (0.003 – 0.007)	—
	EX.	0.18 – 0.28 (0.007 – 0.011)	—
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0015)	—
	EX.	0.030 – 0.057 (0.0012 – 0.0022)	—
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)	—
	EX.	4.455 – 4.470 (0.1754 – 0.1760)	—
Valve stem deflection	IN. & EX.	—	0.25 (0.010)
Valve stem runout	IN. & EX.	—	0.05 (0.002)
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	Inner	—	30.1 (1.19)
	Outer	—	35.3 (1.39)
Valve spring tension	Inner	31.3 – 38.3 N (3.2 – 3.9 kgf, 7.0 – 8.6 lbs) at length 27.55 mm (1.085 in)	—
	Outer	91.3 – 105.1 N (9.3 – 10.7 kgf, 20.5 – 23.6 lbs) at length 33.05 mm (1.301 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
Cam height	IN.	37.68 – 37.73 (1.483 – 1.485)	37.38 (1.472)
	EX.	36.88 – 36.93 (1.452 – 1.454)	36.58 (1.440)
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	—		0.10 (0.004)
Cam chain pin (at arrow “3”)	14th pin		—
Cylinder head distortion	—		0.02 (0.0008)

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard			Limit
Compression pressure	1 400 – 1 800 kPa (14 – 18 kgf/cm^2, 199 – 256 psi)			1 000 kPa (10 kgf/cm^2, 142 psi)
Compression pressure difference	—			200 kPa (2 kgf/cm^2, 28 psi)
Piston-to-cylinder clearance	0.030 – 0.040 (0.0012 – 0.0016)			0.120 (0.0047)
Cylinder bore	74.500 – 74.515 (2.9331 – 2.9337)			Nicks or scratches
Piston diam.	74.465 – 74.480 (2.9317 – 2.9323) Measure 10 mm (0.4 in) from the skirt end.			74.380 (2.9283)
Cylinder distortion	—			0.02 (0.0008)
Piston ring free end gap	1st		Approx. 7.0 (0.28)	5.6 (0.22)
	2nd	T	Approx. 8.0 (0.32)	6.4 (0.25)
Piston ring end gap	1st		0.06 – 0.18 (0.002 – 0.007)	0.50 (0.020)
	2nd		0.06 – 0.18 (0.002 – 0.007)	0.50 (0.020)
Piston ring-to-groove clearance	1st		—	0.180 (0.0071)
	2nd		—	0.150 (0.0059)
Piston ring groove width	1st		0.83 – 0.85 (0.0327 – 0.0335) 1.30 – 1.32 (0.0512 – 0.0520)	—
	2nd		0.81 – 0.83 (0.0319 – 0.0327)	—
	Oil		1.51 – 1.53 (0.0594 – 0.0602)	—
Piston ring thickness	1st		0.76 – 0.81 (0.0299 – 0.0319) 1.08 – 1.10 (0.0425 – 0.0433)	—
	2nd		0.77 – 0.79 (0.0303 – 0.0311)	—
Piston pin bore	15.002 – 15.008 (0.5906 – 0.5909)			15.030 (0.5917)
Piston pin O.D.	14.995 – 15.000 (0.5903 – 0.5512)			14.980 (0.5898)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard		Limit
Conrod small end I.D.	15.010 – 15.018 (0.5909 – 0.5913)		15.040 (0.5921)
Conrod big end side clearance	0.10 – 0.20 (0.004 – 0.008)		0.30 (0.012)
Conrod big end width	19.95 – 20.00 (0.7854 – 0.7874)		—
Crank pin width	20.10 – 20.15 (0.7913 – 0.7933)		—
Conrod big end oil clearance	0.040 – 0.064 (0.0016 – 0.0025)		0.080 (0.0031)
Crank pin O.D.	34.976 – 35.000 (1.3770 – 1.3780)		—
Crankshaft journal oil clearance	0.016 – 0.034 (0.0006 – 0.0013)		0.080 (0.0031)
Crankshaft journal O.D.	34.982 – 35.000 (1.3772 – 1.3780)		—
Crankshaft thrust bearing thickness	Right side	2.420 – 2.440 (0.0953 – 0.0961)	—
	Left side	2.360 – 2.500 (0.0929 – 0.0984)	—
Crankshaft thrust clearance	0.060 – 0.110 (0.0024 – 0.0043)		—
Crankshaft runout	—		0.05 (0.002)

Balancer

Unit: mm (in)

Item	Standard	Limit
Balancer shaft journal oil clearance	0.028 – 0.052 (0.0011 – 0.0020)	0.080 (0.0031)
Balancer shaft journal O.D.	19.992 – 20.000 (0.7871 – 0.7874)	—

Throttle Body

Item	Specification
Bore size	44 mm (1.73 in)
I.D. No.	47H1 (For E-33), 47H0 (For others)
Idle r/min	1 150 ± 100 r/min
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)

Tightening Torque Specifications

B947H11407002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Throttle cable lock-nut	4.5	0.45	3.0	☞(Page 1D-11)
STP sensor mounting screw	3.5	0.35	2.5	☞(Page 1D-13)
TP sensor mounting screw	3.5	0.35	2.5	☞(Page 1D-14)
ISC valve mounting screw	2	0.2	1.5	☞(Page 1D-14)
Fuel delivery pipe mounting screw	3.5	0.35	2.5	☞(Page 1D-15)
Engine mounting thrust adjuster	23	2.3	16.5	☞(Page 1D-24)
Engine mounting thrust adjuster lock-nut	45	4.5	32.5	☞(Page 1D-24)
Cylinder head bolt (M10)	31 N·m (3.1 kgf-m, 22.5 lbf-ft) then turn in 1/6 (60°) turn			☞(Page 1D-29)
Cylinder head bolt (M6)	10	1.0	7.0	☞(Page 1D-29)
Camshaft journal holder bolt	10	1.0	7.0	☞(Page 1D-31) / ☞(Page 1D-37)
Cam chain tension adjuster mounting bolt	10	1.0	7.0	☞(Page 1D-33)
Cam chain tension adjuster service cap	23	2.3	16.5	☞(Page 1D-34) / ☞(Page 1D-42)
Valve timing inspection cap	11	1.1	8.0	☞(Page 1D-34)
Cylinder head cover bolt (Initial)	10	1.0	7.0	☞(Page 1D-35)
Cylinder head cover bolt (Final)	14	1.4	10.0	☞(Page 1D-35)
CMP sensor bolt	10	1.0	7.0	☞(Page 1D-35)
PAIR reed valve cover bolt	10	1.0	7.0	☞(Page 1D-36)
Oil gallery plug (Cylinder head)	10	1.0	7.0	☞(Page 1D-42)
Intake pipe bolt	8.5	0.85	6.5	☞(Page 1D-42)
Bypass hose union	12	1.2	8.5	☞(Page 1D-42)
Thermostat cover bolt	10	1.0	7.0	☞(Page 1D-43)
ECT sensor	18	1.8	13.0	☞(Page 1D-43)
Water jacket plug	9.5	0.95	6.9	☞(Page 1D-57)
Oil gallery plug (M10)	18	1.8	13.0	☞(Page 1D-57)
Oil gallery plug (M12)	15	1.5	11.0	☞(Page 1D-57)
Oil gallery plug (M26)	11	1.1	8.0	☞(Page 1D-57)
Oil gallery plug (M6)	10	1.0	7.0	☞(Page 1D-57)
Piston cooling oil jet bolt	10	1.0	7.0	☞(Page 1D-59)
Conrod cap bolt	37 N·m (3.7 kgf-m, 26.5 lbf-ft) then turn in 1/6 (60°) turn			☞(Page 1D-60) / ☞(Page 1D-78)
Crankshaft journal bolt (M9)	18 N·m (1.8 kgf-m, 13.0 lbf-ft) then turn in 50°			☞(Page 1D-63) / ☞(Page 1D-75) / ☞(Page 1D-80)
Crankcase bolt (M8) (Initial)	15	1.5	11.0	☞(Page 1D-63) / ☞(Page 1D-75)
Crankcase bolt (M8) (Final)	26	2.6	19.0	☞(Page 1D-63) / ☞(Page 1D-75)
Crankcase bolt (M6)	12	1.2	8.5	☞(Page 1D-63) / ☞(Page 1D-75)
Oil pump mounting bolt	10	1.0	7.0	☞(Page 1D-64)
Oil pan bolt	10	1.0	7.0	☞(Page 1D-65)
Oil pressure switch	14	1.4	10.0	☞(Page 1D-66)
Gear position switch mounting bolt	6.5	0.65	4.7	☞(Page 1D-66)
Water pump mounting bolt	10	1.0	7.0	☞(Page 1D-67)
Cam chain tensioner bolt	23	2.3	16.5	☞(Page 1D-67)
Cam chain guide No. 1 bolt	23	2.3	16.5	☞(Page 1D-67)

NOTE

The specified tightening torque is described in the following.
“Throttle Cable Routing Diagram” (Page 1D-2)
“Throttle Body Components” (Page 1D-8)
“Throttle Body Construction” (Page 1D-9)
“Engine Assembly Installation” (Page 1D-24)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H11408001

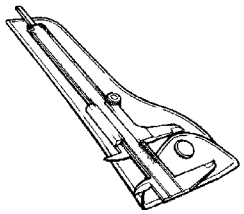
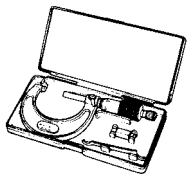
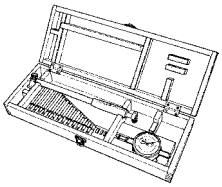
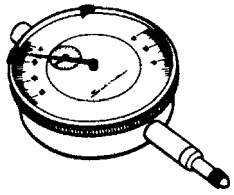
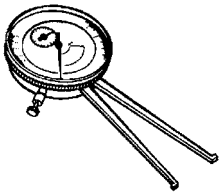
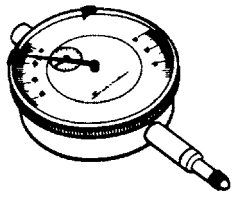
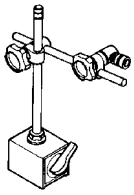
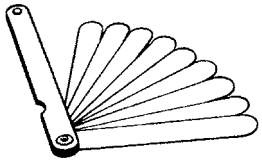
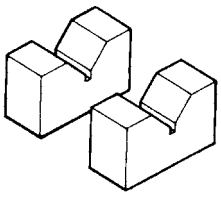
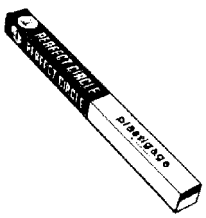
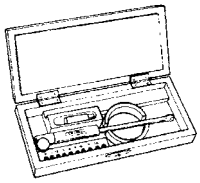
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 1D-13) / ☞(Page 1D-14) / ☞(Page 1D-42) / ☞(Page 1D-64) / ☞(Page 1D-65) / ☞(Page 1D-65) / ☞(Page 1D-66) / ☞(Page 1D-66)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1D-29) / ☞(Page 1D-43) / ☞(Page 1D-43) / ☞(Page 1D-58) / ☞(Page 1D-58) / ☞(Page 1D-59) / ☞(Page 1D-60) / ☞(Page 1D-60) / ☞(Page 1D-61) / ☞(Page 1D-73)
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1D-34) / ☞(Page 1D-42) / ☞(Page 1D-62) / ☞(Page 1D-66) / ☞(Page 1D-68)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 1D-36) / ☞(Page 1D-56) / ☞(Page 1D-57) / ☞(Page 1D-57) / ☞(Page 1D-59) / ☞(Page 1D-64) / ☞(Page 1D-65)

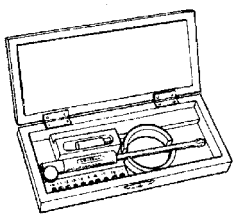
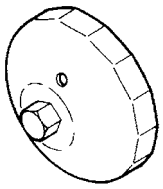
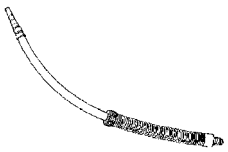
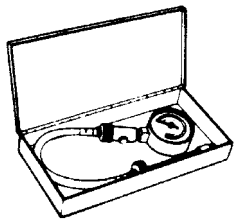
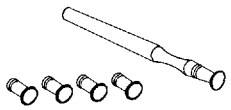
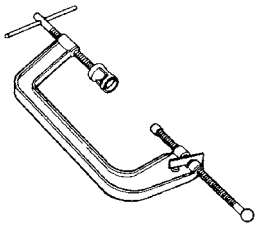
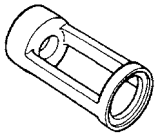
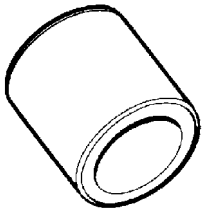
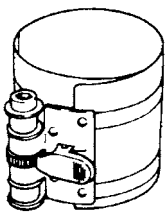
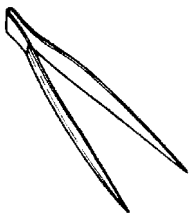
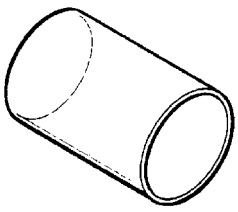
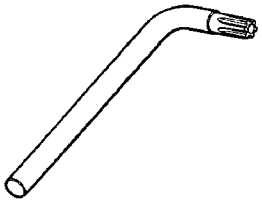
NOTE

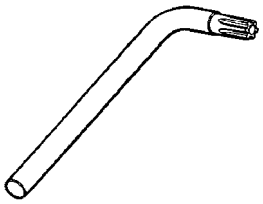
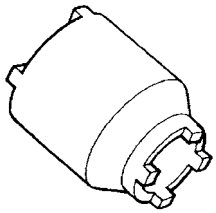
Required service material is also described in the following.
“Throttle Body Components” (Page 1D-8)
“Engine Bottom Side Assembly” (Page 1D-56)

Special Tool

B947H11408002

09900–20102 Vernier calipers (200 mm) ☞(Page 1D-46) / ☞(Page 1D-72) 	09900–20202 Micrometer (25 – 50 mm) ☞(Page 1D-36) / ☞(Page 1D-79) / ☞(Page 1D-81) 
09900–20203 Micrometer (50 – 75 mm) ☞(Page 1D-71) 	09900–20205 Micrometer (0 – 25 mm) ☞(Page 1D-38) / ☞(Page 1D-46) / ☞(Page 1D-71) / ☞(Page 1D-72) / ☞(Page 1D-77) / ☞(Page 1D-82) 
09900–20530 Cylinder gauge set ☞(Page 1D-69) 	09900–20602 Dial gauge ☞(Page 1D-38) / ☞(Page 1D-72) / ☞(Page 1D-77) 
09900–20605 Dial calipers (10 – 34 mm) ☞(Page 1D-77) 	09900–20607 Dial gauge ☞(Page 1D-37) / ☞(Page 1D-45) / ☞(Page 1D-45) / ☞(Page 1D-45) / ☞(Page 1D-77) 
09900–20701 Dial gauge chuck ☞(Page 1D-37) / ☞(Page 1D-45) / ☞(Page 1D-45) / ☞(Page 1D-45) / ☞(Page 1D-77) 	09900–20803 Thickness gauge ☞(Page 1D-44) / ☞(Page 1D-69) / ☞(Page 1D-71) / ☞(Page 1D-72) / ☞(Page 1D-77) / ☞(Page 1D-82) / ☞(Page 1D-82) 
09900–21304 V blocks ☞(Page 1D-37) / ☞(Page 1D-45) / ☞(Page 1D-45) / ☞(Page 1D-77) 	09900–22301 Plastigage (0.025 – 0.076 mm) ☞(Page 1D-37) / ☞(Page 1D-75) / ☞(Page 1D-78) / ☞(Page 1D-78) / ☞(Page 1D-80) 
09900–22302 Plastigage (0.051 – 0.152 mm) ☞(Page 1D-37) 	09900–22401 Small bore gauge (10 – 18 mm) ☞(Page 1D-72) / ☞(Page 1D-77) 

09900–22403 Small bore gauge (18 – 35 mm) ☞(Page 1D-38) 	09915–40610 Oil filter wrench ☞(Page 1D-51) / ☞(Page 1D-65) 
09915–63311 Compression gauge attachment ☞(Page 1D-3) 	09915–64512 Compression gauge ☞(Page 1D-3) 
09916–10911 Valve lapper set ☞(Page 1D-46) 	09916–14510 Valve lifter ☞(Page 1D-40) / ☞(Page 1D-44) 
09916–14522 Valve lifter attachment ☞(Page 1D-40) / ☞(Page 1D-44) 	09916–33210 Valve guide reamer (4.5 mm) ☞(Page 1D-48) 
09916–33320 Valve guide reamer (9.8 mm) ☞(Page 1D-47) 	09916–34542 Reamer handle ☞(Page 1D-47) / ☞(Page 1D-48) 
09916–43211 Valve guide installer & remover ☞(Page 1D-47) / ☞(Page 1D-48) 	09916–53380 Valve guide installer attachment ☞(Page 1D-48) 
09916–77310 Piston ring compressor ☞(Page 1D-59) 	09916–84511 Tweezer ☞(Page 1D-40) / ☞(Page 1D-44) 
09919–28620 Sleeve protector ☞(Page 1D-40) / ☞(Page 1D-44) 	09930–11950 Torx wrench (5 mm) ☞(Page 1D-13) / ☞(Page 1D-13) / ☞(Page 1D-14) 

09930–11960 Torx wrench (4 mm) ☞(Page 1D-14)	
09940–14990 Engine mounting adjust wrench ☞(Page 1D-23) / ☞(Page 1D-23) / ☞(Page 1D-24)	

Engine Lubrication System

Precautions

Precautions for Engine Oil

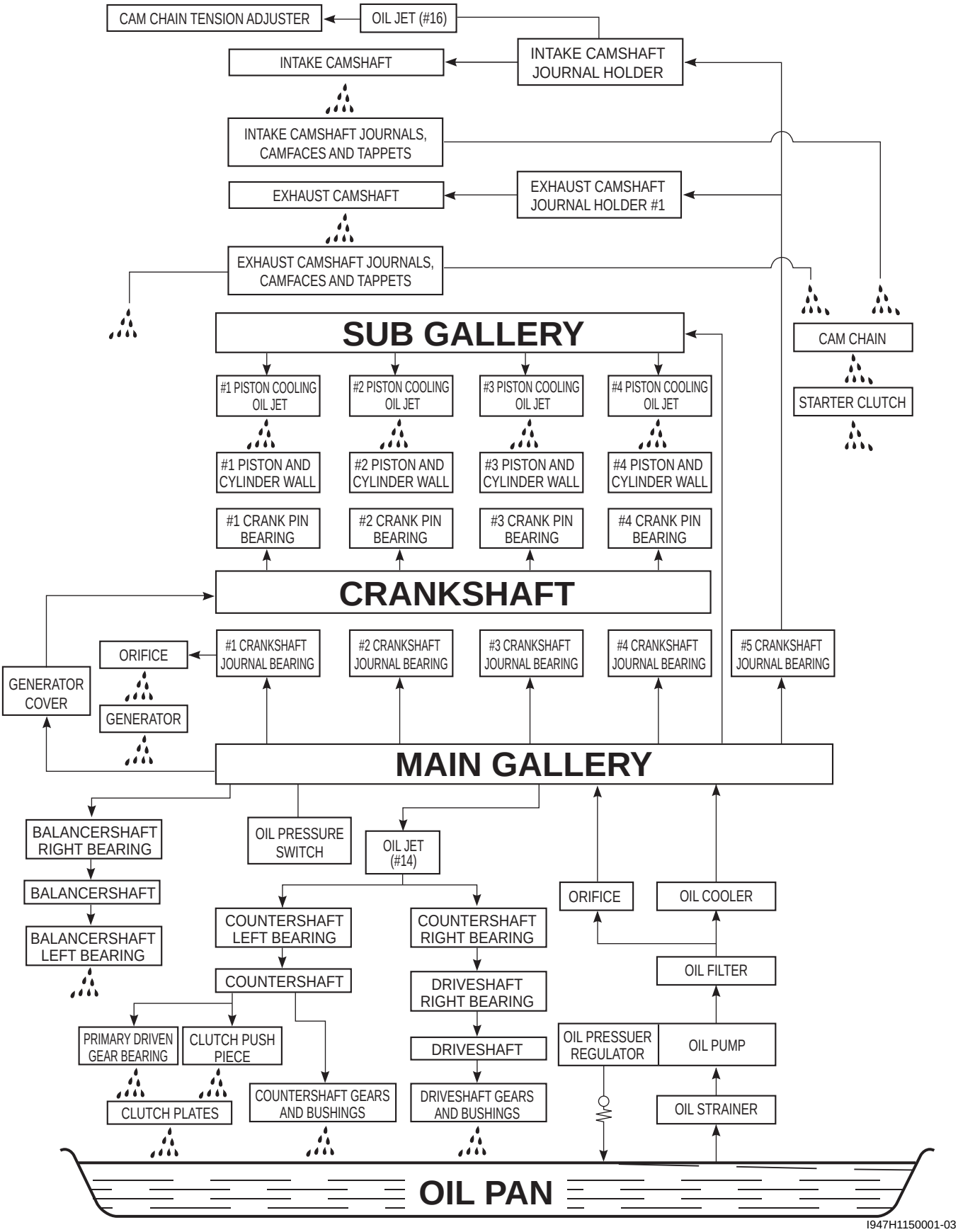
B947H11500001

Refer to “Fuel and Oil Recommendation” in Section 0A (Page 0A-3).

Schematic and Routing Diagram

Engine Lubrication System Chart Diagram

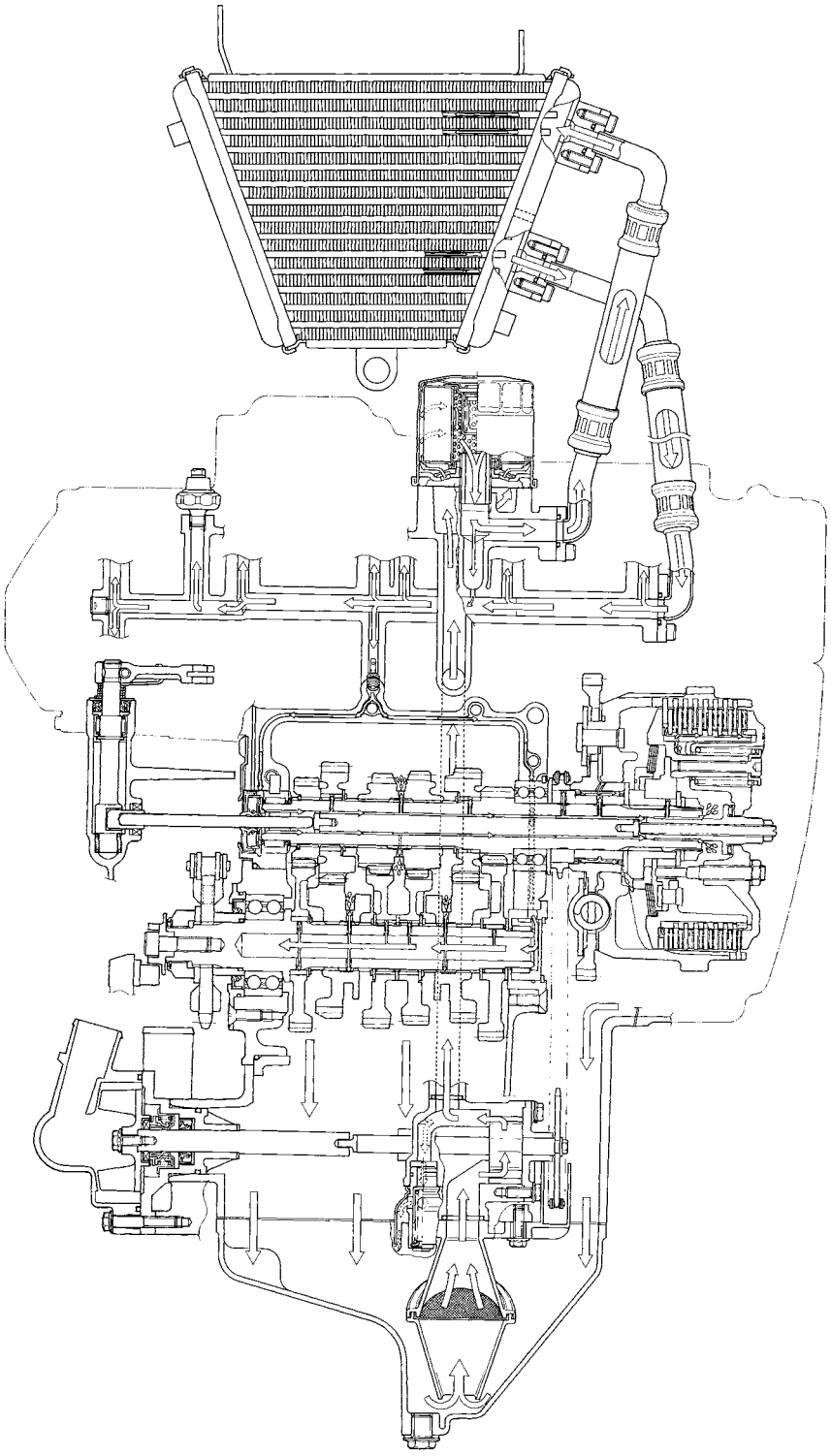
B947H11502001



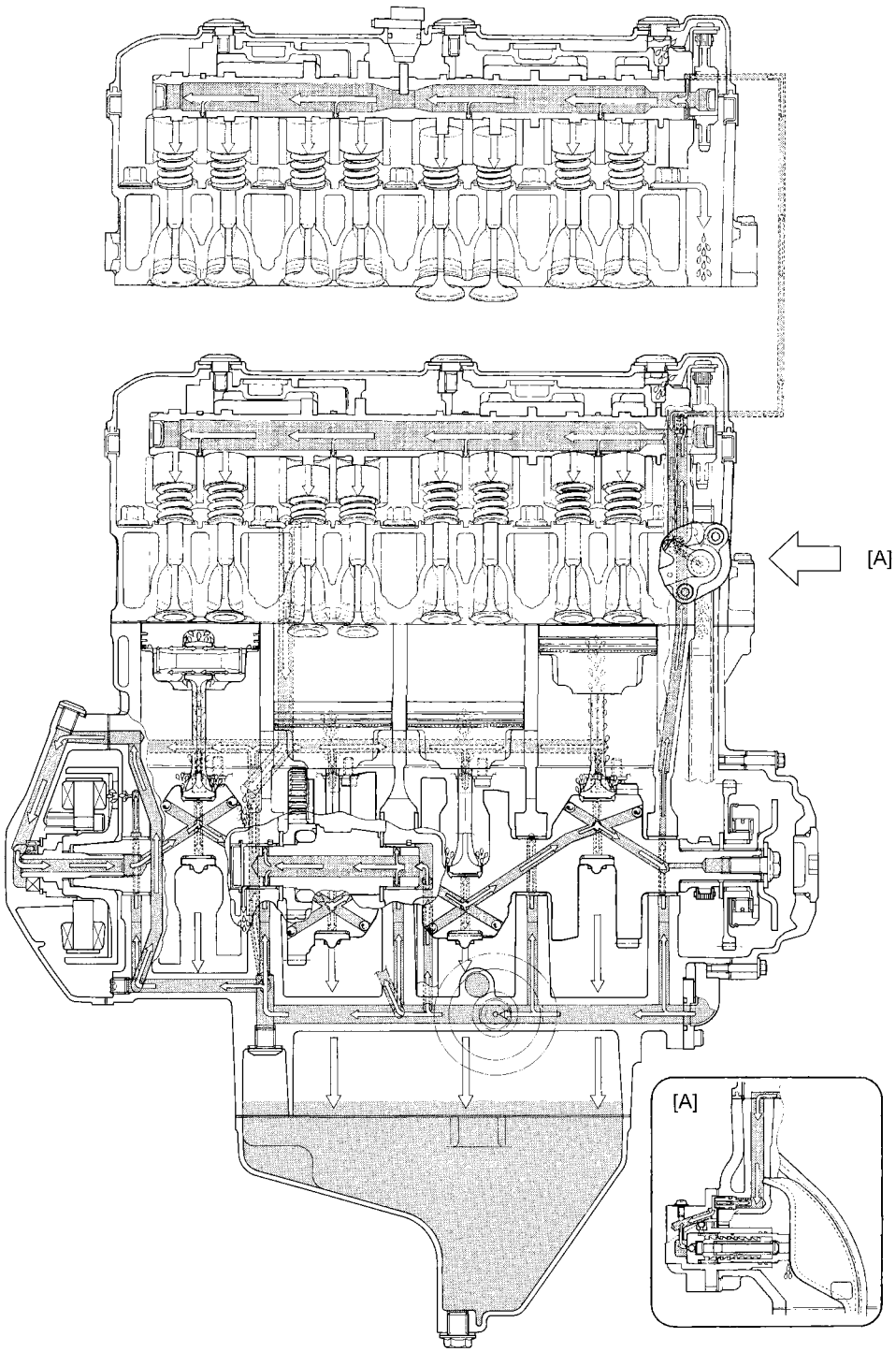
I947H1150001-03

Engine Lubrication Circuit Diagram

B947H11502002



I947H1150002-03



I947H1150003-01

Diagnostic Information and Procedures

Engine Lubrication Symptom Diagnosis

B947H11504001

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.*
	Incorrect engine oil.	*Change.*
Exhaust smoke is dirty or thick	Excessive amount of engine oil.	*Check level and drain.*
Engine lacks power	Excessive amount of engine oil.	*Check level and drain.*

Oil Pressure Check

B947H11504002

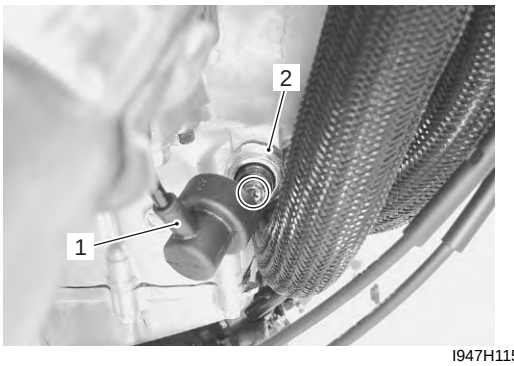
Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

NOTE

Before checking the oil pressure, check the following.

- **Oil level (Refer to "Engine Oil and Filter Replacement" in Section 0B (Page 0B-10).)**
- **Oil leaks (If leak is found, repair it.)**
- **Oil quality (If oil is discolored or deteriorated, replace it.)**

1) 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 left side cowling. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
3) Remove the oil pressure switch lead wire (1) and oil pressure switch (2).

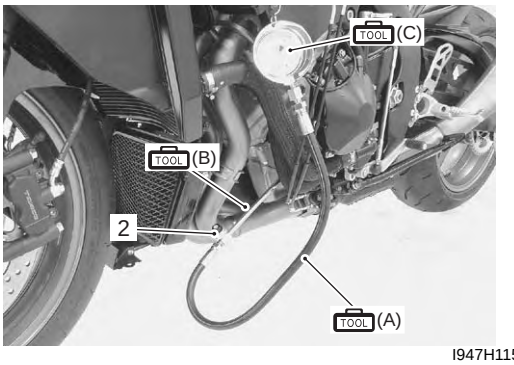


I947H1150005-01

4) Install the special tools to the mounting hole of the oil pressure switch.

Special tool
TOOL (A): 09915–74521 (Adapter hose)
TOOL (B): 09915–17410 (Oil pressure gauge adapter)
TOOL (C): 09915–77331 (Oil pressure gauge (1000 kPa))

5) Install the oil pressure switch (2) to the adapter.



I947H1150036-01

6) Warm up the engine as follows:
Summer: 10 min. at 2 000 r/min
Winter: 20 min. at 2 000 r/min
7) After warming 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^2, 14 – 57 psi) at 3 000 r/min, Oil temp. 60 °C (140 °F)

High oil pressure	Low oil pressure
• Engine oil viscosity is too high • Clogged oil passage • Combination of the above items	• Clogged oil filter • Oil leakage from the oil passage • Damaged O-ring • Defective oil pump • Combination of the above items

8) Stop the engine and remove the oil pressure gauge and attachment.
9) Reinstall the oil pressure switch. Refer to "Oil Pressure Switch Removal and Installation" (Page 1E-9).

10) Check the engine oil level. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).

11) Install the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

Repair Instructions

Engine Oil and Filter Replacement

B947H11506001

Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).

Engine Oil Level Inspection

B947H11506002

Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).

Oil Pan / Oil Pressure Regulator / Oil Strainer Removal and Installation

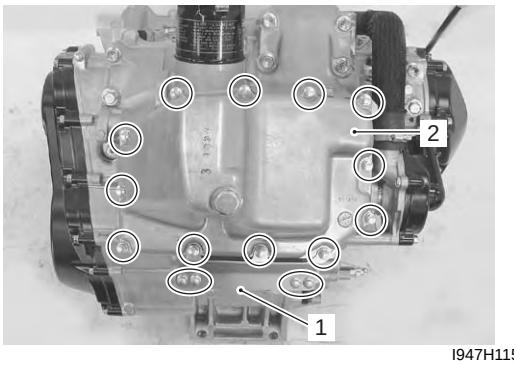
B947H11506003

NOTE

The oil pan/oil strainer/oil pressure regulator cannot be serviced with the engine installed in the frame.

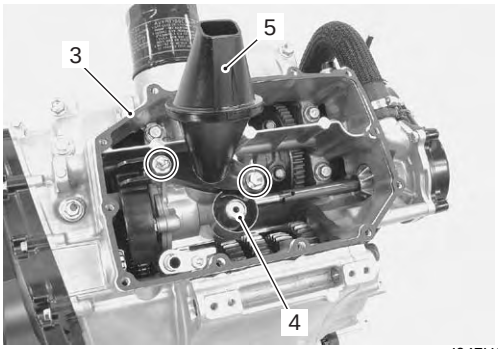
Removal

1) Remove the engine assembly from the frame. Refer to “Engine Assembly Removal” in Section 1D (Page 1D-20).
2) Remove the plate (1).
3) Remove the oil pan (2).



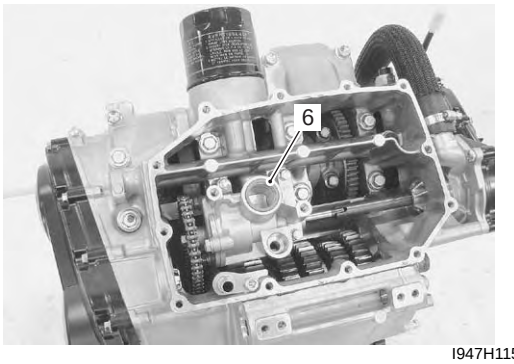
I947H1150006-01

4) Remove the gasket (3).
5) Remove the oil pressure regulator (4) and oil strainer (5).



I947H1150007-01

6) Remove the O-ring (6).



I947H1150008-01

Installation

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

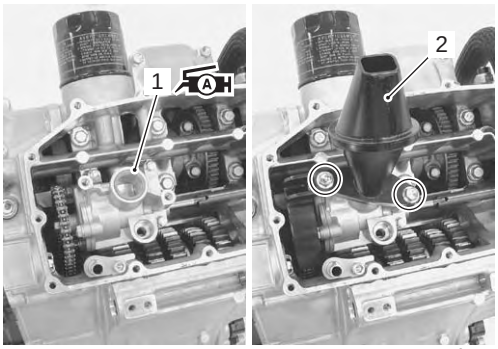
- Apply grease to new O-ring (1).

⚠ CAUTION

Use a new O-ring to prevent oil leakage.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

- Install the oil strainer (2).



I947H1150009-01

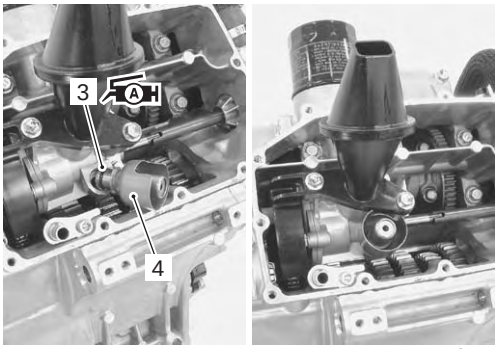
- Apply grease to new O-ring (3).

⚠ CAUTION

Use a new O-ring to prevent oil leakage.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

- Push in the oil pressure regulator (4) to the oil pump as shown.



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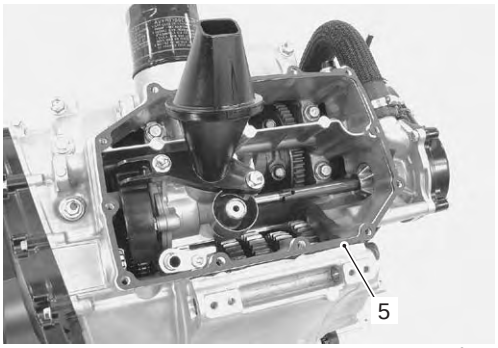
- Install new gasket (5).

⚠ CAUTION

Use new gasket to prevent oil leakage.



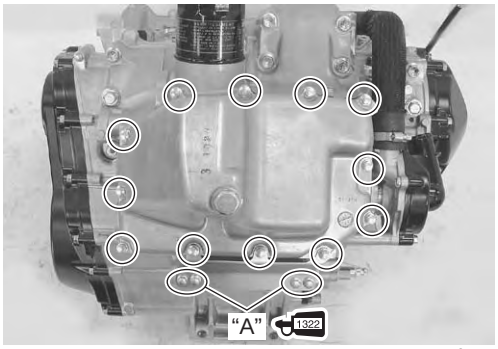
I947H1150011-01

- Apply thread lock to the plate bolts “A”.

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

- Tighten the oil pan bolts and plate bolts diagonally to the specified torque.

Tightening torque
Oil pan bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1150012-02

Oil Pressure Regulator / Oil Strainer Inspection

B947H11506004

Refer to “Oil Pan / Oil Pressure Regulator / Oil Strainer Removal and Installation” (Page 1E-6).

Oil Pressure Regulator

Inspect the operation of the oil pressure regulator by pushing the piston with a proper bar.
If the piston does not operate smoothly, replace the oil pressure regulator with a new one.

I947H1150013-02

Oil Strainer

Clean the oil strainer if necessary.
Inspect the oil strainer body for damage. If necessary, replace it with a new one.

I947H1150014-01

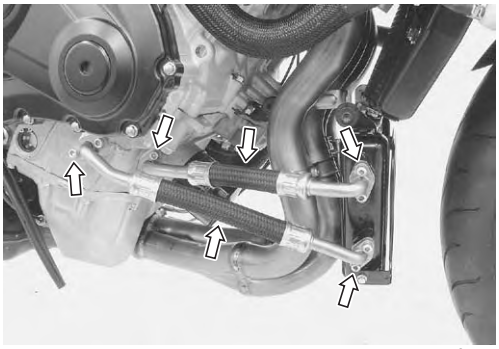
Oil Cooler / Oil Cooler Hose Inspection and Cleaning

B947H11506005

Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

Oil Cooler Hose Inspection

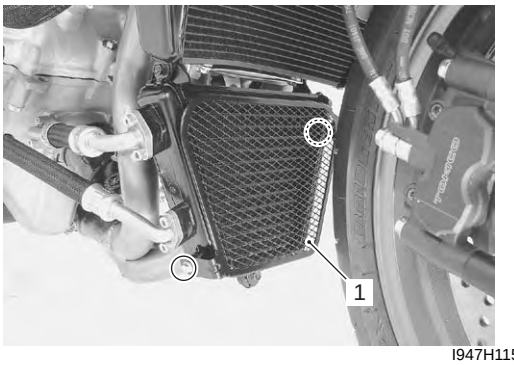
Inspect the oil cooler hoses for any damage and oil leakage. If any defects are found, replace the oil cooler hose with a new one.



I947H1150015-01

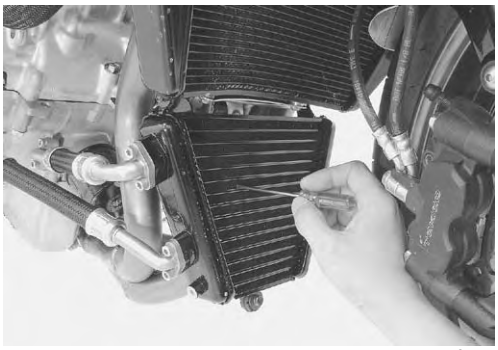
Oil Cooler Inspection

1) Remove the oil cooler guard (1).



I947H1150037-02

2) Inspect the oil cooler for oil leakage. If any defects are found, replace the oil cooler with a new one. If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.

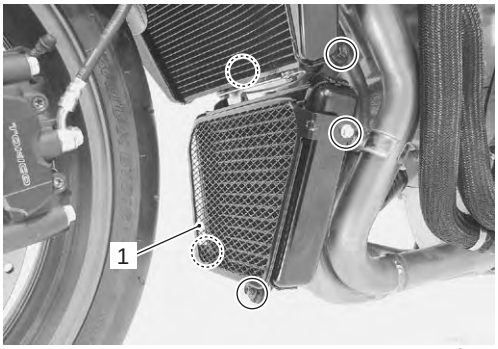


I947H1150038-01

3) Reinstall the removed parts.

Oil Cooler Cleaning

1) Remove the oil cooler guard (1).
2) Remove the oil cooler mounting bolts.

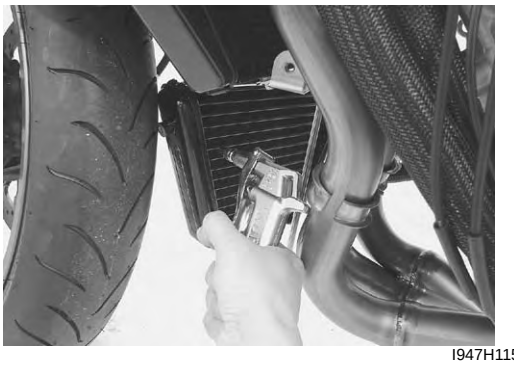


I947H1150039-01

3) Blow out any foreign matter that is stuck in the oil cooler fins using compressed air.

⚠ CAUTION

- **Make sure not to bend the fins when using compressed air.**
- **If compressed air is applied from the front side, dirt will be forced into the pores of oil cooler.**



I947H1150040-01

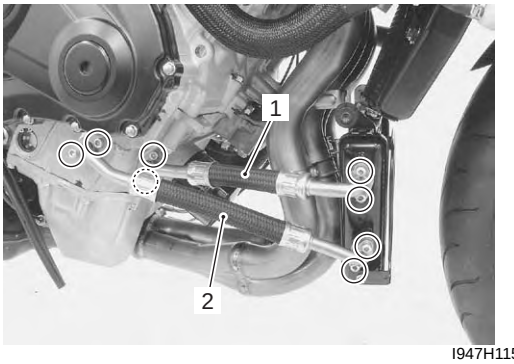
4) Reinstall the removed parts.

Oil Cooler / Oil Cooler Hose Removal and Installation

B947H11506006

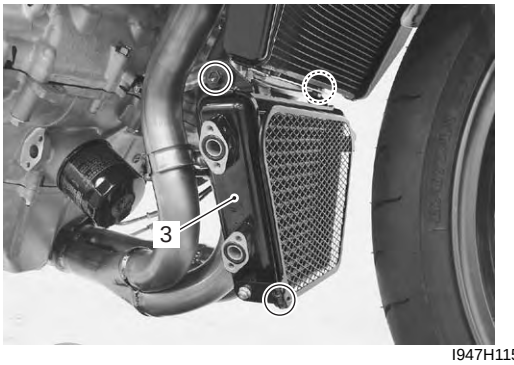
Removal

1) Remove the side cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Drain engine oil. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
3) Remove the oil hoses (1) and (2).



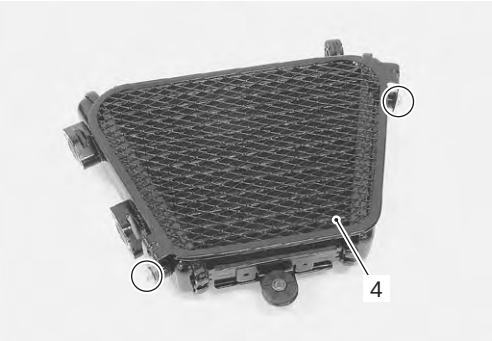
I947H1150016-01

4) Remove the oil cooler (3).



I947H1150041-01

5) Remove the oil cooler guard (4).



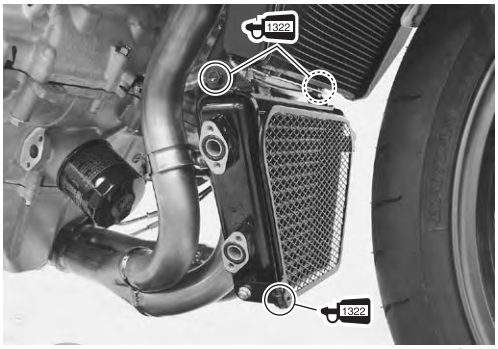
I947H1150017-01

Installation

Install the oil cooler and oil cooler hoses in the reverse order of removal. Pay attention to the following points:

- Apply thread lock to the oil cooler mounting bolt and tighten them securely.

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



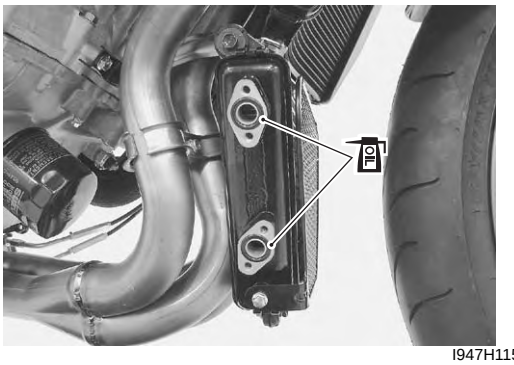
I947H1150045-01

- Apply engine oil to new O-rings.

⚠ CAUTION

Replace the O-rings with new ones to prevent oil leakage.

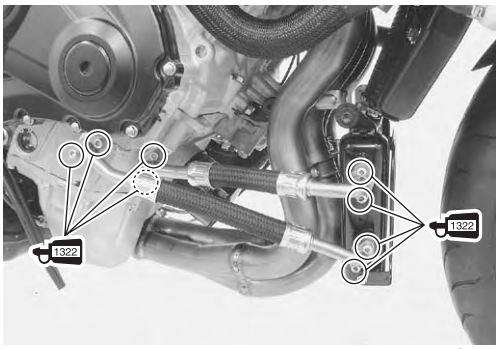
I947H1150018-01



I947H1150019-01

- Apply thread lock to the oil cooler hose bolts and tighten them securely.

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



I947H1150044-01

- Pour engine oil. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
- Install the removed parts.

Oil Pressure Switch Removal and Installation

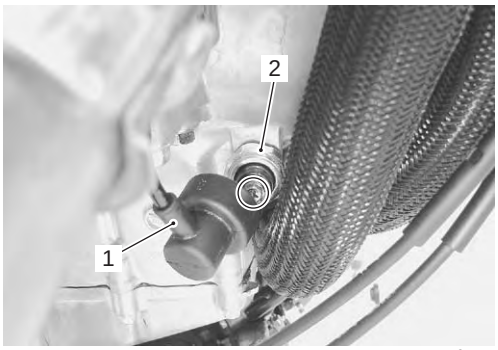
B947H11506007

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

Removal

1) Turn the ignition switch OFF.
2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Drain engine oil. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
4) Disconnect the oil pressure switch lead wire (1).

5) Remove the oil pressure switch (2).



I947H1150020-01

Installation

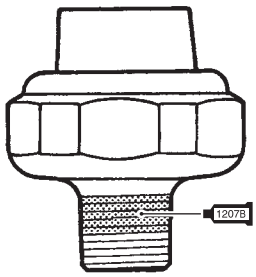
1) Apply bond to the thread part of oil pressure switch and tighten oil pressure switch to the specified torque.

NOTE

Be careful not to apply bond to the hole of thread end.

1207B : 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

2) Route the oil pressure switch lead wire properly and tighten the screw to the specified torque. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-7).

Tightening torque
Oil pressure switch lead wire screw (a): 1.5 N·m (0.15 kgf-m, 1.1 lbf-ft)

I947H1150021-02

3) Pour engine oil. Refer to "Engine Oil and Filter Replacement" in Section 0B (Page 0B-10).
4) Install the removed parts.

Oil Pressure Switch Inspection

B947H11506008

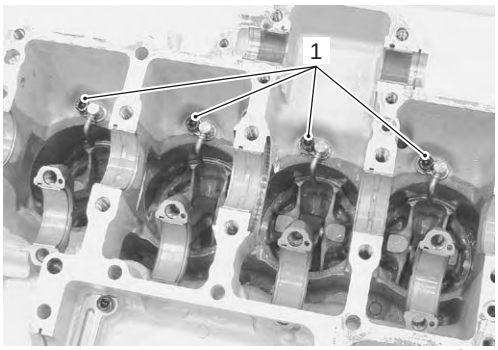
Refer to "Oil Pressure Indicator Inspection" in Section 9C (Page 9C-6).

Oil Jet Removal and Installation

B947H11506009

Piston Cooling Oil Jet
Removal

1) Remove the engine assembly. Refer to "Engine Assembly Removal" in Section 1D (Page 1D-20).
2) Remove the Crankshaft assembly. Refer to "Engine Bottom Side Disassembly" in Section 1D (Page 1D-49).
3) Remove the piston cooling oil jets (1) from the upper crankcase.



I947H1150022-01

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 and apply engine oil to it.

⚠ CAUTION

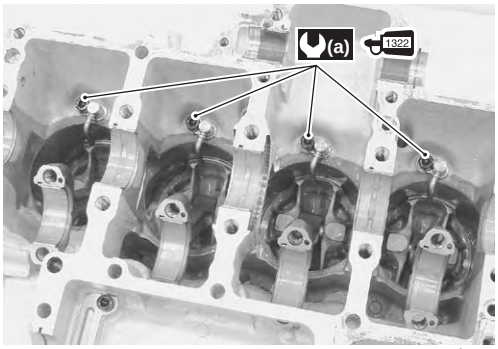
Use new O-rings to prevent oil pressure leakage.

I947H1150023-01

- 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)

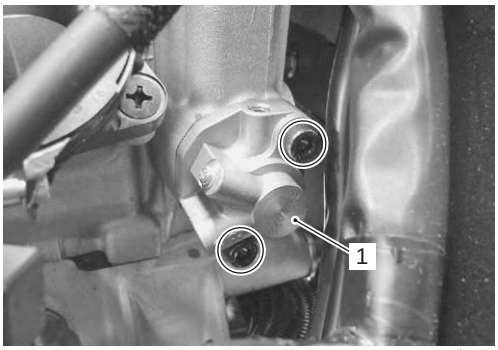
  Tightening torque
  Piston cooling oil jet bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1150024-01

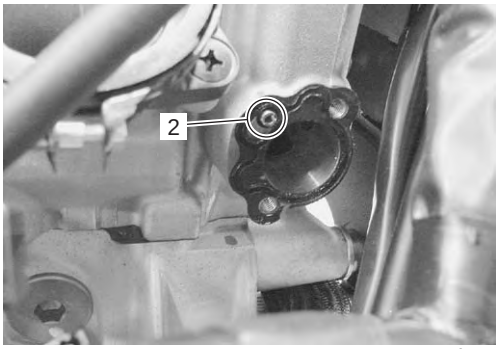
Oil Jet (For Cam Chain Tension Adjuster)
Removal

1) Remove the throttle body. Refer to “Throttle Body Removal and Installation” in Section 1D (Page 1D-10).
2) Remove the regulator/rectifier. Refer to “Regulator / Rectifier Removal and Installation” in Section 1J (Page 1J-7).
3) Remove the cam chain tension adjuster (1). Refer to “Engine Top Side Disassembly” in Section 1D (Page 1D-26).



I947H1150042-01

4) Remove the oil jet (2) (for cam chain tension adjuster).



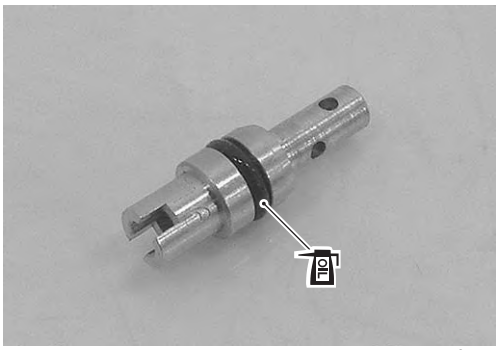
I947H1150043-01

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

- Apply engine oil to the O-ring.

⚠ CAUTION

Use a new O-ring to prevent oil leakage.



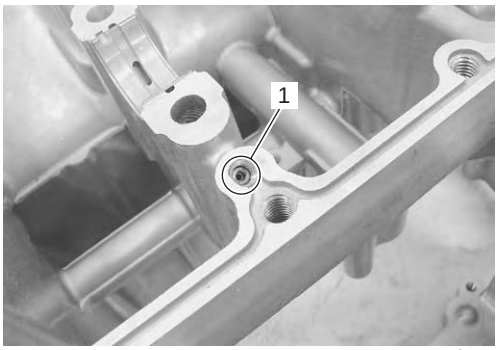
I947H1150025-01

- Install the cam chain tension adjuster. Refer to “Engine Top Side Assembly” in Section 1D (Page 1D-28).
- Install the regulator/rectifier. Refer to “Regulator / Rectifier Removal and Installation” in Section 1J (Page 1J-7).
- Install the throttle body. Refer to “Throttle Body Removal and Installation” in Section 1D (Page 1D-10).

Oil Jet (For Transmission)

Removal

1) Remove the engine assembly. Refer to “Engine Assembly Removal” in Section 1D (Page 1D-20).
2) Separate the crankcases, upper and lower. Refer to “Engine Bottom Side Disassembly” in Section 1D (Page 1D-49).
3) Remove the oil jet (1) (for transmission) from the lower crankcase.



I947H1150026-01

Installation

Installation is in the reverse order of removal. Refer to “Engine Bottom Side Assembly” in Section 1D (Page 1D-56).

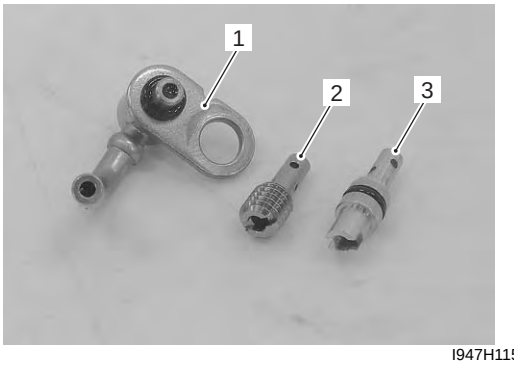
Oil Jet Inspection

B947H11506010

Refer to “Oil Jet Removal and Installation” (Page 1E-10).

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.



I947H1150027-01

1.	Piston cooling jet
2.	Oil jet (For transmission)
3.	Oil jet (For cam chain tension adjuster)

Oil Pump Removal and Installation

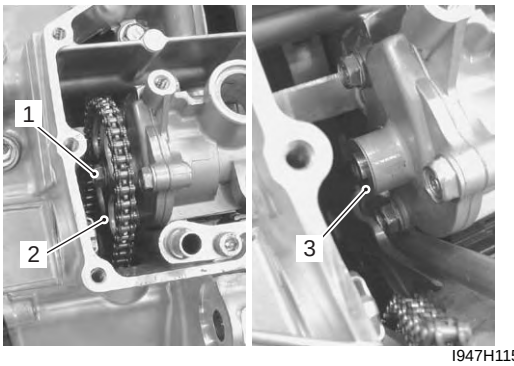
B947H11506011

NOTE

Be careful not to drop any parts into the crankcase.

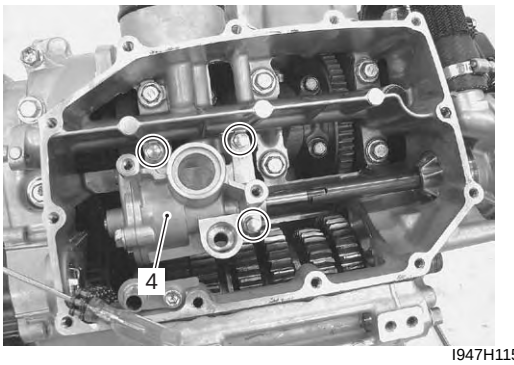
Removal

1) Remove the oil pan, oil pressure regulator and oil strainer. Refer to “Oil Pan / Oil Pressure Regulator / Oil Strainer Removal and Installation” (Page 1E-6).
2) Remove the oil pump driven gear bolt (1).
3) Remove the oil pump driven sprocket (2).
4) Remove the washer (3).



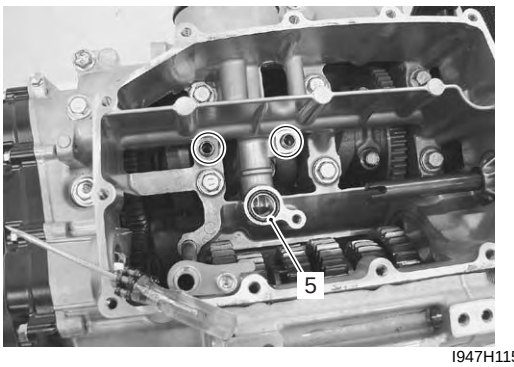
I947H1150028-01

5) Remove the oil pump (4).



I947H1150029-01

6) Remove the O-ring (5) and dowel pins.



I947H1150030-01

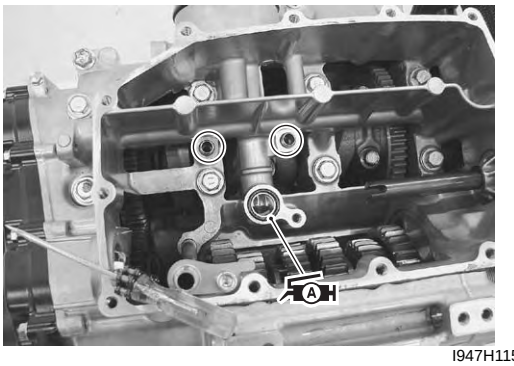
Installation

1) Install the dowel pins.
2) Apply grease to new O-ring.

⚠ CAUTION

Use a new O-ring to prevent oil leakage.

: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

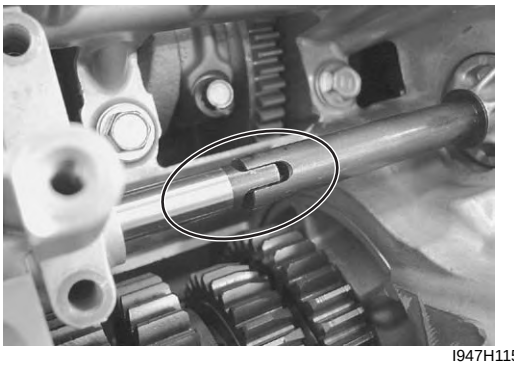


I947H1150031-01

3) Install the oil pump.

NOTE

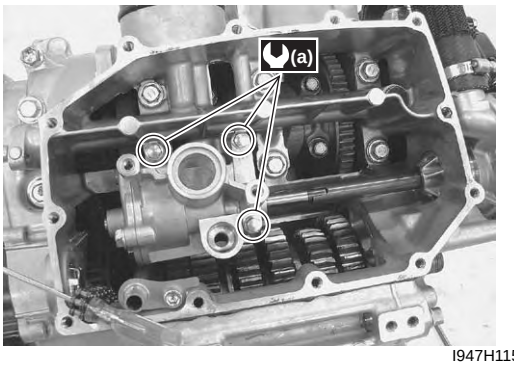
Engage the oil pump shaft end with the water pump shaft slot.



I947H1150032-01

4) Tighten the oil pump mounting bolts to the specified torque.

Tightening torque
Oil pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

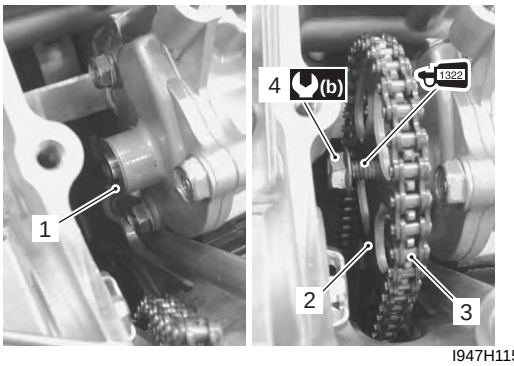


I947H1150033-01

5) Install the washer (1).
6) Install the oil pump driven sprocket (2) with the chain (3).
7) Apply a small quantity of thread lock to the oil pump driven sprocket bolt (4) and tighten it to the specified torque.

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

Tightening torque
Oil pump driven sprocket bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1150034-01

8) Install the oil pan, oil strainer and oil pressure regulator. Refer to "Oil Pan / Oil Pressure Regulator / Oil Strainer Removal and Installation" (Page 1E-6).

Oil Pump Inspection

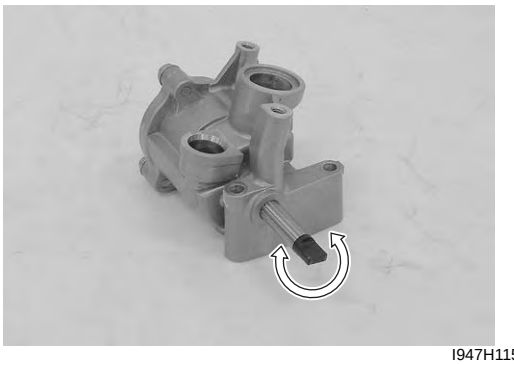
B947H11506012

Inspect the oil pump in the following procedures:

1) Remove the oil pump. Refer to “Oil Pump Removal and Installation” (Page 1E-12).
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. The oil pump is available only as an assembly.



I947H1150035-01

3) Install the oil pump. Refer to “Oil Pump Removal and Installation” (Page 1E-12).

Oil Pump Drive Sprocket Removal and Installation

B947H11506013

Refer to “Engine Bottom Side Disassembly” in Section 1D (Page 1D-49) and “Engine Bottom Side Assembly” in Section 1D (Page 1D-56).

Specifications

Service Data

B947H11507001

Oil Pump

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	100 – 400 kPa (1.0 – 4.0 kgf/cm^2, 14 – 57 psi) at 3 000 r/min	—

Oil

Item	Specification		Note
Engine oil type	SAE 10W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	2 800 ml (3.0/2.5 US/Imp qt)	
	Filter change	3 300 ml (3.5/2.9 US/Imp qt)	
	Overhaul	3 600 ml (3.8/3.2 US/Imp qt)	

Tightening Torque Specifications

B947H11507002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Oil pan bolt	10	1.0	7.0	☞(Page 1E-7)
Oil pressure switch	14	1.4	10.0	☞(Page 1E-10)
Oil pressure switch lead wire screw	1.5	0.15	1.1	☞(Page 1E-10)
Piston cooling oil jet bolt	10	1.0	7.0	☞(Page 1E-11)
Oil pump mounting bolt	10	1.0	7.0	☞(Page 1E-13)
Oil pump driven sprocket bolt	10	1.0	7.0	☞(Page 1E-13)

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

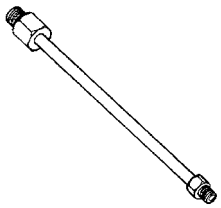
Recommended Service Material

B947H11508001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 1E-6) / ☞(Page 1E-6) / ☞(Page 1E-13)
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1E-10)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 1E-7) / ☞(Page 1E-9) / ☞(Page 1E-9) / ☞(Page 1E-11) / ☞(Page 1E-13)

Special Tool

B947H11508002

09915–17410 Oil pressure gauge adapter ☞(Page 1E-5) 	09915–74521 Adapter hose ☞(Page 1E-5) 
09915–77331 Oil pressure gauge (1000 kPa) ☞(Page 1E-5) 	

Engine Cooling System

Precautions

Precautions for Engine Cooling System

B947H11600001

⚠ WARNING

- **You can be injured by boiling 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

B947H11600002

Refer to “Engine Coolant Recommendation” in Section 0A (Page 0A-4).

General Description

Engine Coolant Description

B947H11601001

⚠ CAUTION

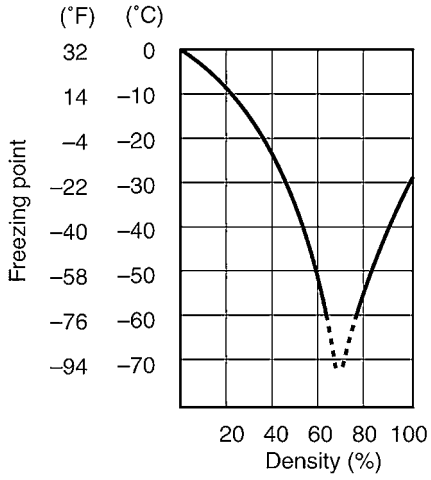
- **Use a high quality ethylene glycol base anti-freeze, mixed with distilled water. Do not mix an alcohol base anti-freeze and different brands of anti-freeze.**
- **Do not put in more than 60% anti-freeze or less than 50%. (Refer to Fig. 1 and 2.)**

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 °C (–24 °F).
If the vehicle is to be exposed to temperatures below –31 °C (–24 °F), this mixing ratio should be increased up to 55% or 60% according to the figure.

Anti-freeze Proportioning Chart

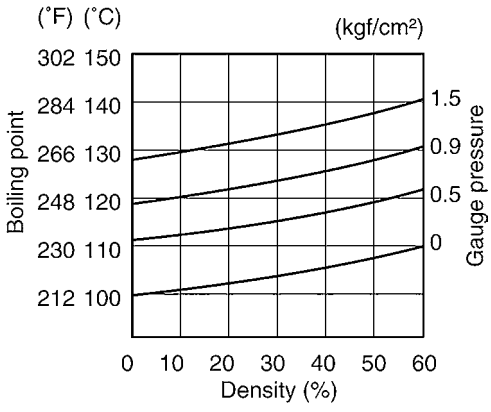
Anti-freeze density	Freezing point
50%	–31 °C (–24 °F)
55%	–40 °C (–40 °F)
60%	–55 °C (–67 °F)

Fig. 1: Engine coolant density-freezing point curve



I310G1160001-01

Fig. 2: Engine coolant density-boiling point curve

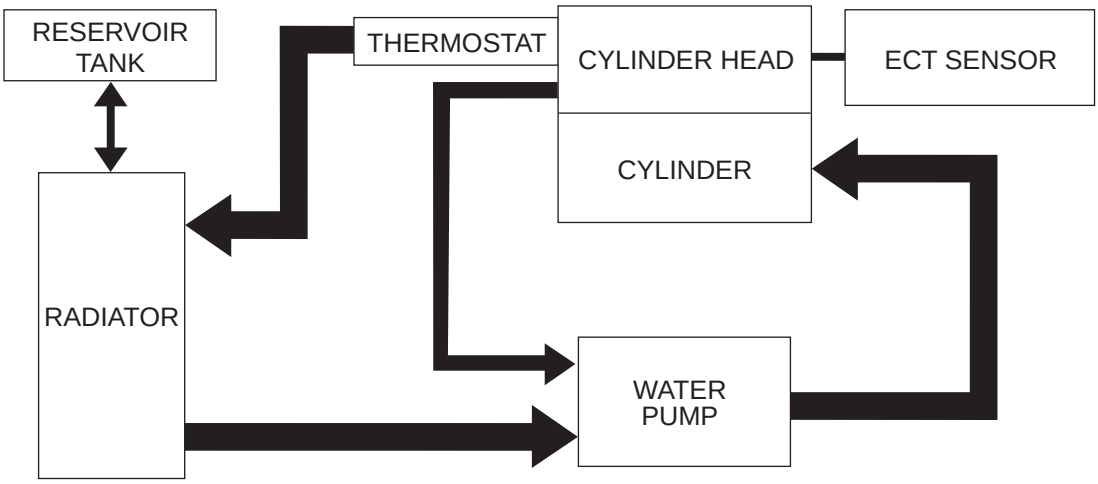


I310G1160002-01

Schematic and Routing Diagram

Cooling Circuit Diagram

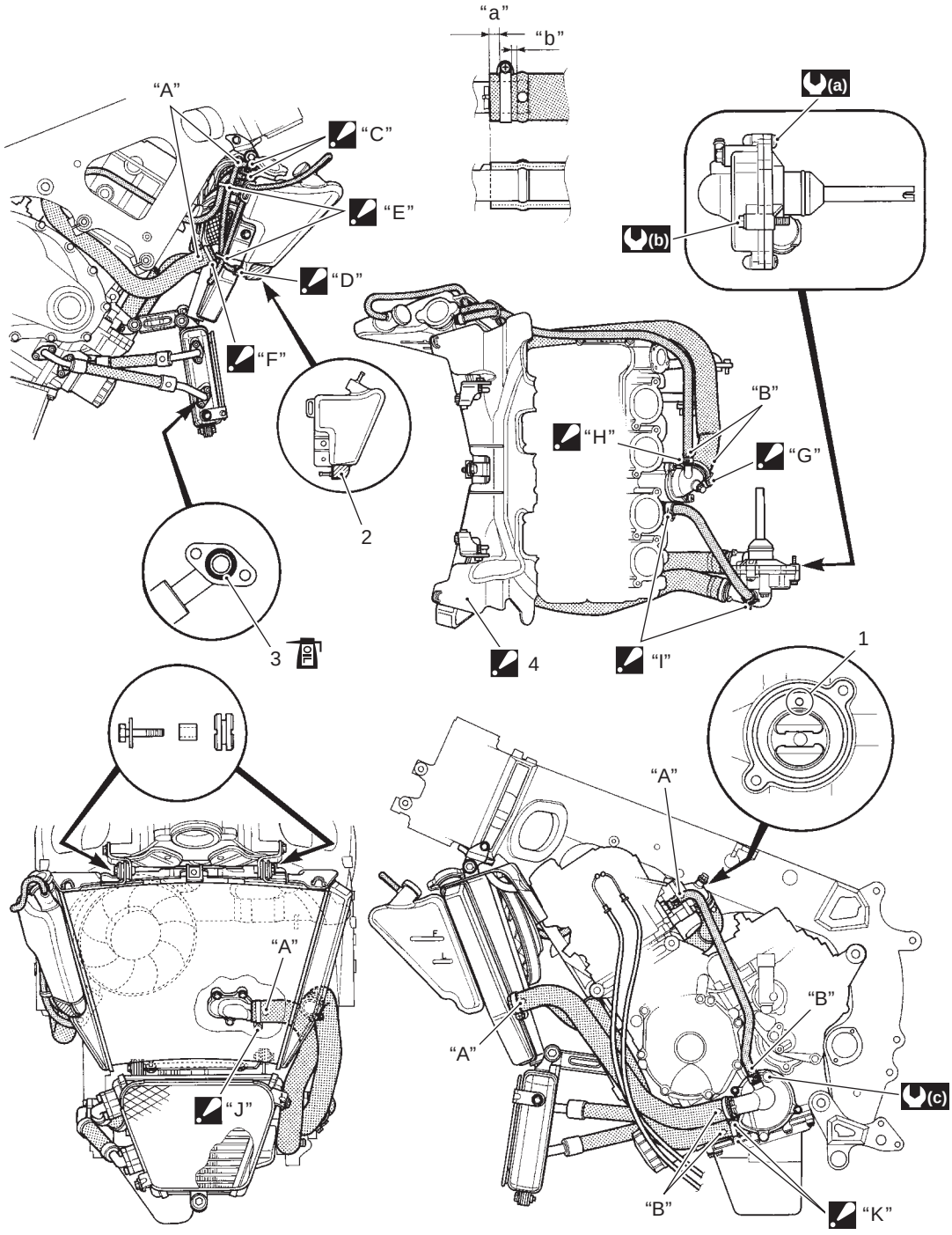
B947H11602001



I947H1160001-02

Water Hose Routing Diagram

B947H11602002



I947H1160053-03

1. Thermostat air bleeder hole	"D": Clamp end should face right side.	"K": Screw head should face left side.
2. Cushion	"E": Cut off the excess tip of the clamp.	"a": 2 – 8 mm (0.08 – 0.31 in)
3. O-ring	"F": Screw head should face right side.	"b": Clearance
4. Radiator heat guard : Be careful not to damage the pawls when removing.	"G": Screw head should face backward.	(a) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)
"A": Yellow marking	"H": Clamp end should face upward.	(b) : 10 N·m (1.0 kgf-m, 0.7 lbf-ft)
"B": White marking	"I": Clamp end should face left side.	(c) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)
"C": Clamp end should face downward.	"J": Screw head should face forward.	: :Apply engine oil.

Diagnostic Information and Procedures

Engine Cooling Symptom Diagnosis

B947H11604001

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-short circuited.	*Repair or replace.*
	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.*
	Damaged ISC valve.	*Replace.*
	Incorrect ISC learning.	*Reset learned value.*
Engine over cools	Defective cooling fan relay, or open-or-short circuited.	*Repair or replace.*
	Extremely cold weather.	*Put on radiator cover.*
	Defective thermostat.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective ECM.	*Replace.*

Repair Instructions

Cooling Circuit Inspection

B947H11606001

⚠ WARNING

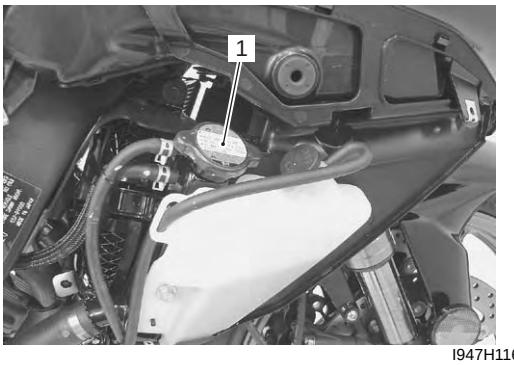
- **Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.**
- **When removing the radiator cap tester, put a rag on the filler to prevent the engine coolant from spraying out.**

Inspect the cooling circuit in the following procedures:

1) Remove the right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
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, 17.6 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.



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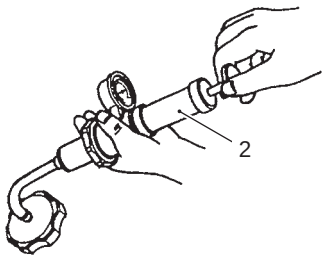


I815H1160002-01

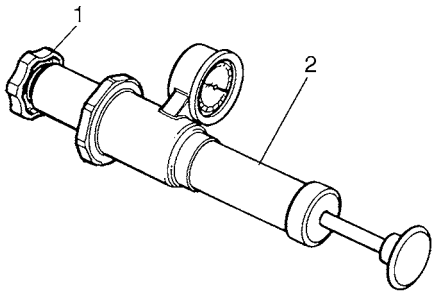
4) After finishing the cooling circuit inspection, reinstall the removed parts.

Radiator Cap Inspection

B947H11606002

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.



I718H1160033-01

3) Slowly apply pressure to the radiator cap.
   If the radiator cap does not hold the pressure for at least 10 seconds, replace it with a new one.

   Radiator cap release pressure
   93 – 123 kPa (0.9 – 1.2 kgf/cm^2, 13.2 – 17.5 psi)

4) After finishing the radiator cap inspection, reinstall the removed parts.

Radiator Inspection and Cleaning

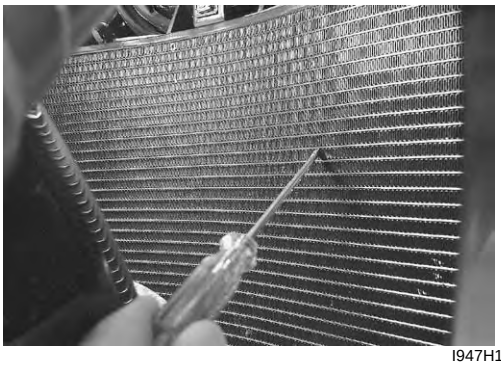
B947H11606003

Radiator Hose Inspection

Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).

Radiator Inspection

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.



I947H1160003-01

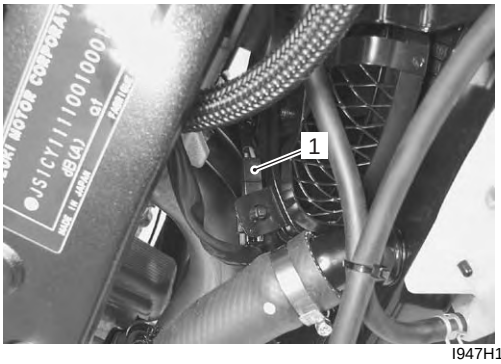
Radiator Cleaning

Blow out any foreign matter that is stuck in the radiator fins using compressed air.

⚠ CAUTION

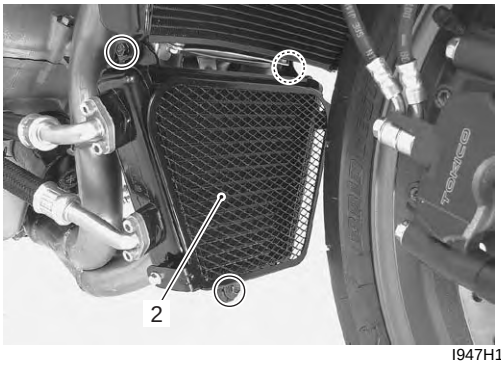
- **Make sure not to bend the fins when using compressed air.**
- **Always apply compressed air from the engine side. If compressed air is applied from the front side, dirt will be forced into the pores of radiator.**

1) Remove the inner under cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the cooling fan motor lead wire coupler (1).



I947H1160005-01

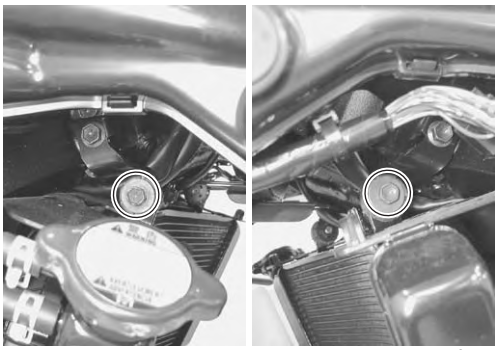
3) Remove the oil cooler (2) from the bracket.



I947H1160006-02

4) Remove the radiator mounting bolts.

I947H1160007-01



I947H1160008-02

5) Move the radiator forward.

6) Apply compressed air from the engine side.

I947H1160051-01

7) Tighten the upper radiator mounting bolts.

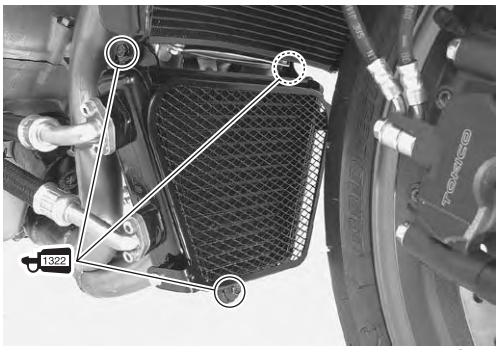
8) Apply thread lock to the radiator bracket bolts and tighten all bolts securely.

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

I947H1160056-01

9) Apply thread lock to the oil cooler bolts and tighten them securely.

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



I947H1160057-01

10) Reinstall the removed parts.

Radiator / Cooling Fan Motor Removal and Installation

B947H11606004

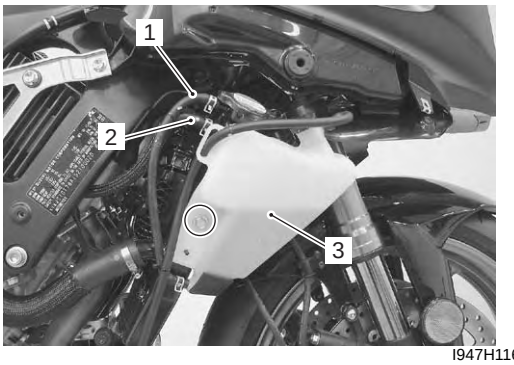
Removal

1) Remove the inner under cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

2) Drain engine coolant. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).

3) Disconnect the reservoir tank inlet hose (1) and water air bleed hose (2).

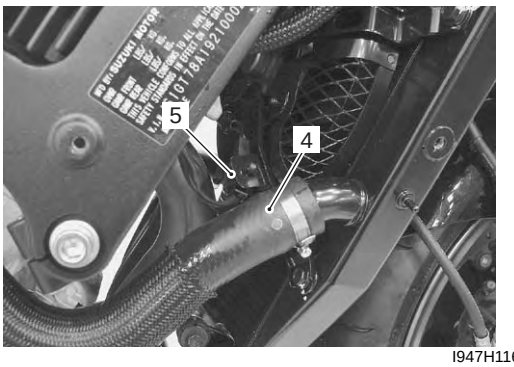
4) Remove the radiator reservoir tank (3).



I947H1160004-02

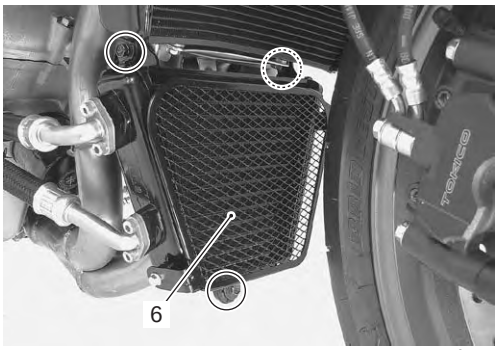
5) Disconnect the radiator inlet hose (4).

6) Disconnect the cooling fan motor coupler (5).



I947H1160009-02

7) Remove the oil cooler (6) from the bracket.



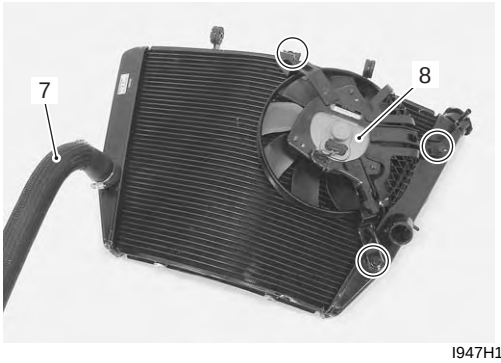
I947H1160010-01

8) Remove the radiator assembly by removing the bolts.

I947H1160011-01

I947H1160012-02

9) Remove the radiator outlet hose (7) and cooling fan motor (8) from the radiator.



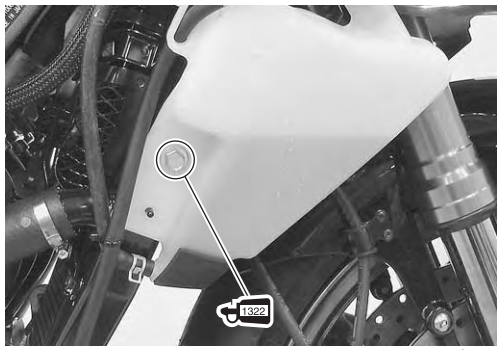
I947H1160013-01

Installation

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

- Install the radiator and oil cooler to their bracket. Refer to “Radiator Inspection and Cleaning” (Page 1F-5).
- Apply thread lock to the reservoir tank bolt and tighten it securely.

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



I947H1160058-01

- 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-12).
- Bleed air from the cooling circuit. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).

Water Hose Inspection

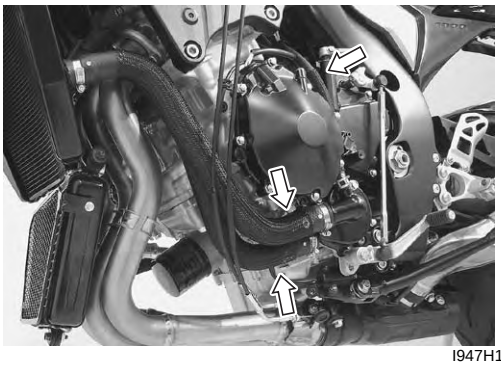
B947H11606005

Inspect the water hoses in the following procedures:

1) Remove the side cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Check the water hoses for crack, damage or engine coolant leakage. If any defect is found, replace the water 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).

I947H1160014-02



I947H1160015-01

I947H1160016-01

4) After finishing the water hoses inspection, reinstall the removed parts.

Water Hose Removal and Installation

B947H11606006

Removal

1) Remove the side cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Drain engine coolant. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).
3) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
4) Remove the water hose as shown in the water hose routing diagram. Refer to “Water Hose Routing Diagram” (Page 1F-3).

Installation

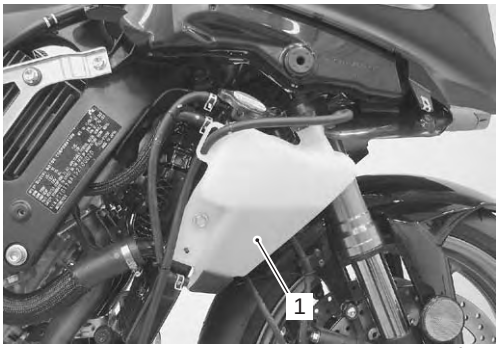
1) Install the water hose as shown in the water hose routing diagram. Refer to “Water Hose Routing Diagram” (Page 1F-3).
2) Install the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
3) Pour engine coolant and bleed air from the cooling circuit. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).
4) Install the side cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

Radiator Reservoir Tank Inspection

B947H11606007

Inspect the radiator reservoir tank in the following procedures:

1) Remove the right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Inspect the radiator reservoir tank (1) for leaks. If any defects are found, replace the radiator reservoir tank with a new one.



I947H1160017-02

3) Reinstall the removed parts.

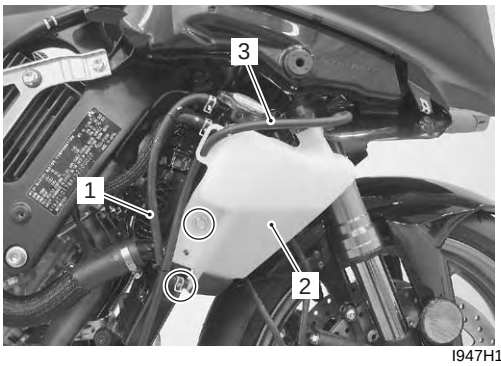
Radiator Reservoir Tank Removal and Installation

B947H11606008

Removal

1) Remove the right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the reservoir tank inlet hose (1) from the reservoir tank (2) and drain the engine coolant.
3) Remove the reservoir tank (2).

4) Disconnect the reservoir tank overflow hose (3).



I947H1160018-03

Installation

1) Install the reservoir tank. Refer to “Radiator / Cooling Fan Motor Removal and Installation” (Page 1F-6).
2) Fill the reservoir tank with engine coolant to the upper level. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).
3) Install the right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

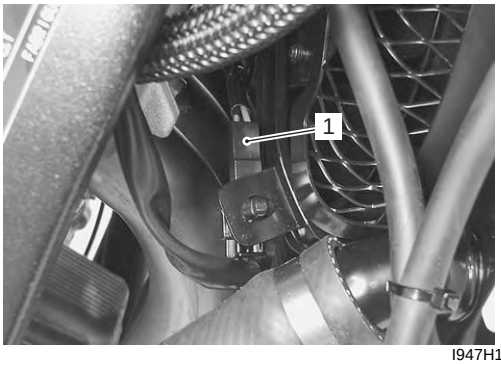
Cooling Fan Inspection

B947H11606009

Cooling fan operating temperature
Standard
(ON → OFF): Approx. 100 °C (212 °F)
(OFF → ON): Approx. 105 °C (221 °F)

Inspect the cooling fan in the following procedures:

1) Disconnect the cooling fan motor coupler (1).

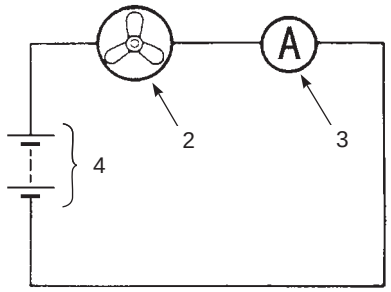


I947H1160019-01

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-6).

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	3. Ammeter	4. Battery

3) Connect the cooling fan motor coupler.

Cooling Fan Relay Inspection

B947H11606010

Inspect the fan relay in the following procedures:

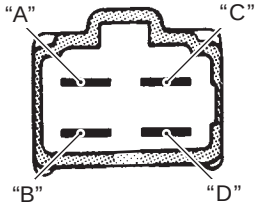
1) Remove the frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the cooling fan relay (1).

I947H1160052-01

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
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

B947H11606011

Refer to “ECT Sensor Removal and Installation” in Section 1C (Page 1C-4).

ECT Sensor Inspection

B947H11606012

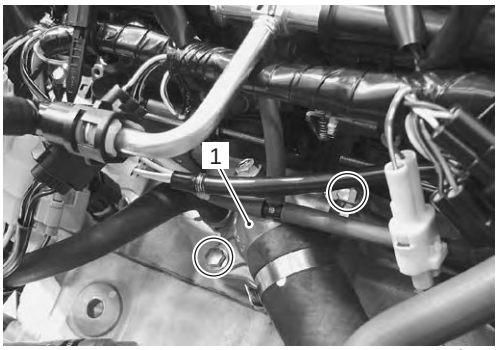
Refer to “ECT Sensor Inspection” in Section 1C (Page 1C-4).

Thermostat Removal and Installation

B947H11606013

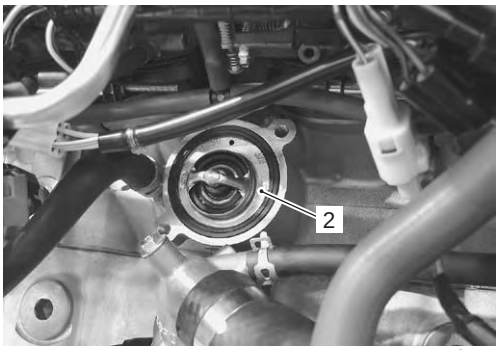
Removal

1) Drain a small amount of engine coolant. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).
2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
3) Remove the thermostat cover (1).



I947H1160020-02

4) Remove the thermostat (2).



I947H1160021-02

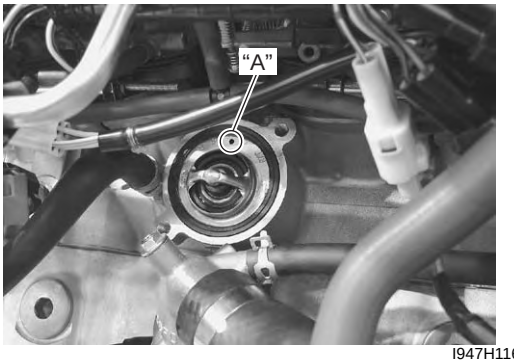
Installation

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

- Install the thermostat.

NOTE

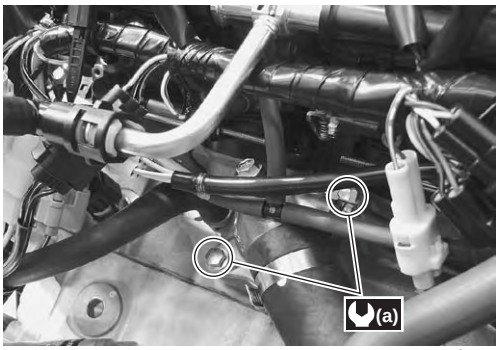
Air bleeder hole “A” of the thermostat faces upside.



I947H1160022-02

- Tighten the thermostat cover bolts to the specified torque.

Tightening torque
Thermostat cover bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1160023-01

- Pour engine coolant and bleed air from the cooling circuit. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).

Thermostat Inspection

B947H11606014

Inspect the thermostat in the following procedures:

1) Remove the thermostat. Refer to “Thermostat Removal and Installation” (Page 1F-10).
2) Inspect the thermostat pellet for signs of cracking.

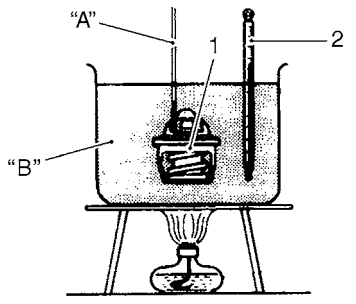
I947H1160024-01

3) Test the thermostat at the bench for control action.

⚠ CAUTION

- **Do not contact the thermostat (1) and 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).



I705H1160030-03

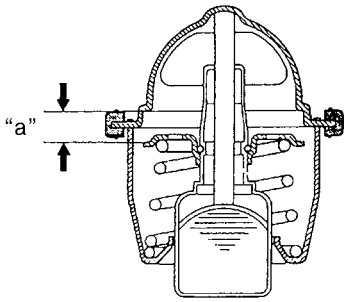
“A”: String	“B”: Water

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 been 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: Over 8 mm (0.31 in) and at 95 °C (203 °F)

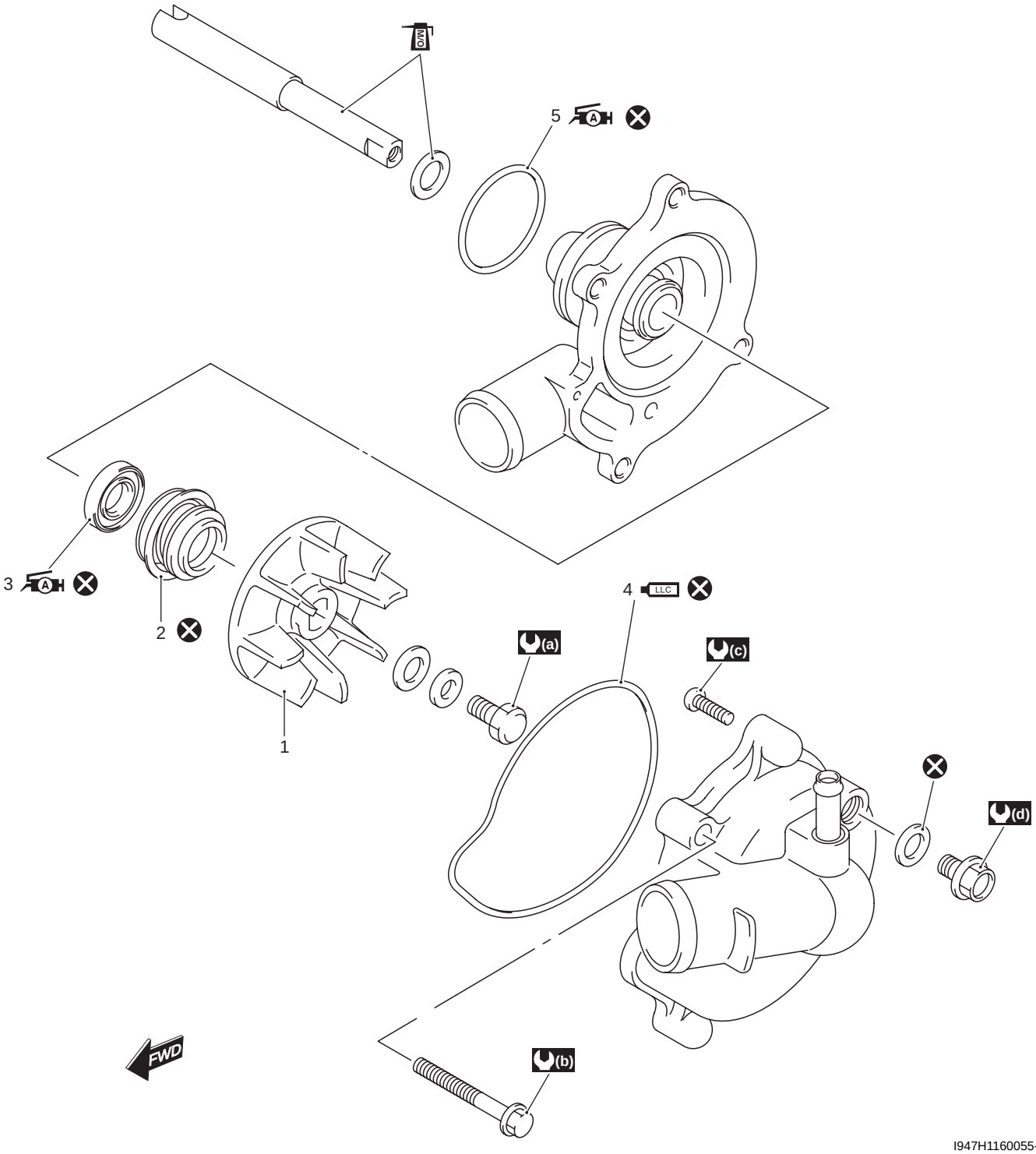


I705H1160031-04

9) Install the thermostat. Refer to “Thermostat Removal and Installation” (Page 1F-10).

Water Pump Components

B947H11606015

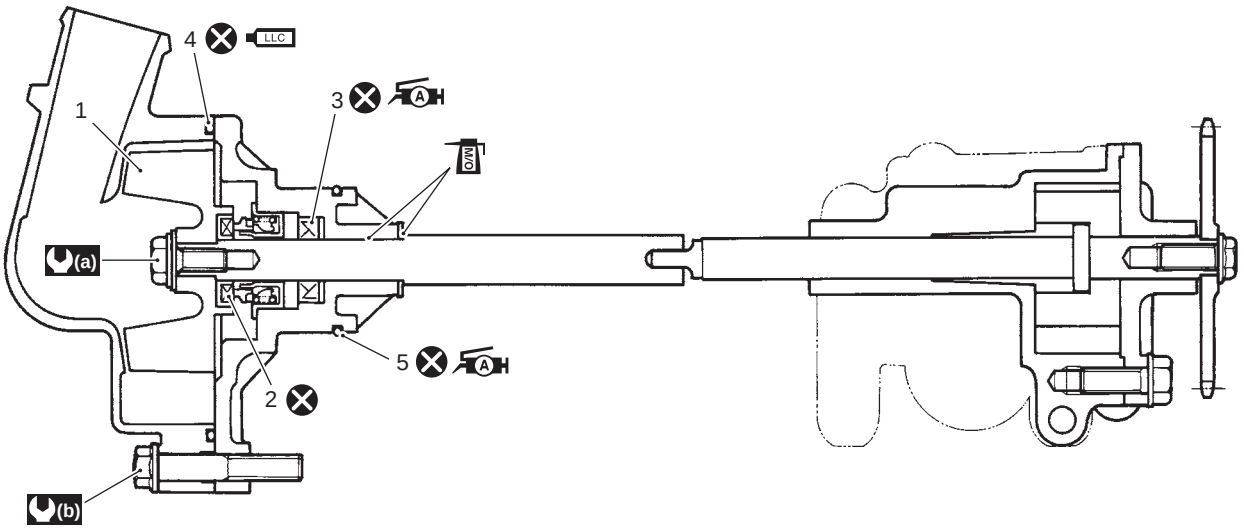


I947H1160055-02

1. Impeller	(a) : 8 N·m (0.8 kgf-n, 6.0 lb-ft)	LLC : Apply engine coolant.
2. Mechanical seal	(b) : 10 N·m (1.0 kgf-n, 7.0 lb-ft)	M/O : Apply molybdenum oil solution.
3. Oil seal	(c) : 6 N·m (0.6 kgf-n, 4.5 lb-ft)	: Do not reuse.
4. O-ring	(d) : 13 N·m (1.3 kgf-n, 9.5 lb-ft)	
5. O-ring	A : Apply grease.	

Water Pump Construction

B947H11606016



I947H1160054-02

1. Impeller	5. O-ring	LLC : Apply engine coolant.
2. Mechanical seal	(a) : 8 N·m (0.8 kgf-m, 6.0 lbf-ft)	M/O : Apply molybdenum oil solution.
3. Oil seal	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	: Do not reuse.
4. O-ring	: Apply grease.	

Water Pump Removal and Installation

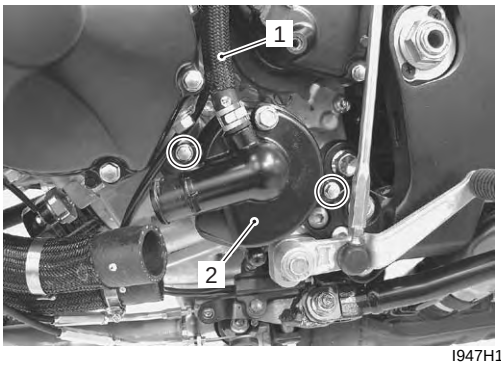
B947H11606017

Removal

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-17).

1) Remove the left side cowling. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Drain engine oil and coolant. Refer to "Engine Oil and Filter Replacement" in Section 0B (Page 0B-10) and "Cooling System Inspection" in Section 0B (Page 0B-12).
3) Disconnect the water bypass hose (1).
4) Remove the water pump (2).



I947H1160025-02

Installation

Install the water pump in the reverse order of removal. Pay attention to the following points:

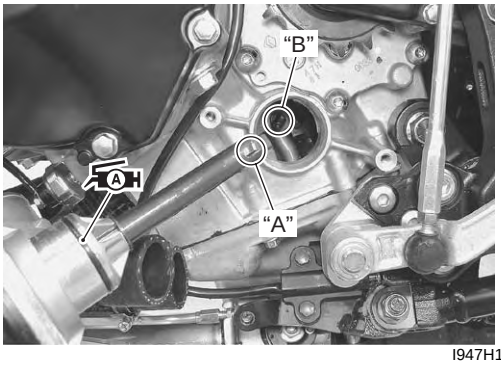
- Apply grease to the O-ring.

⚠ CAUTION

Replace the O-ring with a new one.

: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

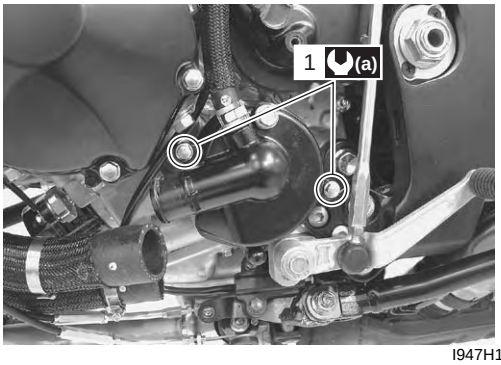
- Install the water pump assembly with the slot of the pump shaft end “A” securely engaged with the flat “B” of the oil pump shaft.



I947H1160026-01

- Tighten the water pump mounting bolts (1) to the specified torque.

Tightening torque
Water pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1160027-03

- 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-10) and “Cooling System Inspection” in Section 0B (Page 0B-12).
- Bleed air from the cooling circuit. Refer to “Cooling System Inspection” in Section 0B (Page 0B-12).

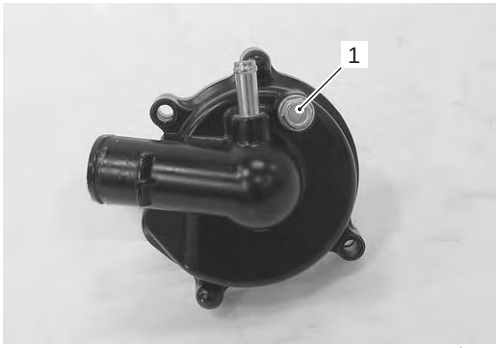
Water Pump Disassembly and Assembly

B947H11606018

Refer to “Water Pump Removal and Installation” (Page 1F-13).

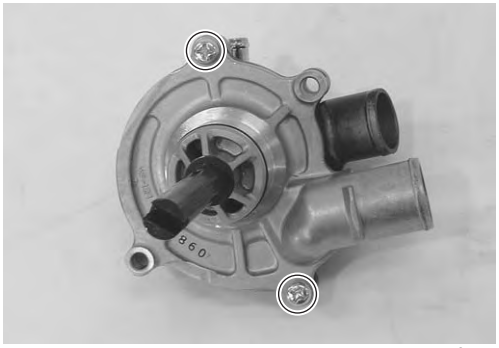
Disassembly

1) Remove the air bleeder bolt (1) if necessary.



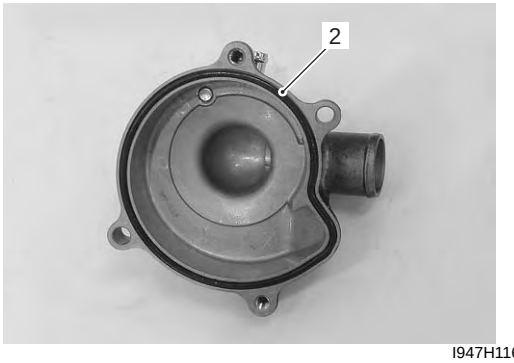
I947H1160028-01

2) Remove the water pump case screws.



I947H1160029-01

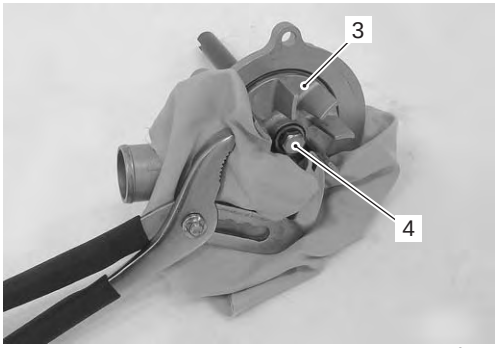
3) Remove the O-ring (2).



I947H1160030-01

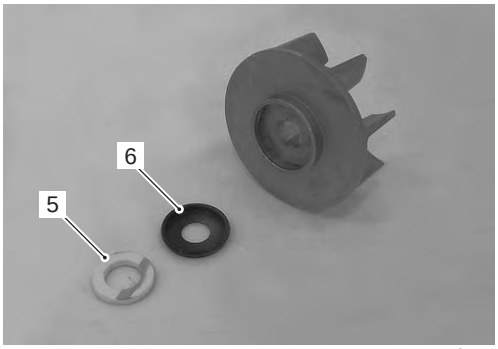
4) Hold the impeller (3) with water pump pliers and remove the impeller securing bolt (4).

5) Remove the impeller (3).



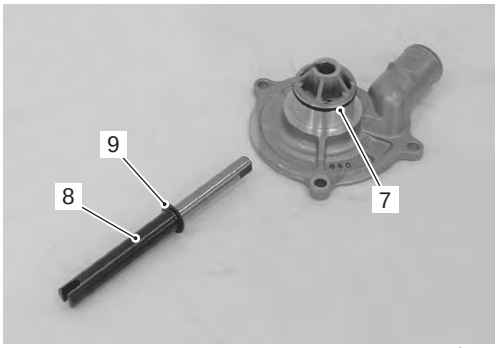
I947H1160031-01

6) Remove the mechanical seal ring (5) and rubber seal (6) from the impeller.



I947H1160032-01

7) Remove the O-ring (7), impeller shaft (8) and washer (9) from the holder.



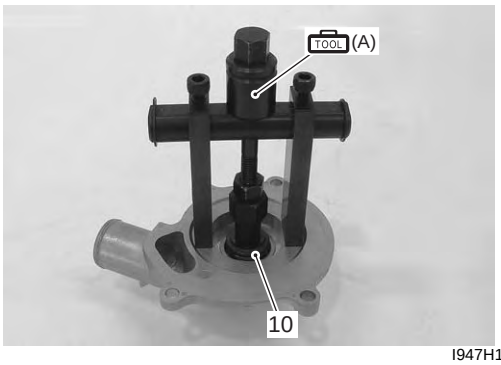
I947H1160033-01

8) Remove the mechanical seal (10) with the special tool.

NOTE

If there is no abnormal condition, the mechanical seal removal is not necessary.

Special tool
TOOL (A): 09921–20240 (Bearing remover set)

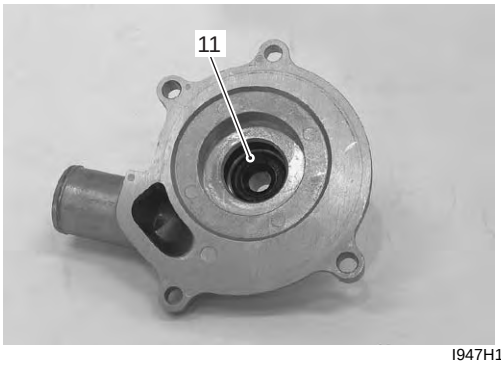


I947H1160034-01

9) Remove the oil seal (11).

NOTE

If there is no abnormal condition, the oil seal removal is not necessary.



I947H1160035-01

Assembly

1) Install the oil seal with the special tool.

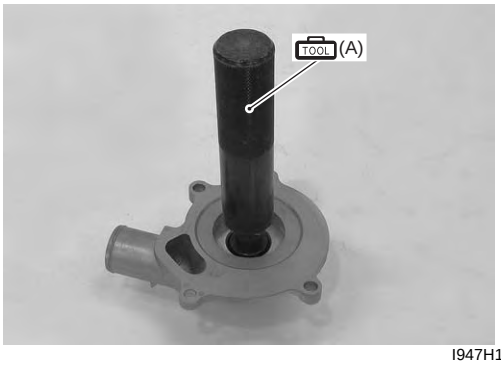
⚠ CAUTION

The removed oil seal must be replaced with a new one.

NOTE

The stamped mark on the oil seal should face mechanical seal side.

Special tool
TOOL (A): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1160036-01

2) Apply a small quantity of the grease to the oil seal lip.

: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

I947H1160037-01

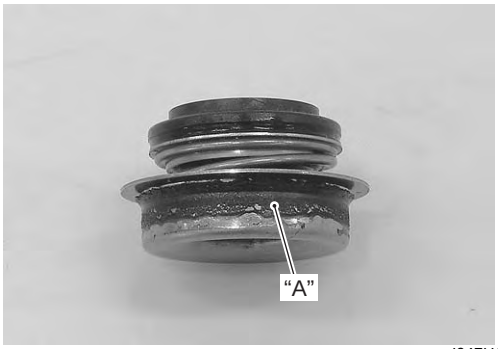
3) Install a new mechanical seal using a suitable size socket wrench.

⚠ CAUTION

The removed mechanical seal must be replaced with a new one.

NOTE

On new mechanical seals, the sealer "A" has been applied.



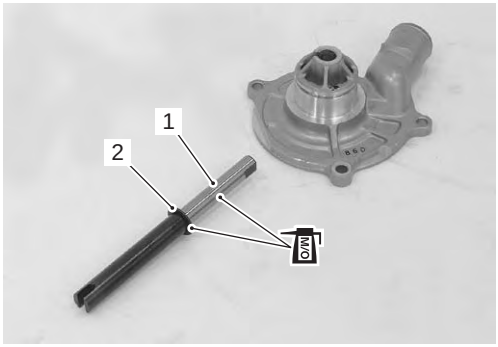
I947H1160038-01

I947H1160039-01

4) Apply molybdenum solution to the impeller shaft (1) and washer (2).

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

5) Install the impeller shaft (1) and washer (2) to the holder.



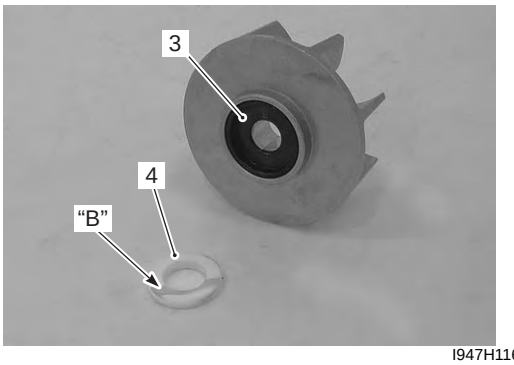
I947H1160040-01

6) Install the rubber seal (3) into the impeller.

7) After wiping off the oily or greasy matter from the mechanical seal ring (4), install it into the impeller.

NOTE

The paint marked side "B" of mechanical seal ring faces the rubber seal.

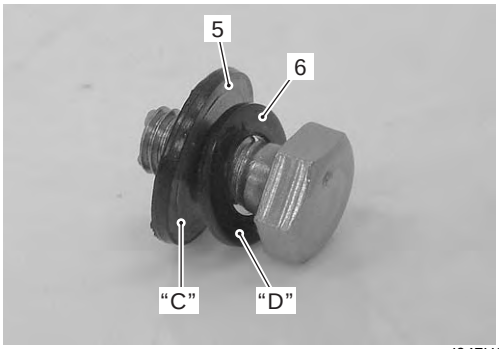


I947H1160041-01

8) Install the washer (5) and seal washer (6) 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.

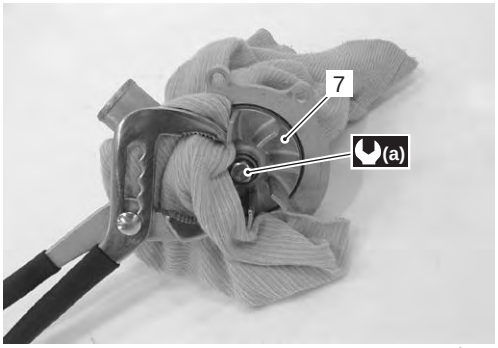


I947H1160042-01

9) Install the impeller (7).

10) Hold the impeller with water pump pliers 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)



I947H1160043-02

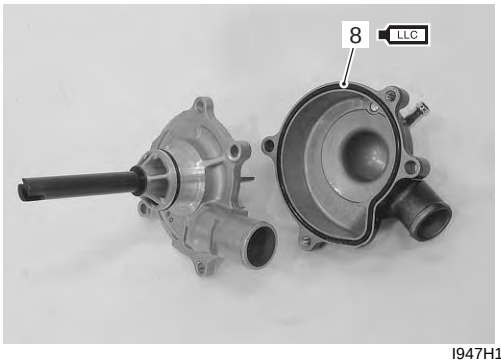
11) Install new O-ring (8) and apply engine coolant to it.

⚠ CAUTION

Use a new O-ring to prevent engine coolant leakage.

12) Tighten the water pump case screws to the specified torque.

Tightening torque
Water pump case screw: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I947H1160044-02

13) Tighten the water pump air bleeder bolt (9) to the specified torque.

⚠ CAUTION

Use a new gasket washer to prevent engine coolant leakage.

Tightening torque
Water pump air bleeder bolt (b): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)

I947H1160045-01

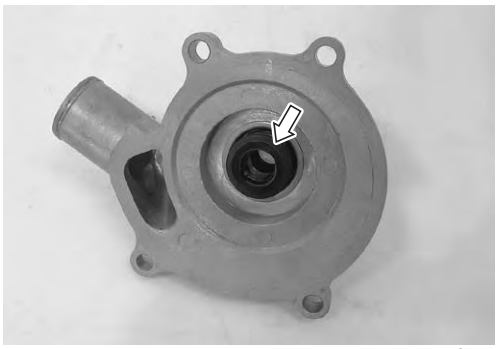
Water Pump Related Parts Inspection

B947H11606019

Refer to “Water Pump Disassembly and Assembly” (Page 1F-14).

Mechanical Seal

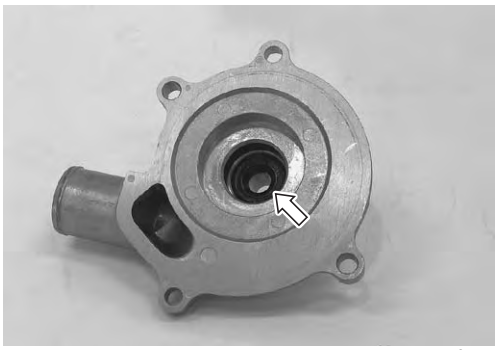
Visually inspect the mechanical seal for damage, with particular attention given to the sealing face.
Replace the mechanical seal that shows indications of leakage.



I947H1160046-01

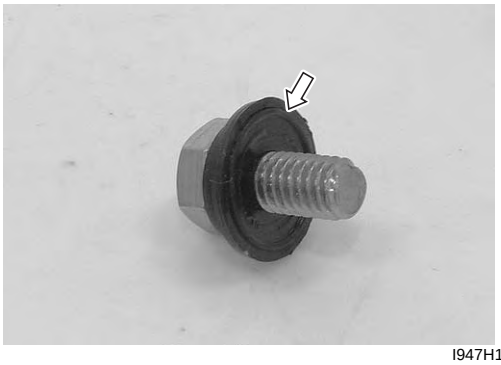
Oil Seal

Visually inspect the oil seal for damage, with particular attention given to the lip.
Replace the oil seal that shows indications of leakage.



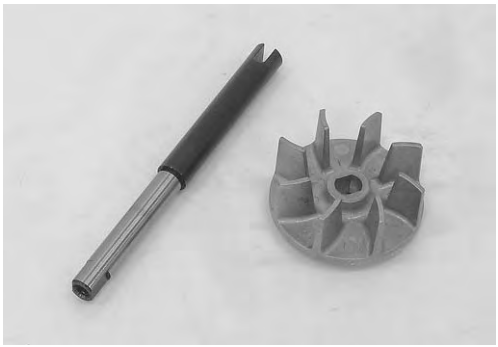
I947H1160047-01

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.



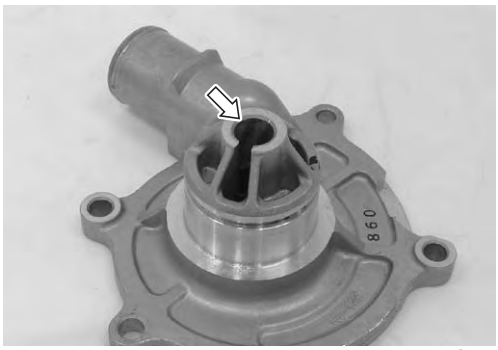
I947H1160048-01

Impeller / Shaft
Visually inspect the impeller and its shaft for damage. Replace the impeller or shaft if necessary.



I947H1160049-01

Impeller Shaft Journal
Visually inspect the journal for damage or scratch. Replace the holder if necessary.



I947H1160050-01

Specifications

Service Data

B947H11607001

Thermostat + Radiator + Fan + Coolant

Item	Specification		Note
Thermostat valve opening temperature	Approx. 82 °C (180 °F)		—
Thermostat valve lift	Over 8 mm (0.31 in) and at 95 °C (203 °F)		—
ECT sensor resistance	20 °C (68 °F)	Approx. 2.45 kΩ	—
	50 °C (122 °F)	Approx. 0.811 kΩ	—
	80 °C (176 °F)	Approx. 0.318 kΩ	—
	110 °C (230 °F)	Approx. 0.142 kΩ	—
Radiator cap valve opening pressure	93 – 123 kPa (0.9 – 1.2 kgf/cm^2, 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 anti-freeze/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/Imp qt)	—
	Engine side	Approx. 2 500 ml (2.6/2.2 US/Imp qt)	—

Tightening Torque Specifications

B947H11607002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Thermostat cover bolt	10	1.0	7.0	☞(Page 1F-10)
Water pump mounting bolt	10	1.0	7.0	☞(Page 1F-14)
Impeller securing bolt	8	0.8	6.0	☞(Page 1F-17)
Water pump case screw	6	0.6	4.5	☞(Page 1F-17)
Water pump air bleeder bolt	13	1.3	9.5	☞(Page 1F-17)

NOTE

The specified tightening torque is described in the following.
“Water Hose Routing Diagram” (Page 1F-3)
“Water Pump Components” (Page 1F-12)
“Water Pump Construction” (Page 1F-13)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H11608001

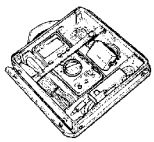
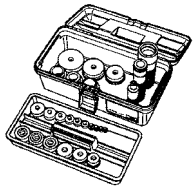
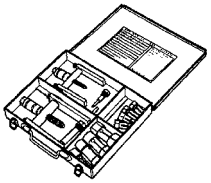
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 1F-13) / ☞(Page 1F-16)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1F-16)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 1F-6) / ☞(Page 1F-6) / ☞(Page 1F-7)

NOTE

Required service material is also described in the following.
“Water Hose Routing Diagram” (Page 1F-3)
“Water Pump Components” (Page 1F-12)
“Water Pump Construction” (Page 1F-13)

Special Tool

B947H11608002

09900–25008 Multi circuit tester set ☞(Page 1F-10) 	09913–70210 Bearing installing set (10 – 75 Φ) ☞(Page 1F-15) 
09921–20240 Bearing remover set ☞(Page 1F-15) 	

Fuel System

Precautions

Precautions for Fuel System

B947H11700001

⚠ 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.**
- **For E-33 models, drain fuel from the fuel tank before disconnecting the fuel feed hose to prevent fuel leakage.**

⚠ 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

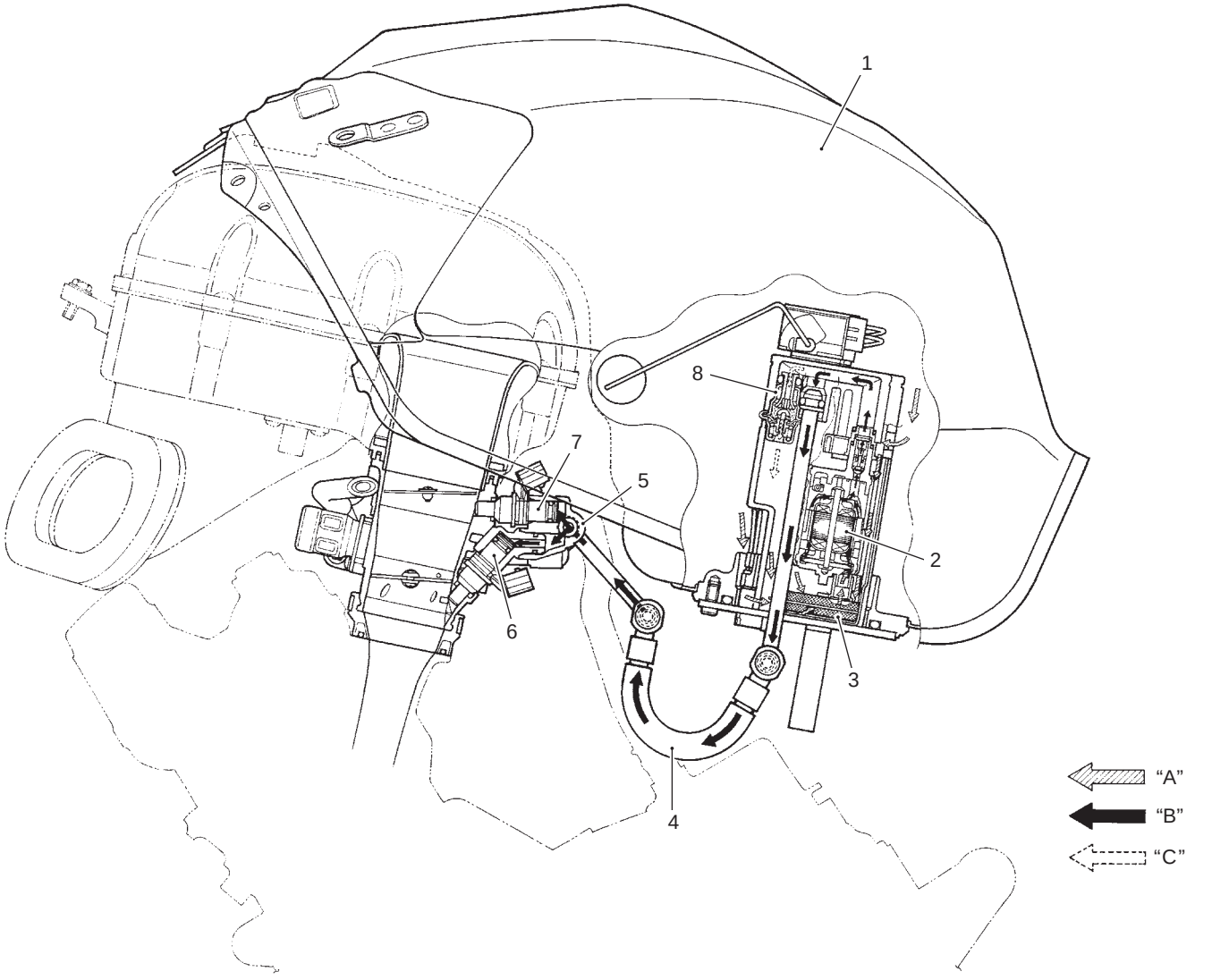
Fuel Injection System Description

B947H11701001

Fuel System

The fuel delivery system consists of the fuel tank (1), fuel pump (2), fuel filter (3), fuel feed hose (4), fuel delivery pipes (5) including fuel injectors (6) and (7), fuel pressure regulator (8). There is no fuel return hose. The fuel in the fuel tank is pumped up by the fuel pump and pressurized fuel flows into the injectors installed in the fuel delivery pipe. Fuel pressure is regulated by the fuel pressure regulator. As the fuel pressure applied to the fuel injectors (the fuel pressure in the fuel delivery pipe) is always kept at absolute fuel pressure of approx. 294 kPa (2.9 kgf/cm^2, 41.8 psi), the fuel is injected into the throttle body in conic dispersion when the injector opens according to the injection signal from the ECM.

The fuel relieved by the fuel pressure regulator flows back to the fuel tank.



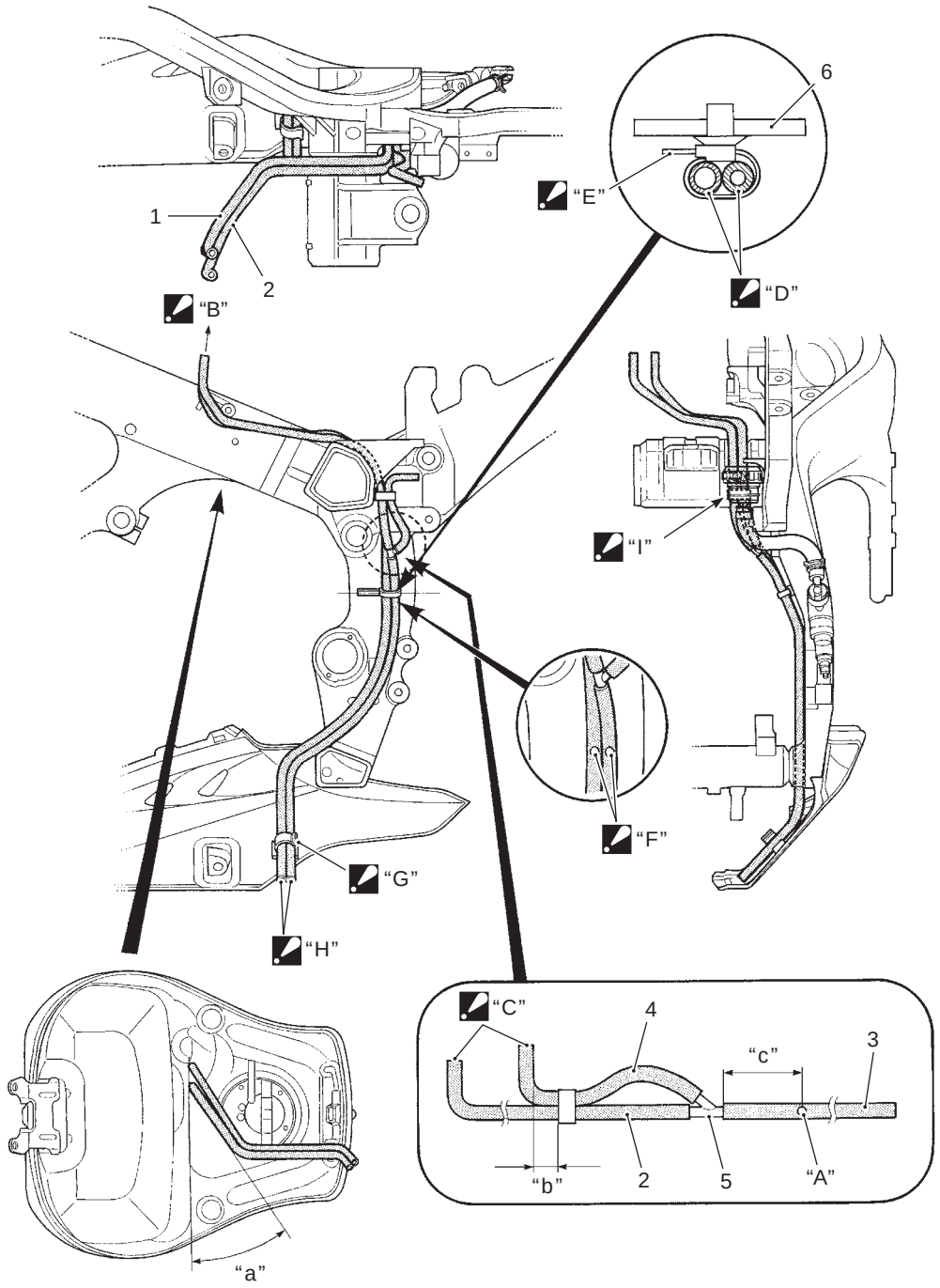
I947H1170019-03

1. Fuel tank	4. Fuel feed hose	7. Secondary fuel injector	"B": Pressurized fuel
2. Fuel pump	5. Fuel delivery pipe	8. Fuel pressure regulator	"C": Relieved fuel
3. Fuel mesh filter	6. Primary fuel injector	"A": Pre-pressurized fuel	

Schematic and Routing Diagram

Fuel Tank Drain Hose and Breather Hose Routing Diagram

B947H11702001



I947H1170020-02

1. Fuel tank water drain hose	"A": White marking	"G": Stick the hose clamp along the line behind the cowling.
2. Fuel tank breather hose No. 1	"B": Set the hose end to the root of tank nipple.	"H": Clamp the hoses at marking point. Match the length of hoses.
3. Fuel tank breather hose No. 2	"C": Match the direction of 3-way joint and hoses.	"I": Pass the hoses in front of the rear brake reservoir.
4. Fuel tank breather hose No. 3	"D": Arrange the hoses in parallel.	"a": 30 – 45°
5. 3-way joint	"E": Face the clamp end forward. Cut off the excess tip of the clamp.	"b": 10 – 30 mm (0.4 – 1.2 in)
6. Frame	"F": Set the hoses with the white marking inside.	"c": 50 mm (2.0 in)

Diagnostic Information and Procedures

Fuel System Diagnosis

B947H11704001

Condition	Possible cause	Correction / Reference Item
Engine will not start or is hard to start (No fuel reaching the intake manifold)	Clogged fuel filter or fuel hose.	*Clean or replace.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective fuel injector.	*Replace.*
	Defective fuel pump relay.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connection.	*Check and repair.*
Engine will not start or is hard to start (Incorrect fuel/air mixture)	TP sensor out of adjustment.	*Adjust.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective IAP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective IAT sensors.	*Replace.*
	Defective AP sensors.	*Replace.*
	Clogged ISC valve air passage way.	*Repair or replace.*
Engine stalls often (Incorrect fuel/air mixture)	Defective IAP sensor or circuit.	*Repair or replace.*
	Clogged fuel filter.	*Clean or replace.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective thermostat.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Damaged or cracked vacuum hose.	*Replace.*
	Damaged or cracked ISC valve.	*Repair or replace.*
Engine stalls often (Fuel injector improperly operating)	Defective fuel injector.	*Replace.*
	No injection signal from ECM.	*Repair or replace.*
	Open or short circuited wiring connection.	*Repair or replace.*
	Defective battery or low battery voltage.	*Replace or recharge.*
Engine runs poorly in high speed range (Defective control circuit or sensor)	Low fuel pressure.	*Repair or replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Defective CMP sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective GP switch.	*Replace.*
	Defective IAP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	TP sensor out of adjustment.	*Replace.*
	Defective STP sensor and/or STVA.	*Replace.*

Repair Instructions

Fuel Pressure Inspection

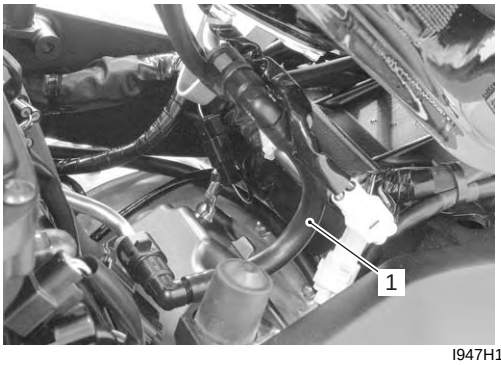
B947H11706001

⚠ 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:

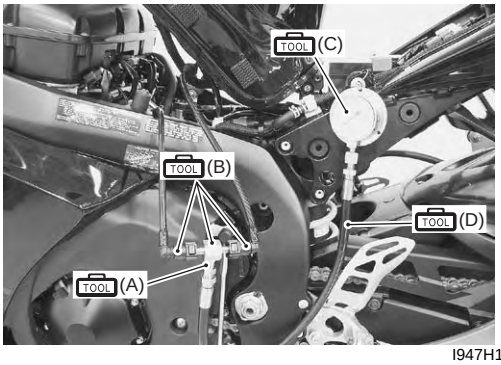
1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” (Page 1G-9).
2) Place a rag under the fuel feed hose (1) and remove the fuel feed hose.



I947H1170001-01

3) Install the special tools between the fuel pump and fuel delivery pipe.

Special tool
TOOL (A): 09940–40211 (Fuel pressure gauge adapter)
TOOL (B): 09940–40220 (Fuel pressure gauge attachment)
TOOL (C): 09915–77331 (Oil pressure gauge (1000 kPa))
TOOL (D): 09915–74521 (Adapter hose)



I947H1170021-01

4) Turn the ignition ON and check for fuel pressure.

Fuel pressure
Approx. 300 kPa (3.0 kgf/cm², 43 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 and release the fuel pressure slowly.

6) Reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation” (Page 1G-9).

NOTE

Connect the fuel feed hose to the fuel pump until it locks securely (a click is heard).

Fuel Pump Inspection

B947H11706002

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 TO sensor. Refer to “Fuel Pump Relay Inspection” (Page 1G-7) and “DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction” in Section 1A (Page 1A-68).
If the fuel pump relay, TO 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 Disassembly and Assembly” (Page 1G-11).

Fuel Discharge Amount Inspection

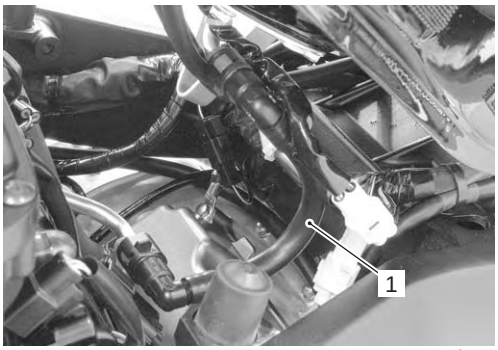
B947H11706003

⚠ WARNING

- **Keep away from fire or spark.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

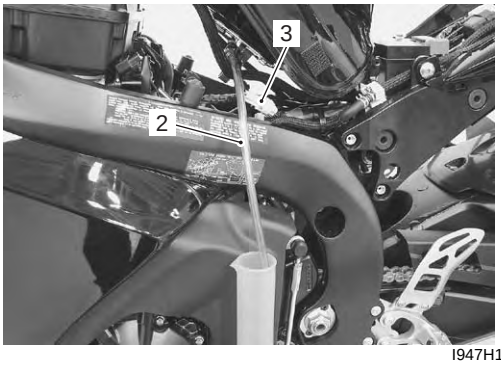
Inspect the fuel discharge amount in the following procedures:

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) and disconnect fuel feed hose from the fuel pump.



I947H1170002-01

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.
5) Disconnect the fuel pump lead wire coupler (3).



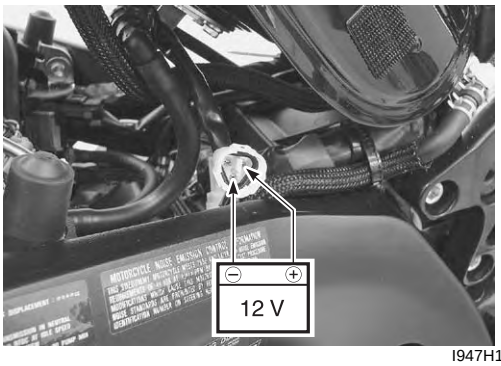
I947H1170022-01

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
222 ml (7.5/7.8 US/Imp oz) and more/10 seconds



I947H1170023-01

7) After finishing the fuel discharge inspection, reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation” (Page 1G-9).

NOTE

Connect the fuel feed hose to the fuel pump until it locks securely (a click is heard).

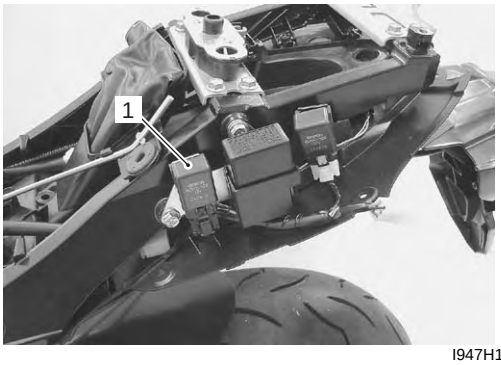
Fuel Pump Relay Inspection

B947H11706004

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

Inspect the fuel pump relay in the following procedures:

1) Remove the frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the fuel pump relay (1).

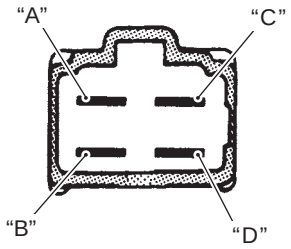


I947H1170024-01

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
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity test (•)))



I718H1170013-01

Fuel Hose Inspection

B947H11706005

Refer to “Fuel Line Inspection” in Section 0B (Page 0B-10).

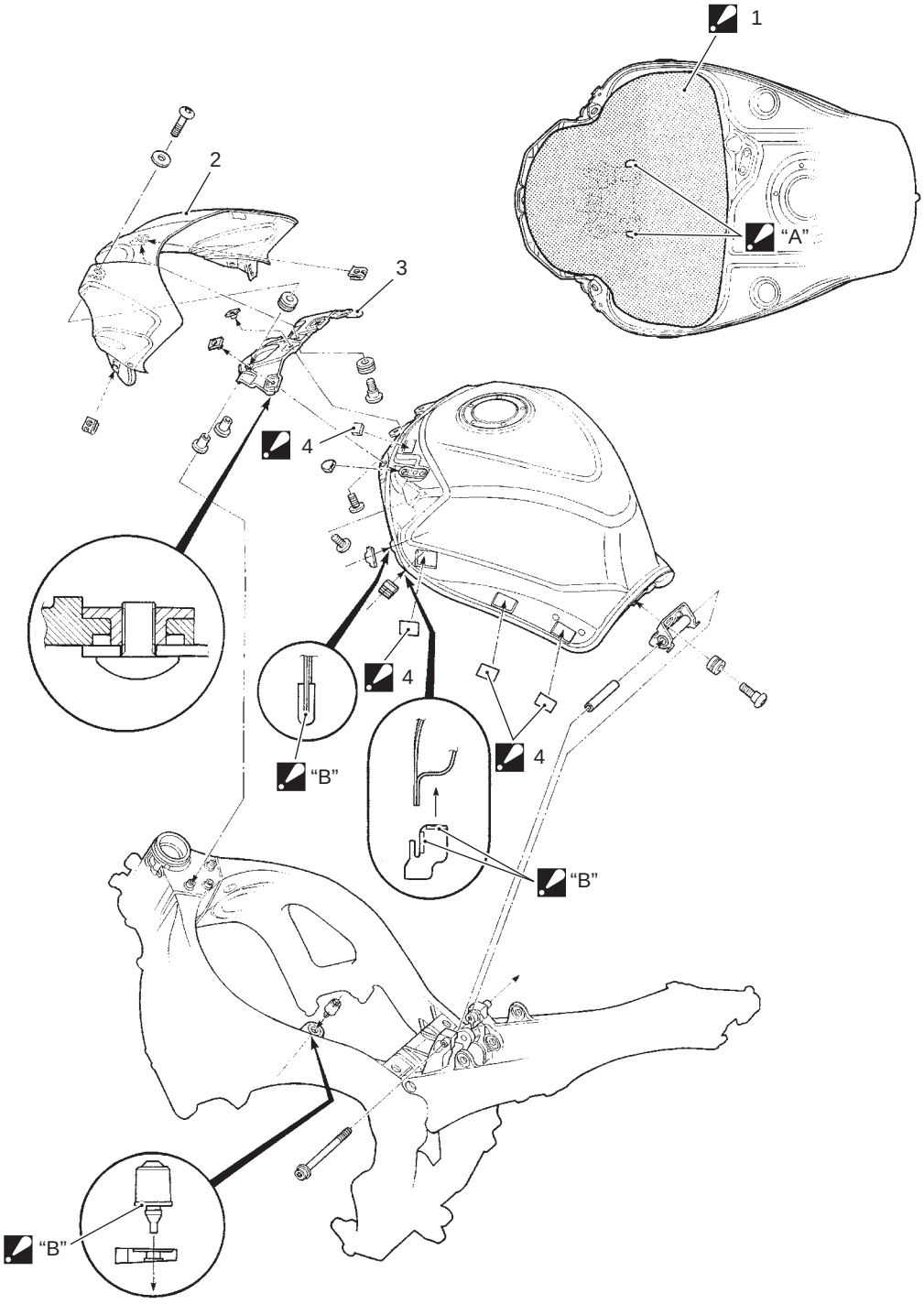
Fuel Level Gauge Inspection

B947H11706006

Refer to “Fuel Level Gauge Inspection” in Section 9C (Page 9C-5).

Fuel Tank Construction

B947H11706007



I947H1170025-02

1. Fuel tank heat shield : Aluminum film side should face the engine side.	3. Fuel tank front bracket	"A": Insert to the bracket.
2. Fuel tank front cover	4. Velcro fastenings : Clean the adhesive surface before adhering the velcro fastenings.	"B": Apply adhesive agent.

Fuel Tank Removal and Installation

B947H11706008

Removal

⚠ WARNING

- **Keep away from fire or spark.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

1) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Take out the fuel tank prop stay (1).

I947H1170026-01

3) Remove the bolts.

I947H1170003-02

4) Lift and support the fuel tank with the prop stay.

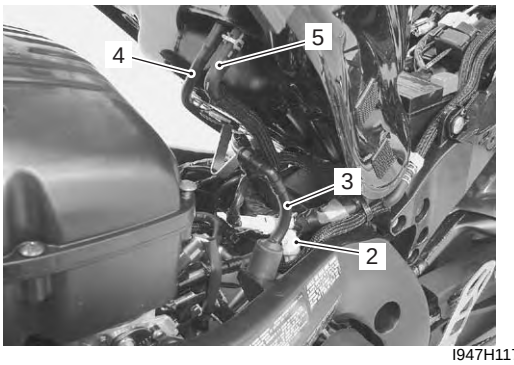
I947H1170027-01

5) Disconnect the fuel pump lead wire coupler (2).
6) Place a rag under the fuel feed hose (3) and disconnect the fuel feed hose from the fuel tank.

⚠ CAUTION

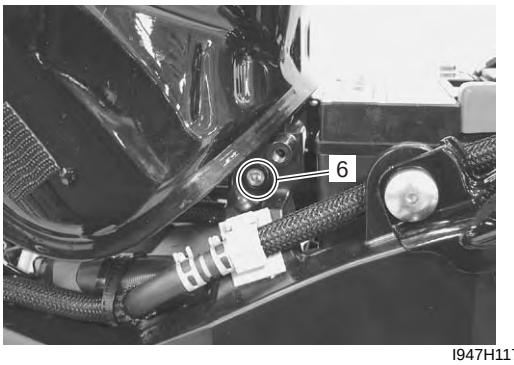
When removing the fuel tank, do not leave the fuel feed hose on the fuel pump side.

7) Disconnect the fuel tank drain hose (4).
8) Disconnect the surge hose (5). (For E-33)
9) Disconnect the fuel tank breather hose. (Except for E-33)



I947H1170028-01

10) Remove the fuel tank by removing its bracket bolt (6).



I947H1170029-01

Installation

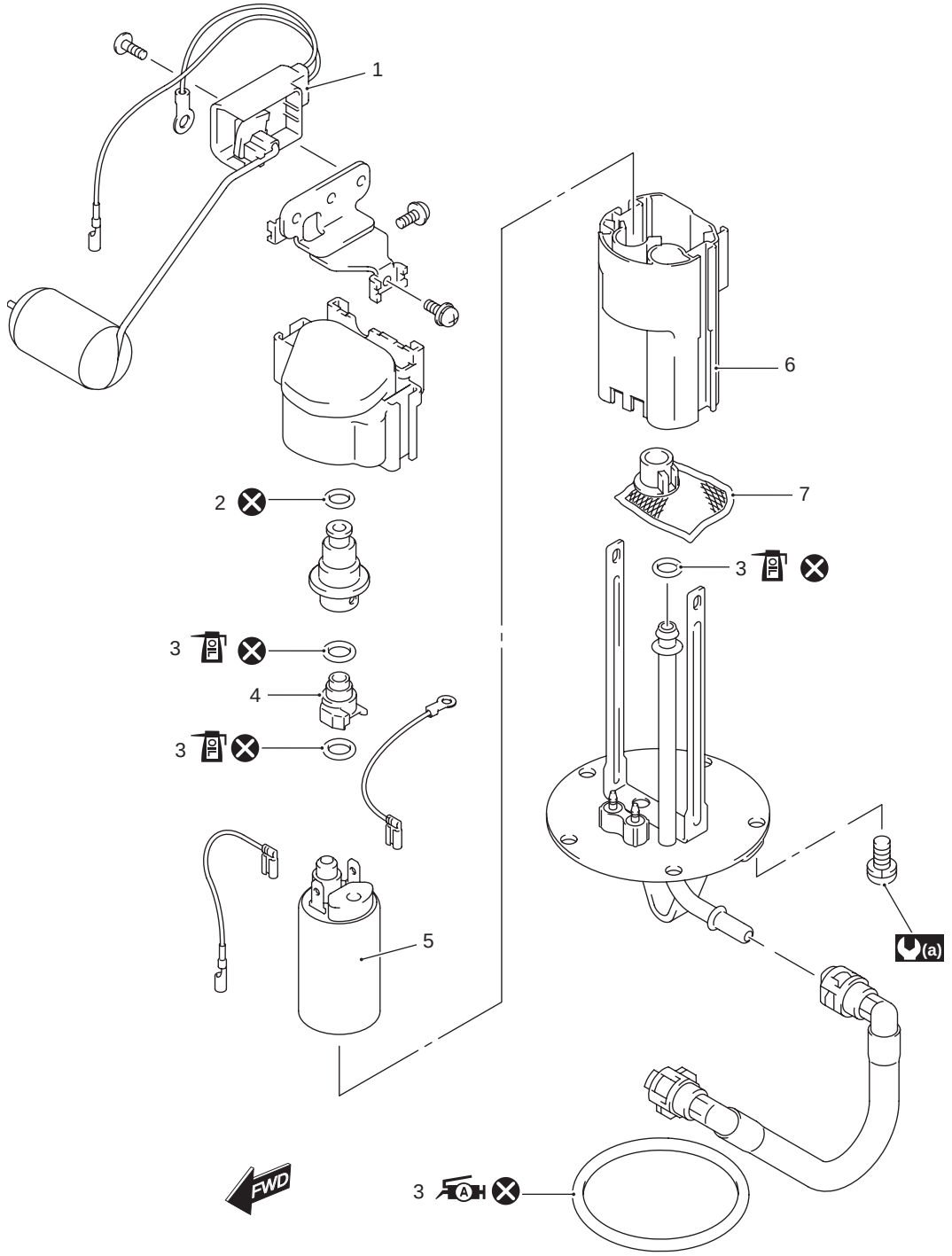
Install the fuel tank in the reverse order of removal. Pay attention to the following point:

NOTE

Connect the fuel feed hose to the fuel pump until it locks securely (a click is heard).

Fuel Pump Components

B947H11706009



I947H1170030-02

1. Fuel level gauge	4. Joint	7. Fuel mesh filter	: Apply grease.
2. Fuel pressure regulator assembly	5. Fuel pump	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	: Do not reuse.
3. O-ring	6. Fuel pump case	: Apply engine oil.	

Fuel Pump Disassembly and Assembly

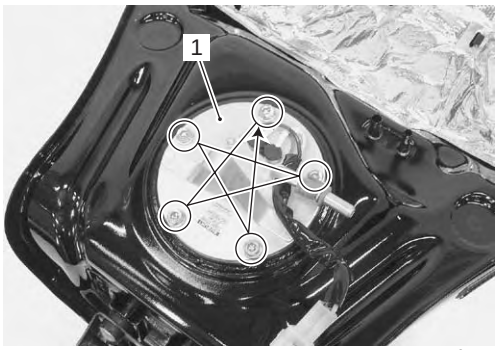
B947H11706010

Disassembly

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation” (Page 1G-9).
2) Remove the fuel pump assembly (1) by removing its mounting bolts diagonally.

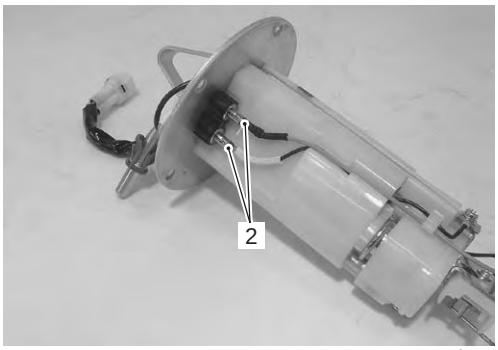
⚠ WARNING

- **Spilled gasoline should be wipe off immediately.**
- **Keep away from fire or spark.**
- **Work in a well-ventilated area.**



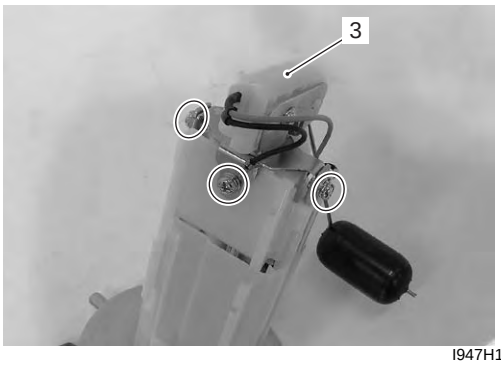
I947H1170004-01

3) Disconnect the lead wires (2).



I947H1170005-01

4) Remove the fuel level gauge (3).



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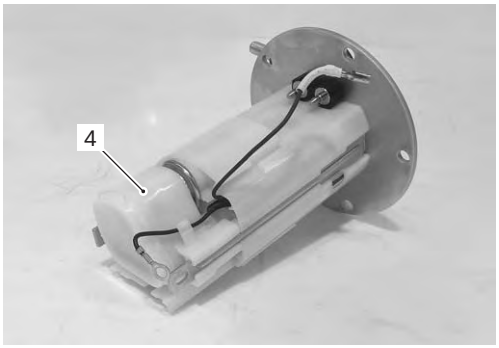
5) Remove the fuel pressure regulator assembly (4).

⚠ CAUTION

Never remove the fuel pressure regulator (5) from the holder.



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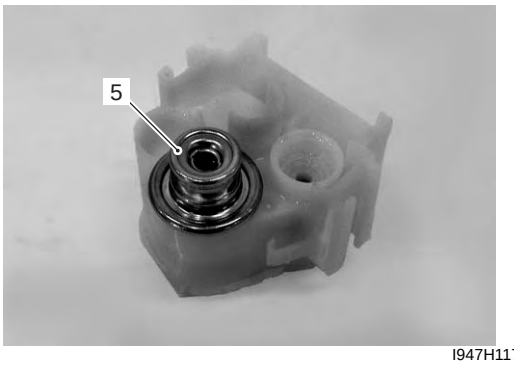

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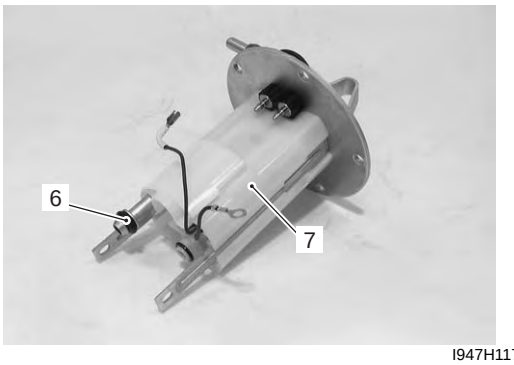
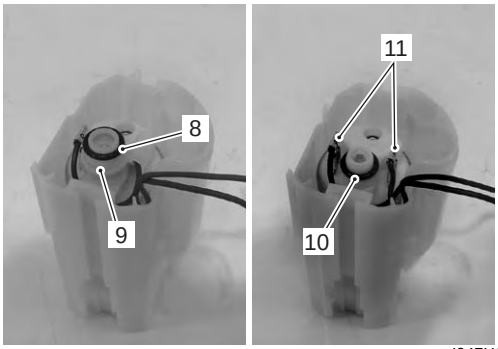
6) Remove the O-ring (6) and fuel pump case (7).



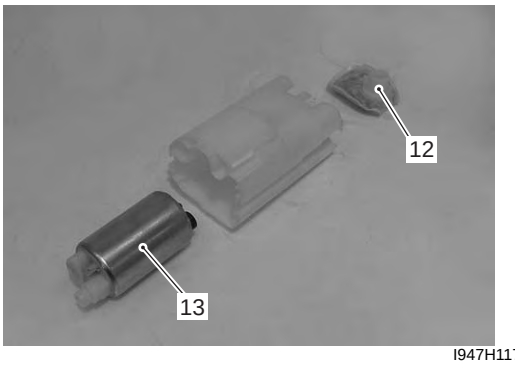
I947H1170009-01

7) Remove the O-ring (8) and joint (9).
8) Remove the O-ring (10) and lead wires (11).



I947H1170010-01

9) Remove the fuel mesh filter (12).
10) Remove the fuel pump (13).



I947H1170011-01

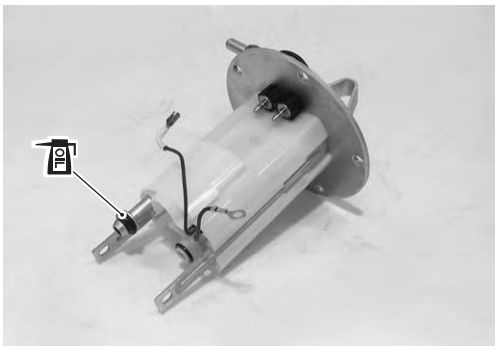
Assembly

Refer to “Fuel Mesh Filter Inspection and Cleaning” (Page 1G-13).

Assemble the fuel tank pump in the reverse order of the disassembly. Pay attention to the following points:

⚠ CAUTION

- **To prevent fuel leakage, the bushing and O-ring must be replaced with new ones.**
- **Apply engine oil lightly to the O-rings.**



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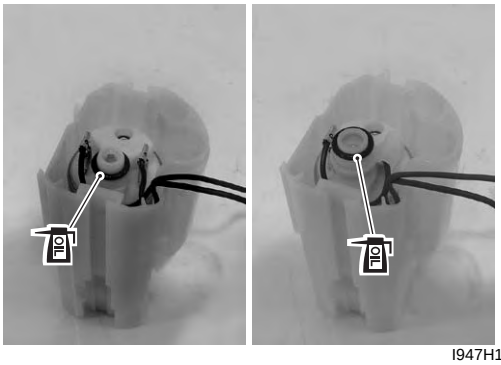

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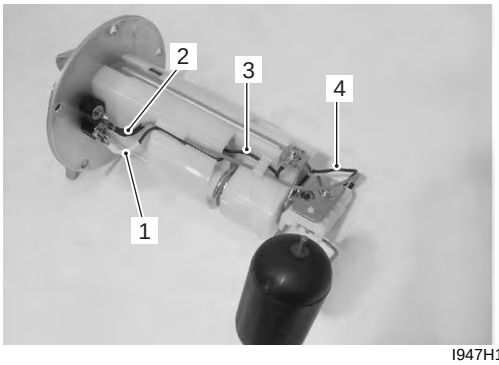
⚠ CAUTION

Connect all lead wires securely so as not to cause contact failure.



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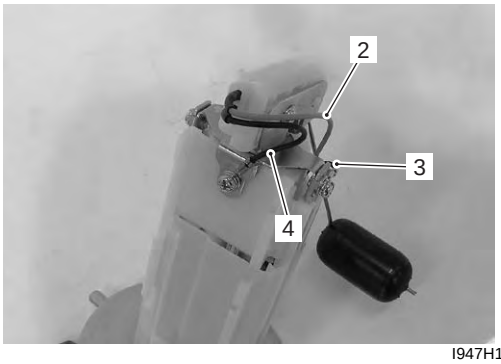


I947H1170018-01

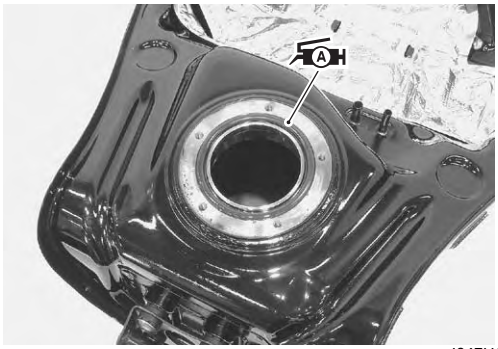
1.	Fuel pump (+) lead wire (Y/R)
2.	Fuel level gauge (+) lead wire (R/B)
3.	Fuel pump (–) lead wire (B/W)
4.	Fuel level gauge (–) lead wire (B/W)

- Install a new O-ring and apply grease to it.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

⚠ WARNING

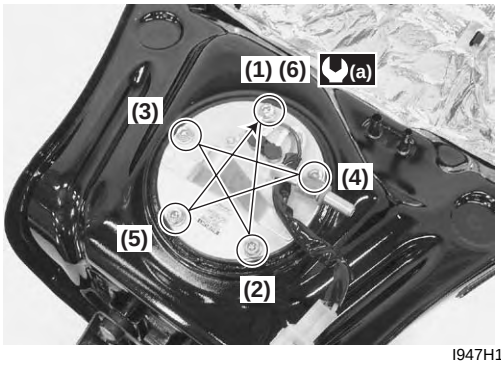
The O-ring must be replaced with a new one to prevent fuel leakage.



I947H1170015-01

- When installing the fuel pump assembly, first tighten all the fuel pump mounting bolts lightly and then to the specified torque in the ascending of numbers.

  Tightening torque
  Fuel pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1170016-01

Fuel Mesh Filter Inspection and Cleaning

B947H11706011

Inspect the fuel mesh filter in the following procedures:

1) Remove the fuel mesh filter. Refer to “Fuel Pump Disassembly and Assembly” (Page 1G-11).
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.

I947H1170017-01

3) After finishing the fuel mesh filter inspection, reinstall the fuel mesh filter. Refer to “Fuel Pump Disassembly and Assembly” (Page 1G-11).

Fuel Injector / Fuel Delivery Pipe / T-joint Removal and Installation

B947H11706012

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

Fuel Injector Inspection and Cleaning

B947H11706013

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 for evidence of dirt and contamination. If present, clean and check for presence of dirt in the fuel lines and fuel tank.

I947H1170031-01

3) Install the fuel injector. Refer to “Throttle Body Disassembly and Assembly” in Section 1D (Page 1D-11).

Specifications

Service Data

B947H11707001

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11 – 13 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	222 ml (7.5/7.8 US/Imp oz) and more/10 sec.	
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm^2, 43 psi)	

Fuel

Item	Specification		Note
Fuel type	Use only unleaded gasoline of at least 90 pump octane (R/2 + M/2). Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.		E-03, 14, 28, 33
	Gasoline used should be graded 95 octane (Research Method) or higher. Unleaded gasoline is recommended.		E-02, 19, 24, 51
Fuel tank capacity	Including reserve	16.5 L (4.4/3.6 US/Imp gal)	E-33
		17.5 L (4.6/3.8 US/Imp gal)	Others
	Fuel level indicator light lighting	Approx. 3.5 L (0.9/0.8 US/Imp gal)	

Tightening Torque Specifications

B947H11707002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Fuel pump mounting bolt	10	1.0	7.0	☞(Page 1G-13)

NOTE

The specified tightening torque is 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-9).

Special Tools and Equipment

Recommended Service Material

B947H11708001

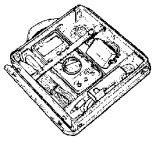
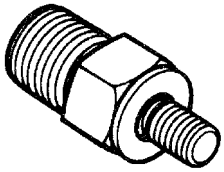
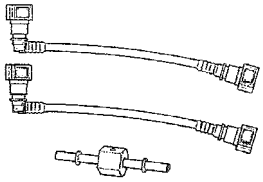
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 1G-12)

NOTE

Required service material is also described in the following.
“Fuel Pump Components” (Page 1G-10)

Special Tool

B947H11708002

09900–25008 Multi circuit tester set ☞(Page 1G-7) 	09915–74521 Adapter hose ☞(Page 1G-5) 
09915–77331 Oil pressure gauge (1000 kPa) ☞(Page 1G-5) 	09940–40211 Fuel pressure gauge adapter ☞(Page 1G-5) 
09940–40220 Fuel pressure gauge attachment ☞(Page 1G-5) 	

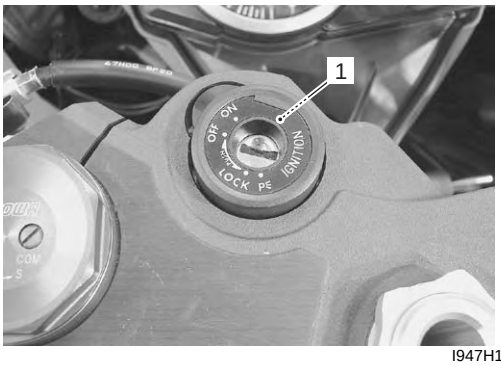
Ignition System

General Description

Immobilizer Description (For E-02, 19, 24, 51)

B947H11801001

The immobilizer, an anti-theft system, is installed as a standard equipment.
The immobilizer verifies that the key ID agrees with ECM ID by means of radio communication through the immobilizer antenna. When the ID agreement is verified, the system makes the engine ready to start.



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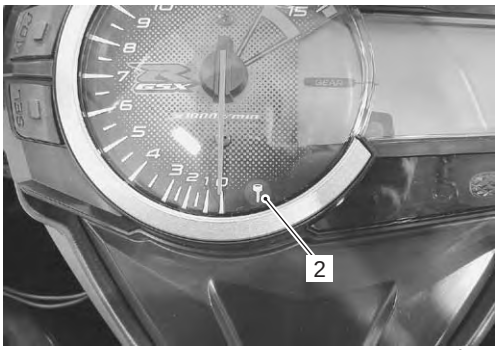
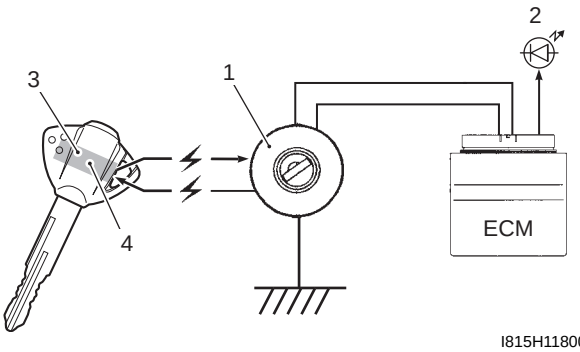


I947H1180002-01

1. Immobilizer antenna	2. Indicator light

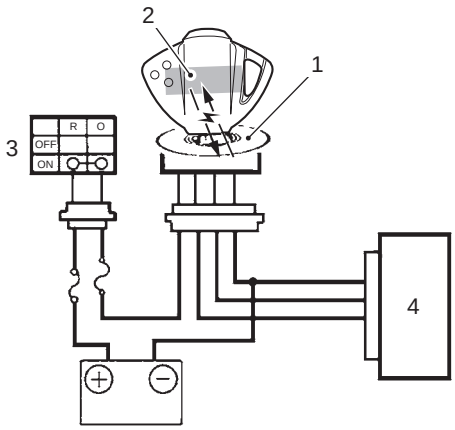


I815H1180002-02

1. Immobilizer antenna	3. Transponder
2. Indicator light	4. ID

Operation

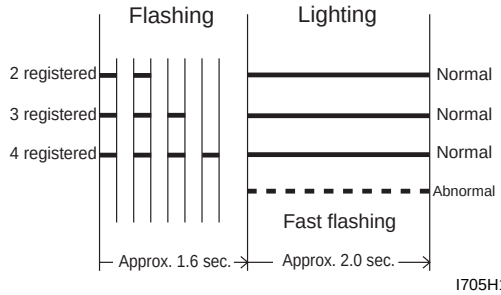
When the ignition switch is turned ON with the engine stop switch in ON, the immobi-antenna and ECM are powered ON.
The ECM transmits a signal to the transponder through the immobi-antenna in order to make comparison between the key ID and ECM ID.
With the signal received, the transponder transmits the key ID signal to ECM so that ECM can make comparison with its own ID, and if it matches, the engine is made ready to start.



I815H1180003-01

1. Immobilizer antenna	3. Ignition switch
2. Transponder	4. ECM

Also, when the ignition switch is turned ON, the indicator light flashes as many as the number of IDs registered in ECM. Thereafter, if the IDs are in agreement, the indicator light turns on for two seconds to notify of completion in successful communication.
If the indicator light (LED) flashes fast, it notifies of communication error or disagreement of ID.



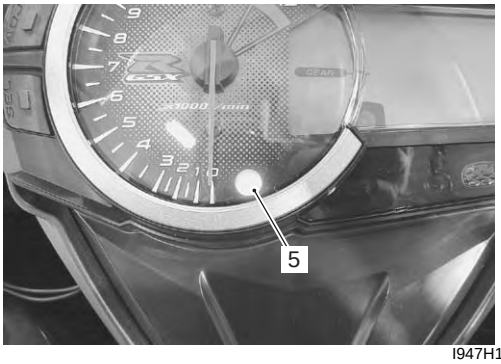
I705H1180006-01

NOTE

If the indicator light flashes fast, turn the ignition switch OFF then ON to make judgment again as there is possible misjudgment due to environmental radio interference.

⚠ CAUTION

When the battery performance is lowered in winter (low temperature), the system may at times makes a re-judgment at the time of beginning the starter motor operation. In this case, the indicator light operation starts immediately after the starter operation.



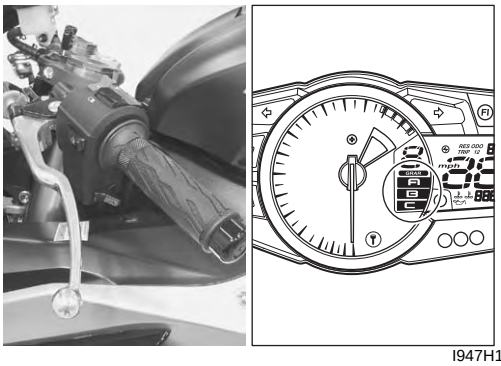
I947H1180003-01

5. Indicator light

Drive Mode Selector Description

B947H11801002

Engine power characteristics can be changed in 3 modes by operating the drive mode selector to meet various riding conditions and rider's preference.



I947H1180015-01

Operation

Drive mode is preset at A-mode when the ignition switch and engine stop switch are turned on. Follow the procedure below to operate drive mode selector.

1) Turn on the ignition switch and engine stop switch.
2) Push the drive mode selector UP "Λ" or DOWN "V" for 1 second until the drive mode indicator shows A.
3) Push the drive mode selector to change drive mode. Pushing the UP "Λ" switch can change from A to C to B to A. Pushing the DOWN "V" switch can change from A to B to C to A. The drive mode indicator indicates actual drive mode.

NOTE

- **Operating the drive mode selector while riding with the throttle opened will change the engine speed because of engine power characteristics change.**
- **Drive mode indicator blinks when drive mode change operation is failed.**
- **Turning off the ignition switch or engine stop switch will return the drive mode to A-mode. Start the engine and reset the drive mode.**

Drive Mode

A-mode

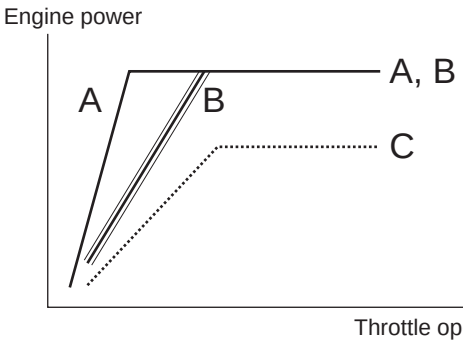
A-mode provides sharp throttle response at all throttle opening range to obtain maximum engine power.

B-mode

B-mode provides softer throttle response than A-mode up to middle throttle opening range.

C-mode

C-mode provides soft throttle response at all throttle opening range by reducing engine power.



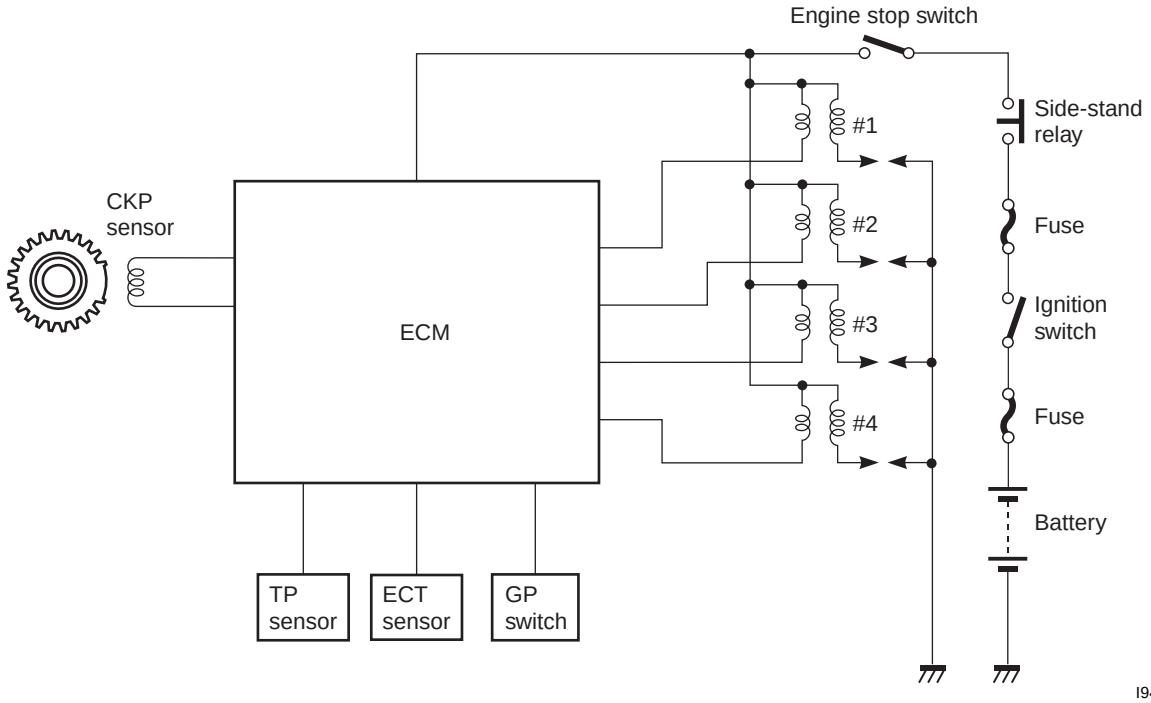
I838H1180001-01

Schematic and Routing Diagram

Ignition System Diagram

B947H11802001

Refer to “Wire Color Symbols” in Section 0A (Page 0A-5).



I947H1180004-01

Ignition System Components Location

B947H11802002

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

Diagnostic Information and Procedures

Ignition System Symptom Diagnosis

B947H11804001

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.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connections.	*Repair or replace.*
Engine stalls easily (No spark)	Fouled spark plugs.	*Clean or replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
Spark plug is wet or quickly becomes fouled with carbon	Excessively rich air/fuel mixture.	*Inspect FI system.*
	Excessively high idling speed.	*Inspect FI system.*
	Incorrect gasoline.	*Change.*
	Dirty air cleaner element.	*Clean or replace.*
	Incorrect spark plug (Cold type).	*Change to hot type spark plug.*
Spark plug quickly becomes fouled with oil or carbon	Worn piston rings.	*Replace.*
	Worn pistons.	*Replace.*
	Worn cylinders.	*Replace.*
	Excessive valve-stem to valve-guide clearance.	*Replace.*
	Worn valve stem oil seals.	*Replace.*
Spark plug electrodes overheat or burn	Incorrect spark plug (Hot type).	*Change to cold type spark plug.*
	Overheated engine.	*Tune-up.*
	Loose spark plugs.	*Tighten.*
	Excessively lean air/fuel mixture.	*Inspect FI system.*

No Spark or Poor Spark

B947H11804002

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.
2	Measure the battery voltage between input lead wires at the ECM with the ignition switch in the “ON” position. (E-02, 19, 24, 51: O/G and B/W, E-03, 14, 28, 33: O/W and B/W) *Is the voltage OK?*	Go to Step 3.	• Faulty ignition switch. • Faulty turn signal/ side-stand relay. • Faulty engine stop switch. • Broken wire harness or poor connection of related circuit couplers.
3	Measure the ignition coil primary peak voltage. Refer to “Ignition Coil Inspection” (Page 1H-7). **NOTE** **This inspection method is applicable only with the multi-circuit tester and the peak volt adaptor.** *Is the peak voltage OK?*	Go to Step 4.	Go to Step 5.
4	Inspect the spark plugs. Refer to “Spark Plug Inspection and Cleaning” in Section 0B (Page 0B-9). *Is the spark plug(-s) OK?*	Go to Step 5.	Faulty spark plug(-s).
5	Inspect the ignition coil. Refer to “Ignition Coil Inspection” (Page 1H-7). *Is the ignition coil OK?*	Go to Step 6.	• Faulty ignition coil. • Poor connection of the ignition coil.
6	Measure the CKP sensor peak voltage and its resistance. Refer to “CKP Sensor Inspection” (Page 1H-9). **NOTE** **The CKP sensor peak voltage inspection is applicable only with the multi-circuit tester and peak volt adaptor.** *Are the peak voltage and resistance OK?*	• Faulty ECM. • Open or short circuit in wire harness. • Poor connection of ignition couplers.	• Faulty CKP sensor. • Metal particles or foreign material being stuck on the CKP sensor and rotor tip.

Repair Instructions

Ignition Coil and Spark Plug Removal and Installation

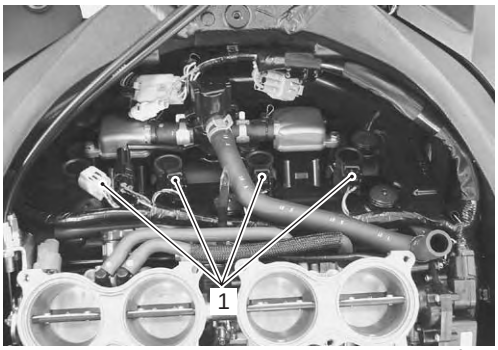
B947H11806001

Removal

⚠ WARNING

The hot engine can burn you.
Wait until the engine is cool enough to touch.

1) Turn the ignition switch OFF.
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
3) Disconnect the lead wire couplers (1).



I947H1180005-03

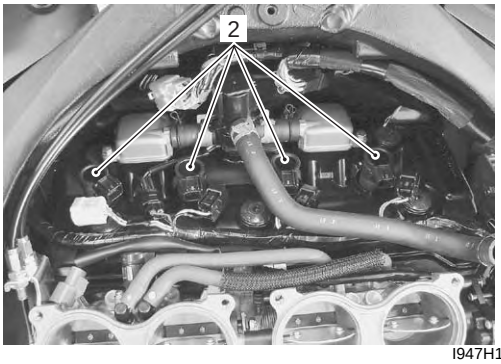
⚠ CAUTION

Disconnect the lead wire coupler before removing the ignition coil to avoid lead wire coupler damage.

4) Remove the ignition coils (2).

⚠ CAUTION

- **Do not pry up the ignition coil with a screwdriver or a bar to avoid its damage.**
- **Be careful not to drop the ignition coil to prevent short/open circuit.**



I947H1180006-02

5) Remove the spark plugs with the spark plug wrench.

Special tool
TOOL (A): 09930–10121 (Spark plug wrench set)

I947H1180007-03

Installation

Install the spark plugs in the reverse order of removal. Pay attention to the following points:

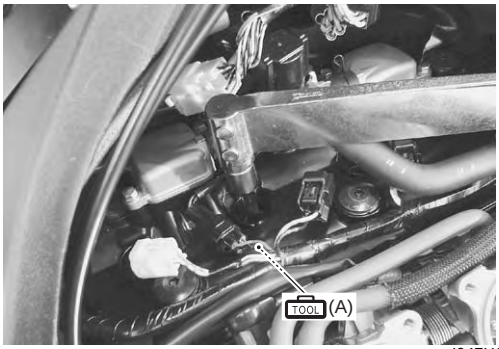
- Screw the spark plugs into the cylinder head with fingers, and then tighten them to the specified torque.

⚠ 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
TOOL (A): 09930–10121 (Spark plug wrench set)

Tightening torque
Spark plug: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

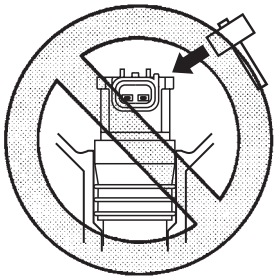


I947H1180008-03

- Install the ignition coil and connect their lead wire couplers.

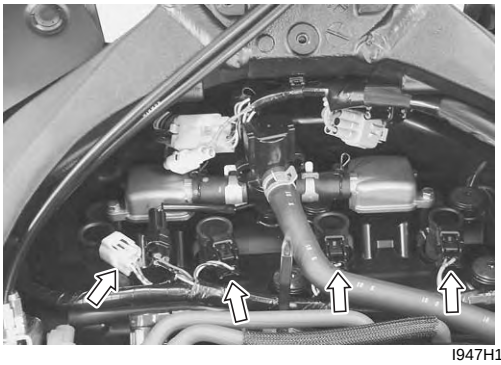
⚠ CAUTION

Do not hit the ignition coil with a plastic hammer when installing it.



INCORRECT

I718H1180012-01



I947H1180009-03

Spark Plug Inspection and Cleaning

B947H11806002

Refer to “Spark Plug Inspection and Cleaning” in Section 0B (Page 0B-9).

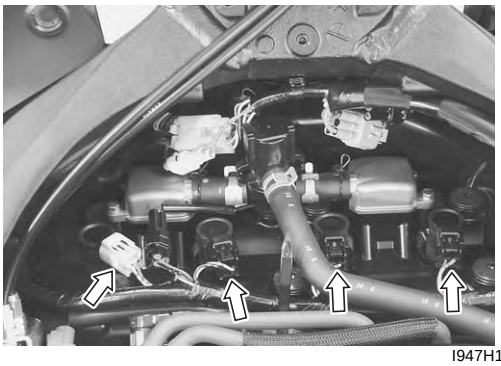
Ignition Coil Inspection

B947H11806003

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

Ignition Coil Primary Peak Voltage

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Disconnect all ignition coil. Refer to “Ignition Coil and Spark Plug Removal and Installation” (Page 1H-6).



I947H1180010-03

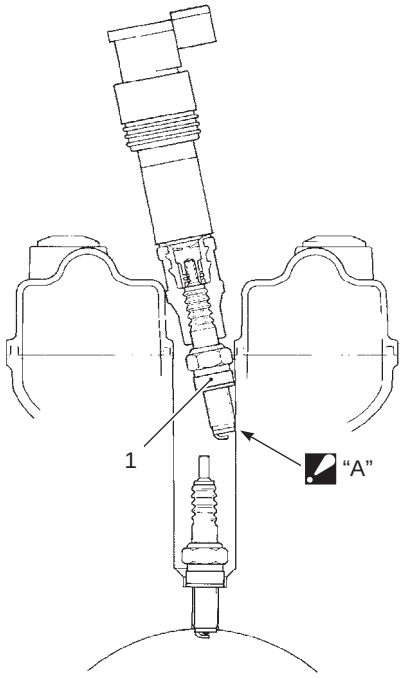
3) Connect the new spark plugs to each ignition coil.
4) Connect all the ignition coil lead wire couplers to the ignition coil respectively, and ground them on the cylinder head (each spark plug hole).

⚠ CAUTION

Avoid grounding the spark plugs and suppling the electrical shock to the cylinder head cover (magnesium parts) to prevent the magnesium material from damage.

NOTE

Be sure that all the spark plugs are connected properly and the battery used is in fully-charged condition.



I823H1180011-02

1.	New spark plug
“A”:	Contact the spark plug to the cylinder head.

5) Insert the needle pointed probe to the lead wire coupler.

⚠ CAUTION

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.

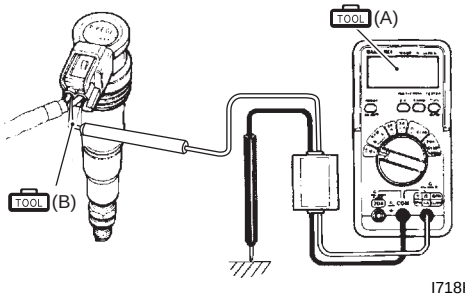
⚠ CAUTION

Before using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)
TOOL (B): 09900–25009 (Needle-point probe set)

Tester knob indication: Voltage (⎓)

	(+) Probe	(–) Probe
Ignition coil #1	W/Bl wire terminal	Ground
Ignition coil #2	Black wire terminal	Ground
Ignition coil #3	Yellow wire terminal	Ground
Ignition coil #4	Green wire terminal	Ground



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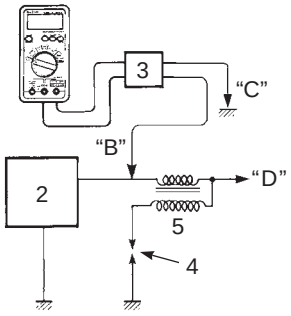


I823H1180026-01

2. ECM	"B": (+) probe
3. Peak voltage adaptor	"C": (–) probe
4. New spark plug	"D": To engine stop switch
5. Ignition coil	

7) Measure the ignition coil primary peak voltage in the following procedures:

⚠ 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 several times and measure the highest peak voltage.
If the voltage is lower than standard range, inspect the ignition coil 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.

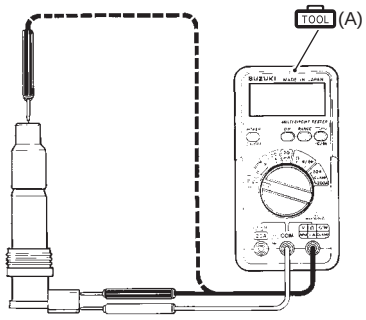
Ignition Coil Resistance

1) Remove the ignition coil. Refer to “Ignition Coil and Spark Plug Removal and Installation” (Page 1H-6).
2) Measure the ignition coil for resistance in both primary and secondary coils. If the resistance is not within the standard range, replace the ignition coil with a new one.

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)

Tester knob indication
Resistance (Ω)

Ignition coil resistance
Primary: 1.1 – 1.9 Ω ((+) terminal – (–) terminal)
Secondary: 6.4 – 9.6 kΩ (Spark plug cap – (–) terminal)



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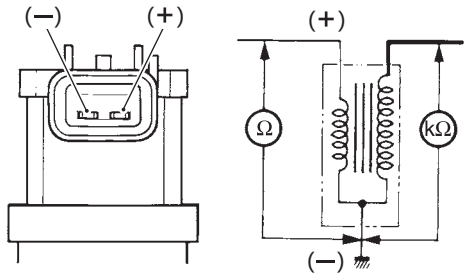


I718H1180006-01

3) After measuring the ignition coil resistance, reinstall the removed parts.

CKP Sensor Inspection

B947H11806004

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

CKP Sensor Peak Voltage

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Disconnect the CKP sensor coupler (1).

NOTE

Be sure that all of the couplers are connected properly and the battery is fully-charged.

I947H1180011-02

3) Connect the multi-circuit tester with the peak volt adaptor as follows.

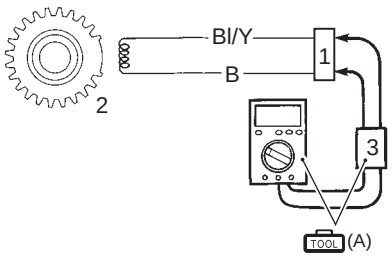
⚠ CAUTION

Before using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)

Tester knob indication: Voltage (⎓)

CKP sensor	(+) Probe	(–) Probe
	B	Bl/Y



I947H1180020-01

1. CKP sensor coupler	3. Peak voltage adaptor
2. CKP sensor	

4) Measure the CKP sensor peak voltage in the following procedures:
   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.
5) Repeat the b) procedure several times and measure the highest CKP sensor peak voltage.

CKP sensor peak voltage
0.5 V and more (B – Bl/Y)

6) 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.

7) After measuring the CKP sensor peak voltage, connect the CKP sensor coupler.

CKP Sensor Resistance

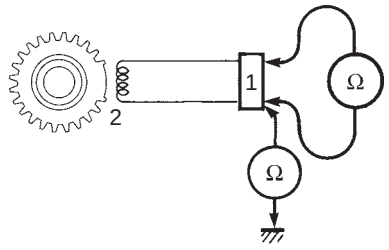
1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Disconnect the CKP sensor coupler (1).

I947H1180012-02

3) 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-10).

Tester knob indication
Resistance (Ω)

CKP sensor resistance
142 – 194 Ω (B – Bl/Y)
∞ Ω (B – Ground)



I837H1180011-01

1. CKP sensor coupler	2. CKP sensor

4) After measuring the CKP sensor resistance, connect the CKP sensor coupler.
5) Reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).

CKP Sensor Removal and Installation

B947H11806005

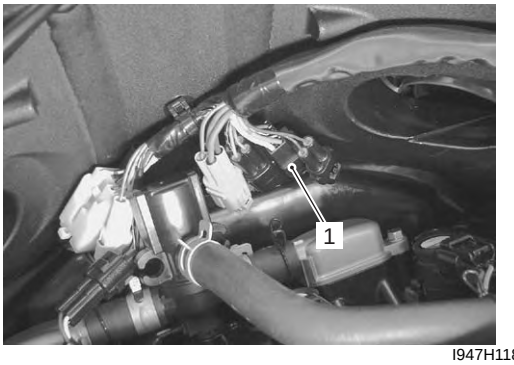
Refer to “Generator Removal and Installation” in Section 1J (Page 1J-4).

Engine Stop Switch Inspection

B947H11806006

Inspect the engine stop switch in the following procedures:

1) Turn the ignition switch OFF.
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
3) Disconnect the right handlebar switch coupler (1).



I947H1180013-01

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 “Handlebar Removal and Installation” in Section 6B (Page 6B-2).

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity (•))))

Color / Position	O/B	O/W
OFF (⊗)		
RUN (◯)	○———	———○

I815H1180012-01

5) After finishing the engine stop switch inspection, reinstall the removed parts.

Ignition Switch Inspection

B947H11806007

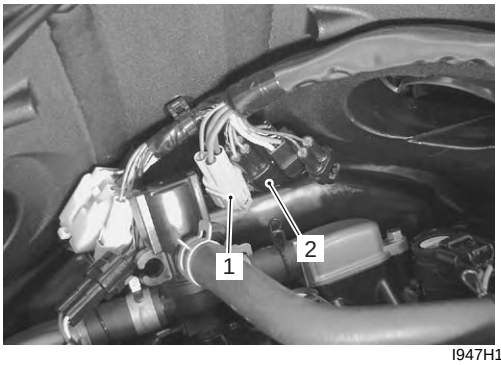
Refer to “Ignition Switch Inspection” in Section 9C (Page 9C-7).

Ignition Switch Removal and Installation

B947H11806008

Removal

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Disconnect the ignition switch lead wire coupler (1).
3) Disconnect the immobilizer lead wire coupler (2). (For E-02, 19, 24, 51)



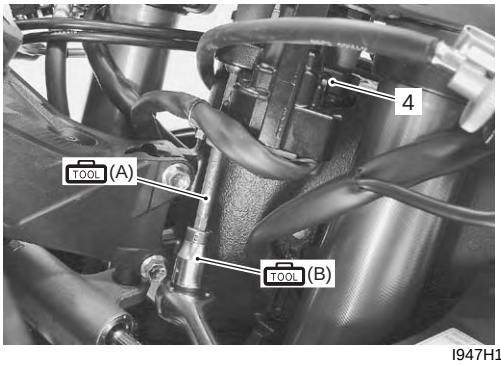
I947H1180014-01

4) Remove the harness clamp (3).

I947H1180016-01

5) Remove the ignition switch (4) with the special tools.

Special tool
TOOL (A): 09930–11920 (Torx bit (JT40H))
TOOL (B): 09930–11940 (Torx bit holder)



I947H1180017-01

Installation

Install the ignition switch in the reverse order of removal. Pay attention to the following points:

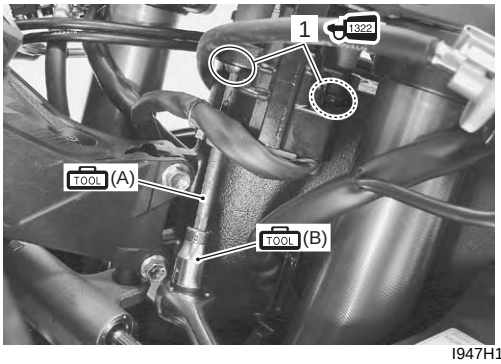
- Tighten the ignition switch mounting bolts (1), right and left with the special tools.

⚠ CAUTION

When reusing the ignition switch bolts, clean the threaded part and apply a thread lock to them.

Special tool
TOOL (A): 09930–11920 (Torx bit (JT40H))
TOOL (B): 09930–11940 (Torx bit holder)

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



I947H1180018-01

Drive Mode Selector Inspection

B947H11806009

Inspect the drive mode selector in the following procedures:

1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
2) Turn the ignition switch ON.
3) Click “Data monitor”.
4) Make sure each of “Driving mode selection” on the monitor is indicated “Open”.

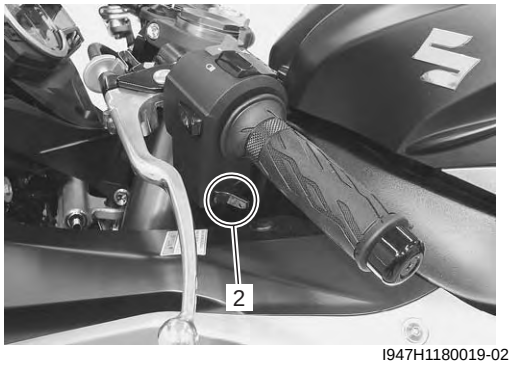
☐ Tip over sensor	Off	
☐ Driving mode selection 1	Open	
☐ Driving mode selection 2	Open	
☐ Steering damper solenoid ampere	0.0	A

I947H1180021-01

5) Push each of drive mode selector (1) and (2). At this time, if the indication is changed to “GND”, the function is normal.

☐ Tip over sensor	Off	
☐ Driving mode selection 1	GND	
☐ Driving mode selection 2	Open	
☐ Steering damper solenoid ampere	0.0	A

☐ Tip over sensor	Off	
☐ Driving mode selection 1	Open	
☐ Driving mode selection 2	GND	
☐ Steering damper solenoid ampere	0.0	A



I947H1180019-02

Specifications

Service Data

B947H11807001

Electrical

Unit: mm (in)

Item	Specification		Note
Firing order	1 · 2 · 4 · 3		
Spark plug	Type	NGK: CR9EIA-9 DENSO: IU27D	
	Gap	0.8 – 0.9 (0.031 – 0.035)	
Spark performance	Over 8 (0.3) at 1 atm.		
CKP sensor resistance	142 – 194 Ω		
CKP sensor peak voltage	0.5 V and more		When cranking
Ignition coil resistance	Primary	1.1 – 1.9 Ω	Terminal – Terminal
	Secondary	6.4 – 9.6 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage	80 V and more		When cranking

Tightening Torque Specifications

B947H11807002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Spark plug	11	1.1	8.0	☞(Page 1H-6)

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

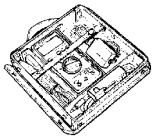
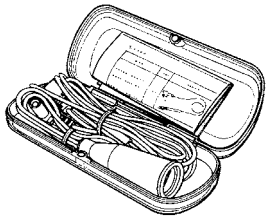
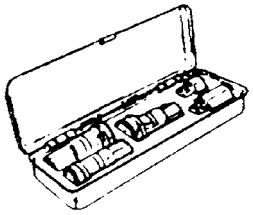
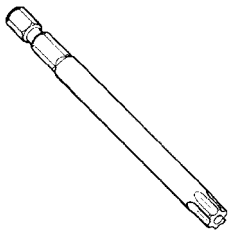
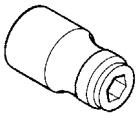
Recommended Service Material

B947H11808001

Material	SUZUKI recommended product or Specification		Note
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 1H-11)

Special Tool

B947H11808002

09900–25008 Multi circuit tester set ☞(Page 1H-8) / ☞(Page 1H-9) / ☞(Page 1H-9) / ☞(Page 1H-10) 	09900–25009 Needle-point probe set ☞(Page 1H-8) 
09930–10121 Spark plug wrench set ☞(Page 1H-6) / ☞(Page 1H-6) 	09930–11920 Torx bit (JT40H) ☞(Page 1H-11) / ☞(Page 1H-11) 
09930–11940 Torx bit holder ☞(Page 1H-11) / ☞(Page 1H-11) 	

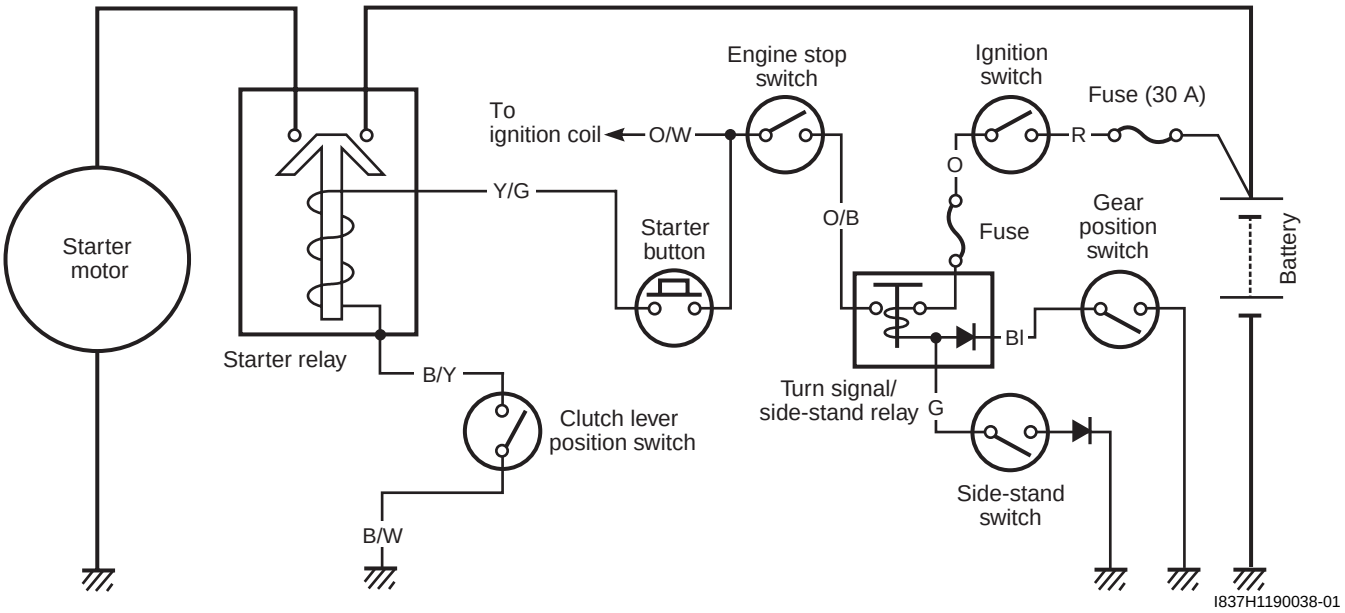
Starting System

Schematic and Routing Diagram

Starting System Diagram

B947H11902001

Refer to “Wire Color Symbols” in Section 0A (Page 0A-5).



Component Location

Starting System Components Location

B947H11903001

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

Diagnostic Information and Procedures

Starting System Symptom Diagnosis

B947H11904001

Condition	Possible cause	Correction / Reference Item
Engine does not turn though the starter motor runs	Faulty starter clutch.	*Replace.*
Starter button is not effective	Run down battery.	*Repair or replace.*
	Defective switch contacts.	*Replace.*
	Brushes not seating properly on starter motor commutator.	*Repair or replace.*
	Defective starter relay or starter interlock switch.	*Replace.*
	Defective main fuse.	*Replace.*

Starter Motor Will Not Run

B947H11904002

NOTE

Make sure the fuses are not blown and the battery is fully-charged before diagnosing.

Troubleshooting

Step	Action	Yes	No
1	1) Shift the transmission into neutral. 2) 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. *Is the 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?*	• Faulty starter relay. • Loose or disconnected starter motor lead wire. • Loose or disconnected between starter relay and battery (+) terminal.	Faulty starter motor.
3	Measure the starter relay voltage at the starter relay terminal (between Y/G (+) and B/Y (–)) when the starter button is pushed. *Is the voltage OK?*	Go to Step 4.	• Faulty ignition switch. • Faulty engine stop switch. • Faulty clutch lever position switch. • Faulty gear position switch. • Faulty turn signal/ side-stand relay. • Faulty starter button. • Faulty side-stand switch. • Poor contact of the coupler. • Open circuit in wire harness.
4	Check the starter relay. Refer to “Starter Relay Inspection” (Page 1I-6). *Is the starter relay OK?*	Poor contact of the starter relay.	Faulty starter relay.

Starter Motor Runs But Does Not Crank The Engine

B947H11904003

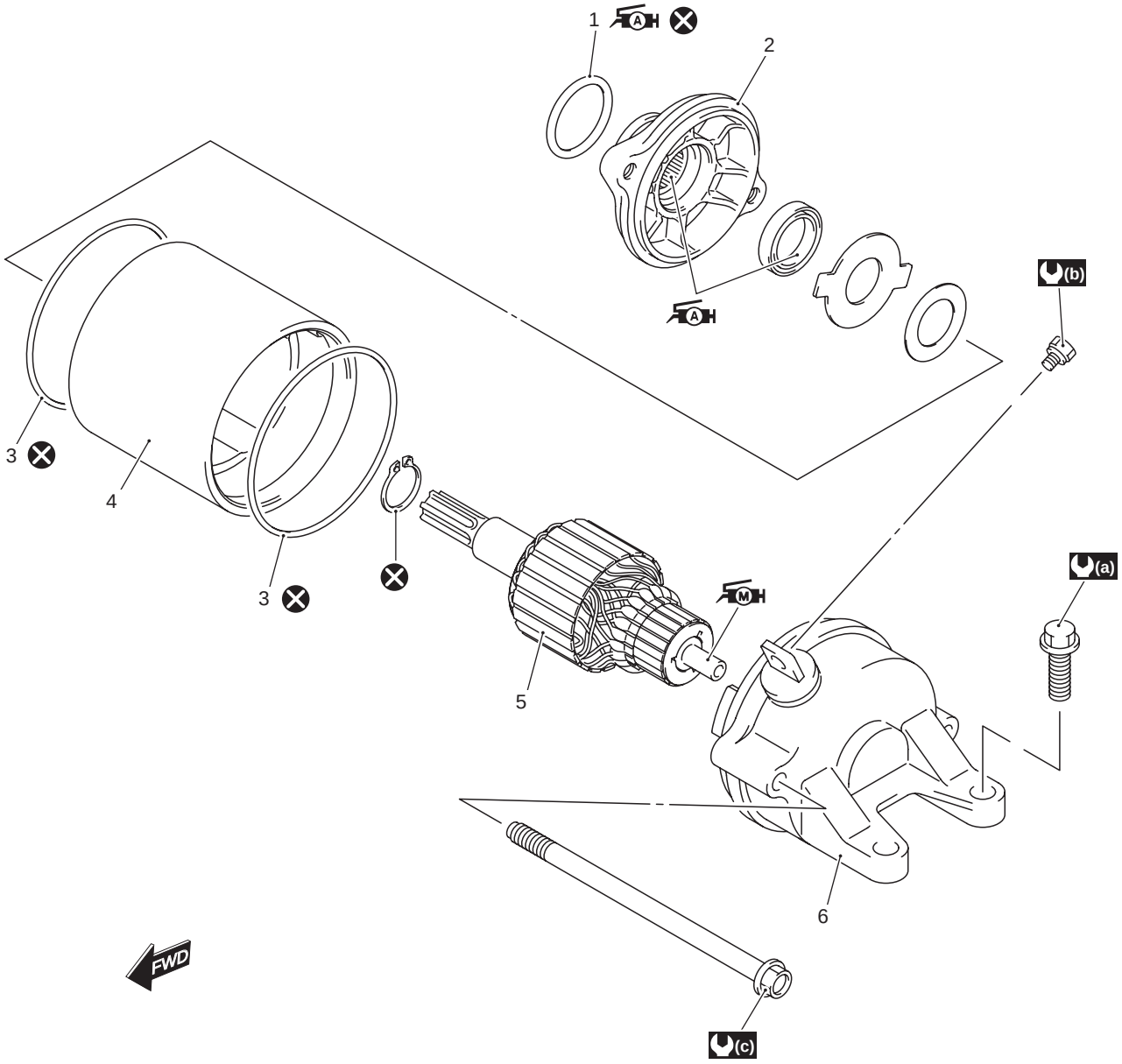
The starter motor runs when the transmission is in neutral, but does not run when the transmission is in any position other than neutral, with the side-stand up.

Step	Action	Yes	No
1	Check the side-stand switch. Refer to “Side-stand / Ignition Interlock System Parts Inspection” (Page 1I-7). *Is the side-stand switch OK?*	Go to Step 2.	Faulty side-stand switch.
2	Check the starter clutch. Refer to “Starter Clutch Removal and Installation” (Page 1I-10). *Is the starter clutch OK?*	• Open circuit in wire harness. • Poor contact of connector.	Faulty starter clutch.

Repair Instructions

Starter Motor Components

B947H11906001



I947H1190032-02

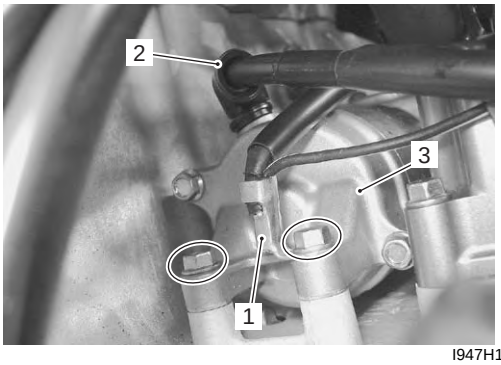
1. O-ring	5. Armature	(c) : 5 N·m (0.5 kgf-m, 3.5 lbf-ft)
2. Housing end (Inside)	6. Housing end (Outside)	A : Apply grease to sliding surface.
3. O-ring	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	M : Apply moly paste to sliding surface.
4. Starter motor case	(b) : 4 N·m (0.4 kgf-m, 3.0 lbf-ft)	: Do not reuse.

Starter Motor Removal and Installation

B947H11906002

Removal

1) Turn the ignition switch OFF and disconnect the battery (–) lead wire (1).
2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
3) Disconnect the starter motor lead wire (2).
4) Remove the starter motor (3).



I947H1190001-02

Installation

Install the starter motor in the reverse order of removal. Pay attention to the following points:

- Apply grease to the O-ring.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

⚠ CAUTION

Replace the O-ring with a new one.

I947H1190002-01

- Install the starter motor. Refer to “Wiring Harness Routing Diagram” in Section 9A (Page 9A-7).

Starter Motor Disassembly and Assembly

B947H11906003

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.

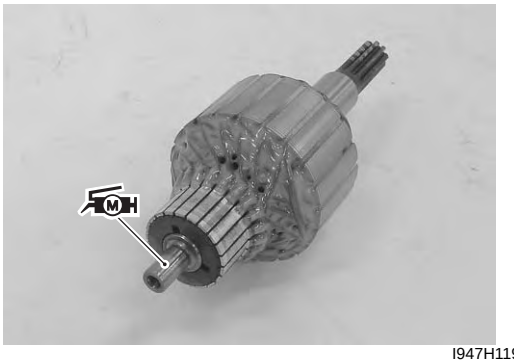
- Apply grease to the bearing and lip of the oil seal.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

I947H1190004-01

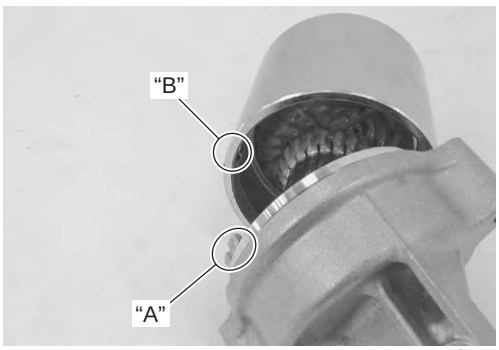
- Apply a small quantity of moly paste to the armature shaft.

: Moly paste 99000–25140 (SUZUKI MOLY PASTE or equivalent)



I947H1190005-01

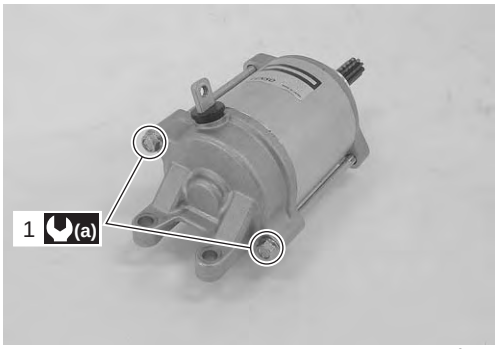
- Fit the depression “A” on the housing end to the projection “B” on the case.



I947H1190006-01

- Tighten the starter motor housing bolts (1) to the specified torque.

  Tightening torque
  Starter motor housing bolt (a): 5 N·m (0.5 kgf-m, 3.5 lbf-ft)



I947H1190007-02

Starter Motor Inspection

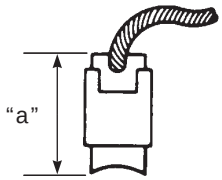
B947H11906004

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 than the service limit, replace the housing end assembly (outside) with a new one.

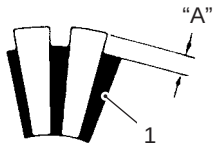
Brush length “a”
Service limit: 3.5 mm (0.14 in)

Special tool
TOOL : 09900–20102 (Vernier calipers (200 mm))



I837H1190008-01

Commutator
Inspect the commutator for discoloration, abnormal wear or undercut “A”.
If the commutator is abnormally worn, replace the armature assembly.
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.

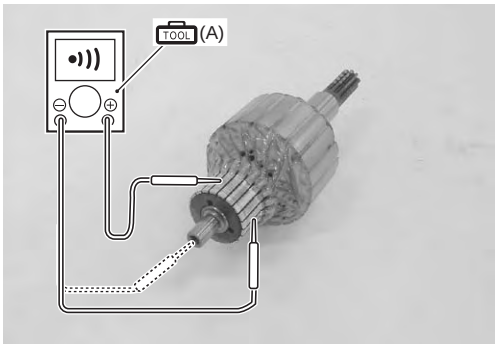


I823H1190007-01

Armature Coil
Inspect for continuity between each segment.
Inspect 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 assembly with a new one.

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity set (•))))



I947H1190008-01

Bearing
Check the bearings for damage.
If any damage is found, replace the housing end.

I947H1190009-01

Oil Seal
Check the seal lip for damage.
If any damage is found, replace the housing end.

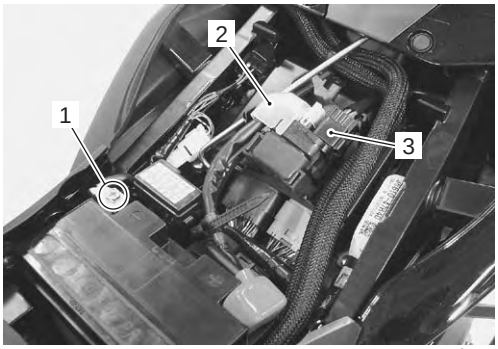
I947H1190010-01

Starter Relay Removal and Installation

B947H11906005

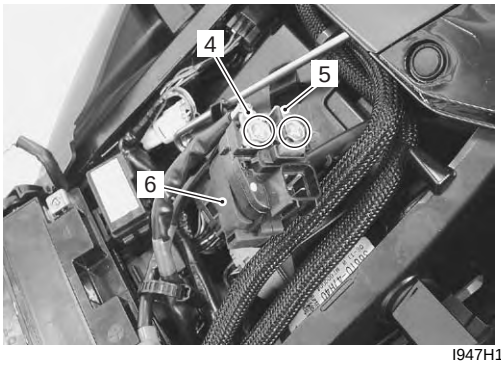
Removal

1) Turn the ignition switch OFF.
2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Disconnect the battery (–) lead wire (1) from the battery.
4) Remove the starter relay cover (2) and disconnect the starter relay coupler (3).



I947H1190011-03

5) Disconnect the starter motor lead wire (4) and battery (+) lead wire (5).
6) Remove the starter relay (6).



I947H1190027-01

Installation
Install the starter relay in the reverse order of removal.

Starter Relay Inspection

B947H11906006

Inspect the starter relay in the following procedures:

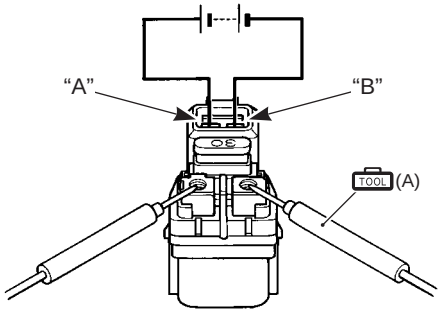
1) Remove the starter relay. Refer to “Starter Relay Removal and Installation” (Page 1I-6).
2) Apply 12 V to “A” and “B” terminals and check for continuity between the positive and negative terminals using the multi-circuit tester. If the starter relay clicks and continuity is found, the relay is ok.

⚠ 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
TOOL (A): 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity test (•))))



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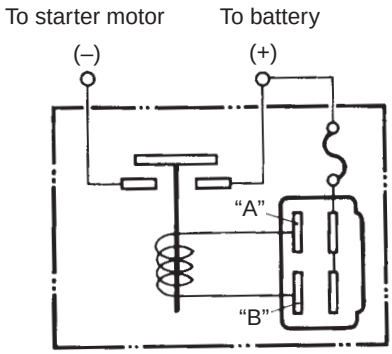
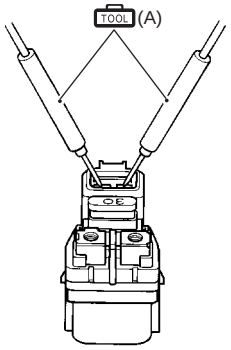


I823H1190040-02

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
TOOL (A): 09900–25008 (Multi circuit tester set)

Starter relay resistance
3 – 6 Ω



I649G1190023-03

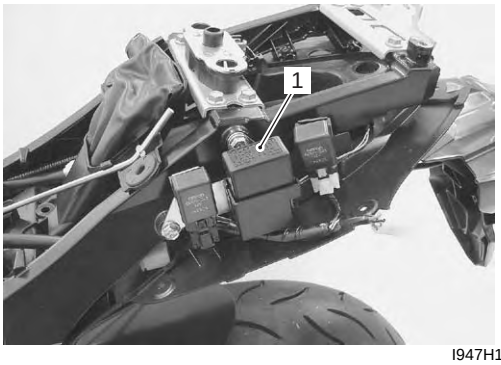
4) Install the starter relay. Refer to “Starter Relay Removal and Installation” (Page 1I-6).

Turn Signal / Side-stand Relay Removal and Installation

B947H11906007

Removal

1) Turn the ignition switch OFF.
2) Remove the frame cover assembly. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Remove the turn signal/side-stand relay (1).



I947H1190028-01

Installation

Install the turn signal/side-stand relay in the reverse order of removal.

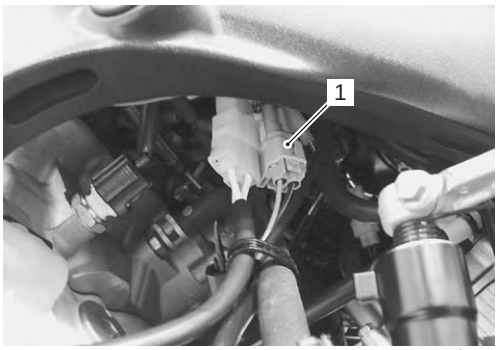
Side-stand / Ignition Interlock System Parts Inspection

B947H11906008

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.
2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Disconnect the side-stand switch coupler (1).



I947H1190012-01

4) Measure the voltage between G and B/W lead wires.

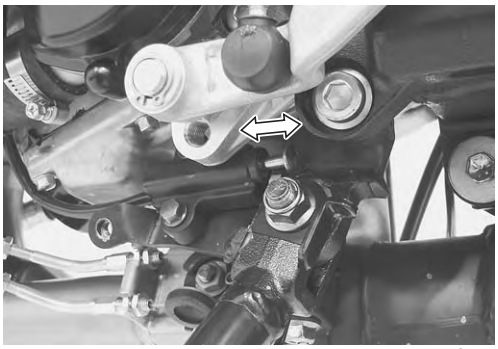
Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Diode test (⊣◀)

	G ((+) probe)	B/W ((–) probe)
ON (Side-stand up)	0.4 – 0.6 V	
OFF (Side-stand down)	1.4 V and more (Tester’s battery voltage)	

NOTE

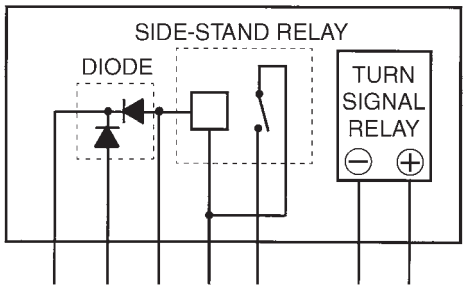
If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.



I947H1190013-01

5) Connect the side-stand switch coupler.
6) Install the removed parts.

Turn Signal / Side-stand Relay
The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.

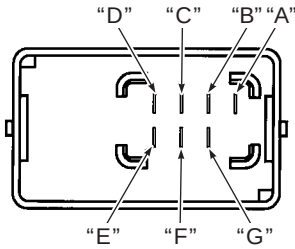


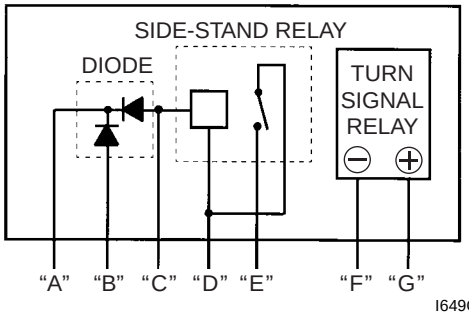
I649G1190027-02

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.

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity test (•))))





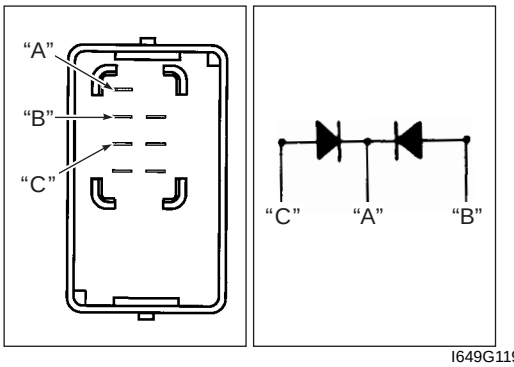
I649G1190028-02

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
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Diode test (⊣◀)



I649G1190029-02

	⊕ Probe of tester to:		
		"B", "C"	"A"
⊖ Probe of tester to:	"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.

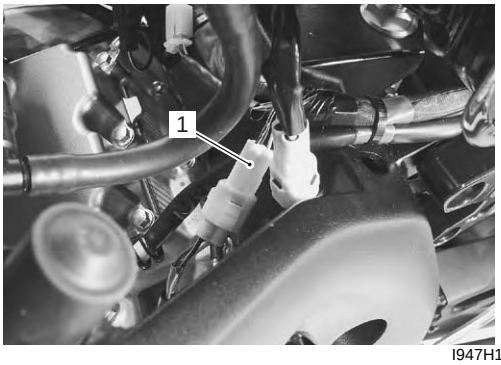
3) Install the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation" (Page 1I-7).

Gear Position Switch
1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).

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.



I947H1190014-01

3) Check the continuity between Bl and B lead wires with the transmission in “neutral”.

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity test (•))))

	Bl	B/W
ON (Neutral)	○	○
OFF (Except neutral)		

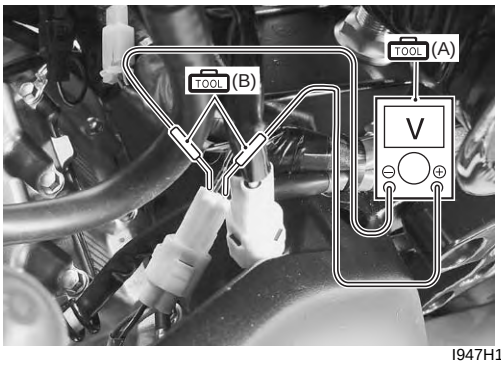
I947H1190030-01

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 P and B/W lead wires using the multi-circuit tester when shifting the gearshift lever from low to top.

Special tool
TOOL (A): 09900–25008 (Multi circuit tester set)
TOOL (B): 09900–25009 (Needle-point probe set)

Tester knob indication
Voltage (⎓)

Gear position switch voltage (Except neutral position)
0.6 V and more ((+) P – (–) B/W)



I947H1190015-01

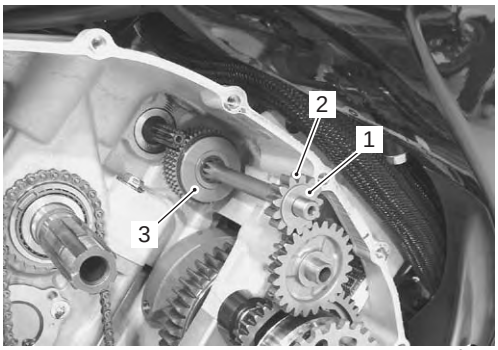
8) Turn the ignition switch OFF.
9) Install the removed parts.

Starter Torque Limiter Removal and Installation

B947H11906012

Removal

1) Remove the clutch assembly. Refer to “Clutch Removal” in Section 5C (Page 5C-5).
2) Remove the washer (1), starter idle gear No. 1 (2) and starter torque limiter (3).

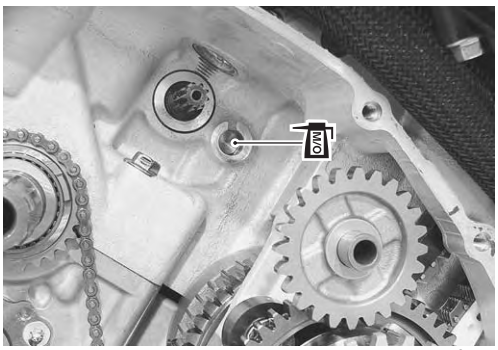


I947H1190016-01

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

- Apply molybdenum oil solution to the starter torque limiter shaft hole.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I947H1190017-01

- Install the clutch assembly. Refer to “Clutch Installation” in Section 5C (Page 5C-7).

Starter Torque Limiter Inspection

B947H11906013

Refer to “Starter Torque Limiter Removal and Installation” (Page 1I-9).

⚠ CAUTION

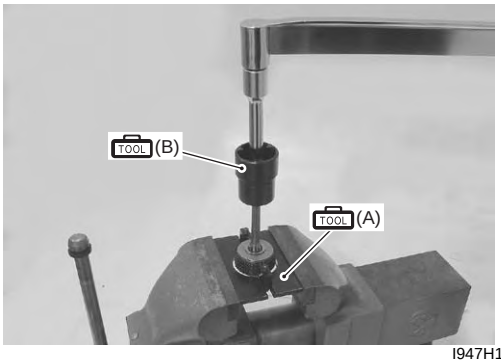
- **Do not attempt to disassemble the starter torque limiter.**
- **The starter torque limiter is available only as an assembly part.**

1) Hold the starter torque limiter with the special tools and vise.

Special tool
TOOL (A): 09930–73170 (Starter torque limiter holder)
TOOL (B): 09930–73181 (Starter torque limiter socket)

2) Turn the starter torque limiter with a torque wrench and check the slip torque. If the slip torque is not within the specification, replace the starter torque limiter with a new one.

Starter torque limiter slip torque
Standard: 20.6 – 36.3 N·m (2.06 – 3.63 kgf-m, 15.0 – 26.0)



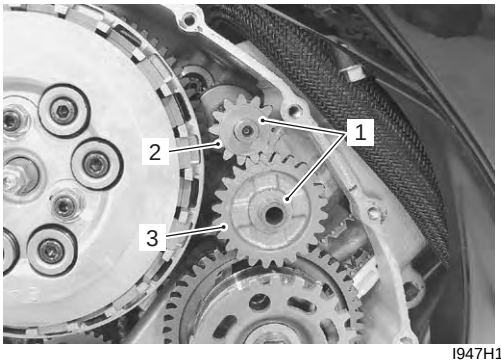
I947H1190031-01

Starter Clutch Removal and Installation

B947H11906009

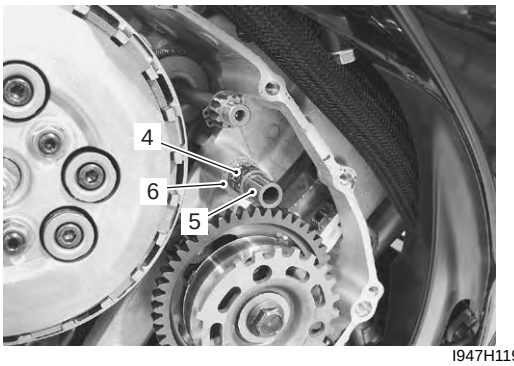
Removal

1) Remove the clutch cover. Refer to “Clutch Removal” in Section 5C (Page 5C-5).
2) Remove the washers (1), starter idle gear No. 1 (2) and No. 2 (3).



I947H1190018-01

3) Remove the starter idle gear No. 2 bearing (4), shaft (5) and washer (6).



I947H1190019-02

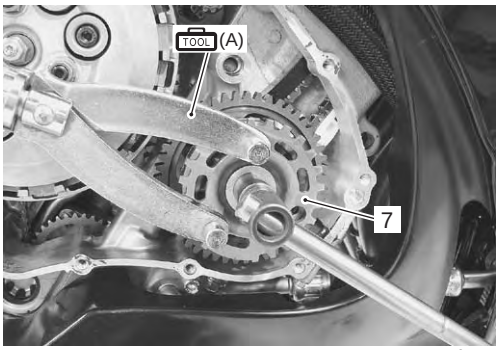
4) Hold the starter clutch with the special tool and remove the starter clutch bolt.

⚠ CAUTION

Make sure that the pawls of the special tool are inserted into the holes of the starter clutch.

Special tool
TOOL (A): 09930–40113 (Flywheel rotor holder)

5) Remove the CKP sensor rotor (7) and starter clutch assembly.

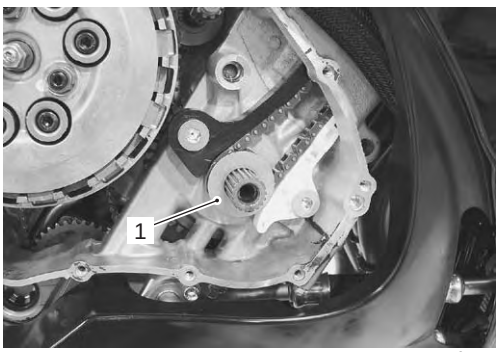


I947H1190020-02

Installation

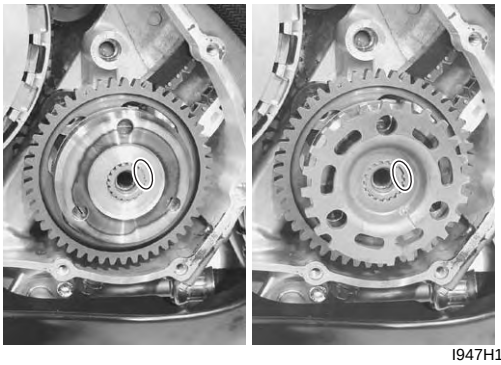
Installation is in the reverse order of removal. Pay attention to the following points:

- Install the washer (1) to the crankshaft.



I947H1190021-01

- When installing the starter clutch and CKP sensor rotor, align the wide spline tooth of them with that of crankshaft.



I947H1190022-01

- Hold the starter clutch with the special tool and tighten the starter clutch bolt to the specified torque.

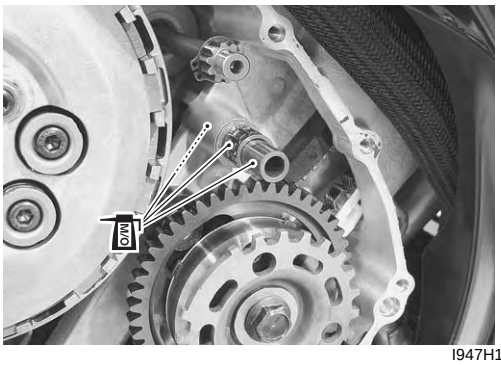
Special tool
TOOL (A): 09930–40113 (Flywheel rotor holder)

Tightening torque
Starter clutch bolt: 54 N·m (5.4 kgf-m, 39.0 lbf-ft)

I947H1190023-01

- Apply molybdenum oil solution to the starter idle gear No. 2 bearing, shaft and shaft hole.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I947H1190024-01

Starter Clutch Inspection

B947H11906010

Refer to “Starter Clutch Removal and Installation” (Page 1I-10).

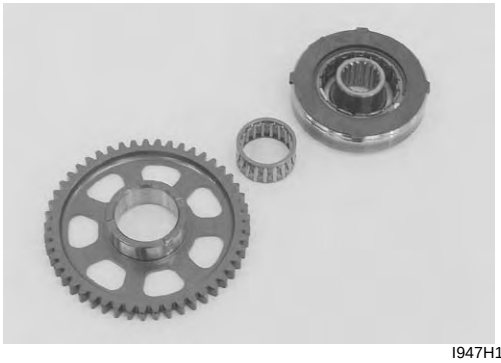
Starter Clutch

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.

I947H1190025-02

Starter Clutch Bearing and Starter Driven Gear

Inspect the starter clutch bearing and starter clutch contacting surface on the starter driven gear for wear and damage. If they are found to be damaged, replace them with new ones.



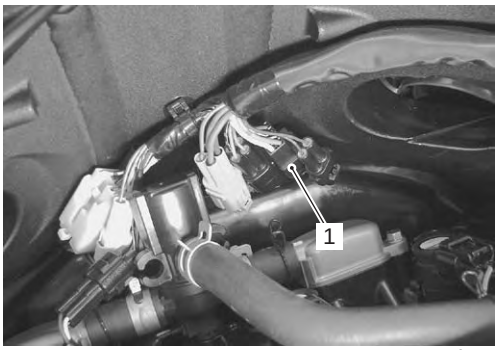
I947H1190026-02

Starter Button Inspection

B947H11906011

Inspect the starter button in the following procedures:

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Disconnect the right handlebar switch coupler (1).



I947H1190029-01

3) Inspect the starter button for continuity with the tester.
   If any abnormality is found, replace the right handle switch assembly with a new one. Refer to “Handlebar Removal and Installation” in Section 6B (Page 6B-2).

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity (•))))

Color / Position	O/W	Y/G	O/R	Y/W
•			○——	——○
PUSH	○——	——○		

I815H1190019-01

4) After finishing the starter button inspection, reinstall the removed parts.

Specifications

Service Data

B947H11907001

Electrical

Unit: mm

Item	Specification		Note
Starter motor brush length	Standard	7.0 (0.28)	
	Limit	3.5 (0.14)	
Starter relay resistance	3 – 6 Ω		

Tightening Torque Specifications

B947H11907002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Starter motor housing bolt	5	0.5	3.5	☞(Page 1I-5)
Starter clutch bolt	54	5.4	39.0	☞(Page 1I-11)

NOTE

The specified tightening torque is 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-9).

Special Tools and Equipment

Recommended Service Material

B947H11908001

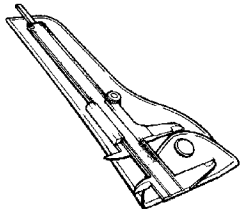
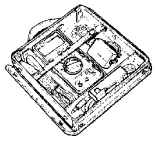
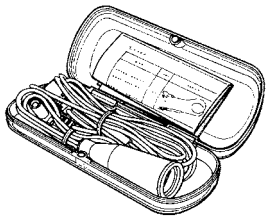
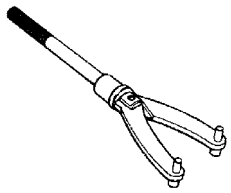
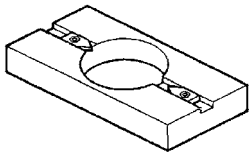
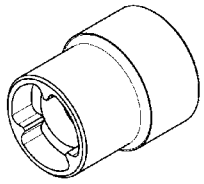
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 1I-4) / ☞(Page 1I-4)
Moly paste	SUZUKI MOLY PASTE or equivalent	P/No.: 99000–25140	☞(Page 1I-4)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1I-9) / ☞(Page 1I-11)

NOTE

Required service material is also described in the following.
“Starter Motor Components” (Page 1I-3)

Special Tool

B947H11908002

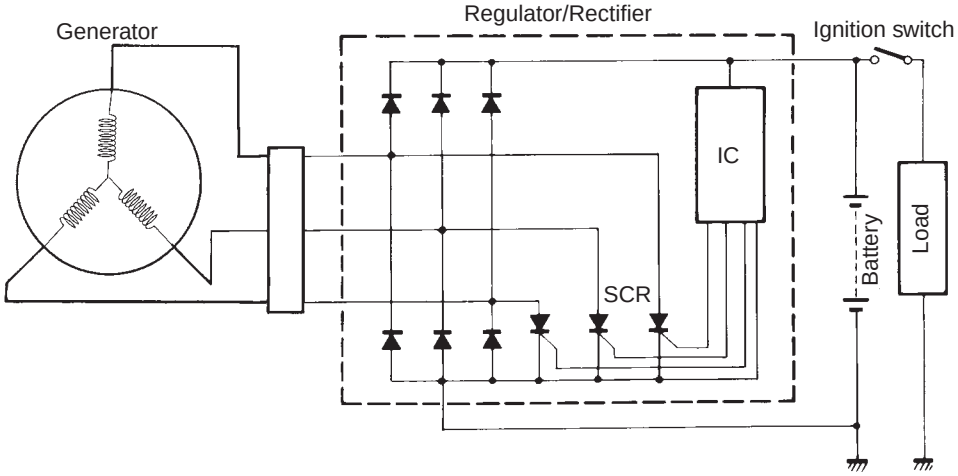
09900–20102 Vernier calipers (200 mm) ☞(Page 1I-5) 	09900–25008 Multi circuit tester set ☞(Page 1I-5) / ☞(Page 1I-6) / ☞(Page 1I-7) / ☞(Page 1I-7) / ☞(Page 1I-8) / ☞(Page 1I-8) / ☞(Page 1I-9) / ☞(Page 1I-9) / ☞(Page 1I-12) 
09900–25009 Needle-point probe set ☞(Page 1I-9) 	09930–40113 Flywheel rotor holder ☞(Page 1I-10) / ☞(Page 1I-11) 
09930–73170 Starter torque limiter holder ☞(Page 1I-10) 	09930–73181 Starter torque limiter socket ☞(Page 1I-10) 

Charging System

Schematic and Routing Diagram

Charging System Diagram

B947H11A02001



I947H11A0021-01

Component Location

Charging System Components Location

B947H11A03001

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

Diagnostic Information and Procedures

Charging System Symptom Diagnosis

B947H11A04001

Condition	Possible cause	Correction / Reference Item
Generator does not charge	Open- or short-circuited lead wires, or loose lead connections.	*Repair, replace or connect properly.*
	Short-circuited, grounded or open generator coil.	*Replace.*
	Short-circuited or punctured regulator/ rectifier.	*Replace.*
Generator does charge, but charging rate is below the specification	Lead wires tend to get short- or open-circuited or loosely connected at terminals.	*Repair or retighten.*
	Grounded or open-circuited generator coil.	*Replace.*
	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 vibration, resulting in intermittent short-circuiting.	*Repair or replace.*
	Internally short-circuited generator.	*Replace.*
	Defective regulator/rectifier.	*Replace.*

Condition	Possible cause	Correction / Reference Item
Battery overcharges	Faulty regulator/rectifier.	*Replace.*
	Faulty battery.	*Replace.*
	Poor contact of generator lead wire coupler.	*Repair.*
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 materials a result of overcharging.	*Replace the battery and correct the charging 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 use battery should be checked at least once a month to avoid sulfation.)	*Replace the battery.*
	The battery was left unused in a cold climate for too long.	*Replace the battery if badly sulfated.*

Battery Runs Down Quickly

B947H11A04002

Troubleshooting

Step	Action	Yes	No
1	Check accessories which use excessive amounts of electricity. *Are accessories being installed?*	Remove accessories.	Go to Step 2.
2	Check the battery for current leakage. Refer to "Battery Current Leakage Inspection" (Page 1J-3). *Is the battery for current leakage OK?*	Go to Step 3.	• Short circuit of wire harness. • Faulty electrical equipment.
3	Measure the regulated voltage between the battery terminals. Refer to "Regulated Voltage Inspection" (Page 1J-3). *Is the regulated voltage OK?*	• Faulty battery. • Abnormal driving condition.	Go to Step 4.
4	Measure the resistance of the generator coil. Refer to "Generator Inspection" (Page 1J-3). *Is the resistance of generator coil OK?*	Go to Step 5.	• Faulty generator coil. • Disconnected lead wires.
5	Measure the generator no-load performance. Refer to "Generator Inspection" (Page 1J-3). *Is the generator no-load performance OK?*	Go to Step 6.	Faulty generator.
6	Inspect the regulator/rectifier. Refer to "Regulator / Rectifier Inspection" (Page 1J-8). *Is the regulator/rectifier OK?*	Go to Step 7.	Faulty regulator/rectifier.
7	Inspect wirings. *Is the wirings OK?*	Faulty battery.	• Short circuit of wire harness. • Poor contact of couplers.

Repair Instructions

Battery Current Leakage Inspection

B947H11A06001

Inspect the battery current leakage in the following procedures:

1) Turn the ignition switch OFF.
2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” 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.

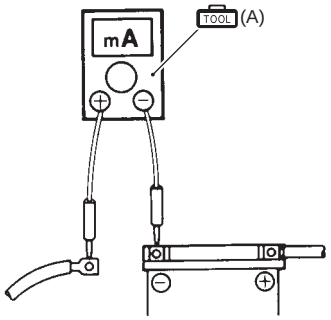
⚠ CAUTION

- **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
TOOL (A): 09900–25008 (Multi circuit tester set)

Tester knob indication
Current (⎓ , 20 mA)

Battery current (Leak)
Under 3 mA



I837H11A0025-01

5) Connect the battery (–) terminal and install the front seat. Refer to “Battery Removal and Installation” (Page 1J-11) and “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

Regulated Voltage Inspection

B947H11A06002

Inspect the regulated voltage in the following procedures:

1) Remove the front seat. Refer to “Exterior Parts Removal and Installation” 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 battery (+) and (–) 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).

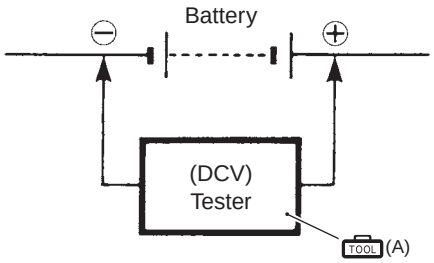
NOTE

When making this test, be sure that the battery is in fully charged condition.

Special tool
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



I837H11A0026-01

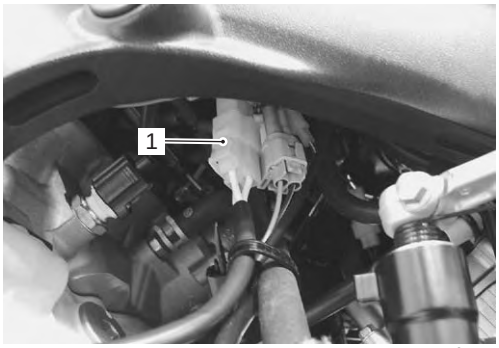
4) Install the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

Generator Inspection

B947H11A06003

Generator Coil Resistance

1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the generator coupler (1).



I947H11A0001-01

3) 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.

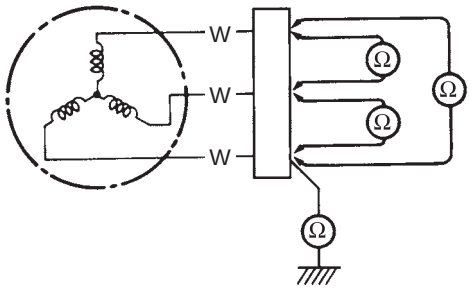
NOTE

When making this test, be sure that the battery is in fully charged condition.

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Resistance (Ω)

Generator coil resistance
0.12 – 0.6 Ω (W – W)
∞ Ω (W – Ground)

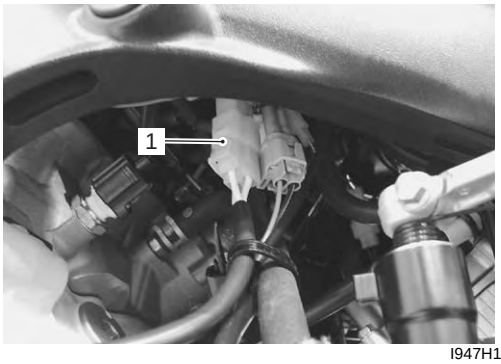


I947H11A0002-02

4) Connect the generator coupler.
5) Install the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

No-load Performance

1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the generator coupler (1).



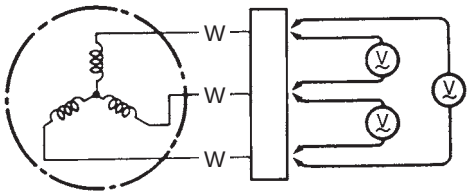
I947H11A0003-01

3) Start the engine and keep it running at 5 000 r/min.
4) 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
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Voltage (~)

Generator no-load performance (When engine is cold)
85 V (AC) and more at 5 000 r/min



I947H11A0004-02

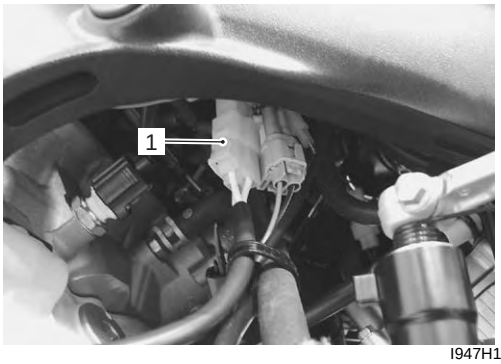
5) Connect the generator coupler.
6) Install the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

Generator Removal and Installation

B947H11A06004

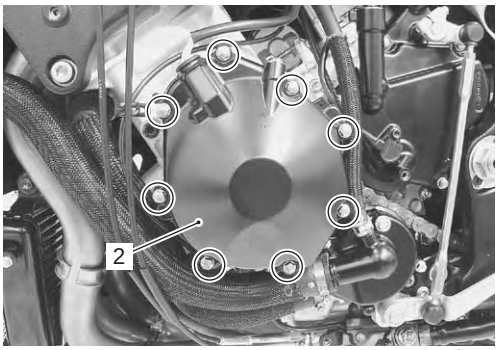
Removal

1) Drain engine oil. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Disconnect the generator coupler (1).



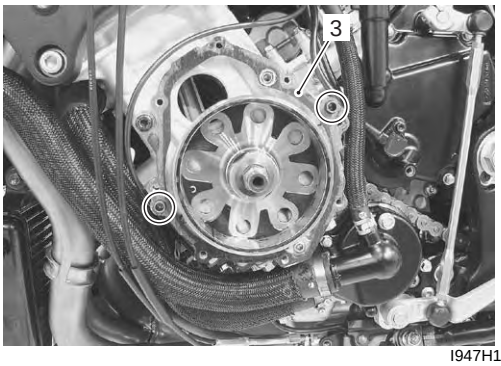
I947H11A0005-01

4) Remove the generator cover (2).



I947H11A0006-01

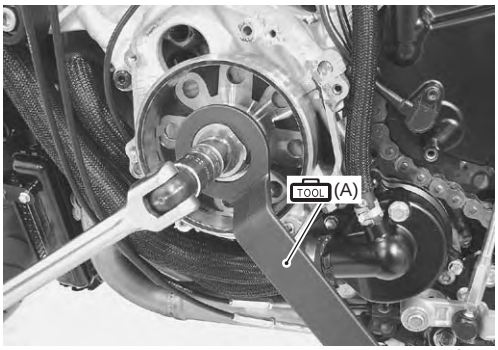
5) Remove the gasket (3) and dowel pins.



I947H11A0007-01

6) Hold the generator rotor with the special tool and remove the generator rotor bolt.

Special tool
TOOL (A): 09930–44530 (Rotor holder)

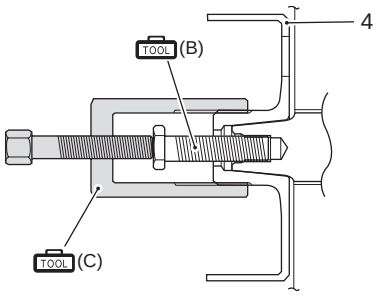


I947H11A0008-01

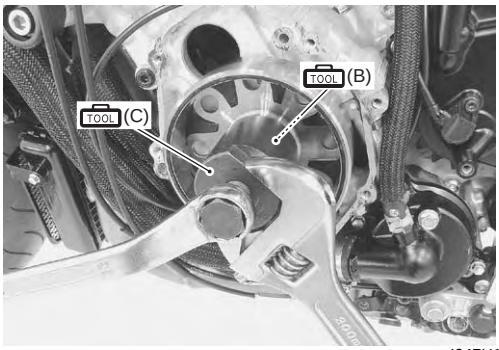
7) Screw in the special tool to the crankshaft.

8) Remove the generator rotor (4) using the special tool.

Special tool
TOOL (B): 09930–30460 (Rotor remover bolt)
TOOL (C): 09930–34970 (Rotor remover)

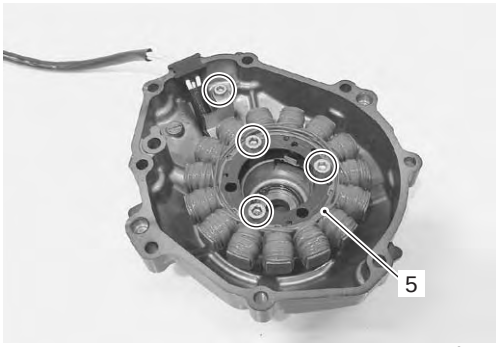


I947H11A0009-03



I947H11A0022-02

9) Remove the generator stator (5).



I947H11A0010-01

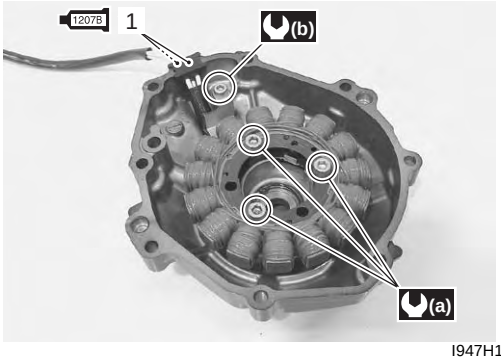
Installation
Install the generator in the reverse order of removal. Pay attention to the following points:

- Tighten the generator stator set bolts and generator lead wire set bolt to the specified torque.

  Tightening torque
  Generator stator set bolt (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
  Generator lead wire set bolt (b): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)

- Apply bond lightly to the generator lead wire grommet (1).

  1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)



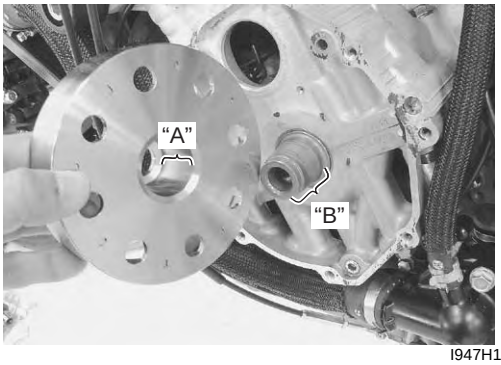
I947H11A0011-03

- Degrease the tapered portion “A” of generator rotor and also the crankshaft “B” with nonflammable cleaning solvent.

⚠ CAUTION

Dry these parts naturally. Do not wipe them with a cloth or use compressed air to dry.

- Install the generator rotor onto crankshaft.

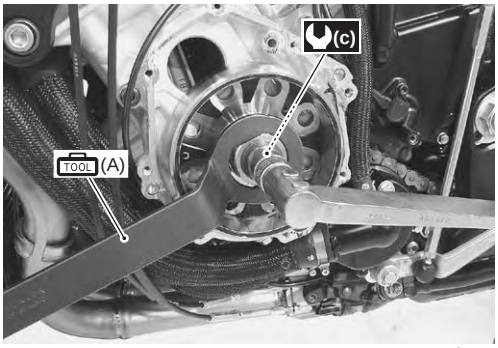


I947H11A0023-01

- Hold the generator rotor with the special tool and tighten its bolt to the specified torque.

Special tool
TOOL (A): 09930–44530 (Rotor holder)

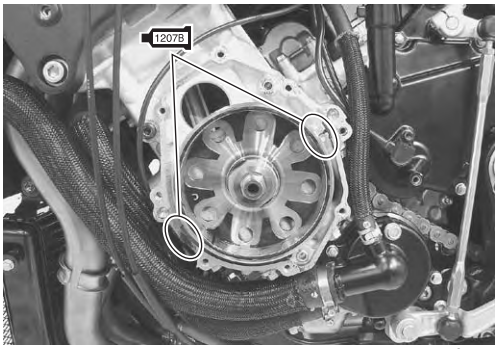
Tightening torque
Generator rotor bolt (c): 145 N·m (14.5 kgf-m, 105.0 lbf-ft)



I947H11A0012-02

- Apply a bond lightly to the mating surfaces at the parting line between the upper and lower crankcases as shown.

1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

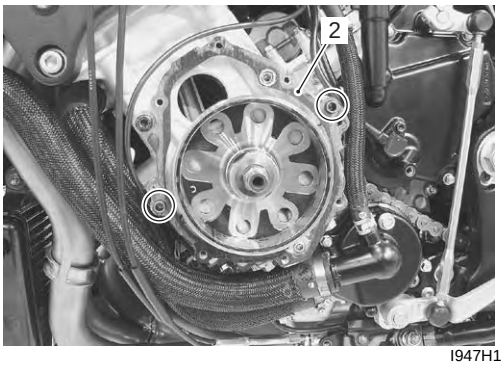


I947H11A0013-01

- Install the dowel pins and new gasket (2).

⚠ CAUTION

Use new gasket to prevent oil leakage.



I947H11A0014-01

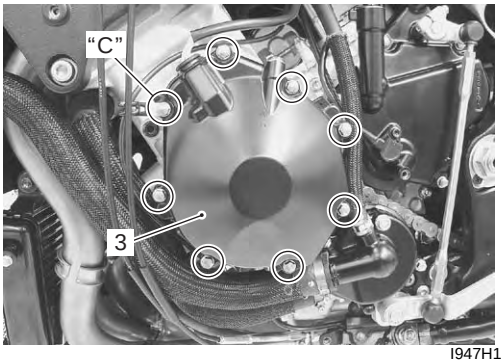
- Install the generator cover (3) and tighten the generator cover bolts.

⚠ WARNING

Be careful not to pinch the finger between the generator cover and crankcase.

NOTE

Fit the clamp to the generator cover bolt “C”.

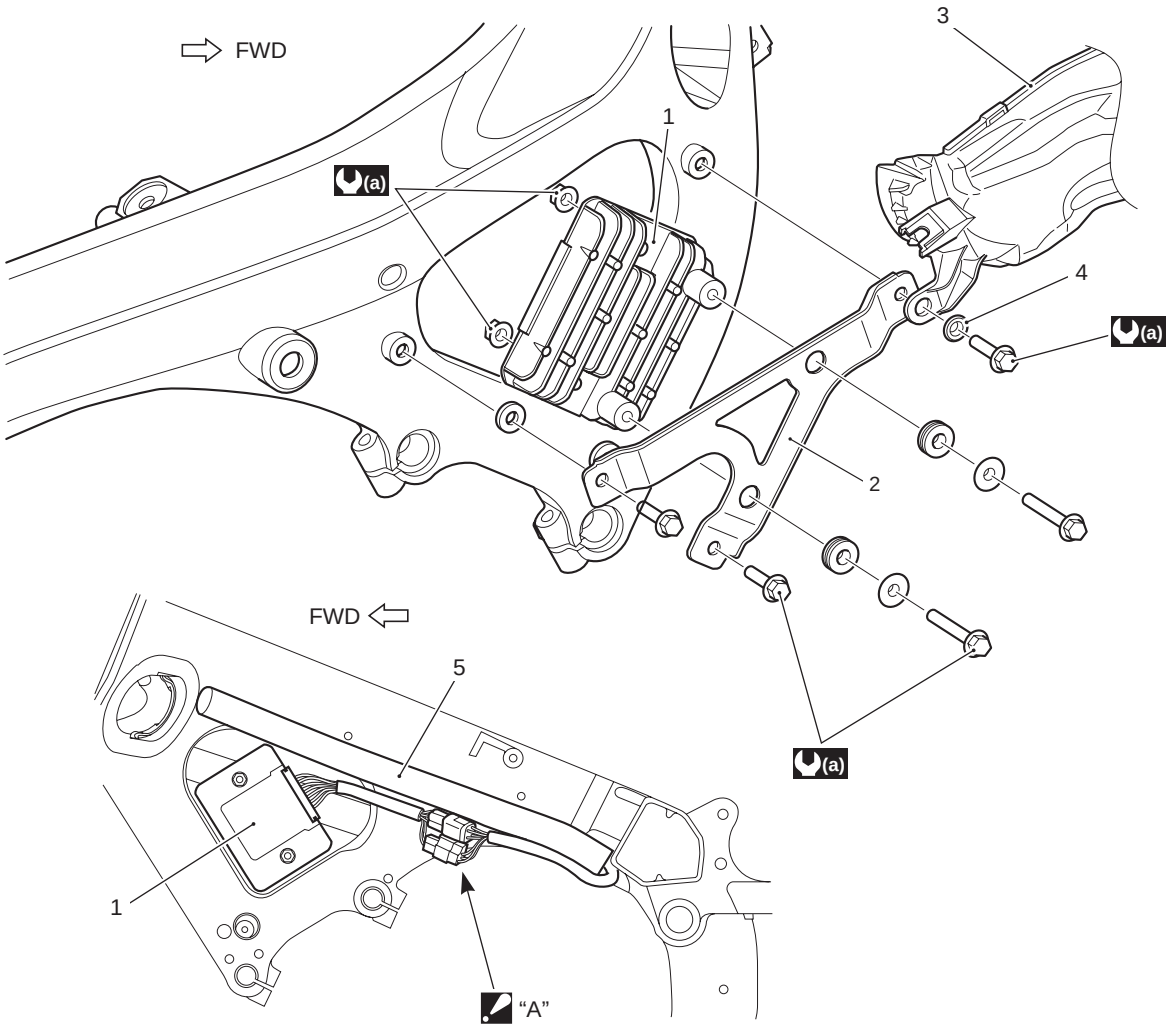


I947H11A0015-01

- Route the generator lead wire. Refer to “Wiring Harness Routing Diagram” in Section 9A (Page 9A-7).

Regulator / Rectifier Construction

B947H11A06005



I947H11A0020-03

1. Regulator/rectifier	4. Spacer	(a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
2. Regulator/rectifier bracket	5. Wiring harness	
3. Air intake pipe (RH)	"A": Connect the regulator/rectifier couplers under the wiring harness.	

Regulator / Rectifier Removal and Installation

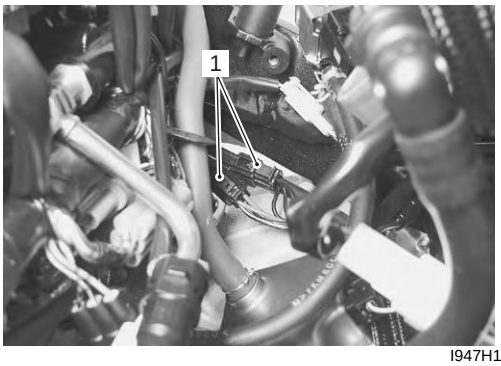
B947H11A06006

Removal

1) Turn the ignition switch OFF.
2) Remove the right side cowling. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
3) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
4) Remove the EVAP system purge control solenoid valve bracket bolt. (E-33 only)

I947H11A0019-01

5) Disconnect the regulator/rectifier couplers (1).



I947H11A0016-02

6) Remove the regulator/rectifier as shown in the regulator/rectifier construction. Refer to “Regulator / Rectifier Construction” (Page 1J-7).

Installation

1) Install the regulator/rectifier as shown in the regulator/rectifier construction. Refer to “Regulator / Rectifier Construction” (Page 1J-7).
2) Reinstall the removed parts.

Regulator / Rectifier Inspection

B947H11A06007

Inspect the regulator/rectifier in the following procedures:

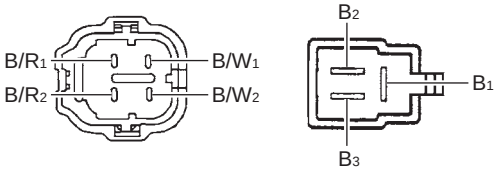
1) Turn the ignition switch OFF.
2) Disconnect the regulator/rectifier couplers. Refer to “Regulator / Rectifier Removal and Installation” (Page 1J-7).
3) Measure the voltage between the terminals using the multi-circuit testers as indicated in the following table. If the voltage is not within the specified value, replace the regulator/rectifier with a new one. Refer to “Regulator / Rectifier Removal and Installation” (Page 1J-7).

NOTE

If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Diode test (⊣◀)



I823H11A0020-04

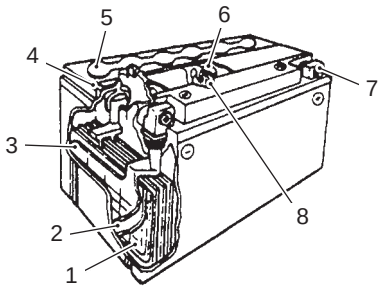
Unit: V

		(+) probe of tester to:						
		B/R_1	B/R_2	B_1	B_2	B_3	B/W_1	B/W_2
(–) probe of tester to:	B/R_1	—	0	0.3 – 0.6	0.3 – 0.6	0.3 – 0.6	0.6 – 0.9	0.6 – 0.9
	B/R_2	0	—	0.3 – 0.6	0.3 – 0.6	0.3 – 0.6	0.6 – 0.9	0.6 – 0.9
	B_1	*	*	—	*	*	0.3 – 0.6	0.3 – 0.6
	B_2	*	*	*	—	*	0.3 – 0.6	0.3 – 0.6
	B_3	*	*	*	*	—	0.3 – 0.6	0.3 – 0.6
	B/W_1	*	*	*	*	*	—	0
	B/W_2	*	*	*	*	*	0	—
*1.4 V and more (tester’s battery voltage)								

4) Connect the regulator/rectifier couplers and bind the clamp.
5) Reinstall the removed parts.

Battery Components

B947H11A06008



I649G11A0046-03

1. Anode plates	5. Stopper
2. Separator (Fiberglass plate)	6. Filter
3. Cathode plates	7. Terminal
4. Upper cover breather	8. Safety valve

Battery Charging

B947H11A06009

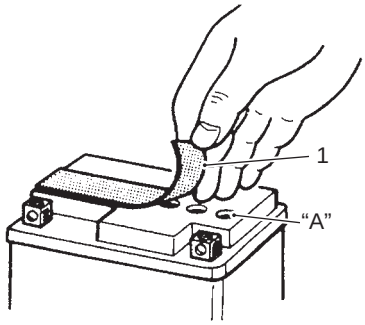
Initial Charging

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”.

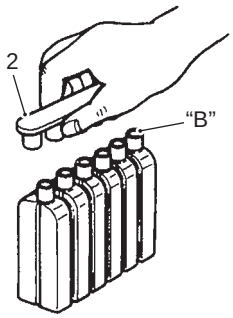


I649G11A0039-03

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.**



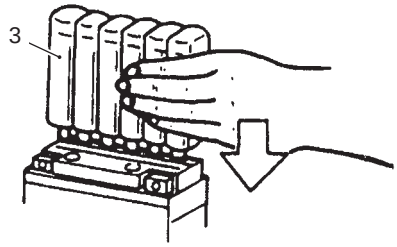
I649G11A0040-03

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.

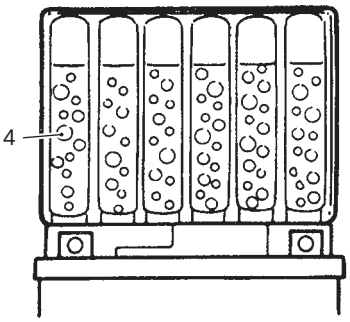
NOTE

Do not allow any of the electrolyte to spill.



I649G11A0041-03

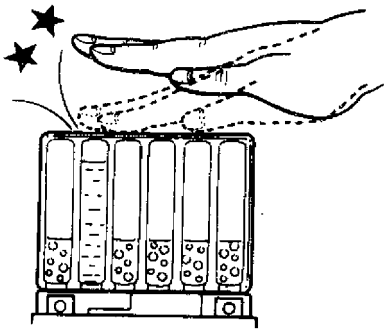
5) Make sure that air bubbles (4) rise to the top of each electrolyte container, and leave in this position for about more than 20 minutes.



I649G11A0042-03

NOTE

If no air bubbles come out from a filler port, tap the bottom of the electrolyte container two or three times.
Never remove the container from the battery.

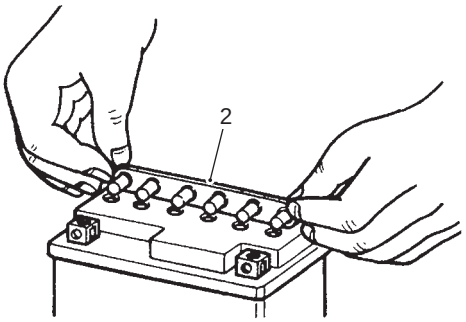


I310G11A0024-01

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.

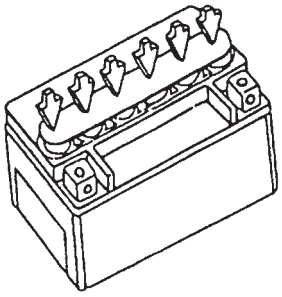
⚠ CAUTION

- **Once the caps are installed to the battery, do not remove the caps.**
- **Do not tap the caps with a hammer when installing them.**

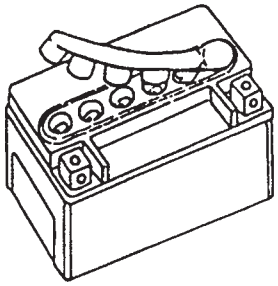


I718H11A0027-01

Correct



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.

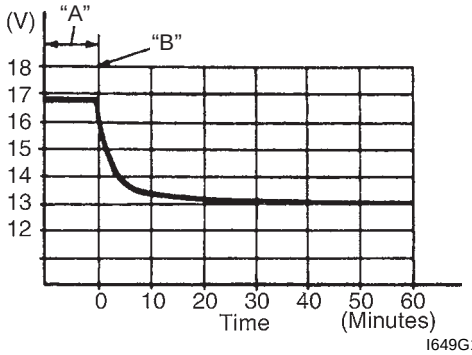
1) Remove the battery from the motorcycle. Refer to "Battery Removal and Installation" (Page 1J-11).
2) Measure the battery voltage using the multi-circuit tester.
   If the voltage reading is less than the 12 V (DC), recharge the battery with a battery charger.

Recharging time
1.2 A for 5 to 10 hours or 5 A for 1 hour

⚠ CAUTION

Be careful not to permit the charging current to exceed 5 A at any time.

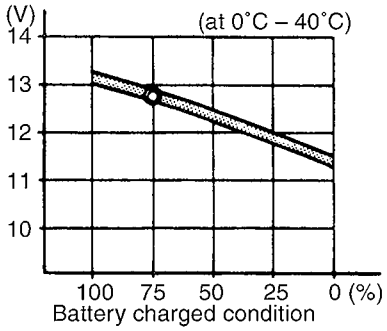
3) After recharging, wait at least 30 minutes and then measure the battery voltage using the multi-circuit tester.
   If the battery voltage is less than 12.5 V, recharge the battery again.
   If the battery voltage is still less than 12.5 V after recharging, replace the battery with a new one.



I649G11A0045-02

"A": Charging period	"B": Stop charging

4) Install the battery to the motorcycle. Refer to "Battery Removal and Installation" (Page 1J-11).



I705H11A0029-02

Battery Removal and Installation

B947H11A06010

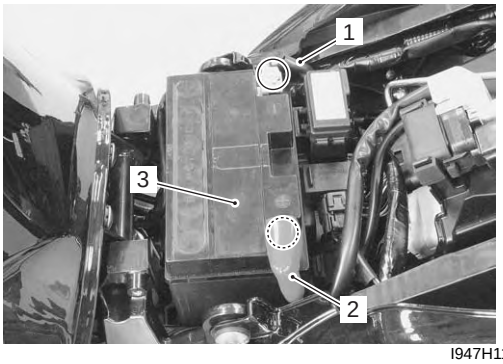
Removal

1) Remove the front seat. Refer to "Exterior Parts Removal and Installation" 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 battery (3) from the motorcycle.



I947H11A0017-01

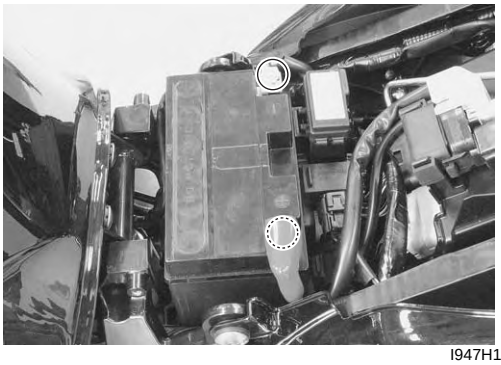
Installation

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

⚠ CAUTION

Never use anything except the specified battery.

- Tighten the battery lead wire bolts securely.



I947H11A0018-01

Battery Visual Inspection

B947H11A06011

Inspect the battery in the following procedures:

1) Remove the front seat. Refer to “Exterior Parts Removal and Installation” 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.
3) Install the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

Specifications

Service Data

B947H11A07001

Electrical

Unit: mm

Item		Specification	Note
Generator coil resistance		0.12 – 0.6 Ω	
Generator maximum output		Approx. 375 W at 5 000 r/min	
Generator no-load voltage (When engine is cold)		85 V (AC) and more at 5 000 r/min	
Regulated voltage		14.0 – 15.5 V at 5 000 r/min	
Battery	Type designation	FT12A-BS	
	Capacity	12 V 36.0 kC (10 Ah)/10 HR	

⚠ CAUTION

Never use anything except the specified battery.

Tightening Torque Specifications

B947H11A07002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Generator stator set bolt	11	1.1	8.0	☞(Page 1J-5)
Generator lead wire set bolt	5.5	0.55	4.0	☞(Page 1J-5)
Generator rotor bolt	145	14.5	105.0	☞(Page 1J-6)

NOTE

The specified tightening torque is described in the following.
“Regulator / Rectifier Construction” (Page 1J-7)

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

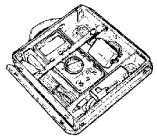
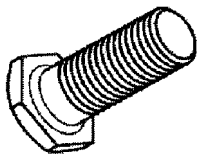
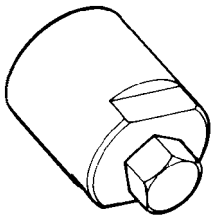
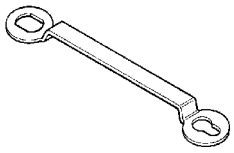
Recommended Service Material

B947H11A08001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1J-5) / ☞(Page 1J-6)

Special Tool

B947H11A08002

09900–25008 Multi circuit tester set ☞(Page 1J-3) / ☞(Page 1J-3) / ☞(Page 1J-4) / ☞(Page 1J-4) / ☞(Page 1J-8) 	09930–30460 Rotor remover bolt ☞(Page 1J-5) 
09930–34970 Rotor remover ☞(Page 1J-5) 	09930–44530 Rotor holder ☞(Page 1J-5) / ☞(Page 1J-6) 

Exhaust System

Precautions

Precautions for Exhaust System

B947H11B00001

⚠ WARNING

To avoid the risk 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

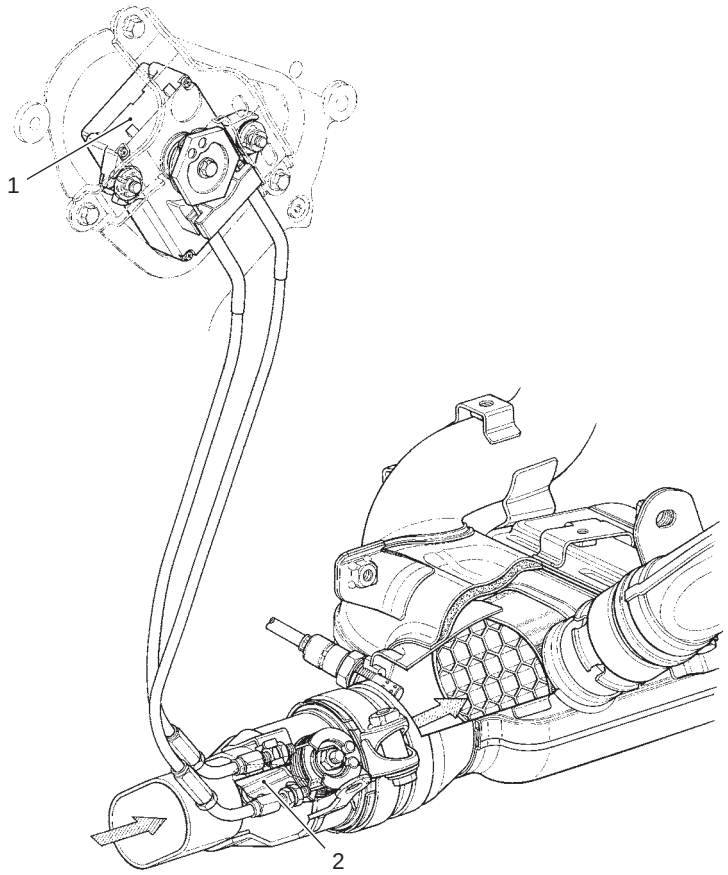
Make sure that the exhaust pipes and muffler have enough clearance from the rubber parts and plastic parts to avoid melting.

General Description

Exhaust Control System Description

B947H11B01001

The exhaust control system (EXCS) consists of the exhaust control valve (EXCV), exhaust control valve actuator (EXCVA) and exhaust control valve cables (EXCV cables).
EXCV is installed in the exhaust pipe. EXCVA is mounted inside of the right frame. The EXCV is operated by the EXCVA via the cables. This system is designed to improve the engine torque at low engine rpm.



I947H11B0001-01

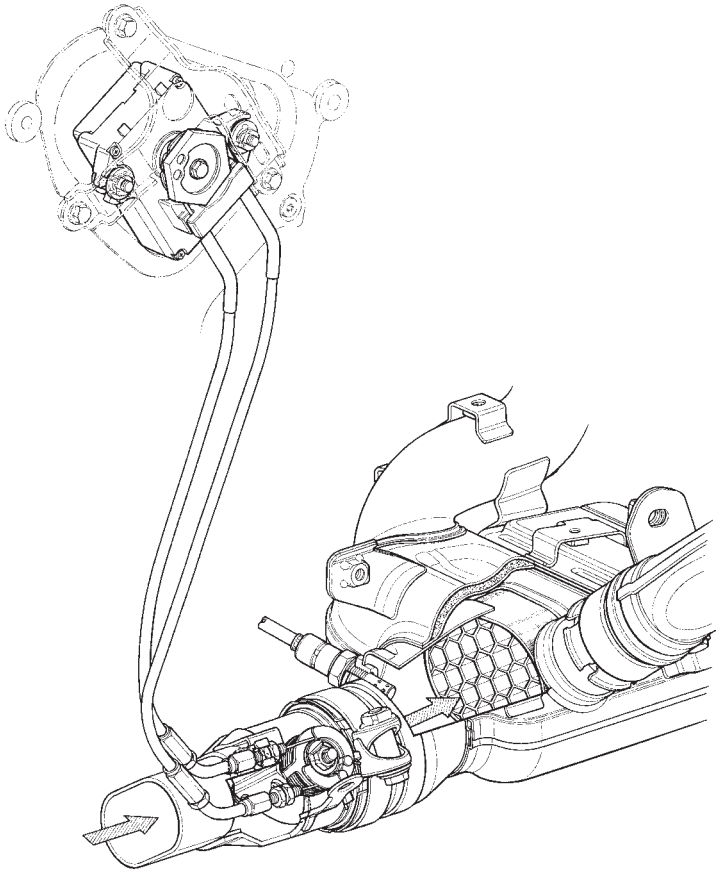
1. Exhaust control valve actuator (EXCVA)	2. Exhaust control valve (EXCV)

Exhaust Control System Operation

B947H11B01002

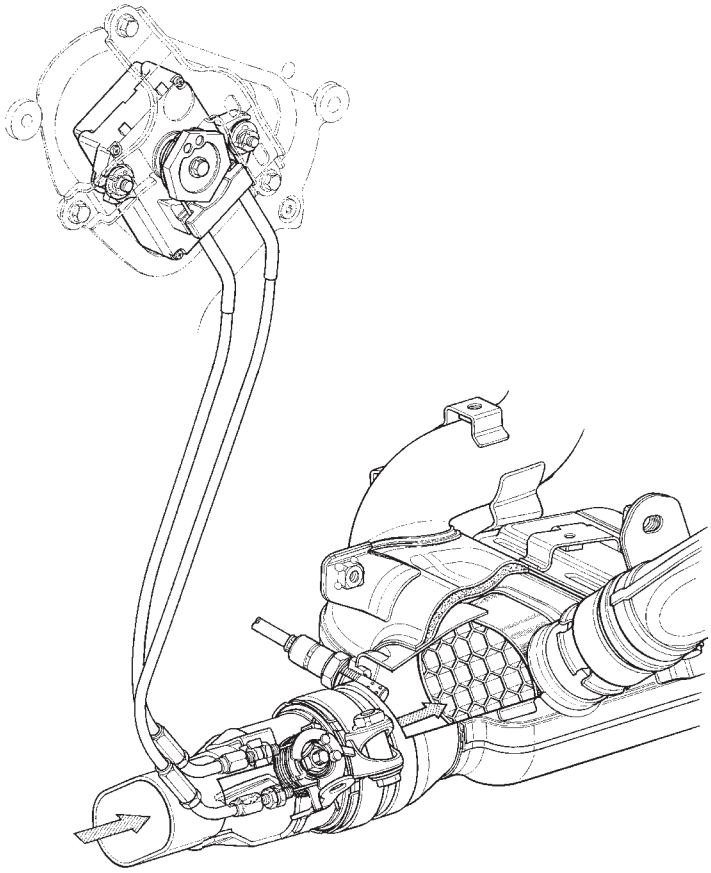
The EXCS is operated by the signal supplied from the ECM. The open/close operation of the EXCV is performed by the EXCVA which is controlled by the ECM by changing the current direction of the actuator motor. The position sensor (incorporated in the EXCVA) detects the EXCVA movement by measuring the voltage and then the ECM determines the EXCV opening angle based on the engine rpm and gear positions. Every time the ignition switch is turned ON, the EXCVA automatically drives the EXCV and detects full close/open position voltages and sets the EXCV to middle position.

FULL CLOSE



I947H11B0002-01

FULL OPEN

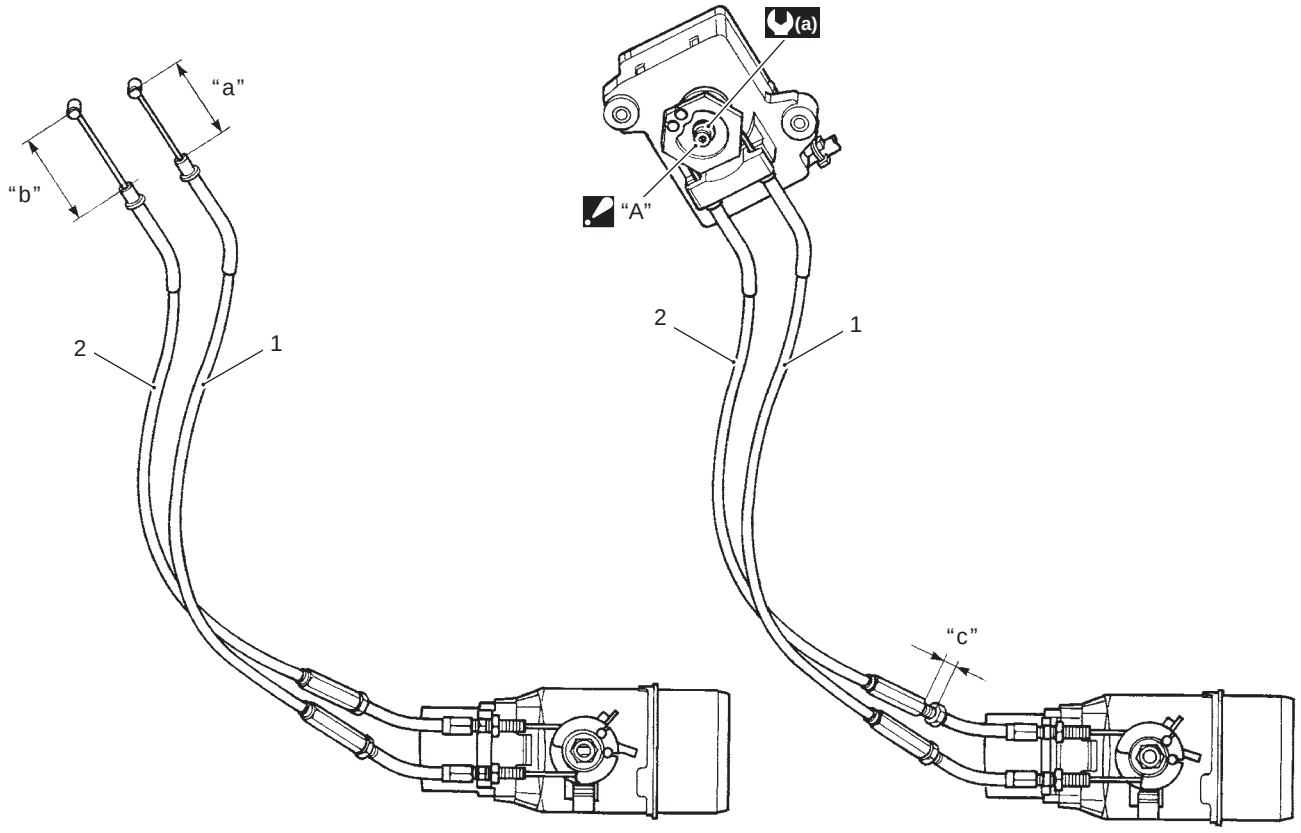


I947H11B0003-01

Repair Instructions

Exhaust Control System Construction

B947H11B06001

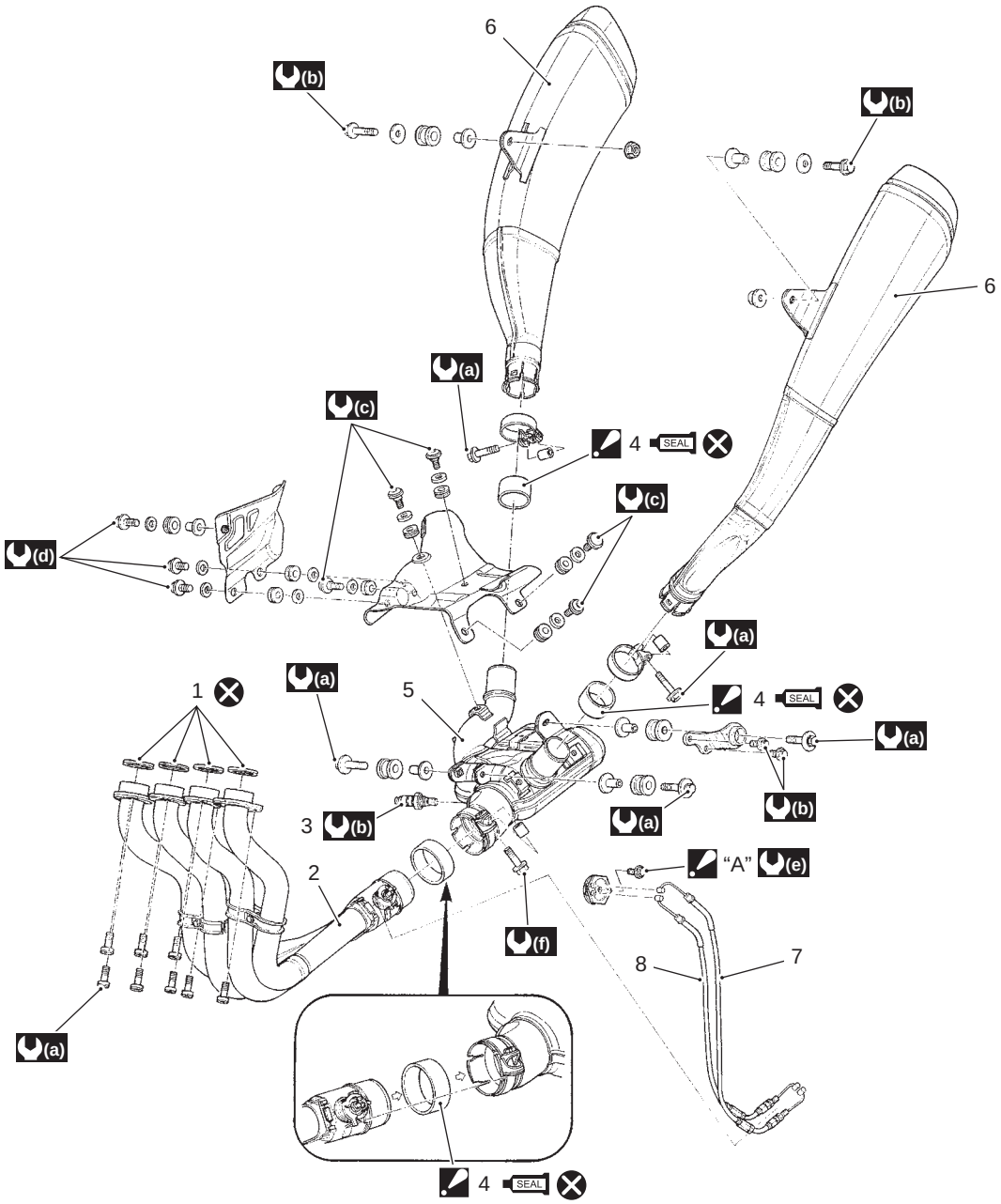


I947H11B0004-02

1. EXCV cable No. 1 (CL)	(a): 5 N·m (0.5 kgf-m, 3.5 lbf-ft)	"c": 11 – 12 mm (0.43 – 0.47 in)
2. EXCV cable No. 2 (OP)	"a": 42 – 43 mm (1.65 – 1.69 in)	
"A": When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.	"b": 60 – 61 mm (2.36 – 2.40 in)	

Exhaust System Components

B947H11B06002



I947H11B0005-03

1. Exhaust pipe gasket	7. EXCV cable No. 1	(d) : 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
2. Exhaust pipe assembly	8. EXCV cable No. 2	(e) : 5 N·m (0.5 kgf-m, 3.5 lbf-ft)
3. HO2 sensor	"A": When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.	(f) : 30 N·m (3.0 kgf-m, 21.5 lbf-ft)
4. Connector : Install the connector so that the chamfer side faces backward.	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	SEAL : Apply muffler seal.
5. Muffler chamber	(b) : 25 N·m (2.5 kgf-m, 18.0 lbf-ft)	: Do not reuse.
6. Muffler body	(c) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	

⚠ CAUTION

Replace the gaskets and connectors with new ones when reassembling.

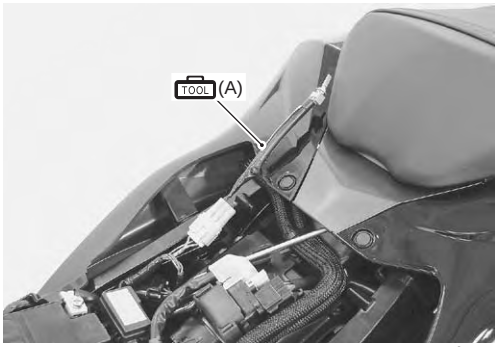
EXCV Cable Removal and Installation

B947H11B06003

Removal

1) Turn the ignition switch OFF.
2) Remove the front seat. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
4) Connect the special tool (Mode select switch) to the dealer mode coupler. Refer to “Self-Diagnostic Procedures” in Section 1A (Page 1A-12).
5) After turning the mode select switch ON, turn the ignition switch ON.

Special tool
TOOL (A): 09930–82720 (Mode selection switch)

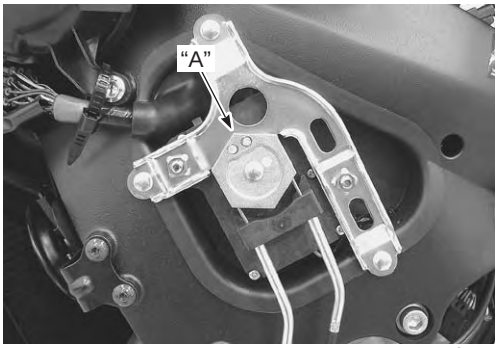


I947H11B0006-01

6) Check that the cable slots of the EXCVA pulley comes to the middle (Adjustment position) “A”.
7) Turn the ignition switch OFF.

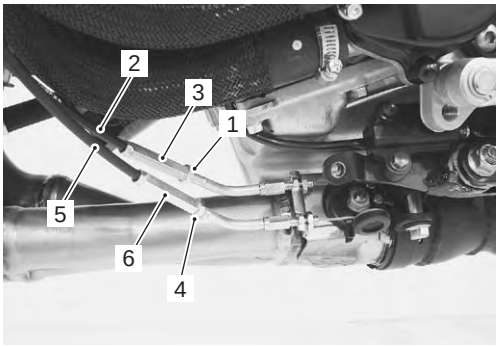
⚠ CAUTION

Before removing the EXCV cables, be sure to set the EXCVA pulley to the adjustment position.



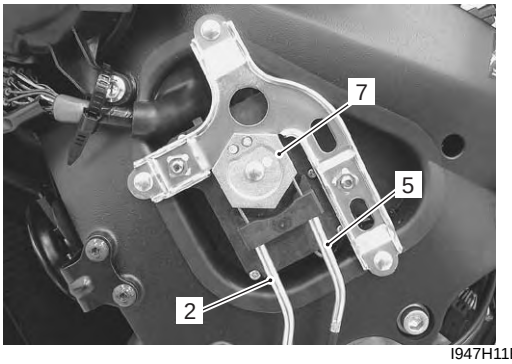
I947H11B0007-01

8) Loosen the lock-nut (1) on the No. 2 cable (2) and turn in the cable adjuster (3) fully.
9) Loosen the lock-nut (4) on the No. 1 cable (5) and turn in the cable adjuster (6) fully.



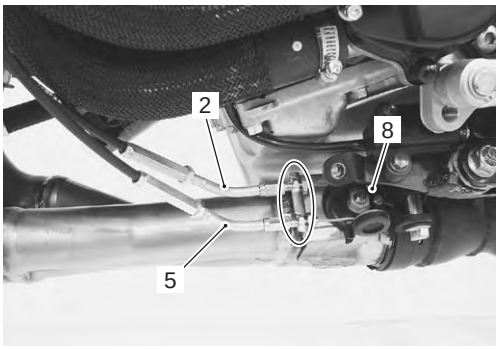
I947H11B0008-01

10) Disconnect the No. 2 cable (2) and No. 1 cable (5) from the EXCVA pulley (7).



I947H11B0009-02

11) Loosen the lock-nuts.
12) Disconnect the No. 2 cable (2) and No. 1 cable (5) from the EXCV pulley (8).



I947H11B0010-02

Installation

⚠ CAUTION

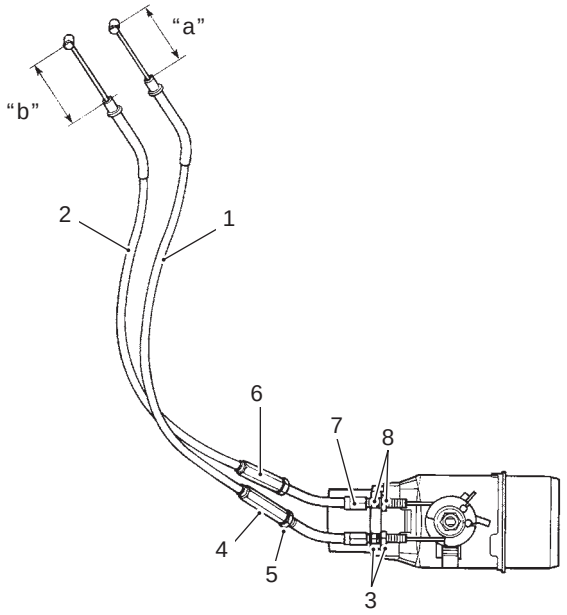
The cable slots of EXCVA pulley must be located adjustment position.

1) Temporarily connect the EXCV cable No. 1 (47H0CL) (1) and No. 2 (47H0OP) (2) to the exhaust pipe and EXCV pulley.

NOTE

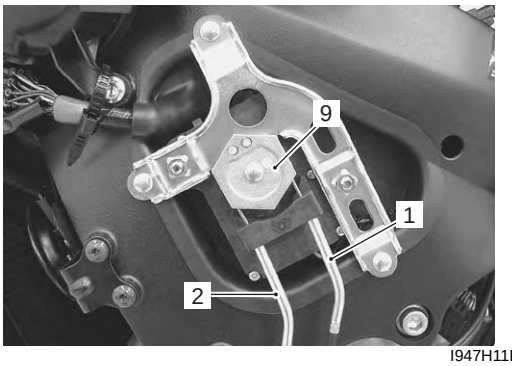
The EXCV cables are identified by the letters.
No. 1 cable (1): 47H0CL
No. 2 cable (2): 47H0OP

2) Tighten the lock-nuts (3) on the No. 1 cable.
3) Adjust the inner cable length “a” of No. 1 cable in 42 – 43 mm (1.65 – 1.69 in) by turning the adjuster (4), then tighten the lock-nuts (5).
4) Turn in the adjuster (6) on the No. 2 cable fully.
5) Turn the No. 2 cable adjuster (7) in or out until the inner cable length “b” becomes 60 – 61 mm (2.36 – 2.40 in).
After adjusting the inner cable length “b”, tighten the lock-nuts (8).



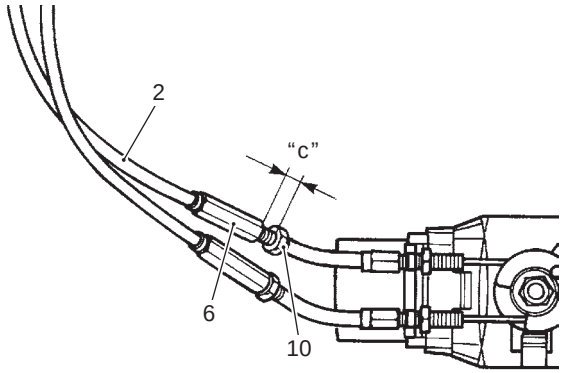
I947H11B0011-02

6) Connect the other end of EXCV cable No. 1 (1) and No. 2 (2) to the EXCVA pulley (9).



I947H11B0012-01

7) After connecting the No. 2 cable (2), loosen the lock-nut (10) and turn the adjuster (6) in or out until 11 – 12 mm (0.43 – 0.47 in) of the thread length “c” on the cable adjuster can be provided and tighten the lock-nut (10).



I947H11B0013-01

8) Inspect the EXCVA position sensor output voltage. Refer to “EXCVA Adjustment” (Page 1K-9).

EXCVA Removal and Installation

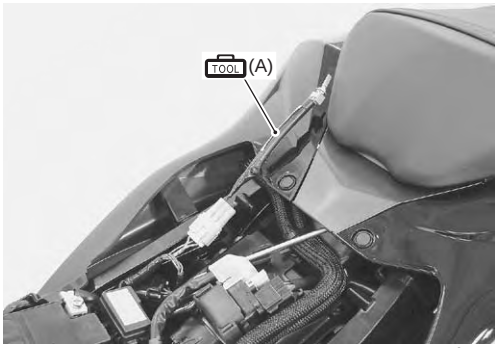
B947H11B06004

Removal

1) Turn the ignition switch OFF.
2) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Connect the special tool (Mode select switch) to the dealer mode coupler. Refer to “Self-Diagnostic Procedures” in Section 1A (Page 1A-12).

4) After turning the mode select switch ON, turn the ignition switch ON.

Special tool
TOOL (A): 09930–82720 (Mode selection switch)

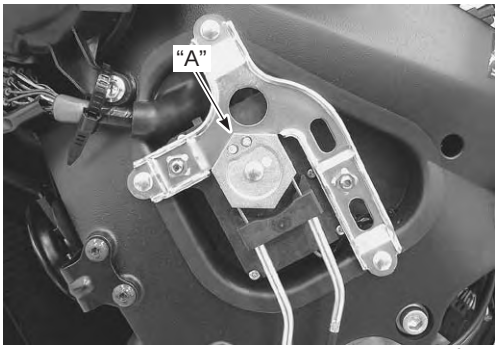


I947H11B0014-01

5) Check that the cable slots of the EXCVA pulley comes to the middle (Adjustment position) “A”.
6) Turn the ignition switch OFF.

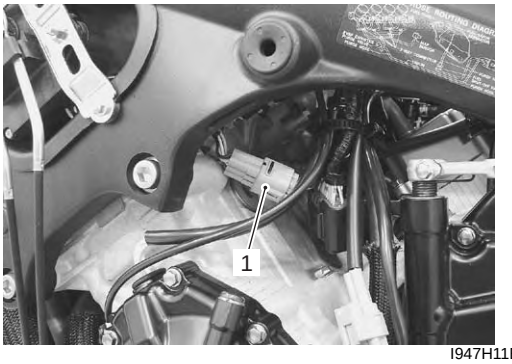
⚠ CAUTION

Before removing the EXCVA, be sure to set the EXCVA pulley to the adjustment position.



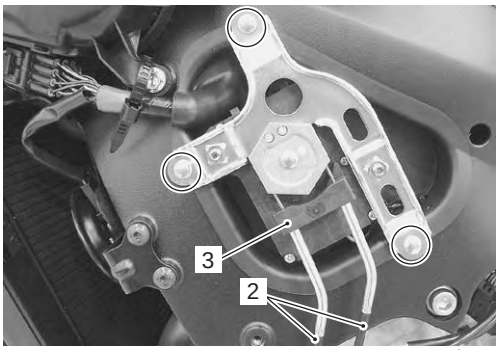
I947H11B0015-01

7) Disconnect the EXCVA coupler (1).



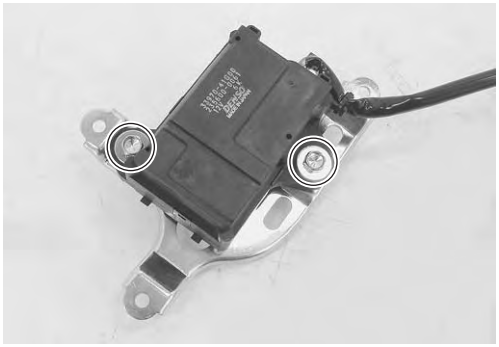
I947H11B0016-01

8) Remove the EXCV cables (2). Refer to “EXCV Cable Removal and Installation” (Page 1K-6).
9) Remove the EXCVA (3) with the bracket.



I947H11B0017-01

10) Remove the bracket from the EXCVA.



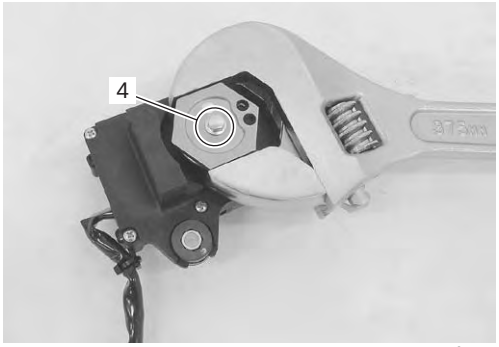
I947H11B0037-01

11) Hold the pulley with an adjustable wrench, and loosen the pulley mounting bolt (4).

⚠ CAUTION

- **When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.**
- **Do not use the adjustable wrench to turn EXCVA pulley so as not to cause damage to the internal gear of EXCVA.**

12) Remove the pulley from the EXCVA body.



I947H11B0038-01

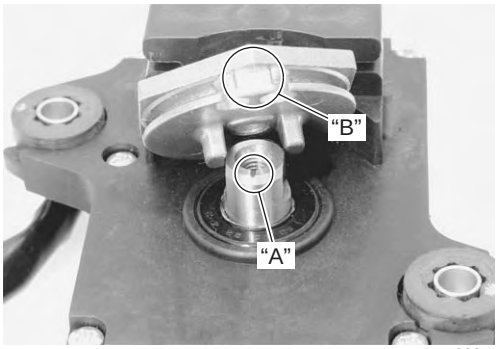
Installation

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

- Install the EXCVA pulley to the shaft.

NOTE

Align the shaft's line "A" and cable slots "B".



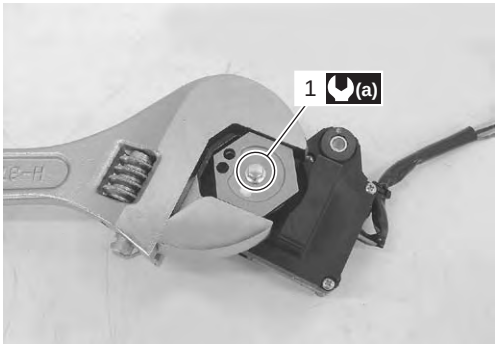
I823H11B0017-02

- Hold the pulley with an adjustable wrench, and then tighten the pulley mounting bolt (1) to the specified torque.

Tightening torque
EXCVA pulley mounting bolt (a): 5 N·m (0.5 kgf-m, 3.5 lbf-ft)

⚠ CAUTION

When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.



I947H11B0039-01

- Install the EXCV cables. Refer to "EXCV Cable Removal and Installation" (Page 1K-6).
- Adjust the EXCVA. Refer to "EXCVA Adjustment" (Page 1K-9).

EXCVA Inspection

B947H11B06005

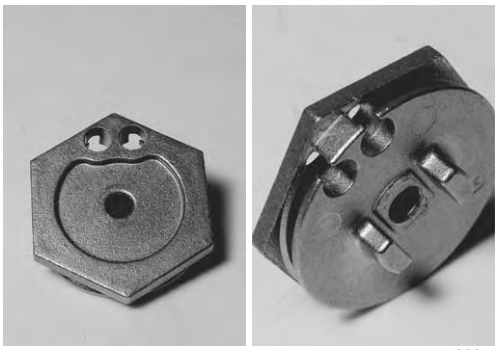
Refer to "DTC "C46" (P1657-H/L or P1658): EXCV Actuator Circuit Malfunction" in Section 1A (Page 1A-109).

EXCVA Pulley Inspection

B947H11B06006

Inspect the EXCVA pulley in the following procedures:

1) Remove the EXCVA pulley. Refer to "EXCV Cable Removal and Installation" (Page 1K-6).
2) Visually inspect the EXCVA pulley for wear and damage. If there is anything unusual, replace the pulley with a new one.



I823H11B0021-01

3) Install the pulley and EXCVA. Refer to "EXCVA Removal and Installation" (Page 1K-7).

EXCVA Adjustment

B947H11B06007

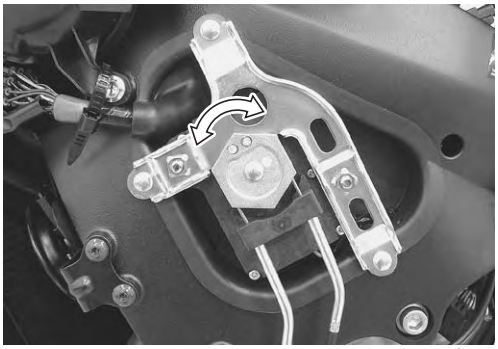
Inspect the EXCVA operation and adjust it if necessary in the following steps:

Step 1

1) Set the EXCVA to the adjustment position. Refer to "EXCV Cable Removal and Installation" (Page 1K-6).

Step 2

1) Turn the ignition switch OFF.
2) Turn the mode select switch OFF.
3) Turn the ignition switch ON and check the operation of EXCVA.
(EXCVA operation order: Full close → Full open → Approx. 60% open)



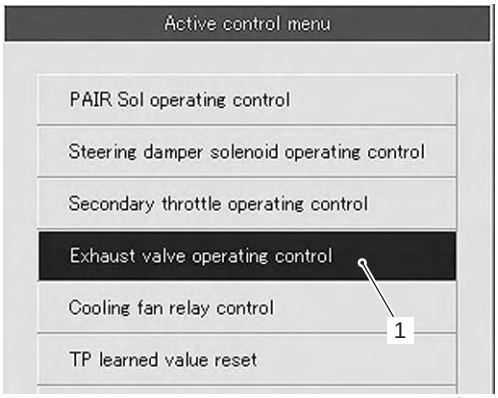
I947H11B0018-01

4) Turn the mode select switch ON. If DTC “C46” is not indicated on the LCD display, the adjustment is correctly completed. If “C46” is indicated, repeat the procedures from Step 3 to Step 4.

I947H11B0019-01

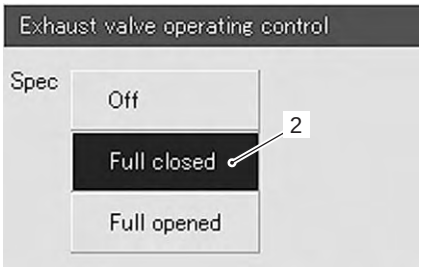
Step 3

1) Turn the ignition switch OFF.
2) Set up the SDS tools. Refer to “Self-Diagnostic Procedures” in Section 1A (Page 1A-12).
3) Turn the ignition switch ON.
4) Click “Exhaust valve operating control” (1).



I947H11B0040-01

5) Click “Full closed” (2).



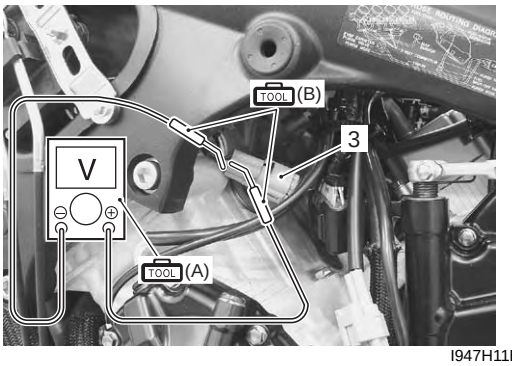
I947H11B0020-02

6) Insert the needle pointed probes into the back side of the EXCVA coupler (3). ((+) Y – (–) W)
7) Measure the EXCVA position sensor output voltage at EXCV fully closed position.

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

Tester knob indication
Voltage (⎓)

EXCVA position sensor output voltage
EXCV is fully closed: 0.45 ≤ Output voltage ≤ 1.4 V ((+) Y – (–) W)



I947H11B0021-02

8) If the measured voltage is less than specification, adjust the No. 1 cable adjuster (4) as follows:
   a) Set the EXCVA to the adjustment position. Refer to “EXCV Cable Removal and Installation” (Page 1K-6).

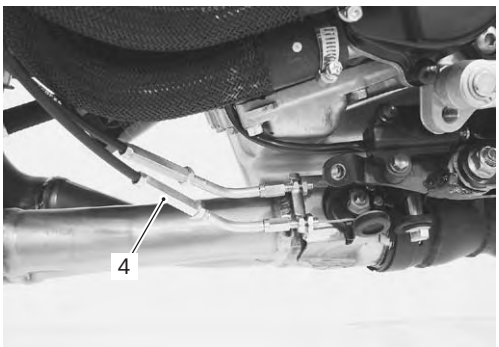
⚠ CAUTION

Adjusting the No. 1 cable with the EXCV fully closed can damage the EXCVA. Be sure to adjust the No. 1 cable with the EXCV set in the adjustment position.

   b) Turn the No. 1 cable adjuster (4) in or out to set the output voltage within the specified value.

NOTE

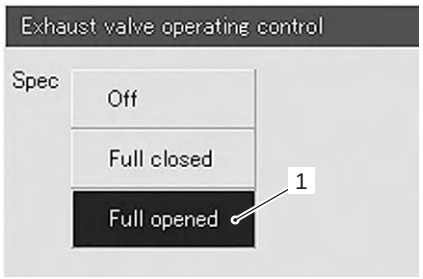
If C46 code is indicated after adjusting the voltage, increase the voltage to 0.9 V.



I947H11B0022-01

Step 4

1) Click “Full opened” (1).



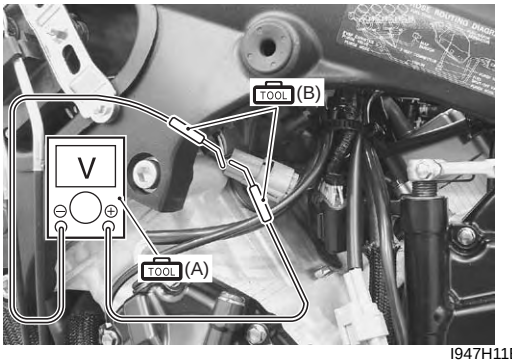
I947H11B0023-02

2) Measure the EXCVA position sensor output voltage at EXCV fully opened position.

Special tool

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

EXCVA position sensor out put voltage
EXCV is fully opened: 3.6 ≤ Output voltage ≤ 4.55 V ((+) Y – (–) W)



I947H11B0024-02

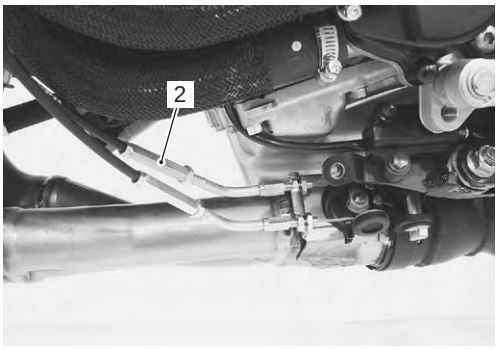
3) If the measured voltage is more than specification, adjust the No. 2 cable adjuster (2) as follows:

a) Set the EXCVA to the adjustment position. Refer to “EXCV Cable Removal and Installation” (Page 1K-6).

⚠ CAUTION

Adjusting the No. 2 cable with the EXCV fully opened can damage the EXCVA. Be sure to adjust the No. 2 cable with the EXCV set in adjustment position.

b) Turn out the No. 2 cable adjuster (2) in or out to set the output voltage within the specified value.



I947H11B0025-02

4) After adjusting the EXCV cables, perform Step 2 to confirm DTC “46” is not indicated.

Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation

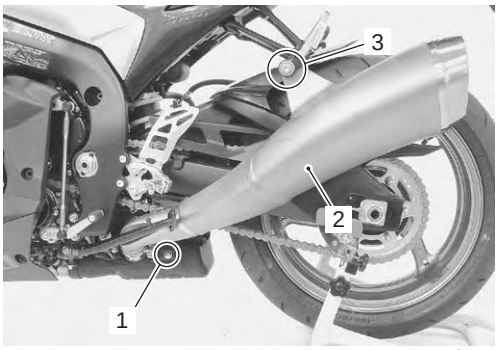
B947H11B06008

Removal

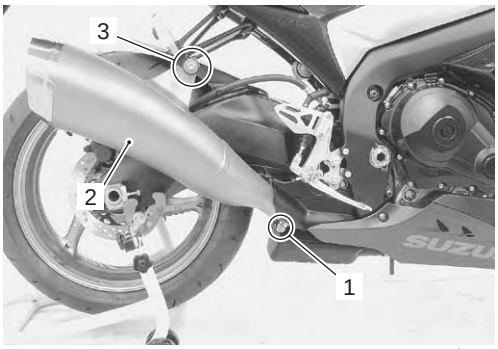
1) Loosen the muffler connecting bolts (1).
2) Remove the mufflers (2) by removing the mounting bolt and nut (3).

NOTE

Support the muffler to prevent it from falling.

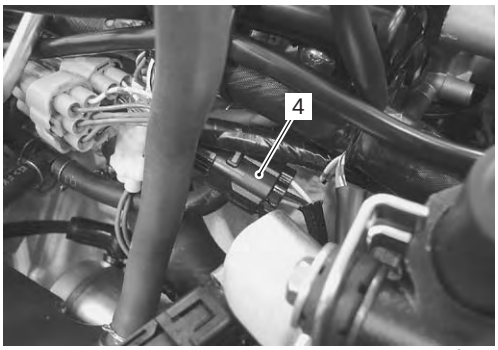


I947H11B0027-01



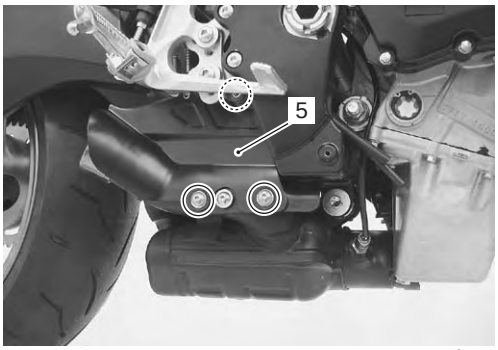
I947H11B0026-01

3) Remove the side cowlings. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
4) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
5) Disconnect the HO2 sensor coupler (4).



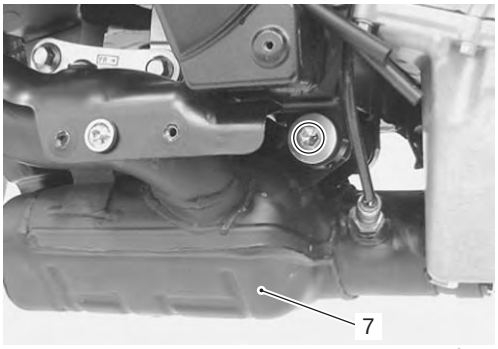
I947H11B0028-01

6) Remove the muffler chamber heat guard No. 2 (5). (RH only)

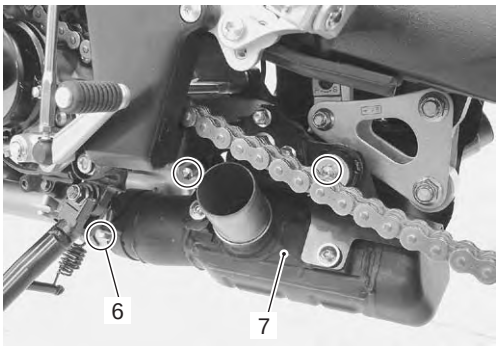


I947H11B0029-01

7) Loosen the muffler chamber connecting bolt (6).
8) Remove the muffler chamber (7).



I947H11B0030-03

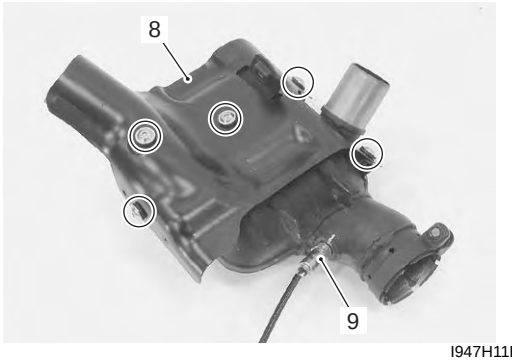


I947H11B0031-01

9) Remove the muffler chamber heat guard No. 1 (8) and HO2 sensor (9) from the muffler chamber.

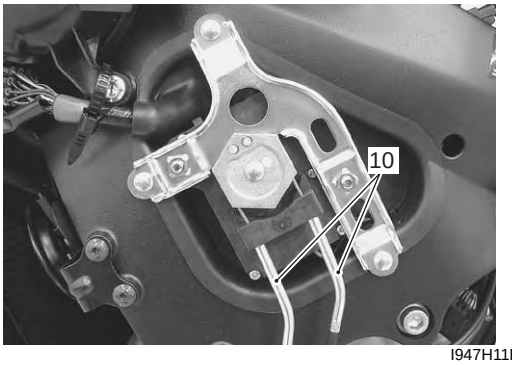
⚠ CAUTION

- **Be careful not to expose the HO2 sensor to an excessive shock.**
- **Be careful not to twist or damage the HO2 sensor lead wires.**



I947H11B0032-01

10) Remove the EXCV cables (10). Refer to “EXCV Cable Removal and Installation” (Page 1K-6).



I947H11B0033-01

11) Move the radiator and oil cooler forward. Refer to “Radiator Inspection and Cleaning” in Section 1F (Page 1F-5).

12) Remove the exhaust pipe assembly by removing the exhaust pipe bolts.

⚠ CAUTION

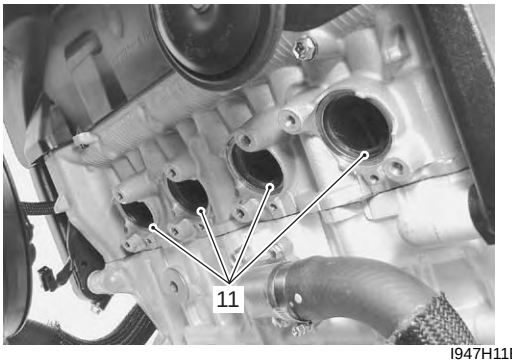
Take care not to bend the radiator/oil cooler fins.

NOTE

Support the exhaust pipe assembly to prevent it from falling.

I947H11B0034-01

13) Remove the exhaust pipe gaskets (11).



I947H11B0035-01

Installation

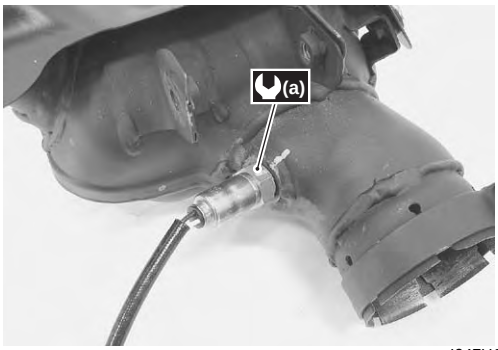
Installation is in the reverse order of removal. Pay attention to the following points:

- 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 the HO2 sensor to an excessive shock.**
- **Do not use an impact wrench when installing the HO2 sensor.**
- **Be careful not to twist or damage the HO2 sensor lead wires.**
- **Do not apply oil or other materials to the sensor air holes.**



I947H11B0036-01

- Install new gaskets and connectors and tighten each bolt to the specified torque. Refer to “Exhaust System Components” (Page 1K-5).

⚠ CAUTION

Replace the gaskets and connectors with new ones.

NOTE

When installing a new connector, remove all of the old sealer. Apply the exhaust gas sealer to both the inside and outside of the new connector.

SEAL : Muffler seal (MUFFLER SEAL LOCTITE 5920 (commercially available) or equivalent)

- Install the EXCVA cables. Refer to “EXCV Cable Removal and Installation” (Page 1K-6).

Exhaust System Inspection

B947H11B06009

Inspect the exhaust pipe, muffler chamber and muffler connection for exhaust gas leakage and mounting condition. If any defect is found, replace the exhaust pipe, muffler chamber or muffler with a new one.
Check the exhaust pipe bolts, muffler connecting bolts and muffler mounting bolts are tightened to their specified torque. Refer to “Exhaust System Components” (Page 1K-5).

Specifications

Service Data

B947H11B07001

FI Sensors

Item	Standard/Specification		Note
HO2 sensor output voltage	0.3 V and less at idle speed		
	0.6 V and more at 5 000 r/min		
EXCVA position sensor input voltage	4.5 – 5.5 V		
EXCVA position sensor output voltage	Closed	0.45 – 1.4 V	
	Opened	3.6 – 4.55 V	
EXCVA position sensor resistance	Approx. 3.1 kΩ		At adjustment position

Tightening Torque Specifications

B947H11B07002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
EXCVA pulley mounting bolt	5	0.5	3.5	☞(Page 1K-9)
HO2 sensor	25	2.5	18.0	☞(Page 1K-13)

NOTE

The specified tightening torque is described in the following.
“Exhaust Control System Construction” (Page 1K-4)
“Exhaust System Components” (Page 1K-5)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H11B08001

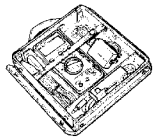
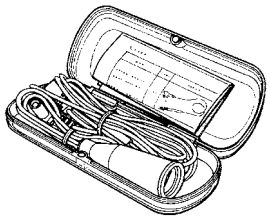
Material	SUZUKI recommended product or Specification		Note
Muffler seal	MUFFLER SEAL LOCTITE 5920 (commercially available) or equivalent	—	☞(Page 1K-13)

NOTE

Required service material is also described in the following.
“Exhaust System Components” (Page 1K-5)

Special Tool

B947H11B08002

09900–25008 Multi circuit tester set ☞(Page 1K-10) / ☞(Page 1K-11) 	09900–25009 Needle-point probe set ☞(Page 1K-10) / ☞(Page 1K-11) 
09930–82720 Mode selection switch ☞(Page 1K-6) / ☞(Page 1K-8) 	

Section 2

Suspension

CONTENTS

Precautions

Precautions

Precautions for Suspension

B947H12000001

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

⚠ 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

B947H12104001

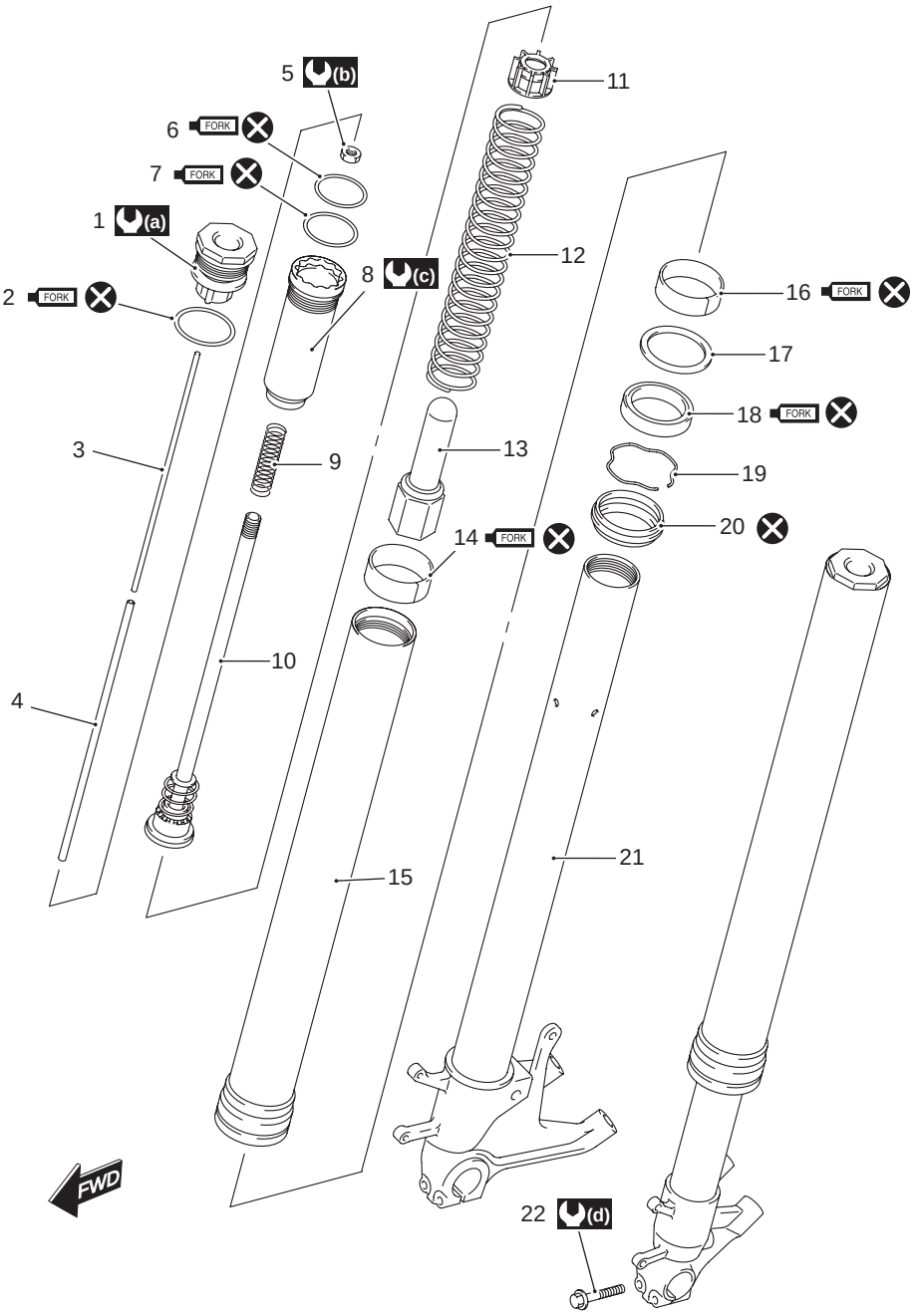
Condition	Possible cause	Correction / Reference Item
Wobbly front wheel	Distorted wheel rim.	*Replace.*
	Worn front wheel bearings.	*Replace.*
	Defective or incorrect tire.	*Replace.*
	Loose front axle nut.	*Tighten.*
	Loose front axle pinch bolts.	*Tighten.*
	Incorrect fork oil level.	*Adjust.*
	Incorrect front wheel weight balance.	*Adjust.*
Front suspension too soft	Weak spring.	*Replace.*
	Insufficient fork oil.	*Check level and add.*
	Wrong weight fork oil.	*Replace.*
	Improperly set front fork spring adjuster.	*Adjust.*
	Improperly set front fork damping force adjuster.	*Adjust.*
Front suspension too stiff	Excessively viscous fork oil.	*Replace.*
	Excessive fork oil.	*Check level and drain.*
	Bent front axle.	*Replace.*
Front suspension too noisy	Insufficient fork oil.	*Check level and add.*
	Loose front suspension bolt/nut.	*Tighten.*
Wobbly rear wheel	Distorted wheel rim.	*Replace.*
	Worn rear wheel bearings.	*Replace.*
	Defective or incorrect tire.	*Replace.*
	Worn swingarm bearings.	*Replace.*
	Worn rear suspension bearings.	*Replace.*
	Loose rear suspension bolt/nut.	*Tighten.*
	Incorrect rear wheel weight balance.	*Adjust.*
Rear suspension too soft	Weak rear shock absorber spring.	*Replace.*
	Rear shock absorber leaks oil.	*Replace.*
	Improperly set rear spring pre-load adjuster.	*Adjust.*
	Improperly set damping force adjuster.	*Adjust.*
Rear suspension too stiff	Bent rear shock absorber shaft.	*Replace.*
	Bent swingarm pivot shaft.	*Replace.*
	Worn swingarm bearings.	*Replace.*
	Worn rear suspension bearings.	*Replace.*
	Improperly set rear spring pre-load adjuster.	*Adjust.*
	Improperly set damping force adjuster.	*Adjust.*
Rear suspension too noisy	Loose rear suspension bolt/nut.	*Tighten.*
	Worn rear suspension bearings.	*Replace.*
	Worn swingarm bearings.	*Replace.*

Front Suspension

Repair Instructions

Front Fork Components

B947H12206001



I947H1220001-03

1. Front fork cap	8. Rod guide case	15. Outer tube	22. Front axle pinch bolt
2. O-ring	9. Spring	16. Guide bushing	(a) : 35 N·m (3.5 kgf-m, 25.5 lbf-ft)
3. Rebound damping force adjuster rod	10. Piston rod	17. Oil seal spacer	(b) : 28 N·m (2.8 kgf-m, 20.0 lbf-ft)
4. Compression damping force adjuster rod	11. Spring collar B	18. Oil seal	(c) : 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
5. Piston rod nut	12. Spring	19. Stopper ring	(d) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
6. O-ring	13. Spring collar A	20. Dust seal	FORK : Apply fork oil.
7. Piston ring	14. Slide bushing	21. Inner tube	: Do not reuse.

Front Fork Removal and Installation

B947H12206002

NOTE

The right and left front forks are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

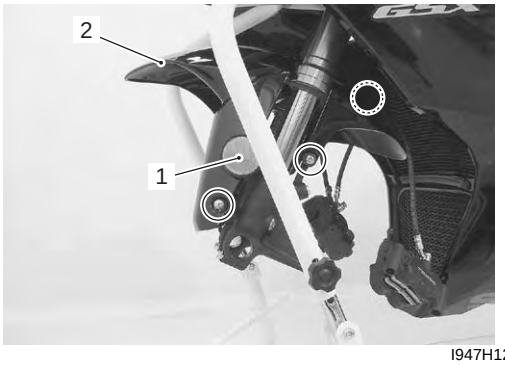
Removal

1) Remove the front wheel. Refer to “Front Wheel Assembly Removal and Installation” in Section 2D (Page 2D-4).

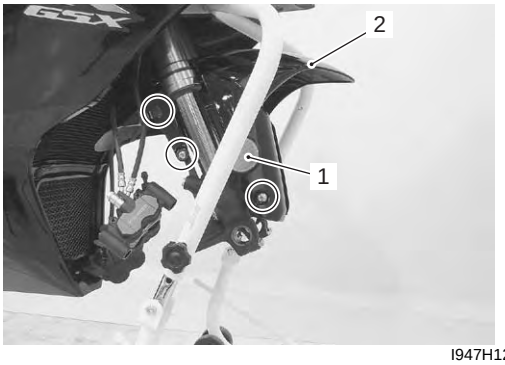
⚠ CAUTION

- **Make sure that the motorcycle is supported securely.**
- **Do not operate the front brake lever with the front wheel removed.**

2) Disconnect the brake hoses from the clamps on the front fender.
3) Remove the reflex reflectors (1). (Except for E-02, 19, 51)
4) Remove the front fender (2) by removing the bolts.



I947H1220002-01



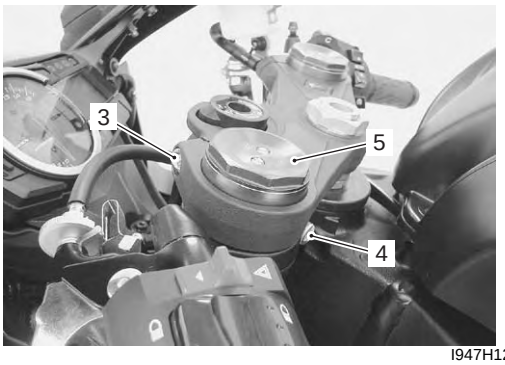
I947H1220003-01

5) Loosen the front fork upper clamp bolt (3).
6) Loosen the handlebar clamp bolt (4).

NOTE

Slightly loosen the front fork cap (5) to facilitate later disassembly.

Special tool
TOOL : 09941–53670 (Front fork cap socket wrench (45 mm))

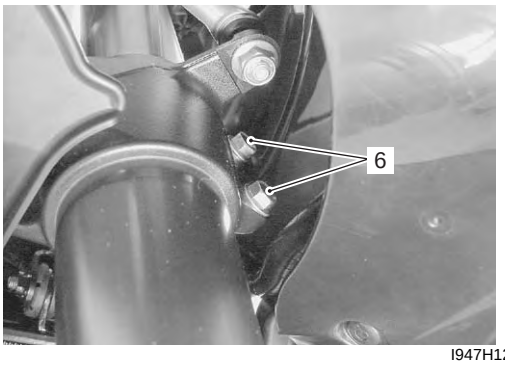


I947H1220004-01

7) Loosen the front fork lower clamp bolts (6) and remove the front fork.

NOTE

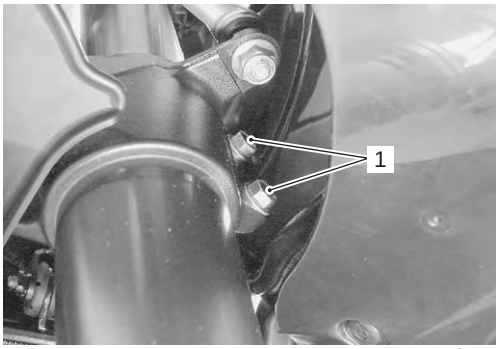
Hold the front fork by hand to prevent it sliding out of the steering stem.



I947H1220005-01

Installation

1) Set the front fork to the steering stem lower bracket temporarily by tightening the lower clamp bolts (1).



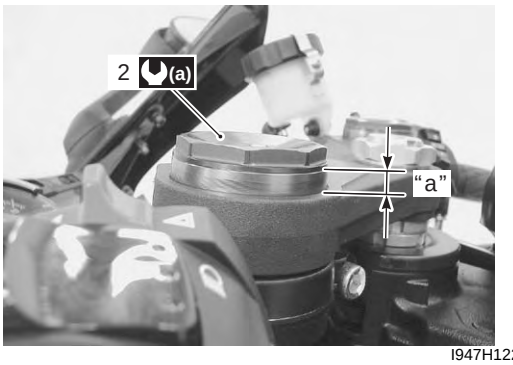
I947H1220006-01

2) Tighten the front fork cap (2) to the specified torque.

Tightening torque
Front fork cap (a): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)

3) Loosen the lower clamp bolts.

4) Set the front fork with the edge of the outer tube positioned 7.0 mm (0.28 in) “a” from the upper surface of the upper bracket.

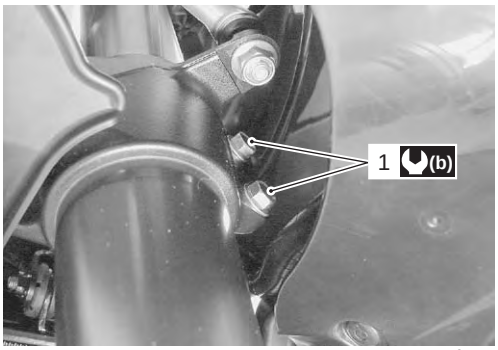


I947H1220007-02

“a”: 7.0 mm (0.28 in)

5) Tighten the front fork lower clamp bolts (1).

Tightening torque
Front fork lower clamp bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I947H1220045-01

6) Tighten the front fork upper clamp bolt (3).

Tightening torque
Front fork upper clamp bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

7) Tighten the handlebar clamp bolt (4).

Tightening torque
Handlebar clamp bolt (d): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

I947H1220008-01

8) Install the front wheel. Refer to “Front Wheel Assembly Removal and Installation” in Section 2D (Page 2D-4).

⚠ WARNING

After remounting the brake calipers, pump the brake lever until the pistons push the pads correctly.

NOTE

Before tightening the front axle bolt and front axle pinch bolts, move the front fork up and down four or five times.

I947H1220009-01

Front Suspension Adjustment

B947H12206003

After installing the front fork, adjust the spring pre-load and two kinds of damping force as follows:

⚠ WARNING

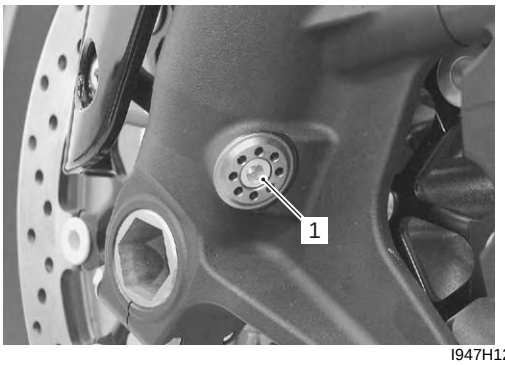
Adjust the left and right front forks to the same setting.

Spring Pre-load Adjustment

Turn the spring pre-load adjuster (1) counterclockwise fully. From that position (softest), turn it clockwise to the specified position.

STD position

4 turns in from softest position



I947H1220010-01

Damping Force Adjustment

Rebound damping force

Fully turn the rebound damping force adjuster (1) clockwise. From that position (stiffest), turn it out to standard setting position.

STD position

4 turns out from stiffest position

I947H1220011-01

Compression damping force

Fully turn the compression damping force adjuster (1) clockwise. From that position (stiffest), turn it out to standard setting position.

STD position

5 turns from stiffest position

I947H1220012-01

Front Fork Disassembly and Assembly

B947H12206004

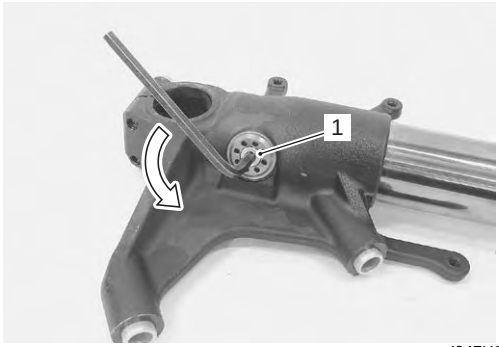
Refer to “Front Fork Removal and Installation” (Page 2B-2).

NOTE

The right and left front forks are installed symmetrically and therefore the disassembly procedure for one side is the same as that for the other side.

Disassembly

1) Turn the spring pre-load adjuster (1) to the softest position.



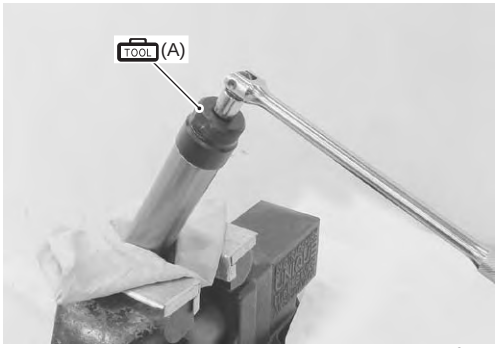
I947H1220013-01

2) Loosen the front fork cap using the special tool and vise.

⚠ CAUTION

Do not clamp the outer tube too tight.

Special tool
TOOL (A): 09941–53670 (Front fork cap socket wrench (45 mm))



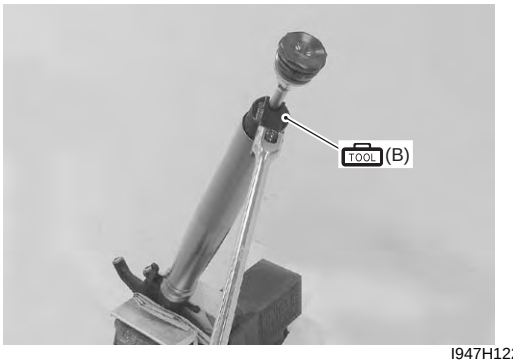
I947H1220014-01

3) Loosen the rod guide case installed in the inner tube using the special tool.

Special tool
TOOL (B): 09940–84710 (Rod guide case wrench)

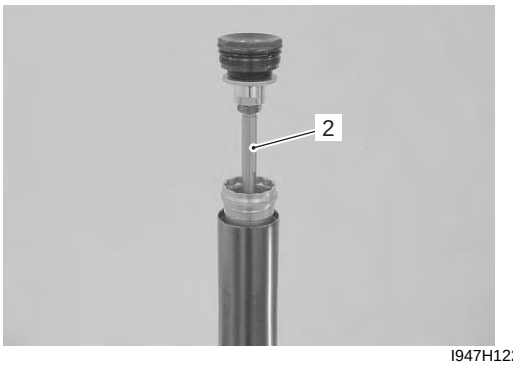
⚠ WARNING

Hold the front fork cap when removing the rod guide case, or it will jump out due to the spring pressure.



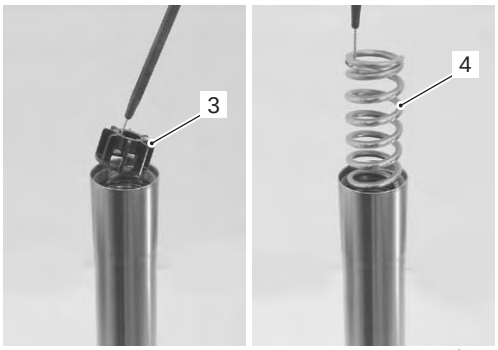
I947H1220015-01

4) Remove the piston rod assembly (2).



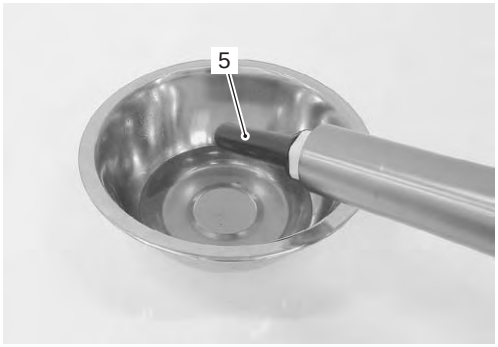
I947H1220016-01

5) Remove the spring collar B (3) and spring (4).



I947H1220017-01

6) Drain fork oil and remove the spring collar A (5).



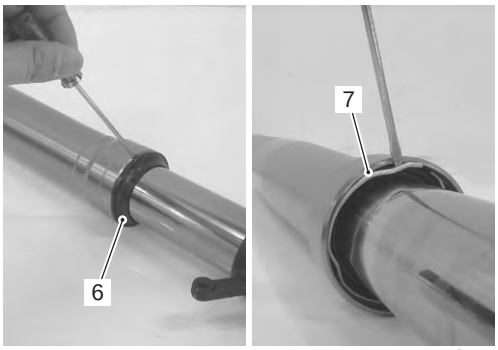
I947H1220018-01

7) Remove the dust seal (6).

8) Remove the oil seal stopper ring (7).

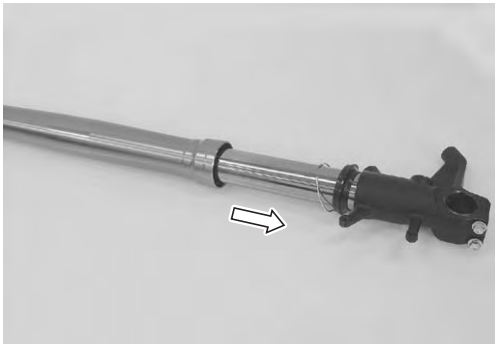
⚠ CAUTION

- **Scratches on the inner tube could cause oil leaks.**
- **Avoid scratching when removing.**



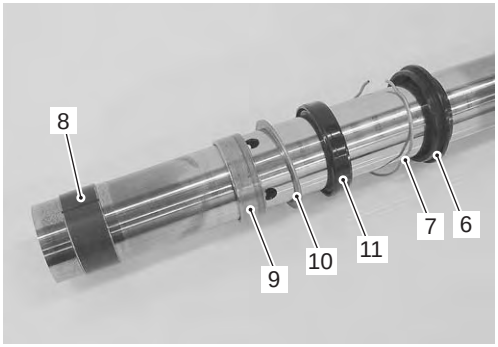
I947H1220019-01

9) Pull out the inner tube from the outer tube.



I947H1220020-01

10) Remove the slide bushing (8) from the inner tube.
11) Remove the following parts from the inner tube.
    a) Guide bushing (9)
    b) Oil seal spacer (10)
    c) Oil seal (11)
    d) Oil seal stopper ring (7)
    e) Dust seal (6)

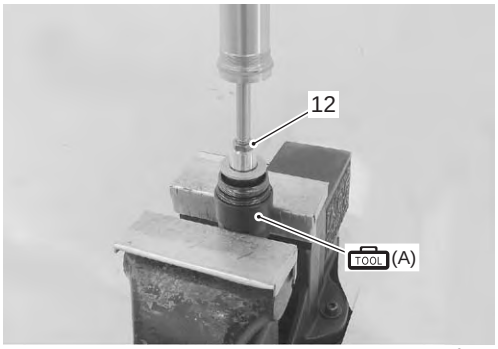


I947H1220021-01

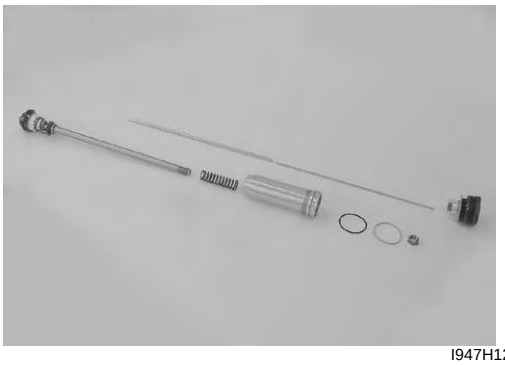
12) Hold the piston rod assembly with the special tool and vise.

Special tool
TOOL (A): 09941–53670 (Front fork cap socket wrench (45 mm))

13) Loosen the piston rod nut (12) and disassemble the piston rod as shown.



I947H1220022-01



I947H1220023-01

Assembly

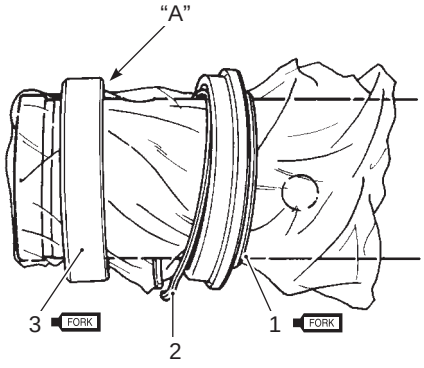
⚠ CAUTION

- **Clean all fork parts before reassembling.**
- **Replace the O-rings, seals and bushings with new ones.**
- **Apply specified front fork oil when installing the O-rings, slide bushing and guide bushing.**

1) Cover the inner tube with a plastic film.
2) Install the following parts to the inner tube.
    a) New dust seal (1)
    b) Stopper ring (2)
    c) New oil seal (3)

⚠ CAUTION

- **Scratches on the oil seal lip may cause oil leakage. When installing the seals, place a plastic film over the slide bushing groove and edges of the inner tube to avoid damaging the seals' lip.**
- **Misdirecting of the parts may cause inferior operation and oil leakage.**
- **Face the stamp mark side "A" of the oil seal to the dust seal side.**



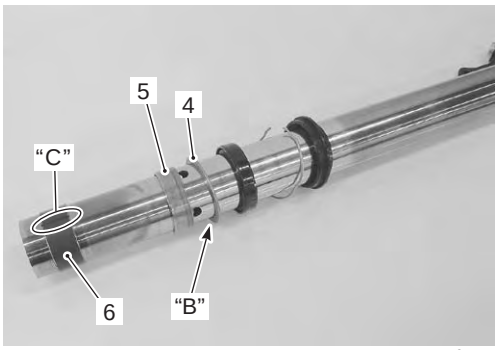
I947H1220024-01

"A": Stamp mark

3) Remove the plastic film and install the oil seal spacer (4), guide bushing (5) and slide bushing (6) keep them free from dust.

⚠ CAUTION

- **Face the grooved side “B” of the oil seal spacer to the outer tube side.**
- **Position the slit “C” of slide bushing 90° against the traveling direction.**



I947H1220025-02

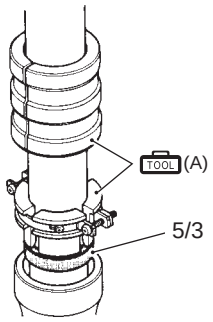
“B”: Groove	“C”: Slit

4) Insert the inner tube into the outer tube.

5) Press fit the guide bushing (5) using the special tools.

6) Press fit the new oil seal (3) using the special tools until the stopper ring groove on the outer tube can be seen.

Special tool
TOOL (A): 09940–52861 (Front fork oil seal installer set)

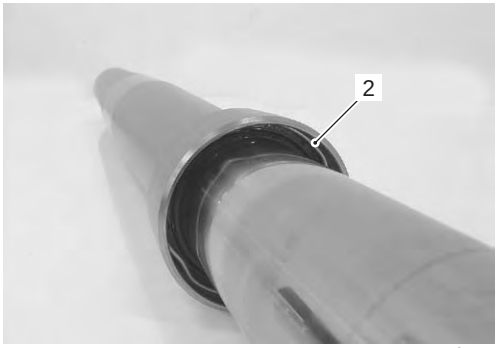


I947H1220026-01

7) Install the stopper ring (2).

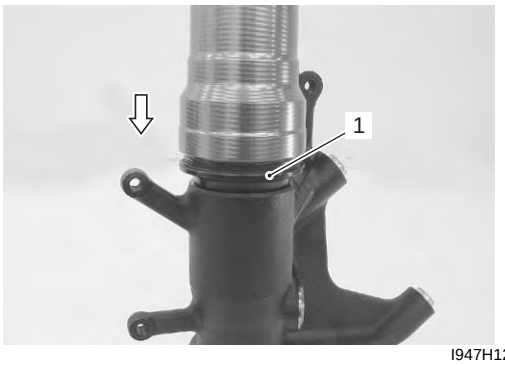
⚠ CAUTION

Make sure that the stopper ring is fitted securely into the groove.



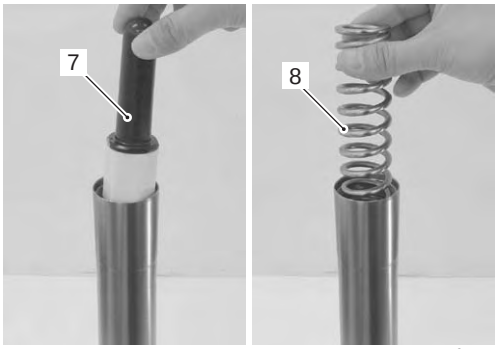
I947H1220027-01

8) Press fit the dust seal (1).



I947H1220028-01

9) Insert the spring collar A (7) and spring (8) into the inner tube.

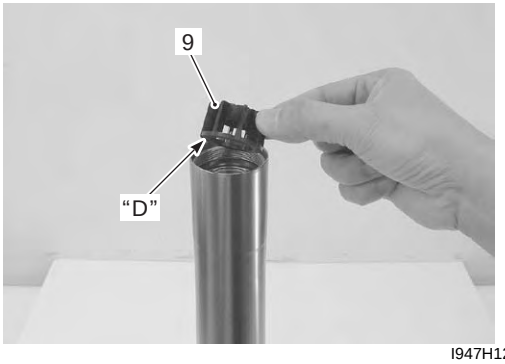


I947H1220029-01

10) Insert the spring collar B (9) into the inner tube.

⚠ CAUTION

Face the flange “D” of the collar to the spring side.



I947H1220030-01

“D”: Flange

11) Pour specified fork oil until its surface passes the side holes of inner tube.

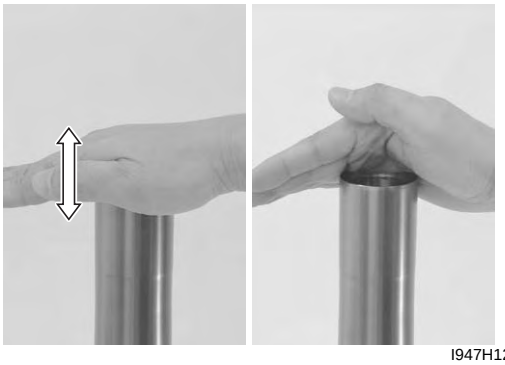
FORK : Fork Oil 99000–99001–SS5 (SUZUKI FORK OIL SS-05 or equivalent)

I947H1220031-01

12) Slowly stroke the outer tube more than ten times to pump out air.

NOTE

Take extreme attention to pump out air completely.

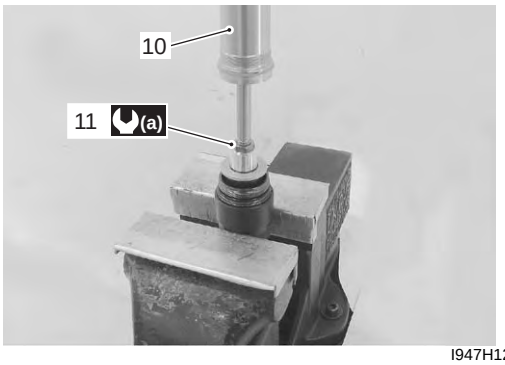


I947H1220032-01

13) Assemble the piston rod and rod guide case (10).

14) Tighten the piston rod nut (11) with the special tool and vise.

Tightening torque
Piston rod nut (a): 28 N·m (2.8 kgf-m, 20.0 lbf-ft)



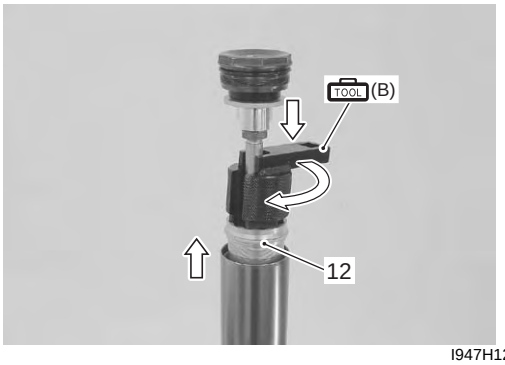
I947H1220033-01

15) Insert the piston rod assembly into the inner tube and temporarily tighten the rod guide case by hand.

⚠ CAUTION

Insert the piston rod assembly into the inner tube with the outer tube lifted up. Be sure not to damage the piston ring (12) of the rod guide case.

Special tool
TOOL (B): 09940–84710 (Rod guide case wrench)



I947H1220034-03

16) Tighten the rod guide case to the specified torque. Refer to “Rod Guide Case Tightening Torque” (Page 2B-10).

Special tool
(B): 09940–84710 (Rod guide case wrench)

Tightening torque
Rod guide case: 90 N·m (9.0 kgf-m, 65.0 lbf-ft)

I947H1220035-01

17) Pour specified fork oil up to the top of the rod guide case.

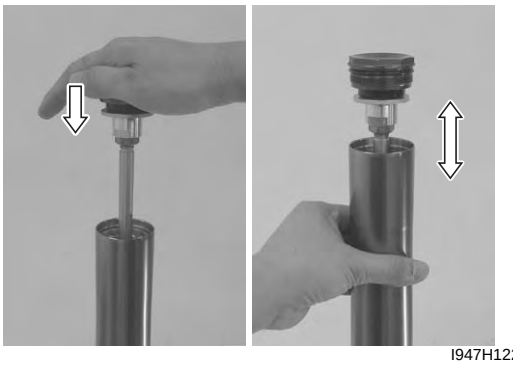
: Fork Oil 99000–99001–SS5 (SUZUKI FORK OIL SS-05 or equivalent)

I947H1220036-01

18) Push the front fork cap, then stroke the outer tube several times to pump out air.

NOTE

Take extreme attention to pump out the air completely.

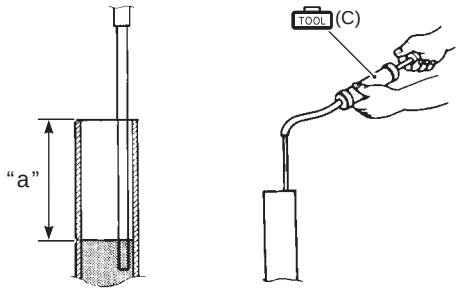


I947H1220037-01

19) Hold the front fork vertically and adjust the oil level using the special tool.

Special tool
(C): 09943–74111 (Front fork oil level gauge)

Fork oil level “a”
75.0 mm (2.95 in)



I947H1220038-01

20) Apply fork oil to the O-ring (13).

⚠ CAUTION

Use new O-ring to prevent oil leakage.

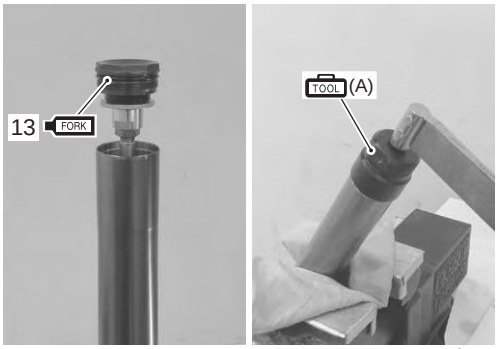
21) Tighten the front fork cap to the specified torque.

⚠ CAUTION

Do not clamp the outer tube too tight.

Tightening torque
Front fork cap: 35 N·m (3.5 kgf-m, 25.5 lbf-ft)

Special tool
(A): 09941–53670 (Front fork cap socket wrench (45 mm))



I947H1220039-02

Front Fork Parts Inspection

B947H12206005

Refer to “Front Fork Disassembly and Assembly” (Page 2B-4).

Inner and Outer Tubes

Inspect the inner tube and outer tube for scratches.

I947H1220040-01

Slide Bushing / Guide Bushing

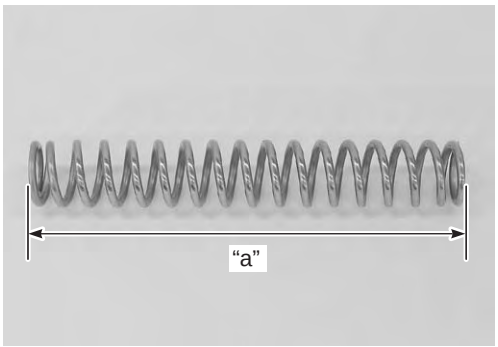
Inspect the slide bushing and guide bushing for wear or damage. If they are worn or damaged, replace them with new ones. If they are not clean, clean them with a nylon brush and fork oil.

I947H1220041-01

Fork Spring

Measure the fork spring free length “a”. If it is shorter than the service limit, replace it with a new one.

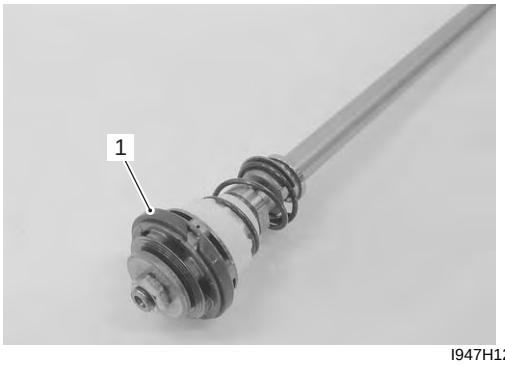
Front fork spring free length “a”
Service limit: 236 mm (9.29 in)



I947H1220042-02

Piston Rod / Piston Ring

Inspect the piston rod and piston ring (1) for wear or damage. If any defects are found, replace the piston rod with a new one.



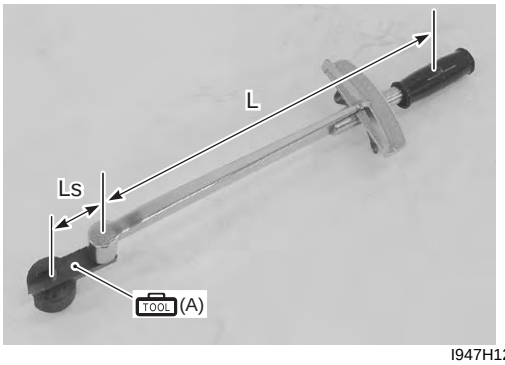
I947H1220043-01

Rod Guide Case Tightening Torque

B947H12206006

Tighten the rod guide case in the following procedures: Measure the effective length L of the torque wrench. Calculate the reading torque on the torque wrench by use of the formula shown below.

Special tool
TOOL (A): 09940–84710 (Rod guide case wrench)



I947H1220044-01

$$T = \frac{L \times Ts}{L + Ls}$$

I933H1310046-01

T:	Reading torque on the torque wrench
Ts:	Specified torque
Ls:	0.05 m (1.97 in)
L:	Effective length of the torque wrench

Specifications

Service Data

B947H12207001

Suspension

Unit: mm (in)

Item	Standard		Limit
Front fork stroke	125 (4.9)		—
Front fork spring free length	241 (9.49)		236 (9.29)
Front fork oil level (Without spring, outer tube fully compressed)	75 (2.95) 70 (2.76) 10 min. after adjustment		—
Front fork oil type	SUZUKI FORK OIL SS-05 or an equivalent fork oil		—
Front fork oil capacity (Each leg)	476 ml (16.1/16.8 US/Imp oz)		—
Front fork inner tube O.D	43 (1.7)		—
Front fork spring adjuster	4 turns in from softest position		—
Front fork damping force adjuster	Rebound	4 turns out from stiffest position	—
	Compression	5 turns from stiffest position	—

Tightening Torque Specifications

B947H12207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front fork cap	35	3.5	25.5	☞(Page 2B-3) / ☞(Page 2B-9)
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)
Handlebar clamp bolt	23	2.3	16.5	☞(Page 2B-3)
Piston rod nut	28	2.8	20.0	☞(Page 2B-8)
Rod guide case	90	9.0	65.0	☞(Page 2B-9)

NOTE

The specified tightening torque is described in the following.
“Front Fork Components” (Page 2B-1)

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H12208001

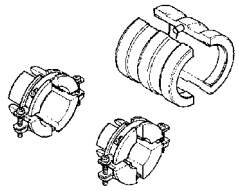
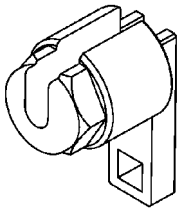
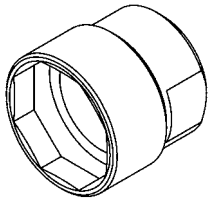
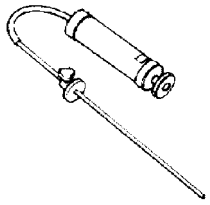
Material	SUZUKI recommended product or Specification		Note
Fork Oil	SUZUKI FORK OIL SS-05 or equivalent	P/No.: 99000–99001–SS5	☞(Page 2B-8) / ☞(Page 2B-9)

NOTE

Required service material is also described in the following.
“Front Fork Components” (Page 2B-1)

Special Tool

B947H12208002

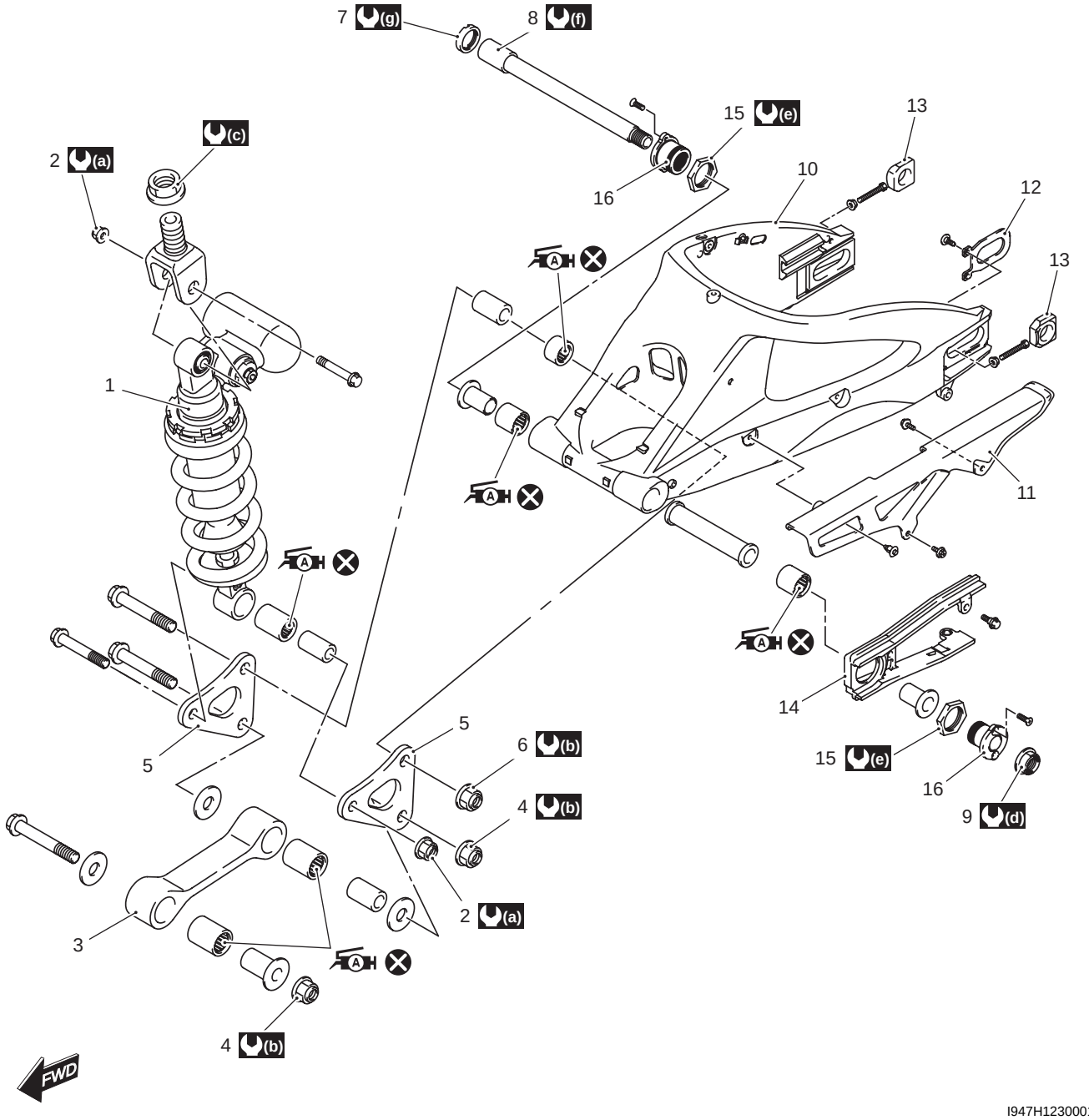
09940–52861 Front fork oil seal installer set ☞(Page 2B-7)		09940–84710 Rod guide case wrench ☞(Page 2B-5) / ☞(Page 2B-8) / ☞(Page 2B-9) / ☞(Page 2B-10)	
09941–53670 Front fork cap socket wrench (45 mm) ☞(Page 2B-2) / ☞(Page 2B-5) / ☞(Page 2B-6) / ☞(Page 2B-9)		09943–74111 Front fork oil level gauge ☞(Page 2B-9)	

Rear Suspension

Repair Instructions

Rear Suspension Components

B947H12306001

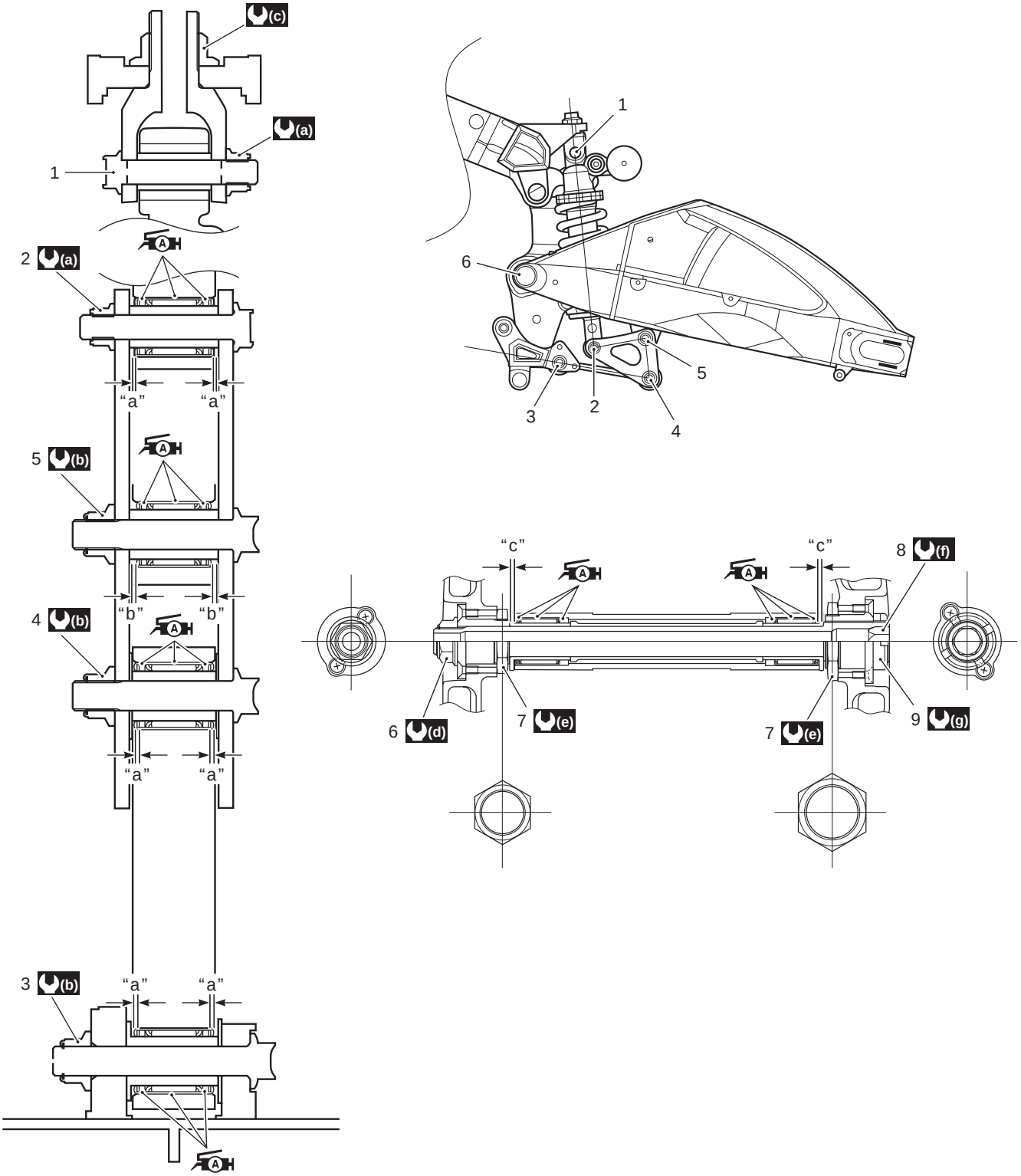


I947H1230001-02

1. Rear shock absorber	10. Swingarm	(c) : 115 N·m (11.5 kgf-m, 83.0 lbf-ft)
2. Rear shock absorber mounting nut	11. Chain case	(d) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
3. Cushion rod	12. Plate	(e) : 65 N·m (6.5 kgf-m, 47.0 lbf-ft)
4. Cushion rod mounting nut	13. Chain adjuster	(f) : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
5. Cushion lever	14. Chain buffer	(g) : 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
6. Cushion lever mounting nut	15. Swingarm pivot boss nut	A : Apply grease to the bearing.
7. Swingarm pivot lock-nut	16. Swingarm pivot boss	: Do not reuse.
8. Swingarm pivot shaft	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	
9. Swingarm pivot nut	(b) : 98 N·m (9.8 kgf-m, 71.0 lbf-ft)	

Rear Suspension Assembly Construction

B947H12306002



I947H1230002-04

1. Rear shock absorber mounting bolt (Upper)	8. Swingarm pivot shaft	(c) : 115 N·m (11.5 kgf-m, 83.0 lbf-ft)
2. Rear shock absorber mounting nut (Lower)	9. Swingarm pivot lock-nut	(d) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
3. Cushion rod mounting nut (Front)	"a": 0.5 mm (0.02 in)	(e) : 65 N·m (6.5 kgf-m, 47.0 lbf-ft)
4. Cushion rod mounting nut (Rear)	"b": 1.5 mm (0.06 in)	(f) : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
5. Cushion lever mounting nut	"c": 0 – 0.5 mm (0 – 0.02 in)	(g) : 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
6. Swingarm pivot nut	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	A : Apply grease to the bearing.
7. Swingarm pivot boss nut	(b) : 98 N·m (9.8 kgf-m, 71.0 lbf-ft)	

Rear Shock Absorber Removal and Installation

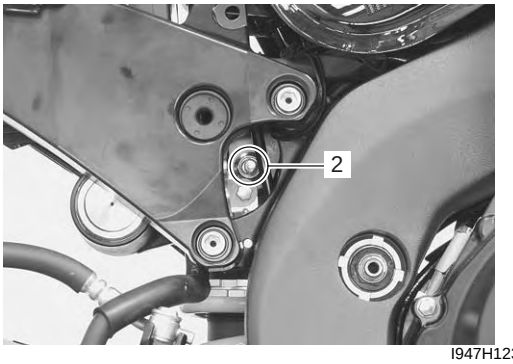
B947H12306003

Removal

1) Remove the right side cowling and side frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Support the motorcycle with a jack to relieve load on the rear shock absorber.
3) Remove the left muffler and muffler chamber heat guard No. 2. Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).
4) Remove the rear shock absorber lower mounting bolt and nut (1).

I947H1230003-02

5) Remove the rear shock absorber upper mounting bolt and nut (2).



I947H1230004-02

6) Remove the rear shock absorber upward.

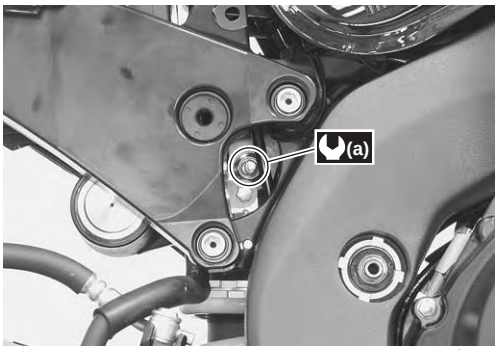
I947H1230005-01

Installation

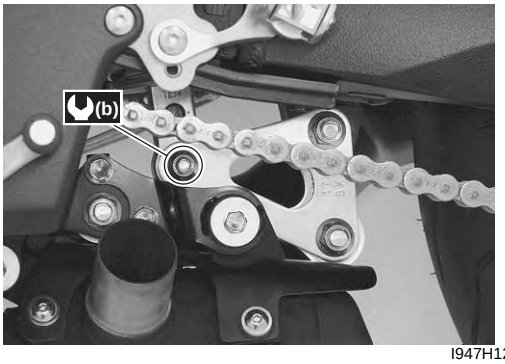
Install the rear shock absorber in the reverse order of removal. Pay attention to the following points:

- Tighten the rear shock absorber upper/lower mounting bolts and nuts.

  Tightening torque
  Rear shock absorber upper mounting nut (a): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
  Rear shock absorber lower mounting nut (b): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



I947H1230006-01



I947H1230007-01

- Install the left muffler and muffler chamber heat guard No. 2. Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).
- Install the side frame covers and right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

Rear Suspension Inspection

B947H12306004

Refer to “Rear Suspension Inspection” in Section 0B (Page 0B-19).

Rear Shock Absorber Inspection

B947H12306005

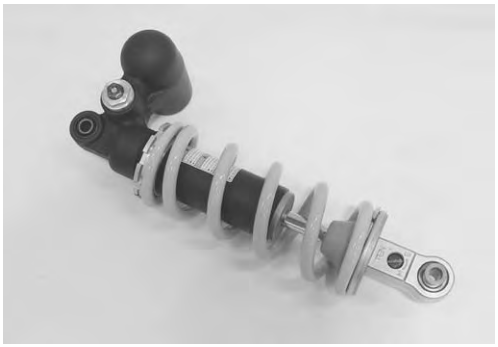
Refer to “Rear Shock Absorber Removal and Installation” (Page 2C-3).

Shock Absorber

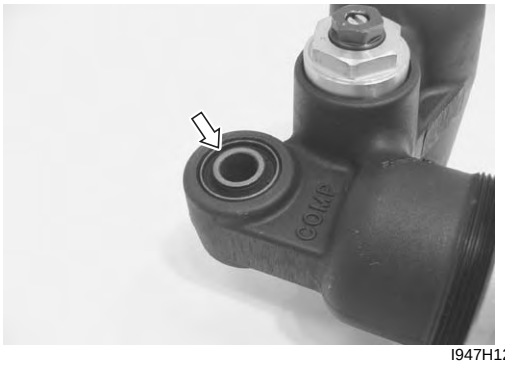
Inspect the rear shock absorber for damage and oil leakage, and absorber bushing for wear and damage. If any defect is found, replace the rear shock absorber with a new one.

⚠ CAUTION

Do not attempt to disassemble the rear shock absorber. It is unserviceable.



I947H1230008-01



I947H1230009-01

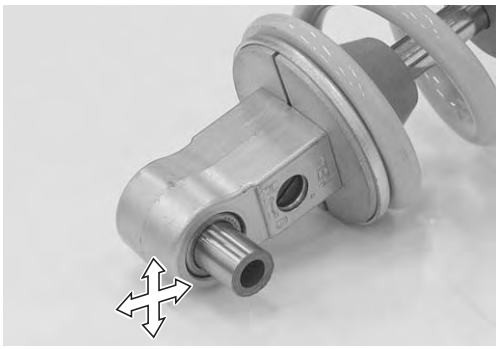
Spacer

1) Remove the spacer from the cushion lever.
2) Inspect the spacer for any flaws or other damage. If any defect is found, replace the spacer with a new one.

I947H1230010-01

Rear Shock Absorber Bearing

1) Insert the spacer into bearing.
2) Check the play by moving the spacer up and down. If excessive play is noted, replace the bearing with a new one. Refer to “Rear Shock Absorber Removal and Installation” (Page 2C-3).



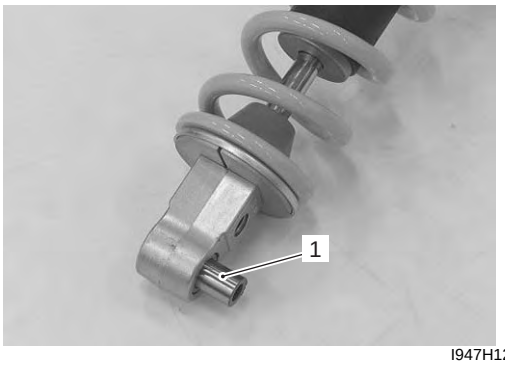
I947H1230011-01

Rear Shock Absorber Bearing Removal and Installation

B947H12306017

Removal

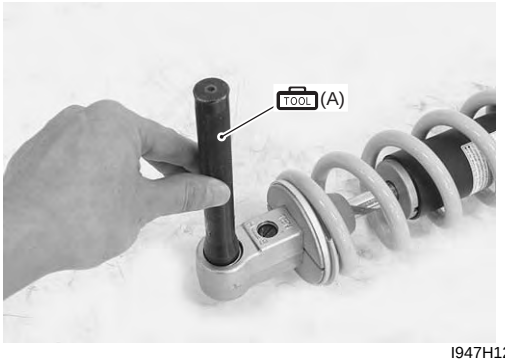
1) Remove the rear shock absorber. Refer to “Rear Shock Absorber Removal and Installation” (Page 2C-3).
2) Remove the spacer (1).



I947H1230012-01

3) Remove the rear shock absorber bearing with the special tool.

Special tool
TOOL (A): 09943–88211 (Pinion bearing installer)



I947H1230013-01

Installation

⚠ CAUTION

The removed bearing must be replaced with a new one.

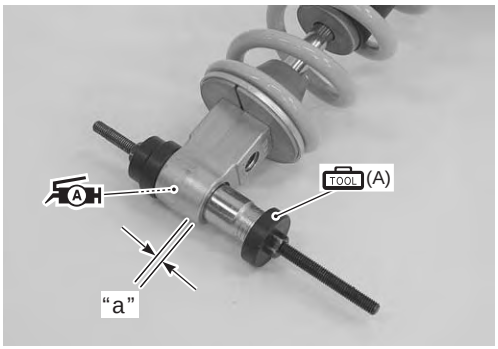
1) Press the bearing into the rear shock absorber at 0.5 mm (0.02 in) depth “a” from the rear shock absorber side surface with the special tool and suitable size socket wrench.

NOTE

Apply a small quantity of the grease to housing when installing the bearing.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

Special tool
(A): 09924–84521 (Bearing installer set)



I947H1230015-02

“a”: 0.5 mm (0.02 in)

2) Apply grease to the bearing.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

I947H1230016-01

3) Install the rear shock absorber. Refer to “Rear Shock Absorber Removal and Installation” (Page 2C-3).

Rear Shock Absorber Adjustment

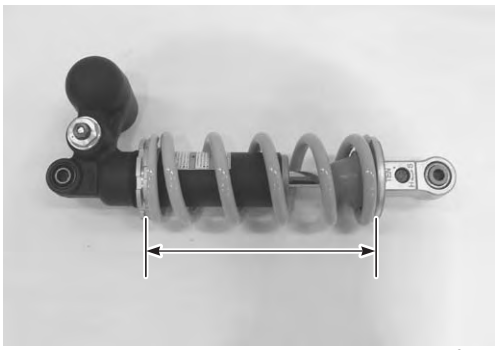
B947H12306006

After installing the rear suspension, adjust the spring pre-load and damping force as follows:

Spring Pre-load Adjustment

- The set length 179.3 mm (7.06 in) provides the maximum spring pre-load.
- The set length 189.3 mm (7.45 in) provides the minimum spring pre-load.

STD position
184.3 mm (7.26 in)



I947H1230014-01

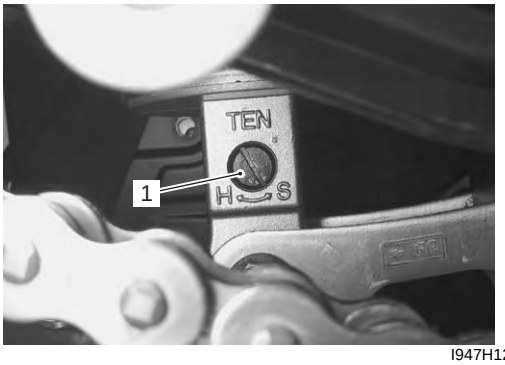
Damping Force Adjustment

NOTE

- **Turn the adjuster clockwise to stiffen the damping force and turn it counterclockwise to soften the damping force.**
- **Fine-tune the adjusters by turning it slightly until two punch marks align.**

Rebound side
Fully turn the rebound damping force adjuster (1) clockwise. From that position (stiffest), turn it out to standard setting position.

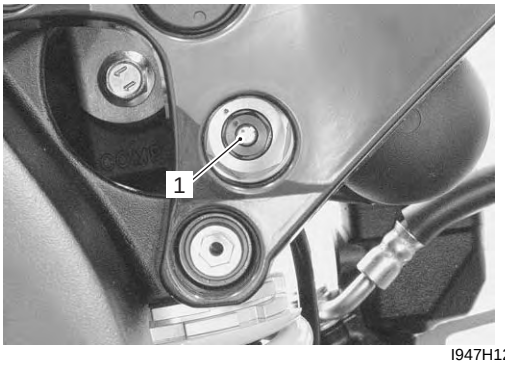
STD position
2-3/4 turns out from stiffest position



I947H1230017-01

Compression side (Low speed)
Fully turn the compression damping force (Low speed) adjuster (1) clockwise. From that position (stiffest), turn it out to standard setting position.

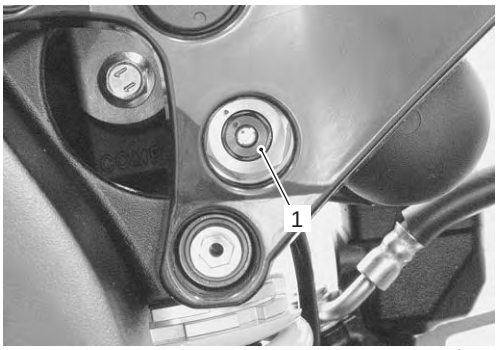
STD position
2-1/4 turns out of from stiffest position



I947H1230060-01

Compression side (High speed)
Fully turn the compression damping force (High speed) adjuster (1) clockwise. From that position (stiffest), turn it out to standard setting position.

STD position
3 turns out of from stiffest position



I947H1230018-02

Rear Shock Absorber Disposal

B947H12306007

Refer to “Rear Shock Absorber Removal and Installation” (Page 2C-3).
The rear shock absorber unit contains high-pressure nitrogen gas.

⚠ WARNING

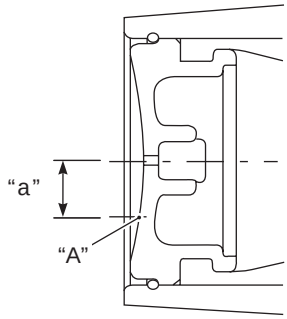
- **Mishandling can cause explosion.**
- **Keep away from fire and heat. High gas pressure caused by heat can cause an explosion.**
- **Release gas pressure before disposing.**

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.



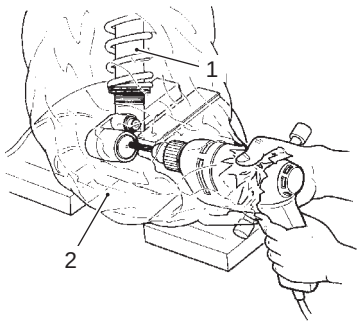
I823H1230009-01

“a”: 9 mm (0.35 in)	“A”: Mark the drill hole

2) Wrap rear shock absorber (1) with a plastic bag (2) and fix it on a vise as shown in the figure.
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 plastic 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.**



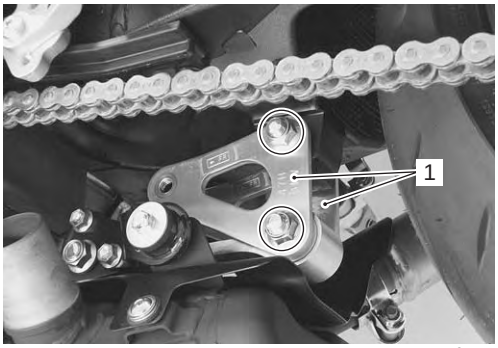
I823H1230010-01

Cushion Lever Removal and Installation

B947H12306008

Removal

1) Remove the right side cowling and side frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Support the motorcycle with a jack to relieve load on the cushion levers.
3) Remove the left muffler and muffler chamber heat guard No. 2. Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).
4) Remove the rear shock absorber. Refer to “Rear Shock Absorber Removal and Installation” (Page 2C-3).
5) Remove the cushion levers (1).



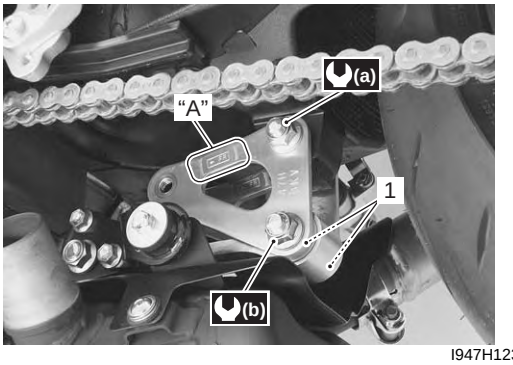
I947H1230019-01

Installation

Install the cushion levers in the reverse order of removal. Pay attention to the following point:

- Set the cushion levers so that the arrow mark “A” points forward.
- Install the washers (1) between the cushion rod and cushion levers.
- Tighten each nut to the specified torque.

Tightening torque
Cushion lever mounting nut (a): 98 N·m (9.8 kgf-m, 71.0 lbf-ft)
Cushion rod rear mounting nut (b): 98 N·m (9.8 kgf-m, 71.0 lbf-ft)



I947H1230020-01

- Install the rear shock absorber. Refer to “Rear Shock Absorber Removal and Installation” (Page 2C-3).
- Install the muffler chamber heat guard No. 2 and left muffler. Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).
- Install the side frame covers and right side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).

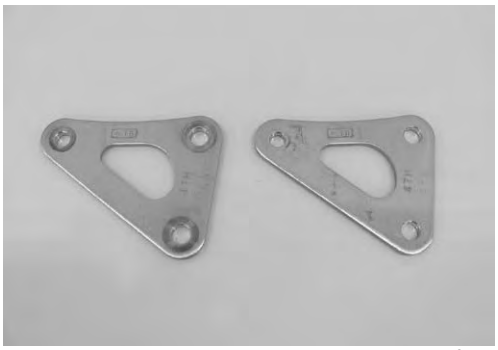
Cushion Lever Inspection

B947H12306009

Refer to “Cushion Lever Removal and Installation” (Page 2C-7).

Cushion Lever

Inspect the cushion levers for damage. If any defects are found, replace the cushion levers with new ones.



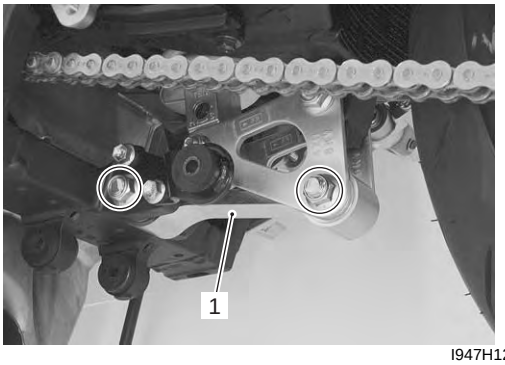
I947H1230021-01

Cushion Rod Removal and Installation

B947H12306011

Removal

1) Remove the right side cowling and side frame covers. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Support the motorcycle with a jack to relieve load on the cushion rod.
3) Remove the muffler chamber. Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).
4) Remove the cushion rod (1) and washer.

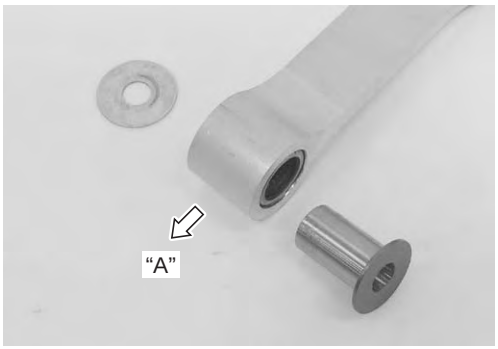


I947H1230022-01

Installation

Install the cushion rod in the reverse order of removal. Pay attention to the following points:

- Before installing the cushion rod to the frame, insert the collar into the bearing from the left side.
- Install the washer between the cushion rod right side and frame.

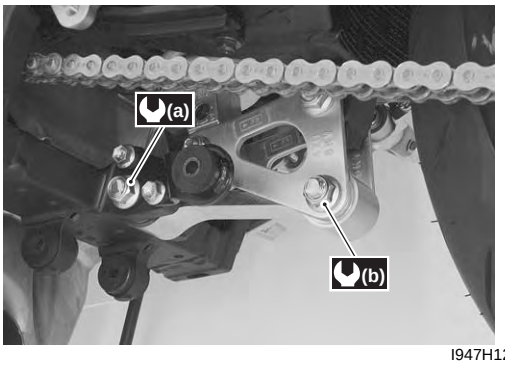


I947H1230023-01

"A": Forward

- Tighten each bolts and nuts to the specified torque.

Tightening torque
Cushion rod front mounting nut (a): 98 N·m (9.8 kgf-m, 71.0 lbf-ft)
Cushion rod rear mounting nut (b): 98 N·m (9.8 kgf-m, 71.0 lbf-ft)



I947H1230024-01

- Install the muffler chamber. Refer to "Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation" in Section 1K (Page 1K-11).
- Install the side frame covers and right side cowling. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).

Cushion Rod Inspection

B947H12306012

Refer to "Cushion Rod Removal and Installation" (Page 2C-7).

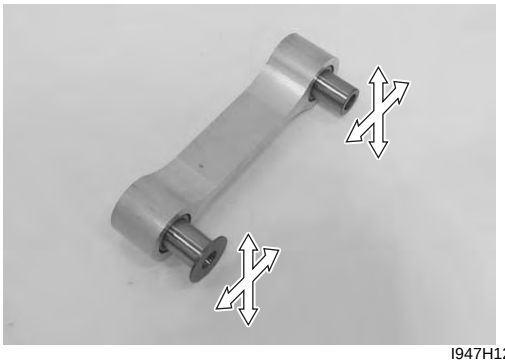
Collar and Spacer

1) Remove the collar and spacer from the cushion rod.
2) Inspect the collar and spacer for any flaws or other damage. If any defects are found, replace it with a new one.

I947H1230025-01

Cushion Rod Bearing

1) Insert the collar and spacer into bearing.
2) Check the play by moving the collar and spacer up and down. If excessive play is noted, replace the bearing with a new one. Refer to "Cushion Rod Bearing Removal and Installation" (Page 2C-9).



I947H1230026-02

Cushion Rod

Inspect the cushion rod for damage. If any defects are found, replace the cushion rod with a new one.

I947H1230027-01

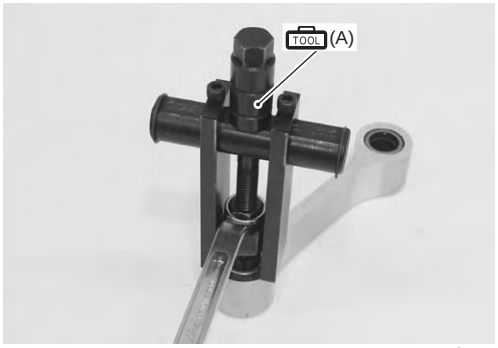
Cushion Rod Bearing Removal and Installation

B947H12306013

Removal

1) Remove the cushion rod. Refer to “Cushion Rod Removal and Installation” (Page 2C-7).
2) Remove the cushion rod bearing with the special tool.

Special tool
TOOL (A): 09921–20240 (Bearing remover set)



I947H1230028-01

Installation

⚠ CAUTION

The removed bearings must be replaced with new ones.

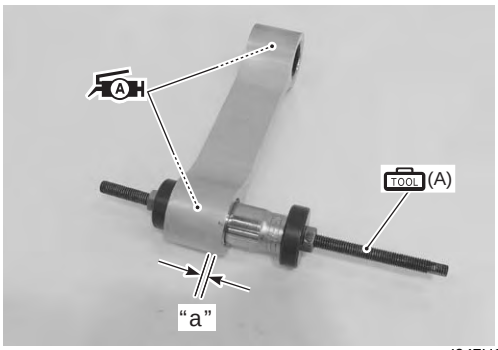
1) Press the bearings into the cushion rod at 0.5 mm (0.02 in) depth “a” from the cushion rod side surface with the special tool and suitable size socket wrench.

NOTE

When installing the bearing, apply a small quantity of the grease to housing.

A: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

Special tool
TOOL (A): 09924–84521 (Bearing installer set)

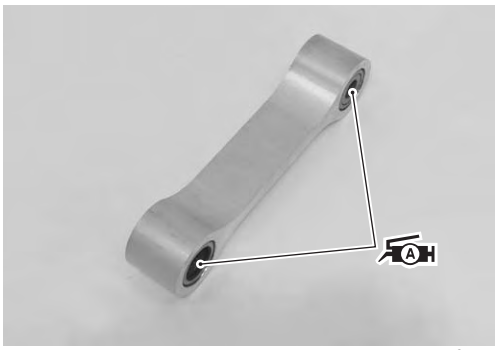


I947H1230029-02

“a”: 0.5 mm (0.02 in)

2) Apply grease to the bearings.

A: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



I947H1230030-01

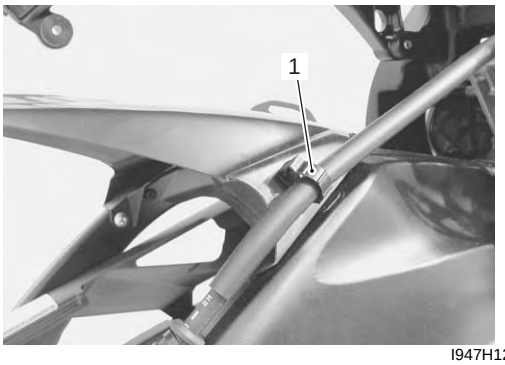
3) Install the cushion rod. Refer to “Cushion Rod Bearing Removal and Installation” (Page 2C-9).

Swingarm Removal and Installation

B947H12306014

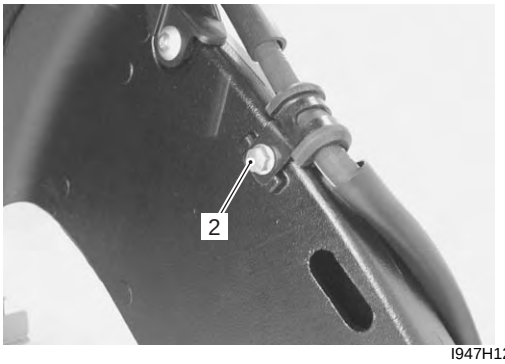
Removal

1) Cut the drive chain. Refer to “Drive Chain Replacement” in Section 3A (Page 3A-7).
2) Remove the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation” in Section 2D (Page 2D-11).
3) Disconnect the rear brake hose from the brake hose clamp (1).



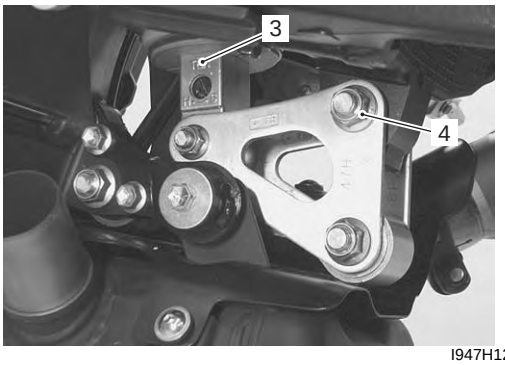
I947H1230031-01

4) Remove the brake hose clamp bolt (2).
5) Remove the rear brake caliper from the swingarm.



I947H1230032-01

6) Remove the left muffler and muffler chamber heat guard No. 2. Refer to “Muffler / Muffler Chamber / Exhaust Pipe Removal and Installation” in Section 1K (Page 1K-11).
7) Remove the rear shock absorber (3) and cushion lever mounting bolt and nut (4). Refer to “Rear Shock Absorber Removal and Installation” (Page 2C-3) and “Cushion Lever Removal and Installation” (Page 2C-7).



I947H1230058-02

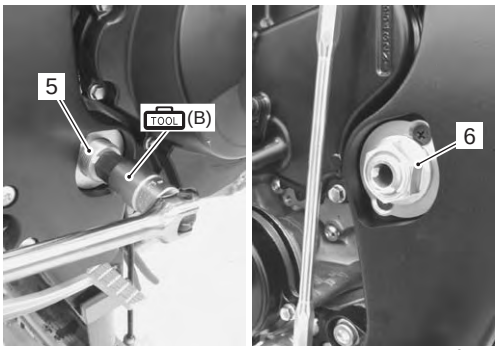
8) Remove the swingarm pivot shaft lock-nut with the special tool.

Special tool
TOOL (A): 09940–14940 (Swingarm pivot thrust adjuster wrench)

I947H1230033-01

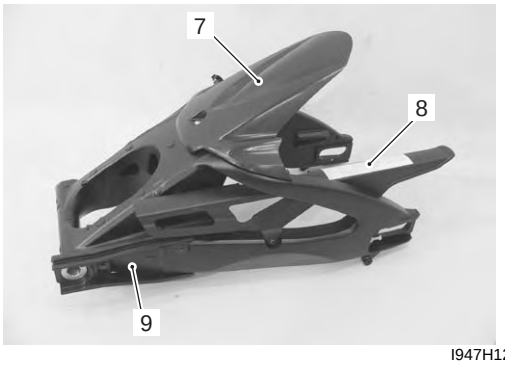
9) Hold the swingarm pivot shaft (5) with the special tool and remove the swingarm pivot nut (6).

Special tool
TOOL (B): 09944–28321 (Hexagon socket (19 mm))



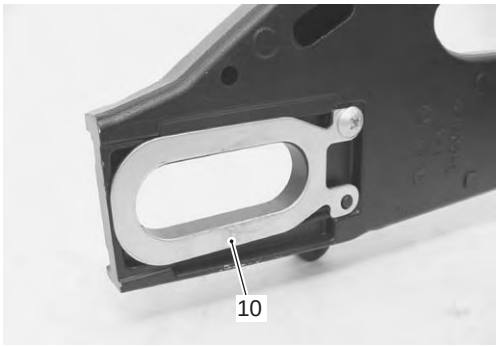
I947H1230034-01

10) Remove the swingarm pivot shaft.
11) Remove the swingarm assembly.
12) Remove the mudguard (7), chain case (8) and chain buffer (9) from the swingarm.



I947H1230035-01

13) Remove the plate (10).



I947H1230036-01

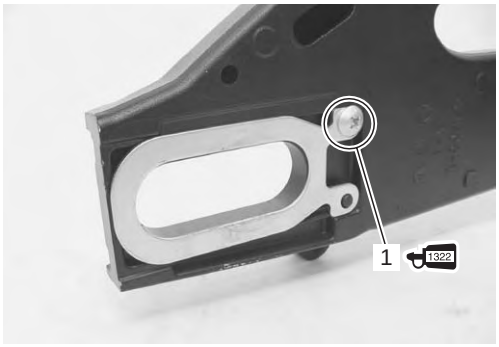
Installation
Install the swingarm in the reverse order of removal. Pay attention to the following points:

- Install the plate.

NOTE

When reusing the removed screw (1), apply a small quantity of the thread lock to it.

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

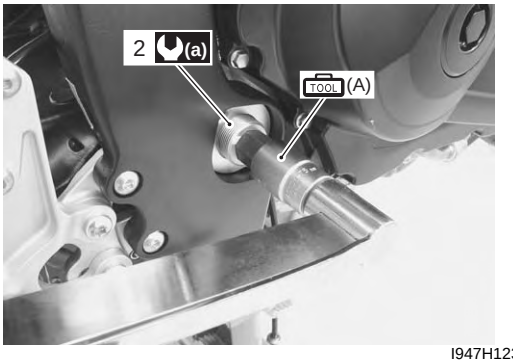


I947H1230037-01

- Adjust swingarm pivot thrust clearance in the following procedures:
  – Insert the swingarm pivot shaft (2) and tighten it to the specified torque with the special tool.

    Special tool
    TOOL (A): 09944–28321 (Hexagon socket (19 mm))

    Tightening torque
    Swingarm pivot shaft (a): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)

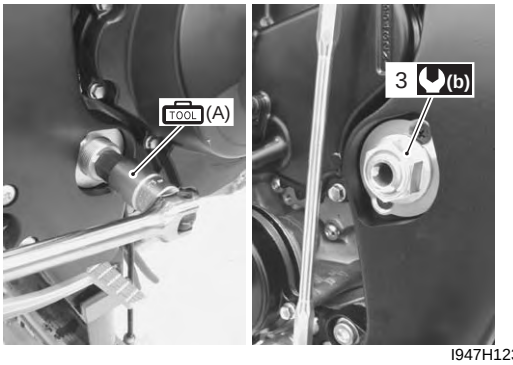


I947H1230038-01

  – Hold the swingarm pivot shaft with the special tool and tighten the swingarm pivot nut (3) to the specified torque.

    Special tool
    TOOL (A): 09944–28321 (Hexagon socket (19 mm))

    Tightening torque
    Swingarm pivot nut (b): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)

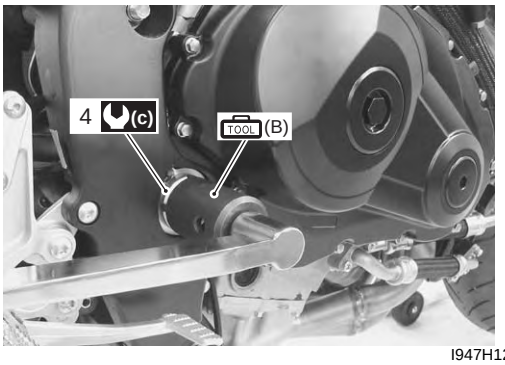


I947H1230039-01

  – Tighten the swingarm pivot lock-nut (4) to the specified torque with the special tool.

    Special tool
    TOOL (B): 09940–14940 (Swingarm pivot thrust adjuster wrench)

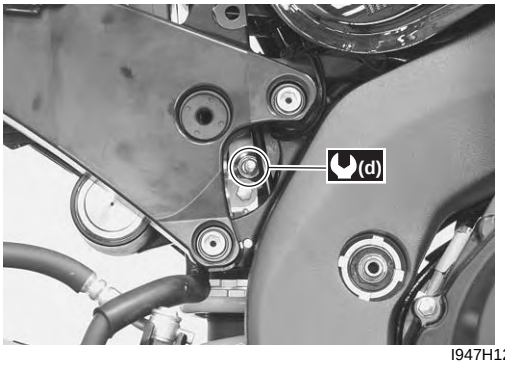
    Tightening torque
    Swingarm pivot lock-nut (c): 90 N·m (9.0 kgf-m, 65.0 lbf-ft)



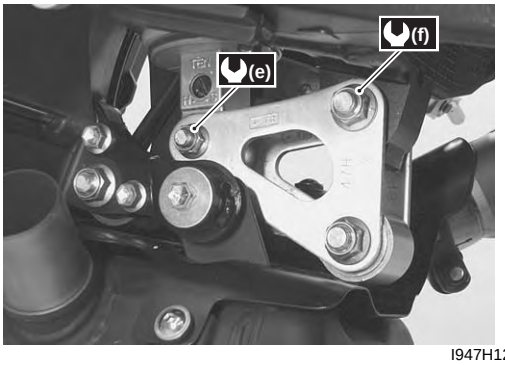
I947H1230040-01

- Tighten the cushion lever, cushion rod and rear shock absorber mounting bolts and nuts to the specified torque.

  Tightening torque
  Rear shock absorber upper mounting nut (d): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
  Rear shock absorber lower mounting nut (e): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
  Cushion lever mounting nut (f): 98 N·m (9.8 kgf-m, 71.0 lbf-ft)



I947H1230041-01



I947H1230059-02

Swingarm Pivot Boss Removal and Installation

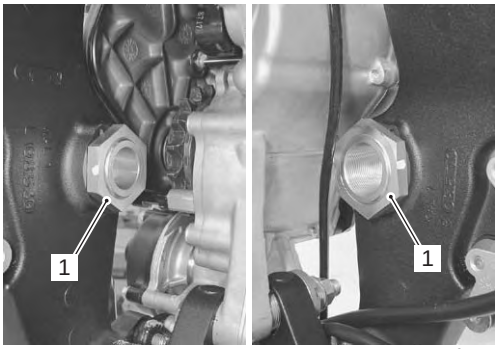
B947H12306018

Removal

1) Remove the swingarm. Refer to “Swingarm Removal and Installation” (Page 2C-9).
2) Remove the swingarm pivot boss nut (1).

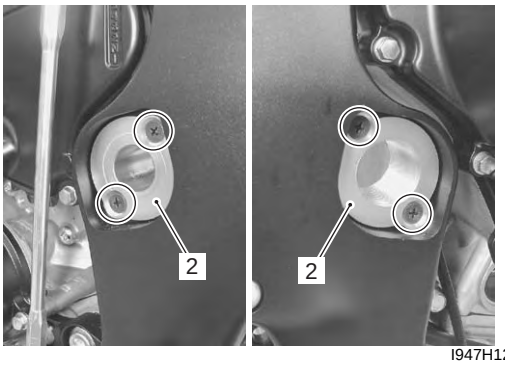
NOTE

Remove the swingarm pivot boss only when replacing it.



I947H1230042-01

3) Remove the swingarm pivot boss (2) by removing its set screws.

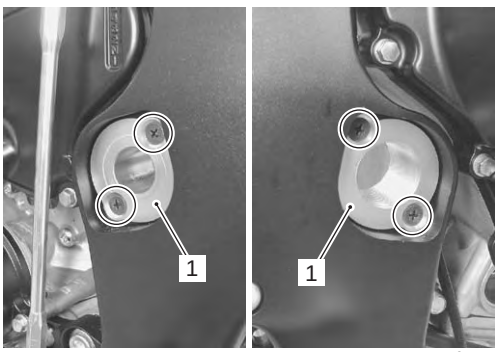


I947H1230043-01

Installation

Install the swingarm pivot boss in the reverse order of removal. Pay attention to the following points:

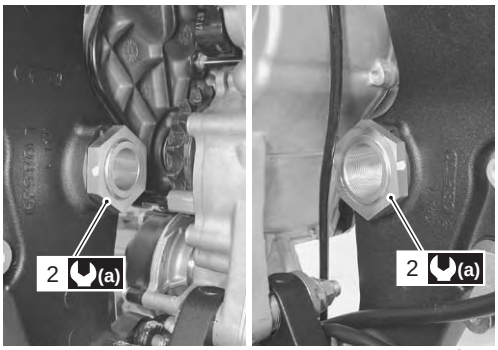
- Install the swingarm pivot boss (1).



I947H1230044-01

- Tighten the swingarm boss nut (2) to the specified torque.

Tightening torque
Swingarm pivot boss nut (a): 65 N·m (6.5 kgf-m, 47.0 lbf-ft)



I947H1230045-01

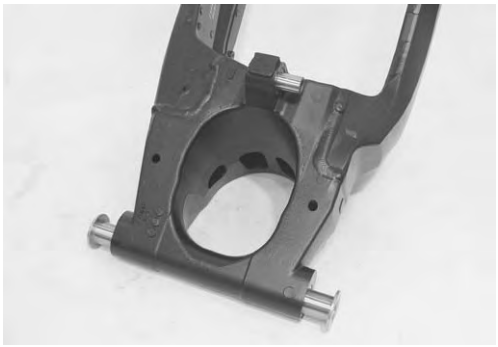
Swingarm Related Parts Inspection

B947H12306015

Refer to “Swingarm Removal and Installation” (Page 2C-9).

Spacers

1) Remove the collar and spacer from the swingarm.
2) Inspect the collars and spacer for wear and damage. If any defects are found, replace them with new ones.



I947H1230046-01

Chain Buffer

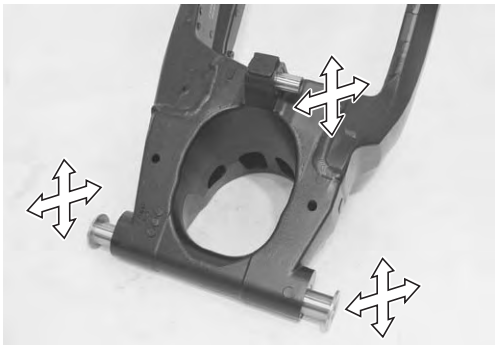
Inspect the chain buffer for wear and damage. If any defect is found, replace the chain buffer with a new one.

I947H1230047-02

Plate
Inspect the plate for damage and excessive bend. If any defect is found, replace the plate with a new one.


I947H1230048-01

Swingarm Bearing
1) Insert the collars and spacer into bearings.
2) Check the play by moving the collars and spacer up and down. If excessive play is noted, replace the bearings with new ones. Refer to “Swingarm Bearing Removal and Installation” (Page 2C-13).


I947H1230049-01

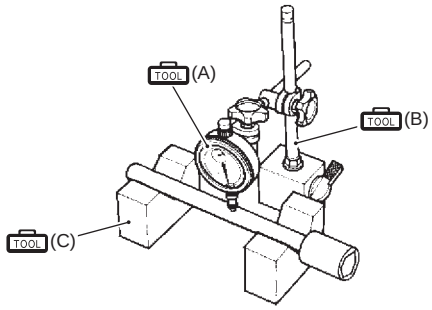
Swingarm
Inspect the swingarm for damage. If any defect is found, replace the swingarm with a new one.


I947H1230050-01

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)
(B): 09900–20701 (Dial gauge chuck)
(C): 09900–21304 (V blocks)

Swingarm pivot shaft runout
Service limit: 0.3 mm (0.01 in)

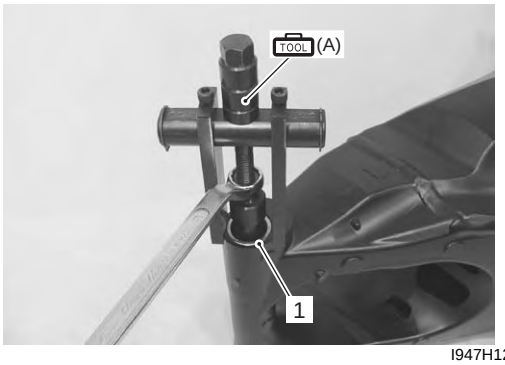


I823H1230048-01

Swingarm Bearing Removal and Installation
B947H12306016

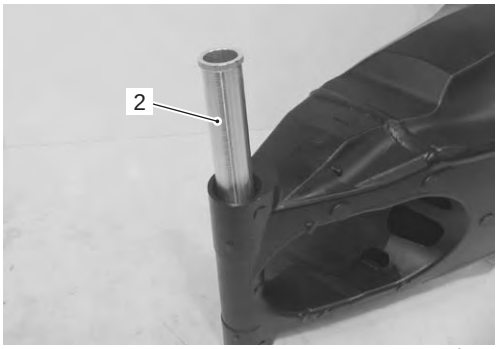
Removal
1) Remove the swingarm. Refer to “Swingarm Removal and Installation” (Page 2C-9).
2) Remove the swingarm pivot bearings (1) using the special tool.

Special tool
(A): 09921–20240 (Bearing remover set)



I947H1230051-01

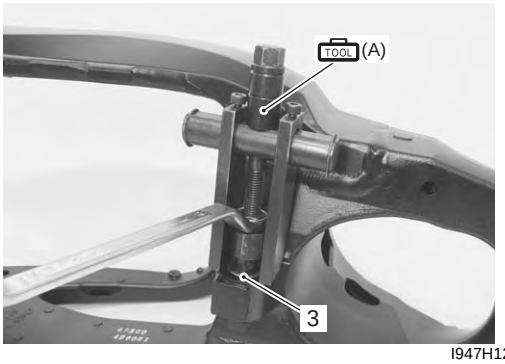
3) Remove the center spacer (2).



I947H1230052-01

4) Remove the cushion lever bearing (3) using the special tool.

Special tool
(A): 09921–20240 (Bearing remover set)



I947H1230053-01

Installation

⚠ CAUTION

The removed bearings must be replaced with new ones.

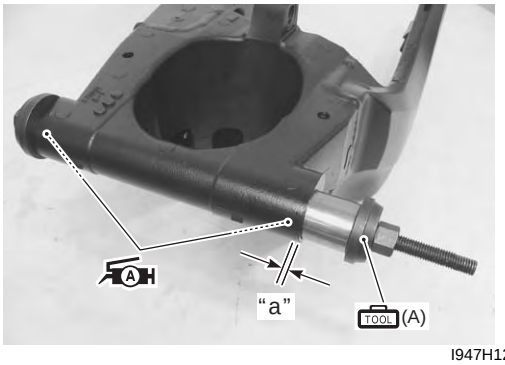
1) Install the center spacer.
2) Press the pivot bearings into the swingarm pivot to the depth “a” of 0 – 0.5 mm (0 – 0.02 in) from the edge with the special tool and suitable size socket wrench.

NOTE

When installing the bearing, stamped mark on the bearing must face outside and apply a small quantity of the grease to housing.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

Special tool
(A): 09941–34513 (Bearing installer)



I947H1230054-02

“a”: 0 – 0.5 mm (0 – 0.02 in)

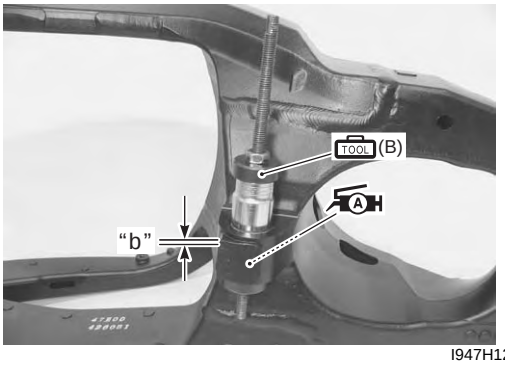
3) Press the cushion lever bearing into the swingarm to the depth “b” of 1.5 mm (0.06 in) from the edge with the special tool and suitable size socket wrench.

NOTE

Apply a small quantity of the grease to housing when installing the bearing.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

Special tool
(B): 09924–84521 (Bearing installer set)

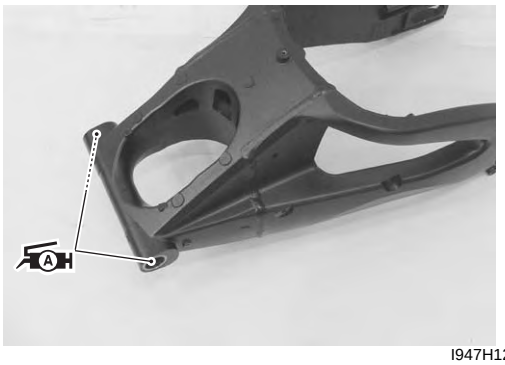


I947H1230055-02

“b”: 1.5 mm (0.06 in)

4) Apply grease to the bearings.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



I947H1230056-01

I947H1230057-01

5) Install the swingarm. Refer to “Swingarm Removal and Installation” (Page 2C-9).

Specifications

Service Data

B947H12307001

Suspension

Unit: mm (in)

Item	Standard		Limit
Rear shock absorber spring pre-set length	184.3 (7.26)		—
Rear shock absorber damping force adjuster	Rebound	2-3/4 turns from stiffed position	—
	Compression	Lo: 2-1/4 turns from stiffest position Hi: 3 turns from stiffest position	—
Rear wheel travel	130 (5.12)		—
Swingarm pivot shaft runout	—		0.3 (0.01)

Tightening Torque Specifications

B947H12307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear shock absorber upper mounting nut	50	5.0	36.0	☞(Page 2C-3) / ☞(Page 2C-11)
Rear shock absorber lower mounting nut	50	5.0	36.0	☞(Page 2C-3) / ☞(Page 2C-11)
Cushion lever mounting nut	98	9.8	71.0	☞(Page 2C-7) / ☞(Page 2C-11)
Cushion rod rear mounting nut	98	9.8	71.0	☞(Page 2C-7) / ☞(Page 2C-8)
Cushion rod front mounting nut	98	9.8	71.0	☞(Page 2C-8)
Swingarm pivot shaft	15	1.5	11.0	☞(Page 2C-11)
Swingarm pivot nut	100	10.0	72.5	☞(Page 2C-11)
Swingarm pivot lock-nut	90	9.0	65.0	☞(Page 2C-11)
Swingarm pivot boss nut	65	6.5	47.0	☞(Page 2C-12)

NOTE

The specified tightening torque is described in the following.
“Rear Suspension Components” (Page 2C-1)
“Rear Suspension Assembly Construction” (Page 2C-2)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H12308001

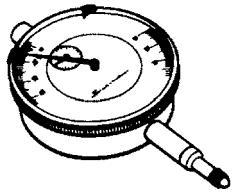
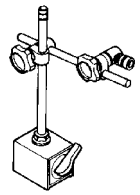
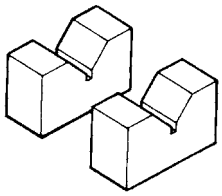
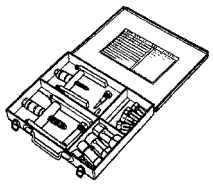
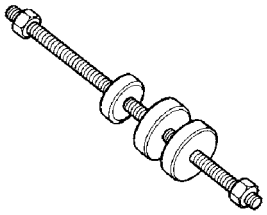
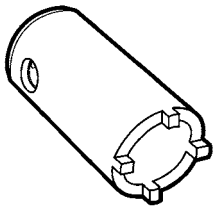
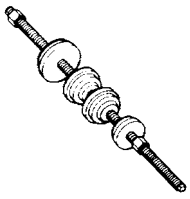
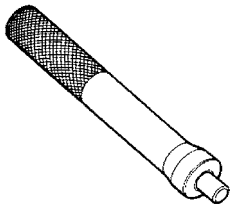
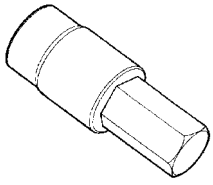
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 2C-5) / ☞(Page 2C-5) / ☞(Page 2C-9) / ☞(Page 2C-9) / ☞(Page 2C-14) / ☞(Page 2C-14) / ☞(Page 2C-14)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 2C-10)

NOTE

Required service material is also described in the following.
“Rear Suspension Components” (Page 2C-1)
“Rear Suspension Assembly Construction” (Page 2C-2)

Special Tool

B947H12308002

09900–20607 Dial gauge ☞(Page 2C-13) 	09900–20701 Dial gauge chuck ☞(Page 2C-13) 
09900–21304 V blocks ☞(Page 2C-13) 	09921–20240 Bearing remover set ☞(Page 2C-9) / ☞(Page 2C-13) / ☞(Page 2C-14) 
09924–84521 Bearing installer set ☞(Page 2C-5) / ☞(Page 2C-9) / ☞(Page 2C-14) 	09940–14940 Swingarm pivot thrust adjuster wrench ☞(Page 2C-10) / ☞(Page 2C-11) 
09941–34513 Bearing installer ☞(Page 2C-14) 	09943–88211 Pinion bearing installer ☞(Page 2C-4) 
09944–28321 Hexagon socket (19 mm) ☞(Page 2C-10) / ☞(Page 2C-11) / ☞(Page 2C-11) 	

Wheels and Tires

Precautions

Precautions for Wheel and Tire

B947H12400001

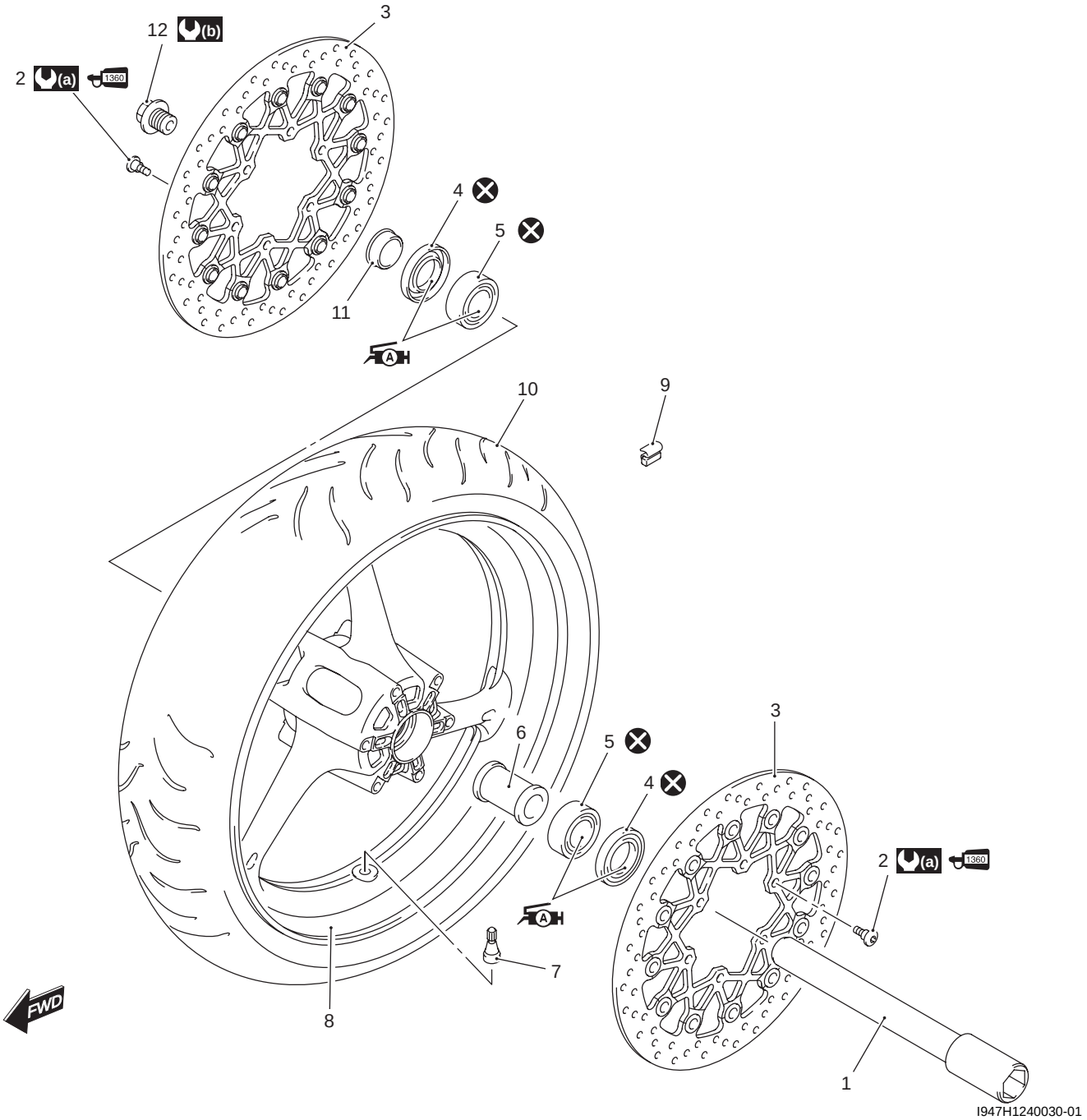
⚠ WARNING

- **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

B947H12406001

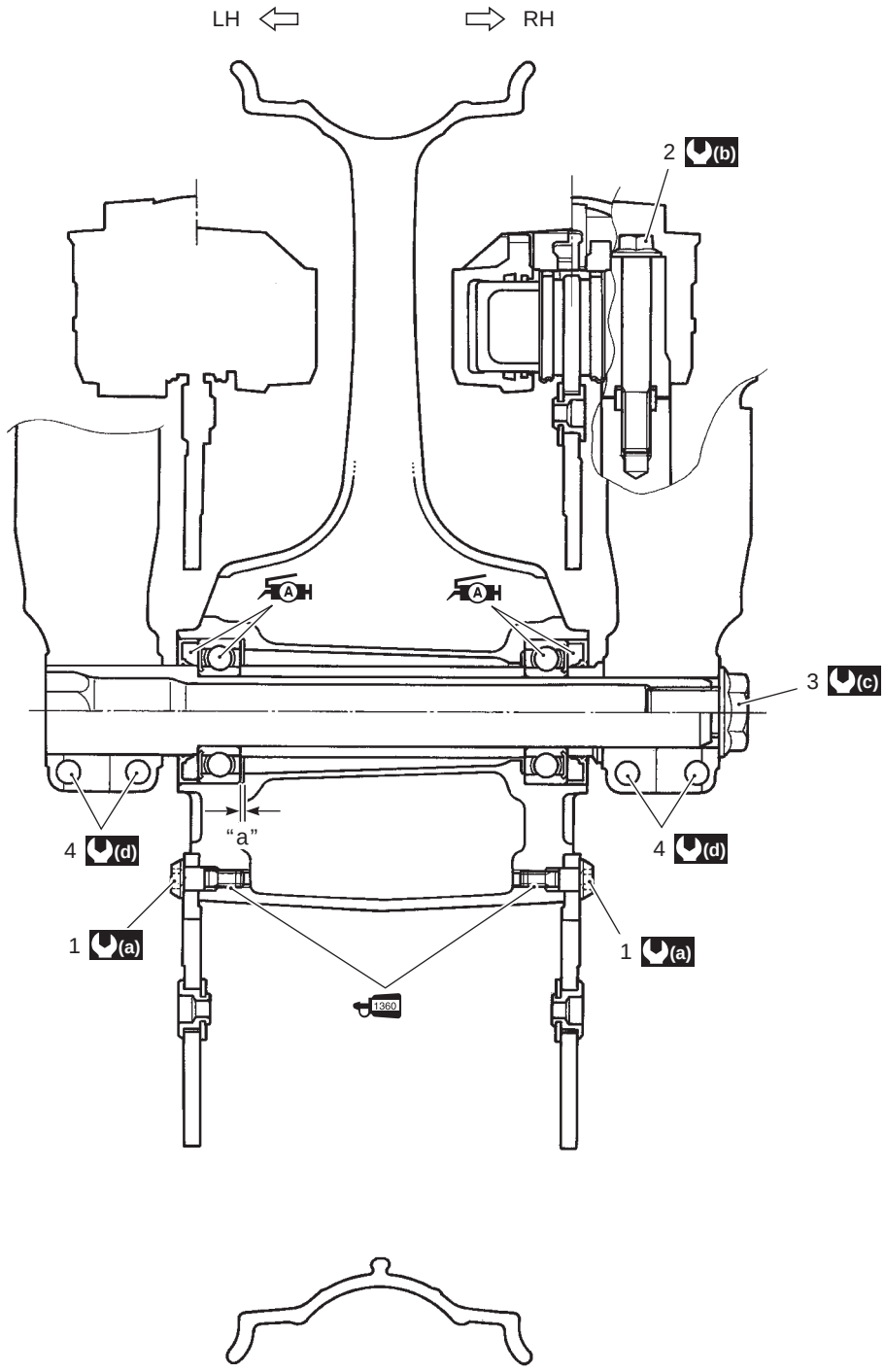


I947H1240030-01

1. Front axle	6. Spacer	11. Collar	1360 : Apply thread lock to the thread part.
2. Brake disc bolt	7. Air valve	12. Front axle bolt	⊗ : Do not reuse.
3. Brake disc	8. Front wheel	(a) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)	
4. Dust seal	9. Wheel balancer	(b) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)	
5. Bearing	10. Front tire	A : Apply grease.	

Front Wheel Assembly Construction

B947H12406002



I947H1240031-02

1. Brake disc bolt	"a": Clearance	(d) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Brake caliper mounting bolt	(a) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)	A H : Apply grease.
3. Front axle bolt	(b) : 39 N·m (3.9 kgf-m, 28.0 lbf-ft)	1360 : Apply thread lock to the thread part.
4. Front axle pinch bolt	(c) : 100 N·m (10 kgf-m, 72.5 lbf-ft)	

Front Wheel Assembly Removal and Installation

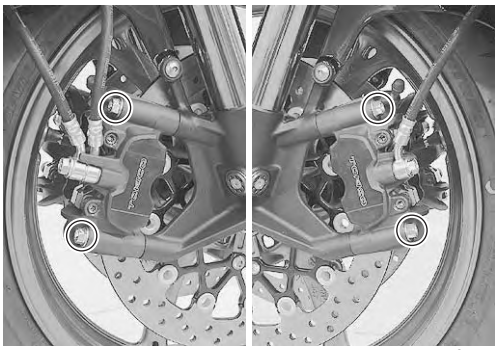
B947H12406003

Removal

1) Remove the brake calipers, left and right.

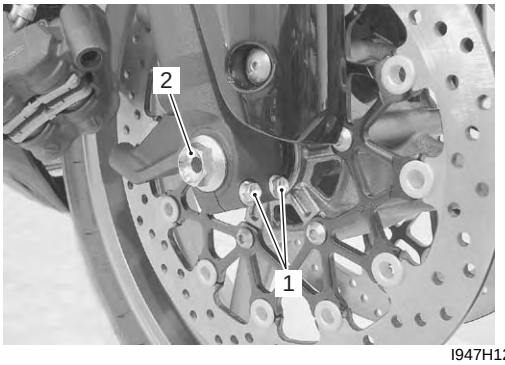
⚠ CAUTION

Do not operate the brake lever with the caliper removed.



I947H1240001-01

2) Loosen two axle pinch bolts (1) on the right front fork leg.
3) Remove the front axle bolt (2).



I947H1240002-01

4) Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

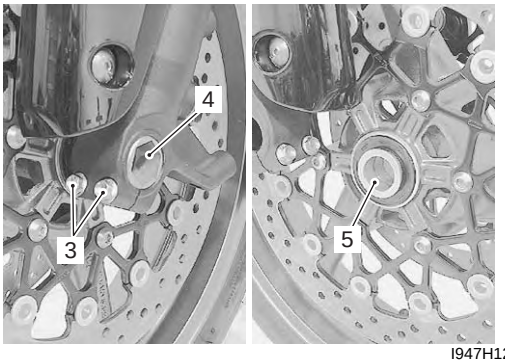
⚠ CAUTION

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.

5) Loosen two axle pinch bolts (3) on the left front fork leg.
6) Draw out the front axle (4) and remove the front wheel.
7) Remove the collar (5) (RH only).

NOTE

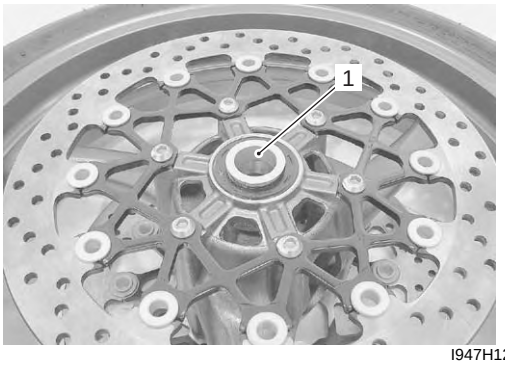
After removing the front wheel, fit the calipers temporarily to the original positions.



I947H1240003-01

Installation

1) Install the collar (1) to the right side of the wheel.



I947H1240004-01

⚠ WARNING

The directional arrow on the tire should point to the wheel rotation.

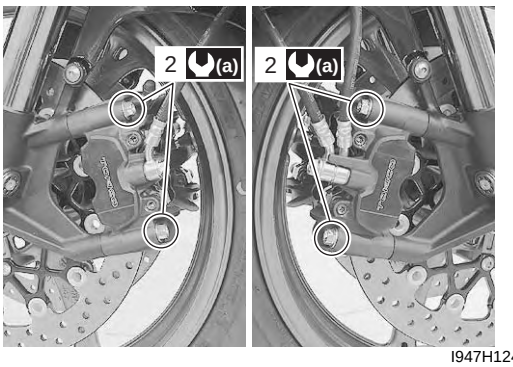
I947H1240005-01

2) Insert the front axle from the left side and tighten the front axle bolt temporarily.
3) Tighten the brake caliper mounting bolts (2) to the specified torque.

Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)

⚠ WARNING

After remounting the brake calipers, pump the brake lever until the pistons push the pads correctly.



I947H1240006-01

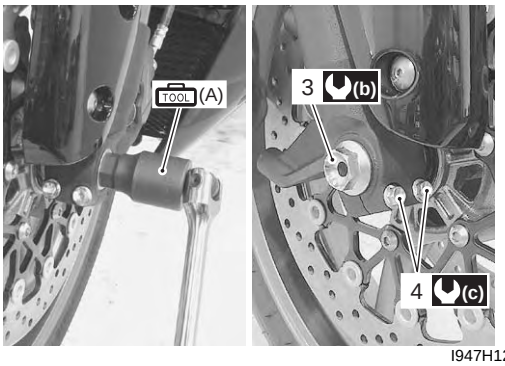
4) Hold the front axle with the special tool and tighten the front axle bolt (3) to the specified torque.

Special tool
TOOL (A): 09900–18740 (Hexagon socket (24 mm))

Tightening torque
Front axle bolt (b): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)

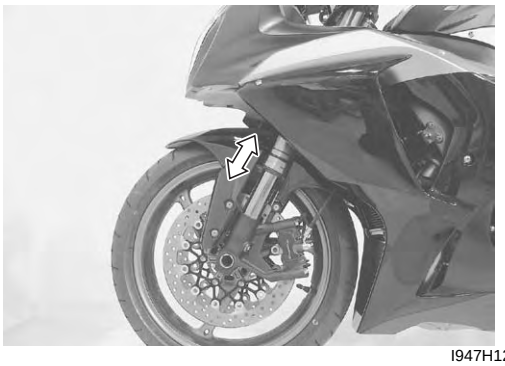
5) Tighten two axle pinch bolts (4) on the right fork leg to the specified torque.

Tightening torque
Front axle pinch bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



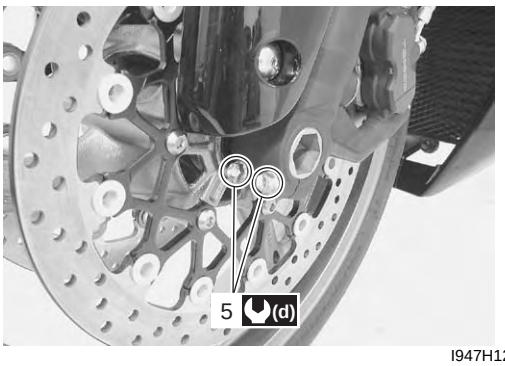
I947H1240027-02

6) Move the front forks up and down 4 or 5 times.


I947H1240007-01

7) Tighten two axle pinch bolts (5) on the left front fork leg to the specified torque.

Tightening torque
Front axle pinch bolt (d): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I947H1240028-02

Front Wheel Related Parts Inspection

B947H12406004

Refer to “Front Wheel Assembly Removal and Installation” (Page 2D-4).

Tire

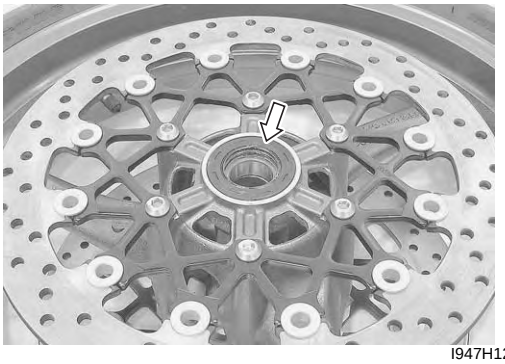
Refer to “Tire Inspection” in Section 0B (Page 0B-18).

Front Brake Disc

Refer to “Front Brake Disc Inspection” in Section 4B (Page 4B-6).

Dust Seal

Inspect the lip of dust seals for wear or damage. If any defects are found, replace the dust seal with a new one. Refer to “Front Wheel Dust Seal / Bearing Removal and Installation” (Page 2D-7).



I947H1240008-02

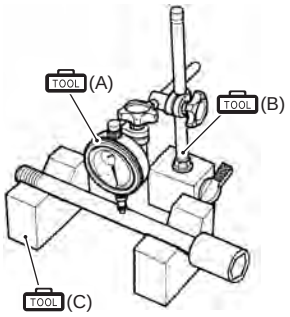
Wheel Axle

Using a dial gauge, check the wheel axle for runout. If the runout exceeds the limit, replace the axle shaft.

Special tool

TOOL (A): 09900–20607 (Dial gauge)
TOOL (B): 09900–20701 (Dial gauge chuck)
TOOL (C): 09900–21304 (V blocks)

Wheel axle runout
Service limit: 0.25 mm (0.010 in)

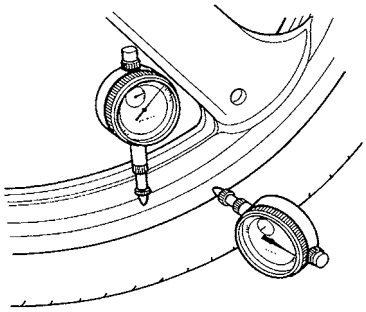


I649G1240054-02

Wheel

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 in the figure 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.

   Wheel rim runout
   Service limit (Axial and Radial): 2.0 mm (0.08 in)

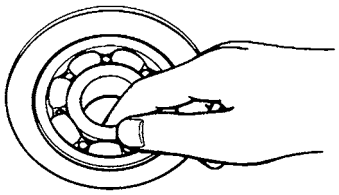


I649G1240014-02

3) Install the brake pads. Refer to “Front Brake Pad Replacement” in Section 4B (Page 4B-2).

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 if there is anything unusual. Refer to “Front Wheel Dust Seal / Bearing Removal and Installation” (Page 2D-7).



I649G1240015-02

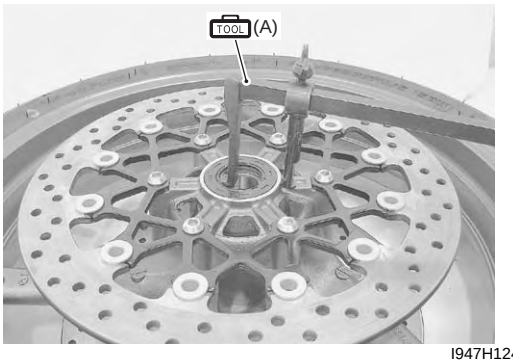
Front Wheel Dust Seal / Bearing Removal and Installation

B947H12406005

Removal

1) Remove the front wheel assembly. Refer to “Front Wheel Assembly Removal and Installation” (Page 2D-4).
2) Remove the dust seals using the special tool.

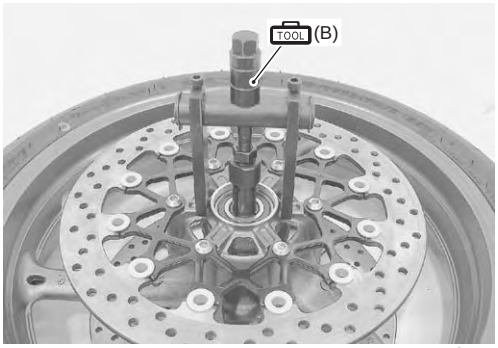
Special tool
(A): 09913–50121 (Oil seal remover)



I947H1240009-01

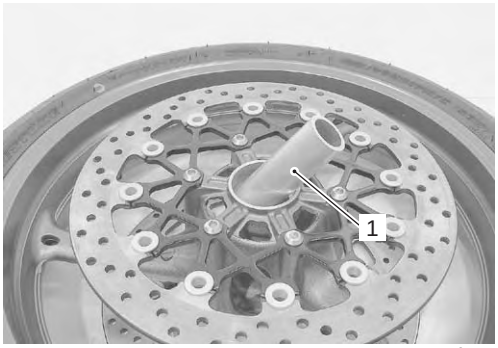
3) Remove the wheel bearings using the special tool.

Special tool
(B): 09921–20240 (Bearing remover set)



I947H1240010-01

4) Remove the spacer (1).



I947H1240011-01

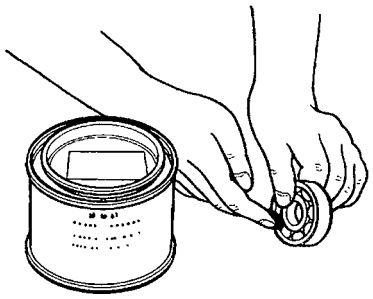
Installation

⚠ CAUTION

The removed dust seals and bearings must be replaced with new ones.

1) Apply grease to the wheel bearings.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



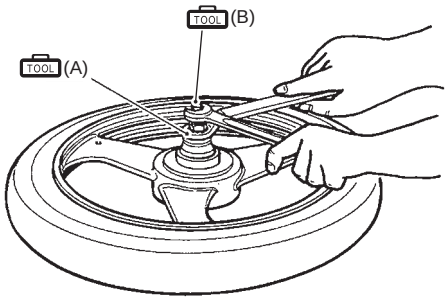
I649G1240019-02

2) First install the right wheel bearing, then install the spacer (1) and left wheel bearing with the special tool.

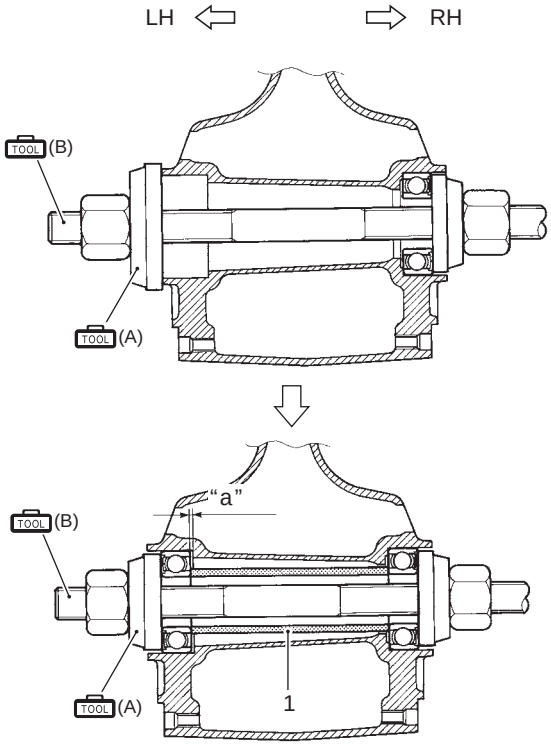
Special tool
TOOL (A): 09924–84510 (Bearing installer set)
TOOL (B): 09941–34513 (Bearing installer)

⚠ CAUTION

The sealed cover of the bearing must face outside.



I837H1240014-01

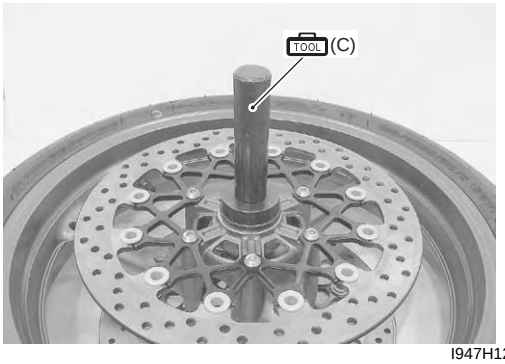


I837H1240037-01

1. Spacer	"a": Clearance

3) Install the dust seals with the special tool.

Special tool
TOOL (C): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1240012-01

4) Apply grease to the lip of dust seals.

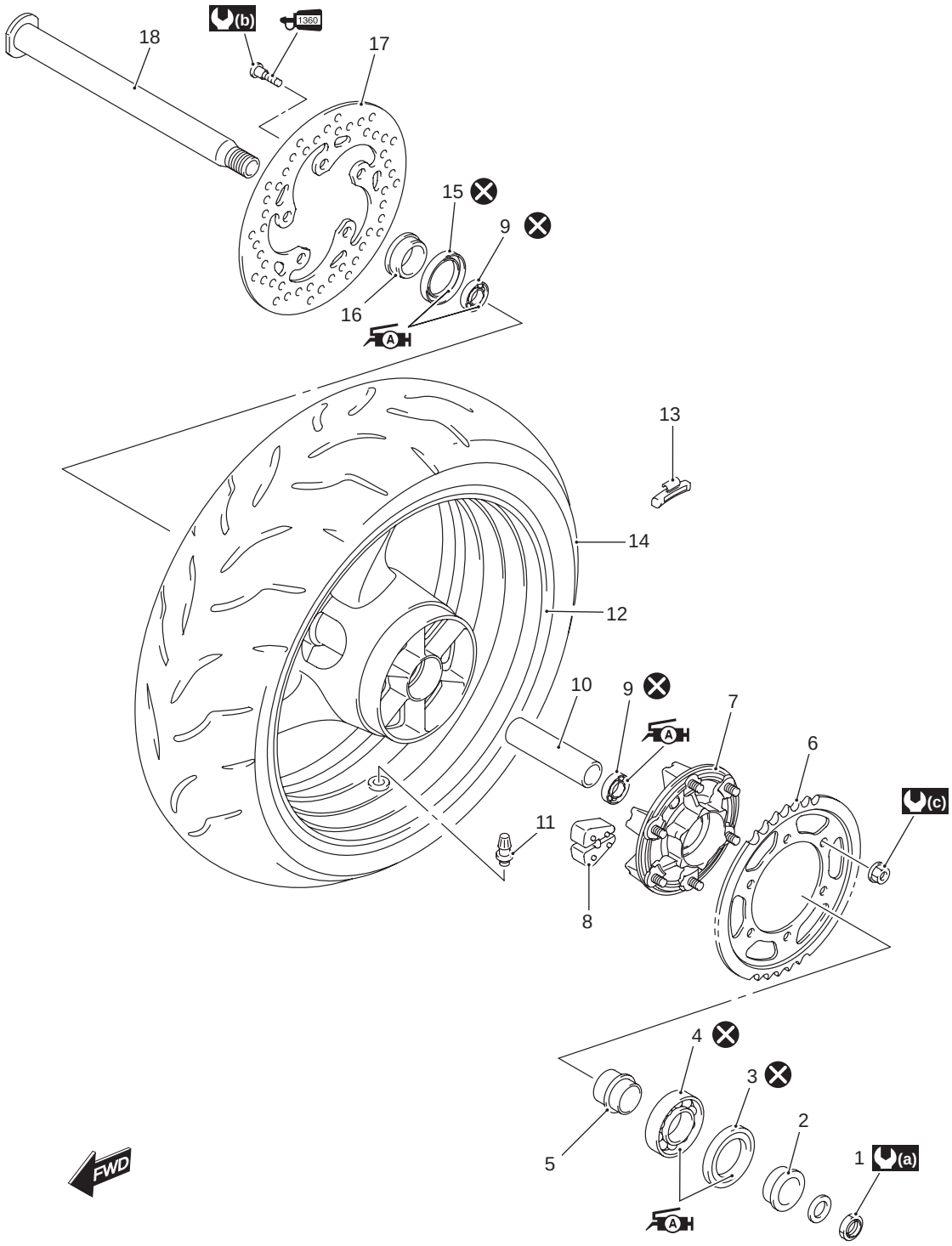
: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

I947H1240013-01

5) Install the front wheel assembly. Refer to"Front Wheel Assembly Removal and Installation" (Page 2D-4).

Rear Wheel Components

B947H12406006

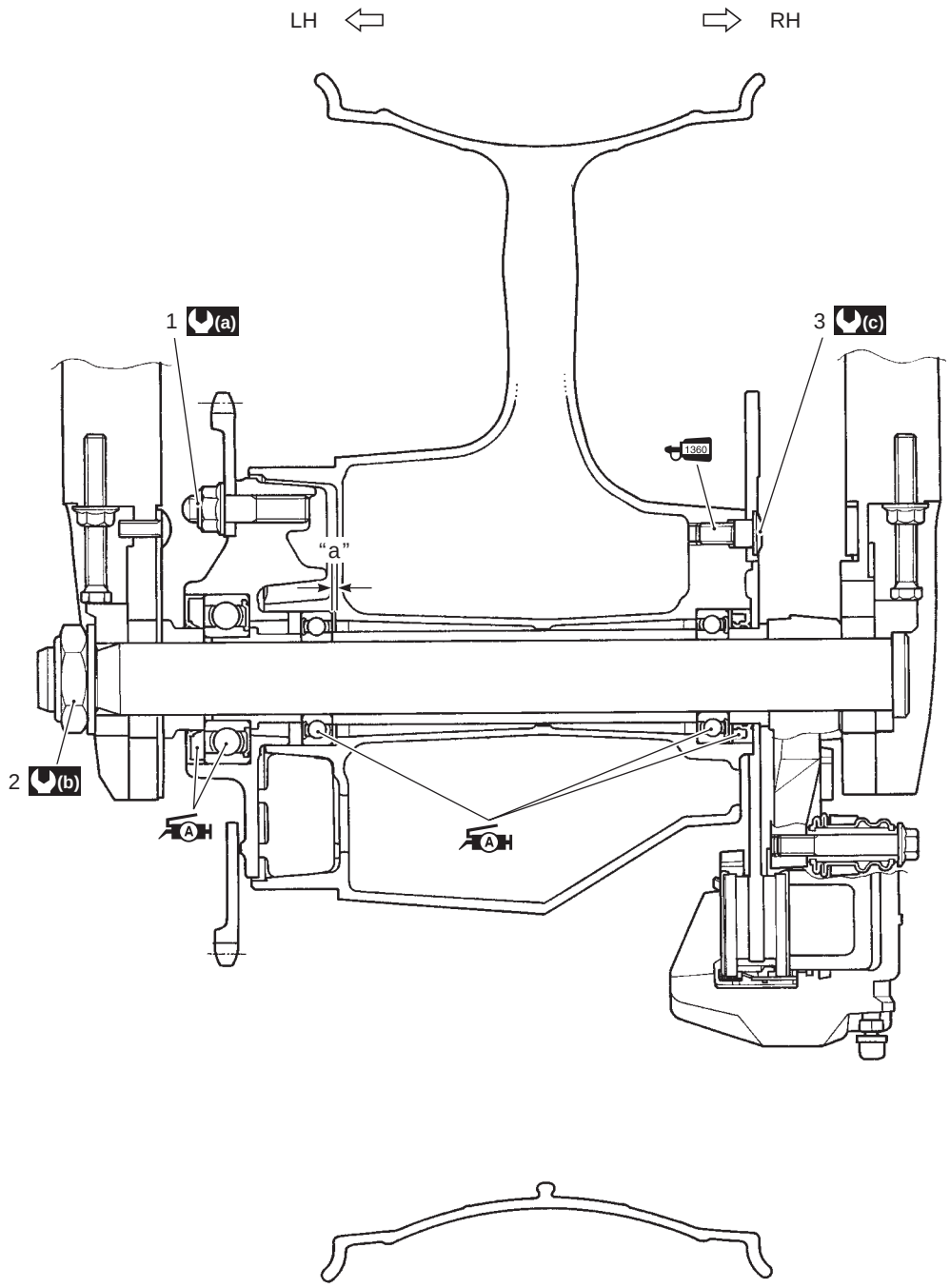


I947H1240033-01

1. Rear axel nut	9. Bearing	17. Rear brake disc
2. Collar	10. Spacer	18. Rear axle
3. Dust seal	11. Air valve	(a) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
4. Bearing	12. Rear wheel	(b) : 35 N·m (3.5 kgf-m, 25.5 lbf-ft)
5. Retainer	13. Wheel balancer	(c) : 60 N·m (6.0 kgf-m, 43.0 lbf-ft)
6. Rear sprocket	14. Rear tire	A : Apply grease.
7. Sprocket mounting drum	15. Dust seal	1360 : Apply thread lock to the thread part.
8. Wheel damper	16. Collar	: Do not reuse.

Rear Wheel Assembly Construction

B947H12406007



I947H1240034-02

1. Rear sprocket nut	"a": Clearance	(c) : 35 N·m (3.5 kgf-m, 25.5 lbf-ft)
2. Rear axle nut	(a) : 60 N·m (6.0 kgf-m, 43.0 lbf-ft)	A : Apply grease.
3. Brake disc bolt	(b) : 100 N·m (10 kgf-m, 72.5 lbf-ft)	1360 : Apply thread lock to the thread part.

Rear Wheel Assembly Removal and Installation

B947H12406008

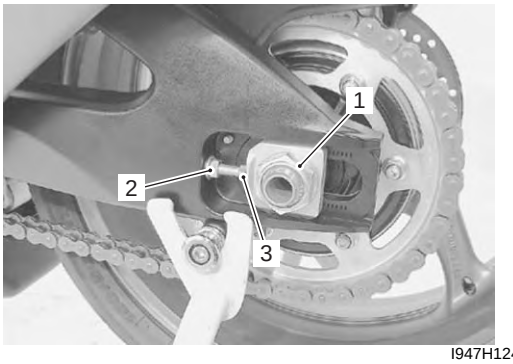
Removal

1) Loosen the axle nut (1).
2) Raise the rear wheel off the ground and support the motorcycle with a jack or wooden block.

⚠ CAUTION

Make sure that the motorcycle is supported securely.

3) Remove the axle nut (1).
4) Loosen the left and right lock-nuts (2) and turn in the adjuster bolts (3).
5) Draw out the rear axle.



I947H1240014-02

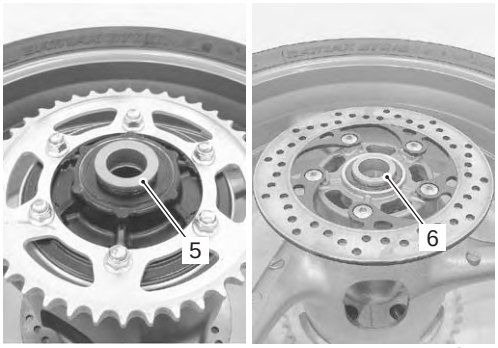
6) Remove the rear wheel by disengaging the drive chain.

⚠ CAUTION

Do not operate the rear brake pedal with the rear wheel removed.

I947H1240015-01

7) Remove the collars (5) and (6).



I947H1240017-02

Installation

1) Install the collars (1) and (2).

I947H1240026-02

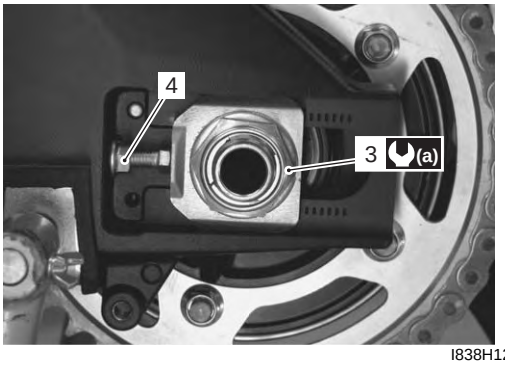
2) Remount the rear wheel and rear axle, tighten the rear axle nut (3) temporarily.
3) Adjust the chain slack after installing the rear wheel. Refer to “Drive Chain Inspection and Adjustment” in Section 0B (Page 0B-14).
4) Tighten the rear axle nut (3) to the specified torque.

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.

5) Tighten both chain adjuster lock-nut (4) securely.



I838H1240002-01

Rear Wheel Related Parts Inspection

B947H12406009

Refer to “Rear Wheel Assembly Removal and Installation” (Page 2D-11).

Tire

Refer to “Tire Inspection” in Section 0B (Page 0B-18).

Rear Brake Disc

Refer to “Rear Brake Disc Inspection” in Section 4C (Page 4C-7).

Wheel Damper

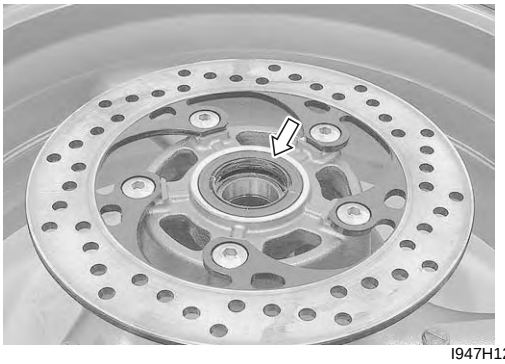
Refer to “Drive Chain Related Parts Inspection” in Section 3A (Page 3A-5).

Sprocket

Refer to “Drive Chain Related Components” in Section 3A (Page 3A-1).

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).



I947H1240018-02

Wheel Axle

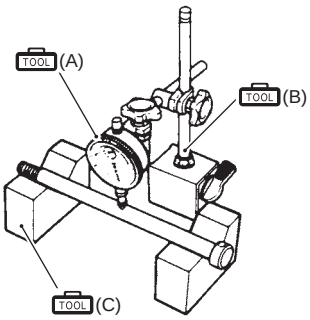
Using a dial gauge, check the wheel axle for runout, If the runout exceeds the limit, replace the axle shaft.

Wheel axle runout

Service limit: 0.25 mm (0.010 in)

Special tool

TOOL (A): 09900–20607 (Dial gauge)
TOOL (B): 09900–20701 (Dial gauge chuck)
TOOL (C): 09900–21304 (V blocks)



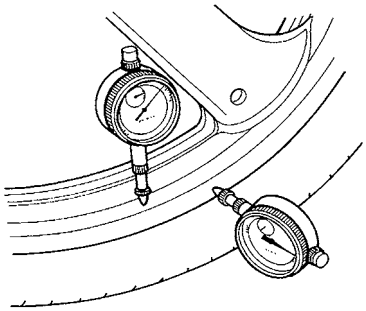
I649G1230034-03

Wheel

1) Remove the rear brake pads. Refer to “Rear Brake Pad Replacement” in Section 4C (Page 4C-2).
2) Make sure that the wheel runout checked as shown in the figure 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.

   Wheel rim runout

   Service limit (Axial and Radial): 2.0 mm (0.08 in)

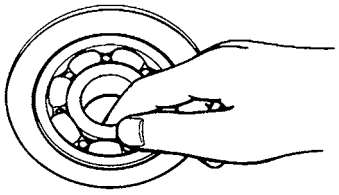


I649G1240014-02

3) Install the rear brake pads. Refer to “Rear Brake Pad Replacement” in Section 4C (Page 4C-2).

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).



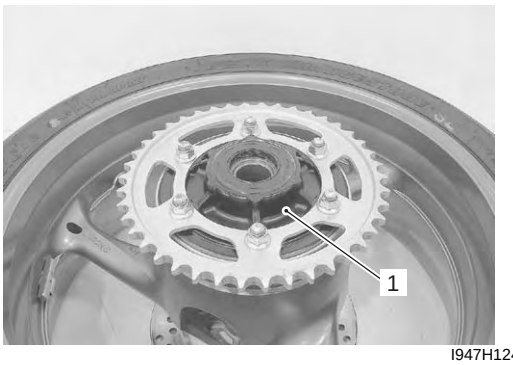
I649G1240015-02

Rear Wheel Dust Seal / Bearing Removal and Installation

B947H12406010

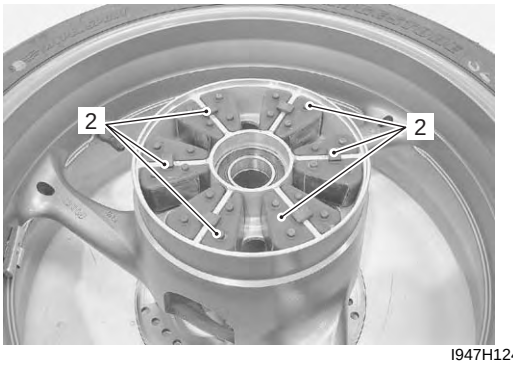
Removal

1) Remove the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation” (Page 2D-11).
2) Remove the rear sprocket mounting drum assembly (1) from the rear wheel.



I947H1240019-01

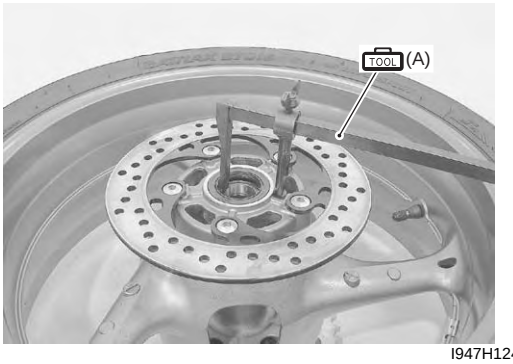
3) Remove the wheel dampers (2).



I947H1240020-02

4) Remove the dust seal.

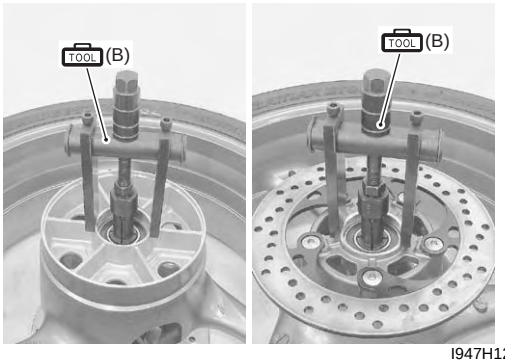
Special tool
(A): 09913–50121 (Oil seal remover)



I947H1240021-01

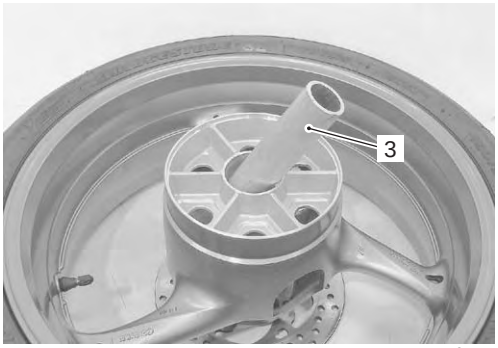
5) Remove the bearings on both sides using the special tool.

Special tool
(B): 09921–20240 (Bearing remover set)



I947H1240022-01

6) Remove the spacer (3).



I947H1240023-01

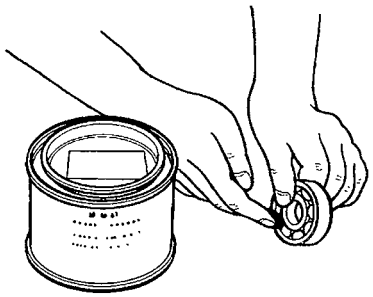
Installation

⚠ CAUTION

The removed dust seal and bearings must be replaced with new ones.

1) Apply grease to the wheel bearings.

: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



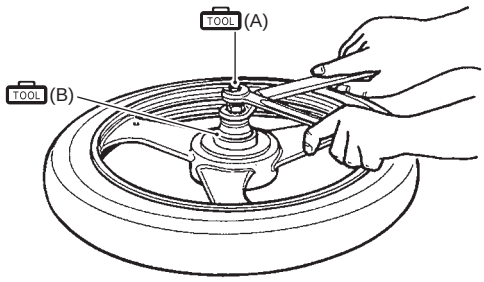
I649G1240019-02

2) First install the right wheel bearing, then install the spacer (1) and left wheel bearing with the special tools.

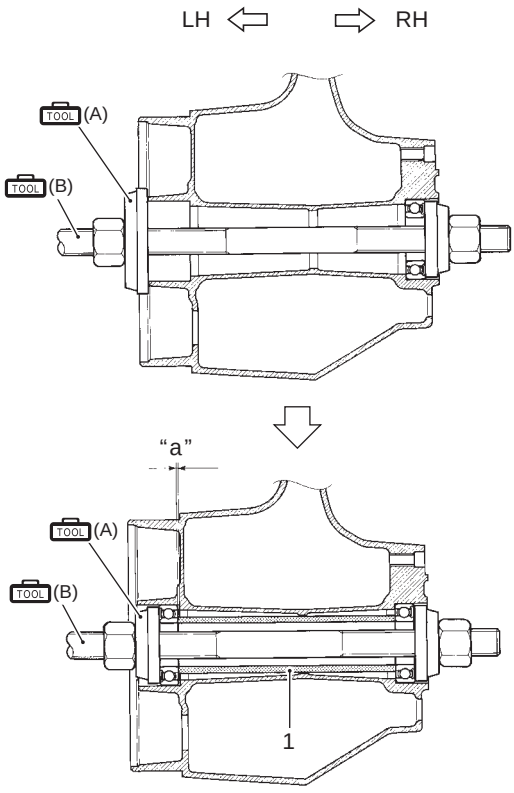
Special tool
TOOL (A): 09941–34513 (Bearing installer)
TOOL (B): 09924–84510 (Bearing installer set)

⚠ CAUTION

The sealed cover of the bearing must face outside.



I649G1240030-02

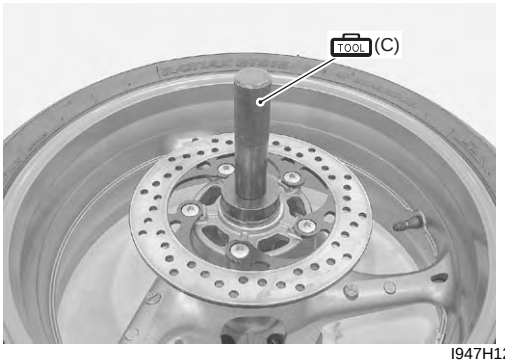


I947H1240032-01

1. Spacer	"a": Clearance

3) Install new dust seal with the special tool.

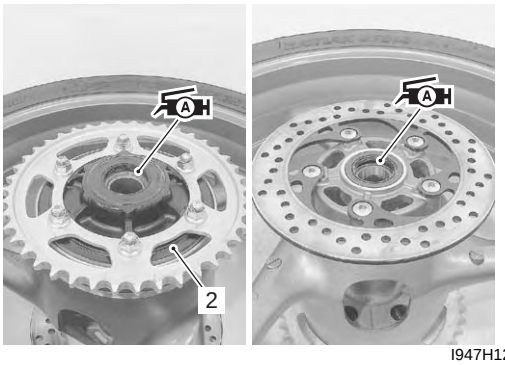
Special tool
TOOL (C): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1240024-01

4) Install the rear sprocket mounting drum assembly (2).
5) Apply grease to the lip of dust seals.

A: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



I947H1240025-03

6) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation" (Page 2D-11).

Tire Removal and Installation

B947H12406011

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" (Page 2D-4) and "Rear Wheel Assembly Removal and Installation" (Page 2D-11).
2) Remove the mounting drum from the rear wheel. (For rear wheel)
Refer to "Rear Wheel Assembly Removal and Installation" (Page 2D-11).
3) Remove the valve core.

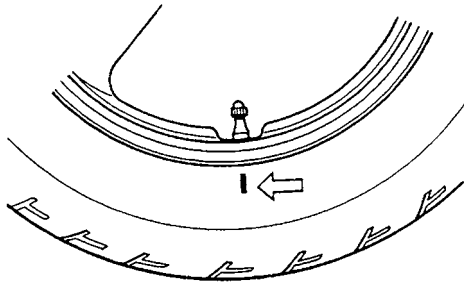
4) Remove the tire using the tire changer.

⚠ 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.



I649G1240037-02

Installation

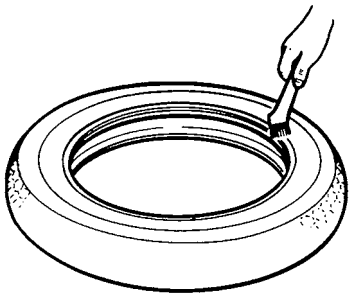
⚠ CAUTION

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

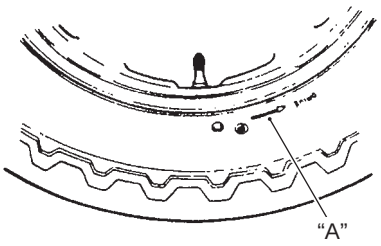
2) Install the tire onto the wheel.

⚠ 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

3) Bounce the tire several times while rotating. This makes the tire bead expand outward to contact the wheel, thereby facilitating air inflation.

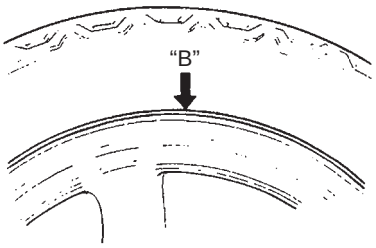
4) Install the valve core and inflate the tire.

⚠ WARNING

- **Do not inflate the tire to more than 400 kPa (4.0 kgf/cm^2, 57 psi). 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 “rim 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.



I649G1240040-02

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
Solo riding	250 kPa (2.50 kgf/cm^2, 36 psi)	290 kPa (2.90 kgf/cm^2, 42 psi)
Dual riding	250 kPa (2.50 kgf/cm^2, 36 psi)	290 kPa (2.90 kgf/cm^2, 42 psi)

9) Install the mounting drum to the rear wheel. (For rear wheel)
Refer to "Rear Wheel Assembly Removal and Installation" (Page 2D-11).
10) Install the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-4) and "Rear Wheel Assembly Removal and Installation" (Page 2D-11).

Wheel / Tire / Air Valve Inspection and Cleaning

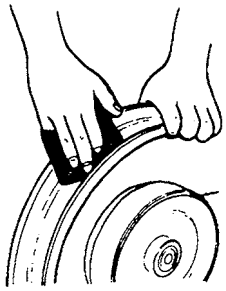
B947H12406012

Refer to "Tire Removal and Installation" (Page 2D-14).

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 Related Parts Inspection" (Page 2D-6) and "Rear Wheel Related Parts Inspection" (Page 2D-12).

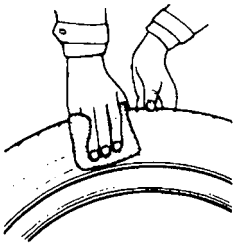


I649G1240041-02

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-18).)
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner



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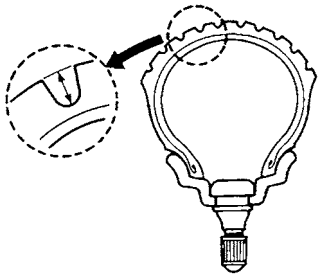
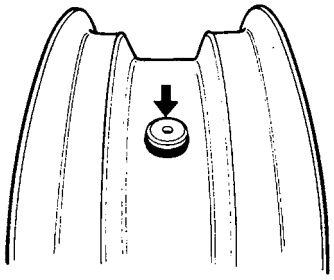


I649G1240043-02

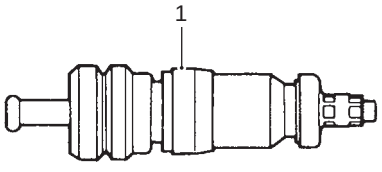
Air Valve

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-16).



I649G1240044-02

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-16).



I649G1240045-02

1. Seal

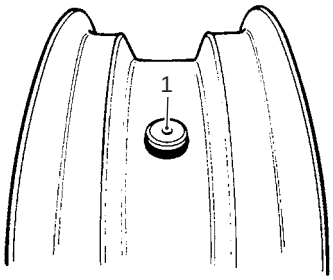
Air Valve Removal and Installation

B947H12406013

Removal

1) Remove the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-4) and "Rear Wheel Assembly Removal and Installation" (Page 2D-11).
2) Remove the tire. Refer to "Tire Removal and Installation" (Page 2D-14).

3) Remove the air valve (1) from the wheel.

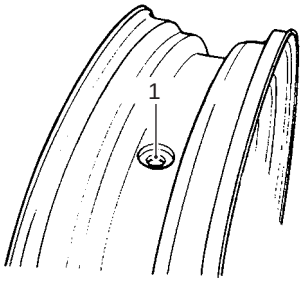


I837H1240031-01

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.



I837H1240032-01

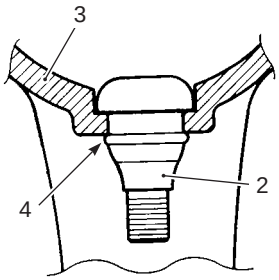
- Install the air valve (2) in the wheel (3).

⚠ CAUTION

- **Be careful not to damage the valve lip (4) of the 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.



I837H1240033-01

2. Valve	3. Wheel	4. Valve lip

Wheel Balance Check and Adjustment

B947H12406014

Check and adjust the wheel balance in the following procedures:

1) Removal the wheel assembly. Refer to “Front Wheel Assembly Removal and Installation” (Page 2D-4) and “Rear Wheel Assembly Removal and Installation” (Page 2D-11).
2) Remove the mounting drum from the rear wheel. (For rear wheel)
   Refer to “Rear Wheel Assembly Removal and Installation” (Page 2D-11).
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.

4) When installing the balancer weight to the wheel, set the balancer weight on center rib of the wheel.

I947H1240029-01

5) Recheck the wheel balance.
6) Install the mounting drum to the rear wheel. (For rear wheel)
   Refer to “Rear Wheel Assembly Removal and Installation” (Page 2D-11).
7) Install the wheel assembly. Refer to “Front Wheel Assembly Removal and Installation” (Page 2D-4) and “Rear Wheel Assembly Removal and Installation” (Page 2D-11).

Specifications

Service Data

B947H12407001

Wheel

Unit: mm (in)

Item	Standard		Limit
Wheel rim runout	Axial	—	2.0 (0.08)
	Radial		
Wheel rim size	Front	17 M/C x MT 3.50	—
	Rear	17 M/C x MT 6.00	—
Wheel axle runout	Front	—	0.25 (0.010)
	Rear		

Tire

Item	Standard		Limit
Cold inflation tire pressure (Solo riding)	Front	250 kPa (2.50 kgf/cm^2, 36 psi)	—
	Rear	290 kPa (2.90 kgf/cm^2, 42 psi)	—
Cold inflation tire pressure (Dual riding)	Front	250 kPa (2.50 kgf/cm^2, 36 psi)	—
	Rear	290 kPa (2.90 kgf/cm^2, 42 psi)	—
Tire size	Front	120/70 ZR17M/C (58 W)	—
	Rear	190/50 ZR17M/C (73 W)	—
Tire type	Front	BRIDGESTONE BT016F N	—
	Rear	BRIDGESTONE BT016R N	—
Tire tread depth (Recommended depth)	Front	—	1.6 mm (0.06 in)
	Rear	—	2.0 mm (0.08 in)

Tightening Torque Specifications

B947H12407002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front brake caliper mounting bolt	39	3.9	28.0	☞(Page 2D-5)
Front axle bolt	100	10.0	72.5	☞(Page 2D-5)
Front axle pinch bolt	23	2.3	16.5	☞(Page 2D-5) / ☞(Page 2D-5)
Rear axle nut	100	10.0	72.5	☞(Page 2D-11)

NOTE

The specified tightening torque is described in the following.
“Front Wheel Components” (Page 2D-2)
“Front Wheel Assembly Construction” (Page 2D-3)
“Rear Wheel Components” (Page 2D-9)
“Rear Wheel Assembly Construction” (Page 2D-10)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H12408001

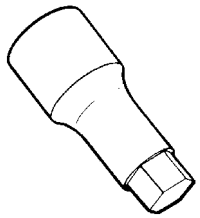
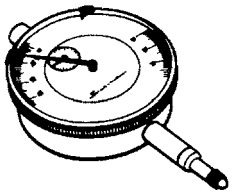
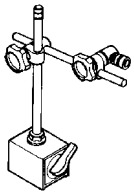
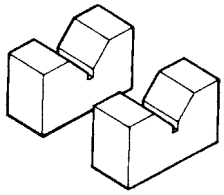
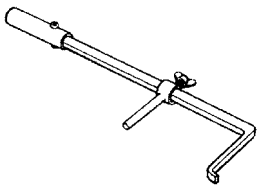
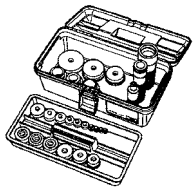
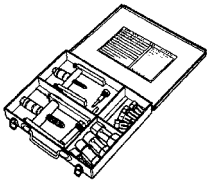
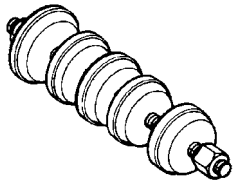
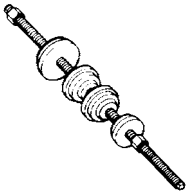
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 2D-7) / ☞(Page 2D-8) / ☞(Page 2D-13) / ☞(Page 2D-14)

NOTE

Required service material is also described in the following.
“Front Wheel Components” (Page 2D-2)
“Front Wheel Assembly Construction” (Page 2D-3)
“Rear Wheel Components” (Page 2D-9)
“Rear Wheel Assembly Construction” (Page 2D-10)

Special Tool

B947H12408002

09900–18740 Hexagon socket (24 mm) ☞(Page 2D-5)		09900–20607 Dial gauge ☞(Page 2D-6) / ☞(Page 2D-12)	
09900–20701 Dial gauge chuck ☞(Page 2D-6) / ☞(Page 2D-12)		09900–21304 V blocks ☞(Page 2D-6) / ☞(Page 2D-12)	
09913–50121 Oil seal remover ☞(Page 2D-7) / ☞(Page 2D-13)		09913–70210 Bearing installing set (10 – 75 Φ) ☞(Page 2D-8) / ☞(Page 2D-14)	
09921–20240 Bearing remover set ☞(Page 2D-7) / ☞(Page 2D-13)		09924–84510 Bearing installer set ☞(Page 2D-8) / ☞(Page 2D-14)	
09941–34513 Bearing installer ☞(Page 2D-8) / ☞(Page 2D-14)			

Section 3

Driveline / Axle

CONTENTS

Precautions

Precautions

Precautions for Driveline / Axle

B947H13000001

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

⚠ WARNING

Never inspect or adjust the drive chain while the engine is running.

⚠ CAUTION

- **Do not use trichloroethylene, gasoline or such 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 DID 50VAZ. 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

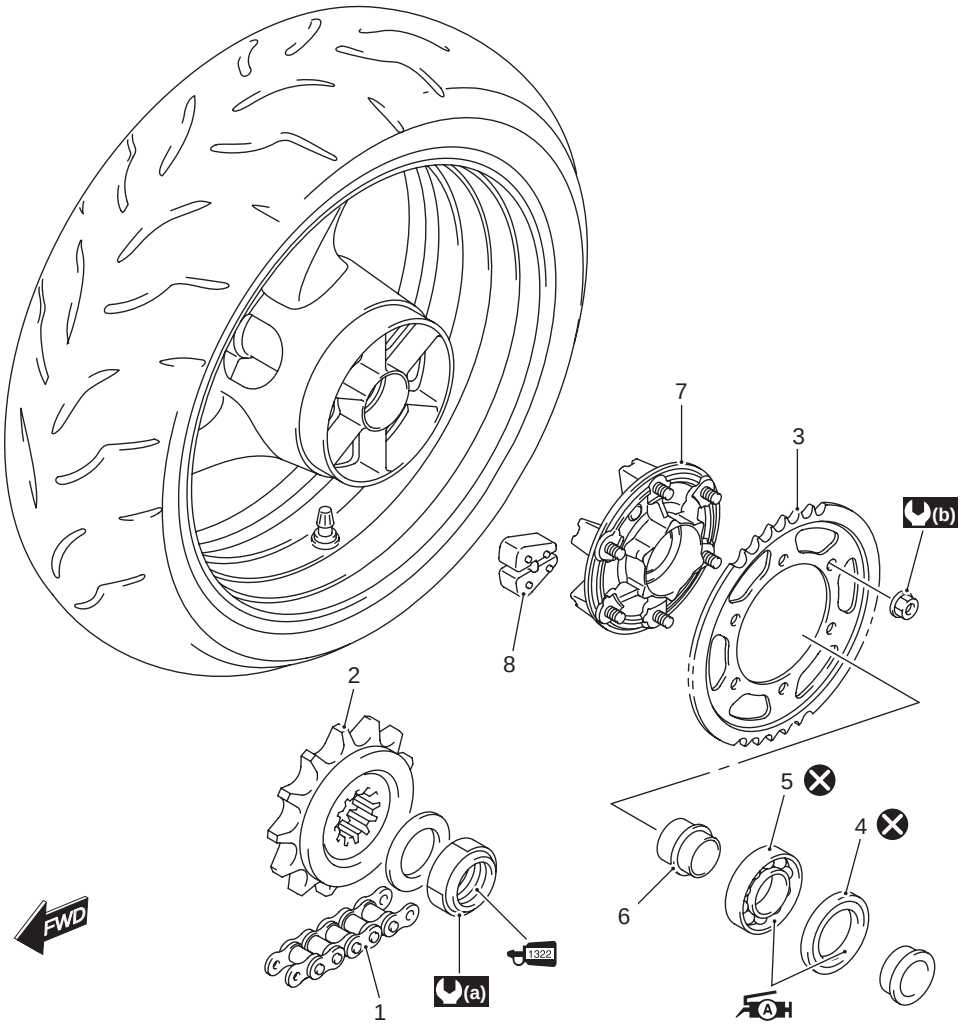
B947H13104001

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

B947H13106001



I947H1310028-01

1. Drive chain	6. Retainer	A : Apply grease.
2. Engine sprocket	7. Sprocket mounting drum	1322 : Apply thread lock to thread part.
3. Rear sprocket	8. Wheel damper	⊗ : Do not reuse.
4. Dust seal	(a) : 145 N·m (14.5 kgf-m, 105.0 lbf-ft)	
5. Bearing	(b) : 60 N·m (6.0 kgf-m, 43.0 lbf-ft)	

Engine Sprocket Removal and Installation

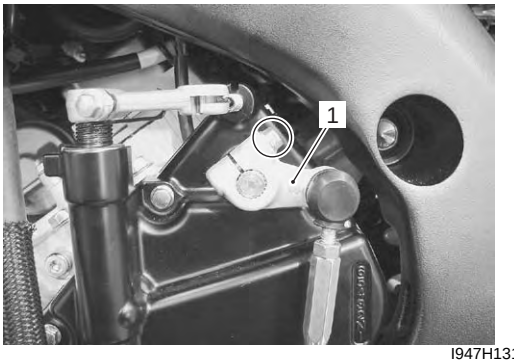
B947H13106002

Removal

1) Remove the gearshift link arm (1) from the gearshift shaft.

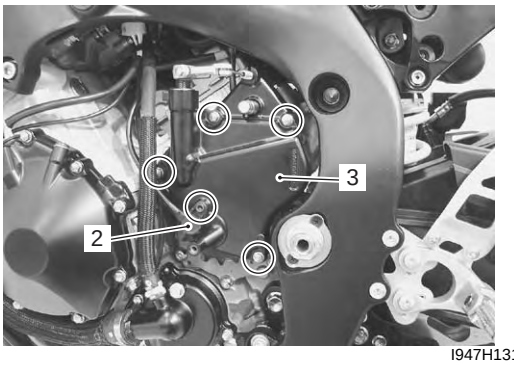
NOTE

Mark the gearshift shaft head at which the gearshift link arm slit set for correct reinstallation.



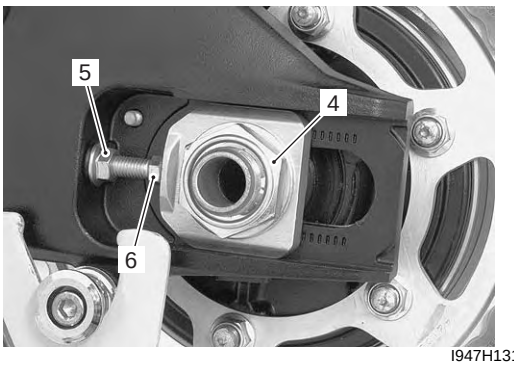
I947H1310018-01

2) Remove the speed sensor (2).
3) Remove the engine sprocket cover (3).



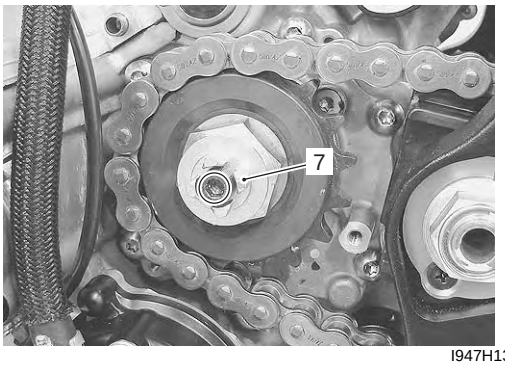
I947H1310019-01

4) Support the motorcycle with a jack or wooden block.
5) Loosen the rear axle nut (4) and left and right chain adjuster lock-nuts (5).
6) Loosen the chain adjusters (6) to provide additional chain slack.



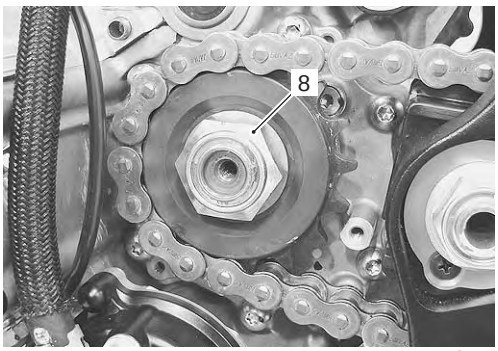
I947H1310020-01

7) Remove the speed sensor rotor (7) by removing its bolt while depressing the rear brake pedal.



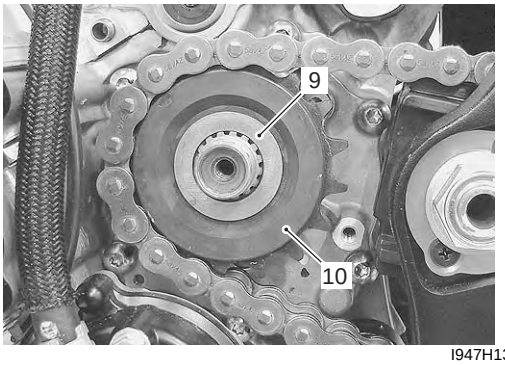
I947H1310021-01

8) Remove the engine sprocket nut (8) while depressing the rear brake pedal.



I947H1310022-01

9) Remove the washer (9).
10) Remove the engine sprocket (10).



I947H1310023-01

Installation

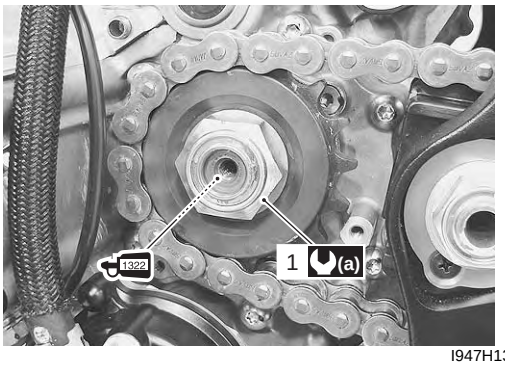
Install the engine sprocket in the reverse order of removal. Pay attention to the following points:

- Apply thread lock to the driveshaft.

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

- Tighten the engine sprocket nut (1) to the specified torque.

  Tightening torque
  Engine sprocket nut (a): 145 N·m (14.5 kgf-m, 105.0 lbf-ft)



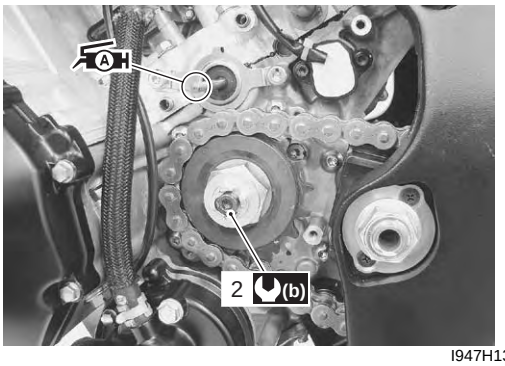
I947H1310024-01

- Tighten the speed sensor rotor bolt (2) to the specified torque.

  Tightening torque
  Speed sensor rotor bolt (b): 28 N·m (2.8 kgf-m, 20.0 lbf-ft)

- Before installing the engine sprocket cover, apply a small quantity of grease to the clutch push rod.

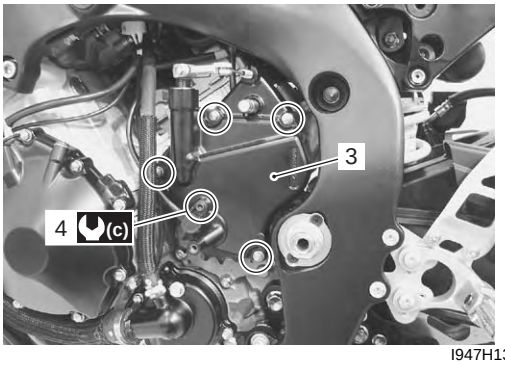
  A : Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



I947H1310025-01

- Install the engine sprocket cover (3).
- Tighten the speed sensor mounting bolt (4) to the specified torque.

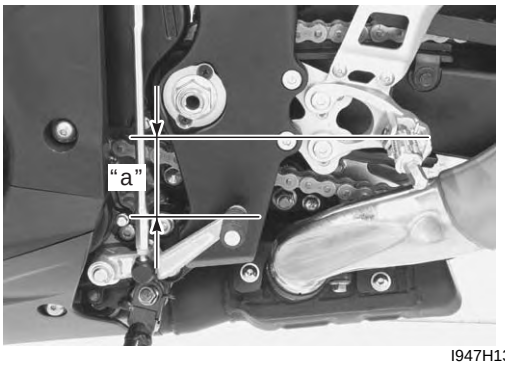
  Tightening torque
  Speed sensor mounting bolt (c): 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)



I947H1310026-01

- Fit the gearshift link arm to the gearshift shaft so that the gearshift lever is located at height "a" below the footrest.

  Gearshift lever height "a"
  Standard: 65 – 75 mm (2.6 – 3.0 in)



I947H1310001-01

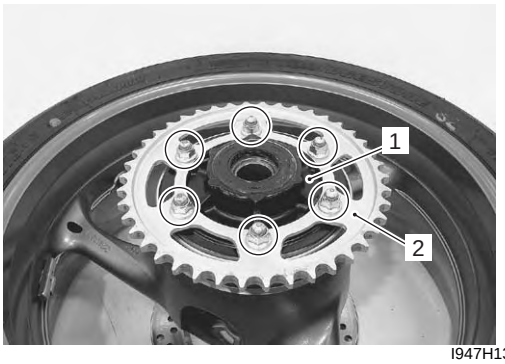
- Adjust the drive chain slack. Refer to "Drive Chain Inspection and Adjustment" in Section 0B (Page 0B-14).

Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation

B947H13106003

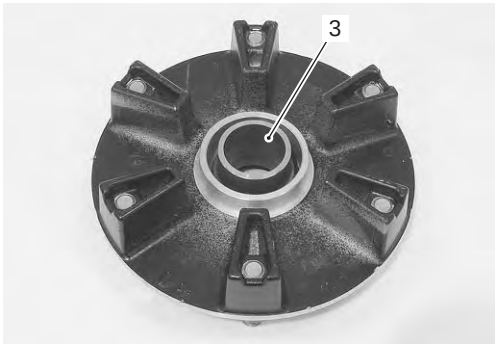
Removal

1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-11).
2) Loosen the rear sprocket nuts.
3) Draw out the rear sprocket mounting drum (1) along with the rear sprocket (2) from the wheel hub.
4) Remove the rear sprocket nuts and separate the rear sprocket (2) from its mounting drum (1).



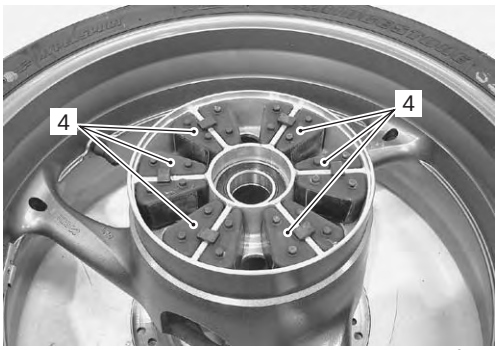
I947H1310002-01

5) Remove the retainer (3).



I947H1310003-01

6) Remove the wheel dampers (4).



I947H1310004-01

Installation

Install the rear sprocket and rear sprocket mounting drum in the reverse order of removal. Pay attention to the following points:

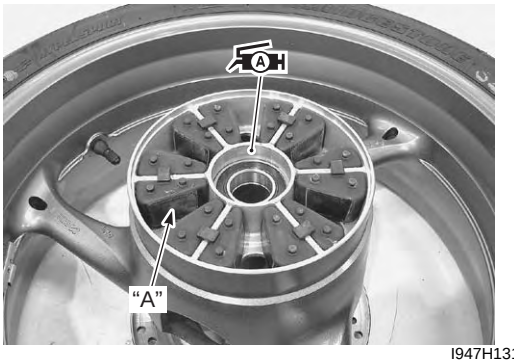
- Apply grease to the contacting surface between the rear wheel hub and rear sprocket mounting drum.

  : Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

- Apply special tire lubricant or neutral soapy liquid to the wheel damper surfaces “A”.

⚠ CAUTION

Never use oil, grease or gasoline on the wheel damper in place of the tire lubricant or neutral soapy liquid.



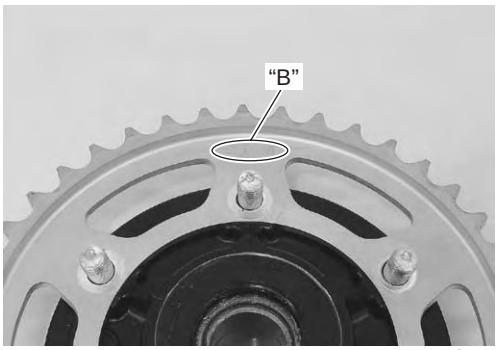
I947H1310005-01

- Apply grease to the retainer.

  : Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

I947H1310006-01

- Install the rear sprocket so that the letters “B” face outside.



I947H1310007-01

- Tighten the rear sprocket nuts to the specified torque.

  Tightening torque
  Rear sprocket nut (a): 60 N·m (6.0 kgf-m, 43.0 lbf-ft)

I947H1310008-01

- Install the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation” in Section 2D (Page 2D-11).

Drive Chain Related Parts Inspection

B947H13106004

Refer to “Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation” (Page 3A-3).

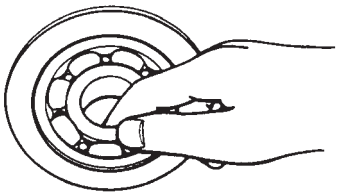
Dust Seal

Inspect the dust seal for wear or damage. If any damage is found, replace the dust seal with a new one.

I947H1310009-01

Bearing

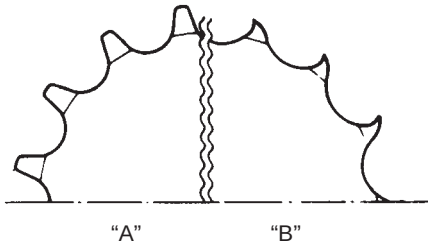
Inspect the play of the sprocket mounting drum bearing by hand while it is in the drum. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



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.



I947H1310010-01

“A”: Normal wear	“B”: Excessive wear

Wheel Damper

Inspect the dampers for wear and damage. Replace the dampers if there is anything unusual.

I947H1310011-01

Drive Chain

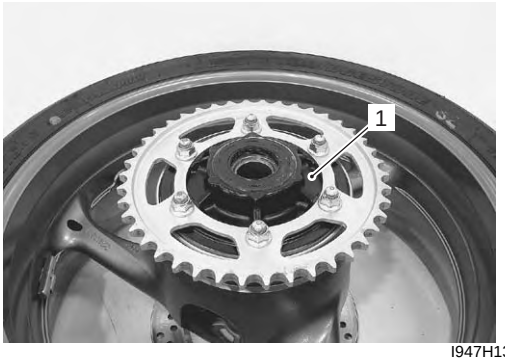
Refer to “Drive Chain Inspection and Adjustment” in Section 0B (Page 0B-14).

Sprocket Mounting Drum Dust Seal / Bearing Removal and Installation

B947H13106005

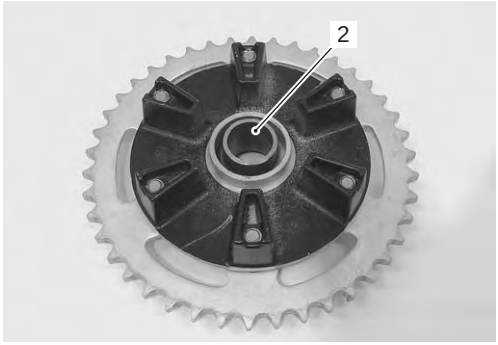
Removal

1) Remove the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation” in Section 2D (Page 2D-11).
2) Remove the rear sprocket mounting drum assembly (1). Refer to “Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation” (Page 3A-3).



I947H1310012-01

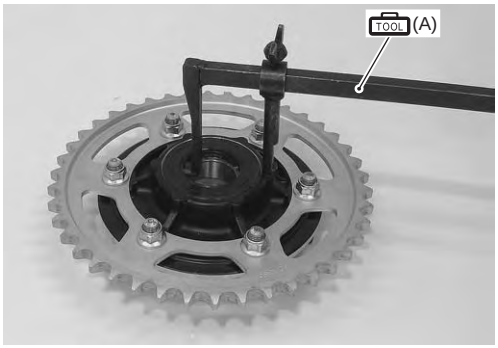
3) Remove the retainer (2).



I947H1310013-01

4) Remove the sprocket mounting drum dust seal with the special tool.

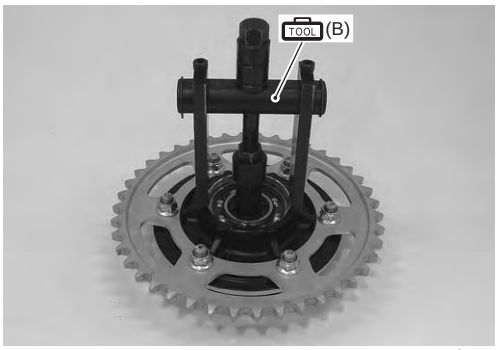
Special tool
TOOL (A): 09913–50121 (Oil seal remover)



I947H1310014-01

5) Remove the sprocket mounting drum bearing with the special tool.

Special tool
TOOL (B): 09921–20240 (Bearing remover set)



I947H1310015-01

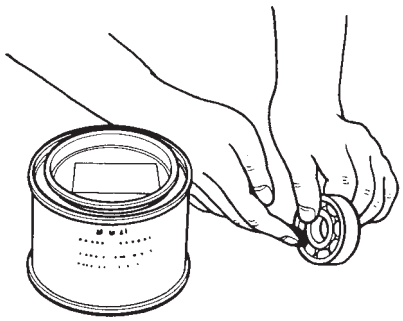
Installation

⚠ CAUTION

The removed dust seal and bearing must be replaced with new ones.

1) Apply grease to the bearing before installing.

A : Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



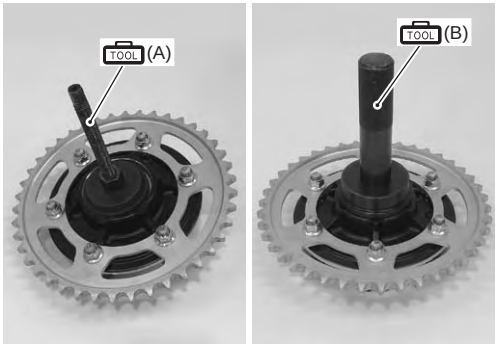
I649G1310020-02

2) Install the bearing and dust seal to the sprocket mounting drum with the special tools.

⚠ CAUTION

The sealed cover of the bearing must face wheel hub side.

Special tool
TOOL (A): 09924–84510 (Bearing installer set)
TOOL (B): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1310016-01

3) Apply grease to the retainer.

A : Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

I947H1310017-01

4) Install the rear sprocket mounting drum assembly to rear wheel hub. Refer to "Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation" (Page 3A-3).

5) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-11).

Drive Chain Replacement

B947H13106006

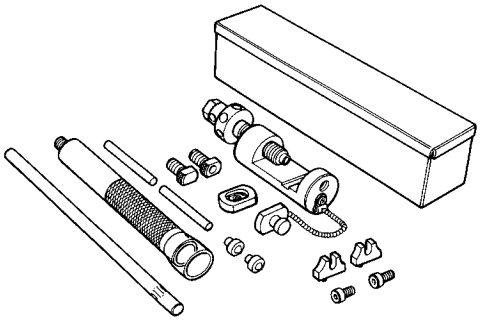
Use the special tool in the following procedures, to cut and rejoin the drive chain.

NOTE

When using the special tool, apply a small quantity of grease to the threaded parts of the special tool.

Special tool

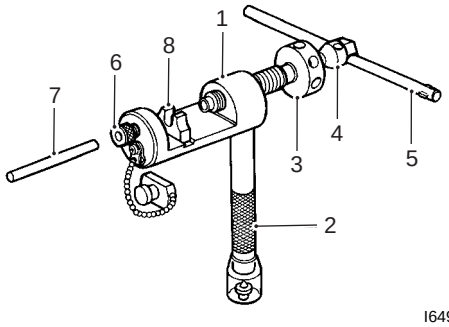
TOOL : 09922–22711 (Drive chain cutting and joint tool set)



I649G1310023-02

Drive Chain Cutting

1) Set up the special tool as shown in the figure.

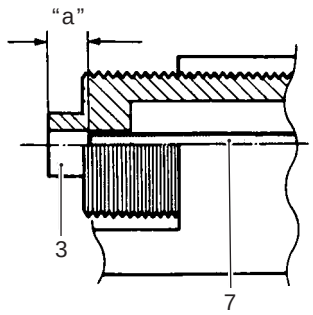


I649G1310024-02

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

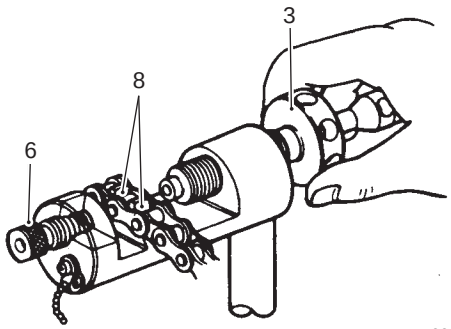
The tip of pin remover (7) should be positioned inside “a” approximately 5 mm (0.2 in) from the end face of pressure bolt [A] (3) as shown in the figure.



I837H1310026-02

“a”: 5 mm (0.2 in)

2) Place the drive chain link being disjointed on the chain holder (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.



I837H1310027-02

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 should been completely pushed out of the chain.

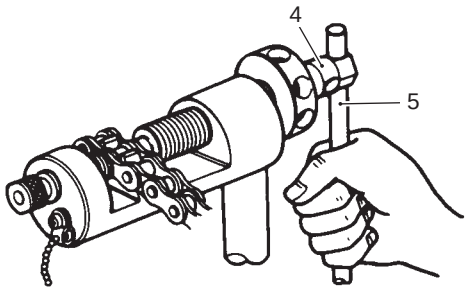
NOTE

After the joint pin (9) is removed, loosen the pressure bolt [B] (4) and then pressure bolt [A] (3).

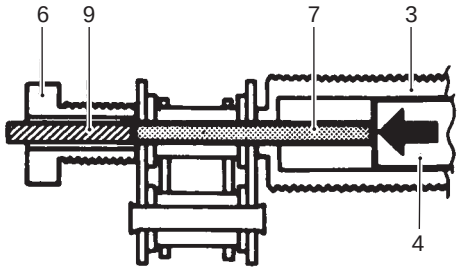
6) Remove the joint pin (9) of the other side of joint plate.

⚠ CAUTION

Never reuse joint pins, O-rings and plates.



I649G1310027-02



I837H1310028-02

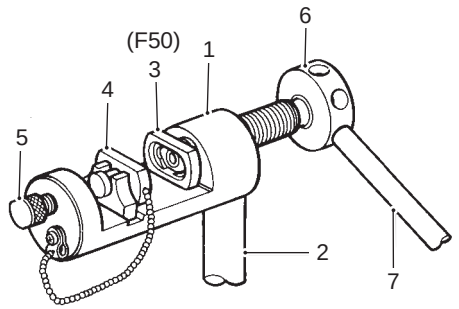
Drive Chain Connecting

⚠ 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.

Joint plate installation

1) Set up the special tool as shown in the figure.



I947H1310027-01

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

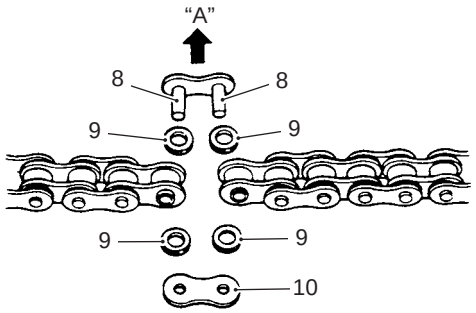
2) Apply grease to the joint pins (8), O-rings (9) and plates (10).

⚠ CAUTION

Replace the joint pins (8), O-rings (9) and plates (10) with new ones.

3) Connect both ends of the drive chain with the joint pins (8) inserted from the wheel side “A” as installed on the motorcycle.

Joint set part number
DID: 27620 – 40F20



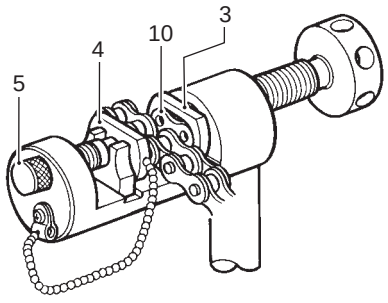
I837H1310029-01

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.

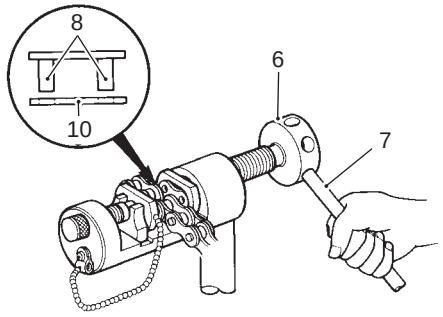
5) Set the drive chain on the tool as illustrated and turn in the adjuster bolt (5) to secure the wedge holder and wedge pin (4).



I649G1310031-02

6) Turn in the pressure bolt [A] (6) and align two joint pins (8) 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.



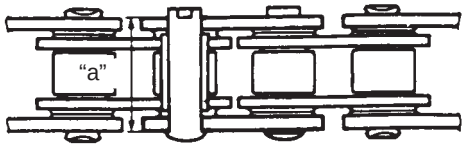
I837H1310030-01

8) Continue pressing the joint plate until the distance between the two joint plates comes to the specification.

Joint plate distance specification "a"
20.7 – 21.0 mm (0.81 – 0.83 in)

⚠ CAUTION

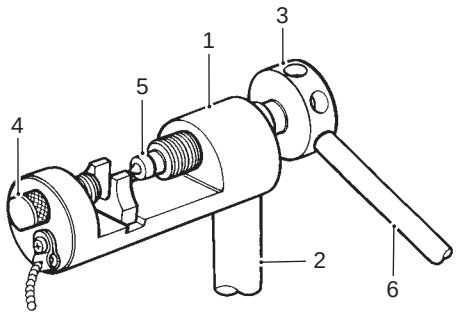
If pressing of the joint plate makes the dimension out of specification excessively, the work must be carried out again by using new joint parts.



I649G1310033-03

Joint pin staking

1) Set up the special tool as shown in the figure.



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

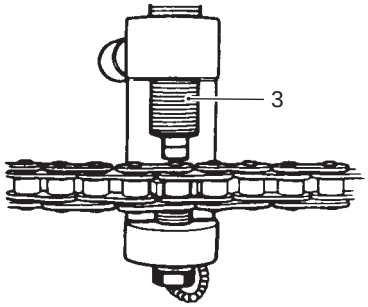
Before staking the joint pin, apply a small quantity of grease to the staking pin (5).

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.

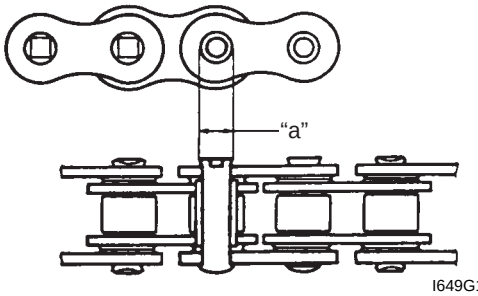
⚠ CAUTION

- **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.**

Pin end diameter specification "a"
DID: 5.7 – 6.0 mm (0.22 – 0.24 in)



I649G1310035-02



I649G1310036-03

3) Adjust the drive chain slack, after connecting it. Refer to "Drive Chain Inspection and Adjustment" in Section 0B (Page 0B-14).

Specifications

Service Data

B947H13107001

Drive Train

Unit: mm (in) Except ratio

Item	Standard		Limit
Final reduction ratio	2.470 (42/17)		—
Drive chain	Type	DID 50VAZ	—
	Links	114 links	—
	20-pitch length	—	319.4 (12.57)
Drive chain slack (on side-stand)	20 – 30 (0.8 – 1.2)		—
Gearshift lever height	65 – 75 (2.6 – 3.0)		—

Tightening Torque Specifications

B947H13107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Engine sprocket nut	145	14.5	105.0	☞(Page 3A-3)
Speed sensor rotor bolt	28	2.8	20.0	☞(Page 3A-3)
Speed sensor mounting bolt	6.5	0.65	4.5	☞(Page 3A-3)
Rear sprocket nut	60	6.0	43.0	☞(Page 3A-4)

NOTE

The specified tightening torque is 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-9).

Special Tools and Equipment

Recommended Service Material

B947H13108001

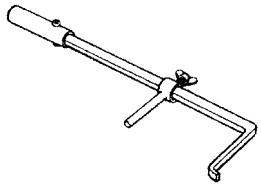
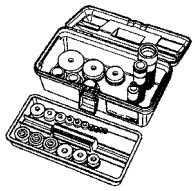
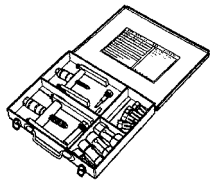
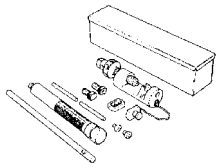
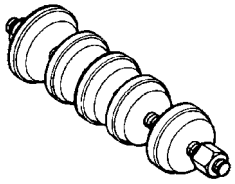
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 3A-3) / ☞(Page 3A-4) / ☞(Page 3A-4) / ☞(Page 3A-6) / ☞(Page 3A-6)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 3A-2)

NOTE

Required service material is also described in the following.
“Drive Chain Related Components” (Page 3A-1)

Special Tool

B947H13108002

09913–50121 Oil seal remover ☞(Page 3A-6) 	09913–70210 Bearing installing set (10 – 75 Φ) ☞(Page 3A-6) 
09921–20240 Bearing remover set ☞(Page 3A-6) 	09922–22711 Drive chain cutting and joint tool set ☞(Page 3A-7) 
09924–84510 Bearing installer set ☞(Page 3A-6) 	

Section 4

Brake

CONTENTS

Precautions

Precautions

Precautions for Brake System

B947H14000001

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

Brake Fluid Information

B947H14000002

⚠ 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 a long period 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.**

⚠ CAUTION

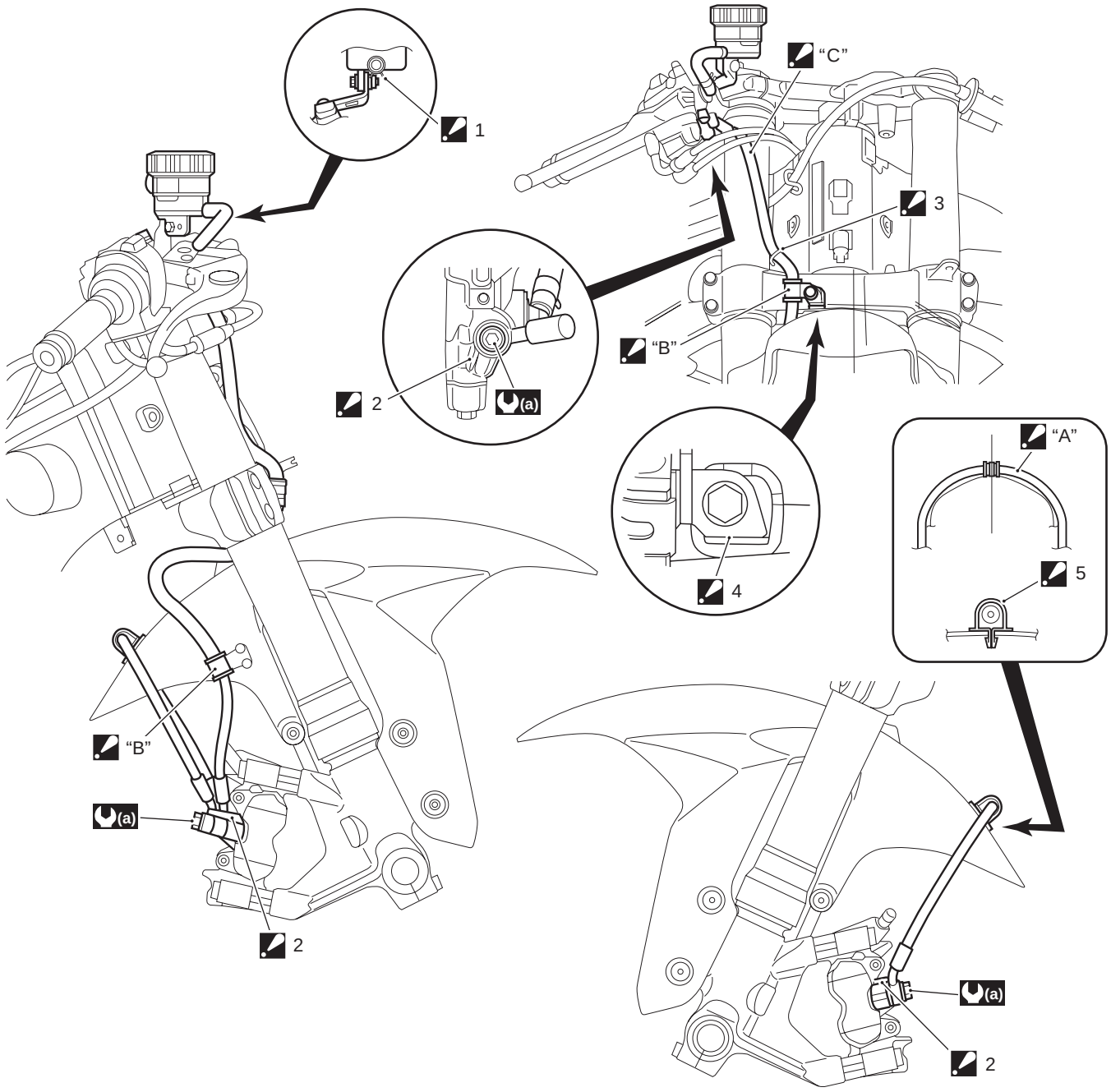
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

Brake Control System and Diagnosis

Schematic and Routing Diagram

Front Brake Hose Routing Diagram

B947H14102001

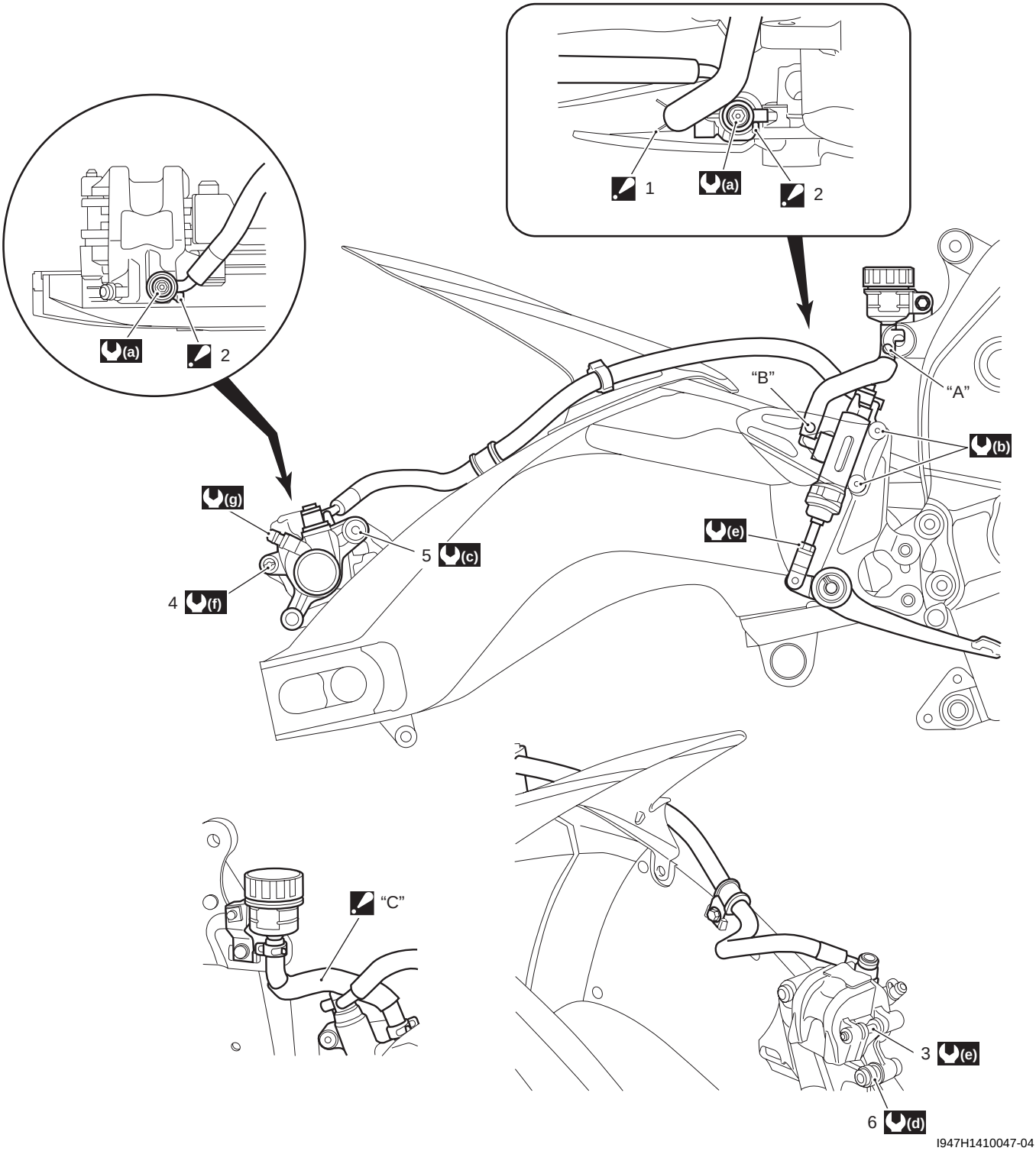


I947H1410046-02

1. Hose clamp : Clamp end should face downward.	"A": White marking : White marking should be on right side and face upward.
2. Stopper : After the brake hose union has contacted to the stopper, tighten the union bolt.	"B": Clamp the brake hose firmly.
3. Hose guide : Pass the brake hose through the hose guide.	"C": Pass the brake hose through rear side of the throttle cables.
4. Stopper : After positioning the clamp with the stopper, tighten the clamp bolt.	(a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
5. Hose clamp : Insert the clamp end into the hole on the front fender.	

Rear Brake Hose Routing Diagram

B947H14102002



I947H1410047-04

1. Hose clamp : Face the clamp end backward.	"A": White marking	(d) : 12 N·m (1.2 kgf-m, 8.5 lbf-ft)
2. Stopper : After the brake hose union has contacted to the stopper, tighten the union bolt.	"B": Yellow marking	(e) : 17 N·m (1.7 kgf-m, 12.5 lbf-ft)
3. Brake pad pin	"C": Pass the reservoir hose above the brake hose.	(f) : 2.5 N·m (0.25 kgf-m, 2.0 lbf-ft)
4. Plug	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	(g) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)
5. Caliper sliding pin B	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	
6. Caliper sliding pin A	(c) : 27 N·m (2.7 kgf-m, 19.5 lbf-ft)	

Diagnostic Information and Procedures

Brake Symptom Diagnosis

B947H14104001

Condition	Possible cause	Correction / Reference Item
Insufficient brake power	Leakage of brake fluid from hydraulic system.	*Repair or replace.*
	Worn pads and disc.	*Replace.*
	Oil adhesion on friction surface of pads.	*Clean disc and pads.*
	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 axle.	*Tighten to specified torque.*
	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 stroke	Air in hydraulic system.	*Bleed air.*
	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 joints.	*Tighten to specified torque.*
	Cracked hose.	*Replace.*
	Worn piston and/or cup.	*Replace piston and/or cup.*
	Worn piston seals and dust seals.	*Replace piston seals and dust seals.*
Brake drags	Rusty part.	*Clean and lubricate.*
	Insufficient brake lever or brake pedal pivot lubrication.	*Lubricate.*

Repair Instructions

Brake Pedal Height Inspection and Adjustment

B947H14106001

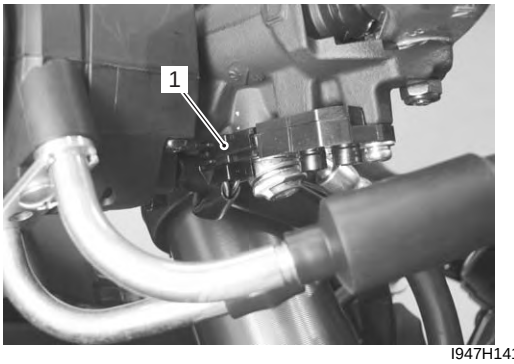
Refer to “Brake System Inspection” in Section 0B (Page 0B-16).

Front Brake Light Switch Inspection

B947H14106002

Inspect the front brake light switch in the following procedures:

1) Disconnect the front brake light switch coupler (1).



I947H1410001-03

2) Inspect the front brake light switch for continuity with the 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-11).

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity (•))))

Color / Position	Terminal (B/R)	Terminal (B/BI)
OFF		
ON	○	○

I815H1410006-01

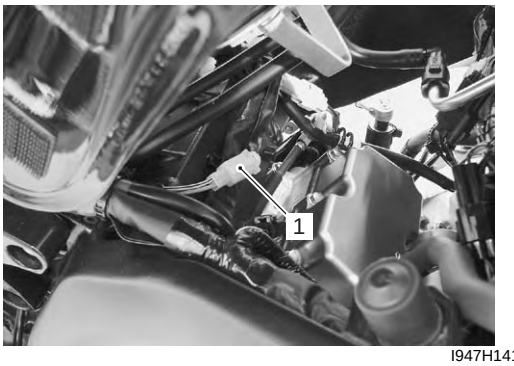
3) Connect the front brake light switch coupler.

Rear Brake Light Switch Inspection

B947H14106003

Inspect the rear brake light switch in the following procedures:

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
2) Disconnect the rear brake light switch lead wire coupler (1).



I947H1410042-01

3) Inspect the rear brake light switch for continuity with the tester.
   If any abnormality is found, replace the rear brake light switch with a new one.

   Special tool
   TOOL : 09900–25008 (Multi circuit tester set)

   Tester knob indication
   Continuity (•))))

Rear brake light switch

Color / Position	Terminal (O)	Terminal (W/B)
OFF		
ON	○	○

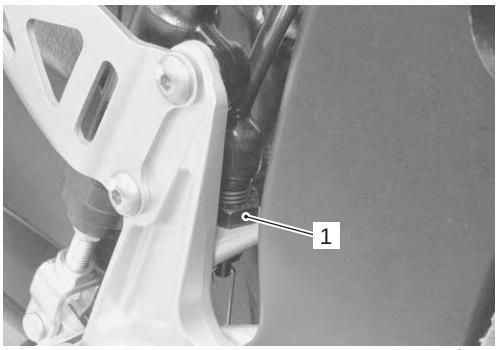
I837H1410002-01

4) Connect the rear brake light switch lead wire coupler.
5) Reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).

Rear Brake Light Switch Inspection and Adjustment

B947H14106004

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.



I947H1410002-01

Brake Fluid Level Check

B947H14106005

Refer to “Brake System Inspection” in Section 0B (Page 0B-16).

Brake Hose Inspection

B947H14106006

Refer to “Brake System Inspection” in Section 0B (Page 0B-16).

Air Bleeding from Brake Fluid Circuit

B947H14106007

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

NOTE

If air is trapped in the master cylinder, bleed air from the master cylinder first in the same manner as follows. Refer to "Front Brake Master Cylinder Assembly Removal and Installation" (Page 4A-10).

1) Remove the reservoir cap and diaphragm.
2) Fill the reservoir with brake fluid to the upper line of the reservoir. Place the reservoir cap to prevent dirt from entering.

I947H1410043-01

3) Attach a hose to the air bleeder valve, and insert the free end of the hose into a receptacle.
4) Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it.

I947H1410003-02

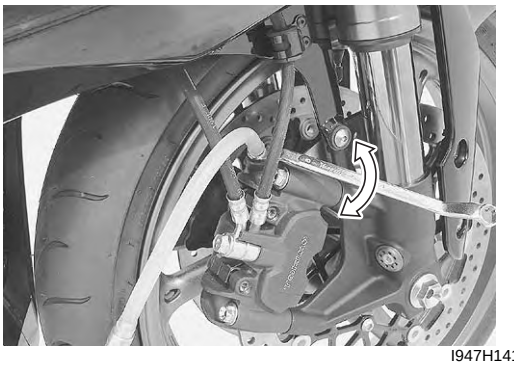
5) Loosen the air bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handlebar grip.
6) Close the air bleeder valve, pump and squeeze the lever, and open the valve.
7) Repeat this process 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.

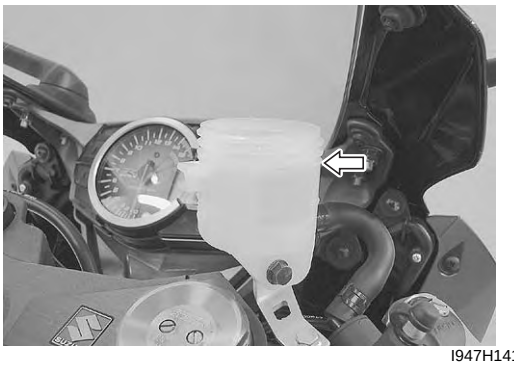
8) Close the air bleeder valve and disconnect the hose.

Tightening torque
Air bleeder valve (Front caliper): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)



I947H1410004-01

9) Fill the reservoir with brake fluid to the upper line of the reservoir.

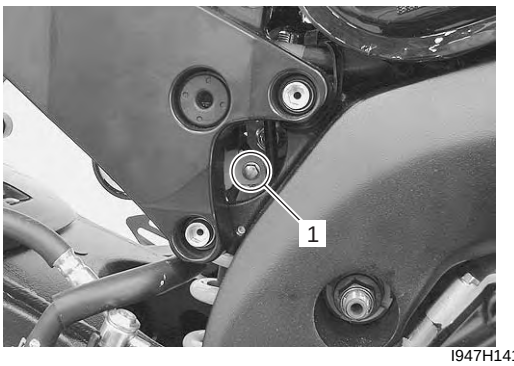


I947H1410005-01

10) Install the diaphragm and reservoir cap.

Rear Brake

1) Remove the right side frame cover. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Remove the rear brake fluid reservoir mounting bolt (1).



I947H1410048-01

3) Remove the reservoir cap and diaphragm.

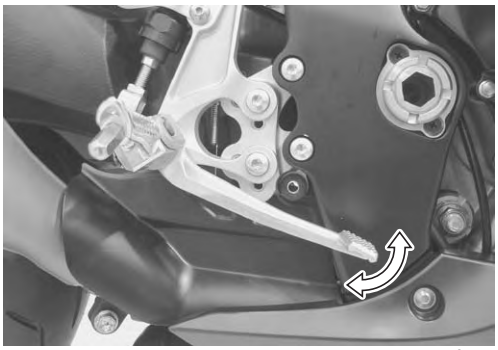
4) Fill the reservoir with brake fluid to the upper line of the reservoir. Place the reservoir cap to prevent dirt from entering.

I947H1410049-01

NOTE

The 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 caliper): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I947H1410007-01

I947H1410008-01

5) Fill the reservoir with brake fluid to the upper line of the reservoir.

I947H1410009-03

6) Install the diaphragm and reservoir cap.
7) Install the removed parts.

Brake Fluid Replacement

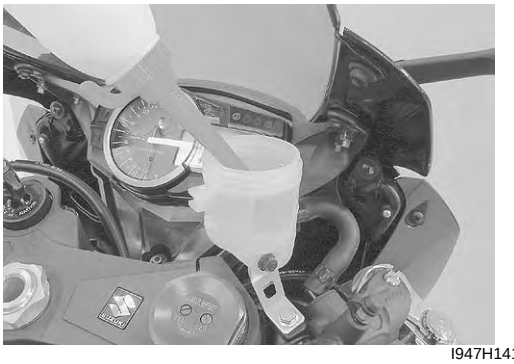
B947H14106008

⚠ 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.



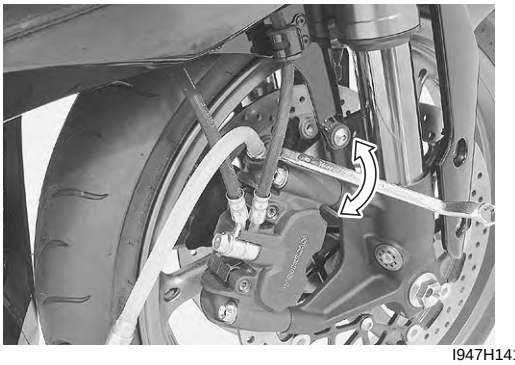
I947H1410010-01

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.

6) Loosen the air bleeder valve and pump the brake lever until the old brake fluid flows out of the brake system.



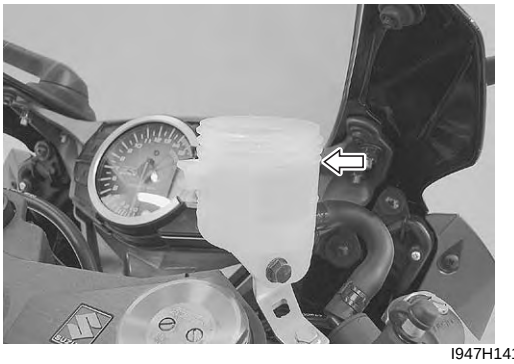
I947H1410011-01

I947H1410012-02

7) Close the air bleeder valve and disconnect the clear hose.

Tightening torque
Air bleeder valve (Front caliper): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)

8) Fill the reservoir with brake fluid to the upper mark of the reservoir.

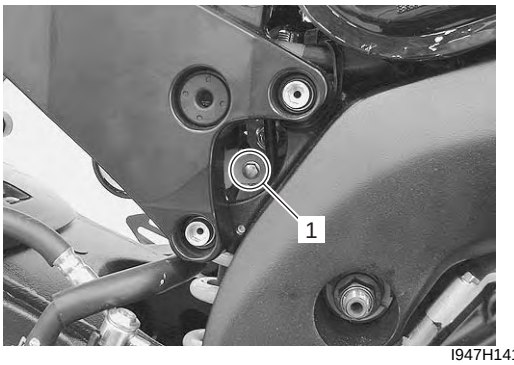


I947H1410013-01

9) Bleed air from the brake fluid circuit. Refer to “Air Bleeding from Brake Fluid Circuit” (Page 4A-4).
10) Install the diaphragm and reservoir cap.

Rear Brake

1) Place the motorcycle on a level surface.
2) Remove the right side frame cover. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Remove the rear brake fluid reservoir mounting bolt (1).



I947H1410050-01

4) Remove the brake fluid reservoir cap and diaphragm.
5) Suck up the old brake fluid as much as possible.

I947H1410014-02

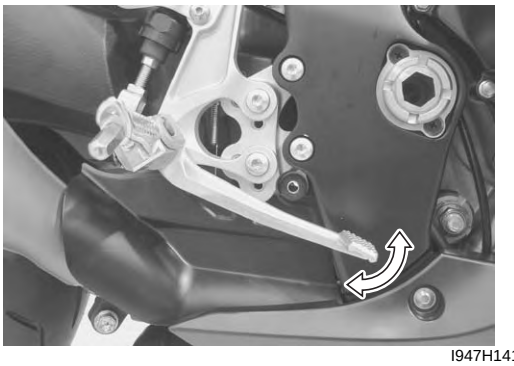
6) Fill the reservoir with new brake fluid.

BF: Brake fluid (DOT 4)

7) Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.

8) Loosen the air bleeder valve and pump the brake pedal until the old brake fluid flows out of the brake system.

I947H1410015-01



I947H1410016-01

9) Close the air bleeder valve and disconnect the clear hose.

Tightening torque
Air bleeder valve (Rear caliper): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

10) Fill the reservoir with brake fluid to the upper line of the reservoir.

I947H1410017-03

11) Bleed air from the brake fluid circuit. Refer to “Air Bleeding from Brake Fluid Circuit” (Page 4A-4).
12) Install the diaphragm and reservoir cap.
13) Install the removed parts.

Front Brake Hose Removal and Installation

B947H14106009

Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement” (Page 4A-6).
2) Remove the front brake hoses as shown in the front brake hose routing diagram. Refer to “Front Brake Hose Routing Diagram” (Page 4A-1).

Installation

⚠ CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

1) Install the front brake hose as shown in the front brake hose routing diagram. Refer to “Front Brake Hose Routing Diagram” (Page 4A-1).
2) Bleed air from the front brake system. Refer to “Air Bleeding from Brake Fluid Circuit” (Page 4A-4).

Rear Brake Hose Removal and Installation

B947H14106010

Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement” (Page 4A-6).
2) Remove the rear brake hoses as shown in the rear brake hose routing diagram. Refer to “Rear Brake Hose Routing Diagram” (Page 4A-2).

Installation

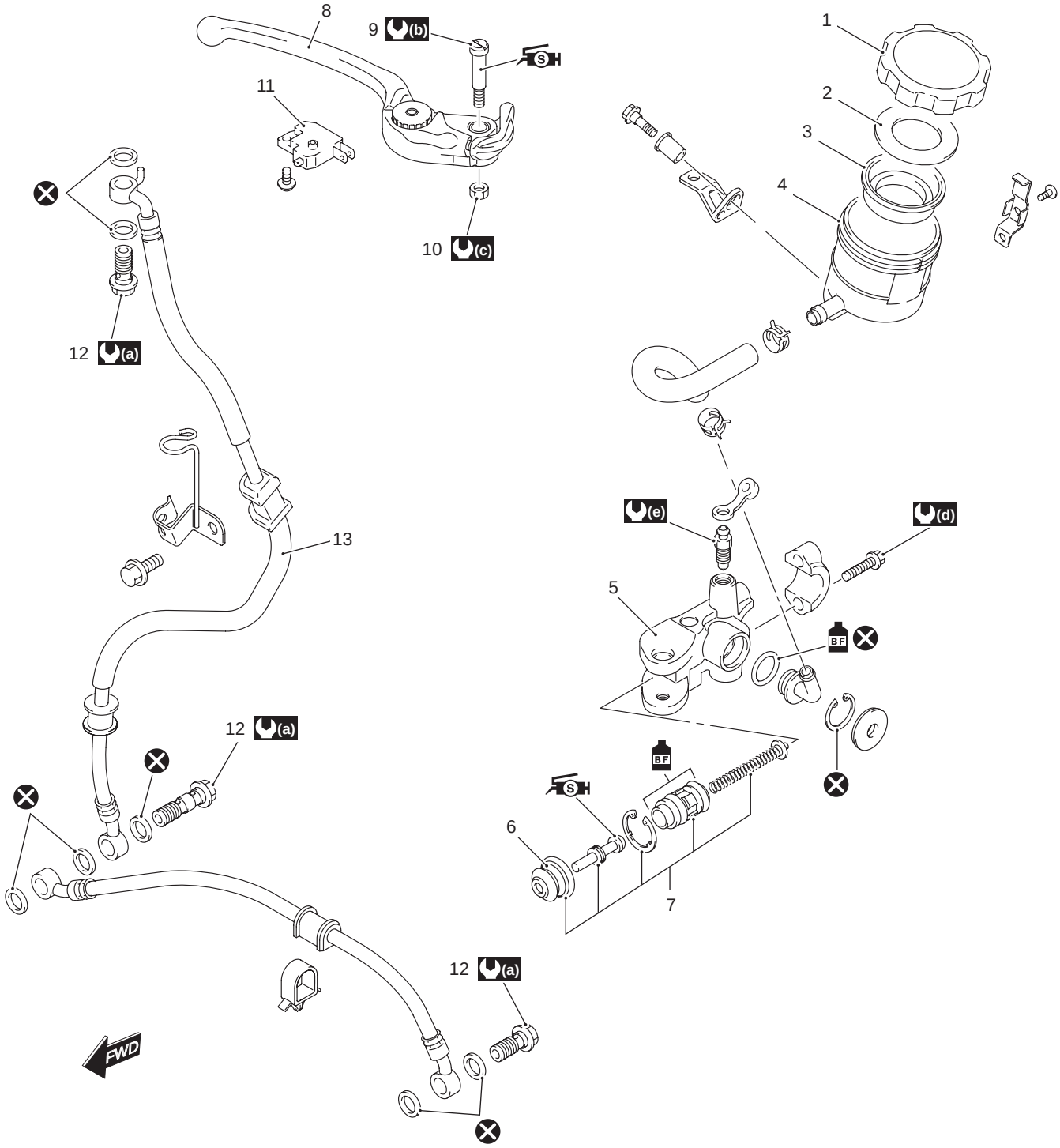
⚠ CAUTION

The seal washers should be replaced with new ones to prevent fluid leakage.

1) Install the rear brake hose as shown in the rear brake hose routing diagram. Refer to “Rear Brake Hose Routing Diagram” (Page 4A-2).
2) Bleed air from the rear brake system. Refer to “Air Bleeding from Brake Fluid Circuit” (Page 4A-4).

Front Brake Master Cylinder Components

B947H14106011



I947H1410051-02

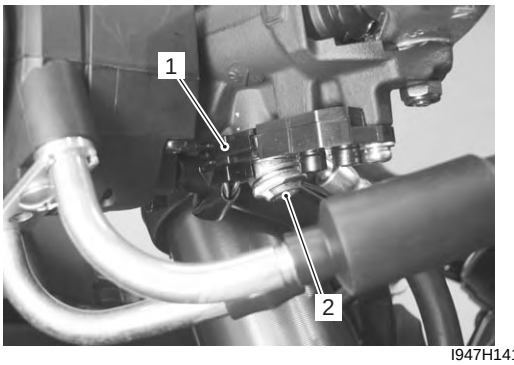
1. Reservoir cap	8. Brake lever	(b) : 1 N·m (0.1 kgf-m, 0.5 lbf-ft)
2. PLATE	9. Brake lever pivot bolt	(c) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)
3. Diaphragm	10. Brake lever pivot bolt lock-nut	(d) : 10 N·m (1.0 kgf-m, 0.7 lbf-ft)
4. Reservoir tank	11. Brake light switch	(e) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)
5. Master cylinder	12. Brake hose union bolt	BF : Apply brake fluid.
6. Dust boot	13. Brake hose	S : Apply silicone grease.
7. Piston set	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	: Do not reuse.

Front Brake Master Cylinder Assembly Removal and Installation

B947H14106012

Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement” (Page 4A-6).
2) Disconnect the front brake light switch coupler (1).
3) Place a rag underneath the brake hose union bolt (2) on the master cylinder to catch any spilt brake fluid.
4) Remove the brake hose union bolt (2).



I947H1410018-02

5) Remove the master cylinder assembly.

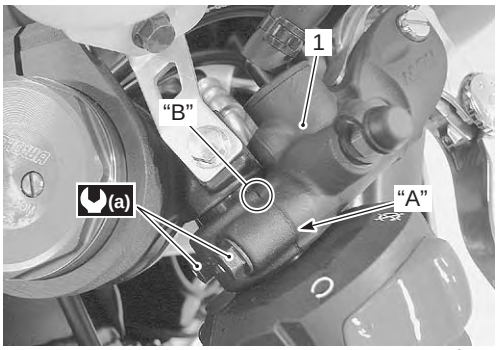
I947H1410019-02

Installation

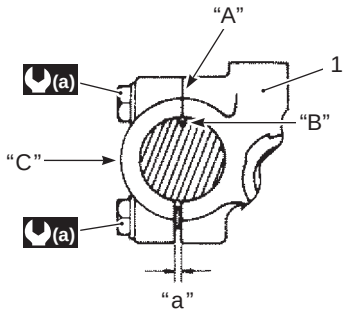
Install the front brake master cylinder in the reverse order of removal. Pay attention to the following points:

- When installing the master cylinder (1) onto the handlebar, align the master cylinder holder’s mating surface “A” with the punch mark “B” on the handlebar and tighten the upper holder bolt first.

Tightening torque
Front brake master cylinder holder bolt (Upper and Lower) (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1410020-01



I947H1410041-01

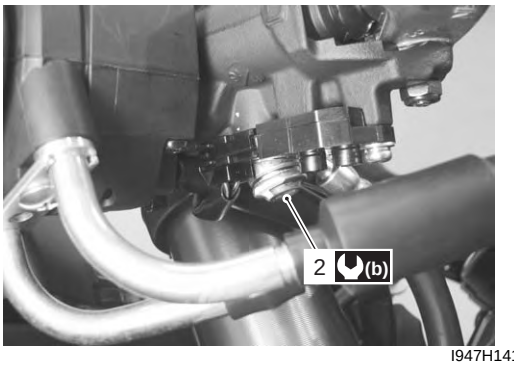
“C”: Up mark	“a”: Clearance

- 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)



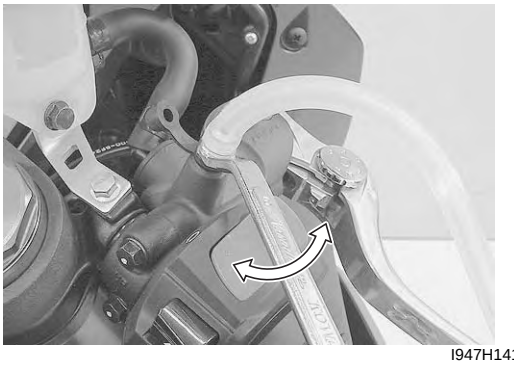
I947H1410021-03

- Bleed air from the master cylinder in the same manner as caliper side.

NOTE

If air is trapped in the master cylinder, bleed air from the master cylinder first.

Tightening torque
Air bleeder valve (Front master cylinder): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I947H1410022-01

- Bleed air from brake system. Refer to “Air Bleeding from Brake Fluid Circuit” (Page 4A-4).

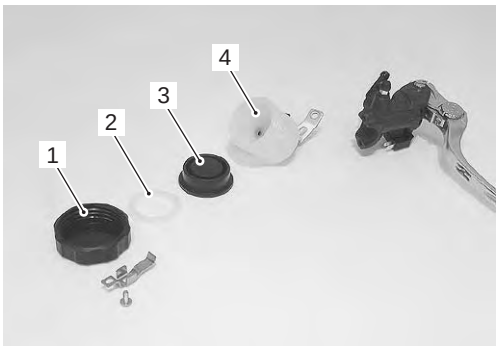
Front Brake Master Cylinder / Brake Lever Disassembly and Assembly

B947H14106013

Refer to “Front Brake Master Cylinder Assembly Removal and Installation” (Page 4A-10).

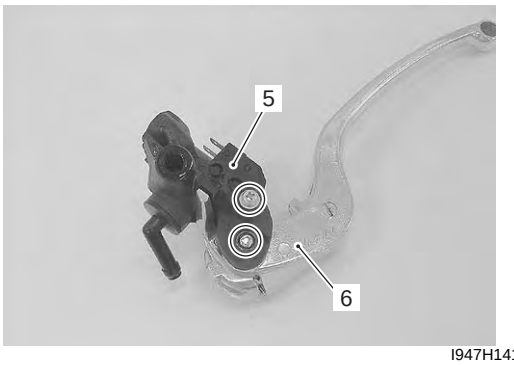
Disassembly

1) Remove the reservoir cap (1), PLATE (2), diaphragm (3) and reservoir tank (4).



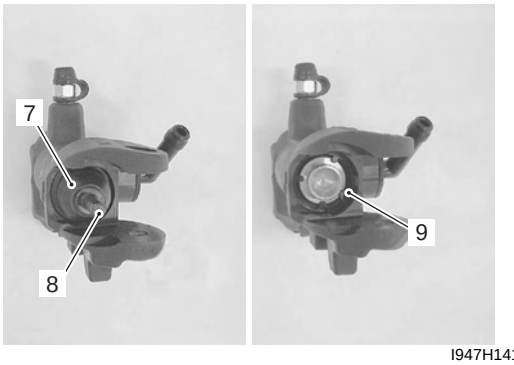
I947H1410023-01

2) Remove the brake light switch (5) and brake lever (6).



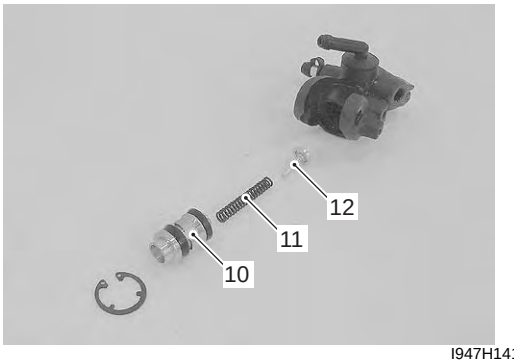
I947H1410024-01

3) Remove the dust boot (7) and push rod (8).
4) Remove the snap ring (9).



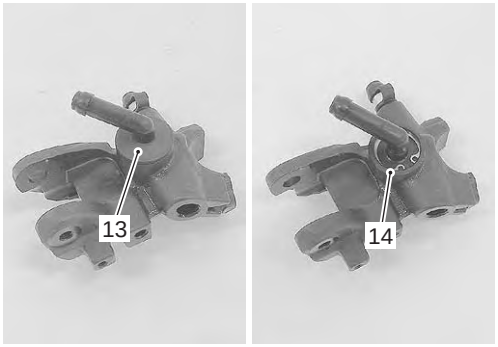
I947H1410025-02

5) Remove the following parts from the master cylinder.
- Piston (10)
- Return spring (11)
- Return spring guide (12)



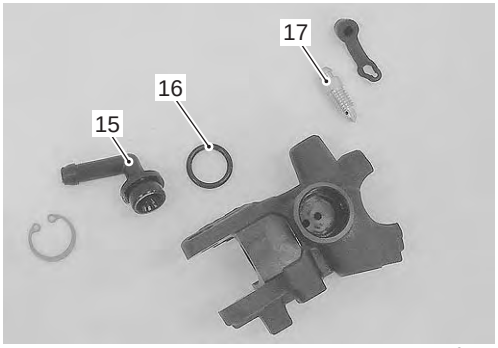
I947H1410026-01

6) Remove the dust rubber (13) and snap ring (14).



I947H1410027-02

7) Remove the connector (15), O-ring (16) and air bleeder valve (17).



I947H1410028-01

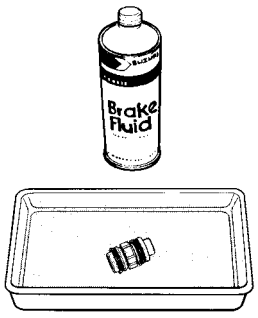
Assembly

Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

⚠ CAUTION

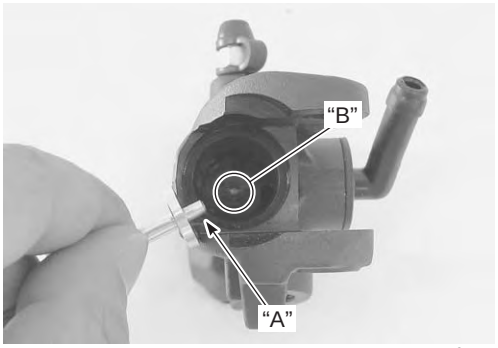
- **Wash the master cylinder components with new brake fluid before reassembly.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.**
- **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)



I837H1410034-01

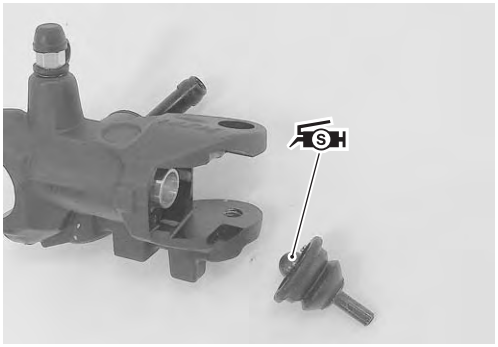
- When install the spring guide, insert the spring guide end “A” into the hole “B” of the master cylinder.



I947H1410029-01

- Apply grease to the push rod.

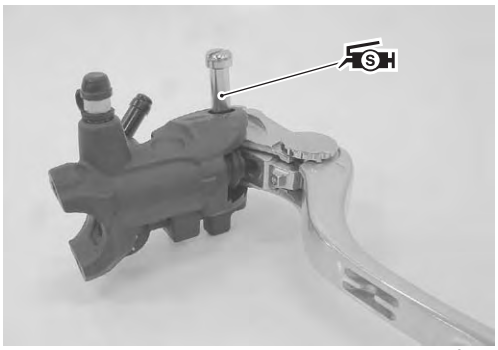
  : Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)



I947H1410030-01

- Apply grease to the brake lever pivot bolt.

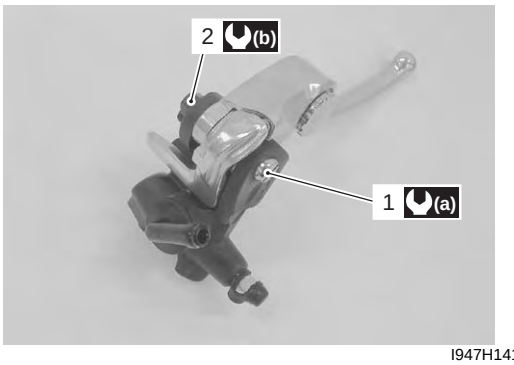
  : Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)



I947H1410031-01

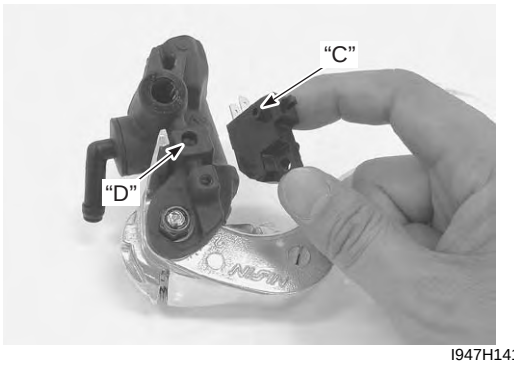
- Tighten the pivot bolt (1) and lock-nut (2) to the specified torque.

  Tightening torque
  Brake lever pivot bolt (a): 1 N·m (0.1 kgf-m, 0.5 lbf-ft)
  Brake lever pivot bolt lock-nut (b): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I947H1410032-02

- When installing the brake light switch, align the projection “C” on the switch with the hole “D” in the master cylinder.



I947H1410044-03

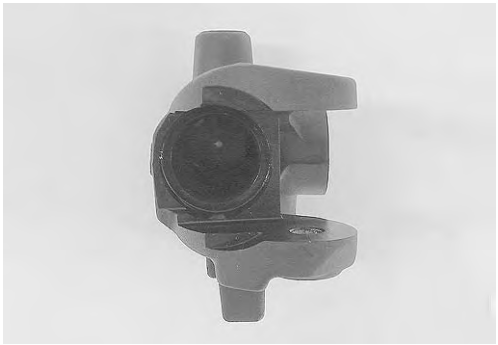
Front Brake Master Cylinder Parts Inspection

B947H14106014

Refer to “Front Brake Master Cylinder / Brake Lever Disassembly and Assembly” (Page 4A-11).

Master Cylinder

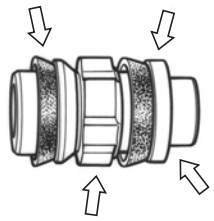
Inspect the master cylinder bore for any scratches or other damage.



I947H1410033-01

Piston / Rubber Parts

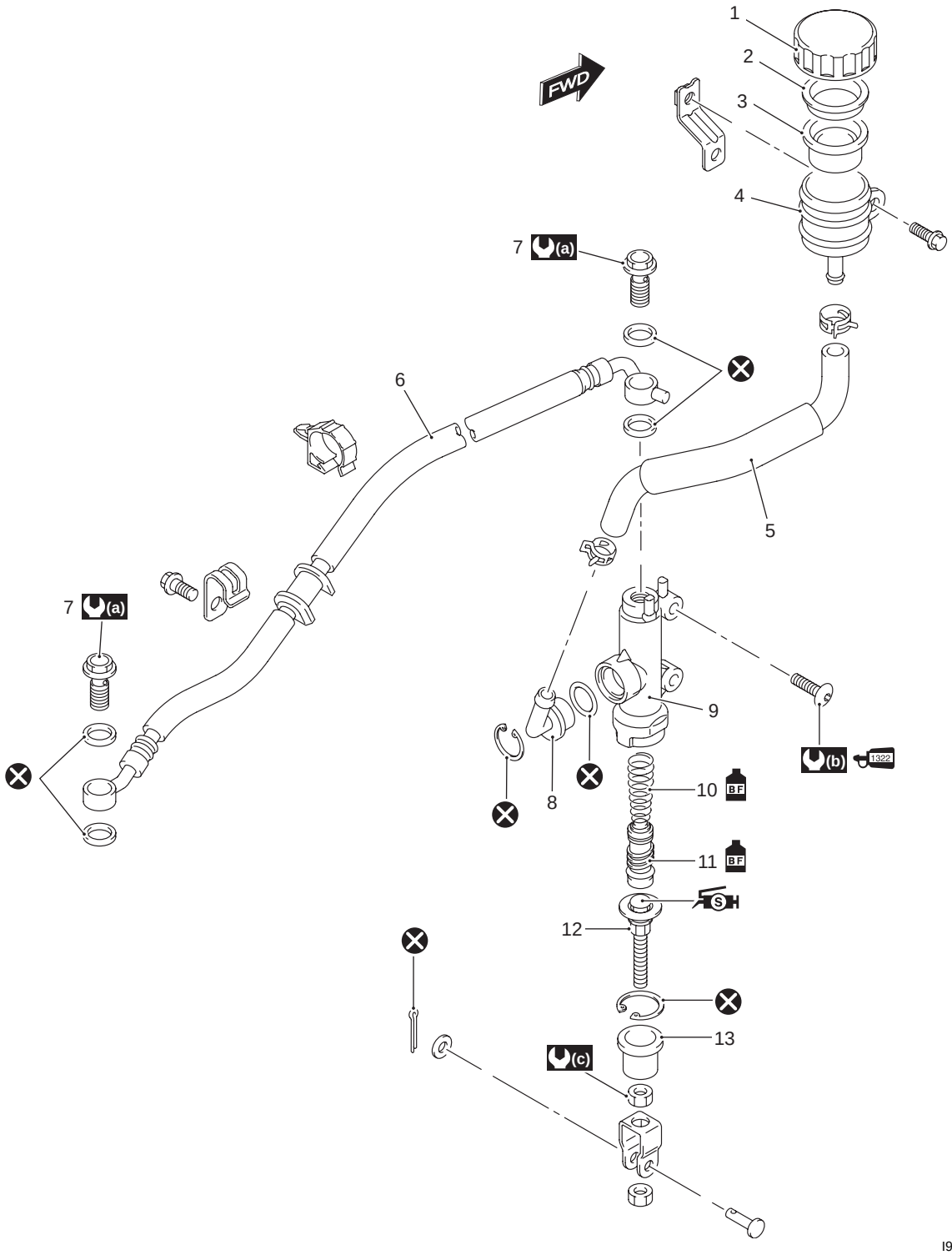
Inspect the piston surface for any scratches or other damage.
Inspect the primary cup, secondary cup and dust boot for wear or damage.



I837H1410041-01

Rear Brake Master Cylinder Components

B947H14106015



I947H1410052-02

1. Reservoir cap	6. Brake hose	11. Piston/Cup set	(C) : 17 N·m (1.7 kgf-m, 12.5 lbf-ft)
2. PLATE	7. Brake hose union bolt	12. Push rod	S : Apply silicone grease.
3. Diaphragm	8. Brake hose connector	13. Dust boot	1322 : Apply thread lock to the thread part.
4. Reservoir tank	9. Master cylinder	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	BF : Apply brake fluid.
5. Reservoir hose	10. Spring	(b) : 10 N·m (1.0 kgf-m, 0.7 lbf-ft)	: Do not reuse.

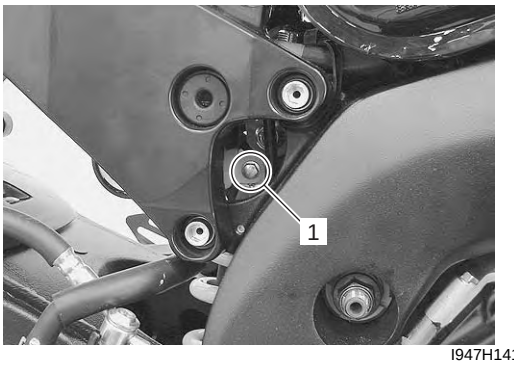
Rear Brake Master Cylinder Assembly Removal and Installation

B947H14106016

Refer to “Rear Brake Hose Routing Diagram” (Page 4A-2).

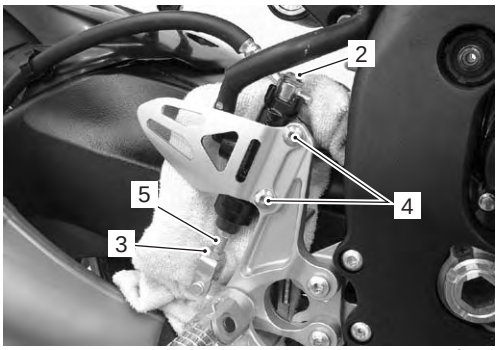
Removal

1) Remove the right side frame cover. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the rear brake fluid reservoir mounting bolt (1).



I947H1410053-01

3) Drain brake fluid. Refer to “Brake Fluid Replacement” (Page 4A-6).
4) Place a rag underneath the brake hose union bolt (2) on the master cylinder to catch any spilt brake fluid.
5) Remove the brake hose union bolt (2).
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).



I947H1410034-02

Installation

Install the rear brake master cylinder in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

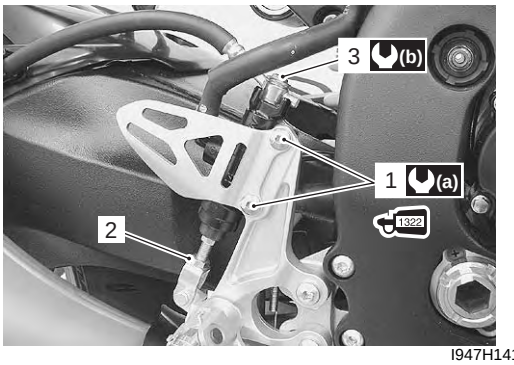
The seal washers should be replaced with the new ones to prevent fluid leakage.

- Apply thread lock to the master cylinder mounting bolts (1) and tighten them to the specified torque.

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

- Tighten the lock-nut (2) temporarily.
- 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): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
  Brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I947H1410045-02

- Bleed air from the brake system after reassembling the master cylinder. Refer to “Air Bleeding from Brake Fluid Circuit” (Page 4A-4).
- Adjust the brake pedal height. Refer to “Brake Pedal Height Inspection and Adjustment” (Page 4A-3).
- Install the removed parts.

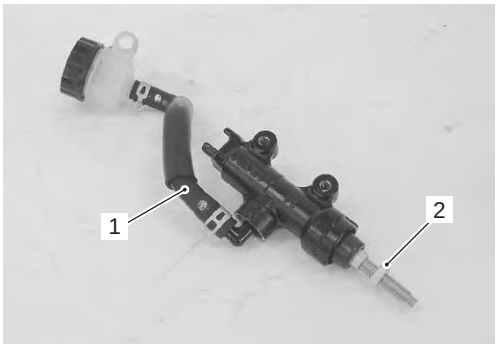
Rear Brake Master Cylinder Disassembly and Assembly

B947H14106017

Refer to “Rear Brake Master Cylinder Assembly Removal and Installation” (Page 4A-15).

Disassembly

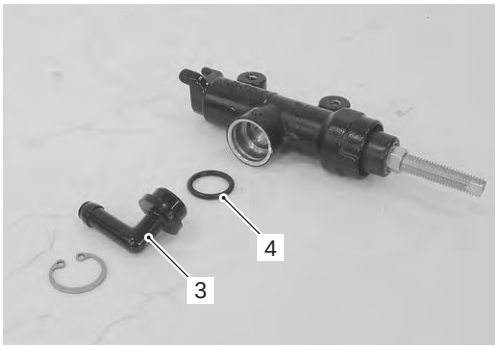
1) Disconnect the reservoir hose (1).
2) Remove the lock-nut (2).



I947H1410035-02

3) Remove the brake hose connector (3) and O-ring (4).

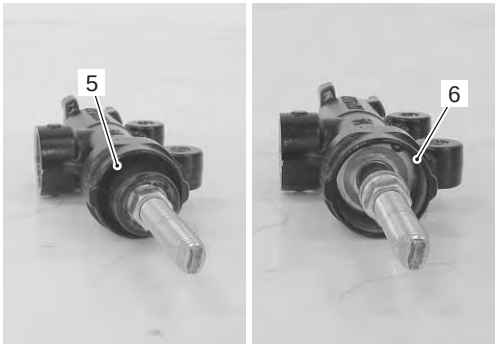
Special tool
TOOL : 09900–06108 (Snap ring remover (Close type))



I947H1410036-02

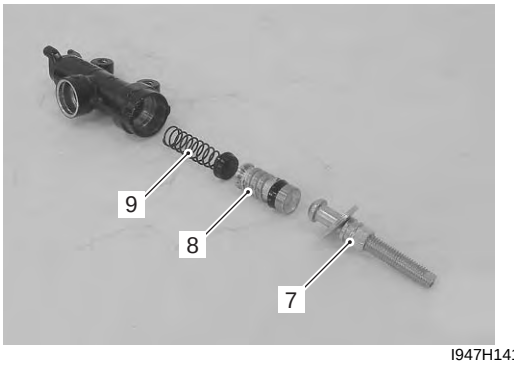
4) Pull out the dust boot (5) and remove the snap ring (6).

Special tool
TOOL : 09900–06108 (Snap ring remover (Close type))



I947H1410037-02

5) Remove the push rod (7), piston/cup set (8) and spring (9).



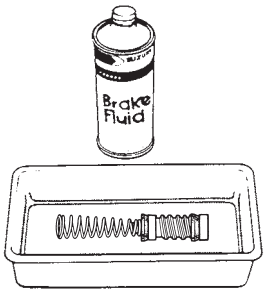
I947H1410054-01

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.**

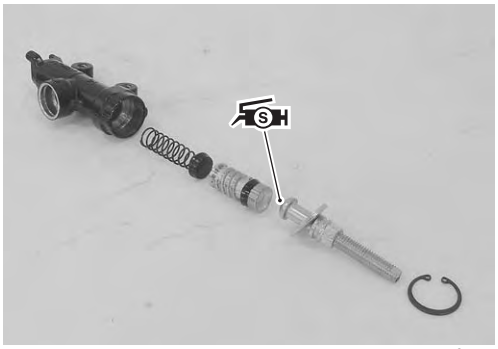
BF: Brake fluid (DOT 4)



I947H1410038-01

- Apply grease to the push rod end.

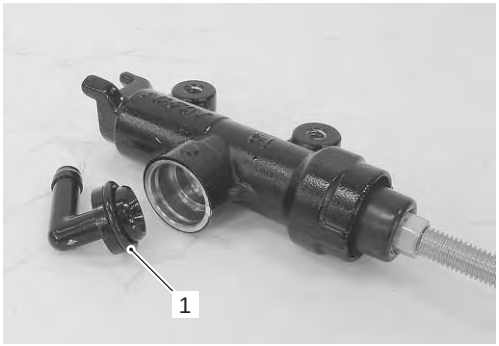
SH: Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)



I947H1410039-02

⚠ CAUTION

Replace the O-ring with a new one.



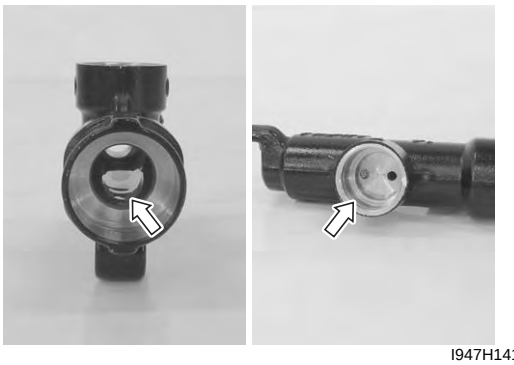
I947H1410055-01

Rear Brake Master Cylinder Parts Inspection

B947H14106018

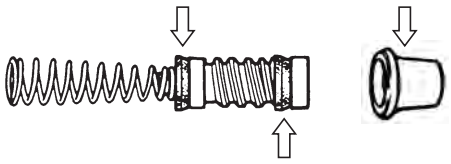
Refer to “Rear Brake Master Cylinder Disassembly and Assembly” (Page 4A-16).

Master Cylinder
Inspect the master cylinder bore for any scratches or other damage.



I947H1410040-02

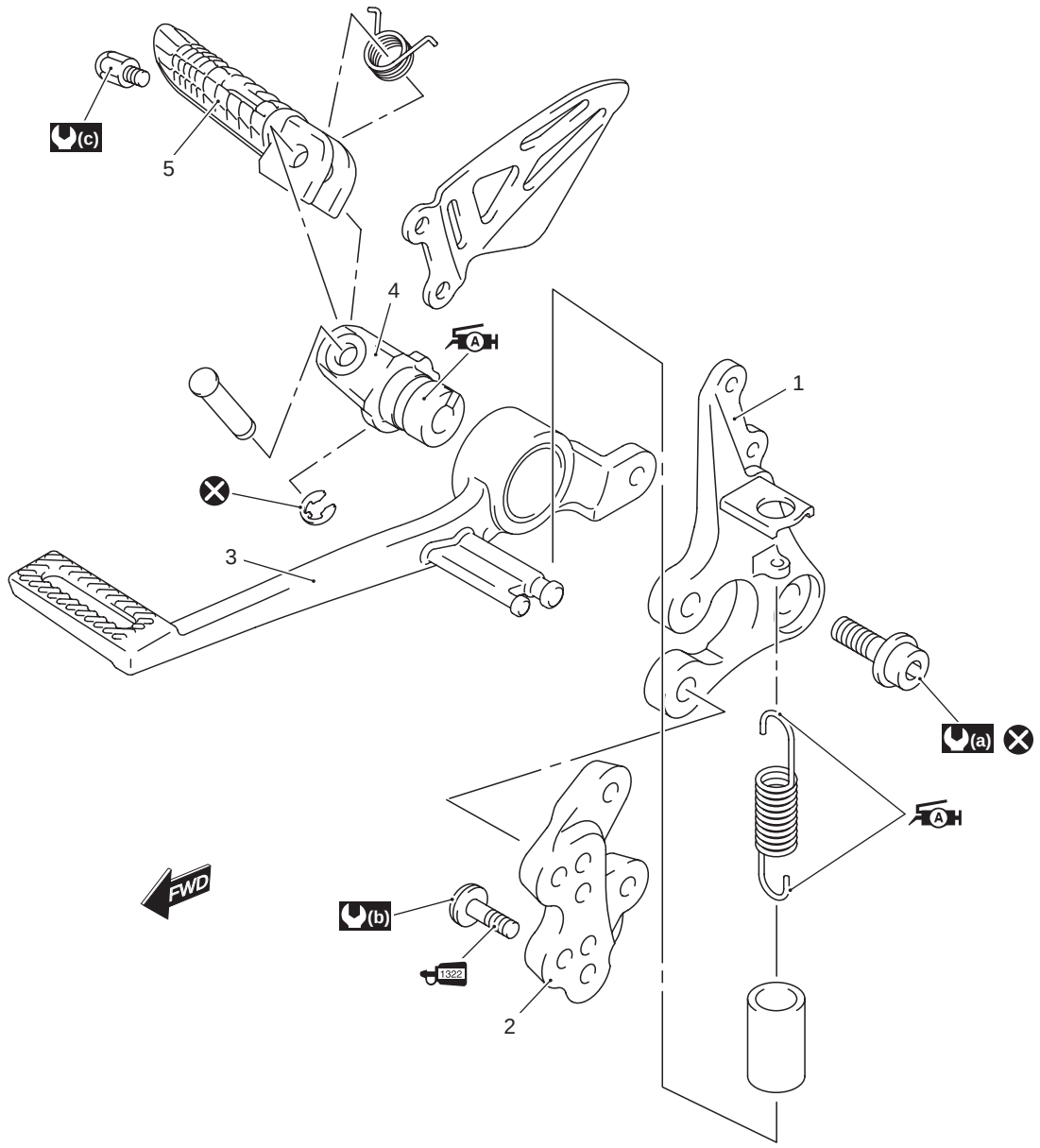
Piston / Rubber Parts
Inspect the piston surface for any scratches or other damage.
Inspect the primary cup, secondary cup and dust boot for wear or damage.



I837H1410050-01

Rear Brake Pedal Construction

B947H14106019



I947H1410056-02

1. Footrest bracket No. 2	5. Footrest	A : Apply grease.
2. Footrest bracket No. 1	(a) : 35 N·m (3.5 kgf-m, 25.5 lbf-ft)	1322 : Apply thread lock to the thread part.
3. Rear brake pedal	(b) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	: Do not reuse.
4. Footrest holder	(c) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)	

Rear Brake Pedal Removal and Installation

B947H14106020

Removal

1) Remove the master cylinder assembly. Refer to “Rear Brake Master Cylinder Assembly Removal and Installation” (Page 4A-15).
2) Disconnect the rear brake light switch lead wire coupler. Refer to “Rear Brake Light Switch Inspection” (Page 4A-4).
3) Remove the rear brake pedal as shown in the rear brake pedal construction. Refer to “Rear Brake Pedal Construction” (Page 4A-18).

Installation

⚠ CAUTION

Replace the snap ring with a new one.

Install the rear brake pedal as shown in the rear brake pedal construction. Refer to “Rear Brake Pedal Construction” (Page 4A-18).

Specifications

Service Data

B947H14107001

Brake

Unit: mm (in)

Item	Standard		Limit
Rear brake pedal height	65 – 75 (2.6 – 3.0)		—
Master cylinder bore	Front	17.460 – 17.503 (0.6874 – 0.6891)	—
	Rear	14.000 – 14.043 (0.5512 – 0.5529)	—
Master cylinder piston diam.	Front	17.417 – 17.444 (0.6857 – 0.6868)	—
	Rear	13.957 – 13.984 (0.5495 – 0.5506)	—
Brake fluid type	DOT 4		—

Tightening Torque Specifications

B947H14107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Air bleeder valve (Front caliper)	7.5	0.75	5.5	☞(Page 4A-5) / ☞(Page 4A-7)
Air bleeder valve (Rear caliper)	6	0.6	4.5	☞(Page 4A-6) / ☞(Page 4A-8)
Front brake 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-11) / ☞(Page 4A-15)
Air bleeder valve (Front master cylinder)	6	0.6	4.5	☞(Page 4A-11)
Brake lever pivot bolt	1	0.1	0.5	☞(Page 4A-13)
Brake lever pivot bolt lock-nut	6	0.6	4.5	☞(Page 4A-13)
Rear brake master cylinder mounting bolt	10	1.0	7.0	☞(Page 4A-15)

NOTE

The specified tightening torque is described in the following.
“Front Brake Hose Routing Diagram” (Page 4A-1)
“Rear Brake Hose Routing Diagram” (Page 4A-2)
“Front Brake Master Cylinder Components” (Page 4A-9)
“Rear Brake Master Cylinder Components” (Page 4A-14)
“Rear Brake Pedal Construction” (Page 4A-18)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H14108001

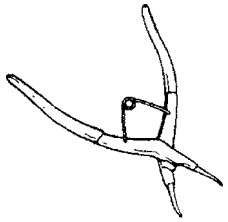
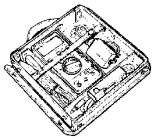
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4A-6) / ☞(Page 4A-7) / ☞(Page 4A-12) / ☞(Page 4A-17)
Grease	SUZUKI SILICONE GREASE or equivalent	P/No.: 99000–25100	☞(Page 4A-13) / ☞(Page 4A-13) / ☞(Page 4A-17)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 4A-15)

NOTE

Required service material is also described in the following.
“Front Brake Master Cylinder Components” (Page 4A-9)
“Rear Brake Master Cylinder Components” (Page 4A-14)
“Rear Brake Pedal Construction” (Page 4A-18)

Special Tool

B947H14108002

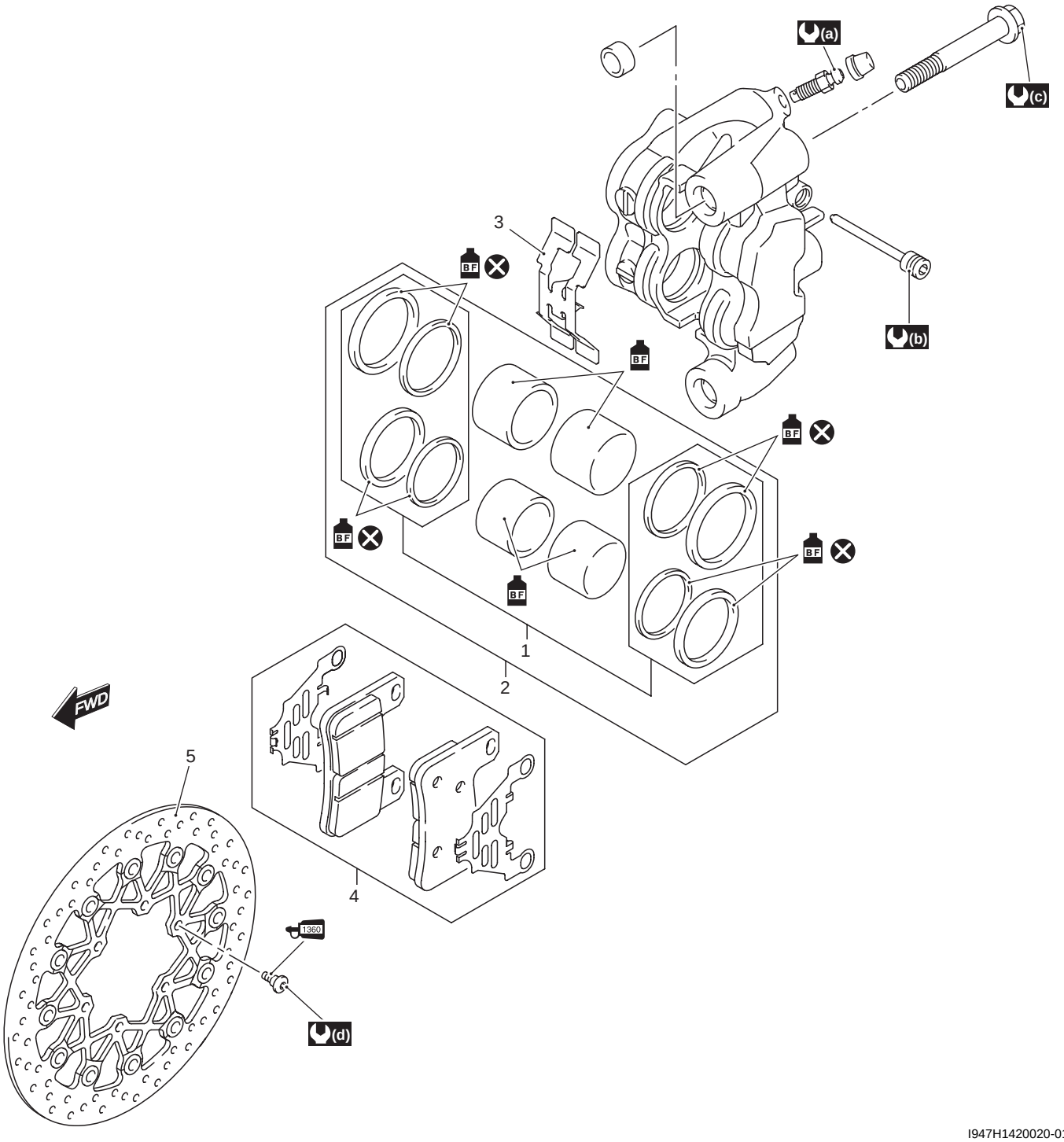
09900–06108 Snap ring remover (Close type) ☞(Page 4A-16) / ☞(Page 4A-16)		09900–25008 Multi circuit tester set ☞(Page 4A-3) / ☞(Page 4A-4)	

Front Brakes

Repair Instructions

Front Brake Components

B947H14206001



I947H1420020-01

1. Seal set	5. Front brake disc	(d) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)
2. Piston and seal set	(a) : 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)	1360 : Apply thread lock to the thread part.
3. Brake pad spring	(b) : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)	BF : Apply brake fluid.
4. Brake pad set	(c) : 39 N·m (3.9 kgf-m, 28.0 lbf-ft)	⊗ : Do not reuse.

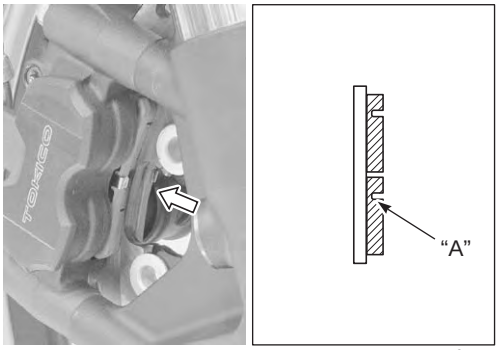
Front Brake Pad Inspection

B947H14206002

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.



I947H1420001-02

Front Brake Pad Replacement

B947H14206003

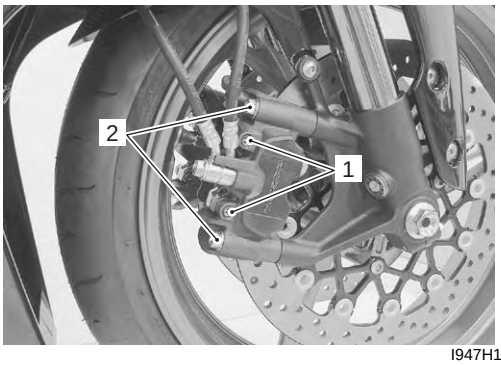
1) Loosen the pad mounting pins (1).
2) Remove the brake caliper by removing the caliper mounting bolts (2).
3) Remove the pad mounting pins (1), brake pads and spring.

⚠ CAUTION

Do not operate the brake lever while the pads are removed.

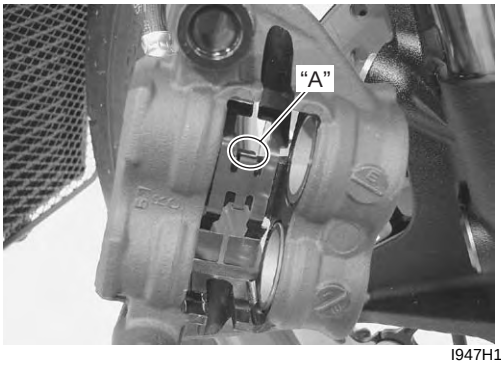
NOTE

When removing the pads and pad spring, push the pistons all the way into the brake caliper.



I947H1420002-01

4) Clean up the caliper especially around the caliper pistons.
5) When installing the spring to caliper, bring its wider pawl “A” to top side.



I947H1420018-01

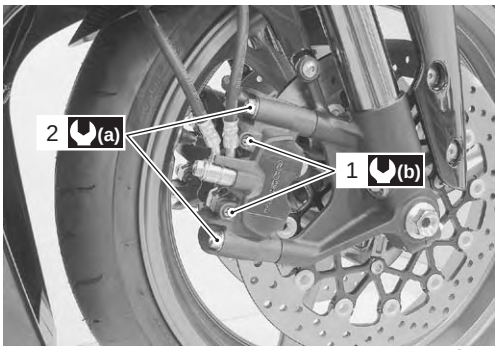
6) Install new brake pads and temporarily tighten the pad mounting pins.

⚠ CAUTION

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

7) Install the brake caliper.
8) Tighten the front brake caliper mounting bolts (2) and front brake pad mounting pins (1) to the specified torque.

Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)
Front brake pad mounting pin (b): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)



I947H1420003-02

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

B947H14206004

NOTE

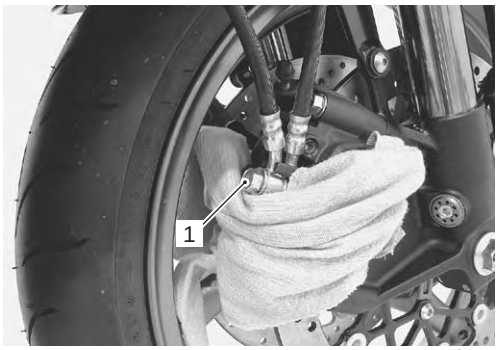
The right and left calipers are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement” in Section 4A (Page 4A-6).
2) Remove the brake hose from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.

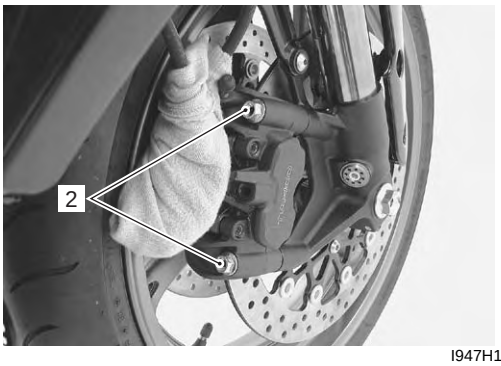
NOTE

Place a rag underneath the union bolt on the brake caliper to catch any spilt brake fluid.



I947H1420019-01

3) Remove the brake caliper by removing its mounting bolts (2).



I947H1420017-02

Installation

Install the brake caliper in the reverse order of removal. Pay attention to the following points:

- Tighten each bolt to the specified torque.

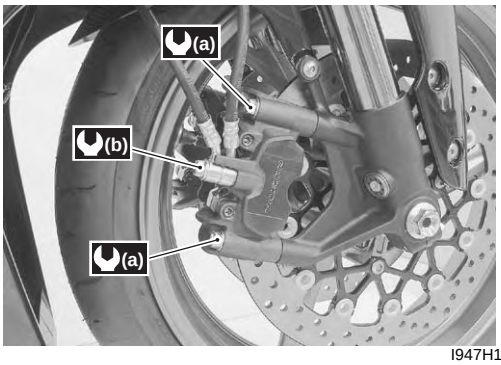
Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)

- 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
Brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I947H1420004-01

- Bleed air from the brake system after installing the caliper. Refer to “Air Bleeding from Brake Fluid Circuit” in Section 4A (Page 4A-4).
- 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

B947H14206005

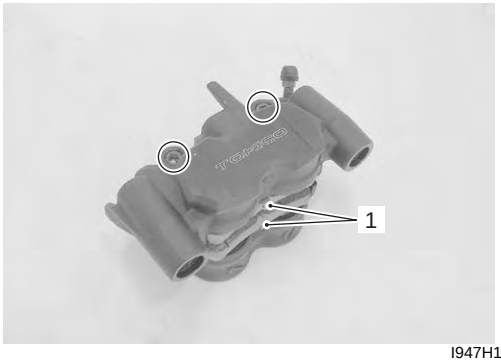
Refer to “Front Brake Caliper Removal and Installation” (Page 4B-3).

NOTE

The right and left calipers are installed symmetrically and therefore the disassembly procedure for one side is the same as that for the other side.

Disassembly

1) Remove the brake pads (1) and spring from the caliper by removing the pad mounting pins.

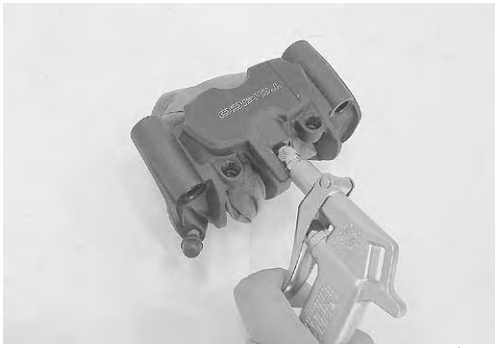


I947H1420005-01

2) Place a rag over the pistons to prevent them from popping out and then force out the pistons using compressed air.

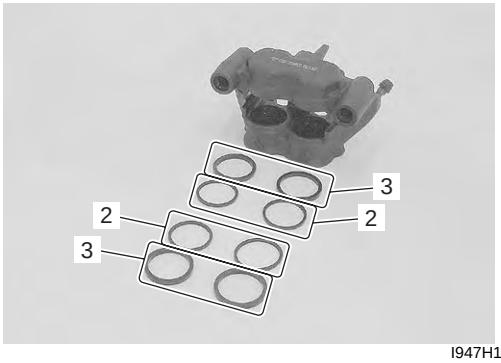
⚠ CAUTION

Do not use high pressure air to prevent piston damage.



I947H1420006-01

3) Remove the dust seals (2) and piston seals (3) from both sides of the caliper.



I947H1420007-01

Assembly

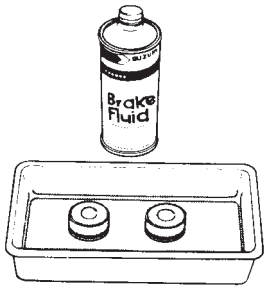
Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

- 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.**



I649G1420012-02

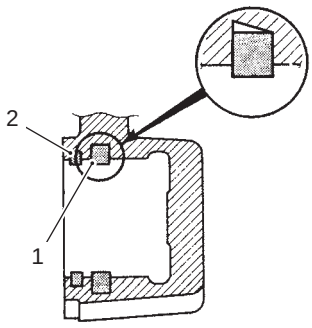
- Apply the brake fluid to piston seals (1) and dust seals (2).

  ⚠ CAUTION

  Replace the piston seals (1) and dust seals (2) with new ones.

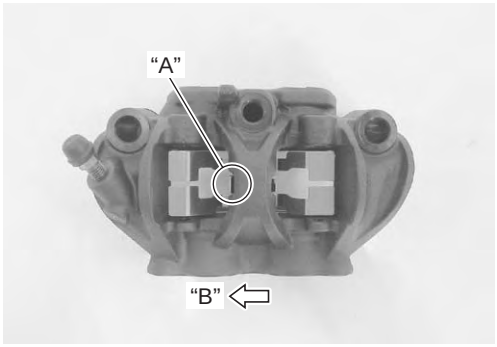
  BF: Brake fluid (DOT 4)

- Install the piston seals as shown in the figure.



I649G1420013-02

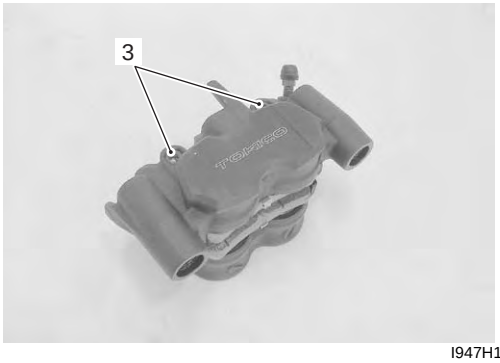
- When installing the spring to the caliper, bring its wider pawl “A” facing top side.



I947H1420009-01

“A”: Wider pawl	“B”: Top side

- Install the brake pads and temporarily tighten the pad mounting pins (3).



I947H1420010-01

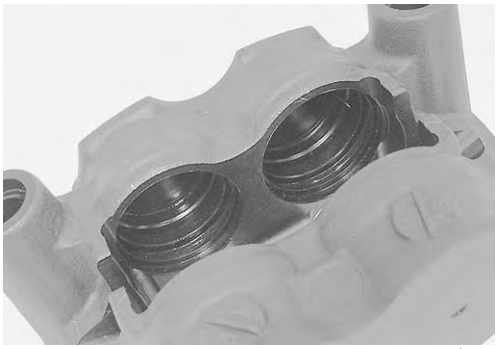
Front Brake Caliper Parts Inspection

B947H14206006

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.



I947H1420011-01

Brake Caliper Piston

Inspect the surface of brake caliper pistons for any scratches or other damage. If any damage is found, replace the pistons with a new set.

I947H1420012-01

Brake Pad Mounting Pin

Inspect the brake pad mounting pins for wear and other damage. If any damage is found, replace the mounting pins with new ones.

I947H1420013-01

Brake Pad Spring

Inspect the brake pad spring for damage and excessive bend. If any damage is found, replace it with a new one.

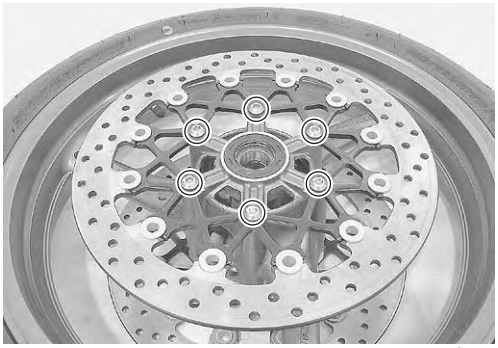
I947H1420014-01

Front Brake Disc Removal and Installation

B947H14206007

Removal

1) Remove the front wheel assembly. Refer to “Front Wheel Assembly Removal and Installation” in Section 2D (Page 2D-4).
2) Remove the front brake disc.



I947H1420015-01

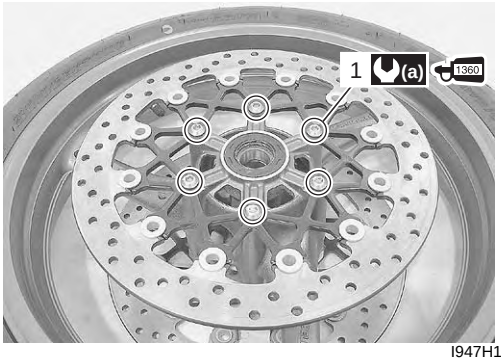
Installation

Install the front brake disc in the reverse order of removal. Pay attention to the following points:

- Make sure that the brake disc is clean and free of any grease.
- Apply thread lock to the brake disc bolts (1) and tighten them to the specified torque.

1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER “1360” or equivalent)

Tightening torque
Brake disc bolt (Front) (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



I947H1420016-02

Front Brake Disc Inspection

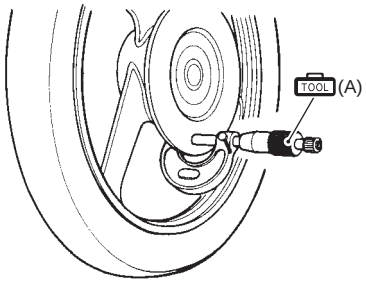
B947H14206008

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
TOOL (A): 09900–20205 (Micrometer (0 – 25 mm))

Brake disc thickness
Service limit (Front): 5.0 mm (0.20 in)



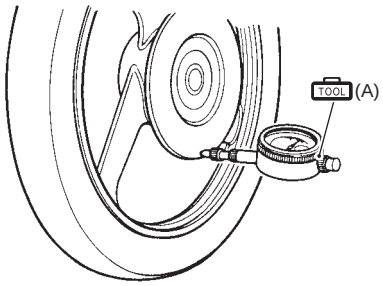
I649G1420019-03

Brake Disc Runout

1) Dismount the front brake caliper. Refer to “Front Brake Caliper Removal and Installation” (Page 4B-3).
2) Measure the runout using the dial gauge.
Replace the disc if the runout exceeds the service limit.

Special tool
TOOL (A): 09900–20607 (Dial gauge)
TOOL : 09900–20701 (Dial gauge chuck)

Brake disc runout
Service limit: 0.30 mm (0.012 in)



I649G1420020-03

3) Remount the front brake caliper. Refer to “Front Brake Caliper Removal and Installation” (Page 4B-3).

Specifications

Service Data

B947H14207001

Brake

Unit: mm (in)

Item	Standard			Limit
Brake disc thickness	Front	5.3 – 5.7 (0.21 – 0.22)		5.0 (0.20)
Brake disc runout	—			0.30 (0.012)
Brake caliper cylinder bore	Front	Leading	30.280 – 30.330 (1.1921 – 1.1941)	—
		Trailing	32.080 – 32.130 (1.2630 – 1.2650)	—
Brake caliper piston diam.	Front	Leading	30.167 – 30.200 (1.1877 – 1.1890)	—
		Trailing	31.967 – 32.000 (1.2585 – 1.2598)	—
Brake fluid type	DOT 4			—

Tightening Torque Specifications

B947H14207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front brake caliper mounting bolt	39	3.9	28.0	☞(Page 4B-2) / ☞(Page 4B-3)
Front brake pad mounting pin	15	1.5	11.0	☞(Page 4B-2)
Brake hose union bolt	23	2.3	16.5	☞(Page 4B-3)
Brake disc bolt (Front)	18	1.8	13.0	☞(Page 4B-6)

NOTE

The specified tightening torque is described in the following.
“Front Brake Components” (Page 4B-1)

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H14208001

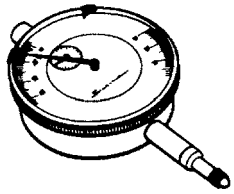
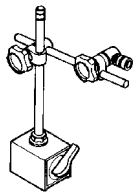
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4B-4) / ☞(Page 4B-4)
Thread lock cement	THREAD LOCK CEMENT SUPER “1360” or equivalent	P/No.: 99000–32130	☞(Page 4B-6)

NOTE

Required service material is also described in the following.
“Front Brake Components” (Page 4B-1)

Special Tool

B947H14208002

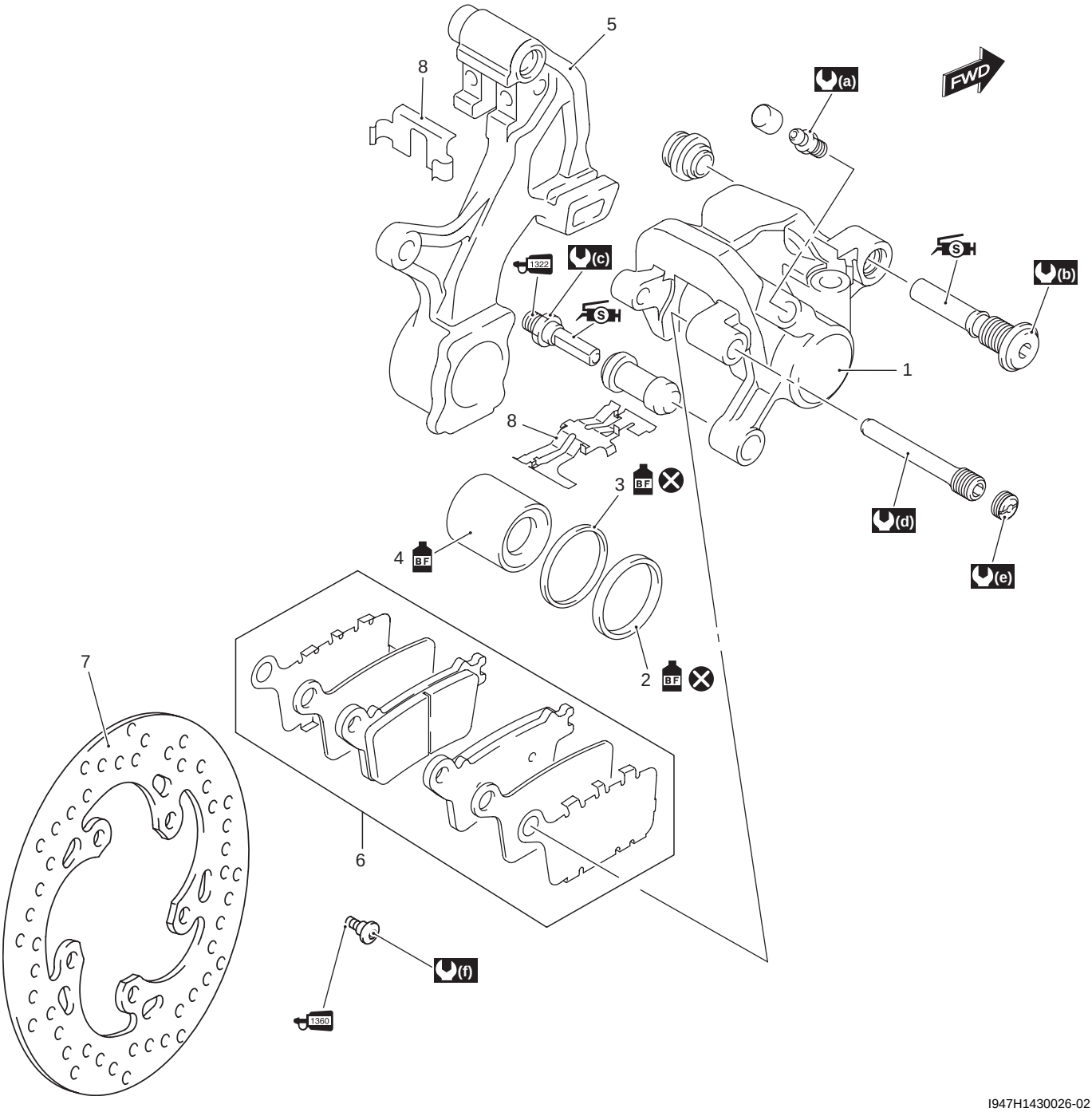
09900–20205 Micrometer (0 – 25 mm) ☞(Page 4B-6) 	09900–20607 Dial gauge ☞(Page 4B-6) 
09900–20701 Dial gauge chuck ☞(Page 4B-6) 	

Rear Brakes

Repair Instructions

Rear Brake Components

B947H14306001



I947H1430026-02

1. Rear brake caliper	8. Brake pad spring	: Apply silicone grease to sliding surface.
2. Piston seal	(a) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)	1322 : Apply thread lock to the thread part.
3. Dust seal	(b) : 27 N·m (2.7 kgf-m, 19.5 lbf-ft)	1360 : Apply thread lock to the thread part.
4. Piston	(c) : 12 N·m (1.2 kgf-m, 8.5 lbf-ft)	BF : Apply brake fluid.
5. Rear caliper bracket	(d) : 17 N·m (1.7 kgf-m, 12.5 lbf-ft)	: Do not reuse.
6. Rear brake pad set	(e) : 2.5 N·m (0.25 kgf-m, 2.0 lbf-ft)	
7. Rear brake disc	(f) : 35 N·m (3.5 kgf-m, 25.5 lbf-ft)	

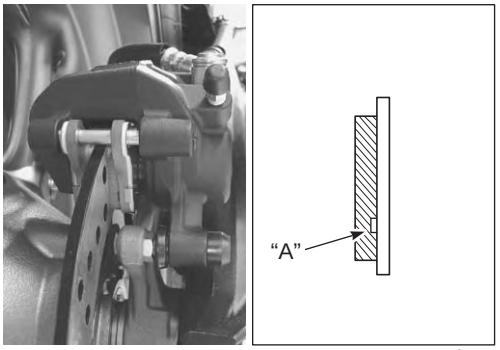
Rear Brake Pad Inspection

B947H14306002

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.

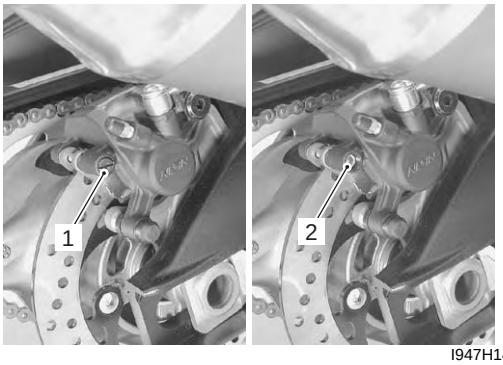


I947H1430027-01

Rear Brake Pad Replacement

B947H14306003

1) Remove the plug (1) and brake pad mounting pin (2).

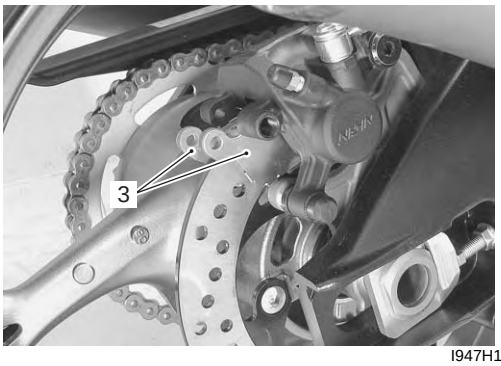


I947H1430001-02

2) Remove the brake pads (3).

⚠ CAUTION

Do not operate the brake pedal while the pads are removed.



I947H1430002-02

3) Clean up the caliper, especially around the caliper piston.

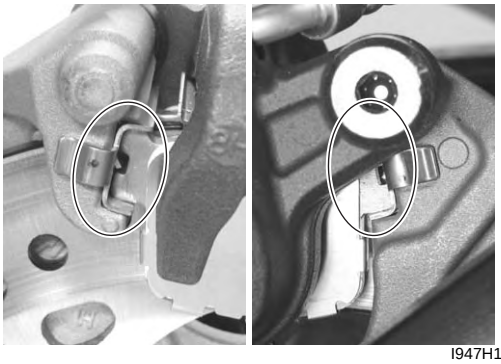
⚠ CAUTION

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

4) Install new brake pads.

NOTE

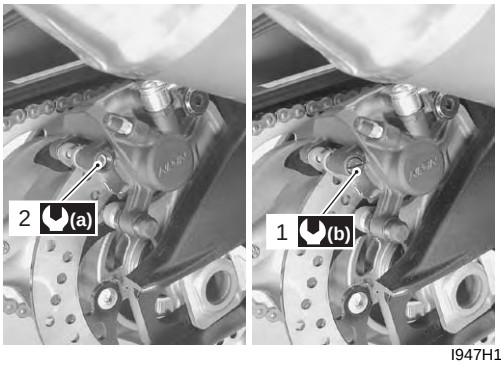
Make sure that the detent of the pads is seated onto the retainers on the caliper bracket.



I947H1430003-01

5) Tighten the brake pad mounting pin (2) and plug (1) to the specified torque.

Tightening torque
Rear brake pad mounting pin (a): 17 N·m (1.7 kgf-m, 12.5 lbf-ft)
Rear brake pad mounting pin plug (b): 2.5 N·m (0.25 kgf-m, 2.0 lbf-ft)



I947H1430005-02

NOTE

After replacing the brake pads, pump the brake pedal several times to check for proper brake operation and then check the brake fluid level.

Rear Brake Caliper Removal and Installation

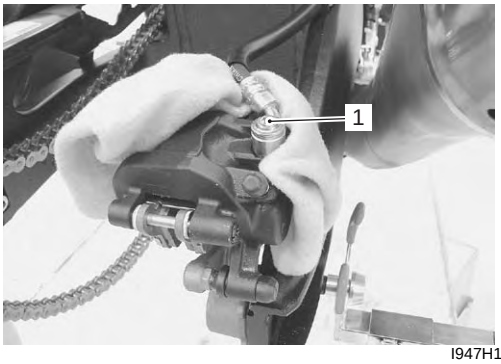
B947H14306004

Removal

1) Remove the rear wheel. Refer to “Rear Wheel Assembly Removal and Installation” in Section 2D (Page 2D-11).
2) Drain brake fluid. Refer to “Brake Fluid Replacement” in Section 4A (Page 4A-6).
3) Remove the brake hose from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.
4) Remove the brake pads. Refer to “Rear Brake Pad Replacement” (Page 4C-2).

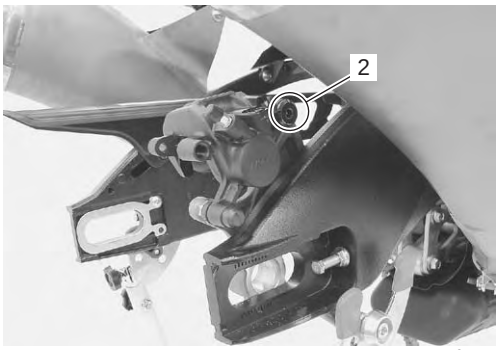
NOTE

Place a rag underneath the union bolt on the brake caliper to catch any spilt brake fluid.



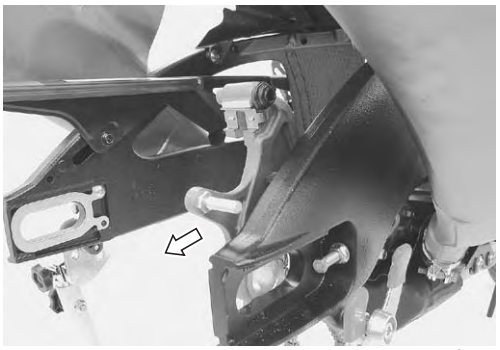
I947H1430006-03

5) Remove the caliper by removing the sliding pin A (2).



I947H1430007-03

6) Remove the caliper bracket (3) from the swingarm.

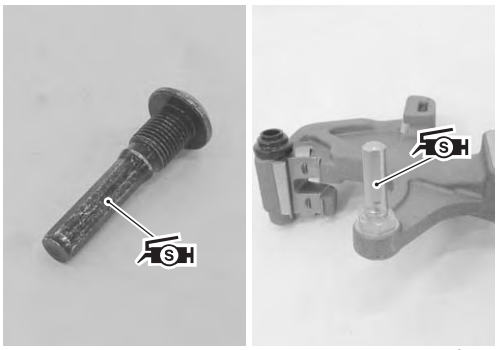

I947H1430008-03

Installation

Install the brake caliper in the reverse order of removal. Pay attention to the following points:

- Apply grease to the sliding pins.

: Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)

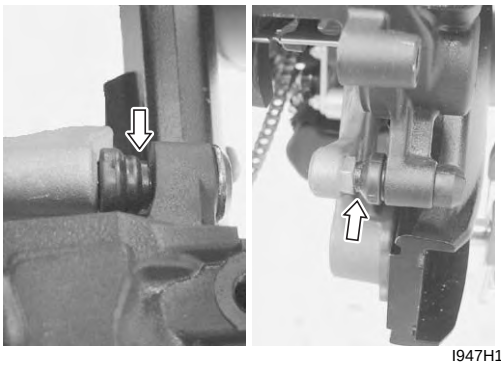

I947H1430009-03

- Tighten the caliper sliding pin A (1) to the specified torque.

  Tightening torque
  Rear brake caliper sliding pin A (a): 27 N·m (2.7 kgf-m, 19.5 lbf-ft)

I947H1430010-04

- Fit each boot end into the sliding pin groove.



I947H1430011-03

- Install the rear wheel. Refer to “Rear Wheel Assembly Removal and Installation” in Section 2D (Page 2D-11).
- Install the brake pads. Refer to “Rear Brake Pad Replacement” (Page 4C-2).
- 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)

I947H1430012-03

- Bleed air from the brake system after installing the caliper. Refer to “Air Bleeding from Brake Fluid Circuit” in Section 4A (Page 4A-4).
- 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.

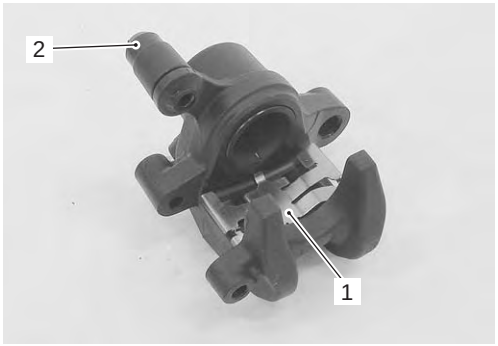
Rear Brake Caliper Disassembly and Assembly

B947H14306005

Refer to “Rear Brake Caliper Removal and Installation” (Page 4C-3).

Disassembly

1) Remove the pad spring (1) and rubber boot (2) from the caliper.

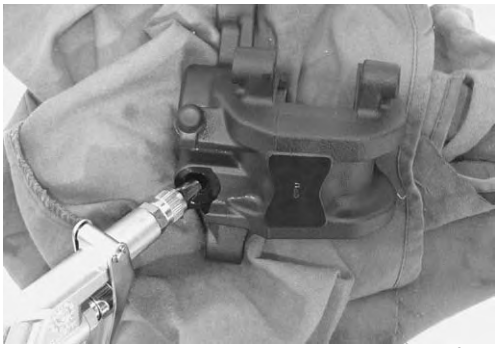


I947H1430013-02

2) Place a rag over the piston to prevent it from popping out and then force out the piston using compressed air.

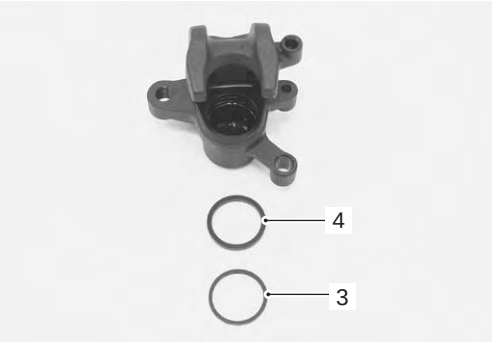
⚠ CAUTION

Do not use high pressure air to prevent piston damage.



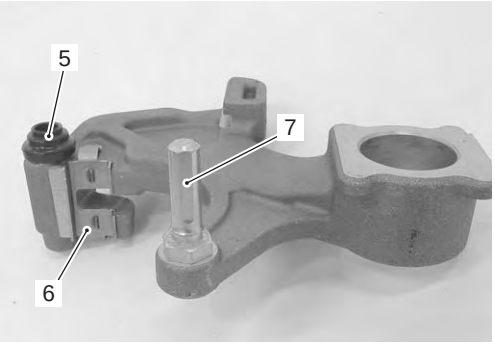
I947H1430014-01

3) Remove the dust seal (3) and piston seal (4).



I947H1430015-02

4) Remove the rubber boot (5), pad spring (6) and sliding pin B (7) from the bracket.



I947H1430028-01

Assembly

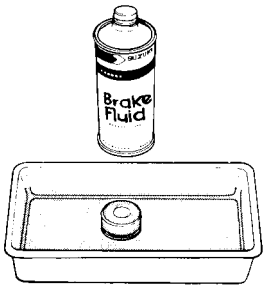
Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

- 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.**
- **Replace the piston seal and dust seal with new ones.**



I649G1430018-02

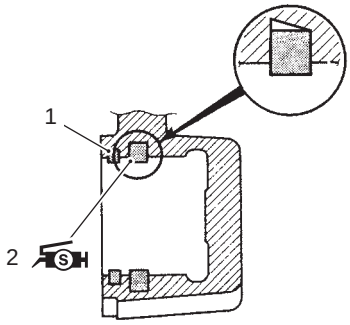
- Apply the brake fluid to dust seal (1).

  BF: Brake fluid (DOT 4)

- Apply grease to the piston seal (2).

  : Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)

- Install the piston seal (2) as shown in the figure.

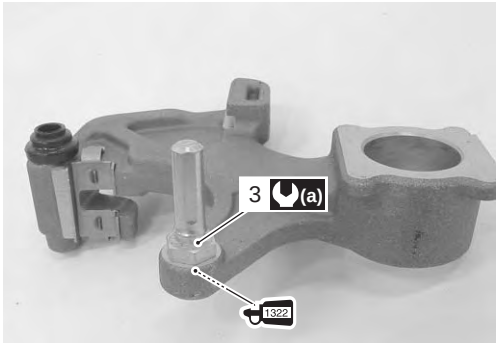


I947H1430016-04

- Apply thread lock to the thread part and install the sliding pin B (3) to the bracket.

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

  Tightening torque
  Rear caliper sliding pin B (a): 12 N·m (1.2 kgf-m, 8.5 lbf-ft)



I947H1430017-02

- Install the rear brake caliper. Refer to “Rear Brake Caliper Removal and Installation” (Page 4C-3).

Rear Brake Caliper Parts Inspection

B947H14306006

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.

I947H1430019-01

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.

I947H1430020-01

Brake Caliper Sliding Pin

Inspect the brake caliper sliding pins for wear and other damage. If any damage is found, replace the sliding pin with a new one.

I947H1430021-01

Boot

Inspect the boots for damage and wear. If any defects are found, replace it with a new one.

I947H1430022-01

Brake Pad Spring

Inspect the brake pad spring for damage and excessive bend. If any defects are found, replace it with a new one.

I947H1430023-01

Rear Brake Disc Removal and Installation

B947H14306007

Removal

1) Remove the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation” in Section 2D (Page 2D-11).
2) Remove the rear brake disc.

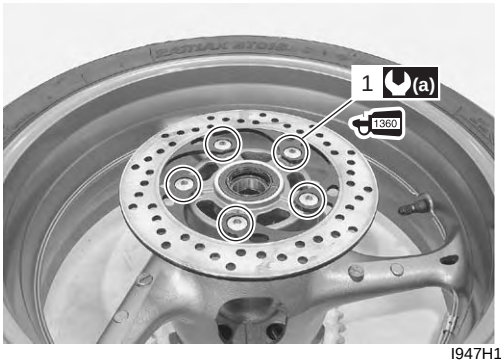
I947H1430024-01

Installation
Install the rear brake disc in the reverse order of removal. Pay attention to the following points:

- Make sure that the brake disc is clean and free of any grease.
- Apply thread lock to the brake disc bolts (1) and tighten them to the specified torque.

1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER “1360” or equivalent)

Tightening torque
Brake disc bolt (Rear) (a): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)



I947H1430025-01

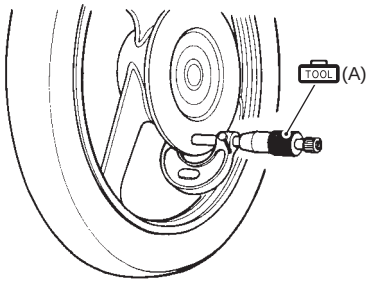
Rear Brake Disc Inspection

B947H14306008

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
TOOL (A): 09900–20205 (Micrometer (0 – 25 mm))

Brake disc thickness
Service limit (Rear): 4.5 mm (0.18 in)



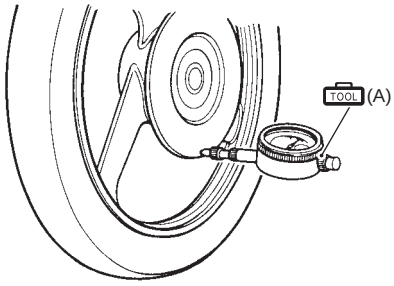
I649G1430027-03

Brake Disc Runout

1) Dismount the rear brake caliper. Refer to “Rear Brake Caliper Removal and Installation” (Page 4C-3).
2) Measure the runout using the dial gauge. Replace the disc if the runout exceeds the service limit.

Special tool
TOOL (A): 09900–20607 (Dial gauge)
TOOL : 09900–20701 (Dial gauge chuck)

Brake disc runout
Service limit: 0.30 mm (0.012 in)



I649G1430028-03

3) Remount the rear brake caliper. Refer to “Rear Brake Caliper Removal and Installation” (Page 4C-3).

Specifications

Service Data

B947H14307001

Brake
Unit: mm (in)

Item	Standard		Limit
Brake disc thickness	Rear	4.8 – 5.2 (0.19 – 0.20)	4.5 (0.18)
Brake disc runout	—		0.30 (0.012)
Brake caliper cylinder bore	Rear	30.230 – 30.280 (1.1902 – 1.1921)	—
Brake caliper piston diam.	Rear	30.148 – 30.198 (1.1869 – 1.1889)	—
Brake fluid type	DOT 4		—

Tightening Torque Specifications

B947H14307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear brake pad mounting pin	17	1.7	12.5	☞(Page 4C-3)
Rear brake pad mounting pin plug	2.5	0.25	2.0	☞(Page 4C-3)
Rear brake caliper sliding pin A	27	2.7	19.5	☞(Page 4C-4)
Brake hose union bolt	23	2.3	16.5	☞(Page 4C-4)
Rear caliper sliding pin B	12	1.2	8.5	☞(Page 4C-5)
Brake disc bolt (Rear)	35	3.5	25.5	☞(Page 4C-7)

NOTE

The specified tightening torque is 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-9).

Special Tools and Equipment

Recommended Service Material

B947H14308001

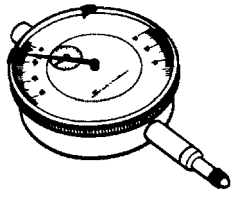
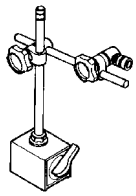
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4C-5) / ☞(Page 4C-5)
Grease	SUZUKI SILICONE GREASE or equivalent	P/No.: 99000–25100	☞(Page 4C-3) / ☞(Page 4C-5)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 4C-5)
	THREAD LOCK CEMENT SUPER “1360” or equivalent	P/No.: 99000–32130	☞(Page 4C-7)

NOTE

Required service material is also described in the following.
“Rear Brake Components” (Page 4C-1)

Special Tool

B947H14308002

09900–20205 Micrometer (0 – 25 mm) ☞(Page 4C-7) 	09900–20607 Dial gauge ☞(Page 4C-7) 
09900–20701 Dial gauge chuck ☞(Page 4C-7) 	

Section 5

Transmission / Transaxle

CONTENTS

Precautions

Precautions

Precautions for Transmission / Transaxle

B947H15000001

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

Manual Transmission

Diagnostic Information and Procedures

Manual Transmission Symptom Diagnosis

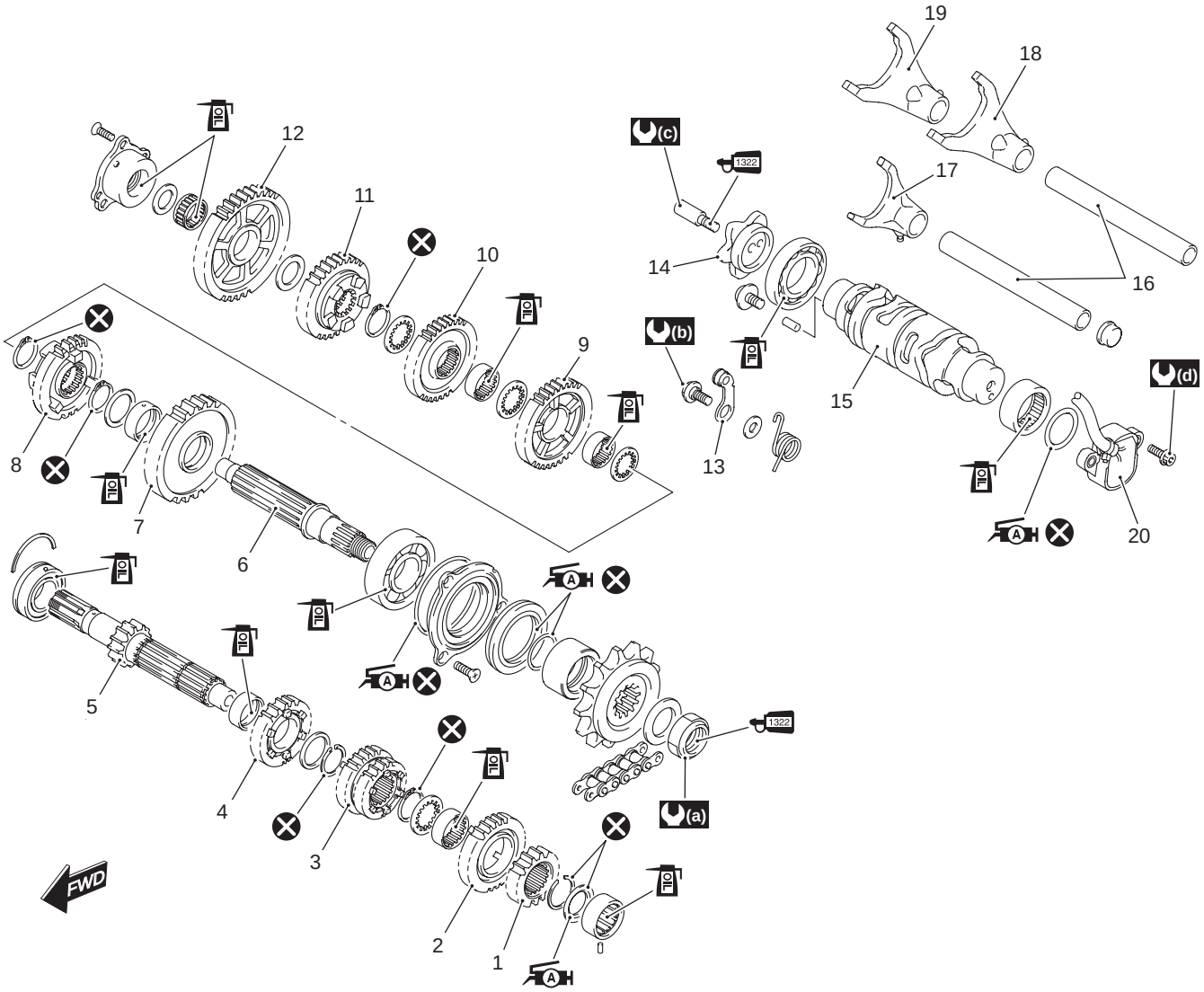
B947H15204001

Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise seems to come from the transmission)	Worn or rubbing gear.	*Replace.*
	Worn countershaft spline.	*Replace countershaft.*
	Worn driveshaft spline.	*Replace driveshaft.*
	Worn or rubbing primary gear.	*Replace.*
	Worn bearing.	*Replace.*
Transmission will not shift	Broken gearshift cam.	*Replace.*
	Distorted gearshift fork.	*Replace.*
	Worn gearshift pawl.	*Replace.*
Transmission will not shift back	Broken return spring on shift shaft.	*Replace.*
	Rubbing or stuck gearshift shaft.	*Repair or replace.*
	Worn or distorted gearshift fork.	*Replace.*
Transmission jumps out of gear	Worn shifting gears on driveshaft or countershaft.	*Replace.*
	Worn or distorted gearshift fork.	*Replace.*
	Weakened gearshift stopper spring.	*Replace.*
	Worn gearshift cam plate.	*Replace.*

Repair Instructions

Transmission Components

B947H15206001



I947H1520072-02

1. 2nd drive gear	11. 5th driven gear	(a) : 145 N·m (14.5 kgf-m, 105.0 lbf-ft)
2. 6th drive gear	12. 1st driven gear	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
3. 3rd/4th drive gear	13. Gearshift cam stopper	(c) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)
4. 5th drive gear	14. Gearshift cam plate	(d) : 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)
5. Countershaft/1st drive gear	15. Gearshift cam	A : Apply grease to the oil seal lip.
6. Driveshaft	16. Gearshift fork shaft	1322 : Apply thread lock to the thread part.
7. 2nd driven gear	17. Gearshift fork (For 3rd/4th drive gear)	OIL : Apply engine oil.
8. 6th driven gear	18. Gearshift fork (For 6th driven gear)	: Do not reuse.
9. 3rd driven gear	19. Gearshift fork (For 5th driven gear)	
10. 4th driven gear	20. GP switch	

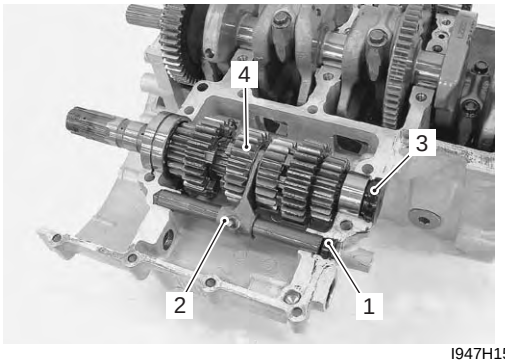
Transmission Removal

B947H15206002

1) Remove the engine assembly from the frame. Refer to “Engine Assembly Removal” in Section 1D (Page 1D-20).
2) Remove the engine top side. Refer to “Engine Top Side Disassembly” in Section 1D (Page 1D-26).
3) Separate the upper and lower crankcases. Refer to “Engine Bottom Side Disassembly” in Section 1D (Page 1D-49).

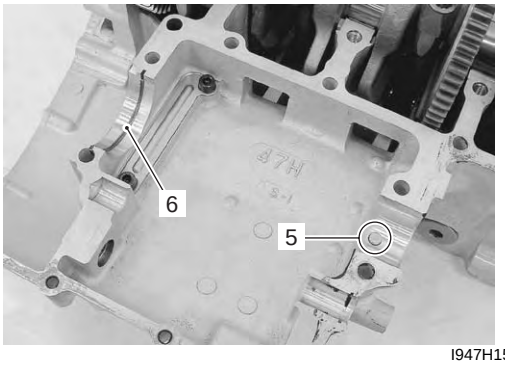
Countershaft Assembly

1) Remove the gearshift shaft plug (1) and gearshift fork/gearshift shaft (2).
2) Remove the clutch push rod oil seal (3) and countershaft assembly (4).



I947H1520023-01

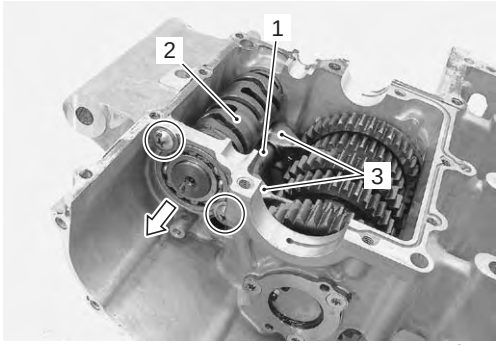
3) Remove the bearing pin (5) and C-ring (6).



I947H1520024-01

Gearshift Fork and Gearshift Cam

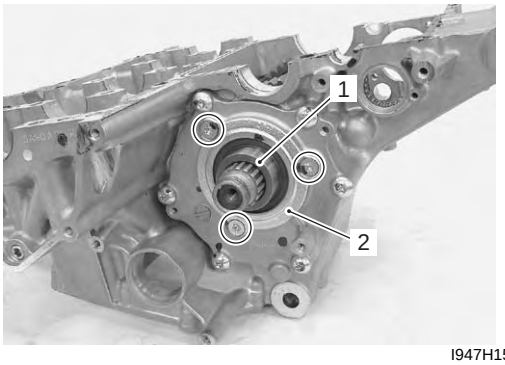
1) Remove the gearshift cam bearing retainer screws.
2) Remove the gearshift fork shaft (1).
3) Remove the gearshift cam (2) along with its bearing.
4) Remove the gearshift forks (3).



I947H1520025-01

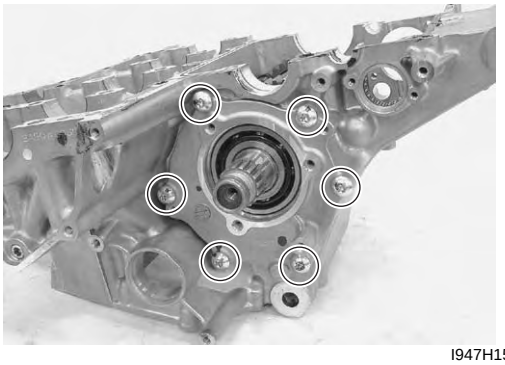
Driveshaft Assembly

1) Remove the spacer (1).
2) Remove the driveshaft oil seal retainer (2).



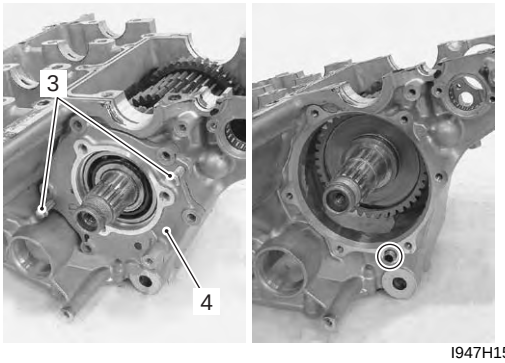
I947H1520026-01

3) Remove the driveshaft left bearing case bolts.



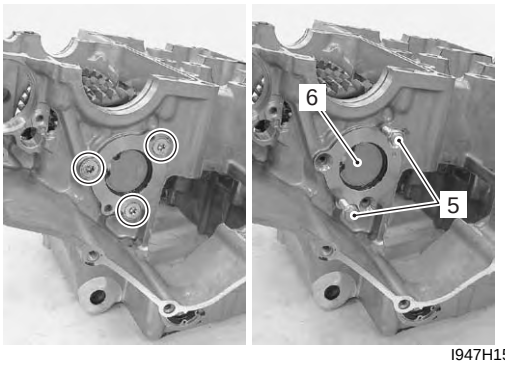
I947H1520027-01

4) Using suitable size bolts (3), remove the driveshaft left bearing case (4).
5) Remove the dowel pin.



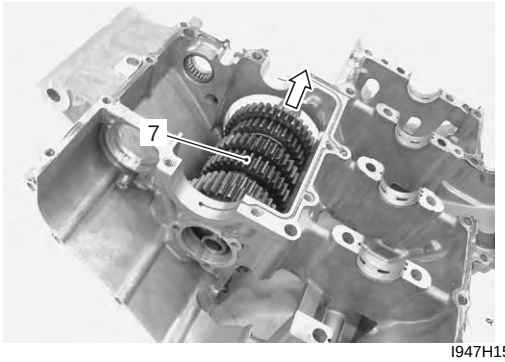
I947H1520028-01

6) Remove the driveshaft right bearing case bolts.
7) Using suitable size bolts (5), remove the driveshaft right bearing assembly (6).



I947H1520029-01

8) Remove the driveshaft assembly (7).



I947H1520030-01

Bearing and Oil Seal

NOTE

If there is no abnormal condition, the oil seal and bearing removal is not necessary.

⚠ CAUTION

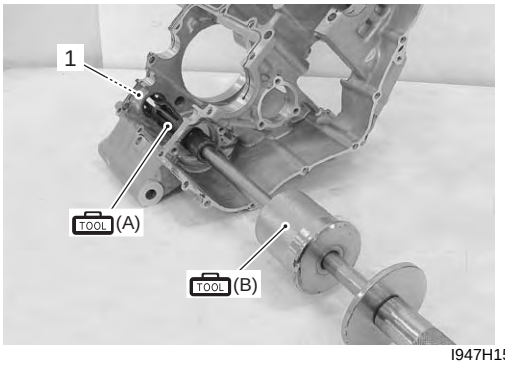
The removed oil seal and bearing must be replaced with a new one.

1) Remove the gearshift cam bearing (1) with the special tools.

⚠ CAUTION

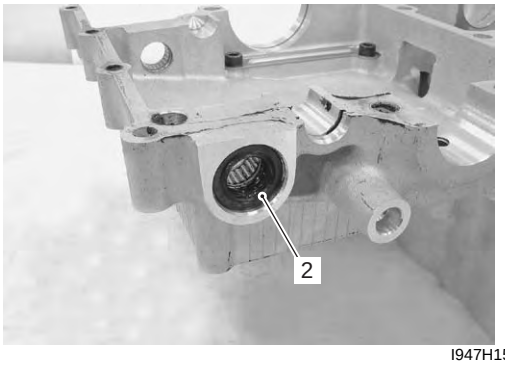
Be careful not to lean the bearing remover.

Special tool
TOOL (A): 09923–74511 (Bearing remover)
TOOL (B): 09930–30104 (Rotor remover sliding shaft)



I947H1520031-02

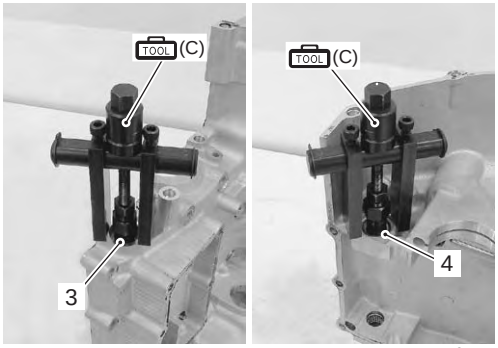
2) Remove the gearshift shaft oil seal (2). (LH only)



I947H1520032-01

3) Remove the gearshift shaft bearings (3) and (4) with the special tool.

Special tool
TOOL (C): 09921–20240 (Bearing remover set)



I947H1520033-01

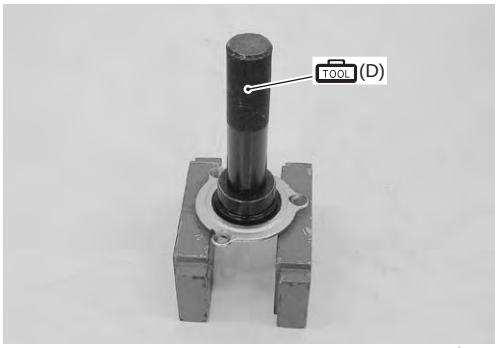
4) Remove the driveshaft left bearing with the special tool.

Special tool
TOOL (D): 09913–70210 (Bearing installing set (10 – 75 Φ))

I947H1520034-01

5) Remove the driveshaft left bearing oil seal from the retainer using the special tool.

Special tool
TOOL (D): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1520035-01

Transmission Installation

B947H15206003

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

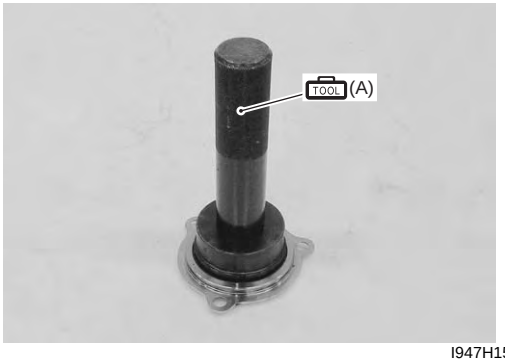
Bearing and Oil Seal

⚠ CAUTION

Replace the removed bearings and oil seals with new ones.

- Install the driveshaft left bearing oil seal into the retainer using the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1520036-01

- Install the driveshaft left bearing with the special tool.

NOTE

The stamped mark side of the driveshaft left bearing faces outside.

Special tool
TOOL (A): 09913–70210 (Bearing installing set (10 – 75 Φ))

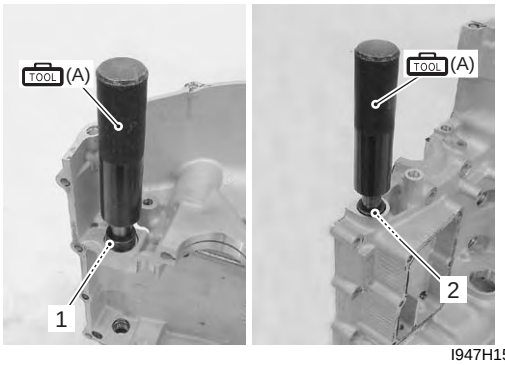
I947H1520037-01

- Install the gearshift shaft bearings (1) and (2) with the special tool.

NOTE

The stamped mark side of the gearshift shaft bearing faces outside.

Special tool
(A): 09913–70210 (Bearing installing set (10 – 75 Φ))



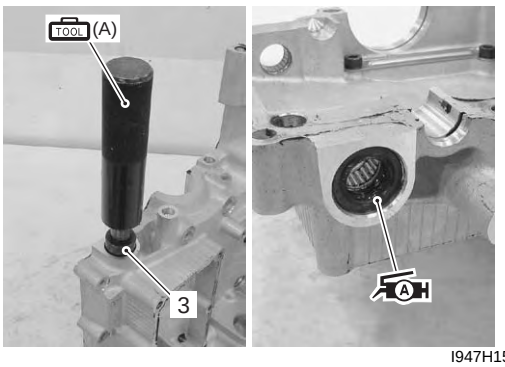
I947H1520038-01

- Install the gearshift shaft oil seal (3) with the special tool.

Special tool
(A): 09913–70210 (Bearing installing set (10 – 75 Φ))

- Apply grease to the oil seal lip.

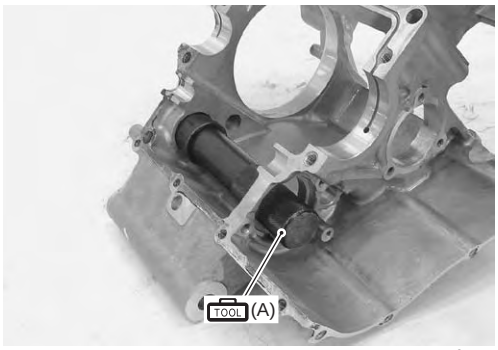
: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



I947H1520039-01

- Install the gearshift cam bearing with the special tool.

Special tool
(A): 09913–70210 (Bearing installing set (10 – 75 Φ))



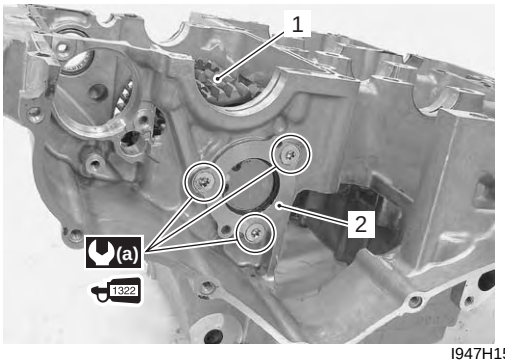
I947H1520040-01

Driveshaft Assembly

- Put the driveshaft assembly (1) into the lower crankcase.
- Install the driveshaft right bearing assembly (2).
- Apply thread lock to the bolts and tighten them to the specified torque.

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

Tightening torque
Driveshaft right bearing case bolt (a): 12 N·m (1.2 kgf-m, 8.7 lbf-ft)



I947H1520041-01

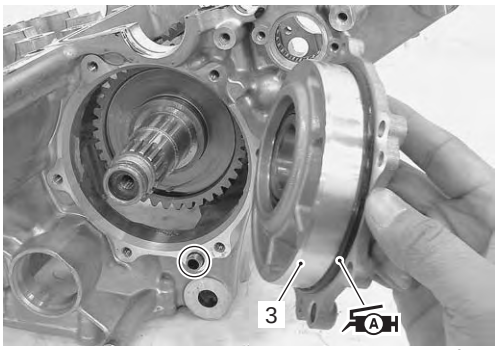
- Install the dowel pin.

- Apply grease to the O-ring and install the driveshaft left bearing case (3).

⚠ CAUTION

Replace the O-ring with a new one.

: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

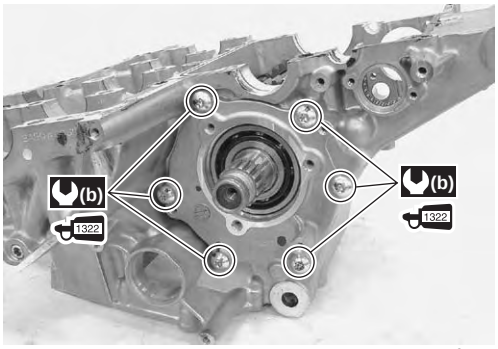


I947H1520042-01

- Apply thread lock to the bolts and tighten them to the specified torque.

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

Tightening torque
Driveshaft left bearing case bolt (b): 12 N·m (1.2 kgf-m, 8.7 lbf-ft)



I947H1520043-01

- Apply grease to the oil seal lip and O-ring.

⚠ CAUTION

Replace the O-ring with a new one.

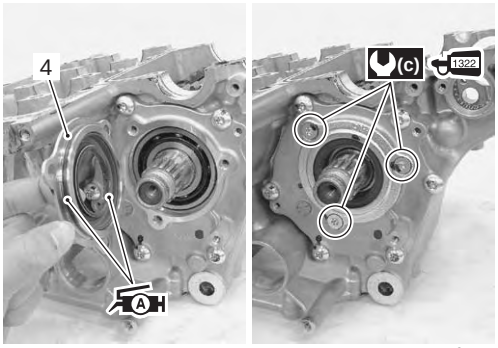
: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

- Install the oil seal retainer (4).

- Apply thread lock to the screws and tighten them to the specified torque.

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

Tightening torque
Driveshaft oil seal retainer screw (c): 12 N·m (1.2 kgf-m, 8.7 lbf-ft)



I947H1520044-01

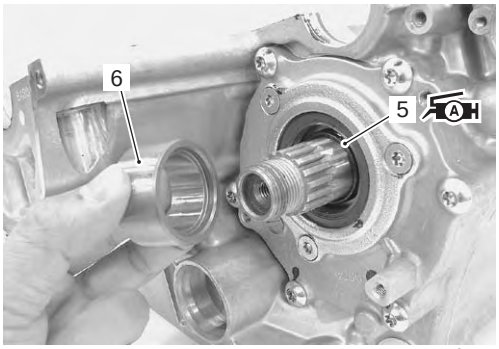
- Apply grease to the O-ring (5) and install it to the driveshaft.

⚠ CAUTION

Replace the O-ring with a new one.

: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

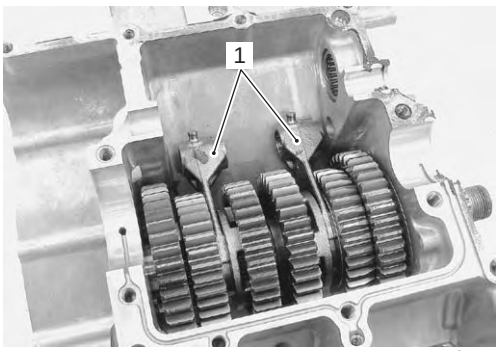
- Install the spacer (6).



I947H1520045-02

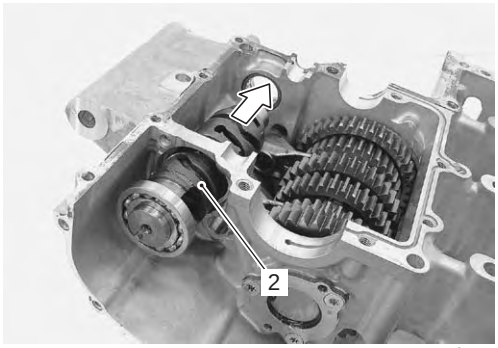
Gearshift Cam and Gearshift Fork

- Install the gearshift forks (1) as shown.



I947H1520046-01

- Install the gearshift cam (2) with the bearing fitted.

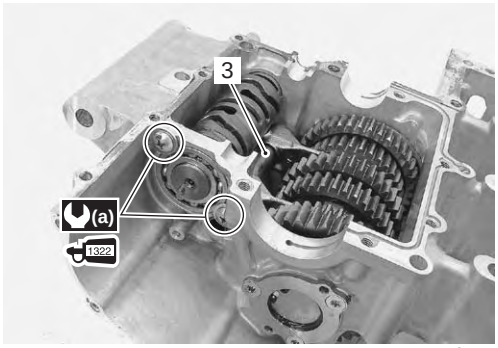


I947H1520047-01

- With engaging each fork end to the cam groove, insert the fork shaft (3).
- 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)

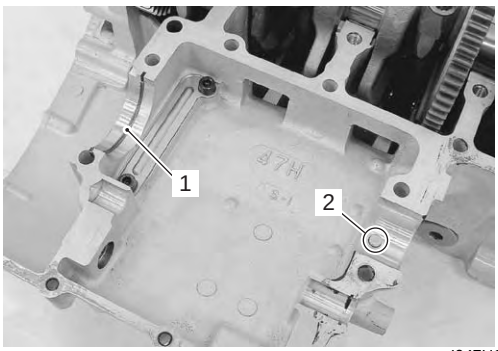
Tightening torque
Gearshift cam bearing retainer screw (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1520048-01

Countershaft

- Install the C-ring (1) and bearing pin (2) to the upper crankcase.

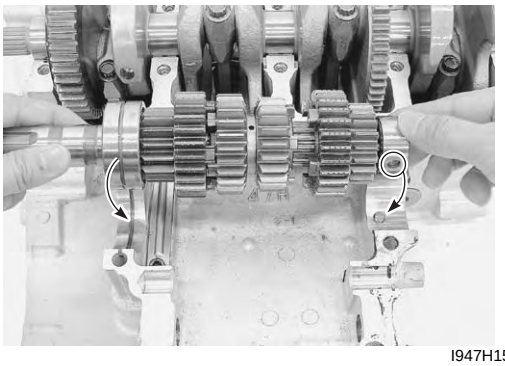


I947H1520049-01

- Install the countershaft assembly to the upper crankcase.

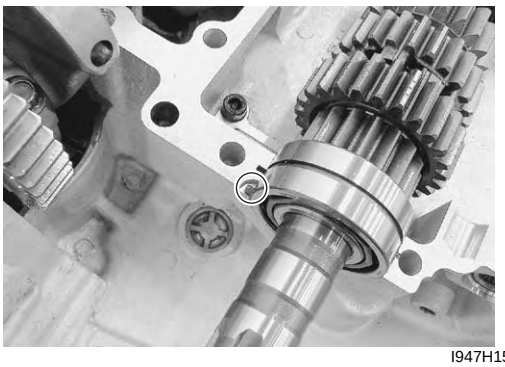
NOTE

Align the C-ring with the groove of bearing and the bearing pin with the indent on the bearing.



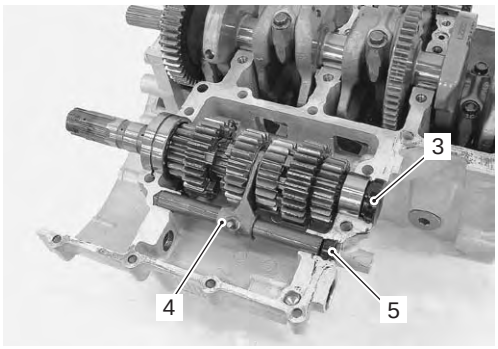
I947H1520050-01

- Turn the bearing and set the bearing dowel pin in position.



I947H1520051-01

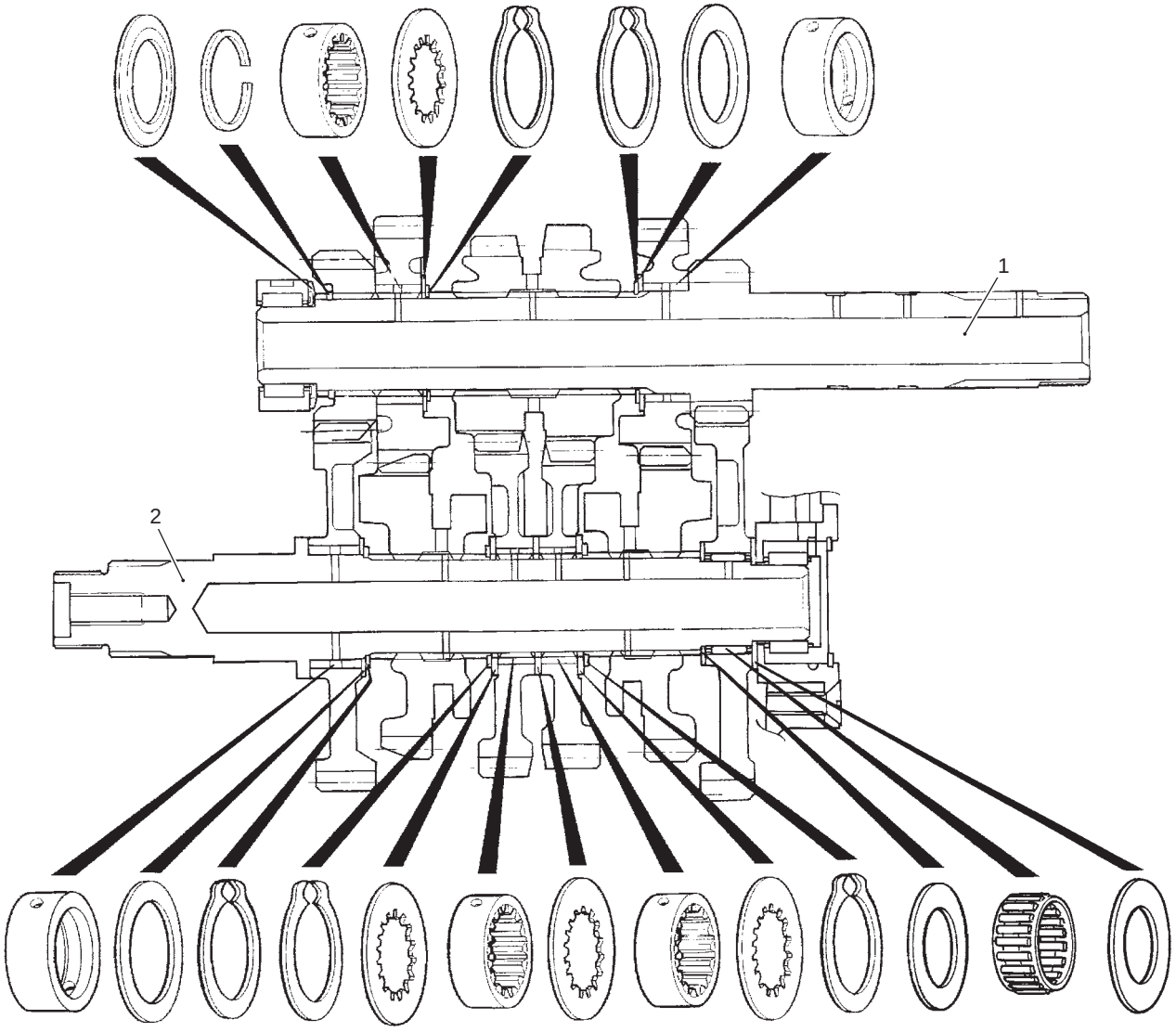
- Install the clutch push rod oil seal (3).
- Install the gearshift fork/gearshift shaft (4) and gearshift shaft plug (5).



I947H1520052-01

Transmission Construction

B947H15206004



I947H1520060-02

1. Countershaft	2. Driveshaft

Countershaft Gear / Driveshaft Gear Disassembly and Assembly

B947H15206005

Refer to “Transmission Removal” (Page 5B-3) 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.

Countershaft

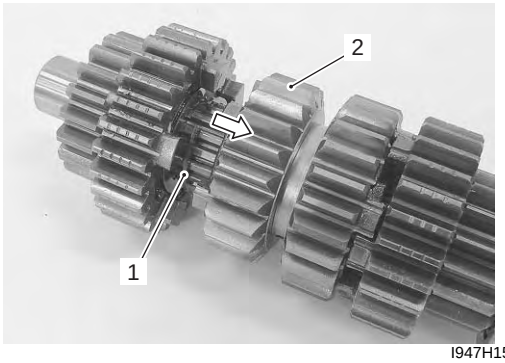
Disassemble the countershaft as shown in the transmission construction. Refer to “Transmission Construction” (Page 5B-9).

Pay attention to the following points:

- Remove the 6th drive gear snap ring (1) from its groove and slide it towards the 3rd/4th drive gears (2).

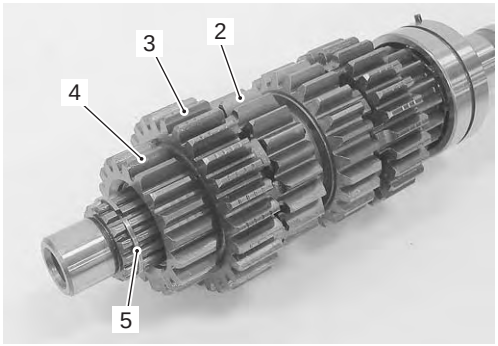
Special tool

TOOL : 09900–06104 (Snap ring remover (Open type))



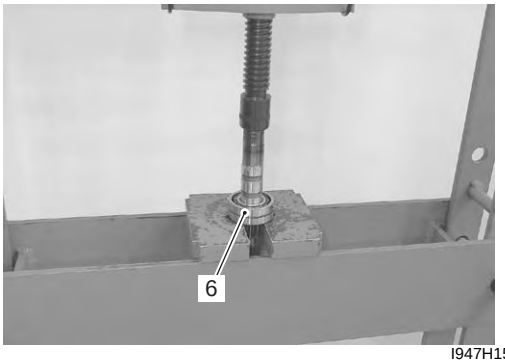
I947H1520061-02

- Slide the 6th (3) and 2nd (4) drive gears toward the 3rd/4th drive gears (2), then remove the 2nd drive gear circlip (5).
- Remove the 2nd drive gear (4) and 6th drive gear (3).



I947H1520062-01

- Remove the countershaft bearing (6) using hydraulic press.



I947H1520063-01

Driveshaft

- Disassembly the driveshaft as shown in the transmission construction. Refer to “Transmission Construction” (Page 5B-9).

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-9).

⚠ CAUTION

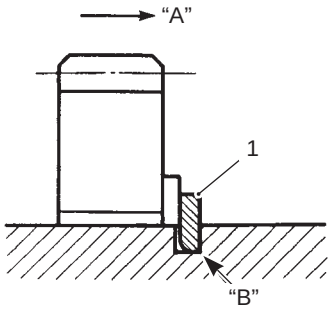
- **Never reuse a snap ring. After a snap ring has been removed from the shaft, it should be discarded and a new snap ring must be installed.**
- **When installing a new snap ring, do not expand the end gap larger than required to slip the snap ring over the shaft.**
- **After installing a snap ring, make sure that it is completely seated in the groove and securely fitted.**

NOTE

- **Rotate the bearing by hand to inspect if there is any abnormal noise and for 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.**

: 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 figure.

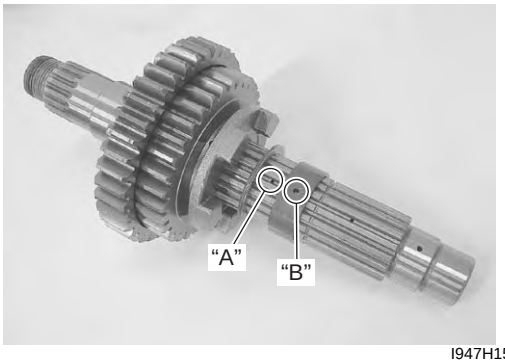


I649G1520049-02

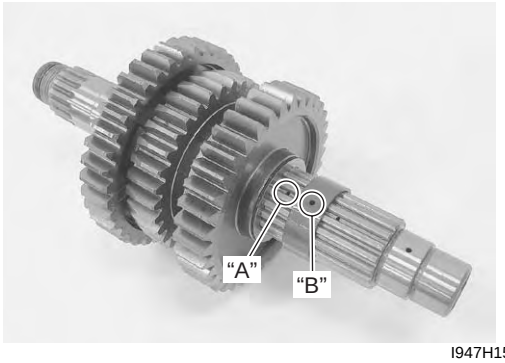
"A": Thrust	"B": Sharp edge

Driveshaft

- When installing the gear bushings onto the driveshaft, align the shaft oil holes "A" with the bushing oil hole "B".



I947H1520064-01

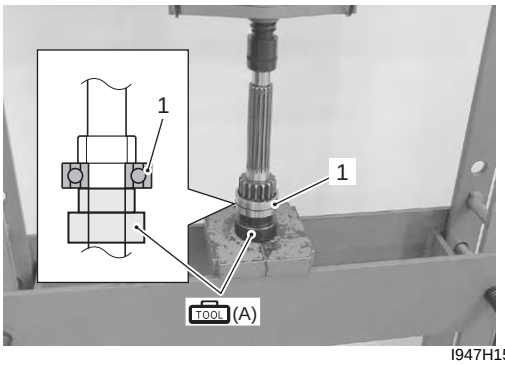


I947H1520065-01

Countershaft

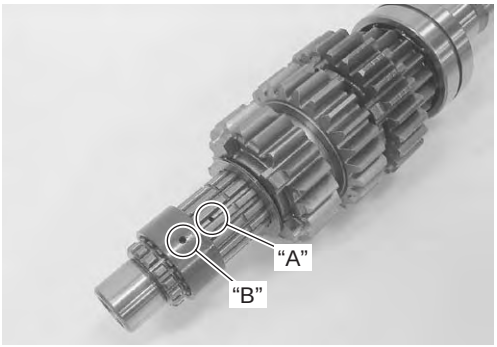
- Install the countershaft bearing (1) using a hydraulic press and special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1520066-02

- When installing the gear bushing onto the countershaft, align the shaft oil hole “A” with the bushing oil hole “B”.



I947H1520067-01

Transmission Related Parts Inspection

B947H15206006

Refer to “Transmission Removal” (Page 5B-3), “Transmission Installation” (Page 5B-5) and “Countershaft Gear / Driveshaft Gear Disassembly and Assembly” (Page 5B-10).

Gearshift Fork to Groove Clearance

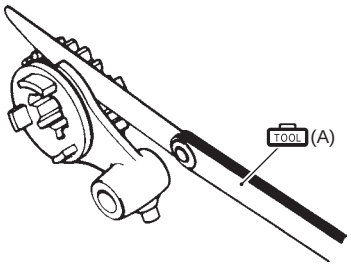
NOTE

The clearance for each gearshift fork plays an important role in the smoothness and positiveness of the shifting action.

Using the 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
TOOL (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)



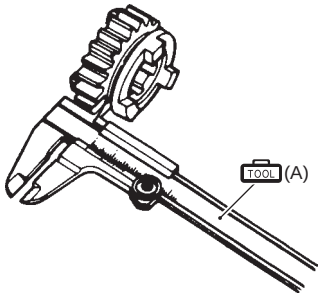
I649G1520056-03

Gearshift Fork Groove Width

Measure the gearshift fork groove width using the vernier calipers.

Special tool
TOOL (A): 09900–20102 (Vernier calipers (200 mm))

Gearshift fork groove width
Standard: 5.0 – 5.1 mm (0.197 – 0.201 in)



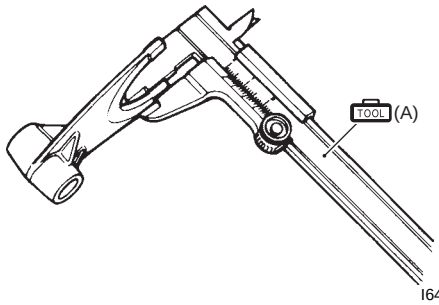
I649G1520057-03

Gearshift Fork Thickness

Measure the gearshift fork thickness using the vernier calipers.

Special tool
TOOL (A): 09900–20102 (Vernier calipers (200 mm))

Gearshift fork thickness
Standard: 4.8 – 4.9 mm (0.189 – 0.193 in)



I649G1520058-03

Gearshift Cam
Inspect the gearshift cam groove for abnormal wear and damage. If any defects are found, replace the gearshift cam with a new one.

I947H1520053-01

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-3) and “Transmission Installation” (Page 5B-5).

I947H1520054-01

Driveshaft Bearing
Inspect the driveshaft left bearing for abnormal noise and smooth rotation while it is in the case.
Replace the bearing if there is anything unusual. Refer to “Transmission Removal” (Page 5B-3) and “Transmission Installation” (Page 5B-5).

I947H1520056-01

Inspect the driveshaft right bearing for abnormal noise and smooth rotation.
If there is anything unusual, replace the bearing assembly. Refer to “Transmission Removal” (Page 5B-3) and “Transmission Installation” (Page 5B-5).

I837H1520041-01

Driveshaft Oil Seal
Inspect the driveshaft left bearing dust seal for wear and damage.
Replace the dust seal if there is anything unusual. Refer to “Transmission Removal” (Page 5B-3) and “Transmission Installation” (Page 5B-5).

I947H1520057-01

Gear Position (GP) Switch Inspection

B947H15206007

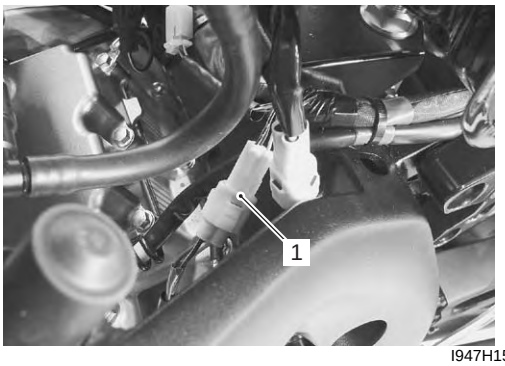
Refer to “Side-stand / Ignition Interlock System Parts Inspection” in Section 1I (Page 1I-7).

Gear Position (GP) Switch Removal and Installation

B947H15206008

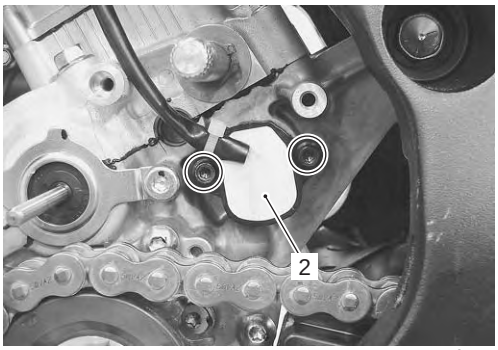
Removal

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) Disconnect the gear position switch lead wire coupler (1).



I947H1520068-01

4) Remove the engine sprocket cover. Refer to “Engine Sprocket Removal and Installation” in Section 3A (Page 3A-2).
5) Remove the GP switch (2).



I947H1520069-01

Installation

Install the gear position switch in the reverse order of removal. Pay attention to the following points:

- Apply grease to the O-ring.

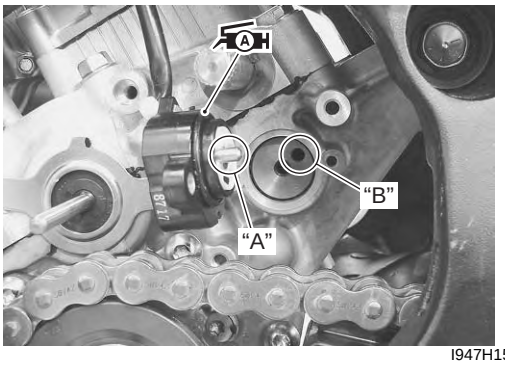
⚠ CAUTION

Replace the O-ring with a new one.

NOTE

Align the gear position switch pin “A” with the gearshift cam hole “B”.

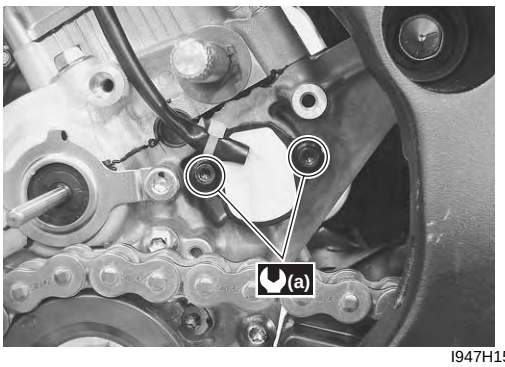
: Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



I947H1520070-01

- Tighten the gear position switch mounting bolts to the specified torque.

Tightening torque
Gear position switch mounting bolt (a): 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)

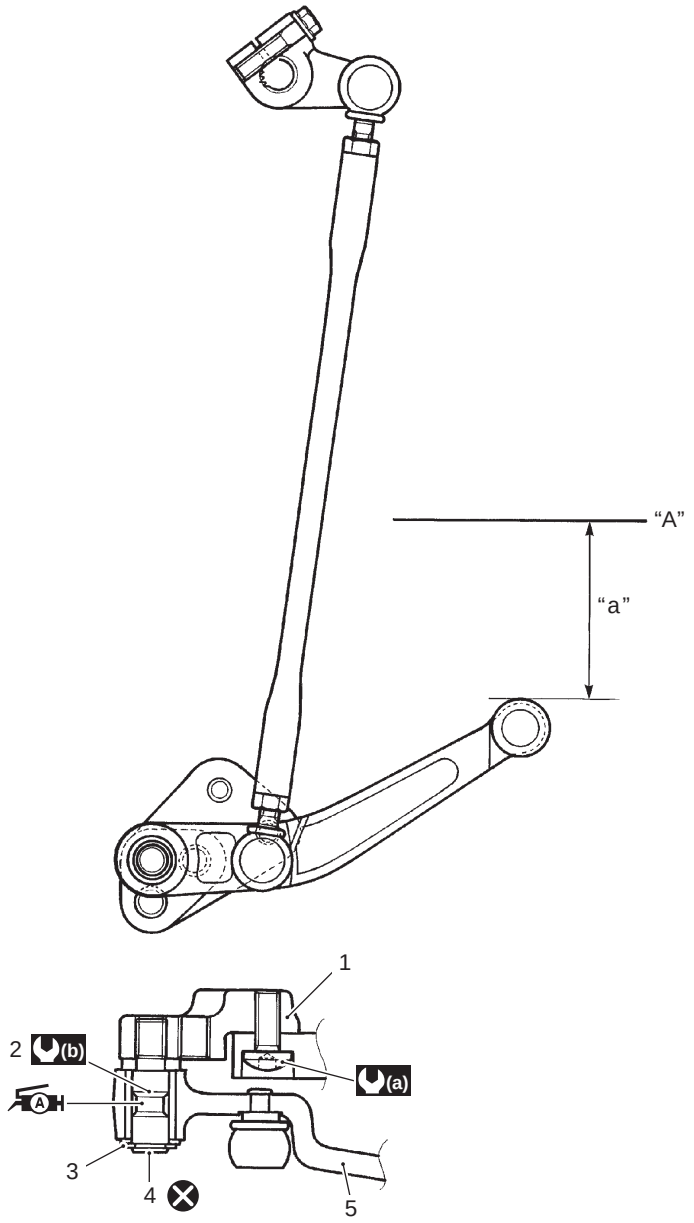


I947H1520071-01

- Route the gear position switch lead wire. Refer to “Wiring Harness Routing Diagram” in Section 9A (Page 9A-7).

Gearshift Lever Construction

B947H15206009



I947H1520058-02

1. Gearshift lever bracket	4. Snap ring	"a": 65 – 75 mm (2.6 – 3.0 in)	A : Apply grease.
2. Gearshift lever shaft	5. Gearshift lever	(a) : 28 N·m (2.8 kgf-m, 20.0 lbf-ft)	⊗ : Do not reuse.
3. Washer	"A": Footrest top surface	(b) : 40 N·m (4.0 kgf-m, 29.0 lbf-ft)	

Gearshift Lever Removal and Installation

B947H15206010

Removal

Remove the gearshift lever as shown in the gearshift lever construction. Refer to "Gearshift Lever Construction" (Page 5B-15).

Installation

1) Install the gearshift lever as shown in the gearshift lever construction. Refer to "Gearshift Lever Construction" (Page 5B-15).
2) After installing the gearshift lever, check the gearshift lever height. Refer to "Gearshift Lever Height Inspection and Adjustment" (Page 5B-16).

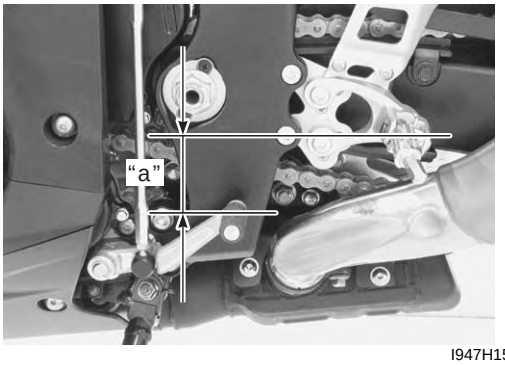
Gearshift Lever Height Inspection and Adjustment

B947H15206011

Inspect and adjust the gearshift lever height in the following procedures:

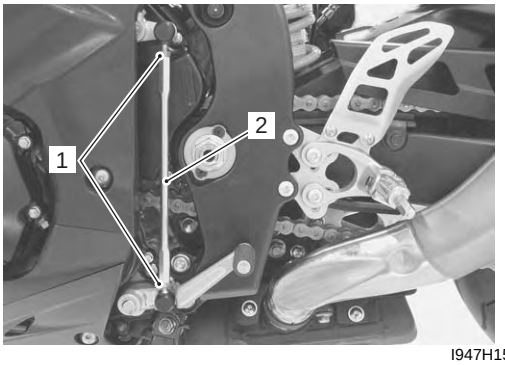
1) Inspect the gearshift lever height “a” between the lever top and footrest.
   Adjust the gearshift lever height if necessary.

   Gearshift lever height “a”
   Standard: 65 – 75 mm (2.6 – 3.0 in)



I947H1520001-01

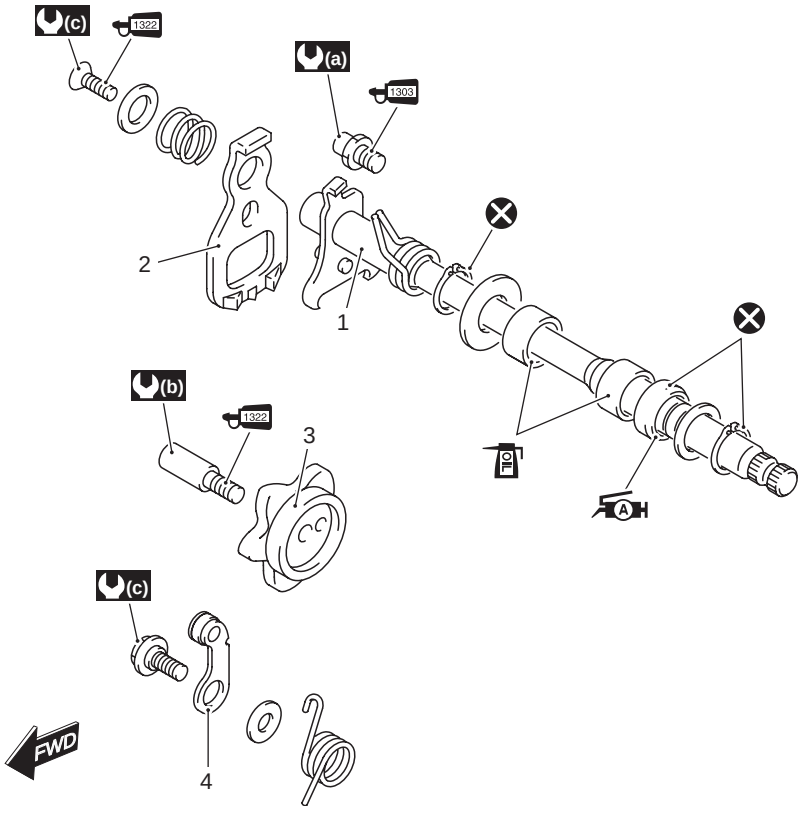
2) Loosen the lock-nuts (1).
3) Turn the gearshift link rod (2) until the gearshift lever is 65 – 75 mm (2.6 – 3.0 in) below the top of the footrest.
4) Tighten the lock-nuts securely.



I947H1520002-01

Gearshift Shaft / Gearshift Cam Plate Components

B947H15206012

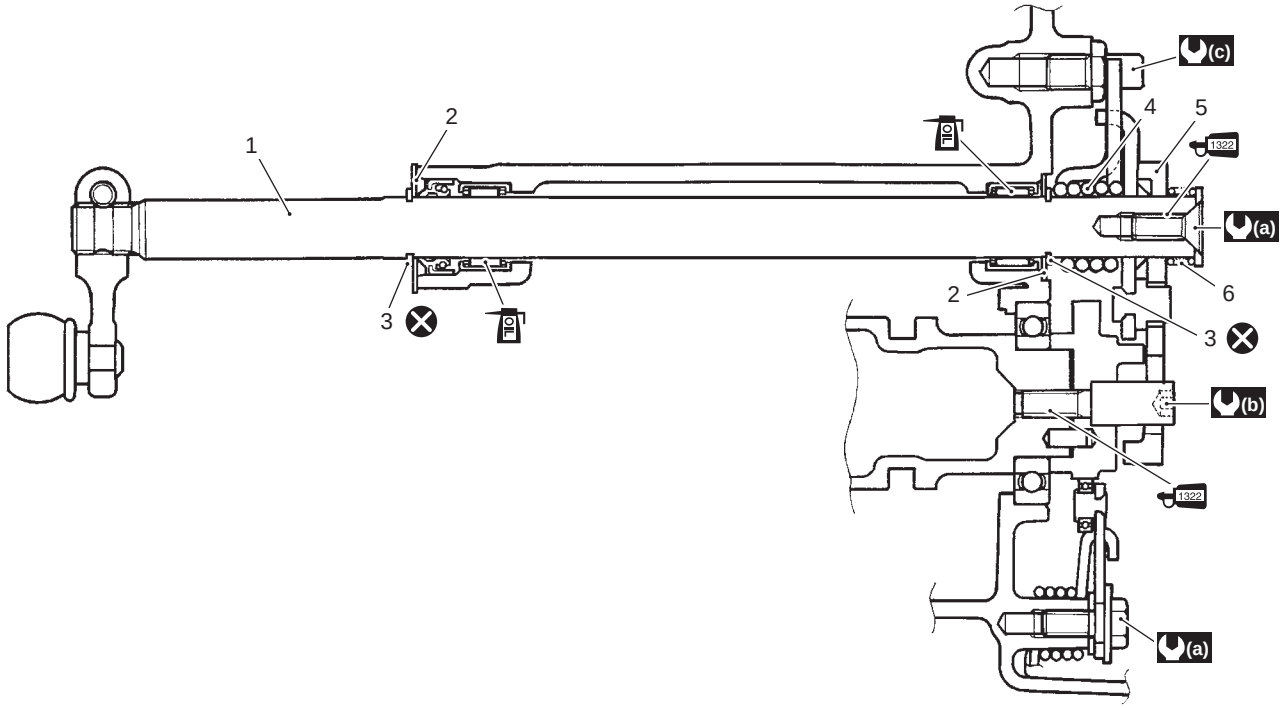


I947H1520073-01

1. Gearshift shaft	(a) : 19 N·m (1.9 kgf-m, 13.5 lbf-ft)	1303 : Apply thread lock to the thread part.
2. Gearshift cam drive plate	(b) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)	1322 : Apply thread lock to the thread part.
3. Gearshift cam plate	(c) : 8.5 N·m (0.85 kgf-m, 6.0 lbf-ft)	: Apply engine oil to bearing.
4. Gearshift cam stopper	: Apply grease to oil seal lip.	: Do not reuse.

Gearshift Shaft Construction

B947H15206013



I947H1520059-03

1. Gearshift shaft	6. Gearshift plate return spring	1303 : Apply thread lock to the thread part.
2. Washer	(a) : 8.5 N·m (0.85 kgf-m, 6.0 lbf-ft)	1322 : Apply thread lock to the thread part.
3. Snap ring	(b) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)	: Apply engine oil to bearing.
4. Gearshift shaft return spring	(c) : 19 N·m (1.9 kgf-m, 13.5 lbf-ft)	: Do not reuse.
5. Gearshift cam drive plate	: Apply grease.	

Gearshift Shaft / Gearshift Cam Plate Removal and Installation

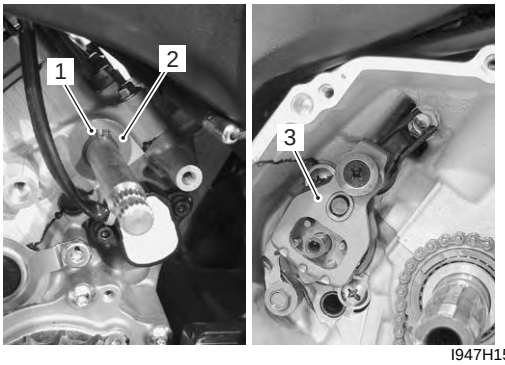
B947H15206014

Removal

1) Remove the engine sprocket cover. Refer to “Engine Sprocket Removal and Installation” in Section 3A (Page 3A-2).
2) Remove the clutch components. Refer to “Clutch Removal” in Section 5C (Page 5C-5).
3) Remove the snap ring (1) and washer (2) from the gearshift shaft.

Special tool
TOOL : 09900–06107 (Snap ring remover (Open type))

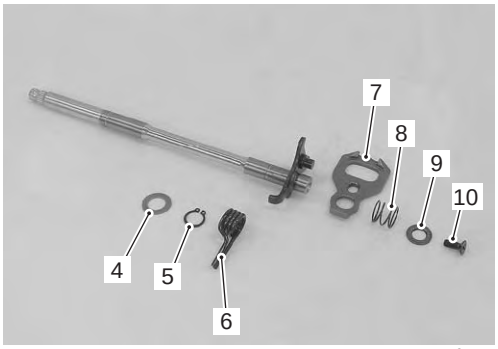
4) Remove the gearshift shaft assembly (3).



I947H1520003-01

5) Remove the following parts from the gearshift shaft.

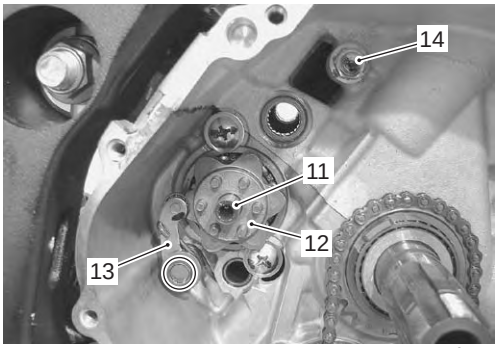
Special tool
TOOL : 09900–06107 (Snap ring remover (Open type))



I947H1520004-01

4.	Washer
5.	Snap ring
6.	Gearshift shaft return spring
7.	Gearshift cam drive plate
8.	Gearshift plate return spring
9.	Washer
10.	Gearshift shaft end screw

6) Remove the gearshift cam plate bolt (11) and gearshift cam plate (12).
7) Remove the gearshift cam stopper (13).
8) Remove the gearshift arm stopper (14).



I947H1520005-02

Installation
Install the gearshift shaft and gearshift cam plate in the reverse order of removal. Pay attention to the following points:

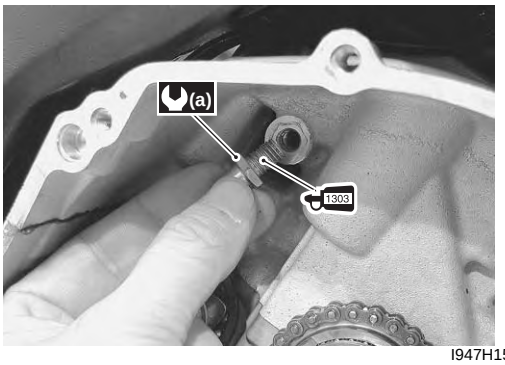
⚠ CAUTION

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.

1303 : 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)



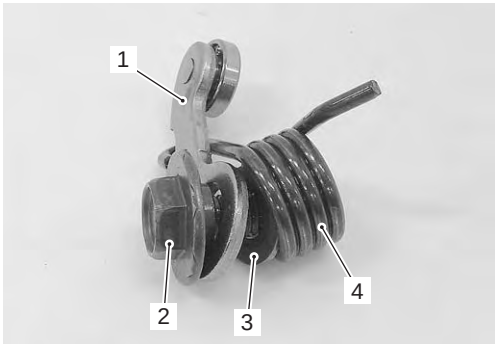
I947H1520006-02

- Assemble the gearshift cam stopper (1), bolt (2), washer (3) and return spring (4).
- Tighten the gearshift cam stopper bolt (2) to the specified torque.

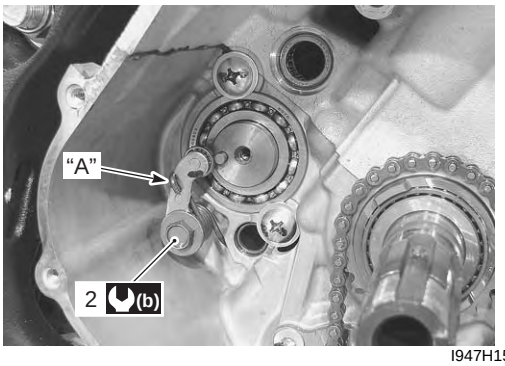
NOTE

Hook the return spring end “A” to the stopper.

Tightening torque
Gearshift cam stopper bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1520007-01

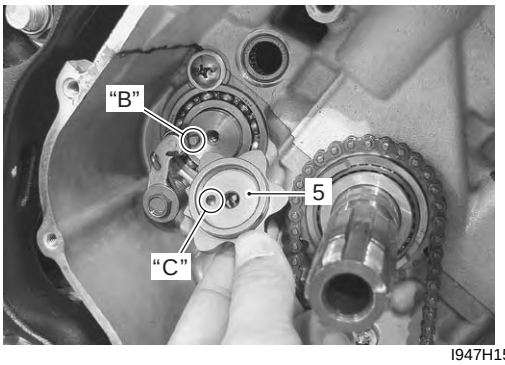


I947H1520008-01

- Check the gearshift cam stopper moves smoothly.
- Locate the gearshift cam in the neutral position.
- Install the gearshift cam plate (5).

NOTE

Align the gearshift cam pin “B” with the gearshift cam plate hole “C”.

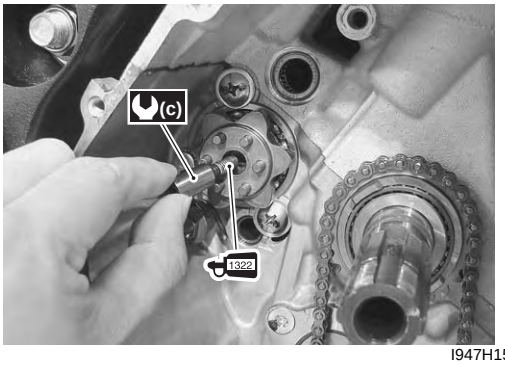


I947H1520009-01

- Apply a small quantity of thread lock to the gearshift cam 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 plate bolt (c): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)

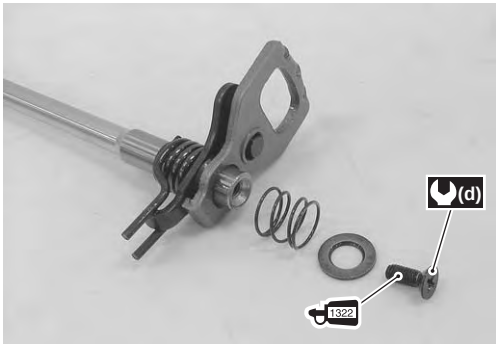


I947H1520010-01

- Apply a small quantity of thread lock to the gearshift shaft end screw and tighten it to the specified torque.

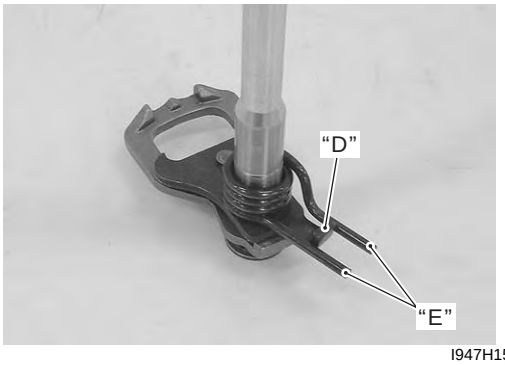
1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER “1322” or equivalent)

Tightening torque
Gearshift shaft end screw (d): 8.5 N·m (0.85 kgf-m, 6.0 lbf-ft)



I947H1520011-01

- When installing the gearshift shaft return spring, position the stopper “D” of gearshift arm between the shaft return spring ends “E”.

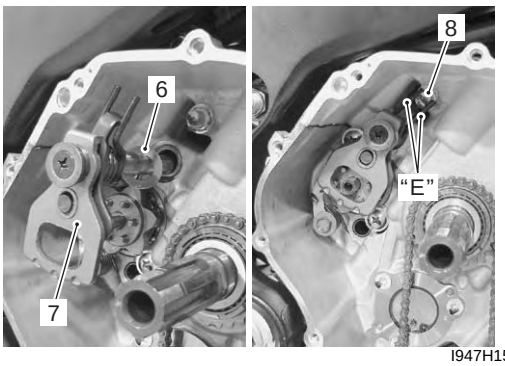


I947H1520012-01

- Install the washer (6) and gearshift shaft assembly (7).

NOTE

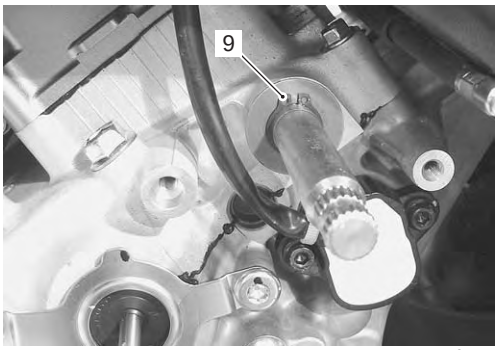
Pinch the gearshift arm stopper (8) with return spring ends “E”.



I947H1520013-01

- Install a new snap ring (9).

  Special tool
  TOOL : 09900–06107 (Snap ring remover (Open type))



I947H1520014-01

- After installing the gearshift lever, check the gearshift lever height. Refer to “Gearshift Lever Height Inspection and Adjustment” (Page 5B-16).

Gearshift Linkage Inspection

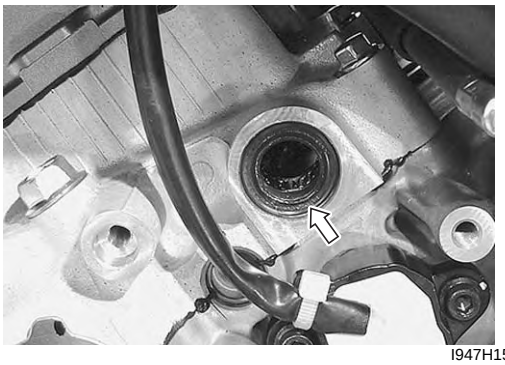
B947H15206015

Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation” (Page 5B-17).

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).

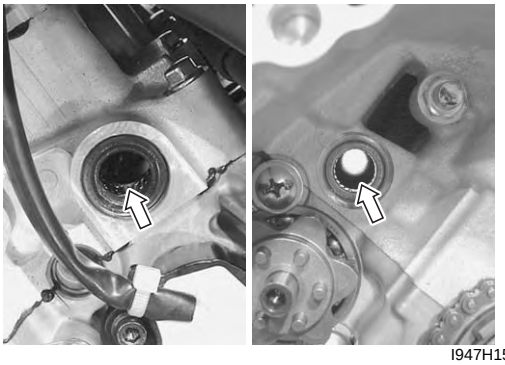
I947H1520015-01

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.



I947H1520016-02

Gearshift Shaft Bearing
Inspect the gearshift shaft bearings for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



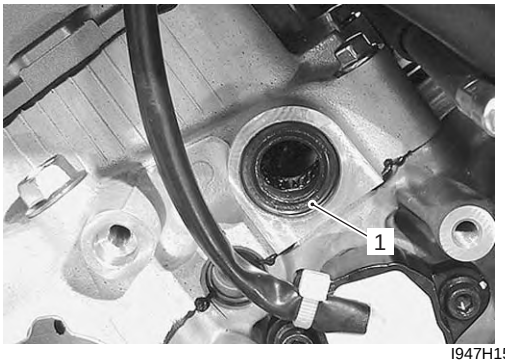
I947H1520017-01

Gearshift Shaft Oil Seal / Bearing Removal and Installation

B947H15206016

Removal

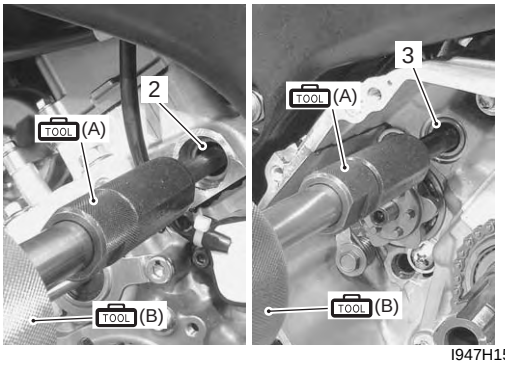
1) Remove the gearshift shaft. Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation” (Page 5B-17).
2) Remove the gearshift shaft oil seal (1).



I947H1520018-01

3) Remove the bearings (2) and (3) with the special tools.

   Special tool
   TOOL (A): 09921–20210 (Bearing remover (12 mm))
   TOOL (B): 09930–30104 (Rotor remover sliding shaft)



I947H1520019-01

Installation
Install the oil seal and bearing in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

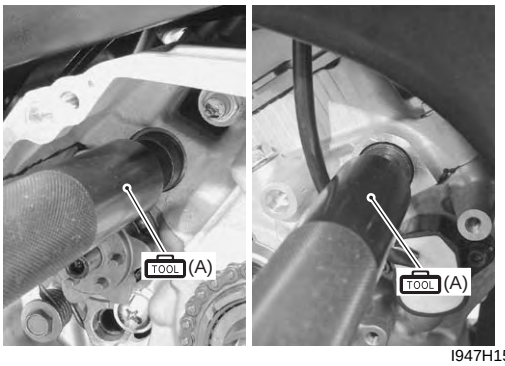
The removed oil seal and bearings must be replaced with new ones.

- Install the bearings with the special tool.

NOTE

The stamped mark side of gearshift shaft bearing faces outside.

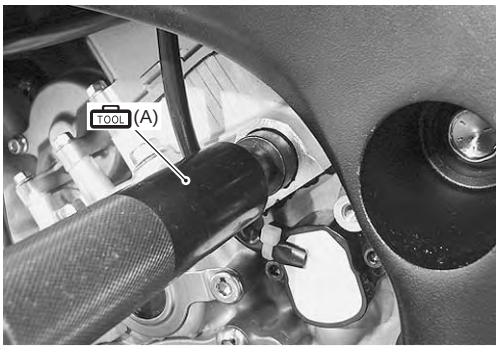
Special tool
(A): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1520020-01

- Install the oil seal with the special tool.

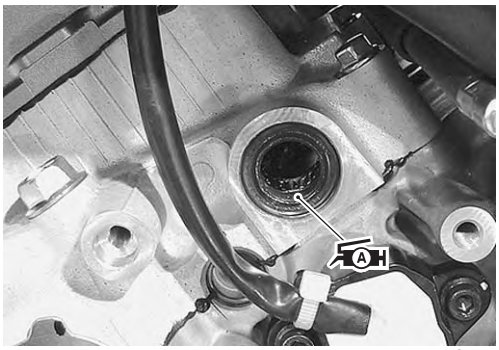
Special tool
(A): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1520021-01

- Apply grease to the oil seal lip.

: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



I947H1520022-01

Specifications

Service Data

B947H15207001

Drive Train
Unit: mm (in) Except ratio

Item		Standard	Limit
Primary reduction ratio		1.617 (76/47)	—
Final reduction ratio		2.470 (42/17)	—
Gear ratios	Low	2.562 (41/16)	—
	2nd	2.052 (39/19)	—
	3rd	1.714 (36/21)	—
	4th	1.500 (36/24)	—
	5th	1.360 (34/25)	—
	Top	1.269 (33/26)	—
Gearshift fork to groove clearance		0.1 – 0.3 (0.004 – 0.012)	0.5 (0.02)
Gearshift fork groove width		5.0 – 5.1 (0.197 – 0.201)	—
Gearshift fork thickness		4.8 – 4.9 (0.189 – 0.193)	—
Gearshift lever height		65 – 75 (2.6 – 3.0)	—

Tightening Torque Specifications

B947H15207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Driveshaft right bearing case bolt	12	1.2	8.7	☞(Page 5B-6)
Driveshaft left bearing case bolt	12	1.2	8.7	☞(Page 5B-7)
Driveshaft oil seal retainer screw	12	1.2	8.7	☞(Page 5B-7)
Gearshift cam bearing retainer screw	10	1.0	7.0	☞(Page 5B-8)
Gear position switch mounting bolt	6.5	0.65	4.5	☞(Page 5B-14)
Gearshift arm stopper	19	1.9	13.5	☞(Page 5B-18)
Gearshift cam stopper bolt	10	1.0	7.0	☞(Page 5B-18)
Gearshift cam plate bolt	13	1.3	9.5	☞(Page 5B-19)
Gearshift shaft end screw	8.5	0.85	6.0	☞(Page 5B-19)

NOTE

The specified tightening torque is described in the following.
“Transmission Components” (Page 5B-2)
“Gearshift Lever Construction” (Page 5B-15)
“Gearshift Shaft / Gearshift Cam Plate Components” (Page 5B-16)
“Gearshift Shaft Construction” (Page 5B-17)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H15208001

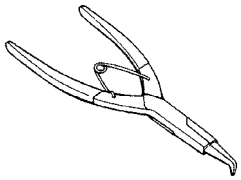
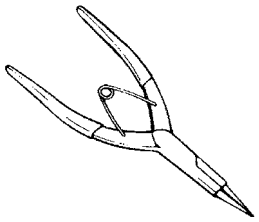
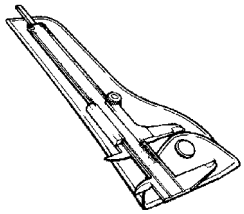
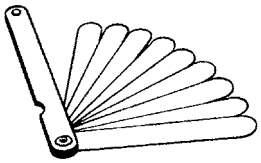
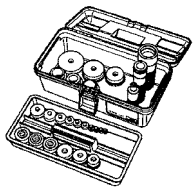
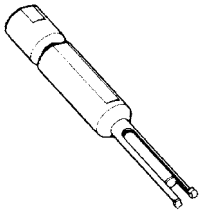
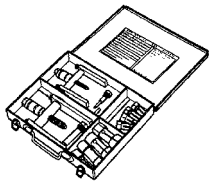
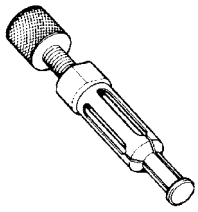
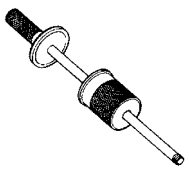
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 5B-6) / ☞(Page 5B-7) / ☞(Page 5B-7) / ☞(Page 5B-7) / ☞(Page 5B-11) / ☞(Page 5B-14) / ☞(Page 5B-21)
Thread lock cement	THREAD LOCK CEMENT SUPER “1303” or equivalent	P/No.: 99000–32030	☞(Page 5B-18)
	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 5B-6) / ☞(Page 5B-7) / ☞(Page 5B-7) / ☞(Page 5B-8) / ☞(Page 5B-19) / ☞(Page 5B-19)

NOTE

Required service material is also described in the following.
“Transmission Components” (Page 5B-2)
“Gearshift Lever Construction” (Page 5B-15)
“Gearshift Shaft / Gearshift Cam Plate Components” (Page 5B-16)
“Gearshift Shaft Construction” (Page 5B-17)

Special Tool

B947H15208002

09900–06104 Snap ring remover (Open type) ☞(Page 5B-10)	
09900–06107 Snap ring remover (Open type) ☞(Page 5B-17) / ☞(Page 5B-18) / ☞(Page 5B-20)	
09900–20102 Vernier calipers (200 mm) ☞(Page 5B-12) / ☞(Page 5B-12)	
09900–20803 Thickness gauge ☞(Page 5B-12)	
09913–70210 Bearing installing set (10 – 75 Φ) ☞(Page 5B-5) / ☞(Page 5B-5) / ☞(Page 5B-5) / ☞(Page 5B-5) / ☞(Page 5B-6) / ☞(Page 5B-6) / ☞(Page 5B-6) / ☞(Page 5B-11) / ☞(Page 5B-21) / ☞(Page 5B-21)	
09921–20210 Bearing remover (12 mm) ☞(Page 5B-20)	
09921–20240 Bearing remover set ☞(Page 5B-5)	
09923–74511 Bearing remover ☞(Page 5B-4)	
09930–30104 Rotor remover sliding shaft ☞(Page 5B-4) / ☞(Page 5B-20)	

Clutch

Precautions

Precautions for Clutch System

B947H15300001

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

Schematic and Routing Diagram

Clutch Cable Routing Diagram

B947H15302001

Refer to “Throttle Cable Routing Diagram” in Section 1D (Page 1D-2).

Diagnostic Information and Procedures

Clutch System Symptom Diagnosis

B947H15304001

Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise seems to come from the clutch)	Worn countershaft spline.	*Replace countershaft.*
	Worn clutch hub spline.	*Replace clutch hub.*
	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.*

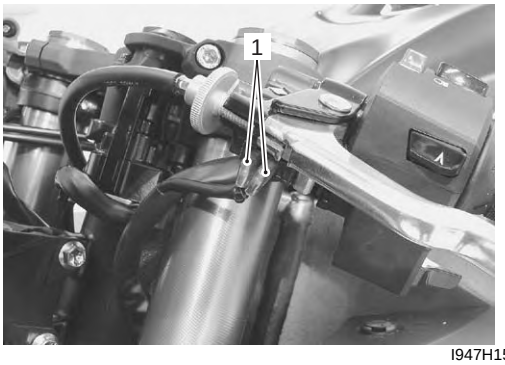
Repair Instructions

Clutch Lever Position Switch Inspection

B947H15306001

Inspect the clutch lever position switch in the following procedures:

1) Disconnect the clutch lever position switch lead wires (1).



I947H1530001-02

2) Inspect the clutch lever position switch for continuity with the tester.
   If any abnormality is found, replace the switch with a new one.

   Special tool
   TOOL : 09900–25008 (Multi circuit tester set)

   Tester knob indication
   Continuity (•)))

Clutch lever position switch

Color / Position	Terminal (B/Y)	Terminal (B/W)
FREE		
•	○	○

I649G1530004-03

3) Connect the clutch lever position switch lead wires.

Clutch Cable Inspection

B947H15306002

Refer to “Clutch Cable Play Inspection and Adjustment” in Section 0B (Page 0B-14).

Clutch Cable Removal and Installation

B947H15306003

Removal

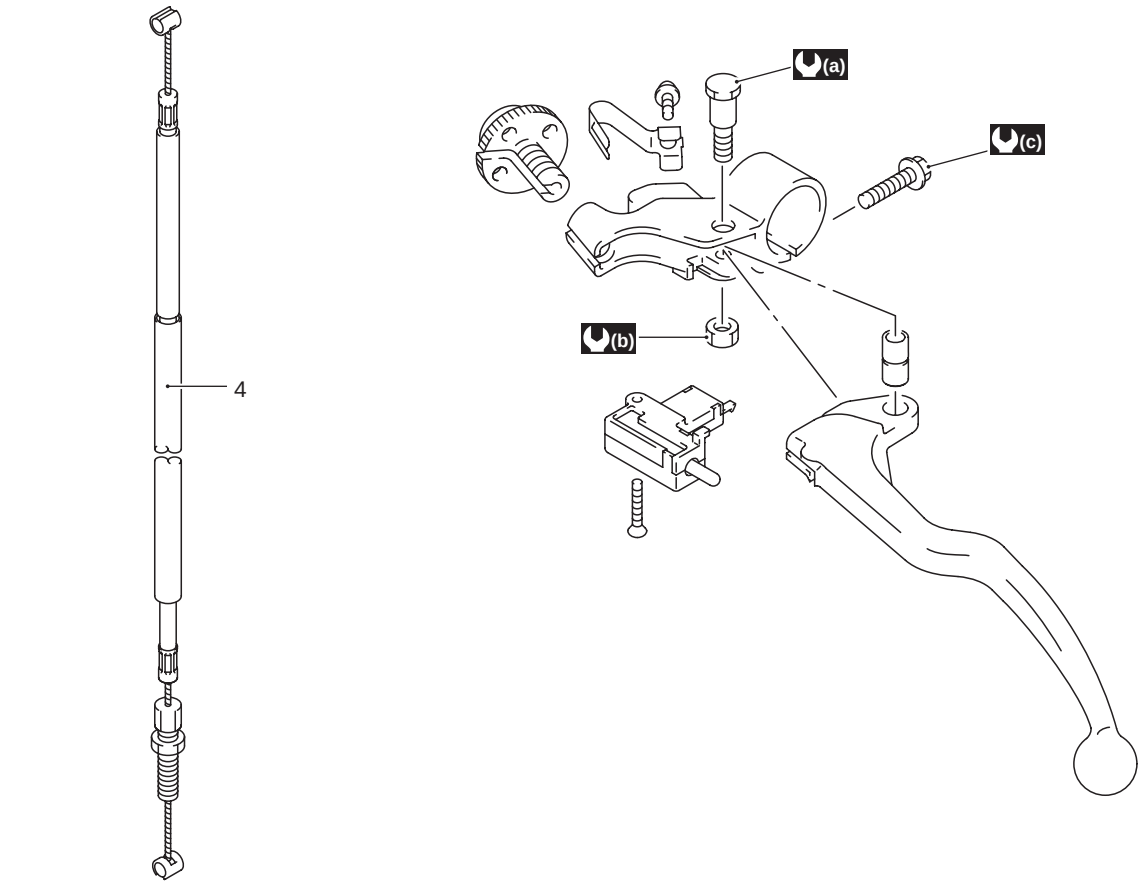
1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the clutch cable from the clutch lever. Refer to “Handlebar Removal and Installation” in Section 6B (Page 6B-2).
3) Remove the clutch cable as shown in the throttle cable routing diagram. Refer to “Throttle Cable Routing Diagram” in Section 1D (Page 1D-2).

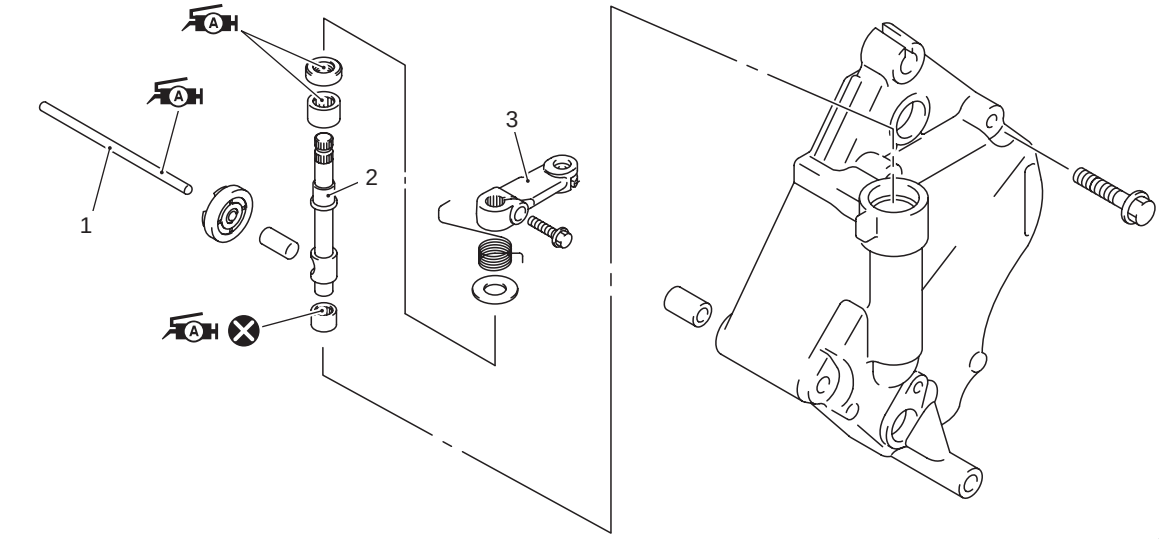
Installation

1) Install the clutch cable as shown in the throttle cable routing diagram. Refer to “Throttle Cable Routing Diagram” in Section 1D (Page 1D-2).
2) Reinstall the removed parts.

Clutch Control System Components

B947H15306004



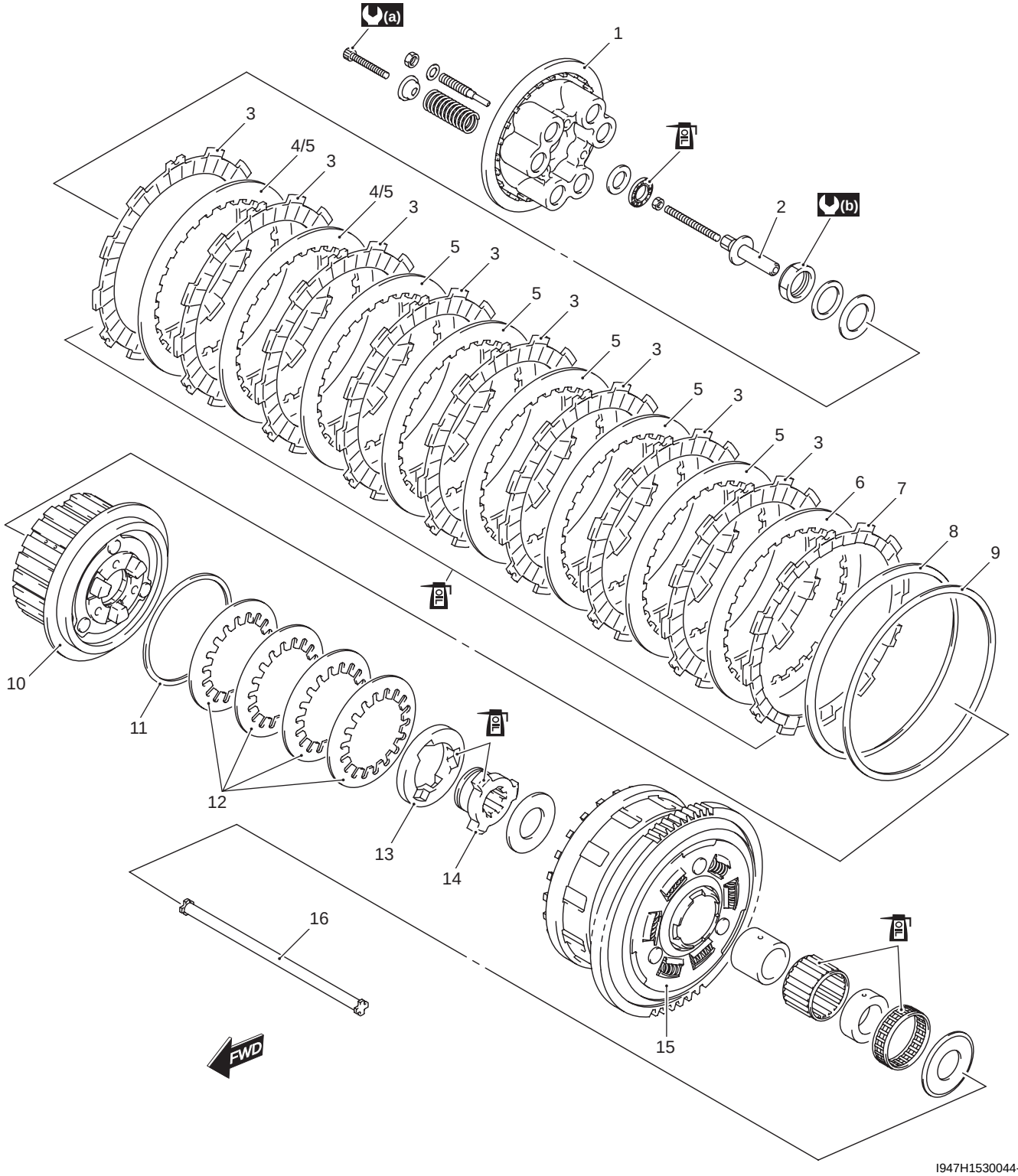


I947H1530043-02

1. Push rod	4. Clutch cable	(c) : 10 N·m (1.0 kgf-m, 0.7 lbf-ft)
2. Clutch release camshaft	(a) : 1 N·m (0.1 kgf-m, 0.7 lbf-ft)	: Apply grease.
3. Clutch release arm	(b) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)	: Do not reuse.

Clutch Components

B947H15306005



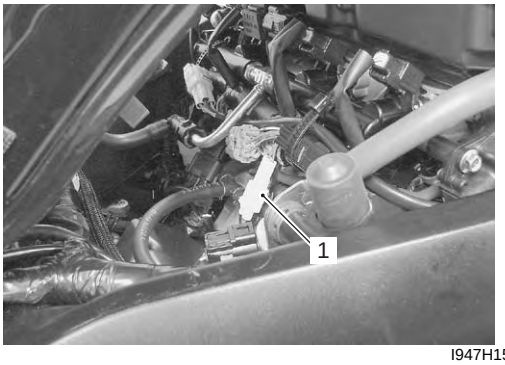
I947H1530044-03

1. Clutch pressure plate	8. Spring washer	15. Primary driven gear assembly
2. Clutch push piece	9. Spring washer seat	16. Push rod
3. No. 1 drive plate (8 pcs.)	10. Clutch sleeve hub	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
4. No. 3 driven plate (0 – 2 pcs.)	11. Seat washer	(b) : 95 N·m (9.5 kgf-m, 68.7 lbf-ft)
5. No. 1 driven plate (5 – 7 pcs.)	12. Wave spring washer	: Apply engine oil.
6. No. 2 driven plate (1 pc.)	13. Clutch lifter driven cam	
7. No. 2 drive plate (1 pc.)	14. Clutch lifter drive cam	

Clutch Removal

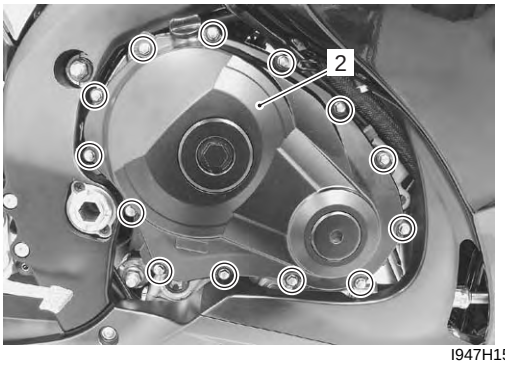
B947H15306006

1) Drain engine oil. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).
2) Lift and support the fuel tank with the prop stay. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).
3) Disconnect the CKP sensor coupler (1).



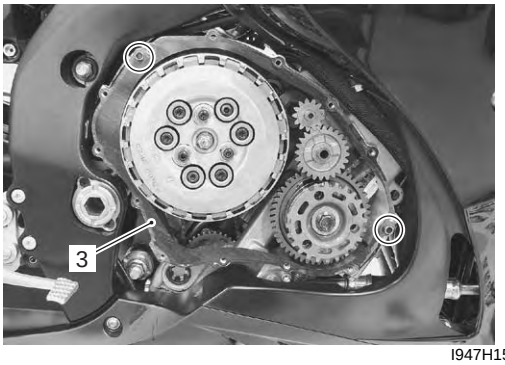
I947H1530042-02

4) Remove the clutch cover (2).



I947H1530002-01

5) Remove the gasket (3) and dowel pins.

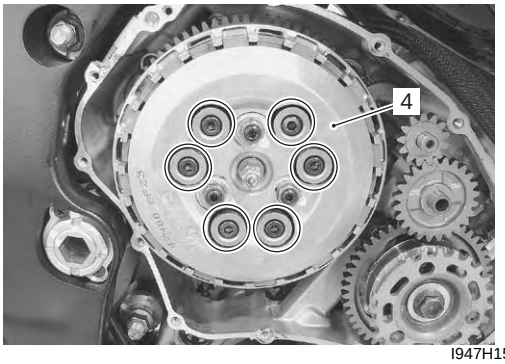


I947H1530003-01

6) Remove the clutch springs and pressure plate (4).

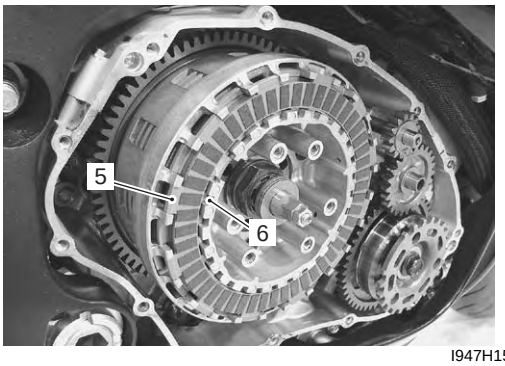
NOTE

Loosen the clutch spring set bolts little by little and diagonally.



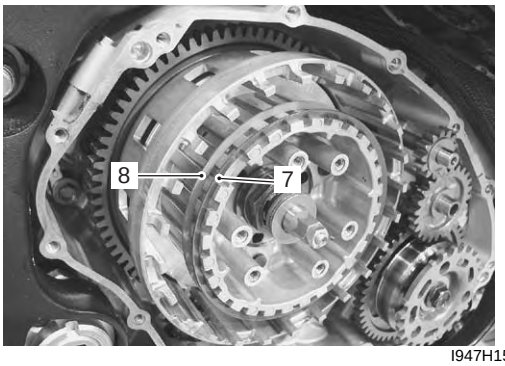
I947H1530004-01

7) Remove the clutch drive plates (5) and driven plates (6).



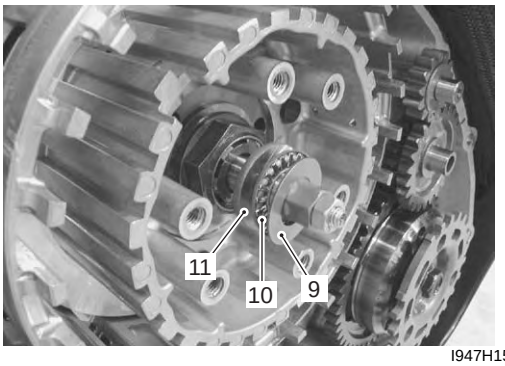
I947H1530005-01

8) Remove the spring washer (7) and its seat (8).



I947H1530006-01

9) Remove the thrust washer (9), bearing (10) and clutch push piece (11).

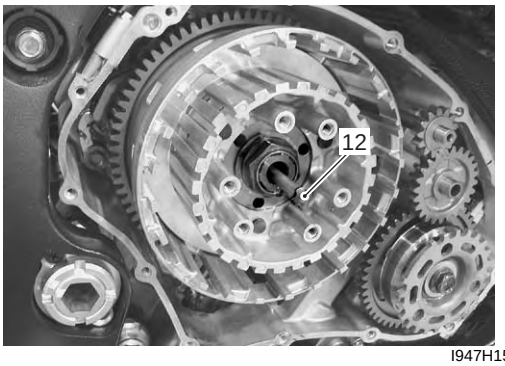


I947H1530007-01

10) Remove the clutch push rod (12).

NOTE

If it is difficult to pull out the push rod (12), use a magnetic hand or wire.



I947H1530008-01

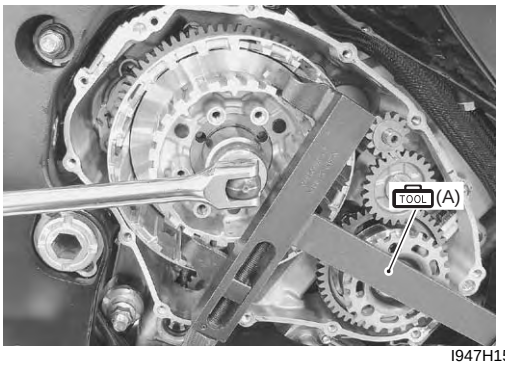
11) Unlock the clutch sleeve hub nut.

I947H1530009-01

12) Hold the clutch sleeve hub with the special tool.

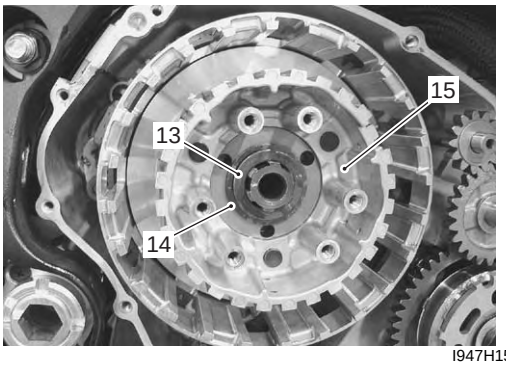
Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)

13) Remove the clutch sleeve hub nut.



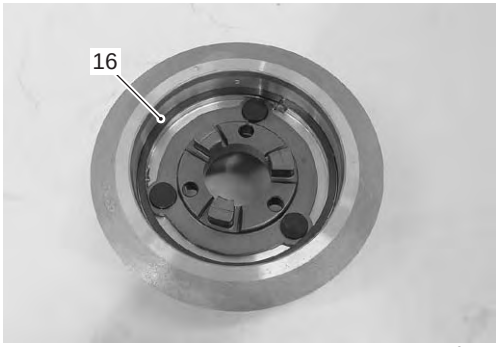
I947H1530010-01

14) Remove the spring washer (13), washer (14) and clutch sleeve hub (15).



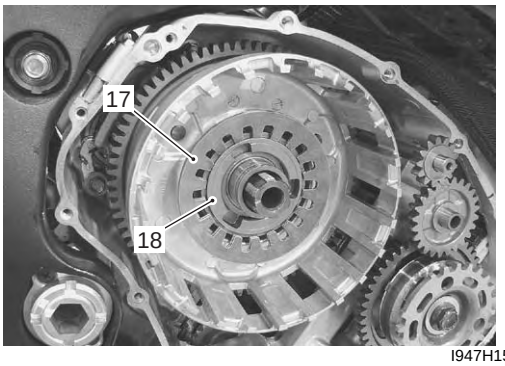
I947H1530011-01

15) Remove the seat washer (16) from the clutch sleeve hub.



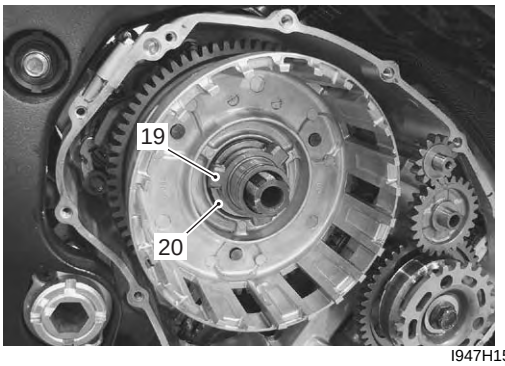
I947H1530012-01

16) Remove the wave spring washers (17) and clutch lifter driven cam (18).



I947H1530013-01

17) Remove the clutch lifter drive cam (19) and thrust washer (20).



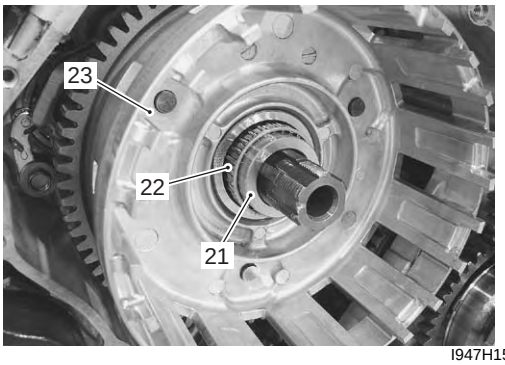
I947H1530014-01

18) Remove the spacer (21) and bearing (22).

19) Remove the primary driven gear assembly (23).

NOTE

If it is difficult to remove the primary driven gear, rotate the crankshaft.



I947H1530015-01

Clutch Installation

B947H15306007

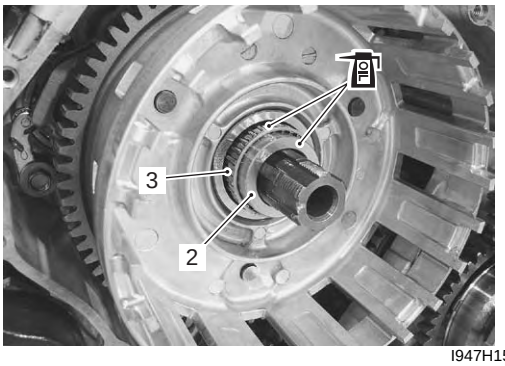
1) Install the primary driven gear assembly (1).

⚠ CAUTION

- **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.**

I947H1530016-01

2) Install the spacer (2) and bearing (3), and apply engine oil to them.

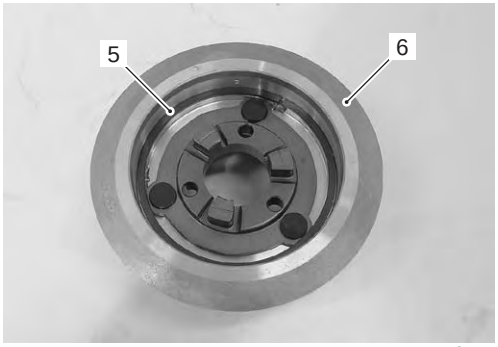


I947H1530017-01

3) Install the thrust washer (4).

I947H1530018-01

4) Install the seat washer (5) to the clutch sleeve hub (6).

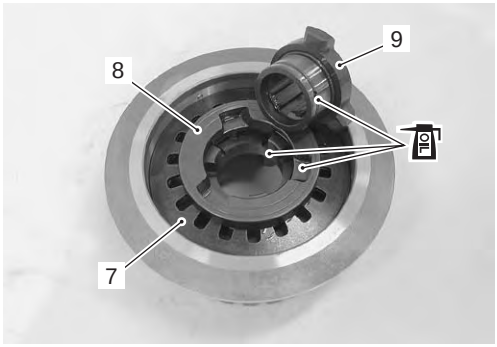


I947H1530019-01

5) Install the wave spring washers (7) and clutch lifter driven cam (8).

6) Apply engine oil to the contacting surfaces of the clutch sleeve hub, clutch lifter drive cam and clutch lifter driven cam.

7) Install the clutch lifter drive cam (9).

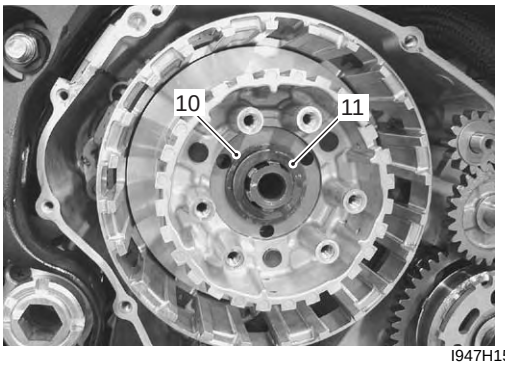


I947H1530020-02

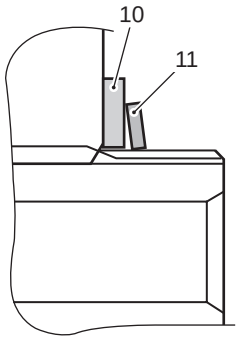
8) Install the clutch sleeve hub, washer (10) and spring washer (11).

NOTE

The conical curve side of spring washer (11) faces outside.



I947H1530021-01



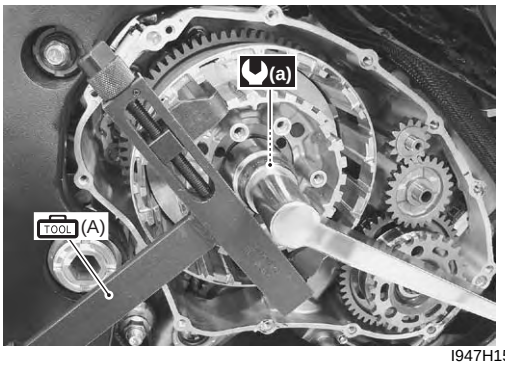
I837H1530024-02

9) Hold the clutch sleeve hub with the special tool.

Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)

10) Tighten the clutch sleeve hub nut to the specified torque.

Tightening torque
Clutch sleeve hub nut (a): 95 N·m (9.5 kgf-m, 68.7 lbf-ft)

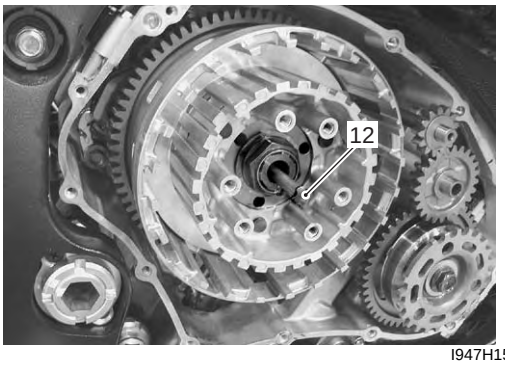


I947H1530022-01

11) Lock the clutch sleeve hub nut with a center punch.

I947H1530023-01

12) Install the clutch push rod (12) into the countershaft.

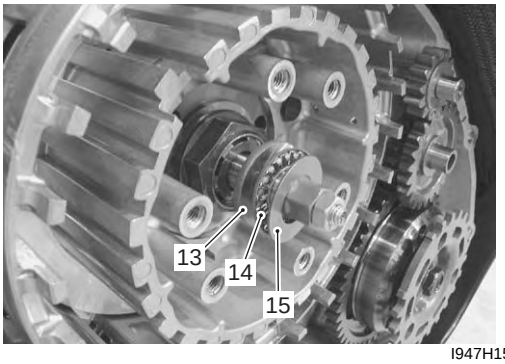


I947H1530024-01

13) Install the clutch push piece (13), bearing (14) and thrust washer (15) to the countershaft.

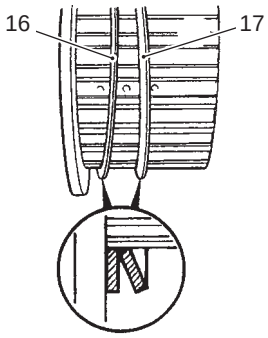
NOTE

Thrust washer (15) is located between the pressure plate and bearing (14).



I947H1530025-01

14) Install the spring washer seat (16) and spring washer (17) onto the clutch sleeve hub correctly.



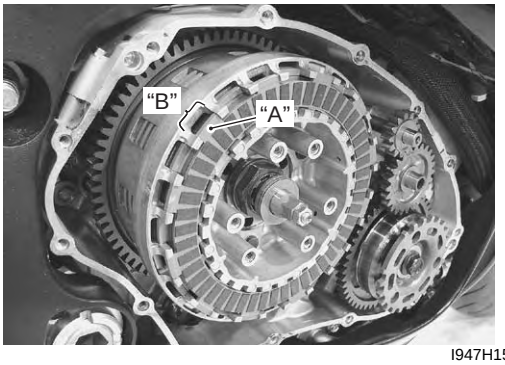
I837H1530028-01

15) Apply engine oil to the clutch drive plates.

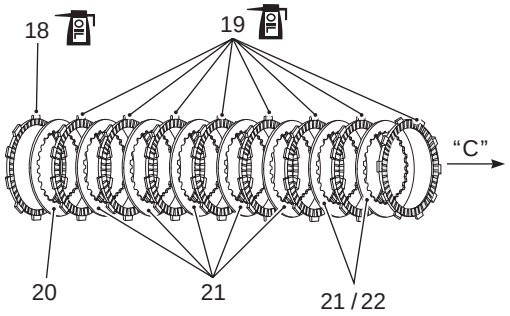
16) Insert the clutch drive plates and driven plate one by one into the clutch sleeve hub in the prescribed order.

NOTE

Insert the outermost No. 1 drive plate claws "A" to the other slits "B" of clutch housing as shown in the figure.



I947H1530026-02



I947H1530027-01

18.	No. 2 drive plate (1 pc.)
19.	No. 1 drive plate (8 pcs.)
20.	No. 2 driven plate (1 pc.)
21.	No. 1 driven plate (5 – 7 pcs.)
22.	No. 3 driven plate (0 – 2 pcs.)
"C":	Direction of outside

NOTE

Two kinds of drive plate (No. 1 and No. 2) are equipped in the clutch system, they can be distinguished by inside diameter.

Drive plate	I.D.
No. 1	112 mm (4.41 in)
No. 2	122.5 mm (4.82 in)

NOTE

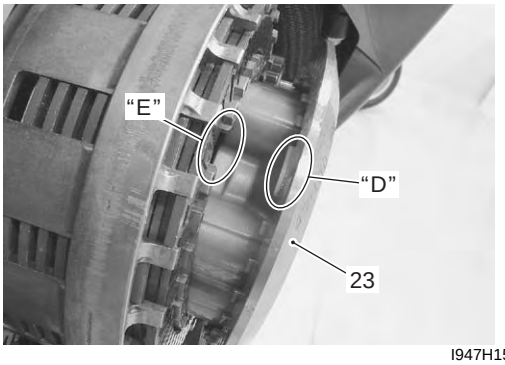
Three kinds of the driven plate (No. 1, No. 2 and No. 3) are equipped in the clutch system, they can be distinguished by color and thickness.
The No. 1, No. 2 and No. 3 driven plates are 8 pcs. in total.
5 – 7 pcs. of No. 1 driven plates are used with 1 pc. of No. 2 and 0 – 2 pc(-s). of No. 3 driven plate(-s) as a set. The No. 3 driven plate(-s) should be installed in pressure plate side.

Driven plate	Thickness	Color
No. 1	2.3 mm (0.09 in)	Silver
No. 2	2.3 mm (0.09 in)	Gray (Heat treated)
No. 3	2.6 mm (0.10 in)	Silver

17) Install the pressure plate (23).

NOTE

When install the pressure plate, fit the convex part "D" of the pressure plate onto the concave part "E" of the clutch sleeve hub.



I947H1530028-02

18) Install the clutch springs and set bolts.

19) Tighten the clutch spring set bolts to the specified torque.

Tightening torque
Clutch spring set bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

NOTE

Tighten the clutch spring set bolt little by little and diagonally.

I947H1530029-01

20) Loosen the lock-nut (24) and turn in the clutch release adjusting screw (25) until resistance is felt.

21) From that position, turn out the clutch release adjusting screw (25) 1 turn and tighten the lock-nut (24) while holding the screw (25).

Tightening torque
Clutch release adjusting screw lock-nut: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

I947H1530030-02

22) Apply bond lightly to the mating surfaces at the parting line between the upper and lower crankcases as shown in the figure.

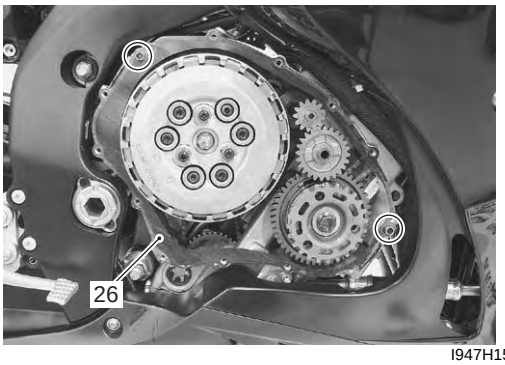
1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

I947H1530031-01

23) Install the dowel pins and new gasket (26).

⚠ CAUTION

Use new gasket to prevent oil leakage.



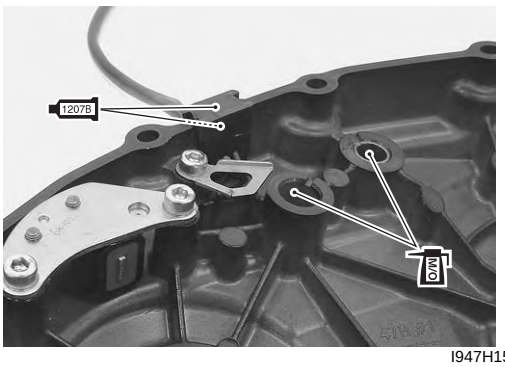
I947H1530032-01

24) Apply bond lightly to the CKP sensor grommet.

1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

25) Apply molybdenum oil solution to the starter torque limiter/idle gear No. 2 shaft holes.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

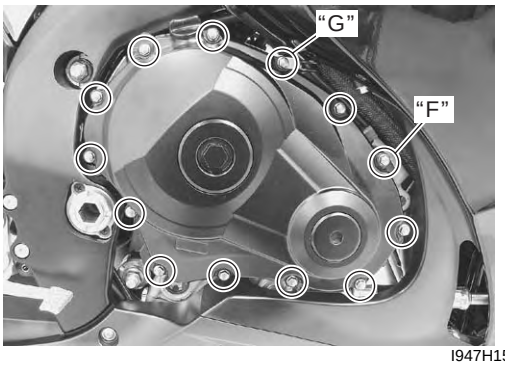


I947H1530033-02

26) Install the clutch cover and tighten the clutch cover bolts.

NOTE

Fit new gasket washer to the bolt “F” and clamp to the bolt “G”.



I947H1530034-01

27) Route the CKP sensor lead wire properly. Refer to “Wiring Harness Routing Diagram” in Section 9A (Page 9A-7).

28) Install the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).

29) Pour engine oil. Refer to “Engine Oil and Filter Replacement” in Section 0B (Page 0B-10).

Clutch Parts Inspection

B947H15306008

Refer to “Clutch Removal” (Page 5C-5) and “Clutch Installation” (Page 5C-7).

Clutch Drive and Driven Plate

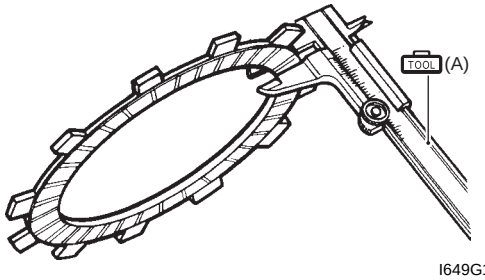
NOTE

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
TOOL (A): 09900–20102 (Vernier calipers (200 mm))

Clutch drive plate thickness
Service limit (No. 1 and No. 2 drive plates): 2.92 mm (0.115 in)

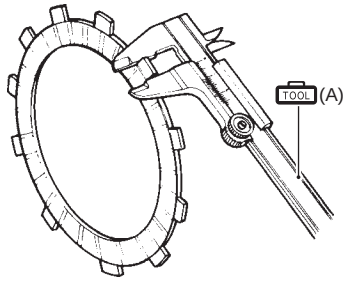


I649G1530056-03

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
TOOL (A): 09900–20102 (Vernier calipers (200 mm))

Clutch drive plate claw width
Service limit (No. 1 and No. 2 drive plates): 12.90 mm (0.508 in)

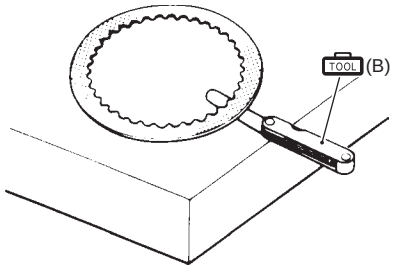


I649G1530057-03

Measure each driven plate for distortion with a thickness gauge and surface plate.
Replace driven plates which exceed the limit.

Special tool
TOOL (B): 09900–20803 (Thickness gauge)

Clutch driven plate distortion
Service limit (No. 1, No. 2 and No.3 driven plates): 0.10 mm (0.004 in)



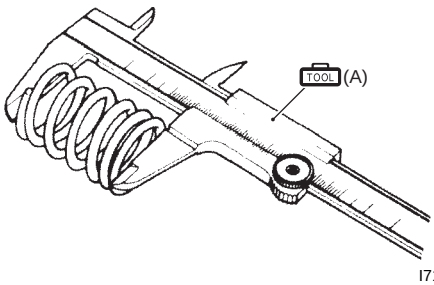
I649G1530058-03

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.

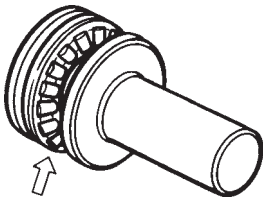
Special tool
TOOL (A): 09900–20102 (Vernier calipers (200 mm))

Clutch spring free length
Service limit: 55.3 mm (2.18 in)



I718H1530062-01

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.

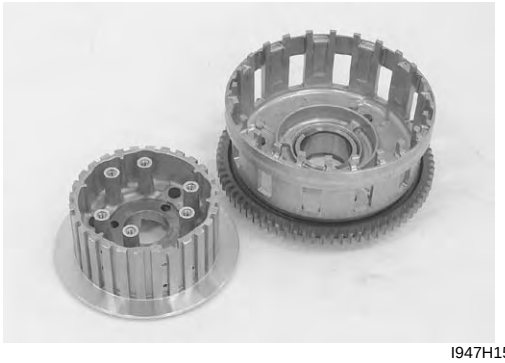


I649G1530059-02

Push Rod (Right)
Inspect the push rod for wear and damage.
If any defects are found, replace the push rod with a new one.

I947H1530035-01

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.

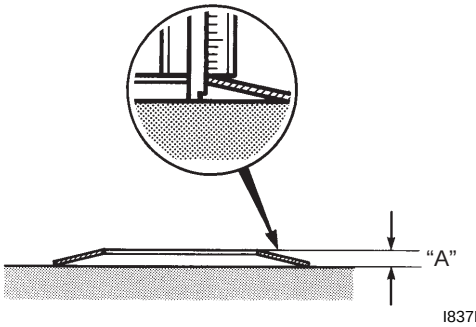


I947H1530036-01

Wave Spring Washer
Measure the free height “A” of each wave spring washer with a vernier calipers.
If each wave spring washer height “A” is not within the specified limit, replace it with a new one.

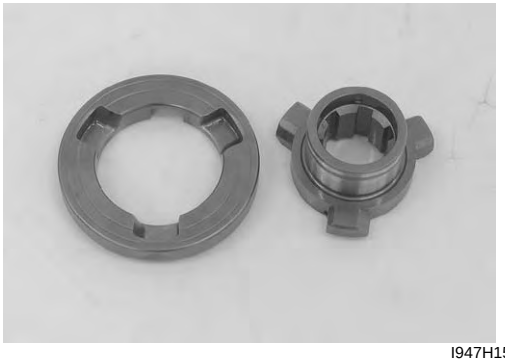
Special tool
TOOL : 09900–20102 (Vernier calipers (200 mm))

Wave spring washer height “A”
Service limit: 4.30 mm (0.169 in)



I837H1530043-01

Clutch Lifter Drive Cam and Clutch Lifter Driven Cam
Inspect the clutch lifter drive cam and clutch lifter driven cam for wear and damage. If any defects are found, replace the clutch lifter drive cam or clutch lifter driven cam.



I947H1530037-01

Clutch Lifter Pin Inspection and Adjustment

B947H15306009

Refer to “Clutch Removal” (Page 5C-5) and “Clutch Installation” (Page 5C-7).

NOTE

When inspection and adjusting the clutch lifter pin, it is not necessary to install the clutch onto the countershaft.

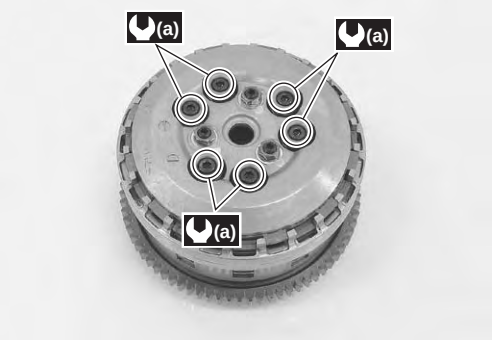
Inspect and adjust the clutch lifter pin in the following procedures:

1) Assemble the following parts into the primary driven gear assembly.
   - Clutch sleeve hub
   - Spring washer seat, spring washer
   - Clutch drive plates, clutch driven plates
   - Pressure plate
   - Clutch springs, clutch springs set bolts

Tightening torque
Clutch spring set bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

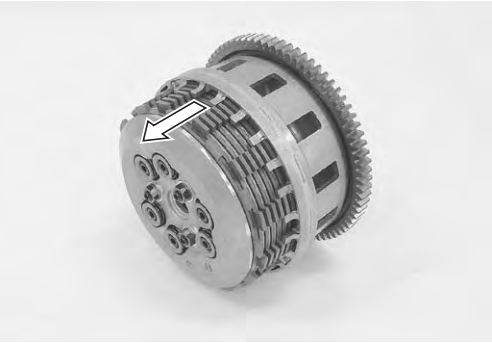
NOTE

Tighten the clutch spring set bolt little by little and diagonally.



I947H1530038-01

2) Remove the clutch assembly from the primary driven gear assembly.

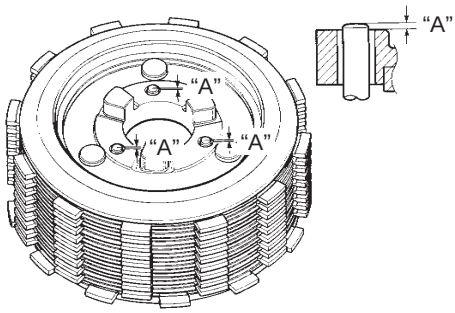


I947H1530039-01

3) Inspect the height “A” of clutch lifter pin at three positions using the thickness gauge. If the measurement is out of the specification, adjust the height “A” as shown in the figure.

Special tool
TOOL : 09900–20803 (Thickness gauge)

Clutch lifter pin height “A”
Standard: 0.2 – 0.4 mm (0.008 – 0.016 in)

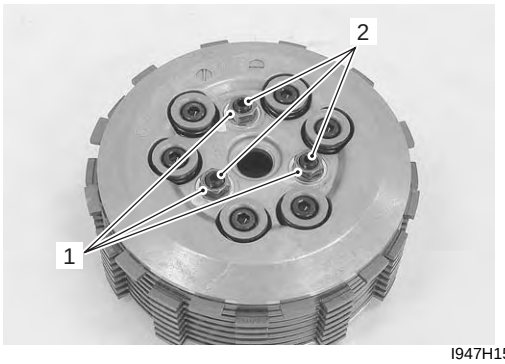


I837H1530044-01

4) Loosen the lock-nuts (1) and turn out the clutch lifter pin (2).

NOTE

Each clutch lifter pin height should be as closely as possible.



I947H1530040-01

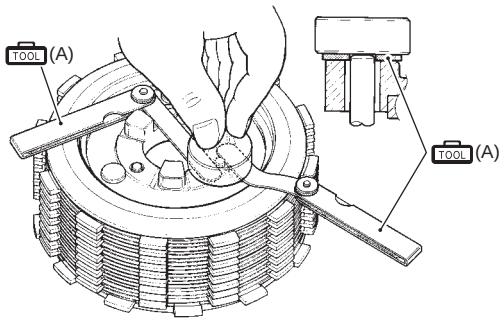
5) Set the thickness gauge to 0.3 mm (0.012 in).

Special tool
TOOL (A): 09900–20803 (Thickness gauge)

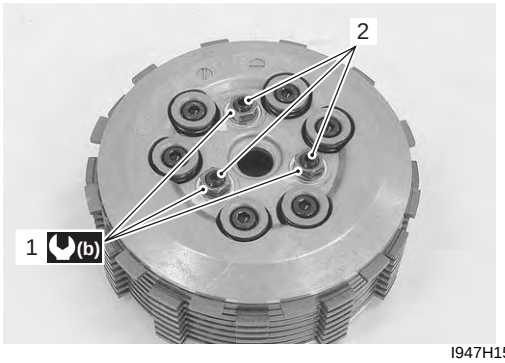
6) Place a proper flat plate on the thickness gauges and hold them by hand.
7) Slowly turn in the clutch lifter pin (2) until resistance is felt.

8) Tighten the lock-nut (1).

Tightening torque
Clutch lifter pin lock-nut (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I837H1530046-02



I947H1530041-02

Specifications

Service Data

B947H15307001

Clutch
Unit: mm (in)

Item	Standard		Limit
Clutch drive plate thickness	No. 1 and 2	3.22 – 3.38 (0.127 – 0.133)	2.92 (0.115)
Clutch drive plate claw width	No. 1 and 2	13.7 – 13.8 (0.539 – 0.543)	12.9 (0.508)
Clutch driven plate distortion	—		0.10 (0.004)
Clutch spring free length	58.18 (2.29)		55.3 (2.18)
Clutch lifter pin height	0.2 – 0.4 (0.008 – 0.016)		—
Wave spring washer height	—		4.30 (0.169)
Clutch lever play	10 – 15 (0.4 – 0.6)		—
Clutch release screw	1 turn back		—

Tightening Torque Specifications

B947H15307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Clutch sleeve hub nut	95	9.5	68.7	☞(Page 5C-8)
Clutch spring set bolt	10	1.0	7.0	☞(Page 5C-10) / ☞(Page 5C-13)
Clutch release adjusting screw lock-nut	6	0.6	4.5	☞(Page 5C-10)
Clutch lifter pin lock-nut	23	2.3	16.5	☞(Page 5C-14)

NOTE

The specified tightening torque is described in the following.
“Clutch Control System Components” (Page 5C-3)
“Clutch Components” (Page 5C-4)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H15308001

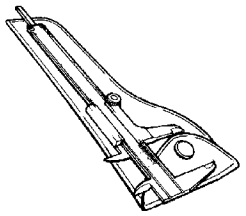
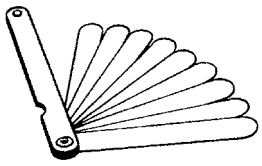
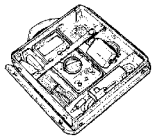
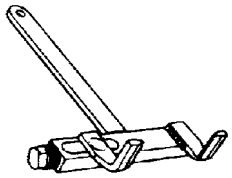
Material	SUZUKI recommended product or Specification		Note
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 5C-10)
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 5C-10) / ☞(Page 5C-10)

NOTE

Required service material is also described in the following.
“Clutch Control System Components” (Page 5C-3)
“Clutch Components” (Page 5C-4)

Special Tool

B947H15308002

09900–20102 Vernier calipers (200 mm) ☞(Page 5C-11) / ☞(Page 5C-11) / ☞(Page 5C-11) / ☞(Page 5C-12) 	09900–20803 Thickness gauge ☞(Page 5C-11) / ☞(Page 5C-13) / ☞(Page 5C-13) 
09900–25008 Multi circuit tester set ☞(Page 5C-2) 	09920–53740 Clutch sleeve hub holder ☞(Page 5C-6) / ☞(Page 5C-8) 

Section 6

Steering

CONTENTS

Precautions

Precautions

Precautions for Steering

B947H16000001

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

Steering General Diagnosis

Diagnostic Information and Procedures

Steering Symptom Diagnosis

B947H16104001

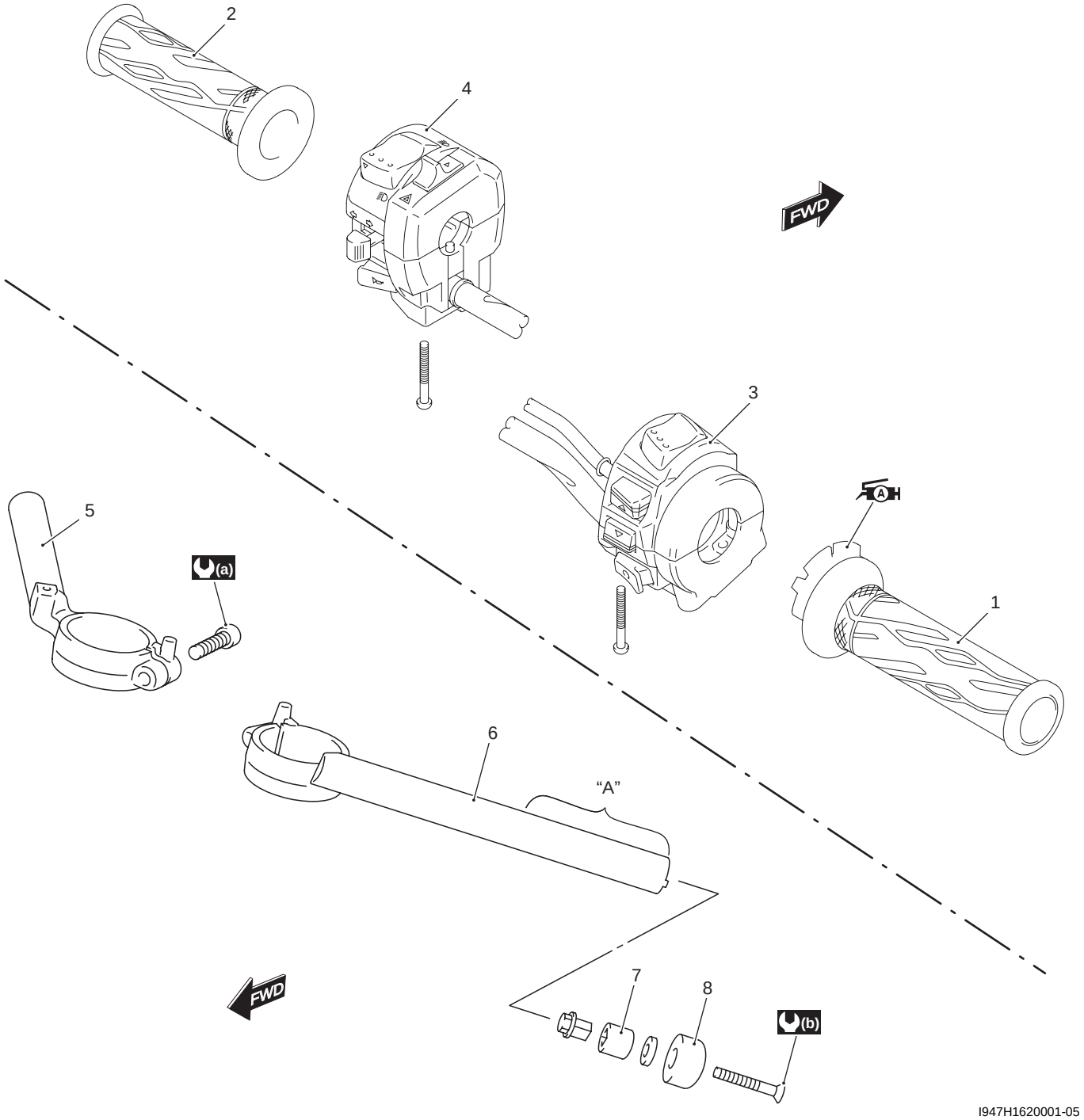
Condition	Possible cause	Correction / Reference Item
Heavy steering	Over tightened steering stem nut.	*Adjust.*
	Broken bearing in steering stem.	*Replace.*
	Distorted steering stem.	*Replace.*
	Not enough pressure in tires.	*Adjust.*
	Defective steering damper unit.	*Replace.*
Wobbly handlebars	Loss of balance between right and left front forks.	*Replace fork, adjust fork oil level or replace 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 pressure.	*Adjust or replace.*
	Worn bearing/race in steering stem.	*Replace.*

Steering / Handlebar

Repair Instructions

Handlebar Components

B947H16206001



I947H1620001-05

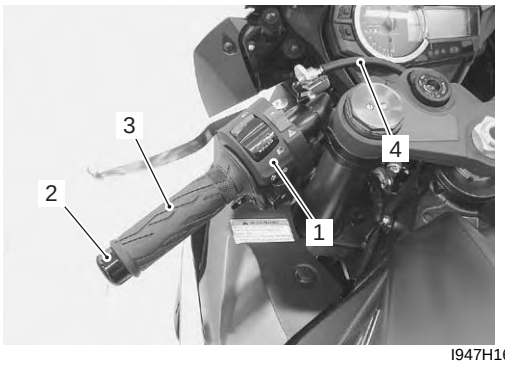
1. Throttle grip	5. Right handlebar	"A": Apply handle grip bond.
2. Grip rubber	6. Left handlebar	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
3. Right handlebar switch box	7. Handlebar expander	(b) : 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
4. Left handlebar switch box	8. Handlebar balancer	A : Apply grease.

Handlebar Removal and Installation

B947H16206002

Removal

1) Remove the following parts from the left handlebar.
   a) Left handlebar switch box (1)
   b) Handlebar balancer (2)
   c) Grip rubber (3)
   d) Clutch cable (4)

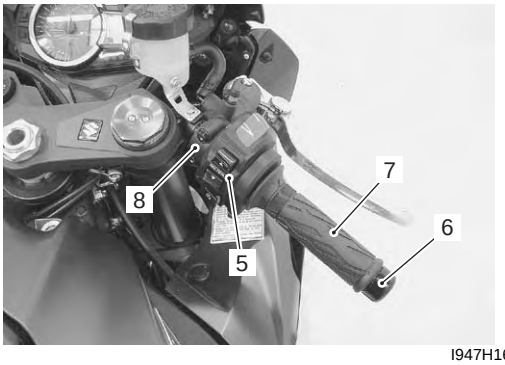


I947H1620002-01

2) Remove the following parts from the right handlebar.
   a) Right handlebar switch box (5)
   b) Handlebar balancer (6)
   c) Throttle grip (7)
   d) Front brake master cylinder (8)

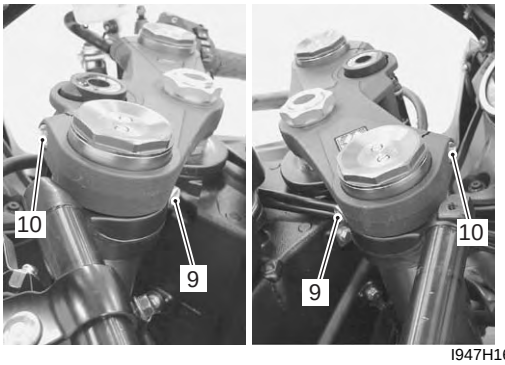
⚠ CAUTION

Do not turn the front brake master cylinder upside down.



I947H1620003-01

3) Loosen the handlebar clamp bolts (9) and front fork upper clamp bolts (10).

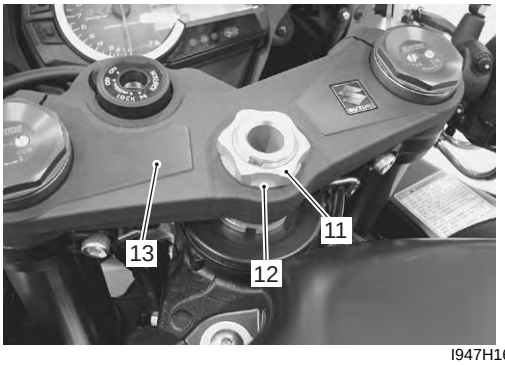


I947H1620004-01

4) Remove the steering stem head nut (11) and washer (12).
5) Remove the steering stem upper bracket assembly (13).

NOTE

Place a rag under the steering stem upper bracket to prevent scratching the body cowling and the combination meter.

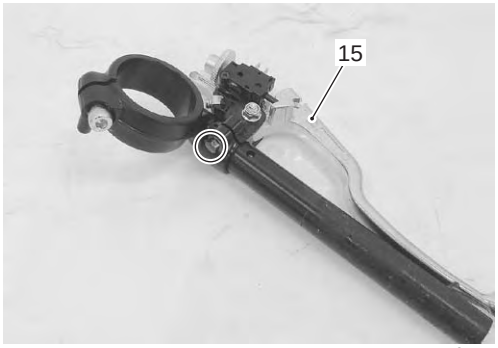


I947H1620005-01

6) Remove the handlebars (14) upward.

I947H1620006-01

7) Remove the clutch lever assembly (15) from the left handlebar.

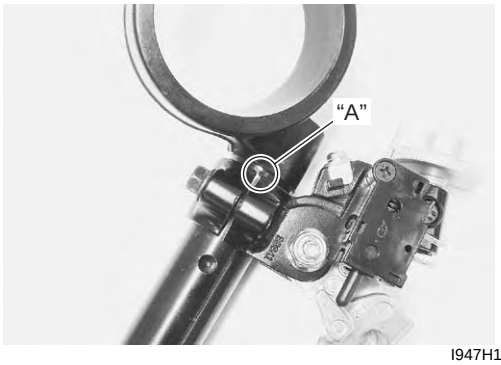


I947H1620007-01

Installation

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

- When installing the clutch lever assembly to the left handlebar, align the slit of lever holder with the punch mark “A”.

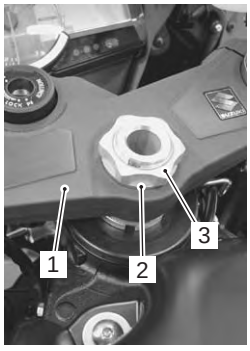


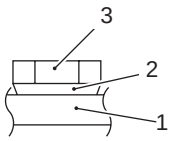
I947H1620009-01

- Install the handlebars temporarily to the front forks.
- Install the upper bracket (1), washer (2) and steering stem head nut (3) temporarily.

NOTE

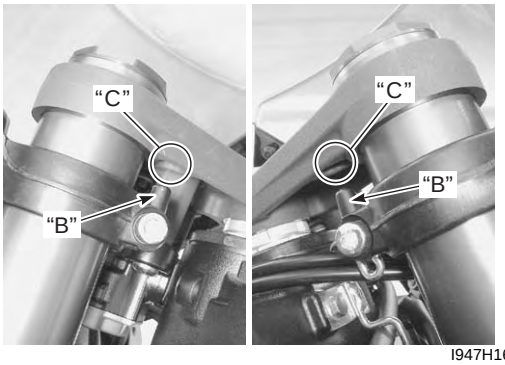
Face the chamfer side of the washer downward.





I947H1620008-01

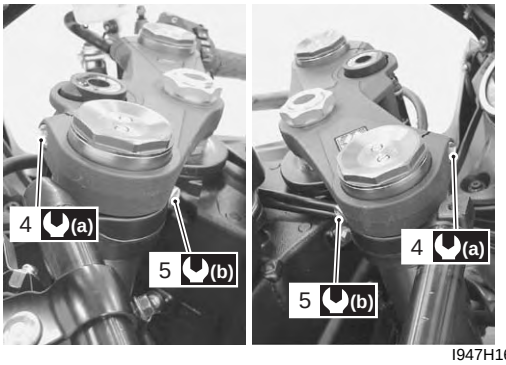
- Insert the protrusion “B” of the handlebar into the hole “C” of the steering stem upper bracket.



I947H1620010-01

- Tighten the front fork upper clamp bolts (4) and handlebar clamp bolts (5) to the specified torque.

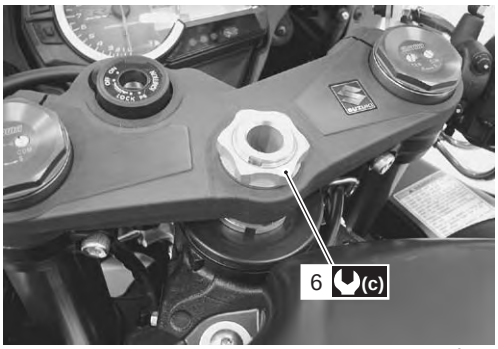
Tightening torque
Front fork upper clamp bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Handlebar clamp bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I947H1620011-01

- Tighten the steering stem head nut (6) to the specified torque.

Tightening torque
Steering stem head nut (c): 90 N·m (9.0 kgf-m, 65.0 lbf-ft)

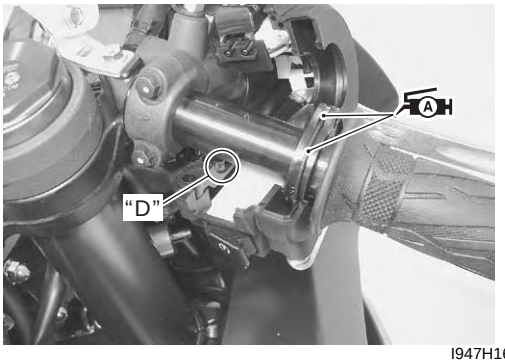


I947H1620012-01

- Install the front brake master cylinder. Refer to “Front Brake Master Cylinder Assembly Removal and Installation” in Section 4A (Page 4A-10).
- Apply grease to the end of the throttle cables and cable pulley.

  : Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)

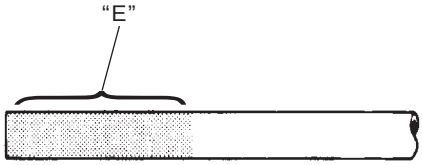
- Insert the projection “D” of the right handlebar switch box into the hole of the right handlebar.



I947H1620013-01

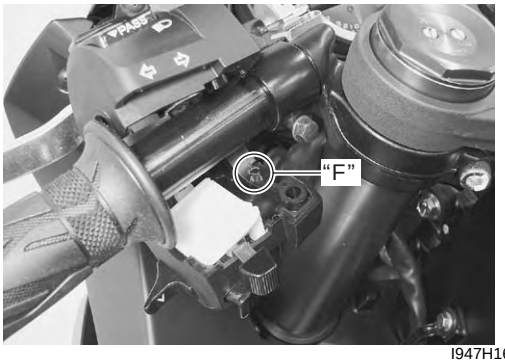
- Apply a handle grip bond “E” onto the left handlebar before installing the handlebar grip.

  : Handle grip bond (Handle Grip Bond (commercially available))



I947H1620014-01

- Insert the projection “F” of the left handlebar switch box into the hole of the left handlebar.



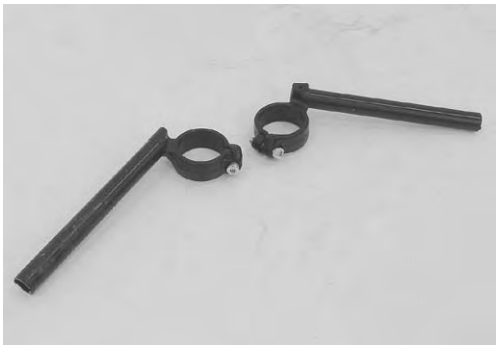
I947H1620015-01

- After installing the steering, the following adjustments are required before driving.
  - Throttle cable routing (Refer to “Throttle Cable Routing Diagram” in Section 1D (Page 1D-2))
  - Clutch cable routing (Refer to “Throttle Cable Routing Diagram” in Section 1D (Page 1D-2))
  - Throttle cable play (Refer to “Throttle Cable Play Inspection and Adjustment” in Section 1D (Page 1D-7))
  - Clutch cable play (Refer to “Clutch Cable Play Inspection and Adjustment” in Section 0B (Page 0B-14))

Handlebars Inspection

B947H16206003

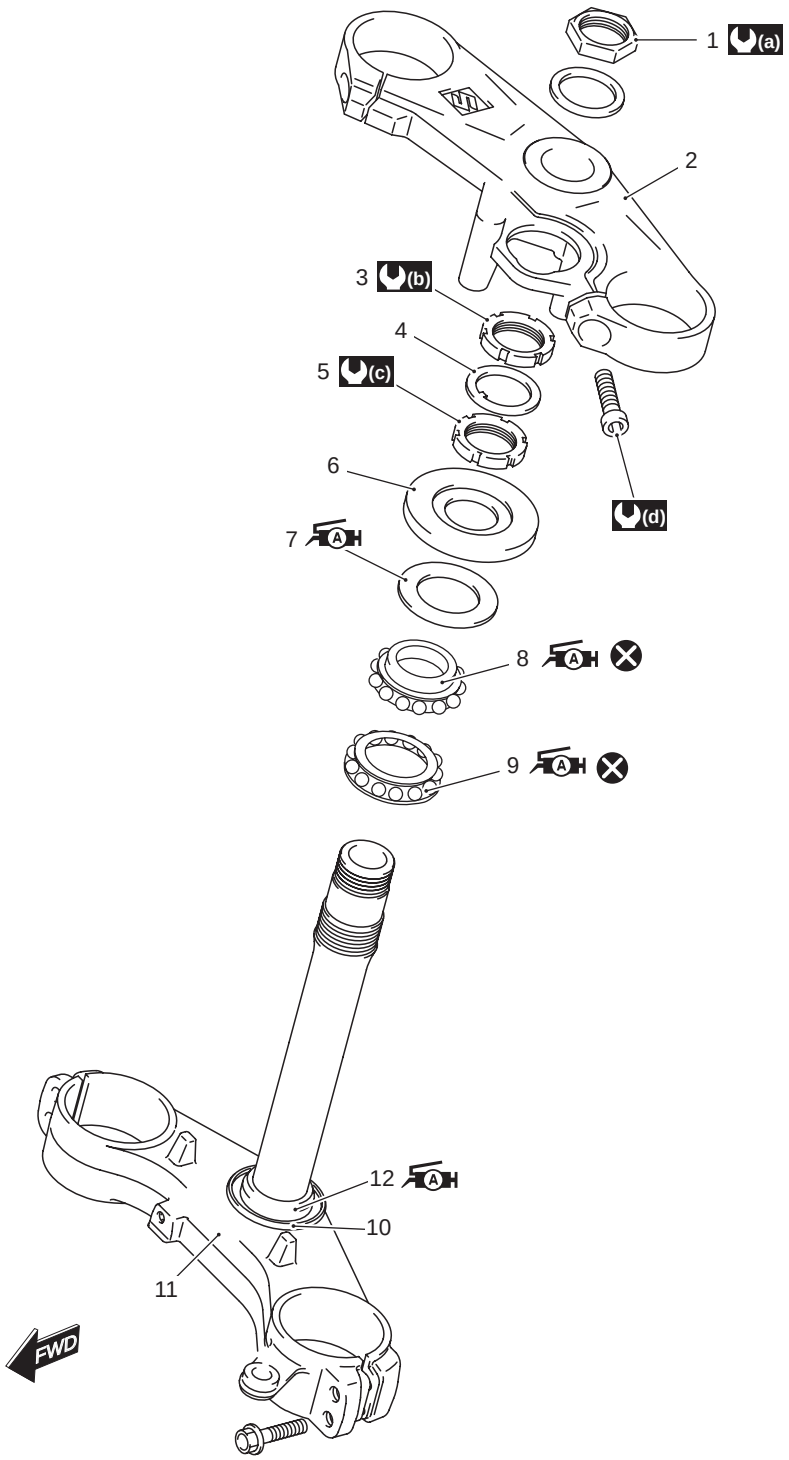
Refer to “Handlebar Removal and Installation” (Page 6B-2).
Inspect the handlebars for distortion and damage.
If any defect is found, replace the handlebar with a new one.



I947H1620016-01

Steering Components

B947H16206004

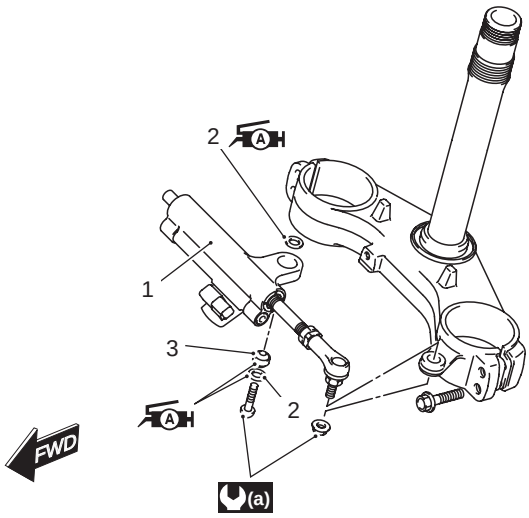


I947H1620017-04

1. Steering stem head nut	7. Dust seal	(a) : 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
2. Steering stem upper bracket	8. Steering stem upper bearing	(b) : 80 N·m (8.0 kgf-m, 58.0 lbf-ft)
3. Steering stem lock-nut	9. Steering stem lower bearing	(c) : 45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/2 – 1/4
4. Washer	10. Lower seal	(d) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
5. Steering stem nut	11. Steering stem lower bracket	: Apply grease.
6. Dust seal cover	12. Steering stem lower bearing inner race	: Do not reuse.

Steering Damper Construction

B947H16206005



I837H1620040-01

1. Steering damper	2. Dust seal	3. Bearing	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	: Apply grease.

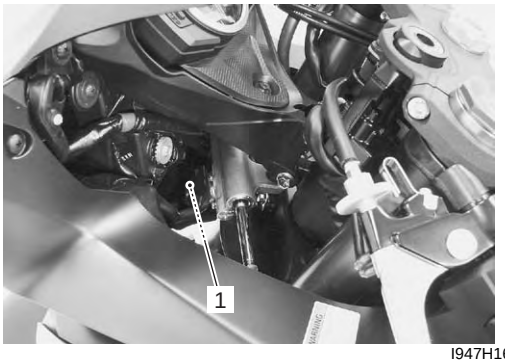
Steering / Steering Damper Removal and Installation

B947H16206006

Removal

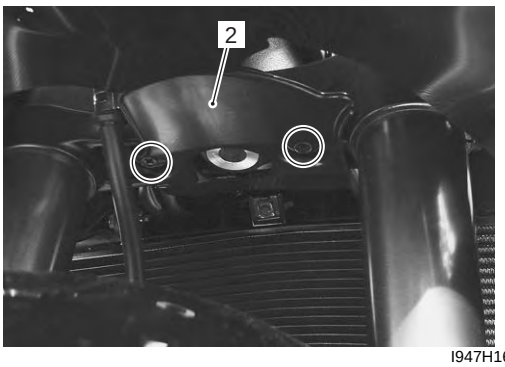
Steering damper

1) Turn the ignition switch OFF.
2) Disconnect the steering damper solenoid coupler (1).



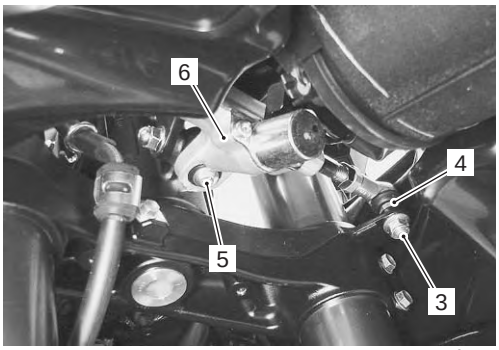
I947H1620018-01

3) Remove the lower bracket cover (2).



I947H1620019-01

4) Remove the steering damper mounting nut (3) while holding the lock-nut (4).
5) Remove the steering damper mounting bolt (5).
6) Remove the steering damper (6).



I947H1620020-01

Steering

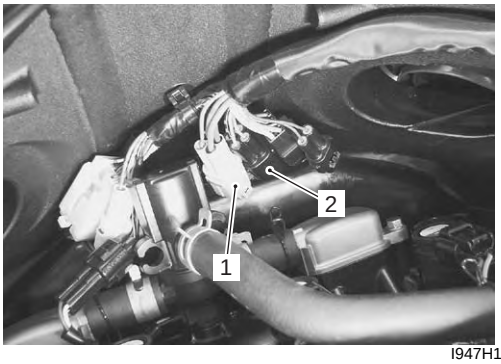
1) Support the motorcycle with a jack or wooden block.

⚠ CAUTION

Do not work by using side stand. Do not support the motorcycle with exhaust pipe. Make sure that the motorcycle is supported securely.

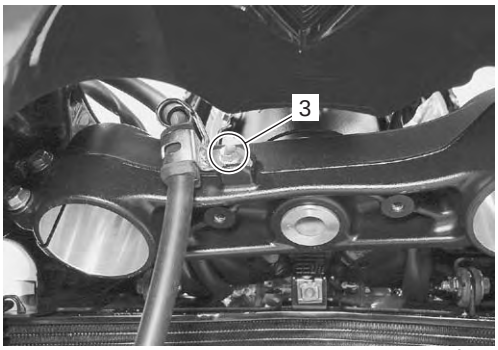
2) Remove the front wheel assembly. Refer to “Front Wheel Assembly Removal and Installation” in Section 2D (Page 2D-4).
3) Remove the front forks. Refer to “Front Fork Removal and Installation” in Section 2B (Page 2B-2).
4) Remove the steering damper. Refer to “Steering / Steering Damper Removal and Installation” (Page 6B-6).
5) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation” in Section 1G (Page 1G-9).

6) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
7) Disconnect the ignition switch lead wire coupler (1) and immobilizer antenna lead wire coupler (For E-02, 19, 24, 51) (2).



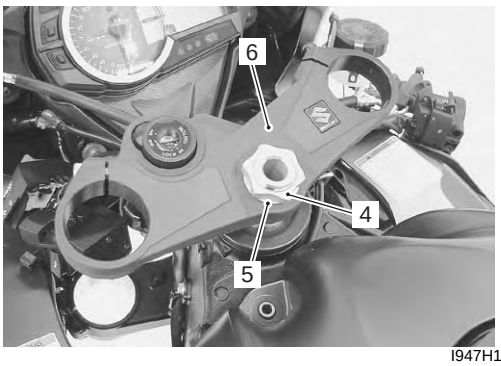
I947H1620021-01

8) Remove the brake hose clamp bolt (3).



I947H1620041-01

9) Remove the steering stem head nut (4) and washer (5).
10) Remove the steering stem upper bracket assembly (6).



I947H1620022-01

NOTE

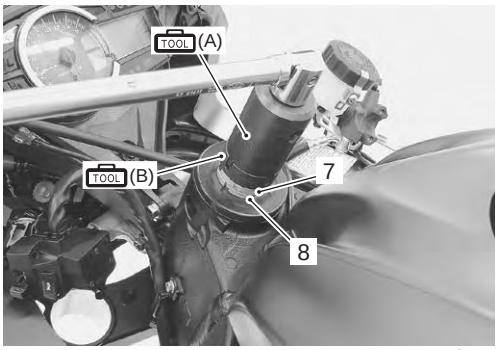
It is not necessary to remove the ignition switch from the upper bracket when servicing the steering system.

11) Remove the steering stem lock-nut (7), washer and steering stem nut (8) with the special tools.

NOTE

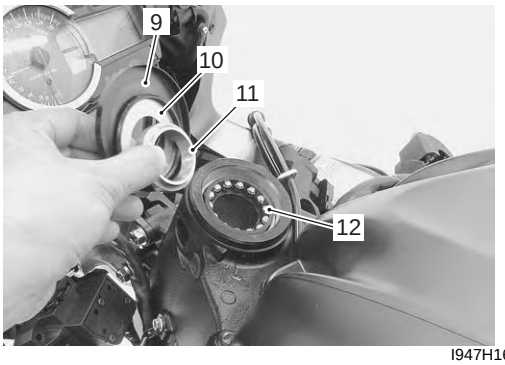
When loosening the stem nuts, hold the steering stem lower bracket to prevent it from falling.

Special tool
TOOL (A): 09940–14911 (Steering stem nut socket wrench)
TOOL (B): 09940–14960 (Steering stem nut socket wrench)



I947H1620023-01

12) Remove the steering stem lower bracket.
13) Remove the dust seal cover (9), dust seal (10), upper bearing inner race (11) and upper bearing (12).



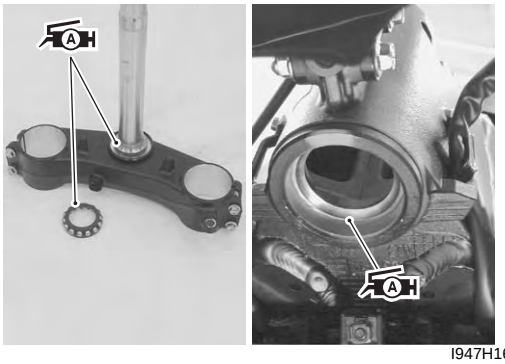
I947H1620024-01

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

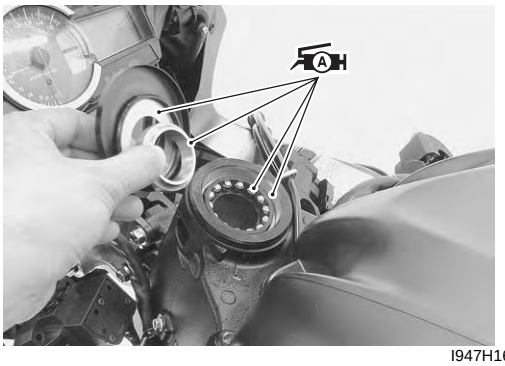
Bearing

- Apply grease to the bearings, bearing races and dust seals before remounting the steering stem.

  (A): Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



I947H1620025-01



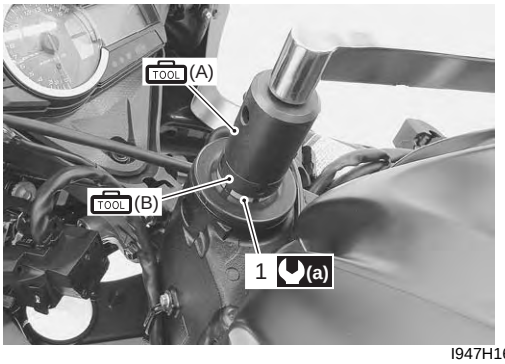
I947H1620026-01

Steering stem nut

- Tighten the steering stem nut (1) to the specified torque with the special tools.

  Special tool
  TOOL (A): 09940–14911 (Steering stem nut socket wrench)
  TOOL (B): 09940–14960 (Steering stem nut socket wrench)

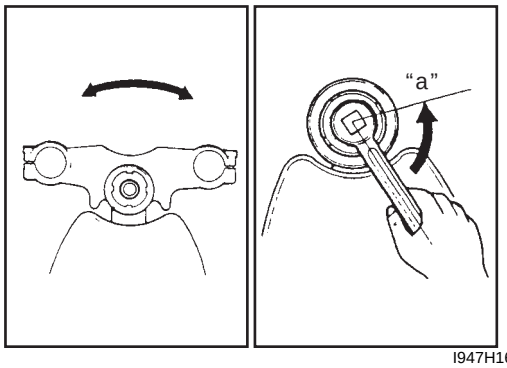
  Tightening torque
  Steering stem nut (a): 45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/4 – 1/2



I947H1620027-01

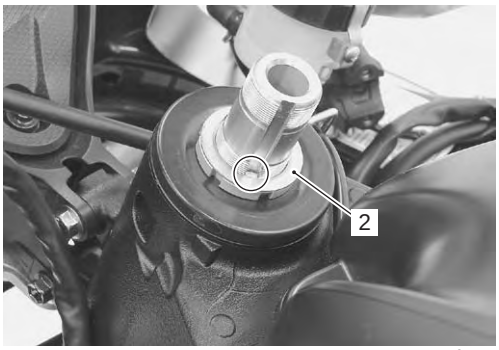
- Turn the steering stem lower bracket about five or six times to the left and right so that the angular ball bearings seat properly.
- Loosen the steering stem nut 1/4 – 1/2 turn "a".

  NOTE
  This adjustment will vary from motorcycle to motorcycle.



I947H1620028-01

- When installing the washer (2), align the lug of the washer to the groove of the steering stem.

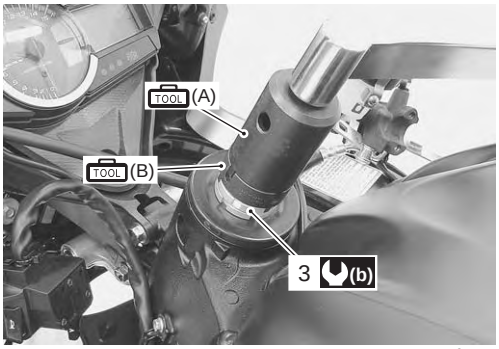


I947H1620029-01

- Tighten the steering stem lock-nut (3) to the specified torque with the special tools.

  Special tool
  TOOL (A): 09940–14911 (Steering stem nut socket wrench)
  TOOL (B): 09940–14960 (Steering stem nut socket wrench)

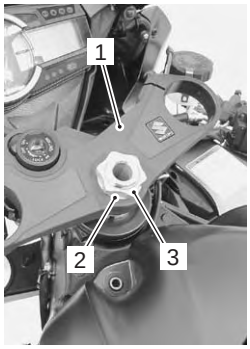
  Tightening torque
  Steering stem lock-nut (b): 80 N·m (8.0 kgf-m, 58.0 lbf-ft)

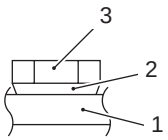


I947H1620030-01

Steering stem upper bracket
Install the front forks and steering stem upper bracket in the following points:

- Temporarily install the upper bracket (1), washer (2) and steering stem head nut (3). Refer to “Handlebar Removal and Installation” (Page 6B-2).

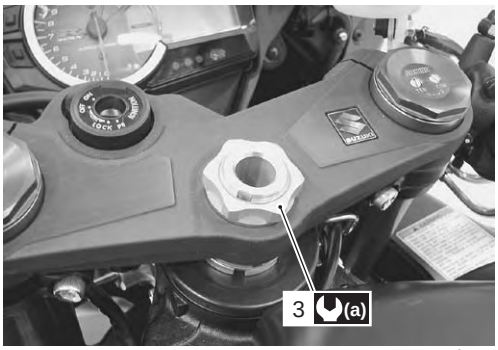




I947H1620031-01

- Temporarily install the front forks.
- Tighten the steering stem head nut (3) to the specified torque.

Tightening torque
Steering stem head nut (a): 90 N·m (9.0 kgf-m, 65.0 lbf-ft)



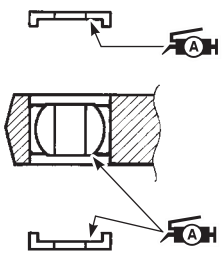
I947H1620032-01

- Tighten the front fork upper and lower clamp bolts. Refer to “Front Fork Removal and Installation” in Section 2B (Page 2B-2).

Steering damper

- Apply grease to the bearings and dust seals.

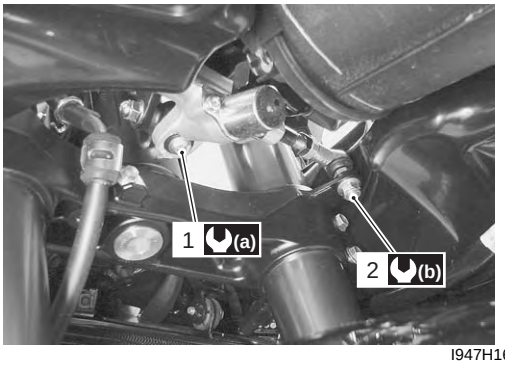
A : Grease 99000–25010 (SUZUKI SUPER GREASE “A” or equivalent)



I823H1620019-02

- Install the steering damper and tighten the bolt (1) and nut (2).

Tightening torque
Steering damper bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Steering damper nut (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I947H1620033-02

Inspection after installation

- Check the steering tension. Refer to “Steering Tension Adjustment” (Page 6B-11).

Steering / Steering Damper Related Parts Inspection

B947H16206007

Refer to “Steering / Steering Damper Removal and Installation” (Page 6B-6).
Inspect the removed parts for the following abnormalities:

Steering Stem

- Distortion of the steering stem and brackets.

I947H1620034-01

Bearing

- Bearing wear or damage
- Abnormal bearing noise
- Race wear or damage
- Bearing lower seal damage

I947H1620035-01

I947H1620036-01

Steering Damper

- Inspect the steering damper body, bearing and oil seal for damage and oil leaking.
- Move the steering damper rod by hand to inspect for a smooth movement.
- If any defects are found, replace the steering damper with a new one.

NOTE

The steering damper operation can be checked without removing it. Refer to "DTC "C93" (P1769): Steering Damper Solenoid Valve Circuit Malfunction" in Section 1A (Page 1A-134).

I947H1620037-01

Steering System Inspection

B947H16206008

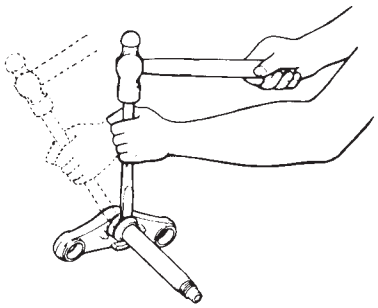
Refer to "Steering System Inspection" in Section 0B (Page 0B-18).

Steering Stem Bearing Removal and Installation

B947H16206009

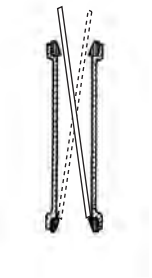
Removal

1) Remove the steering stem upper bearing and steering stem lower bracket. Refer to "Steering / Steering Damper Removal and Installation" (Page 6B-6).
2) Remove the steering stem lower bearing inner race using a chisel.



I649G1620033-02

3) Remove the steering stem upper and lower bearing races using the steel rod.



I837H1620033-01

Installation

Install the steering stem bearings in the reverse order of removal. Pay attention to the following points:

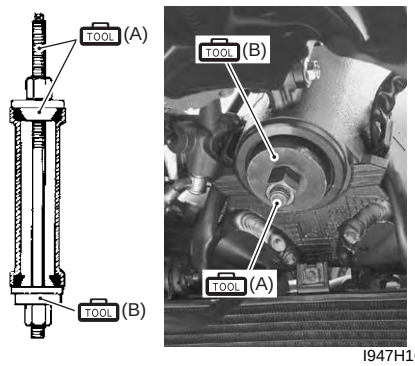
⚠ CAUTION

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
TOOL (A): 09941–34513 (Bearing installer)
TOOL (B): 09913–70210 (Bearing installing set (10 – 75 Φ))



I947H1620038-01

Inner race

- Press in the lower bearing inner race using the special tool.

Special tool
TOOL (A): 09925–18011 (Bearing installer)

I947H1620039-01

- Install the steering. Refer to “Steering / Steering Damper Removal and Installation” (Page 6B-6).

Steering Tension Adjustment

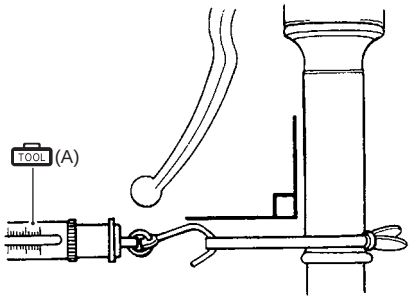
B947H16206010

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) Remove the steering damper. Refer to “Steering Damper Construction” (Page 6B-6).
3) Check to make sure that the cables and wire harnesses are properly routed.
4) 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
TOOL (A): 09940–92720 (Spring scale)



I649G1620040-02

5) Do the same on the other grip end.
6) If the initial force read on the scale when the handlebar starts turning is either too heavy or too light, adjust it till it satisfies the specification.
   a) First, loosen the front fork upper clamp bolts, handlebar clamp bolts, steering stem head nut and steering stem lock-nut, and then adjust the steering stem nut by loosening or tightening it.
   b) Tighten the steering stem lock-nut, stem head nut, handlebar clamp bolts and front fork upper clamp bolts to the specified torque and re-check 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.

I947H1620040-01

Specifications

Tightening Torque Specifications

B947H16207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front fork upper clamp bolt	23	2.3	16.5	☞(Page 6B-3)
Handlebar clamp bolt	23	2.3	16.5	☞(Page 6B-3)
Steering stem head nut	90	9.0	65.0	☞(Page 6B-3) / ☞(Page 6B-9)
Steering stem nut	45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/4 – 1/2			☞(Page 6B-8)
Steering stem lock-nut	80	8.0	58.0	☞(Page 6B-8)
Steering damper bolt	23	2.3	16.5	☞(Page 6B-9)
Steering damper nut	23	2.3	16.5	☞(Page 6B-9)

NOTE

The specified tightening torque is described in the following.
“Handlebar Components” (Page 6B-1)
“Steering Components” (Page 6B-5)
“Steering Damper Construction” (Page 6B-6)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H16208001

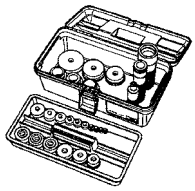
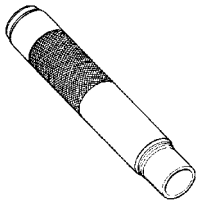
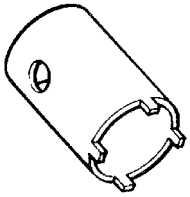
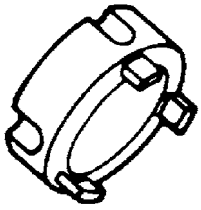
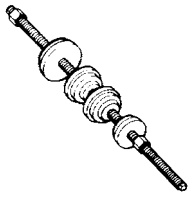
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 6B-4) / ☞(Page 6B-8) / ☞(Page 6B-9)
Handle grip bond	Handle Grip Bond (commercially available)	—	☞(Page 6B-4)

NOTE

Required service material is also described in the following.
“Handlebar Components” (Page 6B-1)
“Steering Components” (Page 6B-5)
“Steering Damper Construction” (Page 6B-6)

Special Tool

B947H16208002

09913–70210 Bearing installing set (10 – 75 Φ) ☞(Page 6B-11)		09925–18011 Bearing installer ☞(Page 6B-11)	
09940–14911 Steering stem nut socket wrench ☞(Page 6B-7) / ☞(Page 6B-8) / ☞(Page 6B-8)		09940–14960 Steering stem nut socket wrench ☞(Page 6B-7) / ☞(Page 6B-8) / ☞(Page 6B-8)	
09940–92720 Spring scale ☞(Page 6B-11)		09941–34513 Bearing installer ☞(Page 6B-11)	

Section 9

Body and Accessories

CONTENTS

Precautions

Precautions

Precautions for Electrical System

B947H19000001

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

B947H19003001

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

Wiring Systems

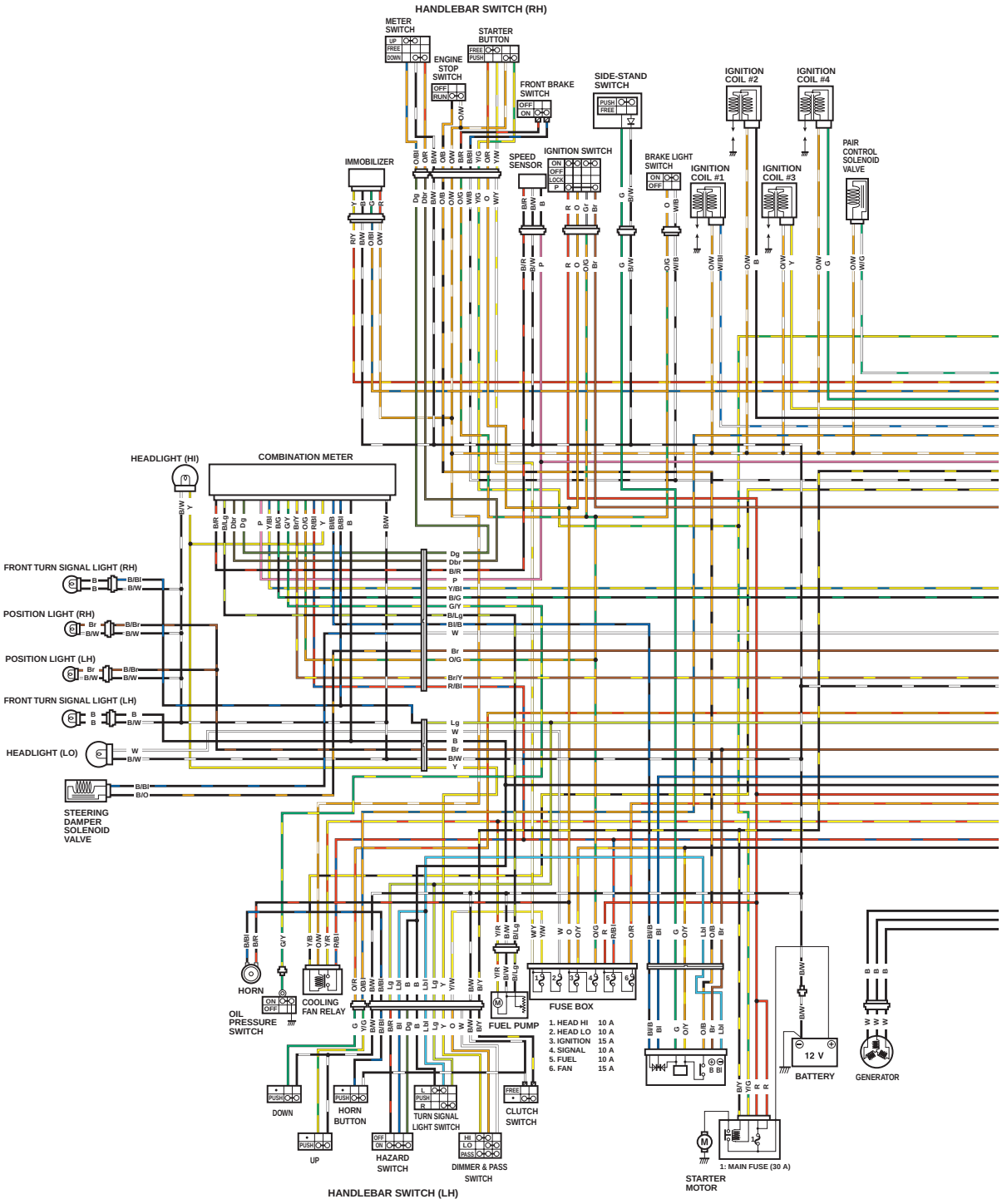
Schematic and Routing Diagram

Wiring Diagram

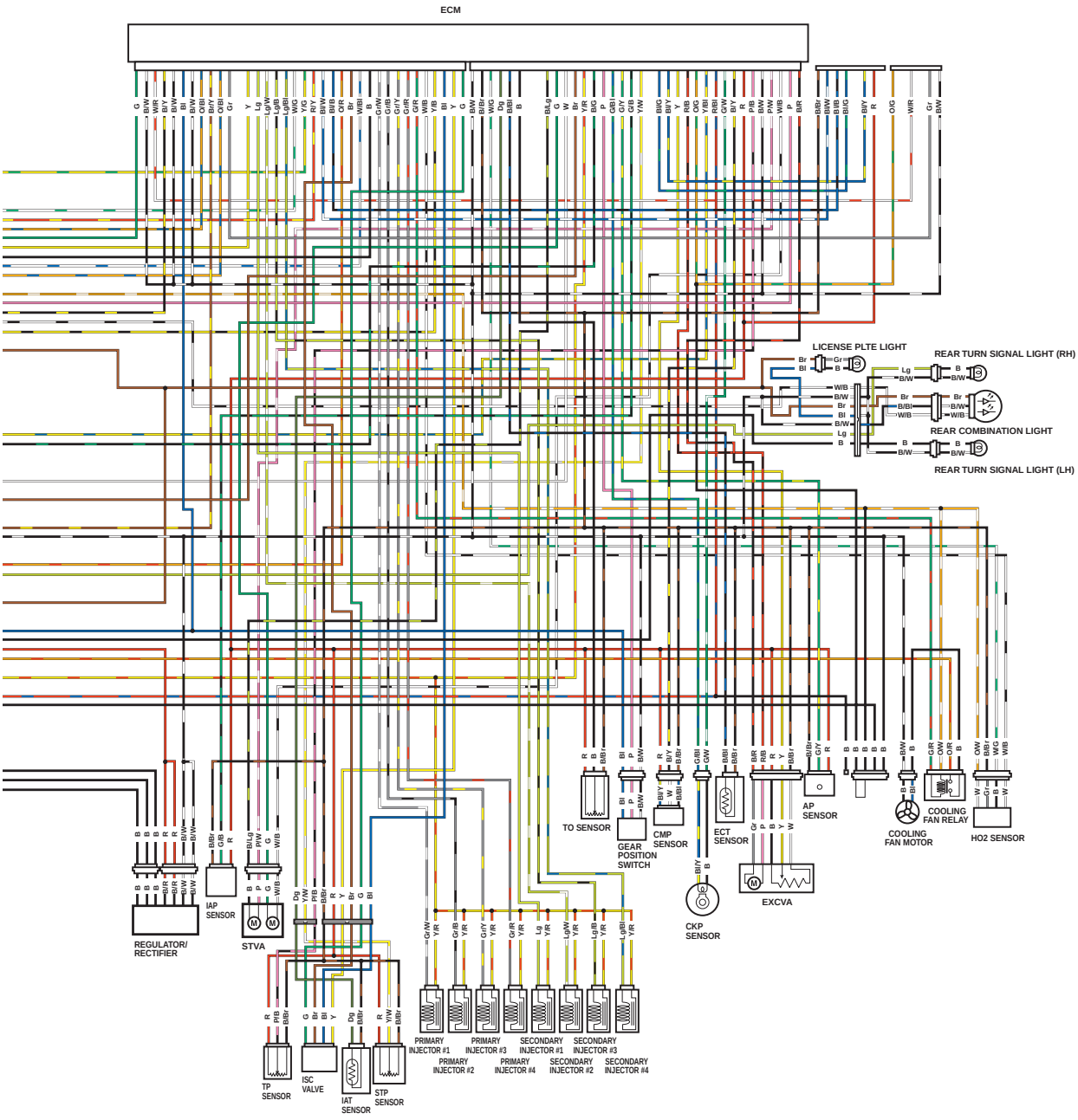
B947H19102001

Refer to “Wire Color Symbols” in Section 0A (Page 0A-5).

For E-02, 19, 24, 51



I947H1910901-03



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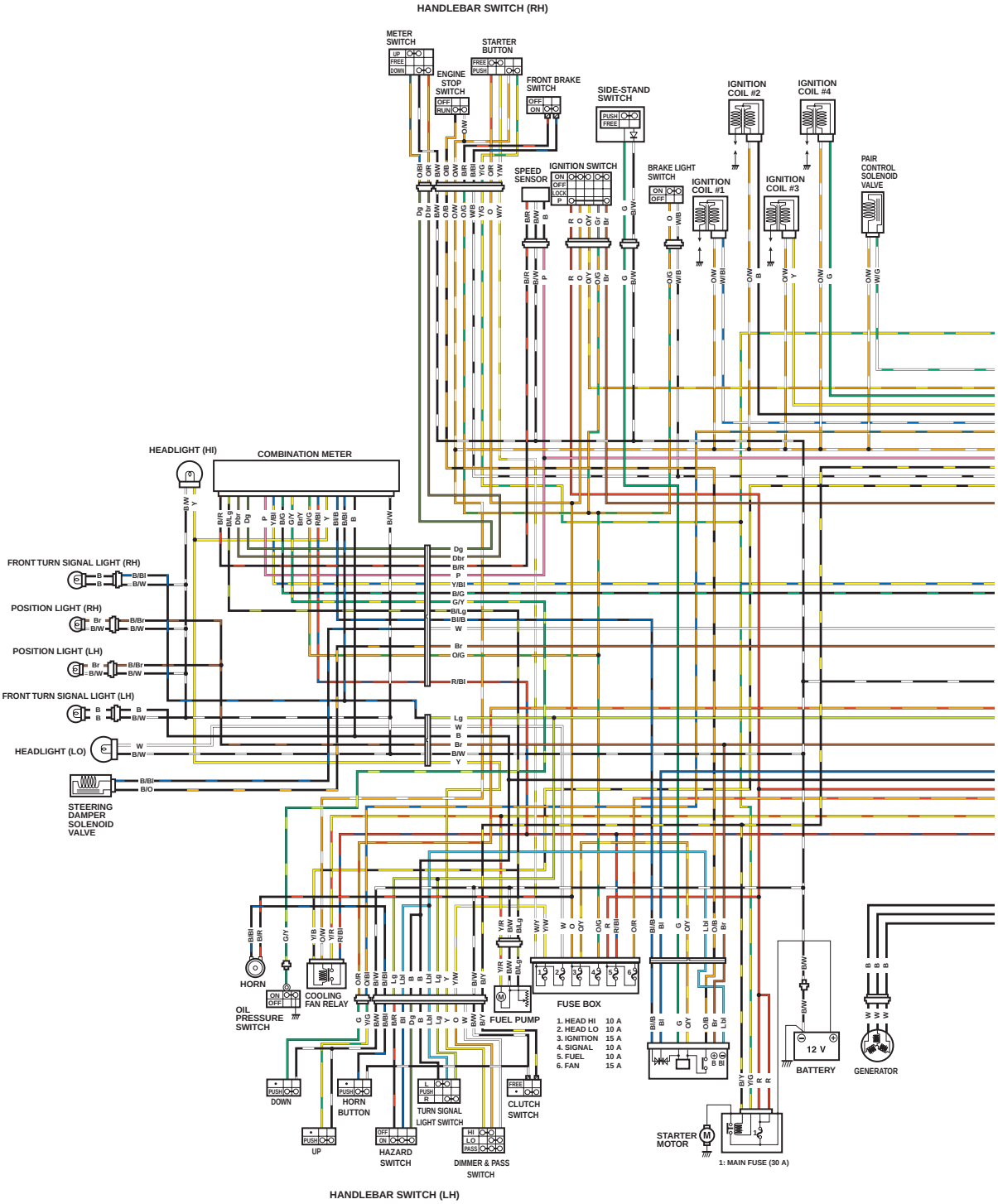
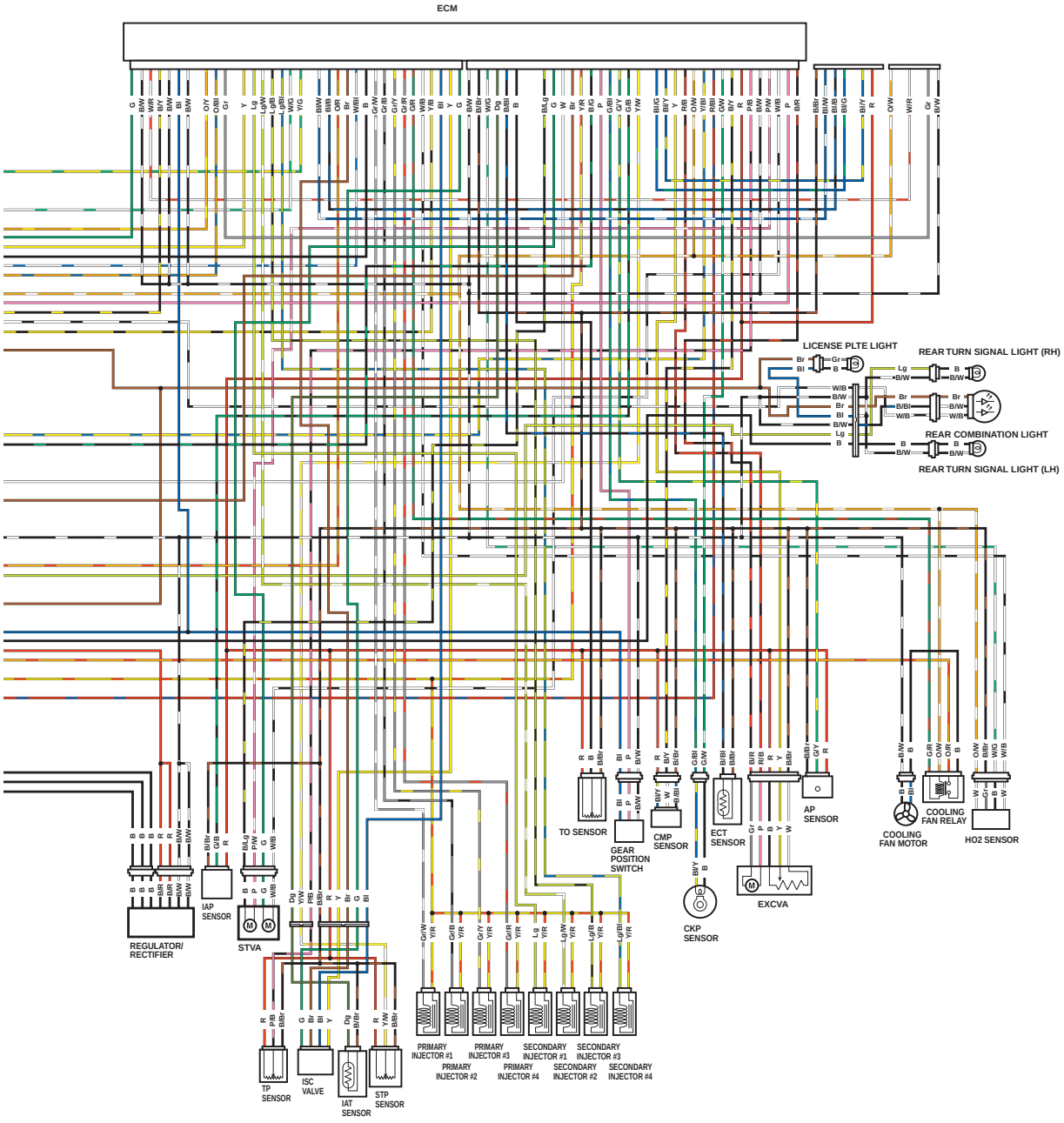
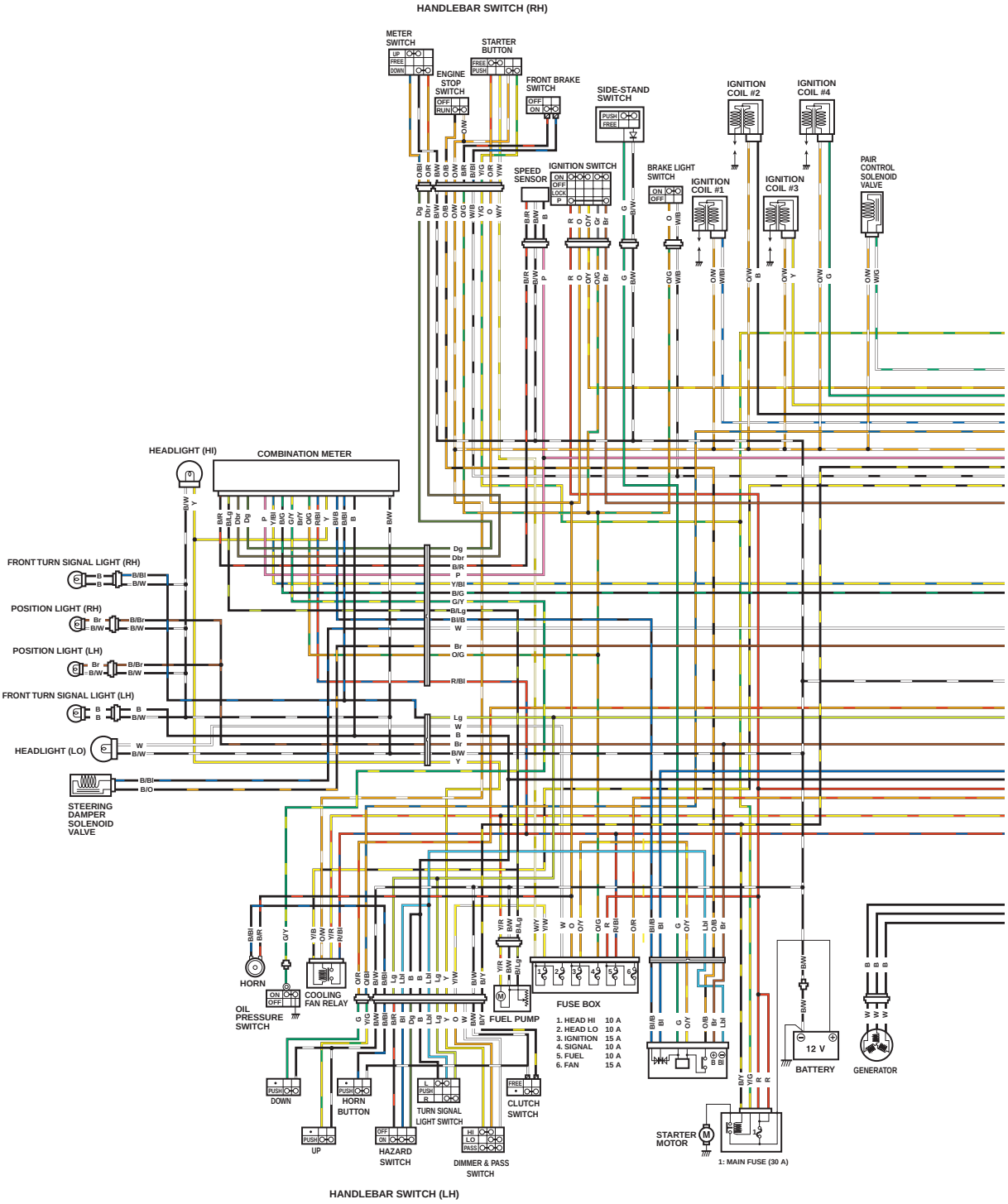
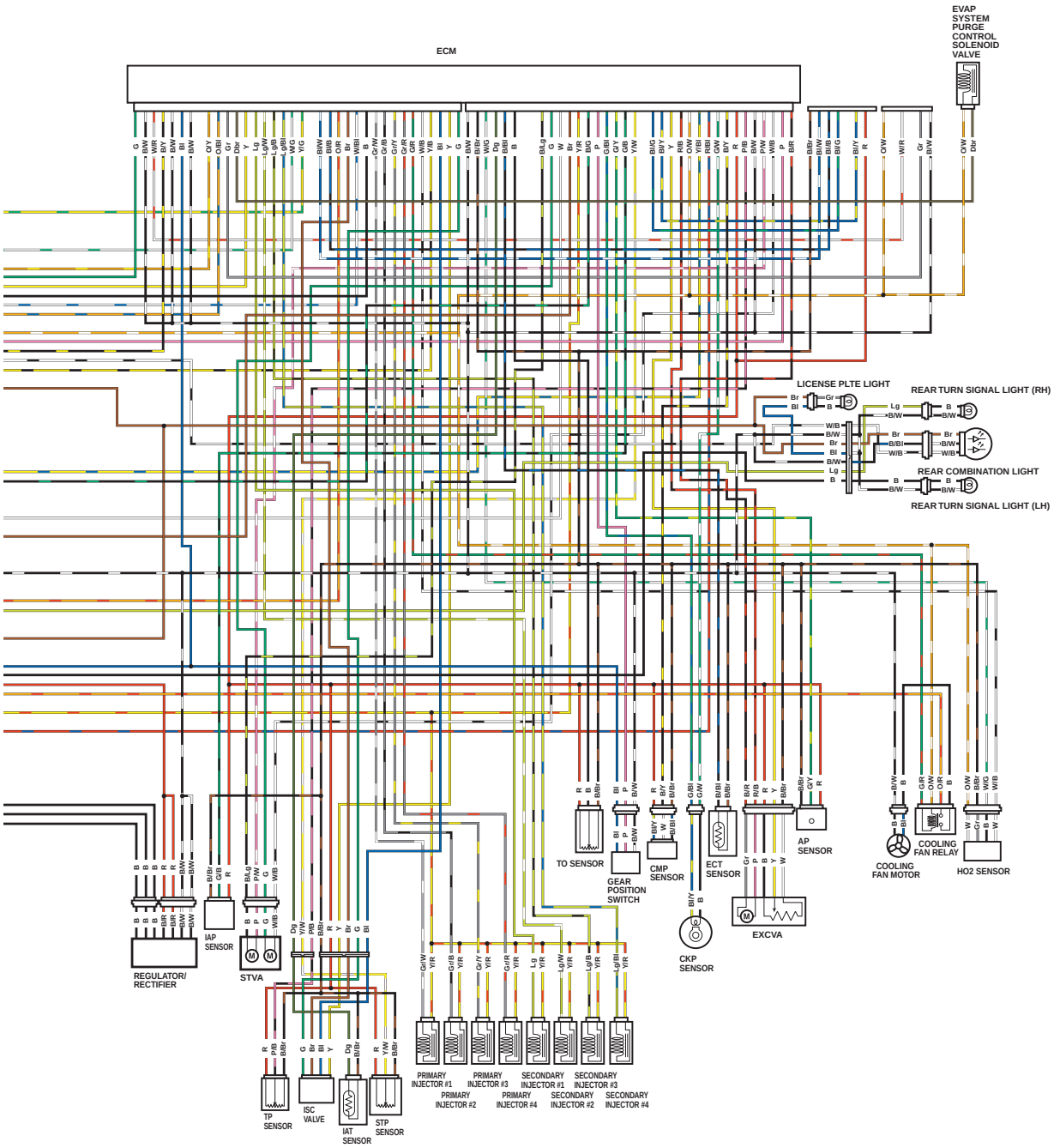
For E-03, 28


HANDLEBAR SWITCH (RH)
METER SWITCH
STARTER BUTTON
ENGINE STOP SWITCH
FRONT BRAKE SWITCH
SIDE-STAND SWITCH
IGNITION COIL #2
IGNITION COIL #4
SPEED SENSOR
IGNITION SWITCH
BRAKE LIGHT SWITCH
IGNITION COIL #1
IGNITION COIL #3
PAIR CONTROL SOLENOID VALVE
HEADLIGHT (HI)
COMBINATION METER
FRONT TURN SIGNAL LIGHT (RH)
POSITION LIGHT (RH)
POSITION LIGHT (LH)
FRONT TURN SIGNAL LIGHT (LH)
HEADLIGHT (LO)
STEERING DAMPER SOLENOID VALVE
HORN
COOLING FAN RELAY
OIL PRESSURE SWITCH
FUEL PUMP
FUSE BOX
1. HEAD HI 10 A
2. HEAD LO 10 A
3. IGNITION 15 A
4. SIGNAL 10 A
5. FUEL 10 A
6. FAN 15 A
12 V
BATTERY
GENERATOR
STARTER MOTOR
1: MAIN FUSE (30 A)
DOWN
HORN BUTTON
UP
HAZARD SWITCH
TURN SIGNAL LIGHT SWITCH
DIMMER & PASS SWITCH
CLUTCH SWITCH
HANDLEBAR SWITCH (LH)


ECM
LICENSE PLTE LIGHT
REAR TURN SIGNAL LIGHT (RH)
REAR COMBINATION LIGHT
REAR TURN SIGNAL LIGHT (LH)
REGULATOR/ RECTIFIER
IAP SENSOR
STVA
TO SENSOR
GEAR POSITION SWITCH
CMP SENSOR
ECT SENSOR
AP SENSOR
EXCVA
CKP SENSOR
COOLING FAN MOTOR
COOLING FAN RELAY
HO2 SENSOR
TP SENSOR
ISC VALVE
IAT SENSOR
STP SENSOR
PRIMARY INJECTOR #1
PRIMARY INJECTOR #2
PRIMARY INJECTOR #3
PRIMARY INJECTOR #4
SECONDARY INJECTOR #1
SECONDARY INJECTOR #2
SECONDARY INJECTOR #3
SECONDARY INJECTOR #4

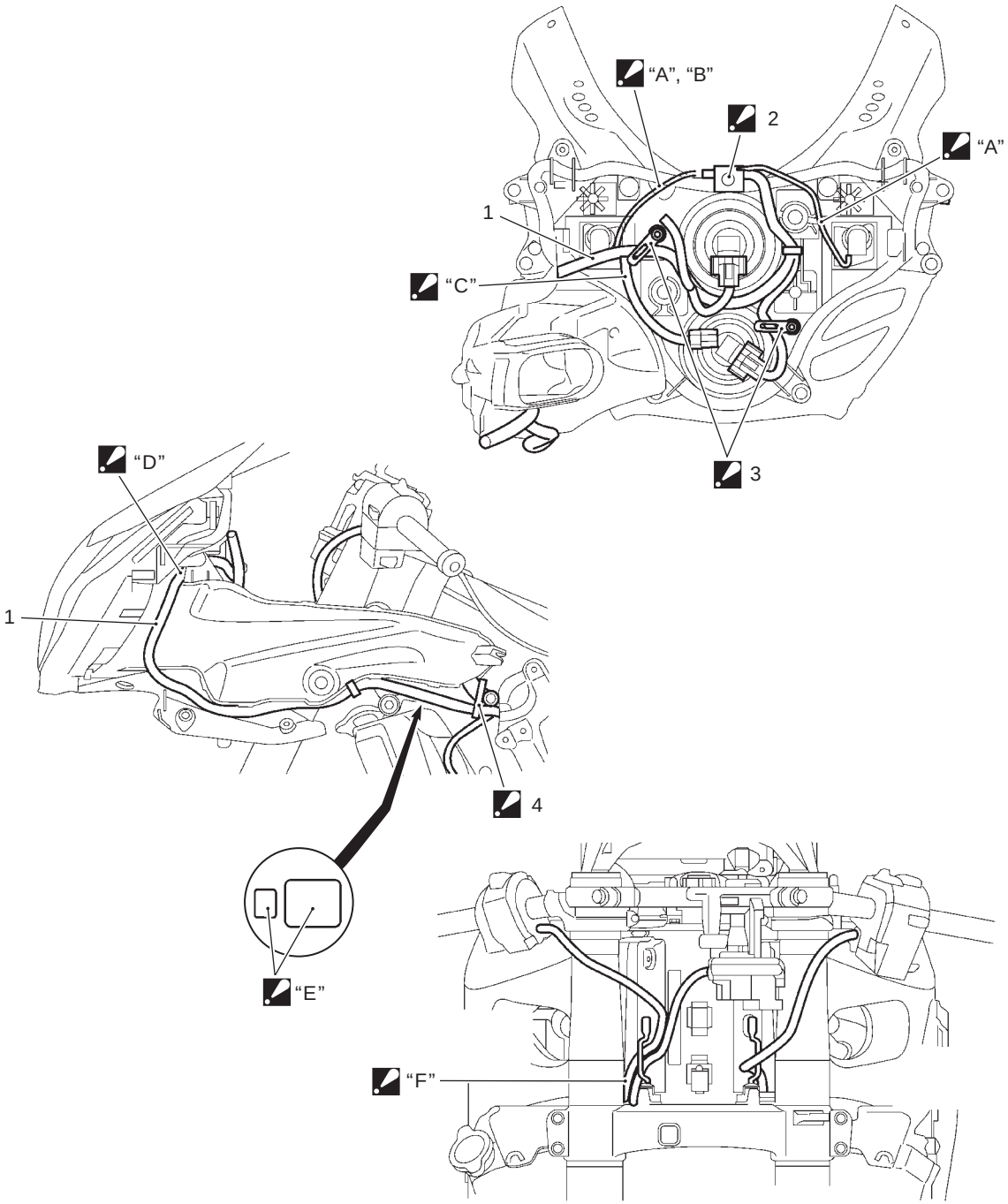
For E-14, 33


HANDLEBAR SWITCH (RH)
METER SWITCH
STARTER BUTTON
ENGINE STOP SWITCH
FRONT BRAKE SWITCH
SIDE-STAND SWITCH
IGNITION COIL #2
IGNITION COIL #4
SPEED SENSOR
IGNITION SWITCH
BRAKE LIGHT SWITCH
IGNITION COIL #1
IGNITION COIL #3
PAIR CONTROL SOLENOID VALVE
HEADLIGHT (HI)
COMBINATION METER
FRONT TURN SIGNAL LIGHT (RH)
POSITION LIGHT (RH)
POSITION LIGHT (LH)
FRONT TURN SIGNAL LIGHT (LH)
HEADLIGHT (LO)
STEERING DAMPER SOLENOID VALVE
HORN
COOLING FAN RELAY
OIL PRESSURE SWITCH
FUEL PUMP
FUSE BOX
1. HEAD HI 10 A
2. HEAD LO 10 A
3. IGNITION 15 A
4. SIGNAL 10 A
5. FUEL 10 A
6. FAN 15 A
BATTERY
12 V
GENERATOR
DOWN
HORN BUTTON
TURN SIGNAL LIGHT SWITCH
CLUTCH SWITCH
UP
HAZARD SWITCH
DIMMER & PASS SWITCH
STARTER MOTOR
1: MAIN FUSE (30 A)
HANDLEBAR SWITCH (LH)


ECM
EVAP SYSTEM PURGE CONTROL SOLENOID VALVE
LICENSE PLTE LIGHT
REAR TURN SIGNAL LIGHT (RH)
REAR COMBINATION LIGHT
REAR TURN SIGNAL LIGHT (LH)
REGULATOR/ RECTIFIER
IAP SENSOR
STVA
TO SENSOR
GEAR POSITION SWITCH
CMP SENSOR
ECT SENSOR
AP SENSOR
EXCVA
CKP SENSOR
COOLING FAN MOTOR
COOLING FAN RELAY
HO2 SENSOR
TP SENSOR
ISC VALVE
IAT SENSOR
STP SENSOR
PRIMARY INJECTOR #1
PRIMARY INJECTOR #2
PRIMARY INJECTOR #3
PRIMARY INJECTOR #4
SECONDARY INJECTOR #1
SECONDARY INJECTOR #2
SECONDARY INJECTOR #3
SECONDARY INJECTOR #4

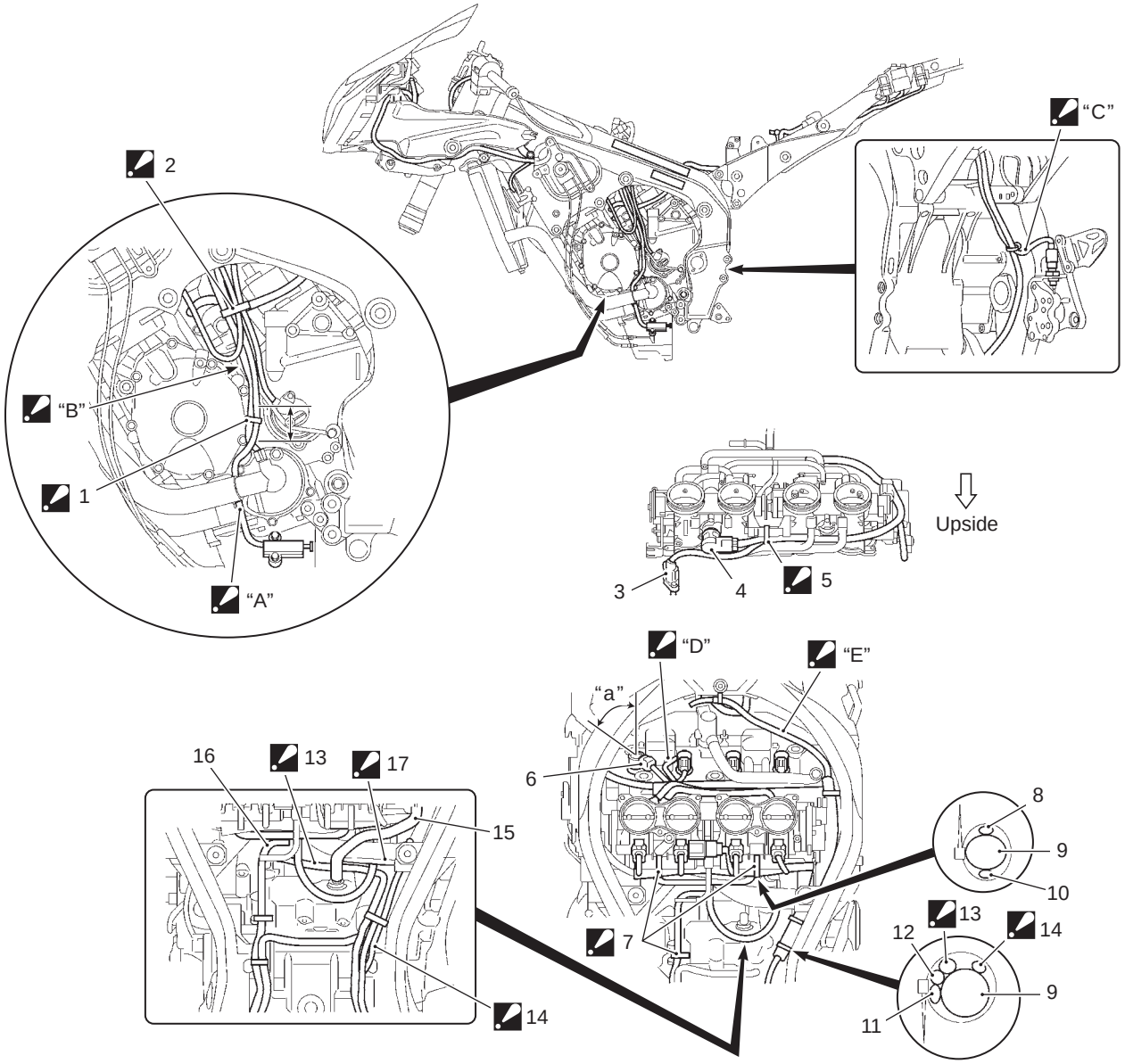
Wiring Harness Routing Diagram

B947H19102002



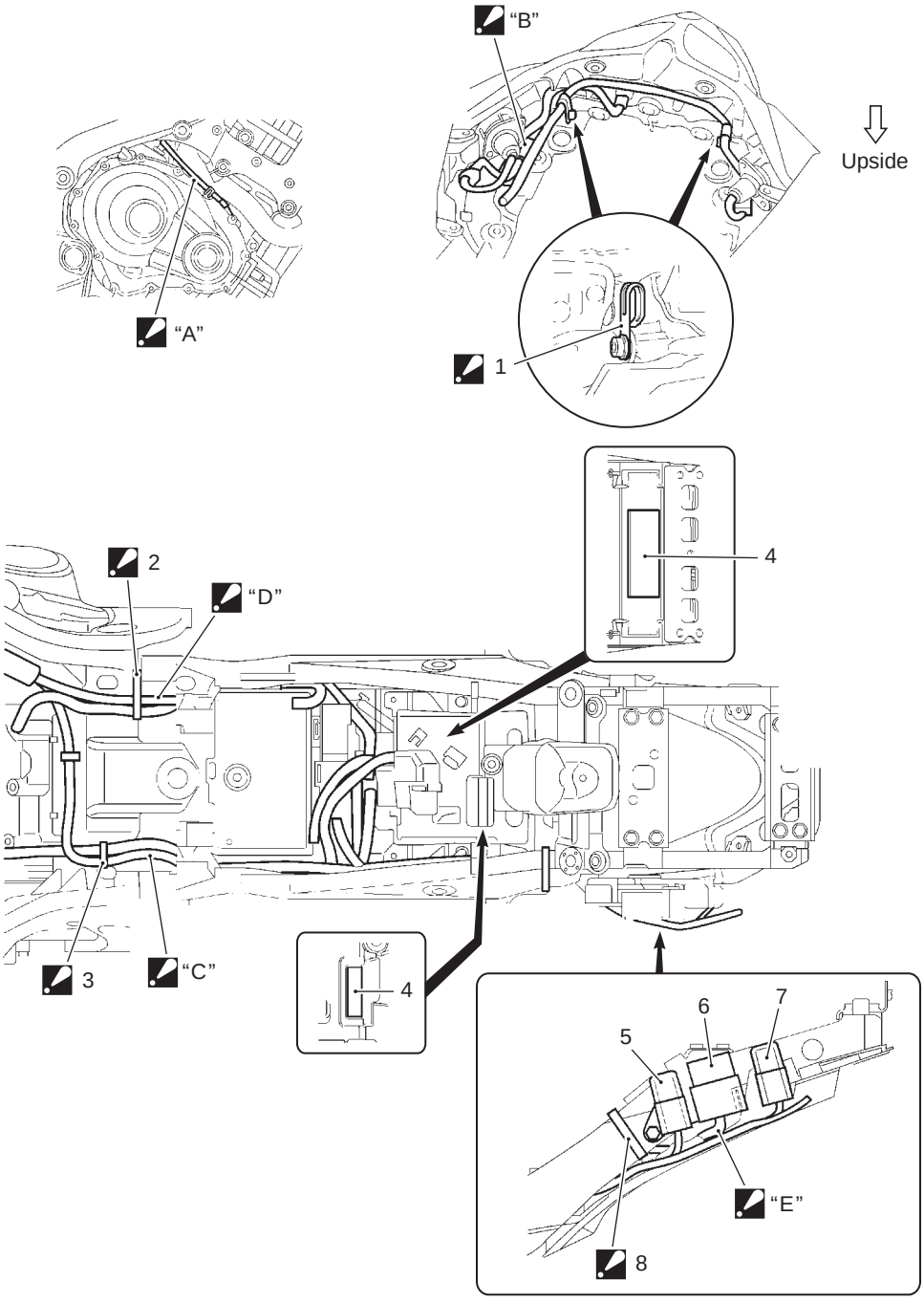
I947H1910907-03

1. Wiring harness No. 2	"B": Pass the left position light lead wires under the wiring harness No. 2.
2. Tapping clamp : Insert the clamp from the front side. Place the turn signal and position light couplers in front of the clamp.	"C": Route the steering damper lead wire under the wiring harness No. 2. Do not pass it over the harness.
3. Steel clamp : Clamp the wiring harness at the blue taping point. Bend the steel clamps to the front side.	"D": Pass the wiring harness No. 2 in front of the air intake pipe mounting fastener.
4. Clamp: Face the clamp end upward.	"E": Place the small coupler inside and the big one outside.
"A": Take care not pinch the position light lead wires between the headlight assembly and cowling brace.	"F": Pass the right handlebar switch lead wire above the ignition switch lead wire.



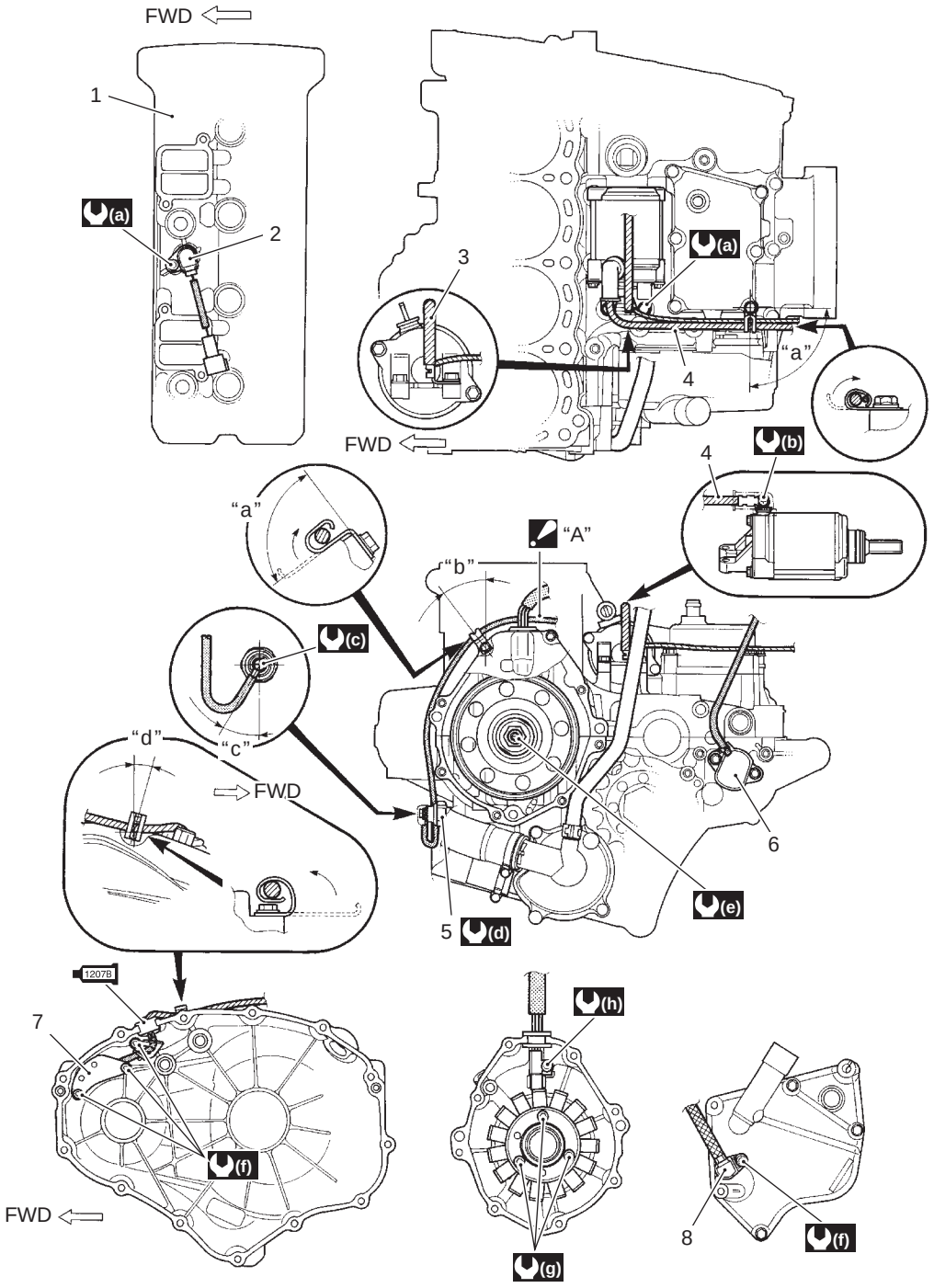
I947H1910908-03

1. Clamp : Pass the side-stand switch lead wire left side of the water by-pass hose and clamp them in this range. Cut off the excess tip of the clamp.	13. Battery negative lead wire : Pass the battery negative lead wire in front of the PCV hose. (For E-33, pass the lead wire below the EVAP solenoid hoses, and between the EVAP solenoid lead wire and wiring harness.)
2. Clamp : Bind the lead wires at the blue taping point and face the clamp end to the engine side.	14. Rear brake light switch lead wire : Pass the rear brake light switch lead wire below the wiring harness and battery negative lead wire at the frame bridge part, then above the wiring harness at the fuel tank rail part. (For E-33, pass the brake light switch lead wire between EVAP solenoid bracket and frame.)
3. IAT sensor	15. Crankcase breather (PCV) hose
4. ISC valve	16. Starter motor lead wire
5. Clamp : Bind the lead wires with throttle body at blue taping point and face the clamp end forward.	17. CKP sensor lead wire : Route the CKP sensor lead wire in front of the PCV hose and above the battery negative lead wire.
6. White coupler (for ignition coil #1)	"A": Pass the side-stand switch lead wire between the water hoses.
7. Clamp: Face the clamp end upward.	"B": Plate the joint coupler to the engine side and pass the side-stand switch lead wire and speed sensor lead wire left side of the water by-pass hose.
8. STVA lead wire	"C": Pass the rear brake light switch lead wire between the frame and drain hose, and under the clamp.
9. Wiring harness	"D": Pass the CMP sensor lead wire between ignition coil #1 and #2.
10. ISC valve lead wire	"E": Pass the wiring harness above the air cleaner duct.
11. Regulator/rectifier lead wire	"a": $60 \pm 5°$
12. EVAP system purge control solenoid valve lead wire (E-33 only)	



I947H1910909-03

1. Steel clamp : Set the clamp facing downward and bend it to outside.	8. Clamp : Put the coupler in the frame rib and face the clamp end inside.
2. Clamp : Bind the wiring harness and battery negative lead wires at blue taping point and face the clamp end outside and downward. Be sure not to slacken the rear brake light switch lead wire.	"A": Be sure not to pinch the CKP sensor lead wire between engine and water hose.
3. Clamp : Bind the wiring harness and starter motor lead wire at blue taping point and cut off the excess tip of the clamp.	"B": Put the coupler between the rear turn signal and frame cover.
4. ECM cushion	"C": Do not twist the wiring harness.
5. FP relay	"D": Bring the part number sticker on the wiring harness upward. Do not twist the wiring harness.
6. Turn signal/side-stand relay	"E": Put the turn signal/side-stand relay lead wires inside the frame.
7. Cooling fan relay	



I947H1910910-02

1. Cylinder head cover	"A": Pass the oil pressure switch lead wire between cylinder and generator lead wires.	(d) : 14 N·m (1.4 kgf-m, 10.0 lbf-ft)
2. CMP sensor	"a": 90°	(e) : 145 N·m (14.5 kgf-m, 105.0 lbf-ft)
3. Battery negative lead wire	"b": 45°	(f) : 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)
4. Starter motor lead wire	"c": 30°	(g) : 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
5. Oil pressure switch	"d": 15°	(h) : 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
6. GP switch	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	1207B : Apply bond.
7. CKP sensor	(b) : 4 N·m (0.4 kgf-m, 3.0 lbf-ft)	
8. Speed sensor	(c) : 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)	

Specifications

Service Data

B947H1910S001

Electrical

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

Tightening Torque Specifications

B947H1910S002

NOTE

The specified tightening torque is described in the following.
“Wiring Harness Routing Diagram” (Page 9A-7)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H1910T001

NOTE

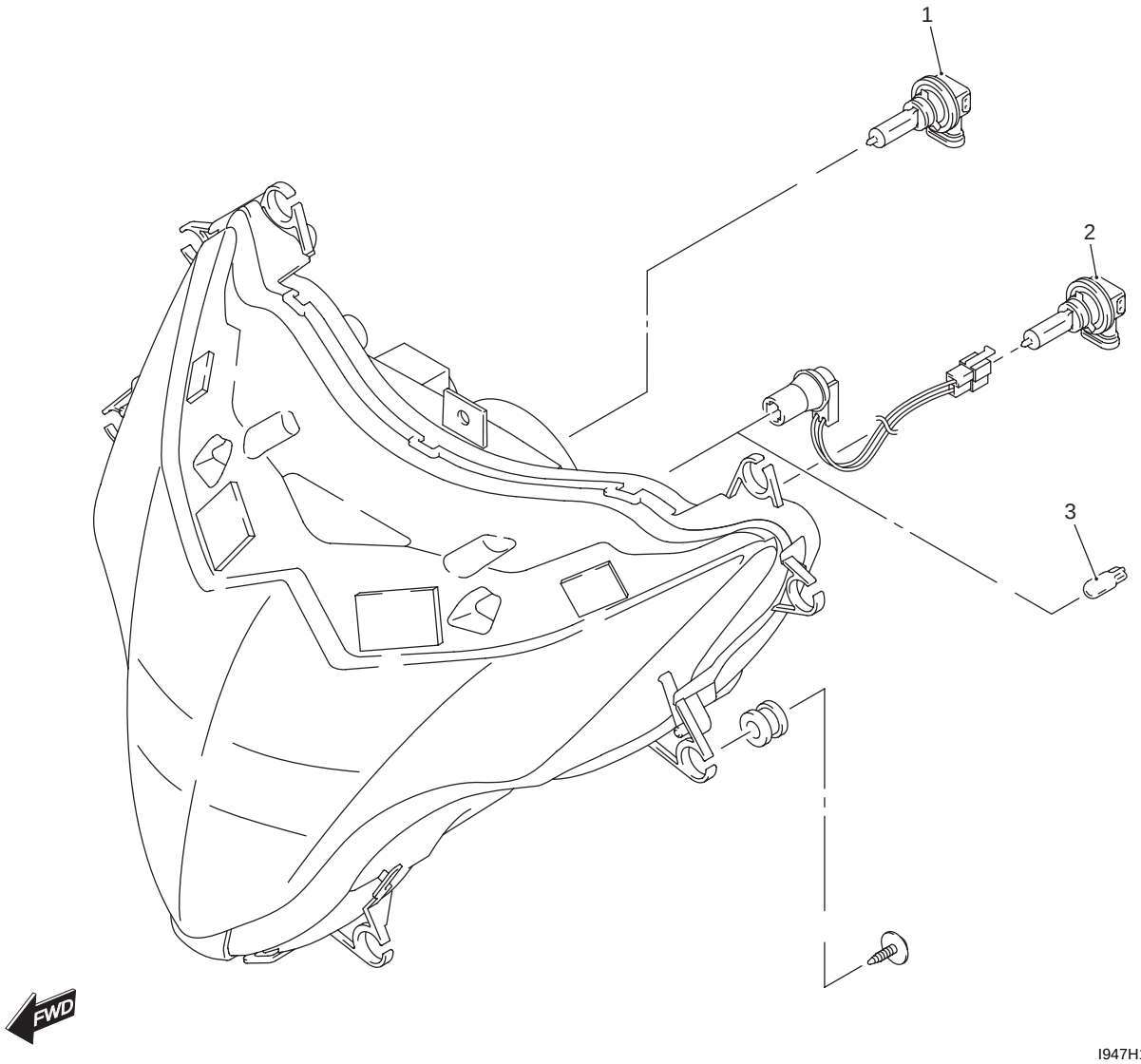
Required service material is also described in the following.
“Wiring Harness Routing Diagram” (Page 9A-7)

Lighting Systems

Repair Instructions

Headlight Components

B947H19206001



I947H1920001-02

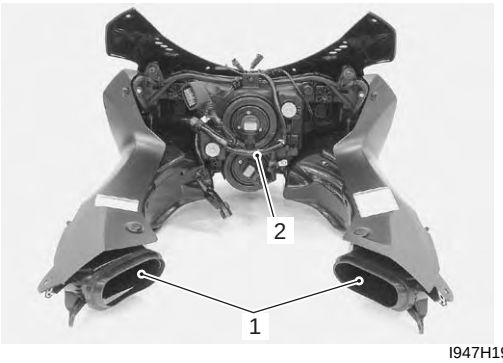
1. Headlight Low beam bulb (12 V 55 W, H11)	2. Headlight High beam bulb (12 V 65 W, H9)	3. Position light bulb (12 V 5 W) x 2

Headlight Removal and Installation

B947H19206002

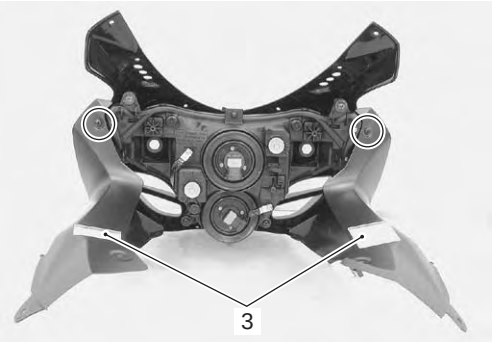
Removal

1) Remove the body cowling assembly. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the air intake pipes (1). Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
3) Remove the wiring harness No. 2 (2) by disconnecting the couplers and clamps.



I947H1920002-01

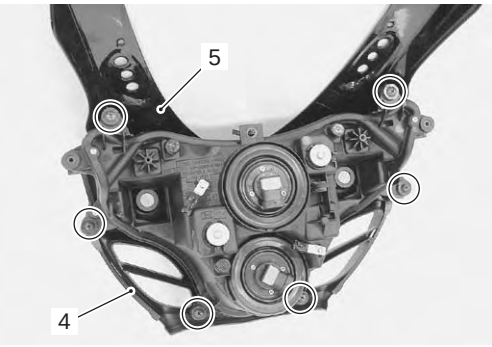
4) Remove the intake pipe covers (3).



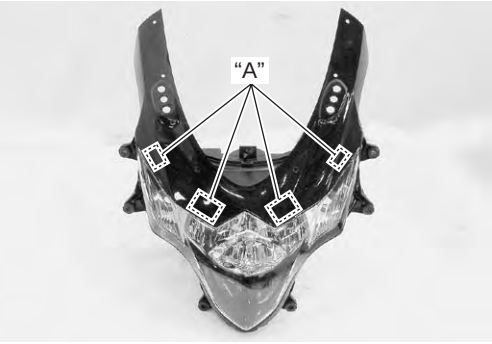
I947H1920003-01

5) Remove the intake cover (4).

6) Remove the body cowling (5).



I947H1920005-01



I947H1920006-01

"A": Velcro fastening

Installation

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

- Route the wiring harness properly. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-7).
- After installing, be sure to inspect the headlight beam. Refer to "Headlight Beam Adjustment" (Page 9B-3).

Headlight Bulb and Position Light Bulb Replacement

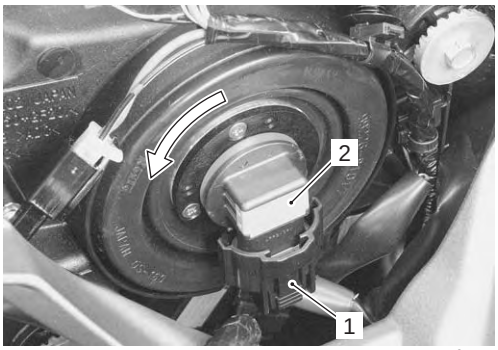
B947H19206003

⚠ CAUTION

When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soap water to prevent premature bulb failure.

Low Beam Bulb

1) Remove the combination meter. Refer to "Combination Meter Removal and Installation" in Section 9C (Page 9C-2).
2) Disconnect the headlight (Low beam) coupler (1).
3) Remove the headlight bulb/socket (Low beam) (2) by turning it counterclockwise.

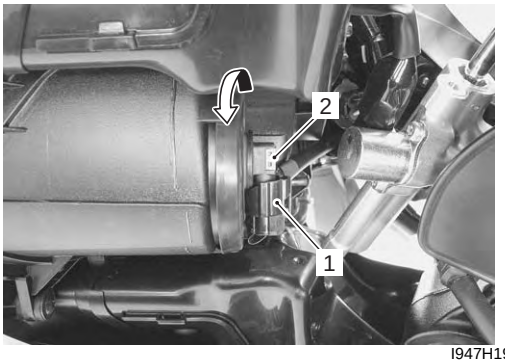


I947H1920007-01

4) Replace the headlight bulb (Low beam) with a new one.
5) Reinstall the removed parts.

High Beam Bulb

1) Remove the body cowling cover. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Disconnect the headlight (High beam) coupler (1).
3) Remove the headlight bulb/socket (High beam) (2) by turning it counterclockwise.

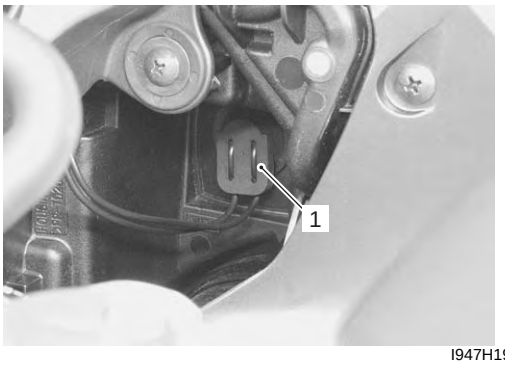


I947H1920008-01

4) Replace the headlight bulb (High beam) with a new one.
5) Reinstall the removed parts.

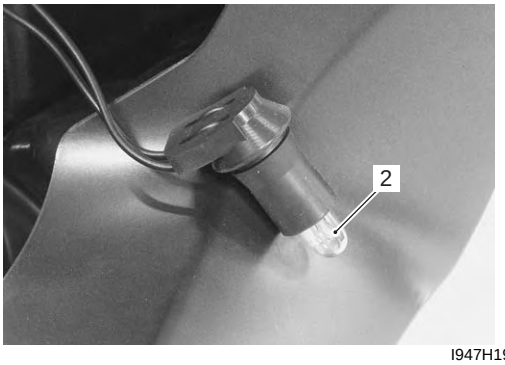
Position Light Bulb

1) Disconnect the position light socket (1).



I947H1920009-01

2) Replace the position light bulb (2) with a new one.



I947H1920010-01

3) Reinstall the position light socket.

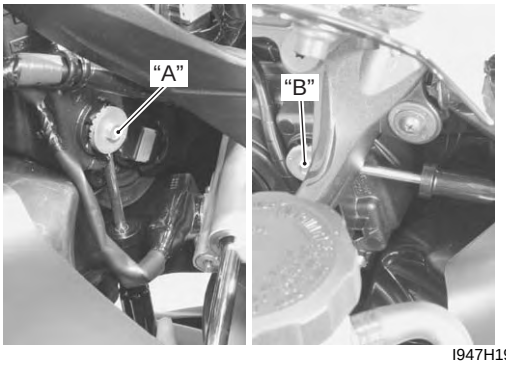
Headlight Beam Adjustment

B947H19206004

Adjust the headlight beam, both horizontally and vertically.

NOTE

- **To adjust the headlight beam, adjust the beam horizontally first, then vertically.**
- **It is not necessary to remove the combination meter to turn the adjusters.**

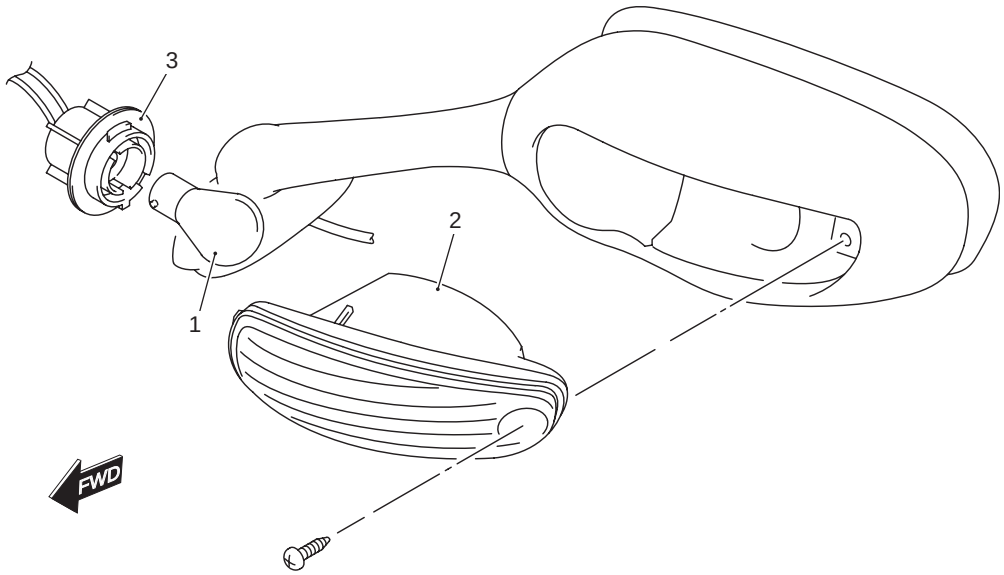


I947H1920011-02

"A": Horizontal adjuster	"B": Vertical adjuster

Front Turn Signal Light Components

B947H19206005



I947H1920012-01

1. Turn signal light bulb (12 V 21 W)	2. Front turn signal light	3. Socket

Front Turn Signal Light Removal and Installation

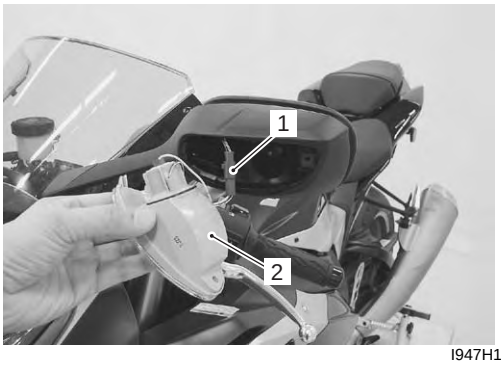
B947H19206006

Removal

1) Remove the screw.

I947H1920013-01

2) Disconnect the front turn signal coupler (1).
3) Remove the turn signal light assembly (2).



I947H1920014-01

Installation

Install the front turn signal light in the reverse order of removal.

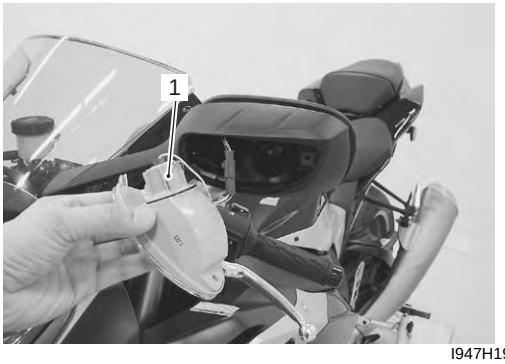
Front Turn Signal Light Bulb Replacement

B947H19206007

⚠ CAUTION

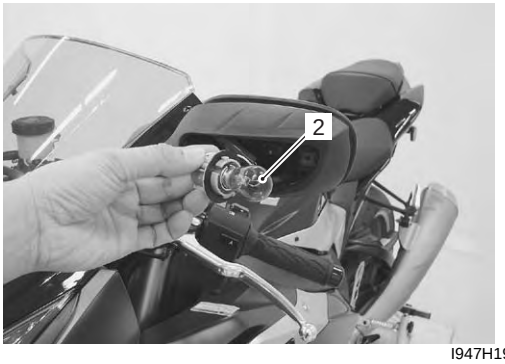
When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soap water to prevent premature bulb failure.

1) Remove the turn signal light assembly.
2) Remove the socket (1) by turning it counterclockwise.



I947H1920015-01

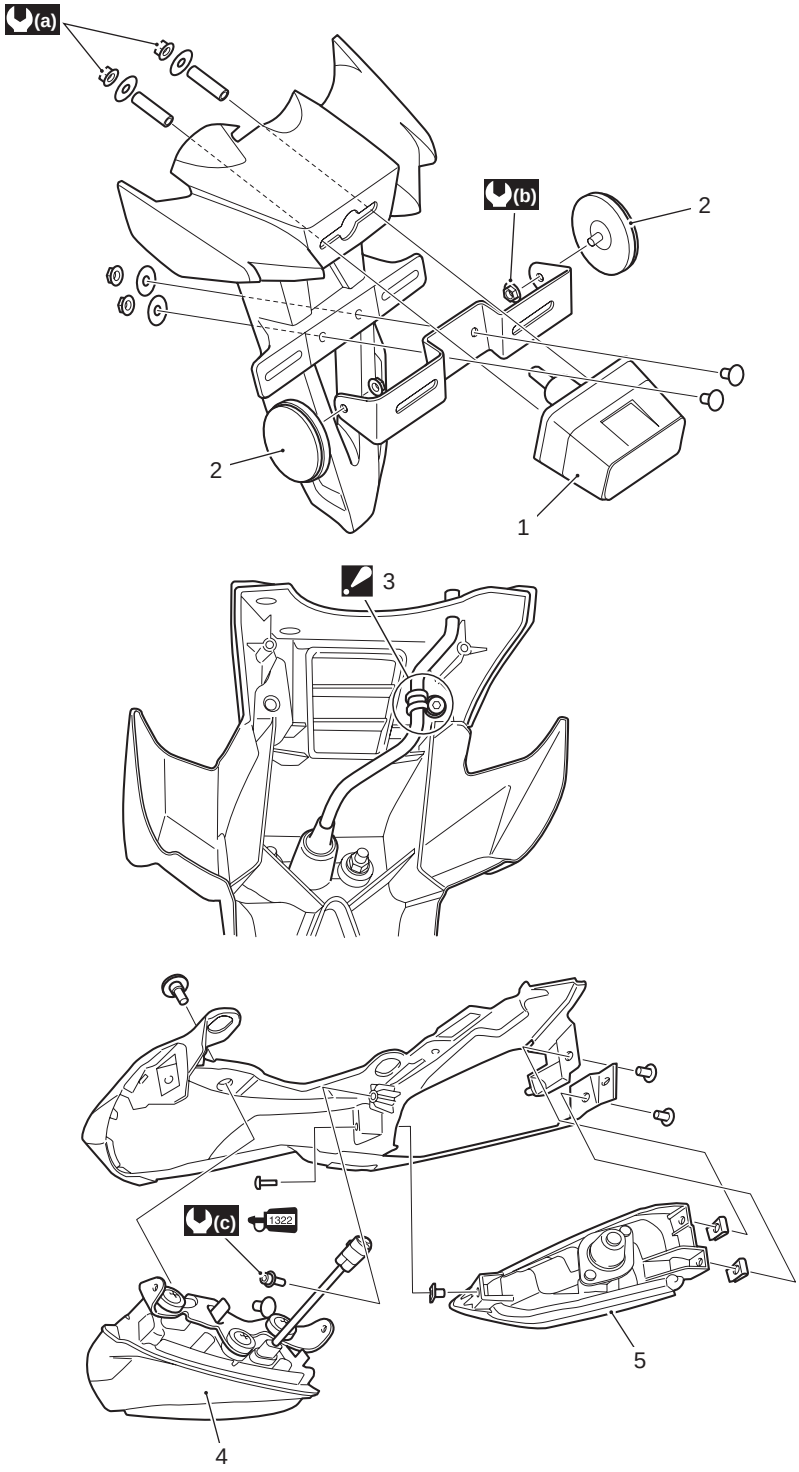
3) Replace the front turn signal light bulb (2).



I947H1920016-01

Rear Lighting System Construction

B947H19206008



I947H1920017-01

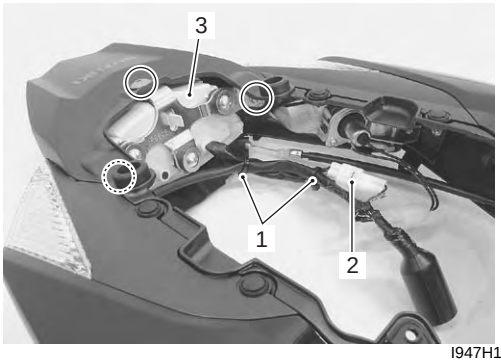
1. License plate light assembly	4. Rear combination light	(b) : 1.8 N·m (0.18 kgf-m, 1.5 lbf-ft)
2. Reflex reflector (E-03, 28, 33 only)	5. Rear turn signal light assembly (LH/RH)	(c) : 2.8 N·m (0.28 kgf-m, 2.0 lbf-ft)
3. Clamp : Clamp the license plate light lead wire so as not to be slack.	(a) : 5 N·m (0.5 kgf-m, 3.5 lbf-ft)	1322 : Apply thread lock to thread part.

Rear Combination Light Removal and Installation

B947H19206009

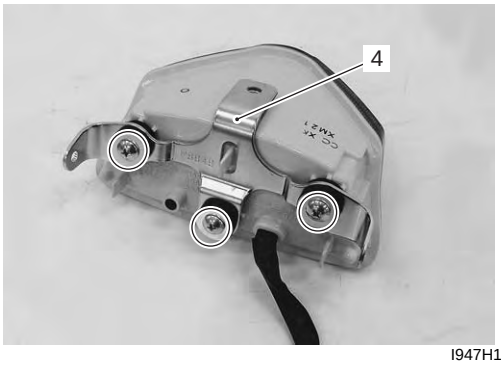
Removal

1) Remove the frame cover assembly. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the clamps (1).
3) Disconnect the combination light coupler (2).
4) Remove the rear combination light assembly (3).



I947H1920018-01

5) Remove the combination light bracket (4).



I947H1920019-01

Installation

Install the rear combination light in the reverse order of removal. Pay attention to the following point:

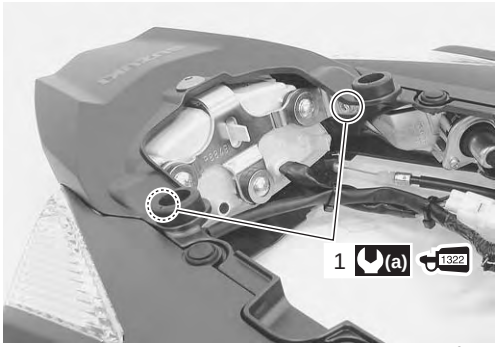
- Tighten the combination light mounting bolts (1) to the specified torque.

NOTE

When reusing the removed bolts (1), apply a small quantity of the thread lock to them.

Tightening torque
Rear combination light mounting bolt (a): 2.8 N·m (0.28 kgf-m, 2.0 lbf-ft)

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



I947H1920020-01

Rear Combination Light Replacement

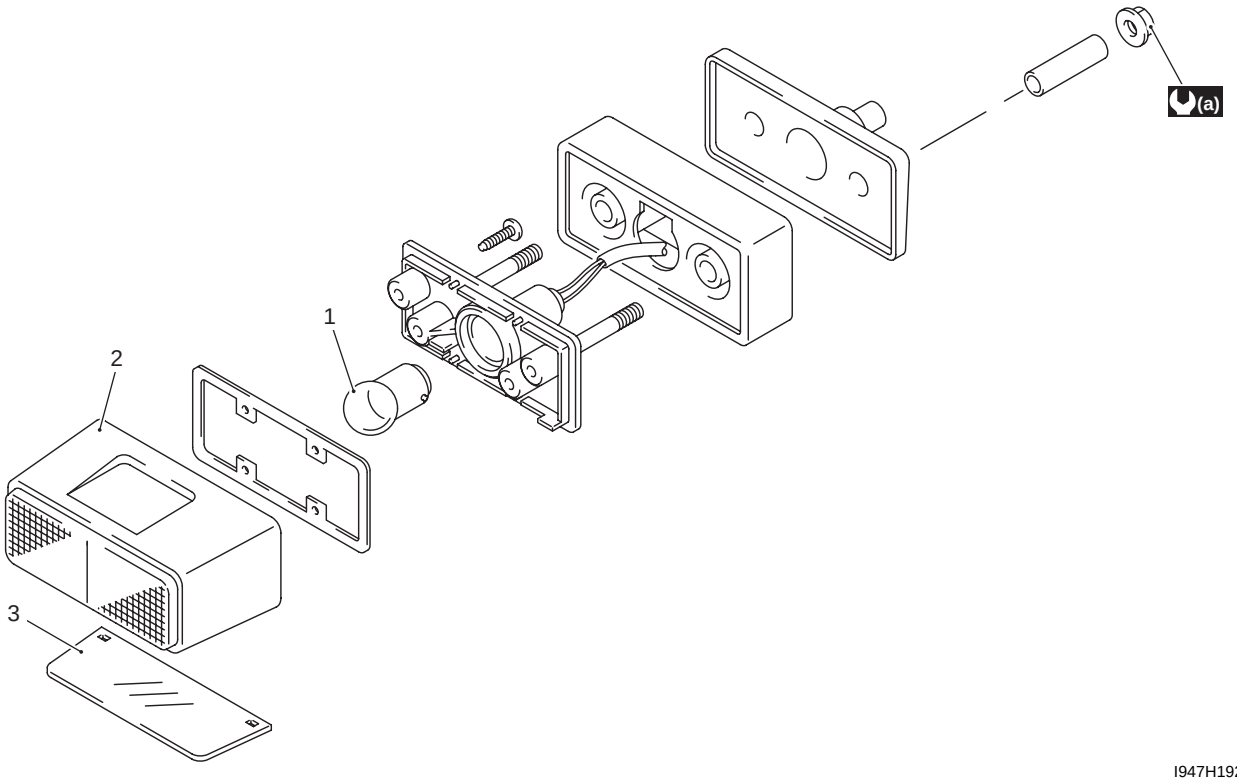
B947H19206010

⚠ CAUTION

If LED operation is abnormal, replace the rear combination light with a new one.

License Plate Light Components

B947H19206011



I947H1920021-01

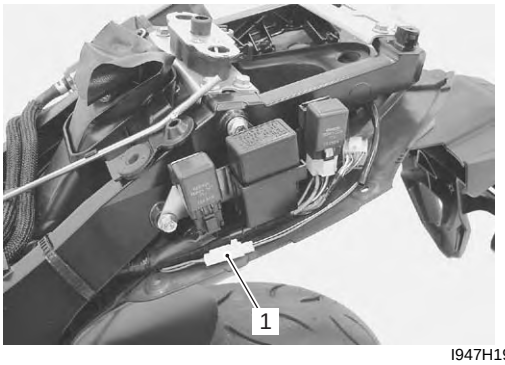
1. License plate light bulb (12 V 5 W)	3. Lens
2. Lens cover	(a) : 5 N·m (0.5 kgf-m, 3.5 lbf-ft)

License Plate Light Removal and Installation

B947H19206012

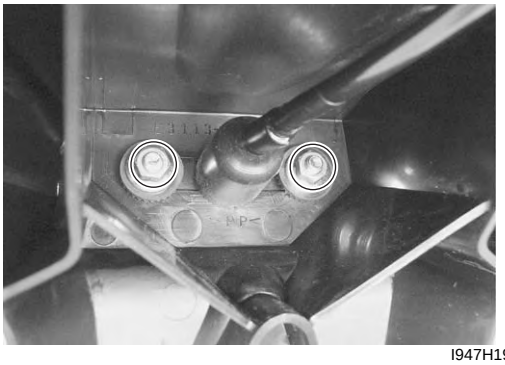
Removal

1) Remove the frame cover. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the license plate light coupler (1).



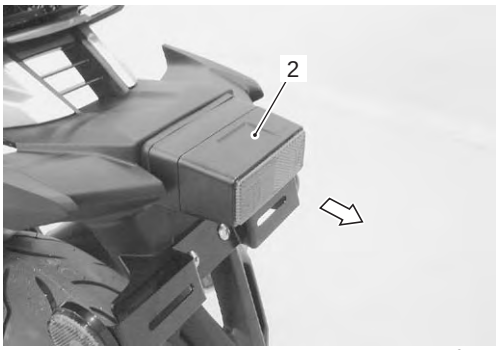
I947H1920022-01

3) Remove the nuts.



I947H1920023-01

4) Remove the license plate light assembly (2).

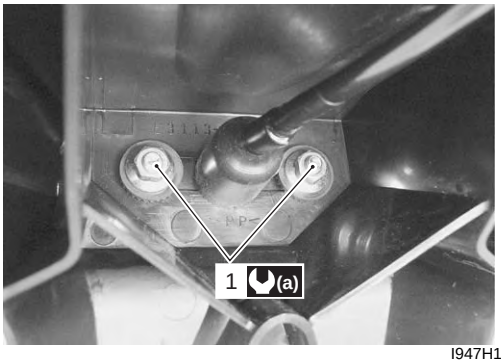


I947H1920024-01

Installation
Install the license plate light in the reverse order of removal. Pay attention to the following point:

- Tighten the license plate light mounting nuts (1) to the specified torque.

Tightening torque
License plate light mounting nut (a): 5 N·m (0.5 kgf-m, 3.5 lbf-ft)



I947H1920025-01

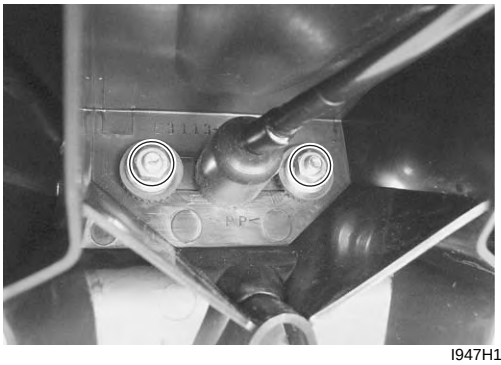
License Plate Light Bulb Replacement

B947H19206013

⚠ CAUTION

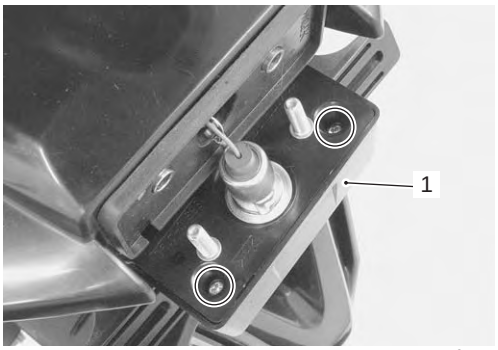
When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soap water to prevent premature bulb failure.

1) Remove the license plate light mounting nuts.



I947H1920026-01

2) Remove the lens cover (1) by removing the screws.



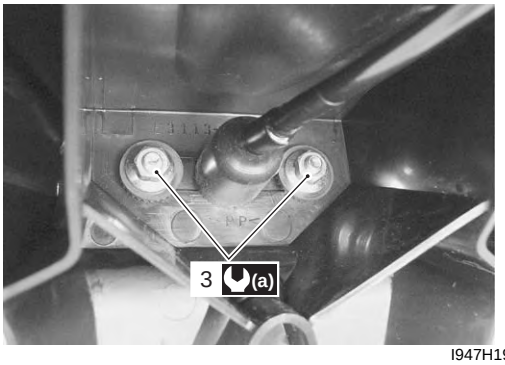
I947H1920027-01

3) Replace the bulb (2) with a new one.

I947H1920028-01

4) Reinstall the removed parts.
5) Tighten the license plate light mounting nuts (3) to the specified torque.

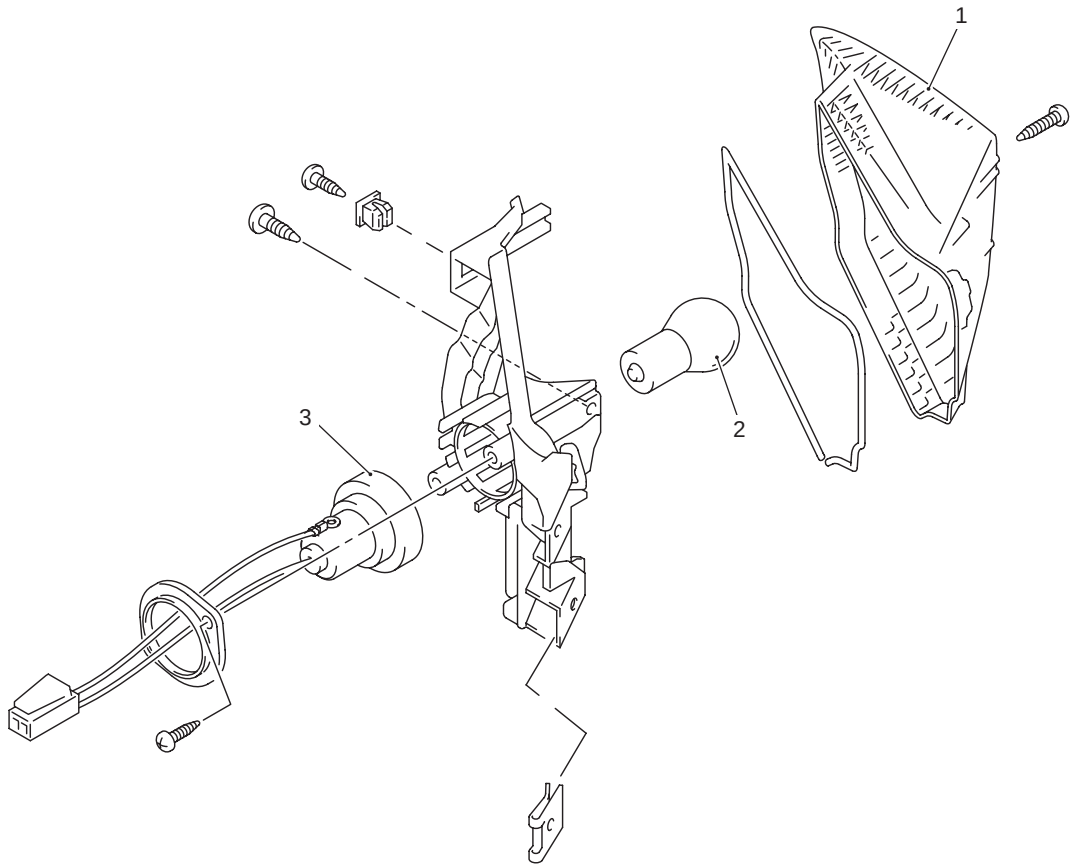
Tightening torque
License plate light mounting nut (a): 5 N·m (0.5 kgf-m, 3.5 lbf-ft)



I947H1920029-01

Rear Turn Signal Light Components

B947H19206014



I947H1920030-01

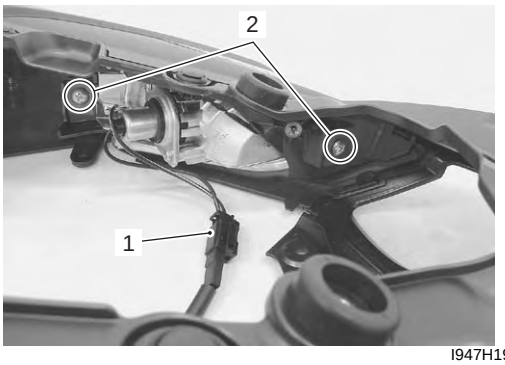
1. Rear turn signal light lens	2. Rear turn signal light bulb (12 V 21 W)	3. Socket

Rear Turn Signal Light Removal and Installation

B947H19206015

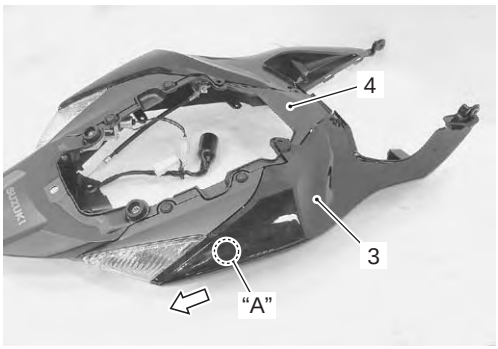
Removal

1) Remove the frame cover assembly. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the rear combination light. Refer to “Rear Combination Light Removal and Installation” (Page 9B-6).
3) Disconnect the lead wire coupler (1). (LH: White, RH: Black)
4) Remove the screws (2).



I947H1920031-01

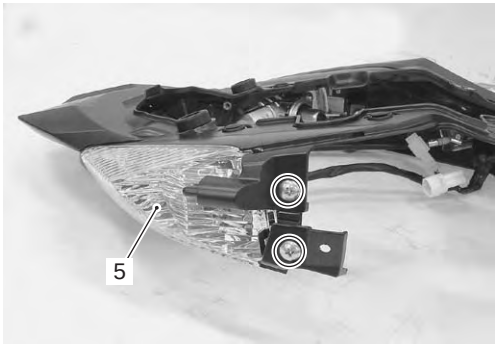
5) Remove the side frame cover (3) from the center frame cover (4). Refer to “Frame Cover Construction” in Section 9D (Page 9D-3).



I947H1920032-01

“A”: Bushing

6) Remove the rear turn signal light (5).



I947H1920033-02

Installation
Install the rear turn signal light in the reverse order of removal.

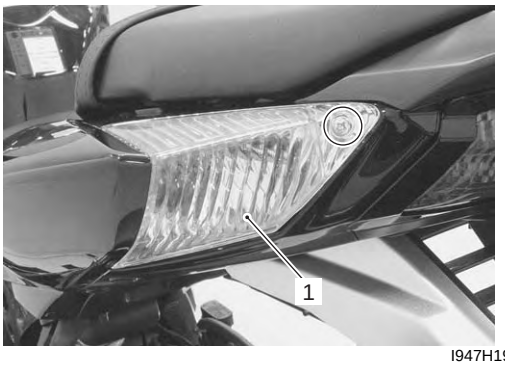
Rear Turn Signal Light Bulb Replacement

B947H19206016

⚠ CAUTION

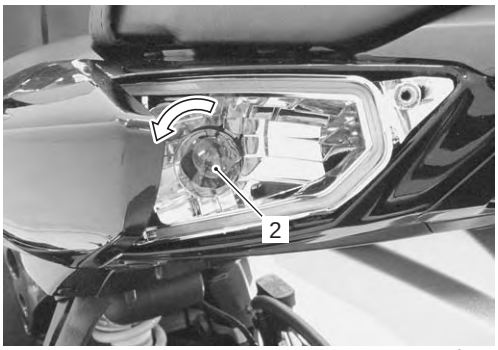
When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soap water to prevent premature bulb failure.

1) Remove the rear turn signal light lens (1).



I947H1920034-01

2) Replace the bulb (2).

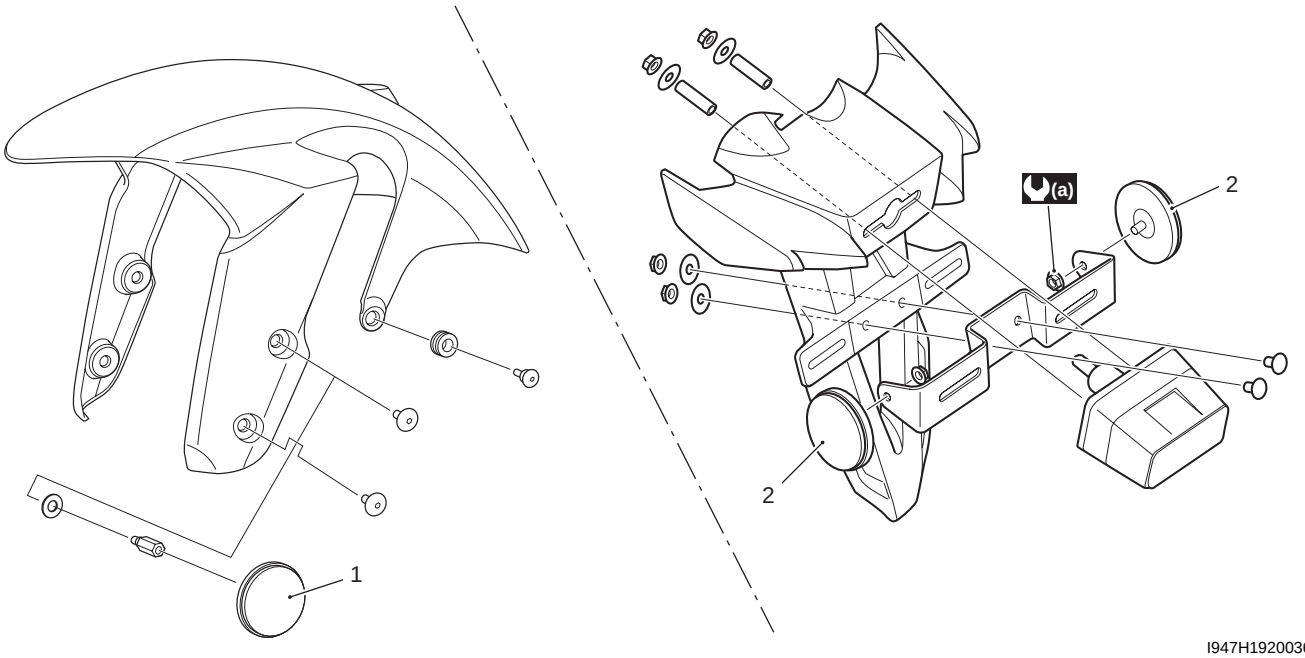


I947H1920035-01

3) Reinstall the removed parts.

Reflex Reflector Construction

B947H19206017



I947H1920036-01

1. Front reflex reflector x 2 pcs. (For E-03, 24, 28, 33)	2. Rear reflex reflector x 2 pcs. (For E-03, 28, 33)	(a) : 1.8 N·m (0.18 kgf-m, 1.5 lbf-ft)

Turn Signal / Side-Stand Relay Inspection

B947H19206019

Refer to “Electrical Components Location” in Section 0A (Page 0A-7).

NOTE

Make sure that the battery is fully charged.

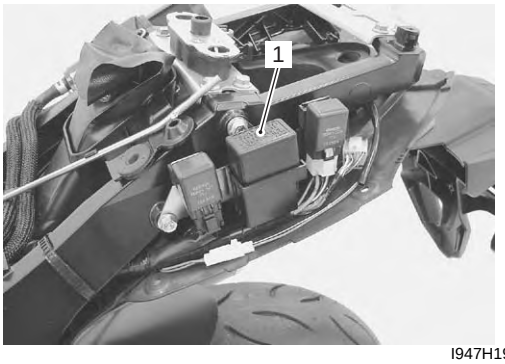
Before removing the turn signal/side-stand relay, check the operation of the turn signal light.
If the turn signal light does not illuminate, inspect the bulb, turn signal switch and circuit connection.
If the bulb, turn signal switch and circuit connection are OK, the turn signal relay may be faulty; therefore, replace the turn signal/side-stand relay with a new one. Refer to “Turn Signal / Side-Stand Relay Removal and Installation” (Page 9B-11).

Turn Signal / Side-Stand Relay Removal and Installation

B947H19206020

Removal

1) Remove the frame cover. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Remove the turn signal/side-stand relay (1).



I947H1920037-02

Installation

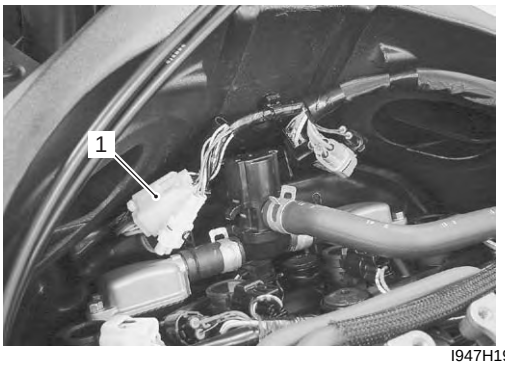
Install the turn signal/side-stand relay in the reverse order of removal.

Hazard Switch Inspection

B947H19206021

Inspect the hazard switch in the following procedures:

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Disconnect the left handlebar switch coupler (1). (Yellow)



I947H1920038-01

3) Inspect the hazard switch for continuity with the tester.
   If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to “Handlebar Removal and Installation” in Section 6B (Page 6B-2).

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity (•)))

Color / Position	B/R	Bl	Dg
OFF			
ON	○	○	○

I947H1920039-01

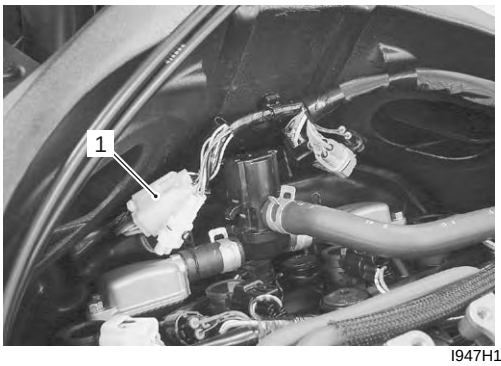
4) After finishing the hazard switch inspection, reinstall the removed parts.

Turn Signal Switch Inspection

B947H19206022

Inspect the turn signal switch in the following procedures:

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Disconnect the left handlebar switch coupler (1). (Yellow)



I947H1920040-02

3) Inspect the turn signal switch for continuity with the tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to “Handlebar Removal and Installation” in Section 6B (Page 6B-2).

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity (•)))

Color / Position	B	Lbl	Lg
L	○	○	
PUSH			
R		○	○

I947H1920041-01

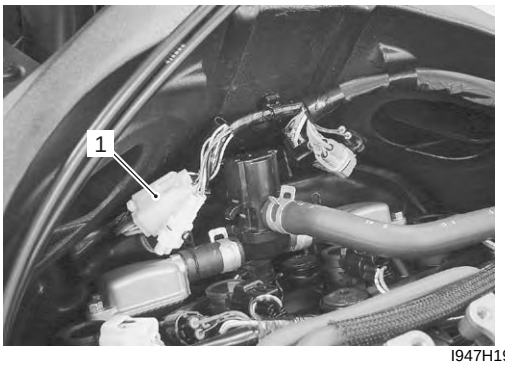
4) After finishing the turn signal switch inspection, reinstall the removed parts.

Dimmer / Passing Light Switch Inspection

B947H19206023

Inspect the dimmer/passing light switch in the following procedures:

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Disconnect the left handlebar switch coupler (1). (Yellow)



I947H1920042-02

3) Inspect the dimmer/passing light switch for continuity with the tester.
If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to “Handlebar Removal and Installation” in Section 6B (Page 6B-2).

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity (•)))

Color / Position	Y	O	W
HI	○	○	
LO		○	○
PASS	○	○	○

I947H1920043-01

4) After finishing the passing light switch inspection, reinstall the removed parts.

Specifications

Service Data

B947H19207001

Wattage

Unit: W

Item		Specification
Headlight	HI	65
	LO	55
Position light		5 x 2
Brake light/Taillight		LED
Turn signal light		21 x 4
License plate light		5

Tightening Torque Specifications

B947H19207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear combination light mounting bolt	2.8	0.28	2.0	☞(Page 9B-6)
License plate light mounting nut	5	0.5	3.5	☞(Page 9B-8) / ☞(Page 9B-8)

NOTE

The specified tightening torque is described in the following.
“Rear Lighting System Construction” (Page 9B-5)
“License Plate Light Components” (Page 9B-7)
“Reflex Reflector Construction” (Page 9B-10)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H19208001

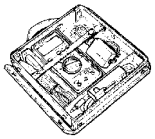
Material	SUZUKI recommended product or Specification		Note
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 9B-6)

NOTE

Required service material is also described in the following.
“Rear Lighting System Construction” (Page 9B-5)

Special Tool

B947H19208002

09900–25008 Multi circuit tester set ☞(Page 9B-11) / ☞(Page 9B-12) / ☞(Page 9B-12)		

Combination Meter / Fuel Meter / Horn

General Description

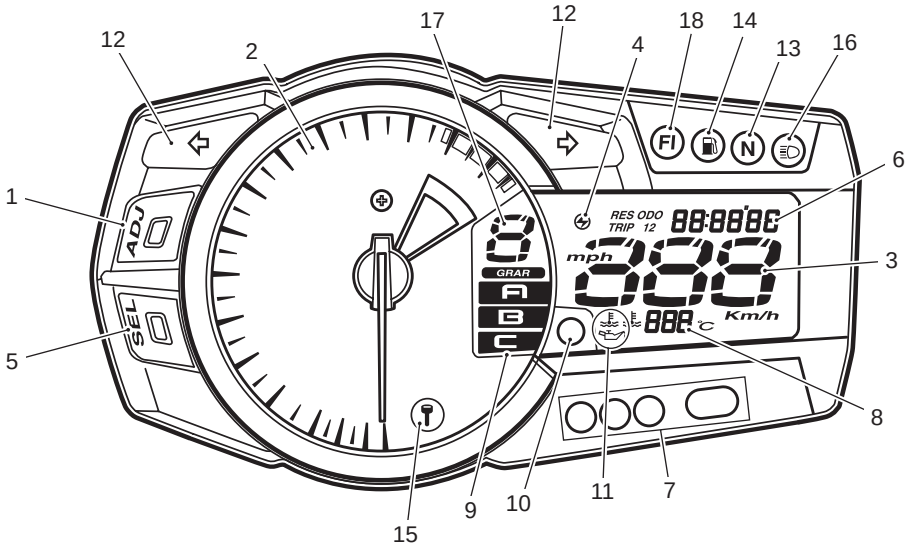
Combination Meter System Description

B947H19301001

This combination meter mainly consists of a stepping motor, LCD (Liquid Crystal Display) and LEDs (Light Emitting Diode).
The tachometer pointer is driven by the stepping motor.
The LCDs indicate followings:
Speed, Odo / Trip 1 / Trip 2 / Fuel reserve trip / Clock / FI (DTC) / Lap time counter / Panel light brightness, Gear position, Engine RPM indicator, Oil pressure indicator, Engine coolant temperature and Drive mode position.

LED (Light Emitting Diode)
LED is used for the illumination light and each indicator light.
LED is maintenance free. LED is less power consuming and more resistant to vibration resistance compared to the bulb.

Engine RPM Indicator Light
This speedometer is equipped the engine revolution indicator light. The engine revolution indicator light is adjustable from 5 000 – 13 750 r/min. (from 5 000 r/min to 10 000 r/min, every 250 r/min and 10 000 r/min to 13 750 r/min, every 50 r/min: Initial setting: 11 000 r/min)



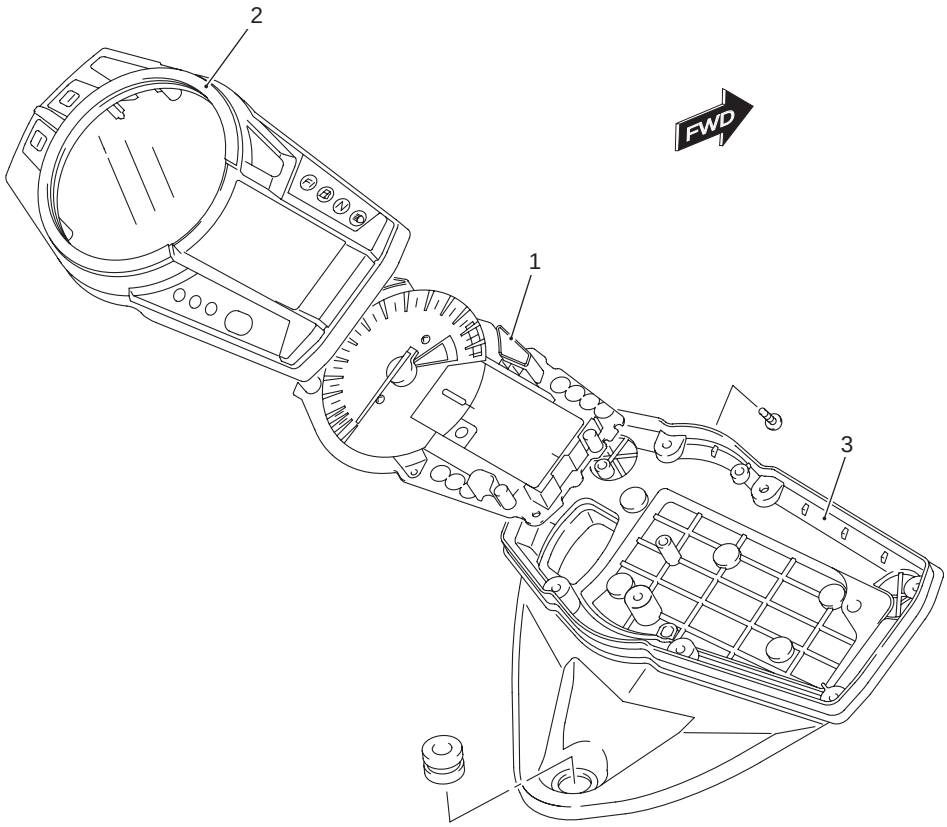
I947H1930001-02

1. ADJ button	10. LED (Oil pressure indicator light / Engine coolant temperature indicator light)
2. Tachometer	11. LCD (Oil pressure indicator / Engine coolant temperature indicator)
3. LCD (Speedometer)	12. LED (Turn signal indicator light)
4. LCD (Engine RPM indicator)	13. LED (Neutral indicator light)
5. SEL button	14. LED (Fuel indicator light)
6. LCD (Odo / Trip 1 / Trip 2 / Fuel reserve trip / Clock / FI (DTC) / Lap time counter / Panel light brightness)	15. LED (Immobilizer indicator light) (For E-02, 19, 24, 51)
7. LED (Engine RPM indicator light)	16. LED (High-beam indicator light)
8. LCD (Engine coolant temperature)	17. LCD (Gear position indicator)
9. LCD (Drive mode indicator)	18. LED (FI / Sd)

Repair Instructions

Combination Meter Components

B947H19306001



I947H1930002-01

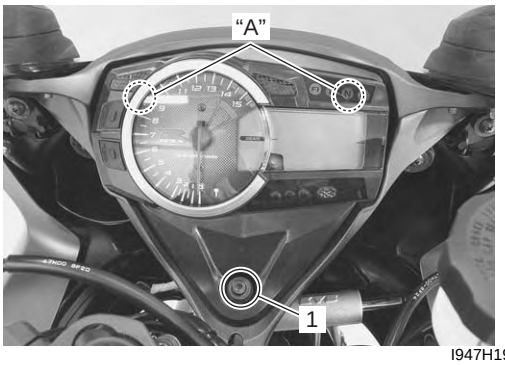
1. Combination meter unit	2. Combination meter case	3. Combination meter cover

Combination Meter Removal and Installation

B947H19306002

Removal

1) Remove the combination meter mounting bolt (1).



I947H1930003-01

"A": Bushing

2) Disconnect the coupler (2) and remove the combination meter assembly (3).

I947H1930004-01

Installation

Install the combination meter in the reverse order of removal.

NOTE

Fix the boot of the combination meter coupler firmly.

Combination Meter Disassembly and Assembly

B947H19306003

Refer to “Combination Meter Removal and Installation” (Page 9C-2).

Disassembly

Disassemble the combination meter as shown in the combination meter components. Refer to “Combination Meter Components” (Page 9C-2).

Assembly

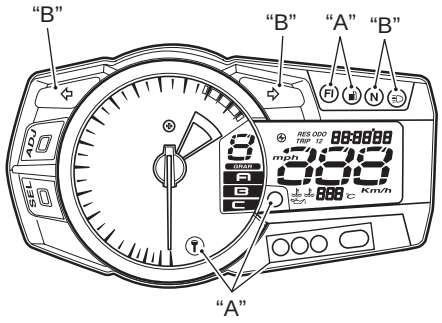
Assemble the combination meter as shown in the combination meter components. Refer to “Combination Meter Components” (Page 9C-2).

Combination Meter Inspection

B947H19306004

LED Inspection

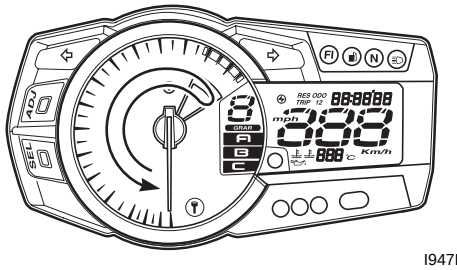
Check that the LEDs “A” (FI, fuel, engine RPM, oil pressure/engine coolant, immobilizer (E-02, 19, 24, 51) and meter panel illumination) immediately light up when the ignition switch is turned ON.
Check that the other LEDs “B” (neutral, high-beam and turn signal indicator lights) light up/go off by operating each switch.
If abnormal condition is found, replace the combination meter assembly with a new one after checking its wire harness/coupler. Refer to “Combination Meter Removal and Installation” (Page 9C-2).



I947H1930005-01

Stepping Motor Inspection and Adjustment

1) Check that the pointers calibrate immediately after turning the ignition switch ON and stop at zero point. If abnormal condition is found, replace the combination meter assembly with a new one after checking its wire harness/coupler.

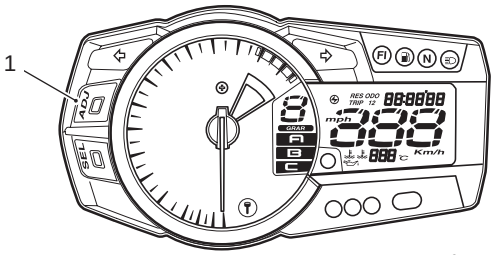


I947H1930006-02

NOTE

- **The pointers may not return to the proper position even turning the ignition switch on under low temperature condition. In that case, you can reset the pointers to the proper position by the following instruction.**
- **Complete the operation within 10 seconds after the ignition switch has been turned on.**

2) With the ADJ button (1) pressed, turn the ignition switch ON.
3) Keep pushing the ADJ button for more than 3 to 5 sec.



I947H1930007-02

4) Release the ADJ button, then tap it twice.

Time	Ignition switch	Adjuster button (1)
	OFF	PUSH
0	ON	
•		
•		
3 sec.		
•		
5 sec.		Release
•		Push
•		
•		Push→Reset
•		
10 sec.		

I837H1930023-01

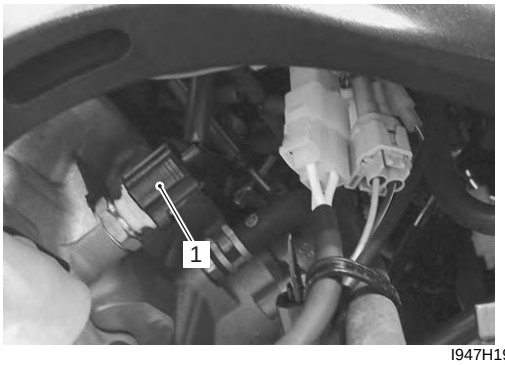
Pointers will return to the proper position right after the completion of the operation. In the case of the pointers not returning to the proper position after doing above, replace the combination meter unit. Refer to “Combination Meter Removal and Installation” (Page 9C-2).

Engine Coolant Temperature Indicator Light Inspection

B947H19306005

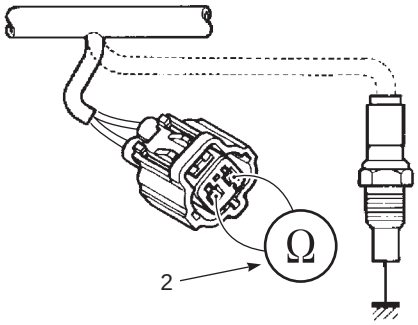
Inspect the engine coolant temperature meter and indicator light (LED) in the following procedures:

1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the ECT sensor coupler (1).



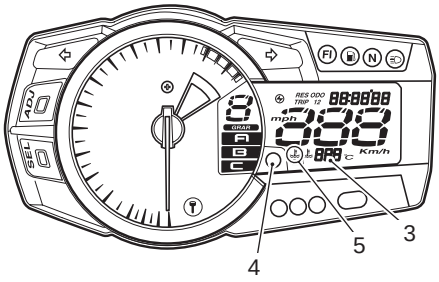
I947H1930008-01

3) Connect a variable resistor (2) between the terminals.



I718H1930009-05

4) Turn the ignition switch ON.
5) Check the engine coolant temperature meter (LCD) (3) and indicator light (LED) (4) operations when the resistance is adjusted to the specified values.
   If either one or both indications are abnormal, replace the combination meter assembly with a new one. Refer to “Combination Meter Removal and Installation” (Page 9C-2).



I947H1930009-02

Resistance “A”	LCD (3)		LED (4)	LCD (5)	Engine coolant temperature
	°C	°F			
2.45 kΩ and more	“- - -”	“- - -”	OFF	—	19 °C (67 °F) and below
Approx. 0.318 kΩ	“80”	“177”	OFF	—	Approx. 80 °C (177 °F)
0.1108 kΩ and less	“120” – “139” flicker	“248” – “282” flicker	ON	Flicker	120 – 139 °C (248 – 282 °F)
0 Ω (Jumper wire)	“HI”	“HI”	ON	Flicker	140 °C (283 °F) and over

6) Connect the ECT sensor coupler.
7) Install the removed parts.

ECT Sensor Removal and Installation

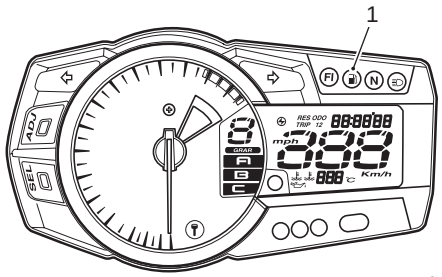
B947H19306006

Refer to “ECT Sensor Removal and Installation” in Section 1C (Page 1C-4).

Fuel Level Indicator Inspection

B947H19306007

If the fuel level indicator light (1) does not function properly, check the fuel level gauge and its lead wire/coupler.
If the fuel level gauge and its lead wire/coupler are functioning properly, replace the combination meter with a new one.



I947H1930010-01

Fuel Level Gauge Inspection

B947H19306008

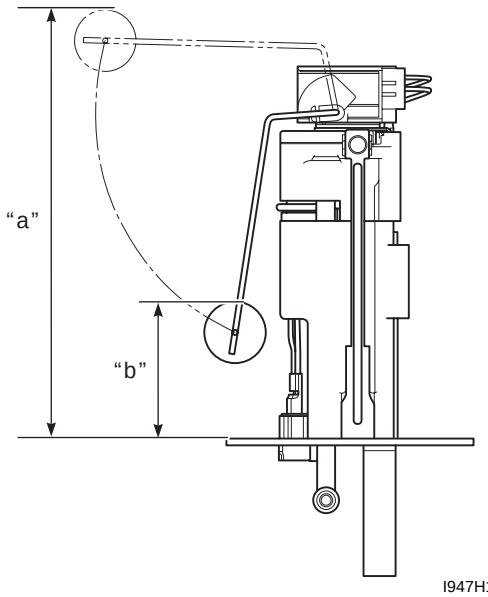
Inspect the fuel level gauge in the following procedures:

1) Remove the fuel pump. Refer to “Fuel Pump Disassembly and Assembly” in Section 1G (Page 1G-11).
2) Measure the resistance at each fuel level gauge in float position. If the resistance is incorrect, replace fuel level gauge with a new one.

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Resistance (Ω)

Float position	Resistance
Full “a”	3 – 5 Ω
Empty “b”	179 – 185 Ω



I947H1930011-01

“a”: 186.5 ± 5 mm (3.34 ± 0.2 in)	“b”: 59.7 ± 5 mm (2.35 ± 0.2 in)

3) Install the fuel pump. Refer to “Fuel Pump Disassembly and Assembly” in Section 1G (Page 1G-11).

Speedometer Inspection

B947H19306009

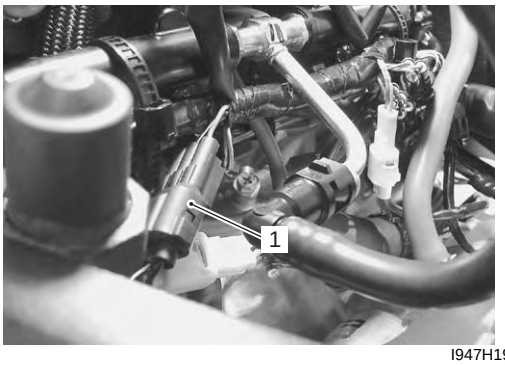
If the speedometer, odometer or tripmeter does not function properly, inspect the speed sensor and the coupler connections. If the speed sensor and coupler connections are OK, replace the combination meter unit with a new one. Refer to “Combination Meter Removal and Installation” (Page 9C-2).

Speed Sensor Removal and Installation

B947H19306010

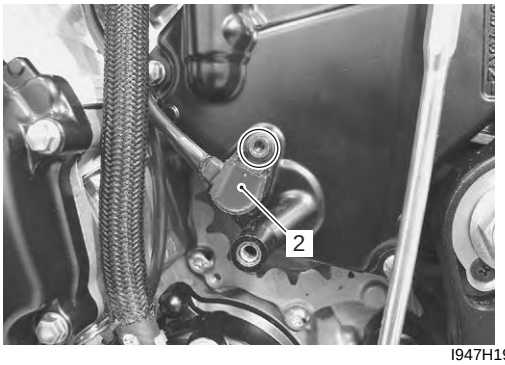
Removal

1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the speed sensor lead wire coupler (1).



I947H1930012-01

3) Remove the speed sensor (2).



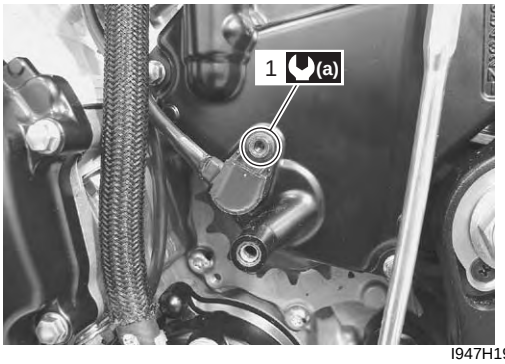
I947H1930013-01

Installation

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

- Tighten the speed sensor mounting bolt (1) to the specified torque.

  Tightening torque
  Speed sensor mounting bolt (a): 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)



I947H1930014-01

- Route the speed sensor lead wire. Refer to “Wiring Harness Routing Diagram” in Section 9A (Page 9A-7).

Speed Sensor Inspection

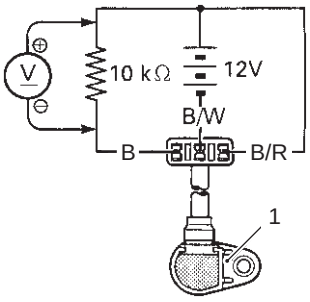
B947H19306011

Inspect the speed sensor in the following procedures:

1) Remove the speed sensor. Refer to “Speed Sensor Removal and Installation” (Page 9C-5).
2) Connect a 12 V battery (between B and B/W), 10 kΩ resistor (between B/R and B) and multi-circuit tester (tester (+) probe to B and tester (–) probe to B/R) as shown in the figure.

   Special tool
   TOOL : 09900–25008 (Multi circuit tester set)

   Tester knob indication
   Voltage (⎓)



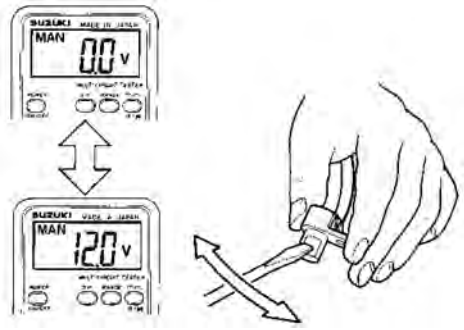
I649G1930016-02

1. Speed sensor

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).



I649G1930017-02

Oil Pressure Indicator Inspection

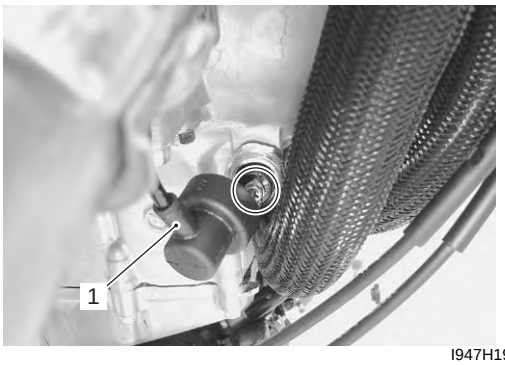
B947H19306012

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-10).

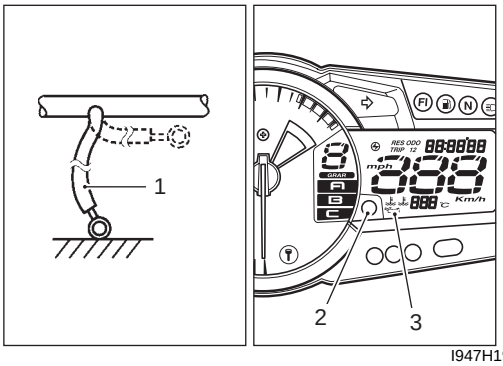
1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the oil pressure switch lead wire (1) from the oil pressure switch.



I947H1930015-01

3) Turn the ignition switch ON.

4) Check if the oil pressure indicator (LED) (2) will light up and LCD (3) will flicker when grounding the lead wire (1).
If the oil pressure indicator does not light up, replace the combination meter assembly with a new one after checking the connection of couplers.



I947H1930016-01

Oil Pressure Switch Removal and Installation

B947H19306013

Refer to “Oil Pressure Switch Removal and Installation” in Section 1E (Page 1E-9).

Oil Pressure Switch Inspection

B947H19306014

Inspect the oil pressure switch 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-10).

1) Remove the left side cowling. Refer to “Exterior Parts Removal and Installation” in Section 9D (Page 9D-6).
2) Disconnect the oil pressure switch lead wire from the oil pressure switch.
3) Inspect the oil pressure switch for continuity with the tester. If any abnormality is found, replace the oil pressure switch with a new one.

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity (•))))

Position \ Color	G/Y	Ground
ON (Engine is at stop.)	○——	——○
OFF (Engine is running.)		

I823H1930033-01

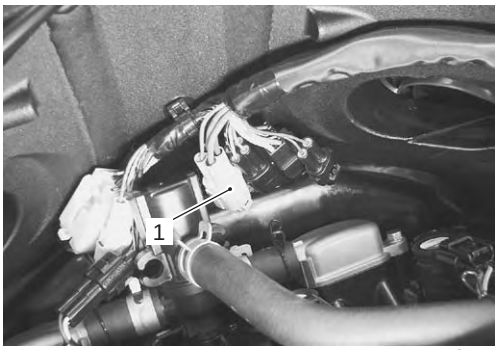
4) After finishing the oil pressure switch inspection, reinstall the removed parts.

Ignition Switch Inspection

B947H19306015

Inspect the ignition switch in the following procedures:

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Disconnect the ignition switch lead wire coupler (1).



I947H1930017-01

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
TOOL : 09900–25008 (Multi circuit tester set)

Tester knob indication
Continuity (•))))

E-02, 19, 24, 51

Position \ Color	R	O	G/Y	Br
ON	○——	——○	○——	——○
OFF				
LOCK				
P	○——	——	——	——○

I947H1930018-01

E-03, 14, 28, 33

Position \ Color	R	O	O/Y	Gr	Br
ON	○——	——○	——○	○——	——○
OFF					
LOCK					
P	○——	——	——	——	——○

I837H1930021-01

4) After finishing the ignition switch inspection, reinstall the removed parts.

Ignition Switch Removal and Installation

B947H19306016

Refer to “Ignition Switch Removal and Installation” in Section 1H (Page 1H-11).

Horn Inspection

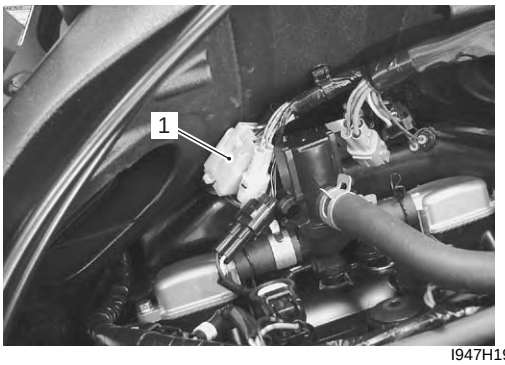
B947H19306017

NOTE

If the horn sound condition is normal, it is not necessary to inspect the horn button continuity.

Horn Button Inspection

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation” in Section 1D (Page 1D-7).
2) Disconnect the left handlebar switch lead wire coupler (1).



I947H1930020-01

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 “Handlebar Removal and Installation” in Section 6B (Page 6B-2).

Special tool
TOOL : 09900–25008 (Multi circuit tester set)

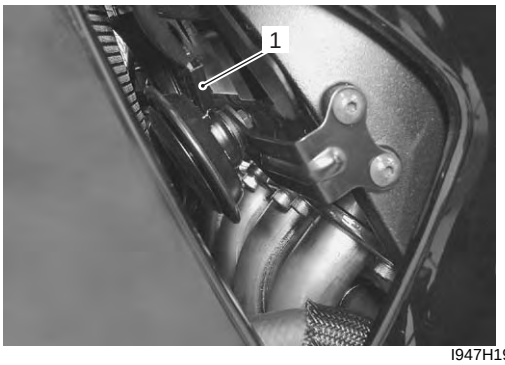
Tester knob indication
Continuity (•)))

Color / Position	B/Bl	B/W
•		
PUSH	○———	———○

I718H1930028-03

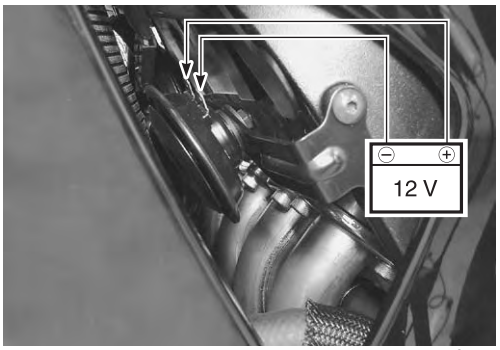
Horn Inspection

1) Disconnect the horn coupler (1).



I947H1930022-01

2) Connect a 12 V battery to the horn terminals. If the sound is not heard from the horn, replace the horn with a new one.



I947H1930023-01

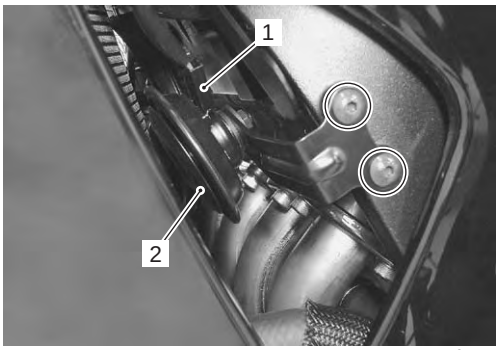
3) Connect the horn coupler.

Horn Removal and Installation

B947H19306018

Removal

1) Disconnect the horn coupler (1).
2) Remove the horn (2) by removing the mounting bolts.



I947H1930024-01

Installation

Install the horn in the reverse order of removal.

Specifications

Service Data

B947H19307001

Wattage

Unit: W

Item	Specification	
	E-02, 19, 24, 51	E-03, 14, 28, 33
Combination meter light	LED	←
Turn signal indicator light	LED	←
High beam indicator light	LED	←
Neutral position indicator light	LED	←
Oil pressure indicator light/Engine coolant temp. indicator light	LED	←
FI indicator light/Sd indicator light	LED	←
Fuel level indicator light	LED	←
Engine RPM indicator light	LED	←
Immobilizer indicator light	LED	—

Tightening Torque Specifications

B947H19307002

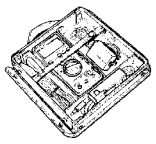
Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Speed sensor mounting bolt	6.5	0.65	4.5	☞(Page 9C-6)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Special Tool

B947H19308001

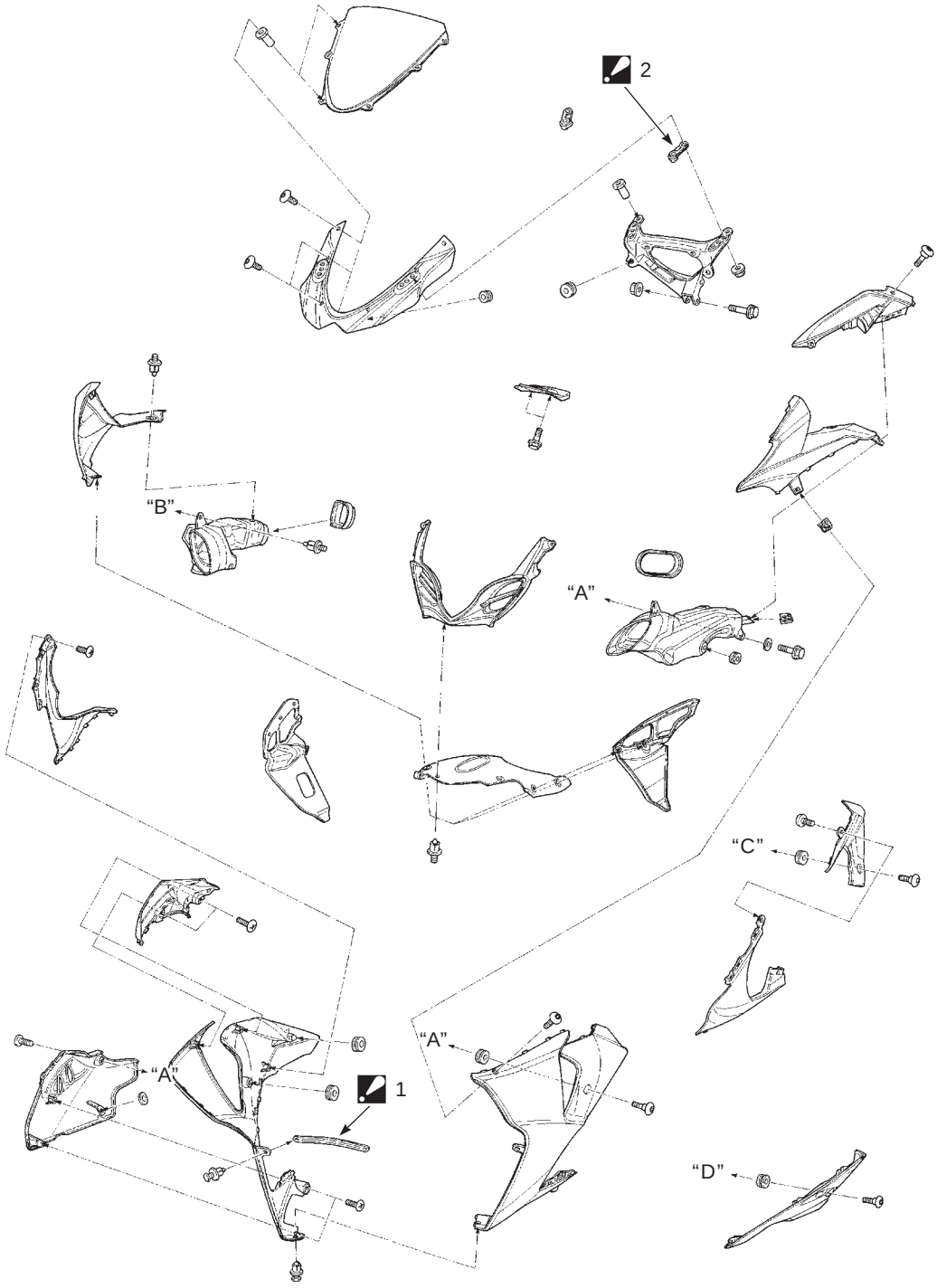
09900–25008 Multi circuit tester set ☞(Page 9C-5) / ☞(Page 9C-6) / ☞(Page 9C-7) / ☞(Page 9C-7) / ☞(Page 9C-8)		

Exterior Parts

Repair Instructions

Exterior Parts Construction

B947H19406001

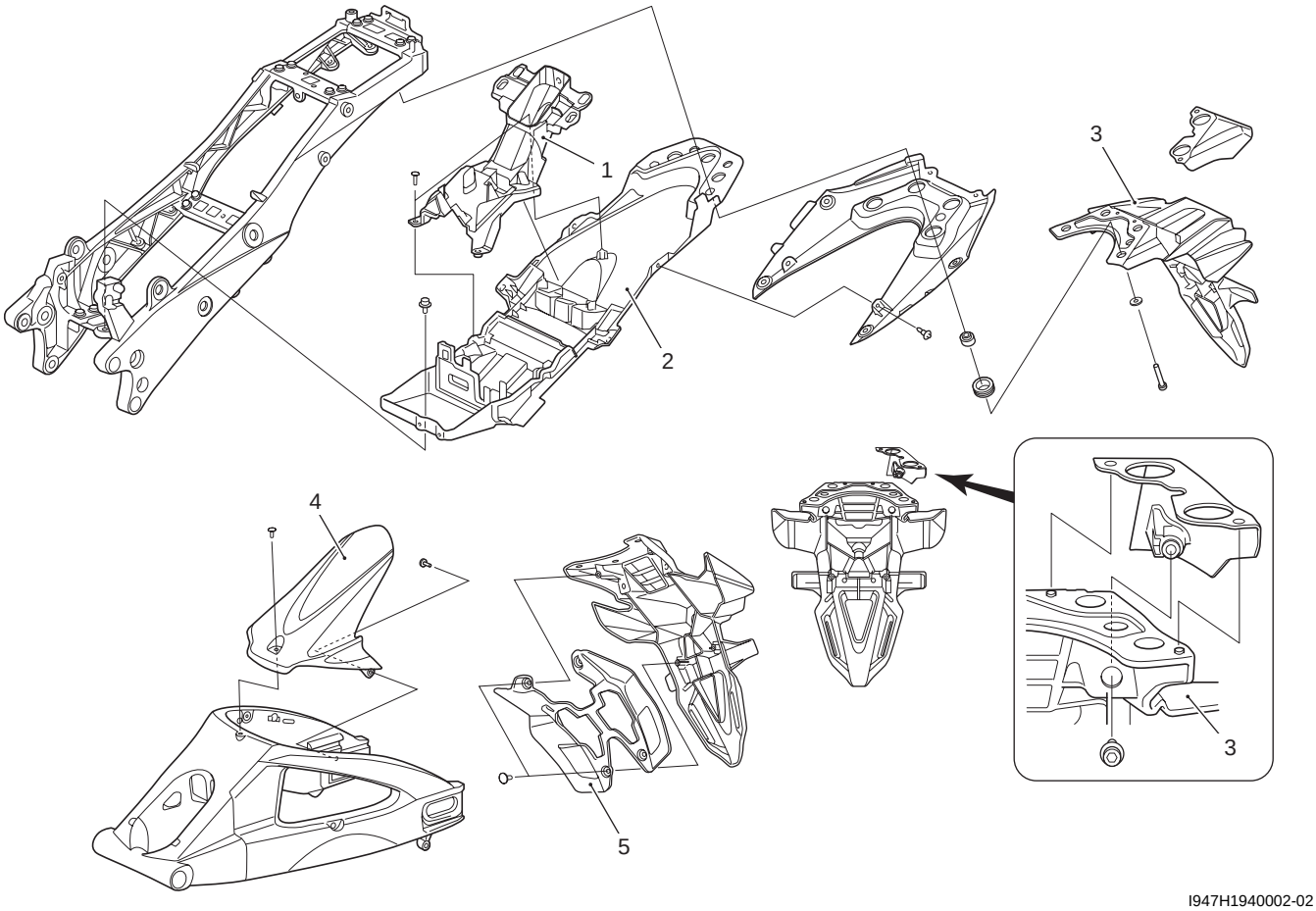


I947H1940001-01

1. Upper cowling bracket : Set the punch mark to the front and upper side.	"A": To frame	"C": To sprocket cover
2. Rear view mirror cushion : Set the dent side to inside.	"B": To headlight assembly	"D": To side-stand bracket

Rear Fender Construction

B947H19406004

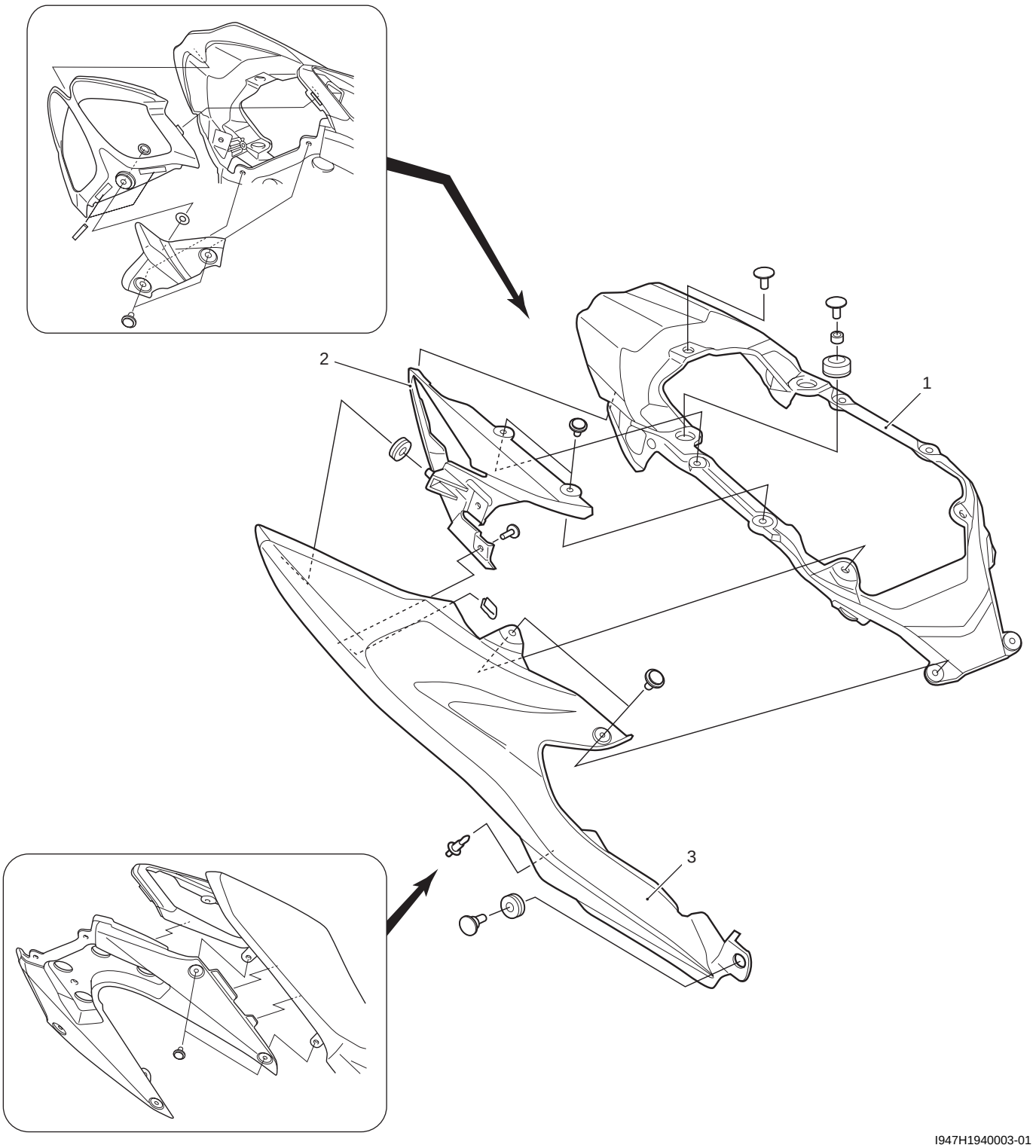


I947H1940002-02

1. Electric parts holder bracket	3. Rear fender (Rear)	5. Rear fender guard (E-24 only)
2. Rear fender (Front)	4. Rear fender (Lower)	

Frame Cover Construction

B947H19406005

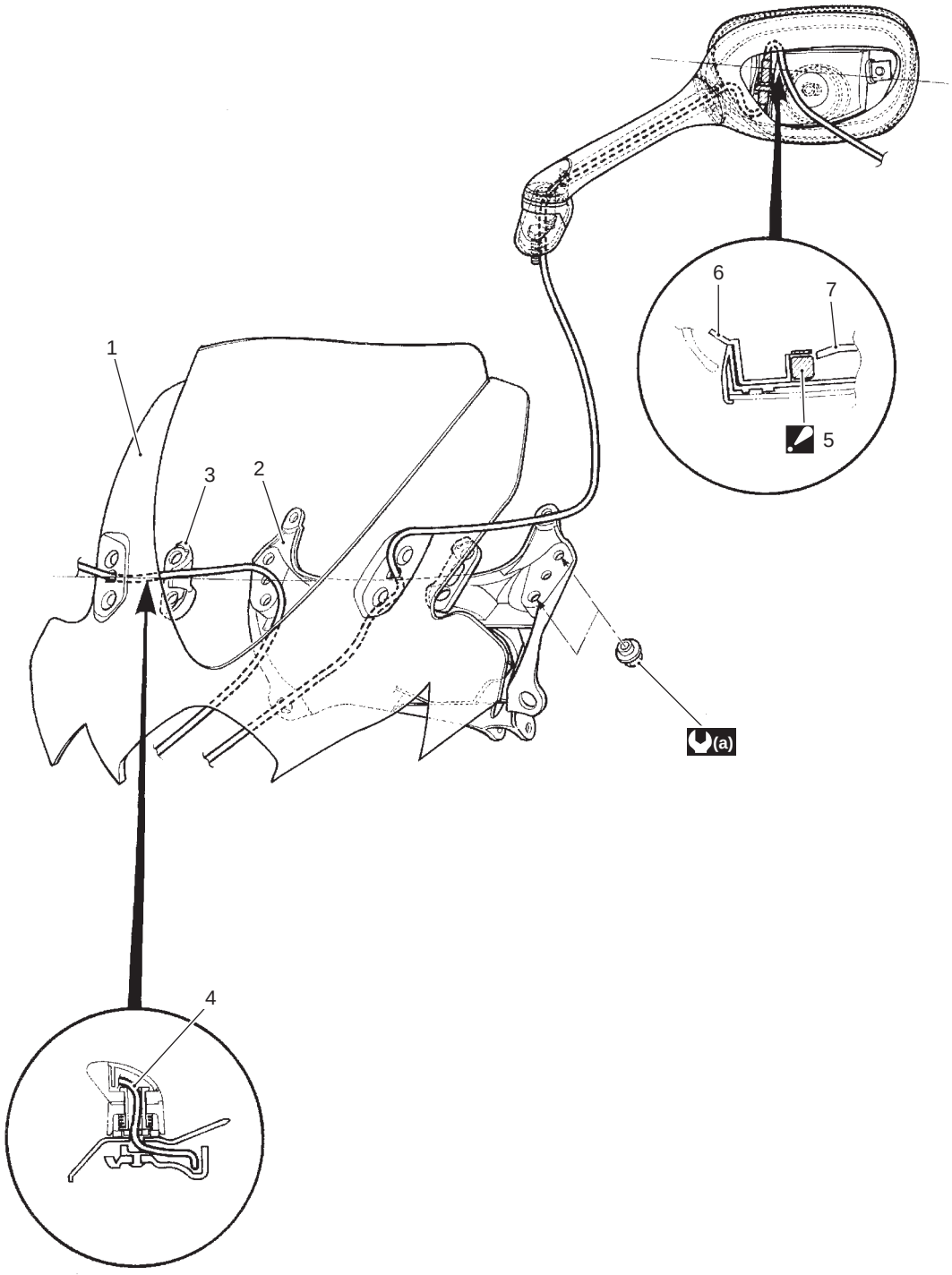


I947H1940003-01

1. Frame cover (Center)	2. Frame cover (Rear), LH/RH	3. Frame cover (LH/RH)

Rear View Mirror Construction

B947H19406008



I947H1940004-01

1. Body cowling	4. Turn signal lead wire	7. Mirror body
2. Cowling brace	5. Turn signal lead wire coupler : Locate the turn signal lead wire coupler (5) between the mirror cover (6) and mirror body (7).	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
3. Cushion	6. Mirror cover	

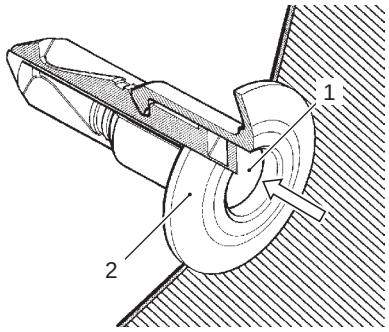
Fastener Removal and Installation

B947H19406010

Type A

Removal

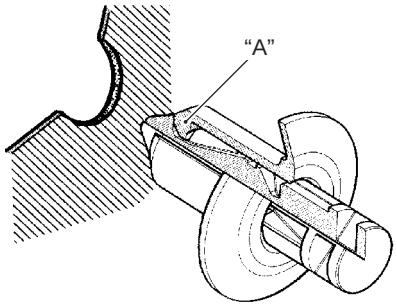
1) Depress the head of fastener center piece (1).
2) Pull out the fastener (2).



I649G1940005-02

Installation

1) Let the center piece stick out toward the head so that the pawls “A” closes.



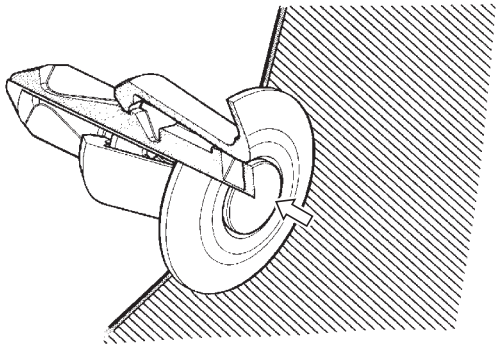
I649G1940006-02

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.

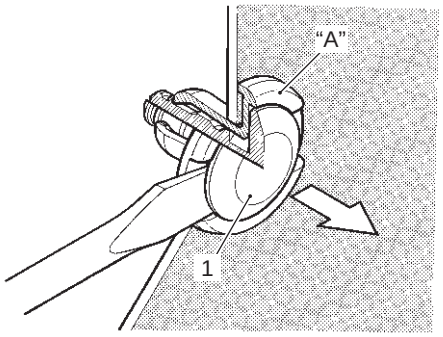


I649G1940007-02

Type B

Removal

1) Pry up the head of fastener center piece (1) with a screw driver.
2) Pull out the fastener “A”.



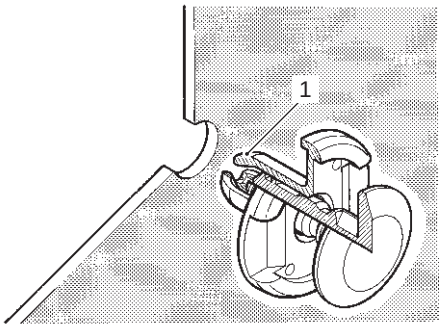
I823H1940001-01

Installation

1) Insert the fastener into the installation hole.

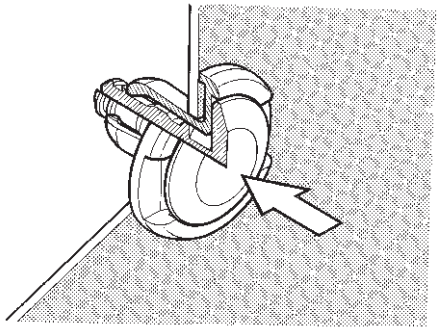
NOTE

To prevent the pawl (1) from damage, insert the fastener all the way into the installation hole.



I947H1940005-01

2) Push in the head of center piece.



I823H1940003-01

Exterior Parts Removal and Installation

B947H19406011

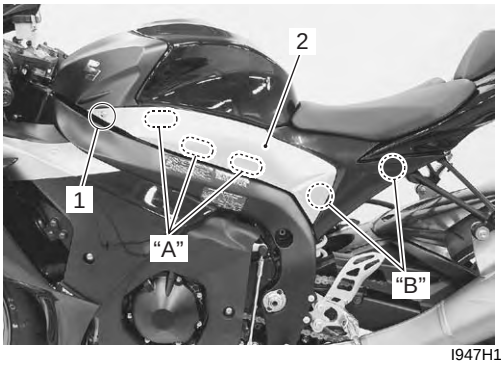
Side Frame Cover

Removal

NOTE

The left and right side frame covers are installed symmetrically and therefore the removal/installation procedure for one side is the same as that for the other side.

1) Remove the bolt (1).
2) Remove the side frame cover (2).



I947H1940006-02

"A": Velcro fastening	"B": Bushing

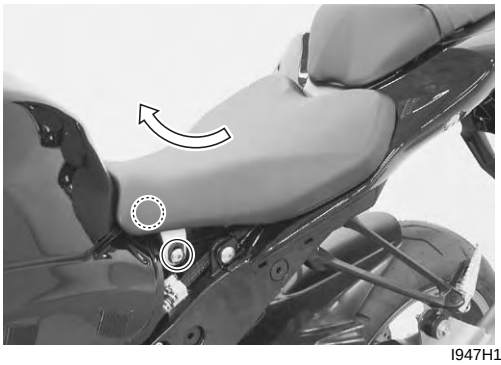
Installation

Installation is in the reverse order of removal.

Front Seat

Removal

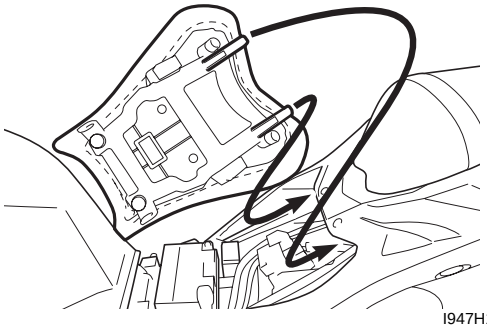
1) Remove the side frame covers.
2) Remove the front seat by removing the bolts.



I947H1940007-01

Installation

1) Slide the seat hooks into the seat hook retainers on the frame and tighten the bolts.



I947H1940008-01

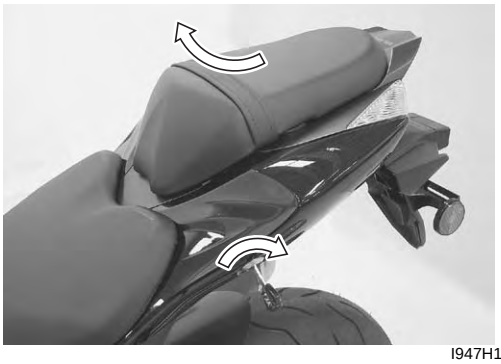
2) Install the side frame covers.

Rear Seat / Seat Tail Cover

Removal

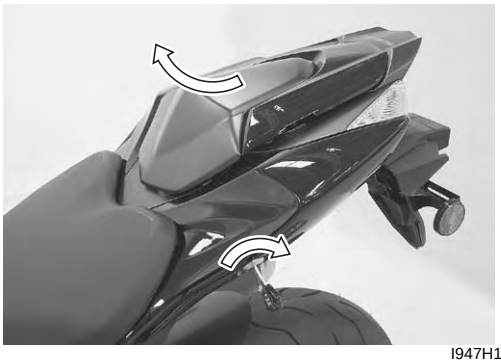
Remove the rear seat or seat tail cover with the ignition key.

Rear Seat



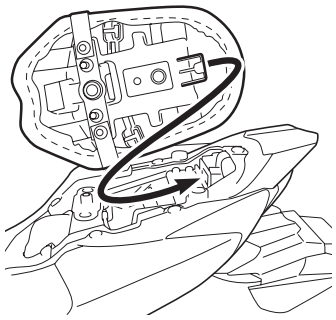
I947H1940009-01

Seat Tail Cover



I947H1940010-01

Installation
Slide the hook into the hook retainer and push down firmly until the rear seat/seat tail cover snaps into the locked position.



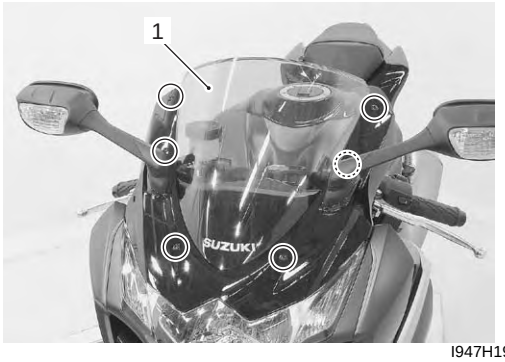
I947H1940011-01

Windscreen
Removal

1) Loosen the rear view mirror mounting nuts.

I947H1940012-01

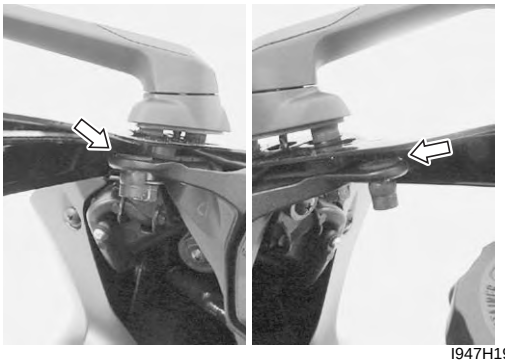
2) Remove the windscreen (1) by removing the screws.



I947H1940013-01

Installation
Install the windscreen in the reverse order of removal. Pay attention to the following point:

- Insert two nuts into the hole of cowling brace.



I947H1940014-01

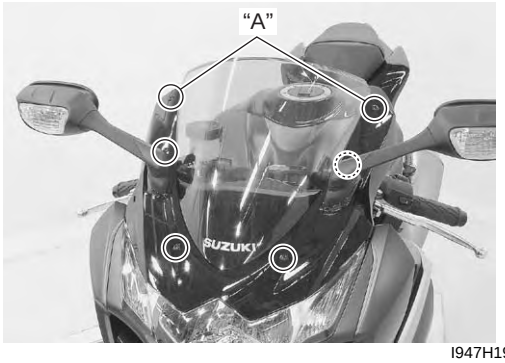
- Insert four nuts (top and bottom ones) into the windscreen.

I947H1940015-01

- Tighten the screws.

NOTE

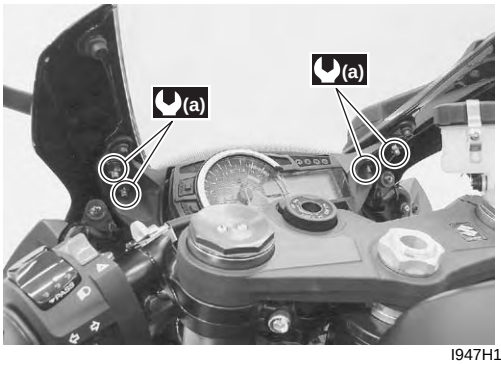
The screws “A” are 3 mm shorter than the others.



I947H1940016-01

- Tighten the rear view mirror mounting nuts to the specified torque.

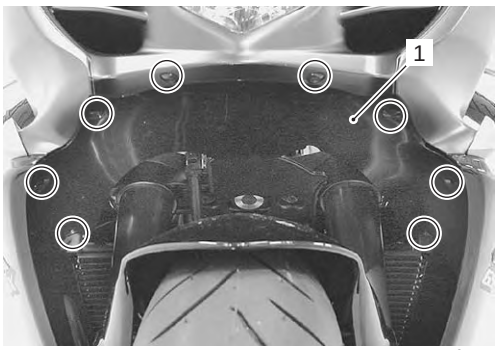
  Tightening torque
  Rear view mirror mounting nut (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I947H1940017-01

Body Cowling Cover
Removal

1) Remove the fasteners (8 pcs.).
2) Remove the body cowling cover (1).

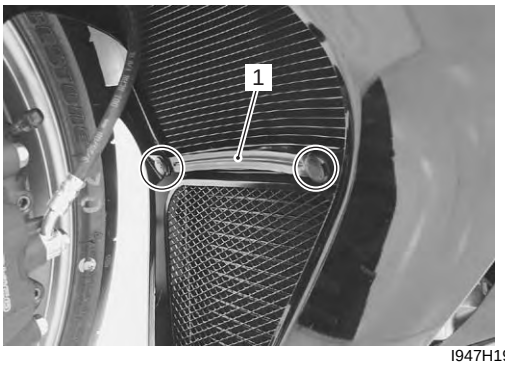


I947H1940018-01

Installation
Install the body cowling cover in the reverse order of removal.

Side Cowling
Removal

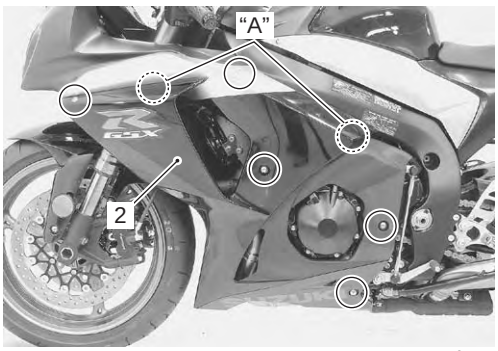
1) Remove the fasteners and cowling bracket (1).



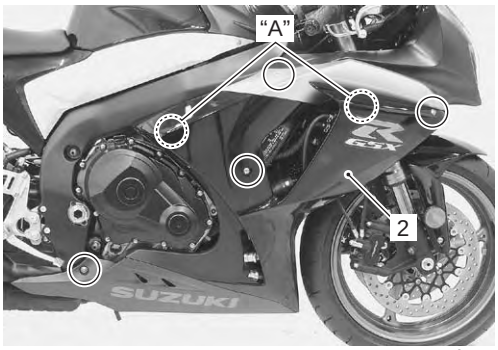
I947H1940019-01

I947H1940020-01

2) Remove the bolts.
3) Remove the side cowling (2). (LH/RH)



I947H1940021-04

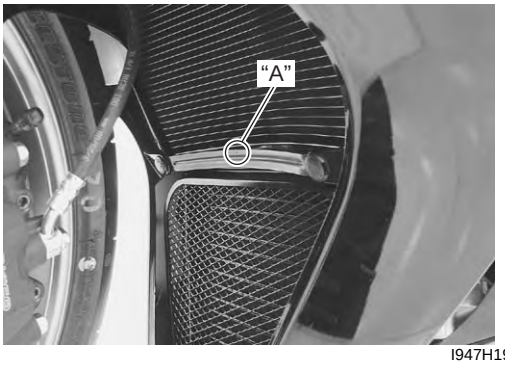


I947H1940036-01

"A": Bushing

Installation
Install side cowling in the reverse order of removal.
Pay attention to the following points:

- When installing the right side cowling, make sure that the fuel tank drain hose and breather hose are routed properly. Refer to “Fuel Tank Drain Hose and Breather Hose Routing Diagram” in Section 1G (Page 1G-3).
- When installing the bracket, set the punch mark “A” to the front and upper side.



I947H1940035-01

Inner Under Cowling
Removal

NOTE

The left and right inner under cowlings are installed symmetrically and therefore the removal/installation procedure for one side is the same as that for the other side.

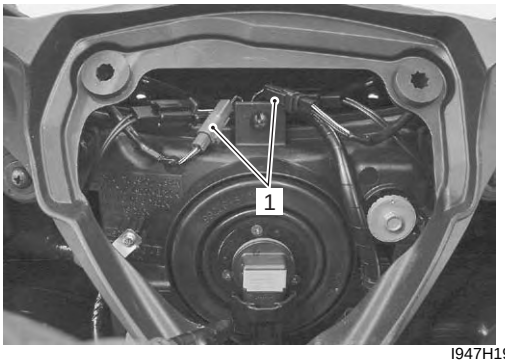
1) Remove the side cowling.
2) Remove the inner under cowling (1).

I947H1940022-02

Installation
Install the inner under cowling in the reverse order of removal.

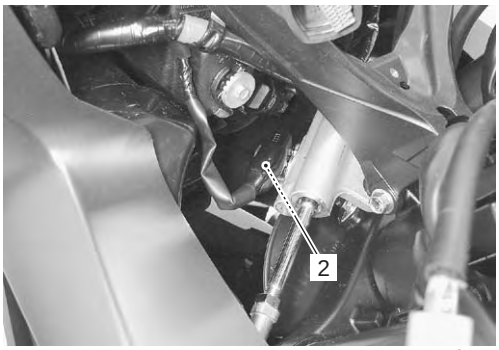
Body Cowling
Removal

1) Remove the body cowling cover.
2) Remove the left and right side cowlings.
3) Remove the inner under cowlings.
4) Remove the rear view mirror.
5) Remove the windscreen.
6) Remove the combination meter. Refer to “Combination Meter Removal and Installation” in Section 9C (Page 9C-2).
7) Disconnect the turn signal lead wire couplers (1).



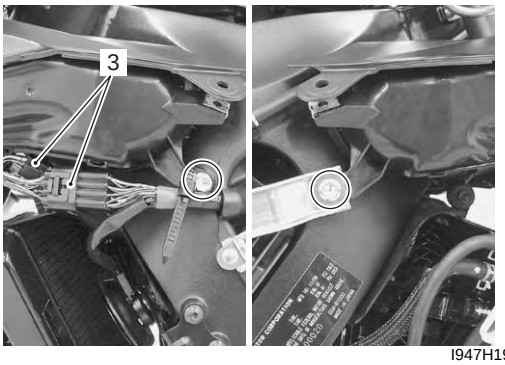
I947H1940023-01

8) Disconnect the steering damper lead wire coupler (2).



I947H1940034-01

9) Disconnect the lead wire couplers (3).
10) Remove the air intake pipe bolts.

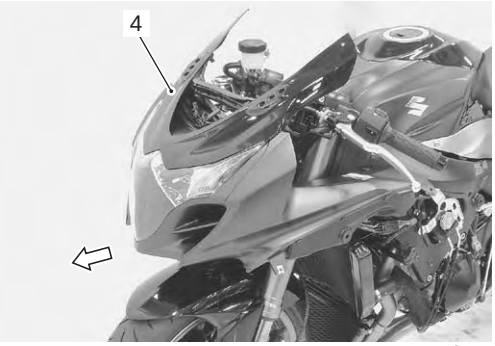


I947H1940024-01

11) Remove the screws.


I947H1940025-01

12) Remove the body cowling assembly (4) forward.



I947H1940026-01

13) Disassemble the body cowling assembly. Refer to "Headlight Removal and Installation" in Section 9B (Page 9B-1).

Installation

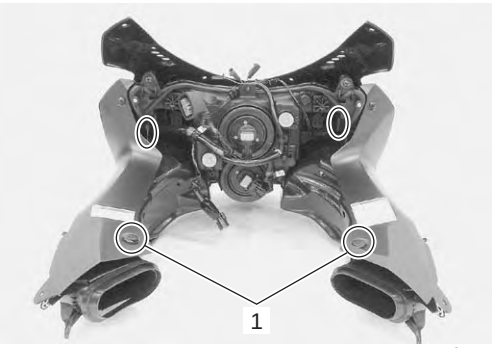
Install the body cowling in the reverse order of removal. Pay attention to the following point:

- Adjust the headlight beam if necessary. Refer to "Headlight Beam Adjustment" in Section 9B (Page 9B-3).

Intake Pipe

Removal

1) Remove the body cowling.
2) Remove the intake pipes (1). (LH & RH)



I947H1940027-01

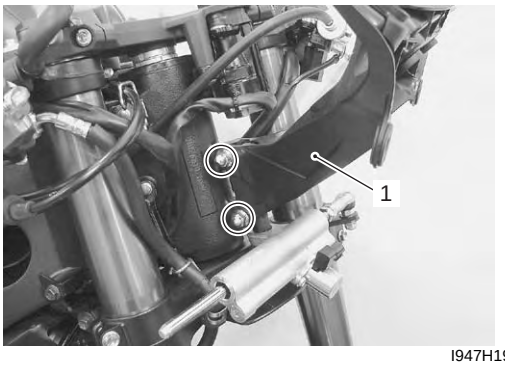
Installation

Install the intake pipes in the reverse order of removal.

Cowling Brace

Removal

1) Remove the body cowling.
2) Remove the cowling brace (1).



I947H1940028-01

Installation

Install the cowling brace in the reverse order of removal. Pay attention to the following point:

- Tighten the cowling brace mounting bolts (1) to the specified torque.

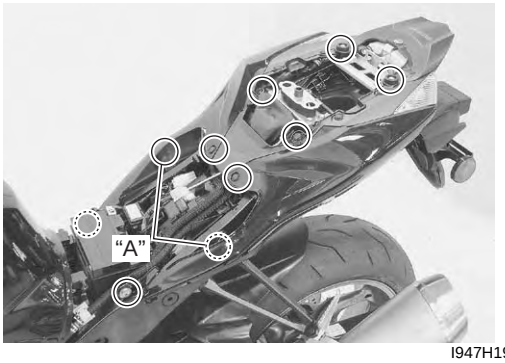
Tightening torque
Cowling brace mounting bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

I947H1940029-01

Frame Cover
Removal

1) Remove the front and rear seats.
2) Remove the bolts and fasteners.

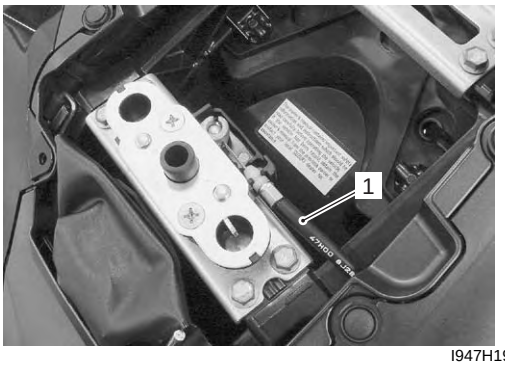
I947H1940030-02



I947H1940031-04

"A": Bushing

3) Disconnect the seat lock cable (1).



I947H1940032-01

4) Disconnect the rear combination light coupler (2).
5) Remove the frame cover assembly from the frame.

I947H1940033-02

6) Disassemble the frame cover assembly. Refer to "Rear Combination Light Removal and Installation" in Section 9B (Page 9B-6).

Installation
Install the frame cover assembly in the reverse order of removal.

Front Fender
Removal
Refer to "Front Fork Removal and Installation" in Section 2B (Page 2B-2).

Installation
Refer to "Front Fork Removal and Installation" in Section 2B (Page 2B-2).

Rear Fender
Removal
Refer to "Rear Fender Construction" (Page 9D-2).

Installation
Refer to "Rear Fender Construction" (Page 9D-2).

Specifications

Tightening Torque Specifications

B947H19407001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear view mirror mounting nut	10	1.0	7.0	☞(Page 9D-8)
Cowling brace mounting bolt	23	2.3	16.5	☞(Page 9D-10)

NOTE

The specified tightening torque is described in the following.
“Rear View Mirror Construction” (Page 9D-4)

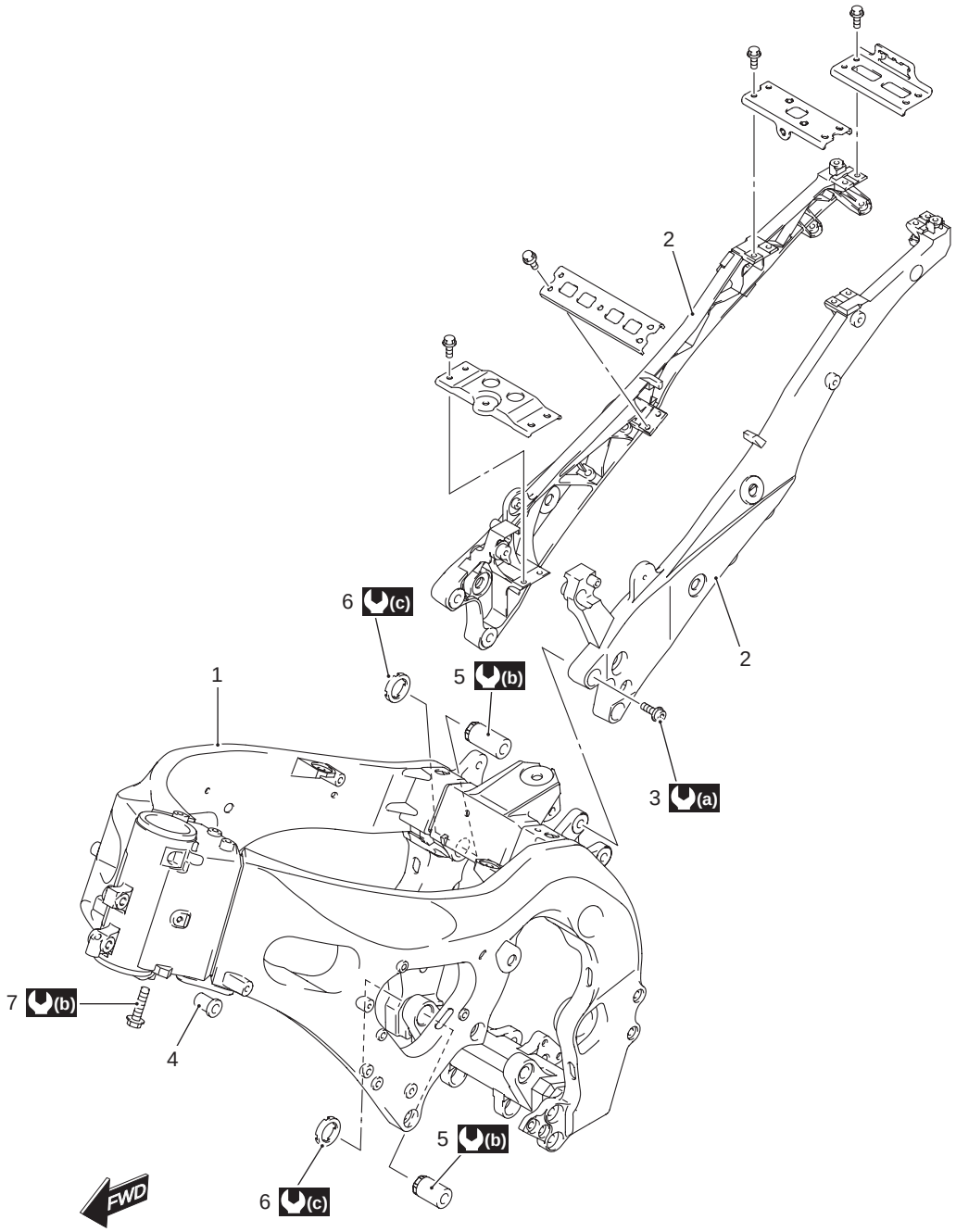
Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Body Structure

Repair Instructions

Body Frame Construction

B947H19506001

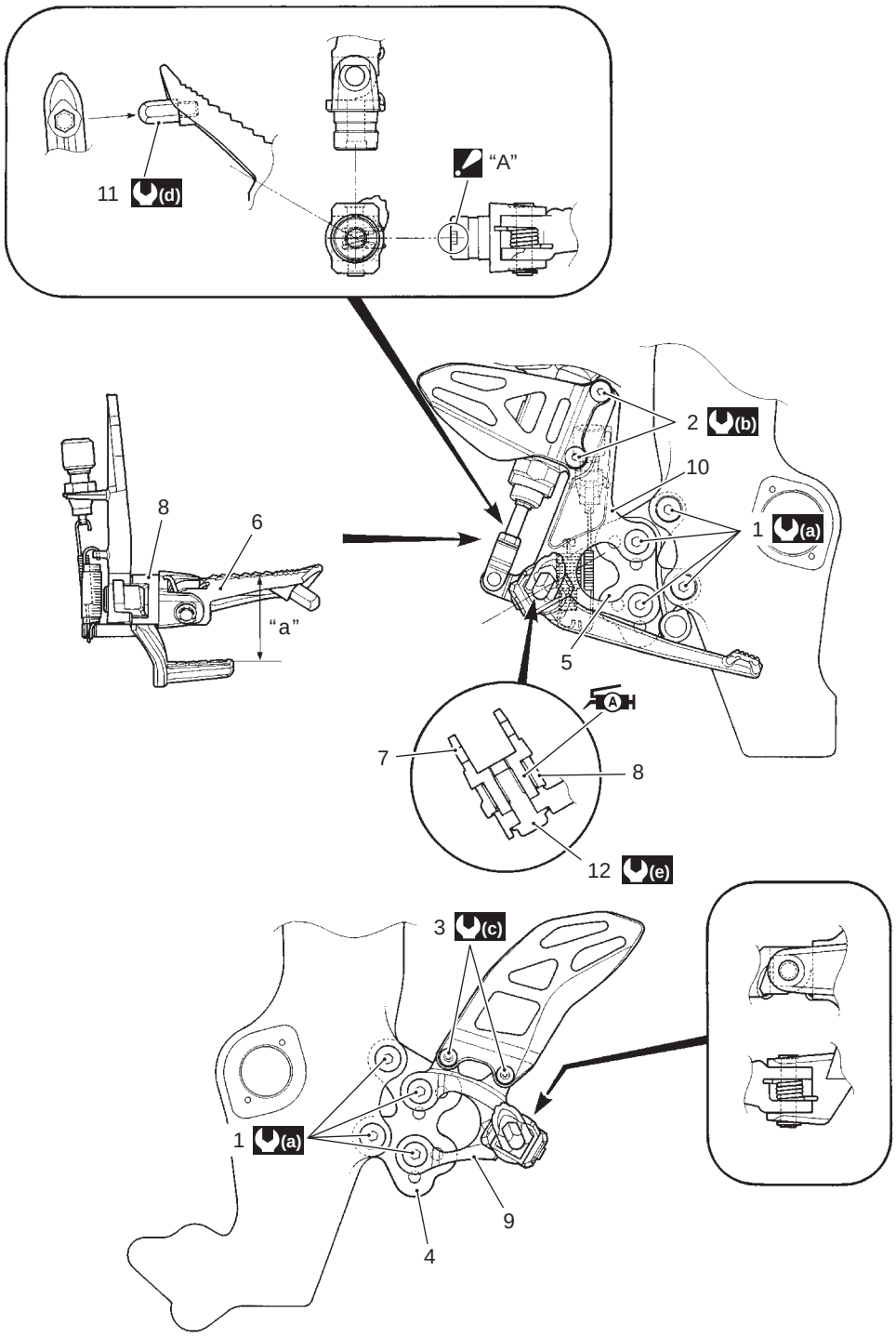


I947H1950001-01

1. Frame	5. Engine mounting thrust adjuster	(b) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Seat rail	6. Engine mounting thrust adjuster lock-nut	(c) : 45 N·m (4.5 kgf-m, 32.5 lbf-ft)
3. Seat rail bolt	7. Engine mounting pinch bolt	
4. Collar	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	

Front Footrest Bracket Construction

B947H19506002

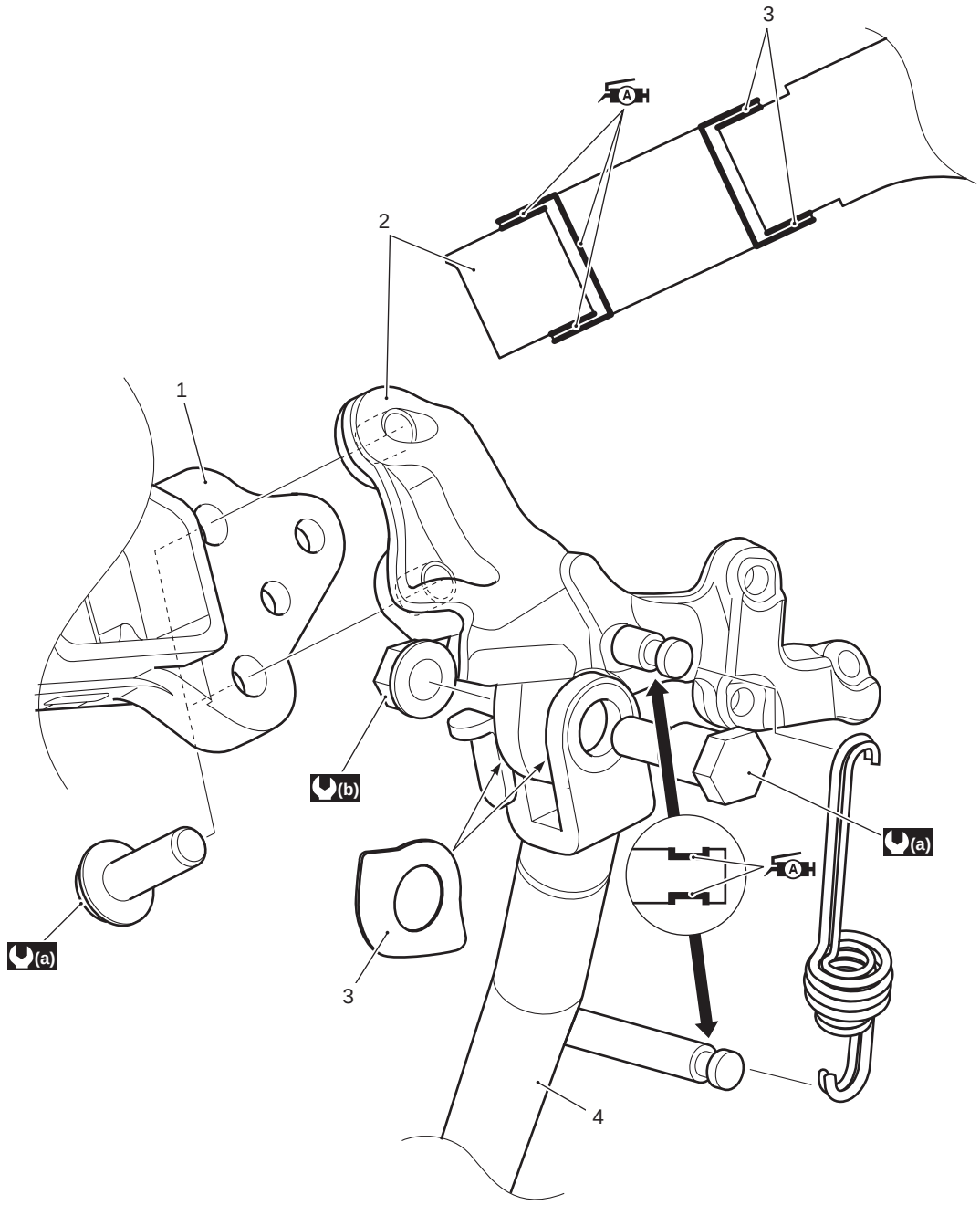


I947H1950002-02

1. Footrest bracket bolt	8. Rear brake pedal	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Rear brake master cylinder mounting bolt	9. Footrest bracket No. 2 (LH)	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
3. Footrest guard bolt	10. Footrest bracket No. 2 (RH)	(c) : 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)
4. Footrest bracket No. 1 (LH)	11. Bank sensor bolt	(d) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)
5. Footrest bracket No. 1 (RH)	12. Footrest holder bolt	(e) : 35 N·m (3.5 kgf-m, 25.5 lbf-ft)
6. Footrest	"A": Align the cutaway when installing.	A : Apply grease to the sliding surface.
7. Footrest holder	"a": 65 – 75 mm (2.6 – 3.0 in)	

Side-stand Construction

B947H19506003

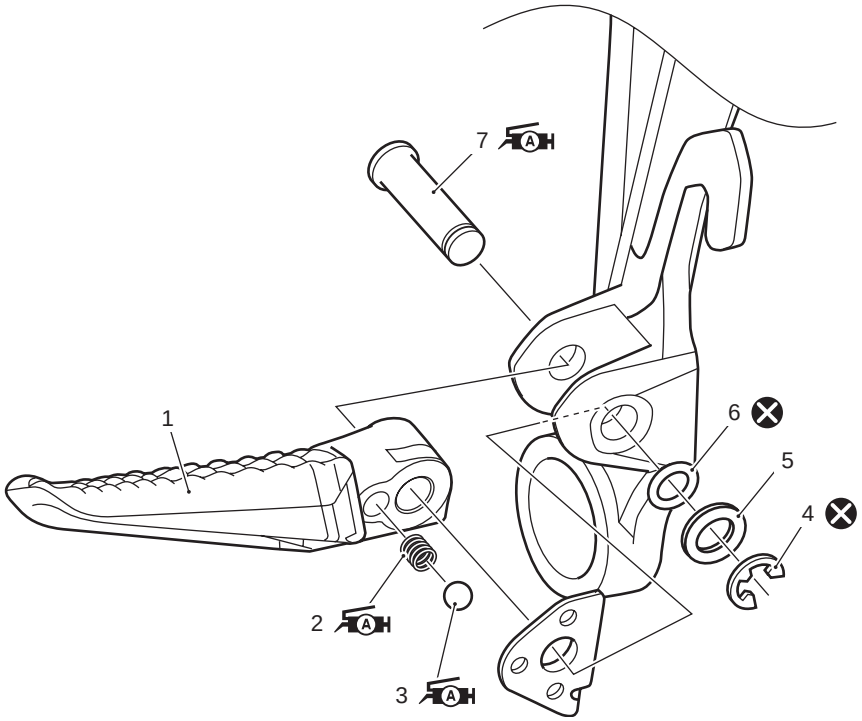


I947H1950003-03

1. Frame	3. Washer	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	: Apply grease to sliding surface.
2. Side-stand bracket	4. Side-stand	(b) : 40 N·m (4.0 kgf-m, 29.0 lbf-ft)	

Pillion Footrest Construction

B947H19506004



I947H1950004-02

1. Pillion footrest	3. Ball	5. Washer	7. Footrest pin	⊗ : Do not reuse.
2. Spring	4. E-ring	6. O-ring	A : Apply grease.	

Side-stand Removal and Installation

B947H19506005

Removal

1) Support the motorcycle with a jack or wooden block.

⚠ CAUTION

- **Do not support the motorcycle with the exhaust pipes.**
- **Make sure that the motorcycle is supported securely.**

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).

Specifications

Tightening Torque Specifications

B947H19507001

NOTE

The specified tightening torque is described in the following.
“Body Frame Construction” (Page 9E-1)
“Front Footrest Bracket Construction” (Page 9E-2)
“Side-stand Construction” (Page 9E-3)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List” in Section 0C (Page 0C-9).

Special Tools and Equipment

Recommended Service Material

B947H19508001

NOTE

Required service material is also described in the following.
“Front Footrest Bracket Construction” (Page 9E-2)
“Side-stand Construction” (Page 9E-3)
“Pillion Footrest Construction” (Page 9E-4)

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